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TM  
1944

**TM 5-3272**

U.S. Dept. of Army

**TRACTOR, CRAWLER,**

**DIESEL,**

**55 to 60-DBHP, STANDARD,**

**INTERNATIONAL TD-14,**

**74-inch GAGE.**



**MAINTENANCE INSTRUCTIONS AND PARTS CATALOG**

**APRIL 1944**

# TracTractor Model TD-14

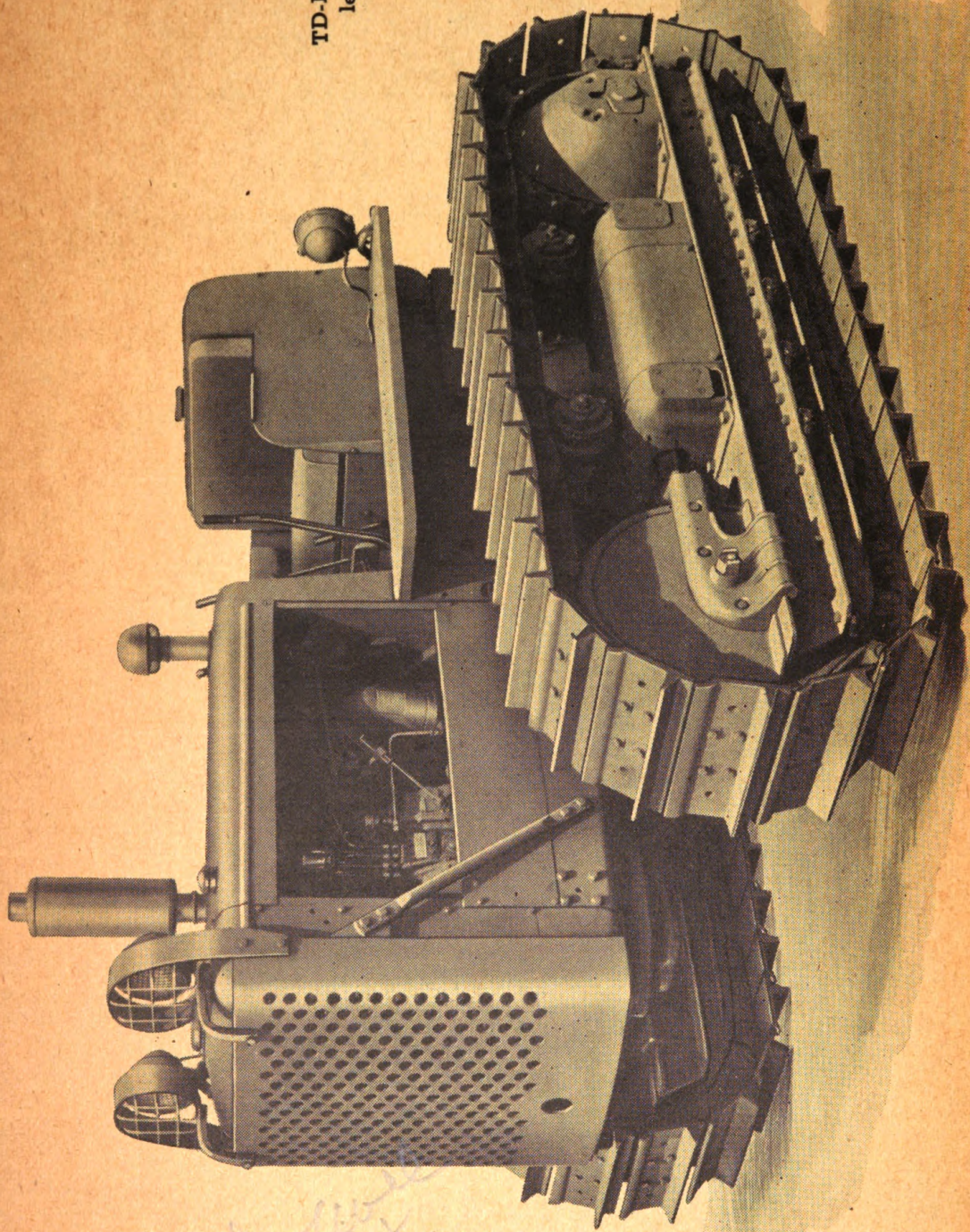
## OPERATIONS SECTION

Each section has a black tab which lines up with the corresponding section name and number shown at the right.

The black tabs are quickly located by bending this book back.

INTERNATIONAL HARVESTER COMPANY  
180 NORTH MICHIGAN AVE. CHICAGO 1, ILLINOIS, U.S.A.

|                                 |   |
|---------------------------------|---|
| GENERAL<br>DRIVING INSTRUCTIONS | G |
| BRAKES<br>(STEERING)            | 1 |
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|                                 |   |



TD-14 TracTracTor,  
left side view.

*Handwritten notes:*  
D-14  
TracTracTor  
left side

U113

2

TMS: 3212

1944

SPECIFICATIONS

CAPACITIES (U.S. Measure)

|   |            |         |
|---|------------|---------|
| Fuel tank . . . . .                       | Approx. 45 | gals. * |
| Gasoline tank . . . . .                   | 1 1/2      | gals. * |
| Water cooling system. . . . .             | 20         | gals.   |
| Transmission. . . . .                     | 24         | qts.    |
| Sprocket drive cases (each side). . . . . | 5          | pints   |
| Crankcase pan . . . . .                   | 16         | qts.    |
| Injection pump (Bosch). . . . .           | 3/8        | pint    |
| Air cleaner oil cup . . . . .             | 5 1/2      | pints   |

ENGINE (Diesel Type)

|   |                      |
|---|----------------------|
| Cylinders . . . . .                           | 4                    |
| Bore. . . . .                                 | 4-3/4 in.            |
| Stroke. . . . .                               | 6-1/2 in.            |
| Engine speed (governed) (full load) . . . . . | 1350 R.P.M.          |
| Fuel injection pump . . . . .                 | Bosch                |
| Carburetor (Dual Manifold Starting) . . . . . | IHC                  |
| Magneto with impulse coupling . . . . .       | IHC Type H-4         |
| Spark plug gap. . . . .                       | .035 in. to .040 in. |
| Valve clearance (engine hot). . . . .         | .018 in.             |

ENGINE CLUTCH

Over-center type (hand-controlled). . . . . 15 in.

STEERING CLUTCH

Multiple dry disc - spring-loaded type with manual release 15 in.

BRAKES

External contracting on steering clutch drums . . . . . 17 in.

TRACK

|   |            |
|---|------------|
| Tread . . . . .                           | 74 in.     |
| ~ Ground contact length (normal). . . . . | 78-5/8 in. |
| Track shoe width . . . . .                | 18 in.     |

TRANSMISSION

|  |                         |       |
|--|-------------------------|-------|
| Six speeds forward - M.P.H. }<br>Two speeds reverse - M.P.H. } | Low . . . . .           | 1-1/2 |
|  | Second. . . . .         | 2     |
|  | Third . . . . .         | 2-1/2 |
|  | Fourth. . . . .         | 3-3/8 |
|  | Fifth . . . . .         | 4-3/4 |
|  | High . . . . .          | 5-3/4 |
|  | Low - Reverse . . . . . | 1-1/2 |
| Hi - Reverse. . . . .  | 3-3/8                   |       |

GENERAL

|  |            |
|--|------------|
| Length (overall) . . . . .                                     | 136 in.    |
| Width (overall). . . . .                                       | 92-1/8 in. |
| Height - to top of exhaust muffler (from ground line). . . . . | 88-3/4 in. |
| Drawbar height (above ground line) . . . . .                   | 13-5/8 in. |
| Drawbar horizontal adjustment. . . . .                         | 27 in.     |

INT. 5721B (Operations Section)

M574550

**OPERATIONS SECTION****INSTRUMENTS AND CONTROLS**(See *Illust. 1*)**COMPRESSION RELEASE LEVER**

Pulling down on the compression release lever converts the Diesel into a gasoline engine for starting. Reduced compression, spark plug ignition, and carbureted gasoline fuel permit starting the engine as a gasoline engine. After a quick cylinder warm-up, switch the engine to Diesel operation by pushing compression release lever all the way up. Refer to page 6 for correct method of starting on gasoline and changing to Diesel operation. See page 8 for changing back to gasoline operation before stopping engine, and then place compression release lever back in Diesel position after engine is stopped.

**ELECTRIC STARTER BUTTON**

Pressing on this button with the foot completes the electrical circuit between the battery and the starting motor and causes the starting motor pinion to engage the flywheel ring gear, thereby cranking the engine. Stop pressing the button the moment the engine starts. Do not run the starting motor for more than 30 seconds at any one time.

**CHOKE BUTTON**

Helps start the engine when the engine is cold. Pulling out the rod shuts off air to the carburetor, giving a rich mixture. After the first few revolutions of the engine, push the choke button in half way, or to a point where the engine runs without missing. Push the choke all the way in after the engine has started. Do not run the engine with the choke rod out.

**PRIMER BUTTON**

When starting in cold weather the engine needs to be primed. A few strokes of the primer button, which sprays raw gasoline direct into the intake manifold, are usually sufficient. The number of strokes will depend on operating temperature.

**LIGHT SWITCH**

Controls the head and tail lamps and the battery charging rate. In its regular position at "L" it is set for low charging. Turn to first position at right, "H" for high charging rate, to second position marked "D" for dim lights, and to last position marked "B" for bright lights.

**AMMETER**

This is the check on the electrical system. It indicates whether the battery is being charged or discharged. When the engine is operating the needle should be in the "Charge" range. If the ammeter shows discharge continuously the cause should be investigated in order to avoid completely discharging the battery.

**LUBRICATING OIL GAGE**

Indicates the pounds of pressure of the oil circulating through the engine. The indicator needle should be in the white area when the engine is running. If the indicator is not in the white area, stop the engine immediately and investigate the cause of the oil pressure failure.

**ENGINE SPEED CONTROL LEVER**

Controls the speed of the engine, and, when set in a given position, maintains a uniform engine speed under variable loads.

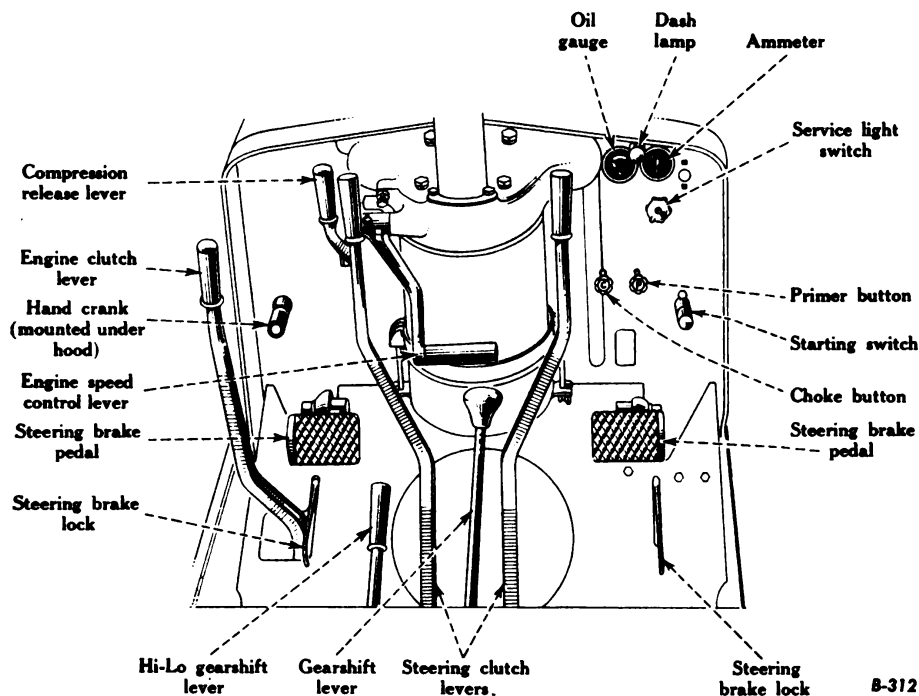
**ENGINE CLUTCH LEVER**

Is used to disengage the engine from the transmission. Push the engine clutch lever all the way forward to disengage the engine clutch.

**GEARSHIFT LEVER**

Is used to select the various gear ratios provided in the transmission. There are three forward positions and one reverse position, giving six forward speeds and two reverse by using the high and low range gearshift lever.

INSTRUMENTS AND CONTROLS - Continued



Illust. 1  
Showing the Operating Controls.

**HI-LO GEARSHIFT LEVER**

Is used to double the range of speeds. Moving the lever forward gives the low range, and backward the high range. (See Illust. 7.)

**STEERING CLUTCH LEVERS**

Are used to steer the tractor. Pulling back on either steering lever releases the steering clutch and makes the track on that side inoperative. To turn left, pull on left lever. To turn right, pull on right lever.

**STEERING BRAKE FOOT PEDALS**

Operating the steering brakes speeds up turning the tractor. Never apply the steering brake until the steering clutch is fully released. Do not use the brake unless it is necessary to make a sharp turn.

**STEERING BRAKE LOCKS**

Each steering brake pedal has a locking device to hold the tractor whenever necessary. To lock either brake, push foot brake pedal down and lift up ratchet pawl, which engages in the ratchet, locking the brake pedal.

**BEFORE STARTING A NEW TRACTRATOR**

Make a complete inspection of the tractor, for any shortage or damage which may have occurred while being shipped.

(4) Engines shipped to destinations in the United States of America, Canada and Mexico are filled with thinned SAE-10 oil when leaving the factory. For further information, see "Lubrication Guide."

**LUBRICATION**

(1) Lubricate the entire tractor, as indicated in the "Lubrication Guide".

(2) Check the oil levels of the engine crankcase, air cleaner, transmission case and sprocket drive gear cases to see that they are filled to the correct levels with the proper grades of oil for the prevailing temperature (refer to specifications of lubricants in the "Lubrication Guide".

(3) Tractors shipped to destinations in the United States of America, Canada, and Mexico are filled with oil in all parts before leaving the factory. However, the lubricant compartments should be checked for proper levels as outlined in previous item 2.

**TRACTORS PACKED FOR EXPORT**

All oil is drained from the engine crankcase, air cleaner, and from all the gear cases of the tractors packed for export.

**ENGINE COOLING SYSTEM**

Be sure the radiator is filled with clean water. (Use soft or rain water.) For further information see "Cooling System", Section 4. If the tractor is to be operated in freezing temperatures (32° F. or lower) refer to "Cold Weather Operations" on pages 11 and 12.

**ELECTRICAL SYSTEM**

Tractors are shipped with the battery ground cable disconnected at the battery end, and in addition, the connection at the "F" terminal on the generator frame is not completed. Before operating the tractor, connect the "battery to ground" cable, and connect the generator wires.

Batteries when shipped dry should be serviced as outlined on the instruction tag attached to the battery.

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**DIESEL FUEL SPECIFICATIONS - Do not use dirty fuel.**

**MARINE CORPS, ENGINEER CORPS,  
ORDNANCE AND AIR CORPS**

Diesel fuel for high speed automotive type Diesel engines.

- GRADES:**  
Class A  
Class B  
Class X (Winter grade)

**NOTE:** Pour point must be lower

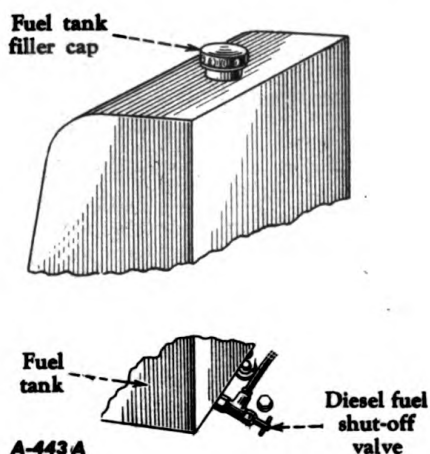
than minimum temperature at which fuel is to be used.

**NAVY**

Diesel fuel for automotive type Diesel engines.

**NOTE:** Pour point must be lower than minimum temperature at which fuel is to be used.

**PREPARING THE TRACTOR FOR DAILY OPERATION**



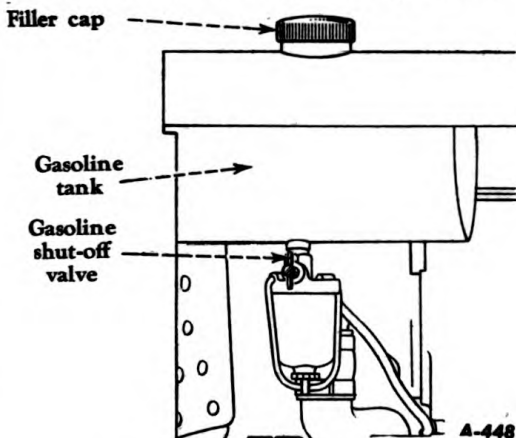
Illust. 2  
Showing the Fuel Tank and Shut-off Valve.

**FUEL SYSTEM**

Fill the main fuel tank (capacity 45 gallons, U.S.). For fuel specifications, see page 4.

Fill the gasoline tank with a good grade of clean gasoline (capacity is approximately 1-1/2 gallons, U.S.). Carefully strain the gasoline and the Diesel fuel to be sure it is free from foreign substances. Do not use dirty fuel.

**NOTE:** Never fill the gasoline tank when near an open flame, or when the engine is running. Keep the funnel in contact with the metal of the tank when pouring in the fuel to avoid the possibility of an electric spark igniting the gas. Do not light matches near gasoline as the air within a radius of several feet is permeated with a highly explosive vapor.



Illust. 3  
Showing the Gasoline Tank and Shut-off Valve.

**COOLING SYSTEM**

See that the drain cocks are closed. Remove the radiator filler cap and see that water comes up to a level slightly below the bottom of the filler opening. Replace radiator cap.

**LUBRICATION**

Be sure the oil in the crankcase is up to full level mark on the oil gage. See the Lubrication Guide for complete lubrication requirements.

Observe the ground under the tractor for any possible oil and lubricant leakage.



**OPERATING THE DIESEL ENGINE**

Four steps are necessary in operating this Diesel engine.

- (1) Starting the engine on gasoline.
- (2) Changing over to Diesel.
- (3) Changing back to gasoline before stopping the engine to facilitate next starting.
- (4) Putting the compression release lever in Diesel position after stopping the engine on gasoline (to permit starting valves to cool on their seats).

The above steps are fully explained in the following pages, please study them carefully.

**TO START THE ENGINE** (See *Illusts. 1 and 4*)

- (1) Move the gear shift lever into neutral position and disengage the engine clutch by pushing the lever all the way forward.
- (2) Pull the compression release lever down to the starting position.
- (3) Pull the engine speed control lever back to the starting position and leave it in this position until the engine is changed to Diesel operation.
- (4) Pull choke button out part way. (In cold weather, pull out all the way). Give the primer several strokes in cold weather, if necessary.
- (5) Step on starter button.
- (6) Push in choke button to where engine runs without missing and gradually push all the way in.
- (7) Check the engine oil pressure. If the gage does not indicate any pressure, stop the engine and inspect the oil system to find the cause of the failure.

(8) The engine is now operating on the gasoline cycle and should operate approximately a minute (2 or 3 minutes in cold weather) before switching to Diesel fuel.

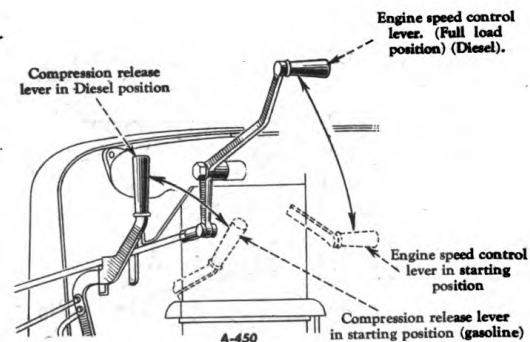
**NOTE:** If trouble is experienced in starting the engine refer to page 10 "OPERATING PRECAUTIONS". Also see "COLD WEATHER OPERATION", page 11.

**TO CHANGE TO DIESEL OPERATION**

(See *Illust. 4*)

- (1) Push the compression release lever all the way forward.
- (2) Immediately advance the engine speed control lever far enough to keep the engine from stalling.
- (3) The engine will not run on the diesel cycle if there is any air in the fuel injection system. (Refer to page 4, Section 7.)

**NOTE:** The carburetor and magneto are cut-out and auxiliary combustion chamber is closed, isolating the spark plugs when the compression release lever is put in the "Diesel position".



**Illust. 4**  
**Engine Controls**

OPERATING THE TRACTOR

**SAFETY-FIRST!**

Put the gearshift lever in neutral position before dismounting from the tractor.

taken to prevent accidents and personal injuries.

Read and follow the "OPERATING PRECAUTIONS" on page 10.

Before attempting to drive the tractor, the driver should be thoroughly familiar with all the instruments and controls. See page 2 for description of all the instruments and controls.

After the tractor is in motion, extreme care should be

**DRIVING THE TRACTOR**

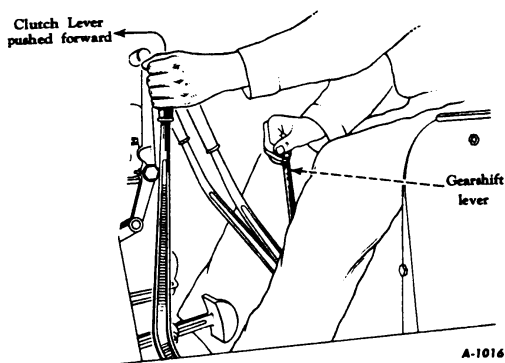
(See Illusts. 5, 6 and 7)

When the engine has been running long enough to warm up, set the engine speed control lever in the idling position (lever slightly up from the lowest position). Disengage the engine clutch by pushing the engine clutch control lever (on left hand side) forward as far as it will go. Continue to press forward on the clutch lever to apply the clutch brake, until the clutch stops turning, then carefully move the gear shift lever to the speed desired.

After putting the transmission gears in mesh, advance the engine speed (by raising engine speed control lever) enough to keep the engine from stalling, and carefully engage the engine clutch until the slack is taken up between the tractor and the load, then pull the clutch lever back until full over-center cam engagement is definitely felt.

**ON A NEW TRACTOR** Do not operate a new tractor immediately on a full load; run light for a reasonable length of time.

Do not overload the tractor at any time.



Illust. 5  
Disengaging engine clutch to shift gears.

**GEAR SHIFTING**

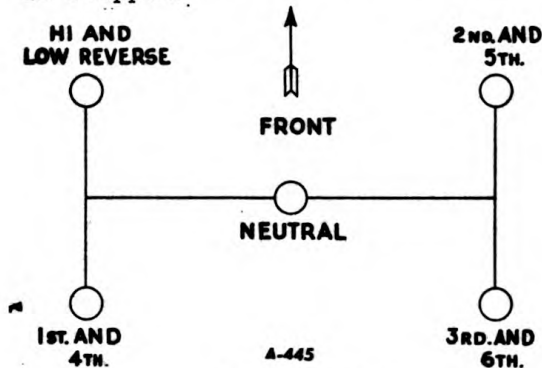
**CAUTION!** Do not shift gears while tractor is in motion.

Always disengage the clutch before shifting gears. (See above paragraph.)

There are three forward positions and one reverse position in the transmission giving six forward speeds and two reverse speeds by using the high and low range gear shift lever.

OPERATING THE TRACTOR - Continued

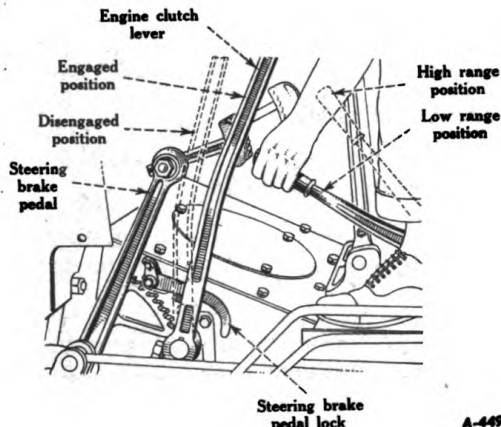
Once a speed has been selected and the tractor is in operation, further gear shifting should not be attempted until clutch is completely disengaged and the tractor is stopped.



Illust. 6  
Showing the various  
Gear Shifting Positions.

HI-LO RANGE

The high and low range of the transmission is controlled by the Hi-Lo gear shift lever (see Illust. 7). Moving this lever forward gives a low range, and backward a high range.



Illust. 7  
Showing Hi-Lo Shifter Lever,  
Engine Clutch Lever and Steering  
Brake Pedals.

HI-LO RANGE - Continued

When the Hi-Lo lever is in the "down" position (forward), the tractor can be shifted with transmission gear shift lever to low-reverse, first, second, or third speeds. When the Hi-Lo lever is in the "up" position (backward), the tractor can be shifted to high-reverse, fourth, fifth, or sixth speeds.

TO STOP TRACTOR

Disengage the clutch by pushing the clutch lever forward and move the gearshift lever to neutral position. Use the brakes if necessary.

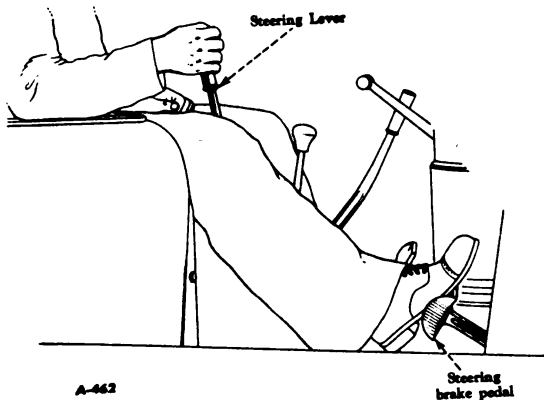
**SAFETY-FIRST!** Always move the gearshift lever into the neutral position when the tractor is stopped.

TO STOP ENGINE

- (1) Make sure the gasoline supply is turned on.
- (2) Retard the engine speed control lever, and at the same time, pull the compression release lever all the way back (to gasoline position).
- (3) Shut off the gasoline fuel supply at the tank (see Illust. 3) and allow the engine to use up the fuel in the carburetor.
- (4) After the engine stops on gasoline, push the compression release lever up to the "Diesel position" to permit the starting valves to cool on their seats.

STEERING THE TRACTOR

(1) To turn to the right or left pull back the steering clutch lever on the side to which the turn is to be made.



illust. 8  
Turning to the right.

(2) To make a sharp turn, use the steering brake on the side toward which the turn is to be made. For example: To turn sharply to the right, pull back on the right hand steering clutch lever and then push down on the right steering brake pedal.

(3) If pulling back on the steering clutch lever does not turn the tractor enough, and if pushing the steering brake all the way down turns the tractor too much, press down gently on the steering brake pedal until the desired turn is made.

STEERING DOWN GRADE

(1) When going down grade with the tractor pulling the load, steering should be done in the usual manner.

(2) When going down grade, if the load is pushing the tractor, the steering clutch operation is reversed. Disengage the right steering clutch to turn left, and the left steering clutch to turn right. Do not apply the brakes.

OPERATING OVER AN OBSTRUCTION

When running over a log, ditch or bank, use the steering clutches instead of the engine clutch to slow the tractor. Both steering clutches may be released slightly until the tractor balances on the top of the obstruction. Then, engage one clutch gradually so the tractor moves forward at an angle over and down. If the load is light, it might be necessary to use the brakes.

STEERING BRAKE LOCKS

Each foot brake pedal has a locking device. To lock either brake, push in lock rod. (See Illust. 7.)

Do not use the brake pedals as foot rests; this causes undue wear on the brake parts.

OPERATING PRECAUTIONS

- (1) Do not attempt to start the engine by towing or coasting the tractor. To do so may cause serious damage to the engine and transmission.
- (2) Do not run the starting motor for more than approximately 30 seconds at any one time.
- (3) If trouble is experienced in starting on gasoline in cold or damp weather, the spark plugs should be removed and wiped off, removing any condensation. At the same time check the spark plug gap which should be .035" to .040". After drying the spark plugs, replace them in the engine, then start the engine in the usual manner.
- (4) If it is necessary to hand crank the engine, the operator should stand in a position that will eliminate any possibility of being struck by the starting crank, if there is a reversal of the direction of the engine. Crank the engine by using quick up-strokes; *do not spin it.*
- (5) **SAFETY-FIRST!** Never fill the gasoline tank when lamps are lighted, when near an open flame, or when the engine is running. Keep the funnel, used for pouring in the fuel, in contact with the metal of the tank. By so doing, you will avoid the possibility of an electric spark igniting the gas. Do not light matches near gasoline as the air within a radius of several feet is permeated with a highly explosive vapor.
- See that the vent holes in the fuel and gasoline tank filler caps are kept open at all times to assure proper flow of the fuel.
- (6) Do not pour cold water into the radiator if the engine is very hot, *unless conditions make it absolutely necessary.* Under such conditions, start the engine and let it idle. Then slowly pour the water into the radiator.
- (7) *Do not apply the steering brake until the steering clutch is fully released or excessive heating and rapid wear of steering brakes will result.*
- When pulling a load, it is not necessary to use the steering brakes except to make sharp turns; the load itself acts as a brake. *Do not use the brakes unless it is necessary to do so in order to make the required turn.*
- (8) Do not ride the brake pedals as this will result in excessive wear on brake linings.
- (9) Improper use of the steering brakes when making turns will cause the tractor to jerk. Try to avoid this by using the steering control lever intermittently with only a slight pressure on brake pedal when making any turn, except a pivot turn. This method of turning gives you a more even turn and does not subject the tractor to sudden impacts.
- (10) The drawbar should be free to swing at all times unless it is absolutely necessary to hold it in one position.
- (11) Do not shift gears while tractor is in motion.

## COLD WEATHER OPERATION

If the tractor is to be operated in temperatures of 32° F. or lower, observe the following precautions:

### STARTING THE ENGINE

During cold weather and when the engine is cold, set the choke valve lever nearly closed and prime the engine with the primer button.

In zero weather, give the engine 6 to 8 primes.  
In temperatures 10° to 20° F., give the engine 3 to 5 primes.  
In temperatures 30° to 40° F., give the engine 1 to 3 primes.

Then crank the engine in the usual manner.

### FUEL SYSTEM

Use only a high-test winter-grade gasoline for starting. Keep your supply in a closed container so the more volatile portion does not evaporate.

Fill the fuel tank at the end of the day's run to prevent moisture from collecting in the tank.

### LUBRICATION

Be sure to use the correct grade of lubricant in the engine crankcase, injection pump, air cleaner, magneto impulse coupling, transmission, track rollers, track idlers and sprocket drive gear case, as specified in the "Lubrication Guide."

### TRACKS FROZEN TO GROUND

If your tractor is left out during cold weather and the tracks become frozen to the ground, do not attempt to jerk them loose with the power of the engine because the sudden impact, if the tracks should not break loose, may damage the tractor. Loosen the tracks before starting the tractor.

### OPERATING IN WATER OR SNOW

When operating the tractor in deep water, or in snow that is in a thawing condition, lubricate the track rollers every four hours. This will flush out the water that might be forced past the seals and into the lubricant. If operating the tractor in water that is deep enough to submerge the bottom of the transmission case, inspect the lubricant in the transmission case and in the drive gear sprocket cases frequently. If any water is present, drain these cases and refill with new oil.

**NOTE:** When operating the tractor in water, or under extremely dusty conditions, water or dust will likely come in through the holes in the drain plugs on the engine clutch and steering clutch compartments. To avoid this take out these drain plugs and replace them with solid plugs which have no holes. Occasionally remove the plugs to allow any oil accumulation to drain out.

COLD WEATHER OPERATION - Continued

COOLING SYSTEM

When the temperature is likely to be 32° F. or lower, there is danger of the water freezing in the cooling system. To overcome this, either drain the water from the cooling system at the end of each run, or use the recommended anti-freezing solution.

**IMPORTANT!** Before filling the radiator in freezing weather, cover the entire radiator and start the engine; then put in the water immediately. This prevents the water from freezing during the warming up period.

TO DRAIN THE SYSTEM

(1) Open the radiator drain cock on the lower left-hand side of the radiator. (See *Illust. 3, Section 4.*)

(2) Open the drain cock in the left hand side of the crankcase. (See *Illust. 2, Section 4.*)

(3) See that the drain cocks are not clogged and that the water drains completely.

ANTI-FREEZE SOLUTIONS

The table shown below gives the quantities of anti-freeze to be added per gallon of water. To determine the total quantity necessary, multiply the capacity of the cooling system (20 U. S. gallons) by the number of pints per gallon required at the prevailing temperature.

**CAUTION!** Do not mix anti-freeze solutions.

Do not under any circumstances use any of the following in the cooling water as an anti-freeze.

Honey, salt, kerosene, Diesel fuel, glucose or sugar, calcium chloride or any alkaline solution.

| Freezing Point<br>(Fahrenheit) | Ethylene Glycol             |
|--------------------------------|-----------------------------|
|                                | (Pints Required Per Gallon) |
| 10°                            | 2                           |
| 0°                             | 2-1/2                       |
| -10°                           | 3                           |
| -20°                           | 3-1/2                       |
| -30°                           | 4                           |
| -40°                           | 4-1/2                       |
| -50°                           | 4-1/2                       |
| -60°                           | 5                           |
| -70°                           | 5                           |

**OPERATIONS SECTION**

**PERIODIC INSPECTIONS**

To insure mechanical efficiency it is necessary that tractors be systematically inspected at intervals as outlined below.

**AFTER 8 HOURS OF OPERATION**

| Point of Inspection          | Remarks                  |
|------------------------------|--------------------------|
| Lubrication Points . . . . . | See "Lubrication Guide." |

**AFTER 64 HOURS OF OPERATION**

| Point of Inspection  | Remarks   |
|--|---|
| *Air Cleaner Screen . . . . .  | Wash. } (Refer to page 2,<br>Clean. } Section 6).                                   |
| *Air Cleaner Intake Pipe. . . . .  |   |
| Flexible rubber connection between<br>Air Cleaner and Air Intake Pipe. . | Inspect for loose fit or damage.  |
| Diesel Fuel Water Trap . . . . .   | Take apart and clean. (Refer to<br>page 1, Section 7.)                              |
| Fan Belt . . . . .   | Check tension; replace when nec-<br>essary. (Refer to pages 2 and 3,<br>Section 4.) |
| Radiator Fins. . . . .   | Clean spaces. (Refer to page 2,<br>Section 4.)                                      |
| Steering Clutch Housing Drain Plugs.                                     | Remove plugs and drain oil accu-<br>mulation. (Refer to "Lubrication<br>Guide,")    |
| Tracks . . . . .   | Check slack. (Refer to page 1,<br>Section 9.)                                       |
| Lubrication Points . . . . .   | See "Lubrication Guide."  |

**AFTER 96 HOURS OF OPERATION (For Ordnance, Navy,  
Marine Corps and Air Corps.)**

**AFTER 128 HOURS OF OPERATION (For Engineer Corps.)**

|                                      |   |
|--------------------------------------|---|
| Lubricating Oil Filters (2). . . . . | Replace filter element. (Refer<br>to page 4, Section 6.)  |
| Engine Crankcase . . . . .           | Drain and change oil. (Refer to<br>"Lubrication Guide.")  |
| Diesel Fuel Filter . . . . .         | Clean and wash elements. (Refer<br>to page 2, Section 7). |
| Lubrication Points . . . . .         | See "Lubrication Guide."                                  |

\* - When unusual mud or dust conditions are encountered during operation, it may be necessary to service these points more frequently.



## OPERATIONS SECTION

### PERIODIC INSPECTIONS - Continued

To insure mechanical efficiency it is necessary that tractors be systematically inspected at intervals as outlined below.

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#### AFTER 240 HOURS OF OPERATION (For Ordnance, Air Corps and Marine Corps.)

#### AFTER 256 HOURS OF OPERATION (For Engineer Corps and Navy.)

| Point of Inspection                  | Remarks  |
|--------------------------------------|--|
| Gasoline Strainer and Sediment Bowl. | Take apart and clean. (Refer to page 1, Section 7).        |
| Governor Breather on Injection Pump. | Remove and clean. (Refer to page 2, Section 7).            |
| Spark plugs. . . . .                 | Remove and clean; check gap. (Refer to page 1, Section 5). |
| Magneto Breaker Points and Chamber . | Clean chamber and check gap. (Refer to page 2, Section 5). |

#### AFTER 500 HOURS OF OPERATION (For Ordnance and Marine Corps.)

#### AFTER 512 HOURS OF OPERATION (For Navy and Engineer Corps.)

| Point of Inspection                  | Remarks  |
|--------------------------------------|--|
| Carburetor Float Valve Strainer. . . | Remove and clean. (Refer to page 3, Section 7).                      |
| Cooling System . . . . .             | Clean. (Refer to page 2, Section 4).                                 |
| Engine Valves. . . . .               | Check for clearance. (Refer to page 5, Section 6).                   |
| Steering Clutch Hand Levers. . . . . | Check for free movement at handles. (Refer to page 2, Section 3).    |
| Steering Brake Pedal . . . . .       | Check for free movement at pedal pads. (Refer to page 1, Section 1). |
| *Air Cleaner, Complete. . . . .      | Remove and clean. (Refer to page 2, Section 6).                      |
| Lubrication Points (500 hours) : : : | See "Lubrication Guide."   |

\* - When unusual mud or dust conditions are encountered during operation it may be necessary to service these points more frequently.

## OPERATIONS SECTION

### STORING AND HOUSING DIESEL TRACTORS

When the tractor is not to be used for a period of time, it should be stored in a dry and protected place. To leave equipment outdoors, exposed to the elements, will result in materially shortening its life.

Follow the procedure outlined below when the tractor is placed in storage for 30 days or more, and the lubrication precautions should be repeated every six months thereafter. We also recommend caution to be practiced in starting an engine that has been in storage (see instructions on the next page).

(1) Wash or clean and completely lubricate the tractor. (Refer to the "Lubrication Guide.")

(2) Drain the lubricating oil from the Diesel injection pump and governor and refill them with new oil as specified on the Lubrication Guide.

(3) Close the Diesel fuel shut-off valve under the fuel tank, clean the water trap and drain the Diesel fuel filter. Disconnect the fuel supply line at the inlet side of the fuel supply pump, and also disconnect the fuel return pipe at the injection pump. Connect a suitable tubing to the inlet side of the fuel supply pump and lead the free end of the tubing into a container of flushing oil. The oils recommended for flushing are Gulf Oil Corporation No. 301, Shell Latus No. 22 Oil, Formula No. 11326 Standard Oil Company, Capella Oil "AA", or No. 8504 or E382 Socony Vacuum Oil Company. (In emergencies a flushing oil mixture of 1/2 kerosene and 1/2 good grade of light lubricating oil may be used.)

Start the engine and run it on gasoline until sufficient fuel has

been used to assure filling the fuel filters and flushing the pump. (This will require approximately 2 quarts of flushing mixture to fill filter.) (Filling of fuel filter can be determined by opening air bleed on top of fuel filters.)

After the fuel filter has been filled, the engine should continue on gasoline for an additional 5 minutes to assure the flushing of the internal parts of the pump. Then, drain the flushing oil from the fuel filter. Reconnect the regular fuel supply line and reconnect the fuel return pipe to the fuel supply pump.

(4) Drain the water from the cooling system.

(5) Oil the magneto impulse coupling liberally with the proper grade of oil designated in the "Lubrication Guide."

(6) Remove the spark plugs and put the compression release lever in the gasoline (starting) position. Pour one tablespoon full of SAE-50 lubricating oil of a good grade through the spark plug opening into each cylinder. Put the compression release lever in the Diesel position.

(7) Remove the valve housing cover and spray oil over the rocker arm and the starting valve assembly; then, replace the cover.

(8) Cover the exhaust pipe with a tin can to prevent moisture from entering the manifold.

(9) Remove the oil filter element. (If any evidence of rust is found on the center stud, clean the stud thoroughly.) Replace the filter element with new one and drain out any sludge from the filter base.

The engine must not be run after the slushing operation.

### BEFORE STARTING DIESEL ENGINES THAT HAVE BEEN IN STORAGE

- (1) Remove the spark plugs and put the compression release lever in the gasoline (starting) position, and pour a mixture of one-half gasoline and one-half engine oil, SAE-10 into each cylinder (two tablespoonfuls per cylinder is enough).
  - (2) Remove the valve housing cover and flush the valve and the valve operating mechanism with same mixture.
  - (3) Crank the engine rapidly until the excess oil has been blown out of the spark plug holes. This operation will loosen any tight piston rings and wash the old gummy oil from the valves and the pistons.
  - (4) Flush out the impulse coupling with the same grade of oil used for lubrication and lubricate as specified in the "Lubrication Guide."
  - (5) Flush out the crankcase with Diesel fuel; solvent, dry cleaning; or kerosene and fill it with the proper grade of lubricating oil specified in the "Lubrication Guide."
  - (6) Drain the oil from the injection pump and refill the pump to the proper level with the specified grade of lubricating oil shown in the "Lubrication Guide."
  - (7) Be sure the filter has a new element before starting the engine.
  - (8) Remove the tin can from the exhaust pipe.
  - (9) Install the spark plugs.
  - (10) Fill the water cooling system.
  - (11) Fill the fuel tanks.
  - (12) Start the engine and let it run slowly. Observe if any valves are sticking. If so, pour a small quantity of Diesel fuel; solvent, dry cleaning; or kerosene on the valve stem until the valves become loose.
  - (13) Assemble the valve housing cover.
- CAUTION!** Do not accelerate the engine rapidly, or operate it at high speed immediately after starting.

**STEERING BRAKES**

The steering brakes are 17" external contracting bands on the steering clutch drums.

**ADJUSTMENT** (See *Illusts. 1 and 2*).

The adjustment for wear is done by turning the brake rod adjusting knobs "A" on each side (located under the dash just above the engine frame side channels) clockwise until the desired pedal travel is obtained.

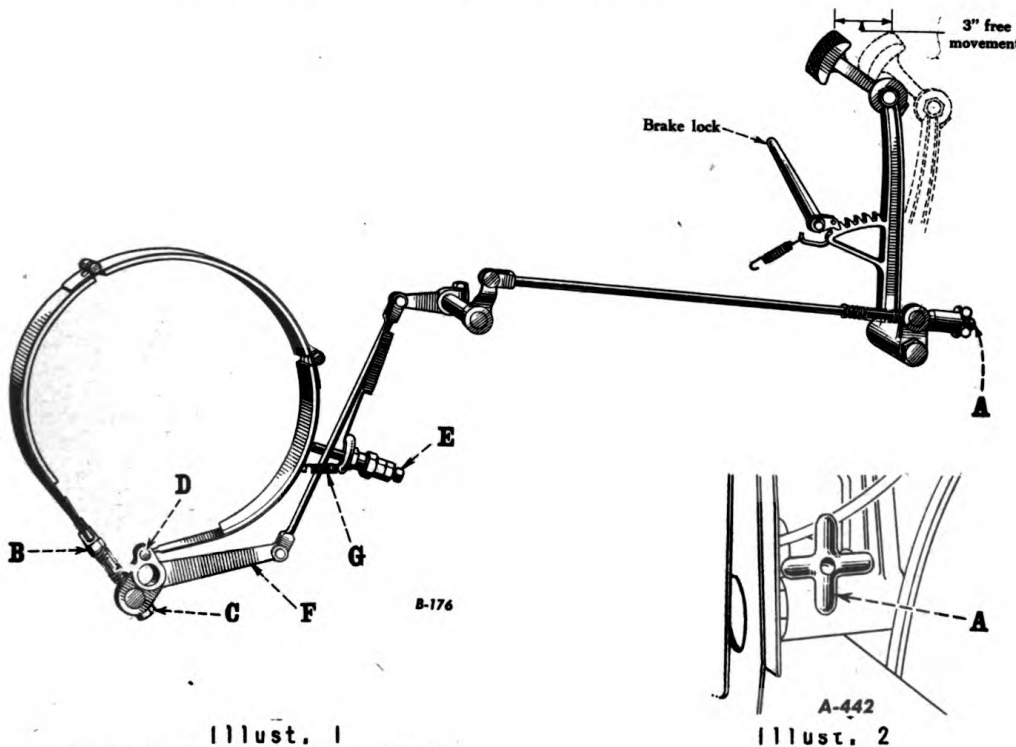
When adjustment can no longer be made with knobs, turn the knobs counterclockwise until about 1 inch of the threads are covered. Then remove the brake inspection cover, under the rear section of the main frame on each side of the tractor. Adjust the brake band set screw "E" to give 1/64 of an inch clearance between the steering clutch drum and the lining at that point and lock the set screw. Loosen the jam nut "B" and turn the steering brake band adjusting bolt "C" until 1/64 of an inch clearance is obtained between the

steering clutch drum and the brake lining at all points. Lock the jam nut "B", replace the covers and adjust the knob "A" to give 3 inches free pedal movement.

Subsequent intermediate adjustments can be made with the adjustment knobs "A".

**BRAKE LINING RENEWAL** (See *Illusts. 1 and 2*).

Release the tension on the adjusting knob "A". Remove the covers from the bottom and the rear of the main frame. Remove the set screw from the brake band pivot shaft and slide the shaft far enough into the main frame so as to remove it from the pivot arm "F". Back up the adjusting set screw "E". Unhook the spring "G" from the brake band. Remove the brake band adjusting bolt "C", pin "D" and pull the brake band from the drum. Reline the bands and replace them by reversing the above procedure; then, adjust as described above.



Illust. 1  
Steering Brake Adjustment.

A-442  
Illust. 2

**OPERATIONS SECTION**

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**MEMORANDA**

1952-1953  
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**MINOR CHASSIS SERVICE OPERATIONS****STEERING CLUTCH COMPARTMENT  
AND CLUTCH HOUSING DRAINS**

**NOTE:** If operating the tractor in water, under very wet conditions, or under extremely dusty conditions, water or dust will likely come in through the holes in the drain plugs on the engine clutch and steering clutch compartments. To avoid this, replace these plugs with solid plugs which have no holes.

Remove the plugs after every 64 hours of operation to allow any oil accumulation to drain out.

**TRANSMISSION AND SPROCKET  
DRIVE GEAR CASES**

The oil in the transmission case and in the final drive housings should be changed at the interval specified in the "Lubrication Guide."

If the oil in the transmission case and in the final drive housings has been thinned with kerosene for operation in temperatures below zero, the oil should be changed before the weather becomes hot.

Remove the drain plugs and drain the oil while it is warm. Allow time for complete drainage, then replace the plugs. Refill to the

proper level with approved Lubricant (see "Lubrication Guide.")

**TO WASH TRANSMISSION**

Fill the transmission case and the sprocket drive gear cases to the proper level with Diesel fuel; solvent, dry cleaning; or kerosene. Operate the tractor in low gear for a few minutes, then remove the drain plugs and allow time for complete drainage. Replace the plugs and fill to the proper levels with fresh lubricant see "Lubrication Guide."

**REPLACEMENTS OF MAIN FRAME  
PARTS**

When making replacements of parts in the main frame, the old oil should be thoroughly washed out to remove all sediment, etc.; then, refill with new oil. It is important that this be done as foreign matter, such as very fine dirt, etc., will not separate from the old oil by settling.

**SETTING BEVEL GEAR DEFLECTION  
SET SCREWS**

Screw in snug (by hand) against highest point of the gear (turn gear to determine this high point) and back off 1/4 of a turn. If feeler gages are used, .020 of an inch is the recommended clearance between the set screw and the high point of the gear.

**OPERATIONS SECTION**

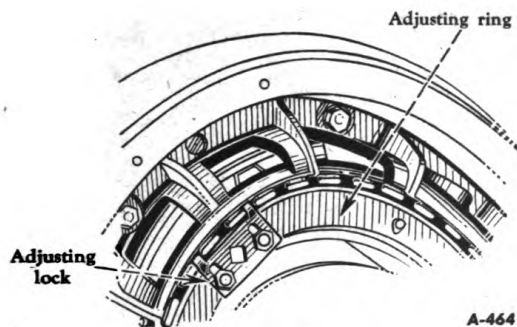
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**MEMORANDA**

## OVER-CENTER ENGINE CLUTCH - 15-INCH

## CARE OF THE CLUTCH

The over-center clutch is so designed that it requires a minimum of attention. It is important, however, that the instructions for lubricating given on "Lubrication Guide", be followed.



Illust. 1  
Adjustment features of the  
over-center clutch.

(4) Loosen the nuts on the adjusting ring lock and disengage the lock from the notches in the back plate.

(5) With clutch hand lever in the disengaged position, turn the adjusting ring in a clockwise direction, moving it one notch, or possibly two notches at the most at any one time. Engage the ring lock in the back plate. Pull the hand lever back as a check to determine if over-center engagement can be felt.

*For satisfactory operation of the clutch do not have the clutch adjusted so tight that this full over-center engagement is not easily secured.*

If little or no pressure is required on the end of the hand lever to engage the clutch, then further adjustment, as outlined above, is necessary.

## OPERATION AND ADJUSTMENT

(1) The clutch is fully engaged when the engine clutch hand lever is pulled so that full over-center cam engagement is definitely felt.

(2) The clutch needs adjusting only when any noticeable slippage is taking place when the tractor is operating under load.

(3) To adjust the clutch remove the clutch inspection cover on the floor plate ahead of the steering clutch levers.

(6) When correct clutch adjustment is obtained, be sure to tighten the nuts on the adjusting ring lock and replace the cover plate.

The correct adjustment has been made when a considerable (not excessive) pressure is felt when pulling clutch hand operating lever to engaged position so that a definite over-center cam engagement is felt.

If the adjustment has been made as described above, and the cams are so tight that you do not get the full over-center engagement, the adjusting ring should be backed off one notch (in counterclockwise direction).



STEERING CLUTCHES

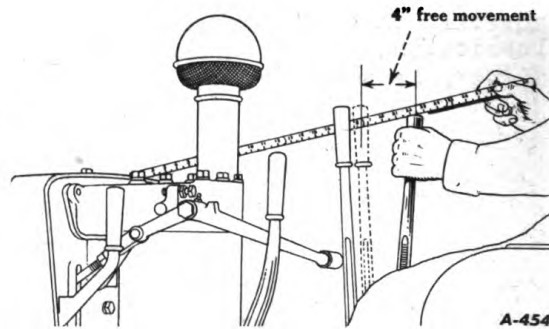
If the steering clutch slips, or if the steering clutch hand lever free movement is less than 2 inches (measured at the handle of the lever), adjustment is necessary.

TO ADJUST (See *Illusts. 2 and 3.*)

Loosen the yoke lock nuts "D" and the rod by turning nut "H" so as to lengthen the rod. Then tighten the lock nuts "D" against the rods.

Check to see if the free movement of hand lever is 4 inches.

When adjustment can no longer be made by means of lengthening the operating rod, remove the release

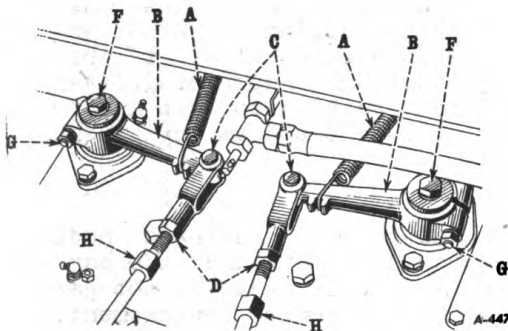


Illust. 3  
Adjustment of Steering  
Clutch Levers.

lever return spring "A" and the operating rod yoke pin "C"; then remove the steering clutch release lever cap screw "F". Loosen the cap screws "G" and pry the release lever off the splined release shaft and turn the right hand release lever clockwise (left hand release lever counterclockwise) slightly, and replace the lever on the splined release shaft. Then loosen the lock nut and adjust the operating rod until a free movement of 4 inches is obtained.

When the desired free movement of the hand lever is obtained, replace and tighten the release lever cap screw "F" and tighten the cap screws "G".

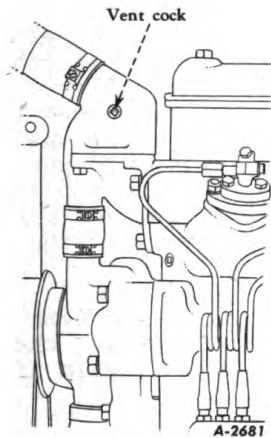
Subsequent intermediate adjustments can be made by means of lengthening rod linkage as described above.



Illust. 2  
Steering Clutch Adjustment.

COOLING SYSTEM

The water is circulated through the engine block, cylinder head and radiator by a centrifugal pump. The water temperature is controlled by a thermostat that does not allow the water to flow through the radiator until the engine has reached operating temperature. With the thermostat closed the water circulates only through the engine.

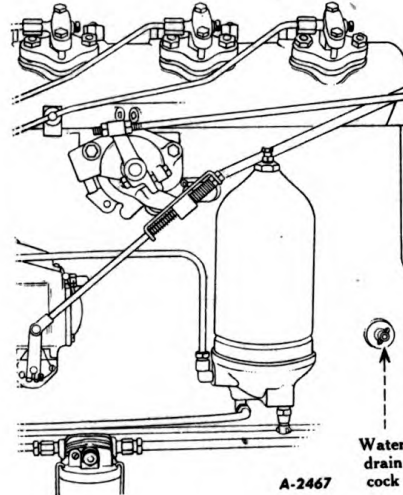


Illust. 1  
Showing Thermostat Housing  
Vent Cock

TO FILL COOLING SYSTEM

The water capacity of this tractor is approximately 20 gallons (U.S.).

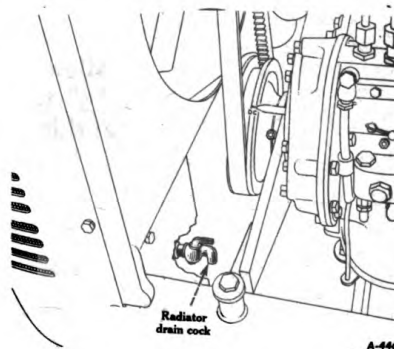
- (1) Close the crankcase and radiator drain cocks (see Illusts. 2 and 3).
- (2) Remove the vent plug in the thermostat housing (see Illust. 1).
- (3) Pour water (soft or rain water, if available) into the radiator until water flows from thermostat housing. Replace vent plug and fill the radiator to level 1" below bottom of filler neck.



Illust. 2  
Showing Crankcase Drain Cock

(4) Do not pour cold water into the radiator if the engine is very hot, unless conditions make it absolutely necessary. Under such conditions, start the engine and let it idle. Then slowly pour the water into the radiator.

(5) If the engine is to be operated in freezing temperatures, refer to "COLD WEATHER OPERATION" on page 12. Section G.



Illust. 3  
Showing Radiator Drain Cock

COOLING SYSTEM - Continued

TO CLEAN OUT DIRT AND SLUDGE

(1) Drain the cooling system by opening the radiator drain cock and the crankcase drain cock. Allow the system to drain and close the drain cocks. (See *Illusts. 2 and 3.*)

(2) Fill the cooling system with a solution of 6 to 7 pounds of ordinary washing soda mixed with 20 gallons (U.S.) of water (cooling system capacity).

(3) Leave the radiator filler cap off and run the engine until the water is hot, then drain and flush with clean water.

RADIATOR CORE

Overheating is often caused by bent or clogged radiator fins. If the spaces between the radiator fins become clogged, clean them with an air or a water hose. When straightening bent fins be careful not to injure the tubes or break the bond between fins and tubes.

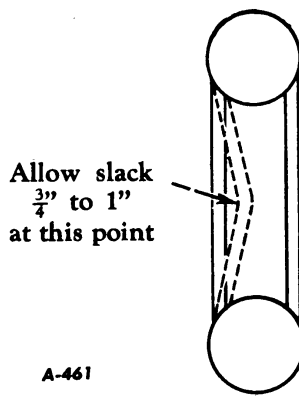
FAN BELT TENSION

The slack of the fan belt should be checked frequently to assure maintenance of the correct tension. The tension is correct when the belt can be depressed without effort by the thumb, approximately  $\frac{3}{4}$  to 1 inch midway between the two pulleys as shown in *Illust. 4*. If the slack is more than 1 inch, adjust the belt as follows:

ADJUSTING THE BELT

The tension of the fan belt is adjusted by changing the width of the groove in the fan pulley. To adjust, loosen the set screw (2) (*Illust. 5*), then screw the pulley flange (1) in toward the belt to tighten the belt, and out to loosen it. Retighten the set screw (2) after the correct tension is obtained.

After a new belt has been run approximately 50 hours, check the tension and adjust again if necessary.



Illust. 4  
Correct Belt Tension

## COOLING SYSTEM - Continued

The belt should at no time contact the bottom of the pulley groove because this will wear it out rapidly. Adjust the pulley for a narrower groove, if this is possible without increasing the tension more than allowable. Having "V" belts tighter than the tension specified will result in rapid wear.

### REMOVING THE FAN BELT (See *Illust. 5.*)

To remove the fan belt, loosen the screw (2) in flange on the fan pulley and unscrew the flange as far as possible. Start the belt over the outer flange of the lower pulley and pry it out with a light bar or rod. Slowly crank the engine at the same time and the belt will work off the pulley. After the belt is off the pulley, remove the starting crank. The belt can now be worked over the top of the fan blades.

### REPLACING FAN BELT

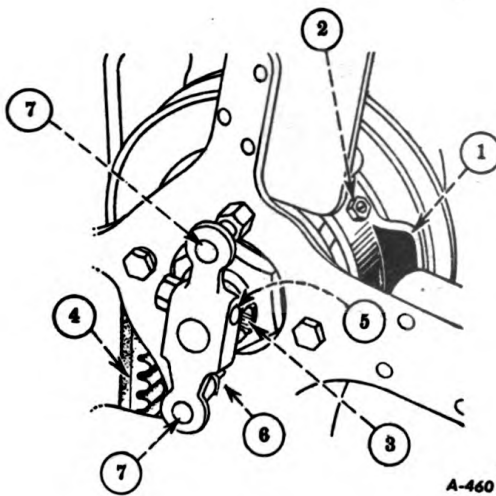
The fan belt should be replaced when it becomes soaked with grease, or when it is so badly worn that it does not drive the fan at the proper speed.

When replacing the belt, reverse the procedure outlined under "Removing Fan Belt", except the belt can be started on the lower pulley by hand, and by slowly cranking the engine the belt will find the correct position.

### WATER PUMP PACKING

Due to wear after considerable service, the pump packing may leak. If this occurs, tighten the packing nut (3) (see *Illust. 5.*) just enough to stop the leaking.

To install new packing, remove the driver pin (5) and the driver (6). Unscrew and remove the packing nut (3). Place the water pump packing around shaft and reassemble the packing nut, driver and the driver pin.



- (1) Fan pulley flange.
- (2) Set screw in pulley flange.
- (3) Water pump packing nut.
- (4) Fan belt.
- (5) Driver pin.
- (6) Driver.
- (7) Stud.

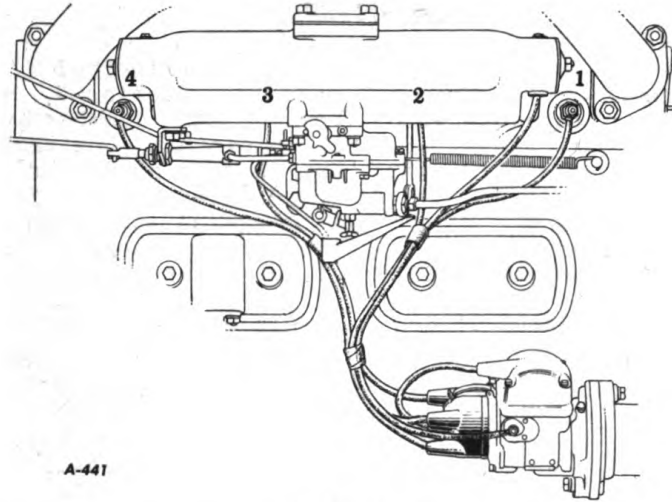
Illustr. 5

**OPERATIONS SECTION**

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**MEMORANDA**

## SPARK PLUGS AND CABLES

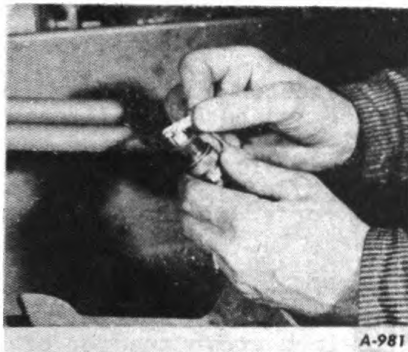


Illust. 1

H-4 Magneto--Wiring Chart. Engine firing order is 1, 3, 4, 2.

## SPARK PLUGS

The spark plug selected after careful tests as suited for this engine is the Champion No. 44 and should be used ordinarily. At the interval specified under "Periodical Inspections", page 14, Section G, or oftener if necessary, remove the spark plugs for cleaning and checking gaps between electrodes.



Illust. 2

Checking the Gap between the Points. Gap should be .035 to .040-in.

A gap of .035 to .040-inch should be maintained (a gage of this thickness is furnished). When making this adjustment, always bend the outer electrode. Never bend the center electrode as it may

damage the insulator. If the gap between the electrodes is too great, due to improper setting or burning off the ends, the engine will misfire and be hard to start.

## CLEANING SPARK PLUGS

Sand blasting is the recommended method of cleaning spark plugs.

Never scrape or clean the insulator with anything which will scratch the porcelain. Scratched porcelain allows carbon and dirt to accumulate much faster.

## SPARK PLUG CABLES

If spark plug cables are removed for any reason, note the position of each cable on magneto so they can be replaced correctly. (*Wiring Chart, Illust. 1, shows correct wiring.*)

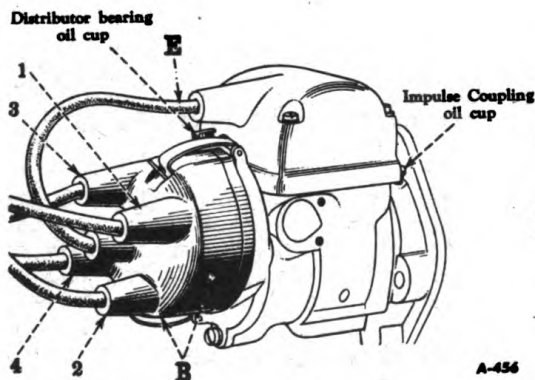
There should be 1/4-inch minimum clearance between the spark plug cables and the cylinder head. By maintaining this clearance, shorting-out the spark plug will be prevented and the cable will be away from the extreme heat of the cylinder head. If the cable touches the head, heat soon causes the rubber to become soft and ruins the cable.

## MAGNETO

This tractor is equipped with a high-tension magneto which is designed and built in accordance with the latest ignition practices.

### LUBRICATION

Every 64 hours of operation, oil the impulse coupling liberally with the grade of oil specified in the "Lubrication Guide".



Illust. 3  
Counterclockwise Rotation  
(viewed from the distributor end)

Fill the distributor bearing oil cup with lubricant at the interval specified in the "Lubrication Guide". Do not oil oftener as excessive oil might work into the breaker point chamber and cause rapid point wear.

### GREASING BREAKER MECHANISM AND CHECKING POINTS

This magneto requires very little attention other than properly lubricating the oil cups as specified above.

It is important, however, to keep the breaker arm chamber clean, as oil on the breaker points will cause rapid point wear. Overlubrication of the distributor bearing oil cup (see Illust. 3) might cause a dirty breaker point chamber. At the interval specified

under "Periodical Inspections", page 14, Section G, inspect the breaker point chamber to assure that it is clean. See that the points are in good condition and have the proper clearance. If the chamber is clean, no attention is necessary other than checking the clearance of the points; but if the chamber is dirty, all parts must be thoroughly cleaned. After cleaning, the points should be dressed, the point clearance checked, and the breaker arm regreased as outlined below.

To reach the breaker mechanism, remove the distributor cap and crank the engine slowly until metal strip on distributor rotor points toward the No. 1 terminal on distributor cap and impulse coupling just trips. Remove the distributor rotor. Take off the distributor body by removing the three screws (see "A", Illust. 4). Do not crank the engine while the distributor body is removed or it might be necessary to retune the magneto to the engine.

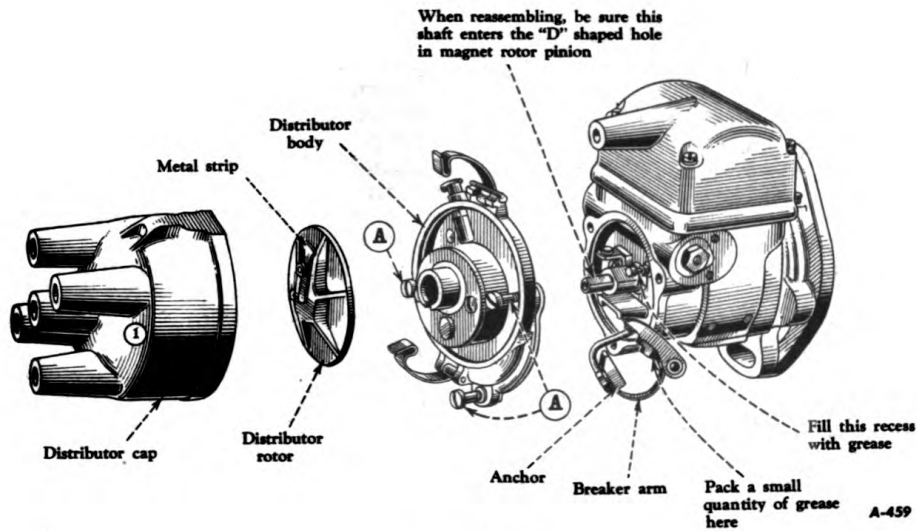
Pry the breaker arm and anchor from the chamber and clean all parts. Inspect the breaker points and if necessary, dress them with a sharp fine file. If the points are worn excessively, replace both points.

Fill the recess in breaker post with lubricant and pack a small quantity of lubricant in back of the breaker arm rubbing block (see Illusts. 4 and 5). (Refer to "Lubrication Guide" for grade of lubricant to be used.)

Assemble the breaker arm, leaving the spring anchor projecting 1/8 to 3/16-inch above the top of slot so it is pushed into place by distributor body. Be sure the points line up after breaker arm is pushed into place.

Check the gap between the breaker points using the gage furnished with the tractor (see Illust. 5). The point opening should be .013-inch when the rubbing block is on the high part of the cam. If gap

MAGNETO - Continued



Illust. 4

is not correct, adjust it by loosening the screw holding the adjustable point (see *Illust. 5*) and moving the point up or down until gage slips snugly into opening. After the proper adjustment has been made, tighten the screw.

Line up the distributor rotor key with keyway in spindle (see *Illust. 4*) and press rotor loosely on spindle. With the engine on top dead center of the No. 1 firing stroke, turn the distributor rotor until the metal strip on rotor points to the No. 1 terminal on the distributor cap. Place the distributor body on the magneto and be sure rotor shaft enters the "D" shaped hole in magnet rotor pinion. Remove the distributor rotor to tighten the three screws (see "A", *Illust. 4*). Replace the distributor rotor and distributor cap.

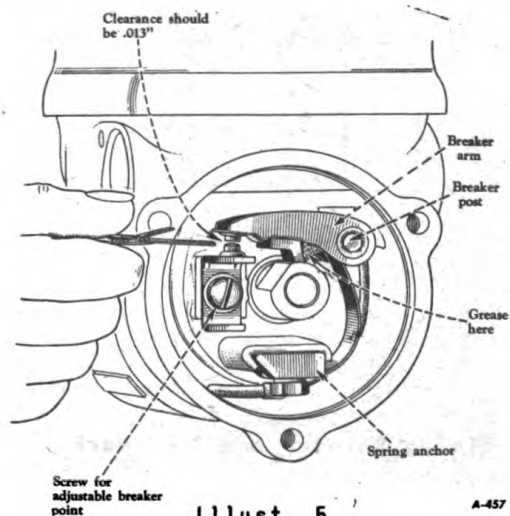
**GREASING ROTOR BEARINGS AND DISTRIBUTOR GEAR CASE**

Every 2,000 hours of operation, or at least every two years, the magnet rotor bearings, distributor gear case, and distributor gear bearing should be cleaned and re-packed. This is to be done by the

proper maintenance personnel.

**DISTRIBUTOR CAP**

Both the inside and outside of distributor cap should be kept reasonably free of dust and oil deposits. To assure long life of the distributor, care must be taken to keep the two small ventilator holes (see "B", *Illust. 3*) open at all times. The distributor rotor should also be kept clean.



Illust. 5



**MAGNETO - Continued**

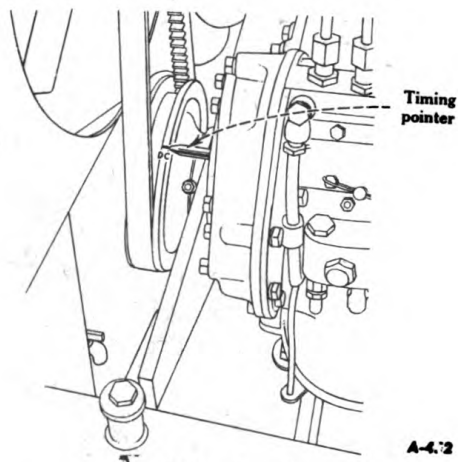
**INSTALLING AND TIMING THE  
MAGNETO TO ENGINE**

If the magneto has been removed, the following instructions must be closely followed when replacing the magneto on the engine:

(1) Pull out cable "E" (see *Illust. 3*) from the coil cover end. This will eliminate any possibility of accidental starting.

(2) Set the compression release lever in low compression position (gasoline operation).

(3) Crank the engine until the No. 1 piston (the piston next to the radiator) is on the upper dead center of the compression stroke. The compression stroke can be determined by removing the No. 1 spark plug. Place your thumb over the opening and crank the engine until an outward pressure is felt. Continue cranking slowly until the notch marked "DC" on the fan drive pulley is in line with the pointer on the front crankcase cover. (See *Illust. 6*.)



**Illust. 6**  
Timing Pointer and "DC" Mark.

(4) Remove the distributor cap and turn the magneto coupling in a clockwise direction (as viewed from the coupling end) until the metal strip on the distributor rotor points toward the No. 1 terminal on the distributor cap.

(5) Assemble the magneto on the engine. Make sure the lugs on the impulse coupling engage in the slots on the magneto drive coupling. (Assemble the magneto so the top is as far away from the crankcase as possible.)

(6) Insert the magneto mounting bolts loosely in the magneto flange, just enough to hold the magneto in place. Then, crank the engine one complete revolution to the next top dead center. Now, push the upper part of the magneto toward the engine until the impulse coupling just trips.

(7) Tighten the mounting bolts securely. Attach the spark plug cables to the engine and magneto. Start by connecting the No. 1 cylinder spark plug to the socket marked "1" on the distributor block, connect the No. 3 socket with the No. 3 cylinder, next with the No. 4 cylinder, next with the No. 2 cylinder (see *Wiring Charts, Illusts. 1 and 3*).

(8) To check the timing, crank the engine slowly until the top dead center of the No. 1 cylinder is reached at which time the impulse coupling should just trip.

(9) The magneto is now correctly wired and timed.

**NOTE:** Push the cable "E" back into the socket in the coil cover (see *Illust. 3*).

## ELECTRICAL EQUIPMENT

### WIRING DIAGRAM

The wiring diagram, located in the *Electrical Section of the Spare Parts Catalog* may be used as a guide in identifying the various electrical units, and for tracing the electrical cables and connections.

### PRECAUTIONS

**CAUTION!** As a precaution against shorting and causing damage to any of the electrical units, disconnect the battery ground cable, at the battery end, before working on any part of the electrical system. Do not reconnect this cable until all the electrical work has been completed.

Be sure all the terminals are clean and securely fastened. Make sure there are no broken wires anywhere in the electrical circuit.

Tractors are shipped with the battery ground cable disconnected at the battery end, and in addition, the connection at the "F" terminal on the generator frame is not completed. Before operating the tractor, connect the "battery to ground" cable, and connect the generator wires.

**DANGER!** The generator will burn out if operated with the battery cables, or the battery charging circuit cables disconnected or broken. To operate the generator without the battery, remove the connection from the "GEN" terminal on the relay and ground it on the relay mounting screw, or remove the generator field cable from the "F" terminal on generator frame.

### STORAGE BATTERIES

*To prevent failure of batteries it is important that the electrolyte in the batteries be kept at the proper level at all times.*

*Keep the vent hole in the battery filler caps open.*

Batteries when shipped dry should be serviced as outlined on the instruction tag attached to the battery.

Inspect the battery every 64 hours or oftener to keep the water at the correct level and to maintain the correct specific gravity. The specific gravity reading of about 1.250, corrected to 80° F. should be maintained. (See Chart "VARIATION OF SPECIFIC GRAVITY WITH TEMPERATURE" on page 8.)

**CAUTION:** If water is added to the battery when the temperature is near the freezing point (32° F.) always run the engine long enough to mix the water and the electrolyte so the water in the battery does not freeze.

Acid or electrolyte should never be added except by a skilled battery man. Under no circumstances add any special battery "dopes", solutions or powders.

The electrolyte in each cell should be 3/8 of an inch above the separators. When the electrolyte is below this level, pure distilled water should be added. Never use hydrant water, or any water which has been in a metal receptacle. Keep on hand a glass jar of pure distilled water for battery use only. Use a clean syringe to put water in a cell.

The battery cable terminals must be clean and tight. Use hot water to remove any terminal corrosion, and also for cleaning the top of the battery. Brighten the terminal contact surfaces with wire wool, apply a light coat of vaseline and reassemble. Be sure the terminals are clamped tightly and be sure the battery is clamped securely in the battery box; if this is done two or three times a year you should have no trouble from corroded terminals.

## **ELECTRICAL EQUIPMENT - Continued**

### **GENERATOR AND LIGHT SWITCH**

The generator has an adjustable third brush for changing the charging rate. It also has a light switch with a field resistance control for regulating the charging rate of the generator from the instrument panel.

The generator field circuit is grounded through the light switch. Therefore, it is necessary at all times to make sure that a good electrical connection is made between the switch and the mounting panel.

The light switch is used to control the generator field resistance and has four positions; Low Charge, High Charge, Dim and Bright.

When the lights are turned on either dim or bright, the field circuit is direct to the ground giving high charge or increased generator output. This is also true when the switch is on the high charge position.

During the daytime when lights are not used, the switch should be put in the low charge position. This adds a resistance coil to the field circuit and reduces the output of the generator to approximately one-half its original charge rate. If the charge in the battery is low, the switch should be placed in the high charge position until the battery has a full charge as indicated on *Specific Gravity Chart on page 8.*

The generator as received from the factory, has the third brush set in a position to give an output of approximately 9 amperes when the switch is in the high charge position, and

4 to 5 amperes when the switch is in the low charge position. It may be desired to reduce the charging rates mentioned. This can be done by adjusting the third brush. (See paragraph relating to third brush adjustment on page 7.) The charging rates given are for average conditions only. The generator output may have to be varied to meet abnormal operating conditions in order to maintain a fully charged battery. To obtain the best life and performance of the battery, maintain the correct specific gravity. Do not under or overcharge it.

### **GENERATOR AND STARTING MOTOR COMMUTATORS**

If the commutator is dirty or slightly burred, it can be polished with a strip of No. 00 sandpaper. *Never use emery cloth.*

### **TO CLEAN COMMUTATORS**

The commutator can be cleaned by placing a strip of sandpaper between the brush and the commutator, while the armature is revolving. After the polishing operation, all dust must be blown from the commutator. If the commutator is very rough or out of round, it should be referred to the proper maintenance personnel.

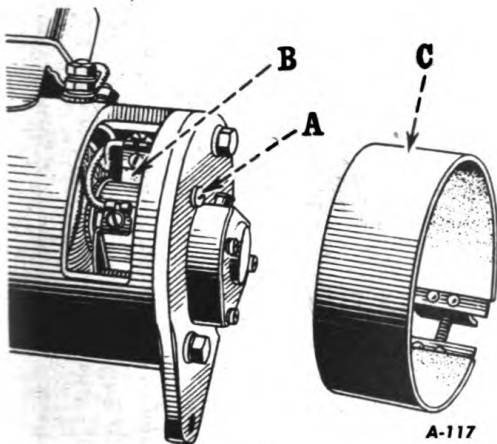
### **GENERATOR LUBRICATION (2 CUPS)**

Every 64 hours of operation, put 8 to 10 drops of engine oil into the oil cups. Do not lubricate excessively as excessive oiling may cause oil and grease to gum on the commutator and cause a reduction of the generator output. *Never oil the commutator.*

## ELECTRICAL EQUIPMENT - Continued

### TO ADJUST CHARGING RATE BY THIRD BRUSH - See Illusts. 7 and 8.

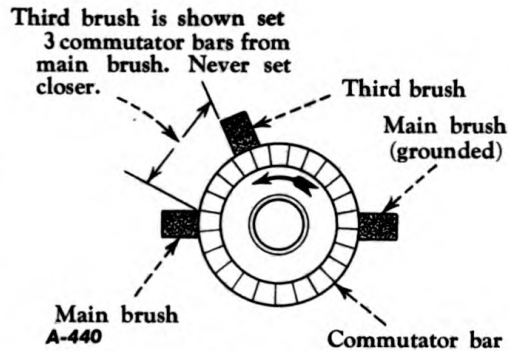
Remove the cover band "C" and loosen the round head screw "A" on the commutator end bearing casting until the lock washer tension is released. Do not try to remove the screw. Change the charging rate by moving the third brush "B". This brush is the one mounted on a movable carrier, whereas the other main brushes are mounted directly on the end bearing casting. The rate of charge is increased by moving the third brush in the direction of rotation of the armature. To decrease the rate of charge, move the third brush in a direction opposite to that of the armature rotation.



Illust. 7  
Generator showing Third Brush

The maximum rate of charge for the generator (with the switch in the high charge position and with no electrical load) is 6 to 8 amperes when "hot" and 8 to 10 amperes when "cold". DO NOT SET BEYOND THESE LIMITS. Always check the maximum generator output when operating with a fully charged battery.

**IMPORTANT!** The third brush should never be set closer than 3 commutator bars from main brush (see Illust. 8).



Illust. 8  
View showing Commutator End (Brush Setting)

When the above adjustments are completed, be sure to tighten the round head screw "A" which locks the third brush carrier in place. Reassemble the cover band "C" with the joint on the bottom of the generator so that the joint is not over any opening.

**CAUTION!** The above adjustment should be done by proper maintenance personnel.

### GENERATOR BELT TENSION

The slack of the generator belt should be checked frequently to assure maintenance of the correct tension. The tension is correct when the belt can be depressed without effort by the thumb, approximately  $\frac{3}{4}$ " to 1" midway between the two pulleys. If the slack is more than 1", adjust the belt for proper tension.

## Variation of Specific Gravity with Temperature

### Consult This Chart

Read the thermometer in the battery acid—read the Hydrometer—then at the top of the table find the column headed by the temperature which is nearest the battery acid temperature; find, in that column, the figure nearest the observed Specific Gravity reading, and trace horizontally across to the 80° F. column. The 80° F. figures are the true acid gravity and should form the basis for any acid adjustment.

The specific gravity of acid in fully charged batteries should not exceed the value specified by the manufacturer (base temperature 80° F.). If hydrometer readings are taken at acid temperatures other than 80° F., allowance must be made for temperature.

All figures in horizontal lines represent the same state of charge but at the various temperatures shown in the column headings; that is, 1.280 Specific Gravity at 80° F. (the base temperature) becomes 1.268 when Electrolyte temperature is 110° F., and 1.312 when Electrolyte temperature is 0° F.

| 0° F. | 10° F. | 20° F. | 30° F. | 40° F. | 50° F. | 60° F. | 70° F. | 80° F. | 90° F. | 100° F. | 110° F. | 120° F. |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|
| 1.167 | 1.163  | 1.160  | 1.157  | 1.154  | 1.150  | 1.147  | 1.144  | 1.140  | 1.137  | 1.134   | 1.131   | 1.127   |
| 1.177 | 1.174  | 1.170  | 1.167  | 1.164  | 1.160  | 1.157  | 1.154  | 1.150  | 1.147  | 1.143   | 1.140   | 1.137   |
| 1.187 | 1.184  | 1.181  | 1.177  | 1.174  | 1.170  | 1.167  | 1.164  | 1.160  | 1.157  | 1.153   | 1.150   | 1.146   |
| 1.198 | 1.195  | 1.191  | 1.187  | 1.184  | 1.180  | 1.177  | 1.173  | 1.170  | 1.166  | 1.163   | 1.159   | 1.156   |
| 1.208 | 1.205  | 1.201  | 1.198  | 1.194  | 1.191  | 1.187  | 1.183  | 1.180  | 1.176  | 1.173   | 1.169   | 1.165   |
| 1.219 | 1.215  | 1.211  | 1.208  | 1.204  | 1.201  | 1.197  | 1.193  | 1.190  | 1.186  | 1.182   | 1.179   | 1.175   |
| 1.229 | 1.225  | 1.222  | 1.218  | 1.214  | 1.211  | 1.207  | 1.203  | 1.200  | 1.196  | 1.192   | 1.189   | 1.185   |
| 1.239 | 1.236  | 1.232  | 1.228  | 1.224  | 1.221  | 1.217  | 1.213  | 1.210  | 1.206  | 1.202   | 1.198   | 1.195   |
| 1.251 | 1.247  | 1.243  | 1.239  | 1.236  | 1.232  | 1.228  | 1.224  | 1.220  | 1.217  | 1.213   | 1.209   | 1.205   |
| 1.261 | 1.257  | 1.253  | 1.249  | 1.246  | 1.242  | 1.238  | 1.234  | 1.230  | 1.227  | 1.223   | 1.219   | 1.215   |
| 1.271 | 1.267  | 1.263  | 1.259  | 1.256  | 1.252  | 1.248  | 1.244  | 1.240  | 1.236  | 1.233   | 1.229   | 1.225   |
| 1.281 | 1.277  | 1.273  | 1.269  | 1.266  | 1.262  | 1.258  | 1.254  | 1.250  | 1.246  | 1.243   | 1.239   | 1.235   |
| 1.291 | 1.287  | 1.284  | 1.280  | 1.276  | 1.272  | 1.268  | 1.264  | 1.260  | 1.256  | 1.252   | 1.248   | 1.245   |
| 1.301 | 1.298  | 1.294  | 1.290  | 1.286  | 1.282  | 1.278  | 1.274  | 1.270  | 1.266  | 1.262   | 1.258   | 1.255   |
| 1.312 | 1.308  | 1.304  | 1.300  | 1.296  | 1.292  | 1.288  | 1.284  | 1.280  | 1.276  | 1.272   | 1.268   | 1.265   |
| 1.322 | 1.318  | 1.314  | 1.310  | 1.306  | 1.302  | 1.298  | 1.294  | 1.290  | 1.286  | 1.282   | 1.278   | 1.274   |
| 1.332 | 1.328  | 1.324  | 1.320  | 1.316  | 1.312  | 1.308  | 1.304  | 1.300  | 1.296  | 1.292   | 1.288   | 1.284   |
| 1.342 | 1.338  | 1.334  | 1.330  | 1.326  | 1.322  | 1.318  | 1.314  | 1.310  | 1.306  | 1.302   | 1.298   | 1.294   |
| 1.354 | 1.350  | 1.346  | 1.342  | 1.337  | 1.333  | 1.329  | 1.325  | 1.320  | 1.316  | 1.312   | 1.308   | 1.303   |

With battery fully charged and on charge at the normal rate, the cell voltage will be about as follows:

Average cell voltage at 80° usually falls between 2.5 and 2.7 volts.

Average cell voltage at 100° usually falls between 2.4 and 2.6 volts.

For accuracy always take acid temperature when reading specific gravity.

**ENGINE SERVICE OPERATIONS****CYLINDER HEAD GASKET**

For the most satisfactory results in tightening the cylinder head after installing the cylinder head gasket, tighten all nuts fairly snug, starting with the row on the center line, then going to the others. Retighten in the same order, giving each nut a small part of a turn at a time. Continue this until all the nuts are tight. Do not screw one nut down perfectly tight and then go to the next, as you will not secure an even pressure on the gasket in this manner.

After replacing the cylinder head, it is necessary to assure against leaks by retightening the stud nuts after the engine has been run and the water jacket becomes thoroughly heated. To tighten the nuts properly, the valve rocker shaft assembly must be raised.

Be sure to adjust the valve tappet clearance after the last tightening of the cylinder head stud nuts (see "Valve Adjustment" on page 5).

**REMOVING CYLINDER HEAD OR VALVES**

Whenever the cylinder head or the valve mechanism has been removed, care must be taken when they are replaced that valves are not damaged by coming into contact with the top of the piston, or through improper adjustment of the valve lever screw by being pushed down too far into the cylinder sleeve. To prevent this, always loosen the valve lever screw clear up and bring the piston to the top dead center of the compression stroke. Then screw down on the adjustment screw until the proper clearance is obtained.

After replacing the cylinder head, check to see that there is a clearance of not less than .060-inch or more than .080-inch, between all four starting valve covers and starting valve shaft cam rollers, in Diesel position. If the clearance is incorrect, readjust the operating rod adjusting yoke on the right side of the engine.

**REMOVAL OF PISTONS**

If the pistons are to be removed from the crankcase, care must be taken to see that each part is reassembled in its original place and position. To assist in this operation, pistons, connecting rods and connecting rod caps are marked with the corresponding cylinder numbers 1, 2, 3 and 4, and the cylinder numbers are also marked on the bottom flange of the crankcase.

Each piece should be reassembled so that the numbers correspond. Also, all the numbers should be on the same side of the assembly as the number on the crankcase flange indicates.

**IRREGULAR FIRING OF ENGINE**

The bleeder valves at the top of the injection nozzles at the cylinder head should be opened only in case of irregular firing caused by entrapped air in the injection lines, or if the engine is continuously noisy in one cylinder. Opening the bleeder valve will locate the noisy cylinder and usually indicate a faulty injector.

(See Instructions on page 4, Section 7, for venting fuel system.)

## AIR CLEANING SYSTEM

### OIL CUP

Clean and refill the oil cup every day, or every 8 hours of operation (more frequently when operating under dusty conditions). Refill the oil cup to the oil level bead with the grade of oil specified in the "Lubrication Guide". The oil cup capacity is 5-1/2 pints (U.S.).

Before replacing the oil cup, clean or wipe the oil or grit from the top bead of the oil cup.

### AIR INTAKE CAP AND TOP CASTING

The screen in the air intake cap prevents chaff and other coarse dirt from getting into the air cleaner. This screen should be kept clean and free from all chaff, oil, dust, or paint because clogged holes in the screen will reduce the power of the engine by restricting the flow of the air.

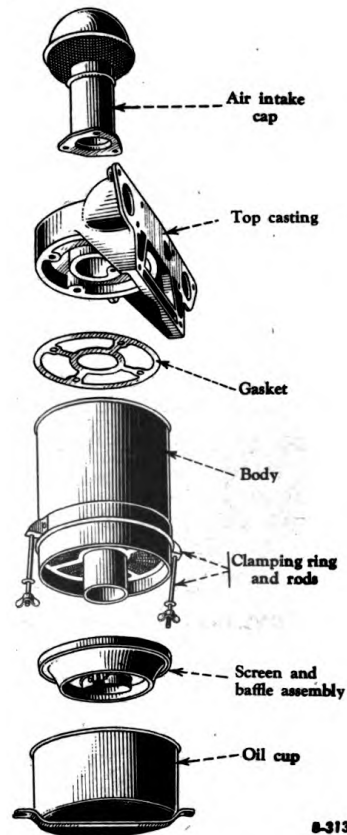
### WASHING THE CLEANER

After every 64 hours of operation, particularly if operating the tractor in an atmosphere heavily laden with dust, chaff or lint, remove the entire air cleaner from the tractor and completely disassemble it. Wash the parts thoroughly in Diesel fuel; solvent, dry cleaning; or kerosene. Be sure to clean out the air intake pipe, also thoroughly clean out the inside of the top casting.

After all the parts have been thoroughly cleaned, replace the air cleaner body on the tractor. Make sure all the joints are airtight, then replace the air intake cap. Fill the oil cup to the proper level with the specified grade of oil and replace it on the air cleaner. Be sure it is held securely in place by the cup clamps.

### GENERAL PRECAUTIONS

As an added precaution against dirt getting into the engine, frequently inspect the flexible rubber hose connections between the carburetor and the air cleaner. If they show any sign of deterioration, replace them.

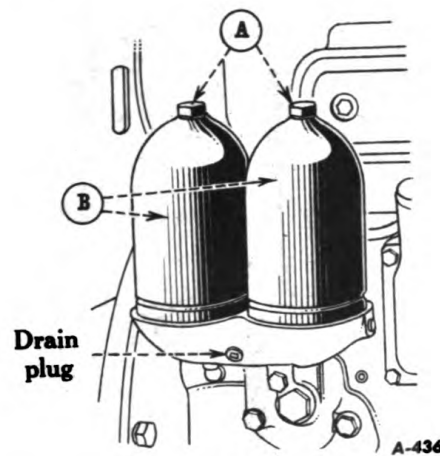


Illust. 1  
"Exploded" View of the Air Cleaner  
Removed from the Tractor.

To eliminate strain on the rubber hose connections be sure the pipes line up.

All joints between the air cleaner and carburetor, manifold and the cylinders of the engine should be tight. All the gaskets must be in a good condition and the bolts should be drawn up tight.

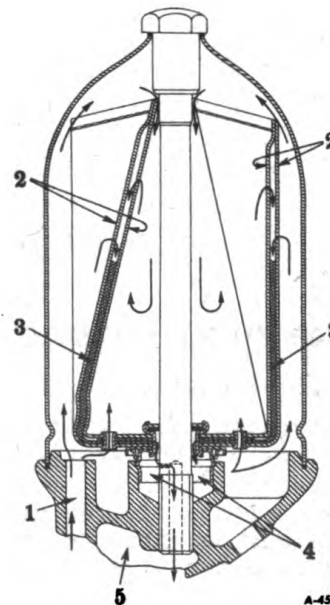
## LUBRICATING OIL FILTERS



Illustr. 2  
Showing Dual Oil Filters Assembled.

The life of the engine depends upon clean oil being circulated to all bearings. Every good tractor operator knows that minute particles of abrasive matter eventually accumulate in the crankcase of the engine, and that in the normal course of engine operation, the lubricating oil undergoes changes which produce sludge, acids, gums, varnish, and other harmful by-products.

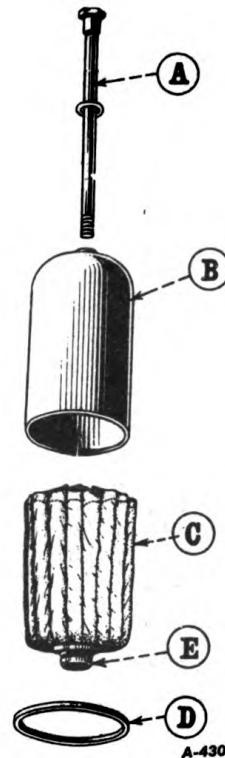
The purpose of the oil filters is to separate and remove the dirt and other foreign substances from the oil to prevent these injurious materials from being circulated to the engine. The oil filter elements should be replaced each time the engine oil in the crankcase is changed. (Refer to the "Lubrication Guide".) Close adherence to the simple, common-sense procedure for keeping dirt and oil impurities away from precision-made engine parts will safe-guard the tractor engine against undue wear and the operating troubles and upkeep expense which are a natural result of that condition.



Illustr. 3  
Cutaway view of filter showing; (1) oil inlet; (2) replaceable filtering element; (3) mesh screen separator to provide passage for filtered oil between inner and outer layer of element; (4) outlet for filtered oil; (5) filtered oil return.



LUBRICATING OIL FILTERS - Continued



Illustr. 4  
Detail of Oil Filter Disassembled.

TO CHANGE FILTER ELEMENTS

- (1) Stop the engine.
- (2) Remove the oil filter base drain and allow the oil filters to drain completely.
- (3) Clean off the filter cases to eliminate any possibility of dirt dropping into the base.
- (4) Unscrew and remove the retaining bars "A".
- (5) Lift up and remove the cases "B".
- (6) Remove the old elements "C".

NOTE: If some special equipment on the tractor prevents the lifting of the case "B" over the element "C", remove the case and the element as a unit.

(7) Wipe out the base and the cases with a cloth dampened with kerosene.

(8) See that the case gaskets "D" are in position. Replace the drain plug in the filter base and install the new filter elements (pilot "E" must be down). Replace the cases and retaining bars "A" and draw the nuts up tight.

(9) Check the oil level in the crankcase to see that the new oil is up to the proper level (see "Lubrication Guide"). Now start up the engine, see that oil pressure indicator is registering pressure and inspect the filter for oil leaks.

VALVE CLEARANCE ADJUSTMENT

Check the valves for clearance every 500 to 512 hours and adjust the clearance if necessary. A clearance of .018-inch is necessary between end of the valve levers and the valve stems when the valves are closed, when engine is hot.

(1) Before checking the valve clearance, cut out the magneto by pulling the cable "E" (see *Illust. 3, Section 5*) out of the socket. This will eliminate any danger of accidentally starting the engine.

(2) Set the compression release lever in low compression position (gasoline operation).

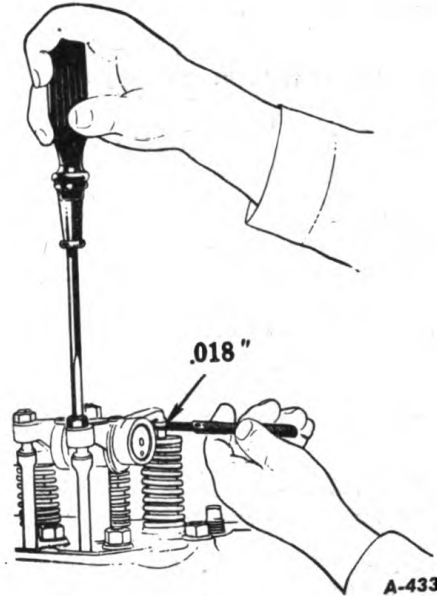
(3) Remove the valve housing.

(4) Remove the spark plug from the No. 1 cylinder (the cylinder next to the radiator).

(5) Place your thumb over the spark plug opening and slowly crank the engine until an outward pressure can be felt. Pressure indicates No. 1 piston is moving toward upper dead center of the compression stroke.

(6) Continue cranking slowly until the notch marked "D.C." on fan drive pulley is in line with timing pointer in the front crankcase cover. (See *Illust. 6, Section 5*.) Both the valves are now closed on compression stroke of the No. 1 cylinder.

(7) Loosen the lock nut and adjust the screw in the valve lever so that the gage slips snugly between the end of the valve lever and the valve stem (see *Illust. 5*). Tighten the lock nut and recheck clearance.



Illust. 5  
Gaging Valve Levers  
with a Feeler Gage.

(8) Crank the engine 1/2 of a revolution at a time and check the clearance of each cylinder's valves and adjust the clearance if necessary. Do this on each set of cylinder valves in succession according to the firing order of the engine, which is 1, 3, 4, 2.

(9) Replace the valve housing. Check to see that the valve housing gasket makes an oil tight seal with the cylinder head. Replace the gasket with a new one if necessary.

(10) Replace the magneto cable "E" into the socket from which it was removed.

**IMPORTANT!** Be accurate - use a feeler gage for checking the valve clearance.

## SUGGESTIONS FOR CHECKING TROUBLE

*Study the problem before making any changes.*

If any adjustments are to be disturbed, the original setting should be noted, so this same setting may be restored in case the part changed does not remedy the trouble.

### FAILURE TO START ON GASOLINE:

No gasoline in carburetor.  
Gasoline supply cock closed.  
Carburetor choked too much.  
No spark from magneto.  
Gears engaged (transmission).  
Gasoline starting device not set.  
Condensation on spark plugs.

### MISSING AND BACKFIRING:

Water in gasoline.  
Air leaks around intake manifold.  
Starting valves not properly seated.

### FAILURE TO CHANGE OVER TO HIGH COMPRESSION OPERATION:

Starting valve mechanism sticks.  
Injection pump not primed (vent air).  
Fuel supply cock closed at tank.  
Speed control hand lever not set in proper position.  
Fuel supply pump not developing fuel pressure.

### LACK OF LUBRICATING OIL PRESSURE:

Insufficient amount of oil.  
Dirt under pressure regulating valve.  
Oil pump strainer clogged or pump not working.  
Broken oil pressure indicator or pipe lines.

### LACK OF POWER:

Injection pump air bound (vent air from fuel system).  
Insufficient fuel, filter clogged, supply pump not working properly.  
Clutch slipping, exhaust pipe or air cleaner clogged or restricted.

*(Also see "Lack of Compression" and "Overheating".)*

### KNOCKING:

Loose piston pin, connecting rod, camshaft or crankshaft bearing.  
Broken piston rings or loose pistons.  
Combustion knock in one or two cylinders generally indicates leaky injection nozzle valve.  
General rough running usually due to improper timing of injection.  
Poor grade of fuel, or water in fuel.  
Excessive carbon in cylinder.

### LACK OF COMPRESSION:

Sticky, dirty, pitted or improperly adjusted valves.  
Stuck, worn or broken piston rings.  
Worn pistons or cylinder sleeves.  
Leaky cylinder head gasket.  
Leaky gasoline starting valve.

*(Also see "Lack of Oil Pressure".)*

### OVERHEATING:

Insufficient amount of water, fan belt slipping, excess load on engine.  
Inside of radiator and cylinder block limed up or clogged with dirt.  
Outside of radiator or radiator screen covered with dirt or chaff.  
Lack of oil pressure, or water pump not working properly.  
Water pump air bound.

### ENGINE SMOKES:

Overloaded injection of fuel too early, lack of compression, poor grade of fuel, piston pumping lubricating oil.

### EXCESSIVE LUBRICATING OIL CONSUMPTION:

Oil leaks, pistons pump oil, poor grade of lubricating oil being used, piston rings stuck in grooves.

If the injection pump does not perform properly, notify the proper maintenance personnel at once.

## OPERATIONS SECTION

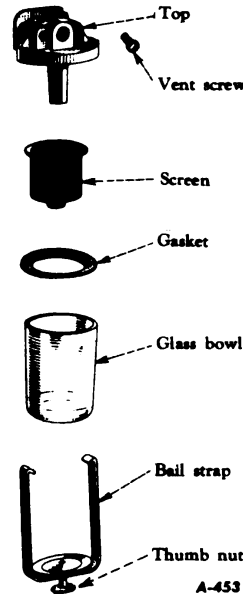
### DIESEL FUEL WATER TRAP

Clean fuel is an important factor for successful Diesel engine operation. The fuel is strained and filtered between the tank and the injection pump by the fuel water trap and filter.

After reassembling, open the fuel shut-off valve under the tank, then open the vent screw to vent any air. See *Instructions on page 4 for venting the air.*

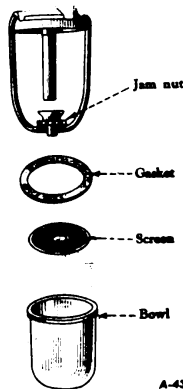
#### CLEANING

The fuel oil water trap, located on left hand side of engine, should be taken apart and cleaned at least every 64 hours. To do this, close fuel shut-off valve under the tank. Remove the bolt and remove the entire water trap from the engine. Then loosen the thumb nut under the water bowl and remove the bail strap. Then remove the glass bowl. Loosen the gasket and pull the screen off the tube. If the screen is dirty, wash the screen and the glass bowl in Diesel fuel; solvent, dry cleaning; or kerosene to remove all dirt and sediment. Reassemble the screen and the gasket. The gasket must be in its proper place, and in good condition. Reassemble the glass bowl and the strap and tighten the thumb nut by hand. Then assemble the entire water trap to the bracket by tightening the bolt.



Illust. 1  
Fuel Strainer and Water Trap

### CLEANING THE GASOLINE STRAINER AND SEDIMENT BOWL



Illust. 2  
Gasoline Strainer Showing Glass Bowl Removed for Cleaning.

The gasoline strainer, located under the gasoline tank, should be cleaned at the interval specified under "Periodical Inspections," page 14, Section G. To clean the strainer close the gasoline shut-off valve and take the strainer apart by loosening the lower jam nut and disassembling the strainer. Clean the screen and sediment bowl if necessary.

When reassembling the strainer be sure the cork gasket between the bowl and the main body is in good condition and does not leak.

## OPERATIONS SECTION

### DIESEL FUEL FILTER

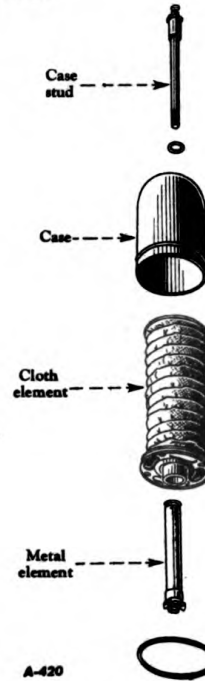
#### COMBINATION CLOTH AND METAL ELEMENTS

The Diesel fuel filter located on the left side of engine should be taken apart and the elements cleaned regularly at the interval specified in the "Lubrication Guide".

#### TO CLEAN THE ELEMENTS

(1) Remove the case stud and the case.

(2) Remove the elements and wash both the metal and cloth elements with kerosene or fuel oil. After cleaning the fuel filter elements, vent the air from the injection system before operating on the Diesel cycle. This should be done as described on page 4.



Illust. 3  
Showing the Diesel Fuel Filter  
Taken Apart for Cleaning.

### GOVERNOR

The governor of this engine is an integral part of the fuel injection pump and is fully enclosed and sealed at the factory. It operates in a bath of oil and its function is to maintain the engine speed selected by the operator and to automatically proportion the fuel to the load.

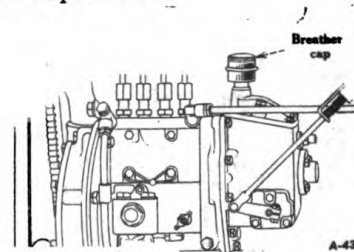
#### ENGINE SPEED

Never operate the engine at more than the regular governed speed. Excessive speeds are harmful.

The rated or maximum full load governed speed is 1350; maximum idle speed is 1470 to 1530 R.P.M.; minimum speed (hand throttle) is 425 R.P.M.

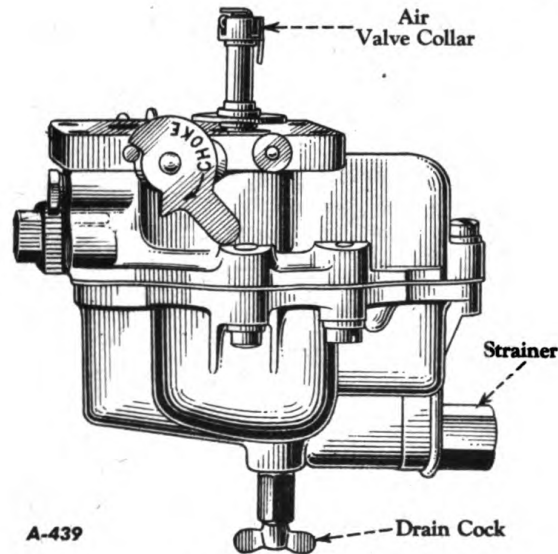
#### CLEANING GOVERNOR BREATHER CAP

The breather cap should be removed and cleaned every 240 to 256 hours, or more often if dusty conditions require it. To clean the breather, wash it in Diesel fuel; solvent, dry cleaning; or kerosene, dip it in engine lubricating oil and replace it after the excess oil has been wiped off.



Illust. 4

## DIESEL DUAL MANIFOLD STARTING CARBURETOR



Illustr. 5  
Starting Carburetor

The Diesel dual manifold starting carburetor is used only when starting the engine. The gasoline level is controlled by a conventional float and float valve mechanism when starting and running on gasoline. The float valve is locked into its seat, shutting off the gasoline supply to the fuel bowl when the engine is changed over to operate on the Diesel cycle.

The float valve is protected against dirt and foreign material by a strainer. This strainer should be removed occasionally and cleaned.

**NOTE:** Periodically, check the screw which fastens the fuel bowl to the fuel bowl cover; also see that the cover screws are kept tight to prevent any leakage of air past the fuel bowl cover gasket.

#### TO CLEAN STRAINER

- (1) Close the gasoline shut-off valve at the gasoline tank.
- (2) Disconnect the gasoline pipe at the carburetor.

- (3) Unscrew the strainer fitting from the carburetor, wash it in Diesel fuel; solvent, dry cleaning; or kerosene and reassemble.

- (4) Open the gasoline shut-off valve.

#### ADJUSTMENT

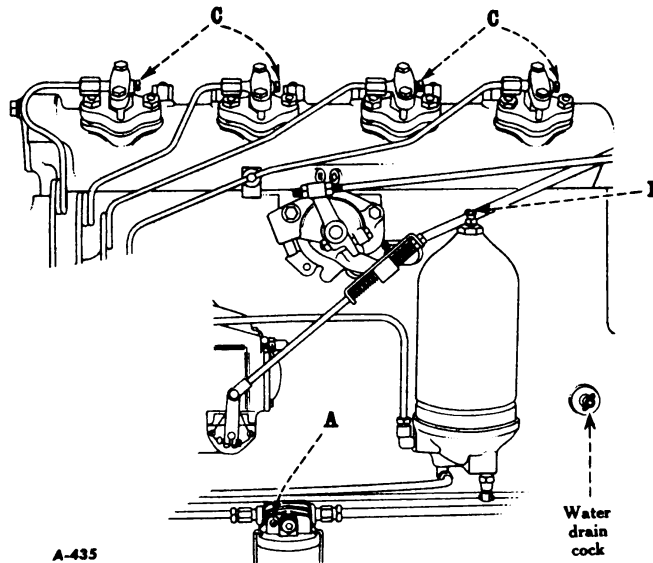
The speed of the engine, when operating on gasoline, is controlled by the amount of opening of the air valve. The maximum valve opening is set by the adjustment of the air valve collar. This opening should be  $9/64$ -inch.

The starting choke regulates the air for starting.

**CAUTION:** The present day grade of gasoline has a tendency to form gum. It is necessary therefore, that the gasoline tank and the fuel bowl be completely drained of fuel when the engine is to be out of service for more than two weeks.

These gum deposits can be completely dissolved with a mixture of one part of alcohol and one part of benzol, or with acetone.

VENTING AIR FROM INJECTION NOZZLES,  
FUEL FILTER AND WATER TRAP



Illust. 6  
Air Vents at Fuel Filter  
and Injection Pump Nozzles.

**NOTE:** The engine will fail to run on the Diesel cycle if there is any air in the fuel injection system. If air is present in the fuel injection system, it will be necessary to bleed the air from the system by following the procedure outlined below:-

To remove the air, it is necessary to bleed the system by opening the vent cocks successively on the water trap, fuel filter and injection nozzles.

(1) With the fuel tank shut-off valve open, open the vent cock "A" on the water trap (with engine stopped).

(2) Close the vent cock when the fuel starts to flow.

(3) Open the fuel filter vent cock "B"; then start the engine. With the engine operating on the gasoline cycle, advance the engine speed control lever slightly while venting the fuel and injection line.

(4) Close the vent cock when the fuel starts to flow.

(5) Open each nozzle vent "C" individually. Close each cock when the fuel starts to flow.

**REMOVING AND REPLACING FUEL INJECTION PUMP**

In case it becomes necessary to remove the complete fuel injection pump from the engine, the following instructions should be followed:

- (1) Keep all parts clean.
- (2) Before removing any fuel lines from the pump, first thoroughly clean the pump and connections with fuel oil. When the lines are removed the connections on the engine should be covered to prevent dirt from entering the system.
- (3) Close the fuel shut-off valve at the tank (see *Illust. 2, Section G*). Put the compression release lever in the gasoline position. Disconnect the center terminal at the magneto distributor cover.
- (4) Disconnect all the fuel lines attached to the injection pump.
- (5) Disconnect the injection pump control rod.
- (6) Remove the pump gear cover and remove the cap screws "A" holding the hub, gear and pointer together (see *Illust. 7*).
- (7) Remove the complete injection pump assembly after taking out the four screws at the rear of the timing gear compartment and the one at the front inside.

**TO REPLACE INJECTION PUMP**

(See *Illust. 7*)

- (1) Crank the engine until the No. 1 cylinder is at the top dead center of the compression stroke. This position can be determined by removing the No. 1 spark plug, placing the thumb over the opening and cranking the engine slowly until an outward pressure is felt.

Continue cranking slowly until the notch marked "DC" on fan drive pulley is in line with the timing pointer in the front crankcase cover.

- (2) Check the pump gasket and the cover gasket to be sure they are clean, and assemble them in place.
- (3) Assemble the injection pump to the engine and secure it by center, inner and lower screws.
- (4) Place the injection pump gear "C" on the drive hub "B" and assemble the gear (with engine at the top dead center compression No. 1 cylinder), so that the chamfered tooth "D" on the gear lines up with the "DC" mark on the front cover "E" which is located at the right side of the opening above the center.

*Under no conditions should an attempt be made to retime the engine with the front cover in place by matching the "K" marks on the injection pump gear and the idler gear.*

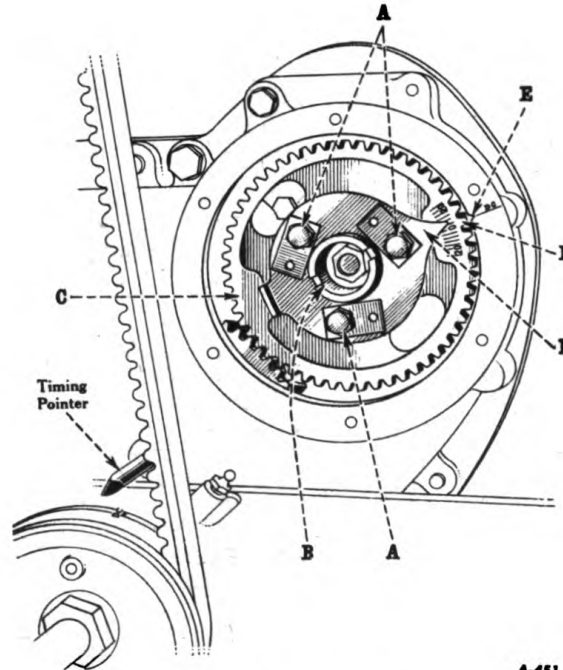
- (5) Turn the injection pump gear hub "B" until the deep groove on the hub lines up with the "zero" graduation mark on the gear. Place the timing pointer "F" on the hub with the pointer at 0° position against the gear face. While in this position bolt the hub, gear and pointer together with the cap screws "A" in this position.

- (6) Replace the fuel pump gear cover. Reconnect the controls and fuel lines. Replace the magneto terminal and the spark plug. Turn on the fuel.

- (7) Start the engine, bleed the fuel system (see page 4), and reset the injection timing as required (see page 6).



**INJECTION PUMP TIMING**



**Illust. 7**  
**Injection Pump Timing.**

The injection timing may be advanced or retarded by means of the slots in the gear. This adjustment must be made when engine is not operating.

The injection pump is fitted with a timing adjustment. The pump timing adjustment indicator is bolted through the slots in the injection pump gear to the gear hub. The gear hub is keyed to the injection pump shaft. The pump gear timing indicator can be seen by removing the pump gear cover.

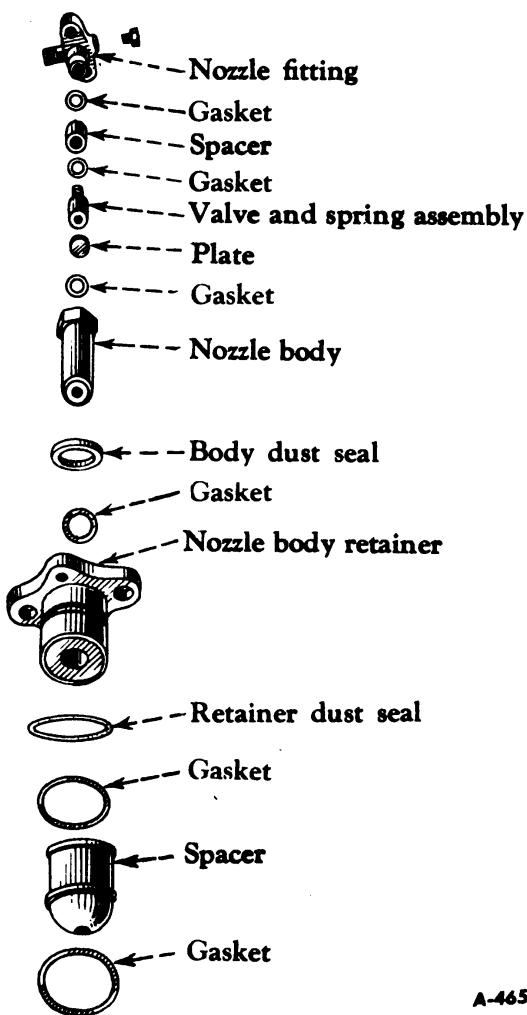
The adjustment is normally set with the indicator on the center mark of the graduations on the pump gear. To assure the best operating conditions, the indicator can be tried on either side of the center mark and set at the best operating position.

To change the location of the indicator, "F", loosen the cap screws "A" which hold the indicator and the gear hub "B" to the gear "C", and turn the gear hub "B" until the indicator is at the desired position. Then tighten the cap screws "A" (see *Illust. 7*).

For advanced position, turn the gear hub clockwise and for retarded position, turn the gear hub counterclockwise.

The correct adjustment is obtained when the engine speed is maximum for a fixed load and the engine operation is smooth with a clean exhaust.

INJECTION NOZZLE



A-465

Illustr. 8  
Injection Nozzle.

If any cylinder seems to fire too noisily, it probably is an indication that the injection nozzle valve is leaking badly. If this occurs, clean the nozzle and fitting thoroughly with clean fuel oil. Remove the nozzle and disassemble it. A leaky valve will gen-

erally have a black appearance. Clean the valve and seat, and wash in clean Diesel fuel; solvent, dry cleaning; or kerosene (*see Illustr. 8*).

The nozzle plate should be free of carbon. There should be no carbon in the nozzle body spacer.

**OPERATIONS SECTION**

---

**MEMORANDA**

## OPERATIONS SECTION

### GENERAL ENGINE LUBRICATION

The life of any engine depends on the care it is given. Proper lubrication is very important.

This engine has a pressure feed lubrication system. A gear type oil pump circulates the lubricating oil under pressure to the crankshaft bearings, connecting-rod bearings, valve mechanism, timing gears, and governor, thereby assuring positive lubrication of all parts.

The engine is equipped with two oil filters which clean the oil continuously while the engine is running. To obtain the full benefit from the filters, the elements should be replaced with new ones every time the oil in the crankcase is changed. (See "Lubrication Guide" for the proper oil change interval.) (Cleaning the old elements is not satisfactory.)

#### OIL LEVEL GAGE

Do not run the engine for any length of time when the level of the oil is below the low mark on the gage.

To test the oil level with the bayonet gage, unscrew the wing nut, remove the gage, wipe it clean and insert it in crankcase until wing nut rests on top of the gage sleeve threads. Do not screw nut onto the sleeve. Remove gage and read oil level. NOTE: Do not check oil level while the engine is running.

#### OIL PRESSURE INDICATOR

An oil pressure indicator indicates the pounds of pressure of the oil circulating through the engine. Under all operating conditions, the pressure of the oil in the engine should hold the indicator in the white section of the gage. Should the indicator not register, stop the engine at once and inspect oil system to find the cause of failure. If unable to find the cause, notify proper maintenance personnel.

*Always look at the oil pressure indicator immediately after starting engine.*

#### OIL PUMP

The gear type oil pump in the crankcase has a screen attached to the oil intake which stops the large dirt particles from entering the oiling system. This screen should be cleaned whenever the oil pan is removed. The oil intake floats on top of the oil in the crankcase and draws the oil from the surface, thus eliminating the possibility of mixing water or sediment with the oil.

#### IMPORTANT!

Engines shipped to destinations in the United States of America, Canada and Mexico are filled with thinned SAE-10 oil before leaving the factory. This oil, as shipped from the factory, may be used when operating in air temperatures below zero F. (until the next regular oil change). For temperatures above 0° F., use engine oil as specified under the proper temperature range, in the "Lubrication Guide".

After changing to a lighter grade of oil, the engine should be started and run at least 5 to 10 minutes, so that the lighter oil is worked into the bearings and on cylinder walls.

Change oil at the proper interval as indicated in the "Lubrication Guide". Drain crankcase lubricant while the oil is warm so it will drain freely. (All lubricating oil is drained from the crankcase of engines for export. See "Lubrication Guide" for oil to use.)

#### ENGINE LUBRICATING OIL

Engine lubricating oil shall be of well-refined petroleum oils, free from water, sediment, and without admixtures of fatty oils, acids, soaps, resins or any other substance not derived from petroleum. Oil shall not corrode any metal used in engine construction. Also engine lubricating oil containing additive products not necessarily derived from petroleum, but being of non-corrosive type, is satisfactory for use in our engines.

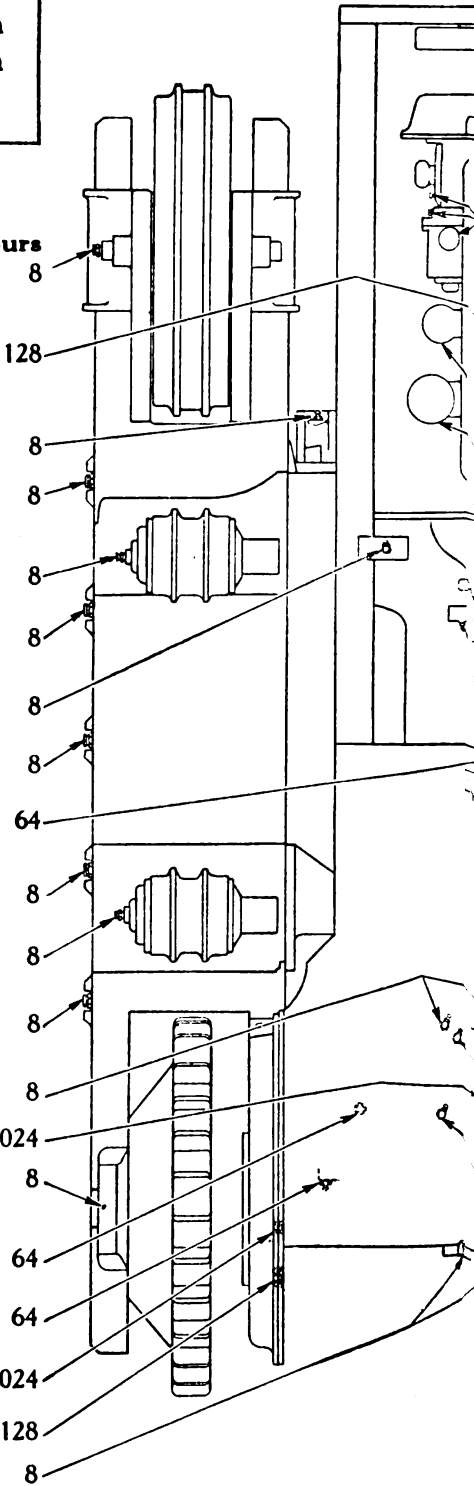
*See special instructions for "COLD WEATHER OPERATION" on pages 11 and 12 of Section G.*

*Manufacturer's Serial Number located on plate on upper left-hand corner of dash.*

**CAUTION!** All points indicated by short-shaft, dotted arrows are points that are on both sides of vehicle and must be serviced in accordance with instructions for similar point on opposite side.

| INTERVA   |           |
|---|-----------|
| 8 =   | 8 hours   |
| 64 =  | 64 hours  |
| 96 =  | 96 hours  |
| 128 =   | 128 hours |
| <b>CHECK DAILY</b><br>Crankcase, Air Cleaner,<br>Pump (if used) |           |

|  |    | Lubri-<br>cant Hours |
|--|----|----------------------|
| Front idler (see table). (Note 13).....                      | GO | 8                    |
| Crankcase drain plug. (Note 3).....                          | .. | 128                  |
| Track frame guide roller.....                                | CG | 8                    |
| Track roller (see table). (Notes 8 and 13)                   | GO | 8                    |
| Track idler (see table). (Note 13).....                      | GO | 8                    |
| Track roller (see table). (Notes 8 and 13)                   | GO | 8                    |
| Steering brake pedal shaft. ....                             | CG | 8                    |
| Track roller (see table). (Notes 8 and 13)                   | GO | 8                    |
| Engine clutch compartment drain plug. }<br>(Note 8)          | .. | 64                   |
| Track roller (see table). (Notes 8 and 13)                   | GO | 8                    |
| Track idler (see table). (Note 13).....                      | GO | 8                    |
| Track roller (see table). (Notes 8 and 13)                   | GO | 8                    |
| Steering clutch release bearings.....                        | CG | 8                    |
| Transmission drain plug.....                                 | .. | 1024                 |
| Track frame pivot.....                                       | CG | 8                    |
| Steering clutch compartment drain plug. }<br>(Note 8)        | .. | 64                   |
| Steering clutch pilot bearing. (Note 9)..                    | CG | 64                   |
| Final drive drain plug.....                                  | .. | 1024                 |
| Final drive (see table) (fill and level plug). }<br>(Note 7) | GO | 128                  |
| Track frame diagonal braces.....                             | CG | 8                    |

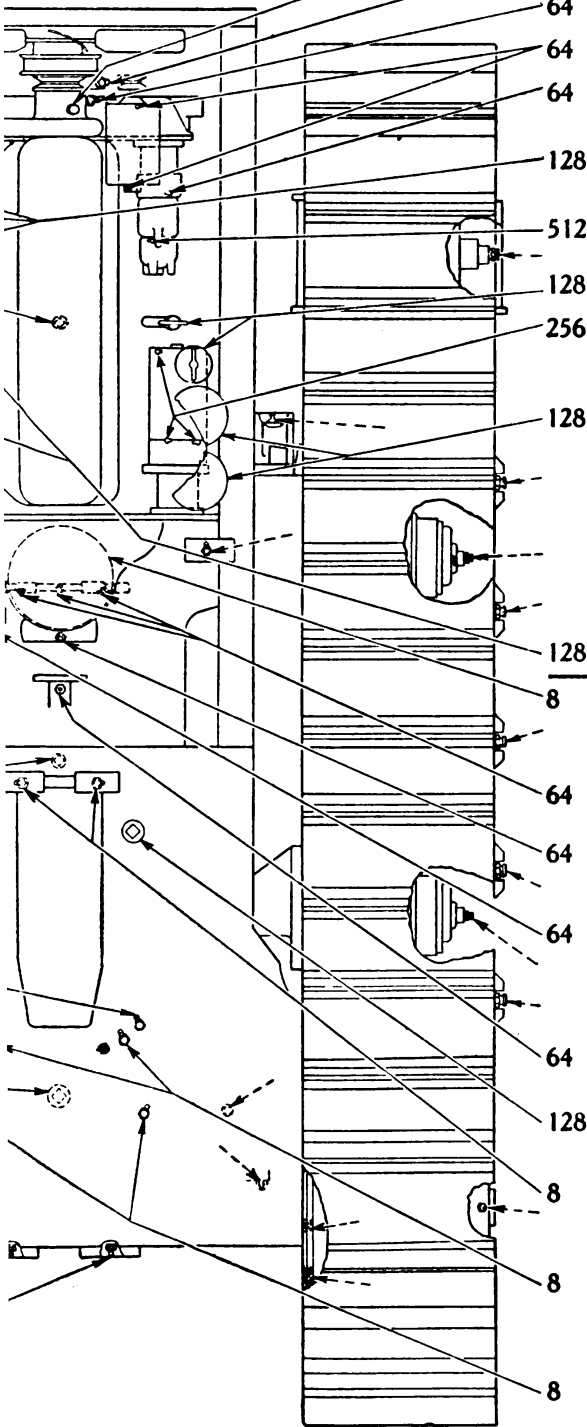


# LUBRICATION GUIDE FOR TD-14 TR.

**S**  
 56 = 256 hours  
 12 = 512 hours  
 24 = 1024 hours

---

and IHC Injection



## SERVICED FROM UNDER HO

| Lubri-<br>Hours cant |          |                                      |
|----------------------|----------|--------------------------------------|
| 8                    | CG       | Water pump shaft (sparingly)         |
| 64                   | CG       | Front engine support                 |
| 64                   | CG       | Fan hub bearing (sparingly)          |
| 64                   | OE       | Generator (sparingly)                |
| 64                   | PS or PL | { Magneto impulse coupling           |
| 128                  | OE       | Injection pump and governor. (N      |
| 512                  | PS or PL | { Magneto distributor bearing. (No   |
| 128                  | OE       | { Crankcase (see table). Drain, refi |
| 256                  | OE       | { Starter (sparingly). Remove cove   |
| 128                  | ..       | Oil filters. (Note 5)                |
| 128                  | ..       | Fuel filters. (Note 4)               |
| 8                    | OE       | Air cleaner. (Note 6)                |
| 64                   | CG       | { Engine clutch camshaft bearings    |
| 64                   | CG       | Engine clutch release bearing        |
| 64                   | CG       | Engine speed control lever           |
| 64                   | CG       | { Engine clutch pilot bearing. (Rer  |
| 128                  | GO       | { Transmission (see table). Fill p   |
| 8                    | CG       | Steering clutch lever bearings       |
| 8                    | CG       | Steering clutch fork lower bearings  |
| 8                    | CG       | Steering clutch fork upper bearings  |

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**TRACK ASSEMBLIES**

If the track chain is too loose it may have a tendency to climb the sprocket when backing the tractor.

When the track adjustment is either too tight or too loose, it causes undue wear on the track links, pins, bushings and bearings, and also on the front idler bearings.

The two heavy coil springs in each track frame are properly set at the factory and require no adjustment. Their purpose is to allow the front idler to recoil under shock but exert no tension on the track when in normal operating position.

On a new unit check the track shoe bolts every 8 hours of operation until it becomes evident that set has taken place. The evidence of set having taken place can be determined when the bolts retain a tightness of 190 to 200 ft. - lbs. The bolts used for attaching the track shoes to the tracks are heat-treated alloy bolts and they will stand considerable tightening strain (common bolts should not be used.)

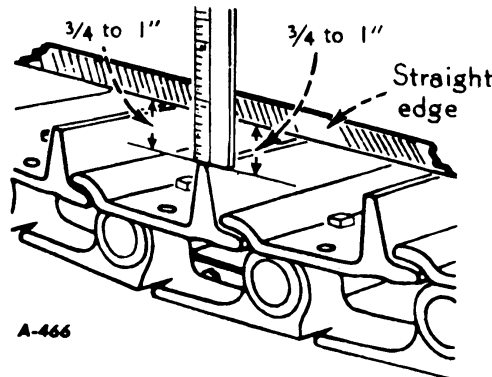
While tightening the bolts it is well to strike the head of the bolt several sharp hammer blows and re-tighten. As a safety measure we

recommend you use goggles to protect your eyes while striking the bolts.

**METHOD OF CHECKING SLACK IN TRACK CHAIN**

To check the slack in the track chain, the chain must be tight everywhere except on the top, between the front idler and the sprocket. This can be accomplished by placing a wooden block, approximately one foot in height, under the foremost track shoe lug; then, with the engine running, put the tractor in low gear and engage the clutch just enough so the sprocket drive tightens the chain along the ground and around the sprocket. After locking the brake and stopping the engine, stand on top of the track chain. Your weight will pull the chain tight around the front idler. All the slack should now be in the top part of the track chain.

Using a string or a straight edge align the tips of the track shoe cleats across each of the three spans between the top idlers and sprocket and front idler. The sag of the chain under the straight edge of each span should be approximately 3/4 to 1 inch. (See *Illust. 1*).



Illust. 1  
Check Slack in Track Chain.



TRACK ASSEMBLIES

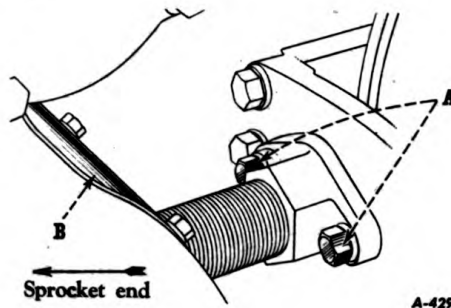
TO ADJUST TRACK CHAIN

(See *Illust. 2*)

If adjustment is necessary, remove the small cover plate "B" at the front of the equalizer spring housing and loosen the track spring adjuster lock bolt just inside the housing. Remove the two cap screws "A" at the front of the track spring adjuster. Turn the adjuster clockwise, as viewed from rear (sprocket end); this pushes the front idler forward, tightening track chain. Turn the adjuster counterclockwise to loosen the track chain.

After the correct adjustment has been obtained, replace the cap screws "A", tighten the lock bolt and replace the cover plate "B".

After the track chain has been thoroughly broken in it is well to check the slack and adjust it if necessary.



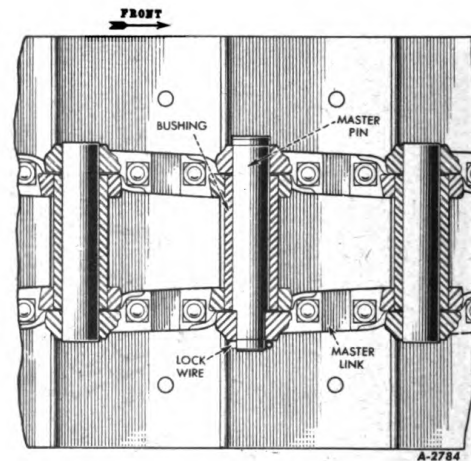
Illust. 2  
Adjusting Track Chain.

REMOVING THE TRACK

To remove the entire track from the tractor, drive the tractor forward until the track link master pin is in the front of the front idler. The tractor should be level when removing the track chain. Loosen the tension in the track chain by turning the adjuster counterclockwise as described under "TO ADJUST TRACK CHAIN".

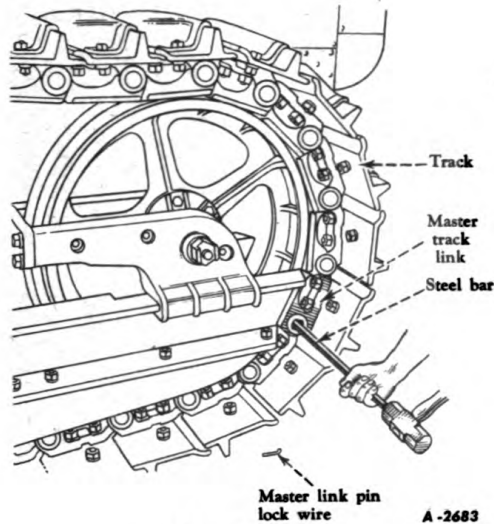
Remove the track link master pin by removing the master pin lock wire and driving out the master pin (see *Illust. 4*). Run the tractor backward until it is at the end of the track. Place a plank flush against the rear of the track when the track is flat on the ground as shown in *Illust. 5*. The plank should be approximately the same thickness as the track, narrow enough to fit between the track frame shields, and long enough so the entire tractor can rest on the plank. Now, back the tractor off the tracks and on to the plank.

NOTE: If it is desired to replace the old track with a new one, remove the old track as mentioned previously and place the new track flush against rear of the old track when the track is flat on the ground.



Illust. 3  
Track Link Master Pin Assembly.

REMOVING THE TRACK - Continued



Illust. 4  
Master Link Pin Removal

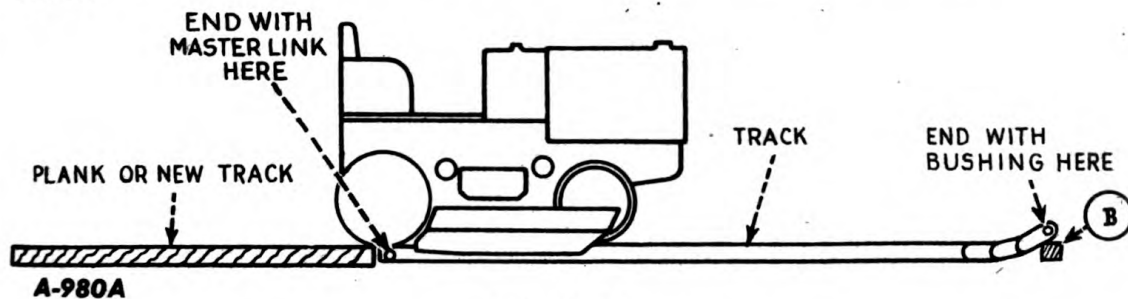
When replacing the track, place the track flush against the plank. The end with the bushing should be in the position shown in *Illust. 5*. Run the tractor forward on to the track until the sprocket is slightly ahead of the rear end of the track. Put a crowbar through the master pin hole and pull track up around the sprocket and forward over the track idlers and front idlers as the tractor is driven forward.

Place a block (about 8 to 10 inches high) under the cleat of the shoe on the last link of the track at "B", *Illust. 5*, to hold the track against the idler. Engage the engine clutch and apply just enough power in forward speed to take the slack out of the bottom part of the track. Then, replace the master pin and the lockwire. Adjust the tension in the track chain as described on page 1.

**CAUTION:** Drive the tractor forward in low speed with the engine speed control lever in the idle position and ride the brakes so that the tractor does not go too fast.

TRACK ROLLER LUBRICATION

It is important that the track rollers have the proper lubrication. (See "Lubrication Guide", section 8, for further information).



Illust. 5

**OPERATIONS SECTION**

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**MEMORANDA**

# TracTractor Model TD-14

## REPAIR SECTION

The various assemblies in this tractor are arranged alphabetically, in sections, according to their function.

Each section has a black tab which lines up with the corresponding section name and number shown at the right. The black tabs are quickly located by bending this book back.

The contents of each section can be determined at a glance by referring to the index on the other side of this page.

*NOTE: Refer to Section 14, page 1, for important note on tolerances clearances and oil seals.*

COOLING SYSTEM 1

ELECTRICAL 2

ENGINE 3

ENGINE CLUTCH 4

FINAL DRIVE 5

FRAME 6

FUEL SYSTEM 7

POWER TAKE-OFF 8

POWER TRAIN 9

STARTING SYSTEM 10

STEERING  
MECHANISM 11

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TRANSMISSION 13

SERVICE CHARTS 14

# REPAIR SECTION

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**REPAIR SECTION**

**COOLING SYSTEM**

**Specifications**

|                                    |  |
|------------------------------------|--|
| Type . . . . .                     | Centrifugal Pump Circulation                     |
| Radiator . . . . .                 | .IHC Flat Tube                                   |
| Thermostat, opens at . . . . .     | 165°   |
| Thermostat, wide open at . . . . . | 190°   |
| "V" Belt Drive . . . . .           | Adjusted by turning one<br>flange of pump pulley |
| Capacity U.S. Gallons. . . . .     | 20   |
| Water Pump Capacity G.P.M. . . . . | 87   |
| Fan Diameter, inches . . . . .     | 20   |
| Fan Blades, number . . . . .       | 4  |
| Fan R.P.M. . . . .                 | 2,079  |

**Water Pump**

A positive, centrifugal pump circulates water in the closed system between the engine block, cylinder head, and radiator. The temperature is controlled by a thermostat of the by-pass type, set in the casting attached to front of the cylinder head. The path of the water circulation when the engine is cold is from the radiator bottom, up through the pump, through the engine block, up to the cylinder head, and out into the thermostat, through the thermostat, and is by-passed back into the pump. Any water escaping into the radiator is made up from the supply at the bottom of the radiator.

This circulation during the warm-up period prevents formation of steam pockets. The thermostat starts to open at 165°. The temperature controls the opening of the thermostat which in turn controls the amount of water recirculated through the pump and also the amount of cooler water added from the radiator.

With the thermostat in the wide open position (190°F.), the by-pass is closed, no water is circulated through the pump and flow is

from the cylinder head through the radiator and back to the pump.

The fan assembly, and drive pulley run on ball bearings mounted on a sleeve, (22), *Illust. 1*, is a press fit in the water-pump body, (28). The impeller, (17), is driven through a full-floating type shaft.

Refer to the "Operations Section" for tightening packing, replacing packing, and adjusting fan belt tension.

**Removal of the Water Pump**

The water pump can be removed after disconnecting the hose, removing the fan, fan belt, and bolts holding the pump to the crankcase. A gasket is used between the pump and crankcase at each point where a bolt is used to fasten the pump to the crankcase.

**Disassembly of the Water Pump**

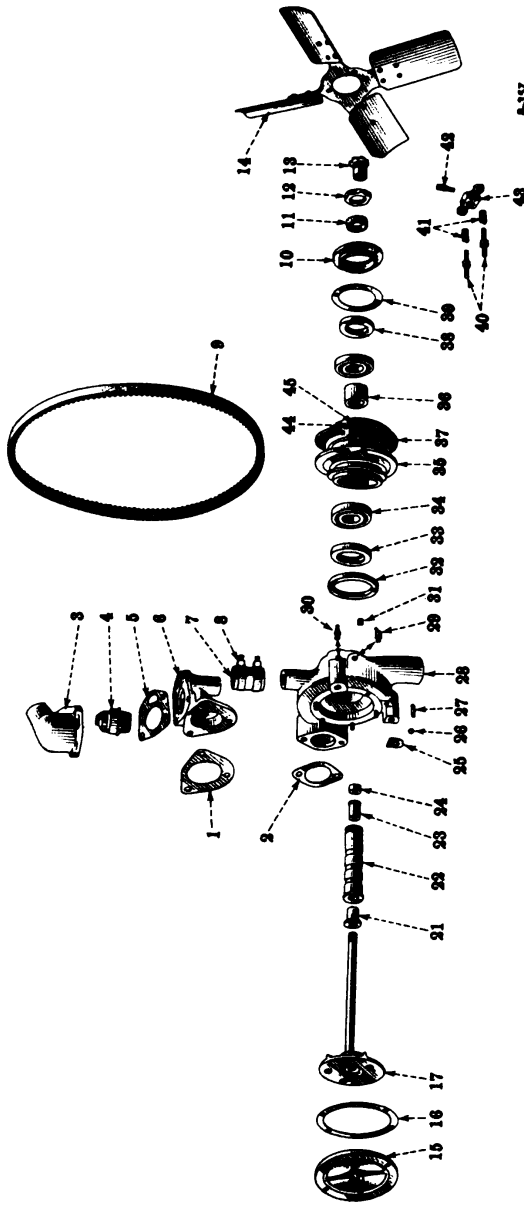
Remove the fan and parts mentioned in preceding paragraphs.

Then take off the bearing retaining nut (12), *Illust. 1*, retainer (10), gasket (39), oil seal (38) and

INT. 5721B (Repair Section)

REPAIR SECTION

COOLING SYSTEM - Continued



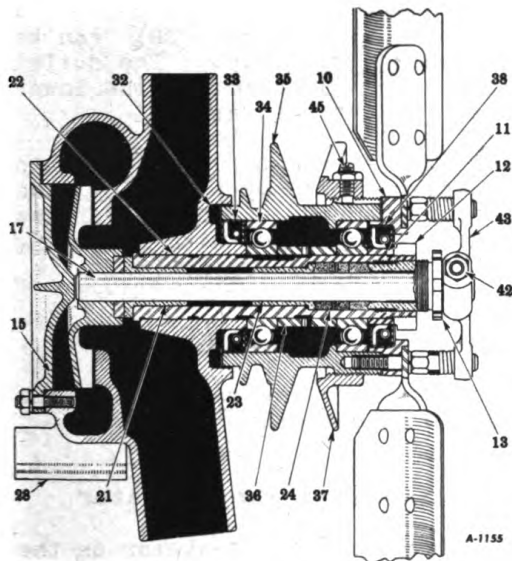
Illustr. 1 - Exploded View of the Water Pump.

| Ref. No. | Description                       | Ref. No. | Description                | Ref. No. | Description                   |
|----------|-----------------------------------|----------|----------------------------|----------|-------------------------------|
| 1        | Gasket.                           | 15       | Cover.                     | 33       | Oil seal, rear.               |
| 2        | Gasket.                           | 16       | Gasket.                    | 34       | Bearing.                      |
| 3        | Thermostat housing.               | 17       | Impeller, with shaft.      | 35       | Pulley hub, with oil seal.    |
| 4        | Thermostat (1650-1900).           | 21       | Thrust bushing.            | 36       | Spacer.                       |
| 5        | Gasket.                           | 22       | Sleeve, with bushings.     | 37       | Pulley flange.                |
| 6        | Outlet elbow.                     | 23       | Bushing.                   | 38       | Oil seal, front.              |
| 7        | Hose (1-5/8" I.D. x 2-3/8" long). | 24       | Packing.                   | 39       | Gasket.                       |
| 8        | Hose clamp.                       | 25       | Body spacer.               | 40       | Driving stud.                 |
| 9        | Fan belt.                         | 26       | Plug.                      | 41       | Spring.                       |
| 10       | Bearing retainer.                 | 27       | Body stud.                 | 42       | Pin.                          |
| 11       | Bearing lock sleeve.              | 28       | Body, with plug and studs. | 43       | Driver.                       |
| 12       | Nut.                              | 29       | Lubricator.                | 44       | Hex. jam nut, 5/16" N.C.      |
| 13       | Packing gland.                    | 30       | Lubricator cap.            | 45       | Set screw, 5/16" N.C. x 7/8". |
| 14       | Fan.                              | 31       | Felt washer.               |          |                               |
|          |                                   | 32       |                            |          |                               |

## COOLING SYSTEM - Continued

**Disassembly of the Water Pump -  
Continued from page 1**

bearing, lock sleeve (11). Support the pulley hub (35) in a press and push on the forward end of sleeve (22), removing the sleeve, body, and rear bearing from the pulley assembly. The front bearing can be removed from the hub (35). Be careful to support both races when removing the bearing.



**Illust. 2 - Cross-Section of the Water Pump.** 10. Bearing Retainer; 11. Bearing Lock Sleeve; 12. Nut; 13. Packing Gland; 15. Cover; 17. Shaft with Impeller; 21. Bushing; 22. Sleeve; 23. Bushing; 24. Packing; 28. Body; 32. Felt Washer; 33. Oil Seal; 34. Bearing; 35. Pulley Hub; 36. Spacer; 37. Adjusting Flange; 38. Hub Oil Seal; 42. Driver Pin; 43. Driver; 45. Set Screw.

**Repair of the Water Pump**

The running clearance of the impeller shaft in the bushings is .0015" to .0025". When wear is sufficient, the bushings (21) and

(23) can be replaced with service parts reamed to size. The sleeve (22) is a press-fit in the pump body (28). The impeller shaft (17) is .6215" to .6220" in diameter.

**Reassembly of the Water Pump**

If the sleeve (22) has been removed, press it back into the body (28). Place the felt washer (32) slightly oil soaked, in the groove in the pump body. Assemble the rear bearing (34) to the hub (35), then put the oil seal (33) in the hub, with the lip toward the bearing and the outside edge of the seal flush with the end of the hub.

Place the spacer (36) in the hub (35) and assemble the front bearing in the hub. Grease the bearings with the grease specified in the "Lubrication Guide." Line up the spacer (36) with the inner races of the bearings and press the assembly on the sleeve (22). Weld a couple of spacers together and use them to drive the hub assembly on the sleeve (22). Be sure the rear bearing is against the pump body. Support the sleeve (22) while pressing on the hub.

Assemble the oil seal (38) to the retainer (10) with the lip toward the fan when assembled to the pump.

Place the bearing lock sleeve (11) on the sleeve (22), then the gasket (39), and bearing retainer (10), lining up the holes in the bearing retainer, gasket and hub. Screw the bearing retaining nut (12) on the sleeve (22) and tighten. Place the impeller (17) in the pump, add the packing (24), packing nut (13), fan, and the driver assembly. Replace the cover (15) and gasket (16).

**Replacement of the Water Pump**

The replacement is the reverse of the removal. Be sure all gaskets are new and are in place between the pump and crankcase. Adjust the fan belt tension as covered in the "Operations Section".



COOLING SYSTEM - Continued

**Radiator**

**Removal of the Radiator**

The water must be drained from the system before removing the radiator. Then remove the muffler and engine hood sheet and disconnect the head lamp at the head lamp junction block. The junction is located on the lower right side of the radiator. Disconnect the water hoses (27) and (24), *Illust. 3*, at clamps (17) and (23). Close the gasoline shut-off valve under the starting fuel tank attached to the radiator. Disconnect the fuel line from the tank to the carburetor and remove the gasoline tank from the radiator. Remove the radiator guard and then the radiator grille (2) and screen (33) complete. The radiator assembly can then be lifted out of the tractor.

**Disassembly of the Radiator**

Remove the fan housing sheets (31) and (32) from the rear side of the radiator assembly. The upper water

tank (8) can be removed by taking out cap screws in the core spacers (7) and (30) and also by removing the cap screws from the core stiffeners (6) and (18).

The lower water tank (22) can be removed the same way. The outlet elbow (25) is held to the lower water tank by cap screws.

The core (3) can be reassembled to the water tanks by reversing the above procedure. The overflow pipe (5) is attached with a fitting to the upper water tank (8).

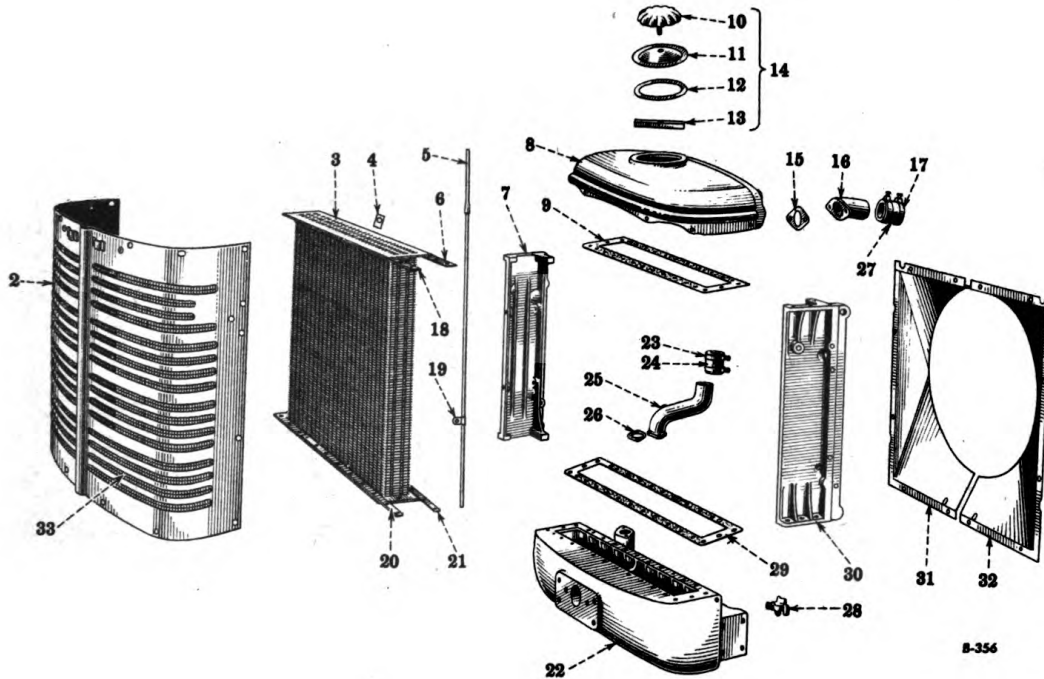
**Reassembly of the Radiator**

Reassembly of the radiator is the reverse of disassembly.

**Replacement of the Radiator**

Replacement of the radiator on the tractor is the reverse of removal from tractor.

COOLING SYSTEM - Continued



Illust. 3 - Exploded View of the Radiator.

| Ref. No. | Description                         | Ref. No. | Description                             |
|----------|-------------------------------------|----------|---|
| 2        | Grille.                             | 18       | Stiffener, front.                       |
| 3        | Radiator core.                      | 19       | Clip.                                   |
| 4        | Overflow pipe gasket.               | 20       | Stiffener, front.                       |
| 5        | Overflow pipe.                      | 21       | Stiffener, lower, rear.                 |
| 6        | Stiffener, upper, rear.             | 22       | Water tank, lower.                      |
| 7        | Core spacer, right hand.            | 23       | Hose clamp.                             |
| 8        | Water tank, upper.                  | 24       | Outlet hose, 2-1/8" I.D. x 2-3/8" long. |
| 9        | Gasket.                             | 25       | Outlet elbow.                           |
| 10       | Cap handle.                         | 26       | Gasket.                                 |
| 11       | Cap cover.                          | 27       | Inlet hose, 2-1/8" I.D. x 2-3/8" long.  |
| 12       | Gasket.                             | 28       | Drain cock.                             |
| 13       | Cap clamp.                          | 29       | Gasket.                                 |
| 14       | Cap, with clamp, gasket and handle. | 30       | Core spacer, left hand.                 |
| 15       | Gasket.                             | 31       | Fan housing sheet, right hand.          |
| 16       | Inlet elbow.                        | 32       | Fan housing sheet, left hand.           |
| 17       | Hose clamp.                         | 33       | Radiator grille screen.                 |

**REPAIR SECTION**

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**MEMORANDA**

ELECTRICAL SYSTEM

Ignition System

|                                    |                                |
|------------------------------------|--------------------------------|
| Magneto Type . . . . .             | International Harvester H-4    |
| Rotation . . . . .                 | Counterclockwise               |
| Magneto Grounding Switch . . . . . | Automatic in Manifold          |
| Breaker Point Gap. . . . .         | .013 inch                      |
| Spark Advance. . . . .             | 15°                            |
| Impulse Coupling Advance . . . . . | T.D.C.                         |
| Magneto Gear, Helical. . . . .     | 27 Teeth                       |
| Drive. . . . .                     | Camshaft                       |
| Spark Plug Size. . . . .           | .7/8-inch, 18, 15/16-inch Hex. |
| Spark Plug Gap . . . . .           | .035 to .040 inch              |
| Firing Order . . . . .             | 1-3-4-2                        |

Magneto

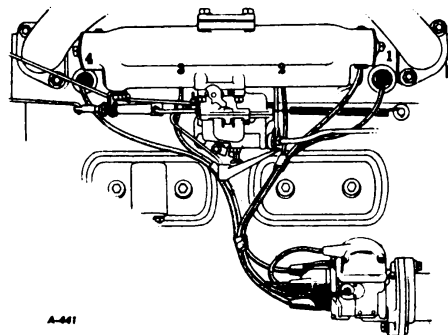
The magneto is driven through the impulse coupling which has a 150 R.P.M. missing speed. Throwout speed is 240 to 330 R.P.M.

The magneto, *Illust. 1*, has a completely enclosed breaker chamber, a starting impulse coupling, and an Alnico rotor magnet that should never require re-magnetizing. The exterior is extremely clean and all possible dirt-catching points have been eliminated. The flange is mounted to a drive bracket which is connected to the front plate of the engine. All shimming and lining up of various bolt holes when coupling the magneto to the engine is eliminated. Fine adjustment of timing is accomplished by rotating the magneto in slotted holes in flanges of the bracket and magneto.

Designed for operation with 4-cylinder engines, the entire mechanism is fully enclosed and protected against entrance of dirt, dust, and moisture. The condenser and coil are located underneath a plastic cover. The magnet is the rotating type, revolving between ends of pole pieces. Near the end of the magnet rotor

shaft is the cam which operates the breaker mechanism. The breaker mechanism is sealed from the coil and distributor compartment. The flat on the extreme end of the magnet rotor shaft drives reduction gears which drive the distributor arm. The distributor cap fits only one way and the No. 1 lead out is plainly marked.

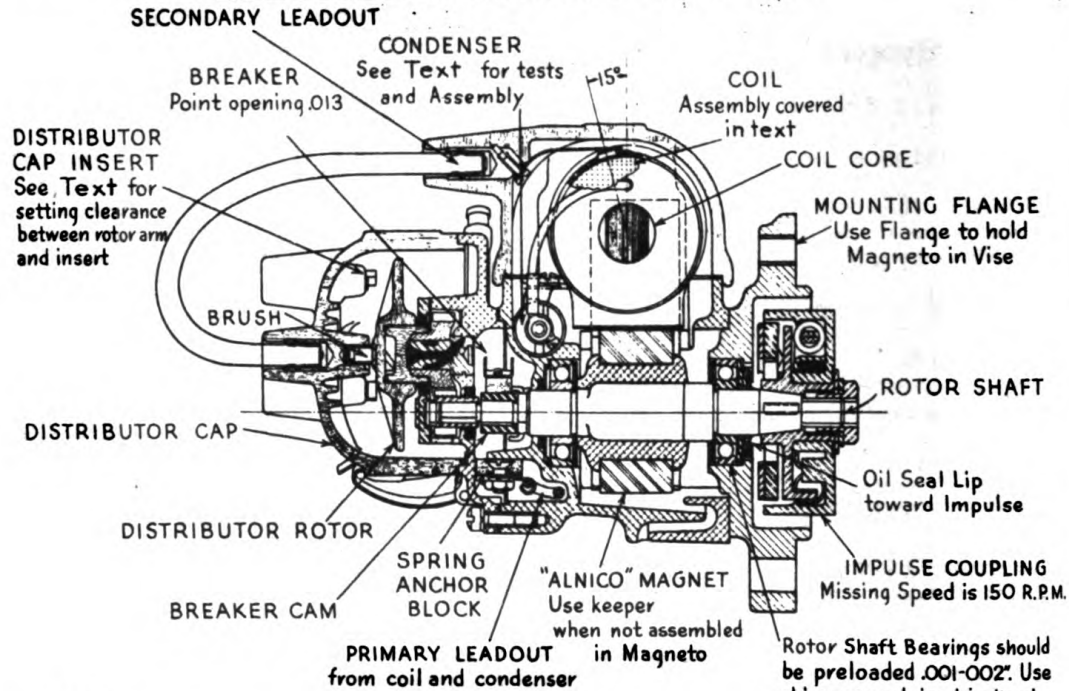
The serial number is stamped on the magneto frame and will identify the magneto and give all necessary information about it.



*Illust. 1*  
Magneto Mounted on the Engine with Wires Connected. Engine Firing Order is 1, 3, 4, 2.

## REPAIR SECTION

### ELECTRICAL SYSTEM - Continued



A-1108

Illust. 2

Cross Section of the International H-4 Magneto.

#### Removal of the Magneto

To remove the magneto, take off the switch cable by removing the fillister head screw and lock washer attaching the wire to the magneto. Pull the spark plug wires from the distributor insert sockets.

The magneto with impulse coupling and gasket are freed after removing the cap screws that secure the magneto to the bracket.

The bracket with the magneto drive can be taken off by running out four 3/8 inch x 1-1/2 inch cap screws that secure it to the front plate.

#### Replacement of the Bracket

To replace the bracket on the tractor, secure the bracket assembly with a gasket to the front plate with four 3/8 inch x 1-1/2 inch cap screws. The double punch mark on the magneto gear should

match the double punch mark on the camshaft gear. To see the timing marks, the crankcase front cover must be removed when replacing this bracket.

#### Replacement of the Magneto

Replacement of the magneto is described in the "Operations Section." Replace the spark plug wires. Replace the switch cable by using a screw with lock washer.

#### Disassembly of the Bracket

Removal can be accomplished as described above.

Bend back the nut lock (10) and run off nut (11), *Illust. 3*, as the first step in disassembling the bracket.

Then, by pressing the drive shaft (6) out of the bracket the gear (9) will be freed. The gear may also be pulled from the shaft.

ELECTRICAL SYSTEM - Continued

Repair of the Bracket

The bushing in the bracket is replaceable, steel-back babbitt. When replacing the bushing, the 9/16 inch holes should be assembled to the front end of the bracket and arranged vertically to coincide with a similar opening in the bracket. The four 3/16 inch holes are then toward the magneto end. The end of the bushing should be flush with the front face of the bracket.

The shaft diameter is .9995 inch to 1.0005 inch and the bushings should be reamed to 1.0015 inch to 1.0030 inch. Replacement bushings should have a running clearance of .001 inch to .003 inch. Particular care must be taken while reaming this hole to have the bore square with the mounting face within .002 inch; if not, the gear will run out, causing a noisy timing gear train.

End clearance of the shaft and gear assembly is .003 inch to .013 inch.

Reassembly of the Bracket

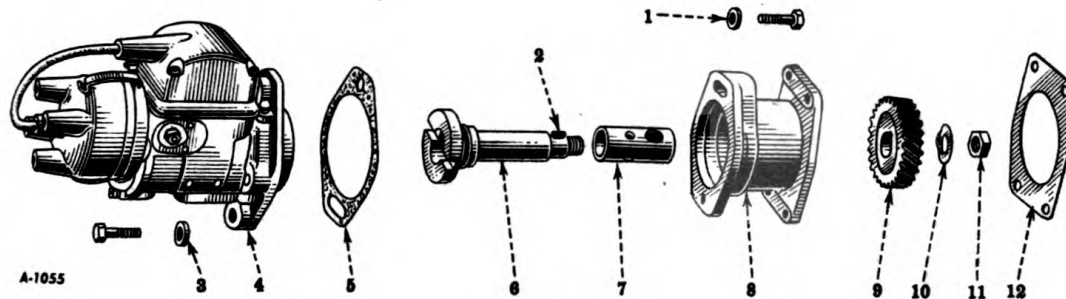
When reassembling, place the drive shaft (6), *Illust. 3*, in the bracket and assemble the key (2).

Press the gear on the shaft and secure it with nut (11) and lock washer (10). The flat side of the gear is assembled against the bracket for end-thrust contact. Check the face of the gear to make sure it runs true with the front surface of the bracket.

Replacement is accomplished as outlined above.

Impulse Coupling

The first purpose of the impulse coupling is to retard the spark at low engine speeds to approximately top dead center of the piston stroke, thereby preventing the engine from back-firing. Secondly, as the magneto member (7), *Illust. 6*, is retarded by the pawls (1), *Illust. 7*, (at low speeds these pawls are stopped by pawl stop pin (7), *Illust. 24*, the



Illust. 3  
Exploded View of the Magneto Bracket Assembly.

| Ref. No. | Description | Ref. No. | Description | Ref. No. | Description   |
|----------|-------------|----------|-------------|----------|---------------|
| 1        | Washer.     | 5        | Gasket.     | 9        | Gear.         |
| 2        | Key.        | 6        | Shaft.      | 10       | Nut lock.     |
| 3        | Washer.     | 7        | Bushing.    | 11       | Hex. jam nut. |
| 4        | Magneto.    | 8        | Bracket.    | 12       | Gasket.       |

ELECTRICAL SYSTEM - Continued

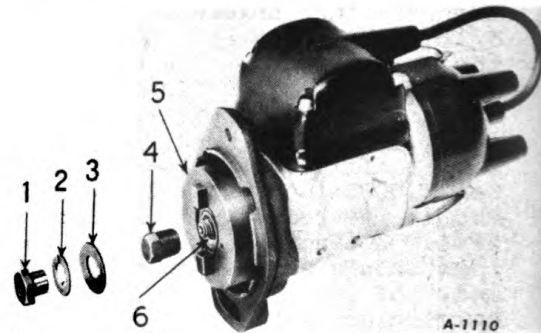
Impulse Coupling - Continued

lug (3) on the magneto member (7) compresses the impulse spring (1), *Illust. 6*. The lugs on driver (6) which continues to rotate at constant speed, trip the pawls (forces them away from the pawl pin) and the magneto member (keyed to the magneto rotor) is forced to rotate by the compressed spring at a greater speed than that of the drive member (6). The increased speed of the rotor provides a much hotter spark to the engine than would be provided by a direct drive to the magneto.

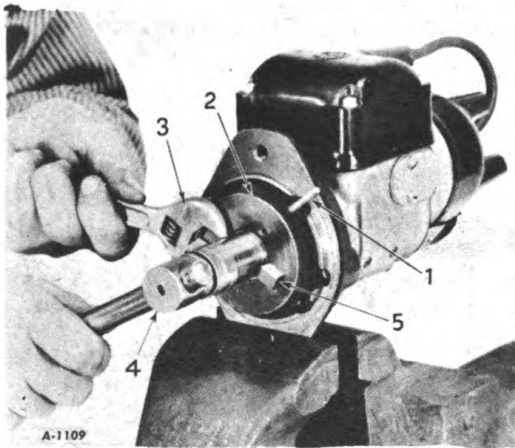
As the speed of the engine increases, the weighted ends (2) of the pawls (1), *Illust. 7*, are thrown out by centrifugal force and their short ends no longer engage the pawl pin in the mounting flange. The spark is no longer retarded. The missing speed, approximately 150 R.P.M., is the speed at which the impulse coupling no longer continually retards the spark. At this speed

it retards the spark intermittently only. Over the range of the throwout speed, 240 to 330 R.P.M., the impulse coupling should cease to function completely, giving the effect of a direct drive.

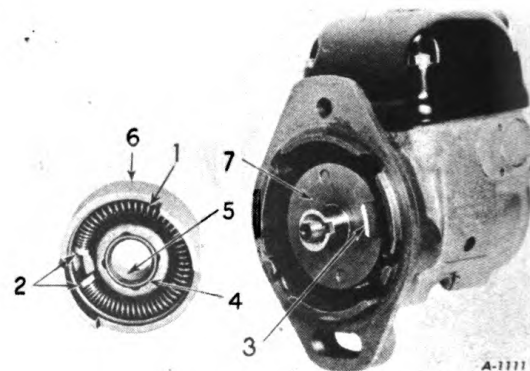
The engine should never be allowed to idle slowly enough to permit the impulse coupling to operate.



*Illust. 5*  
Removing Impulse Coupling. 1. Impulse nut; 2. Lock washer; 3. Washer; 4. Service tool SE-912; 5. Impulse drive member; 6. Thread on inside of magneto member.



*Illust. 4*  
Correct Method of Removing Impulse Coupling Nut. 1. Pin connecting hole in impulse driving member and lug of magneto member; 2. Impulse driving member; 3. Adjustable wrench; 4. Socket wrench; 5. Impulse pawl spring.



*Illust. 6*  
Impulse Coupling Removed. 1. Impulse spring; 2. Impulse spring button; 3. Lug on magneto member; 4. Drive member hub; 6. Impulse drive member; 7. Impulse magneto member.

## ELECTRICAL SYSTEM - Continued

## Impulse Coupling - Continued

Its operation is denoted by a sharp click.

To remove the impulse coupling, insert a nail or pin through hole (1), *Illust. 4*, in the coupling drive member (2), locking the two elements together.

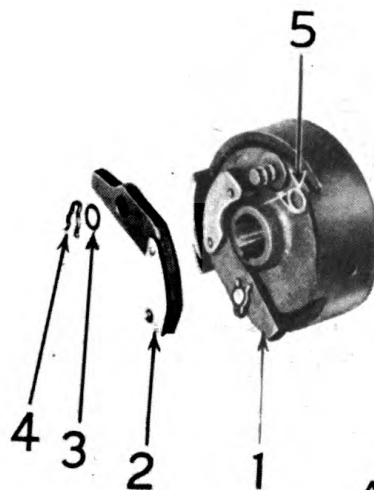
Apply a socket wrench to the nut and a wrench to one of the driving lugs (5) to prevent shearing the nail or pin while removing the nut.

The impulse coupling can now be removed with service tool SE-912 (4), *Illust. 5*, which screws into a thread provided inside the magneto member (6). As the tool is turned in, the inside end contacts the rotor shaft and forces the member off the shaft.

The impulse coupling drive member (6) with impulse coupling spring (1) can readily be removed as shown in *Illust. 6*. The impulse coupling spring (1) should seldom need to be removed from the driving member, but should it be necessary to remove the spring it can readily be pried out of place.

To replace this spring, just compress it sufficiently to fit into the drive member as shown. Before assembling the impulse coupling member (6) with the magneto member (7), soak the wick inside the impulse coupling spring with a PL or PS oil. Also coat inside hub (5) of the driving member with magneto grease (WB-2). The lug (3) should be a tight fit between the hardened button (2) on each end of the impulse coupling spring. If the buttons (2) should become worn or grooved, renew them.

The impulse pawl (1), *Illust. 7*, can be taken off after removing the retaining snap ring (4) and washer (3). The impulse pawl springs (5) can then be replaced. Use a small amount of (WB-2) grease on the pawl pivot and replace the springs, pawls, washers, and snap



A-1112

Illust. 7

Impulse Coupling Complete, Showing Rear Side of Magneto Member with Impulse Pawl Removed. 1. Impulse pawl; 2. Counterweight; 3. Washer; 4. Retaining snap ring; 5. Impulse pawl spring.

rings. The pawls should move freely on their pivots.

When replacing drive member (6), *Illust. 6*, be sure lug (3) of magneto member (7) fits between spring buttons (2).

Place a small amount of (WB-2) grease on the pawl pin (7), *Illust. 24* when replacing.

Press the assembled impulse coupling on the rotor shaft. Make sure that the keyway in the magneto member (7), *Illust. 6*, engages the key in the magneto rotor shaft.

Replace the washer (3), *Illust. 5*, and lock washer (2) which fits in one position only. Tighten impulse nut (1) the same way it was removed.

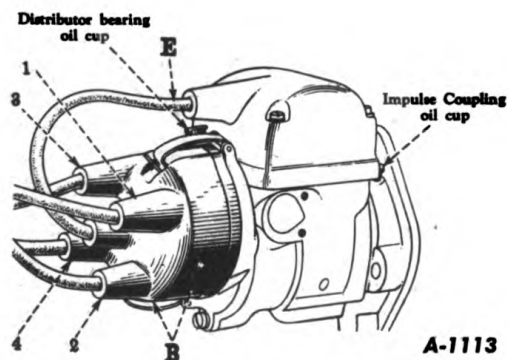


ELECTRICAL SYSTEM - Continued

Distributor Cap

The lead wire from the secondary coil (E), *Illust. 8*, plugs into the central insert socket and the cables to the spark plugs fit in the outside sockets, starting with No. 1, marked on the face of the cap. Pull out the cables and secondary wire from the distributor cap.

To remove the distributor cap, push the distributor cap springs out of the cap recesses and pull off the cap which fits only one way.



*Illust. 8*  
Order of Connecting Spark Plug Wires in the Sockets of the Distributor Cap on the Counter-clockwise rotation.

The carbon brush (4), *Illust. 9*, in the central socket contacts the monel metal strip (2) of the distributor rotor (1). The brush, which is attached to a spring, should move freely in the socket. The brush (4) and spring can be pulled out of the socket if replacement is necessary.

If the four inserts (3) are badly worn, the cap should be replaced.

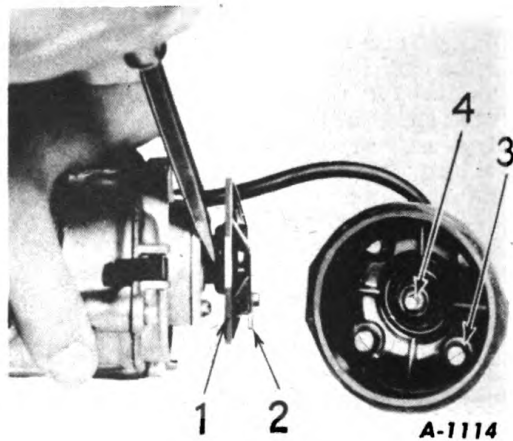
All grease should be removed from the monel strip on the distributor rotor to assure good contact.

The distributor cap should be free from dust or dirt, inside and out, before assembling to the magneto. The two ventilating holes (B), *Illust. 8*, should be open at all times.

Check thoroughly for cracks in the bakelite around the spark cable and secondary insert sockets. Very small cracks will allow a spark to go through the cap and partially short-out the engine.

For adjustment of the distributor rotor arm with respect to the inserts (3), *Illust. 9*, refer to *Illusts. 10 and 11* and the text on the distributor rotor.

The cap fits only one way; the ventilating holes (B), *Illust. 8*, are always on the bottom side. Snap the body springs into the distributor cap recesses, replace the secondary wire and connect up the spark cables.



*Illust. 9*  
Method of Removing Distributor Rotor from its Spindle. 1. Distributor rotor; 2. Monel distributor arm; 3. Distributor cap inserts; 4. Secondary carbon brush.

## ELECTRICAL SYSTEM - Continued

## Distributor Rotor

In removing this part, first take off the distributor cap. Apply the end of a screwdriver against the hub of the rotor and pry off as shown in *Illust. 9*. The bakelite rotor is fragile and should be handled with care.

The monel metal arm (1), *Illust. 10*, on the distributor rotor is adjustable and renewable. It is removed by running out the arm nut (2).

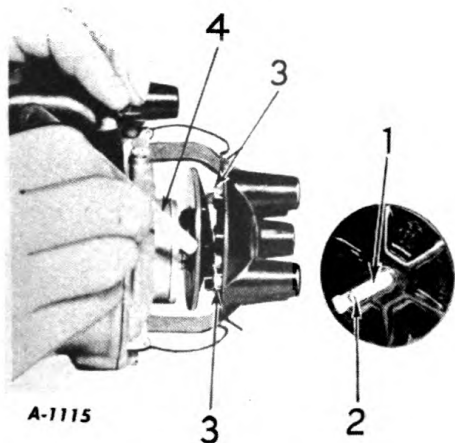
The arm (1) should operate as close to the insert in the distributor cap as possible without rubbing. (*Refer to Illusts. 10 and 11.*) To correctly adjust the distributor arm, a cap may be taken from stock and cut away as shown in *Illust. 10*. Then, by using a feeler gauge, the distance between the distributor arm and insert in the distributor cap can be checked. The arm can be adjusted slightly to gain the desired clearance.

Another method is to apply a little Prussian blue to the end of

the distributor arm, then place the distributor cap on the magneto. Next, turn the magneto rotor over several times by hand. If the limits between the distributor arm and caps are close, a small amount of bluing will be transferred to the distributor cap insert. A very slight coating should show on the insert without any actual rubbing occurring.

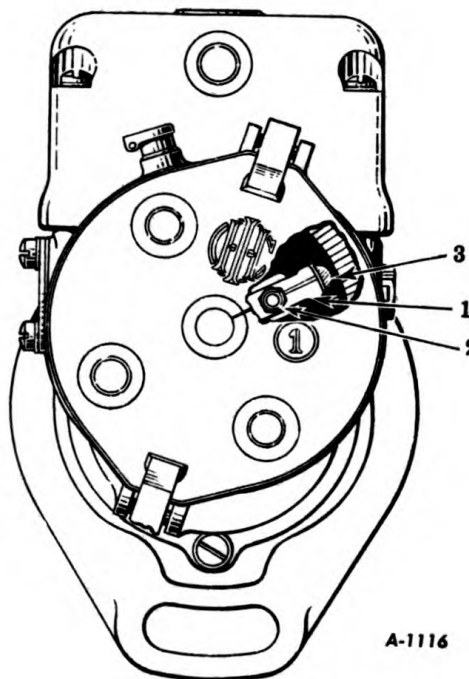
To adjust the rotor arm, loosen the nut (2), *Illust. 10*, and move the arm to the point where the outside end just clears the vertical portion of the distributor cap inserts (3).

When replacing the rotor, be sure that the key (1), *Illust. 12*, on the inside of the rotor (2) coincides with the slot (3) on the



*Illust. 10*

Checking Clearance between Distributor Rotor Metal Arm and the Insert in Distributor Cap Using a Cutaway Cap. 1. Monel metal arm; 2. Arm nut; 3. Distributor cap insert; 4. Feeler gauge.

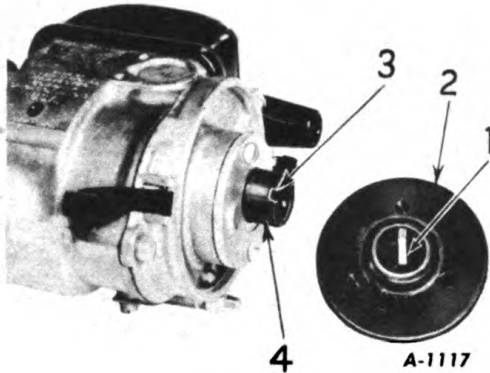


*Illust. 11*

Loosen nut (2) to adjust distributor rotor arm (1) as close to all four distributor cap inserts (3) as possible without actually rubbing.

ELECTRICAL SYSTEM - Continued

Distributor Rotor - Continued



Illustr. 12

Distributor Rotor Removed Showing Key and Keyway for Locking in Position. 1. Rotor key; 2. Rotor; 3. Distributor spindle keyway; 4. Distributor spindle.

end of the distributor gear spindle (4). To assist in lining up the key with the slot, use the rib which is opposite the monel metal arm on the opposite side of the rotor as a guide, the rib being in line with the key. Be sure that the rotor is pressed on as far as it will go because there is a possibility of entrapped air preventing the rotor from being pushed all the way down on the hub of the distributor gear. The rotor should have a heavy hand-press fit on the distributor spindle.

Replace the distributor cap, spark plug cables, and secondary cable.

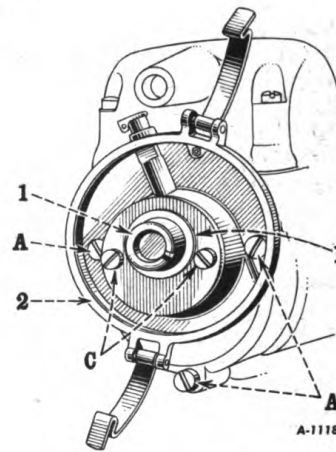
Distributor Body  
Removal and Replacement

The distributor body is removed to make the breaker points accessible. This can be done by removing the three cap screws "A", *Illustr. 13*, and lifting the complete body (2) from the magneto frame.

After servicing the breaker points, be careful that the flat spot on the rotor shaft (6), *Il-*

*lust. 14*, lines up with the flat spot on the pinion hub (5) in the distributor body (4). Also be sure to withdraw the spring anchor block (1) slightly so that the pad (2) will push it into place when the body (4) is reassembled to the magneto frame.

Secure the body (4), *Illustr. 14*, with the gasket, to the magneto frame with the three cap screws and lock washers when reassembling. The body and gasket fit in one position only.



Illustr. 13

Magneto with Distributor Cap and Rotor Removed. 1. Rotor spindle; 2. Distributor body.

Disassembly and Reassembly

The distributor gears are contained in a chamber which is a part of the distributor body (2), *Illustr. 13*. This chamber is partially filled with (WB-2) grease and sealed with felt washers around the hub of the gears. These seals and the consistency of the grease should prevent any possibility of the grease working out of the chamber.

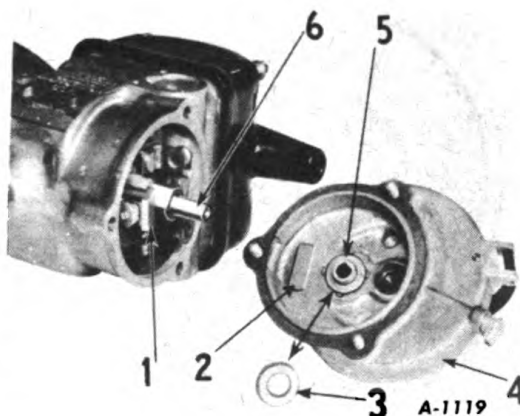
By removing two screws (C), the cover (2), *Illustr. 15*, and gasket come off.

The distributor pinion (5), and the distributor spindle (9) can be lifted out.

ELECTRICAL SYSTEM - Continued

Disassembly and Reassembly  
Continued

The felt oil seal (3) in the distributor body, *Illust. 14*, may be replaced by driving out the old retainer. Before replacing the retainer and felt, clean out the hole with a metal cutting tool such as a bearing scraping tool. Replace the felt and retainer and lock the new retainer in place by very lightly crimping over the edge of the body with a center punch. The thrust surface of the retainer should be flat. Do not soak the new seal in oil. After assembly, coat it lightly with magneto grease.

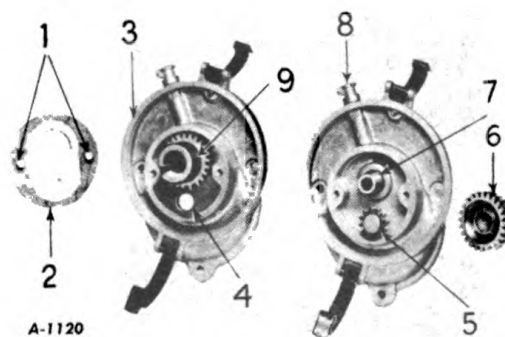


*Illust. 14*  
Magneto with Distributor Body Removed. 1. Spring anchor block; 2. Distributor pad; 3. Distributor pinion oil seal; 4. Distributor body; 5. Distributor pinion hub; 6. Flat on end of rotor shaft.

Replace the distributor gear spindle (9), *Illust. 15*, on the shaft (7). It should turn freely on the shaft.

Replace the pinion (5), *Illust. 15*, and check the backlash with the gear (6). A slight movement should be felt (approximately .002 inch to .004 inch).

Take off the distributor spindle (9) and fill the bore with magneto grease. Press the distributor gear spindle onto the shaft (7). As the teeth come in contact, time the distributor spindle by meshing the rotor pinion (5) and the distributor gear so that the marked tooth on the pinion (5) is in line with the "L" marking (a counter-clockwise magneto) on the gear as shown in *Illust. 16*. This is a very important operation.

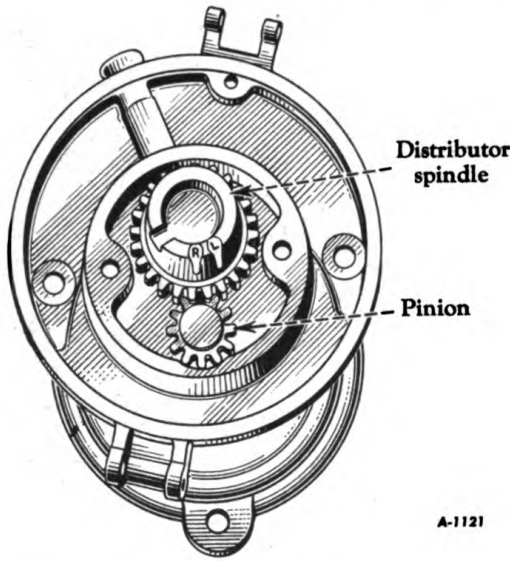


*Illust. 15*  
Distributor Gear Assembly. 1. Cap screws (2) in cover; 2. Gear chamber cover; 3. Gear body; 4. Bore for distributor pinion shaft; 5. Distributor pinion; 6. Distributor gear; 7. Distributor shaft; 8. Distributor bearing oil cup; 9. Distributor spindle.

Partially fill the remaining chamber with (WB-2) grease. Replace the cover (2) with the gasket and secure with two screws. The distributor body can now be replaced as previously outlined.

Replace the distributor rotor as directed under that section and secure the distributor cap. Refer to the "Operations Section" for timing where the gear housing is removed while the magneto is on the engine.

ELECTRICAL SYSTEM - Continued



Illustr. 16  
Timing Marks on Magneto Distributor Spindle and Pinion. "L"--Counter-clockwise Magneto.

Breaker Points

The entire breaker mechanism for the magneto is in its own separate, internal compartment, thoroughly sealed against dirt and moisture. This makes it possible to thoroughly grease the mechanism without grit working into the lubricant causing an abrasive action on working parts.

Remove the distributor cap, distributor rotor, (1), *Illustr. 9*, and the distributor body (4), *Illustr. 14*.

Now the breaker arm assembly (6) and spring anchor block (5), *Illustr. 17*, can readily be inspected and removed for any reworking required.

The spring anchor block (5) can be removed by unscrewing the nut that secures it to the breaker arm and primary leadout wire spring anchor terminal (2), *Illustr. 21*.

The stationary point (1), *Illustr. 17*, can be removed by running out one screw.

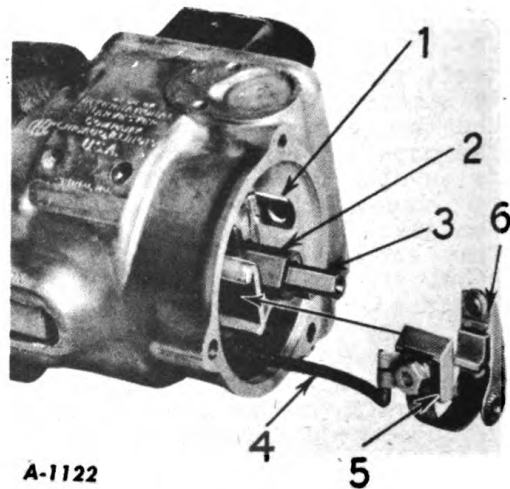
If the rubbing block (2), *Illustr. 18*, is worn, use a new breaker arm (3).

To replace the primary wire in the magneto frame, see instructions under that heading following.

Examine the inside of the breaker housing for oiliness or grease. If oil has been leaking into the breaker housing, the grease being used in the distributor gear case is too thin.

Another possibility is that excessive lubricant is being injected into the distributor gear oil cup, or that the felt seal (3), *Illustr. 14*, is not functioning properly. The replacement of the felt seal is covered under the "Distributor Body" heading.

Remember that a dirty or oily breaker chamber means excessive breaker point wear. Keep the breaker chamber clean at all times.



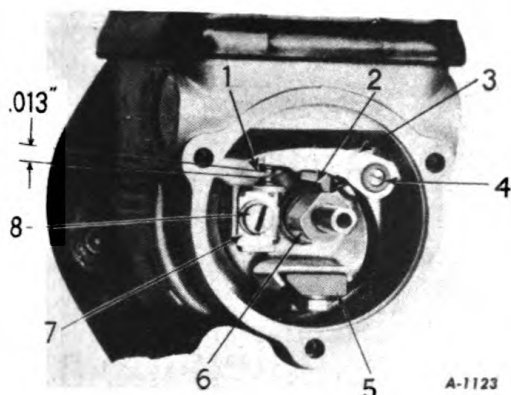
Illustr. 17  
Magneto with Breaker Arm Removed. 1. Stationary point; 2. Breaker cam; 3. "D" shaped end of rotor shaft; 4. Primary lead-out wire; 5. Spring anchor block; 6. Breaker arm assembly.

## ELECTRICAL SYSTEM - Continued

## Breaker Points - Continued

Before reassembling, thoroughly clean all parts to remove dirt and grease.

Apply a light coating of (WB-2) grease to the breaker cam to prevent rusting.



Illustr. 18

End View of Breaker Mechanism. 1. Point opening; 2. Rubbing block; 3. Breaker assembly; 4. Breaker arm pivot recess (fill with magneto grease). 5. Spring anchor block; 6. Breaker cam; 7. Stationary point; 8. Adjusting screw.

Reinstall the fixed breaker point (7), *Illustr. 18*, leaving the screw (8) slightly loose until the point opening is adjusted.

Secure the anchor block and spring anchor terminal (2), *Illustr. 21*, to the breaker arm when assembling the breaker arm to the magneto. Do not flatten the spring terminal (2) and be careful that it does not touch any part of the magneto frame.

When reinstalling the anchor block (5), *Illustr. 18*, do not push it tight against the magneto body frame, but allow it to stick out far enough so that it is pushed into place by the distributor pad (2) onto the distributor body (4), *Illustr. 14*. For proper adjustment and timing see the "Operations Section".

Replace the body gasket and body and secure it with three screws as outlined under the "Distributor Body" heading.

Replace the distributor rotor and distributor cap.

## Breaker Arm Cam

The breaker arm cam (2), *Illustr. 17*, should last indefinitely if it is properly lubricated. If the cam should become worn, it is designed so that it can be replaced. The cam is a press fit on the shaft and fits in only one way.

## Condenser

To remove the condenser (3), *Illustr. 19 and 20*, with the coil in place, bend lock (7) away from the flat on the condenser terminal screw (8). The screw can then be removed with the lock and outer bakelite washer (6).

Remove the coil cover; run out four screws.

Remove screw (2) which holds the condenser clamp.

Remove the flat plate (11) which is held by two screws. Push the condenser back into the frame and remove the inner washer (5) and two primary wires (9), from the condenser terminal. The primary wire from the breaker arm to the condenser is shown in *Illustr. 21*, Item (1).

Push the condenser out through the hole in the side of the magneto.

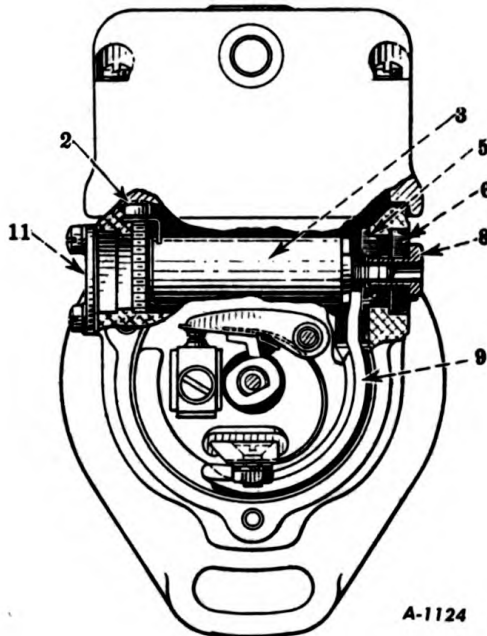
The condenser can be tested with the conventional equipment. Neon condenser tester set for 200 volts will give a satisfactory test.

Replace the inner bakelite washer (5), *Illustr. 19*, first.

Line up the terminals of the primary wires and insert the condenser.

ELECTRICAL SYSTEM - Continued

Condenser - Continued



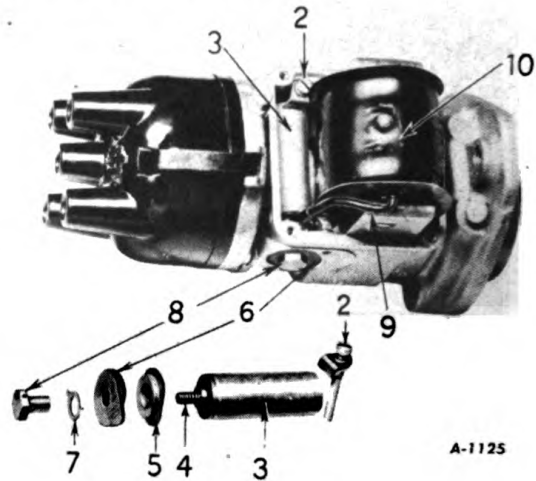
Illust. 19

Cross Section View of Condenser Assembly. 2. Condenser clamp and screw; 3. Condenser; 4. Condenser terminal; 5. Inner bakelite washer; 6. Outer bakelite washer; 8. Terminal screw; 9. Condenser primary wire; 11. Condenser hole cover plate.

Replace the outer bakelite washer (6) and secure the condenser (3) in position with a nut lock and terminal screw (8). When tightening the condenser terminal (8) there is a possibility of breaking the bakelite washer (6) or breaking the condenser terminal (4). Do not apply too much pressure to the wrench when tightening the screw.

Secure the condenser clamp and screw (2).

Secure the condenser hole plate and gasket (11) with cap screws and washers.



Illust. 20

Magneto with Coil Cover Removed Showing Parts Making Up the condenser Assembly. 2. Condenser clamp and screw; 3. Condenser; 4. Condenser terminal; 5. Inner bakelite washer; 6. Outer bakelite washer; 7. Condenser terminal lock; 8. Terminal screw; 9. Primary lead-out wire; 10. Coil.

Replace the coil cover and gasket and secure them with four screws.

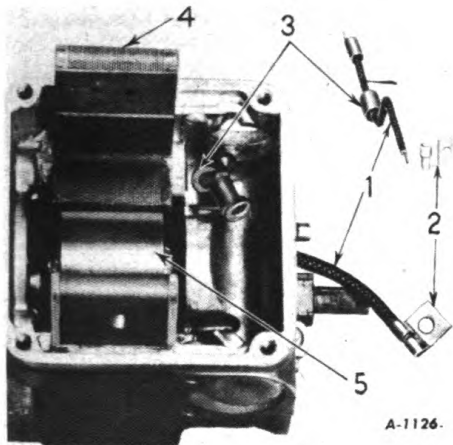
Primary Wire

The primary wire (1), *Illust. 21*, connecting the breaker-arm assembly to the condenser terminal should be a tight fit in the rubber grommet (3). This grommet should be a tight fit in the magneto frame. The primary wire and the grommet should make an airtight job in the magneto frame.

To remove the primary wire (1), the spring anchor terminal (2) must first be unsoldered (assuming the coil cover, distributor cap, rotor and body are removed). Then pull the terminal wire out from the top of the magneto. In reassembling the primary wires, reverse the above procedure. The primary wires to both the coil and condenser should be pulled tightly when the condenser is assembled.

ELECTRICAL SYSTEM - Continued

Primary Wire - Continued



Illustr. 21  
Location and Assembly of Primary Wire. 1. Primary wire; 2. Spring anchor terminal; 3. Rubber grommet; 4. Coil inter pole; 5. Rotor magnet bridging air gap.

Coil and Coil Cover

The coils are marked as to the month and year of their manufacture. For instance, a mark 1-42, means that the coil was built in January, 1942.

Remove the coil cover and gasket by taking out four screws. Screws will be retained in the cover if they are unscrewed only from the magneto frame.

Remove the primary lead-out wire (9), *Illustr. 20*, from the condenser terminal by following the same procedure as outlined for removing the condenser.

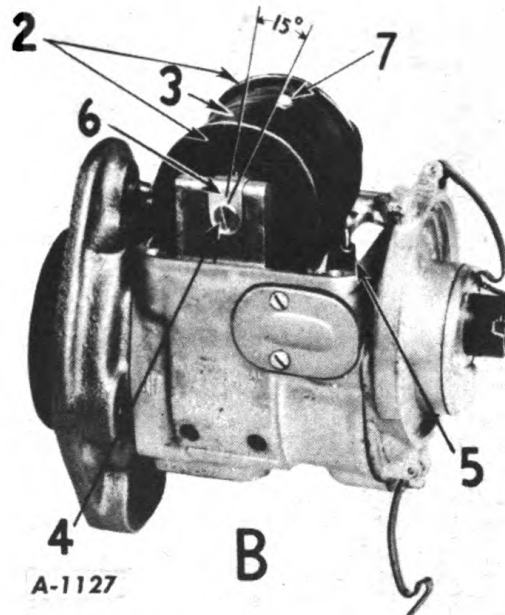
*Illustr. 22* shows the magneto with the coil cover removed; it shows the coil strip (6) attached under the countersunk screw (4). Remove the two screws (4) from each end of the coil core. The coil may then be taken out.

**Important:** Before lifting the coil out, turn the magnet to the neutral position or so the pole of the magnet bridges the air gap between the end of the coil pole

pieces as shown with arrow (5), *Illustr. 21*.

The coil can be tested with conventional equipment.

Inspect the end insulators (2), *Illustr. 22*, of the coil. If they are damaged they should be renewed.



Illustr. 22  
Coil Mounting in Magneto. 2. Coil insulators; 3. Coil; 4. Coil core holding screw, countersunk; 5. Condenser to breaker wire; 6. Coil grounding strip; 7. Secondary lead-out terminal.

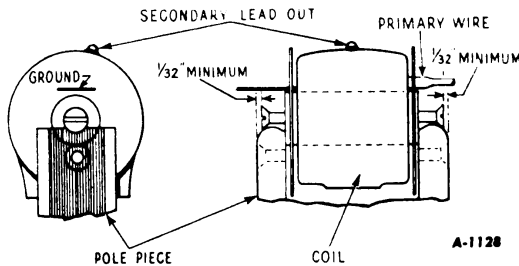
Test the length of the coil-core mounting screw (4) by bottoming the screws lightly in the coil core and pressing the assembly into position as shown in *Illustr. 23*. The mounting screws are 5/8 inch long. If either screw head does not fall back of the face of the pole piece by 1/32 inch as shown, it must be removed and enough cut off the threaded end to meet this requirement. When the coil core is in place, the screws will then tighten up in the countersunk hole of the pole piece before the screws bottom in the coil core.



ELECTRICAL SYSTEM - Continued

Coil and Coil Cover - Continued

**Caution:** Do not file or otherwise deface the ends of the coil core or the face of the pole pieces as this will impair the magnetic circuit and efficiency of the magneto. The coil core should be a tight hand-press fit between the pole pieces.



Illust. 23

Assemble Coil Core Mounting Screws to Coil Core to make sure they do not bottom in core when assembled in Magneto.

Press the coil in place first when replacing. The secondary lead-out terminal (7), *Illust. 22*, should be at an angle of 15° with the center line of the coil. The reason for so positioning the coil terminal is to secure a good contact with the secondary terminal outlet in the coil cover. Secure the coil-core holding screws (4) tightly in position.

Replace the condenser as outlined under that subject, being sure to attach the primary-coil lead-out to the condenser terminal.

Before replacing the coil cover, make sure that the contact points are clean and that the secondary lead-out in the coil cover bears firmly against the secondary lead-out terminal (7), *Illust. 22*. Replace the coil cover and gasket and secure it to the magneto frame with four screws.

Mounting Flange

Remove the impulse coupling as directed under that subject.

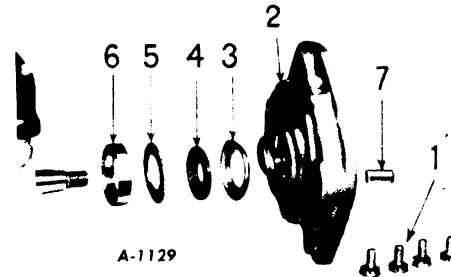
The mounting flange (2), *Illust. 24*, is attached to the magneto bracket and is held to the magneto frame with four countersunk screws and Shakeproof lock washer (1). The flange is freed by taking out these four screws.

If replacement is desired, the leather oil seal can be pushed out of the mounting flange. The outer bearing race (6) must be removed first. Place the outer retainer (3) in position with the internal taper side of the leather seal (4) facing the bearing race; the bulged side of the oil seal faces the retainer (3). Then replace the inner retainer (5) and press the bearing race (6) in position. Assemble the mounting flange to the magneto body and check the rotor shaft for end play as outlined under "Rotor".

After the proper adjustments have been made as directed above, replace the flange and secure with four Shakeproof lock washers and countersunk screws.

Replace the impulse coupling.

See "Bearing Race and Oil Seals" heading.



Illust. 24

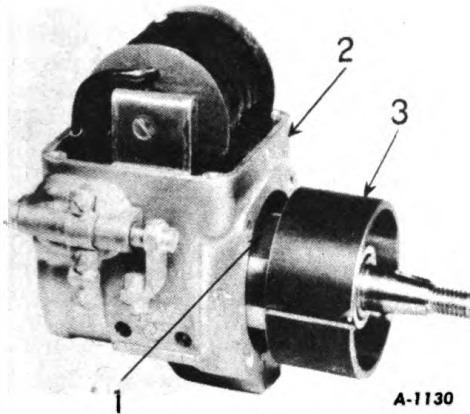
Magneto with Impulse Coupling Removed, showing Mounting Flange and Rotor Bearing Parts. 1. Countersunk screws with lock washers; 2. Mounting flange; 3. Outer oil seal retainer; 4. Leather oil seal; 5. Inner oil seal retainer; 6. Outer bearing race; 7. Pawl pin.

## ELECTRICAL SYSTEM - Continued

**Rotor**

A feature of the magneto is the combination of the rotor and the magnet which means that the magnet is the revolving part of the magneto.

To remove the rotor and bearings, it is necessary to remove the impulse coupling and mounting flange as outlined under those subjects.



Illust. 25

Removing Magneto Rotor. Remove rotor (1) from magneto frame (2). Slide Keeper No. 57314D (3) over rotor poles before rotor is completely out of frame.

Then slide the rotor magnet into a keeper (3), *Illust. 25*, as it is being removed from the magneto frame. Always have the rotor in the keeper when it is out of the magneto frame. Use extreme care to see that the rotor does not pick up dirt and metal particles. The keeper is available as a service part.

The bearing outer races (6), *Illust. 24*, can be removed and replaced with service tools as outlined under "*Mounting Flange*," and as shown in *Illust. 29*. Refer also to the heading "*Bearing Race and Oil Seals*."

The inner bearing race can be readily removed from the rotor by using a puller and adapter as shown in *Illust. 27*. It is necessary to remove the inner bearing race when removing or inserting rotor shims (2), *Illust. 26*, for preloading the rotor bearings.

When the bearing inner race (4) has been removed, the inner oil flinger (3) and the rotor shims are free.

Before reassembling, first read the first four paragraphs following the "*Important*" note below.

Thoroughly clean rotor and bearing parts and reassemble to the rotor approximately the same thickness of shims as was taken out. The distributor body assembly (4), *Illust. 14*, should be removed to facilitate correct adjustment of the rotor.

Replace the inner oil flinger (3), *Illust. 26*, with the upset portion toward the rotor magnet.

Press the bearing inner race (4) firmly in place and replace the bearing retainer with balls (5).

The oil seals in the magneto frame and mounting flange can be replaced as directed under "*Mounting Flange*" and "*Bearing Races and Oil Seals*."

**Important:** The next instructions must now be followed carefully and completely for efficient operation of the magneto.

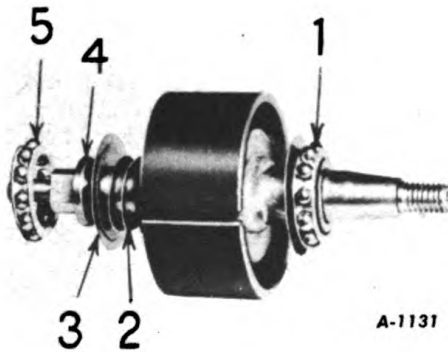
Thoroughly clean the rotor assembly and bearing races of the old grease and any grit. Regreasing of the bearings should not be done until they have been checked for end play.

The bearings, when assembled at the factory, are preloaded .001 inch to .002 inch. The rotor should never have any perceptible end play after it is assembled properly.

ELECTRICAL SYSTEM - Continued

Rotor - Continued

Old bearings and races should be assembled without disturbing shims (2), *Illust. 26*. Should an end play check (*Illust. 28*) reveal that end play is present, no attempt should be made to preload old bearings as this will cause rapid deterioration of the bearings. The recommended procedure when end play exists on old bearings is to replace them.



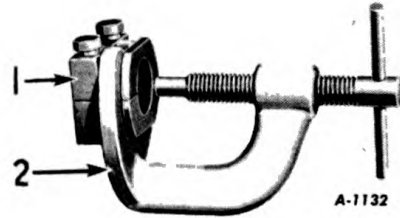
A-1131

Illust. 26

Rotor Magnet with Keeper, Bearings, and Shims. 1. Forward bearing; 2. Rotor shims; 3. Inner oil flinger; 4. Bearing inner race; 5. Bearing retainer with balls.

The distributor body assembly (4), *Illust. 14*, should be removed to facilitate correct adjustment of the magneto rotor.

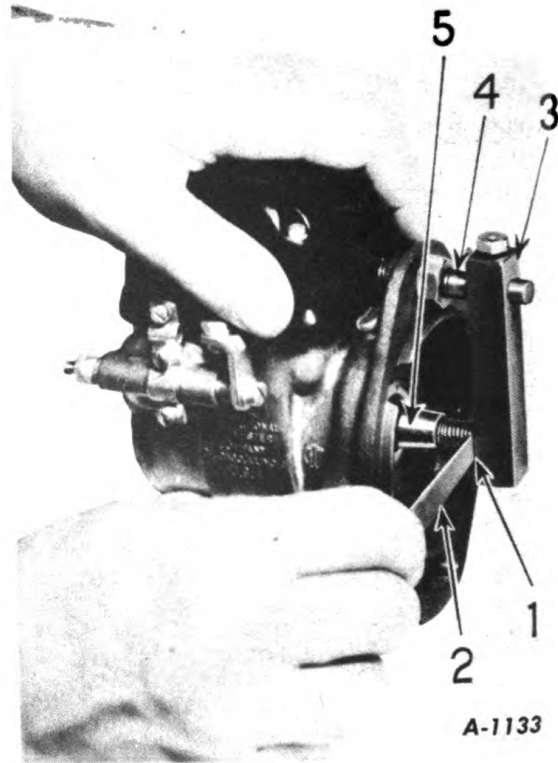
Place sufficient shims (2), *Illust. 26*, in back of the new bearing race to allow a small amount of end play in the rotor shaft after it is completely assembled with the mounting flange in place and the mounting screws (1), *Illust. 24*, tightened up (end play should be checked with no grease on the bearings). The end play may then be checked with a dial indicator or by making a device as shown in *Illust. 28*. Then check the end play between the fixture (3), and the end (1) of the rotor shaft (5) with a feeler gauge (2).



A-1132

Illust. 27

Inner Race Puller Tool SE-839. 1. Bearing race adapter; 2. Puller.



A-1133

Illust. 28

Checking Rotor End Play. 1. Checking position; 2. Feeler gauge; 3. Fixture end piece; 4. Fixture mounting bolt; 5. Rotor shaft.

## ELECTRICAL SYSTEM - Continued

## Rotor - Continued

Take two readings of the feeler gauge, one with the rotor as far one way as it will go, and the other with the rotor moved as far in the opposite direction as it will go. The difference in these two readings will be the actual end play. Add .001 inch to the difference between the two readings, which should be the thickness of the additional shims to be added.

Remove the mounting flange, slide the rotor into the keeper, pull the race from the shaft and then add the required number of shims (2), *Illust. 26*, in the proper location. Grease bearings, reassemble the rotor and the mounting flange, and check the rotor for free turning. Be careful not to overfill the bearings with grease; just fill the spaces between the balls of the bearings with magneto grease. The preloading of the bearing should not cause binding of the rotor.

**Important:** Be sure to keep the rotor and bearings clean during this operation. Do not drop the magnet or hit it with any sharp instrument, because it is very brittle and will chip readily.

Extreme care must be exercised to assure that the rotor is free from metal chips before it is assembled into the magneto, as chips may jam the rotor. The magnet is highly magnetized and will draw all magnetic metals to it. Using compressed air is one of the best methods to clean the rotor.

Replacement of the magneto rotor assembly and mounting flange is covered above.

Then replace the impulse coupling, distributor body, distributor rotor and distributor cap as directed under those subjects.

## Magnet

As stated before, the magnet is part of the rotor and is the revolving member of the magneto. The magnet, made of a new alloy known as Alnico (an Aluminum, nickel, cobalt and iron alloy), is cast directly into sand moulds. After it is once thoroughly magnetized, this magnetic material should never lose its magnetism if carefully handled.

It cannot be stressed too emphatically the importance of being careful to guard against metal chips adhering to the magnet. The use of compressed air is one of the best methods of cleaning the magnet and rotor before assembly into the main frame of the magneto. The clearance of the magnet and the pole pieces of the magneto is so close that any chips adhering to the magnet may cause the rotor to become jammed.

## Bearing Outer Race and Oil Seals

The front bearing outer race and oil seal are assembled in the mounting flange (2), *Illust. 24*; they are accessible after removing the impulse coupling and mounting flange as directed under those subjects. The purpose of the oil seals is to keep lubricating oil out of the magneto body.

The rear bearing outer race and oil seal are assembled in the main frame. The magneto rotor, distributor cap, distributor rotor, and distributor body assembly as well as the above mentioned must be removed.

The rotor shaft leather seal (4), *Illust. 24*, and the two retaining members (3) and (5) are held in place by the press fit of the rotor ball-bearing outer race (6). The rotor bearing races (6) can be removed with a puller, item (1), *Illust. 29*. Races may be replaced with a tool, such as item (2).

ELECTRICAL SYSTEM - Continued

**Bearing Outer Race and Oil Seals - Continued**

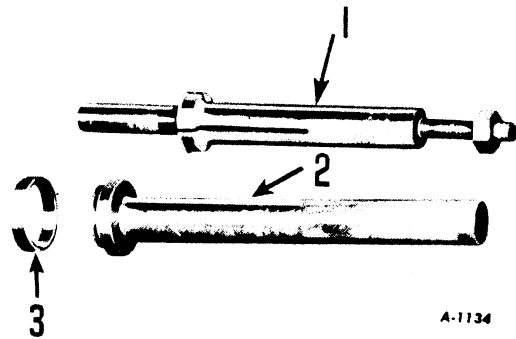
The magneto outer bearing race in both the housing and magneto mounting flange can be readily removed. Loosen the expander and insert the tool into the bearing race. Manipulate the split sleeve flange through the bearing race and hold it against the felt retainer. Now draw up on the expander by applying a wrench to flats on the threaded end of the expander and turning in a counter-clockwise direction until a definite pressure is felt. Then tighten the hexagon nut, and carefully drive the bearing race from place.

*Illust. 24* shows the sequence of assembly of the bearing race and oil seal. The internal taper side of the leather oil seal (4) faces the bearing race (6), and the bulged side of the oil seal retainer (5) faces the oil seal (4). Careful centering and proper arrangement of the oil seal produces maximum compression and efficiency.

Before replacing the outer bearing races, make sure the felts and retainers are correctly assembled in place. Set the bearing race on the end of the tool (2), *Illust. 29*. A small amount of clean grease will hold the

race on the tool. Carefully line up the tool over the hole and drive the race in place.

If a new bearing race has been installed, the recommended procedure is to remove the complete rotor and bearings and reassemble all parts as covered under "Rotor" (including checking magneto rotor shaft end play).



*Illust. 29*  
Tools Used for Removing and Replacing Magneto Outer Bearing Races. 1. Magneto bearing race puller tool SE-1020; 2. Magneto bearing race replacer tool SE-1021; 3. Outer bearing race.

**Generator and Relay**

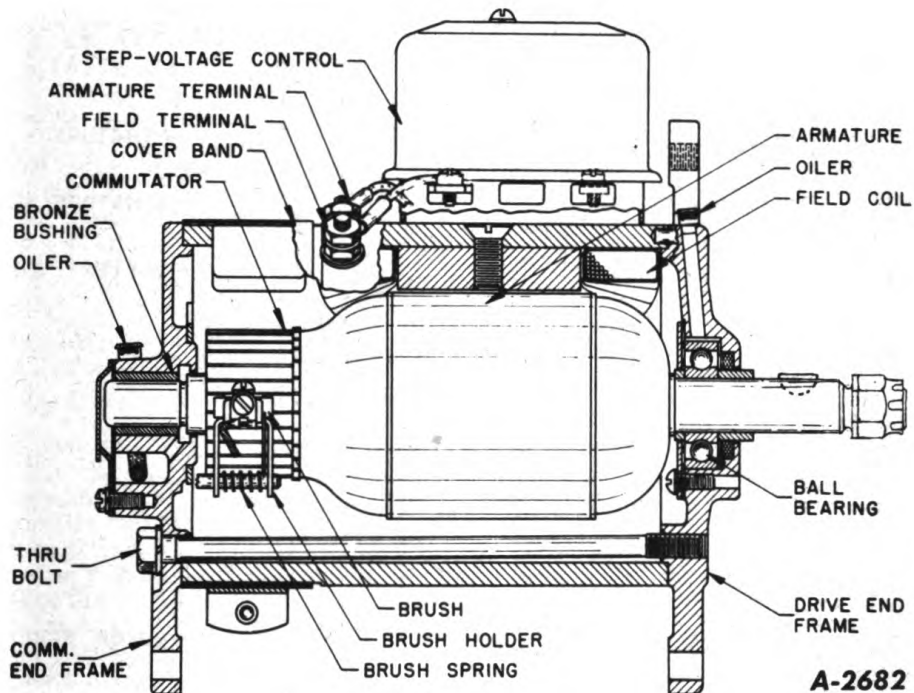
**Generator Specifications**

- Rotation - clockwise, viewing drive end.
- Brush spring tension - 16 ounces.
- Maximum cold output - 8-10 amperes at 14.4-14.9 volts at 2200 R.P.M.
- Maximum hot output - 6-8 amperes at 14.1-14.5 volts at 2400 R.P.M.
- Field current - 1.5 to 1.67 amperes at 12 volts.

**Cut-Out Relay Specifications**

- Air gap - .015 inch with points closed.
- Point opening - .020 inch.
- Closing voltage - 13-13.8 volts.
- Opening amperage - 0-3.0 amperes.

## ELECTRICAL SYSTEM - Continued



Illustr. 30  
Cross Section of Generator.

### Generator and Relay

The Delco-Remy Model 1101725 Generator is a 12-volt, third brush unit with a ball bearing in the drive end and a bronze bearing in the commutator end. A Model 1116777 Cut-Out Relay is mounted on the generator frame.

### Maintenance of the Generator

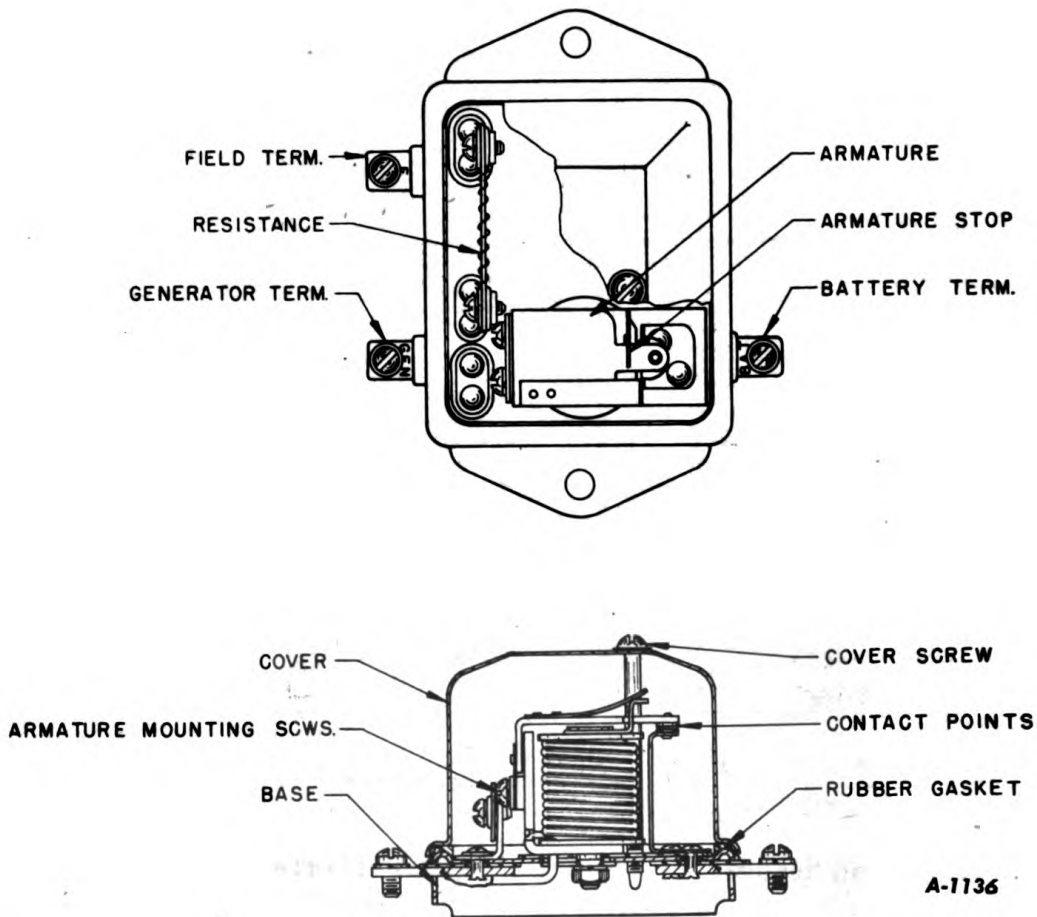
General maintenance may be divided into two sections, *normal maintenance* required to assure continued operation of the generator and the *checking and repair of inoperative generator*.

### Normal Maintenance of the Generator

**Inspection:** The cover band should be removed and the commutator and brushes inspected at regular intervals. If the commutator is dirty, it may be cleaned with No. 00 sandpaper. Blow out dust. **NEVER USE EMERY CLOTH TO CLEAN COMMUTATOR.** If the commutator is rough, out of round, or has high mica, it should be turned down in a lathe and the mica undercut.

Worn brushes should be replaced. They can be seated with a brush seating stone. The brush seating stone is an abrasive material which, held against the revolving commutator, carries under and seats the brushes in a few seconds. Blow out the dust. **NEVER USE EMERY CLOTH.**

ELECTRICAL SYSTEM - Continued



Illust. 31  
Cross Section of Generator Cut-Out Relay.

**Disassembly of the Generator**

At the recommended intervals, the generator should be disassembled for a thorough cleaning and inspection of all parts. Never clean the armature or fields in any degreasing tank, or with grease dissolving materials, since these may damage the insulation. The ball bearing should be cleaned and re-packed with the recommended lubricant. The commutator should be trued in a lathe and the mica undercut if necessary. All wiring and connections should be checked.

Rosin flux should be used in making all soldered connections. Acid flux must never be used on electrical connections.

**Checking an Inoperative Generator**

Several conditions may require removal of the generator from the engine and further checking of the generator, as follows:

1. No output.
2. Unsteady or low output.
3. Excessive output.
4. Noisy generator.

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**ELECTRICAL SYSTEM - Continued****Checking an Inoperative Generator - Continued**

## 1. No Output.

Remove cover band and check for sticking or worn brushes and burned commutator bars. Burned bars, with other bars fairly clean, indicate open circuited coils. If brushes are making good contact with commutator and commutator looks okay, use test leads and light and check as follows:

- a. Raise grounded brush, check with test points from "A" terminal to frame. Light should not light. If it does, the generator is grounded; raise other brush from commutator and check field, commutator and brush holder to locate ground.
- b. If generator is not grounded, check field for open circuit.
- c. If the field is not open, check for shorted field. Field draw at 12 volts should be 1.5 to 1.67 amperes. Excessive current draw indicates shorted field.
- d. If trouble has not yet been located, remove armature and check on growler for short circuit.

## 2. Unsteady or Low Output.

Check as follows:

- a. Check drive.
- b. Check brush spring tension and brushes for sticking.
- c. Inspect commutator or roughness, grease and dirt, dirt in slots, high mica, out of

round, burned bars. With any of these conditions, the commutator must be turned down in a lathe and mica undercut. In addition, with burned bars which indicate open circuit, the open circuit condition must be eliminated or the armature replaced.

## 3. Excessive Output.

Excessive output usually results from a grounded generator field - grounded either internally or externally. Opening the field circuit disconnecting lead from "F" terminal of generator with the generator operating at a medium speed will determine if the generator is at fault. If the output drops off, the field is grounded externally. If the output remains high, the field is grounded in the generator, either at the pole shoes, leads, or at the "F" terminals.

## 4. Noisy Generator

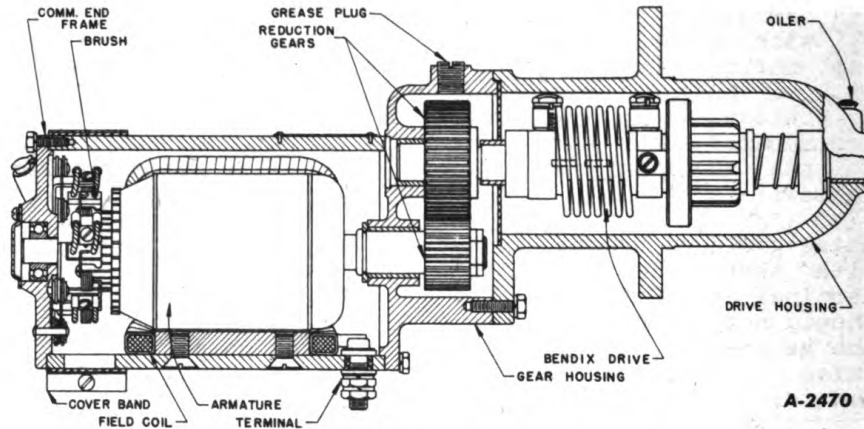
Noisy generator may be caused by loose mounting, drive unit, worn, dry or dirty bearings, or by improperly seated brushes. Brushes may be seated by using brush seating stone, referred to above.

**Installation Caution:** After the generator is reinstalled on the engine, or at any time after leads have been disconnected and then reconnected to the generator, a jumper lead should be connected **MOMENTARILY** between the **BATTERY** and **GENERATOR** terminals of the cut-out relay, *before starting the engine*. This allows a momentary surge of current from the battery to the generator which correctly polarizes the generator with respect to the battery it is to charge.



ELECTRICAL SYSTEM - Continued

Starting Motor



Illustr. 32  
Cross Section of Starting Motor.

Starting Motor Specifications

- Clockwise rotation viewing the pinion end.
- Brush spring tension . . . . . 2.25 to 2.50 lbs.
- No load test . . . . . 4500 R.P.M. - 80 amperes - 11.20 volts.
- Lock torque. . . . . 32 ft.-lbs. - 670 amperes - 5.35 volts.

The Delco-Remy Model 710 Starting Motor is a heavy-duty, 12-volt gear-reduction unit. There is an annular ball bearing at the commutator end, a bronze center bearing, and a bronze bearing in the pinion housing. Lubrication is provided for each bearing by dust-proof, hinged-cap oilers. The Bendix drive, keyed to the drive shaft, automatically engages the cranking pinion with the flywheel ring gear when the armature begins to revolve. When the engine fires, the

over-running effect of the flywheel on the pinion disengages it from the flywheel.

Maintenance of the Starting Motor

Starting motor maintenance may be divided into two sections, *normal maintenance* required to assure continued operation of the motor and the *checking and repair of an inoperative starting motor*.

**ELECTRICAL SYSTEM - Continued****Normal Maintenance of the Starting Motor**

**Inspection:** The cover band should be removed periodically and the brushes and commutator inspected. If the commutator is dirty, it may be cleaned with No. 00 sandpaper. **NEVER USE EMERY CLOTH TO CLEAN COMMUTATOR.** If the commutator is rough, out of round, or has high mica, it should be turned down in a lathe and the mica undercut. The mica should be cut away to the depth of 1/32-inch. Worn brushes should be replaced. If brushes wear with excessive rapidity, check for excessive brush spring tension, roughness or high mica of the commutator.

**Disassembly of the Starting Motor**

At the recommended intervals, depending on the type of service, the starting motor should be disassembled for cleaning and inspection of all parts. The Bendix drive should be cleaned and oiled with a PS or PL oil, as any accumulation of dirt on the drive might restrict the free movement of the pinion. Never clean the armature and field coils in a degreasing tank, or with grease dissolving materials since these may damage the insulation. The commutator should be trued in a lathe and the mica undercut if necessary. Replace all parts shown excessive wear. All wiring and connections should

be checked. Roxin flux should be used in making soldered connections. Acid flux must never be used on electrical connections. Submit reassembled unit to NO LOAD and LOCK TORQUE TESTS.

**Checking of Improperly Operating Starting Motor**

If the starting motor does not develop rated torque and cranks the engine slowly or not at all, check the battery, battery terminals and connections and the battery cables. Corroded, frayed or broken cables should be replaced and loose or dirty connections corrected. The starting motor control switch should be checked for burning contacts and the switch contacts cleaned or the switch replaced if necessary. If all these are in order, remove the cover bank of the starting motor and inspect the brushes and commutator. The brushes should form good contact with the correct brush spring tension. A dirty commutator can be cleaned with a strip of No. 00 sandpaper held against the commutator with a stick while the starting motor operates. **NEVER USE EMERY CLOTH TO CLEAN COMMUTATOR.** If the commutator is very dirty, or burned, or has high mica, remove the armature from the starting motor and take a cut off the commutator in a lathe. The mica should be undercut to a depth of 1/32-inch.

ELECTRICAL SYSTEM - Continued

**Checking of Improperly Operating Starting Motor - Continued**

If there are burned bars on the commutator, it may indicate open circuited armature coils which will prevent proper cranking. Inspect the soldered connections at the commutator riser bars. An open armature will show excessive arcing at the commutator bar which is open, on the no-load test.

Tight or dirty bearings will reduce armature speed or prevent the armature from turning. A worn bearing, bent shaft, or loose field pole screws will allow the armature to drag on the pole shoes, causing slow speed or failure of the armature to revolve. Check for these conditions.

If the brushes, brush spring tension and commutator appear in good condition, the battery and external circuit found satisfactory, and the starting motor still does not operate correctly, it will be necessary to remove the starting motor for no-load and torque checks.

**No Load Test**

Connect the starting motor in series with a battery of the specified voltage and an ammeter capable of reading several hundred amperes. If an R.P.M. indicator is available, read the armature R.P.M. in addition to the current draw.

**Torque Test**

It is advisable to use in the circuit a high current carrying variable resistance, so that the specified voltage at the motor can be obtained. A small variation of the voltage will produce a marked difference in the torque developed.

**Interpreting results of No Load and Torque Tests**

1. Rated torque, current draw and no load speed indicates normal condition of starting motor.
2. Low free speed and high current draw with low developed torque may result from:
  - a. Tight, dirty, or worn bearings, bent armature shaft or loose field pole screws which would allow the armature to drag.
  - b. Shorted armature. Check armature further on growler.
  - c. A grounded armature or field. Check by raising the grounded brushes and insulating them from the commutator with cardboard and then checking with a test lamp between the insulated terminal and the frame. If test lamp lights, raise other brushes from commutator and check fields and commutator separately to determine whether it is the fields or armature that is grounded.

**ELECTRICAL SYSTEM - Continued****Interpreting results of No  
Load and Torque Tests -  
Continued**

3. Failure to operate with high current draw:
  - a. A direct ground in the switch, terminal or fields.
  - b. Frozen shaft bearings which prevent the armature from turning.
4. Failure to operate with no current draw:
  - a. Open field circuit. Inspect internal connections and trace circuit with a test lamp.
  - b. Open armature coils. Inspect the commutator for badly burned bars. Running free speed, an open armature will show excessive arcing at the commutator bar which is open.
  - c. Broken or weakened brush springs, worn brushes, high mica on the commutator, or other causes which would prevent good contact between the brushes and commutator. Any of these conditions will cause burned commutator bars.
5. Low no-load speed, with low current draw indicates:
  - a. An open field winding. Raise and insulate ungrounded brushes from commutator and check fields with test lamp.
  - b. High internal resistance due to poor connections, defective leads, dirty commutator and causes listed under 4.c. above.
6. High free speed with low developed torque and high current draw indicates shorted fields. There is no easy way to detect shorted fields, since the field resistance is already low. If shorted fields are suspected, replace the fields and check for improvement in performance.

**REPAIR SECTION**

---

**MEMORANDA**

ENGINE

Specifications

|   |               |
|---|---------------|
| Bore and Stroke, inches . . . . .                   | 4-3/4 x 6-1/2 |
| Number of Cylinders . . . . .                       | 4             |
| Type of Cylinders . . . . .                         | Wet Sleeve    |
| Displacement, Cu. In. Per Rev. . . . .              | 461           |
| Governed R.P.M. . . . .                             | 1350          |
| Governed High Idle Speed, R.P.M. . . . .            | 1500          |
| Governed Low Idle Speed, R.P.M. . . . .             | 425           |
| Piston Speed, feet per minute @ 1350 R.P.M. . . . . | 1462          |
| Compression Pressure, lbs. . . . .                  | 465           |
| Compression Ratio . . . . .                         | 13.67 to 1    |
| Fuel . . . . .                                      | Diesel Fuel   |

Air Cleaner

A Donaldson 9" oil-washed air cleaner with an oil cup is used on this tractor. The intake is provided with a screen to prevent large particles, such as chaff, leaves, etc. from entering the air cleaner. The air passes through the screen, down the center into the oil cup, and up through screens to the intake manifold. Reversal of air flow at the base separates dust from the air. Oil carried upward with air as a mist is separated from the air by crimped screen elements, returning oil to the base and washing the crimped screens.

The oil cup should be removed for periodical cleaning and refilling with fresh oil to the proper level. Screens should be washed with kerosene. Joints, rubber connections, etc., should be air tight to prevent entrance of dirt particles. Refer to the "Operations Section" for complete servicing of the air cleaner.

Proper functioning of the air cleaner is important to obtain maximum power from an engine. A restricted air cleaner will cause a loss of power.

Manifold

The intake manifold is of the dual type, consisting of two air passages. Only one of the passages is used during the starting operation -- the other is used for Diesel operation. The manifold includes two butterfly valves which close off the Diesel passage when starting the engine on gasoline. The magneto cut-out switch is located in a compartment at the front end of the manifold and is attached directly to the end of the butterfly valve shaft. It grounds the magneto after the engine is converted from gasoline to Diesel operation and breaks contact when the starting mechanism controls are set in the starting position.

The entire unit can be removed after disconnecting the fuel line to the carburetor; removing cotter keys and slipping out the primer control rod, the choke control rod, and the carburetor control link; disconnecting the magneto grounding wire from the front of the manifold; removing the nuts holding the manifold to the cylinder head; and removing the air pipe from the air cleaner to the manifold.

ENGINE - Continued

Manifold - Continued

Replacement is the reverse of the above. Be sure gaskets are in good condition. Tighten manifold nuts to 75 ft.-lbs. torque.

When the entire unit is serviced, or parts replaced, refer to the "Starting System," Section 10.

Lubrication

Capacity, U.S. Quarts . . . . . 16  
Full-Pressure System. . . . . Yes  
Oil Filter, Model . . . . . P-20  
Oil Pressure, Lbs. . . . . 60  
Oil Pressure  
Valve. . . . . In Purolator Base

Full force-feed lubricates the crankshaft bearings, camshaft bearings, connecting rod bearings, piston pins, valve mechanism, and timing gears.

Oil Pressure

Oil pressure is controlled by a plunger-type regulating valve located in the Purolator base, set at 60 lbs. pressure. The oil regulating spring should test 38.2 lbs. at 2-3/32" while the free length is 3-39/64".

The pressure valve O.D. is .900" to .901" and the bore in the Purolator base is .905" to .906", or the clearance for the valve is .004" to .006". Be sure the valve slides freely and the spring does not cock the valve in the bore, seating improperly.

Valve springs take a set after continued use - hence their free length may be somewhat shorter than dimensions listed. The best way to check these springs is to load them with weight specified and to measure their length at this load. This load is equivalent to the conditions existing when the valve spring is in the operat-

ing position. Valve springs falling below this standard should be replaced.

Oil Filters

Two Motor Improvement P-20, paper renewable type, lubricating oil filters are accessibly located on the right side of the engine. A quantity of oil is bypassed from the main circulatory system, through the cleaning element to the crankcase.

Filter elements should be renewed every time oil is changed, or oftener if need be. Be sure the end of the element marked "Top" is toward the top of the filter case.

Circulation

The path of lubricating oil is from the sump and through a "Float-o" oil screen from where it is pumped under pressure to the Purolator filter base. From the base, a passage leads to the filters and is known as the bypass. A portion of the oil is bypassed through the filters, the amount depending upon the cleanliness of the filter elements. The valve in the Purolator base maintains the proper pressure on all bearings and at the same time protects the system and pump mechanism when thick oils caused by severe weather conditions build up high pressures in the oil lines. The oil passed through the filter is returned to the sump as is the oil that is bypassed by the pressure relief valve. Oil under pressure, however, is discharged from the filter base into the rifle-drilled passages in the crankcase from where it is directed to the main bearings.

Oil from the main bearings passes through drilled passages in the crankshaft to the connecting-rod bearings, then through drilled passages in the connecting rods to the piston pins.

Oil passages also lead to the camshaft bearings, and timing gears. Another passage leads from the

ENGINE - Continued

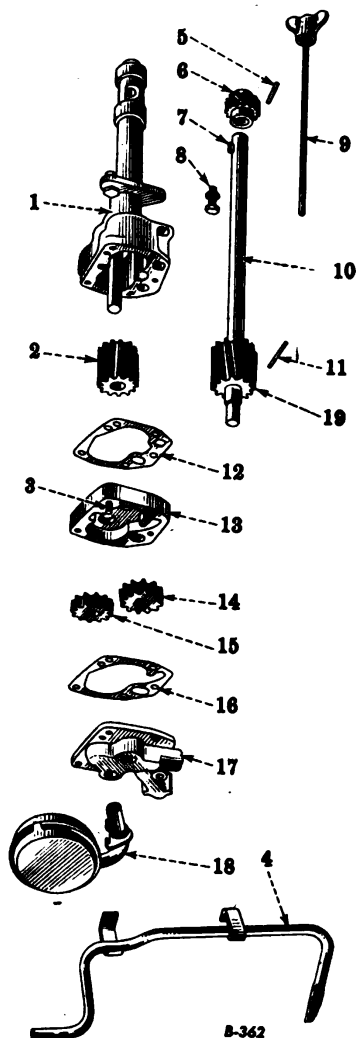
Circulation - Continued

front camshaft bearing and extends upward through the crankcase to the valve rocker mechanism. A slot in the bearing journal allows a small amount of oil to flow to the rocker arms with each revolution of the camshaft. The valve lever shaft is hollow and distributes oil to valve rockers and valve stems. The oil is drained back to the sump through the valve push-rod holes in the crankcase and in so doing lubricates valve tappets and cams. A valve oiler pad over the

valve levers is kept saturated with oil from drilled holes in the top of the valve lever.

Oil Pump

The double-gear type oil pump has two gears on the pump drive shaft and two gears on the idler shaft. The upper main set of gears supplies oil to the lubricating system; the auxiliary set of gears pumps oil from the shallow end of the oil pan back to the sump when the unit is operating downgrade.



| Ref. No. | Description                      |
|----------|----------------------------------|
| 1        | Body.                            |
| 2        | Idler gear.                      |
| 3        | Dowel.                           |
| 4        | Return pipe.                     |
| 5        | Pinion pin.                      |
| 6        | Drive pinion.                    |
| 7        | Key.                             |
| 8        | Body cap screw.                  |
| 9        | Oil level gauge.                 |
| 10       | Drive shaft, with pins.          |
| 11       | Gear pin.                        |
| 12       | Gasket.                          |
| 13       | Gear housing, with dowel.        |
| 14       | Auxiliary body gear (12 teeth).  |
| 15       | Auxiliary idler gear (12 teeth). |
| 16       | Gasket.                          |
| 17       | Cover.                           |
| 18       | Pump float.                      |
| 19       | Body gear (12 teeth).            |

Illust. 1 - Exploded View of the Lubricating Oil Pump.



ENGINE - Continued

**Removal of the Oil Pump**

Remove the crankcase guard and oil pan from the engine, and remove cap screws holding the oil return pipe (4), *Illust. 1*. Remove the pump assembly from the engine by removing the two body cap screws (8) from the flange above the main body of the pump.

**Disassembly of the Oil Pump**

Pull the cotter key from the cover (17), and remove the pump float (18). Remove the cap screws holding the cover. The cover (17), gasket (16), auxiliary body gear (14), auxiliary idler gear (15), auxiliary gear housing (13), gasket (12), and large pump body idler gear (2) can now be disassembled.

Check for end play in the shaft (10). If necessary, drive out the pinion pin (5) and remove the drive pinion (6) and the key (7) from the drive shaft. Pull the drive shaft with the body gear (19) from the body (1). The body gear (19) can be removed from the drive shaft by driving out the pin (11) and pulling the gear from the shaft. Remove the key from the shaft.

**Service of the Oil Pump**

Check all the gears, body, gear housing, drive shaft, and cover for wear. The idler shaft in the body is a press fit and is located with the end of the shaft 2-5/32" from the base of the body. Backlash in gears can be .003" to .006". A dowel pin (3) locates the cover (17), gear housing (13), and body (1).

The idler shaft should be concentric with the body bore and square with the bottom of the gear chamber within .001". The drive (19) and idler (2) gears should have .0065" clearance between the body bore and the outside diameter of the gear. Use a 1/2" wide, .0065" feeler gauge between the body and gear; turn the pinion several rev-

olutions when checking the clearance.

**Reassembly of the Oil Pump**

Place the key in the shaft and assemble the body gear (19) and then drive in the pin (11). Peen the ends of the pin to hold it in place. Take care not to strike the gear, and be sure that the pin does not stick up in the bottom of the tooth.

Place the drive shaft (10) in the body (1). Assemble the key (7) and the pinion gear (6), replace the pinion pin (5), and peen the ends of the pin. Be sure the pin does not interfere with the bottom of the tooth and that the gear is not damaged when the pin is peened.

Assemble the idler gear on the idler shaft, and push it into the body. Place a thin coat of pressure-gun grease on the surface where the gasket (12) contacts the auxiliary gear housing (13), to keep them in line while assembling.

Assemble the auxiliary gear housing and the gasket to the body. The dowel pin (3) in the gear housing locates the two parts. The gasket is .006" thick and serves as a shim to obtain .003" to .005" end play of the drive shaft when the pump is completely assembled.

Place the auxiliary body gear (14) on the drive shaft (10), and the auxiliary idler gear (15) on the idler shaft. Assemble the gasket (16) to the cover (17), replace the cap screws and tighten. The driveshaft gears should turn freely when assembled.

If the return pipe (4) should be loose in the cover, remove it and give it another coat of babbitt. Scrape off any surplus material that interferes with the pipe being assembled as a tight fit in the cover. Replace the pump float (18) in the cover, inserting the cotter key in the hole in the cover to hold the float in place.

## ENGINE - Continued

### Replacement of the Oil Pump

Place the oil pump in the crankcase, replace the cap screws (8), and tighten. Lock the cap screws by placing a wire through the holes in the heads and twisting the ends together. Replace the cap screws holding the return pipe (4) to the crankcase. Replace the oil pan and fill with the proper amount of lubricating oil.

### Cylinder Head

The cylinder head contains the conventional intake and exhaust valves of overhead design. In addition, the starting valves are assembled to the head; when open for starting on the gasoline cycle, they increase cylinder volume, decrease compression ratio and expose spark plugs for starting as a gasoline engine. Service of valves and head is the same as for any conventional engine. The hood sheet and valve mechanism must be removed to remove the cylinder head. Be sure that the compression release lever is on the Diesel cycle before starting service work.

The cylinder head is removed when valves and valve seats need reconditioning, when the gasket is leaking, or when the pistons, connecting rods, or cylinder sleeves are to be taken out. Whenever the head is off for valve reconditioning, inspect the sleeves for wear.

### Removal of the Cylinder Head

Remove the hood sheet, air cleaner pipe to the intake manifold, the valve-lever housing and valve rocker arms as described under the "Valve Mechanism" in this section. Drain the radiator, disconnect the water outlet elbow from the front of the cylinder head, and disconnect the injection pipes at the pump and nozzles. Place caps on the pump and nozzles to protect them from dirt. Disconnect the clip on the No. 4 injection pipe

from the head. It is not necessary to remove the injection nozzles unless a new cylinder head is being installed.

Shut off the valve on the gasoline tank and disconnect the fuel line at the carburetor. Disconnect the primer rod at the control rod end; also the cable to the choke control. Disconnect the wires and remove the spark plugs. This is a precaution to prevent damage to the plugs while servicing the cylinder head. Disconnect the link between the starting control mechanism and the carburetor. Remove the end cover and disconnect the short-circuiting cable from the intake manifold. Take out the six nuts holding the exhaust manifold to the cylinder head, and lift off the manifold. Remove the four nuts holding the intake manifold and lift off this manifold.

Remove all the manifold gaskets and the valve push rods (10), *Illust. 2*. Remove all nuts holding the cylinder head (45), and take off the head. Remove the cylinder head gasket (15) and gasket rings (14).

### Disassembly of the Cylinder Head

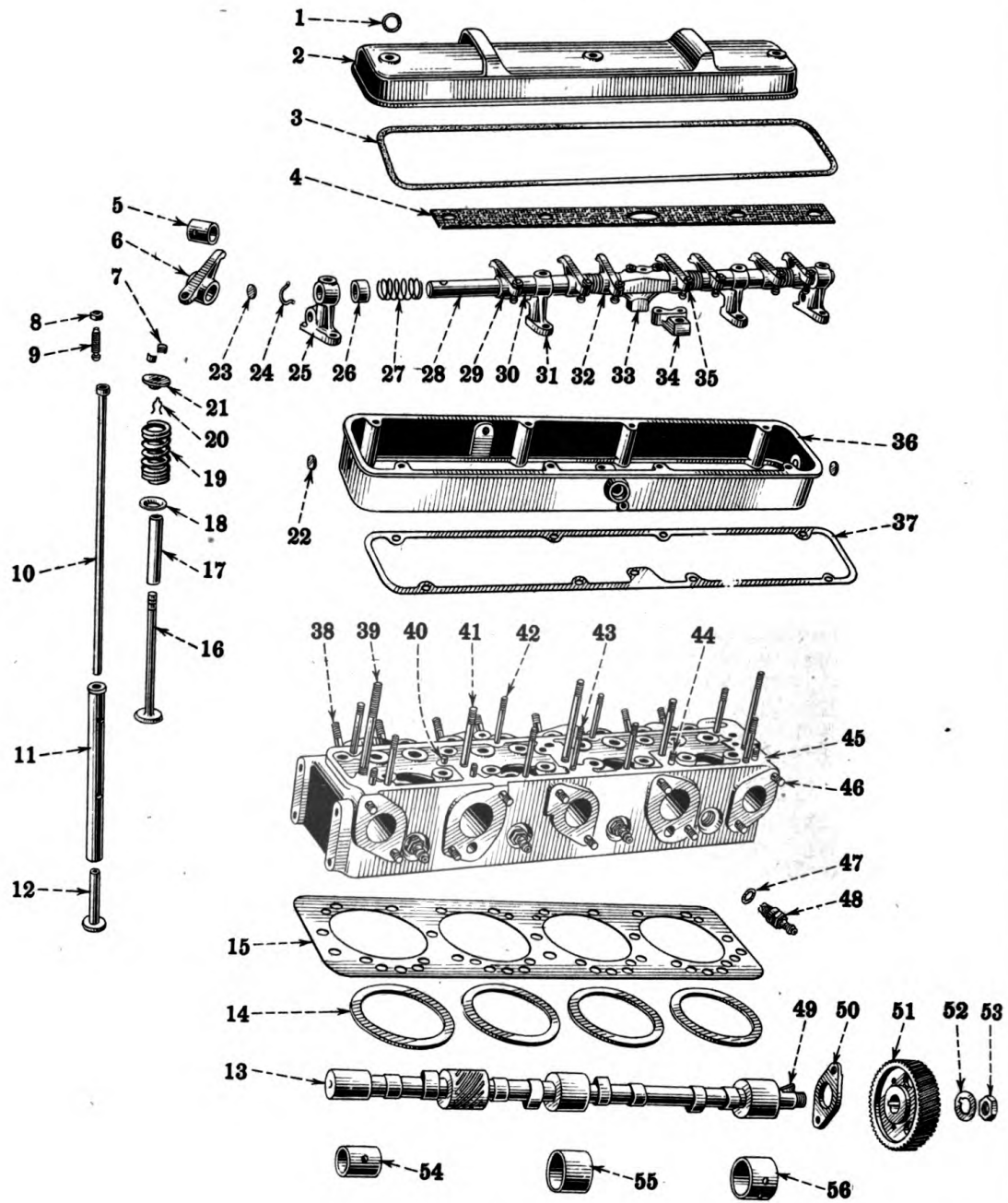
Place the cylinder head on a bench with a small block to support the valves when the springs are depressed. Be sure to keep the valves in order and replace them in their original positions.

To remove the valves (16), *Illust. 2*, depress the upper seat (21) and remove the keys while holding head of valve stationary. Lift off the upper seat and the spring (19) and remove the retainer (20) and lower seat (18). Tip the head on its side and withdraw valves.

To remove the starting valves (17), *Illust. 3*, remove the cotter key from the retainer (14) and unscrew it. The valves can then be removed from the head. Be sure to keep the valves in proper order.

# REPAIR SECTION

## ENGINE - Continued



B-360

Illust. 2  
Exploded View of the Cylinder Head, Valves, and Camshaft

**ENGINE - Continued**

**Cylinder Head - Continued**

| Ref. No. | Description                                       |
|----------|---|
| 1        | Washer.   |
| 2        | Cover.  |
| 3        | Gasket.   |
| 4        | Oiler felt.                                       |
| 5        | Lever bushing.                                    |
| 6        | Lever with bushing, right hand.                   |
| 7        | Key.  |
| 8        | Nut.  |
| 9        | Adjusting screw.                                  |
| 10       | Push rod.   |
| 11       | Tappet guide.                                     |
| 12       | Tappet.   |
| 13       | Camshaft.   |
| 14       | Gasket ring.                                      |
| 15       | Gasket.   |
| 16       | {Exhaust valve.<br>Intake valve.                  |
| 17       | Guide.  |
| 18       | Lower seat.                                       |
| 19       | Spring.   |
| 20       | Retainer.   |
| 21       | Upper seat.                                       |
| 22       | Plug.   |
| 23       | Plug.   |
| 24       | Retainer ring.                                    |
| 25       | End bracket.                                      |
| 26       | Spacer, outer.                                    |
| 27       | Spring.   |
| 28       | Shaft, complete with re-<br>tainer ring and plug. |
| 29       | Lever, straight, with<br>bushing.                 |
| 30       | Spacer, intermediate.                             |
| 31       | Intermediate bracket.                             |
| 32       | Lever with bushing, left<br>hand.                 |
| 33       | Center bracket, upper<br>half.                    |
| 34       | Center bracket, lower<br>half.                    |
| 35       | Lever with bushing, right<br>hand.                |
| 36       | Housing.  |
| 37       | Gasket.   |
| 38       | Nozzle body stud.                                 |
| 39       | Bracket stud, long.                               |
| 40       | Locating pin.                                     |
| 41       | Intermediate bracket<br>stud.                     |
| 42       | Valve housing stud, long.                         |
| 43       | Valve housing stud, short.                        |
| 44       | Bracket stud, short.                              |
| 45       | Cylinder head.                                    |
| 46       | Manifold stud.                                    |
| 47       | Spark plug gasket.                                |

| Ref. No. | Description     |
|----------|-----------------|
| 48       | Spark plug.     |
| 49       | Key.            |
| 50       | Thrust plate.   |
| 51       | Gear.           |
| 52       | Nut lock.       |
| 53       | Nut.            |
| 54       | Rear bearing.   |
| 55       | Center bearing. |
| 56       | Front bearing.  |

**Repair of Valves and Head**

All the valve guides (17), *Illust. 2*, and (16), *Illust. 3*, in the head are replaceable. The starting-valve guides (16), should be assembled 15/16" below the top of the cylinder head. The exhaust and intake valve guides (17), *Illust. 2*, should be assembled with the sharp-edged chamfer at the top and the top shoulder 1-3/8" above the top of the cylinder head.

The guides can be driven out by using a rod with a diameter slightly smaller than the outside of the guide.

Guides can be replaced by placing a piece of wood on the end of the guide to protect it and driving it into the head to specified distance.

**Reassembly of the Cylinder Head**

Clean all the carbon off the top of the pistons and cylinder head. Remove all foreign material off the mating surfaces of the engine block and cylinder head. Do not let any carbon or dirt fall into the engine through the push-rod openings or in the cylinders.

Insert the valves (16), *Illust. 2*, in the cylinder head in proper order and support them with a block of wood. As each valve is inserted, place the lower seat (18) with the outside edge of the seat on the cylinder head and replace the retainer (20).

## REPAIR SECTION

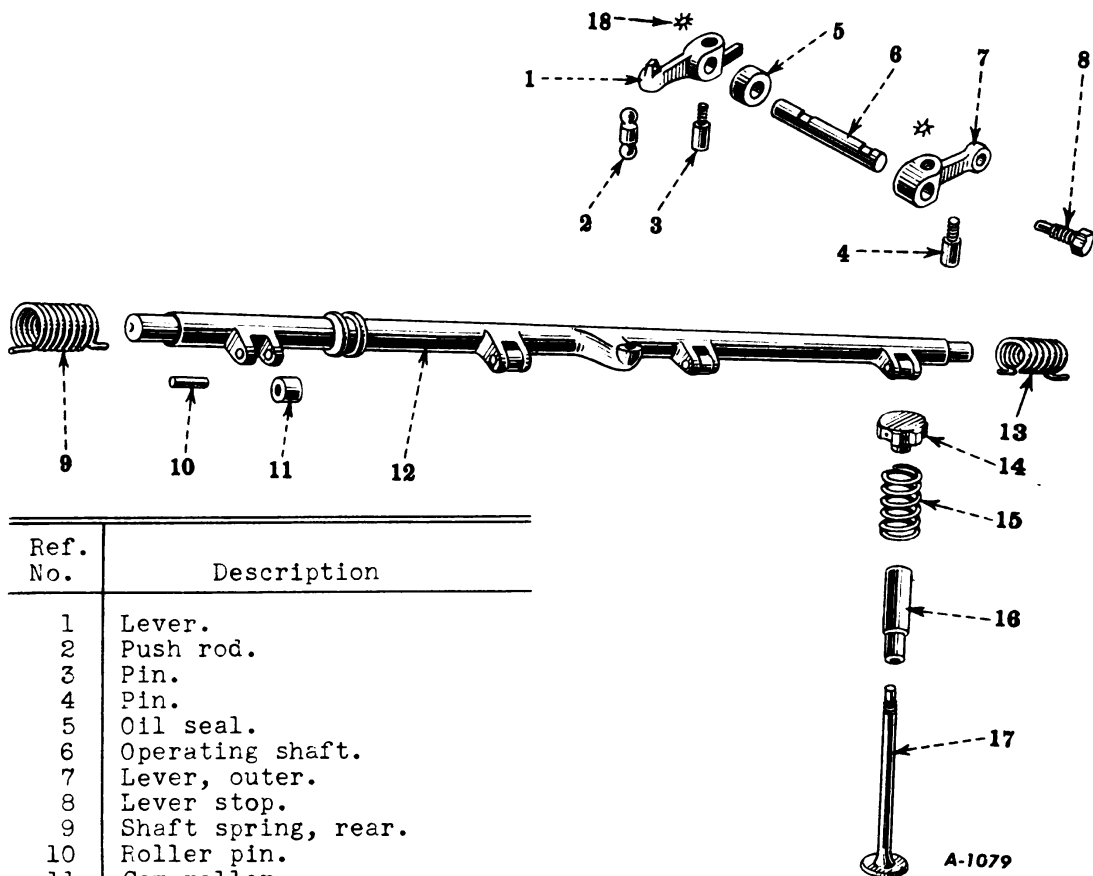
### ENGINE - Continued

Replace the spring (19) and the upper seat (21) on the stem and depress until the keys can be inserted in the end of the stem, tapered ends down.

Replace the starting valves (17), *Illust. 3*, in the head in proper order; place the springs (15) on the stems and screw the retainers (14) down until they are .240" to .250" above the cylinder head. Then replace the cotter keys.

### Replacement of the Cylinder Head

Place the gasket rings (14), *Illust. 2*, on the cylinder block with the flange side facing up  
**NOTE:** In the event new gasket rings are not available when reassembling the engine, the old rings should be annealed. These gasket rings, being made of copper, become hardened in use. Annealing restores flexibility, which facilitates maintaining a gas-tight seal. To anneal the gasket rings,



| Ref. No. | Description                                     |
|----------|---|
| 1        | Lever.  |
| 2        | Push rod.                                       |
| 3        | Pin.  |
| 4        | Pin.  |
| 5        | Oil seal.                                       |
| 6        | Operating shaft.                                |
| 7        | Lever, outer.                                   |
| 8        | Lever stop.                                     |
| 9        | Shaft spring, rear.                             |
| 10       | Roller pin.                                     |
| 11       | Cam roller.                                     |
| 12       | Starting valve shaft, with roller and pin.      |
| 13       | Shaft spring, front.                            |
| 14       | Retainer.                                       |
| 15       | Valve spring.                                   |
| 16       | Valve guide.                                    |
| 17       | Valve.  |
| 18       | Starting valve operating shaft pin lock washer. |

*Illust. 3*  
Exploded View of Starting Valve Mechanism.

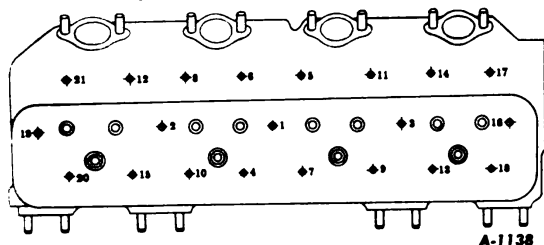
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ENGINE - Continued

Replacement of the Cylinder Head - Continued from page 7

heat to a dull red heat and quench in water.

Grease both sides of gasket and carefully place it on the studs with side marked "Top" facing up. Be sure no foreign material is adhering to the gasket, crankcase, or cylinder head. Place the cylinder head on the engine and run down the nuts.



Illust. 4  
Cylinder Head Nut Tighting Sequence.

Following the sequence given on the Chart, *Illust. 4*, start with No. 1, drawing each nut down a little. Repeat the operations several times, drawing the nuts down a small amount each time. Check with a torque wrench to see how much the nuts have been tightened. The nuts are to be tightened to 190 ft.-lbs. Repeat the operation with the torque wrench. After nuts have been drawn to the final torque go back over the nuts, following the sequence diagram, to make sure those already tightened are not now below 170 ft.-lbs. torque because the entire head has been pulled down.

Replace the valve push rods (10), *Illust. 2*, in the head. Replace the lower half (34) of the valve lever shaft center bracket, with the cap screw holes toward the valve side of the head. Replace the valve-lever assembly as described under the "Valve Mechanism" in this section.

Replace manifolds, ground wire for the starting system, carburetor connections, cooling system connections, injection pump tubing, etc., in the reverse order of removal. Bleed air from the fuel injection system as described in the "Operations Section".

Adjust the clearance between the starting valve retainer and cam roller as described under the "Starting System" in Section X. Adjust clearance between intake and exhaust valves and levers as described in the "Operations Section".

Replace the valve housing but leave off the valve-housing cover for readjustment of valve clearances after the engine has been warmed up. Refill the cooling system, start the engine and bring it up to operating temperature. Re-adjust the intake and exhaust valves to .018". Replace the valve housing cover and hood. Replace the air cleaner pipe.

Valves

Specifications

- Valve seat width . . . . . 3/32"
- Valve seat angle . . . . . 45°
- Stem guides (replaceable). Grey Iron
- Stem Diameter
  - Intake valves . . . . . .4325"
  - Exhaust valves. . . . . .4315"
- Stem clearance in guide
  - Intake valves . .002" to .004"
  - Exhaust valves .003" to .005"
- Tappet clearance, hot. . . . .018"
- Valve spring, free length. 2-7/8"
- Valve spring
  - test . . 50 to 56 lbs. at 2-1/2"

ENGINE - Continued

Specifications - Continued

Valve lever shaft  
diameter . . . . . .9660" to .9665"

Valve lever clearance  
in bushing . . . . .0015" to .002"

Valve lever bushing length. 1-1/4"

Intake Valves Specifications

Head Diameter. . . . . 2"

Port Diameter. . . . . 1-3/4"

Lift . . . . . 1/2"

Valve opens. . . . . 10° before TDC

Valve closes . . . . . 25° after LDC

Exhaust Valves Specifications

Head Diameter . . . . . 1-3/4"

Port Diameter . . . . . 1-1/2"

Lift . . . . . 1/2"

Valve opens . . . . . 43° before LDC

Valve closes . . . . . 10° after TDC

Starting Valves Specifications

Head Diameter. . . . . 1-9/32"

Stem Diameter . . . . . .3715"

Valve guide replaceable. . . . Yes

Clearance in guide . . . . .0025"

Valve seat width . . . . . 3/64"

Removal of the Valve Mechanism

Remove the gasoline tank cap and the hood sheet, and the air cleaner pipe to the intake manifold.

Remove three nuts with copper gaskets from the valve housing cover (2), *Illust. 2*, and lift it off with the gasket. Lift off the wick (4) and disconnect the starting-valve operating shaft lever (7), *Illust. 3*, on the outside of the valve housing. Loosen all the adjusting screws on the valve levers (6), *Illust. 2*. Remove nuts around the outside of the valve housing (36) and the cap screws and nuts on the valve lever brackets (25), (31), and (33). Lift off the valve mechanism and the valve housing as a unit.

Disassembly of the Valve Mechanism

Remove the nut from the pin (3) *Illust. 3*, in the operating lever (1) on the inside of the valve housing and drive out the pin. Remove the operating lever by pulling on the lever outside the housing. The valve housing can now be removed from the valve assembly. Loosen the jam nuts and set screws on the upper and lower center brackets (33) and (34), *Illust. 2*. The shafts (28), with levers (6), (29), (32), and (35), springs (27), and spacers (26) and (30) are now slipped out of the center bracket. The levers, springs, spacers, and starting-valve shaft are now removed from the shafts for repair.

Repair of the Valve Mechanism

Bushings (5) in the valve levers (6), (29), (32), and (35) can be replaced; they should be reamed to sizes as listed in the Valve Specifications. In replacing bushings, be sure holes in the levers line up with holes in the bushings. The valve lever shaft (28) can be checked for wear with specifications.

When it is necessary to replace an intake or exhaust valve, first ream the valve seat with the proper reamer and then lap in the new valve. The valve seat should be 3/32" wide. Remove all grinding

## ENGINE - Continued

## Repair of the Valve Mechanism - Continued

compound from the guide, valve, and seat and then oil the valve stem well.

Check the valve springs (19) to the specifications.

## Valve Service Tools Available

## (Valve Guides)

SE-1202-3 - Cleaner

SE-640 Reamer

## (Intake)

SE-1235 - 45° Valve Seat Reamer, Finish

SE-1223 - 45° Valve Seat Reamer, Rough

SE-1225 - 75° Valve Seat Reamer, Rough

SE-1227 - 15° Valve Seat Reamer, Rough

SE-903 - Reamer Pilot

## (Exhaust)

SE-1236 - 45° Valve Seat Reamer, Finish

SE-691-1 - 45° Valve Seat Reamer, Rough

SE-1225 - 75° Valve Seat Reamer, Rough

SE-691-2 - 15° Valve Seat Reamer, Rough

## (Valve Lever Bushings)

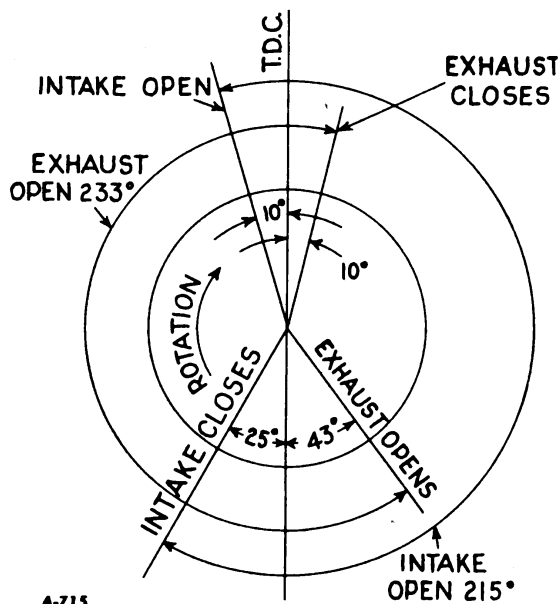
SE-945 - Reamer Body

SE-873-5 - Reamer Blades

SE-877-1 - Reamer Pilot

## Reassembly of the Valve Mechanism

Reassembly of valve mechanism is the reverse of disassembly procedure. When replacing the valve levers on the shaft, be sure the spacers are in the correct place and that the right, left, and straight levers are in the proper place. Analyzing the two groups of four, the center two are straight,



Illustr. 5  
Engine Valve Timing Diagram

with a left and right at the respective ends. When replacing valve springs on the cylinder head, be sure the end of the spring, when the coils are close together, is assembled against the cylinder head.

## Replacement of the Valve Mechanism

Replace the valve lever assembly on the studs from which it was removed. Be sure the collar on the starting-valve shaft (12), *Illustr. 2*, is over the locating pin (40), *Illustr. 2*, on the cylinder head.

Replace the oil seal (5), *Illustr. 3*, in the valve housing, with the lip of the seal to the outside. Replace the valve housing (36), *Illustr. 2*, and the gasket (37). Replace the operating shaft (6), *Illustr. 3*, through the hole in the valve housing. Then place the inner lever (1) on the shaft and fasten with the drive pin (3) and hex. nut.

Adjust the valve tappet clearance as described in the "Operations



ENGINE - Continued

Replacement of the Valve Mechanism - Continued

Section", and then readjust after the engine is hot. Replace the felt wick over the valve mechanism and the gasket and the cover on the housing. Replace the hood sheet, air intake pipe, and the

gas tank cap.

Connect the outer lever, to the starting mechanism. Check clearance between rollers and starting valves. If it is not .060", see the "Starting System", Section 10, for adjustments.

Camshaft

|  |                           |
|--|---------------------------|
| Bearings, number . . . . .                 | 3                         |
| Bearing material . . . . .                 | (Steel back) Babbit lined |
| Bearing Journal Diameter, front . . . . .  | 2.618" to 2.619"          |
| Bearing Journal Diameter, center . . . . . | 2.368" to 2.369"          |
| Bearing Journal Diameter, rear . . . . .   | 1.7475" to 1.7485"        |
| Running clearance . . . . .                | .0015" to .0035"          |
| Bearing length, front . . . . .            | 2-1/16"                   |
| Bearing length, center . . . . .           | 2"                        |
| Bearing length, rear . . . . .             | 2-3/16"                   |
| End Clearance . . . . .                    | .005" to .011"            |
| Camshaft drive . . . . .                   | Helical gear              |
| Number of teeth in gear . . . . .          | 54                        |
| Pressure lubricated . . . . .              | Yes                       |

The slot in the front bearing journal allows a small amount of oil to flow from the oil passage in the crankcase to the valve lever mechanism with each revolution of the camshaft.

Removal of the Camshaft

In the removal of the camshaft (13), *Illust. 2*, from the cylinder block, it is assumed that the engine has been removed from the tractor. The fuel injection pipes should be removed to prevent damage when the crankcase is laid on the pump side for camshaft service.

Remove the valve-lever assembly and push rods as described under the "Valve Mechanism" in this section. Remove the oil pan, the crankcase front cover, and the oil pump as described under those subjects. Remove the idler gear (49), *Illust. 7*, by bending back the corners of the bolt lock (51) and removing the two cap screws, through the thrust washer (50).

Turn the camshaft gear (51), *Illust. 2*, until the hole in the gear lines up with the head of the cap screw holding the thrust plate (50). Then remove the cap screw.

## ENGINE - Continued

**Removal of the Camshaft -  
Continued**

Repeat the operation to remove the second cap screw. Reach up from the bottom of the crankcase and push the tappets (12) toward the top of the crankcase as far as they will go. The camshaft can now be removed from the crankcase by pulling on the gear (51).

Bend the washer (52) down and remove the nut (53). Using a gear puller, remove the gear (51) from the camshaft, and take off the thrust plate, and the key (49).

**Repair of the Camshaft**

Inspect the camshaft bearing surfaces and check to the dimensions given in the specifications. The groove in the front bearing journal meters oil to the rocker-arm assembly.

In order to facilitate the replacement of the camshaft bearings (54), (55), and (56), remove the flywheel and the rear engine support (1), *Illust. 7*, and drive out the plug (21) in the rear of the crankcase by using a long bar placed against the plug from the front end of the crankcase and tapping with a hammer; or by drilling a hole in the plug to pull it out.

Drive out the bearings by using a brass rod placed against the edge of the bearing and tapping. Move the end of the rod around the edge of the bearing as tapping proceeds, to prevent the bearing from jamming in the boss.

Replacement bearings are furnished reamed to size. In replacing the bearings, be sure all the holes in the bearings line up with the holes in the crankcase.

The front bearing (56), *Illust. 2*, is pressed flush with the front end of the crankcase by placing a block of wood across it and tapping with a hammer. Be sure the

bearing is started square with the crankcase so that it does not bind. Repeat the above procedure for the center bearing (55), pressing it flush with the boss inside the casting. Drive the rear bearing (54) so that the inner end is  $1/8$ " inside the inside end of the boss in the crankcase.

**Replacement of the Camshaft**

Place the thrust plate (50), *Illust. 2*, on the camshaft (13) with the countersunk surfaces toward the threaded end of the shaft. Insert the key (49) in the shaft and press on the gear (51). Be sure the lettered side of the gear is outside. Replace the nut lock (52), tighten the nut (53), and bend down the edge of the nut lock to lock the nut.

Place the camshaft in the crankcase and tighten the cap screws on the thrust plate (50). Be sure the face of the gear (51) runs true with the front plate (15), *Illust. 7*, on the engine. If this is not done, the timing gears will be noisy. Clearance between the thrust plate and the gear, when all are assembled, should be .005" to .011".

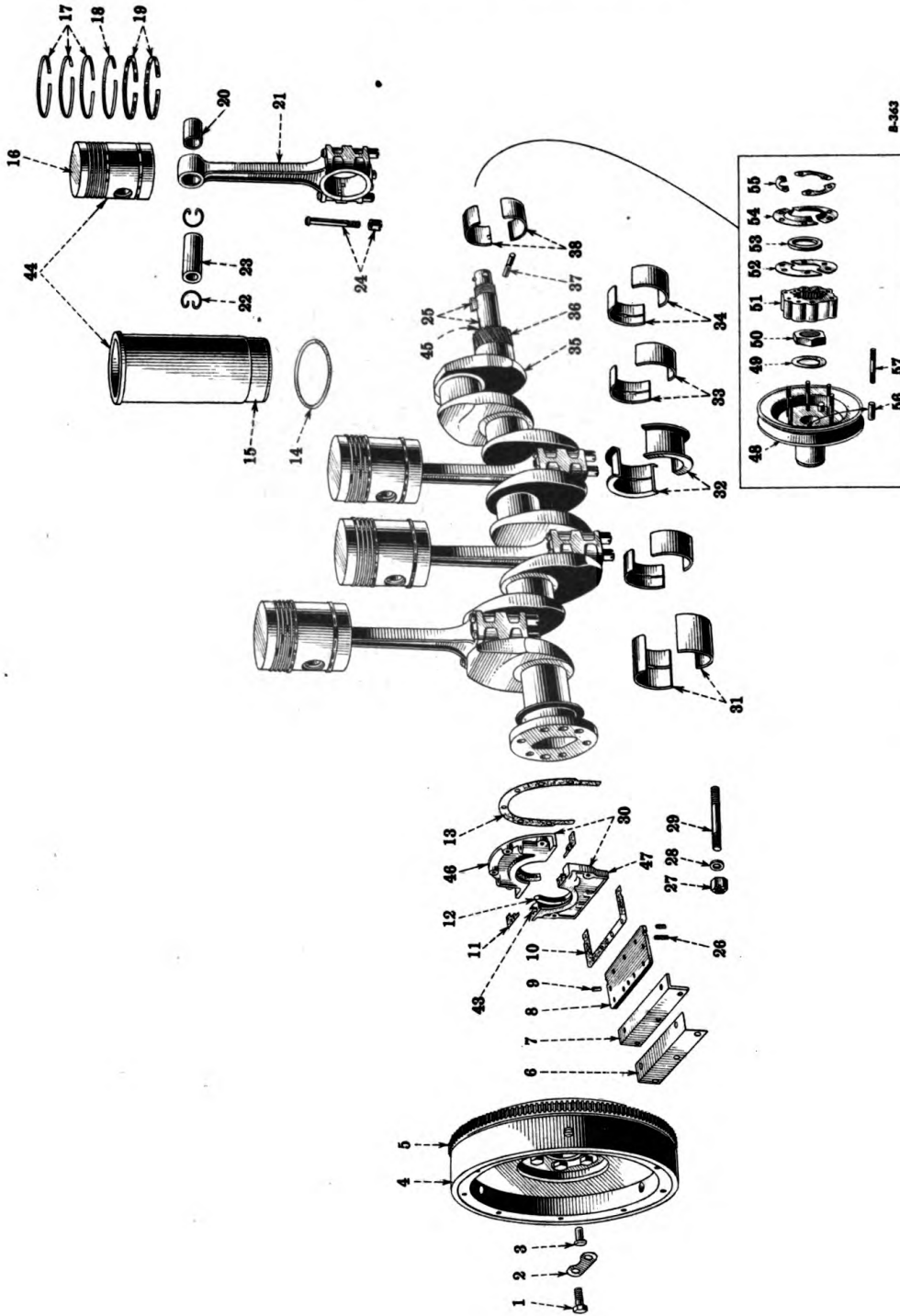
Replace the idler gear (49). The gears are punch marked "C", "P", and "S". Be sure all marks correspond when the idler gear is slipped on the shaft. Replace the idler thrust washer (50), bolt lock (51) and tighten the cap screws. Lock the idler cap screws by bending down the corners of the bolt lock.

Replace the crankcase front cover as described under that subject, and the oil pan. Replace the plug in the rear of the crankcase with a new one. Place a good sealer on the edge of the plug and put the plug in the crankcase. Using a bar slightly smaller than the plug, set the plug.

Replace the rear engine support (1), and all other parts removed.

# REPAIR SECTION

## ENGINE - Continued



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Illust. 6  
Exploded View of the Crankshaft, Connecting Rods, Pistons, and Cylinder Sleeves

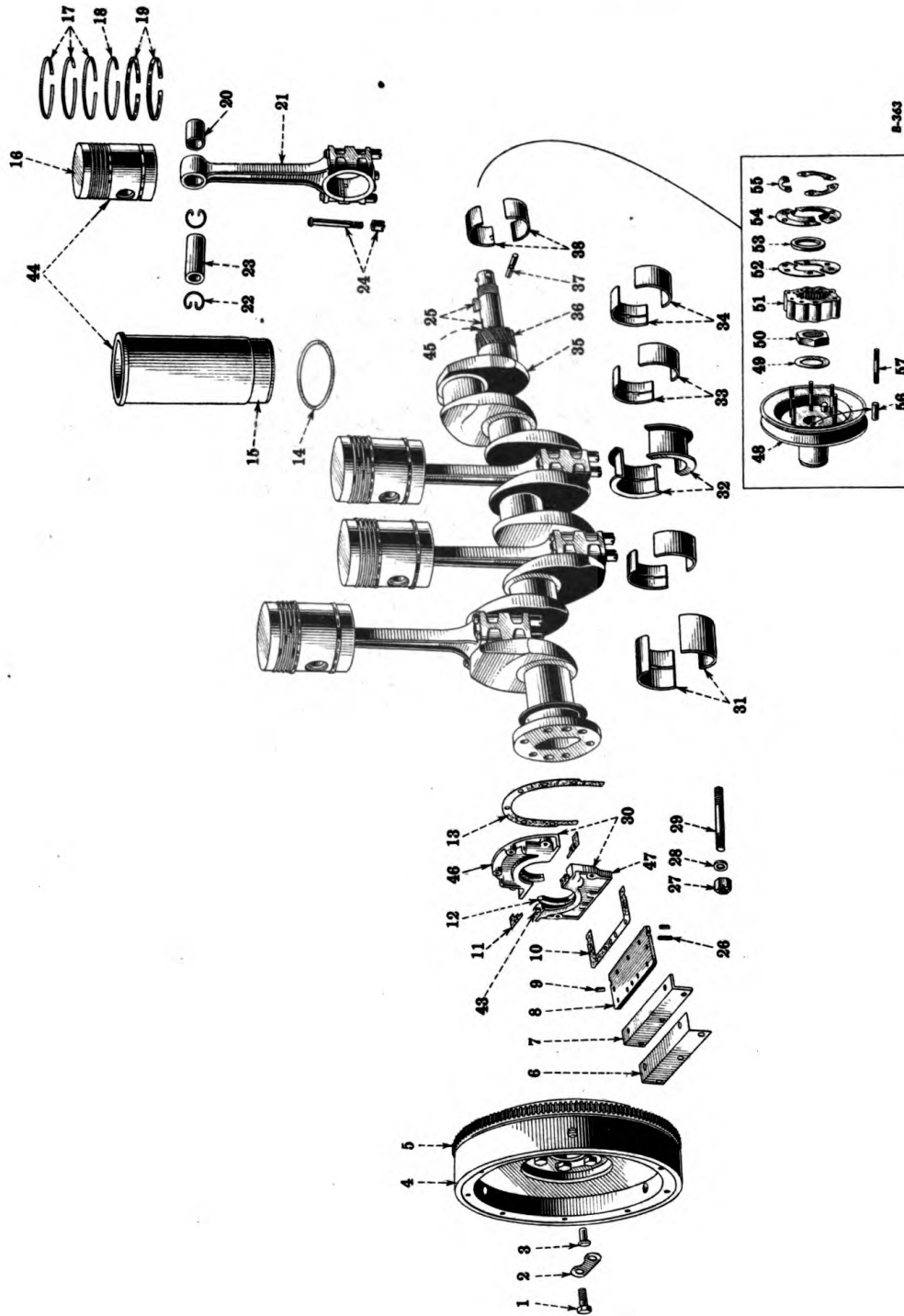
# REPAIR SECTION

## ENGINE - Continued

| Ref. No. | Description               | Ref. No. | Description            | Ref. No. | Description               |
|----------|---------------------------|----------|------------------------|----------|---------------------------|
| 1        | Bolt.                     | 19       | Oil regulating ring.   | 38       | Connecting rod bearing.   |
| 2        | Bolt lock.                | 20       | Bushing.               | 43       | Dowel.                    |
| 3        | Dowel.                    | 21       | Connecting rod.        | 44       | Sleeve and piston.        |
| 4        | Flywheel, with ring gear. | 22       | Retainer.              | 45       | Crankshaft gear key.      |
| 5        | Ring gear (146 teeth).    | 23       | Piston pin.            | 46       | Oil seal retainer, upper. |
| 6        | Gasket.                   | 24       | Bolt.                  | 47       | Oil seal retainer, lower. |
| 7        | Dust seal.                | 25       | Key.                   | 48       | Pulley.                   |
| 8        | Plate.                    | 26       | Stud.                  | 49       | Nut lock.                 |
| 9        | Felt plug.                | 27       | Nut.                   | 50       | Nut.                      |
| 10       | Gasket.                   | 28       | Washer.                | 51       | Coupling.                 |
| 11       | Gasket.                   | 29       | Stud.                  | 52       | Shaft retainer.           |
| 12       | Felt.                     | 30       | Oil seal retainer.     | 53       | Felt washer.              |
| 13       | Gasket.                   | 31       | Bearing, rear.         | 54       | Felt retainer.            |
| 14       | Packing ring.             | 32       | Bearing, center.       | 55       | Lock.                     |
| 15       | Sleeve.                   | 33       | Bearing, intermediate. | 56       | Pin.                      |
| 16       | Piston.                   | 34       | Bearing, front.        | 57       | Stud.                     |
| 17       | Compression ring. (taper  | 35       | Crankshaft.            |          |                           |
| 18       | face).                    | 36       | Gear (27 teeth).       |          |                           |
|          |                           | 37       | Crank pin.             |          |                           |

# REPAIR SECTION

## ENGINE - Continued



Illustr. 6  
Exploded View of the Crankshaft, Connecting Rods, Pistons, and Cylinder Sleeves

REPAIR SECTION

ENGINE - Continued

| Ref. No. | Description                    | Ref. No. | Description            | Ref. No. | Description               |
|----------|--------------------------------|----------|------------------------|----------|---------------------------|
| 1        | Bolt.                          | 19       | Oil regulating ring.   | 38       | Connecting rod bearing.   |
| 2        | Bolt lock.                     | 20       | Bushing.               | 43       | Dowel.                    |
| 3        | Dowel.                         | 21       | Connecting rod.        | 44       | Sleeve and piston.        |
| 4        | Flywheel, with ring gear.      | 22       | Retainer.              | 45       | Crankshaft gear key.      |
| 5        | Ring gear (146 teeth).         | 23       | Piston pin.            | 46       | Oil seal retainer, upper. |
| 6        | Gasket.                        | 24       | Bolt.                  | 47       | Oil seal retainer, lower. |
| 7        | Dust seal.                     | 25       | Key.                   | 48       | Pulley.                   |
| 8        | Plate.                         | 26       | Stud.                  | 49       | Nut lock.                 |
| 9        | Felt plug.                     | 27       | Nut.                   | 50       | Nut.                      |
| 10       | Gasket.                        | 28       | Washer.                | 51       | Coupling.                 |
| 11       | Gasket.                        | 29       | Stud.                  | 52       | Shaft retainer.           |
| 12       | Felt.                          | 30       | Oil seal retainer.     | 53       | Felt washer.              |
| 13       | Gasket.                        | 31       | Bearing, rear.         | 54       | Felt retainer.            |
| 14       | Packing ring.                  | 32       | Bearing, center.       | 55       | Lock.                     |
| 15       | Sleeve.                        | 33       | Bearing, intermediate. | 56       | Pin.                      |
| 16       | Piston.                        | 34       | Bearing, front.        | 57       | Stud.                     |
| 17       | Compression ring.              | 35       | Crankshaft.            |          |                           |
| 18       | Compression ring (taper face). | 36       | Gear (27 teeth).       |          |                           |
|          |                                | 37       | Crank pin.             |          |                           |

ENGINE - Continued

Connecting Rods

|                                       |                          |
|---------------------------------------|--------------------------|
| Length, center to center . . . . .    | 13-1/4"                  |
| Crank pin diameter . . . . .          | 3.248" to 3.2485"        |
| Bearing material . . . . .            | Copper lead (Steel back) |
| Bearings length, total . . . . .      | 2-1/16"                  |
| Bearings, running clearance . . . . . | .003" to .004 "          |
| Rod end clearance . . . . .           | .005" to .012"           |
| Bolts, number . . . . .               | 4                        |
| Bolts, size . . . . .                 | 1/2"                     |
| Bolts, torque, foot-lbs. . . . .      | 70                       |

Connecting rods (21), *Illust. 6*, should be straight, free from twist, and parallel with the piston (16). The cylinder numbers are stamped on the rod and cap -- No. 1 starts at the front end of the engine. Assemble the numbered side toward the camshaft. The clearance may be checked by placing a .003" brass shim (1/4" wide by 1-1/4" long) lengthwise between the lower bearing and the crankshaft. If the clearance is not excessive there should be a slight drag when turn-

ing the crankshaft with the spark plugs removed. When installing bearings, be sure that the bearing backs and rod surfaces are absolutely clean, smooth, and free from oil. The bearings have a nib engaging the milled notch in the rod and cap. The connecting rods (21) are removed from the bottom of the crankcase. The piston and rod assembly can be taken out after turning the crankshaft to the side so the piston will clear as it is pulled out of the crankcase. Then pull down on the rod. Be sure the piston does not hit the shaft or crankcase. Bearing caps are held to the rods with four bolts and nuts (24). A torque wrench should be used to tighten these bolts to 70 ft.-lbs. The nuts have slotted heads for locking purposes. Tighten beyond 70 ft.-lbs. torque if necessary to make the holes in the bolts line up with the slots in the nuts.

Service Tools Available

|                         |           |
|-------------------------|-----------|
| Reamer body . . . . .   | SE-949    |
| Reamer blades . . . . . | SE-949-5  |
| Pilot bushing . . . . . | SE-949-15 |
| Hone blades . . . . .   | SE-949-10 |
| Burnishing bar. . . . . | SE-941    |

ENGINE - Continued

**Piston Assembly**

|  |               |
|--|---------------|
| Clearance (at bottom of skirt) . . . . . | .008"         |
| "Go" gauge (1/2" wide) . . . . .         | .006"         |
| Light pull . . . . .                     | 2 to 4 lbs.   |
| "No Go" gauge (1/2" wide) . . . . .      | .008"         |
| Tight pull . . . . .                     | 11 to 14 lbs. |

**Piston Rings**

|  |                |
|--|----------------|
| Total required . . . . .   | 6              |
| Compression . . . . .  | 4              |
| Oil control . . . . .  | 2              |
| Width compression rings . . . . .  | .1235"         |
| Width oil control rings . . . . .  | .2488"         |
| Gap top compression rings . . . . .  | .010" to .020" |
| Gap bottom compression and oil control rings . . . . .                             | .010" to .018" |
| Clearance in groove, top compression . . . . .                                     | .0045"         |
| Clearance in groove, second compression . . . . .                                  | .0035"         |
| Clearance in groove, third and fourth<br>compression and oil control (2) . . . . . | .003"          |

**Piston Pin**

|                                    |                    |
|------------------------------------|--------------------|
| Type . . . . .                     | Full floating      |
| Retainers . . . . .                | Snap rings         |
| Length. . . . .                    | 4.105"             |
| Diameter . . . . .                 | 1.6250" to 1.6253" |
| Clearance in rod bushing . . . . . | .0006" to .0009"   |
| Clearance in piston bore. . . . .  | .0001" to .0003"   |



ENGINE - Continued

**Piston Assembly - Continued**

The replaceable, wet-liner sleeves (15), *Illust. 6*, are select fitted to pistons (16) to give the normal measured clearance as listed in the specifications. The fourth compression ring (18) from the top of the piston is tapered and should be assembled with the word "top" toward the top of the piston. Two oil regulating rings (19) fit in the two bottom grooves.

When replacing the rings, stagger the ring gaps around the piston. The ring grooves should be clean and free from carbon, and the oil holes in the oil control grooves should be drilled out. Fit the rings to the smallest section of the sleeve. Bathe the piston in oil before replacing it in the engine.

Piston pins (23) are the full-floating type, secured in the piston bosses by retainer rings (22). Heat the piston in hot water to remove or install the pins. An oversize piston pin (.005") is available marked +5 on one end or on one side. The piston bore should be reamed to give the clearances listed in the specifications.

**Service Tools Available**

- Reamer body . . . . . SE-949
- Reamer blades . . . . . SE-949-5
- Pilot bushing . . . . . SE-949-15
- Hone blades . . . . . SE-949-10
- Burnishing bar . . . . . SE-941

**Cylinder Sleeves**

Wet-liner type sleeves (15), *Illust. 6*, are used in this engine. They can be removed and replaced easily. They require no honing or boring after assembly. Standard piston and sleeve sets are available for service replacement. The sleeve puller SE-654 is available for removal of the sleeves. Remove the rubber sealing ring (14) from the block and clean the ring groove in the crankcase. Be sure to protect the crankshaft bearing journals with rags when cleaning out the water jackets.

Always use new sealing rings (14) and keep them free of oil and grease. Make a soap solution to which glycerine (1/2 oz. glycerine to a tablespoon of soap and 1 qt. of hot water) has been added. Apply this soap solution to the rings and press them in their grooves in the crankcase just prior to the replacement of the sleeves. Apply the same solution to the bottom of the sleeves on the outside finished surface and allow the sleeve to slip into position. Be sure the rubber sealing rings are engaged all the way around on the taper of the sleeve. Then push the sleeve in place. Wipe out the inside of the sleeves before replacing the pistons and cylinder head.

ENGINE - Continued

**Crankshaft**

Drilled for pressure lubrication . . . . . Yes

Bearing journal diameter . . . . . 3.2480" to 3.2485"

The crankshaft (35), *Illust. 6*, has Tocco-hardened bearing journals and is drilled for pressure lubrication of connecting rod bearings. The running clearance of the bearings can be checked by the same method as the connecting rod bearings. Each bearing cap carries a number which corresponds to a number stamped on the camshaft side of the crankcase. To remove the rear bearing remove the small plate (8) below the bearing. A torque wrench should be used when pulling down the main bearing cap nuts. The amount of torque is 150 ft.-lbs.

Replacement crankshafts with bearings are available in .030" under-size.

For servicing connecting rods and main bearings with the engine in the tractor, the oil pan must be removed. However, when the engine is removed from the tractor the crankshaft is easily removed. Take off the front cover as described under that subject in this section. Remove the bolts from the flywheel (4) and pull the flywheel from the shaft. Then remove the oil pan. Remove plate (8) and take off the rear oil seal retainers (30) with the felts (12) and gaskets (11) and (13). Then remove the cap screws and lift off the rear engine support (1), *Illust. 7*. Remove the connecting rods, the oil pump, and the main bearing cap. Lift out the crankshaft.

When replacing, be sure that the bearing caps, bearings, crank journals, and crankcase are clean and absolutely dry. Place all of the upper bearings in the crankcase, replace the shaft, and attach the bearing caps after oiling the shafts and the bearings. Be careful that the bearings of the caps do not jump out of place when tapping the cap in place. Start with the center main bearing and tighten all stud nuts. Check the nuts with a torque wrench at 150 ft.-lbs. Tighten the nuts further if the holes in the studs do not line up with the slots in the nuts. When all of the nuts are drawn the shaft can be turned over by one hand.

When replacing the flywheel, draw the bolts up to 150 ft.-lbs. torque. Be sure that the bolt locks (2) *Illust. 6*, cover the dowel pins (3).

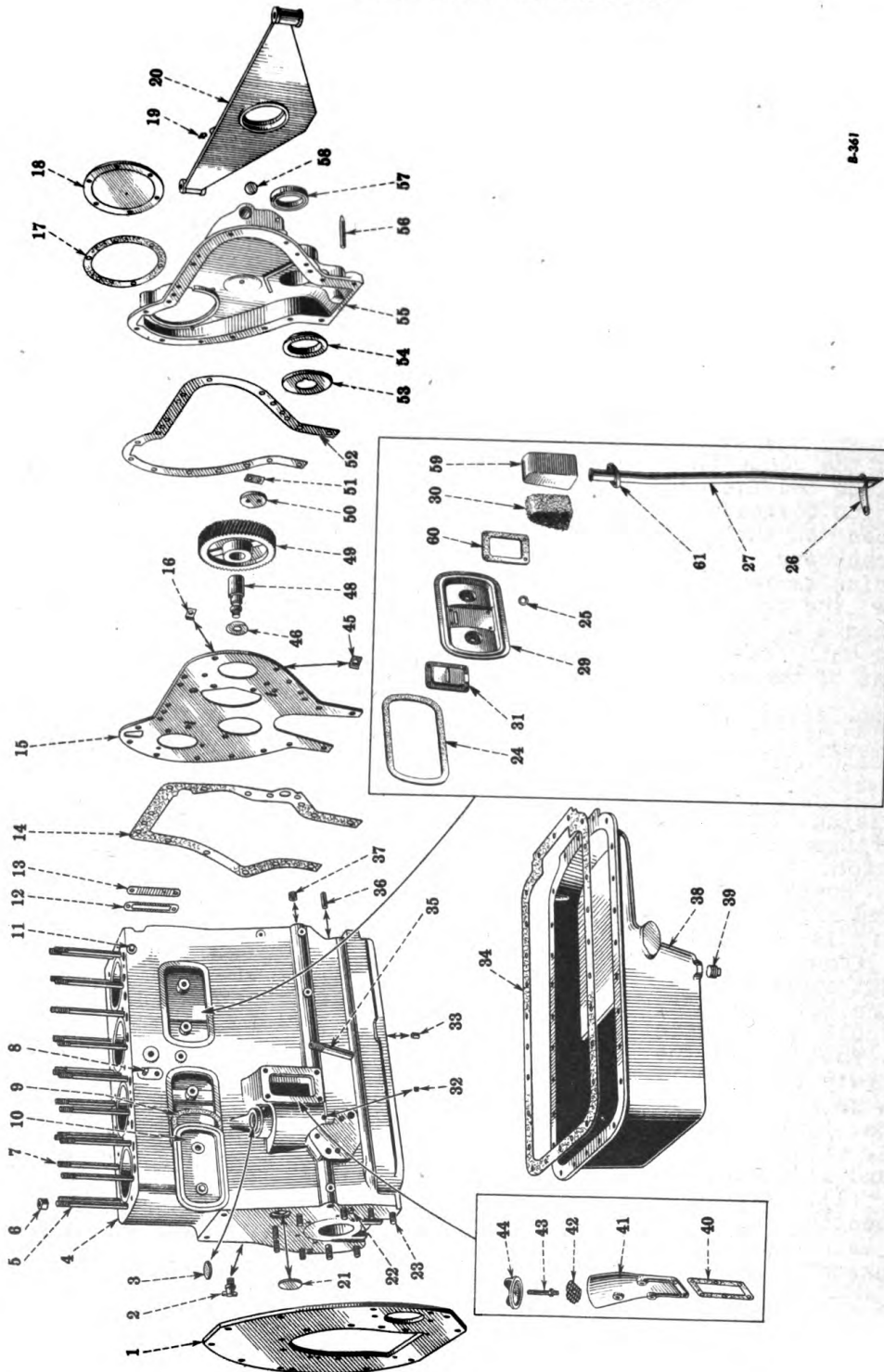
**Oil Seals**

Front and rear oil seals are provided. The front seal is composed of two felt rings located in the crankcase front cover.

The rear oil seal is the split-type. The flywheel must be removed to replace this oil seal. When the oil leaks behind the flywheel, check the fit of the Welch plug at the rear of the camshaft. Replace the felt, and check the rear main bearing for excessive wear.

# REPAIR SECTION

## ENGINE - Continued



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Illustr. 7  
Exploded View of the Crankcase.

## REPAIR SECTION

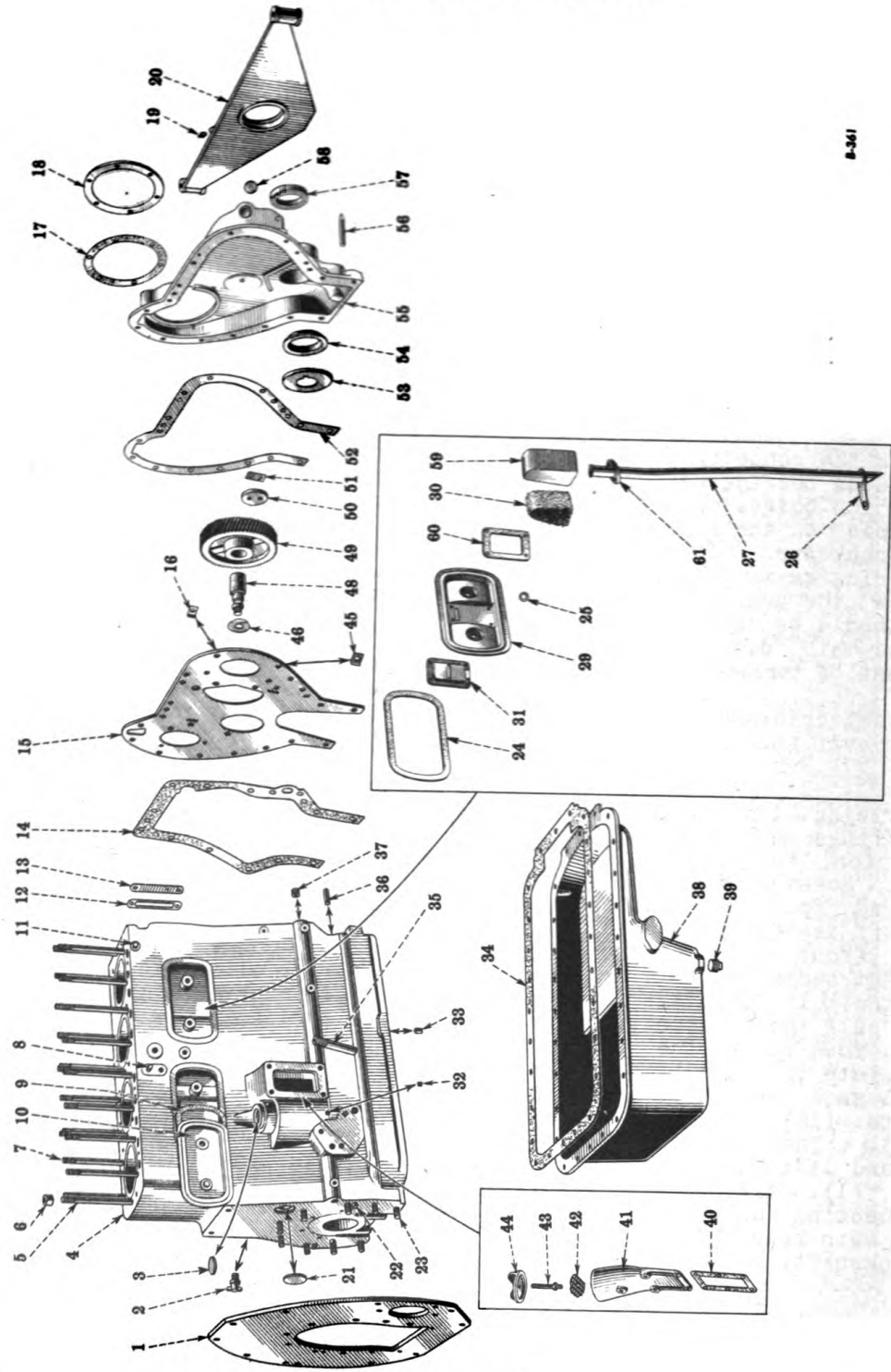
Engine - 3  
Page 21

### ENGINE - Continued

| Ref. No. | Description                             | Ref. No. | Description           | Ref. No. | Description              |
|----------|---|----------|-----------------------|----------|--------------------------|
| 1        | Rear engine support.                    | 21       | Plug.                 | 42       | Screen.                  |
| 2        | Drain cock.                             | 22       | Dowel.                | 43       | Stud.                    |
| 3        | Plug.                                   | 23       | Stud.                 | 44       | Cap.                     |
| 4        | Crankcase.                              | 24       | Gasket.               | 45       | Bolt lock.               |
| 5        | Stud, long.                             | 25       | Washer.               | 46       | Nut lock.                |
| 6        | Nut.                                    | 26       | Clip.                 | 48       | Idler gear shaft.        |
| 7        | Stud, short.                            | 27       | Breather pipe.        | 49       | Idler gear with bushing. |
| 8        | Latch bracket stud.                     | 29       | Side plate.           | 50       | Thrust washer.           |
| 9        | Gasket.                                 | 30       | Element.              | 51       | Bolt lock.               |
| 10       | Side plate, rear.                       | 31       | Baffle.               | 52       | Gasket.                  |
| 11       | Spring pin.                             | 32       | Plug.                 | 53       | Oil flinger.             |
| 12       | Front plate gasket.                     | 33       | Plug (wood).          | 54       | Oil deflector.           |
| 13       | Front plate.                            | 34       | Gasket.               | 55       | Front cover.             |
| 14       | Gasket.                                 | 35       | Sleeve.               | 56       | Timing pointer.          |
| 15       | Front plate, with lock.                 | 36       | Dowel.                | 57       | Oil seal.                |
| 16       | Bolt lock.                              | 37       | Pipe plug.            | 58       | Welch plug, 1-1/4".      |
| 17       | Gasket.                                 | 38       | Oil pan, with plugs.  | 59       | Breather body.           |
| 18       | Fuel pump gear cover.                   | 39       | Pipe plug (magnetic). | 60       | Breather body gasket.    |
| 19       | Lubricator.                             | 40       | Gasket.               | 61       | Breather pipe flange.    |
| 20       | Engine support, front, with lubricator. | 41       | Oil filler body.      |          |                          |

# REPAIR SECTION

## ENGINE - Continued



8-361

Illustr. 7  
Exploded View of the Crankcase.

# REPAIR SECTION

## ENGINE - Continued

| Ref. No. | Description                             | Ref. No. | Description           | Ref. No. | Description              |
|----------|---|----------|-----------------------|----------|--------------------------|
| 1        | Rear engine support.                    | 21       | Plug.                 | 42       | Screen.                  |
| 2        | Drain cock.                             | 22       | Dowel.                | 43       | Stud.                    |
| 3        | Plug.                                   | 23       | Stud.                 | 44       | Cap.                     |
| 4        | Crankcase.                              | 24       | Gasket.               | 45       | Bolt lock.               |
| 5        | Stud, long.                             | 25       | Washer.               | 46       | Nut lock.                |
| 6        | Nut.                                    | 26       | Clip.                 | 48       | Idler gear shaft.        |
| 7        | Stud, short.                            | 27       | Breather pipe.        | 49       | Idler gear with bushing. |
| 8        | Latch bracket stud.                     | 29       | Side plate.           | 50       | Thrust washer.           |
| 9        | Gasket.                                 | 30       | Element.              | 51       | Bolt lock.               |
| 10       | Side plate, rear.                       | 31       | Baffle.               | 52       | Gasket.                  |
| 11       | Spring pin.                             | 32       | Plug.                 | 53       | Oil flinger.             |
| 12       | Front plate gasket.                     | 33       | Plug (wood).          | 54       | Oil deflector.           |
| 13       | Front plate.                            | 34       | Gasket.               | 55       | Front cover.             |
| 14       | Gasket.                                 | 35       | Sleeve.               | 56       | Timing pointer.          |
| 15       | Front plate, with lock.                 | 36       | Dowel.                | 57       | Oil seal.                |
| 16       | Bolt lock.                              | 37       | Pipe plug.            | 58       | Weich plug, 1-1/4".      |
| 17       | Gasket.                                 | 38       | Oil pan, with plugs.  | 59       | Breather body.           |
| 18       | Fuel pump gear cover.                   | 39       | Pipe plug (magnetic). | 60       | Breather body gasket.    |
| 19       | Lubricator.                             | 40       | Gasket.               | 61       | Breather pipe flange.    |
| 20       | Engine support, front, with lubricator. | 41       | Oil filler body.      |          |                          |

## REPAIR SECTION

### ENGINE - Continued

#### Main Bearings (Steel Back Precision)

|                                      |                |
|--------------------------------------|----------------|
| Number . . . . .                     | 5              |
| Material . . . . .                   | Copper Lead    |
| Total Length, front . . . . .        | 1-7/8"         |
| Total Length, intermediate . . . . . | 1-3/4"         |
| Total Length, center . . . . .       | 2.368"         |
| Total Length, rear . . . . .         | 2-11/16"       |
| Running Clearance . . . . .          | .003" to .004" |
| End Clearance : . . . . .            | .008" to .012" |

When bearing clearance is excessive, replacement is necessary. The clearance may be checked with a pressure tank connected to the lubricating system or by placing a .003" brass shim (1/4" by 1-1/4" long) lengthwise between the lower bearing and the crankshaft. The rate of the oil flow in the first method, and the drag on the crankshaft in the second method, indicates the amount of clearance.

Check the end play by driving a wooden wedge between the crankshaft and the rear of the crankcase, forcing the shaft to the front with the front crankshaft thrust surface tight against the front flange of the center bearing. Remove the wedge and measure the thrust flange clearance on the upper and lower bearing flanges.

Each bearing can be replaced without removing the crankshaft. Tap the bearing cap lightly with the hammer to loosen and remove the cap from the studs. The lower bearing can then be removed from the cap. The upper bearing can be slid out of place by pushing on the end without the nib, using a thin piece of flexible metal while turning the crankshaft over with the hand crank in the direction of removal. The center main bearing has flanged thrust surfaces. To take out the rear bearing remove the small plate (8), *Illust. 6*,

below the bearing. The cap and bore of the bearings are milled to receive the projection on the back of the bearing liner. The projection end is removed first.

When replacing, rotate the shaft so that the projection enters last. The bearing backs, crankcase bore, and cap bore should be absolutely clean and dry when replacing the shells. Put the bearing cap in place with the numbered side facing the numbered side or camshaft side of the crankcase. The main bearing numbers are stamped on the surface to which the oil pan attaches. The ends of the caps fit snugly into the crankcase. Engage one end first and tap the cap into place.

#### Crankcase Front Cover

When the engine is removed from the tractor, the crankcase front cover (55), *Illust. 7*, can be taken off. After taking out the crank pin in the crankshaft, remove the nut and nut lock from the crankshaft, remove the fan belt, pull the fan drive pulley, remove the two keys from the crankshaft, and then the bolts from around the front cover. The crankshaft front oil seal (57) is located in the front cover. The cover is doweled to the front plate (15) of the engine. The front crankcase support (20) does not have to be removed before taking off the cover.

---

**ENGINE - Continued****Timing Gears**

The timing gear train is accessible when the crankcase front cover is off. The timing gears are driven off the front end of the crankshaft and provide a positive and accurate drive for the camshaft and magneto. These gears must be in their proper place to have the engine timed correctly. The gears are punch-marked and stamped "C", "K", and "S" for proper timing. Replace the idler gear last. Have the other gears arranged to make the letters correspond when assembling the idler gear.

**Idler Gear**

The idler gear (49), *Illust. 7*, is held to the crankcase by a thrust washer (50) using two cap screws with lock (51). The idler gear slides off the idler gear shaft (48) which is held to the crankcase with a nut and lock (46) fastening on the inside of the case. The pin in the idler shaft locates the hole in the shaft with respect to the hole in the crankcase so that the bushing in the idler gear receives pressure lubrication.

**Camshaft Removal**

The camshaft removal is covered under "*Camshaft*" in this section.



**REPAIR SECTION**

---

**MEMORANDA**

ENGINE CLUTCH

|                                   |                           |
|-----------------------------------|---------------------------|
| Size . . . . .                    | 15"                       |
| Manufacturer . . . . .            | Rockford                  |
| Type . . . . .                    | Single Plate, over-center |
| Torque Capacity, ft.-lbs. . . . . | 1050                      |
| Throwout Bearing, Type . . . . .  | Ball                      |
| Pilot Bearing, Type. . . . .      | Ball                      |

The hand-operated, over-center clutch with ball-bearing release features two rollers in each release cam to prevent wear and binding.

The release mechanism has a clutch brake which facilitates faster shifting of the transmission gears. No adjustment of this brake is necessary.

Pins on the release carrier (16), *Illust. 1*, have bushings (2) which fit into the release fork (1), reducing wear and friction at this point to a minimum. When replacing the release fork, be sure to engage the bushings in the fork and have the ridged end of the bushings on the inside.

Be sure adjustment of the clutch makes engagement positive. Refer to the "Operations Section" for complete details on adjusting the clutch.

**Removal of the Engine Clutch**

The engine clutch can be removed through the top of the main frame without disturbing the engine or transmission. However, the clutch must be removed in order to remove the transmission.

With the steering brake pedals locked forward, tie back the steering clutch levers and remove the base of the air cleaner for additional working room. Then remove the main frame cover over the clutch compartment.

With the clutch engaged, remove the nuts and locks from the coupling bolts (29), *Illust. 1*, around the brake friction disc (10) and push out the bolts. Turn the engine over with the hand crank to make all nuts accessible. Next remove the bolts (28) and locks (27) connecting the clutch coupling (8) to the transmission driving flange. This will allow the coupling and ring to be lifted out of place.

Disengage the clutch and remove bolts from the clutch hand lever and the release fork (1). The fork can be removed by driving the shaft through the side of the tractor. Holes in the fender side sheets make this possible. The clutch hand lever will drop off, but the shaft will have to be turned to remove the keys (4). Allowing a chisel to remain in place after driving it, between the clamps of the release fork, makes it easier to slide the release shaft from the main frame.

After removing the clutch release fork and bushings, remove the cap screws from the back plate of the clutch, pry out the clutch shaft and lift the entire unit from the main frame.

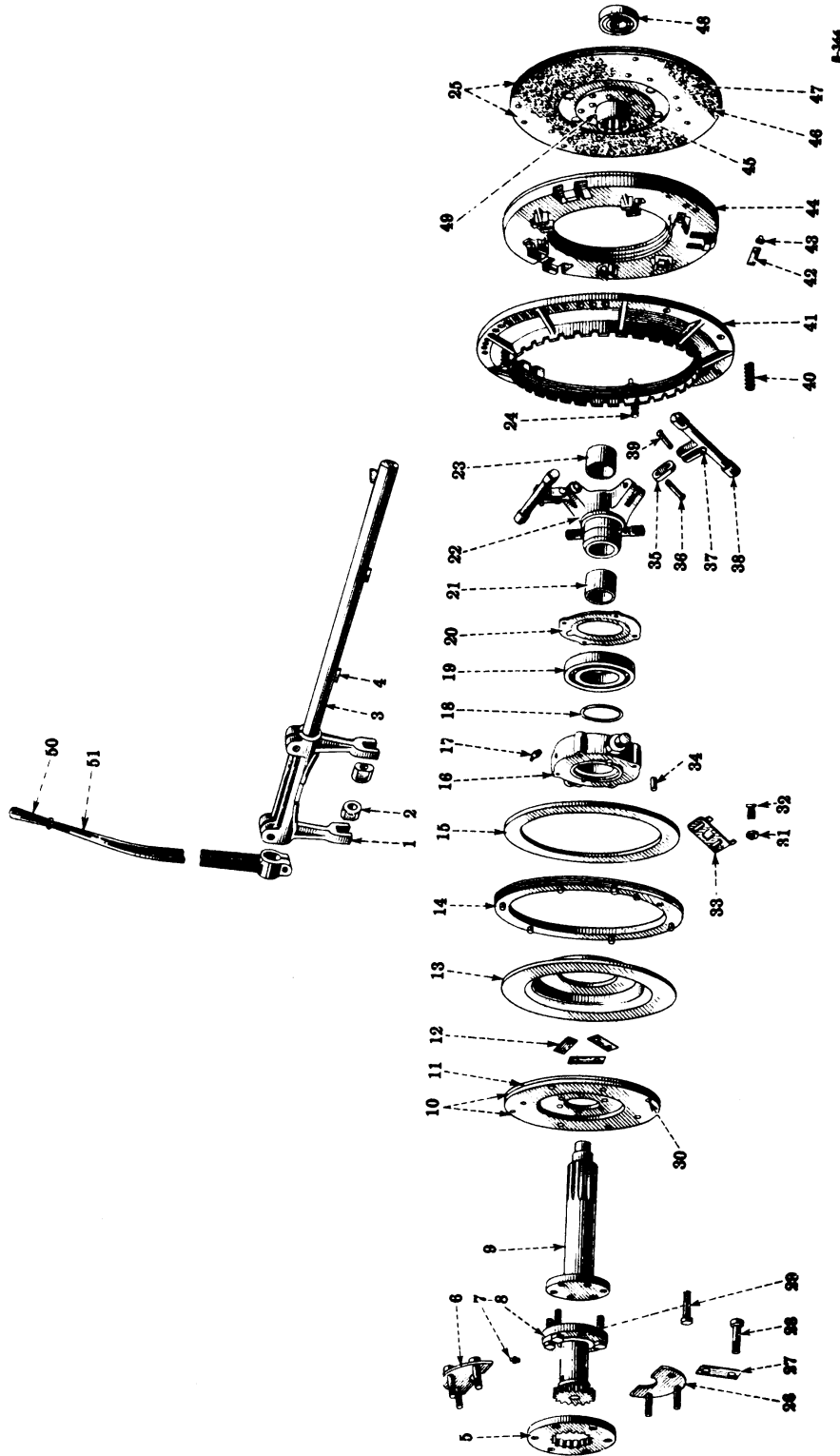
**Disassembly and Repair of the Engine Clutch**

Slide the driven member (25) from the clutch shaft (9) and pull the shaft with the clutch brake disc (10) with facing from the release sleeve. Inspect the spline of the shaft, the face of the flywheel,

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REPAIR SECTION

ENGINE CLUTCH, - Continued



Illust. 1 - Exploded View of Engine Clutch.

**ENGINE CLUTCH - Continued**

| Ref. No. | Description                       | Ref. No. | Description            | Ref. No. | Description                                |
|----------|-----------------------------------|----------|------------------------|----------|--|
| 1        | Release fork.                     | 19       | Bearing.               | 37       | Lubricator.                                |
| 2        | Release pin bushing.              | 20       | Plate.                 | 38       | Camshaft assembly (set of 3).              |
| 3        | Release shaft.                    | 21       | Bushing.               | 39       | Pin, short.                                |
| 4        | Key.                              | 22       | Sleeve with bushings.  | 40       | Return spring.                             |
| 5        | Ring (16 teeth).                  | 23       | Bushing.               | 41       | Back plate.                                |
| 6        | Coupling washer.                  | 24       | Return spring bolt.    | 42       | Cam block (set of 6).                      |
| 7        | Lubricator.                       | 25       | Clutch facing package. | 43       | Lock.                                      |
| 8        | Coupling (16 teeth).              | 26       | Coupling washer.       | 44       | Pressure plate with cam blocks and screws. |
| 9        | Shaft.                            | 27       | Bolt lock.             | 45       | Rivet.                                     |
| 10       | Brake disc with facing.           | 28       | Bolt.                  | 46       | Rivet.                                     |
| 11       | Brake facing.                     | 29       | Coupling bolt.         | 47       | Driven member assembly.                    |
| 12       | Coupling bolt lock.               | 30       | Rivet.                 | 48       | Pilot bearing.                             |
| 13       | Brake disc.                       | 31       | Lock nut.              | 49       | Clutch plate center.                       |
| 14       | Adjusting ring with lock and pin. | 32       | Lock bolt.             | 50       | Engine clutch lever rubber handle.         |
| 15       | Ring plate.                       | 33       | Lock.                  | 51       | Engine clutch lever.                       |
| 16       | Bearing carrier.                  | 34       | Dowel pin.             |          |  |
| 17       | Lubricator.                       | 35       | Link.                  |          |  |
| 18       | Snap ring.                        | 36       | Pin, long.             |          |  |

ENGINE CLUTCH - Continued

**Disassembly and Repair of the Engine Clutch -  
Continued from page 1**

the face of the clutch pressure plate (44), and the friction surface of the driven member (47).

If further disassembly is warranted, loosen the adjusting ring lock (33) and turn the adjusting ring (14) from the clutch back plate (41). The ring plate (15) and the release sleeve assembly (22) will all be free for removal. The clutch pressure plate (44) can be removed from the back plate (41) after removing the spring-mounted cap screws.

The release sleeve assembly (22) can be disassembled by taking out the bolts in the brake disc (10), removing cap screws in the release bearing carrier (16), pulling the carrier off the bearing, removing the snap ring (18) from the sleeve and pulling the bearing from the sleeve. Pins with cotter keys hold the cams to the sleeve.

Inspect the driven member (47) for wear of the friction surfaces. Rough or oil soaked facing should be replaced. The facing may be replaced and riveted in place. Be sure the heads of the rivets are well countersunk. Do not replace facing on a warped driven member. The fit of the clutch shaft (9) in the spline of the driven member (47) should be snug, yet allow one to slide freely on the other.

If the pressure plate (44) is heat checked, scored or warped, replace it with a new one. Slight roughness may be polished out. The surface of the flywheel contacting the driven member should be smooth and free of heat checks. If necessary, the flywheel should be removed, and the surface re-machined.

Bushings in the release sleeve (22) should have .001" to .005" clearance with the clutch shaft. The outside diameter of the clutch

shaft is 1.997" to 1.999". Replace the bushings if the clearance is excessive. Replacement bushings are furnished reamed to size. It is only necessary to press them in place. The ends of the bushings are flush with the outside ends of the sleeve.

Worn pins connecting camshafts to the release sleeve should be replaced. Rollers in cams cannot be replaced. Flat or stuck rollers require replacement of the entire cam. Camshafts are available only in sets of three and should not be replaced individually. Cam blocks attached to the pressure plate should be replaced in sets of six, never one at a time. Failure to do so will cause the clutch to wear excessively on one side.

New facings may be attached to the clutch brake and riveted in place.

**Reassembly of the Engine Clutch**

Clean out all grease fittings in the drilled shaft before reassembling the clutch. With the plate (20) assembled to the sleeve (22) press the bearing (19) onto the sleeve. Then replace the snap ring (18) on the sleeve. Drive the carrier (16) over the bearing (19). Replace the cap screws in plate (20) and carrier (16). Insert dowel pins (34) in the carrier and secure plate (13) to the carrier with the cap screws. Replace the link and pin assembly (35), (36), and (39) between the camshaft (38) and the carrier (16). Be sure the doweled oil hole in the camshaft is open.

Drop the camshaft (38) into the plate assembly (44) with the cam stops facing the back plate (41). With the ring plate (15) in position and the adjusting ring (14) started, bring up the back plate (41) to the plate assembly (44).

Insert the bolts and replace the springs (40) and the nuts and cot-

**ENGINE CLUTCH - Continued****Reassembly of the Engine Clutch  
- Continued**

ter keys. The nuts should be run down the same distance on each bolt to facilitate final adjustment of the clutch. Screw in the adjusting ring (14) until the distance from the face of the plate (44) to the face of the back plate (41) is  $31/32$ ". Assemble the disc (10) to the clutch shaft (9) and replace the shaft in the assembly. The driven member (47) can now be placed on the shaft (9). If the splines on either the shaft or the driven member are burred or damaged causing the driven member to stick, the shaft should be replaced. The driven member should slide freely but without play on the shaft.

**Replacement of the Engine  
Clutch**

To replace the clutch in the tractor, drive the pilot bearing (48) into the flywheel face. Then lower the clutch into the main frame. Push the clutch shaft (9) into the pilot bearing. Line up the cap-screw holes in the back plate (41) with those in the flywheel and then run in the cap screws. Set the clutch release fork (1) into position so that the bushings (2) at the bottom line up correctly with the pins of the carrier (46). Also be sure the lubricator fitting (17) is on the top side of the carrier.

Slide the release shaft (3) through the main frame bushing into the

release fork (1). The keys (4) should be inserted in the shaft and the shaft driven into position in the fork. Turn the shaft around and continue driving until it emerges on the opposite side of the main frame.

Assemble the clutch hand lever to the end of shaft (3). Replace the cap screw, and put the cap screws in the release fork (1). Be sure the fork is centered over the carrier (16).

Push the clutch all the way forward to replace the coupling (8), with the teeth in the ring (5) engaging those on the coupling. Engage one of the bolts (29) in the clutch shaft to hold the coupling in place. Line up the holes in disk (10) and push in the rest of the bolts (29). Replace and tighten the nuts and bend the locks. The coupling can be turned to make each one of these accessible. Place one coupling washer (6) against the ring (5) and replace the ring bolts (28) and the bolt locks (27). Then do the same with the lower half of the washer. Pry the ring bolts into the flange, tighten them, and bend the locks.

Adjust the clutch according to instructions in the "Operations Section".

Replace the clutch cover, assemble the cap screws on each side under the fenders, and replace the bottom of the air cleaner.

**REPAIR SECTION**

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**MEMORANDA**

FINAL DRIVE

Drive Bevel Gear

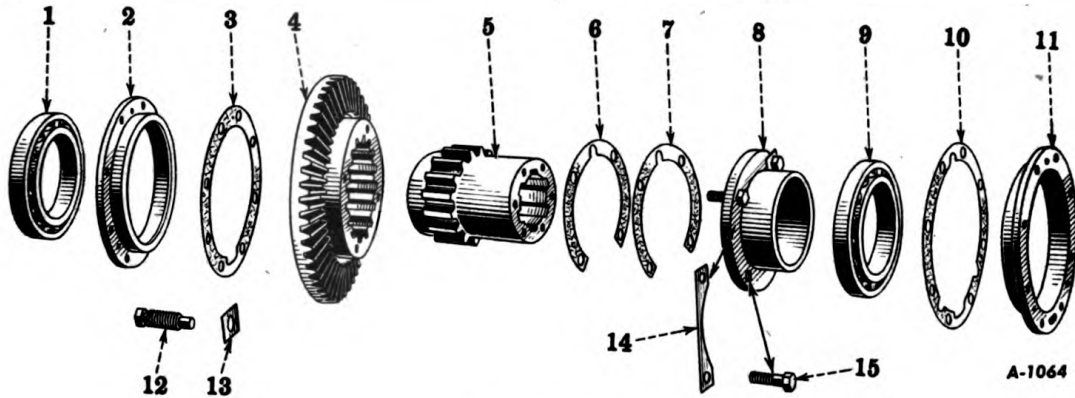
The drive bevel gear assembly is located in a separate compartment directly behind the transmission and between the two steering clutch compartments. The bevel gear and pinion are lubricated from the transmission compartment. Two leather oil seals prevent oil from entering the steering clutch compartment.

Preparation for Removal of the Drive Bevel Gear

Remove the seat, batteries, and fuel tank.

Drain the oil from the transmission. Remove the main frame cover as described under "Preparation for the Removal of the Transmission" in Section 13.

Remove the steering clutches as described under "Steering Clutches" in Section 11.



Illust. 1  
Exploded View of the Drive Bevel Gear

Removal of the Drive Bevel Gear

Assemble puller cap screws to the tapped holes in the right hand bearing cage (11), *Illust. 1*. Run them out evenly and remove the cage and gasket (10). Loosen the set-screw (12) in the left steering clutch compartment. Bend back bolt locks (14) and remove the bolts (15) in the spacer (8) and the gear (4). Pry the gear and spacer apart and remove shims (6) and (7).

Assemble puller cap screws to the tapped holes and the left bearing cage (2), run them up evenly, and remove the cage with the bearing (1) and the gasket (3).

| Ref. No. | Description               |
|----------|---------------------------|
| 1        | Bearing.                  |
| 2        | Bearing cage, left hand.  |
| 3        | Gasket.                   |
| 4        | Drive bevel gear.         |
| 5        | Hub.                      |
| 6        | Shim, heavy.              |
| 7        | Shim, light.              |
| 8        | Spacer.                   |
| 9        | Bearing.                  |
| 10       | Gasket.                   |
| 11       | Bearing cage, right hand. |
| 12       | Set screw.                |
| 13       | Set screw lock.           |
| 14       | Nut lock.                 |
| 15       | Bolt.                     |



**FINAL DRIVE - Continued**

**Removal of the Drive Bevel Gear  
- Continued**

Drive the hub (5) to the right, out of the ring gear, forcing the spacer (8) and the bearing (9) with it. The bearing can be pulled from the hub (5) and the spacer (8) slid off. The gear (4) can be lifted from the compartment.

**Repair of the Drive Bevel Gear**

If the bevel gear is to be replaced with a new one, the bevel pinion should also be replaced at the same time. These parts are furnished in matched pairs.

**Replacement of the Drive Bevel Gear**

Clean the compartment before replacing assembly. Clean it again after the assembly is completed.

Assemble the left hand bearing (1), *Illust. 1*, to the bearing cage (2). The outer race of bearings (1) and (9) are narrower than the inner race. The races of the bearings are flush on one side. Assemble the bearings to the bearing cages so that the flush side is always to the left, or so that the projection side of the inner race is toward the right side.

With gasket (3) secured to the bearing cage (2) in which bearing (1) is assembled, place the unit to the left bore from the steering clutch compartment. Assemble the left bearing cage cap to the bearing cage (2), and then bolt the cap and the cage to the main frame.

Place the bevel gear (4) in the compartment. Insert hub (5) through the right steering clutch compartment into the bore of the bevel gear. Engage the spline of the hub with that in the bore of the gear. Drive the assembly into the bore of the bearing (2) until the spline of the hub strikes the inner race of the bearing.

Place the same number of shims as removed against the bevel gear and slide the spacer (8) into position against the spline of hub (5). Start the bolts (15) with locks (14) in the spacer and gear.

Assemble the right-hand bearing (9) to the bearing cage (11), with the flush side of the bearing to the left and the projection of the inner race to the right. Attach gasket (10) to the bearing cage and push the assembly in place over the hub.

Remove the left-hand bearing cage cap (2).

Assemble the steering clutch shaft coupling to the left and right ends of hub (5).

Assemble the caps to the bearing cages (2) and (11) and draw all bolts tight.

Draw all bolts (15) tight, revolving the gear with the transmission in neutral to make each one accessible.

**Adjustment of the Drive Bevel Gear**

Check the backlash of the gears. This can be done by wedging the transmission gears and rocking the bevel gear back and forth. A dial indicator touching the face of one of the teeth in the ring gear will give the exact backlash which should be .012". To increase the backlash to this amount remove bolts (15) and add shims between the spacer (8) and the gear (4).

If a new bevel gear and pinion have been installed the pinion must be adjusted for the proper cone setting of the pinion teeth with those of the gear. This is done before replacing the transmission and main frame cover. Do not draw up the bolts tight in the spacer and gear and omit the instructions in the preceding paragraph.

**FINAL DRIVE - Continued****Adjustment of the Drive Bevel Gear - Continued**

Place a .625" gauge between the toe end of the pinion and the machined diameter of the bevel gear (4). Drive the bevel pinion shaft to the rear so that this gauge can be held in place. This gauge may be made from 5/8" key stock, 5/8" drill rod, or any narrow object 6 inches long measuring .625". Since there are slight variations in key stock and drill rod, select a piece exactly the size. With the pinion held firmly against the gauge and gear hub, insert the proper number of shims at the pinion shaft front bearing cage to establish the correct position of the pinion with the .625" gauge in place. If, when turning the bevel gear over, a slight run-out on the gear hub or spacer is noted, set the gauge between the tightest and lowest point.

Now adjust the shims between the bevel gear and spacer to obtain the backlash specified above.

As an extra check, apply red lead or prussian blue to the teeth of the pinion. Powdered red lead mixed with a small amount of oil can be formed into a cake and applied to the teeth with a stencil brush. Revolve the gears in a forward direction using the pinion to revolve the gear. Inspect the teeth of the pinion where the paint has been removed. The tooth bearing resulting will be on the toe end of the teeth and should be centered up and down on the active portion of the tooth profile. If the profile bearing is high, use less shims at the front end of the pinion shaft. If the profile bearing is low, use more shims. Recheck the backlash when shims are added or subtracted from the pinion shaft.

Set the bevel gear deflection set-screw (12) to .020" clearance between the end of the screw and the

back side of the bevel gear. Bend back the lock (13) after making the adjustment.

The bearing cage caps and the clutch coupling can now be removed so that the steering clutches can be assembled.

Assemble the steering clutches, transmission, main frame cover, and other items removed. Be sure to refill the transmission case with the proper grade of lubricant.

**Sprockets and Sprocket Drive**

The power is transmitted from the drive bevel gear through the steering clutches to the sprocket drive gears and sprockets which are ball-bearing mounted on the stationary pivot shaft. The bearings on the pivot shaft are sealed in two self-adjusting, floating diaphragm-type seals. Each sprocket is reversible. It can be removed from its hub, reversed and placed back on the same side of the tractor thereby utilizing both sides of the teeth.

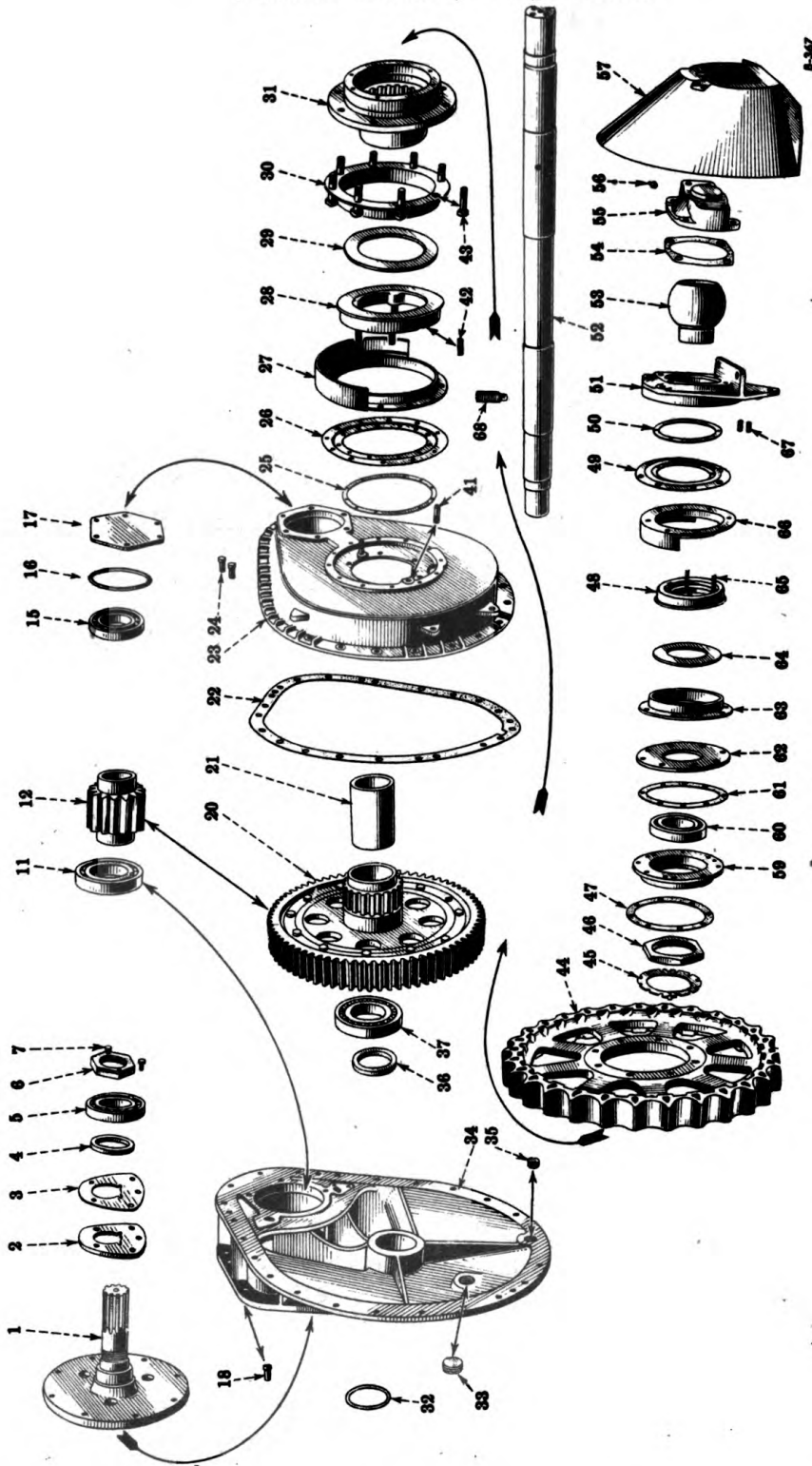
**Removal of the Sprockets and Sprocket Drive**

Lock the steering brakes and support the steering clutches when removing the sprocket drive parts. Take off the track chain, jack up the tractor, and remove the track frame. The track frame is freed at the front by putting a jack under the front stabilizer and raising it sufficiently to take the load off the equalizer spring. Remove the cap screws from the diagonal brace bearings at the pivot shaft.

Lift off the sprocket shield (57), *Illust. 2*, after the cap screws from the bracket (51) and bolts

# REPAIR SECTION

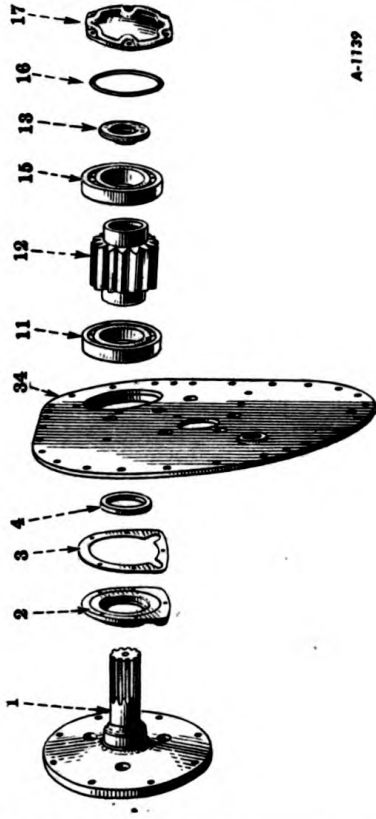
## FINAL DRIVE - Continued



Illustr. 2  
Exploded View of the Sprocket Drive Assembly

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FINAL DRIVE - Continued



The illustration to the left applies to regular tread tractors only. Items with similar numbers shown above, as well as items 5, 6, 7 and 18, apply only to wide tread tractors.

A-1139

| Ref. No. | Description                       | Ref. No. | Description                     | Ref. No. | Description               |
|----------|-----------------------------------|----------|---------------------------------|----------|---------------------------|
| 1        | Pinion shaft.                     | 24       | Dowel pin.                      | 47       | Gasket.                   |
| 2        | Bearing retainer with oil seal.   | 25       | Retainer.                       | 48       | Pressure plate.           |
| 3        | Bearing retainer gasket.          | 26       | Diaphragm.                      | 49       | Diaphragm.                |
| 4        | Oil seal.                         | 27       | Guard.                          | 50       | Retainer.                 |
| 5        | Bearing.                          | 28       | Pressure plate.                 | 51       | Bracket.                  |
| 6        | Bearing nut.                      | 29       | Packing.                        | 52       | Track frame pivot shaft.  |
| 7        | Lock bolt.                        | 30       | Deflector.                      | 53       | Pivot bearing.            |
| 11       | Bearing.                          | 31       | Carrier.                        | 54       | Gasket (track pivot),     |
| 12       | Sprocket drive pinion (13 teeth). | 32       | Ring (track frame pivot shaft). | 55       | Cap (track pivot).        |
| 13       | Washer (not illustrated).         | 33       | Plug, 1-1/2".                   | 56       | Lubricator (track pivot). |
| 15       | Bearing.                          | 34       | Carrier with pipe plugs.        | 57       | Shield (sprocket).        |
| 16       | Packing ring.                     | 35       | Plug, 3/4".                     | 59       | Cage.                     |
| 17       | Cap with packing ring.            | 36       | Spacer, short.                  | 60       | Bearing.                  |
| 18       | Pin.                              | 37       | Bearing.                        | 61       | Gasket.                   |
| 20       | Gear (68 teeth) and carrier.      | 41       | Anchor pin.                     | 62       | Retainer.                 |
| 21       | Spacer, long.                     | 42       | Spring.                         | 63       | Deflector (track frame).  |
| 22       | Gasket.                           | 43       | Bolt.                           | 64       | Packing.                  |
| 23       | Cover with anchor pins.           | 44       | Sprocket (29 teeth).            | 65       | Spring.                   |
|          |                                   | 45       | Lock.                           | 66       | Guard.                    |
|          |                                   | 46       | Nut.                            | 67       | Anchor pin.               |
|          |                                   |          |                                 | 68       | Pivot shaft set screw.    |

FINAL DRIVE - Continued

**Removal of the Sprockets and Sprocket Drive - Continued**

from the track frame have been removed. The track pivot cap (55) and gasket (54) come off after removing four capscrews.

Remove cap screws from the pivot bearing (53) and the pivot bracket (51). Jack up the rear of the tractor on the side being worked on. Slide off the pivot bearing (53) with the bracket (51) and items (48), (49), (50), (65), (66), and (67). The packing (64) may be lifted from the dirt deflector (63).

Remove the cap screws which hold the dirt deflector (63) to the bearing cage (59). Lift off the dirt deflector (63), the retainer (62), the gasket (61). Assemble puller cap screws to the bearing cage (59). Run up cap screws evenly and pull the bearing cage (59) with bearing (60) and gasket (47). Bend back nut lock (45) and unscrew the nut (46). The service tool SE-1184-2 fits the nut (46). The sprocket (44) with its carrier (31) and dirt deflector (30) can be pried from the splined hub of the gear (20).

If the gear cover (23) or the carrier (34) are to be removed, a different procedure is necessary for both regular and wide tread tractors. Refer to the heading concerning the tractor on which you are working.

**Wide Tread TracTractors**

Lift out the packing (29) and remove cap screws in the dirt deflector (27). This will allow the retainer (25), diaphragm (26), dirt deflector (27), pressure plate (28), and springs (42) to be removed as a unit. Remove cap screws in the cap (17) and lift it off.

Remove cap screws, bolts, and nuts around gear cover (23) and turn puller cap screws into the tapped holes provided. Pull the gear cover (23) with gasket (22) and dowels (24). Bearing (15) will come off with cover (23) as will possibly the pinion (12). If not, the pinion (12) with the bearing (11) can be pried from the carrier (34). The gear (20) may now be pried from the pivot shaft (52) with bearing (37) and spacer (21). The spacer (36) may now be slid from the pivot shaft.

To remove the carrier it will be necessary to take off the inspection covers on top of the main frame cover near the steering clutch release fork and support the steering clutches with a rope attached to a chain hoist. Now remove the lock bolts (7) from the bearing nut (6). Turn the nut off pinion shaft (1). Remove nuts and bolts from the carrier (34). Assemble puller cap screws, run them up evenly and pull the carrier from the main frame with oil seal retainer, gasket, oil seal (4) with bearing (5), and dowel pins (18). The ring (32) fitting in the groove in the main frame around the pivot shaft (52) may be removed.

**Regular Tread TracTractors**

Lift out the packing (29), *Illust. 2*, and remove cap screws in the dirt deflector (27). This will allow the retainer (25), diaphragm (26), dirt deflector (27), pressure plate (28), and springs (42) to be removed as a unit.

Remove capscrews from cap (17) and lift it off. Then remove cap screws and lift off the pinion bearing retainer. Remove cap screws, bolts, and nuts around the gear cover (23) and turn puller cap screws into the tapped holes provided. Pull the gear cover (23) with gasket (22) and dowels (24). The bearing (15)

**FINAL DRIVE - Continued****Regular Tread TracTractors -  
Continued**

will come out with cover (23). Pinion (12) may also come out with the cover. If it does not, the pinion (12) and bearing (11) can be pried from the carrier (34). The gear (20) can now be pried from the pivot shaft (52) along with bearing (37) and spacer (21). The short spacer (36) can be slid from the pivot shaft.

To remove the carrier plate (34), it will be necessary to remove the inspection covers on top of the main frame cover near the steering clutches, and to support the steering clutches with a rope attached to chain hoist. Remove the nuts and bolts from the carrier plate (34). Assemble puller cap screws, run them up evenly, and pull the carrier from the main frame with the oil seal retainer (2), gasket (3), oil seal (4), bearing (5), and dowel pins (18). The ring (32)

fitting in the groove in the main frame around the pivot shaft (52) can then be removed.

**Replacement of the Sprocket  
Drives**

To replace the sprocket drives the removal procedure can be reversed. The oil seal (4) should be placed in the oil seal cage so that the lip of the seal will face the pinion (12). When pressing the bearing cage (59), with the bearing (60), into the carrier (31), be sure to line up the cap screw holes in the bearing cage with those in the carrier.

When replacing diaphragm seals test the action of the seals first. Be sure the anchor pins (41) enter the holes in the pressure plate (28). Also be sure that the anchor pins (67) which go in the bracket (51) fit into the pressure plate (48).

**REPAIR SECTION**

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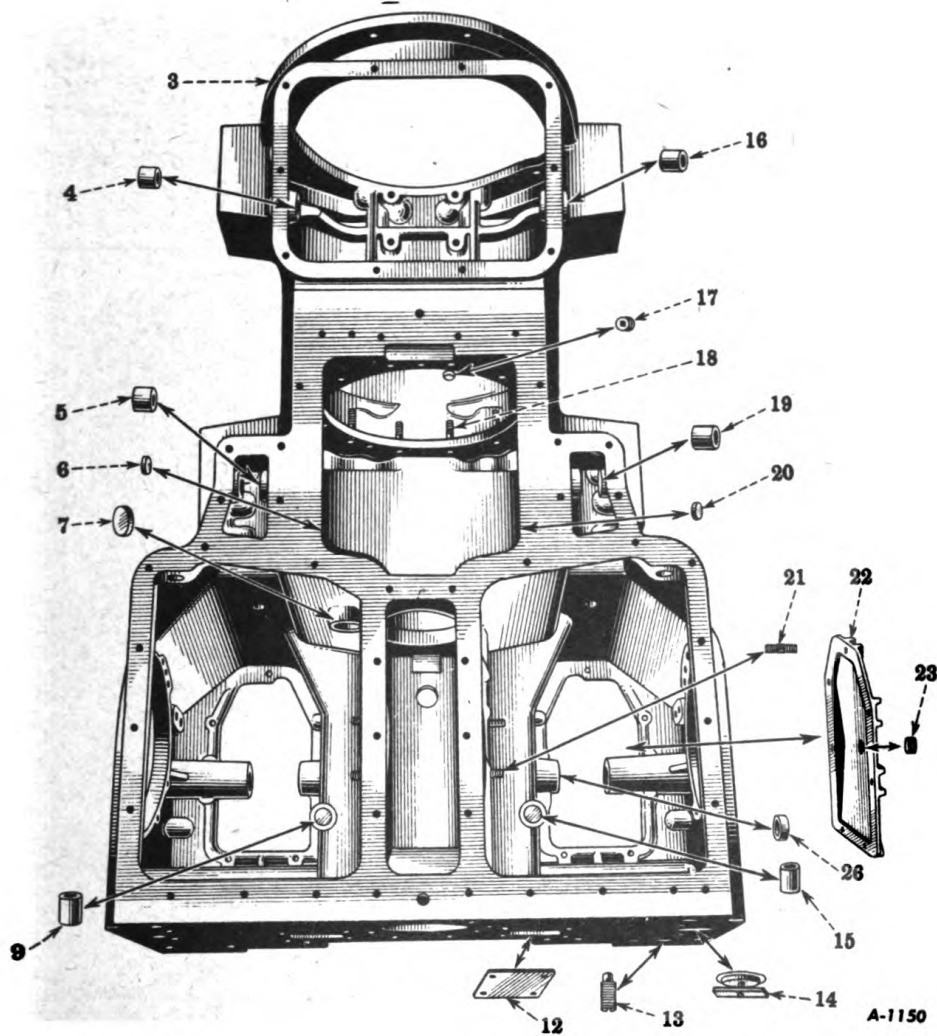
**MEMORANDA**

FRAME

Main Frame

A heavy reinforced casting houses the engine clutch, transmission, bevel gear and pinion, steering clutches, and steering brakes.

Heavy channels of steel are securely bolted to the main frame casting and tied in front by the heavy radiator base. This rugged foundation absorbs stresses and strains.



Illust. 1  
Exploded View of the Main Frame.



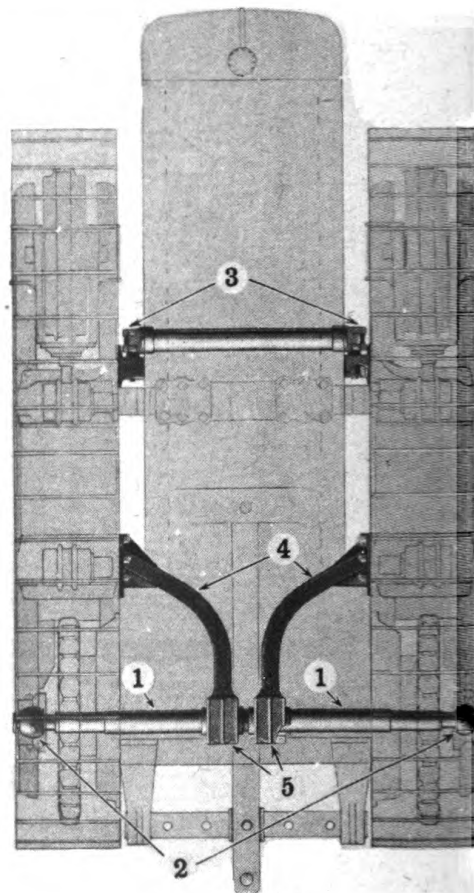
**REPAIR SECTION**

**FRAME - Continued**

| Ref. No. | Description                             | Ref. No. | Description                                 |
|----------|---|----------|---|
| 3        | Main frame.                             | 16       | Engine clutch release shaft bushing.        |
| 4        | Engine clutch release shaft bushing.    | 17       | Socket head pipe plug (magnetic).           |
| 5        | Steering brake lever outer bushing.     | 18       | Transmission end cover stud                 |
| 6        | Steering brake operating shaft plug.    | 19       | Steering brake lever outer bushing.         |
| 7        | Transmission reverse idler shaft plug.  | 20       | Steering brake operating shaft plug.        |
| 9        | Steering clutch release shaft bushing.  | 21       | Bevel gear bearing cage stud.               |
| 12       | Main frame rear inspection cover.       | 22       | Steering brake inspection cover.            |
| 13       | Track frame pivot shaft set screw.      | 23       | Steering brake inspection cover drain plug. |
| 14       | Steering clutch lubricating port cover. | 26       | Steering brake pivot shaft cup plug.        |
| 15       | Steering clutch release shaft bushing.  |          |   |

**Track Frame**

The front idler, track idlers and track rollers are secured to the heavy welded-steel, channel-constructed track frames. They are pivoted by a ball and socket on the ends of the pivot shaft. Each track is free to oscillate vertically independent of one another. This prevents leverage strains being imposed on the pivot shaft (1), *Illust. 2*, due to the slight lateral deflection of the track frame. The equalizer spring contacts the track frame, and the roller-type stabilizers (3) maintain the track spacing (heavy braces and brackets attached to the main frame side channels carry the stabilizer rollers; roller guides are bolted to the track frame). Heavy steel diagonal braces (4) are bearing-mounted at the center of the pivot shaft. They keep the track frame in upright position but allow vertical oscillation.



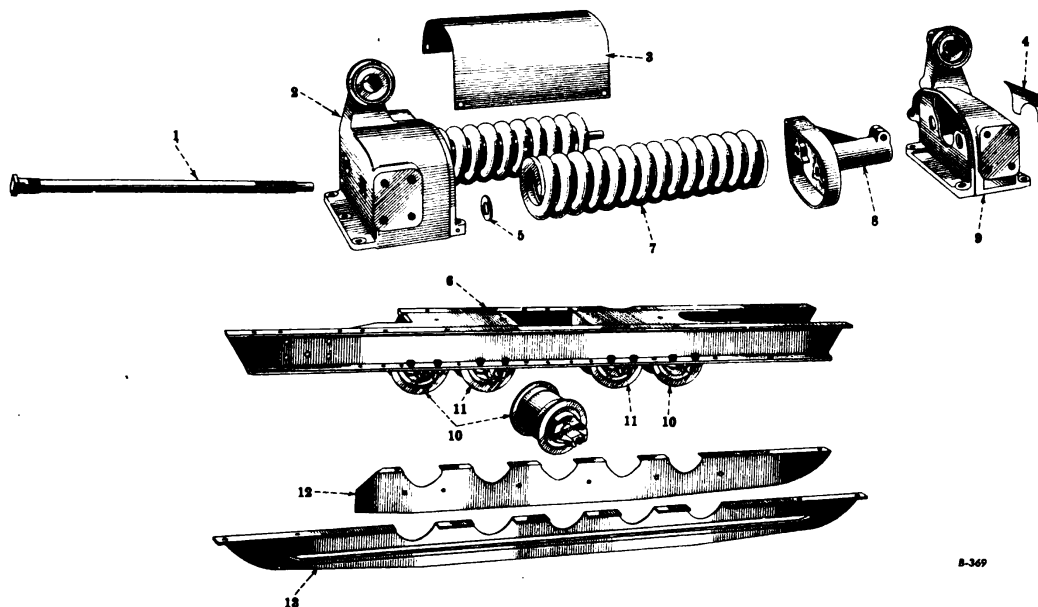
**Illust. 2** →  
Track Stabilizer Construction -  
1. Track Frame Pivot; 2. Ball-and-Socket Pivot Bearings; 3. Front Stabilizer; 4. Diagonal Braces; 5. Diagonal Brace Pivot Bearings.

FRAME - Continued

Removal of the Track Frame

Take off the track chain, place a jack under the stabilizer brace and raise the front of the tractor enough to take the load of the equalizer spring from the track

frame. Take out the bolts in the roller guide, and put a jack under the drawbar. Then disconnect the diagonal brace at the pivot shaft. Take out the bolts in the sprocket shield and pivot bearing bracket. The frame can then be slid out of place.



Illust. 3  
Exploded View of Track Frame with Recoil Spring

| Ref. No. | Description                               | Ref. No. | Description  |
|----------|---|----------|--|
| 1        | Adjusting rod.                            | 10       | Track roller (single flange) with shaft and carrier (Nos. 1, 3 and 5). |
| 2        | { Spring retainer, left hand.             | 11       | Track roller (double flange) with shaft and carrier (Nos. 2 and 4).    |
| 3        | { Spring retainer, right hand.            |          |  |
| 4        | { Spring guard, left hand.                | 12       | { Shield, inner, left hand.  |
| 5        | { Spring guard, right hand.               |          |  |
| 6        | { Cover.                                  | 13       | { Shield, inner, right hand.   |
| 7        | { Lock washer.                            |          |  |
| 8        | { Frame, complete, left hand.             |          | { Shield, outer, left hand.  |
| 9        | { Frame, complete, right hand.            |          |  |
|          | { Spring.                                 |          | { Shield, outer, right hand.   |
|          | { Retainer, front.                        |          |  |
|          | { Track idler support, front, left hand.  |          |  |
|          | { Track idler support, front, right hand. |          |  |

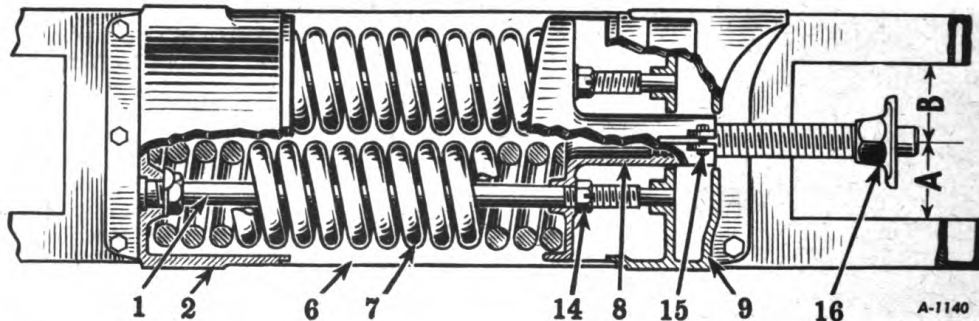
FRAME - Continued

Disassembly of the Track Frame

Remove the guard (3), *Illust. 3*. The outer (13) and inner (12) track shields can be taken off after the bolts have been removed from the frame (6). To release the track rollers (10) and (11) remove the bolts from the roller brackets. Jack up the nearest end of the track frame and lift the rollers out.

Remove the track front idler as outlined in Section XII. Then remove the cap screws from the cover plate (4) and take off the plate. After loosening the lock bolt in front of the spring retainer (8), unscrew the idler adjuster.

Remove the bolts from the spring guide (9) and the frame (6). The spring guide and the top idler can be slid forward and removed. Compression in the springs (7) can be relieved by unscrewing the nut from the end of the spring adjusting rod (1) after taking out the cotter keys. Unscrew each nut the same amount to relieve the compression evenly. The springs (7) can then be pulled off the spring adjusting rod (1). Remove cap screws from the retainer (2) and lift it off the frame (6). After bending back the lock washer (5) for the spring adjusting rod (1) and removing the lock nut, the rod can be slid out.



**Illust. 4 - Cross Section of Front Track Idler Recoil Spring Assembly.**  
1. Spring Adjusting Rod; 2. Rear Spring Retainer; 6. Track Frame;  
7. Recoil Spring; 8. Front Spring Retainer; 9. Recoil Spring Guide;  
14. Castellated Nut; 15. Adjuster Rod Lock Bolt; 16. Idler Adjuster Rod.

Reassembly of the Track Frame

Place the rear retainer (2) on the frame (6) and run in the cap screws. Insert the spring adjusting rod (1) in the retainer (2). Place the lock washer on the rod and run up the lock nut. Then bend back the lock washer.

Slide the compression springs (7) over the spring adjusting rod.

Bring the front retainer (8) into position on the adjusting rod (1) and run up the nuts until the cotter keys can be placed through them and also through the adjusting rod. The nuts must be run up evenly to compress the spring (7) without danger of cocking the retainer (8) on the rods (1). The end of the retainer (8) should be centered between the channels of the track frame (6). (See A and B of *Illust. 4.*)

**FRAME - Continued****Reassembly of the Track Frame  
- Continued**

Place the spring guide (9) on the frame so that the adjusting rods (1) enter the two holes in the guide. Run in the idler adjuster. After final adjustment, the lock bolt in the front retainer (8) should be tightened. Adjust the nuts on the end of the rod (1) so that the idler adjuster is parallel with the frame (6). It should not be cocked to the side because this causes the tractor to creep to one side and increases track wear. Bend the cotter keys in the nuts and replace the cover plate (4).

Replace the five track rollers (10) and (11). Assemble the guard (3) to the spring guide (9) and the retainer (2). Then shields (12) and (13) can be secured to the frame.

**Replacement on the Tractor**

The track frame assembly is replaced on the tractor in the reverse order of removal.

**Track Frame Pivot**

A heavy pivot shaft (52), *Illust. 2, Section V*, extends through the rear of the tractor from track to track. The driving sprockets (44) revolve around the stationary axle. The track frames are mounted on this same axle through a ball and socket joint (51), (53), and (55), thus eliminating any twist or leverage loads at this point. Heavy steel diagonal braces bolted to the track frames are pivoted at midpoint of this shaft.

The pivot shaft needs replacement only in case of breakage. To remove the pivot shaft it is advisable to pull the pin from the front end of the drawbar and remove the cap screws from each diagonal brace at the pivot shaft. Jack up the tractor at the rear end, remove the sprocket drive gears and hous-

ing down to the main frame. Remove the diagonal brace bearings from the pivot shaft. Remove the drawbar braces. Remove the pivot shaft set screw (13), *Illust. 1*, and scrape the paint away from the pivot shaft at the center.

When replacing the pivot shaft, be sure to install new rubber rings between the main frame and the carrier casting.

**Track Frame Guide**

The track frame guides which maintain the track spacing consist of rollers (8), *Illust. 5*, attached to brackets (4) and (11) bolted to the main frame side channels (2) and (3), and the guides (5) attached to the recoil spring guides (9), *Illust. 3*. The bracket brace (10), *Illust. 5*, maintains the roller spacing.

To remove the track frame guide assembly, jack up the front of the tractor at the radiator. Then remove the bolts in the bracket brace (10), the brackets (4) and (11), and guides (5). Lift off the guides and drive the brackets off the dowel pins (1).

The rollers can be removed from the brackets by bending the cap screw lock (6), taking out the cap screws, and sliding off washers (7) and rollers (8).

Replacement of the guides is the reverse of removal.

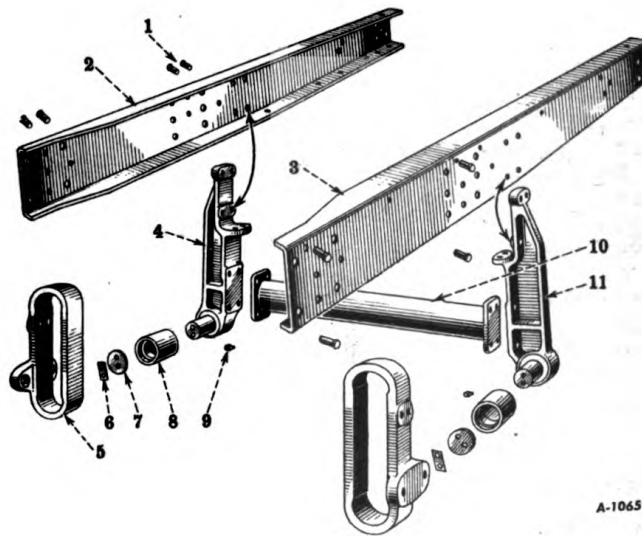
**Track Frame Diagonal Brace**

The diagonal brace (15), *Illust. 6*, keeps the tracks in vertical alignment and extends from a fixed position on the track frame to a pivot bearing on the pivot shaft at the center of the tractor.

This unit can be disassembled by removing nuts (16) from the studs (17) in the track frame. After

**REPAIR SECTION**

**FRAME - Continued**



**Illustr. 5**  
**Exploded View of Track Frame Guides.**

| Ref. No. | Description          | Ref. No. | Description          |
|----------|----------------------|----------|----------------------|
| 1        | Dowel.               | 7        | Washer.              |
| 2        | Channel, left hand.  | 8        | Roller.              |
| 3        | Channel, right hand. | 9        | Lubricator.          |
| 4        | Bracket.             | 10       | Bracket brace.       |
| 5        | Guide.               | 11       | Bracket, right hand. |
| 6        | Cap screw lock.      |          |                      |

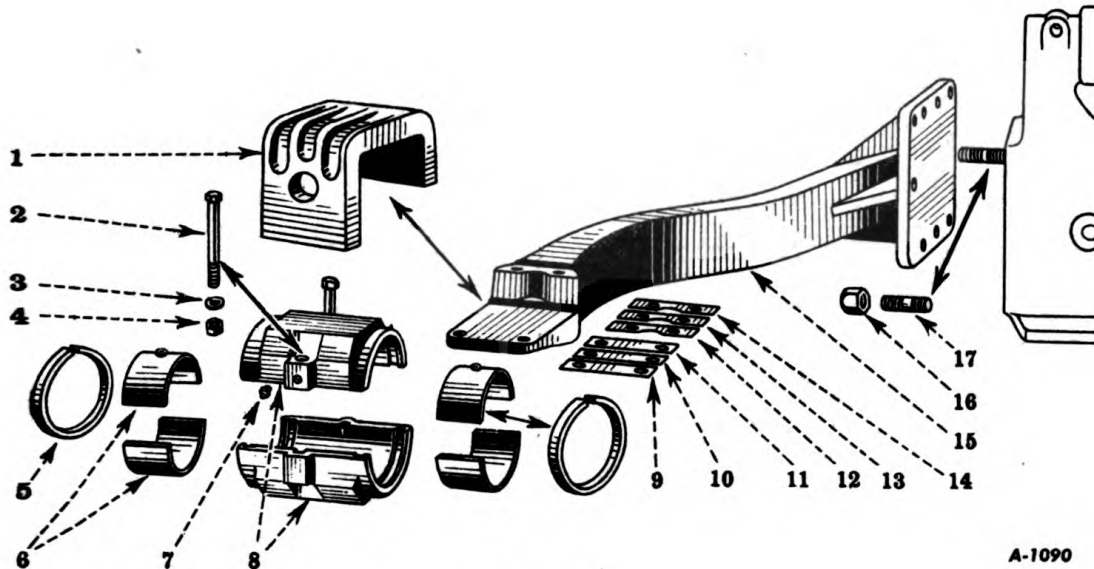
**Track Frame Diagonal Brace**  
**- Continued**

removing clamp (1), the brace (15) can be let down. When nut (4) is taken off, bolts (2) can be pulled out and bearing (8) slipped off. Felts (5) can be pulled out. Use new oil-soaked felts for replacement.

If the bushings (6) are only slightly worn, play can be removed by displacing the proper shims (9) to (12), (10) to (13), or (11) or (14). If replacement is desired, the bushings can be removed with a screw driver. They are replaceable, furnished to size.

Reassembly of the diagonal brace is the reverse of disassembly.

FRAME - Continued



Illust. 6  
Exploded View of the Diagonal Brace.

| Ref. No. | Description                  | Ref. No. | Description  |
|----------|------------------------------|----------|--|
| 1        | Clamp.                       | 10       | Shim, outer - medium.                                      |
| 2        | Cap screw, 1/2 x 3-1/2" N.F. | 11       | Shim, outer - light.                                       |
| 3        | Lock washer.                 | 12       | Shim, inner - heavy.                                       |
| 4        | Hex. nut, 1/2" N.F.          | 13       | Shim, inner - medium.                                      |
| 5        | Felt.                        | 14       | Shim, inner - light.                                       |
| 6        | Bushing (set of 2).          | 15       | {Diagonal brace, left hand.<br>Diagonal brace, right hand. |
| 7        | Lubricator.                  | 16       | Diagonal brace flange stud nut.                            |
| 8        | Bearing (set of 2).          | 17       | Diagonal brace flange stud.                                |
| 9        | Shim, outer - heavy.         |          |  |

**Equalizer Spring**

The equalizer spring is removed from the tractor by jacking up the front end of the tractor, removing the track frame from one side of the tractor, and running out dowel bolts from the lower frame pad (17), *Illust. 7*. Be careful to support the spring in doing so because the pad is now free along with the entire equalizer spring

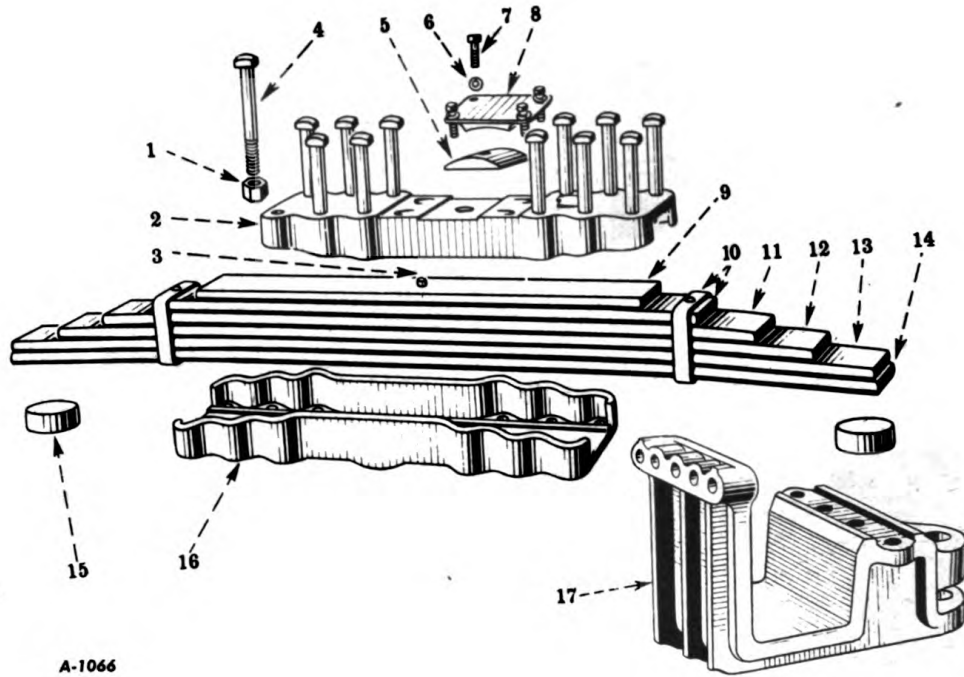
assembly. The entire assembly can be removed from the tractor.

**Disassembly of the Equalizer Spring**

Remove the bolts (4) from the upper (2) and lower (16) saddles. If necessary, the pad (5) can be disengaged from the upper saddle (2) by removing the rivets in the pad.

**REPAIR SECTION**

**FRAME - Continued**



Illustr. 7  
Exploded View of the Equalizer Spring.

| Ref. No. | Description         | Ref. No. | Description           |
|----------|---------------------|----------|-----------------------|
| 1        | Bolt nut            | 10       | No. 5 leaf with clip. |
| 2        | Saddle, upper.      | 11       | No. 4 leaf.           |
| 3        | Center bolt.        | 12       | No. 3 leaf.           |
| 4        | Saddle bolt.        | 13       | No. 2 leaf.           |
| 5        | Wearing plate.      | 14       | No. 1 leaf.           |
| 6        | Lock washer, 9/16". | 15       | Guide pad.            |
| 7        | Dowel bolt.         | 16       | Saddle, lower.        |
| 8        | Pad, upper.         | 17       | Frame pad, lower.     |
| 9        | No. 6 leaf.         | 18       | Bumper pad bracket.   |

**Disassembly of the Equalizer Spring - Continued**

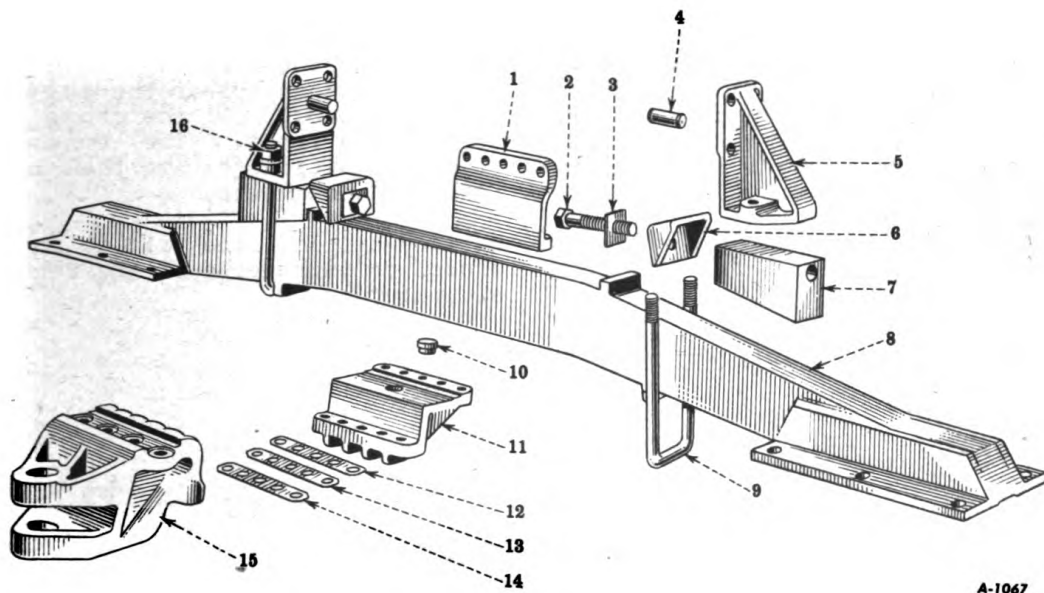
The top leaf can be lifted off when the center bolt (3) is taken out.

If it is necessary to replace damaged springs, remove clips on both ends of No. 5 leaf (10) thus freeing the rest of the leaves.

**Reassembly of the Equalizer Spring**

Reassembly is the reverse of disassembly. To facilitate reassembly, however, assemble all the leaves. Then replace the center bolt (3) to align the leaves. The upper pad (8) is attached to the bottom of the main frame with the special dowel bolts (7).

FRAME - Continued



A-1067

Illust. 8  
Exploded View of the Rigid Track Frame.

| Ref. No. | Description  | Ref. No. | Description            |
|----------|--|----------|------------------------|
| 1        | Clamp support.   | 9        | Bracket "U" bolt.      |
| 2        | Wedge bolt.  | 10       | Dowel.                 |
| 3        | Wedge bolt lock.   | 11       | Clamp.                 |
| 4        | Bracket dowel.   | 12       | Shim, medium.          |
| 5        | Bracket, left hand.  | 13       | Shim, heavy.           |
| 6        | Bracket, right hand.                                       | 14       | Shim, extra heavy.     |
| 7        | Wedge clamp.   | 15       | Drawbar pivot bracket. |
| 8        | Rigid track frame cross bar, complete with angle brackets. | 16       | "U" bolt nut.          |



FRAME - Continued

**Rigid Track Frame**

(Used in place of Equalizer Spring, etc., when the TracTractor is equipped with Cranes, Pipe Booms, and Similar Superimposed Equipment.)

The rigid track frame is a term used to specify the action of the track frame when the equalizer spring is replaced with a rigid cross bar. The removal procedure for this type of unit is similar to the removal of the equalizer spring.

Jack up the tractor at the front just enough to relieve the cross bar of the engine weight. Remove the track chain on both sides. Remove the front idlers and turn out the front idler adjusters. Take off the recoil spring guards (3), *Illust. 3*. Take out the bolts in the rear spring retainer (2) and

withdraw the spring retainer with the recoil spring assembly.

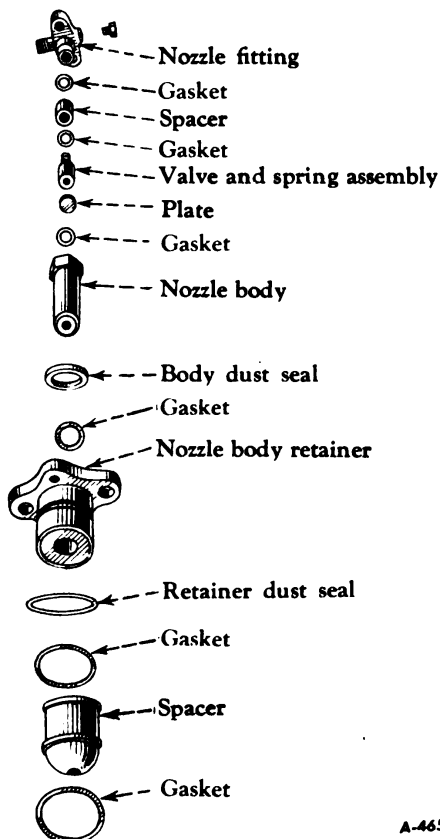
Take out bolts and lift off the recoil spring guides (9). Remove the bolts holding clamp support (1), *Illust. 8*, and clamp (11) to the main frame. Remove the nuts from the U-bolts (9). Jack up the front end some more so that the wedge clamps (6) clear the lugs on the cross bar. Pull the cross bar (8) out the front. The brackets (5) are doweled (4) to the main frame side channels.

Replacement of the rigid frame cross bar is reverse of the removal procedure.

FUEL SYSTEM

Injection Nozzles

The injection nozzle assembly consists principally of the nozzle, the nozzle body retainer, and the spacer or precombustion chamber. There are three copper gaskets inside the nozzle body. The first is below the nozzle plate, the second is between the spacer and the valve-and-valve-spring assembly, and the third is between the spacer and the nozzle fitting, (Illusts. 1 and 2). Use new gaskets if possible whenever servicing nozzle parts. Another copper gasket is located between the nozzle body and the retainer. Steel gaskets are located above and below the spacer.



Illust. 1  
Exploded View of an  
Injection Nozzle

A-465

**Note:** When replacing the nozzle body spacer be sure it is assembled with the word "UP" toward the top of the cylinder head.

The injection nozzles have a counterbore and a groove in the nozzle body retainers to accommodate dust seals. When assembling these seals, apply a light coating of potash soap solution to the seals. Roll it onto the nozzle body retainer and insert the assembly into the cylinder head bore. Tighten the nuts holding the nozzle body retainer to the cylinder head to 45 ft.-lbs. torque.

The injection nozzles can be readily removed by taking out two cap screws and disconnecting the fuel injection pump tubing. The assembly should be clean and free of carbon. To clean the nozzle, unscrew the nozzle fitting from the nozzle body. Check the length of the nozzle valve spring as it is assembled before dismantling. It will make reassembly to the proper tension much easier. The correct pressure of the assembled springs should be 34 to 35 lbs.

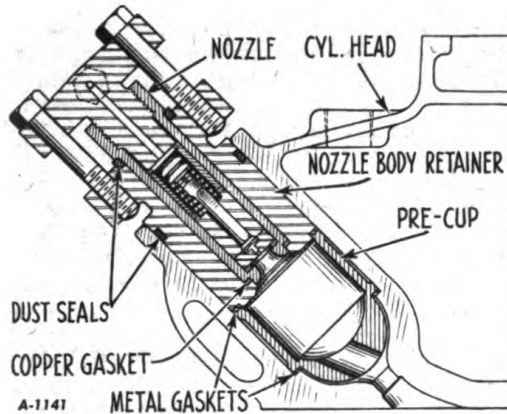
The nozzle should be checked with the hydraulic test pump SE-905-A for correct opening pressure as follows:

The leakage past the valve at 700 lbs. per sq. in. pressure should not exceed five drops per minute. The valve should be set to open at 700 lbs. per sq. in. pressure. Re-adjust the spring if necessary. Before testing the nozzle draw down the nozzle fitting to the nozzle body with a torque wrench to 90 ft.-lbs. torque. Cap screws holding the nozzle body and fitting in the nozzle body retainer should be drawn down to 20 ft.-lbs. torque.

If a smoky exhaust condition exists in one cylinder it can be traced by opening successively the fuel bleeder screw in each nozzle. The clearing of smoke on opening any one bleeder screw indicates a leaky

FUEL SYSTEM - Continued

Injection Nozzles - Continued



Illustr. 2  
Cross Section of an  
Injection Nozzle

injector valve in that nozzle. This is particularly true of a light exhaust condition. Dirty nozzles and poor fuel will cause a light or dark blue smoke. The leaky nozzle valve, improper timing of the injector, poor fuel, and insufficient air are several of the causes for a heavy brown or black exhaust smoke. A knocking condition confined to one cylinder very often is caused by a leaky nozzle valve, a dirty fuel pump delivery valve, a broken delivery valve spring, sticky or warped intake or exhaust valves, and a leaky cylinder head gasket. Water in the fuel, sticky nozzle valves, or poor fuel will result in a general knocking condition of erratic or intermittent nature.

Fuel Injection Pump

The primary unit of the Diesel fuel injection system is a Bosch flange-mounted injection pump. It is a constant stroke, cam-actuated solid injection type equipped with a variable-stroke, self-regulating, plunger-type fuel supply pump. Fuel from the supply tank is pumped through an absorption-type metal and cloth element fuel filter. The injection pump operates at 1/2 engine speed. Air in the fuel system may be bled at the sediment bowl, fuel filters, and injection nozzles as described in the "Operations Section".

Whenever the high-pressure tubing is to be disconnected from the fuel injection pump, use two wrenches--one to loosen the pipe fitting and the other to prevent possible turning of the discharge fitting on the pump. Whenever the tubing has been removed place caps over the discharge fittings to prevent the possible entrance of dirt.

Removal and Replacement of the  
Injection Pump

Replacement and timing of the pump is outlined in the "Operation Section".

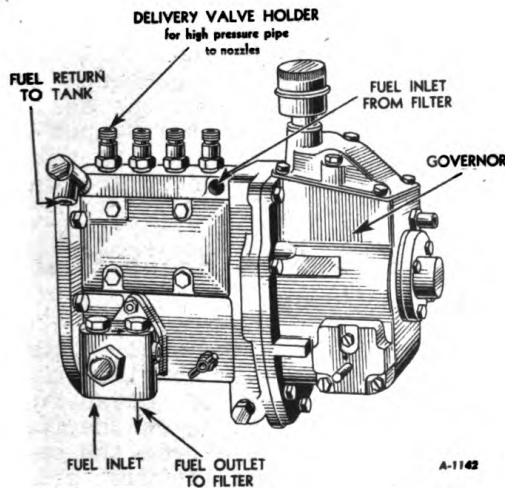
Refer to the "Adjusting Starting Control Mechanism," Section 10. If the engine does not come up to the proper high idle speed, remove the small cover adjacent to the governor control lever on the pump and adjust the rear set screw to give the speed desired. If the pump does not shut off by closing the throttle, adjust the front set screw to make it do so. Replace the cover and seal.

## FUEL SYSTEM - Continued

**Basic Tests and Adjustments of the Bosch Fuel Injection Pump**

Fuel injection pumps removed from an engine, as well as those re-assembled after servicing, should be operated on a test bench such as the IHC SE-1247 test bench. Fundamentally, such a bench is a means of running the pump at normal operating speeds - with the tractor fuel piping duplicated and graduated containers to catch the fuel delivered from the injection nozzles.

The start of injection for each plunger, the pressure maintained by the fuel supply pump (6 to 8 lbs.), and the quantity of fuel delivered to each cylinder of the engine can be checked. Necessary adjustments can be made and the pump replaced on an engine with a minimum of lost time. Many pumps removed from engines require only retiming and recalibration.



Illust. 3  
Bosch Fuel Injection Pump.

The test stand should be equipped to drive the injection pump at a speed of 550 R.P.M., and preferably another speed equivalent to the full load speed of the engine (1350 R.P.M. engine speed; 675 R.P.M. pump speed). In addition, the drive should include a disc graduated in degrees of a circle, and an adjustable pointer. A gauge rod graduated in millimeters or 64ths, attachable to the rear of the injection pump housing, and a pointer to match, attachable to the rear end of the control rod should be provided.

**Timing the Bosch Fuel Injection Pump**

For timing, attach the injection pump to a suitable bracket aligned with the drive. Thoroughly clean the exterior of the pump and remove the governor assembly as outlined under "Repair of the Bosch Fuel Injection Pump". Attach a fuel line from the source of fuel supply to the inlet fitting on the pump housing. Remove the delivery valve holder (2), *Illust. 5*, from the No. 1 injector, extract the delivery valve spring (3) and delivery valve (5), and replace the delivery valve holder. Move the control rod (45-B) so the mark on its underside at the rear is in line with the edge of the bushing. At this position, the split in the control sleeve toothed segments are straight out or perpendicular to the control rod.

Rotate the pump so the No. 1 injector starts to rise -- this can be determined by watching the tappet (71-A) through the inspection cover (38-A) opening. Turn on the fuel supply and carefully continue turning the pump camshaft until the flow of fuel from the delivery valve holder ceases. Set the indicator at zero on the graduated disc or at a recorded number of degrees on the disc. Turn the pump through a complete cycle and again check the position of the pointer on the indicator when the fuel

## FUEL SYSTEM - Continued

**Timing the Bosch Fuel Injection Pump - Continued**

stops flowing from the delivery valve holder. Blowing the fuel from the depression in the top of the delivery valve holder will allow the exact position of fuel flow stoppage to be more clearly observed. The pump must be turned very slowly as this point is reached.

When the fuel stops flowing, the "SI" mark on the injection pump gear hub should line up with the "SI" mark on the face of the end plate (15). If the fuel does not stop flowing when these marks line up, the tappet adjusting screw (66) should be: (A) Raised to make the fuel stop flowing sooner, and (B) lowered to make the fuel stop flowing later. The pump turns in a clockwise direction when viewed from the front. The "SI" mark on the end cover is reached approximately 30° before the vertical center-line of the pump.

With the flow of fuel stopped at the time the "SI" marks on the hub and end cover line up (adjusted with the tappet screw for No. 1 cylinder), the delivery valve and spring may be replaced. The point at which the fuel stops flowing is called the start of injection and is abbreviated with the letters "SI". Remove the delivery valve for No. 3 plunger and turn the pump to make the fuel stop flowing from that delivery valve holder. The start of injection or stoppage of fuel flow for this plunger should occur exactly 90° of rotation after that for No. 1 plunger. If the fuel flow stops before 90° of turning has elapsed, the tappet adjusting screw for that plunger should be lowered. If the fuel flow stops after 90° of turning has elapsed, the tappet adjusting screw should be raised. When the tappet adjusting screw is set to make the fuel flow stop exactly 90° after that for No. 1 plunger, the delivery valve and spring may be replaced for this plunger.

Repeat this process for No. 4 plunger. The "SI" for this plunger should be exactly 90° after that for No. 3. When this has been properly adjusted, check the "SI" for plunger No. 2. It should likewise be 90° after that for No. 4. When this has been adjusted, see how many degrees of rotation are required to reach the "SI" for plunger No. 1, and see if this coincides with the "SI" marks on the end plate of the pump and pump gear hub. The "SI" for No. 1 should be 90° after that for plunger No. 2. This will be a check on the accuracy of your work. If these marks do not coincide after 90° rotation from the "SI" for plunger No. 2, the entire process must be gone over again, starting off with cylinder No. 1, and corrections made wherever necessary.

With each plunger properly timed for start of injection, "SI", turn the camshaft until plunger No. 1 rises as far as the cam will lift it. Lift the tappets with a screw driver to see if there is at least .020" vertical free travel of the plunger before it strikes the delivery valve seat. For accurately checking this free travel from the maximum lift position, a short rod of small diameter can be slipped down into the delivery valve holder until it contacts the top of the plunger (delivery valve removed). A dial indicator contacting the top of the rod will show the exact clearance between the top of the plunger and the delivery valve seat when the tappet is raised from the maximum lift position. Check each plunger for this minimum clearance.

**Calibration of the Bosch Fuel Injection Pump**

For calibration, the fuel piping for the pump should consist of a lead from a source of clean fuel to the forward fitting on the fuel supply pump. A pipe from the outlet fitting should include a 15-pound capacity pressure gauge and should lead to the inlet fitting at the rear of the injection pump

## FUEL SYSTEM - Continued

## Calibration of the Bosch Fuel Injection Pump - Continued

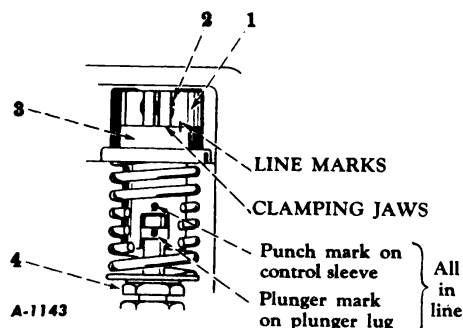
housing. A line for the return fuel should lead from the fitting at the front of the injection pump housing back to the original fuel supply container. The use of a filter in the outlet fuel line from the supply pump is recommended. Standard injection pipes and injection nozzles (set for 700 lbs.) are also necessary.

Run the pump to be sure that all air is bled out of the system. Bleed the air from the nozzles before making any quantity test. Attach a fixture to the pump and control rod and set the rod 6 mm. or 15/64" from the full stop position. Operate the pump for exactly four minutes at 550 R.P.M. The quantity of fuel delivered from each nozzle into the graduated beaker should be 136 cc. If this amount of fuel is not delivered from each nozzle, the following adjustments should be made:

- a. Move the control rod to the full stop position so that the clamping screw (2) *Illustr. 4*, in the jaw of the control segment is accessible.
- b. Loosen the clamping screw of the segment (1) for the plunger for which the quantity of fuel delivered was not correct.
- c. Facing the inspection cover opening, turn the control sleeve (3) to the right if fuel delivery was too low. Only a slight movement of the sleeve is required.
- d. If fuel delivery was too high, turn the control sleeve (3) to the left.
- e. Tighten each lock screw (2) that has been loosened.
- f. Take another test run of the pump with the control rod in exactly the same position as set for the initial test. If

the adjustment of the segments (1) was not satisfactory, repeat the foregoing steps until all are delivering the quantity required.

- g. The average delivery from the nozzles should be within 7 cc. of the amount specified. The maximum variation in the delivery of any nozzle from the average delivery for all nozzles should not exceed 5 cc.



Illustr. 4  
Points of Adjustment for Timing and Calibrating Pump Plungers.

- (1) Toothed segment.
- (2) Clamping screw.
- (3) Control sleeve.
- (4) Tappet adjusting screw.

Move the control rod to a position 9 mm. or 23/64" from the full stop position. Repeat the test run outlined above. The quantity of fuel delivered from each nozzle should be 217 cc. If the control segments had to be readjusted to get the average fuel delivery from all nozzles within 11 cc. of the 217 cc. quantity, or within 9 cc. of one another, a re-run should be made at the 6 mm. or 15/64" setting of the control rod. The adjustment of the control segments should be balanced to give satisfactory fuel delivery at both the 6 mm. (15/64") and 9 mm. (23/64") setting of the control rod.

## FUEL SYSTEM - Continued

**Calibration of the Bosch Fuel Injection Pump - Continued**

When pumps are tested prior to disassembly, and a pump cannot be made to deliver fuel within the limits specified, look for faulty delivery valve action, a faulty cam, and broken plunger springs, faulty test nozzles, or worn plungers. Switching of the test nozzles should not change the quantity of fuel delivered. If this does change the quantity of fuel delivered, the nozzles should be rechecked for uniform setting. If the pump delivers uniformly at these two settings, there is every assurance the engine will idle properly, and give smooth performance throughout the load range. This assumes the mechanical condition of the engine and the nozzles in the cylinder head are operating effectively.

Reassemble the governor to the pump. Operate the pump for exactly four minutes at 550 R.P.M. with the control lever held wide open. The quantity of fuel delivered, should be 268 cc. The maximum variation from the average of fuel delivered from any one nozzle should be 11 cc. and the average quantity of fuel should be within 13 cc. of the 268 cc. specified. If this amount is not delivered, remove the cover for the operating lever stops and adjust the forward stop screw to obtain this amount. Turning the screw in decreases the fuel delivery. Be sure to lock the screw after adjusting. This will be as close as the horsepower of the engine and maximum idle speed of the engine can be set by bench testing of the fuel pump.

Whenever a governor has been reassembled and the setting of the stop plate (2), *Illust. 11*, is not known because new parts have been installed, it is necessary to operate the pump as closely as possible to the rated load speed or 675 R.P.M. of the pump. At this speed, the smoke limit cam (24),

*Illust. 9*, should just float against the rear corner of the step on the stop plate (2), *Illust. 11*. When set at the factory, the position of the parts is marked as indicated in *Illust. 11*. If the old parts are reinstalled, they can be made to line up with the scratch marks already inscribed. A straight edge against the forward step of the stop plate should show the alignment of the forward step of the stop plate with the scratch lines on the governor end cover. The scratch line on the smoke limit cam should line up with the mating mark on the fulcrum yoke lever. Where new parts are used, it may be necessary to reset both the cam and plate. If this is the case, eradicate the old scratch lines and add new lines at the new setting. Be sure the proper spring gap is used for the governor springs, as outlined under the "Governor Reassembly". The setting of the stop plate and the smoke limit cam have a definite effect on engine performance which can be checked after assembly of the pump to the engine.

Before attaching the inspection covers to the pump, inscribe a line on both the control sleeve toothed segment and the control sleeve of the plunger so that their position at the time of calibrating can be duplicated, should it become necessary to disassemble the pump again. Check all lock screws and adjustments for tightness before replacing the inspection covers. Be sure the pump is filled with the proper grade and amount of lubricating oil before testing.

The injection pump can now be replaced on the engine and timed. If the high idle speed of the engine is not 1500 R.P.M., adjustment of the forward stop screw for the control lever will give the speed desired. Readjust the control mechanism as outlined in the "Starting System", Section 10. If the engine smokes excessively under

## REPAIR SECTION

### FUEL SYSTEM - Continued

#### Calibration of the Bosch Fuel Injection Pump - Continued

load, check the timing for the best position. If it continues, and all other items of the system have been checked, the stop plate and the smoke limit cam may have to be readjusted. If the smoking condition of the engine is satisfactory, but apparently there is insufficient power for overload or lugging ability, a slight adjustment of the plate or cam may be necessary. The setting of the cam and plate can only be made accurately when the engine is tested with a dynamometer where it can be given the rated load and overload. Be sure to check all other possible parts of the engine and pump which might contribute to faulty operation, before attempting to set these parts.

#### Repair of the Bosch Fuel Injection Pump

If it ever becomes necessary to adjust or disassemble the fuel injection equipment, it is of utmost importance that cleanliness be practiced. Should any dust, grit, water, etc., reach the working parts of the injection pump, serious damage will result that may make costly shut-downs and repairs necessary. Only after its accessories have been washed thoroughly with clean Diesel fuel to eliminate entirely any dirt or dust, should disassembly of the equipment be attempted.

Repair of the injection pump is divided into three main units: The injection pump housing assembly; the supply pump assembly; the governor assembly.

With the complete injection pump removed from the engine, or while it is assembled to the engine, the fuel supply pump may be replaced after taking off the three nuts holding the unit to the studs 59-A, *Illust. 5*. Pull on the fuel supply pump housing 15-A, *Illust. 8*, to remove it. Be sure to use a good gasket (16) when replacing the fuel supply pump.

With the injection pump removed from the engine as indicated in the procedure for this operation given in the Operations Section, the governor and pump housing assemblies can be separated. After removing the nine cap screws joining the governor end cover (38) *Illust. 9*, to the pump housing (62), *Illust. 5*, pull the cover to the rear until the dowels are free from the housing. Then slide the cover to the side to disengage the control rod linkage pin (27), *Illust. 9*, from the control rod (45-B), *Illust. 5*. Disassembly of each unit can now be performed independently of any other unit.

#### Disassembly of the Pump Housing Assembly

Remove the inspection cover (38-A), *Illust. 5*, the four barrel set screws (28-A) from the above inspection opening, the control rod securing screw (44) from the back side of the pump, the four closing plugs (75) in the base of the pump, and the overflow valve (12). Wrench SE-1296 is made to fit the slot in these plugs. A similar tool can be made from a drag-link screw driver rounded to fit the 3/4" radius at the base of the slot.

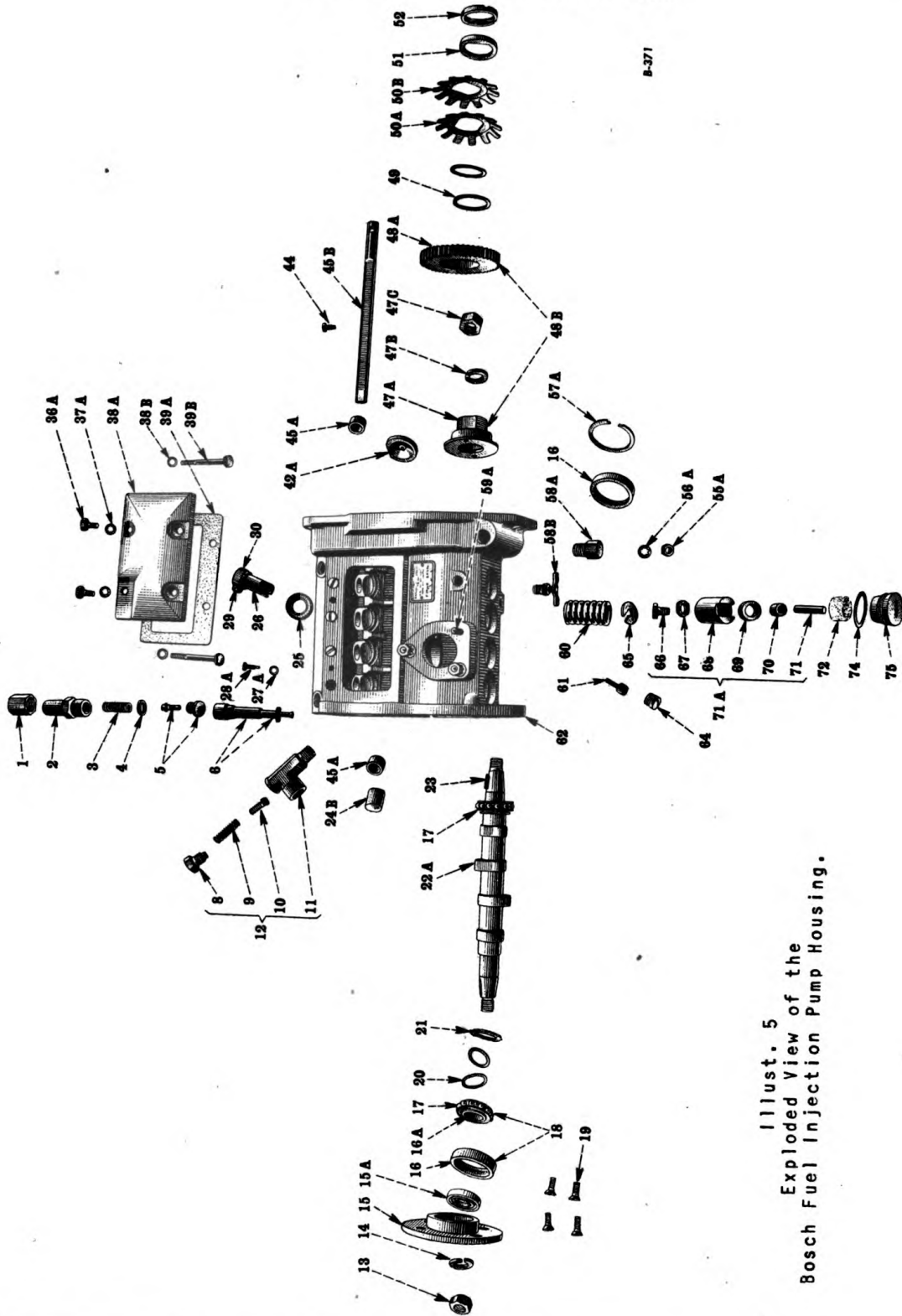
Set the pump gear hub in a vise and remove the governor drive gear hub nut (47-C). Bend back lock (51) and remove the gear adjusting nut (52) (service tool SE-1302). Lift off the lock, the two drive gear spring discs (50-A) and (50-B), the adjusting spacers (49), and the governor drive gear (48-A). Use puller SE-1303 to remove the gear hub (47-A) (with gear (48-A) in place) or turn the adjusting nut (52) on a few turns and pry the hub off, using a screw driver on each side under the nut while tapping on the end of the camshaft (22-A). Remove the key (23).

Remove the lubricating oil overflow tube with plug (61) from the base of the housing (62). Turn over the pump camshaft and place tappet holders (SE-1308), or their equivalent, between each tappet



# REPAIR SECTION

## FUEL SYSTEM - Continued



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Illust. 5  
Exploded View of the  
Bosch Fuel Injection Pump Housing.

# REPAIR SECTION

## FUEL SYSTEM - Continued

| Ref. No. | Description                           | Ref. No. | Description                                   | Ref. No. | Description                              |
|----------|---------------------------------------|----------|---|----------|--|
| 1        | Delivery valve holder protection cap. | 21       | Camshaft oil thrower.                         | 49       | Adjusting spacer, .020".                 |
| 2        | Delivery valve holder.                | 22A      | Camshaft.                                     |          | Adjusting spacer, .035".                 |
| 3        | Delivery valve spring.                | 23       | Camshaft key.                                 |          | Adjusting spacer, .049".                 |
| 4        | Delivery valve holder gasket.         | 24B      | Control rod protection cover.                 | 50A      | Adjusting spacer, .065".                 |
| 5        | Delivery valve and seat.              | 25       | Plunger spring seat, upper.                   |          | Drive gear spring disc, inner.           |
| 6        | Plunger and barrel.                   | 26       | Control sleeve.                               | 50B      | Drive gear spring disc, outer.           |
| 8        | Valve screw.                          | 27A      | Barrel set screw gasket.                      | 51       | Drive gear adjusting nut lock washer.    |
| 9        | Valve spring.                         | 28A      | Barrel set screw.                             | 52       | Gear adjusting nut.                      |
| 10       | Valve proper.                         | 29       | Toothed segment clamping screw.               | 55A      | Hex. nut, 1/4" N.C.                      |
| 11       | Valve body.                           | 30       | Toothed segment.                              | 56A      | Fuel supply pump housing lock washer.    |
| 12       | Overflow valve.                       | 36A      | Inspection cover fastening screw, short.      | 57A      | Bearing retainer ring.                   |
| 13       | Camshaft hex. nut.                    | 37A      | Inspection cover fastening screw lock washer. | 58A      | Lubricating oil drain plug.              |
| 14       | Lockwasher.                           | 38A      | Inspection cover.                             | 58B      | Lubricating oil level cock.              |
| 15       | End plate with oil seal.              | 38B      | Inspection cover fastening screw long gasket. | 59A      | Fuel supply pump stud.                   |
| 15A      | End plate oil seal.                   | 39A      | Inspection cover gasket.                      | 60       | Plunger spring.                          |
| 16       | Camshaft bearing, outer race.         | 39B      | Inspection cover fastening screw, long.       | 61       | Lubricating oil overflow tube with plug. |
| 16A      | Camshaft bearing, inner race.         | 42A      | Pump housing baffle with button.              | 62       | Pump housing.                            |
| 17       | Camshaft bearing retainer with balls. | 44       | Control rod securing screw.                   | 65       | Plunger spring seat, lower.              |
| 18       | Camshaft bearing, L.H. and R.H.       | 45A      | Control rod bushing.                          | 66       | Tappet screw.                            |
| 19       | End plate fastening screw.            | 45B      | Control rod.                                  | 67       | Tappet screw lock nut.                   |
|          | Bearing adjusting washer, o. 1M/M.    | 47A      | Drive gear hub.                               | 68       | Tappet shell with insert.                |
|          | Bearing adjusting washer, o. 2M/M.    | 47B      | Lockwasher.                                   | 69       | Tappet roller.                           |
|          | Bearing adjusting washer, o. 3M/M.    | 47C      | Drive gear hub nut.                           | 70       | Tappet roller bushing.                   |
| 20       |                                       | 48A      | Drive gear.                                   | 71       | Tappet pin.                              |
|          |                                       | 48B      | Drive gear.                                   | 71A      | Tappet.                                  |
|          |                                       |          |   | 72       | Felt cushion.                            |
|          |                                       |          |   | 74       | Closing plug gasket.                     |
|          |                                       |          |   | 75       | Closing plug.                            |

FUEL SYSTEM - Continued

Disassembly of the Pump  
Housing Assembly - Continued

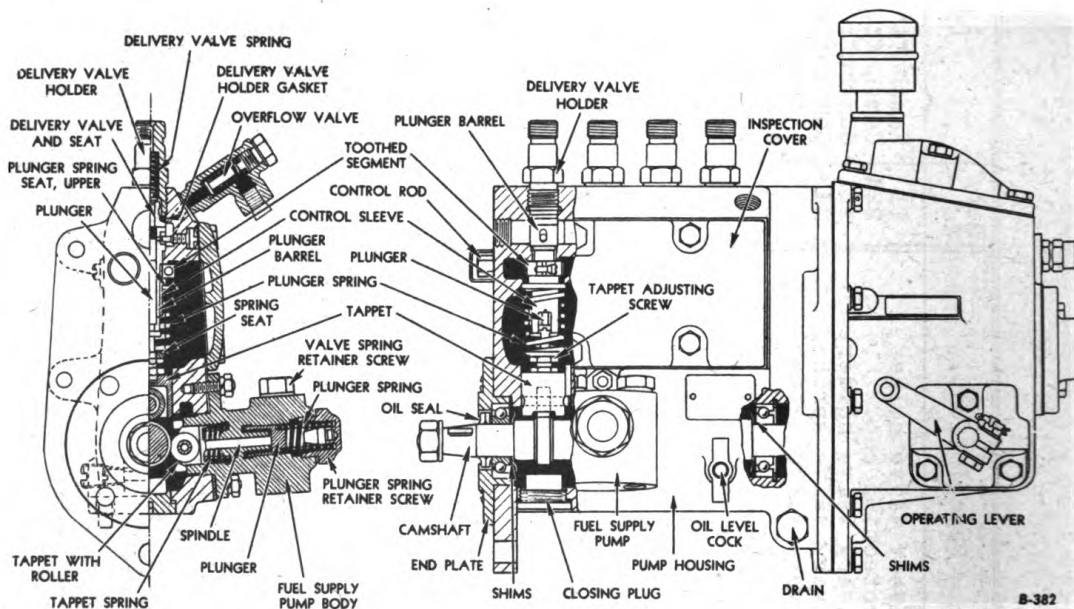
screw (66) and its lock nut (67). Remove the pump gear hub, the key in the camshaft, and then take off the end plate (15) with its oil seal (15-A), and the bearing outer race (16). The camshaft assembly can now be removed from the housing. Use a bearing race puller (SE-1300) to remove the bearing race (16-A) from the camshaft (22-A).

The complete tappets (71-A) can now be removed from the housing. The plunger (6), the lower spring seat (65), and the plunger spring (60) can all be removed through the holes in the base of the pump housing. The upper spring seat (25) and the control sleeve (26) with toothed segment (30) can now be removed through the inspection cover opening.

Remove the delivery valve holder (2) for the same plunger and lift out of the spring (3) and delivery valve (5). Use a block of wood and drive the plunger barrel (6) out of the housing with the delivery valve seat (5) and gasket (4). Flush the barrel and plunger with clean oil and slide the plunger within the barrel. Keep all the parts for this cylinder together before repeating the process for the other cylinders.

Repair of the Pump Housing  
Assembly

All parts should be carefully washed in clean Diesel fuel and blown dry with compressed air (free from water or dirt). Exceptionally dirty parts should be cleaned in paint removed. Gummed or sticky plungers should be soaked in acetone.



Illust. 6  
Cross Section of the Bosch Fuel Injection Pump.

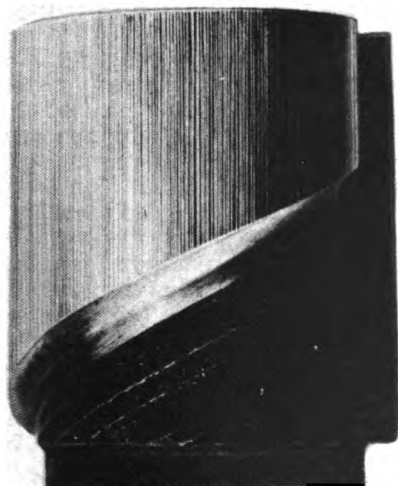
## FUEL SYSTEM - Continued

**Repair of the Pump Housing Assembly - Continued**

If wear is excessive, the bushings (45-A), *Illust. 5*, may be replaced. They must be line-reamed to a dimension of .4331" to .4338". Clearance between the shaft should be from .0015" to .0027".

When replacing the outer bearing race (16), replace also the inner bearing race (16-A) and bearing (17). The end play of the camshaft (22A) when assembled complete is .004" to .008". The lip of the oil seal (15-A) faces the interior of the pump housing (62).

The plunger and barrel (6) should be carefully inspected for wear. If the plunger has lost its mirror-like appearance and looks dull or grey, it is a sure indication that the plunger has been worn due to dirt in the fuel. The edge of the plunger helix should appear sharp under a magnifying glass and the plunger should not be nicked or scratched. *The upper portion of a badly worn plunger is magnified many times in Illust. 8.* If there is some doubt as to whether it is



**Illust. 7**  
Picture of a Badly Worn Plunger.

necessary to replace the plunger, assemble the pump and test it as outlined under the "Basic Tests and Adjustments" heading. Wipe the plunger only with cleansing tissue, never handle the polished surface with bare fingers.

Always use a new delivery valve gasket (4) *Illust. 5*. The delivery valve (5) should fall freely in its seat with both parts lubricated.

The toothed segment (30) should never be moved on the control sleeve (26) unless either are to be replaced. The scratch mark on both parts should line up. If the guide slots are badly worn, replace the sleeve. When assembling new parts, line up the gap in the segment with the slots in the segment for the initial setting. Change the setting as explained under "Basic Tests and Adjustments".

**Reassembly of the Pump Housing Assembly**

When reassembling plunger units in the pump housing, complete all the operations for any one cylinder before proceeding to the next. It is absolutely essential that each plunger (6) *Illust. 5*, is replaced in the barrel from which it is removed. Lubricate the plunger before inserting in the barrel.

Separate the plunger and barrel (6). Insert the barrel in the pump with the long slot in the top of the barrel facing the inspection cover side of the pump. Screw in the barrel set screw (28-A) with its gasket (27-A). Assemble the delivery valve and seat (5), followed by gasket (4), spring (3), and delivery valve holder (2). Tighten the delivery valve holder to 35 ft.-lbs. torque. Place a cap (1) over the holder.

Replace the control rod (45-B) and turn in its securing screw (44) with the long end to the rear. Insert the control sleeve (26) and toothed segment (30) through the inspection cover opening and slide

## REPAIR SECTION

### FUEL SYSTEM - Continued

#### Reassembly of the Pump Housing Assembly - Continued

the unit over the end of the plunger barrel. Move the control rod to a point where the spot on the round surface near the rear of the rod is flush with the inside surface of the housing. Raise the control sleeve (26) and segment (30) to engage the teeth on the control rod so that the split in the segment (30) faces directly out, perpendicular to the control rod. Slide the upper plunger spring seat in place with the groove toward the spring.

Insert the plunger spring over the sleeve from the bottom. Dip plunger (6) in clean Diesel fuel and use service tool SE-1298 or its equivalent to gently insert the plunger (6) in its barrel. Be sure the flange on the plunger with the punch mark freely enters the slot of the sleeve (26) which has a similar mark, *Illust. 4*. Withdraw the plunger slightly and attach the lower plunger spring seat. Be sure the recess in the seat is toward the bottom. Assemble the tappet (71-A), *Illust. 5*, and insert it into the bore in the pump housing. The pin (71) engages a slot in the housing and prevents the tappet from turning. Push the tappet toward the top of the pump housing, engage the flange on the plunger in the control sleeve slot, and slip the tappet lifter SE-1308 between the tappet screw (66) and its lock nut. Move the control rack back and forth to check the free movement of the parts.

Repeat the foregoing process to replace all assemblies for each cylinder. Check after each installation for freedom of parts. Remove any assembly that causes difficulty before proceeding further.

Replace the rear bearing race (16) in the pump housing (62). Also replace the forward bearing race (16) in the end plate (15) after the oil seal (15-A) is in place

with the lip facing the bearing. Assemble the camshaft to the housing and fasten the end plate. Check the end play of the camshaft. Arrange shims (20) for end clearance of .004" to .008", preferably .004". Tappet holders can now be removed. Follow the procedure outlined under "Basic Tests and Adjustments".

Replace key (23). Set the drive gear hub (47-A) in the gear (48-A) and assemble both to the camshaft. Tighten nut (47-C). Assemble adjusting spacers (49), spring discs (50-A) and (50-B), lock washer (51), and gear adjusting nut (52). The spacers (49) are furnished in various thicknesses, namely .035", .049", .065". Use one or more spacers, as required, so that 3 to 3-1/4 ft.-lbs. torque are required to turn the gear (48-A) when the nut (52) is drawn tight. Lock the lock washer (51) against the nut (52).

If only the pump housing has been repaired, assembly of the supply pump and governor can be completed, the pump set for approximate full load delivery as outlined under the "Calibration" heading, and the unit reassembled to the engine. Retime for best operation as outlined in the Operations Section.

#### Disassembly of the Supply Pump

Remove the valve spring retaining screws (10), *Illust. 8*, with gasket (9), and lift out springs (8) and valves (7). Keep these parts in order so they can be replaced in their original position.

Take off the plunger spring retainer screw (11) with gasket (12), and lift out spring (13) and plunger (14). Remove from the housing (15-A) the tappet-securing pin (1), and slide out the tappet assembly (1), (2), (3), and (4). Spring (5) and spindle (6) can then be removed.

Removing the tappet wrist pin (2) from the tappet shell (4) releases the tappet roller (3).

FUEL SYSTEM - Continued

Repair of the Supply Pump

Flush all parts with clean Diesel fuel. Examine all valve seats and the ends of the valves. If the ends of the valves are not smooth they may be refinished in a speed lathe. The spindle (6) is a lapped fit in the housing (15-A); replace the spindle if it is worn excessively.

Reassembly of the Supply Pump

Reassembly of the supply pump is the reverse of the disassembly procedure.

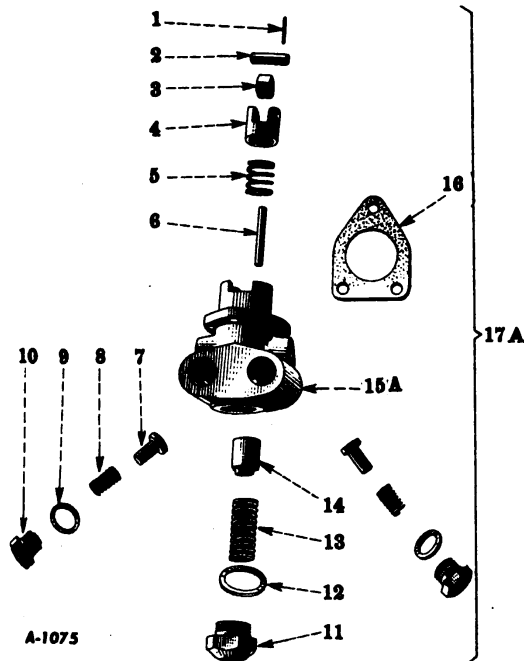
Be sure all parts are clean before proceeding. If the supply pump will not prime after reinstalling it, remove the inlet screw (10), put in a few drops of lubricating oil, and replace the screw. With

the overflow valve on the pump functioning properly, the supply pump should maintain 6 to 8 lbs. of fuel pressure in the pump housing sump. The free length of the overflow valve spring (9), *Illust. 5*, is 5/8".

Disassembly and Repair of the Governor

Remove the governor inspection cover (53), *Illust. 9*. Take off the upper and lower operating stop covers (88) and (89). Take out the four spring cap screws and remove the retainer end cap (65). After turning off the bearing nut (37), the bearing (35), outer and inner governor spring spacers (79) to (84), the outer and inner governor springs (33) and (32) can then be slipped out. Removing the cap screws (15) from the bearing support plate (10) permits the governor weight and shaft assembly (18), complete to be pulled from the end cover (38). The sleeve (19) with the bushing and thrust bearing can now be slipped from the pegs of the fulcrum lever (20) for removal.

(Continued on page 16)

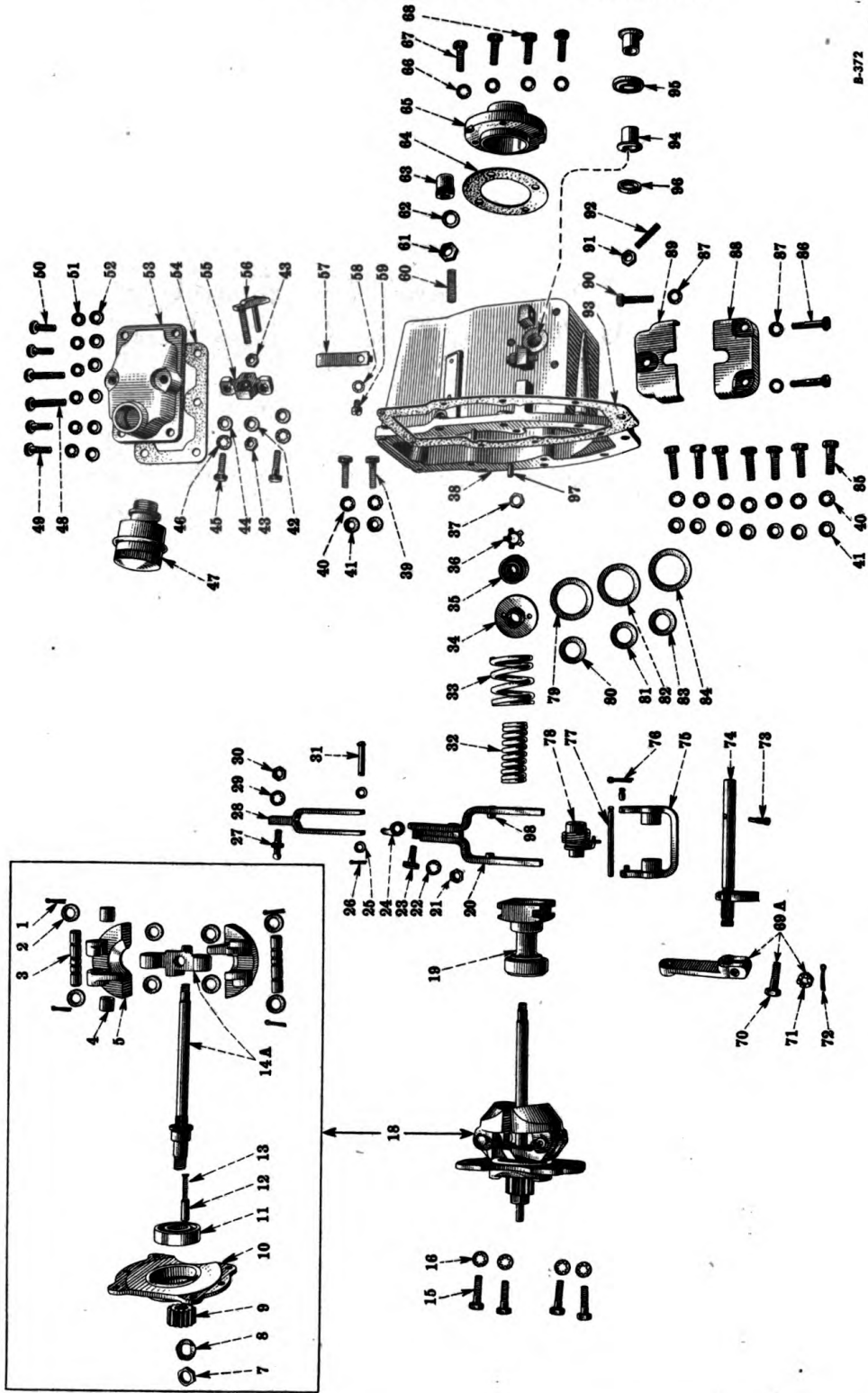


Illust. 8  
Exploded View of the  
Fuel Supply Pump.

| Ref. No. | Description                           |
|----------|---------------------------------------|
| 1        | Tappet securing pin.                  |
| 2        | Tappet wrist pin.                     |
| 3        | Tappet roller.                        |
| 4        | Tappet shell.                         |
| 5        | Tappet spring.                        |
| 6        | Spindle.                              |
| 7        | Valve, inlet and outlet.              |
| 8        | Valve spring.                         |
| 9        | Valve spring retainer screw gasket.   |
| 10       | Valve spring retainer screw.          |
| 11       | Plunger spring retainer screw.        |
| 12       | Plunger spring retainer screw gasket. |
| 13       | Plunger spring.                       |
| 14       | Plunger.                              |
| 15A      | Fuel supply pump housing.             |
| 16       | Fuel supply pump housing gasket.      |
| 17A      | Fuel supply pump, complete.           |

### REPAIR SECTION

### FUEL SYSTEM - Continued



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Illustr. 9  
Exploded View of the Governor.

REPAIR SECTION

FUEL SYSTEM - Continued

| Ref. No. | Description                                 | Ref. No. | Description                                 | Ref. No. | Description                             |
|----------|---|----------|---|----------|---|
| 1        | Cotter pin.                                 | 36       | Governor weight shaft bearing lock washer.  | 68       | Spring retainer end cap bolt, lower.    |
| 2        | Governor weight washer.                     | 37       | Governor weight shaft bearing nut.          | 69A      | Operating lever.                        |
| 3        | Governor weight pin.                        | 38       | Governor end cover.                         | 70       | Operating lever bolt.                   |
| 4        | Governor weight bushing.                    | 39       | Governor end cover bolt.                    | 71       | Operating lever bolt nut.               |
| 5        | Governor weight.                            | 40       | Governor end cover bolt lock washer.        | 72       | Cotter pin.                             |
| 7        | Governor driven gear nut.                   | 41       | Governor end cover bolt washer.             | 73       | Spring plate set screw.                 |
| 8        | Governor driven gear lock washer.           | 42       | Stop plate screw washer.                    | 74       | Operating lever shaft.                  |
| 9        | Governor driven gear.                       | 43       | Hex. jam nut.                               | 75       | Fulcrum lever bracket.                  |
| 10       | Bearing support plate with cage.            | 44       | Stop plate bridge bolt washer.              | 76       | Cotter pin.                             |
| 11       | Governor weight shaft bearing (drive end).  | 45       | Stop plate bridge bolt lock washer.         | 77       | Fulcrum lever bracket pin.              |
| 12       | Governor shaft plunger oiler.               | 46       | Breather.                                   | 78       | Operating shaft plate, .020".           |
| 13       | Governor shaft plunger oiler spring.        | 47       | Governor inspection cover bolt, center.     | 79       | Inner spring spacer, .020".             |
| 14A      | Governor weight shaft and spider.           | 48       | Governor inspection cover bolt.             | 80       | Inner spring spacer, .042".             |
| ...      |   | 49       | Governor inspection cover bolt, short.      | 81       | Inner spring spacer, .042".             |
| 15       | Bearing support plate bolt.                 | 50       | Governor inspection cover bolt, short.      | 82       | Outer spring spacer, .058".             |
| 16       | Bearing support plate bolt lock washer.     | 51       | Governor inspection cover bolt lock washer. | 83       | Inner spring spacer, .082".             |
| 18       | Governor weight and shaft.                  | 52       | Governor inspection cover bolt washer.      | 84       | Outer spring spacer, .073".             |
| 19       | Sleeve with bushing and thrust bearing.     | 53       | Governor inspection cover with baffle.      | 85       | Outer spring spacer, .083".             |
| 20       | Fulcrum lever.                              | 54       | Governor end cover gasket.                  |          | Governor end cover bolt, long.          |
| 21       | Hex. jam nut.                               | 55       | Stop plate bridge.                          | 86       | Operating lever stop cover lower bolt.  |
| 22       | Smoke limit cam screw lock washer.          | 56       | Stop plate (end cover housing).             | 87       | Operating lever stop cover lock washer. |
| 23       | Smoke limit cam screw (fulcrum lever).      | 57       | Bumper spring.                              | 88       | Operating lever stop cover, lower.      |
| 24       | Smoke limit cam.                            | 58       | Screw.                                      | 89       | Operating lever stop cover, upper.      |
| 25       | Control rod link pin washer.                | 59       | Bumper spring adjusting screw.              | 90       | Operating lever stop cover upper bolt.  |
| 26       | Cotter pin.                                 | 60       | Hex. nut.                                   | 91       | Hex. nut.                               |
| 27       | Control rod linkage pin.                    | 61       | Bumper spring cap gasket.                   | 92       | Set screw.                              |
| 28       | Control rod link.                           | 62       | Bumper spring cap.                          | 93       | Governor end cover gasket.              |
| 29       | Control rod linkage pin lock washer.        | 63       | Spring retainer end cap gasket.             | 94       | Operating lever shaft bushing.          |
| 30       | Hex. nut.                                   | 64       | Spring retainer end cap.                    | 95       | Operating lever shaft oil seal.         |
| 31       | Control rod link pin.                       | 65       | Spring retainer end cap bolt lock washer.   | 96       | Plug (for operating lever shaft hole).  |
| 32       | Governor spring, inner.                     | 66       | Spring retainer end cap bolt lock washer.   | 97       | Bearing support plate dowel.            |
| 33       | Governor spring, outer.                     | 67       | Spring retainer end cap bolt, upper.        | 98       | Fulcrum lever pivot pin.                |
| 34       | Spring seat.                                |          |   |          |   |
| 35       | Governor weight shaft bearing (spring end). |          |   |          |   |



FUEL SYSTEM - Continued

**Disassembly and Repair of the Governor - Continued**

If there is excessive play between the fulcrum lever assembly (20) and the bracket pin (77), or between the fulcrum lever bracket (75) and the operating shaft (74), these parts may be removed after taking out the spring plate set screw (73) and pulling the operating shaft (74) from the end cover (38). A socket wrench with an opening 3/16" across the flats is necessary. The ends of the spring on the plate (78) should contact both sides of the prong. The control rod link (28) can be removed from the control rod link pin (31) if there is excessive play between the pin and the fulcrum lever assembly (20). Do not remove the cam (24) unless it must be replaced. Be sure the nut is tight on the square head bolt (23). Do not remove the stop plate bridge (55) and the stop plate (56) unless they must be replaced.

The governor weight and shaft assembly (18) may be disassembled if necessary. Unless the bearing or shaft is in need of replacement, there is no cause to separate these parts. If the weights (5) have excessive play on the governor weight pins (3), the cotter keys (1) and washers (2) can be removed, and the pins (3) driven from the governor spider. Do not drive on the drilled end of the pin. The bushings (4) in the weights can be replaced and line-reamed to size. Both bushings are not reamed to the same size. The bushing with the large bore is on the same side of the governor weight as the long arm which extends from the weight to operate the governor sleeve (19). This bushing is reamed to .3700" to .3705" for the .3680" to .3685" end of the pins (3). The small diameter bushing is reamed to .3545" to .3550" for the .3525" to .3530" end of the pins (3). The governor weight shaft (14-A) is ground to .385" to .390", while the bushing in the sleeve (19) is finished to .3750" to .3756".

The governor weight pins are hol-

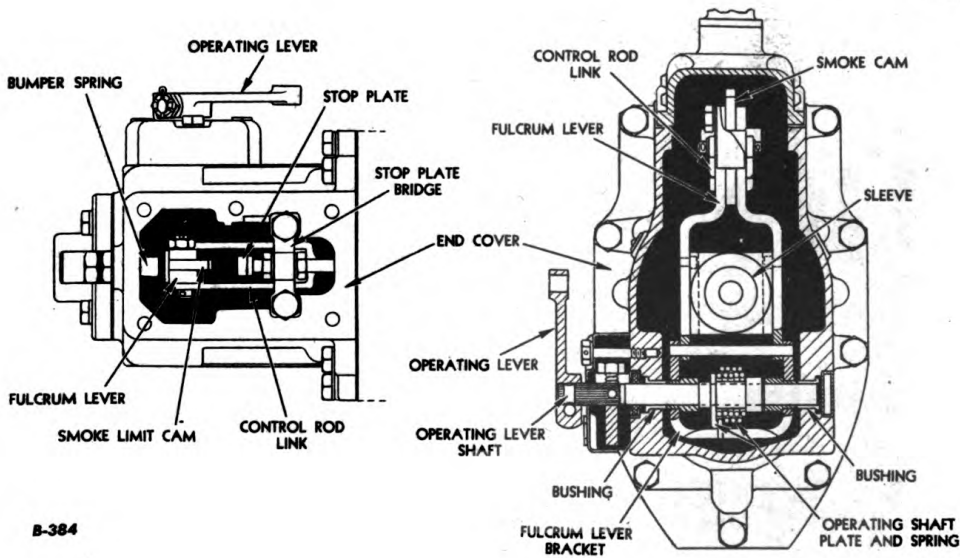
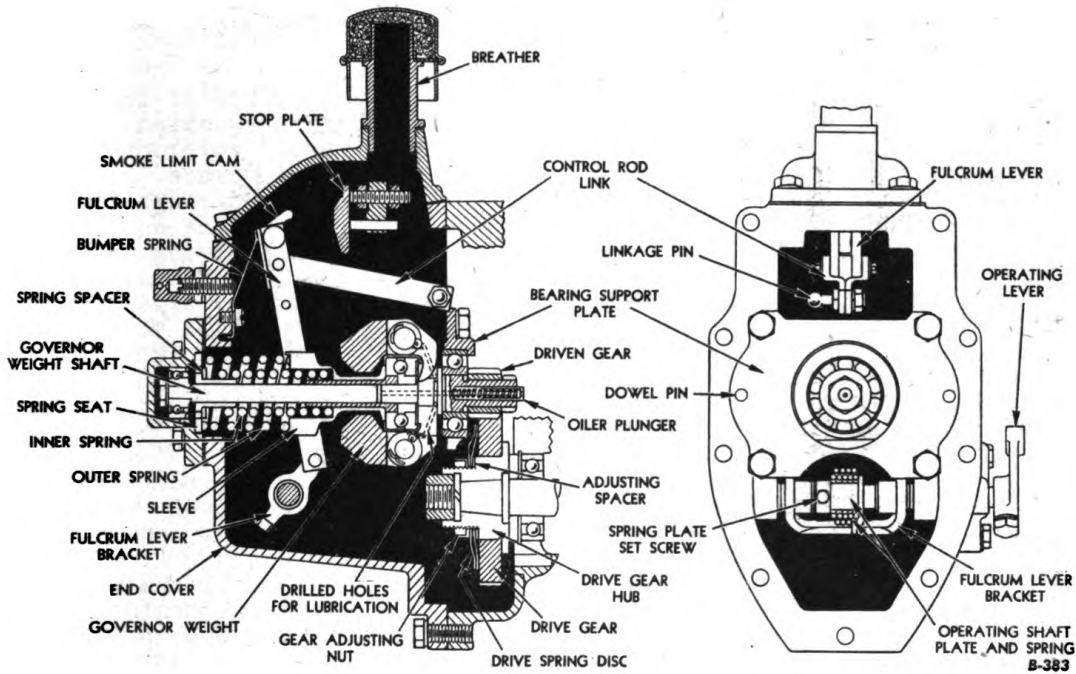
low from the large end almost to the small diameter end. Holes are drilled in the pins (3) to meet this long hole. The grooves at these holes distribute the oil to the bushings in the governor weights. The governor weight shaft (14-A) is drilled from the gear end back to the area of travel of the sleeve (19). The spider (14-A) is also drilled to meet a hole in the shaft. The baffle (42-A), *Illust. 5*, is so situated that it collects oil thrown from the gears. The center of the baffle contacts the spring-loaded governor shaft plunger oiler (12) and (13), *Illust. 9*. Oil flows from the reservoir, through the plunger, and inside the shaft from where it is distributed to the sleeve (19) and to the governor weights through drilled holes in the shaft, the spider (14-A) and the pins (3).

If wear is excessive, the bushings (34) may be removed from the end cover (38). After pressing replacement bushings in place, line-ream them to .377" to .378".

**Reassembly of the Governor**

If new bushings have been assembled to the weights and properly line-reamed to size, hold the weight (5), *Illust. 9*, in place and press the pin (3) into the spider (6), being sure the small end of the pin enters from the large bore bushing side of the weight. Cotter key holes should be equal distance from the weight on both sides. Replace washers (2) and cotter keys (1). The head of the cotter key is normally on the inside. Bend both ends of the key back around the pin. If bearing (11) has been removed from the shaft (14-A), press the bearing into the bearing support plate (10) and then assemble the unit to the shaft. Push the driven gear on the end of the shaft and lock the nut after tightening. Bend the lock over, all the way around the nut. Replace the governor shaft plunger oiler (12) and the spring (13) after blowing air through holes in the shaft.

FUEL SYSTEM - Continued



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Illust. 10  
Cross Section of the Governor.

## REPAIR SECTION

### FUEL SYSTEM - Continued

#### Reassembly of the Governor - Continued

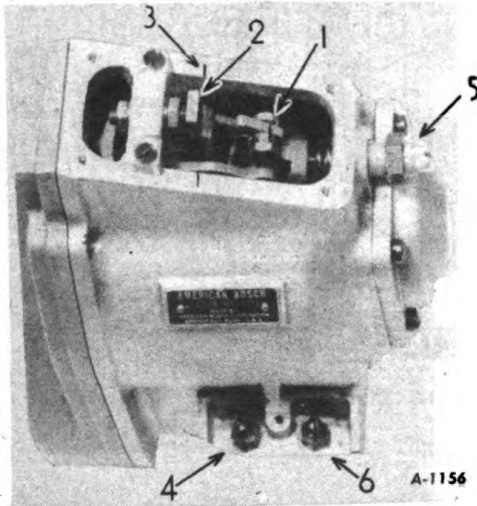
Assemble the fulcrum lever (20) to the fulcrum lever bracket with pin (77). Bend both ends of the cotter keys (76). Attach the control rod link (28) to the fulcrum lever, with the linkage pin (27) on the smoke limit (24) cam side of the fulcrum lever. Set the assembly in the end cover (38), slide the operating lever shaft (74) in place, hold the shaft plate with spring (78) in place, and push the shaft in as far as it will go. The spring end of the plate (78) faces the control lever side. Be sure to engage the prongs of the spring over the bracket (75). Locate the set screw (73) in the tapped hole in the plate (78) and in the hole in the shaft (74). Use a 3/16" socket wrench to tighten the set screw.

Engage the slots of sleeve (19) in the pins of the fulcrum lever (20). Then slide the governor shaft assembly (18) into place. Locate the bearing support plate (10)

over the dowel pins in the end cover (38). Be sure the cut-out side of the bearing plate is on the bottom, and that the cap screws with lock washers are all drawn tight.

Where original parts of the governor are being reassembled, put the inner and outer governor springs (32) and (33) in place. Set the inner and outer springs spacers (79) to (84) on the spring seat (34) and slip the spring seat over the shaft. Slide bearing (35), with the projecting side against the shoulder, on shaft (18). Tighten nut (37) with lock (36) in place, bend the lock, and replace the end cap (65) with the gasket (64).

Where new springs or parts are included in the governor assembly, replace the outer spring and move the control lever (69-A) toward the front of the pump all the way. The end of the spring should extend .020" outside the end of the end cover (38). If the spring does not extend slightly, measure the distance from the outer spring



Illust. 11  
Top View of Governor with  
the Inspection Covers Removed.

- (1) Scratch line on smoke limit cam and fulcrum lever.
- (2) Stop plate.
- (3) Scratch line on end cover to line up stop plate.
- (4) High idle speed stop screw.
- (5) Bumper spring adjuster.
- (6) Pump shut-off stop screw.

## FUEL SYSTEM - Continued

**Reassembly of the Governor  
- Continued**

seat in the sleeve (19) to the outside of the end cover (38) where the end cup attaches. Measure the length of the outer spring. Add spring spacers of .020", .042", .058", or .083" thickness, or a combination of these spacers, to make the distance measured up to .020" but not more than .020" longer than the length of the spring. The counterbore in the sleeve (19) for the inner spring (32) is much deeper than that for the outer spring (33).

With the proper outer spacer, if any, and the inner spring in place, hold the spring seat lightly against the outer spring, being sure the entire assembly is as far forward as it will go. With a depth gauge, measure the distance

from the end of the inner spring to the outer surface of the spring seat. Holes in the spring seat are provided to make this measurement. Try several positions of the spring seat. Subtract .125" from this dimension to allow for the thickness of the spring seat. Inner spacers of necessary thickness should be used to reduce the measurement to .138" (3.5 mm.) or the required spring gap. Put the springs in place in the governor, place the spacers required on the spring seat (34), slide the seat on the shaft (18), and complete the assembly as outlined in the foregoing paragraph.

After reassembly is completed, clean with Diesel fuel. Dry off any excess oil with clean, dry air. Attach the unit to the pump housing and test as outlined under the heading, "Basic Tests and Adjustments".

**REPAIR SECTION**

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**MEMORANDA**

POWER TAKE-OFF

Front Power Take-off

After taking the driven member from the end of the front power take-off shaft remove the six 3/8" hex. nuts from the studs (11), *Illust. 1*, in the fan drive pulley (2). Lift off the nut locks (9), felt washer retainers (8), felt washer (7), shaft retainers (6), and pull out the front power take-off shaft. The coupling (5) can be slid from the studs on the fan drive pulley.

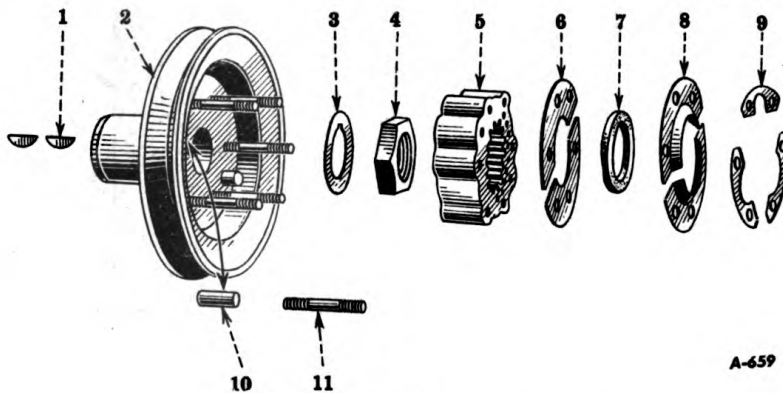
Reassembly of this unit is the reverse of removal procedure.

When the complete radiator is removed from a tractor equipped with the front power take-off, the replacement procedure necessitates special steps so that the lower radiator water tank will be aligned with the engine crankshaft and the front finished facing will be square with the center line of the crankshaft.

After the radiator is replaced, loosen the bolts holding the lower radiator water tank to the main frame side channels. Bolt an alignment gauge coupling similar to that sketched in *Illust. 2* to the front power take-off coupling. Screw the alignment gauge coupling shaft into the coupling. Slip the alignment gauge bearing on the shaft and insert it into the bore of the radiator tank. The gauge bearing should enter readily and the outer flange should fit all around against the machined face of the water tank. Use a feeler gauge for this purpose.

If necessary, slightly slot the bolt holes in the main frame side channels to facilitate alignment. When alignment is perfect tighten bolts in the water tank and side channels.

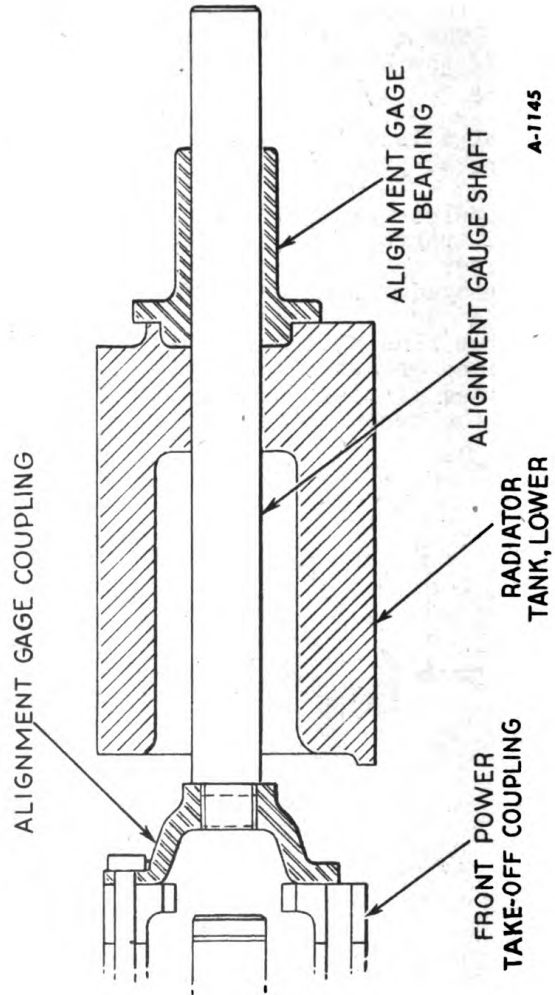
In order to eliminate the necessity for going through the aligning procedure on future removals



Illust. 1  
Exploded View of Front Power Take-Off Coupling Assembly

| Ref. No. | Description               | Ref. No. | Description    |
|----------|---------------------------|----------|----------------|
| 1        | Key.                      | 7        | Felt washer.   |
| 2        | Pulley with drive pins.   | 8        | Felt retainer. |
| 3        | Nut lock.                 | 9        | Lock.          |
| 4        | Nut (regular pulley nut). | 10       | Pin.           |
| 5        | Coupling (14 teeth).      | 11       | Stud.          |
| 6        | Shaft retainer.           |          |                |

POWER TAKE-OFF - Continued



Illustr. 2  
Cross-Section of Gauge to be used for Checking Alignment of Lower Radiator Water Tank with Respect to the Crankshaft.

POWER TAKE-OFF - Continued

Front Power Take-off  
- Continued

of the radiator, two 1/2" dowels may be assembled to the side of the tank by drilling two 15/32" holes through the main frame side channels and into the water tank when alignment is secured and both parts are tightly bolted together. Finish-ream the holes to .497". Space the holes conveniently near the bolts to avoid interference, and use 1-1/8" to 1-3/8" length dowels.

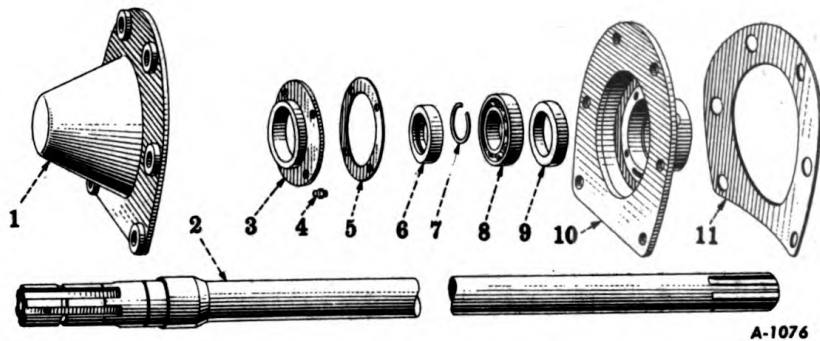
Rear Power Take-off

The rear power take-off consists of a shaft mounted in the rear of the main frame which passes inside the upper spline shaft of the transmission and is driven from the transmission drive gear. When not in use, the rear end of the shaft

can be enclosed with the cover (1) *Illust. 3.*

To remove the shaft with its attached parts, take out cap screws holding bearing cage (10) to the main frame and use puller cap screws to withdraw the entire unit. After taking the cap screws out of the bearing retainer (3), the retainer with oil seal (6) and gasket (5) can be removed from the shaft. Taking the snap ring (7) from the shaft (2) allows the shaft to be pulled from the bearing cage (10). The bearing (8) and the oil seal (9) can now be removed from the bearing cage (10). The leather lip of oil seal (9) faces the drive bevel gears. The lip of seal (6) faces the bearing (8).

Reassembly and replacement is the reverse of the above. Be sure to use new gaskets (5) and (11).



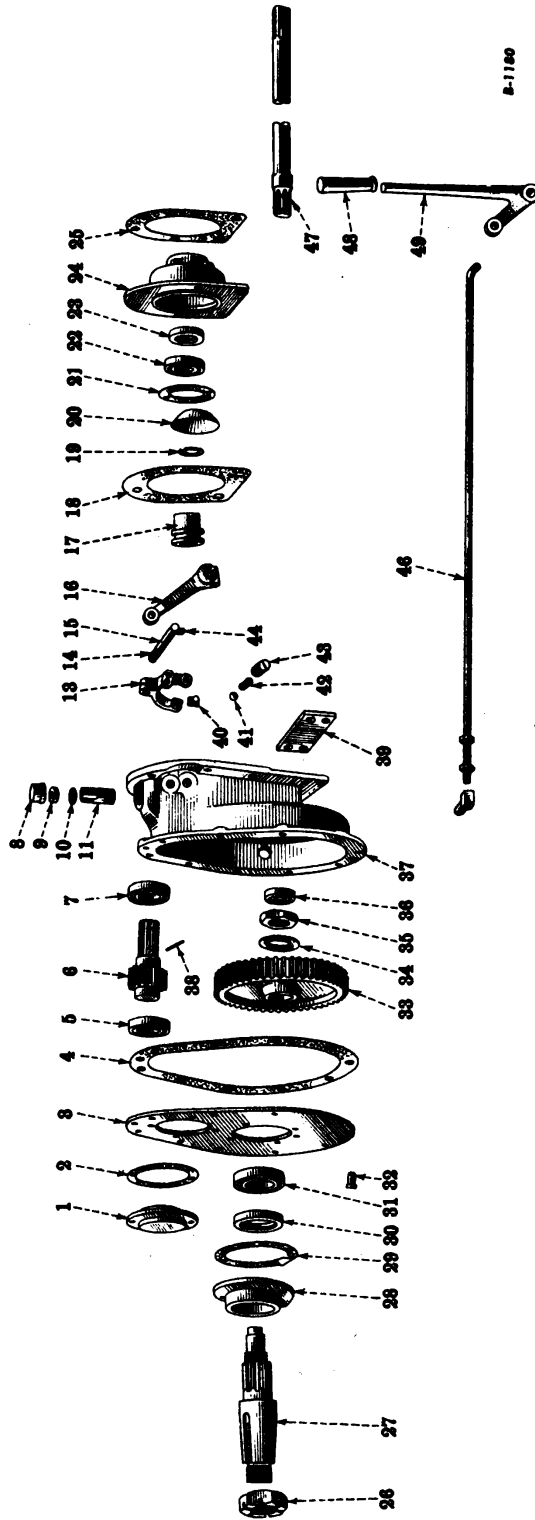
Illust. 3  
Exploded View of the Rear Power Take-Off

| Ref. No. | Description         | Ref. No. | Description      |
|----------|---------------------|----------|------------------|
| 1        | Cover.              | 7        | Snap ring.       |
| 2        | Power shaft.        | 8        | Bearing.         |
| 3        | Retainer with seal. | 9        | Oil seal, inner. |
| 4        | Lubricator.         | 10       | Cage with seal.  |
| 5        | Gasket.             | 11       | Gasket.          |
| 6        | Oil seal, outer.    |          |                  |



# REPAIR SECTION

## POWER TAKE-OFF - Continued



Illustr. 4  
Exploded View of the Reduced Speed Power Take-Off.

# REPAIR SECTION

## POWER TAKE-OFF - Continued

| Ref. No. | Description                             | Ref. No. | Description                        | Ref. No. | Description                                       |
|----------|---|----------|------------------------------------|----------|---|
| 1        | Pinion bearing cage.                    | 20       | Power shaft oil slinger.           | 36       | Gear shaft bearing, inner.                        |
| 2        | Pinion bearing cage gasket.             | 21       | Power shaft bearing cage retainer. | 37       | Housing.  |
| 3        | Housing cover.                          | 22       | Power shaft bearing.               | 38       | Shifter coupling stop pin.                        |
| 4        | Housing cover gasket.                   | 23       | Power shaft oil seal, inner.       | 39       | Housing spacer.                                   |
| 5        | Pinion bearing.                         | 24       | Power shaft bearing cage.          | 40       | Shifter pin.                                      |
| 6        | Pinion (13 teeth).                      | 25       | Power shaft bearing cage gasket.   | 41       | Shifter poppet (ball).                            |
| 7        | Pinion (22 teeth).                      | 26       | Gear shaft nut.                    | 42       | Shifter poppet spring.                            |
| 8        | Pinion (26 teeth).                      | 27       | Gear shaft.                        | 43       | Shifter poppet bushing.                           |
| 9        | Pinion bearing.                         | 28       | Gear shaft outer bearing cage.     | 44       | Shifter shaft key.                                |
| 10       | Pipe cap (1 1/2").                      | 29       | Cage gasket.                       | 45       | Power take-off shifter lever rod adjusting block. |
| 11       | Breather felt.                          | 30       | Oil seal.                          | 46       | Power take-off shifter lever rod.                 |
| 12       | Breather screen.                        | 31       | Gear shaft bearing, outer.         | 47       | Power shaft.                                      |
| 13       | Breather pipe.                          | 32       | Housing cover dowel pin.           | 48       | Shifter hand lever handle.                        |
| 14       | Shifter fork.                           | 33       | Gear (52 teeth).                   | 49       | Shifter hand lever.                               |
| 15       | Shifter shaft key.                      | 33       | Gear (43 teeth).                   | 50       | Shifter hand lever bracket.                       |
| 16       | Shifter lever.                          | 33       | Gear (39 teeth).                   |          |   |
| 17       | Shifter coupling.                       | 34       | Gear clamp nut lock.               |          |   |
| 18       | Housing gasket.                         | 35       | Gear clamp nut.                    |          |   |
| 19       | Power shaft bearing retainer snap ring. |          |                                    |          |   |

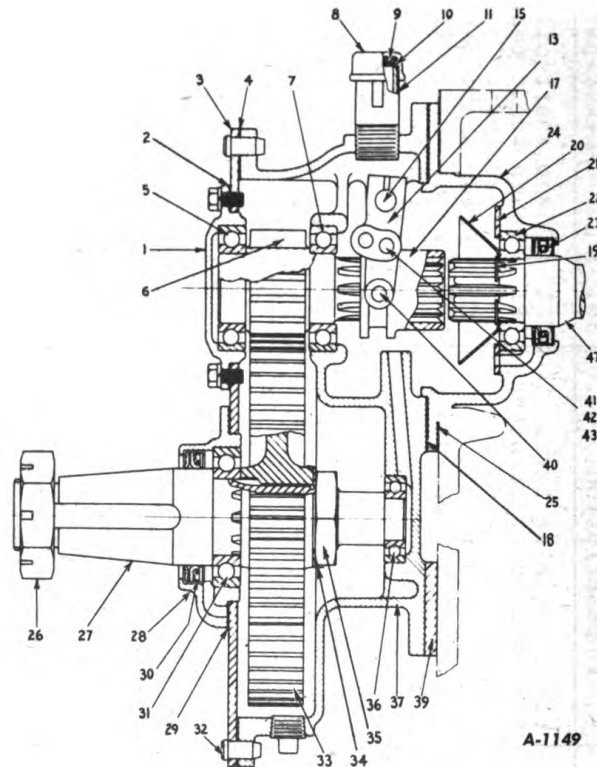
POWER TAKE-OFF - Continued

**Reduced Speed Rear Power Take-off**

The reduced speed rear power take-off attaches to the rear of the main frame. A long shaft of the unit extends forward, passes inside the upper spline shaft, and is driven by a spline within the transmission drive gear. The speed reduction portion of the assembly is contained within the housing (37), *Illust. 4*, which can be removed by disconnecting shifter rod (46) from shifter lever (16), shifting the lever (16) to the engaged position, removing cap screws holding the housing (37) to the main frame, and lifting spacer (39) from between the two castings. This assumes that all

parts attached to the gear shaft (27) and not shown in *Illust. 4* which might interfere with the removal of the unit are removed prior to proceeding as outlined. The power shaft unit including items (18) to (25) and item (47) can be removed by applying puller cap screws to the tapped holes provided in the bearing cage (24).

The power shaft (47) and the oil slinger (20) can be removed from the power shaft unit after the snap ring (19) is removed. Taking out the cap screws in the bearing retainer (21) allows the bearing (22) and the oil seal (23) to be removed from the bearing cage (24). The lip of the leather oil seal faces the drive bevel gear compartment.



**Illust. 5**  
**Cross-Section of the Reduced Speed Power Take-Off.**

POWER TAKE-OFF - Continued

| Ref. No. | Description                             | Ref. No. | Description                                       |
|----------|---|----------|---|
| 1        | Pinion bearing cage.                    | 26       | Gear shaft nut.                                   |
| 2        | Pinion bearing cage gasket.             | 27       | Gear shaft.                                       |
| 3        | Housing cover.                          | 28       | Gear shaft outer bearing cage.                    |
| 4        | Housing cover gasket.                   | 29       | Cage gasket.                                      |
| 5        | Pinion bearing.                         | 30       | Oil seal.   |
| 6        | { Pinion (13 teeth).                    | 31       | Gear shaft bearing, outer.                        |
|          | { Pinion (22 teeth).                    | 32       | Housing cover dowel pin.                          |
|          | { Pinion (26 teeth).                    | 33       | { Gear (52 teeth).                                |
| 7        | Pinion bearing.                         |          | { Gear (43 teeth).                                |
| 8        | Pipe cap (1").                          |          | { Gear (39 teeth).                                |
| 9        | Breather felt.                          | 34       | Gear clamp nut lock.                              |
| 10       | Breather screen.                        | 35       | Gear clamp nut.                                   |
| 11       | Breather pipe.                          | 36       | Gear shaft bearing, inner.                        |
| 13       | Shifter fork.                           | 37       | Housing.  |
| 14       | Shifter shaft key.                      | 38       | Shifter coupling stop pin.                        |
| 15       | Shifter shaft.                          | 39       | Housing spacer.                                   |
| 16       | Shifter lever.                          | 40       | Shifter pin.                                      |
| 17       | Shifter coupling.                       | 41       | Shifter poppet (ball).                            |
| 18       | Housing gasket.                         | 42       | Shifter poppet spring.                            |
| 19       | Power shaft bearing retainer snap ring. | 43       | Shifter poppet bushing.                           |
| 20       | Power shaft oil slinger.                | 44       | Shifter shaft key.                                |
| 21       | Power shaft bearing cage retainer.      | 45       | Power take-off shifter lever rod adjusting block. |
| 22       | Power shaft bearing.                    | 46       | Power take-off shifter lever rod.                 |
| 23       | Power shaft oil seal, inner.            | 47       | Power shaft.                                      |
| 24       | Power shaft bearing cage.               | 48       | Shifter hand lever handle.                        |
| 25       | Power shaft bearing cage gasket.        | 49       | Shifter hand lever.                               |
|          |   | 50       | Shifter hand lever bracket.                       |

Reduced Speed Rear Power Take-off - Continued

The disassembly of the parts in the housing (37) starts with the removal of the pinion bearing cage (1). The bearing (5) may or may not come out with the bearing cage (1). (Also refer to *Illust. 4.*) Take out the cap screws and dowel pins (32) in the housing cover (3). Remove the cover, taking with it the gear shaft (27) and the gear (33). The bearing (36) may or may not come out with the shaft.

Now the pinion (6) with the bearings (5) and (7) can be pulled from the housing. The shifter coupling (17) will then drop out. To remove the shifter fork (13) assembly, lift out the shifter pins (40), remove the shifter poppet bushing

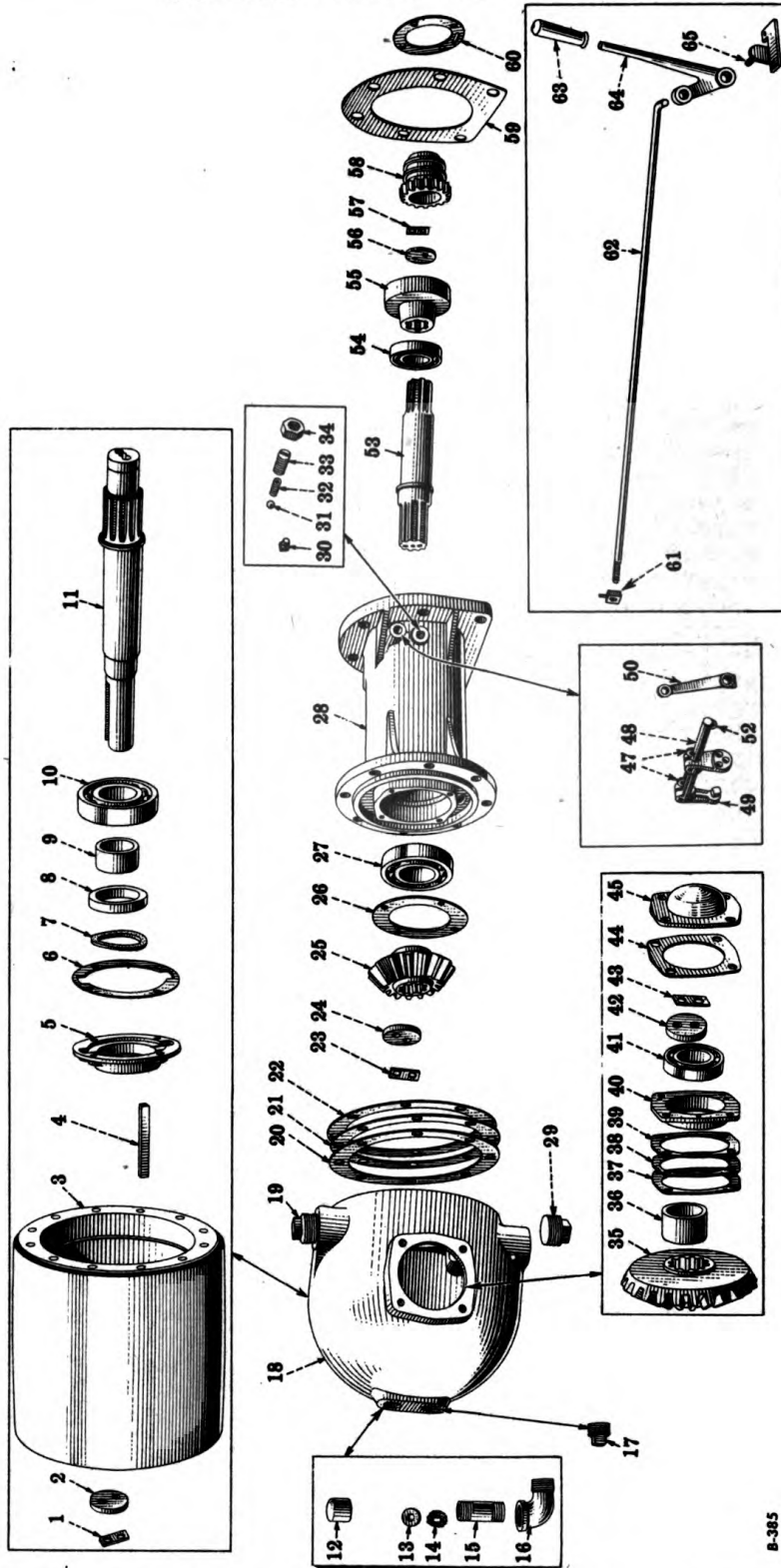
(43), poppet spring (42) and poppet (41). Take out the screw in the shifter fork (13) and pull the shifter shaft (15) out of the housing (37) with the shifter lever (16).

To disassemble the gear shaft (27) pull the bearing (36) from the shaft and remove the nut (35) with the lock washer (34). The gear (33) can then be pulled from the shaft. Removing the bolts in the bearing cage (28) allows the shaft (27), the bearing cage (28), gasket (29), oil seal (30), and bearing (31) to be pulled from the housing cover (3). Pulling the bearing cage from the shaft allows the oil seal to be replaced. The lip of the leather oil seal faces the inside of the housing.

Reassembly of the unit is the re-

# REPAIR SECTION

## POWER TAKE-OFF - Continued



Illust. 6  
Exploded View of the Belt Pulley Assembly.

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REPAIR SECTION

POWER TAKE-OFF - Continued

| Ref. No. | Description              | Ref. No. | Description             | Ref. No. | Description                                    |
|----------|--------------------------|----------|-------------------------|----------|--|
| 1        | Lock.                    | 26       | Retainer.               | 52       | Key.   |
| 2        | Washer.                  | 27       | Bearing.                | 53       | Shaft.   |
| 3        | Pulley.                  | 28       | Carrier.                | 54       | Bearing, front.                                |
| 4        | Key.                     | 29       | Pipe plug, 1-1/2".      | 55       | Pulley coupling (16 teeth).                    |
| 5        | Cage with felt and seal. | 30       | Pin.                    | 56       | Washer.  |
| 6        | Gasket.                  | 31       | Poppet.                 | 57       | Lock.  |
| 7        | Felt.                    | 32       | Spring.                 | 58       | Shifter coupling (16 teeth).                   |
| 8        | Oil seal.                | 33       | Bushing.                | 59       | Gasket.  |
| 9        | Spacer.                  | 34       | Hex. jam nut, 3/4" N.C. | 60       | Retainer.                                      |
| 10       | Bearing.                 | 35       | Gear (24 teeth).        | 61       | Belt pulley shifter lever rod adjusting block. |
| 11       | Pulley shaft.            | 36       | Spacer.                 | 62       | Belt pulley shifter lever rod.                 |
| 12       | Pipe cap, 1".            | 37       | Shim, heavy.            | 63       | Belt pulley shifter hand lever handle.         |
| 13       | Felt.                    | 38       | Shim, medium.           | 64       | Belt pulley shifter hand lever.                |
| 14       | Screen.                  | 39       | Shim, light.            | 65       | Belt pulley shifter hand lever bracket.        |
| 15       | Pipe.                    | 40       | Cage.                   |          |  |
| 16       | Street ell, 1".          | 41       | Bearing.                |          |  |
| 17       | Pipe plug, 1".           | 42       | Washer.                 |          |  |
| 18       | Gear box with plugs.     | 43       | Lock.                   |          |  |
| 19       | Pipe plug, 1-1/2".       | 44       | Gasket.                 |          |  |
| 20       | Shim, heavy.             | 45       | Cap.                    |          |  |
| 21       | Shim, medium.            | 46       | Plug.                   |          |  |
| 22       | Shim, light.             | 47       | Key.                    |          |  |
| 23       | Lock.                    | 48       | Shaft.                  |          |  |
| 24       | Washer.                  | 49       | Fork.                   |          |  |
| 25       | Pinion (15 teeth).       | 50       | Lever.                  |          |  |

POWER TAKE-OFF - Continued

**Reduced Speed Rear Power  
Take-off - Continued**

verse of the disassembly procedure. When replacing the shifter fork (13), be sure there is equal clearance between shifter pins (40) and the shifter coupling (17). Do not turn the shifter poppet bushing (43) in too far or it will strike against the shifter fork.

**Belt Pulley**

The belt pulley attaches to the main frame over the end of the power take-off. After removing the mounting bolts from the carrier (28), *Illust. 6*, the entire unit can be slid from the end of the power take-off shaft.

**Disassembly of the Belt Pulley**

The pulley (3) can be pulled off after taking out two 1/2" cap screws and bending back the cap screw lock (1) between cap screws and the retainer washer (2). Items (4) to (22) and (35) to (45), inclusive, can be removed as a unit after taking out eight 5/8" cap screws holding the gear box (18) to the carrier (28). The shims (20), (21), and (22) are used to set the gears properly for tooth contact.

With the pulley removed, the shaft (11) can be taken out. Remove the cap screws from the bearing cap (45) and the bearing retainer washer (42). Tapped holes are provided in the bearing cage (40) for puller cap screws. The oil seal cage (5) can be removed and the assembly forced out from that side. The gear (35) and spacer (36) can then be lifted from the gear box (18).

The oil seal (8) and felt washer (7) can be taken out of the oil seal cage (5) if their replacement is desirable. The bearing (10) can be pressed from the shaft (11). The shims (37), (38), and (39) are of varying thickness and are used

to obtain the proper running clearance or backlash between the gears. Two cap screws in the bearing retainer washer (43) hold the bearing (41) on the shaft (11).

The shifter coupling (58) can be removed by disengaging it from the coupling (55). The shaft (53) can be removed from the carrier (28) after taking the cap screws from the bearing retainer washer (56) and from the bearing retainer (26). Slide the pulley coupling (55) off the forward end of the shaft and push the pinion (25) with bearing (41) out of the rear end of the carrier (28). The bearing (54) can then be removed from the carrier.

The shifter mechanism can be removed after taking the cap screws from the shifter fork (49) and pulling on the shifter lever (50). When the round keys (47) clear the shifter fork, they may be lifted out and the shaft (48) withdrawn from the carrier. The poppet ball (31), poppet spring (32), and the fork (49) can all be taken out of the carrier.

The power take-off can be disassembled after taking off the retainer (60) and the snap ring (7), *Illust. 3*, from the shaft assembly.

**Reassembly of the Belt Pulley**

Reassembly of the units is practically the reverse of the disassembly procedure. Assemble the carrier unit and the gear box units separately. The carrier assembly can be completed by pressing bearings (27) and (54), *Illust. 6*, on the shaft (53). Put the bearing retainer (26) in position with cap screws in the retainer. Attach the pinion (25) and bolt it securely with retainer washer (24) in place. Assemble the shaft unit to the carrier and bolt the bearing retainer (26) to the carrier (28). Then attach the coupling (55) and the bolt or retainer (56).

**POWER TAKE-OFF - Continued****Reassembly of the Belt Pulley  
- Continued**

Place the pulley shaft (11) in the gear box (18). Set the gear (35) over splines of the shaft. Slide on the spacer (36) and press the bearing cage (40) with the bearing (41) into the shaft, using the same number of shims (37), (38), and (39) as were removed. Attach the bearing retainer washer (42) and bolt in place. Then press the bearing cage into the gear box (18). Press the bearing (10) on the shaft (11) and press into position in the gear box. Add the oil seal cage (5) with spacer (9), oil

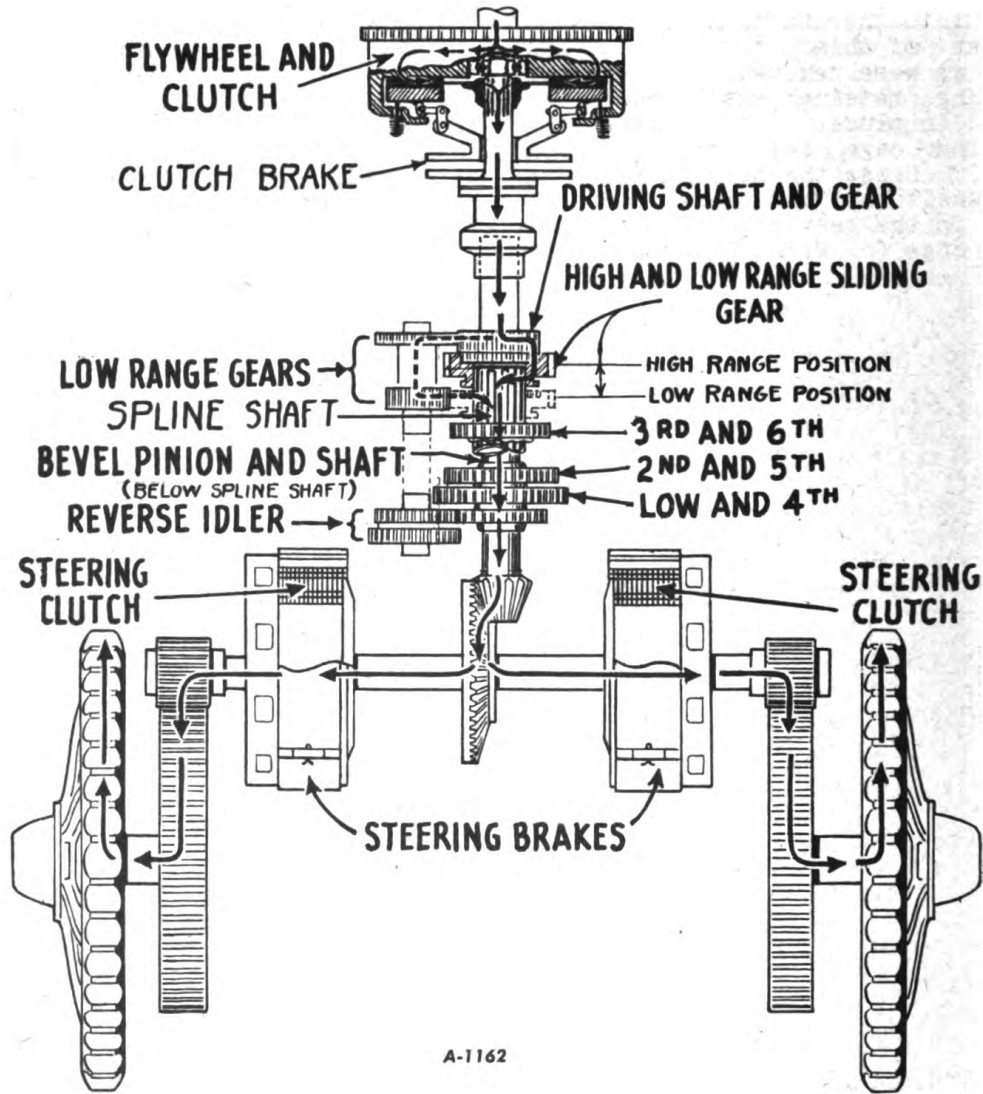
seal (8), felt washer (7), and gasket (6).

Connect the gear box to the carrier with the shims (20), (21), and (22) in place. Test gears for the proper backlash. The heels of the gears should be flush as observed through the opening in the top of the gear box when lighted through the other holes in the gear box. The backlash of the gears should be .004" to .008". Rearrange the shims (37), (38), and (39) to obtain this backlash. Reassemble the rest of the parts in the reverse of the disassembly procedure.



REPAIR SECTION

POWER TRAIN



A-1162

Illustr. 1  
Schematic Drawing Tracing the Line of Power from the Engine Through the Engine Clutch, Transmission, Bevel Gear, Steering Clutches, Sprocket Drives, and Sprockets to the Tracks.

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**POWER TRAIN - Continued****Line of Power**

The line of power from the engine is through the flywheel and engine clutch to the transmission and bevel gears. The power is distributed to both sides through the steering clutches to the sprocket drive gears, sprockets, and track chains on each side of the tractor.


The transmission has six forward speeds and two reverse speeds. Standard shifting is controlled by one lever while the change from the high to low range is controlled by another lever. An automatic clutch brake on the engine clutch comes into action to facilitate easy shifting of gears when the shift lever is pushed as far forward as possible. Gears are assembled on three shafts which are mounted in the rear main frame. The bevel pinion and shaft revolve on a straight roller bearing in a bearing cage next to the pinion. A ball bearing at the opposite end takes up the end thrust and the bearing cage is shimmed from the transmission end cover for cone setting of the bevel gear.

The upper shaft or spline shaft revolves in two bearings which are in cages. It is hollow to allow the power take-off shaft to pass through it, thus driving direct from the drive gear assembly.

The Hi-Lo and reverse gear shaft is stationary in the main frame and the transmission end cover. The reverse gear revolves in two roller bearings and the Hi-Lo gear on a roller bearing and a ball bearing.

The clutch brake operates automatically when the clutch is fully disengaged.

When both steering clutches are engaged, power is equally transmitted to each track. By disengaging one steering clutch, all the power is applied to one track. If one clutch is disengaged and the steering brake applied on the same side, the tractor pivots on its track. The steering brake is a band around the steering clutch drum and is used only for pivot turns and parking purposes. Disengaging both steering clutches at the same time or disengaging the engine clutch stops the tractor.

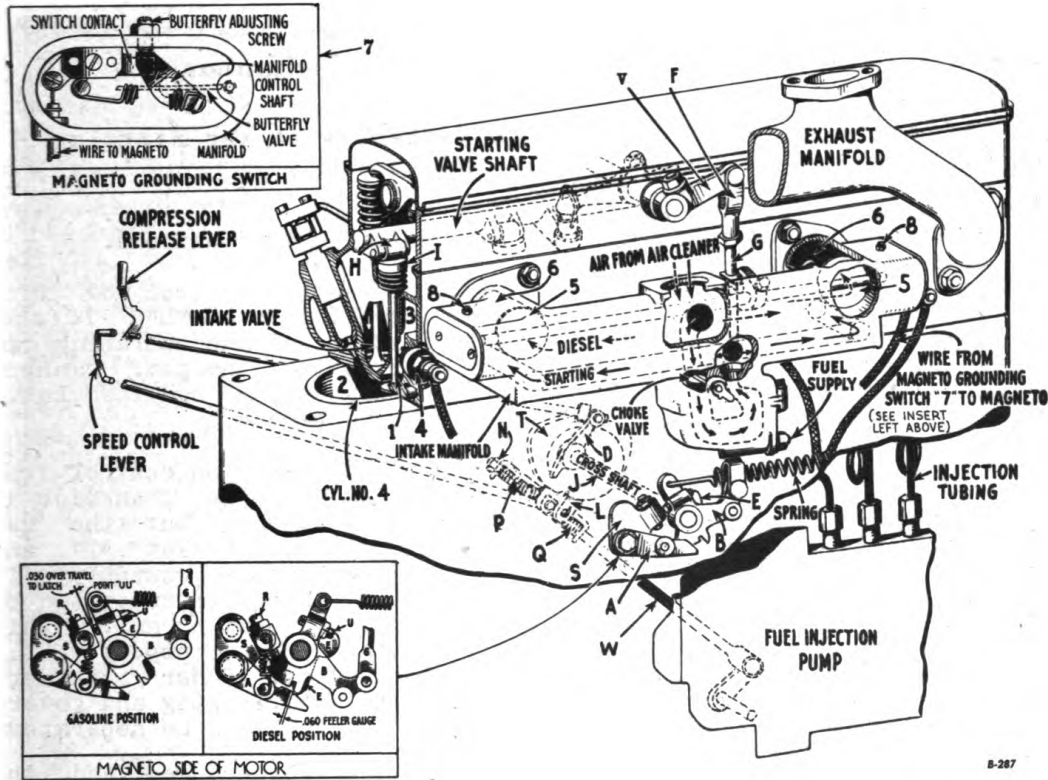


**REPAIR SECTION**

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**MEMORANDA**

## STARTING SYSTEM



Illust. 1  
Schematic Drawing of the Diesel Engine Starting System.

### Operation

The engine is temporarily converted to a gasoline engine during the starting process. After the engine is operated on gasoline for about a minute, the starting mechanism is manually released and the engine will operate on Diesel fuel as a full Diesel engine. *Illust. 1* shows the 45° head engine starting mechanism. Both engine and starting mechanism are in the gasoline operating position. To start the engine, the operator pulls down the speed control lever all the way. This shuts off all the fuel supply to the nozzles from the fuel injection pump. Next, the compression release lever is pulled back until jaw "B" locks behind latch "A".

This operation accomplishes four things:

a. It opens four starting valves (1), *Illust. 1*, thereby enlarging combustion chamber (2) by auxiliary chamber (3) and exposing spark plug (4). The enlarged volume reduces the compression ratio to that of a conventional gasoline engine or about 6.4 to 1.

b. It closes the two butterfly valves (5) in the air intake manifold, closing the Diesel air intake passage from the air cleaner to cylinder intake parts. The solid arrows show the path the air must take. It passes down through the carburetor, around a disc-type air valve (8), *Illust. 5*, and then

## STARTING SYSTEM - Continued

### Operation - Continued

through small high velocity passages to intake ports in the cylinder head. Spark plugs ignite the air-gasoline mixture which is compressed by the pistons in the low-compression chamber (3), *Illust. 1.*

c. It connects the magneto electrical circuit by opening the magneto grounding switch in the front end of the intake manifold. (See Insert 7, upper left corner, *Illust. 1.*)

d. It releases the needle valve (4), *Illust. 5*, in the carburetor fuel bowl by turning cam (2), allowing the needle valve to be actuated by the float.

The operator then starts the engine with the aid of the electric starter or hand cranking. After the engine has operated on gasoline about a minute, the compression release lever is pushed all the way forward. The engine speed control lever is raised to the operating position at the same time, and the engine runs as a full Diesel.

Raising the compression release lever depresses latch "A", *Illust. 3*. The spring attached to jaw "B" pulls it around, pulling down rod "G" and opening butterfly valves (5), *Illust. 1*. Rod "G" also closes starting valves (1). The carburetor needle valve (4), *Illust. 5*, is locked on its seat and the magneto grounding switch (7), *Illust. 1*, is closed. The engine operates on the Diesel cycle while the carburetor, magneto, spark plugs and low-compression chambers are all inactive. The broken line arrows indicate the air path for Diesel operation.

### Starting Mechanism

#### Disassembly of the Starting Mechanism

Remove the intake manifold.

Disconnect the control rod from the operating lever "D", *Illust. 3*, and disconnect the operating rod "G" by removing the pin. Unhook the return spring and the latch spring and remove.

The governor friction control can be removed from the crankcase if desired by taking out the cap screws in the bracket "T" and pulling the entire assembly off. Friction discs may be separated by removing the tension nut. This allows the spring, poppet ball, friction discs, inner retainer, stationary disc, spring and governor control lever to be separated.

Remove the cotter key and the washer (carburetor side) from the cross shaft and remove the jaw "B". The shaft can now be pulled from the crankcase with the jaw lever "E" which then can be taken from shaft by removing the lock nut and taper pin.

Remove the latch "A" by taking out the screw. Remove the latch bracket "S" by removing the nut from the stud holding the bracket to the crankcase.

#### Reassembly of the Starting Mechanism

Place the latch bracket "S" on the stud and replace the nut. (Do not tighten). Replace the latch "A" and screw in the latch pin. Tighten the stud nut and latch pin. Place the jaw lever "E" on the cross shaft, assembling it to the side

## STARTING SYSTEM - Continued

**Reassembly of the Starting Mechanism - Continued**

that has the cotter key hole. Replace the pin in the lever and tighten the nut.

The governor friction control can be reassembled by setting a friction disc over the inner retainer, followed by the stationary disc, and another friction disc. Then the governor control lever "L" can be inserted both through and over this assembly with the spring and poppet in place. Draw down the spring nut with a pronged tool so that 10 ft.-lbs. torque are required to turn the control lever. (See *Illust. 4*).

Place the cross shaft in the crankcase and assemble the lever (1), after putting the governor friction control in place. Be sure to locate the spring and poppet in the

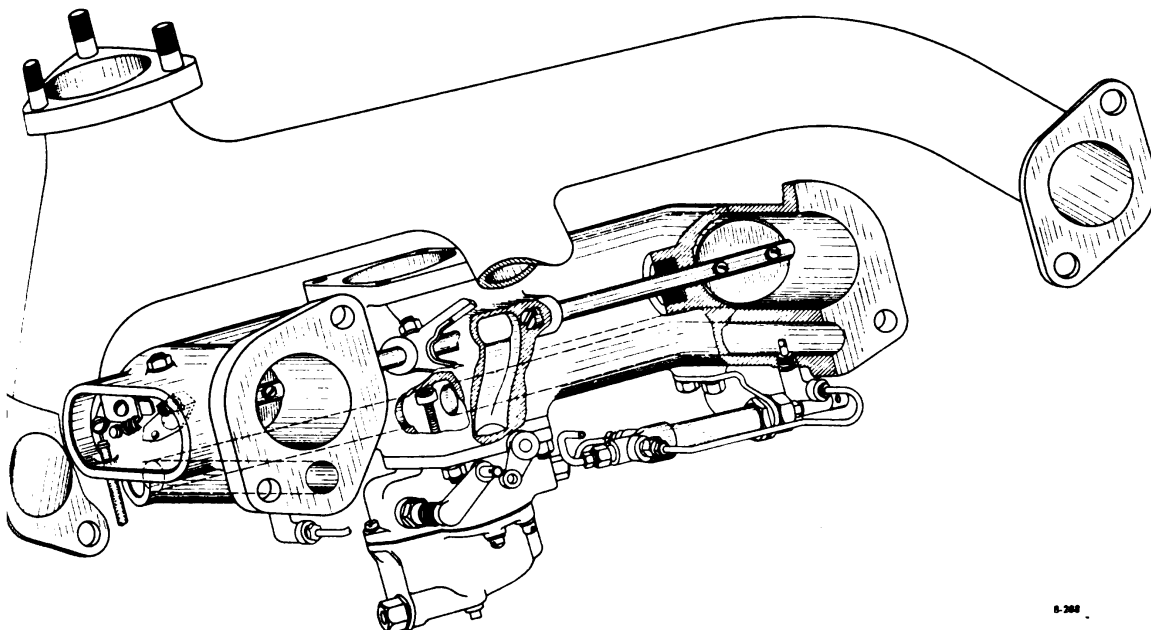
lever "L", and locate the stationary disc over the peg in the crankcase.

Place the jaw "B" on the cross shaft. Replace the washer and cotter key. Replace the return springs and the latch spring. Connect the operating yoke "G" to the jaw "B" by replacing the pin and cotter key.

Adjust the starting mechanism as outlined and replace the intake manifold.

**Intake Manifold****Disassembly of the Intake Manifold**

Remove the intake manifold from the engine as outlined under the "Engine", Section III. Remove the carburetor and primer from the manifold.



Illust. 2

The Intake Manifold as seen when looking from the Center of the Engine toward the manifold.

STARTING SYSTEM - Continued

Disassembly of the Intake  
Manifold - Continued

Remove the end cover and the over-center spring. Remove the nut from the butterfly valve control lever and drive out the pin. Remove the screws holding the butterfly valves (5), *Illust. 1*, and pull out the valves. The butterfly valve control shafts can now be pulled out of the manifold. The dust seals may also be removed.

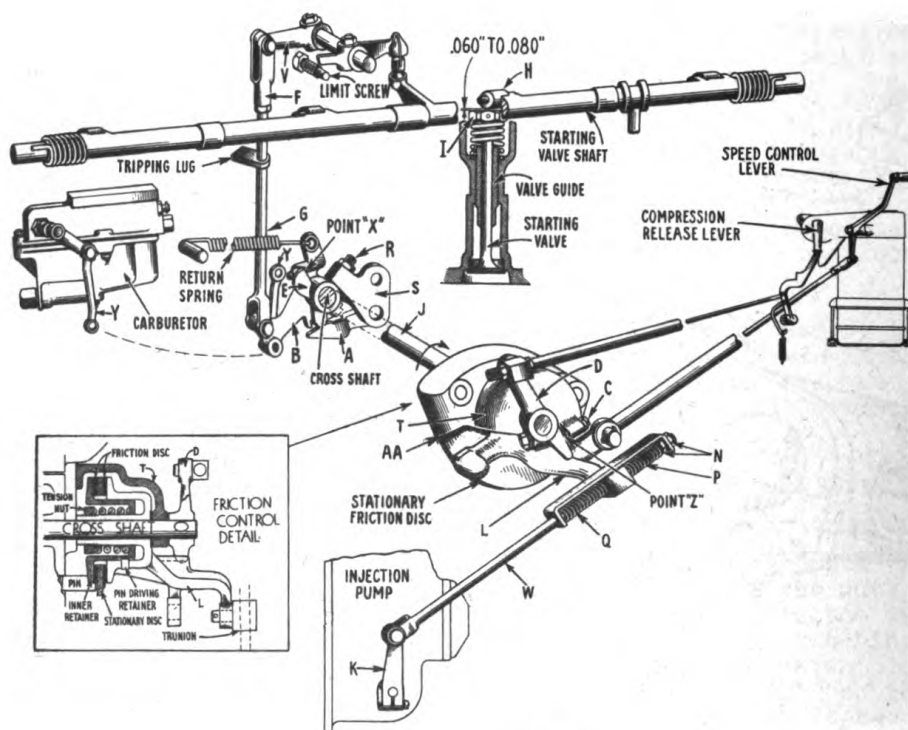
Reassembly of the Intake  
Manifold

Assemble new seals in the manifold. Install the seals, with the edge toward the outside. When assembling the control shafts, be careful not to damage the seals.

Reassemble the starting mechanism in the manifold by reversing the procedure used in disassembling. Be sure the control lever is placed on the front butterfly valve control shaft when reassembling.

Loosen the lock nuts (8), *Illust. 1*, on top of the manifold at each end and adjust the set screws until the butterfly valves (5) are horizontal when in the Diesel position. This is necessary to assure the maximum amount of air entering the cylinders when operating on the Diesel cycle.

Adjust the starting valve mechanism, install the carburetor and primer, and assemble the manifold to the engine. Be sure the short bar on the operating rod "G" is engaged in the butterfly valve control lever.



Illust. 3  
The Engine Starting Control Mechanism and Governor Friction Control.

**STARTING SYSTEM - Continued****Adjusting the Starting Valve Mechanism**

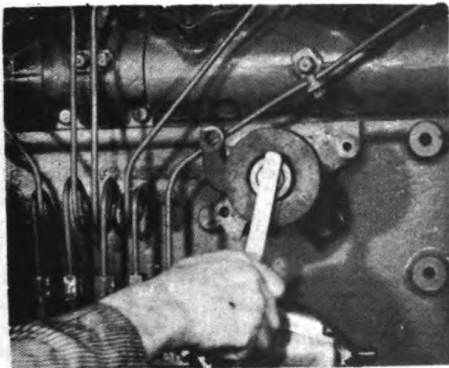
Set the starting mechanism for Diesel operation:

1. Adjust screw "R" until .060-inch exists between jaw "B" and latch "A" (see lower left insert, *Illust. 1*).

2. Adjust yoke "F", *Illust. 3*, on rod "G" so that when it is connected to lever "V" there will be a minimum clearance between the starting valve shaft roller "H" and spring retainer "I" of .060-inch over the closest valve.

There should be no greater clearance than .080-inch over any of the other valves. If it is impossible to adjust the valve clearances on all four valves within the limits of .060-inch to .080-inch, check the rollers for wear and the roller shaft for twist. Lock yoke "F" with the lock nut.

3. Rotate the cross shaft with the compression release lever until lever "E" contacts the pick-up face of jaw "B" at point "X". Now adjust set screw "C" on the pump side to give .100-inch between the set screw "C" and lever "D" at point "Z".



*Illust. 4*  
Increasing Tension on Governor Friction Control Discs.

Set the starting mechanism for gasoline starting:

1. Adjust set screw "U", *Illust. 1*, in jaw "B" to .015-inch between set screw "U" and lever "S" at point "UU".

2. If the intake manifold has been removed it should now be assembled in place and connect link "Y", *Illust. 3*, to the carburetor lever.

Start the engine and run as a Diesel:

1. Retard the speed control lever until the poppet in lever "L" locates in a countersunk hole in the stationary friction disc; this is the low idle speed position.

2. Adjust nuts "N" on rod "W" until springs "P" and "Q" are of equal length, and the engine runs at low idle speed.

3. Move the speed control lever to the extreme shut-off position. Adjust the yoke on the speed control rod so that lever "L" just contacts bracket "T" at point "AA" so that the pump shuts off. Reset the control lever on the pump if necessary, to make the pump shut off. Spring "Q" should be slightly compressed.

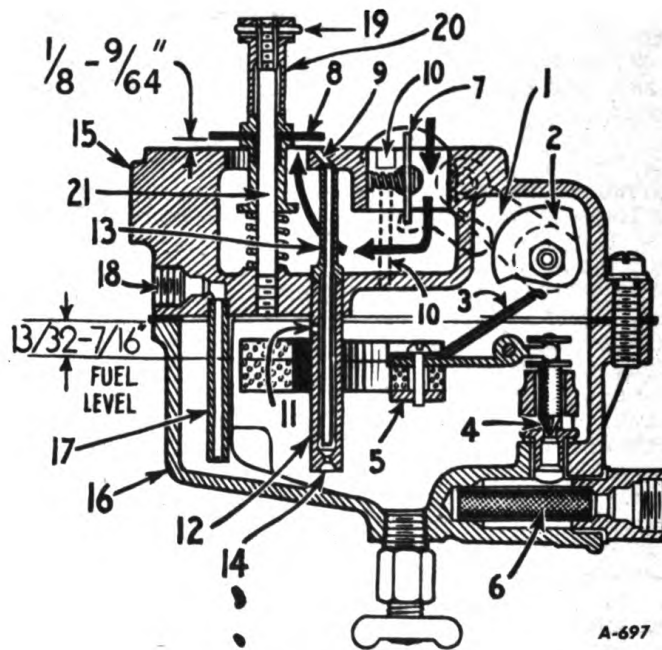
4. Operate the engine at full throttle. Adjust the speed control lever stop screw on the air cleaner so spring "P" is compressed, but not compressed solid.

**Starting Carburetor**

A dual manifold carburetor is used on this Diesel engine. As outlined just previously in this section, link "Y", *Illust. 3*, is connected to jaw "B" and to the carburetor locking lever (1), *Illust. 5*. Pulling back the compression release lever turns the cross shaft and lever "E", *Illust. 3*, which in turn rotates jaw "B". Jaw "B" is



STARTING SYSTEM - Continued



Illustr. 5

Cross Section of the Starting Carburetor. 1. Lever; 2. Cam; 3. Float spring; 4. Needle valve; 5. Cork float; 6. Screen; 7. Starting shutter; 8. Air valve; 9. Nozzle discharge; 10. Drilled passage; 11. Air bleed hole; 12. Metering well; 13. Nozzle; 14. Jet; 15. Body; 16. Fuel bowl; 17. Fuel inlet tube; 18. Tapped hole; 19. Cotter; 20. Air valve collar; 21. Air valve guide.

Starting Carburetor - Continued

free on the cross shaft. As link "Y" is raised with jaw "B", the carburetor locking lever (1), *Illustr. 5*, is also raised. Raising this lever rotates cam (2) inside the carburetor fuel bowl. In the Diesel position, cam (2) contacts spring (3) holding needle valve (4) against its seat. Rotating cam (2) takes it out of contact with spring (3), allows float (5) to drop and lift needle valve (4) from its seat. Gasoline must pass through filter screen (6) before entering the needle valve assembly. When the fuel level is 13/32-inch to 7/16-inch from the top of the float chamber, float (5) will have raised far enough to hold needle

valve (4) on its seat and shut off the fuel supply. As fuel is used, the float maintains the level by opening and closing the needle valve.

*Illustr. 5* shows a cross section of the mechanism and parts of the dual manifold carburetor. The exploded view is shown in the *Spare Parts Catalog*. With manifold valves in the gasoline starting position, the air from the air cleaner is drawn past the choke valve (7), diagonally across upper body (15), and around air valve (8) which is open at all times. The vacuum around valve (8) draws the fuel mixture from the discharge nozzle (9). The mixture is carried through the small diameter passage to the intake parts.

**STARTING SYSTEM - Continued****Starting Carburetor - Continued**

The drilled passage (10), shown with dotted lines, equalizes the air pressure in the fuel bowl for the air bleed (11). The air bleed is located in the side of the metering well (12). As the engine picks up speed, the fuel level in the well is lowered. When it is lowered below the bottom of nozzle (13), air will be drawn from the air bleed and gasoline from jet (14), providing the proper mixture ratio for constant idling speed. Jet (14) at the bottom of the well (12) is the same in principle as the main jet in a conventional carburetor.

When removing the carburetor, remove link "Y", *Illust. 3*, from the float locking lever (1), *Illust. 5*, the dash choke control from the choke lever, the clip from the drip hole tube, the gasoline supply line, and four nuts from the manifold studs. The carburetor body (15) and fuel bowl (16) assemblies may be separated by removing five fillister head screws. Use a good gasket; it normally extends 1/32-inch beyond the bowl and body.

The fuel bowl assembly consists of the float assembly and fuel strainer. The fuel strainer is easily removed. Spring (3) on float (5) is normally 1/4-inch to 5/16-inch above the surface of the bowl. The fuel level is normally 13/32-inch to 7/16-inch below the top of the bowl; the float is 9/32 inch with the float loose and the needle valve held firmly on its seat. The float can be removed by applying a screwdriver to the float pivot screw on the outside of the bowl. A pivot pin is pressed in the pivot screw and extends 1-7/32-inch from the head of the screw. The pivot pin should be straight to avoid binding the

float. A spacer for piloting the other end of the pin is pressed in the fuel bowl. With the float removed, the needle valve may be withdrawn for inspection. If worn, replace both the valve and seat; they are furnished in pairs only as service parts. The needle valve cage hexagonal shape is 7/16-inch across the flats. The thickness of the gasket below the cage may be varied to change the fuel level. If the tang on the float is bent to change the level, remove the float from the pivot pin first to avoid bending the pivot pin.

As a solvent, use a solution of one part alcohol and one part benzene or a pure solution of acetone. Use either solution to dissolve all gums accumulating on carburetor parts. Blow off parts with clean dry air and reassemble as indicated in the foregoing. Do not run wires through the needle valve cage.

The drip hole filler is accessible after removing the drip tube and adapter. The packing should be replaced if it has disintegrated, to prevent entrance of dirt.

The supply for the primer extends down into the fuel bowl and may be easily unscrewed from the body (15) for cleaning. A slot in the end of the tube is .028-inch to .040-inch. The primer can be attached to the tapped hole adjacent to the drip tube.

The metering well (12) and nozzle (13) assembly is easily removed for cleaning by applying a thin screwdriver to the .045-inch to .059-inch slot in the bottom end. When replacing, after cleaning, be sure the upper end of nozzle (13) enters the hole in the top surface of the body (15). Use only a solvent and air to clean these parts. The opening (9) should be clean.

## STARTING SYSTEM - Continued

### Starting Carburetor - Continued

The air valve (8) should be 1/8-inch to 9/64-inch open at all times. Remove the cotter key (19) at the top of the air-valve collar (20) and rotate the collar to give the proper opening. The spring at the bottom of the air valve maintains the valve in the open position. Be sure the air valve is square with the bore and an equal distance from the top surface of the body all the way around. The valve may be pushed down against the body (15) to check the above. The guide (21) should be square with the top surface of the body. If the guide is replaced, the top end should be 1-1/4-inch above the surface of body (15). On the bottom surface of the body, stake the guide to prevent its turning. The free length of the spring is 9/16-inch and tests 3 lbs. at 3/8-inch.

The choke valve (7) is equipped with a spring-loaded air valve to prevent excessive choking. The air valve should open freely. The choke may be removed by taking the two screws in the valve and drawing the shafts from each side. The

body is not equipped with bushings for the shafts. Dust seals and retainers are located on each side and should be replaced if not in good condition. Soak the seals in oil before assembling. When replacing the valve, locate it in slots in the ends of the shafts and center it in the opening in the body before drawing up the two screws. The countersunk side of the shafts faces the heads of the screws; upset the ends of the screws.

The float locking lever (1) connected to link "Y", *Illust. 3*, etc., may be removed after taking the nut off the inside end of the shaft, slipping off the cam, and pulling out the shaft, spring, retainer, and two dust washers. If the bearing is worn it may be replaced by unscrewing from the body. It is furnished reamed to size as a service part. When replacing the assembly, have lever (1) *Illust. 5*, pointing toward the air valve (8); the flat sides of the shaft are then vertical. The cam is then assembled with the large rounded side toward the top of the body. Replace the nut on the end of the shaft and draw it up tight.

## STEERING MECHANISM

### Steering Clutches

There are two 15" multiple dry-disc, spring-loaded-type steering clutches. They are located in separate compartments, one on each side of the bevel gear compartment at the rear of the main frame. They can be removed individually with their release mechanism without disturbing the bevel pinion adjustment or sprocket drive assembly.

### Removal of the Steering Clutches

To remove either steering clutch, proceed as follows:

1. Drain oil from the transmission.
2. Remove the seat, frame, fenders, fuel tank, batteries, and supports being sure to disconnect the fuel lines and electric wiring.
3. Remove from the main frame cover the two inspection covers and the clutch lubricator grease tube fitting bolts, and the springs, cap screws, retainers, and levers on top of the release forks; the transmission gear shifter housing; and cap screws and dowel pins.
4. Remove the main frame cover.
5. Tap the bearing cage (18), *Illust. 1*, from the release fork (19).
6. Loosen the brake band adjuster and take out the cotter key and pin from the steering brake band at the rear.
7. Remove the grease tubes (21) and (3) connected to the release collar (32) and the release fork lower bearing (29).
8. Remove the upper pin (31) from the release fork (19) by taking out the lower cotter key. Then turn the fork and lift the upper link (30) from the release collar (32).

9. Remove the lower pin (31) from the release fork by taking out the upper cotter key. Push the pin down to free the link. Turn the release fork and remove the lower link (30) from the release collar.

10. Lift out the release fork (19).

11. Remove the cap screws from the bearing cage cap (26) and slide the cap into the steering clutch.

12. Remove the two diametrically opposite cap screws (54), *Illust. 2*, from the hub plate (35) *Illust. 1*. Assemble the clutch compressor angle tool with two 5/8" N.C. by 1-1/2" and two 1/2" N.C. by 2-1/4" bolts. Turn in the bolts as far as possible to compress the spring (40) and disengage the steering clutch. The spring retainer (39) will move in until it contacts the hub (41) after approximately 1/2" travel.

13. Bend back the locks and remove the special cap screws (24) from the clutch coupling (22). Turn the bevel gear to make all cap screws accessible.

14. Remove cap screws from the steering clutch drum (46) at the sprocket drive pinion flange (52), *Illust. 2*. Revolve the drum with a bar to make all cap screws accessible. Mark the relative position of the drum on the flange so that the grease tube lines up with the notch at the center of the flange when reassembling. Cap screws are not all evenly spaced around the drum.

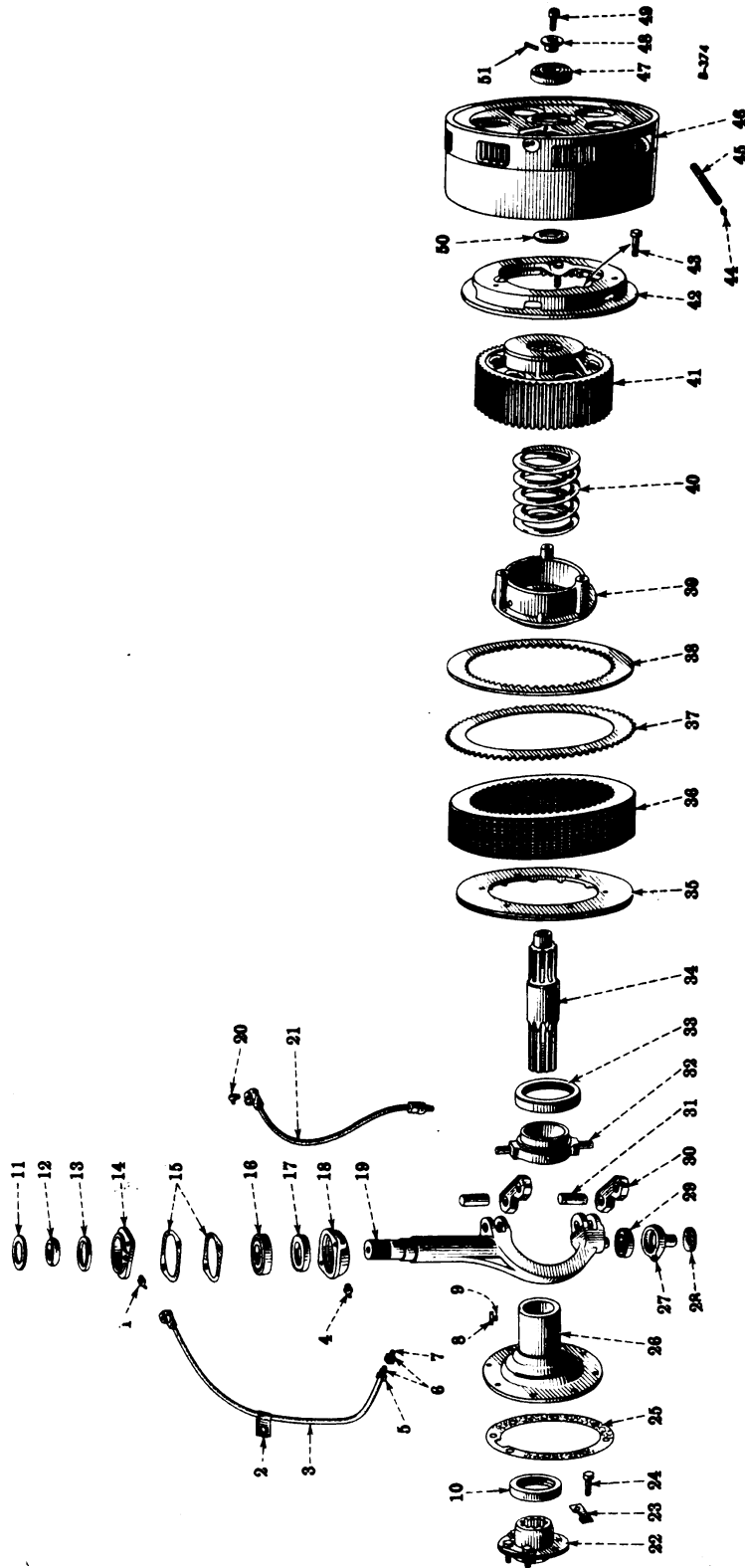
15. Put a sling on the clutch drum, pry the coupling (22), *Illust. 1*, into the bearing cage cap (26). Knock the assembly off the flange (52), *Illust. 2*, and lift out.

### Replacement of the Steering Clutches

Steering clutches can be replaced by reversing the above procedure.

# REPAIR SECTION

## STEERING MECHANISM - Continued



Illustr. 1  
Exploded View of the Steering Clutch and Release Fork.

STEERING MECHANISM - Continued

| Ref. No. | Description          | Ref. No. | Description                      | Ref. No. | Description                                 |
|----------|----------------------|----------|----------------------------------|----------|---|
| 1        | Lubricator.          | 18       | Bearing cage, with oil seal.     | 34       | Shaft.                                      |
| 2        | Clamp.               | 19       | Release fork.                    | 35       | Plate.                                      |
| 3        | Grease tube.         | 20       | Lubricator.                      | 36       | (See Note *).                               |
| 4        | { Lubricator (L.H.): | 21       | Grease tube.                     | 37       | Driving disc.                               |
| 5        | { Lubricator (R.H.): | 22       | Coupling (12 teeth).             | 38       | Friction disc.                              |
| 6        | Connector nut.       | 23       | Lock.                            | 39       | Spring retainer.                            |
| 7        | Connector.           | 24       | Bolt.                            | 40       | Spring.                                     |
| 8        | Key, with pin.       | 25       | Gasket.                          | 41       | Hub.  |
| 9        | Pin.                 | 26       | Bearing cage cap, with oil seal. | 42       | Pressure plate.                             |
| 10       | Oil seal.            | 27       | Bearing pivot.                   | 43       | Dowel.                                      |
| 11       | Felt retainer.       | 28       | Retainer.                        | 44       | Lubricator.                                 |
| 12       | Spacer.              | 29       | Bearing.                         | 45       | Lubricator pipe.                            |
| 13       | Felt.                | 30       | Shifter link.                    | 46       | Drum.                                       |
| 14       | Retainer.            | 31       | Link pin.                        | 47       | Pilot bearing.                              |
| 15       | Gasket.              | 32       | Release collar.                  | 48       | Retainer.                                   |
| 16       | Bearing.             | 33       | Thrust bearing.                  | 49       | Retainer bolt.                              |
| 17       | Oil seal.            |          |                                  | 50       | Spacer.                                     |
|          |                      |          |                                  | 51       | Steering clutch pilot bearing retainer pin. |

\* This assembly is made up of a group of driving discs (Ref. No. 37) and a group of friction discs (Ref. No. 38).

STEERING MECHANISM - Continued

Replacement of the Steering Clutches - Continued

The bearing cage cap gasket (25), *Illust. 1*, should be attached to the main frame before installing the clutch; the gasket is more easily protected from damage by doing this. Then compress the clutch as far as possible. Be sure that the socket head bolt (49) in the steering clutch shaft (34) is tight. The pin (51) in the retainer (48) fits into the drum (46) to keep the inner race of the bearing (47) from revolving on the shaft. It also maintains the bolt tension.

The bearing cage cap (26) and coupling (22) can be slid off the shaft to replace the double leather oil seal (10). Always install a new seal. A handy driver for this seal is provided by the coupling. Assemble the coupling bolts (24) to the coupling and slide the oil seal onto the coupling with the lips of the seal toward the flange of the coupling. Then use this assembly to press or drive the oil seal into the bearing cage cap (26). Be sure that the seal bottoms in the counterbore of the bearing cap.

Lubricate the finished surface of the bearing cage cap and slide the assembly onto the clutch shaft (34) together with the release collar (32) and the release bearing (33). Be sure that collar slides freely on the cap.

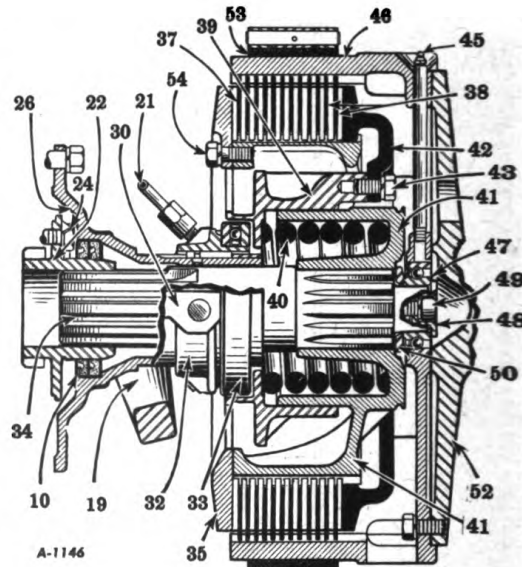
Use several cap screws to draw the steering clutch drum (46) onto the flange of the sprocket drive pinion shaft (52), *Illust. 2*, before centering the coupling (22), *Illust. 1*, and prying it into the hub of the bevel gear. Then insert the special cap screws (24) (punch-marked for identification) and lock them after tightening.

After assembling links (30) to the release fork (19) and the release collar (32), the cotter keys previously removed can be replaced. Turn the fork to one side and

spread one side of the key with a long screw driver or rod inserted through hand holes in the rear of the main frame.

Lubricate the pins of the release collar and release fork before replacing the main frame cover.

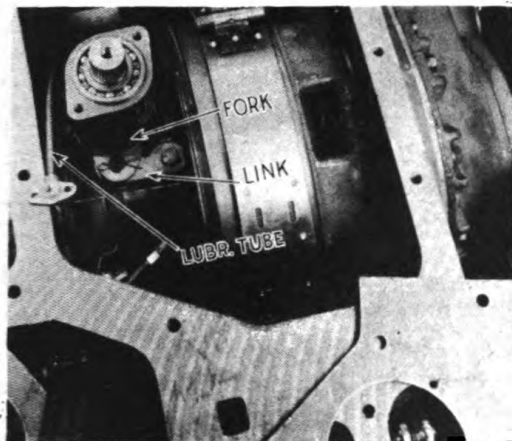
The clutches can be adjusted according to instructions in the "Operations Section."



Illust. 2  
Cross Section of the Steering Clutch Assembly.

10. Oil seal; 19. Release fork; 22. Clutch coupling; 26. Bearing cage cap; 30. Shifter link; 32. Release collar; 33. Thrust bearing; 35. Hub plate; 37. Driving disc; 38. Friction disc; 39. Spring Retainer; 40. Spring; 41. Hub; 42. Pressure plate; 44. Pilot bearing lubricator; 46. Clutch drum; 47. Pilot bearing; 48. Retainer; 49. Retainer bolt; 50. Spacer; 52. Hub plate cap screws; 53. Steering brake band; 54. Sprocket drive pinion flange.

**STEERING MECHANISM - Continued**



Illustr. 3  
View of the Left Steering Clutch Assembled, looking from the front.

**Replacement of the Discs**

With the clutch removed from the tractor the discs can be removed.

1. Assemble 1/2" cap screws to the three tapped holes in the pressure plate (42), *Illustr. 1*. The clutch can be compressed by turning these cap screws in.

2. If compressor angle tools have been used, they should be removed after turning the cap screws all the way in. On a clutch without the compressor tool assembled, the use of cap screws in the pressure plate (42) forces the plate to the right of the hub (41), or compresses the spring (40), or the pressure plate (42) moves while the hub holds its position on the shaft (34).

3. Now remove cap screws (54), *Illustr. 2*, from the hub plate (35), *Illustr. 1*, and lift it off.

4. Discs with internal teeth (38) and those with external teeth (37) can now be removed from the hub and the drum.

5. The drum (46) and shaft (34) can be removed from the assembly consisting of hub (41), pressure plate (42), spring retainer (39), and the spring (40).

6. Remove the socket head bolt (49), the retainer (48), and slide the shaft (34) out of bearing (33).

7. The bearing with its snap ring can be removed from the drum.

8. The spring (40) can be removed by holding the assembly with an arbor press, removing cap screws from the tapped holes of the pressure plate (42) and the three cap screws (43) holding the pressure plate (42) to the three prongs of the spring retainer (39).

9. The free length of the clutch spring is 6-9/16". The spring should rest evenly in both the retainer and the hub. The inside of the hub should show no marks caused by the spring binding on its side.

10. The outside surface of the hub (41) which contacts the retainer should be smooth so that the retainer (39) will slide freely on the hub (41). If the hub shows marks from binding in the retainer (39), assemble two cap screws to the retainer and the pressure plate (42). The third hole in the pressure plate should line up perfectly with the third tapped hole in the retainer. Any force used to remove the third bolt will cause the retainer to bind on the hub.

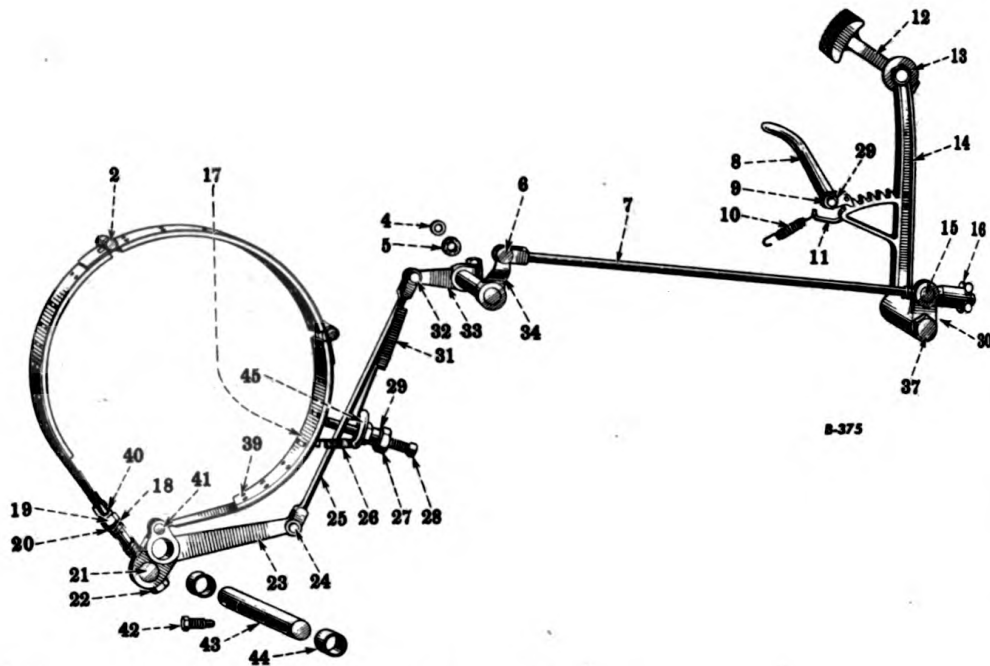
11. When reassembling the retainer (39), the spring (40), the hub (41), and the pressure plate (42) arrange the pressure plate on the hub so that the prongs of the retainer are centered in the holes of the hub. There should be 5/32" to 7/32" radial clearance.

12. The teeth on the hub, drum, and pressure plate should be smooth as well as all surfaces of the internal and external teeth discs.

13. The assembled clutch should run true and the outside diameter



STEERING MECHANISM - Continued



Illustr. 4  
Steering Brake Assembly.

| Ref. No. | Description                                       | Ref. No. | Description   |
|----------|---|----------|---|
| 2        | Pin.  | 22       | Bolt.   |
| 4        | Key for lever, inner.                             | 23       | Lever, with bushing.  |
| 5        | Seal.   | 24       | Pin.  |
| 6        | Rod pin.  | 25       | Rod, inner.   |
| 7        | Rod, outer.                                       | 26       | Anchor spring with hook.                                      |
| 8        | Pawl.   | 28       | Set screw.  |
| 9        | Pawl stud.  | 29       | Stud washer.  |
| 10       | Pawl spring.                                      | 30       | Pedal shaft lubricator.                                       |
| 11       | { Pawl link, left hand.<br>Pawl link, right hand. | 31       | Release spring.   |
| 12       | Pedal pad.  | 32       | Pin, upper.   |
| 13       | Swivel.   | 33       | Lever, inner.   |
| 14       | { Pedal, left hand.<br>Pedal, right hand.         | 34       | { Lever, outer, left hand.<br>Lever, outer, right hand.       |
| 15       | Pivot pin.  | 37       | Pedal shaft.  |
| 16       | Adjusting knob.                                   | 39       | { Lining rivet (.186 x 7/16").<br>Lining rivet (.186 x 5/8"). |
| 17       | Brake band lining.                                | 40       | Adjusting bolt spacer.  |
| 18       | Washer.   | 41       | Pin.  |
| 19       | Nut (5/8" N.F.).                                  | 42       | Shaft stud.   |
| 20       | Spring.   | 43       | Pivot shaft.  |
| 21       | Pin.  | 44       | Bushing.  |
|          |   | 45       | Anchor.   |

**STEERING MECHANISM - Continued****Replacement of the Discs -  
Continued**

of the coupling (22) should be concentric with the outside diameter of the drum (46).

After assembling steering clutches to the main frame and dowel pins to the main frame cover, place the release lever on the shaft of the release fork and check the free travel of the clutch for any possible binding of parts. Adjust the levers as outlined in the "Operations Section."

**Steering Brakes**

A steering brake is provided for each steering clutch. Its purpose is to stop the clutch drum from rotating after the steering clutch has been disengaged. Depressing one brake, locks the track on that side and forms a pivot point for short turns. The brakes can also be used for parking purposes. Each can be locked in position. Pedals for each brake are adjustable to suit the operator. The brakes are simple and readily accessible, contracting on the steering clutch drums.

The bands can be relined after removing them through convenient holes in the bottom of the main frame. No other part of the tractor need be removed.

**Replacement of Brake Linings**

Release the tension on the hand adjusting knob (16), *Illust. 4*. Then remove the hand hole covers from the bottom of the steering clutch compartments. Unhook the anchor spring (26) from the brake band and turn out set screw (28). Turn out the adjuster bolt (22) to free the band. Remove the cotter key and pin (24) from the linkage.

Take out the shaft stud (42) from the center end of the pivot shaft (43) and work the shaft to the side to free the pivot lever (23). Use a screw driver in the notches in shaft (43). Pull down on the pivot lever (23) to slide the band from around the brake drum.

Reline the bands, being sure to countersink the rivets well.

The bands can be replaced in the tractor by reversing the above procedure.

**Replacement of Main Frame Brake  
Shaft Bushings**

To replace these bushings (5) and (19), *Illust. 1*, Section 6, remove the outer rod (7) *Illust. 4*, from the lever (34).

Remove the main frame cover. Attach a wire to the spring (31) and disconnect it from the anchor (45) and the inner rod (25). A hole is provided inside the main frame through which the lock bolt in the inner lever (33) can be removed. Then pull out the outer lever (34).

Knock out caps (6) and (20), *Illust. 1*, Section 6, on the side of the main frame and drive out the bushings (5) and (19).

The dust seals in the main frame can be replaced.

Replace the bushings and press them in. The brake shaft bushings are furnished reamed to size.

The remaining steering brake assembly can be removed as previously described after which the pivot lever (23), *Illust. 4*, brake rod, and brake rod lever (33) can be pulled out through the bottom of the main frame.

**REPAIR SECTION**

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**MEMORANDA**

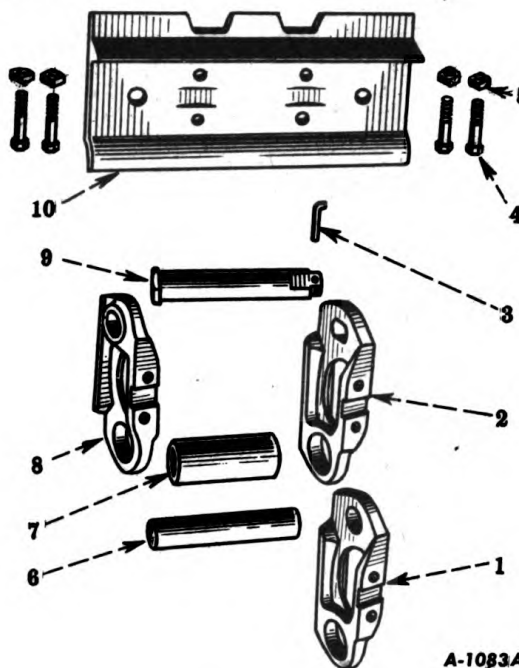
TRACK

Track Chain

The track links are drop-forged, heat-treated steel. The track pins and bushings are machined, carburized, hardened steel forced into the links under great pressure. The pins move freely in the bushings and the ends are a press fit in the links. The left and right tracks are interchangeable.

Removal of the Track Chain

The track chains are easily removed. Each chain has a master pin identified by a locking wire. Have this pin at the front for easy removal. Take out the wire and drive the pin out of the links. Then back up the tractor to shed the track.



Illust. 1  
Exploded View of the Track Link, Pin, and Shoe Assembly.

| Ref. No. | Description       |
|----------|-------------------|
| 1        | Link, right hand. |
| 2        | Master link.      |
| 3        | Lock wire.        |
| 4        | Cap screw.        |
| 5        | Nut.              |
| 6        | Pin.              |
| 7        | Bushing.          |
| 8        | Link, left hand.  |
| 9        | Master link pin.  |
| 10       | Shoe.             |

Replacement of the Track Chain

Lay the replacement track in line with the track being removed. Have the link without the bushing toward the tractor. Run the tractor forward on the new track. Then jack up the end of the new track and engage the bushings in the sprocket teeth. Guide the track around the sprocket and over the idlers as the tractor moves ahead. Line up the link in the bushing with a bar. Install the master pin and replace the lock wire.

Repair of the Track

Worn parts can be replaced by one of two methods, both of which require a hydraulic press with a special adapter ahead and fittings. The pin diameter is 1.622-inch to 1.625-inch and the clearance is .005-inch to .020-inch.

The track can be repaired when the shoes are on the chain or off.

The following procedure should be followed when the track shoes are assembled to the track:

Remove the track chain. Then press pin (6), *Illust. 1*, all the way out of each link which needs repairing, replacement, or reborring. Drive the old bushing (7) out and the new bushing in during the same operation when a bushing needs replacement. Place the links in relation to the track and push the

TRACK - Continued

Repair of the Track - Continued

pin (6) into the assembly, joining the links into a chain. If link (1) or (8) needs replacement, push out the old bushing only, then the link can be replaced.

To repair the track when the shoes are removed from the chain follow this procedure:

Remove the track chain. Push pin (6) just out of the "first link" (8).

*NOTE:* Carry each of the operations to completion for the entire length of the track to be repaired before proceeding to the rest of the operation.

The words "first link" imply that link (8) is to be moved separately.

The words "second link" imply that link (1) is removed with one pin (6) and one bushing (7) assembled to it.

Push the bushing (7) just out of the "first link" (8). After the pin and the bushing are out of the "first link" the sections of the track being repaired are composed of several loose links (8) and several three piece assemblies (1), (6), and (7) consisting of one link (1), and track pin (7), and one bushing (8). These assemblies can be separated from the chain by sliding the pin out of the next bushing.

The following steps pertain to the dismantling of these three-piece assemblies and reassembling them with new pins and new bushings.

Push bushing (7) out of the "second link". Push pin (6) out of the "second link". Push the new bushing (7) into the "second link".

Then push new pin (6) into the "second link". Push bushing (7) into the "first link" (1) while

assembling the section of the track to the track chain. Then push the pin into the "first link".

Track Rollers

Five track rollers on each side carry the weight of the tractor. These rollers are welded, heat-treated, steel-forged fittings with special alloy carriers with four bronze bushings which rotate on heat-treated steel shafts. They are effectively sealed at each end by three individual washers and a spring-loaded double-leather seal with the lips of the seal turned out. The rollers are gravity-lubricated at low turning speeds and pressure-lubricated at high speeds.

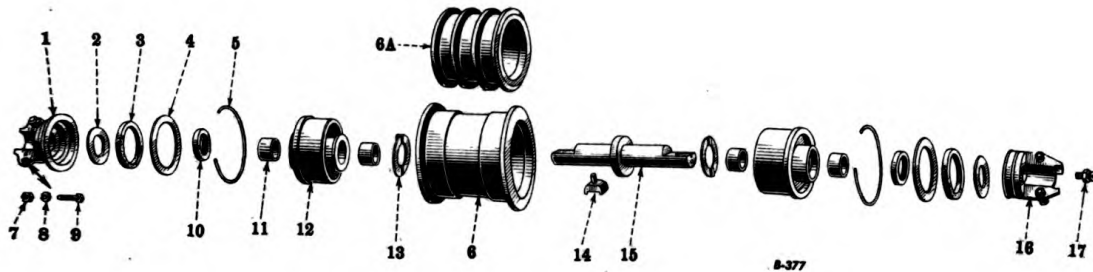
The rollers can be removed with or without removing the track chain. One of the easier and faster methods of removing all rollers is to remove the track chain but do not run off the track. Take out the two bolts in the front idler adjuster and slide the front idler assembly off the track frame. Then take off the track roller seals. Take out all bolts in the track roller brackets, jack up the track frame at the front, and slide all the rollers out the front of the track.

Disassembly of the Track Rollers

The inner (1) and outer (16) brackets, *Illust. 2*, can be slipped from the shaft (15). The outer felts (2), center felts (3), and corks (4) can also be removed. Then pry out the snap rings (5).

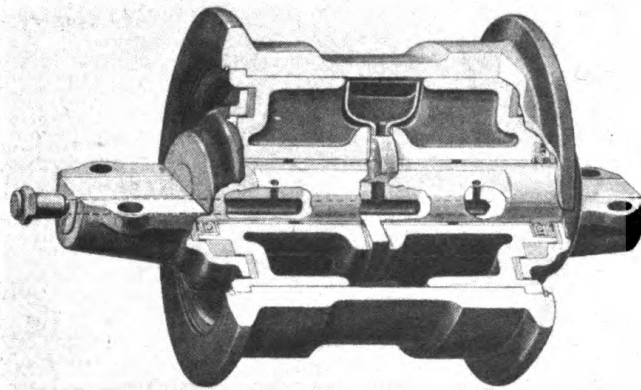
Place the roller (6) in an arbor press; by forcing out the shaft (15), one carrier (12) will come out of the roller. Then the other carrier can be forced from the roller. The shaft (15) can be lifted out of the carrier (12) and the oil scupper (14) can be removed.

TRACK - Continued



Illust. 2  
Exploded View of a Track Roller.

| Ref. No. | Description                          | Ref. No. | Description                   |
|----------|--------------------------------------|----------|-------------------------------|
| 1        | Bracket, inner.                      | 8        | Lock washer, 9/16".           |
| 2        | Washer, outer.                       | 9        | Cap screw, 9/16 x 1-3/4" N.F. |
| 3        | Washer, center.                      | 10       | Oil seal.                     |
| 4        | Washer, inner.                       | 11       | Bushing set.                  |
| 5        | Snap ring.                           | 12       | Carrier set.                  |
| 6        | Roller (single flange) (1, 3 and 5). | 13       | Thrust washer set.            |
| 6A       | Roller (double flange) (2 and 4).    | 14       | Oil scupper.                  |
| 7        | Hex. nut, 9/16" N.F.                 | 15       | Shaft.                        |
|          |                                      | 16       | Bracket, outer.               |
|          |                                      | 17       | Lubricator.                   |



Illust. 3  
Cross-Section of a Track Roller. 1. Five seals. 2. Oil scupper.

**REPAIR SECTION****TRACK - Continued****Disassembly of the Track  
Rollers - Continued**

The thrust washers (13) should be replaced if they are damaged or worn.

The carrier bushings (11) are replaceable, reamed to size and need only be pressed in place, bevel first, until they are flush with the face of the carrier (12). Be sure all the oil holes are clean.

**Reassembly of the Track  
Rollers**

With the aid of an arbor press force one carrier (12) into the roller (6) until the flange of the carrier bottoms in the counterbore of the roller. Then insert the snap ring (6).

Place one thrust washer (13) in the carrier assembly, being sure that the lugs of the thrust washer engage the slots provided in the carrier.

With the oil scupper (14) inserted in the shaft (15), replace the shaft in the carrier roller assembly. With the other thrust washer in place, line up the lugs of the washer with the slots of the second carrier and put the second carrier in place until it bottoms in the counterbore. Then replace the second snap ring (5).

Slots in the carrier (12) may be lined up with the lugs on the washers (13) by holding the shaft (15) against the carrier as it is being pressed into the roller.

Replace new oil seals (10) in the carriers. The lips of the oil seals must face away from the center of the shaft. Assemble the felt washers (2) and (3) (saturated with oil) and the cork washers (4) to the carrier. Brackets (1) and (16) can then be replaced as can the lubricator (17). The entire roller assembly can then be replaced on the tractor.

**Track Idler**

The upper section of the track between the sprocket and the front idler is supported by two grey iron idlers with sealed outer faces (increased hardness). They are mounted on brackets extending upward from the track frame. The idlers revolve on heat-treated replaceable steel shafts which are locked in the brackets with bolts. A felt washer and spring-loaded leather seal with the lip turned toward the tractor are located in the bracket and idler respectively.

Each idler can be removed by blocking up the track chain, taking out the cap screws in the cover and those holding the retainer washer to the shaft. Removing the bolt from the bracket frees the shaft.

**Disassembly of the Track Idler**

Take out the cap screws from cap (8), *Illust. 4*, to remove the cap and gasket (7). Bend back the lock (6) and remove the two cap screws to release the washer (5). Then the idler (4) with the seal (3) can be pulled off the shaft (1). Washer (2) is then removed. If necessary, the bolt (10) may be removed from the shaft and the shaft driven from the spring guide or retainer (11).

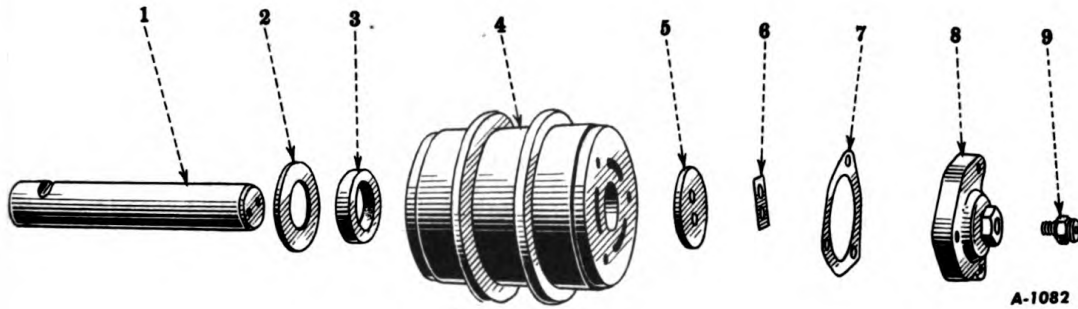
**Reassembly of the Track Idlers**

The reassembly of the idlers is the reverse of disassembly. Be sure to use a new oil seal (3) with the lip of the seal facing the tractor. Be sure that the lubricator (9) is clean when replaced.

**Front Idler**

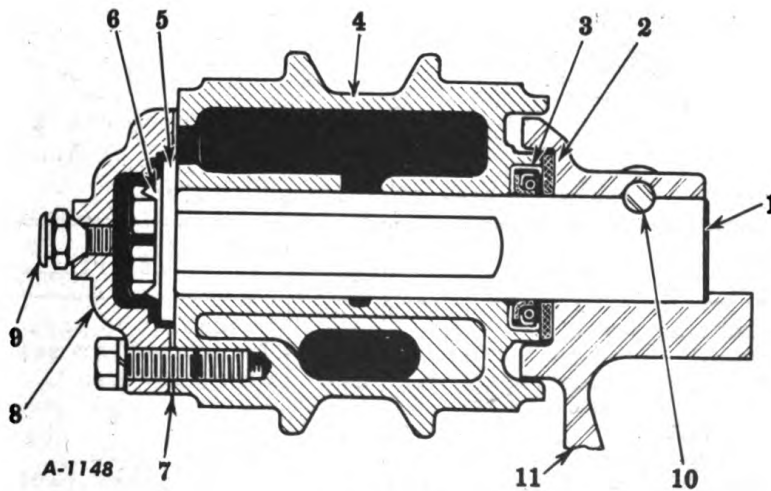
Front idlers for the track chains are slide mounted to the track frames. Tension on the track chains is adjustable at the idler, slide mounted on the guide. Two heavy coil springs on top of the track frame as shown in *Illust. 4*, "Frame", Section 6, permit the

TRACK - Continued



Illustr. 4  
Exploded View of a Track Idler.

| Ref. No. | Description           | Ref. No. | Description    |
|----------|-----------------------|----------|----------------|
| 1        | Idler shaft.          | 7        | Gasket.        |
| 2        | Felt washer.          | 8        | Idler cap.     |
| 3        | Oil seal.             | 9        | Lubricator.    |
| 4        | Idler, with oil seal. | 10       | Retainer bolt. |
| 5        | Thrust washer.        | 11       | Support.       |
| 6        | Bolt lock.            |          |                |



Illustr. 5  
Cross-Section of a Track Idler.



TRACK - Continued

Front Idler - Continued

idlers to recoil under shock but exert no tension on the track when in the normal operating position.

Removal of the Front Idlers

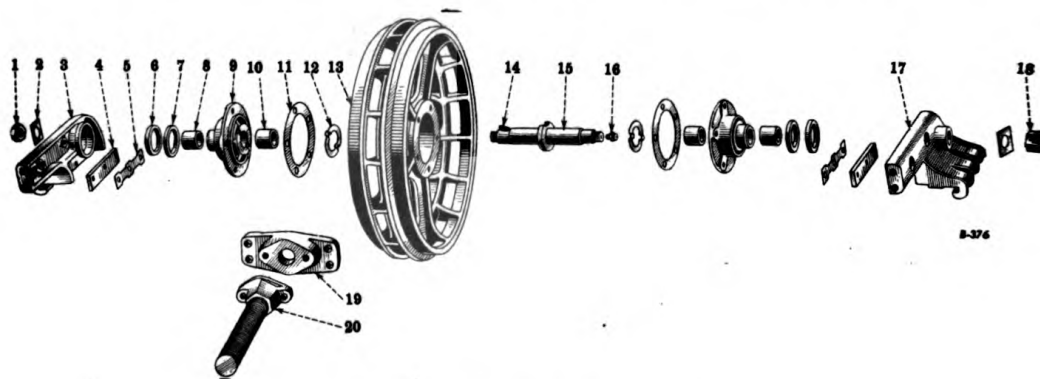
It is not necessary to remove the track frame assembly to take off the front idlers. Remove the track chain. Then remove the cap screws from the adjuster (20), *Illust. 6*, and slide the entire front idler assembly off the tractor frame.

Disassembly of the Front Idler

Both retainers (4) can be removed, if necessary, for replacement by bending back lock (5) and taking out the cap screws. Bend back the nut locks (2) on both sides and

unscrew nuts (1) and (18). The nut for the lubricator should always be placed on the outside.

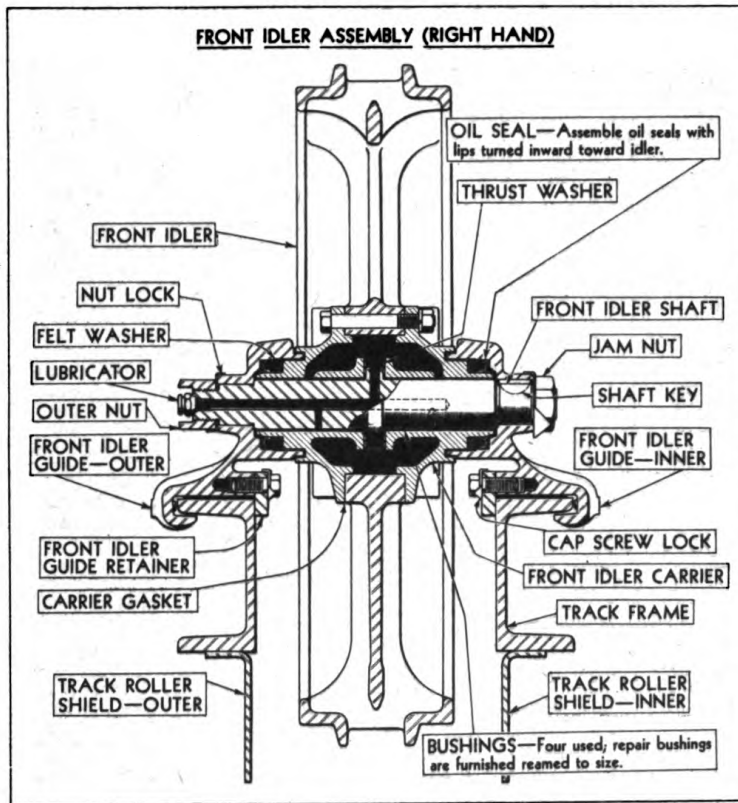
Take out the four bolts to remove the cross plate (19). The inner and outer guides (3) then may be removed to slide off shaft (15). Remove key (14). Take off the carriers (9) from the idler (13). When one of the carriers is removed, the shaft (15) slides out. Then the second carrier can be removed. The shaft diameter is 1.991-inch to 1.992-inch. The bushings are replaceable reamed to size. They should be pressed into the idler bevel first until they are flush with the inside diameter. Clearance is normally .006-inch to .011-inch. The seal (6) and felt washer (7) can then be removed from the carriers (9). In replacing the thrust washers have the



Illust. 6  
Exploded View of the Front Idler.

| Ref. No. | Description   | Ref. No. | Description   |
|----------|---|----------|---|
| 1        | Nut, inner.   | 11       | Gasket.   |
| 2        | Nut lock.   | 12       | Thrust washer set.  |
| 3        | Guide (inner, right hand - outer, left hand) with oil seal. | 13       | Front idler.  |
| 4        | Guide retainer.   | 14       | Key.  |
| 5        | Retainer bolt lock.   | 15       | Shaft.  |
| 6        | Oil seal.   | 16       | Lubricator.   |
| 7        | Felt washer.  | 17       | Guide (inner, left hand - outer, right hand) with oil seal. |
| 8        | Bushing set.  | 18       | Nut, outer.   |
| 9        | Carrier, with bushing.                                      | 19       | Guide cross plate.  |
| 10       | Bushing set.  | 20       | Adjuster.   |

TRACK - Continued



Illust. 7  
Cross-Section of Front Idler Assembly.

**Disassembly of the Front Idler  
- Continued**

projections engage the slots in the carriers and be sure the surfaces are clean.

The lubricator (16) can be unscrewed from shaft (15). Before reassembling, make sure that the drilled holes for lubrication are clean.

**Reassembly of the Front Idler**

Reassembly is the reverse of disassembly. Be sure that the seals (6) have the leather lip facing

toward the center of the idler (13). The thrust washers (12) must engage the slots in the carriers. Be sure the surfaces are clean. Before reassembling the lubricator (16) to the shaft, be sure that the drilled holes for lubrication are clean. Be sure to use new washers (7) and new seals (6).

**Replacement of the Front Idler**

Replacement on the tractor is the reverse of removal. Be sure the proper adjustments are made after idlers are on the tractor to prevent them from cocking, and also to prevent the tractor from creeping to one side.

**REPAIR SECTION**

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**MEMORANDA**

## TRANSMISSION

| <u>Gear</u>  | <u>M.P.H.</u> | <u>F.P.M.</u> | <u>Gear Ratio</u> |
|--------------|---------------|---------------|-------------------|
| 1            | 1.5           | 132           | 81.0 to 1         |
| 2            | 2.1           | 185           | 58.2 to 1         |
| 3            | 2.5           | 220           | 48.1 to 1         |
| 4            | 3.4           | 299           | 35.3 to 1         |
| 5            | 4.8           | 422           | 25.3 to 1         |
| 6            | 5.8           | 510           | 20.9 to 1         |
| Low Reverse  | 1.5           | 132           | 80.4 to 1         |
| High Reverse | 3.4           | 299           | 35.0 to 1         |

The transmission is of the selective spur-gear type having six forward speeds and two reverse speeds. Standard shifting is controlled by one lever while the change from the high to the low range is controlled by another lever. The gears are assembled on three shafts which are mounted in the rear main frame.

The upper spline shaft (33), *Illust. 1*, revolves on two ball bearings in cages. It is hollow to allow the power take-off to drive direct from the drive gear assembly. The bevel gear and pinion shaft (70) revolves on a straight roller bearing in a bearing cage next to the pinion. Ball bearings take the end thrust and the bearing cage is shimmed from the transmission end cover for the cone setting of the bevel gear.

The reverse idler gear revolves on two roller bearings as does the Hi-Lo gear. The rear bearing is a double-row ball bearing. "*Line of Power*", *Illust. 1*, Section 9, shows the flow of power through the transmission. The *service chart*, Section 14, shows the relation of the parts and the procedure for the removal.

Splash lubrication is provided from the constant running oil gear. The reservoir capacity is 6-1/2 gallons.

## Preparation for Removal of the Transmission

Remove the seat cushion and battery covers. Remove the braided ground cable from the positive terminal of the *left* battery. Disconnect the cable between the battery, starting with the terminal of the *right* battery. Then remove the cable from the negative terminals of both batteries. The battery supports are spring-mounted and can be readily taken out when the batteries are removed.

The fuel tank and complete seat can be removed as a unit. Take off the fender brackets.

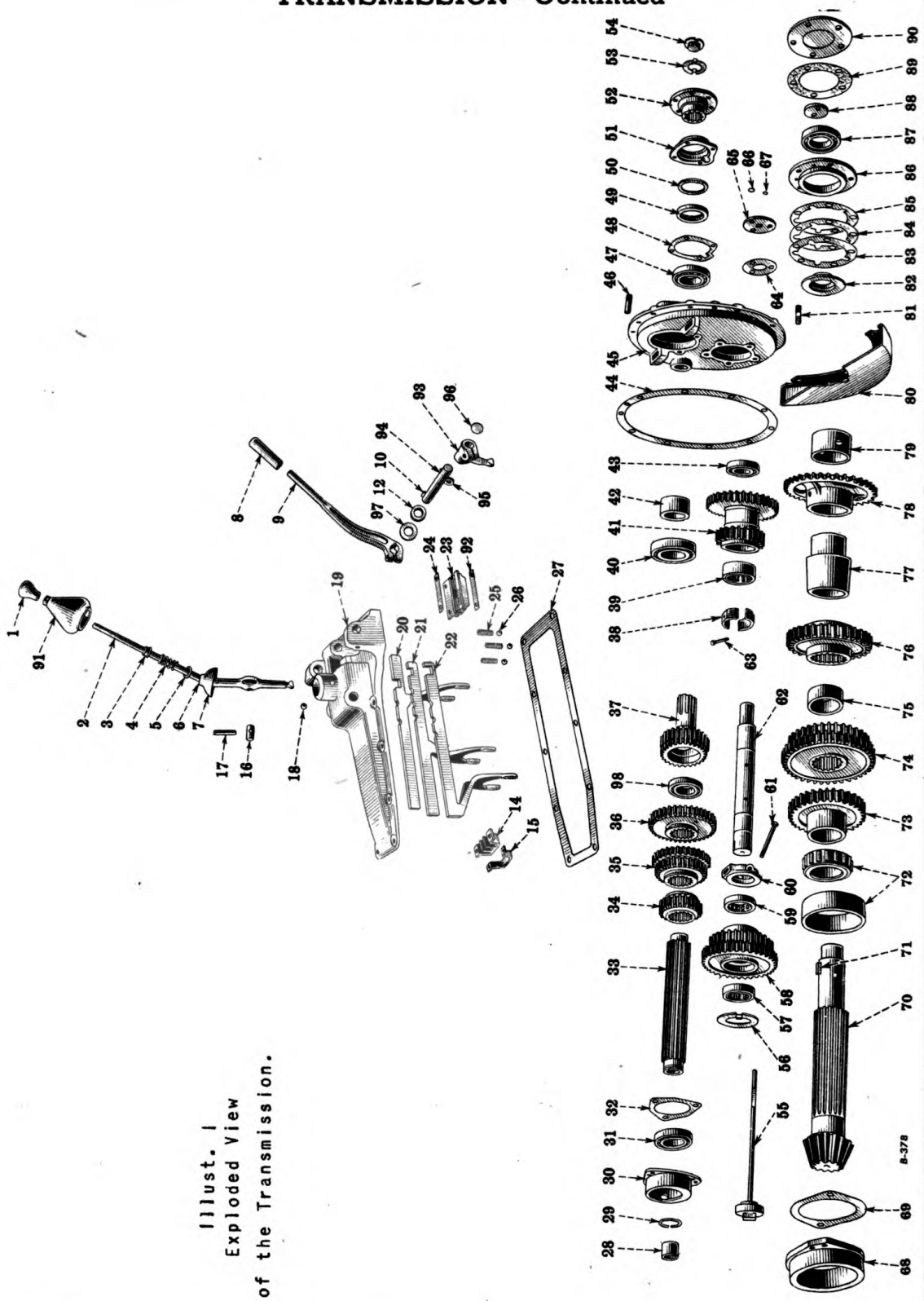
The main frame cover comes off after the following steps have been accomplished:

Remove the cap screws from around the outside edge of the main frame cover. Disconnect the electrical wiring and label all of the wires for easy replacement. Refer to the wiring diagrams in the "*Spare Parts Catalog*".

Remove the two small inspection covers to take out the bolts which hold the steering clutch grease tubes. Remove the springs, cap screws, and bolts from the steering

# REPAIR SECTION

## TRANSMISSION - Continued



Illust. 1  
Exploded View  
of the Transmission.

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TRANSMISSION - Continued

| Ref. No. | Description                    | Ref. No. | Description                           | Ref. No. | Description                                   | Ref. No. | Description                               |
|----------|--------------------------------|----------|---------------------------------------|----------|---|----------|---|
| 1        | Ball.                          | 28       | Bushing.                              | 54       | Nut.  | 78       | Oiler gear (37 teeth).                    |
| 2        | Lever.                         | 29       | Snap ring.                            | 55       | Oil level rod.                                | 79       | Bushing.                                  |
| 3        | Spring stop, upper.            | 30       | Bearing cage, rear.                   | 56       | Thrust washer.                                | 80       | Reservoir.                                |
| 4        | Spring stop, lower.            | 31       | Bearing.                              | 57       | Bearing.                                      | 81       | Stud.                                     |
| 5        | Spring stop, lower.            | 32       | Retainer.                             | 58       | Idler gear (29 and 36 teeth).                 | 82       | Spacer.                                   |
| 6        | Bushing.                       | 33       | Spline shaft, complete.               | 59       | Bearing.                                      | 83       | Shim, heavy.                              |
| 7        | Swivel housing shield.         | 34       | Gear (23 teeth).                      | 60       | Oil scoop.                                    | 84       | Shim, medium.                             |
| 8        | Hi-Lo shifter lever handle.    | 35       | Gear.                                 | 61       | Bolt.   | 85       | Shim, light.                              |
| 9        | Hi-Lo shifter lever.           | 36       | Hi-Lo sliding gear (26 and 38 teeth). | 62       | Idler shaft.                                  | 86       | Bearing cage.                             |
| 10       | Key.                           | 37       | Driving shaft gear (26 teeth).        | 63       | Retainer bolt.                                | 87       | Bearing, front.                           |
| 12       | Oil seal felt.                 | 38       | Thrust collar.                        | 64       | Gasket.                                       | 88       | Washer.                                   |
| 14       | Guide, rear.                   | 39       | Bearing, rear.                        | 65       | Retainer.                                     | 89       | Gasket.                                   |
| 15       | Bolt lock.                     | 40       | Bearing.                              | 66       | Lock washer.                                  | 90       | Retainer, front.                          |
| 16       | Shaft, large.                  | 41       | Hi-Lo gear (21 and 33 teeth).         | 67       | Retaining bolt washer.                        | 91       | Gear shifter boot.                        |
| 17       | Shaft, small.                  | 42       | Spacer.                               | 68       | Bearing cage, rear.                           | 92       | Bolt lock, right hand.                    |
| 18       | Plug.                          | 43       | Bearing.                              | 69       | Retainer.                                     | 93       | Hi-Lo gear shifter arm.                   |
| 19       | Housing.                       | 44       | Gasket.                               | 70       | Bevel pinion and shaft with drive bevel gear. | 94       | Hi-Lo gear shifter arm shaft.             |
| 20       | Hi-Lo shifter rail.            | 45       | End cover.                            | 71       | Key.  | 95       | Hi-Lo gear shifter arm key.               |
| 21       | Second and third shifter rail. | 46       | Dowel.                                | 72       | Roller assembly and outer race.               | 96       | Hi-Lo gear shifter arm shaft plug.        |
| 22       | Low and reverse shifter rail.  | 47       | Bearing, front.                       | 73       | Reverse gear (32 teeth).                      | 97       | Gear washer.                              |
| 23       | Guide, front.                  | 48       | Gasket.                               | 74       | Gear (35 and 40 teeth).                       | ...      | Gear shifter boot clamp.                  |
| 24       | Bolt lock, left hand.          | 49       | Oil seal.                             | 75       | Spacer.                                       | 98       | Transmission spline shaft bearing, front. |
| 25       | Poppet spring.                 | 50       | Felt washer.                          | 76       | Gear (32 teeth).                              |          |   |
| 26       | Poppet ball.                   | 51       | Retainer.                             | 77       | Oiler gear sleeve.                            |          |   |
| 27       | Gasket.                        | 52       | Driving flange.                       |          |   |          |   |
|          |                                | 53       | Nut lock.                             |          |   |          |   |

## TRANSMISSION - Continued

### Preparation for Removal of the Transmission - Continued

clutch release levers. Then remove the cap screws from the steering clutch release fork bearing retainer. Lift the levers and the retainer off the tractor.

Take out the cap screws holding the shifter housing (19) to the main frame cover. Lift the housing assembly with the gasket (27) from the cover. Three dowel pins line up the cover on the main frame and are removed with the aid of a nut on their threaded top. When the pins are out, the main frame cover can be lifted out. If the steering clutch release fork bearing cages stick in the cover, they can be tapped out of place and set back on the release forks. The engine clutch must be removed before the transmission is removed. This is covered in Section 4.

The rear power take-off is removed as described in Section 8.

### Removal and Disassembly of the Transmission

Drain the oil from the transmission. The transmission front cover (45), *Illust. 1*, is removed through the engine clutch compartment. Bend back lock (53) and remove the special nut (54) in the end of the transmission drive shaft (37). Slide the flange (52) from the shaft (33).

Remove the cap screws from around the outside edge of the front end cover. The bearing retainer (90) for the bevel gear and pinion shaft (70) comes out after removing the cap screws. Then take the cap screws from the bearing retainer washer (88) for the bevel gear and pinion shaft. The retainer (65) for the idler shaft (62) should then be removed. Three dowel pins (46) in the cover (45) have threaded

heads for easy removal. Assemble puller cap screws to the tapped holes in the cover (45). Run them up evenly and lift out the cover assembly (51) to (47) and (45) to (37) and also from (87) to (83). The gasket (44) will ordinarily stick to the cover.

To disassemble drive shaft (37) from the cover, remove the bearing retainer (51). Use a babbitt hammer and drive the shaft (37) to the rear of the cover. Bearings (40) and (47) and the spacer (42) can then be removed from the cover. The bearing cage (86) for the bevel gear and pinion shaft (70) can then be taken out of the cover. Shims (83), (84), and (85) fit between this bearing cage and the cover and are used for obtaining the proper tooth setting of the pinion shaft with the ring gear. Bearing (87) can then be removed from the cage (86).

With the cover (45) removed, the front spacer (82) can be lifted off the pinion shaft (70). The gear (78) can also be slid off sleeve (77).

Then remove the cap screws from the rear bearing cage (30). The upper spline shaft (33) with gears (36), (35), and (34) and the bearing (31) can then be pulled out as an assembly. The gears can then be slid from the shaft. Removal of the snap ring (29) permits bearing (31) and the rear retainer (32) to be removed from the shaft. The bushing (28) can be removed if necessary for replacement.

The idler shaft assembly (62) comes out easy. Remove the nut bolt in the rear bearing retainer (38). Push the Hi-Lo gear (41) to the rear. Pry behind the reverse idler gear (58) and the entire assembly can be moved forward out of the main frame. The Hi-Lo gear can then be removed from the idler shaft. The bearings (39) and (43) can be removed from the gear if they are to be replaced.

## TRANSMISSION - Continued

**Removal and Disassembly of the Transmission - Continued**

Remove bolt (61) from the oil scoop (60) and pull the assembly (60) and (58) from the shaft. This will free bearings (59) and (57). The bevel gear and pinion shaft (70) can be removed after taking out the cap screws in the rear bearing cage (68). The sleeve (77) can be pulled out the shaft. Gears are keyed and pressed on the shaft and can be removed with the aid of an arbor press. The bearing (72), retainer (69), and the bearing cage (68) will then come off. The spacer (75) is used between the gears (73) and (74).

Shifter gears (36), (35), and (34) operating on the upper spline shaft (33) should be free enough to slide along the shaft but should not have any perceptible play in the direction of rotation. A good fit between the spline of the gear and that of the shaft is important.

Shifter forks attached to the shifting housing (19) can be removed for replacement. This can be done by removing bolts from the shifter rail guides (14) and (23). Both poppets (26) and springs (25) are freed from the housing (19). The Hi-Lo shifter lever shaft assembly can be removed by taking out the bolt in the lever, pulling off the lever, and pushing the shaft into the housing (19). Replace the seal (12). The lever (2) can be removed by taking plugs (18) from the housing (19) and pushing the pin (17) out of the housing.

**Reassembly and Replacement of the Transmission**

Reassembly and replacement of the transmission shafts and gears can be accomplished by reversing the

disassembly procedure. Use all new gaskets and oil seals when doing so. Thoroughly clean the assembly and the case before replacing the main frame cover. Refer to the *service chart*, Section 14, for the relative positions of the gears.

Replace the oil seal (49), *Illust. 1*, in reassembling, being sure to have the lip of the leather seal facing the transmission gears.

Replacement bushing (79) for the gear (78) is furnished reamed to size and need only be pressed into place. The inside diameter of the bushing is 2.878-inch to 2.882-inch giving a .003-inch to .008-inch clearance.

When replacing the idler shaft (62) be sure that the tang of washer (56) enters the small hole in the main frame. The bevel gear and pinion shaft (70) are properly located in the main frame from front to rear when a 5/8-inch (.625-inch) gauge will slide freely between the end of the pinion and the ring gear hub. Shims (83), (84), and (85) are used to obtain this setting. Remove the shims between the bearing cage (86) and the front end cover (45) to reduce the gap between the end of the pinion and the ring gear hub.

After properly setting the pinion, draw all the cap screws tight and recheck. Then check the gears for backlash and adjust them as outlined under the heading "*Drive Bevel Gear*", Section 5.

Replace all other items previously removed.



**REPAIR SECTION**

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**MEMORANDA**

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## REPAIR SECTION

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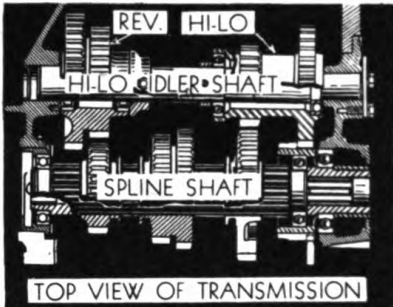
### TOLERANCES AND CLEARANCES

**NOTE:** All tolerances and clearances not found in the Service Charts will be found in the text under the various headings.

### OIL SEALS

**NOTE:** Whenever an oil seal is removed from the tractor, always replace it with a new seal.

When installing new oil seals, check to see that the leather is pliable and the edges are in good condition to assure a tight fit, preventing oil leakage. Inspect the metal surfaces in contact with the oil seal to make sure they are smooth; roughness will cause rapid wear of the seal and consequent oil leakage.



**TRANSMISSION:** To disassemble, it is easiest if seat frame, fenders, fuel tank, gear shifter housing, steering clutch controls, engine clutch cover, and engine clutch with coupling are all removed. Then remove from engine clutch compartment: the coupling flange and oil seal retainer from upper shaft, the bearing cage from lower shaft with puller cap screws and bearing retainer washer, and retaining plate from Hi-Lo shaft. Remove transmission front cover with puller cap screws (3— $1\frac{1}{2}$  x  $2\frac{3}{4}$ "") threaded well back to the head. Pull gears from their respective spline shafts, and pull out Hi-Lo shaft as unit with gears attached. Remove cap screws from rear bearing cages of both shafts and drive or pry out from the rear. Assemble transmission by reversing the above procedure. Bevel gear and pinion should show a toe bearing (small end of tooth, centered top to bottom) with approximately  $.012$ " backlash.

FUEL TANK may be removed together with fenders and seat. Capacity, 45 U. S. Gallons.

POWER TAKE-OFF  
Shaft passes through main frame and drives transmission driving shaft.

GEAR SHIFTER HOUSING can be removed as a unit with gear shifter levers and forks and steering clutch levers all in place.

SEAT

TRACK ASSEMBLY:  
Tracks are interchangeable.

DRAWBAR

SPLINE SHAFT

BEVEL PINION

REV. 2nd & 5th

1st & 4th

DRIVE BEVEL GEAR

PIVOT SHAFT: Locked in position with a dog point setscrew under main frame.

TRACK FRAMES are removable as a complete unit. First remove front stabilizer, then bolts from diagonal brace and from ball socket on pivot shaft.

STEERING CLUTCH RELEASE FORK:  
Assemble lower bearing cage and bearing into main frame. Assemble link pins to fork, insert cotter pins and bend over the uppermost and lowest cotter pins. Insert fork into main frame, pull out loose link pins, insert links onto collar and into fork, bend over cotters with rod through holes in rear of main frame. For further details, see section on steering clutches.

TRANSMISSION COVER  
Cover removed from transmission can be re-attached to cover with screws in tapered cover holes.

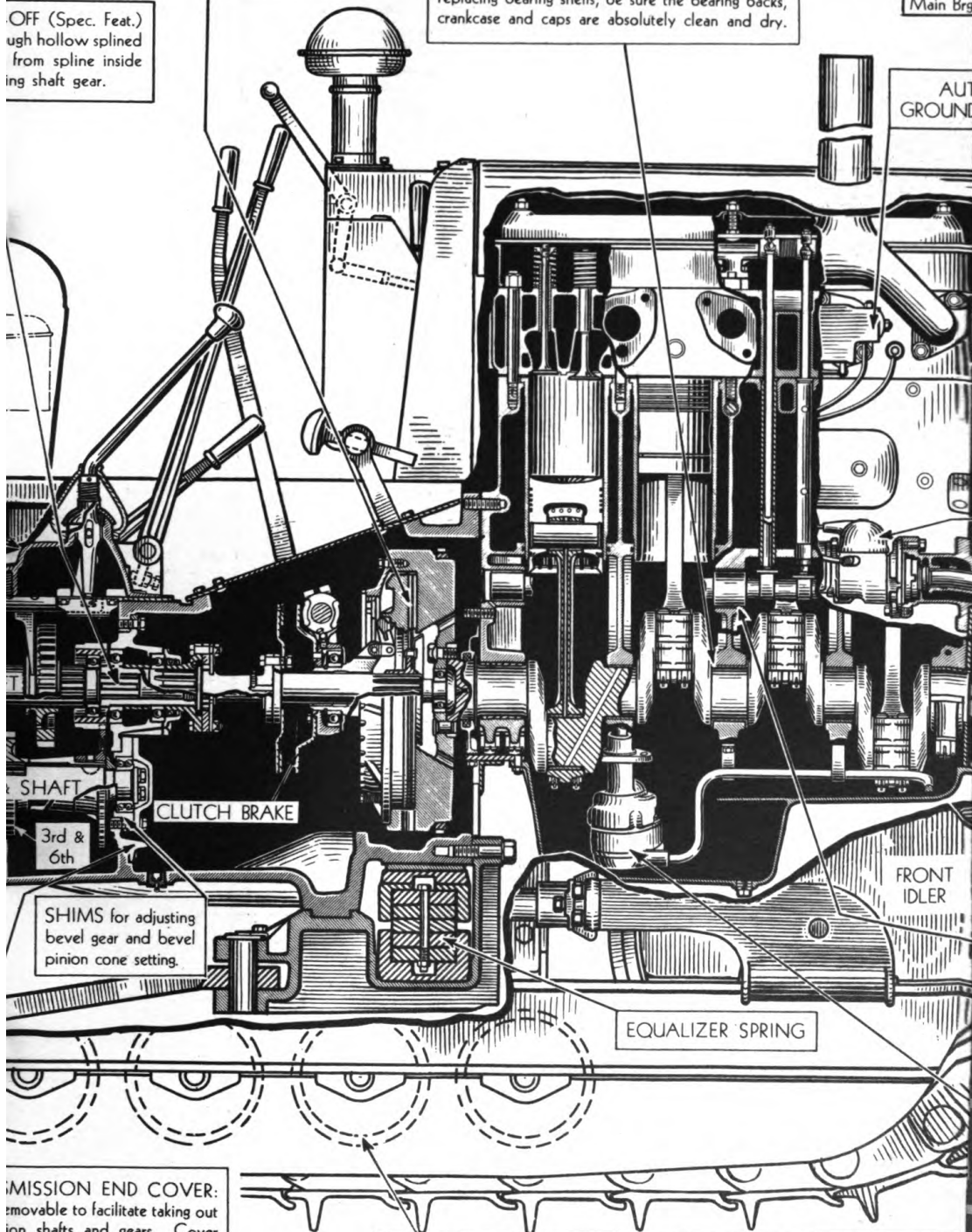
**ENGINE CLUTCH:** 15", over-center type. Readily removed and replaced as a unit without disturbing engine or transmission. To adjust clutch, refer to Instructions in this manual.

**MAIN BEARINGS:** 5 precision type; vertical running clearance .003 to .004", end clearance .006 to .014"; thrust taken on center bearing. Bearings can be replaced without removing crankshaft. Replacement crankshaft and bearings are available in 1/32" undersize. NOTE: When replacing bearing shells, be sure the bearing backs, crankcase and caps are absolutely clean and dry.

**Bolt To**  
(Ft.-Lbs.)  
Cyl. Head  
Conn. Rod  
Flywheel  
Main Brg

OFF (Spec. Feat.)  
ough hollow splined  
from spline inside  
ing shaft gear.

AUT  
GROUND



SHAFT  
3rd &  
6th

CLUTCH BRAKE

SHIMS for adjusting  
bevel gear and bevel  
pinion cone setting.

FRONT IDLER

EQUALIZER SPRING

**TRANSMISSION END COVER:**  
removable to facilitate taking out  
ion shafts and gears. Cover  
removed through engine clutch  
opening. Use 3-1/2 x 2 3/4" cap  
screw, threaded well back to the head,  
and holes provided, to push end  
cover off.

**TRACK ROLLERS** are press mounted on cast carriers which are fitted with four bronze bushings. Bushings, reamed to size, are available for repairs. Replace bushings before carriers start to wear. With track roller assembly removed from track frame, remove snap ring from each side, support roller on press and push on shaft, forcing carrier out. Turn over and push remaining carrier out. Replace new carrier bearings and assemble parts in reverse of removing procedure.

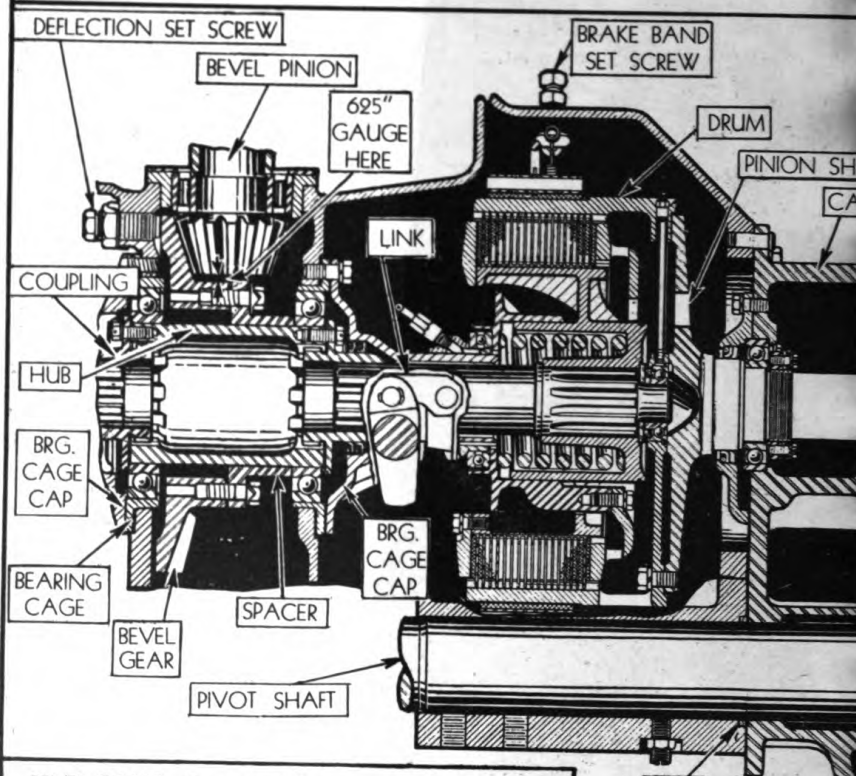
| Torque Data<br>(Torque) |     |
|-------------------------|-----|
| d                       | 190 |
| d                       | 70  |
|                         | 150 |
|                         | 150 |

OMATIC  
ING SWITCH



**STEERING CLUTCHES: Removal**—Clear top of main frame of seat, batteries, controls, etc., and lift off main frame cover. Loosen brake band adjuster and remove pin from rear brake band. Remove grease tubes and pins in release fork. Turn release fork, remove links and lift out release fork. Remove capscrews and slide bearing cage cap into the steering clutch. Assemble clutch compressor angle tools (58920-D) to the clutch and compress. Remove capscrews from clutch drum and clutch coupling. Mark drum and pinion flange, pry coupling into bearing cage cap and lift unit out of main frame.

**Replacement:** Reverse should be attached to a new oil seal in bearing cap. Be sure socket head screw is seated in flange with several capscrews. Bevel gear hub. Cap long rod inserted through bearing cage cap and adjust hand lever free.



**BEVEL GEARS: Removal**—Take out steering clutches, bolts holding spacer to bevel gear, and back out deflection set screw. Pull left hand bearing cage with bearing. Pull right hand bearing cage. Slide hub and spacer out right side and lift bevel gear from its compartment.

**Reassembly**—Press left hand bearing into its bearing cage. The bearing has an outer race that is narrower than its inner race. Flush side of bearing races is always to the left. Press left bearing cage and bearing onto left end of bevel gear hub. Attach steering clutch coupling to left end of hub. Lower bevel gear and press bearing cage into the main frame. Attach bearing cage cap to main frame. Slide spacer over hub from the right side, assemble right bearing to right bearing cage and secure unit to hub and main frame. Be sure left side of bearing is the flush side of the bearing races as shown. Attach right clutch coupling to hub and bearing cage cap to main frame. Insert same number of shims between spacer and bevel gear as were removed at the time of disassembly, or insert shims to give .012" backlash with a new pinion and gear.

When reassembling new pinion, place a .625" thick gauge between the ground surface on bevel gear and the end of the pinion. Then use proper number of shims between bevel pinion bearing cage and transmission front cover to hold the gauge at this point when all bolts are tightened. Be sure backlash of bevel gear is .014" when pinion is held stationary. Now adjust deflection set screw on left side to have .020" clearance between it and back face of bevel gear. Replace steering clutches.

**SPROCKET DRIVE:**

**Removal**—Take off track jack under tractor, remove from pivot bearing, jack tractor, and remove sprocket pivot bracket cap. Take off pivot bearing and pivot bracket with seal. Remove bearing cap and use puller to remove sprocket bearing cap. Service tool SE-118 used to turn off sprocket. Sprocket can now be removed. Replacement is the reverse going.

**Sprocket Drive Gear Removal**—Remove sprocket, as above, and remove bearing cap. Use puller to remove the outer gear hub.

Illust. 3

# Tractor Model TD-14

## SPARE PARTS CATALOG

The major units of the tractor are arranged alphabetically, in sections, in this parts list and are numbered consecutively, as shown at the right.

Each section has a black tab which lines up with the corresponding section at the right. The black tabs are quickly located by bending this book back.

The contents of each section can be determined at a glance by referring to the index on the other side of this page.

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# SPARE PARTS CATALOG

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# SPARE PARTS CATALOG

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Revisions in QMC Form 400 for requisitioning spare parts are confined to new column headings. Until new forms are available all organizations will use the present form and type or write in corrections indicated.

Under revised heading "Nomenclature and Unit" list the article and the unit (ea for each; lb for pound; etc.). Under heading "Maximum or Authorized Level" list the authorized organizational allowances or depot stock levels given in ENG 7 and ENG 8 of the ASF Engineer Supply Catalog (superseding Part III, Corps of Engineers Supply Catalog). The total number on hand for each item is listed under "On Hand". In column headed "Due In" enter the total quantity previously requisitioned but not delivered. Column headed

"Required" is to be changed to read "Quantity Desired." In "Remarks" column enter additional information. For "Initial" and "Replenishment" requisitions, the sum of "Quantity Desired", "Due In", and "On Hand" should equal "Maximum or Authorized Level".

On this page is shown a sample requisition on QMC Form No. 400 which conforms to the latest revisions. The marginal notes give instructions for preparing a requisition for spare parts for Engineer equipment. Additional information on this subject is contained in Section ENG 1-2 of the ASF Engineer Supply Catalog (superseding Section AA-1 of Part III Engineer Supply Catalog), available on requisition from Engineer Field Maintenance Office, P. O. Box 1679, Columbus, Ohio.

State PERIOD designation by use of one of the following terms:

- (1) "INITIAL"—first requisition of authorized allowances.
- (2) "REPLENISHMENT"—subsequent requisitions to maintain authorized allowances.
- (3) "SPECIAL"—requisitions for necessary repairs not covered by allowances.

Type "SPARE PARTS" in upper right hand corner of requisition.

Give complete shipping instructions. Special instructions for packing, marking, routing, etc., should be given at the end of requisition.

State proper nomenclature of machine, also make, model, machine serial number and U. S. A. registration number.

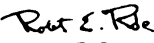
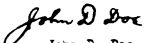
Prepare a separate requisition for each different machine.

State basis or authority and date delivery is required, immediately below description of machine.

Double space between items.

Group parts required under group headings as shown in manufacturers' parts catalogs (Technical Manuals).

State stock numbers, manufacturers' parts numbers and nomenclature accurately and completely. Do not use abbreviations.

| WAR DEPARTMENT<br>Q. M. C. Form No. 400   |  | REQUISITION           |   | SPARE PARTS |        |                  |         |
|---|--|-----------------------|---|-------------|--------|------------------|---------|
| To: Engineer Field Maintenance Office,<br>P. O. Box 1679, Columbus, Ohio  |  | No. of Sheets 1       | Sheet No. 1   |             |        |                  |         |
| Requisition No. E-531-3-44  |  | Date 15 November 1943 | Period Replenishment  |             |        |                  |         |
| SHIP TO Engineer Property Officer, Pine Camp, New York  |  |                       |   |             |        |                  |         |
| MARKED FOR: Supply Officer, 149th Engineer Regiment, Pine Camp, New York  |  |                       |   |             |        |                  |         |
| Requisitioned By (show Signature, Rank, Organization, Destination If different from "ship to" include address):                                   |  |                       | For the Commanding officer  |             |        |                  |         |
| <br>Robert E. Roe,<br>Major, C.E.,<br>Engineer Property Officer. |  |                       | <br>John D. Doe,<br>Colonel, C.E.,<br>Executive Officer. |             |        |                  |         |
| STOCK NO.   | NOMENCLATURE   | UNIT                  | MAX OR AUTHORIZED LEVEL   | ON HAND     | DUE IN | QUANTITY DESIRED | REMARKS |
|   | PARTS FOR TRACTOR, CRAWLER TYPE (74-inch TREAD), DIESEL, INTERNATIONAL HARVESTER MODEL TD-14   |                       |   |             |        |                  |         |
|   | Basis: to complete Second Echelon Set  |                       |   |             |        |                  |         |
|   | Delivery requested by 20 April 1944  |                       |   |             |        |                  |         |
|   | <u>ENGINE GROUP</u>  |                       |   |             |        |                  |         |
| 55401 DX  | Crankshaft with gear nut   | ea.                   | 5   | 2           | 0      | 1                |         |
| 32509 D   | Gasket   | ea.                   | 8   | 2           | 0      | 6                |         |
|   | <u>FINAL DRIVE GROUP</u>   |                       |   |             |        |                  |         |
| 64495 D   | Pinion (15 teeth)  | ea.                   | 4   | 1           | 0      | 3                |         |
|   | <u>STEERING MECHANISM GROUP</u>  |                       |   |             |        |                  |         |
| 8679 DA   | Release lever  | ea.                   | 5   | 2           | 0      | 1                |         |
| 63228 D   | Yoke (left hand thread)  | ea.                   | 5   | 1           | 0      | 2                |         |
|   | <u>COMMON SUPPLIES</u>   |                       |   |             |        |                  |         |
| Q 1818  | Cap screw, 3/8" N.C.x5"  | ea.                   | 12  | 6           | 0      | 6                |         |
|   | *Nonexpendable items such as tools must be accounted for, when requisitioned, by a statement that they have been placed on REPORT OF SURVEY or STATEMENT OF CHARGES. |                       |   |             |        |                  |         |

Emergency requisitions sent by telephone, telegraph or radio must always be confirmed immediately with requisition marked: "Confirming (state identifying data)."

## PREPARATION OF REQUISITIONS

### Sample Copy for Use in the Preparation of Requisitions

A sample requisition in the correct form for submission by the Engineer Property Officer is shown on the opposite page.

### THIS SHALL BE FOLLOWED IN MAKING OUT REQUISITIONS

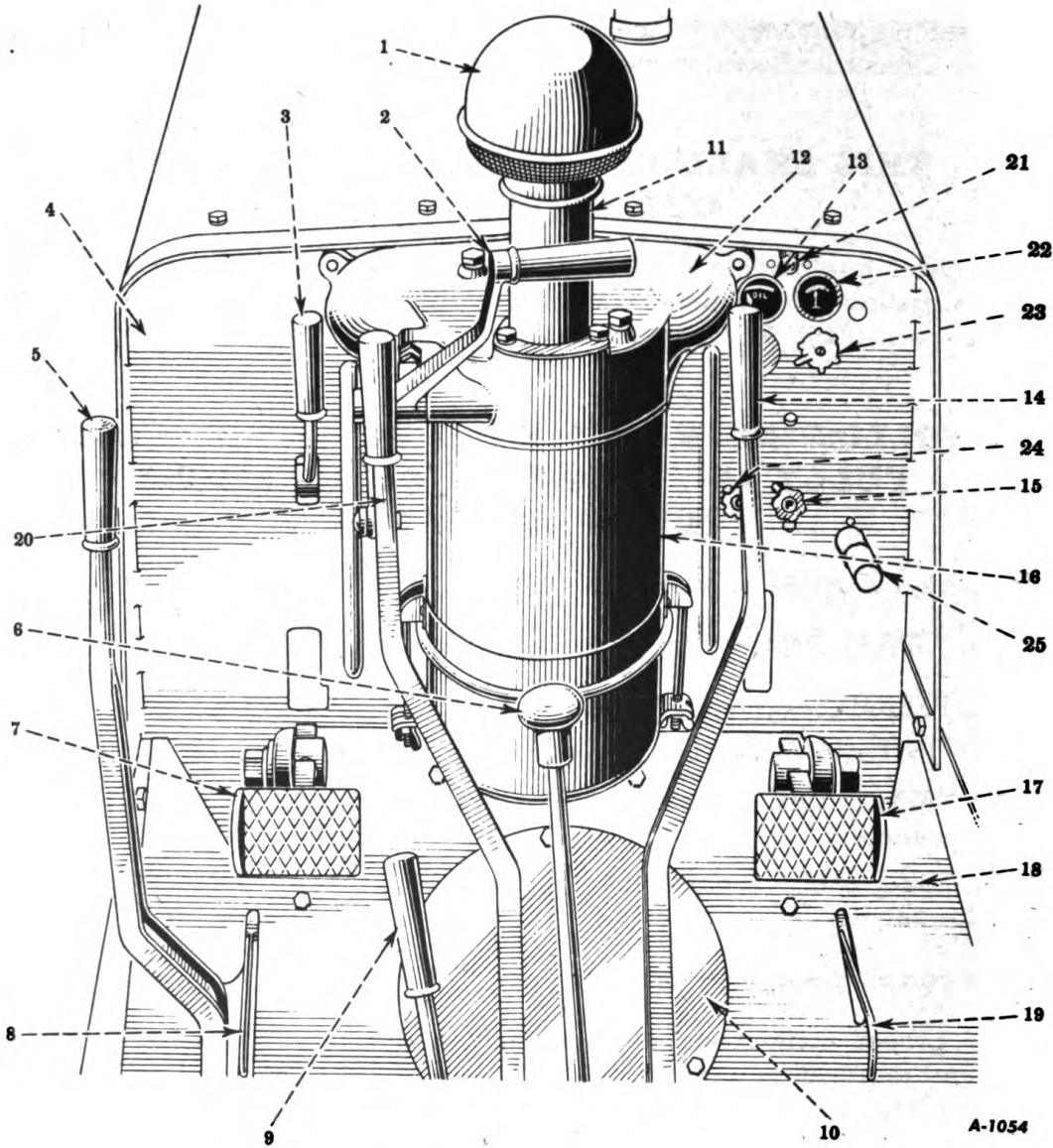
In order to eliminate duplication of work, Property Officers may authorize organizations to prepare requisitions in final form, leaving requisition number space blank for completion by Property Officer.

### THE FOLLOWING RULES WILL BE OBSERVED CARE- FULLY IN PREPARING REQUISITIONS FOR SPARE PARTS:

- a. Prepare a separate requisition for each different machine.
- b. Type "SPARE PARTS" in upper right hand corner of requisition form.
- c. State PERIOD designation by use of one of the following terms:
  - (1) "INITIAL"—first requisition of authorized allowances.
  - (2) "REPLENISH"—subsequent requisitions to maintain authorized allowances.
  - (3) "SPECIAL"—requisitions for necessary repairs not covered by allowances.
- d. Give complete shipping instructions.
- e. State proper nomenclature of machine, and make, model, serial number and registration number.
- f. State basis or authority and date delivery is required, immediately below description of machine.
- g. Group parts required under group headings as shown in manufacturers' parts catalog.
- h. State manufacturers' parts numbers and nomenclature descriptions accurately and completely. Do not use abbreviations.
- i. Double space between items.
- j. Emergency requisitions sent by telephone, telegraph, or radio, must always be confirmed immediately with requisition marked: "**Confirming** (state identifying data)."
- k. Nonexpendable items must be accounted for.

**SPARE PARTS CATALOG**

**CONTROLS AND DASH**



| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | .....          | Air intake cap. (Refer to page 16, Section 4) . . . . .            | 1        | .....    |
| 2        | .....          | Governor control lever. (Refer to page 2, Section 11) . . . . .    | 1        | .....    |
| 3        | .....          | Compression release lever. (Refer to page 2, Section 11) . . . . . | 1        | .....    |
| 4        | 52408 DC       | Dash and cowl assembly. . . . .                                    | 1        | 40.000   |
| ...      | Q 1860         | Cap screw, 1/2" N.C. x 2-1/2" . . . . .                            | 2        | .203     |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .  | 2        | .013     |
| 5        | .....          | Engine clutch lever. (Refer to page 2, Section 5) . . . . .        | 1        | .....    |

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**CONTROLS AND DASH - Continued**

| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 6        | .....          | Gear shifter lever (Refer to page 2, Section 14) . . . . .                    | 1        | .....    |
| 7        | .....          | Brake pedal pad. (Refer to page 4, Section 12) . . . . .                      | 1        | .....    |
| 8        | .....          | Brake lock. (Refer to page 4, Section 12)                                     | 1        | .....    |
| 9        | .....          | Hi-Lo gear shifter lever, (Refer to page 2, Section 14) . . . . .             | 1        | .....    |
| 10       | 42547 D        | Engine clutch inspection cover. . . . .                                       | 1        | 4.313    |
| ...      | Q 4016         | Cap screw, 3/8 x 5/8" N.C. . . . .  | 3        | .047     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .   | 3        | .005     |
| 11       | .....          | Air pipe. (Refer to page 16, Section 4). . . . .                              | 1        | .....    |
| 12       | .....          | Control housing and air cleaner top (Refer to page 16, Section 4). . . . .    | 1        | .....    |
| 13       | .....          | Oil pressure indicator (see Detail List below) . . . . .                      | 1        | .....    |
| 14       | .....          | Steering clutch hand lever, right hand. (Refer to page 3, Section 12)         | 1        | .....    |
| 15       | .....          | Primer control rod. (Refer to page 2, Section 11) . . . . .                   | 1        | .....    |
| 16       | .....          | Air cleaner, (Donaldson - 9"). (Refer to page 16, Section 4) . . . . .        | 1        | .....    |
| 17       | .....          | Brake pedal pad. (Refer to page 4, Section 12) . . . . .                      | 1        | .....    |
| 18       | 50117 DXA      | Engine clutch cover . . . . .   | 1        | 22.016   |
| ...      | Q 1802         | Cap screw, 3/8 x 1" N.C. . . . .  | 8        | .047     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .   | 8        | .005     |
| 19       | .....          | Brake lock. (Refer to page 4, Section 12)                                     | 1        | .....    |
| 20       | .....          | Steering clutch hand lever, left hand (Refer to page 3, Section 12) . . . . . | 1        | .....    |
| ...      | 17793 D        | Dash spacer . . . . .   | 2        | .156     |
| 21       | .....          | Dash lamp. (Refer to page 8, Section 3)                                       | 1        | .....    |
| 22       | .....          | Ammeter. (Refer to page 8, Section 3)   | 1        | .....    |
| 23       | .....          | Light switch. (Refer to page 11, Section 3) . . . . .                         | 1        | .....    |
| 24       | 55752 D        | Choke control rod and button. . . . .   | 1        | .....    |
| ...      | .....          | Cotter, 1/16 x 3/8" . . . . .   | 1        | .....    |

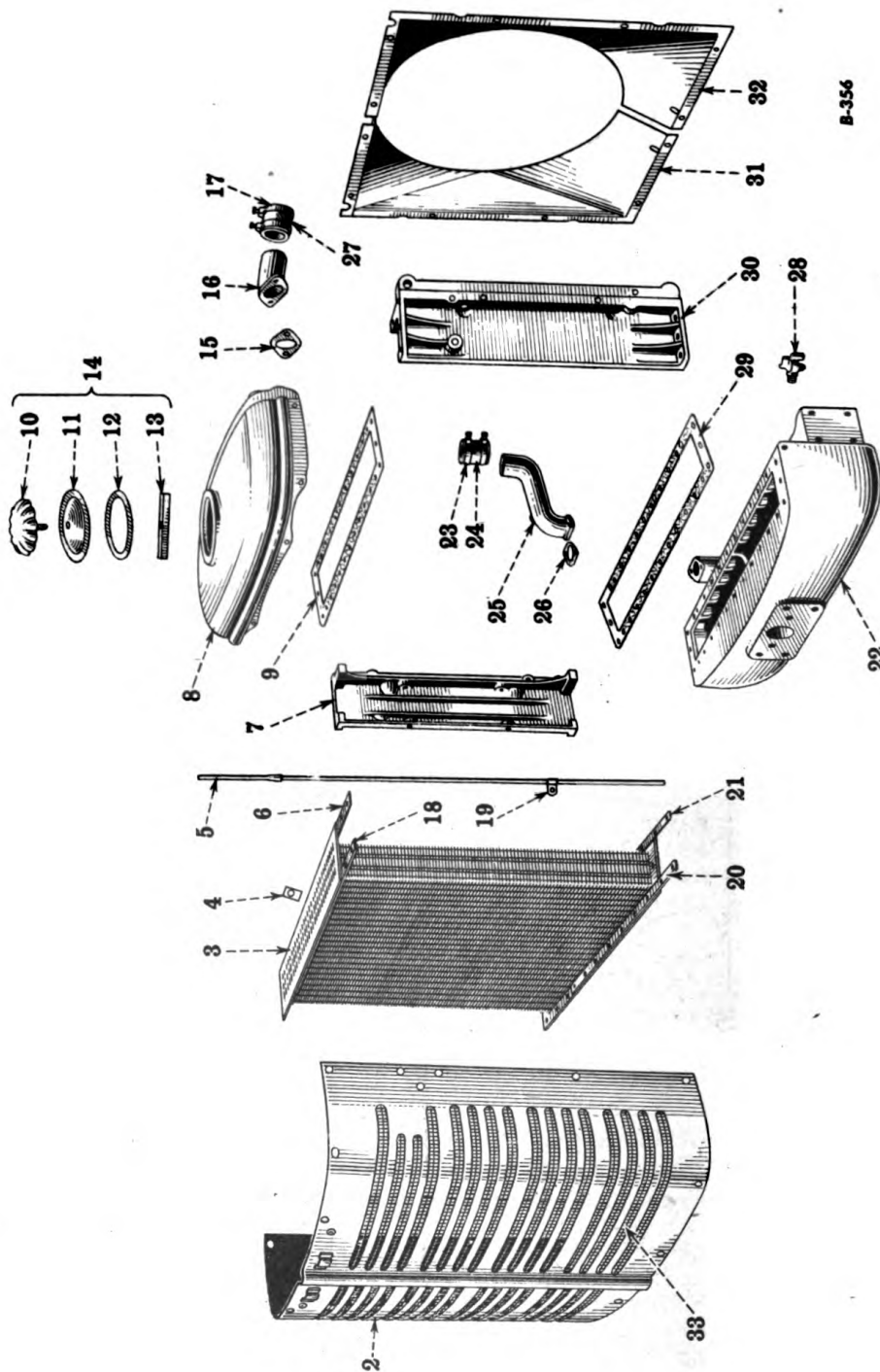
**OIL PRESSURE INDICATOR AND CONNECTIONS**

| I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------------|--|----------|----------|
| 41934 DB       | Oil pressure indicator with clamp and stud washers . . . . .                 | 1        | .500     |
| 29898 D        | Oil pressure indicator pipe coupling elbow nut (in indicator). . . . .       | 1        | .016     |
| 29398 D        | Oil pressure indicator coupling nut (in crankcase). . . . .                  | 1        | .016     |
| 30402 D        | Oil pressure indicator tube coupling elbow (in crankcase) . . . . .          | 1        | .041     |
| 30402 DX       | Oil pressure indicator tube coupling elbow with nut (in crankcase) . . . . . | 1        | .063     |
| 50772 DX       | Oil pressure indicator pipe (indicator to engine) . . . . .                  | 1        | .188     |
| 53031 D        | Pressure indicator stud washer . . . . .                                     | 2        | .....    |
| .....          | Hex. nut, No. 12 - 24" N.C. . . . .  | 2        | .003     |
| 60805 D        | Pressure indicator clamp . . . . .   | 1        | .15      |

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# SPARE PARTS CATALOG

## RADIATOR AND CONNECTIONS



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Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

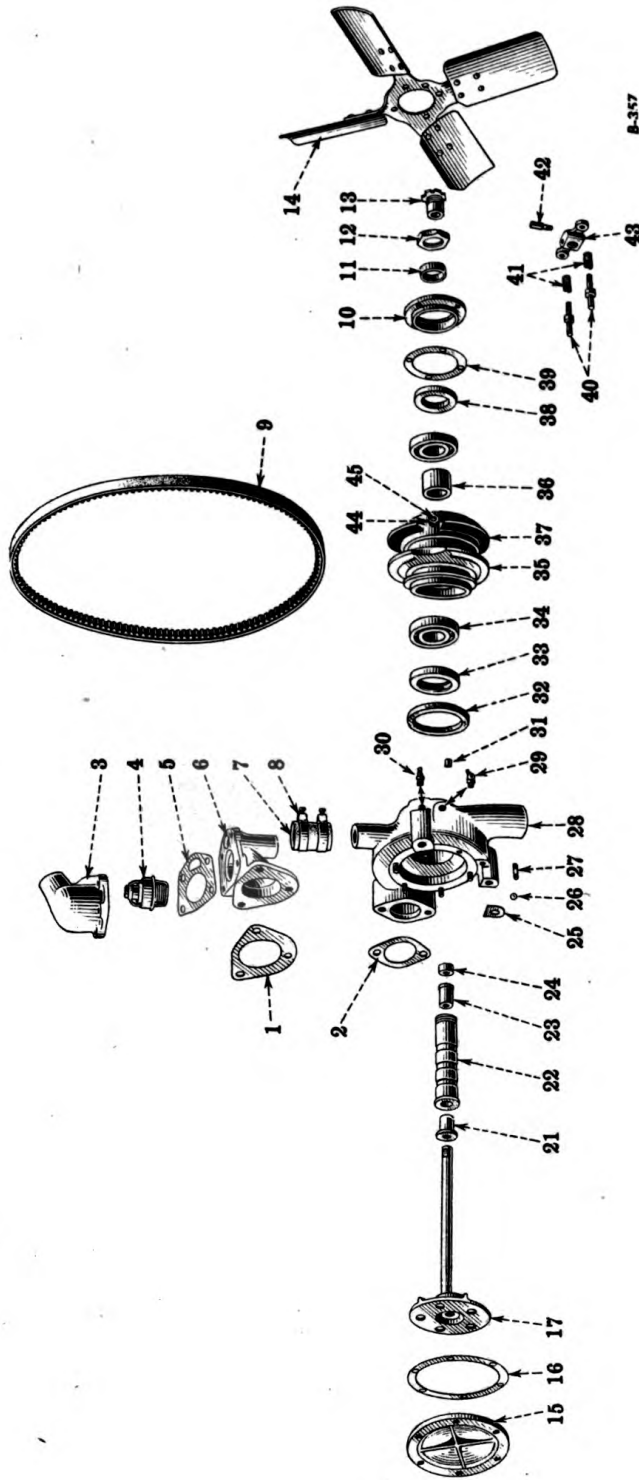
SPARE PARTS CATALOG

RADIATOR AND CONNECTIONS - Continued

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                             | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|----------|----------------|---|----------|----------|
| ...      | 50130 DC       | Radiator, (includes Ref. Nos. 3 thru 9, 18 thru 22 and 28, 29, 30) | 1        | 382.000  | 19       | 27307 D        | Clip                                    | 1        | .031     |
| 2        | 50145 DA       | Grille   | 1        | 22.500   | ...      | Q 1800         | Cap screw, 3/8 x 3/4" N.C.              | 1        | .035     |
| ...      | Q 4016         | Cap screw, 3/8 x 5/8" N.C.   | 16       | .039     | ...      | Q 1920         | Lock washer, 3/8"                       | 1        | .005     |
| ...      | Q 1920         | Lock washer, 3/8"  | 16       | .005     | 20       | 50137 D        | Stiffener, front                        | 11       | 1.000    |
| ...      | ...            | Washer, 13/32" I.D. x 7/8" O.D. x No. 16 ga.                       | 16       | .025     | ...      | Q 1802         | Cap screw, 3/8 x 1" N.C.                | 22       | .045     |
| 3        | 50129 DA       | Radiator core  | 1        | 75.000   | ...      | Q 1920         | Lock washer, 3/8" N.C. x 1-1/8"         | 11       | .047     |
| 4        | 52033 D        | Overflow pipe gasket   | 1        | .001     | 21       | 50136 D        | Stiffener, lower, rear                  | 1        | 1.500    |
| 5        | 50138 DX       | Overflow pipe  | 1        | .281     | ...      | ...            | N.C.                                    | 9        | .047     |
| 6        | 50135 D        | Stiffener, upper, rear   | 1        | .093     | ...      | Q 1920         | Lock washer, 3/8"                       | 9        | .005     |
| ...      | Q 1802         | Cap screw, 3/8 x 1" N.C.   | 9        | .001     | 22       | 6985 D         | Water tank, lower                       | 9        | 155.000  |
| ...      | Q 1920         | Lock washer, 3/8"  | 9        | .005     | 23       | 91406 HA       | Hose clamp                              | 2        | .050     |
| 7        | 6988 DA        | Core spacer, right hand  | 1        | 25.750   | 24       | 16077 D        | Outlet hose (2-1/8" I.D. x 2-3/8" long) | 1        | .217     |
| ...      | Q 1854         | Cap screw, 1/2 x 1-3/4" N.C.                                       | 2        | .130     | 25       | 6992 DA        | Outlet elbow                            | 1        | .320     |
| ...      | Q 185E         | Cap screw, 1/2 x 1-1/4" N.C.                                       | 6        | .122     | ...      | Q 1804         | Cap screw, 3/8 x 1-1/4" N.C.            | 2        | .050     |
| ...      | Q 1922         | Lock washer, 1/2"  | 8        | .013     | ...      | Q 1920         | Lock washer, 3/8"                       | 2        | .005     |
| 8        | 6986 D         | Water tank, upper  | 1        | 88.000   | 26       | 22383 D        | Gasket                                  | 1        | .003     |
| 9        | 50126 D        | Gasket   | 1        | .400     | 27       | 16077 D        | Inlet hose (2-1/8" I.D. x 2-3/8" long)  | 1        | .217     |
| 10       | 42610 D        | Cap handle   | 1        | .750     | 28       | 42605 D        | Drain cock                              | 1        | .375     |
| ...      | ...            | Cotter, 5/32 x 3/4"  | 1        | .008     | 29       | 50126 D        | Gasket                                  | 1        | 26.500   |
| 11       | 5913 D         | Cap cover  | 1        | 6.250    | 30       | 6987 DA        | Core spacer, left hand                  | 1        | .130     |
| 12       | 10429 D        | Gasket   | 1        | .036     | ...      | Q 1854         | Cap screw, 1/2 x 1-3/4" N.C.            | 2        | .120     |
| 13       | 42158 D        | Cap clamp  | 1        | .813     | ...      | Q 1852         | Cap screw, 1/2" N.C. x 1-1/2"           | 6        | .013     |
| 14       | 42611 D        | Cap, with clamp, gasket and handle                                 | 1        | 3.625    | ...      | Q 1922         | Lock washer, 1/2"                       | 8        | .013     |
| 15       | 22383 D        | Gasket   | 1        | 1.500    | 31       | 50140 D        | Fan housing sheet, right hand           | 1        | 4.250    |
| 16       | 6990 D         | Inlet elbow  | 1        | .050     | ...      | Q 4016         | Cap screw, 3/8 x 5/8" N.C.              | 5        | .039     |
| ...      | Q 1804         | Cap screw, 3/8 x 1-1/4" N.C.                                       | 2        | .005     | ...      | Q 1920         | Lock washer, 3/8"                       | 5        | .005     |
| ...      | Q 1920         | Lock washer, 3/8"  | 2        | .050     | ...      | 50139 D        | Fan housing sheet, left hand            | 1        | 4.250    |
| 17       | 91406 HA       | Hose clamp   | 2        | .045     | ...      | Q 4016         | Cap screw, 3/8 x 5/8" N.C.              | 6        | .039     |
| 18       | 50137 D        | Stiffener, front   | 11       | .005     | ...      | Q 1920         | Lock washer, 3/8"                       | 6        | .005     |
| ...      | Q 1802         | Cap screw, 3/8 x 1" N.C.   | 22       | .047     | ...      | 50134 D        | Radiator repair tube                    | As req.  | .063     |
| ...      | Q 1920         | Lock washer, 3/8"  | 11       | ...      | 33       | 50144 D        | Radiator grille screen                  | 1        | .750     |
| ...      | ...            | Cap screw, 3/8" N.C. x 1-1/8"                                      | 11       | ...      |          |                |   |          |          |

**SPARE PARTS CATALOG**

**WATER PUMP, FAN, AND THERMOSTAT**



| Ref. No. | I H C Part No. | Description                                       | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                              | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|----------|----------------|--|----------|----------|
| ...      | 57245 D        | Water pump (includes Ref. Nos. 2 and 10 thru 45). | 1        | 32.000   | 28       | 6963 DX        | Body, with plug and studs                | 1        | 15.000   |
| 1        | 32569 D        | Gasket  | 1        | .006     | ...      | Q 4043         | Cap screw, 1/2" N.C. x 3-1/4"            | 2        | .218     |
| 2        | 30824 D        | Gasket  | 1        | .008     | ...      | Q 1862         | Cap screw, 1/2" N.C. x 2-3/4"            | 1        | .185     |
| 3        | 6965 DX        | Thermostat housing                                | 1        | 9.750    | ...      | Q 1922         | Lock washer, 1/2"                        | 4        | .014     |
| ...      | Q 1804         | Cap screw, 3/8" N.C. x 1-1/4"                     | 4        | .063     | ...      | { 14187 DA     | Lubricator (Alemite No. 1611) (optional) | 1        | .003     |
| ...      | Q 1920         | Lock washer, 3/8"                                 | 4        | .007     | 29       | Q 3625         | Lubricator (Lincoln No. 5100) (optional) | 1        | .312     |
| ...      | .....          | Pipe plug, 1/4"                                   | 1        | .031     |          |                |  |          |          |

Don't order parts from the illustrations only; refer to the list also.

**SPARE PARTS CATALOG**

**WATER PUMP, FAN, AND THERMOSTAT (Continued)**

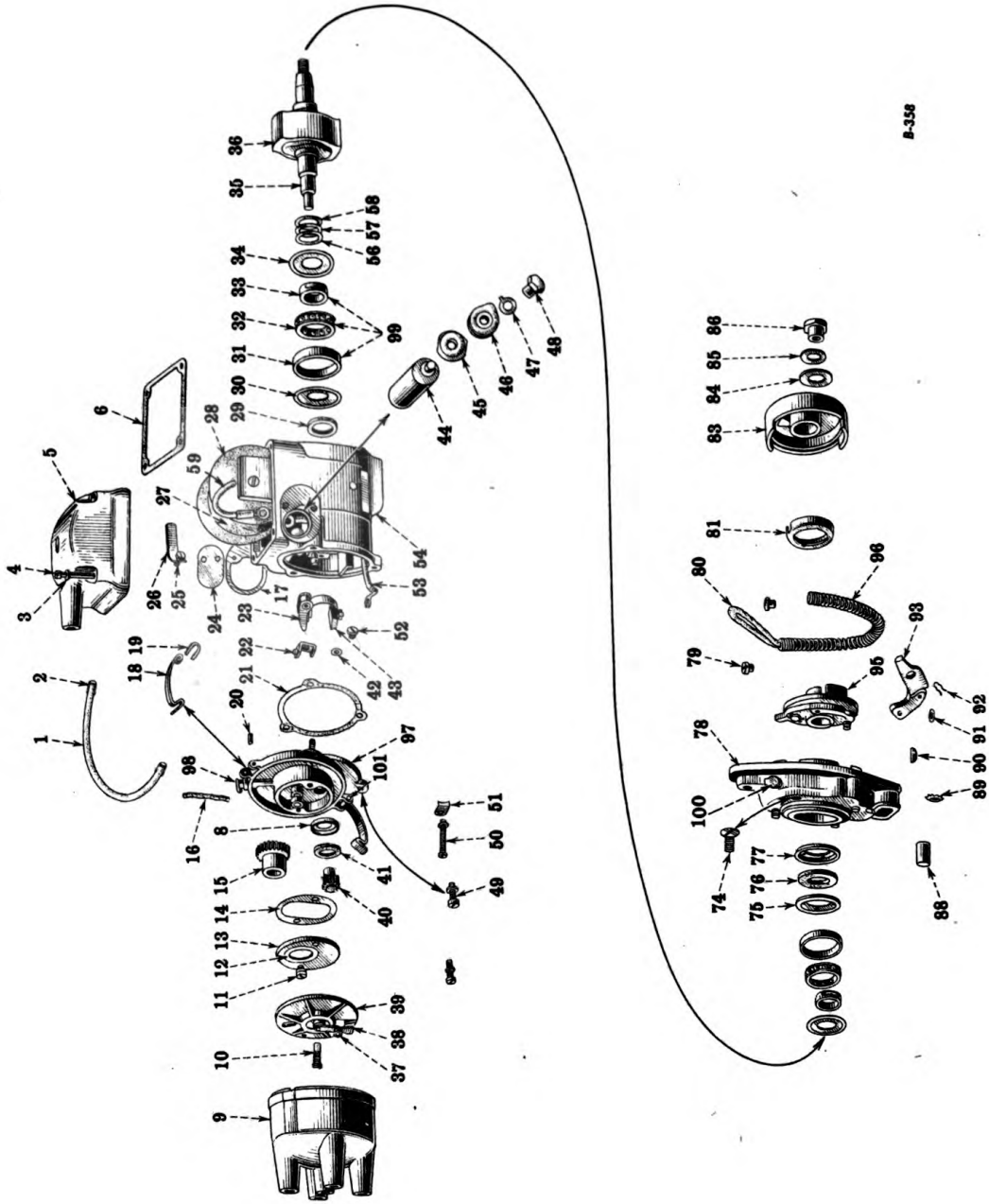
|     |          |                                     |    |    |          |   |   |       |
|-----|----------|-------------------------------------|----|----|----------|---|---|-------|
| 4   | 33814 D  | Thermostat (165° - 190°) (optional) | 1  | 1  | 50790 D  | Packing   | 1 | .020  |
|     | 37634 D  | Thermostat (165° - 190°) (optional) | 1  | 25 | 32349 D  | Body Spacer   | 2 | .003  |
| 5   | 50273 D  | Gasket                              | 1  | 26 | 18196 D  | Plug  | 1 | .001  |
| 6   | 6964 D   | Outlet elbow                        | 1  | 27 | 11657 D  | Body stud   | 6 | .063  |
| ... | Q 1850   | Cap screw, 1/2" N.C. x 1-1/4"       | 3  | 30 | QA 3628  | Lubricator, complete with cap (Lincoln No. A-5575) (optional) | 1 | .312  |
| ... | Q 1922   | Lock washer, 1/2"                   | 3  | 31 | Q 3659   | Lubricator cap (Lincoln No. 5560) (optional)                  | 1 | .312  |
| 7   | 27648 D  | Hose (1-5/8" I.D. x 2-3/8" long)    | 1  | 32 | 20300 D  | Felt washer   | 1 | .060  |
| 8   | 91406 HA | Hose clamp                          | 2  | 33 | 20290 D  | Oil seal, rear  | 1 | .437  |
| 9   | 30982 D  | Fan belt                            | 1  | 34 | 20308 D  | Bearing (optional) (New Departure No. 3207)                   | 2 | .687  |
| 10  | 20306 DX | Bearing retainer                    | 1  | 35 | ST 205 A | Bearing (optional) (IHC)                                      | 2 | .687  |
| 11  | 20293 D  | Bearing lock sleeve                 | 1  |    | 8023 DX  | Pulley hub, with oil seal                                     | 1 | 5.781 |
| 12  | 20299 D  | Nut                                 | 1  | 36 | 45993 D  | Spacer  | 1 | .313  |
| 13  | 20296 D  | Packing gland                       | 1  | 37 | 2370 DAX | Pulley flange   | 1 | 1.500 |
| 14  | 21259 D  | Fan. Cap screw, 5/16" N.C. x 1-1/8" | 1  | 38 | 20289 D  | Oil seal, front   | 1 | .313  |
| ... | ...      | Lock washer, 5/16"                  | 2  | 39 | 21839 D  | Gasket  | 1 | .005  |
| ... | Q 1919   | Rivet, 3/16 x 1/2"                  | 2  | 40 | 20301 D  | Driving stud  | 2 | .062  |
| ... | ...      | Cover                               | 16 | 41 | Q 1913   | Lock washer, 5/16"  | 2 | .003  |
| 15  | 3175 D   | Hex. nut, 1/4" N.F.                 | 1  | 42 | G 3792   | Spring  | 2 | .063  |
| ... | Q 1901   | Lock washer, 1/4"                   | 6  | 43 | 20586 D  | Pin   | 1 | .125  |
| ... | Q 1918   | Gasket                              | 6  | 44 | Q 1903   | Hex. nut, 5/16" N.F.  | 1 | .015  |
| 16  | 24941 D  | Impeller, with shaft                | 1  | 45 | Q 1919   | Lock washer, 5/16"  | 1 | .004  |
| 17  | 2557 DAX | Thrust bushing                      | 1  |    | 20585 D  | Driver  | 1 | .250  |
| 21  | 20303 D  | Sleeve, with bushings               | 1  |    | .....    | Hex. jam nut, 5/16" N.C.                                      | 1 | .015  |
| 22  | 45982 DX | Bushing                             | 1  |    | .....    | Set screw, 5/16" N.C. x 7/8"                                  | 1 | .012  |
| 23  | 24017 D  |                                     | 1  |    | .....    |   |   |       |

*When ordering, always use I H C Part Nos.*



# SPARE PARTS CATALOG

## MAGNETO



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*Don't order parts from the illustrations only; refer to the list also.*

SPARE PARTS CATALOG

MAGNETO - Continued

| Ref. No. | I H C Part No.           | Description   | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|--------------------------|---|----------|----------|----------|----------------|---|----------|----------|
| ...      | 49094 D                  | Magneto (IHC) (H-4) . . .                                 | 1        | 10.156   | 24       | 55015 D        | Condenser hole cover. . .                                     | 1        | .021     |
| ...      | .....                    | Cap screw, 3/8" N.C. x 1-7/8" . . .                       | 1        |          | ...      | .....          | Cadmium plated round head screw (No. 8 - 32 x 3/8") . . . . . | 2        | .003     |
| ...      | Q 1806                   | Cap screw, 3/8" N.C. x 1-1/2" . . .                       | 1        | .005     | ...      | .....          | Cadmium plated lock washer (No. 8) 3/64 x 3/64" . . . . .     | 2        | .001     |
| ...      | Q 1920                   | Lock washer, 3/8" . . . . .                               | 2        |          | ...      | .....          | Screw . . . . .   | 1        | .003     |
| 1        | 49125 D                  | Cable, with terminal. . . . .                             | 1        | .031     | 25       | E4A-546        | Cadmium plated lock washer (No. 4) . . . . .                  | 1        | .000     |
| 2        | 37291 D                  | Terminal. . . . .   | 2        | .001     | ...      | .....          | Secondary lead-out. . . . .                                   | 1        | .003     |
| 3        | 38609 DA                 | Washer. . . . .   | 4        | .009     | 26       | 47452 D        | Coil core . . . . .   | 1        | .250     |
| 4        | 49791 D                  | Screw . . . . .   | 4        | .531     | ...      | .....          | Coil with end insulators                                      | 1        | .031     |
| 5        | 47449 DAY                | Cover . . . . .   | 1        | .003     | 27       | 57926 DX       | Coil with core and end insulators . . . . .                   | 1        | .750     |
| 6        | 47453 D                  | Gasket. . . . .   | 1        | .003     | ...      | .....          | Flat head slotted screw, No. 8 - 32 x 5/8" . . . . .          | 2        | .004     |
| 8        | 49424 D                  | Distributor body felt retainer . . . . .                  | 1        | .406     | 28       | 49593 D        | Insulator . . . . .   | 2        | .006     |
| 9        | { 47413 DX<br>47413 DY   | Cap . . . . .   | 1        | .406     | 29       | E4 - 226       | Felt. . . . .   | 1        | .003     |
| 10       | { 32032 DXA<br>21550 DXA | Cap with brush and spring . . . . .                       | 1        | .003     | 30       | 47454 D        | Retainer, inner . . . . .                                     | 1        | .031     |
| 11       | .....                    | Brush and spring. . . . .                                 | 1        | .003     | 31       | E4A-352        | Bearing outer race. . . . .                                   | 2        | .057     |
| ...      | .....                    | Cadmium plated round head screws, 8 - 32 x 1/2" . . . . . | 2        | .004     | 32       | E4A-353        | Retainer with balls . . . . .                                 | 2        | .025     |
| 12       | { 49417 D<br>49418 D     | Cadmium plated lock washer (No. 8) 3/64 x 3/64" . . . . . | 2        | .001     | 33       | E4A-351        | Bearing inner race. . . . .                                   | 2        | .025     |
| 13       | 49416 DX                 | Felt retainer . . . . .                                   | 1        | .003     | 34       | E4A-324        | Oil flinger . . . . .   | 2        | .031     |
| 14       | 49419 D                  | Felt. . . . .   | 1        | .001     | 35       | 60094 D        | Cam . . . . .   | 1        | .077     |
| 15       | 49420 DX                 | Cover with felt seal, retainer and gasket. . . . .        | 1        | .093     | 36       | 49090 DXR      | Rotor with bearings and keeper . . . . .                      | 1        | 1.375    |
| 16       | E4 - 216                 | Gasket. . . . .   | 1        | .002     | 37       | 47427 D        | Nut . . . . .   | 1        | .001     |
| 17       | 48472 D                  | Spindle core and gear . . . . .                           | 1        | .108     | ...      | .....          | Cadmium plated lock washer (No. 6) 1/32 x 1/32" . . . . .     | 1        | .000     |
| 18       | 51666 D                  | Oil well felt . . . . .                                   | 1        | .003     | 38       | 47428 D        | Arm . . . . .   | 1        | .006     |
| 19       | 55855 D                  | Condenser hole cover gasket . . . . .                     | 1        | .006     | 39       | 47425 DX       | Distributor rotor . . . . .                                   | 1        | .093     |
| 20       | 47424 D                  | Spring. . . . .   | 2        | .007     | ...      | .....          | Distributor rotor with arm and nut . . . . .                  | 1        | .093     |
| 21       | 47408 D                  | Pin . . . . .   | 1        | .002     | 40       | 47417 DX       | Pinion and plug . . . . .                                     | 1        | .015     |
| 22       | 21368 DBX                | Pin . . . . .   | 1        | .001     | 41       | 49423 D        | Felt seal . . . . .   | 1        | .001     |
| 23       | 47431 DB                 | Gasket. . . . .   | 1        | .003     | 42       | 21394 D        | Washer . . . . .  | 1        | .003     |
|          |                          | Point with support. . . . .                               | 1        | .015     |          |                |   |          |          |
|          |                          | Breaker arm . . . . .                                     | 1        | .015     |          |                |   |          |          |

SPARE PARTS CATALOG

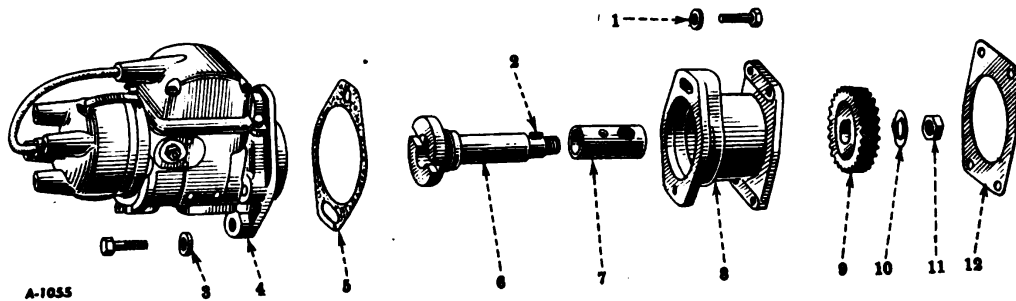
MAGNETO - Continued

| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|----------|----------------|---|----------|----------|
| 43       | 47432 D        | Spring anchor   | 1        | .004     | 80       | 47464 D        | Wick  | 1        | .006     |
| ...      | .....          | Cadmium plated flat head slotted screw (No. 8 - 32 x 3/8")      | 1        | .003     | 81       | 47394 D        | Felt retainer   | 1        | .031     |
| ...      | .....          | Cadmium plated hex nut (No. 8 - 32)                             | 1        | .006     | 83       | 49093 DX       | Drive member and spring stop  | 1        | .500     |
| ...      | .....          | Cadmium plated lock washer (No. 8) 3/64 x 3/64"                 | 1        | .001     | 84       | 24603 D        | Washer  | 1        | .031     |
| 44       | 21409 DB       | Condenser   | 1        | .077     | 85       | .....          | Cadmium plated lock washer, 1/2"  | 1        | .013     |
| 45       | 47438 DA       | Washer, inner   | 1        | .006     | 86       | 47470 D        | Nut   | 1        | .031     |
| 46       | 48341 D        | Washer, outer   | 1        | .006     | 88       | 47468 D        | Stop pin  | 1        | .093     |
| 47       | 48342 DA       | Lock washer   | 1        | .001     | 89       | 46785 D        | Lock washer (Shakeproof No. 1514)   | 4        | .000     |
| 48       | 48340 DA       | Terminal  | 1        | .006     | 90       | 4167 T         | Key   | 1        | .004     |
| 49       | 47409 D        | Screw   | 3        | .012     | 91       | 47461 D        | Washer  | 2        | .002     |
| ...      | .....          | Cadmium plated lock washer (No. 10) 1/16" x 3/64"               | 3        | .002     | 92       | 47462 D        | Snap ring   | 2        | .006     |
| 50       | .....          | Screw, No. 8 - 32 x 1-1/4"                                      | 1        | .010     | 93       | 49092 D        | Pawl  | 2        | .050     |
| 51       | 48339 D        | Clip  | 1        | .006     | 95       | 49091 DX       | Magneto member and pawl pin   | 1        | .187     |
| ...      | .....          | Cadmium plated lock washer (No. 8) 3/64 x 3/64"                 | 1        | .006     | 96       | 49091 DY       | Magneto member (includes 49091 DX and Ref. Nos. 91, 92 and 93)            | 1        | .312     |
| 52       | 21393 D        | Screw   | 1        | .006     | 97       | 47322 D        | Spring  | 1        | .046     |
| 53       | 47433 DX       | Primary lead-out and terminal                                   | 1        | .004     | .....    | 6483 DY        | Distributor body (includes Ref. Nos. 16, 18 thru 21, 41, 98 and 101)      | 1        | .250     |
| 54       | 6482 DAY       | Frame (includes Ref. Nos. 17, 24, 29, 30 and 31)                | 1        | .006     | .....    | 56066 D        | Distributor body (includes Ref. Nos. 11 thru 15, and 40)                  | 1        | 8.000    |
| 56       | E4A-305        | Shim, light   | As req.  | 1.750    | 98       | E4 -295        | Oiler   | 1        | .060     |
| 57       | E4 -212        | Shim, medium  | As req.  | .003     | 99       | E4 -294        | Bearing   | 1        | .078     |
| 58       | E4A-372        | Shim, heavy   | As req.  | .005     | 100      | 27311 D        | Oiler   | 2        | .006     |
| 59       | 47442 D        | Primary to condenser lead-out tube                              | 1        | .002     | 101      | 51667 D        | Distributor cap spring pin  | 1        | .000     |
| 74       | .....          | Screw, 1/4" - 20 x 9/16"  | 4        | .005     | .....    | 21342 D        | Breaker cam key   | 1        | .002     |
| 75       | 47474 D        | Retainer, inner   | 1        | .020     | ...      | 49091 DZ       | Rotating unit (includes 49093 DX and Ref. Nos. 79 thru 83 and 91 thru 96) | 1        | .906     |
| 76       | 47475 DA       | Oil seal  | 1        | .002     | ...      | 57314 D        | Magnet keeper   | 1        | .375     |
| 77       | 47473 D        | Retainer, outer   | 1        | .005     | ...      | .....          | .....   | .....    | .....    |
| 78       | 6783 DX        | Mounting flange (includes Ref. Nos. 31, 75, 76, 77, 88 and 100) | 1        | .438     | .....    | .....          | .....   | .....    | .....    |
| 79       | 47465 D        | Button  | 2        | .009     | .....    | .....          | .....   | .....    | .....    |

When ordering, always use I H C Part Nos.

**SPARE PARTS CATALOG**

**MAGNETO DRIVE**



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

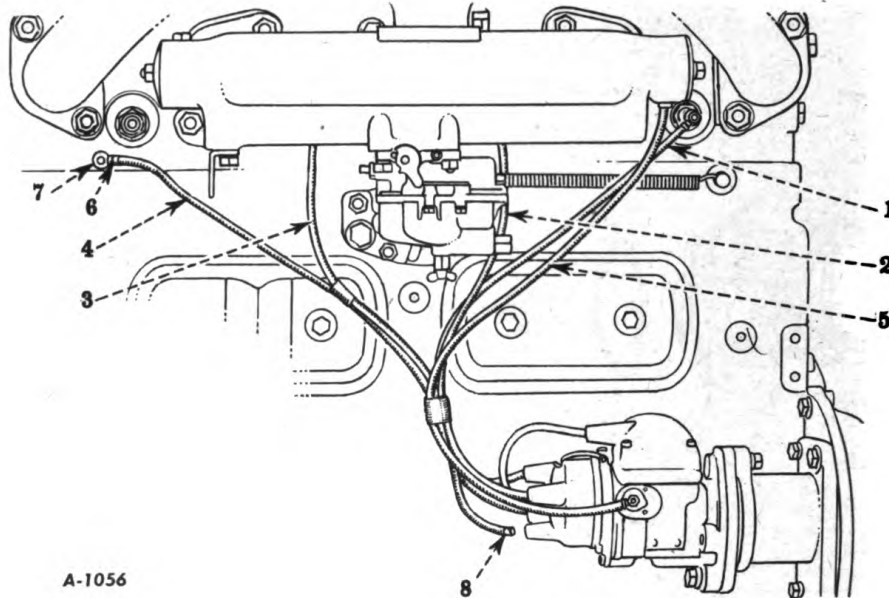
| Ref. No. | I H C Part No. | Description                               | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 1        | 62493 D        | Bolt washer . . . . .                     | 1        | .015     |
| 2        | 4167 T         | Key . . . . .                             | 1        | .012     |
| 3        | 62493 D        | Bolt washer . . . . .                     | 1        | .016     |
| 4        | 49094 D        | Magneto . . . . .                         | 1        | 8.046    |
| ...      | .....          | Cap screw, 3/8 - 16 x 1-7/8" N.C. . . . . | 1        | .063     |
| ...      | Q 1806         | Cap screw, 3/8 - 16 x 1-1/2" N.C. . . . . | 1        | .063     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .               | 2        | .005     |
| 5        | 55780 DA       | Flange gasket . . . . .                   | 1        | .003     |
| 6        | 45001 D        | Magneto drive shaft . . . . .             | 1        | 1.440    |
| 7        | 24473 D        | Bushing . . . . .                         | 1        | .156     |
| 8        | 8394 DX        | Bracket, with bushings. . . . .           | 1        | 6.000    |
| ...      | .....          | Cap screw; 3/8" N.C. x 1-3/8" . . . . .   | 4        | .047     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .               | 4        | .000     |
| 9        | 53264 D        | Gear (27 teeth) . . . . .                 | 1        | .875     |
| 10       | 45003 D        | Nut lock . . . . .                        | 1        | .062     |
| 11       | .....          | Hex. jam nut, 5/8" N.F. . . . .           | 1        | .063     |
| 12       | 50360 D        | Gasket . . . . .                          | 1        | .008     |

*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*

## SPARE PARTS CATALOG

### SPARK PLUG CABLES



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

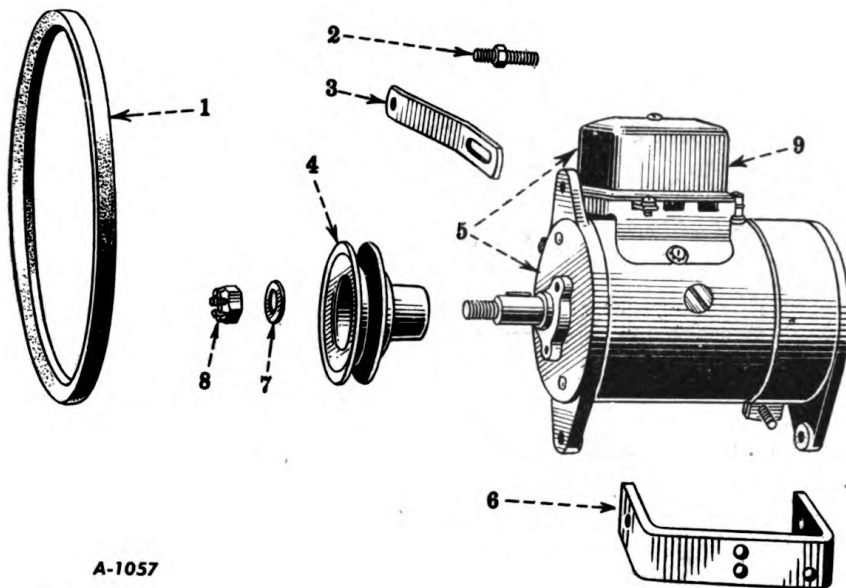
| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| ...      | 53263 DA       | Spark plug cable assembly . . . . .                                   | 1        | .375     |
| 1        | 49359 D        | Cable No. 1 . . . . .   | 1        | .063     |
| 2        | 29873 D        | Cable No. 2 . . . . .   | 1        |          |
| 3        | 29340 D        | Cable No. 3 . . . . .   | 1        |          |
| 4        | 29874 D        | Cable No. 4 . . . . .   | 1        | .130     |
| 5        | 53262 D        | Short circuiting cable. . . . .                                       | 1        | .125     |
| ...      | .....          | Cadmium plated fillister head screw,<br>No. 10 - 32 x 5/16" . . . . . | 1        | .005     |
| ...      | .....          | Cadmium plated fillister head screw,<br>No. 10 - 32 x 3/8" . . . . .  | 1        | .004     |
| ...      | .....          | Cadmium plated lock washer, No. 10. . . . .                           | 2        | .002     |
| 6        | 27618 D        | Cable reinforcement . . . . .   | 4        | .001     |
| 7        | 1924 T         | Cable terminal (ring type). . . . .                                   | 6        | .002     |
| 8        | 37291 D        | Cable terminal (push type). . . . .                                   | 4        | .001     |

*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**GENERATOR, PULLEY AND BRACKETS**



A-1057

*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

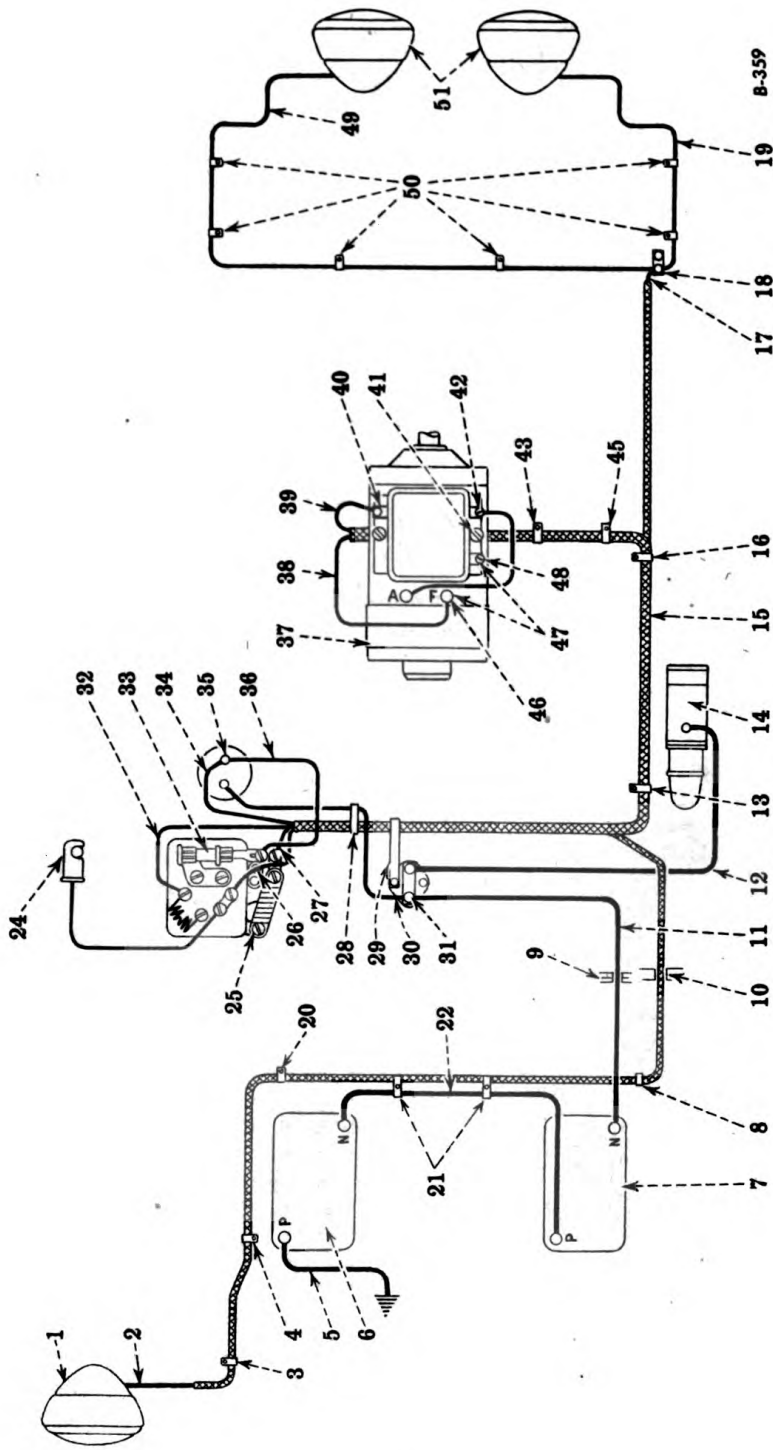
| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 54857 DA       | Belt. . . . .  | 1        | .188     |
| 2        | 50893 D        | Water pump stud (for generator brace)                                | 1        | .250     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .  | 1        | .006     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .  | 1        | .005     |
| 3        | 50892 DA       | Generator brace . . . . .  | 1        | .250     |
| ...      | Q 4014         | Cap screw, 5/16" N.C. x 5/8" . . . . .                               | 1        | .026     |
| ...      | Q 1919         | Lock washer, 5/16" . . . . .   | 1        | .004     |
| ...      | Q 397          | Washer, 11/32" I.D. x 3/4" O.D.<br>No. 16 gage . . . . .             | 1        | .006     |
| 4        | 8081 D         | Pulley. . . . .  | 1        | 1.000    |
| 5        | 50895 D        | Generator with relay (12 volt) (Delco<br>Remy No. 1101725) . . . . . | 1        | 18.625   |
| ...      | .....          | Cotter, 3/32 x 1" . . . . .  | 1        | .001     |
| 6        | 50891 D        | Generator bracket . . . . .  | 1        | 2.125    |
| ...      | .....          | Cap screw, 5/16" N.C. x 1-1/8" . . . . .                             | 2        | .034     |
| ...      | Q 1830         | Cap screw, 7/16" N.C. x 1" . . . . .                                 | 3        | .065     |
| ...      | Q 1904         | Hex. nut, 5/16" N.C. . . . .   | 2        | .016     |
| ...      | Q 1919         | Lock washer, 5/16" . . . . .   | 2        | .004     |
| ...      | Q 1921         | Lock washer, 7/16" . . . . .   | 3        | .010     |
| 7        | Q 1922         | Washer, 1/2" . . . . .   | 1        | .013     |
| 8        | .....          | Castle hex. nut, 1/2" N.F. . . . .                                   | 1        | .016     |
| 9        | 42998 D        | Generator relay (Delco-Remy No.<br>1116777) . . . . .                | 1        | .938.    |

*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**ELECTRIC STARTING AND LIGHTING UNIT  
WIRING DIAGRAM**



| Ref. No. | I H C Part No. | Description   | Ref. No. | I H C Part No. | Description                       |
|----------|----------------|---|----------|----------------|-----------------------------------|
| 1        | 43035 D        | Tail lamp.  | 26       | .....          | Cable - switch to rear lamp.      |
| 2        | .....          | Switch cable - black with white tracer.             | 27       | .....          | Black with white tracer.          |
| 3        | 62302 D        | Clip - on fender mounting carriage bolt in bracket. | 28       | 23428 D        | Cable - generator field to switch |
|          |                |   |          |                | - natural with black tracer.      |
|          |                |   |          |                | Clip.                             |

**SPARE PARTS CATALOG**

**ELECTRIC STARTING AND LIGHTING UNIT  
WIRING DIAGRAM - Continued**

|    |           |   |    |          |   |
|----|-----------|---|----|----------|---|
| 4  | 60938 D   | Clip - on fender mounting bolt.   | 29 | 63763 D  | Clip - on starting switch mounting bolt.  |
| 5  | 42833 D   | Cable - battery to ground. Ground cable on fuel tank mounting bolt - second from rear.  | 30 | 57055 DX | Cable - starting switch to ammeter.   |
| 6  | 60912 DNS | Battery.  | 31 | 64931 H  | Starting switch.  |
| 7  | 55467 D   | Battery.  | 32 | .....    | Cable - switch to junction block, black.  |
| 8  | 60912 DNS | Battery.  | 33 | 10815 V  | Fuse.   |
| 9  | 55467 D   | Battery.  | 34 | .....    | Cable - generator to ammeter - natural with black and red cross tracers.  |
| 10 | 61813 D   | Clip - on seat support front.   | 35 | 42383 D  | Ammeter.  |
| 11 | 50203 H   | Battery cable grommet (in dash).  | 36 | .....    | Cable - ammeter to switch.  |
| 12 | 6838 HA   | Grommet - in dash.  | 37 | 50895 D  | Generator.  |
| 13 | 57056 D   | Cable - battery to starting switch.   | 38 | .....    | Cable - generator to field switch   |
| 14 | 50899 D   | Cable - starting switch to starting motor.  | 39 | .....    | - natural with black tracer.  |
| 15 | 60938 D   | Clip - on side angle - (use 3/8 N.C. x 1" cap screw, nut and lock washer).  | 40 | .....    | Cable - generator to ammeter - natural with black and red cross tracer.   |
| 16 | 37753 D   | Starting motor.   | 41 | .....    | "BAT" terminal on relay.  |
| 17 | 50894 D   | Cable harness, cpt.   | 42 | .....    | Relay mounting screw.   |
| 18 | 60938 D   | Clip - on side angle - (use 3/8 N.C. x 1" hex. hd. cap screw, nut and lock washer).   | 43 | 62302 D  | "GEN" terminal on relay.  |
| 19 | 31522 DX  | Cable - switch to junction block - black.   | 44 | .....    | Clip - on generator mounting bracket front bolt.  |
| 20 | 61813 D   | Junction block.   | 45 | 60938 D  | Clip - on magneto bracket bolt.   |
| 21 | 56278 D   | Cable - right head lamp to junction block.  | 46 | .....    | "F" terminal on generator frame.  |
| 22 | 50897 D   | Clip - on seat support front.   | 47 | .....    | Remove short lead connecting "F" terminal on frame to "F" terminal on relay. Connect generator field to switch cable directly to "F" terminal on generator frame. |
| 23 | 65534 D   | Clip - on seat support front. (Use 3/8 N.C. x 3/4" cap screw, nut and lock washer).   | 48 | .....    | "F" terminal on relay.  |
| 24 | 57311 DX  | Cable - battery to battery.   | 49 | 32046 DX | Cable - left head lamp to junction block.   |
| 25 | .....     | Dash lamp.  | 50 | 60938 D  | Clip - on fan shroud bolts.   |
|    |           | Lighting switch. A good electrical connection must be established between switch and switch mounting to complete generator field circuit. | 51 | 43035 D  | Head lamp mounted on top of radiator.   |



## SPARE PARTS CATALOG

### ELECTRICAL EQUIPMENT

| I n C<br>Part No. | Description  | No.<br>Used | Wt.<br>Lbs. |
|-------------------|--|-------------|-------------|
| 28428 D           | Cable clamp. . . . .   | 1           | .031        |
| *37753 D          | Starting motor (Delco-Remy No. 710) 12 volt.   | 1           | 45.000      |
| Q 4075            | Cap screw, 9/16" N.F. x 1-1/8" . . . . .   | 3           |             |
| Q 1924            | Lock washer, 9/16" . . . . .   | 3           | .641        |
| 42383 D           | Ammeter.(AC Model AM-1801) . . . . .   | 1           | .250        |
| 42915 D           | Head lamp junction block . . . . .   | 1           | .013        |
| .....             | Round head machine screw, #10-24 x 1/2" . . . . .  | 1           | .005        |
| .....             | Hex. nut, #10-24 (Type F) . . . . .  | 1           | .006        |
| Q 1916            | Lock washer, #10 . . . . .   | 1           | .002        |
| 42916 D           | Head lamp junction block bracket . . . . .   | 1           | .016        |
| 42917 D           | Head lamp junction block and bracket assembly  | 3           | .063        |
| 42921 D           | Head lamp bracket. . . . .   | 2           | .750        |
| Q 1848            | Cap screw, 1/2" N.C. x 1" . . . . .  | 4           | .070        |
| Q 1922            | Lock washer, 1/2" . . . . .  | 4           | .013        |
| 42921 D           | Rear lamp bracket. . . . .   | 1           |             |
| Q 1847            | Capscrew, 1/2 N.F. x 1" . . . . .  | 2           | .100        |
| Q 1909            | Hex. nut, 1/2" N.F. . . . .  | 2           | .035        |
| Q 1922            | Lockwasher, 1/2" . . . . .   | 2           | .013        |
| 43035 D           | Head lamp, left hand and right hand and rear<br>lamp (see details on page 10) . . . . .                | 3           | 7.186       |
| *50895 D          | Generator (12 volt) Delco-Remy 1,101,725<br>(for belt, brackets, relay, etc., see<br>page 5) . . . . . | 1           | 18.625      |
| 54044 D           | Starting motor shield. . . . .   | 1           | 3.250       |
| Q 1802            | Cap screw, 3/8" N.C. x 1" . . . . .  | 2           | .045        |
| Q 4016            | Hex. nut, 3/8" N.C. (Type D) . . . . .   | 2           | .010        |
| Q 1920            | Lock washer, 3/8" . . . . .  | 2           | .005        |
| 54064 D           | Battery cable shield . . . . .   | 1           | .047        |
| Q 4016            | Cap screw, 3/8" N.C. x 5/8" . . . . .  | 3           | .039        |
| Q 1906            | Hex. nut, 3/8" N.C. . . . .  | 3           | .020        |
| Q 1920            | Lock washer, 3/8" . . . . .  | 3           | .005        |
| 55752 D           | Choke control rod and button assembly. . . . .   | 1           | .250        |
| .....             | Cotter, 1/16 x 3/8" . . . . .  | 1           | .001        |
| 56278 D           | Battery cable clip . . . . .   | 2           |             |
| Q 1800            | Cap screw, 3/8" N.C. x 3/4" . . . . .  | 2           | .035        |
| Q 1906            | Hex. nut, 3/8" N.C. . . . .  | 2           | .020        |
| Q 1920            | Lock washer, 3/8" . . . . .  | 2           | .005        |
| 57311 DX          | Lighting switch, complete (see details on<br>page 11). . . . .   | 1           | .625        |
| .....             | Lock washer, #8 . . . . .  | 1           | .002        |
| 60938 D           | Loom clip, 1/4" for 3/8" bolt. . . . .   | 10          | .016        |
| Q 1802            | Cap screw, 3/8" N.C. x 1" . . . . .  | 2           | .045        |
| Q 1906            | Hex. nut, 3/8" N.C. . . . .  | 2           | .020        |
| Q 1920            | Lock washer, 3/8" . . . . .  | 2           | .005        |
| 61813 D           | Tail lamp cable clip . . . . .   | 3           | .031        |
| 62302 D           | Loom clip (1/4" for 1/2" bolt) . . . . .   | 2           | .041        |
| 63763 D           | Cable harness clip . . . . .   | 1           | .031        |
| 65534 D           | Dash lamp. . . . .   | 1           | .125        |
| 6838 HA           | Rear lamp grommet. . . . .   | 1           |             |
| 29939 H           | Dash lamp bulb . . . . .   | 1           |             |
| 50203 H           | Battery cable grommet. . . . .   | 1           |             |
| 64931 H           | Starting switch (Delco-Remy No. 405-C) . . . . .   | 1           | .500        |
| Q 1753            | Cap screw, 1/4" N.F. x 1/2" . . . . .  | 2           | .008        |
| Q 1901            | Hex. nut, 1/4" N.F. . . . .  | 2           | .010        |
| Q 1918            | Lock washer, 1/4" . . . . .  | 2           | .001        |
| 10815 V           | Lighting switch fuse . . . . .   | 1           | .002        |

\* All service and replacement parts should be referred to an Authorized United Motors Service Station or Branch.

## SPARE PARTS CATALOG

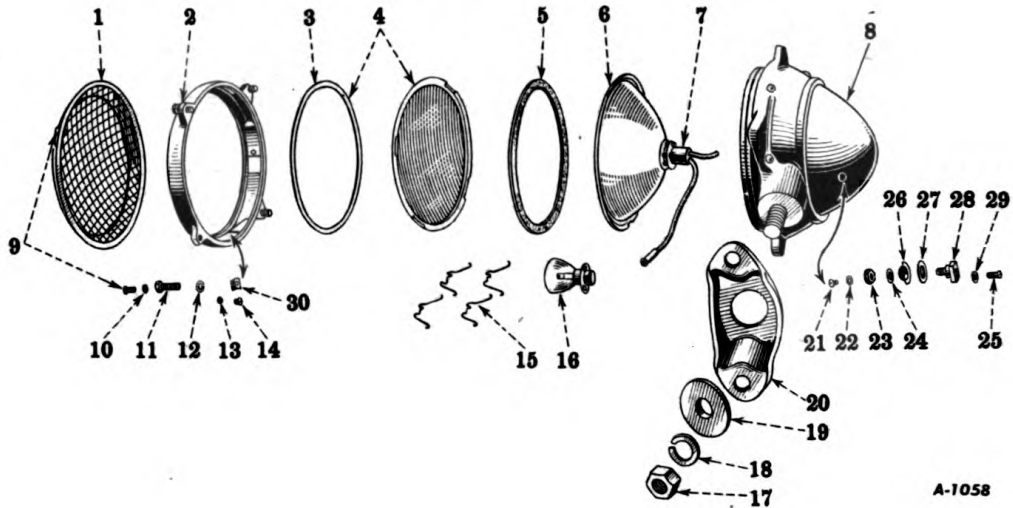
## ELECTRICAL CABLES

| I H C<br>Part No. | Description   | No.<br>Used | Wt.<br>Lbs. |
|-------------------|---|-------------|-------------|
| 31522 DX          | Right head lamp cable (includes (2) terminals #38433 D, loom #38433 D, and (2) clamp rings #27618 D) . . . . .  | 1           |             |
| 32046 DX          | Left head lamp cable (includes (2) terminals #38433 D, loom #30701 D, and (2) clamp rings #27618 D) . . . . .   | 1           | .234        |
| 42833 D           | Battery to ground cable (includes positive terminal with bolt #38778 D) . . . . .   | 1           | 1.000       |
| 50894 D           | Lighting cable harness (includes (7) terminals #38433 D, terminal #27637 H, and (8) insulators #28499 H) . . . . .  | 1           | 1.500       |
| 50897 D           | Battery to battery cable (includes negative terminal with bolt #26376 H, positive terminal with bolt #26375 H, insulator #41910 D and insulator #41913 D) . . . . . | 1           | 1.906       |
| 50899 D           | Starting switch to starting motor cable (includes terminal #46074 H, terminal #23431 D, casing #66299 D, and (2) insulator #41911 D) . . . . .                      | 1           | 1.671       |
| 57055 DX          | Starting switch to ammeter cable (includes terminal #38433 D, terminal #38937 D, loom #27378 D, and (2) clamp rings #27618 D) . . . . .                             | 1           | .063        |
| 57056 D           | Battery to starting switch cable (includes negative terminal with bolt #26376 H, terminal #46074 H, casing #57057 D and (2) insulators #41912 D) . . . . .          | 1           | 2.906       |
| 61645 D           | Ammeter to lighting switch cable (includes (2) terminals #38433 D, and (2) insulators #28500 H) . . . . .   | 1           | .050        |

*When ordering, always use I H C Part Nos.*

**SPARE PARTS CATALOG**

**HEAD AND REAR LAMPS (43035 D)**

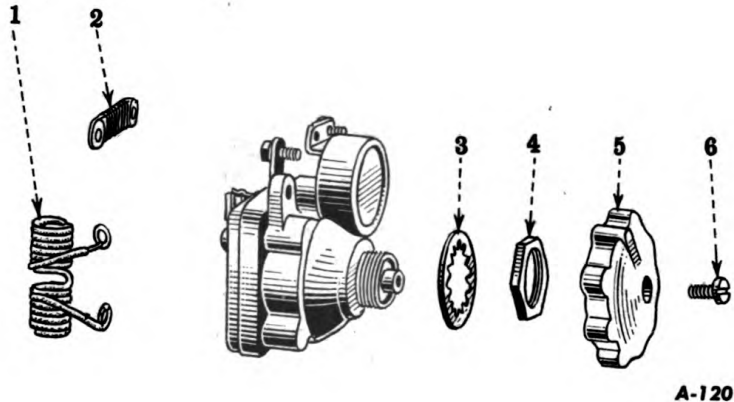


A-1058

| Ref. No. | I H C Part No. | Guide Lamp Co. No. | Description  | No. Used Per Lamp | Wt. Lbs. |
|----------|----------------|--------------------|--|-------------------|----------|
| ...      | 51888 D        | 923754             | Door and guard assembly with lens. . . . .         | 1                 |          |
| ...      | 51895 D        | 924021             | Terminal plate assembly. . .                       | 1                 |          |
| 1        | 51891 D        | 923756             | Guard assembly . . . . .                           | 1                 | .500     |
| 2        | 51889 D        | 923775             | Door only. . . . .                                 | 1                 | 1.265    |
| 3        | 51970 D        | 921636             | Gasket . . . . .                                   | 1                 | .016     |
| 4        | 50784 D        | 921634             | Lens with gasket . . . . .                         | 1                 | .750     |
| 5        | 51892 D        | 921638             | Door gasket. . . . .                               | 1                 | 1.688    |
| 6        | 51894 D        | 924079             | Reflector. . . . .                                 | 1                 | .375     |
| 7        | 51893 D        | 924023             | Socket assembly with wire. .                       | 1                 | .063     |
| 8        | 51887 D        | 921627             | Body assembly . . . . .                            | 1                 | 3.250    |
| 9        | Q 1915         | 121839             | Screw, No. 6 - 32 x 3/8" . .                       | 4                 | .004     |
| 10       | 41229 H        | .....              | Lock washer, No. 6 (Shakeproof No. 1206) . . . . . | 4                 |          |
| 11       | Q 4001         | 121893             | Cap screw, 1/4" N.C. x 7/8".                       | 4                 | .160     |
| 12       | Q 1918         | .....              | Lock washer, 1/4" . . . . .                        | 4                 | .002     |
| 13       | Q 1915         | 106495             | Lock washer, No. 6 . . . . .                       | 1                 | .000     |
| 14       | .....          | 132684             | Screw, No. 6 - 32 x 3/16". .                       | 1                 | .001     |
| 15       | 50539 H        | 914255             | Spring . . . . .                                   | 4                 |          |
| 16       | 66340 H        | .....              | Bulb - 12 volt (Mazda No. 2326) . . . . .          | 1                 |          |
| 17       | .....          | 103030             | Hex. jam nut, 5/8" N.F. . . .                      | 1                 | .063     |
| 18       | Q 1925         | .....              | Lock washer, 5/8" . . . . .                        | 1                 | .031     |
| 19       | 36273 D        | 234869             | Washer . . . . .                                   | 1                 | .002     |
| 20       | 42921 D        | .....              | Bracket. . . . .                                   | 1                 | .750     |
| ...      | Q 1848         | .....              | Cap screw, 1/2" N.C. x 1". . .                     | 4                 | .070     |
| ...      | Q 1922         | .....              | Lock washer, 1/2". . . . .                         | 4                 | .013     |
| 21       | .....          | 115598             | Screw, No. 8 - 32 x 1/4" . . .                     | 1                 | .005     |
| 22       | 48716 H        | 138530             | Lock washer, (Shakeproof No. 1208) . . . . .       | 1                 | .000     |
| 23       | 37063 D        | 134566             | Nut. . . . .                                       | 1                 | .010     |
| 24       | Q 1919         | 112723             | Lock washer, . . . . .                             | 1                 | .004     |
| 25       | .....          | 115548             | Screw, No. 8 - 32 x 1/4" . . .                     | 1                 | .004     |
| 26       | 37072 D        | 918652             | Cup. . . . .                                       | 1                 | .000     |
| 27       | 37075 D        | 918653             | Insulating washer. . . . .                         | 1                 | .001     |
| 28       | 37064 D        | 918651             | Terminal plate . . . . .                           | 1                 | .008     |
| 29       | 48716 H        | 138530             | Lock washer, (Shakeproof No. 1208) . . . . .       | 1                 | .001     |
| ...      | 51898 D        | 924753             | Clip . . . . .                                     | 1                 | .004     |

**SPARE PARTS CATALOG**

**DETAIL PARTS OF LIGHT SWITCH (57311 DX)**



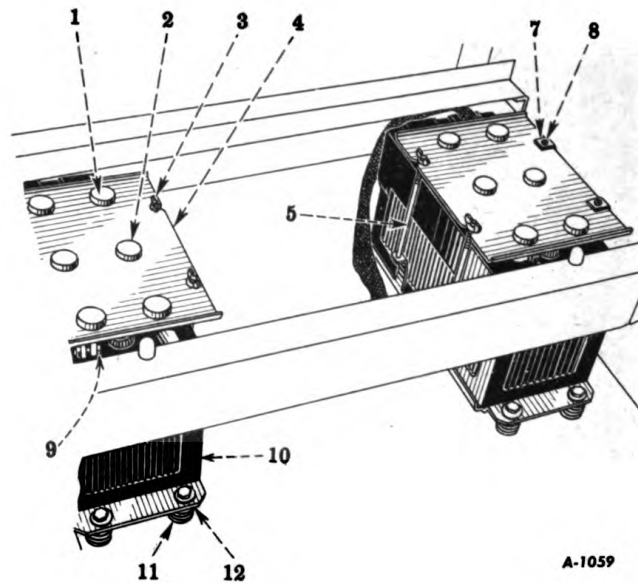
A-120

| Ref. No. | I H C Part No. | Delco-Remy No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|----------------|--|----------|----------|
| ...      | 57311 DX       | 1994020        | Lighting switch (12 volt) . .                      | 1        | .125     |
| 1        | 43039 D        | 1877830        | Dimmer resistance coil . . . .                     | 1        | .016     |
| 2        | 43040 D        | 1877831        | Generator field resistance coil . . . . .          | 1        | .016     |
| 3        | 49425 H        | .....          | Switch lock washer (Shake-proof No. 1230). . . . . | 1        | .006     |
| 4        | 57312 D        | 1882012        | Switch mounting nut . . . . .                      | 1        | .000     |
| 5        | 57313 D        | 1882013        | Switch knob . . . . .                              | 1        | .083     |
| 6        | 64022 H        | 1864099        | Knob mounting screw . . . . .                      | 1        | .004     |

*When ordering, always use I H C Part Nos.*

## SPARE PARTS CATALOG

### BATTERIES AND CONNECTIONS



A-1059

*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 50234 D        | Battery hold-down rubber, short. . . . .                                     | 4        | .047     |
| 2        | 50235 D        | Battery hold-down rubber, long . . . . .                                     | 8        | .063     |
| 3        | Q 3505         | Wing nut, 5/16" N.C. . . . .   | 4        | .184     |
| 4        | 41832 DBX      | Cover, with hold-down rubbers. . . . .                                       | 2        | 4.500    |
| 5        | 52435 D        | Clamp bolt . . . . .   | 4        | .219     |
| 7        | 41831 D        | Stud washer . . . . .  | 4        | .031     |
| 8        | 41830 D        | Clamp stud . . . . .   | 4        | .313     |
| ...      | Q 1904         | Hex. nut, 5/16" N.C. . . . .   | 16       | .016     |
| 9        | 57056 D        | Battery to starting switch cable . . . . .                                   | 1        | 2.906    |
| 10       | 55467 D        | Battery (Willard 5244 Type DRG-15-3).<br>(optional with 60912 DNS) . . . . . | 2        | 70.000   |
|          | 60912 DNS      | Battery (Auto-Lite No. H-15) (option-<br>al) . . . . .                       |          |          |
| 11       | 37976 D        | Bottom rest spring . . . . .   | 8        | .125     |
| 12       | 47868 DX       | Bottom support . . . . .   | 2        | 5.500    |
| ...      | Q 1857         | Cap screw, 1/2" N.C. x 2-1/4" . . . . .                                      | 8        | .167     |
| ...      | .....          | Washer, 17/32" I.D. x 1-1/4" O.D.<br>(14 ga.) . . . . .                      |          |          |
| ...      | 41827 D        | Battery bottom mounting spacer . . . . .                                     |          |          |

*When ordering, always use I H C Part Nos.*

## SPARE PARTS CATALOG

### ENGINE

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| Camshaft . . . . .                     | 3        |
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| Crankcase Guard. . . . .               | 5        |
| Crankcase Oil Pan. . . . .             | 7        |
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### COMPLETE ENGINE REPLACEMENT

- 67936 D ENGINE COMPLETE; also includes ACCESSORIES shown in COLUMN 1.
- 68274 D ENGINE COMPLETE; also includes ACCESSORIES shown in COLUMN 2.
- 67937 D ENGINE COMPLETE; also includes ACCESSORIES shown in COLUMN 3.
- 67938 D ENGINE COMPLETE; also includes ACCESSORIES shown in COLUMN 4.

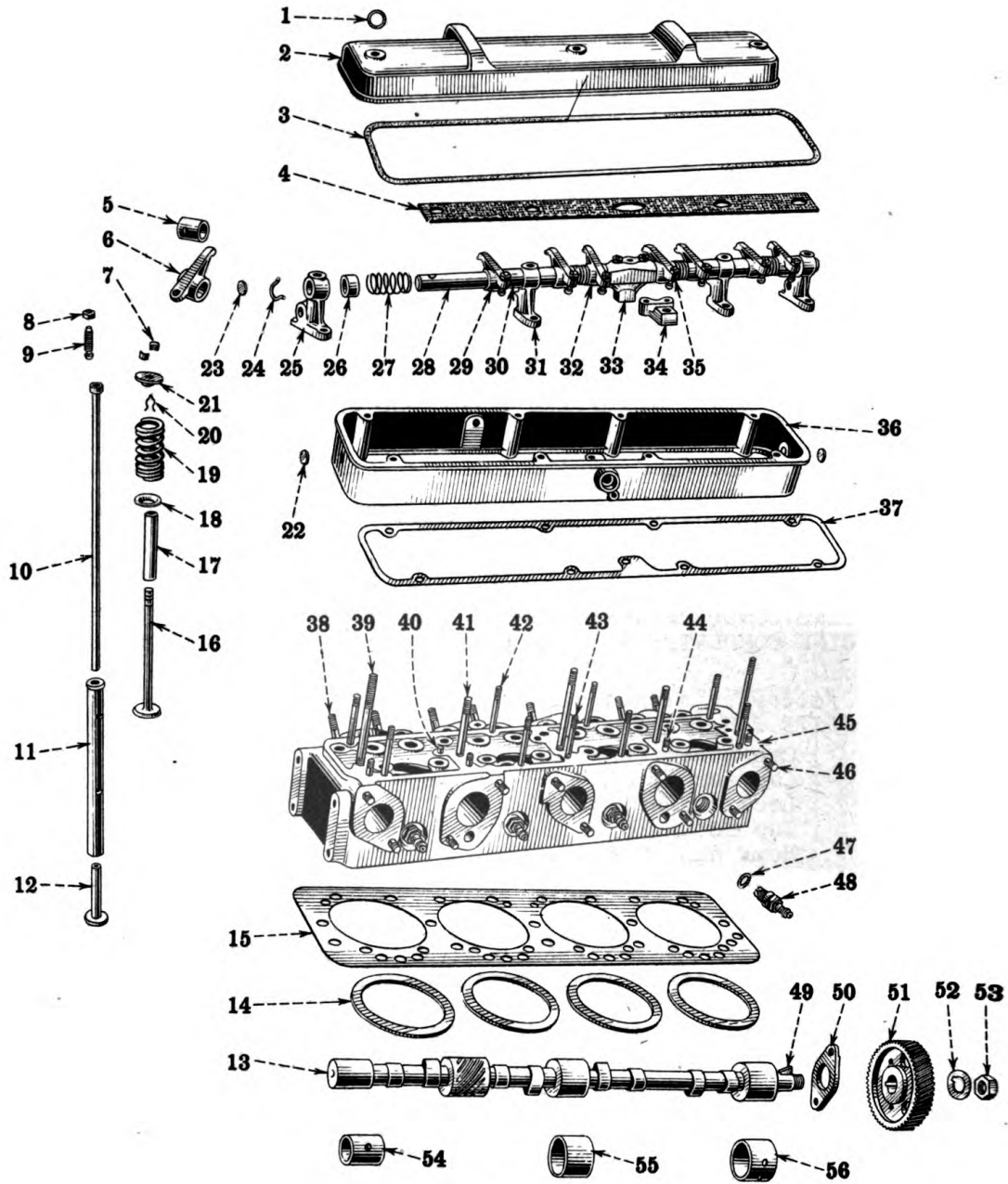
**NOTE:** The following standard parts are used to attach the above COMPLETE ENGINES.

|  |   |
|--|---|
| Cap screw, 5/8" N.C. x 1-1/2". . . . . | 6 |
| Cap screw, 5/8" N.C. x 2-3/8". . . . . | 2 |
| Lock washer, 5/8". . . . .             | 8 |
| Cap screw, 5/8" N.F. x 3-3/4". . . . . | 2 |
| Hex. nut, 5/8" N.F. . . . .            | 2 |
| Lock washer, 5/8". . . . .             | 2 |

| ACCESSORIES   | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Cylinder head, complete with injection nozzles and spark plugs. . . . . | X | X | X | X |
| Diesel starting mechanism . . . . .                                     | X | X | X | X |
| Oil level gauge . . . . .   | X | X | X | X |
| Manifolds . . . . .   | X | X | X | X |
| Fan drive pulley. . . . .   | X | X | X | X |
| Flywheel. . . . .   | X | X | X | X |
| Water outlet elbow and thermostat . . . . .                             | X | X | X | X |
| Rear engine support with studs, dowels and mounting bolts               | X | X | X | X |
| Front engine support with shims and mounting bolts. . . .               | X | X | X | X |
| Carburetor. . . . .   | X | X | X | - |
| Magneto and wiring. . . . .   | X | X | X | - |
| Diesel fuel injection pump and filter system. . . . .                   | X | X | X | - |
| Lubricating oil filter. . . . .   | X | X | X | - |
| Water pump with fan and fan belt. . . . .                               | X | X | X | - |
| Starting motor. . . . .   | X | X | - | - |
| Generator with belt . . . . .   | X | X | - | - |
| Engine clutch . . . . .   | X | - | - | - |

# SPARE PARTS CATALOG

## CYLINDER HEAD, VALVES, ETC.



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*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**CYLINDER HEAD, VALVES, ETC. - Continued**

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 58458 D        | Washer. . . . .  | 3        | .002     |
| 2        | 50665 DX       | Cover . . . . .  | 1        | 6.000    |
| ...      | Q 1901         | Hex. nut, 1/2" N.F. . . . .                              | 3        | .010     |
| 3        | 32685 D        | Gasket. . . . .  | 1        | .063     |
| 4        | 27129 DD       | Oiler felt. . . . .                                      | 1        | .040     |
| 5        | 24965 DB       | Lever bushing . . . . .                                  | 8        | .063     |
| 6        | 32468 DX       | Lever with bushing, right hand. . . . .                  | 2        | .500     |
| 7        | 32485 D        | Key . . . . .  | 16       | .016     |
| 8        | 38763 H        | Nut . . . . .  | 8        | .006     |
| 9        | 10951 D        | Adjusting screw . . . . .                                | 8        | .046     |
| 10       | 32486 DAX      | Push rod. . . . .  | 8        | .438     |
| 11       | 4988 D         | Tappet guide. . . . .                                    | 8        | 1.750    |
| 12       | 25043 DB       | Tappet. . . . .  | 8        | .500     |
| 13       | 53380 D        | Camshaft. . . . .  | 1        | 19.000   |
| 14       | { 67227 D      | Set of four cylinder head gasket rings. . . . .          | 1        |          |
|          | { 25090-DD     | Gasket ring . . . . .                                    | 4        | .250     |
| 15       | 50675 DA       | Gasket. . . . .  | 1        | .063     |
| 16       | { 32482 DB     | Exhaust valve . . . . .                                  | 4        | .500     |
|          | { 42747 D      | Intake valve. . . . .                                    | 4        | .625     |
| 17       | 5025 DBR       | Guide . . . . .  | 8        | .375     |
| 18       | 18746 DA       | Lower seat. . . . .                                      | 8        | .015     |
| 19       | 61808 D        | Spring. . . . .  | 8        | .375     |
| 20       | 18539 D        | Retainer. . . . .  | 8        | .001     |
| 21       | 42748 D        | Upper seat. . . . .                                      | 8        | .125     |
| 22       | 13083 D        | Plug. . . . .  | 2        | .012     |
| 23       | 13083 D        | Plug. . . . .  | 2        | .012     |
| 24       | 27141 D        | Retainer ring . . . . .                                  | 2        | .005     |
| 25       | 5027 DB        | End bracket . . . . .                                    | 2        | 1.000    |
| ...      | Q 1901         | Hex. nut, 1/2" N.F. . . . .                              | 2        | .010     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                              | 2        | .015     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                              | 2        | .005     |
| 26       | 24962 D        | Spacer, outer . . . . .                                  | 2        | .093     |
| 27       | 24961 D        | Spring. . . . .  | 4        | .031     |
| 28       | 27140 DDX      | Shaft, complete with retainer ring and plug . . . . .    | 2        | 1.688    |
| 29       | 32466 DX       | Lever, straight, with bushing . . . . .                  | 4        | .500     |
| 30       | 24964 D        | Spacer, intermediate. . . . .                            | 4        | .156     |
| 31       | 5028 D         | Intermediate bracket. . . . .                            | 2        | .750     |
| ...      | Q 1901         | Hex. nut, 1/2" N.F. . . . .                              | 2        | .010     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                              | 2        | .015     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                              | 2        | .005     |
| 32       | 32467 DX       | Lever with bushing, left hand . . . . .                  | 2        | .500     |
| 33       | 8063 D         | Center bracket, upper half. . . . .                      | 1        | 1.500    |
| ...      | Q 1901         | Hex. nut, 1/2" N.F. . . . .                              | 1        | .010     |
| ...      | Q 1810         | Cap screw, 3/8" N.C. x 2" . . . . .                      | 2        | .077     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                              | 2        | .005     |
| ...      | .....          | Headless set screw cup point, 5/16" N.C. x 3/4". . . . . | 2        | .016     |
| ...      | .....          | Hex. jam nut, 5/16" N.C. . . . .                         | 2        | .008     |

(Continued on next page)

When ordering, always use I H C Part Nos.



**SPARE PARTS CATALOG**

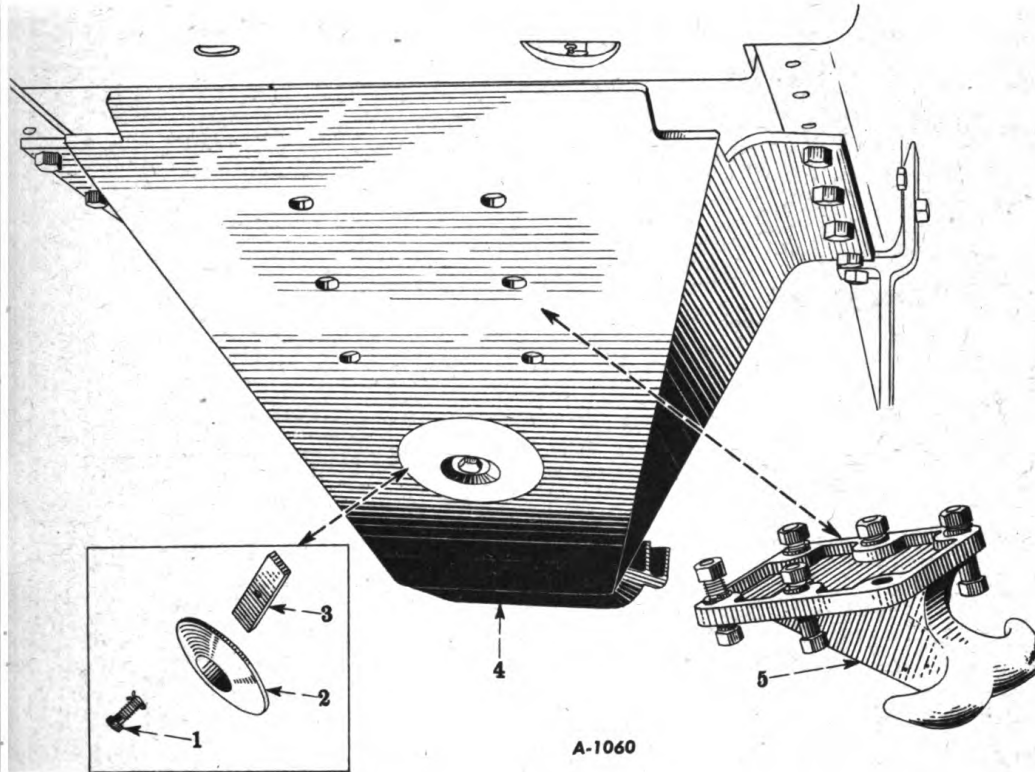
**CYLINDER HEAD, VALVES, ETC. - Continued**

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 34       | 8062 D         | Center bracket, lower half. . . . .  | 1        | .625     |
| 35       | 32468 DX       | Lever with bushing, right hand. . . . .  | 2        | .500     |
| 36       | 8061 DX        | Housing . . . . .  | 1        | 15.250   |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .  | 8        | .010     |
| ...      | Q 1903         | Hex. nut, 5/16" N.F. . . . .   | 1        | .010     |
| 37       | 50669 D        | Gasket . . . . .   | 1        | .063     |
| 38       | 54158 D        | Nozzle body stud. . . . .  | 8        | .250     |
| 39       | 32447 DA       | Bracket stud, long . . . . .   | 3        | .250     |
| 40       | 50668 D        | Locating pin. . . . .  | 1        | .063     |
| 41       | 32448 D        | Intermediate bracket stud . . . . .  | 2        | .188     |
| 42       | 32444 D        | Valve housing stud, long. . . . .  | 8        | .313     |
| 43       | 50664 D        | Valve housing stud, short . . . . .  | 1        | .063     |
| 44       | 32445 D        | Bracket stud, short . . . . .  | 4        | .188     |
|          | 8064 DAXA      | Head, includes valve inserts, valve guides, studs and stud sleeves . . . . .             | 1        | 83.000   |
| 45       | 8064 DAYA      | Head, includes 8064 DAXA with valves, valve springs, seats, keys and re-tainer . . . . . | 1        | 90.000   |
| ...      | .....          | Countersunk pipe plug, 3/8" . . . . .  | 4        | .063     |
| ...      | .....          | Countersunk pipe plug, 1/2" . . . . .  | 2        | .031     |
| 46       | 50677 D        | Manifold stud . . . . .  | 10       | .063     |
| 47       | 3405 H         | Spark plug gasket . . . . .  | 4        | .003     |
| 48       | 31536 DB       | Spark plug (Champion No. 44). . . . .  | 4        | .250     |
| 49       | 13055 D        | Key (Woodruff "B", 3/16 x 1") . . . . .  | 1        | .063     |
| 50       | 5960 D         | Thrust plate. . . . .  | 1        | .500     |
| ...      | Q 1850         | Cap screw, 1/2" N.C. x 1-1/4" . . . . .  | 2        | .110     |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .  | 2        | .012     |
| 51       | 32284 DA       | Gear. . . . .  | 1        | 5.250    |
| 52       | 25323 D        | Nut lock. . . . .  | 1        | .063     |
| 53       | 58253 D        | Nut . . . . .  | 1        | .188     |
| 54       | 25083 DCR      | Rear bearing. . . . .  | 1        | .250     |
| 55       | 32282 DCR      | Center bearing. . . . .  | 1        | .313     |
| 56       | 50283 DAR      | Front bearing . . . . .  | 1        | .250     |
| ...      | 32454 D        | Cylinder head stud nut. . . . .  | 21       | .125     |
| ...      | 50410 DA       | Oil header plug . . . . .  | 1        | .250     |

*When ordering, always use I H C Part Nos.*

**SPARE PARTS CATALOG**

**CRANKCASE GUARD AND FRONT PULL HOOK**



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

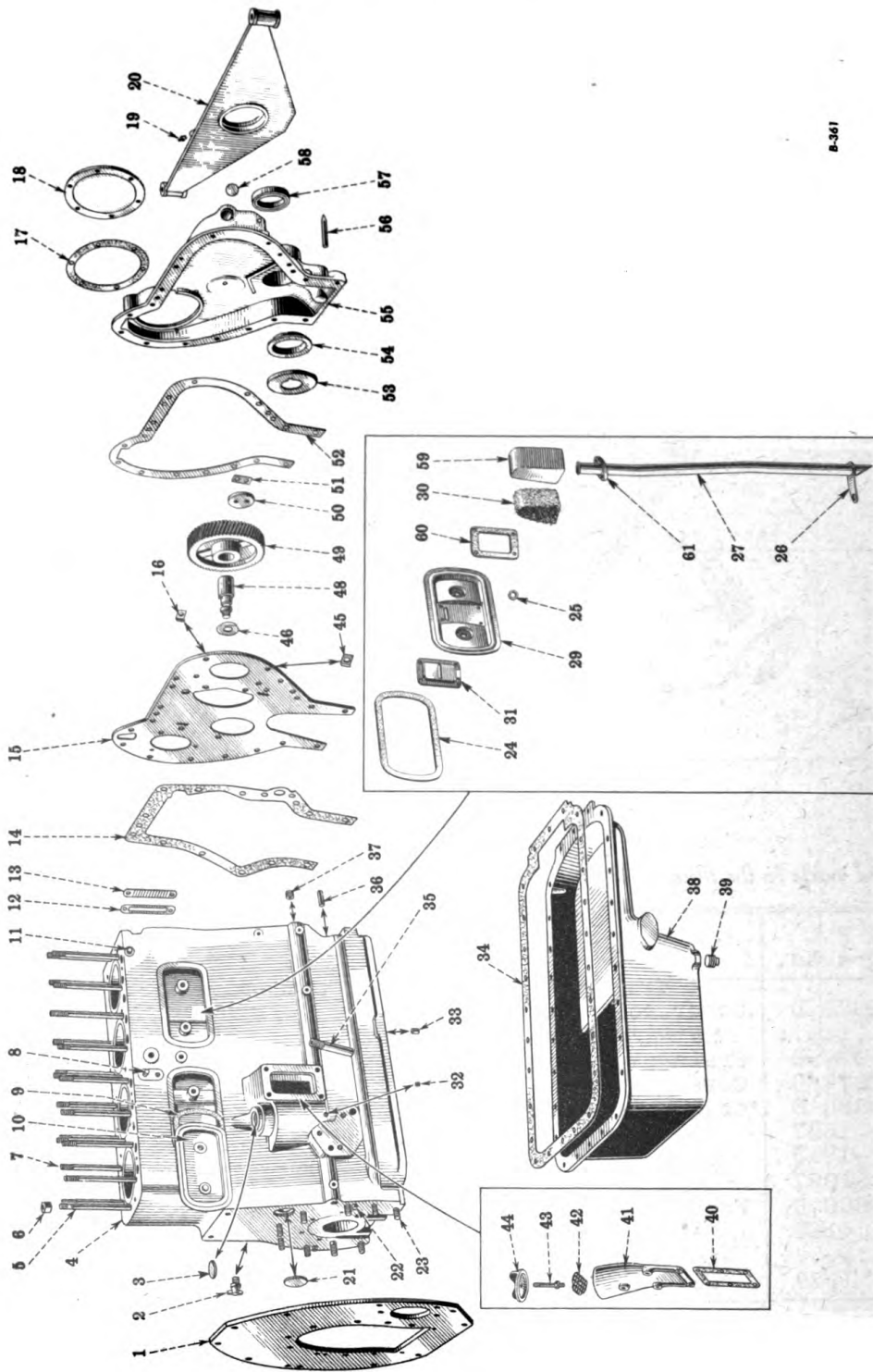
| Ref. No. | I H C Part No. | Description                             | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 1        | 42879 D        | Cover bolt . . . . .                    | 1        | .125     |
| ...      | .....          | Cotter, 1/8 x 3/4" . . . . .            | 1        | .004     |
| 2        | 5977 D         | Drain plug cover . . . . .              | 1        | 2.000    |
| 3        | 42877 D        | Cover support . . . . .                 | 1        | 1.125    |
| 4        | 50880 D        | Crankcase guard complete . . . . .      | 1        | 132.000  |
| ...      | Q 1887         | Cap screw, 3/4" N.F. x 1-3/4" . . . . . | 8        | .375     |
| ...      | Q 1913         | Hex. nut, 3/4" N.F. . . . .             | 8        | .083     |
| ...      | Q 1927         | Lock washer, 3/4" . . . . .             | 8        | .045     |
| 5        | 5980 D         | Front pull hook. . . . .                | 1        | 41.500   |
| ...      | Q 4166         | Cap screw, 7/8" N.F. x 2-3/4" . . . . . | 6        | .625     |
| ...      | .....          | Hex. nut, 7/8" N.F. . . . .             | 6        | .156     |
| ...      | Q 1929         | Lock washer, 7/8" . . . . .             | 6        | .050     |

*When ordering, always use I H C Part Nos.*

**Don't order parts from the illustrations only; refer to the list also.**

# SPARE PARTS CATALOG

## CRANKCASE



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*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

*Don't order parts from the illustrations only; refer to the list also.*

SPARE PARTS CATALOG

CRANKCASE - Continued

| Ref. No. | I H C Part No. | Description                  | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                              | No. Used | Wt. Lbs. |
|----------|----------------|------------------------------|----------|----------|----------|----------------|--|----------|----------|
| 1        | 50363 DAR      | Rear engine support          | 1        | 36.000   |          |                | Lubricator (Lincoln No. 5000) (optional) | 1        | .016     |
| ...      | Q 1911         | Hex. nut, 5/8" N.F.          | 9        | .063     | 19       | Q 14186 DA     | Lubricator (Alemite No. 1610) (optional) | 1        | .015     |
| ...      | Q 1925         | Lock washer, 5/8"            | 9        | .074     |          |                | Engine support, front, with lubricator   | 2        | 24.000   |
| 2        | 31729 D        | Drain cock                   | 1        | .027     | 20       | 50362 DX       | Pipe nipple, 1/8 x 3"                    | 1        | .125     |
| 3        | 29565 D        | Plug                         | 1        | .063     |          |                | Pipe coupling, 1/8"                      | 1        | .016     |
| 4        | 8463 DD        | Crankcase                    | 1        | 525.000  |          |                | Plug                                     | 1        | .088     |
| ...      | .....          | Pipe plug, 1/8"              | 1        | .016     |          |                | Dowel                                    | 2        | .063     |
| 5        | 39810 D        | Stud, long                   | 13       | .625     |          |                | Stud                                     | 9        | .250     |
| 6        | 32454 D        | Nut                          | 21       | .125     | 21       | 13439 V        | Gasket                                   | 1        | .002     |
| 7        | 42717 D        | Stud, short                  | 8        | .500     | 22       | 25086 DA       | Washer                                   | 4        | .063     |
| 8        | 53643 D        | Latch bracket stud           | 1        | .125     | 23       | 53560 D        | Clip                                     | 1        | .041     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F.          | 1        | .006     | 24       | 39757 D        | Breather pipe                            | 1        | .275     |
| ...      | Q 1920         | Lock washer, 3/8"            | 1        | .005     | 25       | 62866 D        | Cap screw, 5/16" N.C. x 7/8"             | 2        | .026     |
| 9        | 39757 D        | Gasket                       | 1        | .005     | 26       | 49026 D        | Lock washer, 5/16"                       | 2        | .004     |
| 10       | 39756 D        | Side plate, rear             | 1        | .002     | 27       | 59483 D        | Side plate                               | 1        | .063     |
| ...      | Q 4017         | Cap screw, 3/8" N.C. x 7/8"  | 1        | .875     | ...      | Q 4013         | Cap screw, 3/8" N.C. x 7/8"              | 2        | .047     |
| 11       | 50826 D        | Spring pin                   | 2        | .047     |          |                | Element                                  | 1        | .156     |
| 12       | 39762 D        | Front plate gasket           | 1        | .063     | ...      | Q 1919         | Baffle                                   | 1        | .094     |
| 13       | 39761 D        | Front plate                  | 1        | .006     | 29       | 59485 D        | Plug                                     | 5        | .250     |
| ...      | Q 4017         | Cap screw, 3/8" N.C. x 7/8"  | 1        | .281     |          |                | Plug (wood)                              | 2        | .001     |
| ...      | Q 1920         | Lock washer, 3/8"            | 2        | .047     | 30       | 59482 D        | Gasket                                   | 1        | .500     |
| 14       | 50478 D        | Gasket                       | 2        | .005     | 31       | 59480 D        | Sleeve                                   | 1        | .063     |
| 15       | 50487 DX       | Front plate, with lock       | 1        | .006     | 32       | 50410 DA       | Dowel                                    | 2        | .063     |
| ...      | Q 1800         | Cap screw, 3/8" N.C. x 3/4"  | 1        | .563     | 33       | 52606 D        | Pipe plug                                | 2        | 60.000   |
| ...      | Q 1848         | Cap screw, 1/2" N.C. x 1"    | 2        | .035     | 34       | 25082 DD       | Oil pan, with plugs                      | 1        |          |
| 16       | 50408 D        | Bolt lock                    | 3        | .090     | 35       | 50357 D        | Cap screw, 3/8" N.C. x 1-1/4"            | 1        |          |
| 17       | 50829 D        | Gasket                       | 2        | .250     | 36       | 52605 D        | Hex. nut, 3/8" N.F.                      | 23       | .050     |
| 18       | 8414 D         | Fuel pump gear cover         | 1        | .006     | 37       | 30397 D        | Lock washer, 3/8"                        | 3        | .006     |
| ...      | Q 4013         | Cap screw, 5/16" N.C. x 7/8" | 1        | 2.750    | 38       | 63986 D        | Pipe plug, 3/4"                          | 26       | .005     |
| ...      | Q 1919         | Lock washer, 5/16"           | 6        | .026     | ...      | Q 1804         | Gasket                                   | 1        | .077     |
| ...      |                |                              | 6        | .004     | 40       | 42733 D        |  | 1        | .013     |

(Continued on next page)

SPARE PARTS CATALOG

CRANKCASE - Continued

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                                       | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|----------|----------------|---|----------|----------|
| 41       | 8029 D         | Oil filler body  | 1        | 3.500    | 56       | 48138 D        | Timing pointer                                    | 1        | .125     |
| ...      | Q 1816         | Cap screw, 3/8" N.C. x 2-3/4"                                | 1        | .105     | 57       | 53872 D        | Oil seal  | 1        | .310     |
| ...      | Q 1802         | Cap screw, 3/8" N.C. x 1"                                    | 3        | .045     | 58       | 13806 D        | Welcn plug, 1-1/4"                                | 1        | .031     |
| ...      | Q 1920         | Lock washer, 3/8"  | 4        | .005     | 59       | 8959 D         | Breather body                                     | 1        | .688     |
| 42       | 50411 D        | Screen   | 1        | .125     | ...      | .....          | Round head machine screw, No. 10 - 24 N.C. x 1/2" | 4        | .005     |
| 43       | 28797 D        | Stud   | 1        | .063     | ...      | Q 1916         | Lock washer, No. 10                               | 4        | .002     |
| ...      | Q 1906         | Hex. nut, 3/8" N.C.  | 1        | .020     | 60       | 59481 D        | Breather body gasket                              | 1        | .006     |
| 44       | 4819 D         | Cap  | 1        | .031     | 61       | 59484 D        | Breather pipe flange                              | 1        | .093     |
| 45       | 32370 D        | Bolt lock  | 3        | .063     | ...      | 13897 D        | Distributor hole lock washer                      | 1        | .001     |
| 46       | 25132 D        | Nut lock   | 1        | 1.188    | ...      | Q 4012         | Cap screw, 5/16" N.C. x 5/8"                      | 1        | .026     |
| 48       | 25138 DAX      | Idler gear shaft   | 1        | .063     | ...      | 45976 D        | Front engine support shim, heavy                  | 2        | .031     |
| ...      | .....          | Hex. jam nut, 3/4" N.F.                                      | 1        | 1.438    | ...      | 45977 D        | Front engine support shim, light                  | As req.  | .010     |
| 49       | 25140 DBX      | Idler gear with bushing                                      | 1        | .250     | ...      | 46250 D        | Front plate cap screw lock                        | 1        | .004     |
| 50       | 25131 D        | Thrust washer  | 1        | .031     | ...      | .....          | Rivet, 3/16 x 3/8"                                | 1        | .005     |
| ...      | Q 1773         | Cap screw, 5/16" N.F. x 3/4"                                 | 2        | .063     | ...      | 62863 D        | Rear engine support dowel bolt                    | 2        | .250     |
| 51       | 25130 D        | Bolt lock  | 1        | .006     | ...      | Q 1911         | Hex. nut, 5/8" N.F.                               | 2        | .063     |
| 52       | 50486 D        | Gasket   | 1        | .063     | ...      | Q 1925         | Lock washer, 5/8"                                 | 2        | .021     |
| 53       | 36796 DA       | Oil flinger  | 1        | .090     | ...      | .....          | .....   | .....    | .....    |
| 54       | 46129 D        | Oil deflector  | 1        | 30.000   | ...      | .....          | .....   | .....    | .....    |
| 55       | 8413 DX        | Front cover, with oil deflector, timing pointer and oil seal | 1        | .111     | ...      | .....          | .....   | .....    | .....    |
| ...      | Q 1852         | Cap screw, 1/2" N.C. x 1-1/2"                                | 7        | .045     | ...      | .....          | .....   | .....    | .....    |
| ...      | Q 1802         | Cap screw, 3/8" N.C. x 1"                                    | 5        | .035     | ...      | .....          | .....   | .....    | .....    |
| ...      | Q 1856         | Cap screw, 1/2" N.C. x 2"                                    | 2        | .012     | ...      | .....          | .....   | .....    | .....    |
| ...      | Q 1922         | Lock washer, 1/2"  | 9        | .005     | ...      | .....          | .....   | .....    | .....    |
| ...      | Q 1920         | Lock washer, 3/8"  | 5        | .....    | ...      | .....          | .....   | .....    | .....    |

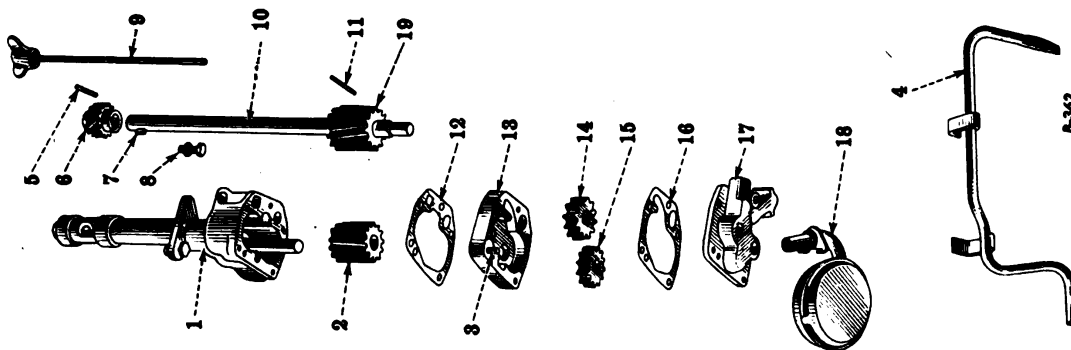
When ordering, always use I H C Part Nos.

# SPARE PARTS CATALOG

## LUBRICATING OIL PUMP AND OIL LEVEL GAGE

| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| ...      | 57484 D        | Lubricating oil pump, complete (includes Ref. Nos. 1 thru 18, less 4 and 9) | 1        | 36.000   |
| 1        | 50371 D        | Body  | 1        | 11.750   |
| 2        | 50375 D        | Idler gear  | 1        | 2.000    |
| 3        | 46053 D        | Dowel   | 1        | .008     |
| 4        | 50377 DX       | Return pipe   | 1        | 1.000    |
| ...      | Q 1800         | Cap screw, 3/8" N.C. x 3/4"   | 2        | .035     |
| ...      | Q 1920         | Lock washer, 3/8"   | 2        | .005     |
| 5        | 5312 T3        | Pinion pin  | 1        | .020     |
| 6        | 46054 DA       | Drive pinion  | 1        | .003     |
| 7        | 13021 D        | Key (Woodruff No. 6)  | 2        | .005     |
| 8        | 10961 D        | Body cap screw  | 2        | .013     |
| ...      | Q 1922         | Lock washer, 1/2"   | 2        | .813     |
| 9        | 50379 DAX      | Oil level gage  | 1        | 3.000    |
| 10       | 50372 DX       | Drive shaft, with pins  | 1        | .063     |
| 11       | 32319 D        | Gear pin  | 1        | .001     |
| 12       | 51223 D        | Gasket  | 1        | 2.750    |
| 13       | 8008 DX        | Gear housing, with dowel  | 1        | 7.500    |
| 14       | 51515 D        | Auxiliary body gear (12 teeth)  | 1        | 7.500    |
| 15       | 51516 D        | Auxiliary idler gear (12 teeth)   | 1        | 7.500    |
| 16       | 50376 D        | Gasket  | 1        | .001     |
| 17       | 8009 D         | Cover   | 1        | 3.000    |
| ...      | Q 1810         | Cap screw, 3/8" N.C. x 2"   | 4        | .080     |
| ...      | Q 1920         | Lock washer, 3/8"   | 5        | .005     |
| ...      | Q 1820         | Cap screw, 3/8" N.C. x 3"   | 1        | .100     |
| 18       | 42791 DA       | Pump float  | 1        | .688     |
| ...      | .....          | Cotter, 1/8 x 1-1/2"  | 1        | .008     |
| 19       | 50374 D        | Body gear (12 teeth)  | 1        | 2.000    |

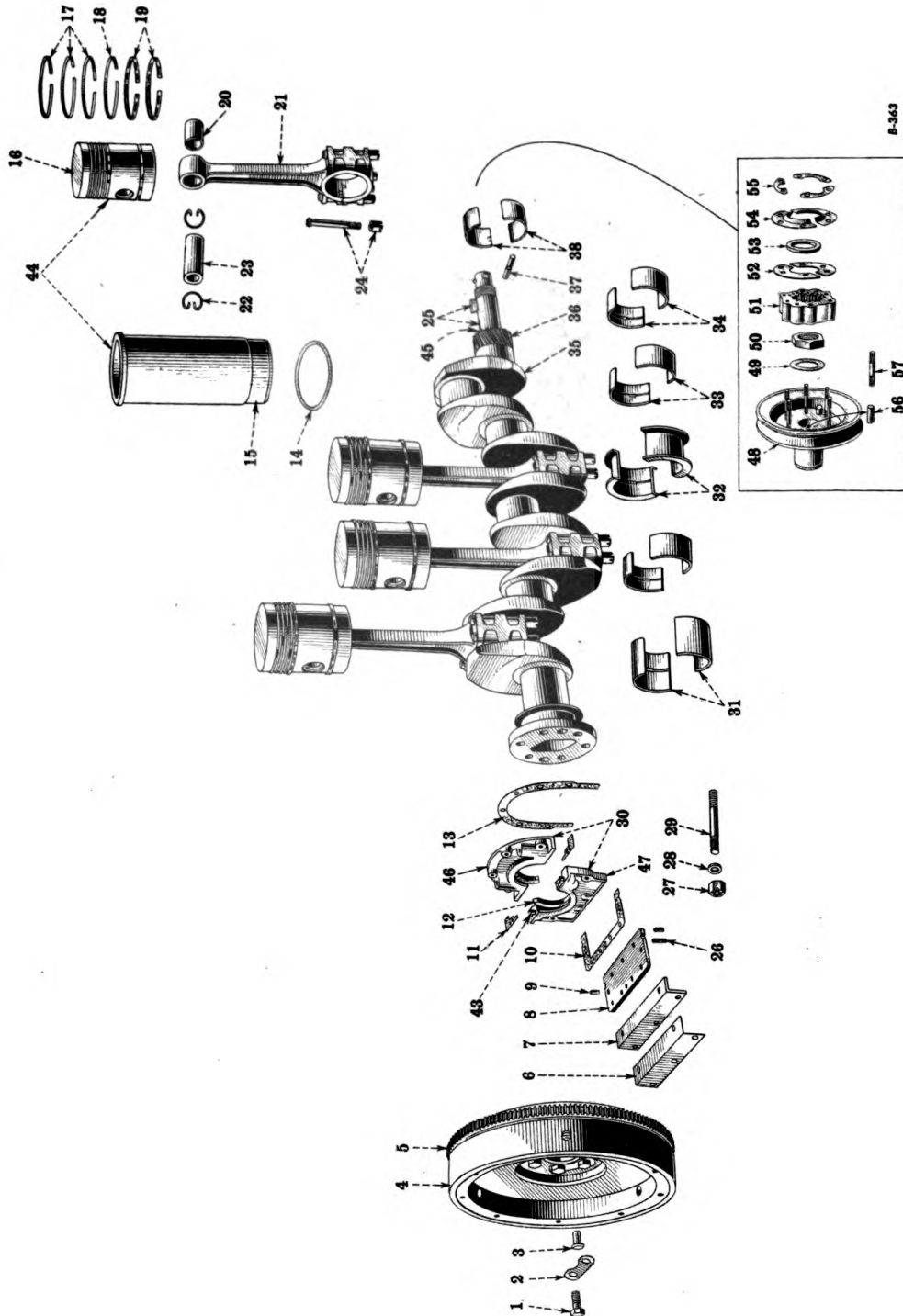
Don't order parts from the illustrations only; refer to the list also.



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# SPARE PARTS CATALOG

## CRANKSHAFT, PISTONS, PISTON RINGS, CONNECTING ROD AND BEARINGS



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Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

CRANKSHAFT, PISTONS, PISTON RINGS,  
CONNECTING ROD AND BEARINGS - Continued

| Ref. No. | I H C Part No. | Description                                   | No. Used | wt. Lbs. | Ref. No. | I H C Part No. | Description  | No. Used                                 | wt. Lbs. |
|----------|----------------|---|----------|----------|----------|----------------|--|--|----------|
| 1        | 32333 D        | Bolt. . . . .                                 | 6        | .250     | 17       | 31458 D        | Compression ring. . . . .                                      | 12                                       | .077     |
| 2        | 24943 D        | Bolt lock . . . . .                           | 3        | .031     | 18       | 42694 D        | Compression ring. . . . .<br>(taper face). . . . .             | 4  | .077     |
| 3        | 32332 D        | Dowel . . . . .                               | 2        | .125     | 19       | 42219 D        | Oil regulating ring . . . . .                                  | 8  | .109     |
| 4        | 8420 DX        | Flywheel, with ring gear. . . . .             | 1        | 175.000  | 20       | 32942 D        | Bushing . . . . .  | 4  | .218     |
| 5        | 50315 D        | Ring gear (146 teeth)                         | 1        | 8.000    | 21       | 42687 DX       | Connecting rod, cap and bushing. . . . .                       | 4  | 11.000   |
| 6        | 25096 D        | Gasket. . . . .                               | 1        | .006     |          | 42687 DY       | Connecting rod, cap, bushing and bearing                       | 4  | 11.875   |
| 7        | 25095 D        | Dust seal . . . . .                           | 1        | 1.500    | 22       | 26916 D        | Retainer . . . . .   | 8  | .010     |
| ...      | Q 1804         | Cap screw, 3/8"N.C. x 1-1/4" . . . . .        | 2        | .050     | 23       | 53612 D        | Piston pin (.005" oversize) . . . . .                          | 4  | 1.438    |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                   | 5        | .005     | 24       | 28737 DX       | Bolt. . . . .  | 16                                       | .313     |
| ...      | Q 1799         | Cap screw, 3/8"N.F. x 3/4" . . . . .          | 3        | 3.250    | ...      | .....          | Cotter, 3/32 x 1" . . . . .                                    | 16                                       | .002     |
| 8        | 25091 DA       | Plate . . . . .                               | 1        | .045     | 25       | 47487 D        | Key (woodruff #23) . . . . .                                   | 2  | .050     |
| ...      | Q 1802         | Cap screw, 3/8" N.C. x 1" . . . . .           | 4        | .005     | 26       | 25094 D        | Stud . . . . .   | 3  | .063     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                   | 4        | .001     | 27       | 39423 D        | Nut . . . . .  | 12                                       | .188     |
| 9        | 25093 DA       | Felt plug . . . . .                           | 2        | .000     | ...      | .....          | Cotter, 1/8 x 1-3/8" . . . . .                                 | 12                                       | .006     |
| 10       | 25092 DA       | Gasket. . . . .                               | 1        | .003     | 28       | 39422 D        | Washer. . . . .  | 12                                       | .041     |
| 11       | 32308 D        | Gasket. . . . .                               | 2        | .063     | 29       | 43113 D        | Stud . . . . .   | 12                                       | .975     |
| 12       | 32307 DB       | Felt. . . . .                                 | 2        | .006     | 30       | 39401 D        | Oil seal retainer, with dowels and gasket (optional) . . . . . | 1  | 4.625    |
| 13       | 32309 D        | Gasket. . . . .                               | 1        | .031     |          | 62578 D        | Oil seal retainer, with dowels and gasket (optional) . . . . . | 1  | 1.313    |
| 14       | 4222 D         | Packing ring. . . . .                         | 4        | 16.000   | 31       |                | 48759 D  | Bearing, rear (.003" undersize). . . . . | 1        |
| 15       | 3202 DDRXA     | Sleeve. . . . .                               | 4        |          | 31       | 64391 D        | Bearing, rear (.003" undersize). . . . .                       | 1  | 1.438    |
| ...      | *5957 DBX      | Piston with pin (optional). . . . .           | 4        |          |          | 48763 D        | Bearing, rear (1/32" undersize). . . . .                       | 1  | 1.625    |
| ▲16      | ↑9323 DX       | Piston with pin (optional). . . . .           | 4        |          | 32       | 63294 D        | Bearing, center (.003" undersize) . . . . .                    | 1  | 1.250    |
| ...      | *5957 DBY      | Piston with pin and rings (optional). . . . . | 4        |          |          | 64385 D        | Bearing, center (.003" undersize) . . . . .                    | 1  | 1.438    |
| ...      | ↑9323 DY       | Piston with pin and rings (optional). . . . . | 4        |          | 32       | 63295 D        | Bearing center (1/32" undersize) . . . . .                     | 1  | 1.438    |
| ...      | ↑64458 D       | Set of 4 pistons with pins and rings. . . . . | 1        |          |          |                |  |  |          |
| ...      | ↑64459 D       | Set of 4 pistons with pins. . . . .           | 1        |          |          |                |  |  |          |

(Continued on next page.)



SPARE PARTS CATALOG

CRANKSHAFT, PISTONS, PISTON RINGS,  
CONNECTING ROD AND BEARINGS - Continued

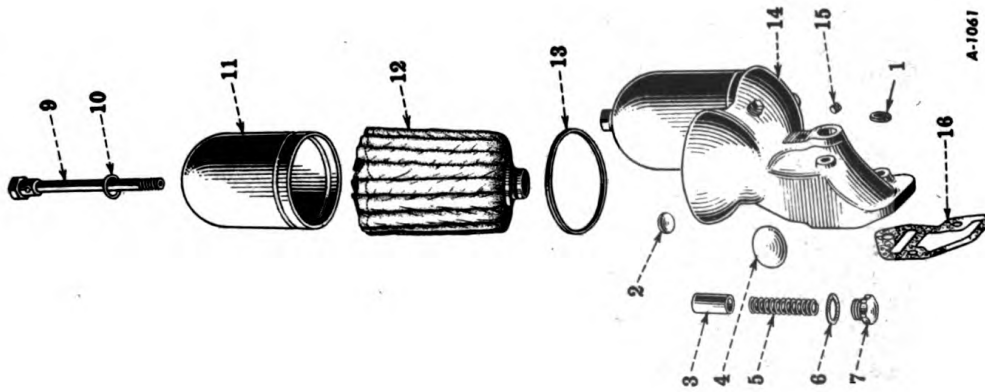
|     |  |  |                       |  |                |                                    |  |                  |                              |
|-----|--|--|-----------------------|--|----------------|------------------------------------|--|------------------|------------------------------|
| 33  | 48757 D<br>64388 D<br>48761 D<br>48756 DA<br>64384 D | Bearing, intermediate<br>Bearing, intermediate<br>(.003" undersize)<br>Bearing, intermediate<br>(1/32" undersize)<br>Bearing, front (.003"<br>undersize) | 2<br>2<br>2<br>1<br>1 | .938<br>1.250<br>1.250<br>.938<br>.938 | ...            | .....<br>Q 4018<br>Q 1920<br>..... | Cap screw, 3/8" N.C. x<br>1-3/8"<br>Cap screw, 3/8" N.C. x<br>3-1/2"<br>Lock washer, 3/8"<br>Washer, 13/32" I.D. x<br>3/4" O.D. x No. 16<br>gage | 4<br>2<br>6<br>6 | .047<br>.125<br>.005<br>.006 |
| ... | 48760 DA<br>63282 D                                  | Bearing, front (1/32"<br>undersize)<br>Crankshaft center bear-<br>ing dowel  | 1<br>1                | 1.250<br>1.438                         | .....<br>47    | { 9270 DX<br>4994 DAX              | Crankshaft rear oil<br>seal retainer, lower<br>with dowels (option-<br>al)   | 1                | 4.675                        |
| 35  | 53401 DX<br>53402 DX                                 | Crankshaft, with gear<br>nut<br>Crankshaft (1/32" under-<br>size) with gear nut  | 1<br>1                | 175.000<br>175.000                     | .....          | .....                              | Crankshaft rear oil<br>seal retainer, lower<br>with dowels (option-<br>al)   | 1                | 4.625                        |
| 36  | 25134 DA   | Gear (27 teeth)  | 1                     | 1.625                                  | .....          | .....                              | Cap screw, 3/8" N.C.<br>x 1-3/8"   | 2                | .047                         |
| 37  | 10319 D  | Crank pin  | 1                     | .250                                   | .....          | Q 1920                             | Lock washer, 3/8"<br>Washer, 13/32" I.D.<br>x 3/4" O.D. x No.16<br>gage  | 2                | .005                         |
| ... | .....  | Headless set screw,<br>5/16" N.C. x 1/2"   | 1                     | .094                                   | .....          | .....                              | .....  | 2                | .006                         |
| 38  | 42688 DAX<br>42690 DAX<br>64368 DX                   | Connecting rod bearing<br>(.030" undersize)<br>Connecting rod bearing<br>(.003" undersize)   | 4<br>4<br>4           | .878<br>1.250<br>.021                  | 48<br>49<br>50 | 8120 DAX<br>4254 DA<br>4253 D      | Pulley with drive pins<br>Nut lock<br>Nut (regular pulley<br>nut)  | 1<br>1<br>1      | 13.625                       |
| 43  | 25076 D<br>*43026 DB                                 | Dowel<br>Set of four sleeves and<br>pistons (optional)   | 2<br>1                | .....                                  | 51<br>52       | 8119 D<br>51268 D                  | Coupling (14 teeth)<br>Shaft retainer  | 1<br>2           | 3.375<br>.015                |
| ▲44 | †64456 DA<br>*42695 DB                               | Set of four sleeves and<br>pistons (optional)<br>Sleeve and piston<br>(optional)   | 1<br>4                | .....                                  | 53<br>54<br>55 | 51269 D<br>51271 D<br>47244 D      | Felt washer<br>Felt retainer<br>Lock   | 1<br>2<br>2      | .004<br>.125<br>.047         |
| 45  | †64440 DA<br>PO 9696                                 | Sleeve and piston<br>(optional)<br>Crankshaft gear key<br>(Woodruff No. 23)  | 4<br>1                | .....                                  | 56<br>57       | 47490 D<br>57715 D<br>Q 1905       | Pin<br>Stud<br>Hex. nut, 3/8" N.F.,<br>type B  | 2<br>2<br>6      | .080<br>.004<br>.001         |
| 46  | 9269 D<br>4993 DA                                    | Crankshaft rear oil<br>seal upper retainer<br>(optional)<br>Crankshaft rear oil<br>seal upper retainer<br>(optional)                                     | 1<br>1                | 4.625<br>4.625                         | .....          | .....                              | .....  | 6                | .....                        |

\* - Aluminum  
† - Grey iron.  
▲ - Note: Use only one type of  
piston (aluminum or grey  
iron) in any one engine.

**SPARE PARTS CATALOG**

**LUBRICATING OIL FILTER**

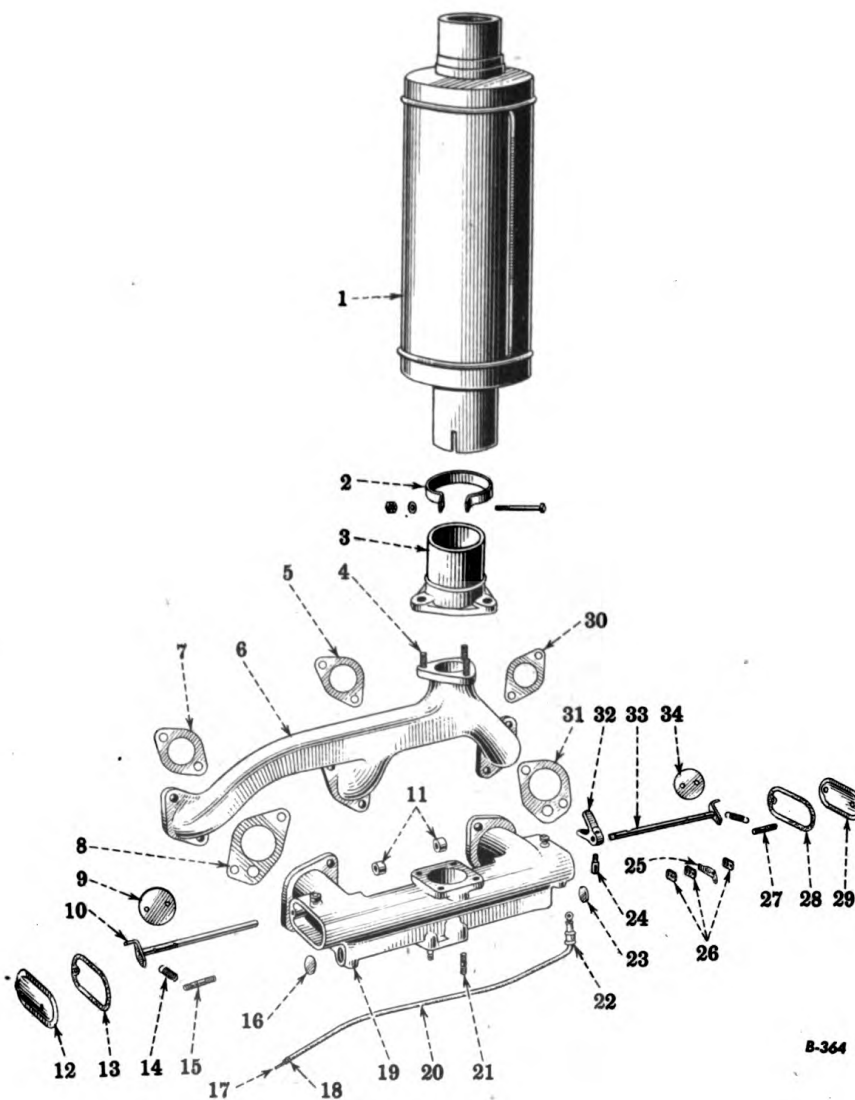
| Ref. No. | I H C Part No. | Description                                     | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| ...      | 51824 D        | Oil filter (includes Ref. Nos. 3 and 5 thru 14) | 1        | 25.000   |
| 1        | 25352 D        | Base bolt gasket.                               | 1        | .003     |
| 2        | 23007 V        | Plug (1")                                       | 2        | .020     |
| 3        | 45285 DA       | Regulating valve.                               | 1        | .041     |
| 4        | 23139 V        | Plug (2")                                       | 1        | .075     |
| 5        | 45286 D        | Valve spring.                                   | 1        | .063     |
| 6        | 28781 D        | Gasket.   | 1        | .003     |
| 7        | 51205 D        | Regulating valve nut.                           | 1        | .125     |
| 9        | 46606 DX       | Retaining bar                                   | 2        | 1.030    |
| 10       | 13839 D        | Gasket.   | 2        | 3.000    |
| 11       | 13842 D        | Case.   | 2        | 1.281    |
| 12       | 63884 D        | Element (paper)                                 | 2        |          |
| 13       | 13841 D        | Gasket.   | 2        |          |
| 14       | 8021 DAX       | Base with plugs                                 | 1        | 16.000   |
| ...      | Q 1856         | Cap screw, 1/2" N.C. x 2"                       | 1        | .145     |
| ...      | Q 1922         | Lock washer, 1/2"                               | 2        | .013     |
| ...      | Q 4046         | Cap screw, 1/2" N.C. x 4"                       | 1        | .250     |
| ...      | Q 1866         | Cap screw, 1/2" N.C. x 4-1/2"                   | 1        | .250     |
| ...      | 50410 DA       | Pipe plug, 3/8"                                 | 1        | .063     |
| 15       | 50410 DA       | Pipe plug                                       | 1        | .250     |
| 16       | 50404 D        | Gasket.   | 1        | .500     |



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**SPARE PARTS CATALOG**

**MANIFOLDS - INTAKE AND EXHAUST**



| Ref. No. | I H C Part No. | Description                            | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 50917 D        | Exhaust muffler. . . . .               | 1        | 7.500    |
| 2        | 23132 D        | Clamp. . . . .                         | 1        | .312     |
| ...      | Q 1784         | Cap screw, 5/16" N.C. x 2" . . . . .   | 1        | .055     |
| ...      | Q 1904         | Hex. nut, 5/16" N.C. . . . .           | 1        | .060     |
| ...      | Q 1920         | Lock washer, 5/16" . . . . .           | 1        | .003     |
| 3        | 6995 DB        | Exhaust pipe . . . . .                 | 1        | 3.250    |
| ...      | Q 1910         | Hex. nut, 1/2" N.C. . . . .            | 3        | .045     |
| 4        | 50677 D        | Stud . . . . .                         | 3        | .078     |
| 5        | 50687 D        | Gasket, center . . . . .               | 1        | .063     |
| 6        | 8055 DX        | Exhaust manifold, with studs . . . . . | 1        | 23.500   |
| ...      | Q 1910         | Hex. nut, 1/2" N.C. . . . .            | 6        | .047     |
| 7        | 50688 D        | Gasket, end. . . . .                   | 1        | .063     |
| 8        | 50689 D        | Intake gasket. . . . .                 | 1        | .063     |

(Continued on next page)

# SPARE PARTS CATALOG

Engine - 4

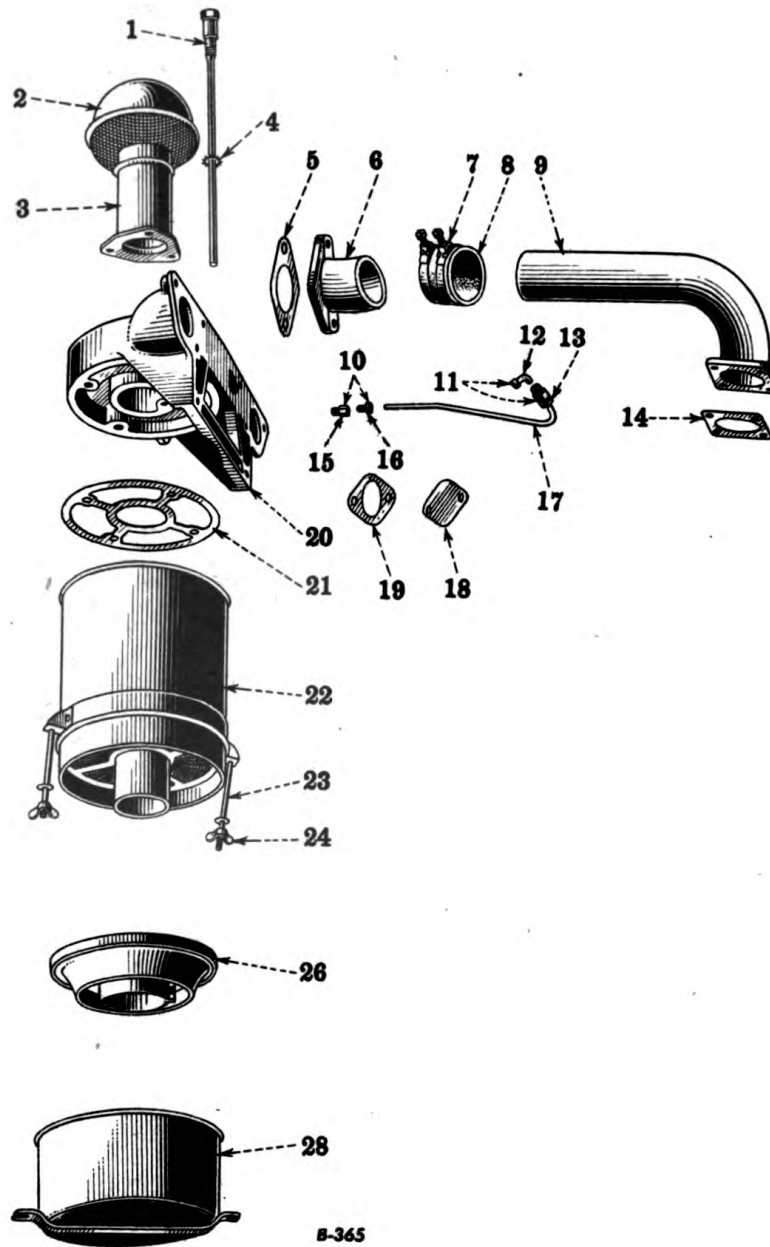
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## MANIFOLDS - INTAKE AND EXHAUST - Continued

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 9        | 50697 D        | Butterfly valve. . . . .   | 1        | .063     |
| ...      | .....          | Machine screw, No. 8 - 32" N.C. x 3/8"                                 | 2        | .004     |
| 10       | 53673 DX       | Control shaft, rear . . . . .  | 1        | .375     |
| 11       | 53083 D        | Seal . . . . .   | 2        | .063     |
| 12       | 52519 D        | End cover. . . . .   | 1        | .188     |
| ...      | Q 1918         | Lock washer, 1/4" . . . . .  | 1        | .002     |
| ...      | Q 1903         | Hex. nut, 5/16" N.F. . . . .   | 1        | .008     |
| ...      | Q 1919         | Lock washer, 5/16" . . . . .   | 1        | .004     |
| ...      | Q 1764         | Cap screw, 1/4" N.C. x 3/4" . . . . .                                  | 1        | .016     |
| 13       | 52520 D        | Cover gasket . . . . .   | 1        | .031     |
| 14       | 56107 D        | Spring . . . . .   | 2        | .016     |
| 15       | 54964 D        | Spring stud. . . . .   | 1        | .041     |
| 16       | 23007 V        | Plug . . . . .   | 1        | .020     |
| 17       | 1924 T         | Terminal . . . . .   | 2        | .002     |
| 18       | 27618 D        | Cable reinforcement. . . . .   | 2        | .001     |
| 19       | 8473 DAX       | Intake manifold, with studs, plug and seal . . . . .                   | 1        | 20.000   |
| ...      | Q 1910         | Hex. nut, 1/2" N.C. . . . .  | 4        | .045     |
| ...      | Q 1903         | Hex. nut, 5/16" N.C. . . . .   | 2        | .030     |
| ...      | .....          | Oval point headless set screw, 5/16" N.C. x 3/4" . . . . .             | 2        | .010     |
| 20       | 53262 D        | Short circuiting cable . . . . .                                       | 1        | .125     |
| ...      | .....          | Cadmium plated fillister head machine screw, No. 10 - 32 x 5/16"       | 1        | .002     |
| ...      | .....          | Round head machine screw, No. 10 - 32 x 3/8" . . . . .                 | 1        | .002     |
| ...      | .....          | Cadmium plated special light lock washer, No. 10. . . . .              | 2        | .002     |
| 21       | 50705 D        | Stud . . . . .   | 4        | .021     |
| 22       | 51234 DA       | Grommet. . . . .   | 1        | .000     |
| 23       | 23007 V        | Plug . . . . .   | 1        | .020     |
| 24       | 42739 DA       | Lever pin. . . . .   | 1        | .063     |
| ...      | Q 1901         | Hex. nut, 1/4" N.F. . . . .  | 1        | .031     |
| 25       | 52515 DA       | Contact and terminal plate . . . . .                                   | 1        | .004     |
| ...      | .....          | Round head rivet, No. 12 - 3/16" . . . . .                             | 2        | .002     |
| ...      | .....          | Round head machine screw, No. 10 - 32 N.F. x 1/4" . . . . .            | 1        | .002     |
| ...      | Q 1916         | Lock washer, No. 10. . . . .   | 1        | .000     |
| 26       | 52514 D        | Insulating plate . . . . .   | 2        | .003     |
| ...      | .....          | Round head bolt, No. 10 - 24 x 1" . . . . .                            | 1        | .005     |
| ...      | Q 1917         | Lock washer, 3/16" . . . . .   | 1        | .002     |
| ...      | .....          | Washer, 13/64" I.D. x 1/2" O.D. x No. 18 gage . . . . .                | 1        | .008     |
| 27       | 54964 D        | Spring stud. . . . .   | 1        | .041     |
| 28       | 52520 D        | Cover gasket . . . . .   | 1        | .031     |
| 29       | 52519 D        | End cover . . . . .  | 1        | .125     |
| ...      | Q 1918         | Lock washer, 1/4" . . . . .  | 1        | .002     |
| ...      | Q 1903         | Hex. nut, 5/16" N.F. . . . .   | 1        | .008     |
| ...      | Q 1919         | Lock washer, 5/16" . . . . .   | 1        | .004     |
| ...      | Q 1756         | Cap screw, 1/4" N.C. x 3/4" . . . . .                                  | 1        | .016     |
| 30       | 50688 D        | Gasket, end. . . . .   | 1        | .063     |
| 31       | 50689 D        | Intake gasket. . . . .   | 1        | .063     |
| 32       | 50698 D        | Control lever. . . . .   | 1        | .250     |
| 33       | 53672 DX       | Control shaft, front . . . . .   | 1        | .500     |
| ...      | .....          | Round head brass rivet, 1/8 x 3/16" . . . . .                          | 1        | .006     |
| 34       | 50697 D        | Butterfly valve. . . . .   | 1        | .063     |
| ...      | .....          | Round head machine screw, No. 8 - 32" N.C. x 3/8" . . . . .            | 2        | .004     |
| ...      | 48716 H        | Manifold butterfly valve lock washer (Shakeproof No. 1208) . . . . .   | 4        | .000     |
| ...      | 2853 Y         | Manifold control lever pin lock washer (Shakeproof No. 1114) . . . . . | 1        | .001     |

# SPARE PARTS CATALOG

## AIR CLEANER AND CONNECTIONS



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*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

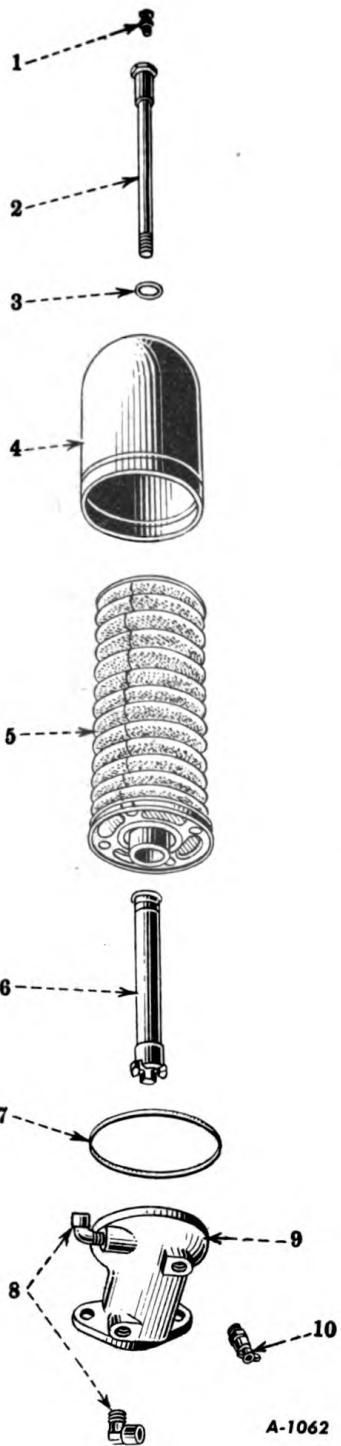
**AIR CLEANER AND CONNECTIONS - Continued**

| Ref. No. | I H C Part No. | Donaldson Co. No. | Description                                      | No. Used | Wt. Lbs. |
|----------|----------------|-------------------|--|----------|----------|
| ...      | 50165 DX       | A-914             | Air cleaner, 9" (includes Ref. Nos. 22 thru 28). | 1        | 21.750   |
| ...      | Q 1866         |                   | Cap screw, 1/2" N.C. x 4-1/2"                    | 4        | .250     |
| ...      | Q 1922         |                   | Lock washer, 1/2"                                | 4        | .013     |
| 1        | 55749 DAX      |                   | Breather tube extension                          | 1        | .313     |
| 2        | 49464 DA       |                   | Cap  | 1        | 1.375    |
| 3        | 48921 D        |                   | Intake pipe                                      | 1        | 1.125    |
| ...      | Q 1800         |                   | Cap screw, 3/8 x 3/4" N.C.                       | 3        | .016     |
| ...      | Q 1920         |                   | Lock washer, 3/8"                                | 3        | .007     |
| 4        | 47415 H        |                   | Lock washer (Shakeproof No. 1128-1)              | 1        | .005     |
| 5        | 50528 D        |                   | Gasket   | 1        | .030     |
| 6        | 6994 D         |                   | Air cleaner pipe flange                          | 1        | 2.000    |
| ...      | Q 1850         |                   | Cap screw, 1/2 x 1-1/4" N.C.                     | 2        | .077     |
| ...      | Q 1922         |                   | Lock washer, 1/2"                                | 2        | .023     |
| 7        | 42613 D        |                   | Hose clamp                                       | 2        | .063     |
| 8        | 50532 D        |                   | Hose, 2-3/4" I.D. x 2-1/4" long                  | 1        | .202     |
| 9        | 50527 DX       |                   | Pipe   | 1        | .171     |
| ...      | Q 1802         |                   | Cap screw, 3/8 x 1" N.C.                         | 4        | .041     |
| ...      | Q 1920         |                   | Lock washer, 3/8"                                | 4        | .007     |
| 10       | 38026 DMX      |                   | Connector with nut                               | 1        | .071     |
| 11       | 57068 DX       |                   | Elbow with nut                                   | 1        | .125     |
| 12       | 57068 D        |                   | Elbow  | 1        |          |
| 13       | 37165 D        |                   | Coupling   | 1        | .063     |
| 14       | 50529 D        |                   | Gasket   | 1        | .021     |
| 15       | 38026 DM       |                   | Connector  | 1        | .071     |
| 16       | 37165 D        |                   | Coupling nut                                     | 1        | .031     |
| 17       | 54520 DX       |                   | Breather tube, with coupling nut                 | 1        | .031     |
| 18       | 50533 D        |                   | Top cover  | 1        | .969     |
| ...      | Q 1848         |                   | Cap screw, 1/2 x 1" N.C.                         | 2        | .094     |
| ...      | Q 1922         |                   | Lock washer, 1/2"                                | 2        | .008     |
| 19       | 50528 D        |                   | Gasket   | 1        | .030     |
| 20       | 8425 DA        |                   | Air cleaner top                                  | 1        | 30.500   |
| ...      | Q 1848         |                   | Cap screw, 1/2 x 1" N.C.                         | 4        | .094     |
| ...      | Q 1922         |                   | Lock washer, 1/2"                                | 4        | .008     |
| 21       | 50166 D        |                   | Gasket   | 1        | .006     |
| 22       | 54259 D        | 2P-3510           | Body assembly                                    | 1        | 14.000   |
| 23       | .....          |                   | Square head machine bolt, 5/16" N.C. x 5-1/2"    | 2        | .250     |
| 24       | .....          |                   | Wing nut, 5/16" N.C.                             | 2        | .031     |
| ...      | .....          |                   | Washer, 5/16"                                    | 2        | .003     |
| 26       | 67117 D        | 2P-4886           | Housed screen and baffle assembly                | 1        | 2.375    |
| ...      | .....          |                   | Fillister head screw, 1/4" N.F. x 1"             | 1        | .155     |
| ...      | .....          |                   | Square nut, 1/4" N.F.                            | 1        |          |
| 28       | 54267 D        | P-3516            | Oil cup (capacity, 5-1/2 pints)                  | 1        | .266     |

*When ordering, always use I H C Part Nos.*

## SPARE PARTS CATALOG

### FUEL OIL FILTER



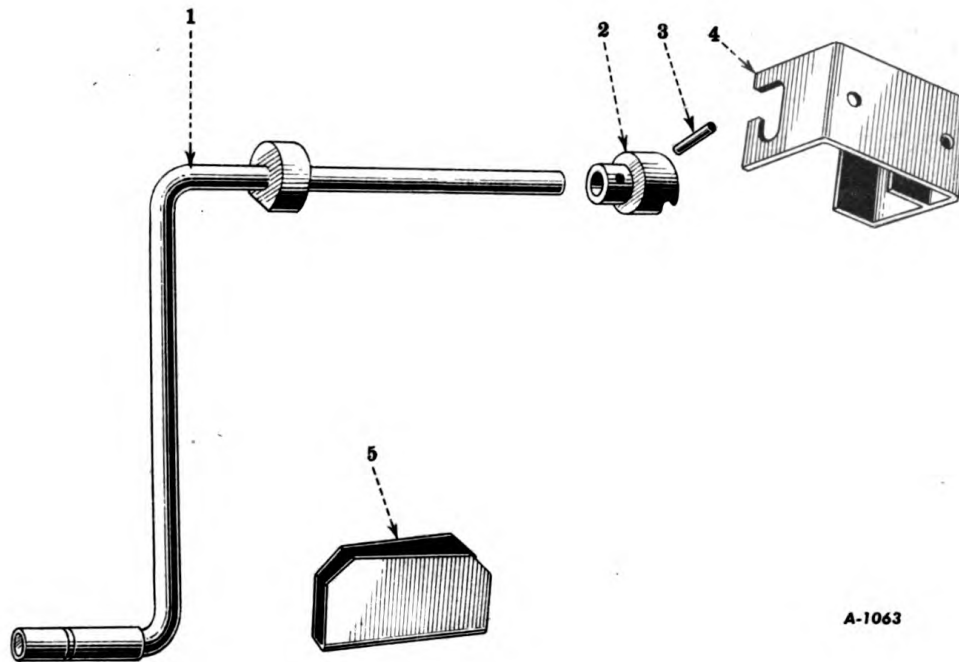
*When ordering, always use I H C Part Nos.*

| Ref. No. | I H C Part No. | Description                              | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 39677 D        | Bleeder . . . . .                        | 1        | .031     |
| 2        | 39577 DA       | Stud . . . . .                           | 1        | 1.188    |
| 3        | 13839 D        | Stud gasket . . . . .                    | 1        | .006     |
| 4        | 28772 D        | Case . . . . .                           | 1        | 3.313    |
| 5        | 29501 DA       | Cloth element . . . . .                  | 1        | 2.875    |
| 6        | 28809 D        | Metal element . . . . .                  | 1        |          |
| 7        | 13841 D        | Gasket . . . . .                         | 1        | .008     |
| 8        | { 37323 DX     | Elbow with nut . . . . .                 | 2        | .111     |
|          | { 37323 D      | Elbow . . . . .                          | 2        |          |
| 9        | 8045 D         | Base . . . . .                           | 1        | 5.750    |
| ...      | Q 1832         | Cap screw, 7/16" N.C. x 1-1/4" . . . . . | 2        | .075     |
| ...      | Q 1921         | Lock washer, 7/16" . . . . .             | 2        | .001     |
| 10       | 9982 T         | Drain cock . . . . .                     | 1        | .073     |

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**STARTING CRANK**



A-1063

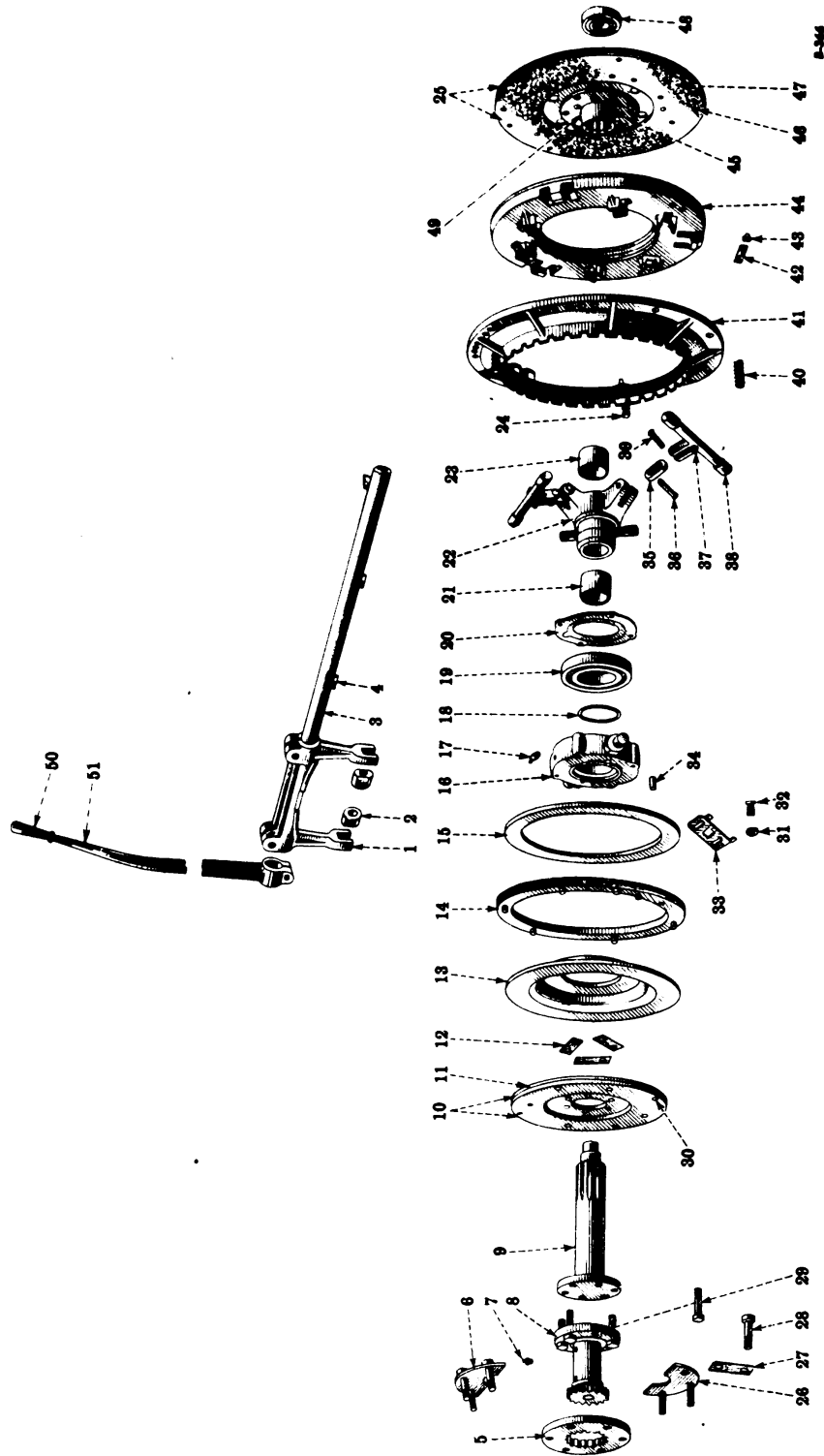
*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

| Ref. No. | I H C Part No. | Description                            | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 50091 DAX      | Starting crank, with ratchet and pin . | 1        | 8.000    |
| 2        | 6935 D         | Ratchet. . . . .                       | 1        | 2.875    |
| 3        | G 3754         | Ratchet pin. . . . .                   | 1        | .015     |
| 4        | 50125 D        | Support. . . . .                       | 1        | 4.187    |
| ...      | Q 1849         | Cap screw, 1/2 x 1-1/4" N.F. . . . .   | 2        | .110     |
| ...      | Q 1909         | Hex. nut, 1/2" N.F. . . . .            | 2        | .031     |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .            | 2        | .013     |
| 5        | 50124 D        | Support clamp. . . . .                 | 1        | 1.062    |
| ...      | Q 1801         | Cap screw, 3/8 x 1" N.F. . . . .       | 2        | .050     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .            | 2        | .015     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .            | 2        | .005     |



# SPARE PARTS CATALOG

## ENGINE CLUTCH AND CONNECTIONS



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**ENGINE CLUTCH AND CONNECTIONS - Continued**

| Ref. No. | I H C Part No. | Rockford Drilling Mach. Co. No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---------------------------------|---|----------|----------|
| ...      | 49971 DD       | CLA-1188-AD                     | Engine clutch, (15") (includes Ref. Nos. 13 thru 25, and 31 thru 47)                  | 1        |          |
| ...      | .....          | .....                           | Cap screw, 1/2 x 1-3/8" N.C. ....   | 9        | .125     |
| ...      | Q 1922         |                                 | Lock washer, 1/2" ....  | 9        | .012     |
| ...      | 50427 DE       | UCLA-5-4305-2                   | Clutch, complete less driven member assembly .....                                    | 1        |          |
| 1        | 5723 DB        |                                 | Release fork. ....  | 1        | 6.625    |
| ...      | Q 1874         |                                 | Cap screw, 5/8 x 2" N.C.  | 2        | .250     |
| ...      | Q 1925         |                                 | Lock washer, 5/8" ....  | 2        | .016     |
| 2        | 42298 DB       |                                 | Release pin bushing ..  | 2        | .188     |
| 3        | 49977 D        |                                 | Release shaft .....   | 1        | 8.250    |
| 4        | 10430 V        |                                 | Key (Woodruff No. 18) ..  | 2        | .031     |
| 5        | 49974 D        |                                 | Ring (16 teeth) .....   | 1        | 2.750    |
| 6        | 49975 D        |                                 | Coupling washer .....   | 1        | .531     |
| 7        | Q 3615         |                                 | Lubricator (Lincoln No. 5000) .....   | 1        | .016     |
| 8        | 49973 DA       |                                 | Coupling (16 teeth) ..  | 1        | 5.375    |
| 9        | 53457 D        |                                 | Shaft .....   | 1        | 9.750    |
| 10       | 40942 DX       |                                 | Brake disc with facing. .   | 1        | 6.500    |
| 11       | 40943 D        |                                 | Brake facing. ....  | 1        | .625     |
| 12       | 40974 DA       |                                 | Coupling bolt lock. ....  | 3        | .031     |
| 13       | 43198 D        | CL-4152                         | Brake disc. ....  | 1        | 6.375    |
| ...      | Q 1774         | CL-3919                         | Cap screw, 5/16 - 18 x 3/4" .....   | 4        | .020     |
| ...      | Q 1919         | CL-3920                         | Lock washer, 5/16" ..   | 4        | .003     |
| 14       | 55371 DAX      | UCL-4815-1                      | Adjusting ring with lock and pin. ....  | 1        | 4.313    |
| 15       | 31238 D        | CL-3461                         | Ring plate. ....  | 1        | 3.000    |
| 16       | 43197 D        | CL-4256                         | Bearing carrier .....   | 1        | 6.375    |
|          | 43197 DX       | UCL-4256                        | Bearing carrier with brake disc, plate, pin and lubricator .....                      | 1        | 13.688   |
| 17       | Q 3625         |                                 | Lubricator (Lincoln No. 5100) (optional) ..   | 1        | .031     |
|          | 14187 DA       |                                 | Lubricator (Alemite No. 1611) (optional) ..   | 1        | .012     |
| 18       | 43195 D        | CL-3900                         | Snap ring .....   | 1        | .047     |
| 19       | 48173 D        | CL-4599                         | Bearing (N.D. No. 3214) .   | 1        | 2.406    |
| 20       | 43201 DA       | CL-4257-1                       | Plate .....   | 1        | .813     |
| ...      | Q 1774         | CL-3919                         | Cap screw, 5/16 - 18 x 3/4" .....   | 4        | .020     |
| ...      | Q 1919         | CL-3920                         | Lock washer, 5/16" ..   | 4        | .003     |
| 21       | 43194 D        | CL-4154                         | Bushing .....   | 1        | .250     |
|          | 50432 DAX      | UCL-4450-1                      | Sleeve with bushings. .   | 1        | 6.875    |
| 22       | 51611 DA       | UCL-4450-1AS                    | Sleeve with bushings, bearing (48173 D) and bearing carrier assembly (43197 DX) ..... | 1        | 22.500   |
|          | 43194 D        | CL-4154                         | Bushing .....   | 1        | .250     |
| 24       | 61131 D        | CL-5329                         | Return spring bolt. ....  | 3        | .031     |
| ...      | Q 1903         | CL-3336                         | Hex. nut, 5/16" N.F. .  | 6        | .008     |
| ...      | .....          | CL-3923                         | Cotter, 1/16 x 1/2" ..  | 6        | .001     |

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**SPARE PARTS CATALOG**

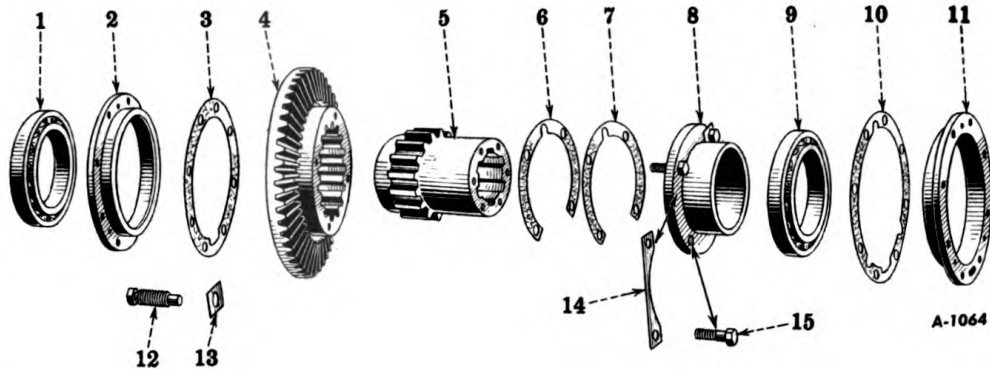
**ENGINE CLUTCH AND CONNECTIONS - Continued**

| Ref. No. | I H C Part No.          | Rockford Drilling Mach. Co. No. | Description  | No. Used | Wt. Lbs. |
|----------|-------------------------|---------------------------------|--|----------|----------|
| 25       | 50423 DX                | CL-4279                         | Clutch facing package . . .                                | 1        | 4.313    |
| 26       | 49975 D                 |                                 | Coupling washer . . . . .                                  | 1        | .531     |
| 27       | 49976 DA                |                                 | Bolt lock . . . . .  | 3        | .047     |
| 28       | 40945 D                 |                                 | Bolt . . . . .   | 6        | .125     |
| ...      | Q 1909                  |                                 | Hex. nut, 1/2" N.F. . . . .                                | 6        | .031     |
| 29       | 40945 D                 |                                 | Coupling bolt . . . . .                                    | 6        | .125     |
| ...      | Q 1919                  |                                 | Hex. nut, 1/2" N.F. . . . .                                | 6        | .031     |
| 30       | 21444 H                 |                                 | Rivet . . . . .  | 8        | .002     |
| 31       | 27166 H                 | CL-1608                         | Lock nut. . . . .  | 2        | .010     |
| 32       | 61115 D                 | CL-5215                         | Lock bolt . . . . .  | 2        | .040     |
| 33       | 61127 D                 | CL-5223                         | Lock . . . . .   | 1        | .050     |
| 34       | 43139 D                 | CL-4052                         | Dowel pin . . . . .  | 2        | .025     |
| 35       | 43207 D                 | CL-4339-1                       | Link . . . . .   | 3        | .002     |
| 36       | 43211 D                 | CL-4340                         | Pin, long . . . . .  | 3        | .188     |
| ...      | .....                   | CL-4397                         | Cotter, 1/8 x 5/8". . . . .                                | 3        | .003     |
| ...      | .....                   | CL-4347                         | Washer, 3/8" I.D. x 7/8" O.D. x 16 ga. . . . .             | 3        | .010     |
| 37       | Q 3627 }<br>27838 D }   | CL-5028                         | Lubricator (Lincoln No. 5318) (optional) . . . . .         | 3        | .016     |
|          |                         |                                 | Lubricator (Alemite No. 1656) (optional) . . . . .         | 3        | .016     |
| 38       | 56996 D }<br>59996 DX } | UCL-1-4337-S3                   | Camshaft assembly (set of 3) . . . . .                     | 1        | 3.625    |
|          |                         | UCL-1-4337-S3A                  | Camshaft (set of 3) and blocks (set of 6). . . . .         | 1        |          |
| 39       | N 32202                 | CL-4341                         | Pin, short. . . . .  | 3        | .063     |
| ...      | .....                   | CL-4597                         | Cotter, 1/8 x 5/8". . . . .                                | 3        | .003     |
| ...      | .....                   | CL-4347                         | Washer, 3/8" I.D. x 7/8" O.D. 16 ga. . . . .               | 3        | .010     |
| 40       | 50424 D                 | CL-4300                         | Return spring . . . . .                                    | 3        | .030     |
| 41       | 50426 DA                | CL-4305-2                       | Back plate. . . . .  | 1        | 16.500   |
| 42       | 43248 D                 | UCL3478-S-6                     | Cam block . . . . .  | 6        | .026     |
| ...      | .....                   | CL-3921                         | Fillister head screw, 1/4" - 20 x 1/2" . . . . .           | 6        | .001     |
| 43       | 54953 D                 | CL-4799                         | Lock . . . . .   | 6        | .004     |
| 44       | 51610 DB                | UCL-4304-4                      | Pressure plate with cam blocks and screws. . . . .         | 1        | 31.500   |
| 45       | 39361 D                 | CL-2167                         | Rivet . . . . .  | 12       |          |
| 46       | 43247 D                 | CL-1011-2                       | Rivet . . . . .  | 30       | .375     |
| 47       | 50392 D                 | UCL4-2086                       | Driven member assembly. . . . .                            | 1        | 13.000   |
| 48       | 11669 K                 |                                 | Pilot bearing (New Departure No. 7306). . . . .            | 1        | .875     |
| 49       | 31538 H                 | CL-2086                         | Clutch plate center . . . . .                              | 1        |          |
| 50       | 41597 D                 |                                 | Clutch lever rubber handle used on 6919 DX only). . . . .  | 1        | .150     |
| 51       | 6919 DX }<br>9650 D }   |                                 | Engine clutch lever with rubber handle (optional). . . . . | 1        |          |
|          |                         |                                 | Engine clutch lever with steel handle (optional) . . . . . | 1        |          |
| ...      | .....                   |                                 | Cap screw, 5/8" N.F. x 2-5/8" . . . . .                    | 1        |          |
| ...      | Q 1911                  |                                 | Hex. nut, 5/8" N.F. . . . .                                | 1        | .127     |
| ...      | Q 1925                  |                                 | Lock washer, 5/8" . . . . .                                | 1        |          |
| ...      | Q 3625                  | CL-4475                         | Lubricating fitting (Lincoln No. 5100). . . . .            | 1        | .031     |
| ...      | 10430 V                 |                                 | Engine clutch and lever key (Woodruff No. 18). . . . .     | 1        |          |

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**SPARE PARTS CATALOG**

**DRIVE BEVEL GEAR ASSEMBLY**

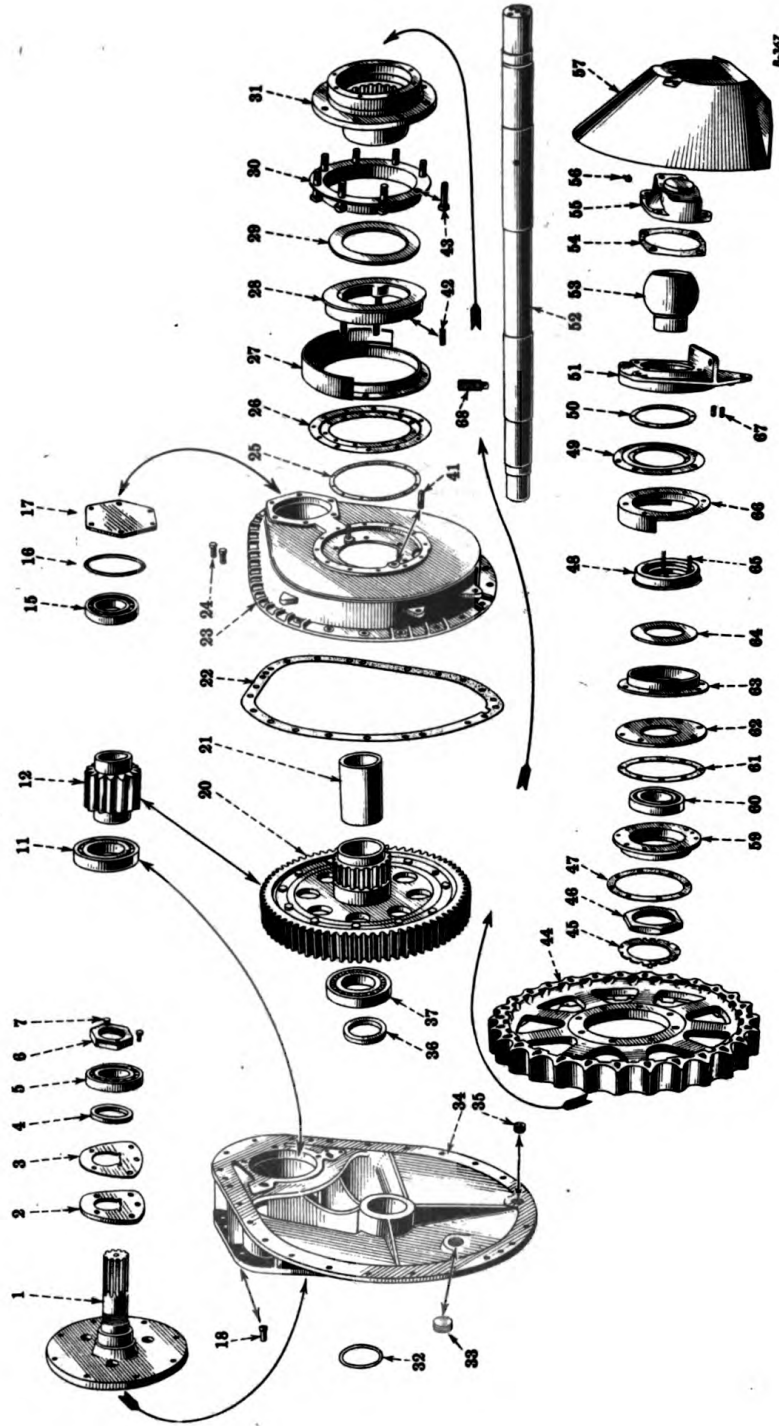


*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 52401 D        | Bearing (New Departure No. 3L-38-A).                     | 1        | 7.625    |
| 2        | 8396 D         | Bearing cage, left hand. . . . .                         | 1        | 6.250    |
| 3        | 51554 D        | Gasket . . . . .   | 1        | .031     |
| 4        | 64628 D        | Bevel pinion and shaft with drive<br>bevel gear. . . . . | 1        | 81.000   |
| 5        | 8395 D         | Hub. . . . .   | 1        | 26.750   |
| 6        | 52396 D        | Shim, heavy. . . . .                                     | 4        | .031     |
| 7        | 52397 D        | Shim, light. . . . .                                     | As req'd | .046     |
| 8        | 53675 D        | Spacer . . . . .   | 1        | 9.500    |
| 9        | 52401 D        | Bearing (New Departure No. 3L-28-A).                     | 1        | 7.625    |
| 10       | 51554 D        | Gasket . . . . .   | 1        | .031     |
| 11       | 8397 D         | Bearing cage, right hand . . . . .                       | 1        | 6.000    |
| 12       | 49849 D        | Set screw. . . . .                                       | 1        | .500     |
| ...      | .....          | Hex. jam nut, 1" N.F. . . . .                            | 1        | .156     |
| 13       | 49850 D        | Set screw lock . . . . .                                 | 1        | .062     |
| 14       | 52399 DA       | Nut lock . . . . .                                       | 2        | .046     |
| 15       | 52398 D        | Bolt . . . . .   | 4        | .250     |
| ...      | Q 1911         | Hex. nut, 5/8" N.F. . . . .                              | 4        | .062     |

# SPARE PARTS CATALOG

## SPROCKET DRIVE ASSEMBLY



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

*Don't order parts from the illustrations only; refer to the list also.*

SPARE PARTS CATALOG

SPROCKET DRIVE ASSEMBLY - Continued

| Ref. No. | I H C Part No. | Description                    | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                           | No. Used | Wt. Lbs. |
|----------|----------------|--------------------------------|----------|----------|----------|----------------|---------------------------------------|----------|----------|
| 1        | 52347 DA       | Pinion shaft.                  | 2        | 43.000   | 24       | 64801 D        | Dowel pin                             | 4        | .312     |
| 2        | 9475 DX        | Bearing retainer with oil seal | 2        | 5.250    | 25       | 53445 D        | Retainer.                             | 2        | .062     |
| ...      | .....          | Cap screw, 1/2"                | 10       | .125     | ...      | Q 4000         | Cap screw, 1/4"<br>N.C. x 5/8"        | 20       | .015     |
| ...      | Q 1922         | Lock washer, 1/2"              | 10       | .013     | ...      | Q 1918         | Lock washer, 1/4"                     | 20       | .002     |
| 3        | 64817 D        | Bearing retainer gasket        | 2        | .031     | 26       | 53444 D        | Diaphragm                             | 2        | .031     |
| 4        | 52348 D        | Oil seal.                      | 2        | .406     | 27       | 53455 D        | Guard                                 | 2        | 4.750    |
| 5        | 40940 D        | Bearing (N.D. No. 7514)        | 2        | 2.500    | ...      | Q 1800         | Cap screw, 3/8"<br>N.C. x 3/4"        | 20       | .035     |
| 6        | 49857 D        | Bearing nut                    | 2        | 1.375    | ...      | Q 1920         | Lock washer, 3/8"                     | 20       | .005     |
| 7        | 10722 D        | Lock bolt                      | 4        | .031     | 28       | 8431 D         | Pressure plate                        | 2        | 8.750    |
| 11       | 17462 H        | Bearing (N.D. No. 1217)        | 2        | 12.750   | 29       | 53440 D        | Packing                               | 2        | .343     |
| 12       | 64493 D        | Pinion (13 teeth)              | 2        |          | 30       | 53439 D        | Deflector                             | 2        | 2.094    |
| 15       | 17462 H        | Bearing (N.D. No. 1217)        | 2        | .020     | 31       | 53438 DA       | Carrier                               | 2        | 44.000   |
| 16       | 64816 D        | Packing ring.                  | 2        | 6.625    | 32       | 49801 D        | Ring (track frame pivot shaft)        | 2        | .031     |
| 17       | 9476 DX        | Cap with packing ring          | 2        |          | 33       | .....          | Plug, 1-1/2"                          | 1        | .281     |
| ...      | .....          | Cap screw, 1/2"                | 12       | .125     | ...      | 64924 D        | Carrier with pipe plugs.              | 2        | 325.000  |
| ...      | Q 1922         | Lock washer, 1/2"              | 12       | .013     | ...      | Q 1870         | Cap screw, 5/8"<br>N.C. x 1-1/2"      | 2        | .191     |
| 18       | 64803 D        | Pin                            | 4        | .250     | ...      | Q 1852         | Cap screw, 1/2"<br>N.C. x 1-1/2"      | 4        | .120     |
| 20       | 64495 D        | Gear (73 teeth) and carrier.   | 2        | 140.000  | 34       | Q 1872         | Cap screw, 5/8"<br>N.C. x 1-3/4"      | 10       | .200     |
| ...      | .....          | Round head rivet, 5/8 x 2-1/8" | 20       | .250     | ...      | Q 1925         | Lock washer, 5/8"                     | 10       | .024     |
| 21       | 49868 D        | Spacer, long.                  | 2        | 8.125    | ...      | .....          | Standard ctsk. head pipe plug, 1-1/2" | 2        | .125     |
| 22       | 64820 D        | Gasket.                        | 2        | .008     | 35       | 58997 D        | Plug, 3/4"                            | 2        | .281     |
| 23       | 9478 DX        | Cover with anchor pins         | 2        | 145.000  | 36       | 49864 D        | Spacer, short                         | 2        | .125     |
| ...      | Q 1849         | Cap screw, 1/2"<br>N.F. x 2"   | 38       | .110     | 37       | 49876 D        | Bearing (N.D. No. 1219-85)            | 2        | 1.500    |
| ...      | Q 1909         | Hex. nut, 1/2" N.F.            | 32       | .037     | 41       | 52419 D        | Anchor pin.                           | 4        | 7.250    |
| ...      | Q 1922         | Lock washer, 1/2"              | 38       | .013     | 42       | 41608 D        | Spring.                               | 8        | .111     |
| ...      | 64802 D        | Dowel pin                      | 6        | .218     | 43       | 49879 DA       | Bolt.                                 | 16       | .500     |

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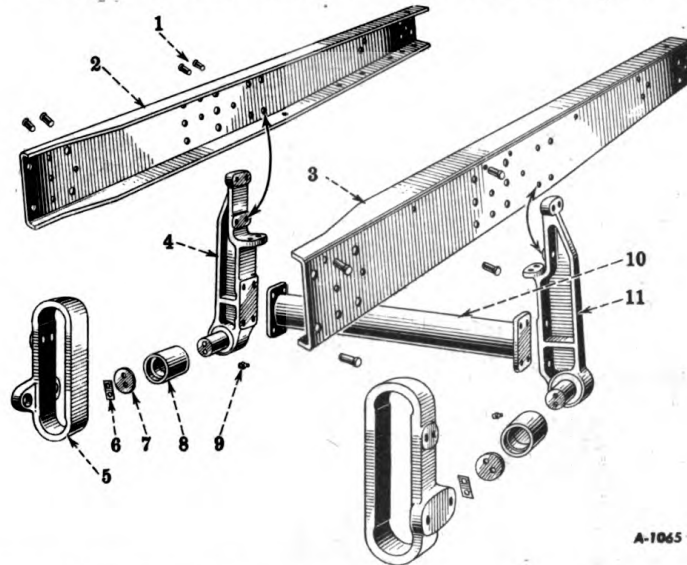
SPARE PARTS CATALOG

SPROCKET DRIVE ASSEMBLY - Continued

| Ref. No. | I H C Part No. | Description                                 | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                       | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|----------|----------------|-----------------------------------|----------|----------|
| 44       | 8784 DA        | Sprocket (27 teeth)                         | 2        | 177.000  | ...      | Q 1924         | Lock washer, 9/16"                | 8        | .031     |
| 45       | 49882 D        | Lock  | 2        | .312     | ...      | Q 1864         | Cap screw, 1/2"                   | 4        | .200     |
| 46       | 53613 DA       | Nut   | 2        | 2.000    | ...      |                | N.C. x 3"                         | 4        | .031     |
| 47       | 53447 D        | Gasket                                      | 2        | .032     | ...      | Q 1922         | Lock washer, 1/2"                 | 2        | 11.375   |
| 48       | 8432 D         | Pressure plate                              | 2        | 5.156    | 59       | 8430 DA        | Cage                              | 2        | .032     |
| 49       | 53450 D        | Diaphragm                                   | 2        | .093     | 60       | 40039 V        | Bearing (N.D. No. 1216)           | 2        | 6.000    |
| 50       | 53451 D        | Retainer                                    | 2        | .312     | 61       | 53447 D        | Gasket                            | 4        | 1.625    |
| ...      | Q 4000         | Cap screw, 1/4"                             | 16       | .014     | 62       | 53446 D        | Retainer                          | 2        |          |
| ...      | Q 1918         | N.C. x 5/8"                                 | 16       | .002     | 63       | 53448 D        | Deflector (track frame)           | 2        |          |
| 51       | 8433 DA        | Lock washer, 1/4"                           | 16       |          | ...      | Q 1853         | Cap screw, 1/2"                   | 16       | .125     |
| ...      | Q 1871         | Bracket                                     | 2        |          | ...      |                | N.F. x 1-3/4"                     | 16       | .031     |
| ...      | Q 1911         | Cap screw, 5/8"                             | 10       |          | ...      | Q 1922         | Lock washer, 1/2"                 | 2        | .250     |
| ...      | Q 1925         | N.F. x 1-3/4"                               | 10       |          | 64       | 53449 D        | Packing                           | 8        | .031     |
| 52       | 52332 D        | Hex. nut, 5/8" N.F.                         | 10       |          | 65       | 41619 D        | Spring                            | 2        | 2.750    |
| ...      | ...            | Lock washer, 5/8"                           | 10       |          | 66       | 53456 D        | Guard                             | 2        |          |
| 53       | 6982 D         | Track frame pivot shaft                     | 1        | 226.000  | ...      | Q 1800         | Cap screw, 3/8"                   | 16       | .031     |
| ...      | Q 1871         | Pivot bearing                               | 2        | 10.375   | ...      |                | N.C. x 3/4"                       | 16       | .005     |
| ...      | Q 1925         | Cap screw, 5/8"                             | 8        | .225     | 67       | 54110 D        | Lock washer, 3/8"                 | 4        | .028     |
| 54       | 49802 D        | N.F. x 1-3/4"                               | 8        | .024     | ...      | 45293 D        | Anchor pin                        | 16       |          |
| 55       | 6984 DAX       | Lock washer, 5/8"                           | 2        | .296     | ...      |                | Sprocket carrier bolt             | 16       | .187     |
| ...      | Q 1888         | Gasket (track pivot)                        | 2        | 10.906   | ...      | 21555 H        | nut                               | 16       | .006     |
| ...      | Q 1927         | Cap (track pivot)                           | 8        | .308     | ...      | Q 1922         | Sprocket carrier bolt             | 16       | .031     |
| 56       | 3615           | Cap screw, 3/4"                             | 8        | .045     | ...      | 47415 H        | lock washer (Shakeproof No. 1132) | 16       |          |
| ...      | ...            | N.C. x 1-3/4"                               | 2        | .015     | ...      |                | Lock washer, 1/2"                 | 14       | .005     |
| 57       | 52357 DX       | Lock washer, 3/4"                           | 2        | 18.000   | ...      | 49763 D        | Sprocket drive carrier stud nut   | 16       |          |
| ...      | Q 4076         | Lubricator (track pivot) (Lincoln No. 5000) | 8        | .046     | ...      | Q 1922         | Lock washer, 1/2"                 | 16       | .031     |
| ...      | .....          | Shield (sprocket)                           | 8        | .031     | ...      |                | Sprocket drive carrier stud nut   | 16       |          |
| ...      | .....          | Cap screw, 9/16"                            | 8        |          | ...      |                | Lock washer, 1/2"                 | 16       |          |
| ...      | .....          | N.F. x 1-1/4"                               | 8        |          | ...      |                |                                   | 16       |          |
| ...      | .....          | Hex. nut, 9/16" N.F.                        | 8        |          | ...      |                |                                   | 16       |          |

**SPARE PARTS CATALOG**

**TRACK FRAME GUIDE, ROLLER AND BRACKET,  
AND MAIN FRAME SIDE CHANNEL**



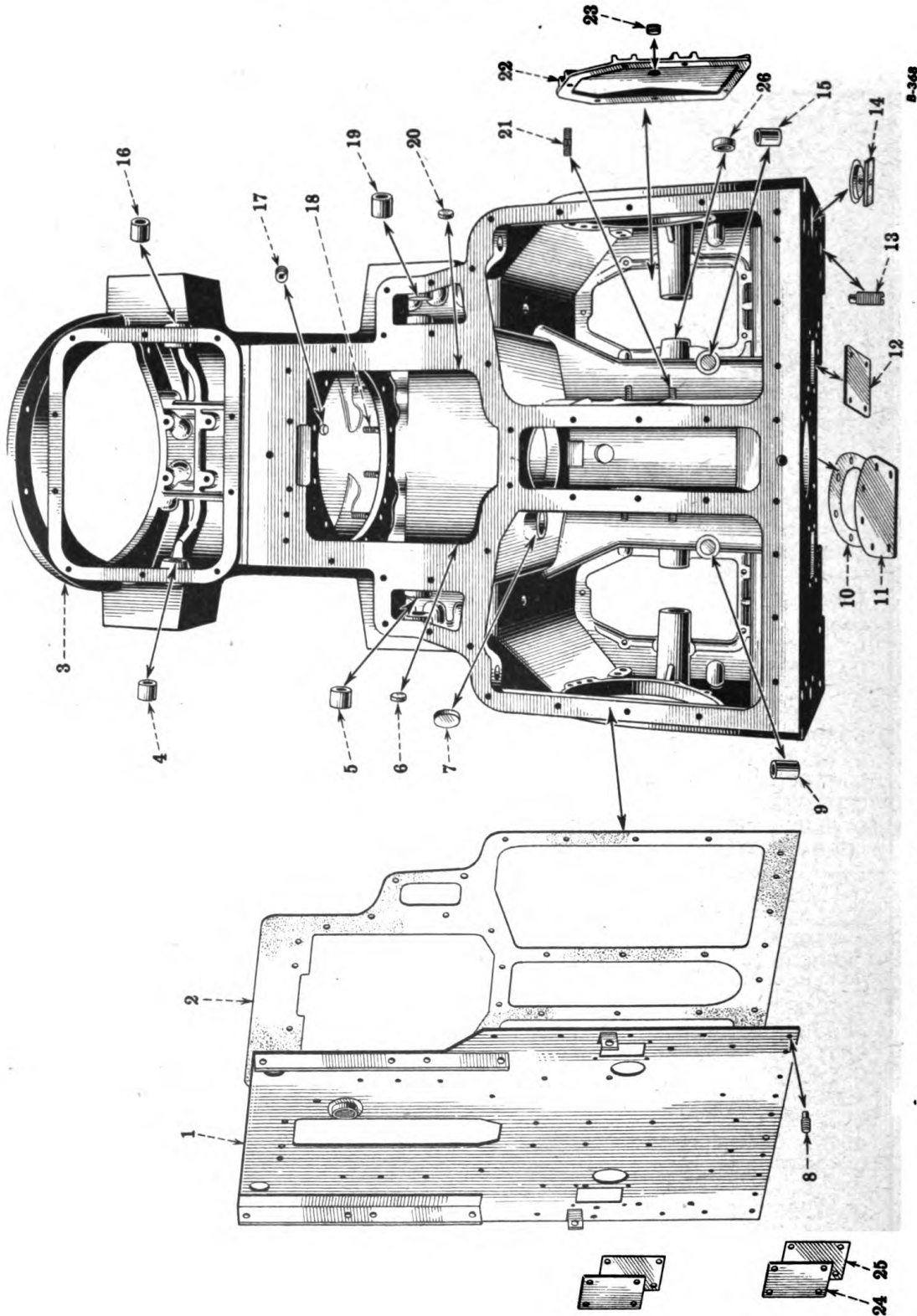
| Ref. No. | I H C Part No. | Description                               | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 1        | 49999 D        | Dowel . . . . .                           | 4        | .406     |
| 2        | 52394 D        | Channel, left hand . . . . .              | 1        | 115.000  |
| ...      | Q 4146         | Cap screw, 7/8" N.C. x 2" . . . . .       | 4        | .468     |
| ...      | Q 1870         | Cap screw, 5/8 x 1-1/2" N.C. . . . .      | 4        | .191     |
| ...      | Q 1929         | Lock washer, 7/8" . . . . .               | 4        | .005     |
| ...      | Q 1925         | Lock washer, 5/8" . . . . .               | 4        | .023     |
| 3        | 52395 D        | Channel, right hand . . . . .             | 1        | 115.000  |
| ...      | Q 4146         | Cap screw, 7/8" N.C. x 2" . . . . .       | 4        | .468     |
| ...      | Q 1870         | Cap screw, 5/8 x 1-1/2" N.C. . . . .      | 4        | .191     |
| ...      | Q 1929         | Lock washer, 7/8" . . . . .               | 4        | .005     |
| ...      | Q 1925         | Lock washer, 5/8" . . . . .               | 4        | .023     |
| * 4      | 6884 DAX       | Bracket, with shaft (left hand) . . . . . | 1        | 38.000   |
| ...      | .....          | Cap screw, 3/4 x 2-5/8" N.F. . . . .      | 2        | .437     |
| ...      | Q 1889         | Cap screw, 3/4 x 2" N.F. . . . .          | 4        | .358     |
| ...      | Q 1913         | Hex. nut, 3/4" N.F. . . . .               | 6        | .120     |
| ...      | Q 1927         | Lock washer, 3/4" . . . . .               | 6        | .004     |
| * 5      | 6886 D         | Guide . . . . .                           | 2        | 31.562   |
| ...      | Q 1897         | Cap screw, 7/8 x 1-3/4" N.F. . . . .      | 8        | .475     |
| ...      | Q 1929         | Lock washer, 7/8" . . . . .               | 8        | .005     |
| * 6      | 35089 D        | Cap screw lock . . . . .                  | 2        | .025     |
| * 7      | 49769 D        | Washer . . . . .                          | 2        | .250     |
| ...      | Q 4050         | Cap screw, 1/2 x 7/8" N.F. . . . .        | 4        | .093     |
| * 8      | 49768 D        | Roller . . . . .                          | 2        | 4.375    |
| * 9      | Q 3615         | Lubricator (Lincoln No. 5000) . . . . .   | 2        | .015     |
| *10      | 49771 DXA      | Bracket brace . . . . .                   | 1        | 31.000   |
| ...      | Q 1873         | Cap screw, 5/8 x 2" N.F. . . . .          | 8        | .250     |
| ...      | Q 1911         | Hex. nut, 5/8" N.F. . . . .               | 8        | .085     |
| ...      | Q 1925         | Lock washer, 5/8" . . . . .               | 8        | .023     |
| *11      | 6885 DAX       | Bracket, with shaft, right hand . . . . . | 1        | 37.000   |
| ...      | .....          | Cap screw, 3/4 x 2-5/8" N.F. . . . .      | 2        | .437     |
| ...      | Q 1889         | Cap screw, 3/4 x 2" N.F. . . . .          | 4        | .358     |
| ...      | Q 1913         | Hex. nut, 3/4" N.F. . . . .               | 6        | .120     |
| ...      | Q 1927         | Lock washer, 3/4" . . . . .               | 6        | .040     |

\* - These items are not used if the tractor is equipped with a "Rigid Track Frame Attachment" (see page 8).



# SPARE PARTS CATALOG

## MAIN FRAME AND COVERS



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

*Don't order parts from the illustrations only; refer to the list also.*

SPARE PARTS CATALOG

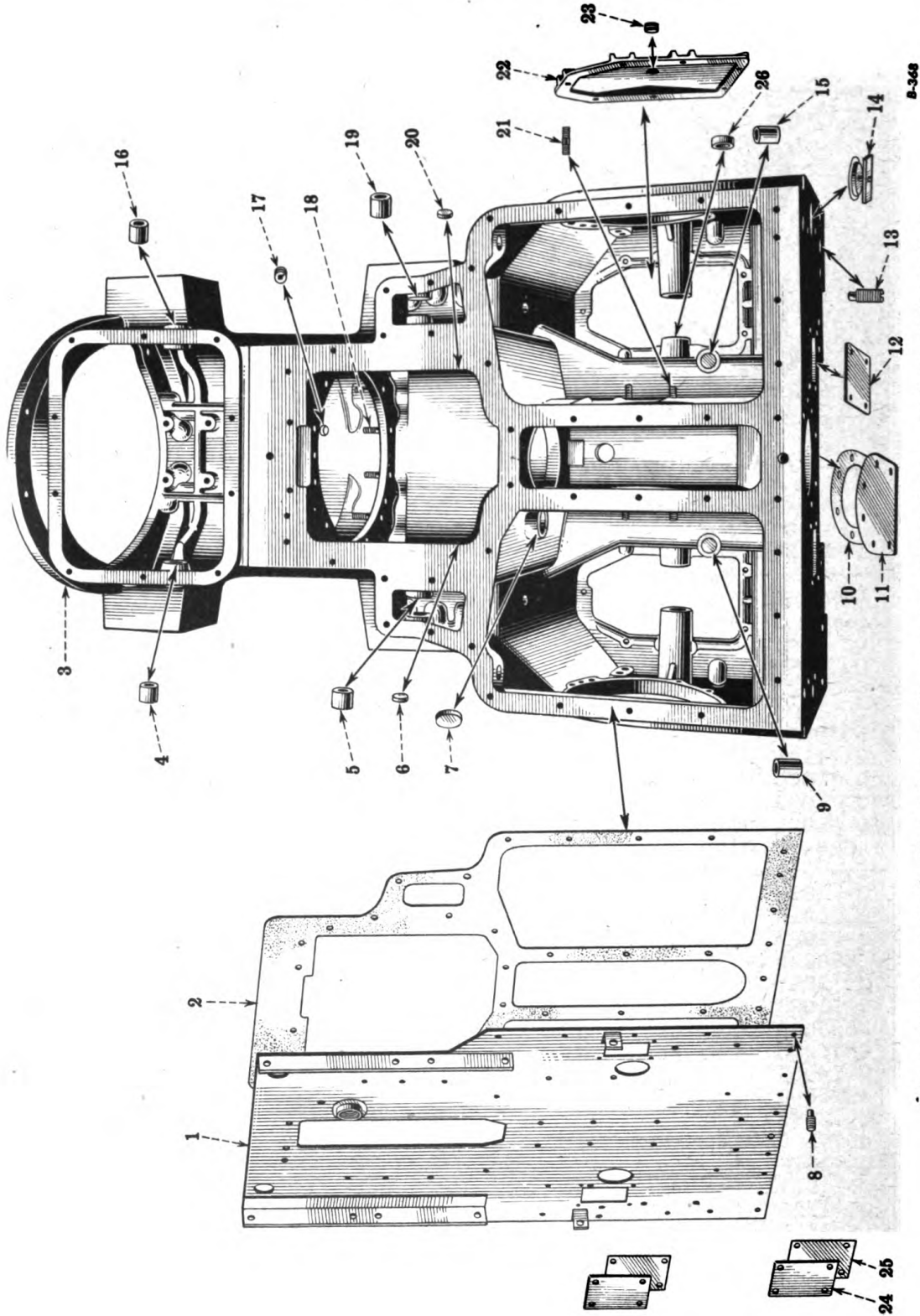
MAIN FRAME AND COVERS - Continued

| Ref. No. | I H C Part No. | Description                                      | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|----------|----------------|---|----------|----------|
| 1        | 56021 DXA      | Main frame cover . . . . .                       | 1        | 98.000   | 16       | 41598 D        | Engine clutch release shaft bushing . . . . .                 | 1        | .156     |
| ...      | Q 1850         | Cap screw, 1/2" N.C. x 1-1/4" . . . . .          | 33       | .105     | 17       | 4926 DA        | Engine clutch compartment drain plug . . . . .                | 1        | .108     |
| ...      | Q 1922         | Lock washer, 1/2" N.C. x 3/4" . . . . .          | 41       | .013     | 18       | 52387 D        | Transmission end cover stud . . . . .                         | 4        | .125     |
| ...      | Q 1846         | Cap screw, 1/2" N.C. x 3/4" . . . . .            | 8        | .085     | 19       | 41599 D        | Steering brake lever outer bushing . . . . .                  | 2        | .077     |
| 2        | 52392 D        | Main frame cover gasket . . . . .                | 1        | .421     | 20       | 41600 D        | Steering brake operating shaft plug . . . . .                 | 1        | .015     |
| 3        | 6900 DHX       | Main frame . . . . .                             | 1        | 1585.000 | 21       | 49997 D        | Bevel gear bearing cage stud . . . . .                        | 4        | .125     |
| 4        | 41598 D        | Engine clutch release shaft bushing . . . . .    | 1        | .156     | 22       | 6913 DA        | Steering brake inspection cover . . . . .                     | 2        | 17.187   |
| 5        | 41599 D        | Steering brake lever outer bushing . . . . .     | 2        | .077     | ...      | Q 1852         | Cap screw, 1/2 x 1-1/2" N.C. . . . .                          | 14       | .120     |
| 6        | 41600 D        | Steering brake operating shaft plug . . . . .    | 1        | .015     | ...      | Q 1922         | Lock washer, 1/2" N.C. . . . .                                | 14       | .013     |
| 7        | 49998 D        | Transmission reverse idler shaft plug . . . . .  | 1        | .125     | 23       | 4926 DA        | Steering brake inspection cover drain plug . . . . .          | 2        | .108     |
| 8        | 18585 DA       | Main frame cover dowel pin . . . . .             | 2        | .125     | 24       | 56011 D        | Steering clutch inspection cover . . . . .                    | 2        | 1.000    |
| 9        | 42000 D        | Steering clutch release shaft bushing . . . . .  | 1        | .108     | ...      | Q 1771         | Cap screw, 5/16 x 1/2" N.F. . . . .                           | 8        | .025     |
| *10      | 42289 D        | Power take-off cover gasket . . . . .            | 1        | .625     | 25       | 56014 D        | Lock washer, 5/16" steering clutch inspection cover . . . . . | 8        | .003     |
| *11      | 42288 D        | Power take-off cover . . . . .                   | 1        | 4.750    | 26       | 41162 D        | Steering brake pivot shaft cup plug . . . . .                 | 2        | .015     |
| ...      | Q 1884         | Cap screw, 3/4 x 1-1/4" N.C. . . . .             | 6        | .258     | ...      | 57384 D        | Drawbar guide bracket stud, lower . . . . .                   | 4        | .500     |
| ...      | Q 1927         | Lock washer, 3/4" N.C. . . . .                   | 6        | .075     | ...      | 57385 D        | Drawbar guide bracket stud, upper . . . . .                   | 2        | .687     |
| 12       | 42290 D        | Main frame rear inspection cover . . . . .       | 2        | .875     | ...      | 59119 D        | Socket head pipe plug, (magnetic) . . . . .                   | 1        | .562     |
| ...      | Q 1800         | Cap screw, 3/8 x 3/4" N.C. . . . .               | 8        | .035     | ...      | 64815 D        | Sprocket drive carrier and cover stud . . . . .               | 16       | .125     |
| ...      | Q 1920         | Lock washer, 3/8" N.C. . . . .                   | 8        | .005     | ...      |                |   |          |          |
| 13       | 40998 DA       | Track frame pivot shaft set screw . . . . .      | 2        | .250     | ...      |                |   |          |          |
| ...      | .....          | Hex. jam nut, 3/4" N.C. . . . .                  | 2        | .003     | ...      |                |   |          |          |
| 14       | 42297 D        | Steering clutch lubricating port cover . . . . . | 2        | .531     | ...      |                |   |          |          |
| 15       | 42000 D        | Steering clutch release shaft bushing . . . . .  | 1        | .108     | ...      |                |   |          |          |

\* - These items are not used if the tractor is equipped with a "Power Take-Off Attachment (see Section 9, page 2).

# SPARE PARTS CATALOG

## MAIN FRAME AND COVERS



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

*Don't order parts from the illustrations only; refer to the list also.*

SPARE PARTS CATALOG

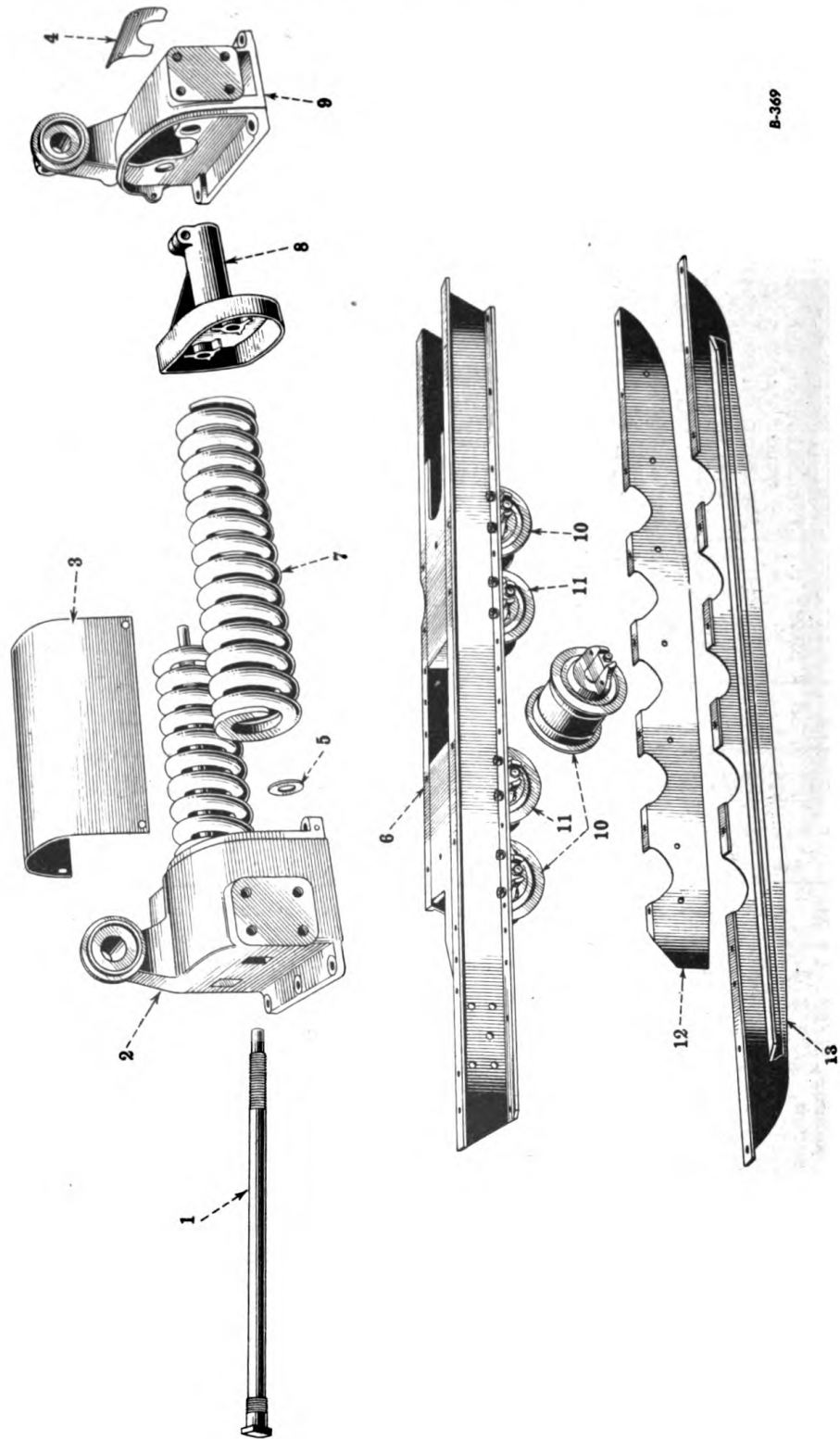
MAIN FRAME AND COVERS - Continued

| Ref. No. | I H C Part No. | Description                                      | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|----------|----------------|--|----------|----------|
| 1        | 56021 DXA      | Main frame cover . . . .                         | 1        | 98.000   | 16       | 41598 D        | Engine clutch release shaft bushing . . . .          | 1        | .156     |
| ...      | Q 1850         | Cap screw, 1/2" N.C. x 1-1/4" . . . . .          | 33       | .105     | 17       | 4926 DA        | Engine clutch compartment drain plug stud. . . . .   | 1        | .108     |
| ...      | Q 1922         | Lock washer, 1/2" N.C. x 3/4" . . . . .          | 41       | .013     | 18       | 52387 D        | Transmission end cover stud, upper . . . . .         | 4        | .125     |
| ...      | Q 1846         | Cap screw, 1/2" N.C. x 3/4" . . . . .            | 8        | .085     | 19       | 41599 D        | Steering brake lever outer bushing . . . . .         | 2        | .077     |
| 2        | 52392 D        | Main frame cover gasket                          | 1        | .421     | 20       | 41600 D        | Steering brake operating shaft plug . . . . .        | 1        | .015     |
| 3        | 6900 DHX       | Main frame . . . . .                             | 1        | 1585.000 | 21       | 49997 D        | Bevel gear bearing cage stud . . . . .               | 4        | .125     |
| 4        | 41598 D        | Engine clutch release shaft bushing . . . . .    | 1        | .156     | 22       | 6913 DA        | Steering brake inspection cover . . . . .            | 2        | 17.187   |
| 5        | 41599 D        | Steering brake lever outer bushing . . . . .     | 2        | .077     | ...      | Q 1852         | Cap screw, 1/2 x 1-1/2" N.C. . . . .                 | 14       | .120     |
| 6        | 41600 D        | Steering brake operating shaft plug . . . . .    | 1        | .015     | ...      | Q 1922         | Lock washer, 1/2" N.C. . . . .                       | 14       | .013     |
| 7        | 49998 D        | Transmission reverse idler shaft plug . . . . .  | 1        | .125     | 23       | 4926 DA        | Steering brake inspection cover drain plug . . . . . | 2        | .108     |
| 8        | 18585 DA       | Main frame cover dowel pin . . . . .             | 2        | .125     | ...      | Q 1771         | Cap screw, 5/16 x 1/2" N.F. . . . .                  | 8        | .025     |
| 9        | 42000 D        | Steering clutch release shaft bushing . . . . .  | 1        | .108     | 24       | 56011 D        | Steering clutch inspection cover . . . . .           | 8        | .003     |
| *10      | 42289 D        | Power take-off cover gasket . . . . .            | 1        | .625     | ...      | Q 1919         | Lock washer, 5/16" x 1/2" N.F. . . . .               | 2        | .001     |
| *11      | 42288 D        | Power take-off cover . . . . .                   | 1        | 4.750    | 25       | 56014 D        | Steering clutch inspection cover gasket . . . . .    | 2        | .015     |
| ...      | Q 1884         | Cap screw, 3/4 x 1-1/4" N.C. . . . .             | 6        | .258     | ...      | Q 1919         | Lock washer, 5/16" x 1/2" N.F. . . . .               | 4        | .500     |
| ...      | Q 1927         | Lock washer, 3/4" N.C. . . . .                   | 6        | .075     | 26       | 41162 D        | Steering brake pivot shaft cup plug . . . . .        | 2        | .687     |
| 12       | 42290 D        | Main frame rear inspection cover . . . . .       | 2        | .875     | ...      | 57384 D        | Drawbar guide bracket stud, lower . . . . .          | 2        | .562     |
| ...      | Q 1800         | Cap screw, 3/8 x 3/4" N.C. . . . .               | 8        | .035     | ...      | 57385 D        | Drawbar guide bracket stud, upper . . . . .          | 1        | .125     |
| ...      | Q 1920         | Lock washer, 3/8" N.C. . . . .                   | 8        | .005     | ...      | 59119 D        | Socket head pipe plug, (magnetic) . . . . .          | 16       |          |
| 13       | 40998 DA       | Track frame pivot shaft set screw . . . . .      | 2        | .250     | ...      | 64815 D        | Sprocket drive carrier and cover stud . . . . .      |          |          |
| ...      | .....          | Hex. jam nut, 3/4" N.C. . . . .                  | 2        | .003     |          |                |  |          |          |
| 14       | 42297 D        | Steering clutch lubricating port cover . . . . . | 2        | .531     |          |                |  |          |          |
| 15       | 42000 D        | Steering clutch release shaft bushing . . . . .  | 1        | .108     |          |                |  |          |          |

\* - These items are not used if the tractor is equipped with a "Power Take-Off Attachment (see Section 9, page 2).

# SPARE PARTS CATALOG

## TRACK FRAME AND SPRINGS



\* (Right hand shields are shown.)  
Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

*Don't order parts from the illustrations only; refer to the list also.*

SPARE PARTS CATALOG

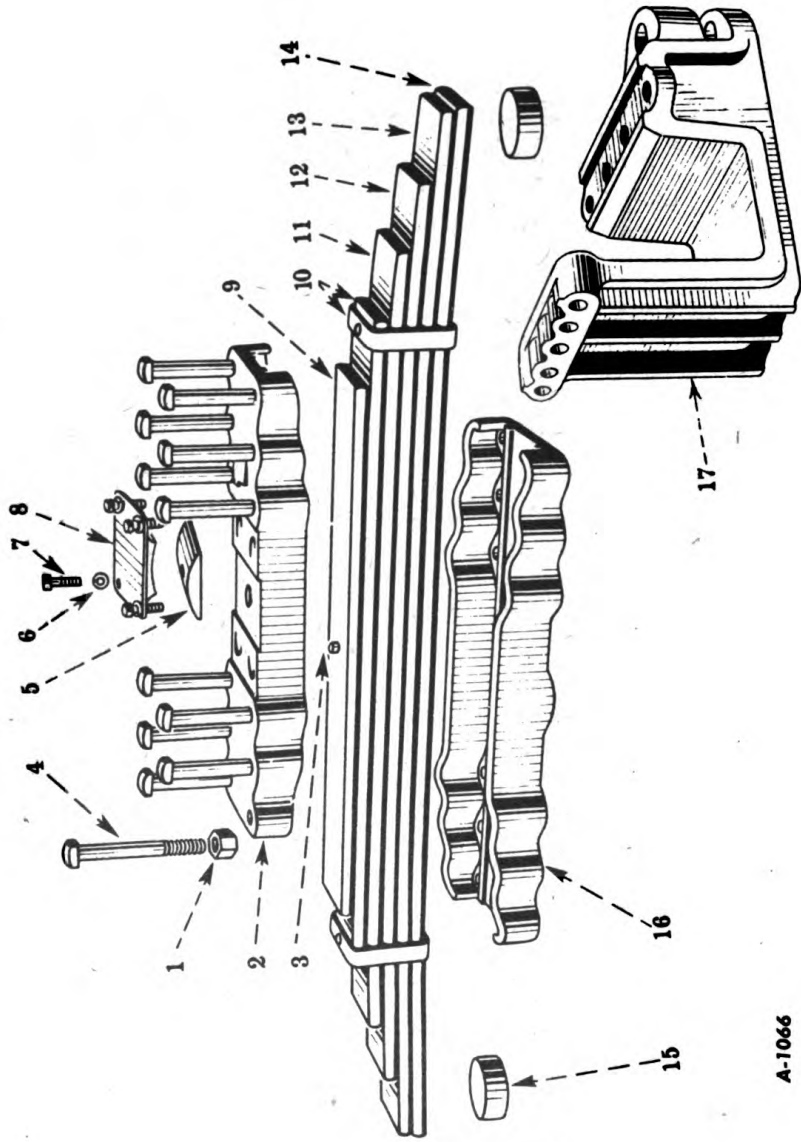
TRACK FRAME AND SPRINGS - Continued

| Ref. No. | I H C Part No. | Description                  | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|------------------------------|----------|----------|----------|----------------|---|----------|----------|
| 1        | 55445 D        | Adjusting rod                | 4        | 3.500    |          | 6871 DBX       | Guide, For tractors not L.H. equipped with "Rigid R.H." Track Frame Attachment. | 1        | 80.000   |
|          |                | Castle hex. nut, 1-1/4" N.F. | 4        | .500     |          | 6872 DBX       | Cap screw, 5/8" N.F. x 3-5/8"   | 1        | 80.000   |
|          |                | Cotter, 5/32 x 2"            | 4        | .016     |          |                | Cap screw, 7/8" N.F. x 1-1/2"   | 2        | .375     |
|          |                | Spring retainer, left hand.  | 1        | 100.000  |          |                | Cap screw, 7/8" N.F. x 2-1/4"   | 2        | .437     |
| 2        | 6868 DCX       | Spring retainer, right hand. | 1        | 100.000  |          |                | Cap screw, 7/8" N.F. x 3"   | 4        | .531     |
|          | 6869 DCX       | Cap screw, 5/8 x 3-5/8" N.F. | 2        | .187     |          |                | Hex. nut, 5/8" N.F.   | 4        | .687     |
|          | Q 1885         | Cap screw, 3/4 x 1-1/2" N.F. | 2        | .300     |          |                | Hex. nut, 7/8" N.F.   | 2        | .085     |
|          |                | Cap screw, 3/4 x 2-1/8" N.F. | 4        | .437     |          |                | Lock Washer, 5/8"   | 8        | .156     |
|          |                | Cap screw, 3/4 x 3" N.F.     | 4        | .375     |          |                | Lock washer, 7/8"   | 2        | .024     |
|          | Q 1911         | Hex. nut, 5/8"               | 2        | .085     |          |                | Support, For Tractors front, L.H. equipped with "Rigid Track front, R.H. ment"  | 10       | .050     |
|          | Q 1913         | Hex. nut, 3/4"               | 8        | .120     |          |                | Cap screw, 5/8" N.F. x 3-5/8"   | 1        |          |
|          | Q 1925         | Lock washer, 5/8"            | 2        | .024     |          |                | Cap screw, 7/8" N.F. x 2-1/8"   | 2        |          |
|          | Q 1927         | Lock washer, 3/4"            | 2        | .045     |          |                | Cap screw, 7/8" N.F. x 3-1/4"   | 4        |          |
| 3        | 49733 DA       | Spring guard.                | 10       | 20.500   |          |                | Hex. nut, 5/8" N.F.   | 2        | .085     |
|          | Q 4042         | Cap screw, 1/2 x 7/8" N.C.   | 4        | .094     |          |                | Hex. nut, 7/8" N.F.   | 8        | .156     |
|          | Q 1922         | Lock washer, 1/2"            | 8        | .013     |          |                | Lock washer, 5/8"   | 2        | .024     |
|          |                | Washer, 17/32" I.D. x 1"     | 8        | .013     |          |                | Track roller, with shaft and carrier (single flange)                            | 10       | .050     |
|          |                | O.D. x No. 14 gage           | 8        |          |          |                | (Nos. 1, 3 and 5)   | 6        | 109.125  |
| 4        | 49732 DA       | Cover                        | 2        | .625     |          |                | Track roller, with shaft and carrier (double flange)                            | 4        | 115.125  |
|          | Q 1798         | Cap screw, 3/8 x 1-1/2" N.C. | 4        | .350     |          |                | Shield, inner, left hand.   | 1        | 75.000   |
|          | Q 1920         | Lock washer, 3/8"            | 4        | .005     |          |                | Shield, inner, right hand.  | 1        | 75.000   |
| 5        | 55446 D        | Lock washer                  | 4        | .100     |          |                | Cap screw, 9/16 x 1-5/8" N.F.   | 16       | .156     |
|          |                | Hex. jam nut, 1-1/2" N.F.    | 4        | .875     |          |                | Hex. nut, 9/16" N.F.  | 16       | .031     |
|          |                | Frame, complete, left hand.  | 1        | 345.000  |          |                | Lock washer, 9/16"  | 16       | .031     |
| 6        | 52362 DB       | Frame, complete, right hand. | 1        | 345.000  |          |                | Shield, outer, left hand.   | 1        | 90.000   |
| 7        | 49729 DA       | Spring.                      | 4        | 110.000  |          |                | Shield, outer, right hand.  | 1        | 90.000   |
| 8        | 6870 DA        | Retainer, front.             | 2        | 32.000   |          |                | Cap screw, 9/16 x 1-5/8" N.F.   | 22       | .156     |
|          | Q 4134         | Cap screw, 3/4 x 3-1/4" N.F. | 2        | .531     |          |                | Hex. nut, 9/16" N.F.  | 22       | .031     |
|          | Q 1913         | Hex. nut, 3/4" N.F.          | 2        | .975     |          |                | Lock washer, 9/16"  | 22       | .031     |
|          | Q 1927         | Lock washer, 3/4"            | 2        | .007     |          |                |   |          |          |

## SPARE PARTS CATALOG

### EQUALIZER SPRING

**NOTE:** If the tractor is equipped with a Rigid Track Frame (see page 8) the Equalizer Spring is not used.



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*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

**SPARE PARTS CATALOG**

**EQUALIZER SPRING - Continued**

If the tractor is equipped with a Rigid Track Frame (see page 8) the parts listed below are not used.

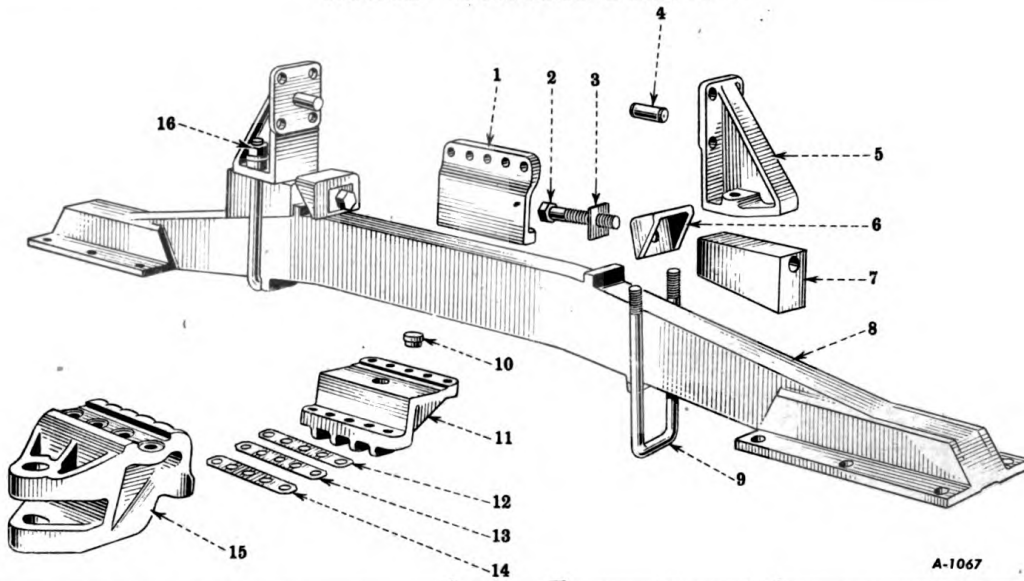
| Ref. No. | I H C Part No. | Description                               | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| ...      | 49775 D        | Equalizer spring, complete (6 leaves)     | 1        | 236.50   |
| 1        | 41842 D        | Bolt nut                                  | 20       | 80.00    |
| 2        | 6888 DX        | Saddle, upper                             | 1        | .37      |
| 3        | 49779 DX       | Center bolt                               | 1        | 1.50     |
| 4        | 49773 D        | Saddle bolt                               | 20       | 3.62     |
| 5        | 49776 D        | Wearing plate                             | 1        | .08      |
| ...      | .....          | Countersunk head iron rivet, 3/8 x 1-1/2" | 2        | .03      |
| 6        | .....          | Lock washer, 9/16"                        | 4        | .18      |
| 7        | 49778 D        | Dowel bolt                                | 4        | 4.25     |
| 8        | 49777 D        | Pad, upper                                | 1        | 25.00    |
| 9        | 49821 D        | No. 6 leaf                                | 1        | 35.00    |
| 10       | 49820 D        | No. 5 leaf with clip                      | 1        | 37.00    |
| 11       | 49819 D        | No. 4 leaf                                | 1        | 43.00    |
| 12       | 49818 D        | No. 3 leaf                                | 1        | 49.00    |
| 13       | 49817 D        | No. 2 leaf                                | 1        | 49.00    |
| 14       | 49816 D        | No. 1 leaf                                | 1        | 3.00     |
| 15       | 8349 D         | Guide pad                                 | 2        | 46.00    |
| 16       | 6890 D         | Saddle, lower                             | 1        | 85.00    |
| 17       | 6911 DB        | Frame pad, lower                          | 1        | .50      |
| ...      | Q 4120         | Cap screw, 3/4 x 3-1/4" N.C.              | 5        | .78      |
| ...      | Q 4184         | Cap screw, 1 x 2-1/2" N.C.                | 4        | .04      |
| ...      | Q 1927         | Lock washer, 3/4"                         | 5        | .08      |
| ...      | .....          | Lock washer, 1"                           | 4        | 20.00    |
| 18       | 9219 DX        | Bumper pad bracket, L.H.                  | 1        | .62      |
| ...      | Q 4149         | Cap screw, 7/8 x 2-3/4" N.C.              | 4        | .05      |
| ...      | Q 1929         | Lock washer, 7/8"                         | 4        | 20.00    |
| ...      | 9220 DX        | Equalizer spring bumper pad bracket, R.H. | 1        | .62      |
| ...      | Q 4149         | Cap screw, 7/8" N.C. x 2-3/4"             | 4        | .05      |
| ...      | Q 1929         | Lock washer, 7/8"                         | 4        | 2.00     |
| ...      | 61613 D        | Equalizer spring bumper pad               | 2        |          |

Don't order parts from the illustrations only; refer to the list also.



## SPARE PARTS CATALOG

### RIGID TRACK FRAME

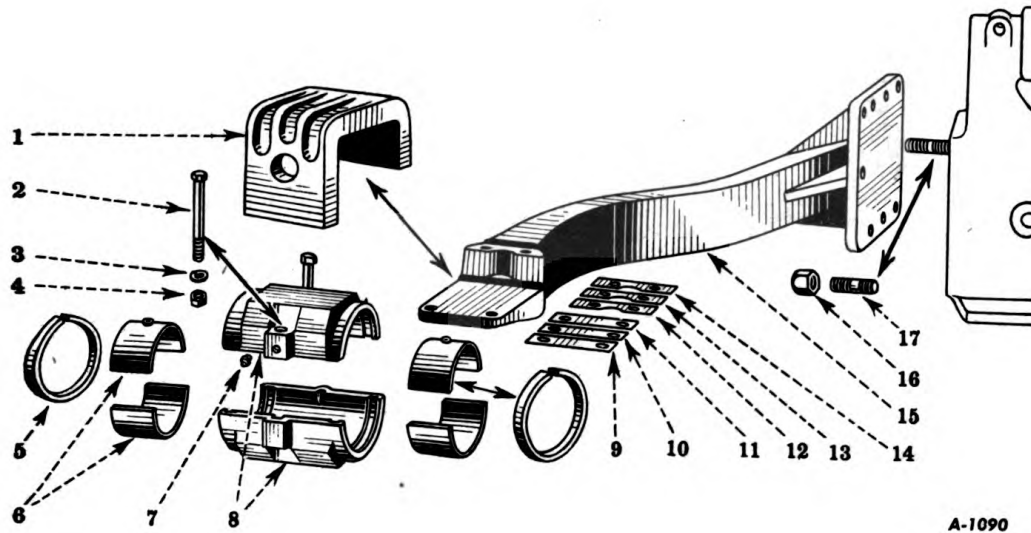


| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 1        | 8964 D         | Rigid track frame cross bar clamp support . . . . .                 | 1        | 15.125   |
| ...      | Q 1894         | Cap screw, 3/4" N.C. x 2-1/2" . . . . .                             | 5        | .408     |
| ...      | Q 1927         | Lock washer, 3/4" . . . . .   | 5        | .045     |
| 2        | 59550 D        | Rigid track frame cross bar wedge bolt                              | 2        | 1.500    |
| ...      | .....          | Washer, 1-3/32" I.D. x 1-1/2" O.D. x 9 gage . . . . .               | 2        |          |
| 3        | 59551 D        | Rigid track frame cross bar wedge bolt lock . . . . .               | 2        | .094     |
| 4        | 59547 D        | Rigid track frame cross bar bracket dowel . . . . .                 | 1        | .500     |
| 5        | 8967 D         | Rigid track frame cross bar bracket, left hand . . . . .            | 1        | 19.000   |
|          | 8968 D         | Rigid track frame cross bar bracket, right hand . . . . .           | 1        | 19.000   |
| 6        | 8969 D         | Rigid track frame cross bar wedge clamp . . . . .                   | 2        | 3.937    |
| 7        | 59549 D        | Rigid track frame cross bar wedge . . . . .                         | 2        | 19.000   |
| 8        | 62598 D        | Rigid track frame cross bar, complete with angle brackets . . . . . | 1        | 436.000  |
| 9        | 59548 D        | Rigid track frame bar bracket "U" bolt                              | 2        | 4.375    |
| 10       | 59541 D        | Rigid track frame cross bar dowel . . . . .                         | 1        | .312     |
| 11       | 8963 D         | Rigid track frame cross bar clamp . . . . .                         | 1        | 25.500   |
| ...      | Q 1891         | Cap screw, 3/4" N.F. x 2-1/4" . . . . .                             | 10       | .400     |
| ...      | Q 1927         | Lock washer, 3/4" . . . . .   | 10       | .045     |
| 12       | 59544 D        | Rigid track frame cross bar clamp shim, medium . . . . .            | 2        | .047     |
| 13       | 59543 D        | Rigid track frame cross bar clamp shim, heavy . . . . .             | 2        | .094     |
| 14       | 59542 D        | Rigid track frame cross bar clamp shim, extra heavy . . . . .       | 2        | .187     |
| 15       | 8962 D         | Rigid track frame drawbar pivot bracket                             | 1        | 51.500   |
| ...      | Q 4184         | Cap screw, 1" N.C. x 2-1/2" . . . . .                               | 4        | .781     |
| ...      | .....          | Lock washer, 1" . . . . .   | 4        | .087     |
| 16       | 41842 D        | Rigid track frame cross bar bracket "U" bolt nut . . . . .          | 4        | .266     |
| ...      | Q 1929         | Lock washer, 7/8" . . . . .   | 4        | .050     |
| ..       | 59545 D        | Track spring guard, L.H. . . . .                                    | 1        |          |
|          | 59546 D        | Track spring guard, R.H. . . . .                                    | 1        |          |

## SPARE PARTS CATALOG

### TRACK FRAME DIAGONAL BRACE

*If the tractor is equipped with a Rigid Track Frame (see page 8) the Track Frame Diagonal Brace is not used.*



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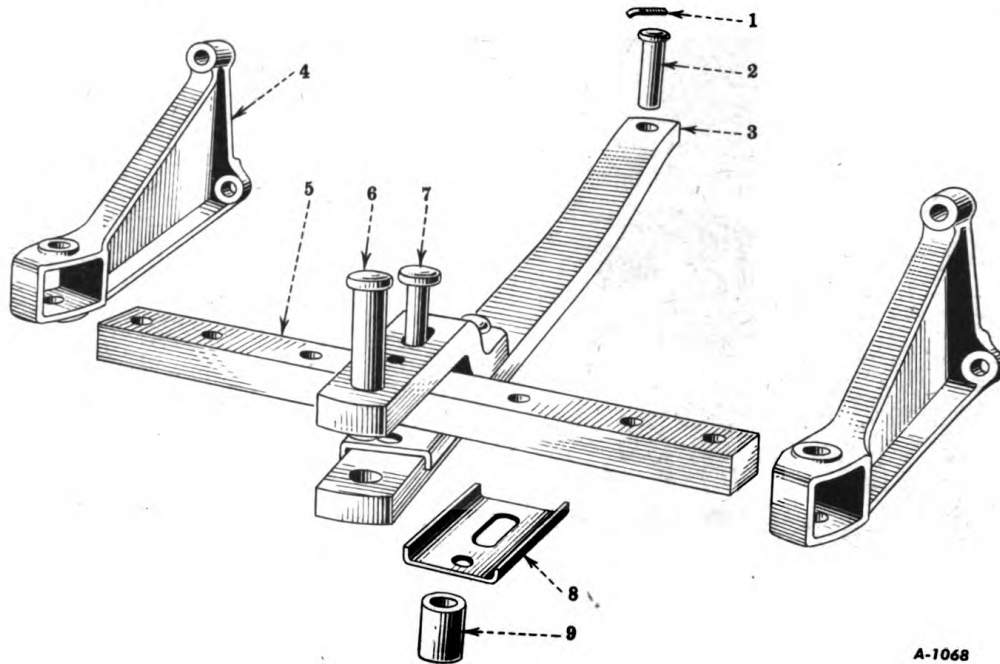
*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 6894 DA        | Clamp . . . . .                                    | 2        | 17.000   |
| ...      | Q 1890         | Cap screw, 3/4 x 2" N.C. . . . .                   | 4        | .333     |
| ...      | Q 4125         | Cap screw, 3/4 x 4-1/2" N.C. . . . .               | 4        | .625     |
| ...      | Q 1927         | Lock washer, 3/4" . . . . .                        | 8        | .045     |
| 2        | Q 4052         | Cap screw, 1/2 x 3-1/2" N.F. . . . .               | 4        | .250     |
| 3        | 18868 D        | Lock washer (Shakeproof No. 1124) . . . . .        | 4        | .003     |
| 4        | Q 1909         | Hex. nut, 1/2" N.F. . . . .                        | 4        | .037     |
| 5        | 49835 D        | Felt. . . . .                                      | 4        | .006     |
| 6        | 57240 D        | Bushing (set of 2) . . . . .                       | 2        | 1.531    |
|          | Q 3615         | Lubricator (Lincoln No. 5000) (optional) . . . . . | 2        | .016     |
| 7        | 14186 DA       | Lubricator (Alemite No. 1610) (optional) . . . . . | 2        | .015     |
| 8        | 57236 D        | Bearing, complete (set of 2) . . . . .             | 2        | 14.125   |
| 9        | 49839 D        | Shim, outer - heavy . . . . .                      | 2        | .062     |
| 10       | 49840 D        | Shim, outer - medium. . . . .                      | 2        | .047     |
| 11       | 49841 D        | Shim, outer - light . . . . .                      | 4        | .016     |
| 12       | 49836 D        | Shim, inner - heavy . . . . .                      | 2        | .062     |
| 13       | 49837 D        | Shim, inner - medium. . . . .                      | 2        | .031     |
| 14       | 49838 D        | Shim, inner - light . . . . .                      | 4        | .016     |
| 15       | 52336 DA       | Diagonal brace, left hand (74" tread) . . . . .    | 1        | 137.000  |
|          | 52337 DA       | Diagonal brace, right hand (74" tread) . . . . .   | 1        | 137.000  |
| 16       | 41842 D        | Diagonal brace flange stud nut. . . . .            | 12       | .265     |
| ...      | Q 1929         | Lock washer, 7/8" . . . . .                        | 12       | .050     |
| 17       | 55338 D        | Diagonal brace stud . . . . .                      | 12       | .453     |

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**DRAWBAR AND BRACKETS**



A-1068

*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

| Ref. No. | I H C Part No. | Description                                   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 1        | 47772 D        | Lock. . . . .                                 | 1        | .125     |
| ...      | Q 1801         | Cap screw, 3/8 x 1" N.F. . . . .              | 1        | .050     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                   | 1        | .005     |
| 2        | 49983 D        | Pivot pin . . . . .                           | 1        | 3.500    |
| 3        | 53973 D        | Drawbar . . . . .                             | 1        | 143.000  |
| ...      | .....          | Round head steel rivets, 1-1/8 x 5" . . . . . | 2        | 1.875    |
| 4        | 6917 DA        | Guide bracket . . . . .                       | 2        | 34.000   |
| ...      | .....          | Hex. nut, 7/8" N.F. . . . .                   | 6        | .156     |
| ...      | Q 1929         | Lock washer, 7/8" . . . . .                   | 6        | .050     |
| 5        | 49984 D        | Guide . . . . .                               | 1        | 70.000   |
| ...      | .....          | Cap screw, 1-1/8 x 5-1/4" N.F. . . . .        | 2        | .687     |
| ...      | .....          | Hex. nut, 1-1/8" N.F. . . . .                 | 2        | .250     |
| ...      | Q 1930         | Lock washer, 1-1/8" . . . . .                 | 2        | .070     |
| 6        | 49986 D        | Clevis pin. . . . .                           | 1        | 4.875    |
| ...      | .....          | Cotter, 3/8 x 2-3/4" . . . . .                | 1        | .125     |
| 7        | 49987 D        | Stop pin. . . . .                             | 1        | 2.500    |
| ...      | .....          | Cotter, 1/4 x 2-1/4" . . . . .                | 1        | .031     |
| 8        | 53977 D        | Clevis wear plates. . . . .                   | 2        | 2.500    |
| ...      | .....          | Cap screw, 1" N.F. x 7" . . . . .             | 1        | 1.750    |
| ...      | .....          | Hex. nut, 1" N.F. . . . .                     | 1        | .281     |
| ...      | .....          | Lock washer, 1" . . . . .                     | 1        | .087     |
| 9        | 53976 D        | Spacer. . . . .                               | 1        | 1.187    |

*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*

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## SPARE PARTS CATALOG

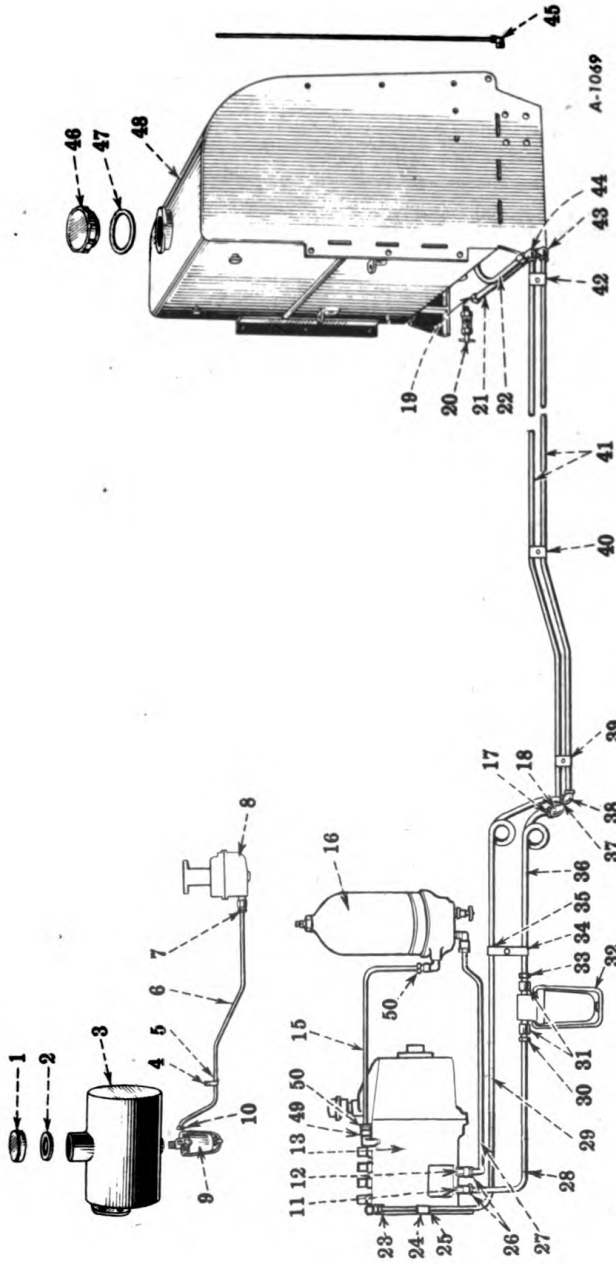
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### FUEL SYSTEM

|   | Page     |
|---|----------|
| Carburetor. . . . .                         | 6,7      |
| Fuel and gasoline tanks and piping. . . . . | 2,3      |
| Fuel supply pump. . . . .                   | 11       |
| Gasoline strainer assembly. . . . .         | 4        |
| Governor. . . . .                           | 16 to 19 |
| Injection nozzle and pipes. . . . .         | 9        |
| Injection pump and connections. . . . .     | 10       |
| Primer and connections. . . . .             | 8        |
| Pump unit . . . . .                         | 12 to 15 |
| Water trap. . . . .                         | 5        |

SPARE PARTS CATALOG

FUEL AND GASOLINE TANKS AND PIPINGS

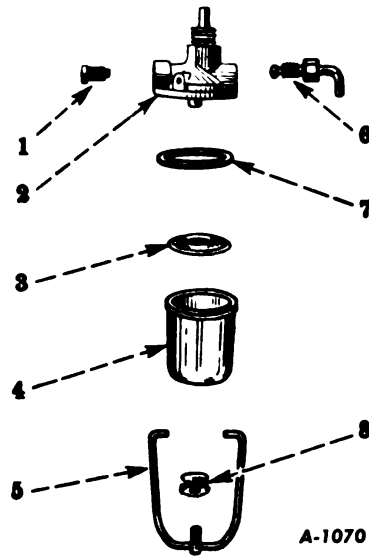


| Ref. No. | I H C Part No. | Description                      | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                          | No. Used | Wt. Lbs. |
|----------|----------------|----------------------------------|----------|----------|----------|----------------|--------------------------------------|----------|----------|
| 1        | 23995 D        | Cap                              | 1        | .125     | 32       | 60870 D        | Water trap                           | 1        | .031     |
| 2        | 23977 DA       | Cap gasket                       | 1        | .009     | 33       | 37165 D        | Coupling nut                         | 1        | .002     |
| 3        | 41574 DCX      | Gasoline tank with filler cap    | 1        | 7.250    | 34       | 16445 D        | Clamp felt                           | 1        | .063     |
| ...      | Q 1800         | Cap screw, 3/8 x 3/4" N.C.       | 4        | .040     | ...      | .....          | Round head screw, No. 10 - 24 x 3/8" | 2        | .....    |
| ...      | Q 1920         | Lock washer, 3/8"                | 4        | .005     | ...      | .....          | Hex. nut, No. 10 - 24                | 1        | .003     |
| 4        | 66360 D        | Gasoline pipe clip               | 1        | .....    | ...      | .....          | Lock washer, No. 10                  | 1        | .004     |
| 5        | 16445 D        | Gasoline pipe clip felt          | 1        | .002     | ...      | Q 1916         | Fuel tube, with coupling nut         | 1        | .002     |
| 6        | 60014 DAX      | Gasoline pipe, with coupling nut | 1        | .281     | 36       | 56148 DX       | Fuel tube, with coupling nut         | 1        | .313     |
| 7        | 29899 D        | Gasoline pipe                    | 1        | .....    | ...      | .....          | .....                                | 1        | .....    |

Don't order parts from the illustrations only; refer to the list also.

**SPARE PARTS CATALOG**

**GASOLINE STRAINER ASSEMBLY**



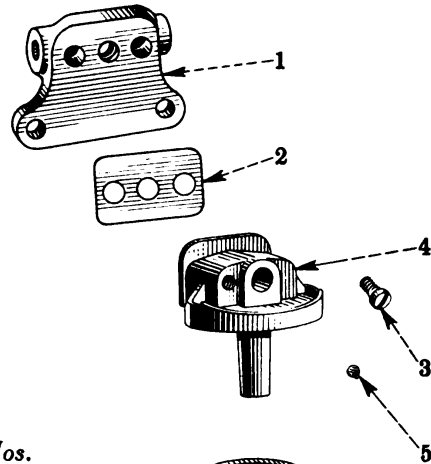
| Ref. No. | I H C Part No. | Description                  | No. Used | Wt. Lbs. |
|----------|----------------|------------------------------|----------|----------|
| ...      | 51066 DBX      | Gasoline strainer, with nut. | 1        | .690     |
| 1        | 29899 D        | Coupling nut . . . . .       | 1        | .001     |
| 2        | 54486 D        | Top or body. . . . .         | 1        | .250     |
| 3        | 13194 D        | Screen . . . . .             | 1        | .006     |
| 4        | 51344 V        | Glass. . . . .               | 1        | .250     |
| 5        | 17564 D        | Bail or strap. . . . .       | 1        | .060     |
| 6        | 52855 D        | Valve. . . . .               | 1        | .040     |
| 7        | 13193 D        | Gasket . . . . .             | 1        | .002     |
| 8        | 17565 DA       | Nut and cap. . . . .         | 1        | .030     |

*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*

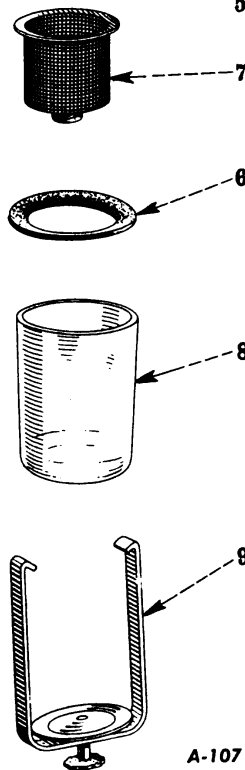
**SPARE PARTS CATALOG**

**WATER TRAP**



*When ordering, always use I H C Part Nos.*

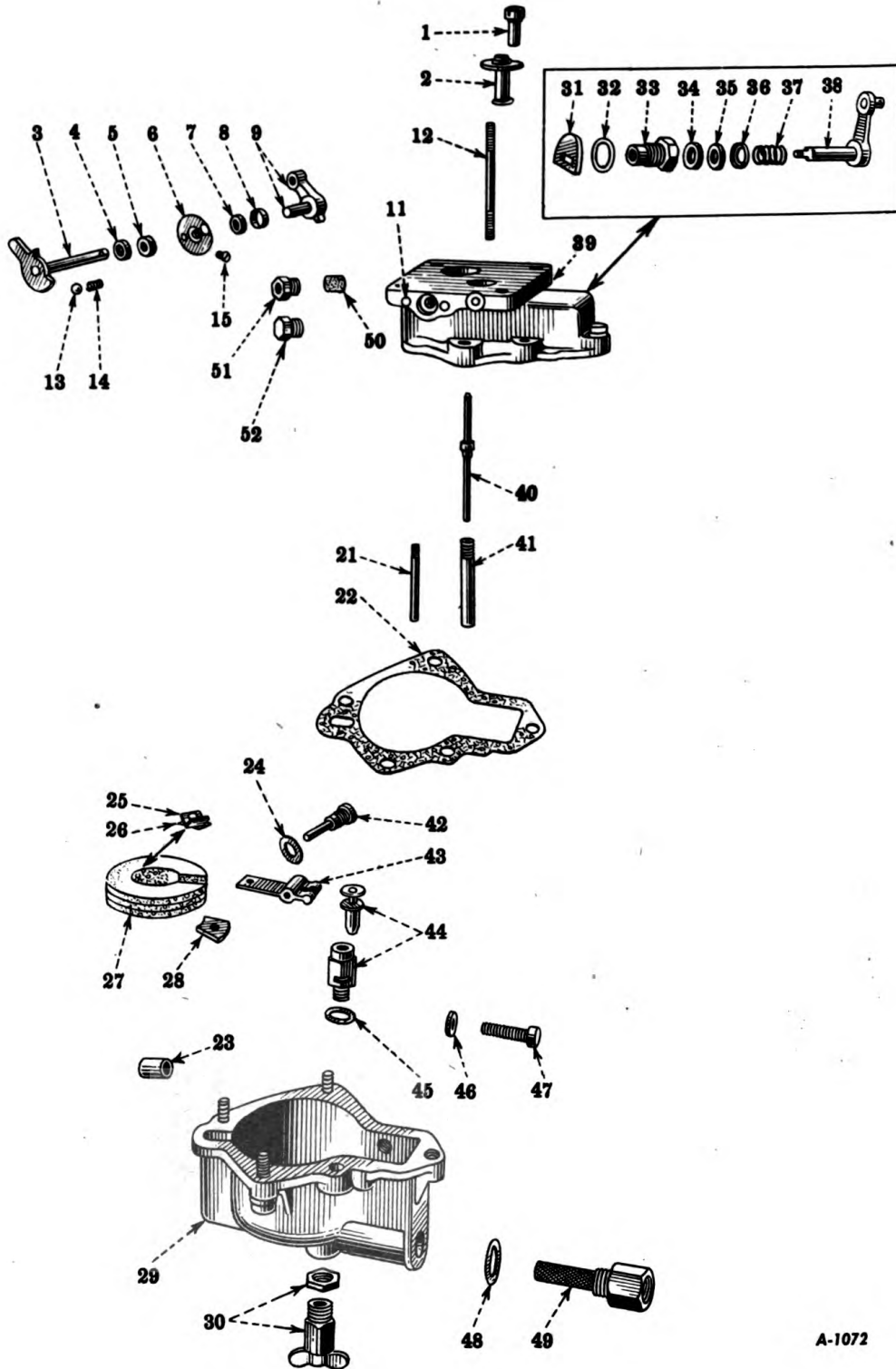
| Ref. No. | I H C Part No. | Description                         | No. Used | Wt. Lbs. |
|----------|----------------|-------------------------------------|----------|----------|
| ...      | 60870 D        | Water trap . . . . .                | 1        | 2.375    |
| ...      | Q 1864         | Cap screw, 1/2" N.C. x 3" . . . . . | 1        | .200     |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .         | 1        | .013     |
| 1        | 8221 D         | Bracket . . . . .                   | 1        | 3.250    |
| ...      | Q 1802         | Cap screw, 3/8" N.C. x 1" . . . . . | 2        | .045     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .         | 2        | .005     |
| 2        | 51527 D        | Gasket . . . . .                    | 1        | .008     |
| 3        | 60871 D        | Vent screw . . . . .                | 1        | .020     |
| 4        | 9118 DX        | Water trap top . . . . .            | 1        | 1.188    |
| ...      | Q 1864         | Cap screw, 1/2" N.C. x 3" . . . . . | 1        |          |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .         | 1        | .013     |
| 5        | 24805 D        | Water trap top plug . . . . .       | 1        | .001     |
| 6        | 60876 D        | Water trap gasket . . . . .         | 1        | .006     |
| 7        | 60872 D        | Water trap screen . . . . .         | 1        | .125     |
| 8        | 60877 D        | Water trap glass . . . . .          | 1        | .718     |
| 9        | 60878 DX       | Water trap bail . . . . .           | 1        | .375     |



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# SPARE PARTS CATALOG

## DIESEL DUAL MANIFOLD STARTING CARBURETOR



A-1072

Don't order parts from the illustrations only; refer to the list also.



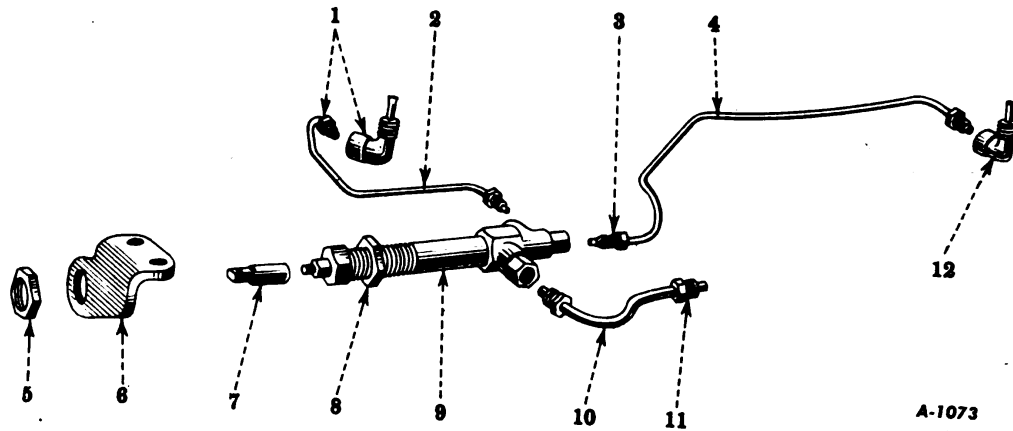
**SPARE PARTS CATALOG**

**CARBURETOR - Continued**

| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| ...      | 53458 DD       | Carburetor (IHC)  | 1        | 4.000    |
| ...      | Q 1903         | Hex. nut, 5/16" N.F.  | 4        | .031     |
| ...      | Q 1919         | Lock washer, 5/16"  | 4        | .003     |
| 1        | 50807 D        | Air valve collar  | 1        | .047     |
| 2        | 56679 D        | Air valve assembly  | 1        | 3.125    |
| 3        | 56537 DX       | Shaft assembly, long, with lever and screw                          | 1        | .062     |
| 4        | 45148 D        | Retainer  | 1        | .001     |
| 5        | 45149 D        | Dust seal   | 1        | .001     |
| 6        | 56542 DX       | Starting shutter assembly   | 1        | .013     |
| 7        | 45149 D        | Dust seal   | 1        | .001     |
| 8        | 45148 D        | Retainer  | 1        | .001     |
| 9        | 56538 DX       | Shaft assembly, short, with lever and screw                         | 1        | .062     |
| 11       | 45110 D        | Stop pin  | 2        | .002     |
| 12       | 53840 D        | Air valve guide   | 1        | .125     |
| ...      | .....          | Cadmium plated cotter, 1/16 x 3/4"                                  | 1        | .001     |
| 13       | 46184 D        | Friction spring ball  | 1        | .005     |
| 14       | 46059 D        | Friction spring   | 1        | .001     |
| 15       | 31636 D        | Shutter screw   | 2        | .001     |
| 21       | 50803 D        | Fuel inlet tube   | 1        | .045     |
| 22       | 32606 DA       | Gasket  | 1        | .003     |
| 23       | 32604 D        | Float lever spacer  | 1        | .003     |
| 24       | 59241 D        | Gasket  | 1        | .002     |
| 25       | 32578 D        | Spring, upper leaf  | 1        | .003     |
| 26       | 32577 D        | Float lever spring, lower leaf                                      | 1        | .002     |
| 27       | 32572 DAX      | Cork float  | 1        | .031     |
| ...      | .....          | Cadmium plated round head slotted screw,<br>No. 4 - 36 x 7.16"      | 1        | .002     |
| 28       | 32574 D        | Reenforcing plate   | 1        | .012     |
| 29       | { 5051 DX      | Fuel bowl (optional)  | 1        | .719     |
|          | { 9390 DX      | Fuel bowl (optional)  | 1        |          |
| 30       | 58840 DX       | Drain valve assembly with lock nut                                  | 1        | .063     |
| 31       | 32582 D        | Cam   | 1        | .016     |
| 32       | 58836 D        | Gasket  | 1        | .003     |
| 33       | 32585 DA       | Bearing   | 1        | .047     |
| 34       | 32588 D        | Dust washer   | 1        | .000     |
| 35       | 32588 D        | Dust washer   | 1        | .000     |
| 36       | 32587 D        | Retainer  | 1        | .063     |
| 37       | 32586 D        | Spring  | 1        | .032     |
| 38       | 50801 D        | Shaft and lever assembly  | 1        | .016     |
| ...      | .....          | Hex. nut, No. 8 - 32  | 1        | .003     |
| ...      | .....          | Lock washer, No. 8  | 1        | .002     |
| 39       | 8479 DBX       | Body with stop pin, dust seal and retainer                          | 1        | 2.000    |
| 40       | 53837 DX       | Nozzle and tube   | 1        | .050     |
| 41       | 53836 D        | Metering well   | 1        | .016     |
| 42       | 32576 DX       | Float pivot screw   | 1        | .016     |
| 43       | 32575 D        | Float lever   | 1        | .016     |
| 44       | 32581 DXA      | Needle valve cage with gasket                                       | 1        | .125     |
| 45       | 25948 D        | Gasket  | 1        | .001     |
| 46       | .....          | Cadmium plated lock washer, (No. 12)                                | 5        | .001     |
| 47       | .....          | Cadmium plated fillister head machine screw<br>(No. 12 - 24 x 7/8") | 5        | .006     |
| 48       | 18377 D        | Gasket  | 1        | .003     |
| 49       | 29902 DX       | Screen retainer   | 1        | .047     |
| 50       | 27445 DB       | Drip hole filler  | 1        | .002     |
| 51       | 50802 D        | Drip tube adapter   | 1        | .063     |
| 52       | 58835 D        | Air valve control plug  | 1        | .208     |
| ...      | 27452 D        | Air valve spring  | 1        | .003     |
| ...      | 35691 D        | Fuel bowl assembly  | 1        | .938     |
| ...      | 51704 D        | Drain tube clip   | 1        | .021     |
| ...      | 53079 D        | Float and lever assembly  | 1        | .025     |
| ...      | 53459 DA       | Carburetor gasket   | 1        | .063     |
| ...      | 58837 D        | Drain valve lock nut  | 1        | .016     |
| ...      | 58843 DX       | Drain trough  | 1        | .156     |
| ...      | 58859 DX       | Drain tube and nut  | 1        | .063     |
| ...      | 25038 HA       | Drain tube nut  | 1        | .010     |

**SPARE PARTS CATALOG**

**PRIMER AND CONNECTIONS**



A-1073

*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

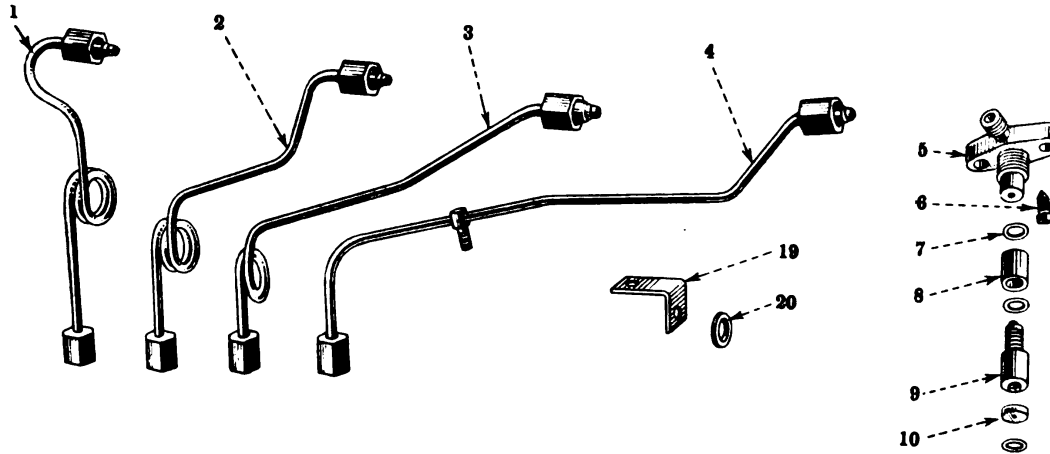
| Ref. No. | I H C Part No. | Description                           | No. Used | Wt. Lbs. |
|----------|----------------|---------------------------------------|----------|----------|
| 1        | 50683 DX       | Elbow and nut . . . . .               | 2        | .063     |
| 2        | 53387 DX       | Pipe, rear, and nut . . . . .         | 1        | .063     |
| 3        | 36092 D        | Nut . . . . .                         | 4        | .012     |
| 4        | 53386 DX       | Pipe, front, and nut. . . . .         | 1        | .063     |
| 5        | 42215 D        | Nut . . . . .                         | 1        | .015     |
| 6        | 50682 D        | Bracket . . . . .                     | 1        | .125     |
| ...      | Q 1774         | Cap screw, 5/16" N.C. x 3/4". . . . . | 2        | .031     |
| ...      | Q 1919         | Lock washer, 5/16". . . . .           | 2        | .003     |
| 7        | 42772 D        | Control rod, end. . . . .             | 1        | .125     |
| 8        | 42215 D        | Nut . . . . .                         | 1        | .015     |
| 9        | { 53136 D      | Primer (optional) . . . . .           | 1        |          |
|          | { 54692 DA     | Primer (optional) . . . . .           | 1        | 5.250    |
| 10       | 53388 DX       | Inlet tube and nut. . . . .           | 1        | .250     |
| 11       | 25038 HA       | Inlet tube nut. . . . .               | 1        | .019     |
| 12       | 50683 D        | Elbow . . . . .                       | 2        | .063     |

*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**INJECTION NOZZLE AND PIPES**



*When ordering, always use I H C Part Nos.*

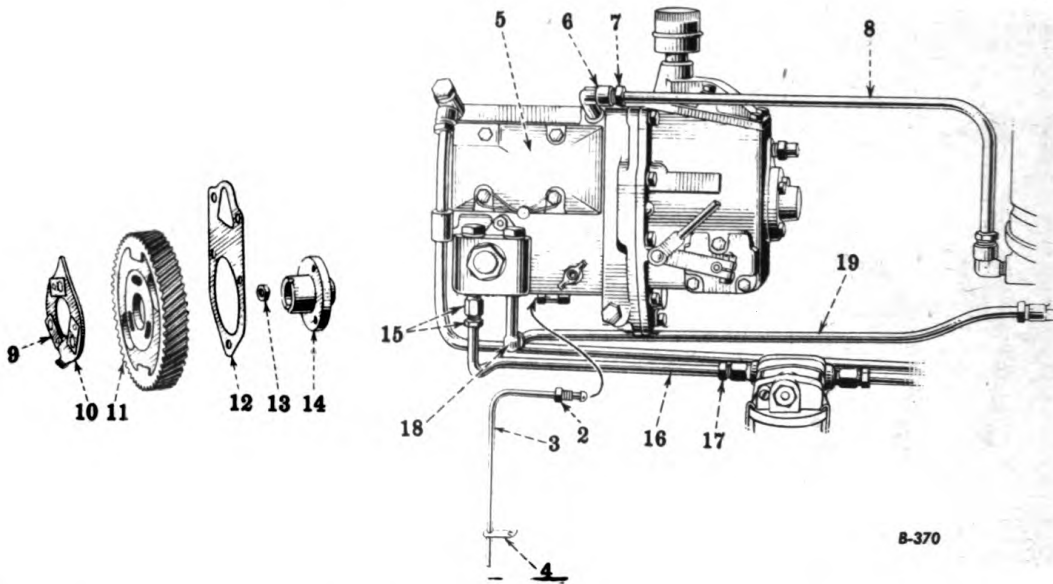
| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| ...      | 50620 D        | Injection pipes. . . . .                           | 1        | 1.188    |
| ...      | 52613 D        | Injection nozzle (includes Ref. Nos. 5 thru 11). . | 4        | 1.438    |
| 1        | 50621 DX       | Pipe, with nuts (No. 1) . .                        | 1        | .438     |
| 2        | 50622 DX       | Pipe, with nuts (No. 2) . .                        | 1        | .438     |
| 3        | 50623 DX       | Pipe, with nuts (No. 3) . .                        | 1        | .500     |
| 4        | 50624 DX       | Pipe, with nuts (No. 4) . .                        | 1        | .500     |
| ...      | Q 1903         | Hex. nut, 5/16" N.F. . . .                         | 1        | .031     |
| ...      | Q 1919         | Lock washer, 5/16" . . . .                         | 1        | .003     |
| 5        | 52612 D        | Nozzle fitting . . . . .                           | 4        | .625     |
| 6        | 32493 D        | Bleeder valve. . . . .                             | 4        | .032     |
| 7        | 37148 D        | Gasket . . . . .                                   | 12       | .020     |
| 8        | 37150 D        | Spacer . . . . .                                   | 4        | .050     |
| 9        | 37152 D        | Valve and spring assembly.                         | 4        | .125     |
| 10       | 43192 DA       | Injection plate. . . . .                           | 4        | .015     |
| 11       | 42766 D        | Nozzle body. . . . .                               | 4        | .437     |
| ...      | .....          | Cap screw, 3/8" N.F. x 2".                         | 8        | .080     |
| 12       | 61208 D        | Nozzle body dust seal. . .                         | 4        | .010     |
| 13       | 31121 D        | Stud nut . . . . .                                 | 8        | .063     |
| 14       | 42767 D        | Gasket . . . . .                                   | 4        | .015     |
| 15       | 42765 DA       | Retainer . . . . .                                 | 4        | 2.250    |
| 16       | 61209 D        | Nozzle body retainer dust seal. . . . .            | 4        | .010     |
| 17       | 4300? D        | Spacer gasket. . . . .                             | 8        | .063     |
| 18       | 56291 D        | Spacer . . . . .                                   | 4        | .500     |
| 19       | 50626 D        | Clip . . . . .                                     | 1        | .063     |
| ...      | Q 1774         | Cap screw, 5/16" N.C. x 3/4". . . . .              | 1        | .031     |
| ...      | Q 1919         | Lock washer, 5/16" . . . .                         | 1        | .003     |
| 20       | 27927 DA       | Brace washer . . . . .                             | 1        | .063     |

*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**INJECTION PUMP AND CONNECTIONS**



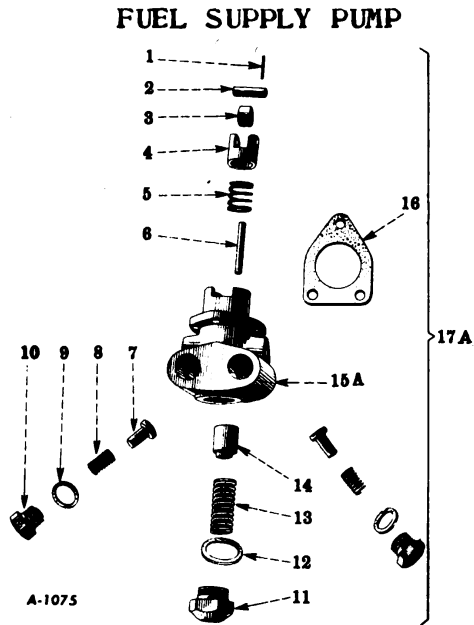
*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 2        | 29898 D        | Overflow pipe elbow nut . . . . .                                | 1        | .016     |
| 3        | 60144 DX       | Injection pump overflow pipe, with nut . . . . .                 | 1        | .125     |
| 4        | 52128 D        | Clip. . . . .  | 1        | .031     |
| 5        | 60023 DX13½    | Fuel injection pump and gear hub (Bosch) (1350 R.P.M.) . . . . . | 1        | 44.000   |
| ...      | .....          | Cap screw, 3/8" N.C. x 1-3/8" . . . . .                          | 1        | .063     |
| ...      | Q 1802         | Cap screw, 3/8" N.C. x 1" . . . . .                              | 3        | .063     |
| ...      | Q 1820         | Cap screw, 3/8" N.C. x 3" . . . . .                              | 1        | .125     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                                      | 4        | .007     |
| 6        | 50607 DX       | Elbow and nut (on pump) . . . . .                                | 1        | .063     |
| 7        | 37165 D        | Nut . . . . .  | 1        | .031     |
| 8        | 60430 DX       | Outlet pipe, with nut . . . . .                                  | 3        | .250     |
| 9        | 46250 D        | Lock. . . . .  | 1        | .063     |
| 10       | 46584 DX       | Timing indicator, with lock . . . . .                            | 1        | .500     |
| 11       | 50412 D        | Pump gear . . . . .  | 1        | 2.750    |
| ...      | Q 1802         | Cap screw, 3/8" N.C. x 1" . . . . .                              | 3        | .015     |
| 12       | 46583 D        | Gasket. . . . .  | 1        | .010     |
| 13       | 54290 D        | Hex. nut. . . . .  | 1        | .032     |
| 14       | 8000 DA        | Gear hub. . . . .  | 1        | 1.500    |
| 15       | 38026 DMX      | Connector and nut (on pump) . . . . .                            | 1        | .093     |
| 16       | 60143 DAX      | Inlet pipe, with nut. . . . .                                    | 1        | .032     |
| 17       | 37165 D        | Nut . . . . .  | 1        | .032     |
| 18       | 50607 DX       | Elbow and nut (on pump) . . . . .                                | 1        | .156     |
| 19       | 60145 DAX      | Pipe, with nut. . . . .  | 1        | .250     |
| ...      | 30402 DX       | Injection pump overflow pipe elbow with nut . . . . .            | 1        | .063     |
| ...      | 30402 D        | Injection pump overflow pipe elbow . . . . .                     | 1        | .047     |

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**DETAIL PARTS OF BOSCH INJECTION PUMP**



**IMPORTANT:** Be sure to give all information shown on Pump Name Plate when ordering parts.

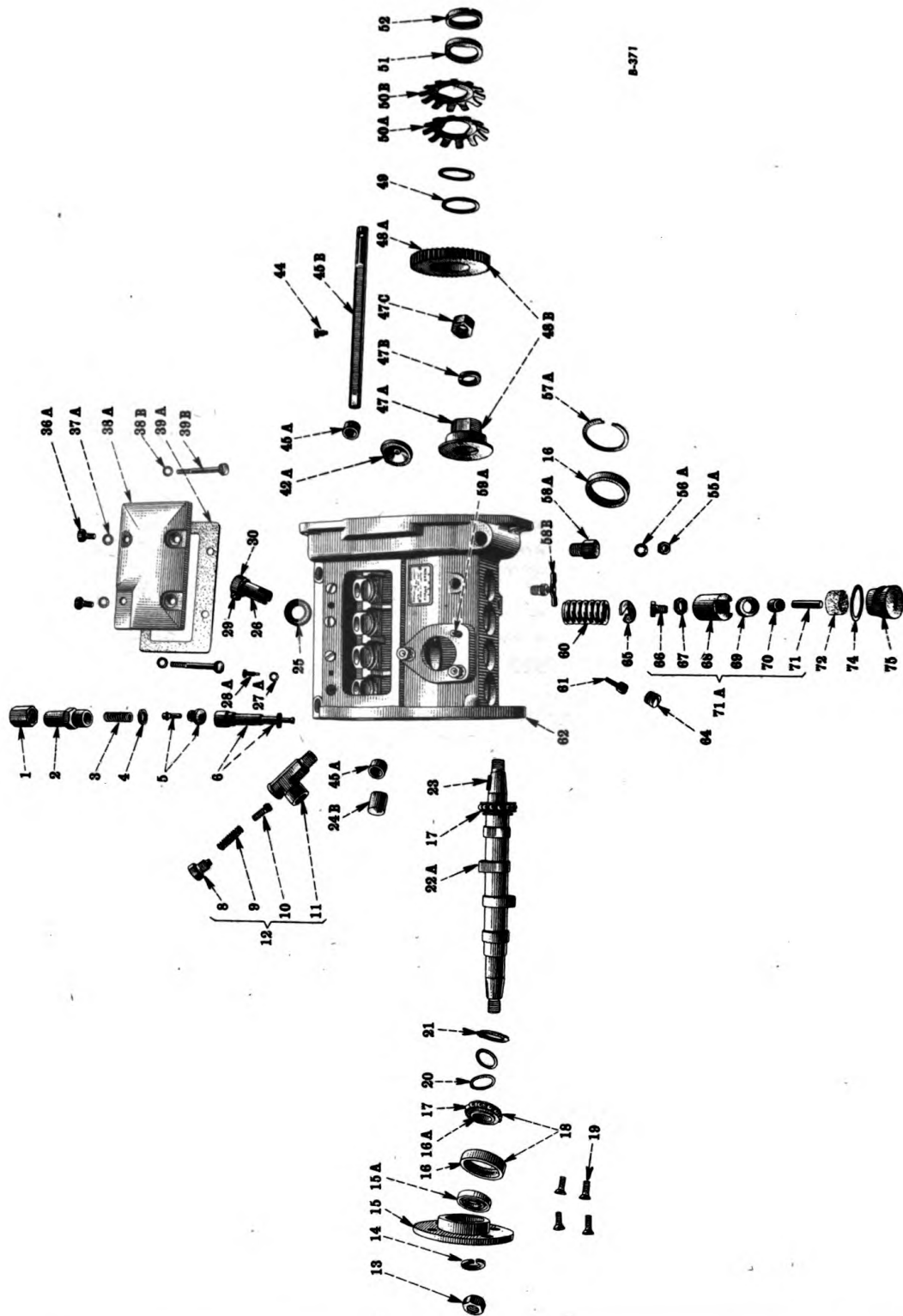
| Ref. No. | I H C Part No. | Bosch Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|----------------|--|----------|----------|
| 17A      | 62125 D        | AFP/K16NK 522  | Fuel supply pump, complete . . . . .                           | 1        |          |
| 1        | 43189 D        | PN 797         | Tappet securing pin . .  | 1        |          |
| 2        | 40388 D        | WBU 2174/1X    | Tappet wrist pin. . . .  | 1        | .010     |
| 3        | 40390 D        | WRL 2004/1X    | Tappet roller . . . . .  | 1        | .020     |
| 4        | 40386 D        | PVE 46/1X      | Tappet shell. . . . .  | 1        | .004     |
| 5        | 40395 D        | WSF 2197A1X    | Tappet spring . . . . .  | 1        | .005     |
| * 6      | 54370 D        | WBO 2140/2X    | Spindle . . . . .  | 1        | .010     |
| 7        | 40385 D        | PVE 45/1X      | Valve, inlet and outlet  | 2        | .003     |
| 8        | 54371 D        | WSF 2196/4X    | Valve spring. . . . .  | 2        | .001     |
| 9        | 62129 D        | WMR 2041/404X  | Valve spring retainer screw gasket . . . . .                   | 1        |          |
| 10       | 40397 D        | WVU 2097/1X    | Valve spring retainer screw. . . . .                           | 2        | .062     |
| 11       | 54367 D        | SC 7919A       | Plunger spring retainer screw with plug. . .                   | 1        | .125     |
| 12       | 61111 D        | WMR 2041/2X    | Plunger spring retainer screw gasket . . . . .                 | 1        | .002     |
| 13       | 54366 D        | WSF 2216A/1X   | Plunger spring. . . . .  | 1        | .018     |
| * 14     | 54365 D        | PKB 45/1X      | Plunger . . . . .  | 1        |          |
| 15A      | 62126 DY       | HG 7965A       | Fuel supply pump housing (includes Ref.Nos. 6 and 14). . . . . | 1        |          |
| ...      | .....          | NT5-8CA        | Hex nut, 1/4" N.C. . . .                                       | 3        |          |
| ...      | .....          | NSRL1A1X       | Pipe plug, 1/8" . . . .  | 1        |          |
| 16       | 54364 DB       | GA 76120       | Fuel supply pump housing gasket . . . . .                      | 1        | .002     |

\* - Not for service, order 62126DY.

# SPARE PARTS CATALOG

## DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

### PUMP UNIT



SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

PUMP UNIT - Continued

IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.

| Ref. No. | I H C Part No. | Bosch Part No.      | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---------------------|---|----------|----------|
| ...      | 60023 DX13½    | .....               | Fuel injection pump, complete<br>(See pages 11 thru 19.)        | 1        | .050     |
| ...      | Q 1802         | .....               | Cap screw, 3/8 x 1" N.C. hex. head                              | 2        | .062     |
| ...      | .....          | .....               | Cap screw, 3/8 x 1-3/8" N.C. hex. head                          | 1        | .120     |
| ...      | Q 1820         | .....               | Cap screw, 3/8 x 3" N.C. hex. head                              | 1        |          |
| ...      | Q 1920         | .....               | Lock washer, 3/8"   | 4        |          |
| ...      | 61909 D        | APE 4A 90P-320K 601 | Pump unit, complete. (less Ref. Nos. 8 thru 12 and 47C thru 55) | 1        |          |
| 1        | 40255 D        | WMU 9A 2X           | Delivery valve holder protection cap                            | 4        |          |
| 2        | 54320 D        | HP 7624             | Delivery valve holder   | 4        |          |
| 3        | 54329 D        | SP 7617             | Delivery valve spring   | 4        | .007     |
| 4        | 55361 D        | WNR 2021/3X         | Delivery valve holder gasket                                    | 4        | .002     |
| 5        | 54326 D        | VA 7636A            | Delivery valve and seat   | 4        | .031     |
| 6        | 54337 D        | BC 7641/2A          | Plunger and barrel (9 mm. dia. x 14.89 mm. helix)               | 4        |          |
| 8        | 54374 D        | SC 7630             | Valve screw   | 1        | .037     |
| 9        | 40401 D        | WSP 2177/1X         | Valve spring  | 1        | .001     |
| 10       | 40399 DA       | PVE 48A 1X          | Valve proper  | 1        | .002     |
| 11       | 54373 DB       | VA 7923             | Valve body  | 1        | .187     |
| 12       | 54372 DB       | VA 7613A            | Overflow valve, complete  | 1        | .918     |
| 13       | 54290 D        | WMU 511/2X          | Camshaft hex. nut   | 1        | .031     |
| 14       | Q 1922         | WA 5-16 CA          | Lock washer, 1/2"   | 1        | .918     |
| 15       | 54294 DAX      | PL 7623A            | End plate with oil seal, 54295 D                                | 1        | .012     |
| 15A      | 54295 D        | PK 764              | End plate oil seal  | 1        | .062     |
| 16       | 64960 D        | NIR-6/17 X          | Camshaft bearing outer race                                     | 2        | .046     |
| 16A      | 64959 D        | NAR-6/17 X          | Camshaft bearing inner race                                     | 2        | .046     |
| 17       | 64961 D        | NFR-6/17 Z          | Camshaft bearing retainer with balls                            | 2        | .046     |
| 18       | 54293 D        | NKL 6/17Z           | Camshaft bearing, (N.D. No. 17H)                                | 2        | .125     |
| 19       | 40216 D        | NSR 734/19X         | End plate fastening screw                                       | 4        |          |

(Continued on next page)

**SPARE PARTS CATALOG**

**DETAIL PARTS OF BOSCH INJECTION PUMP - Continued**

**PUMP UNIT - Continued**

**IMPORTANT:** Be sure to give all information shown on Pump Name Plate when ordering parts.

| Ref. No. | I H C Part No. | Bosch Part No. | Description   | No. Used  | Wt. Lbs. |
|----------|----------------|----------------|---|-----------|----------|
| 20       | 54296 D        | WMS 101/11X    | Bearing adjusting washer, 0.1M/M . . . . .                                      | .As req'd |          |
|          | 54297 D        | WMS 101/27X    | Bearing adjusting washer, 0.13M/M . . . . .                                     | .As req'd |          |
|          | 54298 D        | WMS 101/25X    | Bearing adjusting washer, 0.3M/M . . . . .                                      | .As req'd |          |
| 21       | 56113 D        | WMS 2215/1X    | Camshaft oil thrower. . . . .   | 1         | .003     |
| 22A      | 61911 D        | SH 7632        | Camshaft. . . . .   | 1         | 1.250    |
|          | .....          | WA5-16CA       | Lock washer, 1/2" . . . . .   | 1         | .012     |
| 23       | 54291 D        | NKE 5/1X       | Camshaft key (Woodruff). . . . .  | 1         | .003     |
| 24B      | 61965 D        | CV 76108       | Control rod protection cover . . . . .  | 1         | .012     |
| 25       | 54334 D        | PMS 7/2X       | Plunger spring seat, upper . . . . .  | 4         | .012     |
| 26       | 54330 D        | PMB 3/2X       | Control sleeve . . . . .  | 4         | .041     |
| 27A      | 62123 D        | GA 7615        | Barrel set screw gasket. . . . .  | 4         |          |
| 28A      | 61969 D        | SC 7660        | Barrel set screw . . . . .  | 4         | .007     |
| 29       | 54332 D        | WSR 2100/2X    | Toothed segment clamping screw . . . . .  | 4         | .002     |
| 30       | 54331 D        | PZR 44/1X      | Toothed segment. . . . .  | 4         | .015     |
| 36A      | 62120 D        | SC 1119-1      | Inspection cover fastening screw, short   | 2         |          |
| 37A      | 40753 D        | WA 22-8CA      | Inspection cover fastening screw<br>lock washer (Shakeproof No. 1214) . . . . . | 2         |          |
| 38A      | 62115 D        | CV 76109       | Inspection cover . . . . .  | 1         | 1.062    |
| 38B      | 67870 D        | GA 7616        | Inspection cover fastening screw<br>long gasket . . . . .                       | 2         | .002     |
| 39A      | 62118 D        | GA 76111       | Inspection cover gasket. . . . .  | 1         | .012     |
| 39B      | 62121 D        | SC 7661        | Inspection cover fastening screw, long.   | 2         | .031     |
| 42A      | 61959 DX       | BA 791         | Pump housing baffle with button. . . . .  | 1         | .015     |
| 44       | 54306 D        | WSR 2125/1X    | Control rod securing screw . . . . .  | 1         | .020     |
| 45A      | 54299 D        | BG 763         | Control rod bushing. . . . .  | 2         | .250     |
| 45B      | 61963 D        | RD 7689        | Control rod. . . . .  | 1         | .437     |
| 47A      | 62194 D        | HB 796         | Drive gear hub . . . . .  | 1         | .046     |
| 47B      | Q 1922         | WA5-16CA       | Lock washer, 1/2" (cadmium plated) . . . . .                                    | 1         | .562     |
| 47C      | 62199 D        | NT 7921        | Drive gear hub nut . . . . .  | 1         |          |
| 48A      | 62195 D        | GE 7919        | Drive gear . . . . .  | 1         | 1.000    |
| 48B      | 62193 D        | GE 7918A       | Drive gear, complete . . . . .  | 1         | .004     |
|          | 54411 D        | SR 794/1       | Adjusting spacer, .035" . . . . .   | .As req'd | .007     |
|          | 54412 D        | SR 794/2       | Adjusting spacer, .049" . . . . .   | .As req'd | .009     |
|          | 54413 D        | SR 794/3       | Adjusting spacer, .065" . . . . .   | .As req'd | .004     |
| 49       | 62622 D        | SR 794/4       | Adjusting spacer, .020" . . . . .   | .As req'd | .004     |



SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

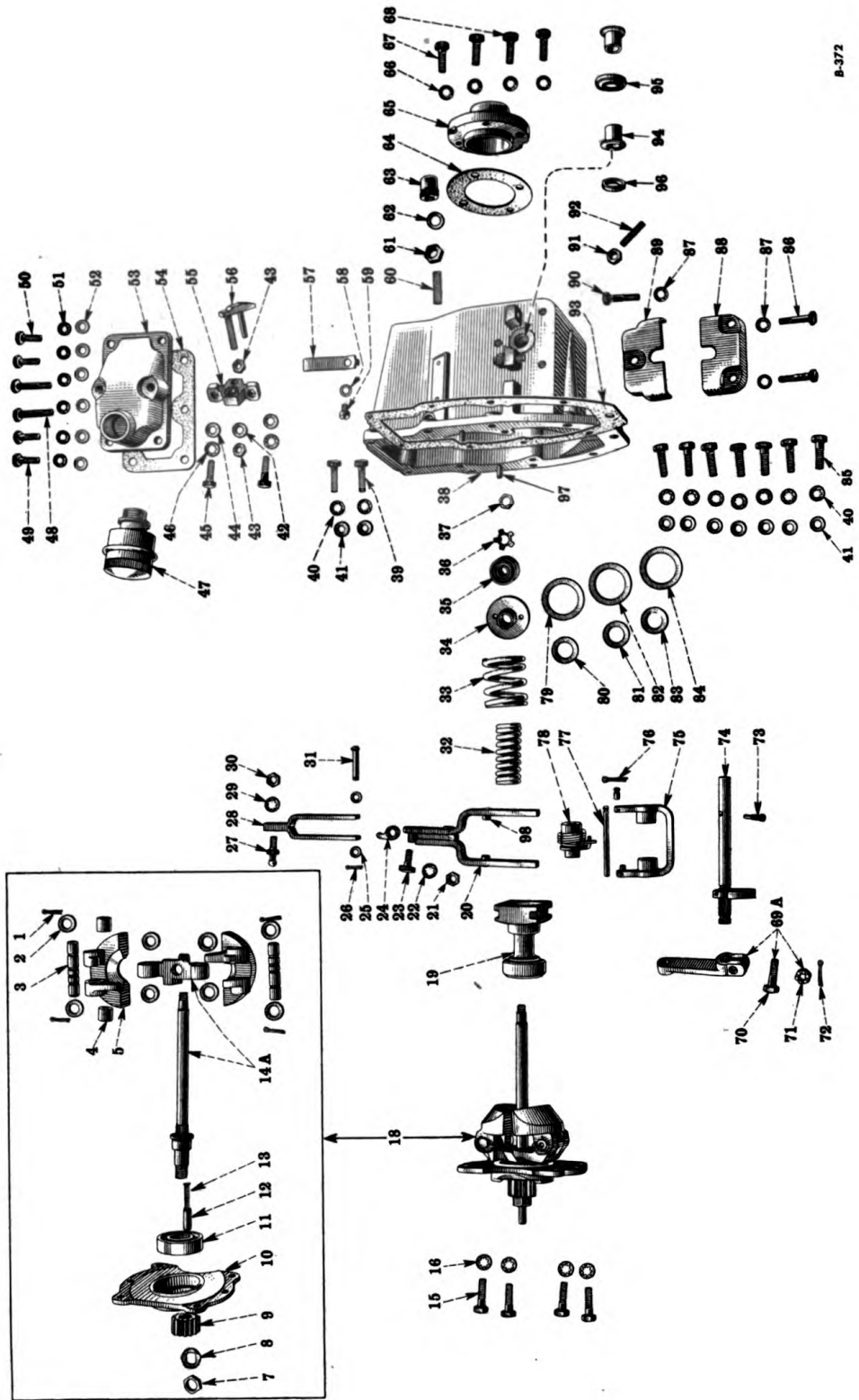
PUMP UNIT - Continued

|     |           |                |   |   |        |
|-----|-----------|----------------|---|---|--------|
| 50A | 62196 D   | DC 792         | Drive gear spring disc, inner.                                | 1 | .020   |
| 50B | 62197 D   | DC 795         | Drive gear spring disc, outer.                                | 1 | .020   |
| 51  | 62198 D   | WA 7918        | Drive gear adjusting nut lock washer                          | 1 | .007   |
| 52  | 54416 D   | NT 795         | Gear adjusting nut  | 1 | .031   |
| 55A | Q 1902    | NT5-8CA        | Hex. nut, 1/4" N.C.   | 3 | .007   |
| 56A | 40753 D   | WA 22-8CA      | Fuel supply pump housing lock washer<br>(Shakeproof No. 1214) | 3 | .007   |
| 57A | 61917 D   | RG 767         | Bearing retainer ring.  | 1 | .073   |
| 58A | 61958 D   | PG 7617        | Lubricating oil drain plug                                    | 1 | .008   |
| 58B | 59708 D   | F1 765         | Lubricating oil level cock                                    | 3 | .062   |
| 59A | 61956 D   | SD 7610        | Fuel supply pump stud.  | 4 | .009   |
| 60  | 54333 DA  | WSF 2205A 400X | Plunger spring  | 1 | 14.000 |
| 61  | 57503 DX  | F1 7625A       | Lubricating oil overflow tube with<br>plug.                   | 1 |        |
| 62  | 61918 DX  | HG 76185 A     | Pump housing, complete  | 1 |        |
| 64  | .....     | NSR 1A 2X      | Pipe plug, 1/4" slotted head<br>(cadmium plated).             | 1 |        |
| 65  | 54335 D   | PMS 6/LX       | Plunger spring seat, lower                                    | 4 | .012   |
| 66  | 54346 D   | PSR 3/LX       | Tappet screw  | 4 | .015   |
| 67  | 54347 D   | WMV 2066/2X    | Tappet screw lock nut.  | 4 | .007   |
| 68  | 54348 DAX | PBK 41/LX      | Tappet shell with insert                                      | 4 | .125   |
| 69  | 54351 D   | PRL 1/3X       | Tappet roller.  | 4 | .017   |
| 70  | 54350 D   | PMB 4/LX       | Tappet roller bushing.  | 4 | .008   |
| 71  | 54349 D   | PBO 1/LX       | Tappet pin  | 4 | .015   |
| 71A | 54345 D   | PKB 41/LZ      | Tappet, complete  | 4 | .187   |
| 72  | 54481 D   | PPT 22/2X      | Felt cushion  | 4 | .002   |
| 74  | 61970 D   | WMR 2041/405X  | Closing plug gasket.  | 4 | .002   |
| 75  | 62124 D   | PG 7614        | Closing plug  | 4 | .093   |
| ... | 61957 D   | PG 7625        | Fuel line closing plug (order 3/8"<br>standard pipe plug)     | 2 | .050   |
| ... | 61962 D   | NSR 1A 2X      | Lubricating oil overflow plug, outer                          | 1 | .020   |

IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.

# SPARE PARTS CATALOG

## DETAIL PARTS OF BOSCH INJECTION PUMP - Continued GOVERNOR



B-372

Bosch Injection Pump Governor

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

GOVERNOR - Continued

| Ref. No. | I H C Part No. | Bosch Part No.        | Description  | No. Used | Wt. Lbs. |
|----------|----------------|-----------------------|--|----------|----------|
| ...      | 62191 D        | GVA 225/<br>675PK-203 | Governor, complete   | 1        | 13.500   |
| 1        | .....          | PN2-14CA              | Cotter pin, 1/16 x 5/8" (cadmium plated)                                   | 4        | .002     |
| 2        | 62220 D        | WA 1134               | Governor weight washer   | 8        | .052     |
| 3        | 62219 D        | PN 7950               | Governor weight pin  | 2        | .015     |
| 4        | 62218 D        | BG 7918               | Governor weight bushing  | 4        | 1.125    |
| 5        | 62217 DX       | WT 7926A              | Governor weight (pairs) (includes Ref. No. 4)                              | 1        | .008     |
| 7        | 62224 D        | NT 7923               | Governor driven gear nut   | 1        | .001     |
| 8        | 62223 D        | WA 7919               | Governor driven gear lock washer   | 1        | .062     |
| 9        | 62222 D        | GE 7920               | Governor driven gear   | 1        | .625     |
| 10       | 62225 DX       | PL 7940               | Bearing support plate with cage  | 1        | .187     |
| 11       | 62221 D        | BB 7911               | Governor weight shaft bearing (drive end) (N.D.3202 B)                     | 1        | .004     |
| 12       | 62227 D        | PC 799                | Governor shaft plunger oiler   | 1        | .002     |
| 13       | 62228 D        | SP 7954               | Governor shaft plunger oiler spring  | 1        | .312     |
| 14A      | 62214 D        | SH 7928A              | Governor weight shaft, with spider and pins                                | 4        | .007     |
| 15       | .....          | PN 2-14CA             | Cotter pin, 1/4 x 7/16" (cadmium plated)                                   | 4        | .017     |
| 16       | 62205 D        | SC 1110-1             | Bearing support plate bolt   | 4        | 2.312    |
| 18       | 40753 D        | WA 22-8CA             | Bearing support plate bolt lock washer (Shakeproof No. 1214)               | 1        | .500     |
| 19       | 62229 DX       | SV 7910A              | Governor weight and shaft, complete (includes Ref. Nos. 1 thru 11 and 14A) | 1        | .250     |
| 20       | 62237 DX       | .....                 | Sleeve with bushing and thrust bearing                                     | 1        | .007     |
|          | 62236 D        | LE 7946A              | Fulcrum lever (includes Ref. No. 98)                                       | 1        | .020     |
| 21       | .....          | R1-6-22               | Fulcrum lever (includes Ref. Nos. 20, 21, 22, 25 thru 31, 75, 76 and 77)   | 1        | .008     |
|          | .....          | NT8-8CA               | Rivet, 3/16" x 11/16", flat head   | 1        | .020     |
| 23       | 62271 D        | SC 1136               | Hex. jam nut, 1/4" N.F. (cadmium plated)                                   | 1        | .125     |
| 24       | 62270 D        | CA 793                | Smoke limit cam screw (fulcrum lever)                                      | 1        | .007     |
| 25       | 62249 D        | WA 1156               | Smoke limit cam  | 1        | .008     |
| 26       | .....          | PN 2-14CA             | Control rod link pin washer  | 2        | .020     |
| 27       | 62247 D        | PN 7935               | Cotter pin, 1/16 x 7/8" (cadmium plated)                                   | 2        | .125     |
| 28       | 62246 DX       | LK 796                | Control rod linkage pin  | 1        | .007     |
| 29       | 40753 D        | WA 22-8CA             | Control rod link   | 1        | .020     |
| 30       | .....          | NT 4-8CA              | Control rod linkage pin lock washer (Shakeproof No. 1214)                  | 1        | .007     |
|          |                |                       | Hex. nut, 1/4" N.F. (cadmium plated)                                       | 1        | .007     |

(Continued on next page.)

**SPARE PARTS CATALOG**

**DETAIL PARTS OF BOSCH INJECTION PUMP - Continued**

**GOVERNOR - Continued**

**IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.**

| Ref. No. | I H C Part No. | Bosch Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|----------------|--|----------|----------|
| 31       | 62248 D        | PN 7946        | Control rod link pin . . . . .   | 1        | .020     |
| 32       | 62648 D        | SP 7950/2      | Governor spring, inner . . . . .   | 1        | .062     |
| 33       | 62645 D        | SP 7951/1      | Governor spring, outer . . . . .   | 1        | .093     |
| 34       | 62628 D        | GU 7912        | Spring seat. . . . .   | 1        | .062     |
| 35       | 62625 D        | BB 7912        | Governor weight shaft bearing (spring end) (N.D. 87008) . . . . .          | 1        | .062     |
| 36       | 62626 D        | WA 1182        | Governor weight shaft bearing lock washer . . . . .                        | 1        | .001     |
| 37       | 62627 D        | NT 1070        | Governor weight shaft bearing nut. . . . .                                 | 1        | .006     |
| 38       | 62200 D        | CV 7961A       | Governor end cover (includes Ref. Nos. 57, 58 and 94 thru 97) . . . . .    | 1        | 2.500    |
| 39       | 62204 D        | SC 1110        | Governor end cover bolt (drilled). . . . .                                 | 2        | .015     |
| 40       | 40753 D        | WA 22-8CA      | Governor end cover bolt lock washer (Shakeproof No. 1214) . . . . .        | 9        |          |
| 41       | 62206 D        | WA 1143        | Governor end cover bolt washer . . . . .                                   | 9        |          |
| 42       | 55428 DA       | WA 1155        | Stop plate screw washer. . . . .   | 3        | .002     |
| 43       | .....          | NT 8-8CA       | Hex. jam nut, 1/4" N.F. (cadmium plated) . . . . .                         | 2        | .007     |
| 44       | 62206 D        | WA 1143        | Stop plate bridge bolt washer. . . . .                                     | 2        | .001     |
| 45       | 62205 D        | SC 1110-1      | Stop plate bridge bolt . . . . .   | 2        | .017     |
| 46       | 40753 D        | WA 22-8CA      | Stop plate bridge bolt lock washer (Shakeproof No. 1214) . . . . .         | 2        |          |
| 47       | 60740 D        | CV 76126A      | Breather, complete . . . . .   | 1        | .312     |
| 48       | 62275 D        | SC 1139        | Governor inspection cover bolt, center . . . . .                           | 2        | .025     |
| 49       | 62276 D        | SC 1140-1      | Governor inspection cover bolt (drilled) . . . . .                         | 2        | .014     |
| 50       | 62633 D        | SC 1140        | Governor inspection cover bolt, short. . . . .                             | 2        | .015     |
| 51       | 40753 D        | WA 22-8CA      | Governor inspection cover bolt lock washer (Shakeproof No. 1214) . . . . . | 6        |          |
| 52       | 62206 D        | WA 1143        | Governor inspection cover bolt washer. . . . .                             | 6        | .001     |
| 53       | 62272 DX       | CV 7982A       | Governor inspection cover with baffle. . . . .                             | 1        | .375     |
| 54       | 62274 D        | GA 7979        | Governor end cover gasket. . . . .   | 1        | .006     |
| 55       | { 62267 D      | BK-7917        | Stop plate bridge. . . . .   | 1        |          |
|          | { 62267 DX     | PL 7943A       | Stop plate bridge (includes Ref.Nos. 42, 43, 56) . . . . .                 | 1        | .093     |
| 56       | 62268 DX       | PL 7942A       | Stop plate with pin and screw . . . . .                                    | 1        | .010     |
| 57       | 62208 D        | SP 7953        | Bumper spring. . . . .   | 1        | .003     |
| 58       | 67980 H        | WA 22-6CA      | Bumper spring lock washer (Shakeproof No. 1212) . . . . .                  | 3        |          |
| 59       | .....          | .....          | Screw, No. 12 - 24 x 5/16" fillister head (cadmium plated) . . . . .       | 1        | .005     |
| 60       | 62209 D        | SC 1134        | Bumper spring adjusting screw. . . . .                                     | 1        | .018     |
| 61       | .....          | NT6-10CA       | Hex. nut, 5/16" N.F. (cadmium plated) . . . . .                            | 2        | .010     |
| 62       | 62211 D        | GA 7980        | Bumper spring cap gasket . . . . .   | 1        | .001     |

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

GOVERNOR - Continued

|     |          |             |  |          |      |
|-----|----------|-------------|--|----------|------|
| 63  | 62210 D  | NT 7917     | Bumper spring cap.   | 1        | .031 |
| 64  | 62235 D  | GA 7982     | Spring retainer end cap gasket                                 | 1        | .003 |
| 65  | 62233 D  | CP 7910     | Spring retainer end cap  | 1        | .500 |
| 66  | 40753 D  | WA 22-8CA   | Spring retainer end cap bolt lock washer (Shakeproof No. 1214) | 4        | .015 |
| 67  | 62204 D  | SC 1110     | Spring retainer end cap bolt, upper.                           | 2        | .018 |
| 68  | 62205 D  | SC 1110-1   | Spring retainer end cap bolt, lower.                           | 2        | .018 |
| 69A | 62263 DX | LE 7957A    | Operating lever with bolt and nut                              | 1        | .018 |
| 70  | 62264 D  | SC 7961     | Operating lever bolt   | 1        | .004 |
| 71  | 62265 D  | NT 7919     | Operating lever bolt nut                                       | 1        | .003 |
| 72  | .....    | PN 2-20CA   | Cotter pin, 1/16 x 5/8"  | 1        | .218 |
| 73  | 54462 D  | SC 7930     | Spring plate set screw   | 1        | .093 |
| 74  | 62255 DX | SH 7921A    | Operating lever shaft with stop and pin.                       | 1        | .006 |
| 75  | 62243 DX | BK 7913A    | Fulcrum lever bracket with bearings.                           | 1        |      |
| 76  | .....    | PN 2-20CA   | Cotter pin, 1/16 x 5/8"  | 1        |      |
| 77  | 64161 D  | PN 7951     | Fulcrum lever bracket pin                                      | 1        |      |
| 78  | 62250 DX | PL 7923A    | Spring plate (less spring)                                     | 1        |      |
|     | 62253 D  | SP 7949     | Operating lever spring   | 1        |      |
|     | 62259 D  | PL 7925A    | Operating shaft plate with hub and spring.                     | 1        |      |
| 79  | 62641 D  | SR 7914/1   | Outer spring spacer, .020"                                     | As req'd | .004 |
| 80  | 62637 D  | SR 799/1    | Inner spring spacer, .020"                                     | As req'd | .002 |
| 81  | 62638 D  | SR 799/2    | Inner spring spacer, .042"                                     | As req'd | .005 |
| 82  | 62642 D  | SR 7914/2   | Outer spring spacer, .042"                                     | As req'd | .010 |
| 83  | 62639 D  | SR 799/3    | Inner spring, .058"  | As req'd | .005 |
|     | 62640 D  | SR 799/4    | Inner spring spacer, .083"                                     | As req'd | .008 |
| 84  | 62643 D  | SR 7914/3   | Outer spring spacer, .058"                                     | As req'd | .012 |
|     | 62644 D  | SR 7914/4   | Outer spring spacer, .083"                                     | As req'd | .018 |
| 85  | 62205 D  | SC 1110-1   | Governor end cover bolt, long (plain).                         | 7        | .018 |
| 86  | 62262 D  | SC 7950-1   | Operating lever stop cover lower bolt.                         | 2        | .014 |
| 87  | 67980 H  | WA 22-6CA   | Operating lever stop cover lock washer (Shakeproof No. 1212)   | 3        |      |
| 88  | 62261 D  | CV 7946     | Operating lever stop cover, lower.                             | 2        | .052 |
| 89  | 62254 D  | CV 7945     | Operating lever stop cover, upper.                             | 1        | .046 |
| 90  | 62260 D  | SC 7950     | Operating lever stop cover upper bolt.                         | 1        | .013 |
| 91  | Q 1902   | NT 6-8CA    | Hex. nut, 1/4" N.F. (cadmium plated)                           | 2        | .007 |
| 92  | .....    | SC 350-16CA | Set screw, 1/4 x 1" headless (oval point) (cadmium plated)     | 2        | .008 |
| 93  | 62203 D  | GA 7978     | Governor end cover gasket.                                     | 1        | .012 |
| 94  | 54435 D  | BG 793      | Operating lever shaft bushing.                                 | 2        | .012 |

IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.

**SPARE PARTS CATALOG**

**DETAIL PARTS OF BOSCH INJECTION PUMP - Continued**

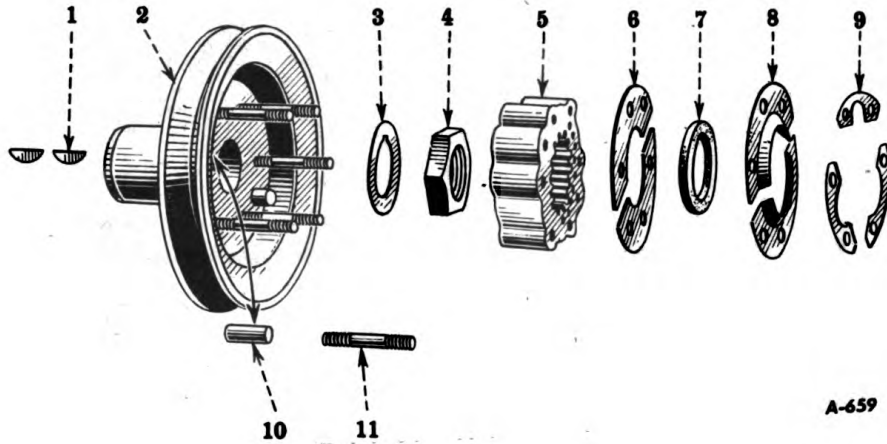
**GOVERNOR - Continued**

**IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.**

| Ref. No. | I H C Part No. | Bosch Part No. | Description                                    | No. Used | Wt. Lbs. |
|----------|----------------|----------------|--|----------|----------|
| 95       | 54434 D        | PK 795         | Operating lever shaft oil seal . . . . .       | 1        | .008     |
| •••      | 40329 DA       | SC 150-2CA     | Name plate drive rivet . . . . .               | 2        |          |
| •••      | 62207 D        | PN 751         | Bearing support plate dowel pin. . . . .       | 2        |          |
| 96       | 54441 D        | PG 797         | Plug (for operating lever shaft hole). . . . . | 1        |          |
| 97       | 62207 D        | PN 751         | Bearing support plate dowel. . . . .           | 2        |          |
| 98       | 62242 D        | PN 7931        | Fulcrum lever pivot pin. . . . .               | 2        |          |

**SPARE PARTS CATALOG**

**FRONT POWER TAKE-OFF COUPLING**

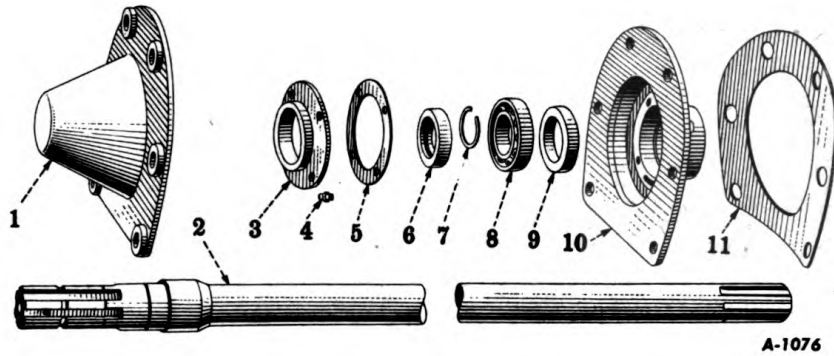


| Ref. No. | I H C Part No. | Description                           | No. Used | Wt. Lbs. |
|----------|----------------|---------------------------------------|----------|----------|
| 1        | 47487 D        | Key (No. 23 Woodruff) . . . . .       | 2        | .050     |
| 2        | 8120 DAX       | Pulley with drive pins. . . . .       | 1        | 13.625   |
| 3        | 4254 DA        | Nut lock. . . . .                     | 1        |          |
| 4        | 4253 D         | Nut (regular pulley nut). . . . .     | 1        |          |
| 5        | 8119 D         | Coupling (14 teeth) . . . . .         | 1        | 3.375    |
| 6        | 51268 D        | Shaft retainer. . . . .               | 2        | .015     |
| 7        | 51269 D        | Felt washer . . . . .                 | 1        | .004     |
| 8        | 51271 D        | Felt retainer . . . . .               | 2        | .125     |
| 9        | 47244 D        | Lock. . . . .                         | 3        | .047     |
| 10       | 47490 D        | Pin . . . . .                         | 2        | .080     |
| 11       | 57715 D        | Stud. . . . .                         | 2        | .004     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F., type B . . . . . | 6        | .001     |

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**REAR POWER TAKE-OFF ATTACHMENT (50908 D)**



*When ordering, always use I H C Part Nos.*

| Ref. No. | I H C Part No. | Description                                 | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 1        | 6277 D         | Cover . . . . .                             | 1        | 9.750    |
| ...      | Q 1890         | Cap screw, 3/4" N.C. x 2" . . . . .         | 6        | .333     |
| ...      | Q 1927         | Lock washer, 3/4" . . . . .                 | 6        | .045     |
| 2        | 50905 DAX      | Power shaft . . . . .                       | 1        | 23.000   |
| 3        | 6276 DX        | Retainer with seal. . . . .                 | 1        | 1.375    |
| ...      | Q 4017         | Cap screw, 3/8" N.C. x 7/8" . . . . .       | 4        | .047     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                 | 4        | .005     |
| 4        | Q 3615         | Lubricator. . . . .                         | 1        | .016     |
| 5        | 45620 D        | Gasket. . . . .                             | 1        | .005     |
| 6        | 45619 D        | Oil seal, outer . . . . .                   | 1        | .500     |
| 7        | 45537 D        | Snap ring . . . . .                         | 1        | .012     |
| 8        | { ST 202       | Bearing (IHC) (optional). . . . .           | 1        | 1.000    |
|          | { 18507 D      | Bearing (N.D. No. 3209) (optional). . . . . | 1        | 1.000    |
| 9        | 45561 D        | Oil seal, inner . . . . .                   | 1        | .250     |
| 10       | 6268 DX        | Cage with seal. . . . .                     | 1        | 10.250   |
| 11       | 42289 D        | Gasket. . . . .                             | 1        | .062     |

*Don't order parts from the illustrations only; refer to the list also.*



# SPARE PARTS CATALOG

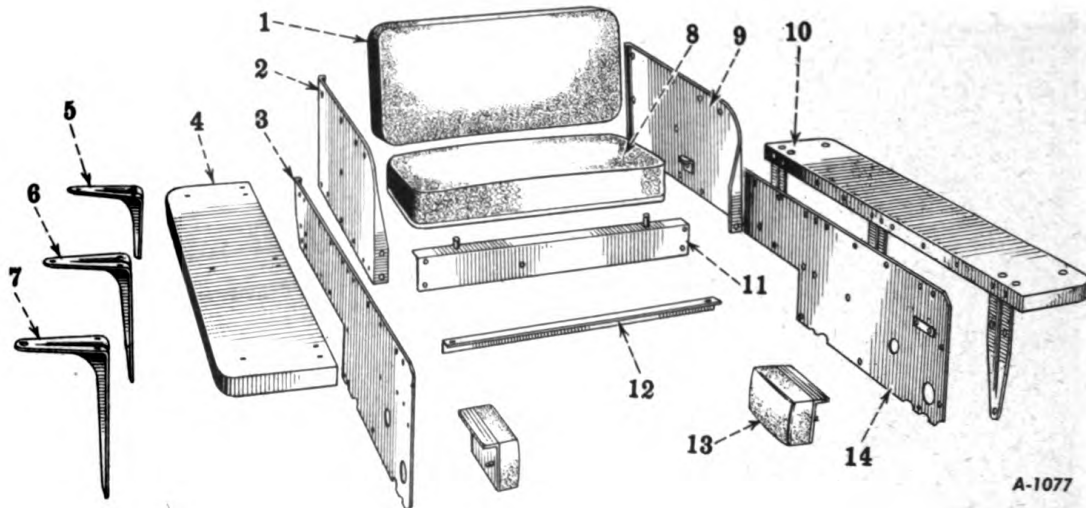
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## SEAT AND FENDERS



**SPARE PARTS CATALOG**

**SEAT AND FENDERS**



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 50524 D        | Cushion back. . . . .                                  | 1        |          |
| ...      | Q 1800         | Cap screw, 3/8" N.C. x 3/4" . . . . .                  | 2        |          |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                            | 2        |          |
| 2        | 50519 DX       | Side sheet, right hand (seat) . . . . .                | 1        |          |
| ...      | Q 4016         | Cap screw, 3/8 x 5/8" N.C. . . . .                     | 2        |          |
| ...      | Q 4020         | Cap screw, 3/8 x 5/8" N.F. . . . .                     | 2        |          |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                            | 2        |          |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                            | 4        |          |
| 3        | 50512 DX       | Side sheet, right hand (fender) . . . . .              | 1        |          |
| ...      | Q 1798         | Cap screw, 3/8 x 1/2" N.C. . . . .                     | 2        |          |
| ...      | Q 1799         | Cap screw, 3/8 x 3/4" N.F. . . . .                     | 4        |          |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                            | 4        |          |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                            | 6        |          |
| ...      | .....          | Washer, 13/32" I.D. x 7/8" O.D. x No. 16 gage. . . . . | 6        |          |
| 4        | 50517 D        | Fender, right hand. . . . .                            | 1        | 26.000   |
| ...      | .....          | Carriage bolt, 3/8 x 5/8" N.C. . . . .                 | 9        | .047     |
| ...      | Q 1799         | Cap screw, 3/8 x 3/4" N.F. . . . .                     | 5        | .040     |
| ...      | Q 1906         | Hex. nut, 3/8" N.C. . . . .                            | 9        | .031     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                            | 5        | .016     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                            | 15       | .005     |
| ...      | Q 1800         | Cap screw, 3/8" N.C. x 3/4" . . . . .                  | 1        | .035     |
| ...      | .....          | Washer, 13/32" I.D. x 7/8" O.D. x No. 16 gage. . . . . | 6        | .016     |
| 5        | 50515 D        | Fender bracket, rear. . . . .                          | 1        | 2.250    |
| ...      | Q 1800         | Cap screw, 3/8 x 3/4" N.C. . . . .                     | 4        | .035     |
| ...      | Q 1847         | Cap screw, 1/2 x 1" N.F. . . . .                       | 8        | .100     |
| ...      | Q 1909         | Hex. nut, 1/2" N.F. . . . .                            | 8        | .035     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                            | 4        | .005     |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .                            | 8        | .013     |

*(Continued on next page)*

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

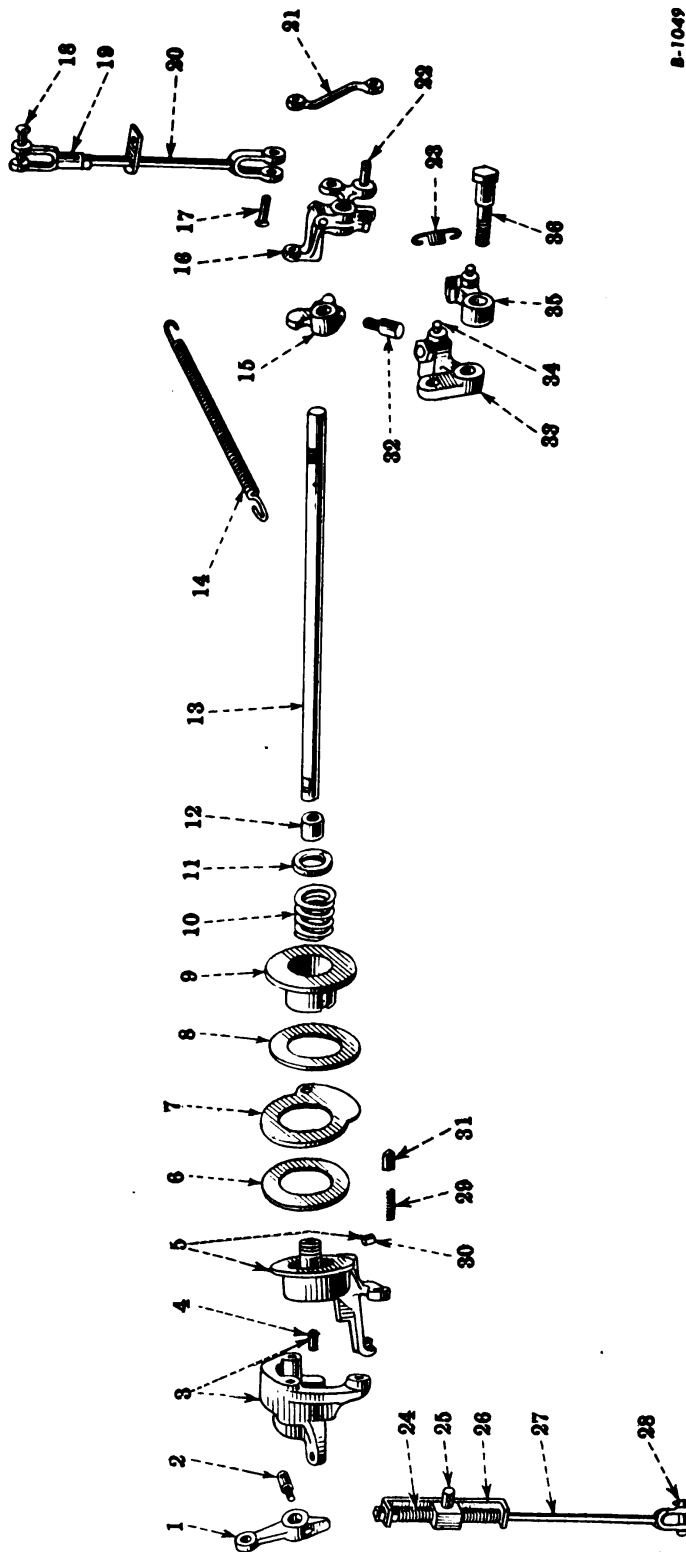
**SEAT AND FENDERS - Continued**

| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 6        | 50514 D        | Bracket, center . . . . .                                 | 1        | 3.000    |
| ...      | Q 1847         | Cap screw, 1/2" N.F. x 1" . . . . .                       | 4        | .051     |
| ...      | Q 1799         | Cap screw, 3/8 x 3/4" N.F. . . . .                        | 4        | .040     |
| ...      | Q 1845         | Cap screw, 1/2 x 3/4" N.F. . . . .                        | 2        | .085     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                               | 4        | .016     |
| ...      | Q 1909         | Hex. nut, 1/2" N.F. . . . .                               | 4        | .035     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                               | 4        | .005     |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .                               | 6        | .013     |
| 7        | 50513 D        | Bracket, front. . . . .                                   | 1        | 3.125    |
| ...      | Q 1799         | Cap screw, 3/8 x 3/4" N.F. . . . .                        | 4        | .040     |
| ...      | Q 1846         | Cap screw, 1/2 x 3/4" N.C. . . . .                        | 2        | .085     |
| ...      | Q 1853         | Cap screw, 1/2 x 1-3/4" N.F. . . . .                      | 4        | .125     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                               | 4        | .016     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                               | 4        | .005     |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .                               | 6        | .013     |
| ...      | Q 1909         | Hex. nut, 1/2" N.F. . . . .                               | 4        | .035     |
| 8        | 50525 D        | Cushion bottom. . . . .                                   | 1        | 20.328   |
| 9        | 50518 DX       | Side sheet, left hand (seat). . . . .                     | 1        | 17.500   |
| ...      | Q 4020         | Cap screw, 3/8" N.F. x 5/8" . . . . .                     | 2        | .040     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                               | 2        | .016     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                               | 4        | .005     |
| ...      | Q 4016         | Cap screw, 3/8 x 5/8" N.C. . . . .                        | 2        | .039     |
| 10       | 50516 D        | Fender, left hand . . . . .                               | 1        | 30.000   |
| ...      | .....          | Carriage bolt, 3/8 x 5/8" N.C. . . . .                    | 9        | .047     |
| ...      | Q 1799         | Cap screw, 3/8 x 3/4" N.F. . . . .                        | 5        | .040     |
| ...      | Q 1906         | Hex. nut, 3/8" N.C. . . . .                               | 9        | .031     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                               | 5        | .016     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                               | 15       | .005     |
| ...      | Q 1800         | Cap screw, 3/8" N.C. x 3/4" . . . . .                     | 1        | .035     |
| ...      | .....          | Washer, 13/32" I.D. x 7/8" O.D. x<br>No. 16 gage. . . . . | 6        | .016     |
| 11       | 50520 DX       | Seat support, front . . . . .                             | 1        | 7.500    |
| ...      | Q 1799         | Cap screw, 3/8 x 3/4" N.F. . . . .                        | 4        | .040     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                               | 4        | .016     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                               | 4        | .005     |
| 12       | 50521 D        | Seat support angle, rear. . . . .                         | 1        | 3.687    |
| ...      | Q 1799         | Cap screw, 3/8 x 3/4" N.F. . . . .                        | 2        | .040     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                               | 2        | .016     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                               | 2        | .005     |
| 13       | 52390 D        | Seat cushion side . . . . .                               | 1        | 2.500    |
| ...      | Q 1904         | Hex. nut, 5/16" N.C. . . . .                              | 4        | .030     |
| ...      | Q 1919         | Lock washer, 5/16" . . . . .                              | 4        | .003     |
| ...      | .....          | Carriage bolt, 5/16 x 5/8" N.C. . . . .                   | 2        | .031     |
| 14       | 50511 DX       | Side sheet, left hand (fender). . . . .                   | 1        | 13.000   |
| ...      | Q 1798         | Cap screw, 3/8 x 1/2" N.C. . . . .                        | 2        | .035     |
| ...      | Q 1799         | Cap screw, 3/8 x 3/4" N.F. . . . .                        | 4        | .040     |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .                               | 4        | .016     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                               | 6        | .005     |
| ...      | .....          | Washer, 13/32" I.D. x 7/8" O.D. x<br>No. 16 gage. . . . . | 6        | .016     |

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# SPARE PARTS CATALOG

## CROSS SHAFT AND GOVERNOR CONTROL



B-1049

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

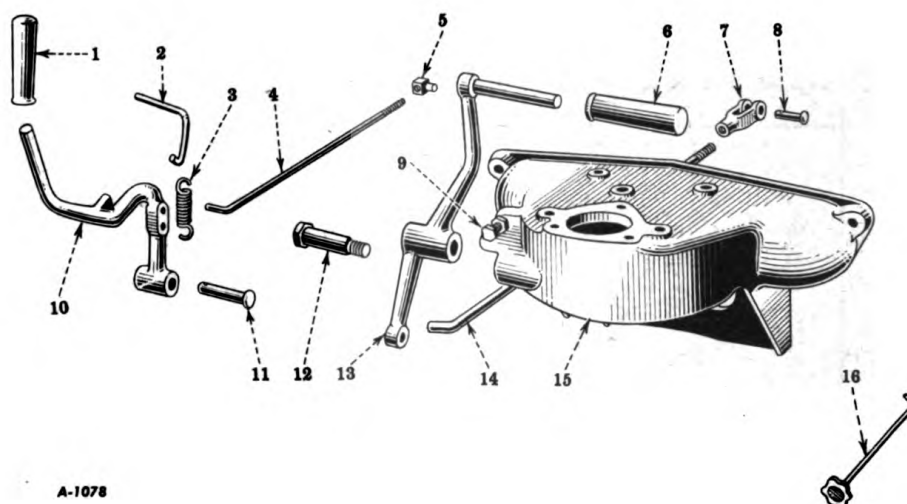
SPARE PARTS CATALOG

CROSS SHAFT AND GOVERNOR CONTROL - Continued

| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                                   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|----------|----------------|---|----------|----------|
| 1        | 54086 D        | Operating lever.                                    | 1        |          | 17       | 19306 D        | Pin.  | 1        | .031     |
| 2        | 20586 D        | Pin.  | 1        |          | 18       | 19306 D        | Cotter, 3/32 x 5/8".                          | 1        | .001     |
| ...      | Q 1903         | Hex. nut, 5/16" N.F.                                | 1        | .008     | 19       | 19305 D        | Cotter, 3/32 x 5/8".                          | 1        | .031     |
| 3        | Q 1919         | Lock washer, 5/16"                                  | 1        | .004     | 20       | 53416 D        | Adjusting yoke                                | 1        | .001     |
| ...      | Q 9446 DAX     | Cross shaft bracket.                                | 1        |          | 21       | Q 1903         | Operating rod.                                | 1        |          |
| ...      | Q 1814         | Cap screw, 3/8" N.C. x 2-1/2".                      | 2        |          | 22       | 53414 DX       | Hex nut, 5/16" N.F.                           | 1        | .008     |
| ...      | .....          | Cap screw, 3/8" N.C. x 1-3/8".                      | 1        |          | 23       | .....          | Carburetor control link.                      | 1        |          |
| ...      | Q 1920         | Lock washer, 3/8"                                   | 3        |          | 24       | .....          | Washer, 9/32" I.D. x 5/8" x No. 18 gage,      | 2        | .001     |
| ...      | .....          | Oval point headless set screw, 5/16" N.C. x 1-1/4". | 1        |          | 25       | .....          | Cotter, 1/16 x 7/16".                         | 2        |          |
| 4        | 45391 D        | Hex. jam nut, 5/16" N.C.                            | 1        |          | 26       | .....          | Jaw pin.                                      | 1        |          |
| 5        | 9447 DX        | Friction plate locating pin.                        | 1        |          | 27       | 53411 D        | Spring.                                       | 1        |          |
| 6        | 48356 D        | Governor control lever, with dowel pin.             | 1        |          | 28       | 52624 D        | Spring.                                       | 1        |          |
| 7        | 64543 D        | Friction disc.                                      | 1        | .875     | 29       | 54125 D        | Spring.                                       | 2        |          |
| 8        | 48356 D        | Governor control friction plate.                    | 1        |          | 30       | 42981 DA       | Trunnion.                                     | 1        |          |
| 9        | 6649 D         | Friction disc.                                      | 1        |          | 31       | .....          | Washer, 13/32" I.D. x 3/4" O.D. x No. 16 gage | 1        | .006     |
| 10       | 48358 D        | Disc retainer.                                      | 1        |          | 32       | .....          | Cotter, 3/32 x 5/8".                          | 1        | .001     |
| 11       | 48359 D        | Spring.   | 1        |          | 33       | .....          | Guide.  | 1        | .008     |
| 12       | 50827 D        | Spring nut.   | 1        |          | 34       | 54124 D        | Hex. jam nut, 5/16" N.F.                      | 2        |          |
| 13       | 53417 D        | Bushing.  | 1        |          | 35       | 53415 DX       | Control rod.                                  | 1        | .031     |
| 14       | 52176 DC       | Cross shaft.  | 2        |          | 36       | 19306 D        | Pin.  | 1        | .001     |
| 15       | 52626 D        | Return spring.                                      | 1        |          | ...      | .....          | Cotter, 3/32 x 5/8".                          | 1        |          |
| 16       | 53410 DX       | Jaw lever.  | 1        |          | ...      | .....          | Low idle poppet spring.                       | 1        |          |
| ...      | .....          | Jaw, with pin.                                      | 1        |          | ...      | .....          | Dowel pin.                                    | 1        |          |
| ...      | .....          | Flat point headless set screw, 5/16" N.C. x 1-1/4". | 1        | .031     | ...      | .....          | Low idle poppet.                              | 1        |          |
| ...      | .....          | Hex. jam nut, 5/16" N.C.                            | 1        | .016     | ...      | .....          | Pin.  | 1        | .008     |
| ...      | .....          | Washer, 21/32" I.D. x 1" O.D. No. 12 gage.          | 1        | .001     | ...      | .....          | Hex. nut, 5/16" N.F.                          | 1        | .003     |
| ...      | .....          | Cotter, 1/8 x 1"                                    | 1        | .004     | ...      | .....          | Lock washer, 5/16".                           | 1        |          |
| ...      | .....          | .....   | 1        |          | ...      | .....          | Latch bracket, with spring pin                | 1        |          |
| ...      | .....          | .....   | 1        |          | ...      | .....          | Flat hd. screw, 3/8" N.C. x 1-1/2".           | 1        | .004     |
| ...      | .....          | .....   | 1        |          | ...      | .....          | Hex. jam nut, 3/8" N.C.                       | 1        | .016     |
| ...      | .....          | .....   | 1        |          | ...      | .....          | Latch spring pin.                             | 2        |          |
| ...      | .....          | .....   | 1        |          | ...      | .....          | Latch, with spring pin.                       | 1        |          |
| ...      | .....          | .....   | 1        |          | ...      | .....          | Latch pin.                                    | 1        |          |

SPARE PARTS CATALOG

ENGINE CONTROLS AND CONNECTIONS

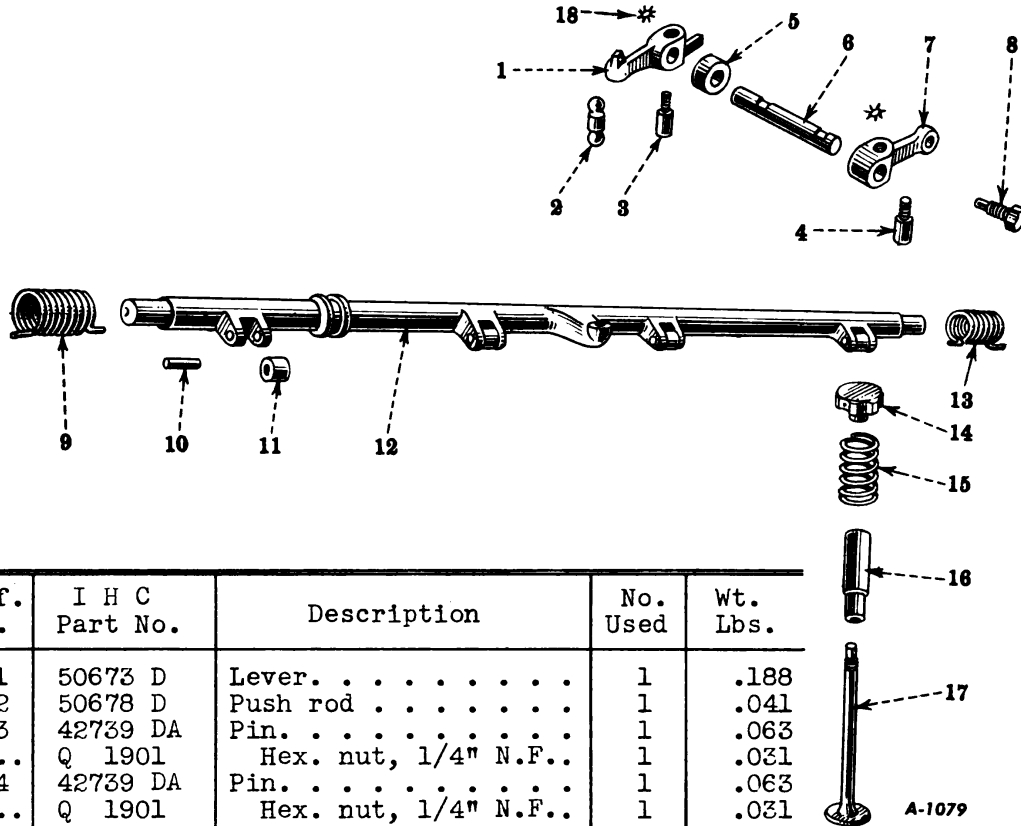


A-1078

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 41597 D        | Compression release lever rubber handle (used on 8427 DX only) . . | 1        |          |
| 2        | 52405 D        | Spring link . . . . .  | 1        |          |
| 3        | 52404 D        | Spring. . . . .  | 1        |          |
| 4        | 52406 D        | Release rod . . . . .  | 1        |          |
| ...      | Q 1905         | Hex. nut, 3/8" N.F. . . . .  | 2        |          |
| ...      | .....          | Cotter, 1/8 x 3/4". . . . .  | 1        |          |
| 5        | 48906 D        | Adjusting block . . . . .  | 1        |          |
| ...      | .....          | Cotter, 3/32 x 3/4". . . . .                                       | 1        |          |
| 6        | 41597 D        | Governor control lever rubber handle (used on 8426 DAX only) .     | 1        |          |
| 7        | 15033 H        | Adjusting yoke. . . . .  | 1        |          |
| 8        | 15041 H        | Pin . . . . .  | 1        |          |
| ...      | .....          | Cotter, 1/8 x 3/4". . . . .  | 1        |          |
| 9        | 55748 D        | Stop screw. . . . .  | 1        |          |
| ...      | Q 1906         | Hex. nut, 3/8" N.C. . . . .  | 1        |          |
| 10       | { 8427 DX      | Compression release lever, with rubber handle (optional) . . . .   | 1        |          |
|          | { 9634 D       | Compression release lever, with steel handle (optional). . . . .   |          |          |
| 11       | H 4213         | Pivot pin . . . . .  | 1        |          |
| ...      | .....          | Cotter, 1/8 x 1". . . . .  | 1        |          |
| 12       | 52403 D        | Lever shaft . . . . .  | 1        |          |
| 13       | { 8426 DAX     | Governor control lever, with rubber handle (optional) . . . .      | 1        |          |
|          | { 9646 D       | Governor control lever, with steel handle (optional). . . . .      |          |          |
| 14       | 52407 D        | Control rod . . . . .  | 1        |          |
| ...      | Q 1909         | Hex. nut, 1/2" N.F. . . . .  | 1        |          |
| ...      | .....          | Cotter, 1/8 x 3/4". . . . .  | 1        |          |
| 16       | 55750 D        | Primer control. . . . .  | 1        |          |
| ...      | .....          | Cotter, 1/16 x 3/8". . . . .                                       | 1        |          |
| ...      | Q 5015         | Governor control lever lubricator (Lincoln No. 5030) . . . . .     | 1        |          |

**SPARE PARTS CATALOG**

**STARTING VALVES AND SHAFT**



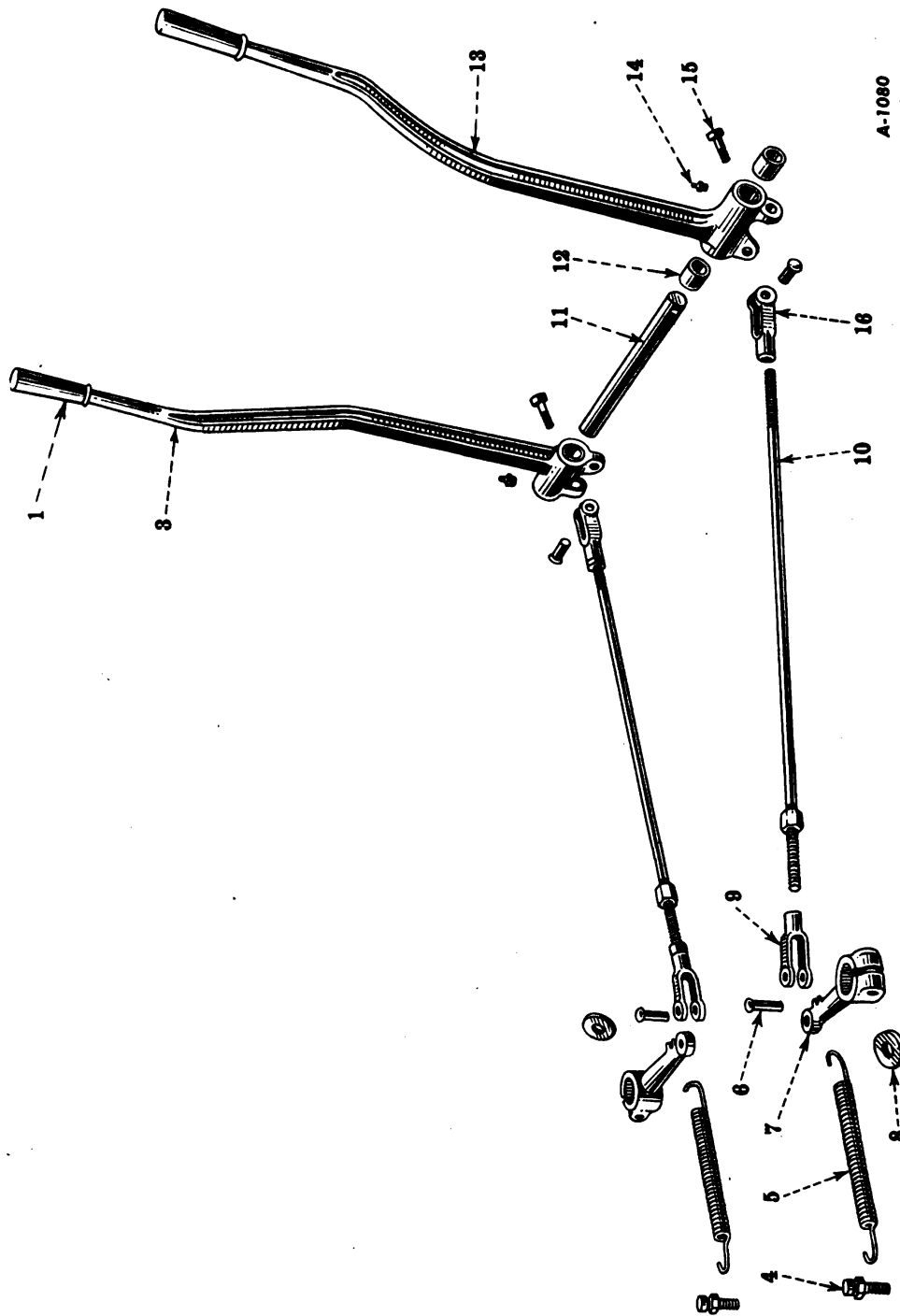
| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 50673 D        | Lever . . . . .  | 1        | .188     |
| 2        | 50678 D        | Push rod . . . . .   | 1        | .041     |
| 3        | 42739 DA       | Pin . . . . .  | 1        | .063     |
| ...      | Q 1901         | Hex. nut, 1/4" N.F..   | 1        | .031     |
| 4        | 42739 DA       | Pin . . . . .  | 1        | .063     |
| ...      | Q 1901         | Hex. nut, 1/4" N.F..   | 1        | .031     |
| 5        | 42746 D        | Oil seal . . . . .   | 1        | .063     |
| 6        | 50672 D        | Operating shaft. . . . .   | 1        | .188     |
| 7        | 53413 D        | Lever, outer . . . . .   | 1        | .250     |
| 8        | 50674 D        | Lever stop . . . . .   | 1        | .063     |
| ...      | Q 1920         | Lock washer, 3/8". . . . .   | 1        | .007     |
| 9        | 46212 D        | Shaft spring, rear . . . . .   | 1        | .063     |
| 10       | 24917 D        | Roller pin . . . . .   | 4        | .012     |
| 11       | 24916 D        | Cam roller . . . . .   | 4        | .025     |
| 12       | 50670 DX       | Starting valve shaft, with roller and pin . . . . .                            | 1        | 4.000    |
| 13       | 46213 D        | Shaft spring, front. . . . .   | 1        |          |
| 14       | 42750 D        | Retainer . . . . .   | 4        | .250     |
| ...      | .....          | Cotter, 3/32 x 1-1/2". . . . .   | 4        | .003     |
| 15       | 32479 D        | Valve spring . . . . .   | 4        | .063     |
| 16       | 5024 DAR       | Valve guide. . . . .   | 4        | .209     |
| 17       | 42749 D        | Valve. . . . .   | 4        | .250     |
| 18       | 2853 Y         | Starting valve operating shaft pin lock washer (Shakeproof No. 1114) . . . . . | 1        |          |

*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*

SPARE PARTS CATALOG

STEERING CLUTCH OPERATING LEVERS



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.



**SPARE PARTS CATALOG**

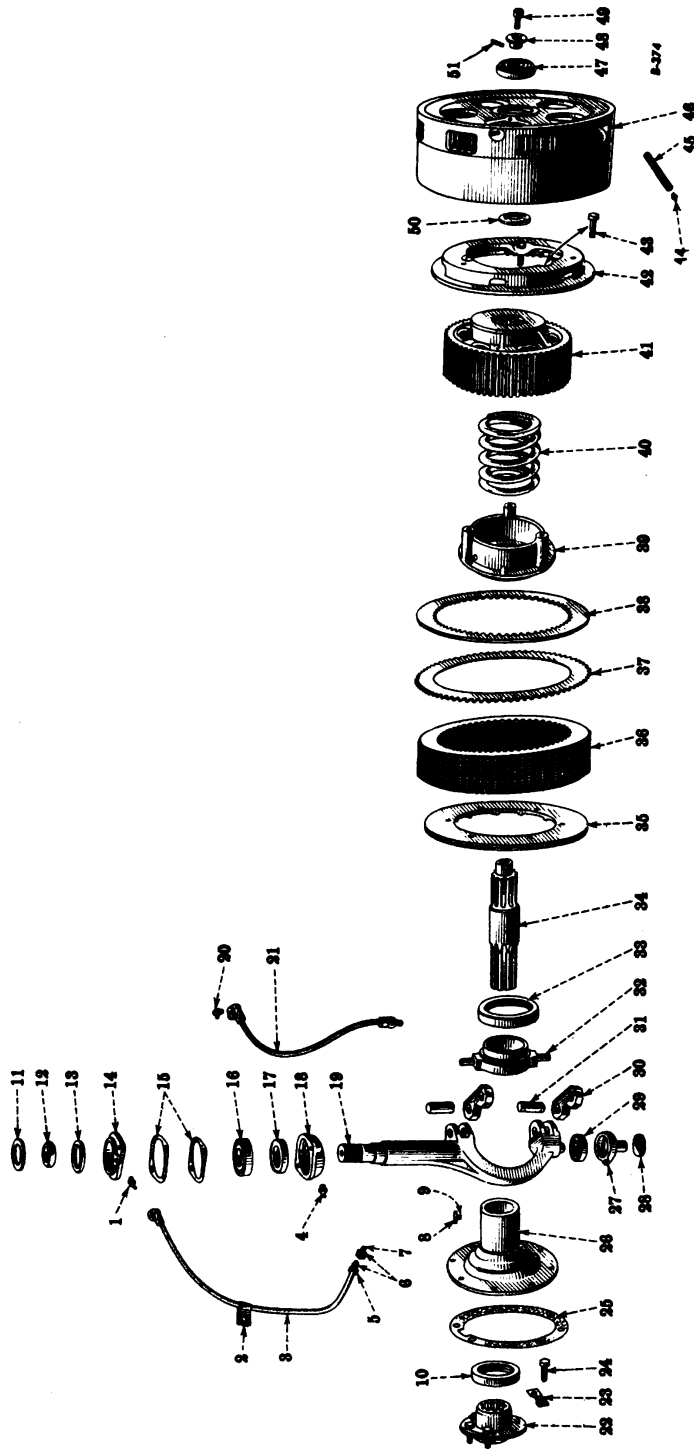
**STEERING CLUTCH OPERATING LEVERS - Continued**

| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description  | No. Used  | Wt. Lbs. |
|----------|----------------|---|----------|----------|----------|----------------|--|---|----------|
| 1        | 41597 D        | Clutch lever rubber handle (used on 8683 DX and 8684 DX only)               | 2        | .156     | ...      | .....          | Hex. nut, 1/2" N.C. (right hand thread)                                      | 2   | .041     |
| 3        | 8683 DX        | Steering clutch lever, left hand, with bushing and rubber handle (optional) | 1        | 5.625    | 11       | 56012 D        | Hex. nut, 1/2" N.C. (left hand thread)                                       | 2   | .041     |
|          |                | Steering clutch lever, left hand, with bushing and steel handle (optional)  | 1        | 5.625    | ...      | Q 1784         | Shaft  | 1   | 2.500    |
| 4        | 41768 D        | Spring anchor   | 1        | 5.625    | ...      | Q 1919         | Cap screw, 5/16 x 2" N.C.  | 1   | .047     |
| 5        | 57288 D        | Lock washer, 1/2"   | 2        | .145     | 12       | 42175 D        | Lock washer, 5/16"   | 1   | .004     |
| 6        | 15041 H        | Pin   | 2        | 6.500    | 13       | 8684 DX        | Steering clutch lever, right hand, with bushing and rubber handle (optional) | 4   | .063     |
| 7        | 8679 DA        | Release lever   | 4        | .002     |          |                | 9642 DX  | Steering clutch lever, right hand, with bushing and steel handle (optional) | 1        |
| 8        | 45794 D        | Retaining washer  | 2        | 1.438    | 14       | 14186 DA       | Lubricator (Lincoln No. 5000)  | 2   | .016     |
| 9        | 63228 D        | Yoke (left hand thread)   | 2        | .500     |          |                | 14186 DA   | Lubricator (Alemite No. 1610)   | 2        |
| 10       | 63230 DX       | Steering clutch operating rod   | 2        | 1.468    | 15       | 46368 D        | Adjusting screw  | 2   | .188     |
|          |                |   | 2        | .550     | ...      | .....          | Hex. jam nut, 1/2" N.F.  | 2   | .063     |
|          |                |   | 2        | .013     | 16       | 63229 D        | Yoke (right hand thread)   | 2   | .250     |

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

STEERING CLUTCH AND RELEASE MECHANISM



| Ref. No. | I H C Part No. | Description                               | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                      | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|----------|----------------|----------------------------------|----------|----------|
| 1        | 52343 DR       | Steering clutch.                          | 2        | 140.000  | 22       | 52345 D        | Coupling (12 teeth)              | 2        | 5.250    |
|          | Q 3617         | Lubricator (Lincoln No. 5003) (optional). | 2        | .031     | 23       | 50103 DA       | Lock                             | 6        | .031     |
|          | 13056 DA       | Lubricator (Alomite No. 1607) (optional). | 2        | .031     | 24       | 50822 D        | Bolt                             | 12       | .104     |
| 2        | 30665 D        | Clamp.                                    | 2        | .036     | 25       | 49848 D        | Gasket                           | 2        | .066     |
| 3        | 56019 DX       | Grease tube.                              | 2        | .281     | 26       | 8685 DX        | Bearing cage cap, with oil seal. | 2        | 14.000   |
| ...      | ...            | Square head machine bolt, 1/4 x 3/4" N.C. | 4        | .010     | ...      | ...            | Cap screw, 9/16 x 1-5/8" N.C.    | 12       | .156     |
| ...      | ...            | Hex. nut, 1/4" N.C.                       | 4        | .006     | ...      | ...            | Hex. nut, 9/16" N.F.             | 4        | .031     |
| ...      | ...            | Lock washer, 1/4" . . .                   | 4        | .001     | 27       | 56016 D        | Lock washer, 9/16" . . .         | 16       | .015     |
| ...      | ...            | Lock washer, 1/4" . . .                   | 4        | .001     | ...      | ...            | Bearing pivot. . . . .           | 2        | .047     |

SPARE PARTS CATALOG

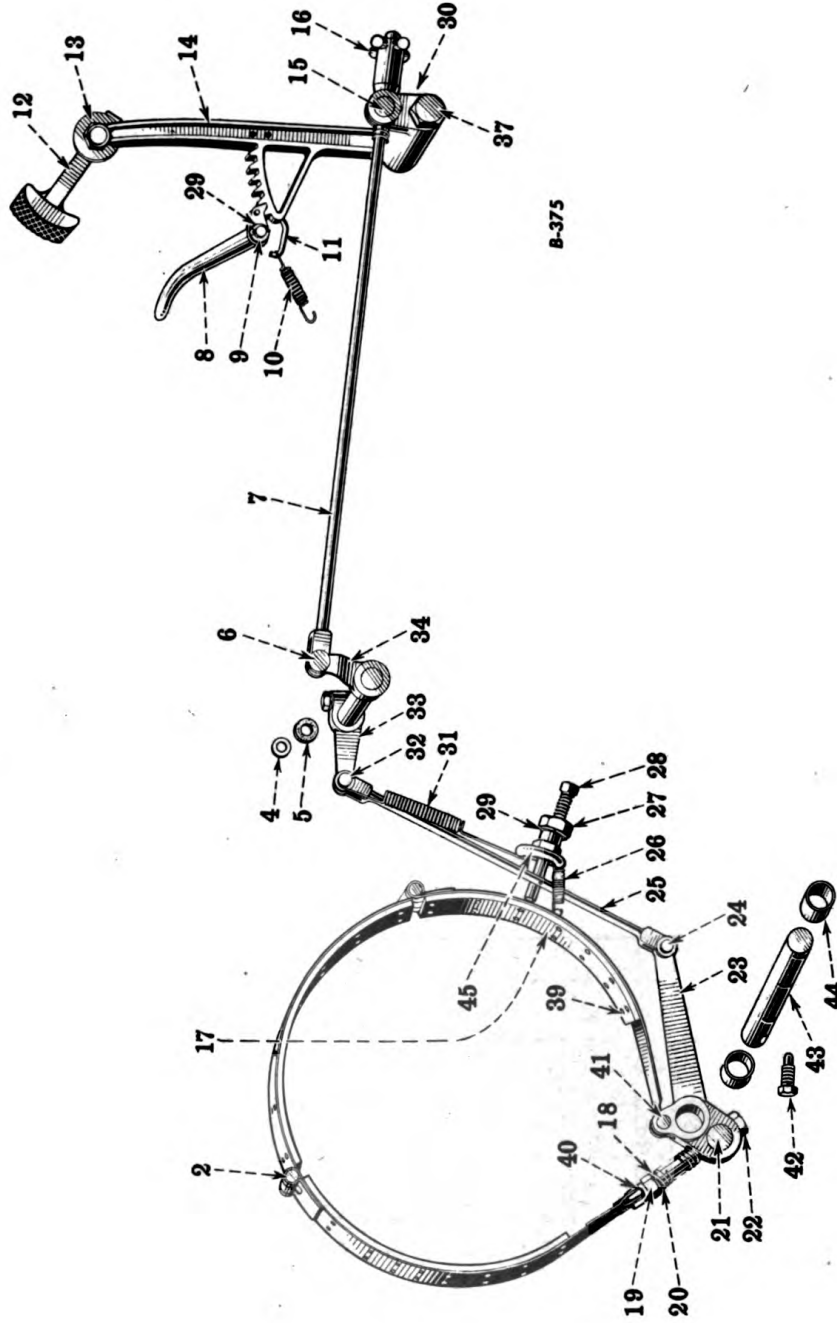
STEERING CLUTCH AND RELEASE MECHANISM - Continued

|     |           |   |   |        |            |  |    |        |
|-----|-----------|---|---|--------|------------|--|----|--------|
| 4   | 14186 DA  | (Lincoln No. 5000)<br>Lubricator (L.H.)     | 1 | .016   | Q 1849     | Cap screw, 1/2 x 1-1/4" N.F.               | 2  | .550   |
|     | Q 3621    | (Alemite No. 1610)<br>Lubricator (R.H.)     | 1 | .015   | Q 1922     | Lock washer, 1/2"                          | 2  | .013   |
|     | 13129 DA  | (Lincoln No. 5300)<br>Lubricator (R.H.)     | 1 | .031   | 56101 D    | Bearing (New Departure No. 8504)           | 2  | .250   |
| 5   | 29899 D   | (Alemite No. 1612)<br>Lubricator (R.H.)     | 1 | .031   | 56005 D    | Shifter link                               | 4  | .813   |
| 6   | 35252 DX  | Connector nut                               | 2 | .025   | 56007 D    | Link pin                                   | 4  | .250   |
| 7   | 35252 D   | Connector with nut                          | 2 | .063   | .....      | Cotter, 1/8 x 1-1/4"                       | 8  | .004   |
| 8   | 56013 DX  | Key, with pin                               | 2 | .031   | 56018 D    | Release collar                             | 2  | 4.500  |
| 9   | 56006 D   | Pin   | 2 | .006   | { 40881 DA | Thrust bearing (optional)                  | 2  | 2.750  |
| 10  | 50104 D   | Oil seal                                    | 2 | .781   | { 53233 D  | Thrust bearing (optional)                  | 2  | 3.750  |
| 11  | 56017 D   | Felt retainer                               | 2 | .083   | 52344 DA   | Shaft                                      | 2  | 16.500 |
| 12  | 56010 D   | Spacer                                      | 2 | .125   | 5715 D     | Plate                                      | 2  | 16.500 |
| 13  | 56008 D   | Felt  | 2 | .008   | Q 1850     | Cap screw, 1/2 x 1-1/4" N.C.               | 2  | .525   |
| 14  | 8680 D    | Retainer                                    | 2 | .625   | Q 1922     | Lock washer, 1/2"                          | 12 | .013   |
| ... | Q 1834    | Cap screw, 7/16 x 1-1/2" N.C.               | 4 | .085   | .....      | (See Note *)                               | 12 | .001   |
| ... | Q 1921    | Lock washer, 7/16"                          | 4 | .010   | 40882 D    | Driving disc                               | 1  | 1.875  |
| 15  | 56009 D   | Gasket                                      | 4 | .005   | 40883 DB   | Friction disc                              | 24 | 1.125  |
| 16  | { 20308 D | Bearing (New Departure No. 3207) (optional) | 2 | .688   | 6973 D     | Spring retainer                            | 26 | 1.125  |
| 17  | { SF 205  | Bearing (IHC) (optional)                    | 2 | .156   | 54491 DB   | Spring                                     | 2  | 9.671  |
| 18  | 21969 D   | Oil seal                                    | 2 | 1.375  | 8352 DB    | Hub  | 2  | 38.000 |
| 19  | 8682 DX   | Bearing cage, with oil seal                 | 2 | 13.625 | 6974 DA    | Pressure plate                             | 2  | 21.000 |
| 19  | 56020 D   | Release fork                                | 2 | .031   | 54968 D    | Dowel                                      | 6  | .125   |
| 20  | Q 3617    | Lubricator (Lincoln No. 5003) (optional)    | 2 | .031   | Q 1922     | Lock washer, 1/2"                          | 6  | .013   |
| 20  | 13056 DA  | Lubricator (Alemite No. 1607) (optional)    | 2 | .688   | { Q 3618   | Lubricator (Lincoln No. 5060) (optional)   | 2  | .010   |
| 21  | 51431 DX  | Grease tube                                 | 2 | .031   | 18220 DA   | Lubricator (Alemite No. 1631) (optional)   | 2  | .016   |
| ... | .....     | Standard iron pipe close nipple, 1/8"       | 2 | .343   | 54652 D    | Lubricator pipe                            | 2  | .156   |
| ... | .....     | Square head machine bolt, 1/4 x 3/4" N.C.   | 2 | .015   | 8519 D     | Drum                                       | 2  | 75.000 |
| ... | .....     | Hex. nut, 1/4" N.C.                         | 4 | .010   | .....      | Cap screw, 1/2" N.F. x 1-1/8"              | 16 | .114   |
| ... | Q 1902    | Lock washer, 1/4"                           | 4 | .006   | Q 1922     | Lock washer, 1/2"                          | 16 | .013   |
| ... | Q 1918    | Lock washer, 1/4"                           | 4 | .002   | 53389 D    | Pilot bearing (New Departure No. 48508)    | 2  | 1.093  |
|     |           |   |   |        | { 50098 DA | Retainer                                   | 2  | .188   |
|     |           |   |   |        | 50098 DAX  | Retainer with pin                          | 2  | .219   |
|     |           |   |   |        | 50099 D    | Retainer bolt                              | 2  | .125   |
|     |           |   |   |        | Q 1922     | Lock washer, 1/2"                          | 2  | .013   |
|     |           |   |   |        | 50096 DA   | Spacer                                     | 2  | .500   |
|     |           |   |   |        | 57750 D    | Steering clutch pilot bearing retainer pin | 2  | .003   |

\* This assembly is made up of a group of driving discs (Ref. No. 37) and a group of friction discs (Ref. No. 38)

# SPARE PARTS CATALOG

## STEERING BRAKES AND CONTROLS



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

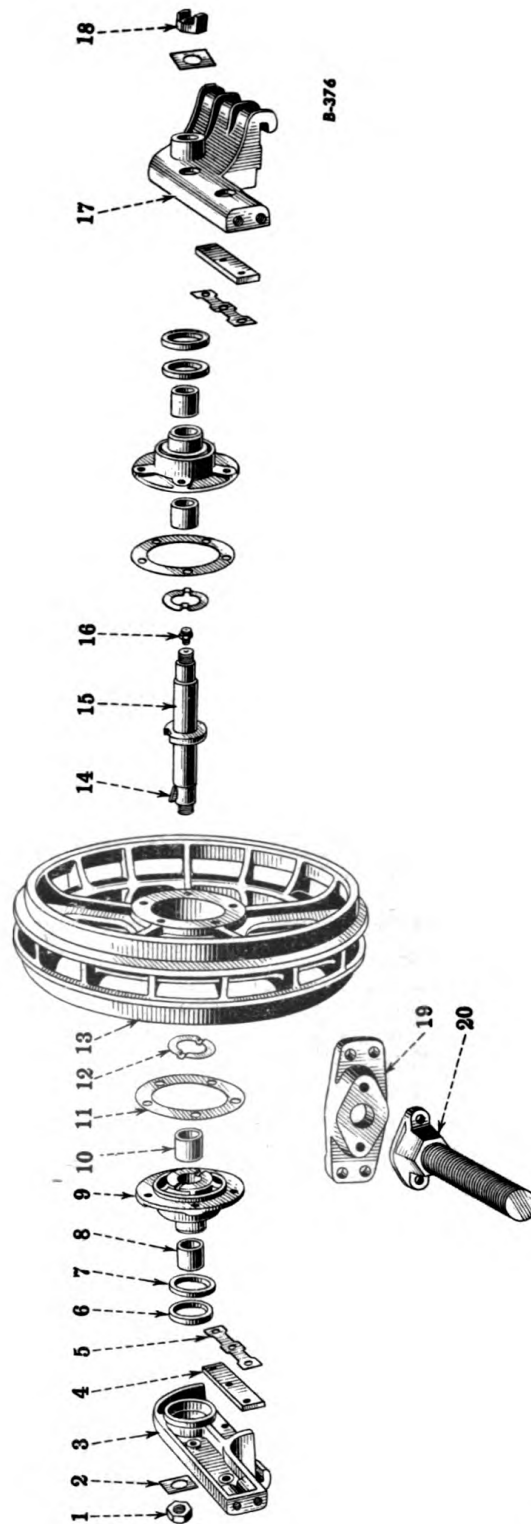
STEERING BRAKES AND CONTROLS - Continued

| Ref. No. | I H C Part No. | Description                 | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|-----------------------------|----------|----------|----------|----------------|---|----------|----------|
| 2        | 60267 DA       | Brake band assembly.        | 2        | 12.25    | 26       | 56478 D        | Anchor spring with hook.                              | 2        | .031     |
| 3        | 60266 D        | Pin.                        | 4        | .218     | 27       | 56476 D        | Spring hook.  | 4        | .012     |
| 4        | 20841 D        | Cotter, 1/8x1-1/4"          | 4        | .004     | 28       | 56475 D        | Anchor spring.  | 2        | .025     |
| 5        | 41519 D        | Key for lever, inner        | 2        | .031     | 29       | Q 1912         | Nut (5/8" N.C.).                                      | 2        | .085     |
| 6        | 15041 H        | Seal                        | 2        | .005     | 30       | 41495 D        | Set screw.  | 2        | .406     |
| 7        | .....          | Rod pin.                    | 2        | .125     | 31       | 41509 D        | Stud washer.  | 2        | .005     |
| 8        | 41512 DA       | Cotter, 1/8 x 3/4"          | 2        | .004     | 32       | Q 3621         | Pedal shaft lubricator (Lincoln No. 5300) (optional). | 2        | .031     |
| 9        | 5818 D         | Rod, outer                  | 2        | 1.75     | 33       | 13129 DA       | Pedal shaft lubricator (Alemite No. 1612) (optional). | 2        | .031     |
| 10       | 5818 D         | Pawl                        | 2        | .50      | 34       | 49970 D        | Release spring.                                       | 2        | .187     |
| 11       | 41523 D        | Pawl stud.                  | 2        | .125     | 35       | 41999 D        | Pin, upper.   | 2        | .093     |
| 12       | Q 1922         | Lock washer, 1/2"           | 2        | .013     | 36       | 5813 D         | Cotter, 1/8 x 3/4"                                    | 2        | .004     |
| 13       | 41935 D        | Cotter, 1/8 x 7/8"          | 2        | .006     | 37       | .....          | Cap screw, 1/2 x 1-5/8" N.C.                          | 2        | .75      |
| 14       | Q 1774         | Pawl spring.                | 2        | .031     | 38       | Q 1922         | Lock washer, 1/2"                                     | 2        | .125     |
| 15       | .....          | Cap screw, 5/16 x 3/4" N.C. | 2        | .02      | 39       | 49964 D        | Lever, outer, left hand.                              | 1        | 2.00     |
| 16       | 41521 D        | Hex. jam nut, 5/16" N.C.    | 2        | .578     | 40       | 49965 D        | Lever, outer, right hand.                             | 1        | 1.875    |
| 17       | 41522 D        | Pawl link, left hand.       | 1        | .12      | 41       | 49978 D        | Pedal shaft.  | 2        | 2.00     |
| 18       | .....          | Pawl link, right hand       | 1        | .046     | 42       | 21407 H        | Lining rivet (.186 x 7/16").                          | 80       | .004     |
| 19       | 5815 D         | Cotter, 1/16x1/2"           | 4        | .001     | 43       | 61175 V        | Lining rivet, (.186 x 5/8")                           | 16       | .004     |
| 20       | 41524 D        | Pedal pad.                  | 2        | 2.25     | 44       | 41498 D        | Adjusting bolt spacer                                 | 2        | .041     |
| 21       | Q 1913         | Swivel                      | 2        | .12      | 45       | 49963 D        | Pin.  | 2        | .375     |
| 22       | Q 1927         | Hex. nut, 3/4" N.F.         | 2        | .046     | 46       | .....          | Cotter, 3/16x1-1/2"                                   | 2        | .012     |
| 23       | 6915 DA        | Lock washer, 3/4"           | 2        | 6.562    | 47       | 41491 D        | Shaft stud.   | 2        | .125     |
| 24       | 6916 DA        | Pedal, left hand.           | 1        | 6.562    | 48       | Q 1922         | Lock washer, 1/2"                                     | 2        | .013     |
| 25       | 41508 D        | Pedal, right hand.          | 2        | .437     | 49       | 49962 D        | Pivot shaft.  | 2        | 1.906    |
| 26       | 5812 D         | Pivot pin.                  | 2        | 1.00     | 50       | 41493 D        | Bushing.  | 4        | .062     |
| 27       | 68631 D        | Adjusting knob.             | 2        | .75      | 51       | 43664 DA       | Anchor.   | 2        | .312     |
| 28       | 41496 D        | Brake band lining.          | 6        | .012     | 52       | .....          | Hex. jam nut, 1" N.C.                                 | 2        | .156     |
| 29       | Q 1911         | Washer                      | 2        | .085     | 53       | .....          | Lock washer, 1"                                       | 2        | .087     |
| 30       | 41497 D        | Nut (5/8" N.F.)             | 2        | .086     | 54       | .....          |   |          |          |
| 31       | 41501 D        | Spring                      | 2        | .937     | 55       | .....          |   |          |          |
| 32       | 41499 D        | Pin.                        | 2        | .562     | 56       | .....          |   |          |          |
| 33       | 6912 DX        | Bolt                        | 2        | 4.00     | 57       | .....          |   |          |          |
| 34       | 15041 H        | Lever, with bushing.        | 2        | .125     | 58       | .....          |   |          |          |
| 35       | .....          | Pin.                        | 2        | .004     | 59       | .....          |   |          |          |
| 36       | 49966 D        | Cotter, 1/8 x 3/4"          | 2        | 1.062    | 60       | .....          |   |          |          |
| 37       | .....          | Rod, inner                  | 2        |          | 61       | .....          |   |          |          |

When ordering, always use I H C Part Nos.

# SPARE PARTS CATALOG

## FRONT IDLER ASSEMBLY



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

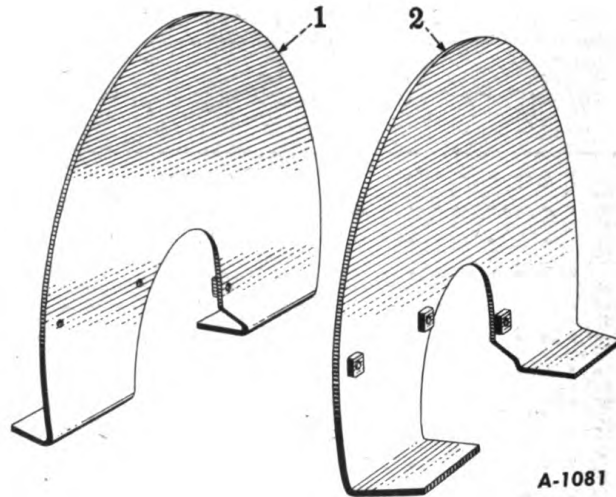
SPARE PARTS CATALOG

FRONT IDLER ASSEMBLY

| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 1        | 15644 D        | Nut, inner.   | 2        | .563     |
| 2        | 45797 D        | Nut lock.   | 4        | .080     |
| 3        | 6874 DAX       | Guide (inner, right hand - outer, left hand) with oil seal. | 1        | 29.000   |
| 4        | 49735 D        | Guide retainer.   | 4        | 2.500    |
| ...      | Q 1872         | Cap screw, 5/8 x 1-3/4" N.C.                                | 12       | .200     |
| 5        | 49736 D        | Retainer bolt lock.   | 4        | .219     |
| 6        | 31119 D        | Oil seal.   | 4        | .281     |
| 7        | 47576 D        | Felt washer   | 4        | .036     |
| 8        | 49738 DX       | Bushing set   | 1        | .312     |
| 9        | 6880 DAX       | Carrier, with bushing                                       | 4        | 12.750   |
| 10       | 49738 DX       | Bushing set   | 1        | .029     |
| 11       | 49739 D        | Gasket.   | 4        | .375     |
| 12       | 49741 DAX      | Thrust washer set   | 2        | 155.000  |
| 13       | 6879 D         | Front idler   | 2        | .062     |
| 14       | SA 3215        | Key (Woodruff No. G).                                       | 2        | 11.812   |
| 15       | 49740 D        | Shaft   | 2        | .125     |
| 16       | { 17829 D      | Lubricator (Alemite No. 1511) (optional)                    | 2        |          |
|          | { 37290 D      | Lubricator (Lincoln No. 5750) (optional)                    | 2        |          |
| 17       | 6875 DAX       | Guide (inner, left hand - outer, right hand) with oil seal. | 1        | 29.000   |
| 18       | 18573 DA       | Nut, outer.   | 2        | .687     |
| 19       | 6878 D         | Guide cross plate   | 2        | .625     |
| ...      | Q 1894         | Cap screw, 3/4 x 2-1/2" N.C.                                | 8        | .437     |
| ...      | Q 1927         | Lock washer, 3/4"   | 8        | .045     |
| 20       | 41853 DB       | Adjuster.   | 2        | 14.000   |
| ...      | .....          | Cadmium plated cap screw, 5/8 x 1-1/2" N.F.                 | 4        | .250     |
| ...      | .....          | Cadmium plated lock washer, 5/8"                            | 4        | .023     |
| ...      | 15944 D        | Front idler carrier bolt nut.                               | 10       | .125     |
| ...      | 19574 D        | Front idler carrier bolt lock washer.                       | 10       | .005     |
| ...      | 57733 D        | (Shakeproof No. 1228) Front idler carrier bolt.             | 10       | .005     |
| ...      |                | Front idler carrier bolt.                                   | 10       | .437     |

**SPARE PARTS CATALOG**

**FRONT IDLER SHIELD ATTACHMENT (53980 D)**



| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 50841 DX       | Shield, left hand - outer, and right hand - inner. . . . . | 2        | 20.50    |
| ...      | .....          | Cap screw, 1/2" N.F. x 1-7/8". . . . .                     | 6        | .138     |
| ...      | Q 1922         | Lock washer, 1/2". . . . .                                 | 6        | .013     |
| 2        | 50842 DX       | Shield, right hand - outer, and left hand - inner. . . . . | 2        | 20.00    |
| ...      | Q 1853         | Cap screw, 1/2" N.F. x 1-3/4". . . . .                     | 6        | .138     |
| ...      | Q 1922         | Lock washer, 1/2". . . . .                                 | 6        | .013     |

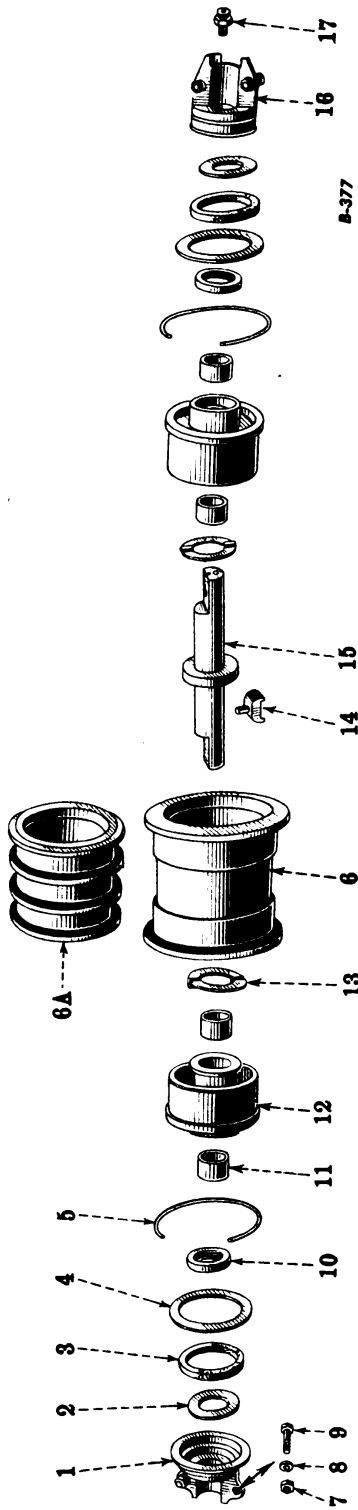
*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*



SPARE PARTS CATALOG

TRACK ROLLER ASSEMBLY



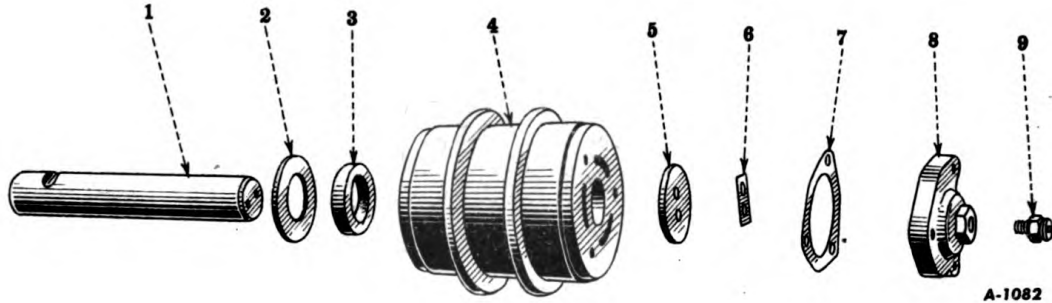
| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                              | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|----------|----------------|--|----------|----------|
| ...      | 52364 D        | Track roller with shaft and carriers (Nos. 1, 3 and 5) | 6        | 109.125  | 9        | Q 4078         | Cap screw, 9/16" x 1-3/4" N.F.           | 20       |          |
| ...      | 52365 D        | Track roller with shaft and carriers (Nos. 2 and 4)    | 4        | 115.125  | 10       | 35149 DA       | Oil seal                                 | 20       |          |
| 1        | 8357 D         | Bracket, inner   | 10       |          | 11       | 49748 DX       | Bushing set                              | 10       |          |
| 2        | 49734 D        | Washer, outer  | 20       |          | 12       | .8356 DY       | Carrier set                              | 10       |          |
| 3        | 35132 D        | Washer, center   | 20       |          | 13       | 49741 DAX      | Thrust washer set                        | 10       |          |
| 4        | 52366 D        | Washer, inner  | 20       |          | 14       | 6485 D         | Oil scupper                              | 10       |          |
| 5        | 49749 D        | Snap ring  | 20       |          | 15       | 52367 D        | Shaft                                    | 10       |          |
| 6A       | 49745 D        | Roller (single flange) (1, 3 and 5)                    | 4        |          | 16       | 8358 D         | Bracket, outer                           | 10       |          |
| 6        | 49746 D        | Roller (double flange) (2 and 4)                       | 4        |          | ...      | Q 4078         | Cap screw, 9/16" N.F. x 1-3/4"           | 20       |          |
| 7        | .....          | Hex. nut, 9/16" N.F.                                   | 20       |          | ...      | .....          | Hex. nut, 9/16" N.F.                     | 20       |          |
| 8        | Q 1924         | Lock washer, 9/16"                                     | 20       |          | ...      | Q 1924         | Lock washer, 9/16"                       | 20       |          |
|          |                |  |          |          | 17       | 37290 D        | Lubricator (Lincoln No. 5750) (optional) | 10       |          |
|          |                |  |          |          |          | 17829 D        | Lubricator (Alemite No. 1511) (optional) | 10       |          |

When ordering, always use I H C Part Nos.

Don't order parts from the illustrations only; refer to the list also.

## SPARE PARTS CATALOG

### TRACK IDLER



A-1082

*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

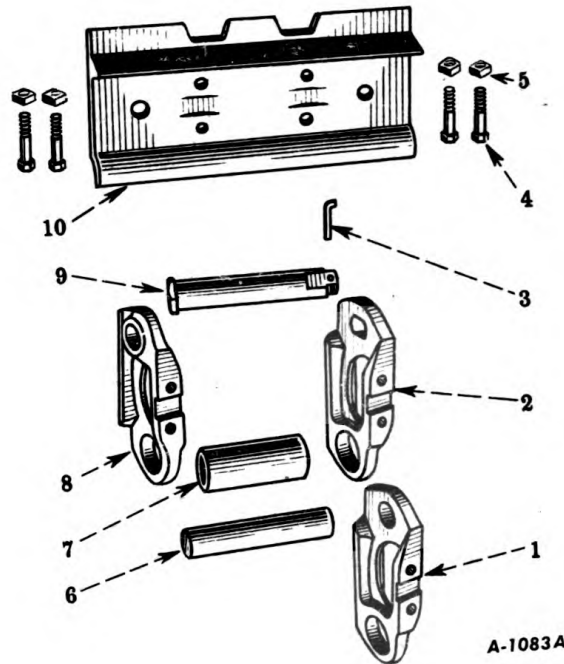
| Ref. No. | I H C Part No. | Description                          | No. Used | Wt. Lbs. |
|----------|----------------|--------------------------------------|----------|----------|
| 1        | 49728 D        | Idler shaft. . . . .                 | 4        | 9.75     |
| 2        | 49734 D        | Felt washer. . . . .                 | 4        | .018     |
| 3        | 21795 D        | Oil seal . . . . .                   | 4        | .25      |
| 4        | 6873 DAX       | Idler, with oil seal . . . . .       | 4        | 31.25    |
| 5        | 23260 D        | Thrust washer. . . . .               | 4        | .513     |
| ...      | Q 1849         | Cap screw, 1/2 x 1-1/4" N.F. . . . . | 8        | .110     |
| 6        | 35089 DA       | Bolt lock. . . . .                   | 4        | .025     |
| 7        | 23261 D        | Gasket . . . . .                     | 4        | .005     |
| 8        | 5235 DA        | Idler cap. . . . .                   | 4        | 2.50     |
| ...      | Q 1852         | Cap screw, 1/2 x 1-1/2" N.C. . . . . | 12       | .12      |
| ...      | Q 1922         | Lock washer, 1/2". . . . .           | 12       | .012     |
| 9        | 37290 D        | Lubricator (Lincoln No. 5750)        | 4        | .120     |
|          |                | (optional). . . . .                  |          |          |
| 9        | 17829 D        | Lubricator (Alemite No. 1511)        | 4        |          |
|          |                | (optional). . . . .                  |          |          |

*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

**TRACK LINK PIN AND SHOE ASSEMBLY**



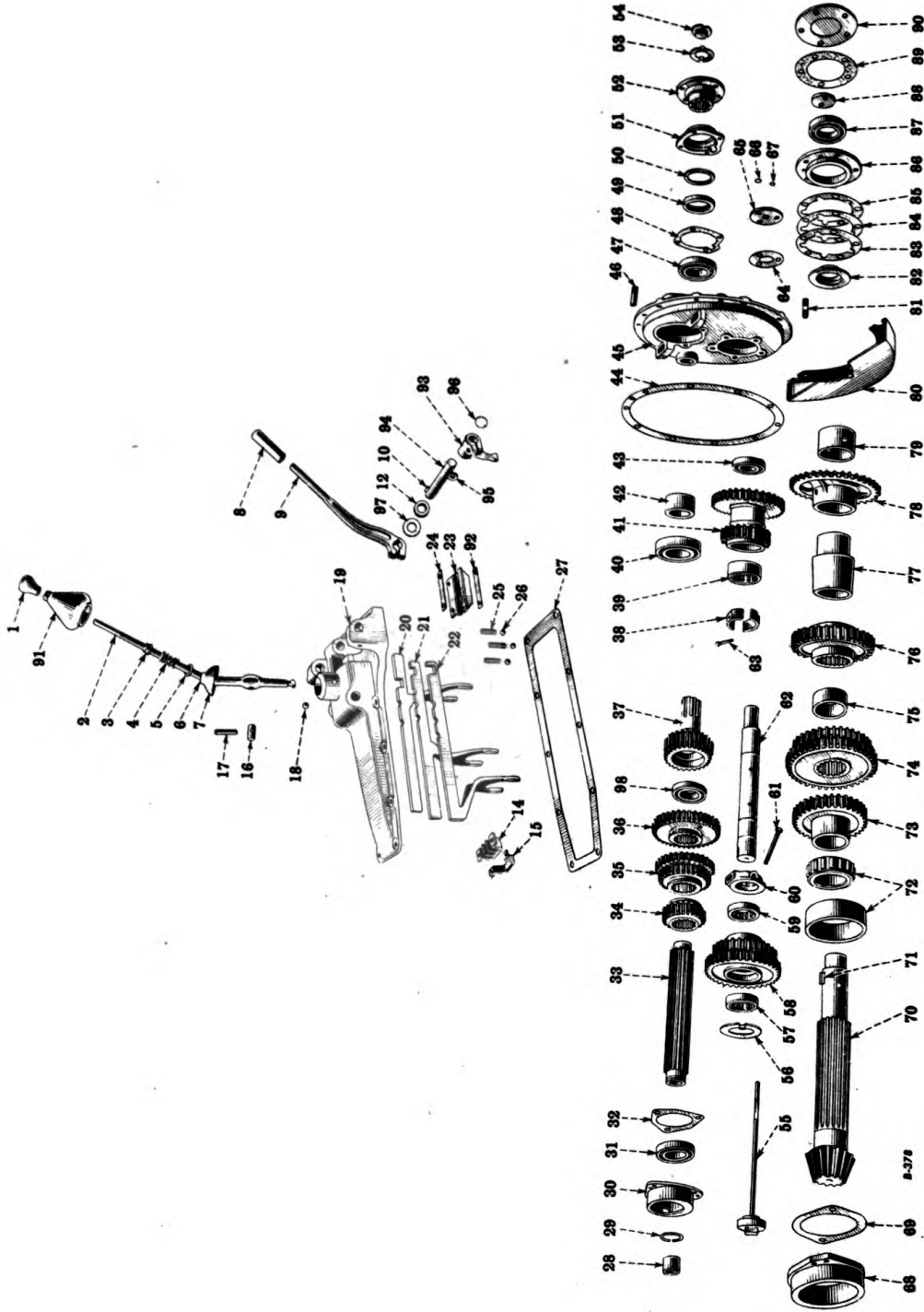
*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

| Ref. No. | I H C Part No. | Description                           | No. Used | Wt. Lbs. |
|----------|----------------|---------------------------------------|----------|----------|
| ...      | 65103 D        | Track (less shoes) . . . . .          | 2        | 675.000  |
| ...      | 65265 D        | Track with 18" track shoes (flat) . . | 2        | 1655.000 |
| 1        | 52351 DA       | Link, right hand. . . . .             | 70       | 6.500    |
| 2        | 52352 DA       | Master link . . . . .                 | 2        | 6.062    |
| 3        | 43712 DB       | Lock wire . . . . .                   | 2        | .029     |
| 4        | 49762 DA       | Cap screw . . . . .                   | 288      | .219     |
| 5        | 60204 DA       | Nut . . . . .                         | 288      | .250     |
| 6        | 49761 DA       | Pin . . . . .                         | 70       | 3.562    |
| 7        | 49759 D        | Bushing . . . . .                     | 72       | 2.875    |
| 8        | 52350 DA       | Link, left hand . . . . .             | 72       | 6.750    |
| 9        | 49760 D        | Master link pin . . . . .             | 2        | 3.750    |
| 10       | 51074 DC       | Shoe (18") (flat) . . . . .           | 72       | 26.000   |

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# SPARE PARTS CATALOG

## TRANSMISSION



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

TRANSMISSION - Continued

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description                                 | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|----------|----------------|---|----------|----------|
| 1        | 53717 DA       | Shifter lever rubber ball used on 42512 DAX  | 1        |          | 20       | 64623 D        | Hi-Lo shifter rail                          | 1        |          |
|          | 9637 D         | Shifter lever cast iron ball on lever 67350 DX (optional)                          | 1        |          | 21       | 64627 D        | Second and third shifter rail               | 1        |          |
|          | 42512 DAX      | Gear shift lever less rubber ball  | 1        |          | 22       | 64625 D        | Low and reverse shifter rail                | 1        |          |
| 2        | 67350 DX       | Gear shift lever with cast iron ball (optional in place of 42512 DAX and 53717 DA) | 1        |          | 23       | 42517 D        | Guide, front                                | 1        |          |
| 3        | 11373 D        | Spring stop, upper   | 1        |          |          |                | Countersunk head steel rivet, No. 9 - 1/2"  | 2        |          |
| 4        | 29547 D        | Spring stop, lower   | 1        |          |          |                | Cap screw, 3/8 x 3/4" N.C.                  | 4        |          |
| 5        | 17700 D        | Bushing  | 1        |          | 24       | 62781 D        | Bolt lock                                   | 4        |          |
| 6        | 20887 D        | Swivel housing shield, with bushing  | 1        |          | 25       | 64163 D        | Poppet spring                               | 3        |          |
| 7        | 42496 DX       | Hi-Lo shifter lever rubber handle used on 5938 DAX                                 | 1        |          | 26       | 4596 D         | Poppet ball (optional)                      | 3        |          |
| 8        | 41597 D        | Hi-Lo shifter lever rubber handle (41597 D) (optional)                             | 1        |          | 27       | 13752 D        | Poppet ball (optional)                      | 3        |          |
| 9        | 5938 DAX       | Hi-Lo shifter lever (steel) (optional)   | 1        |          | 28       | 42511 D        | Gasket                                      | 1        |          |
|          | 9638 DX        | Cap screw, 1/2" x 1-5/8" N.C.  | 1        |          | 29       | 50025 D        | Bushing                                     | 1        |          |
|          |                | Lock washer, 1/2"  | 1        |          | 30       | 50027 D        | Snap ring                                   | 1        |          |
| 10       | 1922           | Key (Woodruff No. 9)   | 1        |          | 31       | 8362 DA        | Bearing cage, rear                          | 1        |          |
| 11       | 7220 T         | Oil seal felt  | 1        |          | 32       | 64630 D        | Bearing (New Departure No. 77511)           | 2        |          |
| 12       | 17053 D        | Guide, rear  | 1        |          |          |                | Retainer                                    | 1        |          |
| 13       | 42518 D        | Countersunk head steel rivet, No. 9 - 1/2"   | 1        |          |          |                | Cap screw, 3/8x1-1/8" N.C.                  | 3        |          |
| 14       |                | Cap screw, 3/8 x 3/4" N.C.   | 1        |          |          |                | Lock washer, 3/8"                           | 3        |          |
| 15       | 1800           | Bolt lock  | 1        |          | 33       | 52376 DX       | Spline shaft, with bushing                  | 1        |          |
| 16       | 40465 DX       | Shaft, large, with plug  | 1        |          | 34       | 52375 D        | Gear (23 teeth)                             | 1        |          |
| 17       | 40466 DX       | Shaft, small, with plug  | 1        |          | 35       | 52361 D        | Gear  | 1        |          |
| 18       | 13115 D        | Plug   | 1        |          | 36       | 52379 D        | Hi-Lo sliding gear (26 and 38 teeth)        | 1        |          |
| 19       | 9456 DX        | Housing, with plug   | 1        |          | 37       | 52380 D        | Driving shaft gear (26 teeth)               | 1        |          |
|          | 4017           | Cap screw, 3/8 x 7/8" N.C.   | 4        |          | 38       | 56470 D        | Bearing retainer, rear                      | 1        |          |
|          | 1852           | Cap screw, 1/2x1-1/2" N.C.   | 4        |          | 39       | 75238 H        | Bearing, rear (New Departure No. 3210)      | 2        |          |
|          |                | Cap screw, 3/8x1-1/8" N.C.   | 2        |          |          |                | Bearing (optional) (New Departure No. 3213) | 1        |          |
|          | 1920           | Lock washer, 3/8"  | 6        |          | 40       | 18510 D        | Bearing (IHC) (optional)                    | 1        |          |
|          |                | Lock washer, 3/8"  | 6        |          | 41       | ST 219         | Hi-Lo gear (21 and 33 teeth)                | 1        |          |
|          | 1922           | Lock washer, 1/2"  | 4        |          | 42       | 56472 D        | Spacer                                      | 1        |          |
|          |                | Lock washer, 1/2"  | 4        |          | 43       | 50062 D        | Bearing (optional) (New Departure No. 1208) | 1        |          |
|          |                | Lock washer, 1/2"  | 6        |          |          |                | Bearing (IHC) (optional)                    | 1        |          |
|          |                | Lock washer, 1/2"  | 4        |          | 44       | ST 214         | Gasket                                      | 1        |          |
|          |                | Lock washer, 1/2"  | 4        |          | 45       | 50085 D        | End cover, with studs                       | 1        |          |
|          |                | Lock washer, 1/2"  | 6        |          |          |                | Cap screw, 1/2" N.C. x 1-1/2"               | 6        |          |
|          |                | Lock washer, 1/2"  | 6        |          |          |                | Hex. nut, 1/2" N.F.                         | 4        |          |
|          |                | Lock washer, 1/2"  | 4        |          |          |                | Lock washer, 1/2"                           | 10       |          |
|          |                | Lock washer, 1/2"  | 4        |          | 46       | 18595 DA       | Dowel                                       | 1        |          |

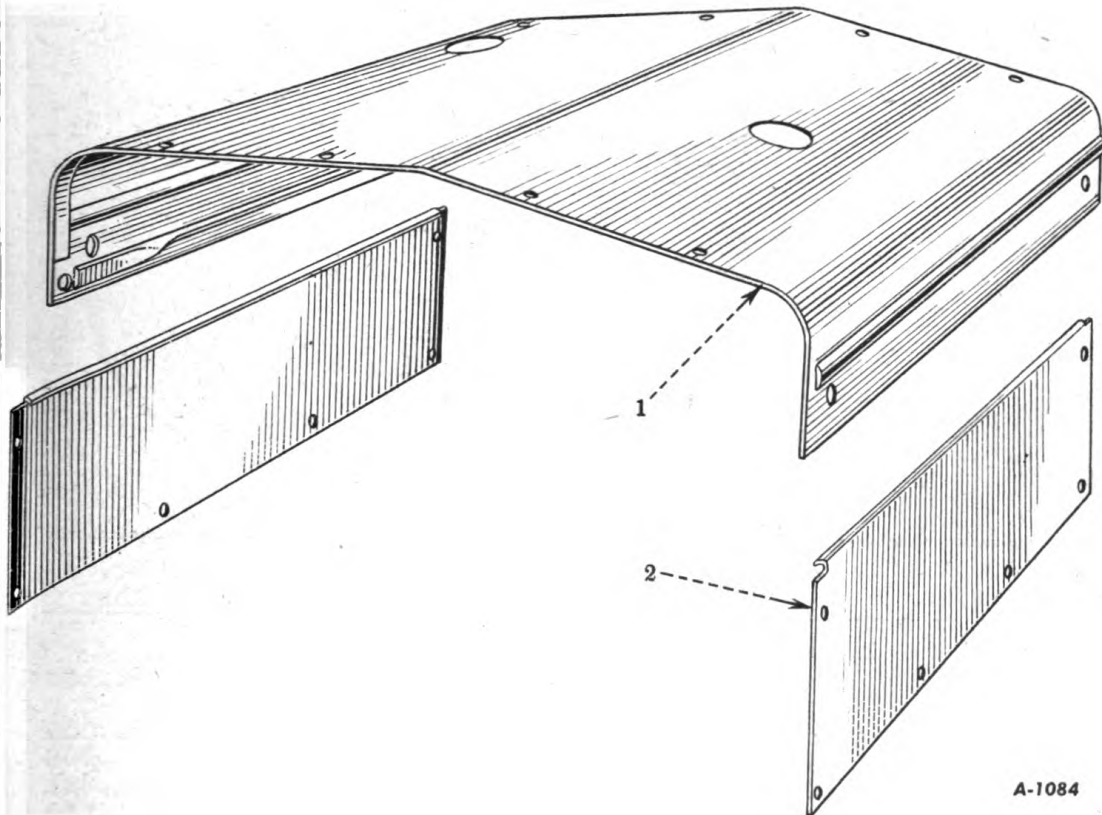
SPARE PARTS CATALOG

TRANSMISSION - Continued

| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. | Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|----------|----------------|--|----------|----------|
| 47       | 18511 D        | Bearing, front (New Departure No. 3212).             | 1        |          | 75       | 50004 D        | Spacer   | 1        | .937     |
| 48       | 50083 D        | Gasket   | 1        |          | 76       | 52374 D        | Gear (32 teeth)  | 1        | 9.000    |
| 49       | 52384 D        | Oil seal   | 1        |          | 77       | 6922 D         | Oilier gear sleeve                                       | 1        | 4.125    |
| 50       | 53709 D        | Felt washer  | 1        | .312     | 78       | 6923 DB        | Oilier gear (37 teeth)                                   | 1        | 5.000    |
| 51       | 53710 D        | Retainer   | 1        | .010     | 80       | 50006 DA       | Bushing  | 1        | .500     |
| ...      | Q 1802         | Cap screw, 3/8 x 1" N.C.                             | 1        | 2.250    | ...      | 52372 DA       | Reservoir  | 1        | 1.750    |
| ...      | Q 1920         | Lock washer, 3/8"                                    | 4        | .045     | ...      | Q 1910         | Hex. nut, 1/2" N.C.                                      | 4        | .045     |
| 52       | 52377 D        | Driving flange                                       | 4        | .005     | ...      | Q 1922         | Lock washer, 1/2"  | 4        | .035     |
| 53       | 50087 D        | Nut  | 1        | 4.500    | 81       | 64632 D        | Hex. nut, 1/2" N.F.                                      | 1        | .045     |
| 54       | 50088 D        | Oil level rod  | 1        | .062     | ...      | Q 1909         | Lock washer, 1/2"  | 1        | .013     |
| 55       | 50090 DB       | Thrust washer  | 1        | .656     | ...      | Q 1922         | Spacer   | 1        | .750     |
| 56       | 50015 D        | Bearing (New Departure No. 1208-TS)                  | 1        | 1.125    | 82       | 6981 D         | Shim, heavy  | 1        | .200     |
| 57       | 50017 D        | Idler gear (29 and 36 teeth)                         | 1        | .187     | 83       | 50010 DB       | Shim, medium   | 1        | .062     |
| 58       | 50016 D        | Bearing (New Departure No. 1208-TS)                  | 1        | .656     | 84       | 50011 DB       | Shim, light  | 1        | .019     |
| 59       | 50017 D        | Oil scoop  | 1        | 17.500   | 85       | 50012 DB       | Bearing cage   | 1        | 4.000    |
| 60       | 8361 D         | Bolt   | 1        | .656     | 86       | 9458 D         | Bearing, front (New Departure No. 5510)                  | 1        | 1.687    |
| 61       | 50018 D        | Castle hex. nut, 3/8" N.F.                           | 1        | 1.000    | 87       | 55806 D        | Washer   | 1        | .312     |
| ...      | Q 1652         | Cotter, 3/32 x 3/4"                                  | 1        | .166     | 88       | 50009 D        | Cap screw, 1/2x1-1/4" N.F.                               | 2        | .110     |
| 62       | 56471 D        | Idler shaft  | 1        | .016     | ...      | Q 1922         | Lock washer, 1/2"  | 2        | .013     |
| 63       | 56469 D        | Retainer bolt  | 1        | .002     | 89       | 50013 DB       | Gasket   | 1        | .013     |
| ...      | Q 1652         | Castle hex. nut, 3/8" N.F.                           | 1        | 13.625   | 90       | 6925 DB        | Retainer, front  | 1        | 2.000    |
| ...      | ...            | Cotter, 3/32 x 3/4"                                  | 1        | .109     | ...      | Q 1856         | Cap screw, 1/2 x 2" N.C.                                 | 4        | .125     |
| 64       | 50023 D        | Gasket   | 1        | .016     | ...      | Q 1922         | Lock washer, 1/2"  | 4        | .013     |
| 65       | 50021 D        | Retainer   | 1        | .002     | 91       | 64603 D        | Gear shifter boot  | 1        | .187     |
| ...      | Q 1802         | Cap screw, 3/8 x 1" N.C.                             | 1        | .006     | 92       | 62782 D        | Bolt lock, right hand                                    | 1        | .062     |
| ...      | Q 1849         | Lock washer, 1/2x1-1/4" N.F.                         | 3        | .750     | 93       | 64606 D        | H1-Lo gear shifter arm                                   | 1        | .750     |
| 66       | 21491 H        | Lock washer (Shakeproof No. 1120)                    | 1        | .045     | ...      | Q 1849         | Cap screw, 1/2" N.F.x1-1/4"                              | 1        | .110     |
| 67       | 18868 D        | Retaining bolt washer (Shakeproof No. 1124)          | 3        | .110     | ...      | Q 1922         | Lock washer, 1/2"  | 1        | .013     |
| 68       | 6921 DA        | Bearing cage, rear                                   | 1        | .001     | 94       | 64607 D        | H1-Lo gear shifter arm shaft                             | 1        | .937     |
| 69       | 50001 D        | Retainer   | 1        | 3.500    | 95       | 64608 D        | H1-Lo gear shifter arm key                               | 1        | .016     |
| ...      | Q 1804         | Lock washer, 3/8"                                    | 1        | .500     | 96       | 23007 V        | H1-Lo gear shifter arm shaft plug                        | 1        | .031     |
| ...      | Q 1920         | Bevel pinion and shaft with drive bevel gear         | 3        | .050     | 97       | 64609 D        | Gear shifter boot clamp                                  | 1        | .062     |
| 70       | 64628 D        | Key (Woodruff No. 18)                                | 3        | .005     | ...      | 64604 D        | Cadmium plated round head stove bolt No. 8               | 1        | .031     |
| 71       | 10430 V        | Roller assembly and outer race (Hyatt No. BU-5214-Z) | 1        | 81.000   | ...      | ...            | Cadmium plated square stove bolt nut, No. 8-32           | 1        | .004     |
| 72       | 52386 D        | Reverse gear (32 teeth)                              | 1        | .031     | 98       | 21559 D        | Transmission spline shaft bearing, front (N.D. No. 3211) | 1        | 1.406    |
| 73       | 52378 D        | Gear (35 and 40 teeth)                               | 1        | 4.719    | ...      | 62780 DX       | Gear shifter rail guide                                  | 1        | 1.406    |
| 74       | 52382 D        | Gear (35 and 40 teeth)                               | 1        | 10.000   | ...      | ...            | bolt lock set  | 1        | .125     |

**SPARE PARTS CATALOG**

**ENGINE HOOD AND SIDE SHEETS**



A-1084

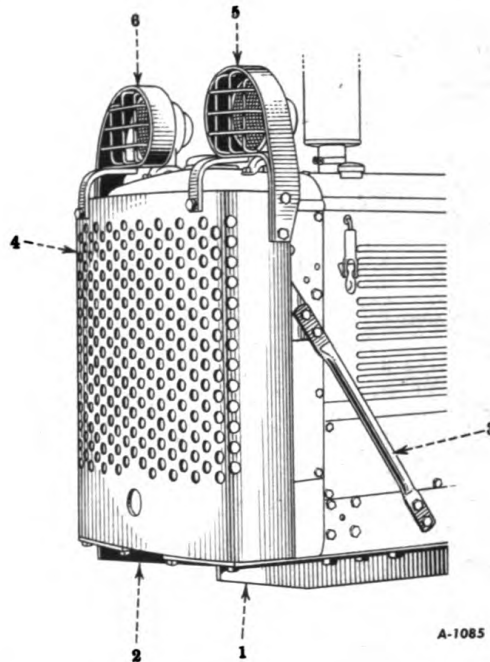
*When ordering, always use I H C Part Nos.*

| Ref. No. | I H C Part No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|---|----------|----------|
| 1        | 52412 DAX      | Hood . . . . .  | 1        | 35.000   |
| ...      | Q 1800         | Cap screw, 3/8 x 3/4" N.C. . . . .                      | 8        | .035     |
| ...      | .....          | Slotted flat head bolt, 3/8 x 1-1/4" N.C. . . . .       | 2        | .075     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                             | 12       | .005     |
| ...      | .....          | Washer, 13/32" I.D. x 7/8" O.D. x No. 16 gage . . . . . | 8        | .025     |
| ...      | Q 1906         | Hex. nut, 3/8" N.C. . . . .                             | 2        | .016     |
| 2        | 50510 D        | Side sheet, right hand or left hand . . . . .           | 2        | 12.000   |
| ...      | Q 1800         | Cap screw, 3/8 x 3/4" N.C. . . . .                      | 12       | .035     |
| ...      | Q 1920         | Lock washer, 3/8" . . . . .                             | 12       | .005     |

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**SPARE PARTS CATALOG**

**RADIATOR GUARD AND HEAD LAMP BRUSH GUARDS**

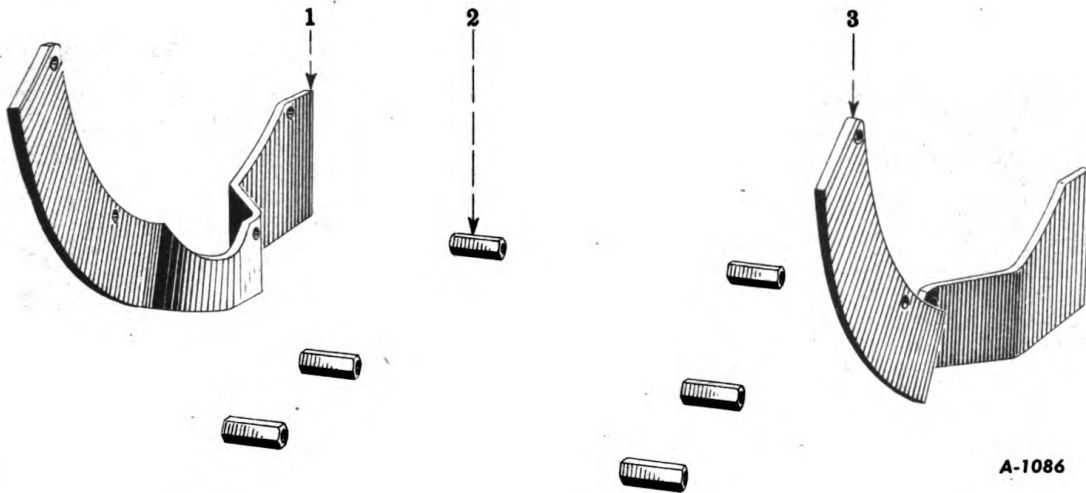


| Ref. No. | I H C Part No. | Description  | No. Used | Wt. Lbs. |
|----------|----------------|--|----------|----------|
| 1        | 50873 D        | Radiator guard support bracket, left hand . . . . .  | 1        | 21.125   |
| 2        | 50874 D        | Radiator guard support bracket, right hand . . . . . | 1        | 21.000   |
| ...      | Q 1888         | Cap screw, 3/4" N.C. x 1-3/4" . . . . .              | 2        | .308     |
| ...      | .....          | Cap screw, 3/4" N.F. x 1-5/8" . . . . .              | 4        | .281     |
| ...      | Q 1914         | Hex. nut, 3/4" N.F. . . . .                          | 4        | .120     |
| ...      | Q 1927         | Lock washer, 3/4" . . . . .                          | 4        | .045     |
| ...      | .....          | Washer, 25/32" I.D. x 1-1/2" O.D. x 10 ga. . . . .   | 2        |          |
| 3        | 50877 DAX      | Radiator guard brace. . . . .                        | 2        | 8.156    |
| ...      | Q 1871         | Cap screw, 5/8" N.F. x 1-3/4" . . . . .              | 4        | .225     |
| ...      | Q 1875         | Cap screw, 5/8" N.F. x 2-1/4" . . . . .              | 4        | .266     |
| ...      | Q 1911         | Hex. nut, 5/8" N.F. . . . .                          | 8        | .085     |
| ...      | Q 1925         | Lock washer, 5/8" . . . . .                          | 8        | .024     |
| 4        | 63887 DX       | Radiator guard. . . . .                              | 1        | 92.000   |
| 5        | 63889 DX       | Head lamp brush guard, left hand. . . . .            | 1        | 13.500   |
| ...      | Q 1851         | Cap screw, 1/2" N.F. x 1-1/2" . . . . .              | 2        | .125     |
| ...      | Q 1909         | Hex. nut, 1/2" N.F. . . . .                          | 2        | .037     |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .                          | 2        | .013     |
| ...      | Q 1871         | Cap screw, 5/8" N.F. x 1-3/4" . . . . .              | 1        | .225     |
| ...      | Q 1911         | Hex. nut, 5/8" N.F. . . . .                          | 1        | .085     |
| ...      | Q 1925         | Lock washer, 5/8" . . . . .                          | 1        | .024     |
| 6        | 63890 DX       | Head lamp brush guard, right hand. . . . .           | 1        | 13.500   |
| ...      | Q 1851         | Cap screw, 1/2" N.F. x 1-1/2" . . . . .              | 2        | .125     |
| ...      | Q 1909         | Hex. nut, 1/2" N.F. . . . .                          | 2        | .037     |
| ...      | Q 1922         | Lock washer, 1/2" . . . . .                          | 2        | .013     |
| ...      | Q 1871         | Cap screw, 5/8" N.F. x 1-3/4" . . . . .              | 1        | .225     |
| ...      | Q 1911         | Hex. nut, 5/8" N.F. . . . .                          | 1        | .085     |
| ...      | Q 1925         | Lock washer, 5/8" . . . . .                          | 1        | .024     |



**SPARE PARTS CATALOG**

**SPROCKET ROCK DEFLECTOR (54210 D)**



*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

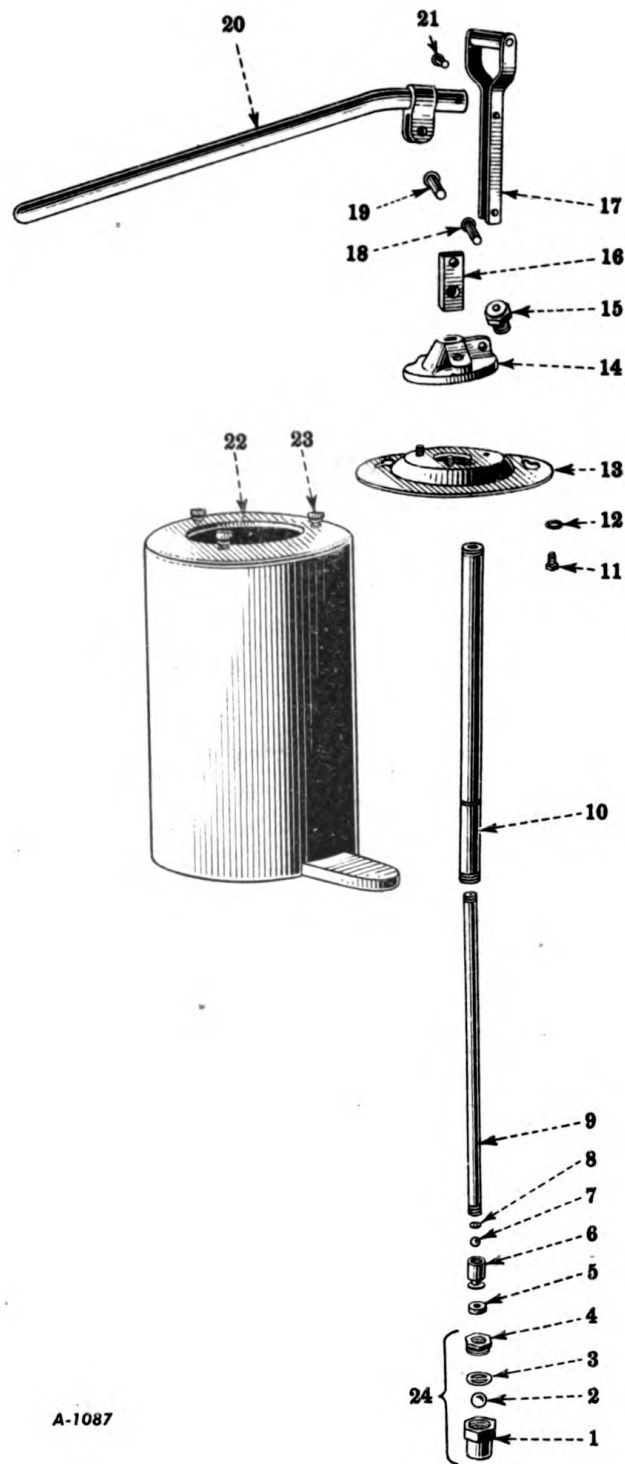
| Ref. No. | I H C Part No. | Description                          | No. Used | Wt. Lbs. |
|----------|----------------|--------------------------------------|----------|----------|
| 1        | 54118 D        | Sprocket rock deflector (left hand)  | 1        | 13.438   |
| ...      | Q 1849         | Cap screw, 1/2" N.F. x 1-1/4"        | 3        | .150     |
| ...      | .....          | Cap screw, 1/2" N.F. x 2-3/8"        | 1        | .168     |
| ...      | Q 1909         | Hex. nut, 1/2" N.F.                  | 1        | .109     |
| ...      | Q 1922         | Lock washer, 1/2"                    | 4        | .013     |
| 2        | 54121 D        | Sprocket rock deflector spacer       | 6        | .375     |
| 3        | 54119 D        | Sprocket rock deflector (right hand) | 1        | 4.198    |
| ...      | Q 1849         | Cap screw, 1/2" N.F. x 1-1/4"        | 3        | .150     |
| ...      | .....          | Cap screw, 1/2" N.F. x 2-3/8"        | 1        | .168     |
| ...      | Q 1909         | Hex. nut, 1/2" N.F.                  | 1        | .109     |
| ...      | Q 1922         | Lock washer, 1/2"                    | 4        | .013     |

*When ordering, always use I H C Part Nos.*

*Don't order parts from the illustrations only; refer to the list also.*

# SPARE PARTS CATALOG

## LINCOLN BUCKET LUBRICATOR



A-1087

*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

*Don't order parts from the illustrations only; refer to the list also.*

**SPARE PARTS CATALOG**

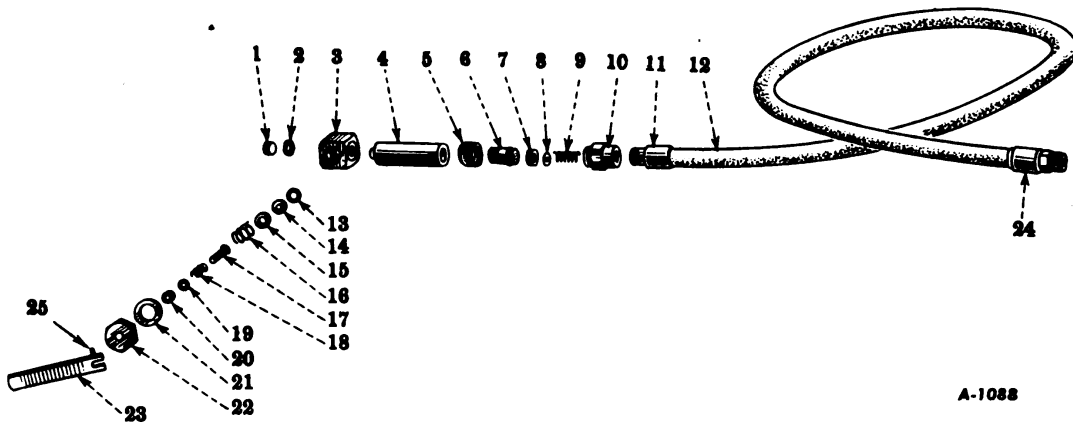
**LINCOLN BUCKET LUBRICATOR - Continued**

| Ref. No. | I H C Part No. | Lincoln Engr. Co. No. | Description   | No. Used | Wt. Lbs. |
|----------|----------------|-----------------------|---|----------|----------|
| ...      | 60012 D        | A-1218-1H             | Bucket lubricator, with hose and coupler . . . . .  | 1        | 19.000   |
| ...      | 60013 D        | 1217                  | Bucket lubricator, (less hose and coupler). . . . . | 1        | 18.437   |
| ...      | 62352 D        | 81-368                | Pump assembly. . . . .                              | 1        | 9.000    |
| 1        | 61733 D        | 11128                 | Foot valve body. . . . .                            | 1        | .203     |
| 2        | 62574 D        | 66144                 | Foot valve check ball. . . . .                      | 1        | .062     |
| 3        | 62573 D        | 45-608                | Foot valve disc. . . . .                            | 1        | .012     |
| 4        | 61732 D        | 11127                 | Foot valve collar. . . . .                          | 1        | .078     |
| 5        | 40630 D        | A-35-020              | Packing. . . . .                                    | 1        | .003     |
| 6        | 40652 D        | A-11-550              | Piston . . . . .                                    | 1        | .072     |
| 7        | 40719 D        | A-66-002              | Ball . . . . .                                      | 1        | .005     |
| 8        | 40698 D        | A-45-559              | Piston disc. . . . .                                | 1        | .001     |
| 9        | 61738 D        | A-62111               | Pump plunger rod . . . . .                          | 1        | .750     |
| 10       | 61737 D        | A-61229               | Pump tube. . . . .                                  | 1        | .750     |
| 11       | .....          | 50037                 | Cap screw, 1/4" N.C. x 7/16" .                      | 3        |          |
| 12       | 52745 V        | 66170                 | Cover plate washer . . . . .                        | 3        | .001     |
| 13       | 62159 D        | A-45-620              | Cover. . . . .                                      | 1        | 1.500    |
| 14       | 61740 D        | B-40-227              | Pump casting . . . . .                              | 1        | 1.500    |
| 15       | 37290 D        | 5750                  | Button head fitting. . . . .                        | 1        | .125     |
| 16       | 40655 D        | A-11-557              | Pump outlet. . . . .                                | 1        | .266     |
| 17       | 53189 D        | A-64-280              | Handle . . . . .                                    | 1        | 1.031    |
| 18       | 40638 D        | A-10-472              | Toggle pin . . . . .                                | 1        | .031     |
| ...      | .....          | A66-031               | Cotter, 3/32" x 1/2" . . . . .                      | 1        |          |
| 19       | 40638 D        | A-10-472              | Toggle pin . . . . .                                | 1        | .031     |
| ...      | .....          | A66-031               | Cotter, 3/32" x 1/2" . . . . .                      | 1        |          |
| 20       | 53193 D        | 90-271                | Lever handle . . . . .                              | 1        | 3.000    |
| 21       | 61735 D        | 11283                 | Toggle pin . . . . .                                | 1        | .047     |
| ...      | .....          | 60078                 | Cotter, 3/32" x 5/8" . . . . .                      | 1        |          |
| 22       | 61736 D        | A-60041               | Container. . . . .                                  | 1        | 9.750    |
| 23       | 55479 D        | A-11-225              | Cover screw. . . . .                                | 3        | .047     |
| 24       | 61739 D        | A-81207               | Foot valve . . . . .                                | 1        | .500     |

*When ordering, always use I H C Part Nos.*

**SPARE PARTS CATALOG**

**HOSE ASSEMBLY COUPLER FOR BUCKET LUBRICATOR**

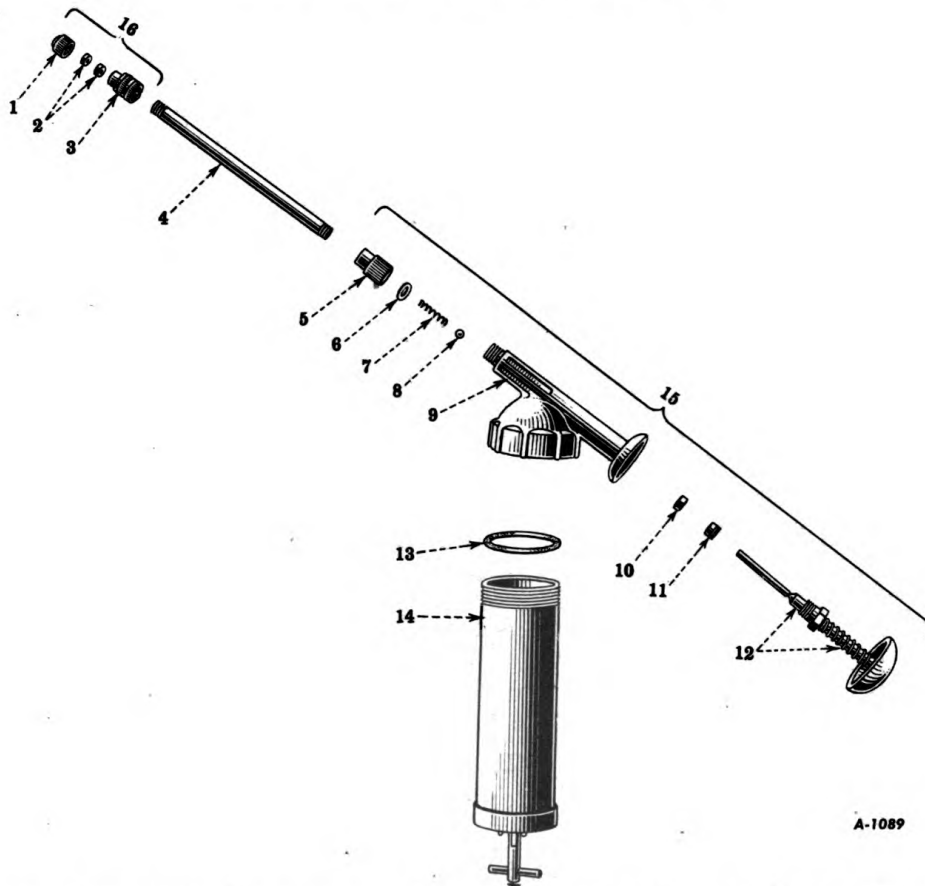


A-1088

| Ref. No. | I H C Part No. | Lincoln Engr. Co. No. | Description                           | No. Used | Wt. Lbs. |
|----------|----------------|-----------------------|---------------------------------------|----------|----------|
| ...      | 36947 D        | A-80-353              | Swivel . . . . .                      | 1        | .260     |
| ...      | 40728 DA       | A-81-219-1H           | Giant coupler. . . . .                | 1        | .660     |
| ...      | 53192 D        | A-81-220              | Hose assembly, with coupler . . . . . | 1        |          |
| 1        | 40649 D        | A-10-618              | Nozzle body plug . . . . .            | 1        | .063     |
| 2        | 40657 D        | A-31-016              | Gasket . . . . .                      | 1        |          |
| 3        | 40648 D        | A-10-617              | Giant nozzle body. . . . .            | 1        | .313     |
| 4        | 53187 D        | A-11-137              | Coupler adapter. . . . .              | 1        | .375     |
| 5        | 40642 D        | A-10-534              | Swivel collar. . . . .                | 1        | .043     |
| 6        | 40641 D        | A-10-533              | Swivel stud. . . . .                  | 1        | .090     |
| 7        | 40631 D        | A-36-019              | Cup leather. . . . .                  | 1        | .001     |
| 8        | 40703 D        | A-48-080              | Swivel washer. . . . .                | 1        | .001     |
| 9        | 40713 D        | A-56-014              | Spring . . . . .                      | 1        | .001     |
| 10       | 40646 D        | A-10-541              | Swivel body. . . . .                  | 1        | .100     |
| 11       | 40725 D        | A-80-356              | Hose fitting . . . . .                | 1        | .150     |
| 12       | 36946 D        | A-79-060              | Hose (5 ft.) . . . . .                | 1        |          |
| 13       | 40693 D        | A-45-033              | Washer . . . . .                      | 1        | .001     |
| 14       | 40661 D        | A-34-037              | Giant packing. . . . .                | 1        | .001     |
| 15       | 40636 D        | A-10-450              | Check seat . . . . .                  | 1        | .010     |
| 16       | 40712 D        | A-55-067              | Spring . . . . .                      | 1        | .001     |
| 17       | 40644 D        | A-10-537              | Plunger. . . . .                      | 1        | .020     |
| 18       | 40711 D        | A-55-063              | Plunger spring . . . . .              | 1        | .001     |
| 19       | 40700 D        | A-48-077              | Packing washer . . . . .              | 1        | .001     |
| 20       | 40628 D        | A-34-039              | Packing. . . . .                      | 1        | .001     |
| 21       | 40656 D        | A-30-012              | Gasket . . . . .                      | 1        | .001     |
| 22       | 40640 D        | A-10-528              | Packing gland. . . . .                | 1        | .090     |
| 23       | 53196 D        | A-11-138              | Handle . . . . .                      | 1        | .090     |
| 24       | 40725 D        | A-80-356              | Hose fitting . . . . .                | 1        | .150     |
| 25       | 40647 D        | A-10-551              | Pin. . . . .                          | 1        | .001     |

**SPARE PARTS CATALOG**

**LUBRICATOR (Hand Type)**



A-1089

*Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.*

| Ref. No. | I H C Part No. | Lincoln Engr. Co. No. | Description                                  | No. Used | Wt. Lbs. |
|----------|----------------|-----------------------|--|----------|----------|
| ...      | Q 3794         | No. 1020              | Lubricator, complete (9 oz. capacity). . . . | 1        | 2.250    |
| 1        | 39653 D        | A-10-733              | Nozzle cap . . . . .                         | 1        | .012     |
| 2        | 39656 DX       | A-34-050              | Washer (set of 2). . . . .                   | 1        | .001     |
| 3        | 39652 D        | A-10-539              | Nozzle body. . . . .                         | 1        | .020     |
| 4        | .....          | A-67-020              | Standard pipe, 1/8" (6" long)                | 1        |          |
| 5        | 39875 D        | A-10-453              | Adapter with gasket. . . . .                 | 1        | .031     |
| 6        | 39655 D        | A-33-018              | Gasket . . . . .                             | 1        | .001     |
| 7        | 39870 D        | A-55-046              | Check spring . . . . .                       | 1        | .001     |
| 8        | 39659 D        | A-66-011              | Check ball . . . . .                         | 1        | .001     |
| 9        | 39868 D        | A-41-052              | Pump body. . . . .                           | 1        | .530     |
| 10       | 39665 D        | A-34-034              | Packing. . . . .                             | 1        | .001     |
| 11       | 39651 D        | A-10-492              | Packing screw. . . . .                       | 1        | .001     |
| 12       | 39663 D        | 89-975                | Plunger assembly . . . . .                   | 1        | .220     |
| 13       | 39654 D        | A-32-029              | Gasket . . . . .                             | 1        | .001     |
| 14       | 39661 D        | B-81-903              | Tube assembly. . . . .                       | 1        | 1.250    |
| 15       | 39662 D        | 89-974                | Head assembly. . . . .                       | 1        | .780     |
| 16       | 39800 D        | A-5804-1              | Nozzle, complete . . . . .                   | 1        | .050     |

## SPARE PARTS CATALOG

### TOOLS

| I H C<br>Part No. | Description   | No.<br>Used | Wt.<br>Lbs. |
|-------------------|---|-------------|-------------|
| 9534 D            | Open end wrench (2-11/16") (optional with 2584 T) . . . . .   | 1           | 11.000      |
| 11858 DA          | Water pump wrench. . . . .  | 1           | .156        |
| 19289 D           | Hexagon socket wrench (9/16") . . . . .   | 1           | .219        |
| 19291 D           | Hexagon socket wrench (5/8") . . . . .  | 1           | .312        |
| 19292 D           | Hexagon socket wrench (3/4") . . . . .  | 1           | .430        |
| 19323 D           | Socket wrench handle (combination offset and tee) . . . . .   | 1           | 1.375       |
| 19324 D           | Hexagon socket wrench (7/8") . . . . .  | 1           | .218        |
| 19325 D           | Hexagon socket wrench (13/16") . . . . .  | 1           | .187        |
| 19326 D           | Hexagon socket wrench (1") . . . . .  | 1           | .250        |
| 19327 D           | Hexagon socket wrench (1-1/8") . . . . .  | 1           | .375        |
| 19328 D           | Socket wrench set carrying case. . . . .  | 1           | .906        |
| 19329 D           | Socket wrench set (in carrying case) . . . . .  | 1           | 4.093       |
| 20156 D           | Square drain plug socket wrench (1/2") . . . . .  | 1           | .125        |
| 20157 D           | Square drain plug socket wrench (11/16") . . . . .  | 1           | .172        |
| 25462 DA          | Stem handled socket wrench (1-1/32") . . . . .  | 1           | 1.875       |
| 25463 D           | Stem handled socket wrench handle. . . . .  | 1           |             |
| 25466 D           | Spark plug wrench handle . . . . .  | 1           | .578        |
| 32941 D           | Spark plug wrench (31/32") . . . . .  | 1           | .250        |
| 45579 DA          | Magneto and spark plug gage. . . . .  | 1           | .004        |
| 50092 D           | Steering clutch pilot bearing retainer bolt wrench . . . . .  | 1           | .187        |
| 60012 D           | Bucket lubricator with hose (Lincoln A-1218-IH) (50 lb. cap.) (See detail list on page 5) . . . . . | 1           | 19.000      |
| 58920 DAX         | Steering clutch compressor angle tool. . . . .  | 1           | 1.250       |
| Q 1870            | Cap screw, 5/8" N.C. x 1-1/2" . . . . .   | 2           | .191        |
| Q 1858            | Cap screw, 1/2" N.C. x 2-1/4" . . . . .   | 2           | .016        |
| 1326 E            | End wrench (3/4 x 7/8") . . . . .   | 1           | .560        |
| H 156             | Oil can. . . . .  | 1           | .250        |
| Q 3794            | Hand lubricator (9 oz.) (Lincoln) (See detail list on page 7) . . . . .                             | 1           | 2.250       |
| 2583 T            | Hammer (1-1/2 lb.) . . . . .  | 1           | 1.875       |
| 2584 T            | Monkey wrench (21") (optional with 9534 D) . . . . .  | 1           | 7.875       |
| 2587 T            | Combination slip joint pliers (8") . . . . .  | 1           | .562        |
| 2588 T            | Screw driver (5") (wood handle) . . . . .   | 1           | .312        |
| 50523 D           | Tool box assembly. . . . .  | 1           | 9.719       |

### GASKET PACKAGES

| I H C<br>Part No. | Description                      | No.<br>Used | Wt.<br>Lbs. |
|-------------------|----------------------------------|-------------|-------------|
| 57307 D           | Engine gasket package. . . . .   | 1           |             |
| 57790 D           | Chassis gasket package . . . . . | 1           | 4.250       |

*When ordering, always use I H C Part Nos.*

### LUBRICATION GUIDE KIT (When Used)

| I H C<br>Part No. | Description  | No.<br>Used |
|-------------------|--|-------------|
| 11232 GT          | Kit holder bracket, front . . . . .                                      | 1           |
| .....             | Cap screw, 1/4" N.F. x 5/8" . . . . .                                    | 3           |
| .....             | Hex. nut, 1/4" N.F. . . . .  | 3           |
| .....             | Lock washer, 1/4" . . . . .  | 3           |
| .....             | Plain washer, 9/32" I.D. x 5/8" O.D. x<br>No. 16 gage. . . . .           | 3           |
| 11233 GT          | Kit holder bracket, rear. . . . .  | 1           |
| .....             | Cap screw, 1/4" N.F. x 5/8" . . . . .                                    | 3           |
| .....             | Hex. nut, 1/4" N.F. . . . .  | 3           |
| .....             | Lock washer, 1/4" . . . . .  | 3           |
| .....             | Plain washer, 9/32" I.D. x 5/8" O.D. x<br>No. 16 gage . . . . .          | 3           |
| .....             | *Lubrication Guide Kit (consists of the follow-<br>ing parts:) . . . . . | 1           |
| .....             | Metal bound lubrication guide . . . . .                                  | 1           |
| .....             | Lubrication check cards . . . . .  | 10          |
| .....             | Waterproof canvas holder. . . . .  | 1           |

\* - *Furnished by the Corps of Engineers.*

## NUMERICAL INDEX

| Part No.   | Section |      | Price  | Part No.  | Section |      | Price  | Part No. | Section |      | Price  |
|------------|---------|------|--------|-----------|---------|------|--------|----------|---------|------|--------|
|            | No.     | Page |        |           | No.     | Page |        |          | No.     | Page |        |
| <b>D</b>   |         |      |        | 6982 D    | 6       | 4    | \$6.00 | 9475 DX  | 6       | 3    | \$3.00 |
| 2370 DAX   | 2       | 3    | \$1.90 | 6984 DAX  | 6       | 4    | 8.00   | 9476 DX  | 6       | 3    | 3.50   |
| 2557 DAX   | 2       | 3    | 1.90   | 6985 D    | 2       | 1    | 30.90  | 9478 DX  | 6       | 3    | 30.25  |
| 3175 D     | 2       | 3    | 1.25   | 6986 D    | 2       | 1    | 20.65  | 9534 D   | 15      | 8    | 3.00   |
| 3202 DDRXA | 4       | 11   | 11.75  | 6987 DA   | 2       | 1    | 5.50   | 9634 D   | 11      | 2    | 1.65   |
| 4222 D     | 4       | 11   | .20    | 6988 DA   | 2       | 1    | 5.50   | 9637 D   | 14      | 1    | .20    |
| 4253 D     | 9       | 1    | .55    | 6990 D    | 2       | 1    | .50    | 9638 DX  | 14      | 1    |        |
| 4254 DA    | 9       | 1    | .12    | 6992 DA   | 2       | 1    | 1.65   | 9641 DX  | 12      | 1    |        |
| 4596 D     | 14      | 1    | .12    | 6994 D    | 4       | 17   | .55    | 9642 DX  | 12      | 1    |        |
| 4813 D     | 4       | 8    | .30    | 6995 DB   | 4       | 14   | 1.10   | 9646 D   | 11      | 2    |        |
| 4926 DA    | 7       | 3    |        | 8000 DA   | 8       | 10   | 2.75   | 9650 D   | 5       | 2    |        |
| 4988 D     | 4       | 3    | 3.00   | 8008 DX   | 4       | 9    | 4.15   | 10319 D  | 4       | 12   | .07    |
| 4993 DA    | 4       | 12   | 1.50   | 8009 D    | 4       | 9    | 1.90   | 10429 D  | 2       | 1    | .10    |
| 4994 DAX   | 4       | 12   | 1.75   | 8021 DAX  | 4       | 13   |        | 10722 D  | 6       | 3    | .09    |
| 5024 DAR   | 11      | 3    | .75    | 8023 DX   | 2       | 3    | 7.45   | 10951 D  | 4       | 3    | .25    |
| 5025 DBR   | 4       | 3    | 1.10   | 8029 D    | 4       | 8    | 1.05   | 10961 D  | 4       | 9    | .12    |
| 5027 DB    | 4       | 3    | 1.70   | 8045 D    | 4       | 18   | 3.30   | 11373 D  | 14      | 1    | .12    |
| 5028 D     | 4       | 3    | 1.70   | 8055 DX   | 4       | 14   | 6.35   | 11657 D  | 2       | 3    | .05    |
| 5051 DX    | 8       | 7    | 2.55   | 8061 DX   | 4       | 4    | 9.00   | 11858 DA | 15      | 8    | .12    |
| 5235 DA    | 13      | 4    | 2.20   | 8062 D    | 4       | 4    | .60    | 13021 D  | 4       | 9    | .01    |
| 5441 D     | 8       | 19   |        | 8063 D    | 4       | 3    | 1.65   | 13055 D  | 4       | 4    | .033   |
| 5715 D     | 12      | 3    | 5.75   | 8064 DAXA | 4       | 4    | 104.00 | 13056 DA | 12      | 2    |        |
| 5723 DB    | 5       | 1    | 3.30   | 8064 DAYA | 4       | 4    | 135.00 | 13056 DA | 12      | 3    | .16    |
| 5812 D     | 12      | 5    | .40    | 8081 D    | 3       | 5    | 1.35   | 13083 D  | 4       | 3    | .022   |
| 5813 D     | 12      | 5    | 3.55   | 8119 D    | 9       | 1    | 5.75   | 13115 D  | 14      | 1    | .022   |
| 5815 D     | 12      | 5    | .95    | 8120 DAX  | 9       | 1    | 14.00  | 13129 DA | 12      | 3    | .10    |
| 5818 D     | 12      | 5    | .65    | 8221 D    | 8       | 5    | .55    | 13129 DA | 12      | 5    | .10    |
| 5913 D     | 2       | 1    | .50    | 8349 D    | 7       | 7    | .95    | 13193 D  | 8       | 4    | .03    |
| 5938 DAX   | 14      | 1    | 1.90   | 8352 DB   | 12      | 3    | 14.00  | 13194 D  | 8       | 4    | .15    |
| 5957 DBX   | 4       | 11   |        | 8356 DY   | 13      | 3    | 13.00  | 13722 D  | 14      | 1    | .03    |
| 5957 DBY   | 4       | 11   |        | 8357 D    | 13      | 3    | 3.20   | 13806 D  | 4       | 8    | .05    |
| 5960 D     | 4       | 4    | .95    | 8358 D    | 13      | 3    | 3.55   | 13839 D  | 4       | 13   | .05    |
| 5977 D     | 4       | 5    | .45    | 8361 D    | 14      | 2    | .50    | 13839 D  | 4       | 18   |        |
| 5980 D     | 4       | 5    | 15.65  | 8362 DA   | 14      | 1    | 2.20   | 13841 D  | 4       | 13   |        |
| 6268 DX    | 9       | 2    | 8.00   | 8394 DX   | 3       | 3    | 3.00   | 13841 D  | 4       | 18   |        |
| 6276 DX    | 9       | 2    | 2.75   | 8395 D    | 6       | 1    | 17.35  | 13842 D  | 4       | 13   | 2.45   |
| 6277 D     | 9       | 2    | 2.20   | 8396 D    | 6       | 1    | 2.75   | 13897 D  | 4       | 8    | .004   |
| 6482 DAY   | 3       | 2    | 6.60   | 8397 D    | 6       | 1    | 2.75   | 14186 DA | 4       | 7    |        |
| 6483 DY    | 3       | 2    | 1.75   | 8413 DX   | 4       | 8    | 11.55  | 14186 DA | 7       | 9    | .05    |
| 6485 D     | 13      | 3    | .55    | 8414 D    | 4       | 7    | 1.05   | 14186 DA | 12      | 1    |        |
| 6649 D     | 11      | 1    | .45    | 8420 DX   | 4       | 11   | 38.25  | 14186 DA | 12      | 3    |        |
| 6783 DX    | 3       | 2    | 2.20   | 8425 DA   | 4       | 17   | 9.60   | 14187 DA | 2       | 2    |        |
| 6868 DCX   | 7       | 5    | 38.00  | 8426 DAX  | 11      | 2    | 2.05   | 14187 DA | 5       | 1    | .11    |
| 6869 DCX   | 7       | 5    | 38.00  | 8427 DX   | 11      | 2    | 1.65   | 15644 D  | 13      | 1    | .40    |
| 6870 DA    | 7       | 5    | 11.95  | 8430 DA   | 6       | 4    | 2.75   | 15944 D  | 13      | 1    | .05    |
| 6871 DBX   | 7       | 5    | 35.00  | 8431 D    | 6       | 3    | 3.20   | 16077 D  | 2       | 1    | .12    |
| 6872 DBX   | 7       | 5    | 35.00  | 8432 D    | 6       | 4    | 1.90   | 16077 D  | 2       | 1    |        |
| 6873 DAX   | 13      | 4    | 8.55   | 8433 DA   | 6       | 4    | 11.35  | 16445 D  | 8       | 2    |        |
| 6874 DAX   | 13      | 1    | 13.45  | 8463 DDX  | 4       | 7    | 198.00 | 16445 D  | 8       | 2    | .02    |
| 6875 DAX   | 13      | 1    | 13.45  | 8473 DAX  | 4       | 15   | 11.00  | 16445 D  | 8       | 3    |        |
| 6878 D     | 13      | 1    | 2.75   | 8479 DBX  | 8       | 7    | 4.40   | 16518 D  | 8       | 2    | .12    |
| 6879 D     | 13      | 1    | 43.00  | 8519 D    | 12      | 3    | 27.25  | 17053 D  | 14      | 1    | .50    |
| 6880 DAX   | 13      | 1    | 7.15   | 8617 DX   | 11      | 1    | 1.35   | 17564 D  | 8       | 4    | .22    |
| 6884 DAX   | 7       | 1    | 15.40  | 8679 DA   | 12      | 1    | 1.55   | 17565 DA | 8       | 4    | .12    |
| 6885 DAX   | 7       | 1    | 15.40  | 8680 D    | 12      | 3    | .85    | 17700 D  | 14      | 1    | .17    |
| 6886 D     | 7       | 1    | 16.00  | 8682 DX   | 12      | 3    | 1.90   | 17793 D  | 1       | 1    |        |
| 6888 DX    | 7       | 7    | 38.00  | 8683 DX   | 12      | 1    | 3.95   | 17829 D  | 13      | 1    |        |
| 6890 D     | 7       | 7    | 38.00  | 8684 DX   | 12      | 1    | 3.85   | 17829 D  | 13      | 3    | .35    |
| 6894 DA    | 7       | 9    | 5.75   | 8685 DX   | 12      | 2    | 6.95   | 17829 D  | 13      | 4    |        |
| 6900 DHX   | 7       | 3    | 291.50 | 8784 DA   | 6       | 3    | 55.00  | 18196 D  | 2       | 3    | .022   |
| 6911 DB    | 7       | 7    | 28.60  | 8959 D    | 4       | 8    | .65    | 18220 DA | 12      | 3    | .11    |
| 6912 DX    | 12      | 5    | 3.55   | 8962 D    | 7       | 8    | 28.00  | 18377 D  | 8       | 7    | .05    |
| 6913 DA    | 7       | 3    | 6.35   | 8963 D    | 7       | 8    | 21.45  | 18507 D  | 9       | 2    | 4.90   |
| 6915 DA    | 12      | 5    | 3.85   | 8964 D    | 7       | 8    | 13.00  | 18510 D  | 14      | 1    | 9.20   |
| 6916 DA    | 12      | 5    |        | 8965 DX   | 7       | 5    | 41.00  | 18511 D  | 14      | 2    | 7.40   |
| 6917 DA    | 7       | 10   | 13.75  | 8966 DX   | 7       | 5    | 41.00  | 18539 D  | 4       | 3    | .02    |
| 6919 DX    | 5       | 2    | 3.55   | 8967 D    | 7       | 8    | 11.50  | 18573 DA | 13      | 1    | .75    |
| 6921 DA    | 14      | 2    | 2.20   | 8968 D    | 7       | 8    | 11.50  | 18585 DA | 7       | 3    |        |
| 6922 D     | 14      | 2    | 2.00   | 8969 D    | 7       | 8    | 2.00   | 18585 DA | 14      | 1    | .12    |
| 6923 DBX   | 14      | 2    | 5.50   | 9118 DX   | 8       | 5    | 1.10   | 18746 DA | 4       | 3    | .05    |
| 6925 DB    | 14      | 2    | 1.00   | 9219 DX   | 7       | 7    | 8.50   | 18868 D  | 7       | 9    |        |
| 6935 D     | 4       | 19   | 1.00   | 9220 DX   | 7       | 7    | 8.50   | 18868 D  | 14      | 2    | .01    |
| 6963 DX    | 2       | 2    | 9.35   | 9269 D    | 4       | 12   |        | 18868 D  | 15      | 8    | .25    |
| 6964 D     | 2       | 3    | 1.20   | 9270 DX   | 4       | 12   |        | 19289 D  | 15      | 8    | .25    |
| 6965 DX    | 2       | 2    | 2.95   | 9323 DX   | 4       | 11   |        | 19291 D  | 15      | 8    | .35    |
| 6973 D     | 12      | 3    | 12.90  | 9323 DY   | 4       | 11   |        | 19292 D  | 15      | 8    | .35    |
| 6974 DA    | 12      | 3    | 7.15   | 9390 DX   | 8       | 7    |        | 19305 D  | 11      | 1    | .17    |
| 6981 D     | 14      | 2    | .45    | 9456 DX   | 14      | 1    | 13.20  | 19306 D  | 11      | 1    | .02    |
|            |         |      |        | 9458 D    | 14      | 2    | 2.00   | 19323 D  | 15      | 8    | 1.15   |
|            |         |      |        | 9446 DAX  | 11      | 1    |        | 19324 D  | 15      | 8    | .40    |
|            |         |      |        | 9447 DX   | 11      | 1    |        | 19325 D  | 15      | 8    | .35    |

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| 19326 D   | 15      | 8    | \$.40 | 27140 DDX | 4       | 3    | \$5.00 | 32576 DX  | 8       | 7    | \$.17 |
| 19327 D   | 15      | 8    | .45   | 27141 D   | 4       | 3    | .07    | 32577 D   | 8       | 7    | .12   |
| 19328 D   | 15      | 8    | .45   | 27307 D   | 2       | 1    | .17    | 32578 D   | 8       | 7    | .12   |
| 19329 D   | 15      | 8    | 4.40  | 27311 D   | 3       | 2    | .09    | 32581 DXA | 8       | 7    | .75   |
| 19574 D   | 13      | 1    | .017  | 27445 DB  | 8       | 7    | .03    | 32582 D   | 8       | 7    | .05   |
| 20156 D   | 15      | 8    | .40   | 27452 D   | 8       | 7    | .40    | 32585 DA  | 8       | 7    | .30   |
| 20157 D   | 15      | 8    | .45   | 27618 D   | 3       | 4    | .005   | 32586 D   | 8       | 7    | .05   |
| 20289 D   | 2       | 3    | .85   | 27618 D   | 4       | 15   |        | 32587 D   | 8       | 7    | .03   |
| 20290 D   | 2       | 3    | .90   | 27648 D   | 2       | 3    | .12    | 32588 D   | 8       | 7    | .03   |
| 20293 D   | 2       | 3    | .17   | 27838 D   | 5       | 2    |        | 32604 D   | 8       | 7    |       |
| 20296 D   | 2       | 3    | .95   | 27927 DA  | 8       | 9    | .07    | 32606 DA  | 8       | 7    | .05   |
| 20299 D   | 2       | 3    | .25   | 28428 D   | 3       | 6    | .12    | 32685 D   | 4       | 3    | .35   |
| 20300 D   | 2       | 3    | .17   | 28428 D   | 3       | 8    |        | 32941 D   | 15      | 8    | .45   |
| 20301 D   | 2       | 3    | .05   | 28737 DX  | 4       | 11   | .55    | 32942 D   | 4       | 11   | .60   |
| 20303 D   | 2       | 3    | .40   | 28772 D   | 4       | 18   | 3.85   | 33814 D   | 2       | 3    | 4.40  |
| 20306 DX  | 2       | 3    | 1.75  | 28781 D   | 4       | 13   | .05    | 35089 D   | 7       | 1    | .05   |
| 20308 D   | 2       | 3    | 3.65  | 28797 D   | 4       | 8    | .12    | 35089 DA  | 13      | 4    | .05   |
| 20308 D   | 12      | 3    |       | 28809 D   | 4       | 18   | 4.50   | 35132 D   | 13      | 3    | .45   |
| 20585 D   | 2       | 3    | .95   | 29340 D   | 3       | 4    | .30    | 35149 DA  | 13      | 3    | 1.20  |
| 20586 D   | 2       | 3    | .12   | 29501 DA  | 4       | 18   | 6.00   | 35252 D   | 12      | 3    |       |
| 20586 D   | 11      | 1    |       | 29547 D   | 14      | 1    | .12    | 35252 DX  | 12      | 3    | .25   |
| 20841 D   | 12      | 5    | .17   | 29565 D   | 4       | 7    | .07    | 35691 D   | 8       | 7    |       |
| 20887 D   | 14      | 1    | .17   | 29873 D   | 3       | 4    | .30    | 36092 D   | 8       | 8    | .07   |
| 21259 D   | 2       | 3    | 1.90  | 29874 D   | 3       | 4    | .35    | 36273 D   | 3       | 10   | .20   |
| 21314 DX  | 3       | 1    | .85   | 29898 D   | 1       | 1    | .06    | 36796 DA  | 4       | 8    | .17   |
| 21342 D   | 3       | 2    | .03   | 29898 D   | 8       | 10   |        | 36946 D   | 15      | 6    | 6.50  |
| 21350 DXA | 3       | 1    |       | 29899 D   | 8       | 2    |        | 36947 D   | 15      | 6    | 1.25  |
| 21388 DBX | 3       | 1    | .40   | 29899 D   | 8       | 3    | .08    | 37063 D   | 3       | 10   | .05   |
| 21393 D   | 3       | 2    | .05   | 29899 D   | 8       | 4    |        | 37064 D   | 3       | 10   | .20   |
| 21394 D   | 3       | 1    | .05   | 29899 D   | 12      | 3    |        | 37072 D   | 3       | 10   | .05   |
| 21409 DB  | 3       | 2    | .85   | 29902 DX  | 8       | 7    | .35    | 37075 D   | 3       | 10   | .05   |
| 21559 D   | 14      | 2    | 6.40  | 30397 D   | 4       | 7    | .09    | 37148 D   | 8       | 9    | .05   |
| 21585 D   | 12      | 3    | .12   | 30402 D   | 1       | 1    | .30    | 37150 D   | 8       | 9    | .70   |
| 21795 D   | 13      | 4    | 1.05  | 30402 D   | 8       | 10   |        | 37152 D   | 8       | 9    | 6.60  |
| 21839 D   | 2       | 3    | .05   | 30402 DX  | 1       | 1    | .30    | 37165 D   | 4       | 17   |       |
| 21969 D   | 12      | 3    | .75   | 30402 DX  | 8       | 10   |        | 37165 D   | 8       | 2    |       |
| 22383 D   | 2       | 1    | .03   | 30665 D   | 12      | 2    | .05    | 37165 D   | 8       | 3    | .17   |
| 23132 D   | 4       | 14   | .40   | 30824 D   | 2       | 2    | .03    | 37165 D   | 8       | 10   |       |
| 23260 D   | 13      | 4    | .85   | 30982 D   | 2       | 3    | 2.30   | 37165 D   | 13      | 1    |       |
| 23261 D   | 13      | 4    | .03   | 31119 D   | 13      | 1    | 1.20   | 37290 D   | 13      | 3    |       |
| 23977 DA  | 8       | 2    | .12   | 31121 D   | 8       | 9    | .03    | 37290 D   | 13      | 4    | .32   |
| 23995 D   | 8       | 2    | .35   | 31238 D   | 5       | 1    | 5.20   | 37290 D   | 15      | 5    |       |
| 24017 D   | 2       | 3    | .35   | 31458 D   | 4       | 11   | .35    | 37291 D   | 3       | 1    |       |
| 24473 D   | 3       | 3    | .45   | 31522 DX  | 3       | 7    | .60    | 37291 D   | 3       | 4    | .015  |
| 24603 D   | 3       | 2    | .03   | 31522 DX  | 3       | 9    |        | 37323 D   | 4       | 18   |       |
| 24805 D   | 8       | 5    | .022  | 31536 DB  | 4       | 4    | .70    | 37323 DX  | 4       | 18   | .30   |
| 24855 D   | 8       | 3    | .25   | 31636 D   | 8       | 7    | .02    | 37634 D   | 2       | 3    | 4.40  |
| 24916 D   | 11      | 3    | .35   | 31729 D   | 4       | 7    | .35    | 37753 D   | 3       | 7    |       |
| 24917 D   | 11      | 3    | .05   | 32032 DXA | 3       | 1    | .10    | 37753 D   | 3       | 8    |       |
| 24941 D   | 2       | 3    | .10   | 32046 DX  | 3       | 7    | .75    | 37976 D   | 3       | 12   | .12   |
| 24943 D   | 4       | 11   | .25   | 32046 DX  | 3       | 9    |        | 38026 DM  | 4       | 17   |       |
| 24961 D   | 4       | 3    | .12   | 32282 DCR | 4       | 4    | 1.65   | 38026 DM  | 8       | 3    | .22   |
| 24962 D   | 4       | 3    | .07   | 32284 DA  | 4       | 4    | 11.40  | 38026 DMX | 4       | 17   |       |
| 24964 D   | 4       | 3    | .09   | 32307 DB  | 4       | 11   | .30    | 38026 DMX | 8       | 3    | .35   |
| 24965 DB  | 4       | 3    | .30   | 32308 D   | 4       | 11   | .03    | 38026 DMX | 8       | 10   |       |
| 25043 DB  | 4       | 3    | 1.25  | 32309 D   | 4       | 11   | .08    | 38411 D   | 8       | 3    | .03   |
| 25076 D   | 4       | 12   | .02   | 32319 D   | 4       | 9    | .03    | 38609 DA  | 3       | 1    | .014  |
| 25082 DD  | 4       | 7    | .85   | 32332 D   | 4       | 11   | .35    | 39361 D   | 5       | 2    | .015  |
| 25083 DCR | 4       | 4    | 1.25  | 32333 D   | 4       | 11   | .12    | 39401 D   | 4       | 11   | 6.00  |
| 25086 DA  | 4       | 7    | .09   | 32349 D   | 2       | 3    | .03    | 39422 D   | 4       | 11   | .03   |
| 25090 DD  | 4       | 3    | 1.25  | 32370 D   | 4       | 8    | .09    | 39423 D   | 4       | 11   | .17   |
| 25091 DA  | 4       | 11   |       | 32444 D   | 4       | 4    | .07    | 39577 DA  | 4       | 18   | 1.35  |
| 25092 DA  | 4       | 11   | .05   | 32445 D   | 4       | 4    | .05    | 39651 D   | 15      | 7    | .15   |
| 25093 DA  | 4       | 11   | .02   | 32447 DA  | 4       | 4    | .25    | 39652 D   | 15      | 7    | .20   |
| 25094 D   | 4       | 11   | .05   | 32448 D   | 4       | 4    | .25    | 39653 D   | 15      | 7    | .25   |
| 25095 D   | 4       | 11   | .45   | 32454 D   | 4       | 4    | .14    | 39654 D   | 15      | 7    | .10   |
| 25096 D   | 4       | 11   | .08   | 32454 D   | 4       | 7    |        | 39655 D   | 15      | 7    | .03   |
| 25115 D   | 11      | 1    | .05   | 32466 DX  | 4       | 3    | 2.05   | 39656 DX  | 15      | 7    | .20   |
| 25130 D   | 4       | 8    | .05   | 32467 DX  | 4       | 3    | 2.05   | 39659 D   | 15      | 7    | .03   |
| 25131 D   | 4       | 8    | .40   | 32468 DX  | 4       | 3    | 2.05   | 39661 D   | 15      | 7    | 1.70  |
| 25132 D   | 4       | 8    | .05   | 32468 DX  | 4       | 4    |        | 39662 D   | 15      | 7    | 2.25  |
| 25134 DA  | 4       | 12   | 5.00  | 32479 D   | 11      | 3    | .17    | 39663 D   | 15      | 7    | .75   |
| 25138 DAX | 4       | 8    | 3.45  | 32482 DB  | 4       | 3    | 2.90   | 39665 D   | 15      | 7    | .08   |
| 25140 DBX | 4       | 8    | 7.90  | 32485 D   | 4       | 3    | .06    | 39677 D   | 4       | 18   | .25   |
| 25323 D   | 4       | 4    | .14   | 32486 DAX | 4       | 3    | 1.60   | 39756 D   | 4       | 7    | .35   |
| 25352 D   | 4       | 13   | .02   | 32493 D   | 8       | 9    | .30    | 39757 D   | 4       | 7    | .20   |
| 25462 DA  | 15      | 8    | 1.15  | 32569 D   | 2       | 2    | .05    | 39761 D   | 4       | 7    | .12   |
| 25463 D   | 15      | 8    | .75   | 32572 DAX | 8       | 7    | .85    | 39762 D   | 4       | 7    | .05   |
| 25466 D   | 15      | 8    | .40   | 32574 D   | 8       | 7    | .05    | 39800 D   | 15      | 7    | .50   |
| 26916 D   | 4       | 11   | .12   | 32575 D   | 8       | 7    | .35    | 39810 D   | 4       | 7    | .45   |
| 27129 DD  | 4       | 3    | .90   |           |         |      |        | 39868 D   | 15      | 7    | 1.30  |

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| 39870 D   | 15      | 7    | \$.05 | 41608 D   | 6       | 3    | \$.05  | 43113 D   | 4       | 11   | \$.45 |
| 39875 D   | 15      | 7    | .15   | 41619 D   | 6       | 4    | .05    | 43189 D   | 8       | 11   | .05   |
| 40216 D   | 8       | 13   | .05   | 41768 D   | 12      | 1    | .17    | 43192 DA  | 8       | 9    | 1.35  |
| 40255 D   | 8       | 13   | .25   | 41827 D   | 3       | 12   | .05    | 43194 D   | 5       | 1    | .70   |
| 40329 DA  | 8       | 19   | .01   | 41830 D   | 3       | 12   | .17    | 43195 D   | 5       | 1    | .16   |
| 40385 D   | 8       | 11   | .45   | 41831 D   | 3       | 12   | .05    | 43197 D   | 5       | 1    | 9.20  |
| 40386 D   | 8       | 11   | 1.90  | 41832 DBX | 3       | 12   | 1.55   | 43197 DX  | 5       | 1    | 14.50 |
| 40388 D   | 8       | 11   | .25   | 41842 D   | 7       | 7    |        | 43198 D   | 5       | 1    | 4.00  |
| 40390 D   | 8       | 11   | .40   | 41842 D   | 7       | 8    | .17    | 43199 D   | 5       | 2    | .10   |
| 40395 D   | 8       | 11   | .25   | 41842 D   | 7       | 9    |        | 43201 DA  | 5       | 1    |       |
| 40397 D   | 8       | 11   | .90   | 41853 DB  | 13      | 1    |        | 43207 D   | 5       | 2    | .65   |
| 40399 DA  | 8       | 13   | .25   | 41935 D   | 12      | 5    | .17    | 43211 D   | 5       | 2    | .10   |
| 40401 D   | 8       | 13   | .15   | 41999 D   | 12      | 5    | .09    | 43247 D   | 5       | 2    | .017  |
| 40465 DX  | 14      | 1    | .17   | 42000 D   | 7       | 3    | .22    | 43248 D   | 5       | 2    | .70   |
| 40466 DX  | 14      | 1    | .17   | 42158 D   | 2       | 1    | .25    | 43664 DA  | 12      | 5    | .75   |
| 40628 D   | 15      | 6    | .15   | 42175 D   | 12      | 1    | .17    | 43712 DB  | 13      | 5    | .03   |
| 40630 D   | 15      | 5    | .35   | 42215 D   | 8       | 8    | .12    | 45001 D   | 3       | 3    | 3.55  |
| 40631 D   | 15      | 6    | .15   | 42219 D   | 4       | 11   | .90    | 45003 D   | 3       | 3    | .03   |
| 40636 D   | 15      | 6    | .20   | 42288 D   | 7       | 3    | 1.10   | 45110 D   | 8       | 7    | .03   |
| 40638 D   | 15      | 5    | .15   | 42289 D   | 7       | 3    |        | 45148 D   | 8       | 7    | .03   |
| 40640 D   | 15      | 6    | .45   | 42289 D   | 9       | 2    | .08    | 45149 D   | 8       | 7    | .03   |
| 40641 L   | 15      | 6    | .45   | 42290 D   | 7       | 3    | .50    | 45285 DA  | 4       | 13   | .30   |
| 40642 D   | 15      | 6    | .20   | 42297 D   | 7       | 3    | .35    | 45286 D   | 4       | 13   | .17   |
| 40644 D   | 15      | 6    | .35   | 42298 DB  | 5       | 1    | .45    | 45293 D   | 6       | 4    | .14   |
| 40646 D   | 15      | 6    | .45   | 42383 D   | 3       | 7    |        | 45391 D   | 11      | 1    |       |
| 40647 D   | 15      | 6    | .05   | 42383 D   | 3       | 8    | 1.10   | 45537 D   | 9       | 2    | .40   |
| 40648 D   | 15      | 6    | 3.00  | 42384 DXA | 8       | 3    | .75    | 45561 D   | 9       | 2    | 1.20  |
| 40649 D   | 15      | 6    | .10   | 42385 D   | 8       | 3    | .05    | 45579 DA  | 15      | 8    | .05   |
| 40652 D   | 15      | 5    | .40   | 42387 D   | 8       | 3    | .55    | 45619 D   | 9       | 2    | 1.10  |
| 40655 D   | 15      | 5    | 1.00  | 42406 D   | 8       | 3    |        | 45620 D   | 9       | 2    | .05   |
| 40656 D   | 15      | 6    | .05   | 42406 DX  | 8       | 3    | .35    | 45794 D   | 12      | 1    | .09   |
| 40657 D   | 15      | 6    | .03   | 42495 D   | 8       | 3    | .40    | 45797 D   | 13      | 1    | .05   |
| 40661 D   | 15      | 6    | .25   | 42496 DX  | 14      | 1    | .40    | 45976 D   | 4       | 8    | .05   |
| 40693 D   | 15      | 6    | .05   | 42511 D   | 14      | 1    | .10    | 45977 D   | 4       | 8    | .05   |
| 40698 D   | 15      | 5    | .05   | 42512 DAX | 14      | 1    | 3.40   | 45982 DX  | 2       | 3    | 2.75  |
| 40700 D   | 15      | 6    | .05   | 42517 D   | 14      | 1    | 1.10   | 45993 D   | 2       | 3    | .50   |
| 40703 D   | 15      | 6    | .03   | 42518 D   | 14      | 1    | .55    | 46053 D   | 4       | 9    | .05   |
| 40711 C   | 15      | 6    | .05   | 42547 D   | 1       | 1    | .85    | 46054 DA  | 4       | 9    | 2.85  |
| 40712 D   | 15      | 6    | .05   | 42605 D   | 2       | 1    | 1.00   | 46059 D   | 8       | 7    | .03   |
| 40713 D   | 15      | 6    | .05   | 42610 D   | 2       | 1    | .85    | 46129 D   | 4       | 8    | .17   |
| 40719 D   | 15      | 5    | .03   | 42611 D   | 2       | 1    | 1.90   | 46184 D   | 8       | 7    | .03   |
| 40725 D   | 15      | 6    | .75   | 42613 D   | 4       | 17   | .17    | 46212 D   | 11      | 3    | .17   |
| 40728 DA  | 15      | 6    | 5.00  | 42687 DX  | 4       | 11   | 22.50  | 46213 D   | 11      | 3    | .17   |
| 40753 D   | 8       | 14   |       | 42687 DY  | 4       | 11   | 25.30  | 46250 D   | 4       | 8    |       |
| 40753 D   | 8       | 15   |       | 42688 DAX | 4       | 12   | 3.70   | 46250 D   | 8       | 10   | .09   |
| 40753 D   | 8       | 18   |       | 42690 DAX | 4       | 12   | 4.30   | 46368 D   | 12      | 1    | .09   |
| 40753 D   | 8       | 19   |       | 42694 D   | 4       | 11   | .55    | 46583 D   | 8       | 10   | .05   |
| 40881 DA  | 12      | 3    |       | 42695 DB  | 4       | 12   |        | 46584 DX  | 8       | 10   | .50   |
| 40882 D   | 12      | 3    | 1.65  | 42717 D   | 4       | 7    | .40    | 46606 DX  | 4       | 13   | .85   |
| 40883 DB  | 12      | 3    | 3.30  | 42733 D   | 4       | 7    | .12    | 46785 D   | 3       | 2    | .007  |
| 40940 D   | 6       | 3    | 10.30 | 42739 DA  | 4       | 15   |        | 47244 D   | 9       | 1    | .03   |
| 40942 DX  | 5       | 1    | 4.40  | 42739 DA  | 11      | 3    | .17    | 47294 D   | 3       | 2    | .12   |
| 40943 D   | 5       | 1    | 1.10  | 42746 D   | 11      | 3    | .60    | 47408 D   | 3       | 1    | .07   |
| 40945 D   | 5       | 2    | .35   | 42747 D   | 4       | 3    | 2.30   | 47409 D   | 3       | 2    | .03   |
| 40974 DA  | 5       | 1    | .09   | 42748 D   | 4       | 3    | .22    | 47413 DX  | 3       | 1    | 1.70  |
| 40998 DA  | 7       | 3    | .30   | 42749 D   | 11      | 3    | 1.70   | 47413 DY  | 3       | 1    | 1.75  |
| 41162 D   | 7       | 3    | .07   | 42750 D   | 11      | 3    | .85    | 47417 DX  | 3       | 1    | .55   |
| 41491 D   | 12      | 5    | .17   | 42765 DA  | 8       | 9    | 3.25   | 47424 D   | 3       | 1    | .03   |
| 41493 D   | 12      | 5    | .17   | 42766 D   | 8       | 9    | 1.60   | 47425 DX  | 3       | 1    | .35   |
| 41495 D   | 12      | 5    | .30   | 42767 D   | 8       | 9    | .05    | 47425 DY  | 3       | 1    | .40   |
| 41496 D   | 12      | 5    | .05   | 42772 D   | 8       | 8    | .30    | 47427 D   | 3       | 1    | .03   |
| 41497 D   | 12      | 5    | .05   | 42791 DA  | 4       | 9    | 1.35   | 47428 D   | 3       | 1    | .05   |
| 41498 D   | 12      | 5    | .09   | 42833 D   | 3       | 7    |        | 47431 DB  | 3       | 1    | 1.00  |
| 41499 D   | 12      | 5    | .30   | 42833 D   | 3       | 9    | 1.35   | 47432 D   | 3       | 2    | .12   |
| 41501 D   | 12      | 5    | .30   | 42877 D   | 4       | 5    | .22    | 47453 DX  | 3       | 2    | .12   |
| 41508 D   | 12      | 5    | .17   | 42879 D   | 4       | 5    | .12    | 47438 DA  | 3       | 2    | .12   |
| 41509 D   | 12      | 5    | .05   | 42915 D   | 3       | 8    | .12    | 47439 DAX | 3       | 1    | 7.15  |
| 41512 DA  | 12      | 5    | .70   | 42916 D   | 3       | 8    | .09    | 47442 D   | 3       | 2    | .03   |
| 41519 D   | 12      | 5    | .03   | 42917 D   | 3       | 7    |        | 47449 DAY | 3       | 1    | .90   |
| 41521 D   | 12      | 5    | .17   | 42917 D   | 3       | 8    | .17    | 47452 D   | 3       | 1    | .05   |
| 41522 D   | 12      | 5    | .17   | 42921 D   | 3       | 8    |        | 47453 D   | 3       | 1    | .05   |
| 41523 D   | 12      | 5    | .17   | 42921 D   | 3       | 10   | .30    | 47454 D   | 3       | 1    | .03   |
| 41524 D   | 12      | 5    | 1.65  | 42981 DA  | 11      | 1    | .40    | 47461 D   | 3       | 2    | .025  |
| 41574 DCX | 8       | 2    | 5.50  | 42998 D   | 3       | 5    | 2.20   | 47462 D   | 3       | 2    | .03   |
| 41597 D   | 5       | 2    |       | 43002 D   | 8       | 9    | .12    | 47464 D   | 3       | 2    | .07   |
| 41597 D   | 11      | 2    |       | 43026 DB  | 4       | 12   | 109.50 | 47465 D   | 3       | 2    | .05   |
| 41597 D   | 12      | 1    | .15   | 43035 D   | 3       | 6    |        | 47468 D   | 3       | 2    | .03   |
| 41597 D   | 14      | 1    |       | 43035 D   | 3       | 7    | 15.60  | 47470 D   | 3       | 2    | .12   |
| 41598 D   | 7       | 3    | .30   | 43035 D   | 3       | 8    |        | 47473 D   | 3       | 2    | .05   |
| 41599 D   | 7       | 3    | .17   | 43039 D   | 3       | 11   | .12    | 47474 D   | 3       | 2    | .03   |
| 41600 D   | 7       | 3    | .05   | 43040 D   | 3       | 11   | .17    | 47475 DA  | 3       | 2    | .17   |

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| 47487 D   | 4       | 11   | \$.088 | 49791 D   | 3       | 1    | \$.03 | 50129 DA  | 2       | 1    | \$52.25 |
| 47487 D   | 9       | 1    | .088   | 49801 D   | 6       | 3    | .17   | 50130 DC  | 2       | 1    | 124.50  |
| 47490 D   | 9       | 1    | .17    | 49802 D   | 6       | 4    | .05   | 50134 D   | 2       | 1    | .09     |
| 47576 D   | 13      | 1    | .50    | 49816 D   | 7       | 7    | 13.85 | 50135 D   | 2       | 1    | .35     |
| 47772 D   | 7       | 10   | .05    | 49817 D   | 7       | 7    | 13.85 | 50136 D   | 2       | 1    | .30     |
| 47822 D   | 3       | 2    | .22    | 49818 D   | 7       | 7    | 12.65 | 50137 D   | 2       | 1    | .35     |
| 47868 DX  | 3       | 12   | 2.75   | 49819 D   | 7       | 7    | 11.20 | 50138 DX  | 2       | 1    | .40     |
| 48138 D   | 4       | 8    | .12    | 49820 D   | 7       | 7    | 10.80 | 50139 D   | 2       | 1    | 2.45    |
| 48173 D   | 5       | 1    | 10.00  | 49821 D   | 7       | 7    | 8.80  | 50140 D   | 2       | 1    | 2.45    |
| 48231 D   | 8       | 3    | 1.80   | 49835 D   | 7       | 9    | .14   | 50144 D   | 2       | 1    | 1.35    |
| 48232 D   | 8       | 3    | .55    | 49836 D   | 7       | 9    | .03   | 50145 DA  | 2       | 1    | 12.65   |
| 48233 D   | 8       | 3    | .45    | 49837 D   | 7       | 9    | .03   | 50148 D   | 8       | 3    | .85     |
| 48234 D   | 8       | 3    | 1.60   | 49838 D   | 7       | 9    | .03   | 50160 DBX | 8       | 3    | 63.25   |
| 48339 D   | 3       | 2    | .03    | 49839 D   | 7       | 9    | .05   | 50165 DX  | 4       | 17   | 34.00   |
| 48340 DA  | 3       | 2    | .05    | 49840 D   | 7       | 9    | .03   | 50166 D   | 4       | 17   | .35     |
| 48341 D   | 3       | 2    | .12    | 49841 D   | 7       | 9    | .05   | 50234 D   | 3       | 12   | .08     |
| 48342 DA  | 3       | 2    | .03    | 49848 D   | 12      | 2    | .17   | 50235 D   | 3       | 12   | .08     |
| 48356 D   | 11      | 1    | .35    | 49849 D   | 6       | 1    | .65   | 50273 D   | 2       | 3    | .05     |
| 48358 D   | 11      | 1    | .17    | 49850 D   | 6       | 1    | .07   | 50283 DAR | 4       | 4    | 1.25    |
| 48359 D   | 11      | 1    | .22    | 49857 D   | 6       | 3    | 2.20  | 50315 D   | 4       | 11   | 3.55    |
| 48472 D   | 3       | 1    | .03    | 49864 D   | 6       | 3    | 1.35  | 50357 D   | 4       | 7    | .55     |
| 48756 DA  | 4       | 12   | 5.10   | 49868 D   | 6       | 3    | 3.15  | 50360 D   | 3       | 3    | .12     |
| 48757 D   | 4       | 12   | 5.10   | 49876 D   | 6       | 3    | 24.60 | 50362 DX  | 4       | 7    | 10.80   |
| 48759 D   | 4       | 11   | 5.75   | 49879 DA  | 6       | 3    | .30   | 50363 DAR | 4       | 7    | 10.15   |
| 48760 DA  | 4       | 12   |        | 49882 D   | 6       | 3    | .22   | 50371 D   | 4       | 9    | 9.00    |
| 48761 D   | 4       | 12   | 6.25   | 49962 D   | 12      | 5    | .85   | 50372 DX  | 4       | 9    | 2.75    |
| 48763 D   | 4       | 11   | 8.25   | 49963 D   | 12      | 5    | .17   | 50374 D   | 4       | 9    | 3.70    |
| 48906 D   | 11      | 2    | .17    | 49964 D   | 12      | 5    | 1.20  | 50375 D   | 4       | 9    | 3.00    |
| 48921 D   | 4       | 17   | .95    | 49965 D   | 12      | 5    | 1.20  | 50376 D   | 4       | 9    | .05     |
| 49026 D   | 4       | 7    | .05    | 49966 D   | 12      | 5    | .70   | 50377 DX  | 4       | 9    | 1.90    |
| 49090 DXR | 3       | 1    | 9.65   | 49970 D   | 12      | 5    | .17   | 50379 DAX | 4       | 9    | 1.10    |
| 49091 DX  | 3       | 2    | 1.65   | 49971 DD  | 5       | 1    |       | 50392 D   | 5       | 2    | 30.25   |
| 49091 DY  | 3       | 2    | 2.55   | 49973 DA  | 5       | 1    | 6.35  | 50408 D   | 4       | 7    | .03     |
| 49091 DZ  | 3       | 2    | 4.65   | 49974 D   | 5       | 1    | 4.15  | 50410 DA  | 4       | 4    |         |
| 49092 D   | 3       | 2    | .45    | 49975 D   | 5       | 1    |       | 50410 DA  | 4       | 7    |         |
| 49093 DX  | 3       | 2    | 1.65   | 49975 D   | 5       | 2    | .22   | 50410 DA  | 4       | 13   | .09     |
| 49094 D   | 3       | 1    |        | 49976 DA  | 5       | 2    | .10   | 50411 D   | 4       | 8    | .12     |
| 49094 D   | 3       | 3    | 37.50  | 49977 D   | 5       | 1    | 2.20  | 50412 D   | 8       | 10   | 2.75    |
| 49125 D   | 3       | 1    | .12    | 49978 D   | 12      | 5    | .95   | 50423 DX  | 5       | 2    | 11.50   |
| 49359 D   | 3       | 4    | .25    | 49983 D   | 7       | 10   | .95   | 50424 D   | 5       | 2    | .10     |
| 49416 DX  | 3       | 1    | .30    | 49984 D   | 7       | 10   | 11.50 | 50426 DA  | 5       | 2    | 12.25   |
| 49417 D   | 3       | 1    | .03    | 49986 D   | 7       | 10   | 1.45  | 50427 DE  | 5       | 1    | 102.00  |
| 49418 D   | 3       | 1    | .03    | 49987 D   | 7       | 10   | 1.10  | 50432 DAX | 5       | 1    | 9.60    |
| 49419 D   | 3       | 1    | .03    | 49997 D   | 7       | 3    | .12   | 50478 D   | 4       | 7    | .17     |
| 49420 DX  | 3       | 1    | 1.35   | 49998 D   | 7       | 3    | .17   | 50486 D   | 4       | 8    | .30     |
| 49423 D   | 3       | 1    | .03    | 49999 D   | 7       | 1    | .22   | 50487 DX  | 4       | 7    | 8.65    |
| 49424 D   | 3       | 1    | .05    | 50001 D   | 14      | 2    | .35   | 50504 D   | 4       | 13   |         |
| 49464 DA  | 4       | 17   | 1.85   | 50004 D   | 14      | 2    | .95   | 50510 D   | 15      | 1    |         |
| 49593 D   | 3       | 1    | .12    | 50006 DA  | 14      | 2    | 1.50  | 50511 DX  | 10      | 3    | 2.45    |
| 49728 D   | 13      | 4    | 3.85   | 50009 D   | 14      | 2    | .12   | 50512 DX  | 10      | 2    | 2.45    |
| 49729 DA  | 7       | 5    | 31.00  | 50010 DB  | 14      | 2    | .12   | 50513 D   | 10      | 3    | 1.00    |
| 49732 D   | 7       | 5    | .17    | 50011 DB  | 14      | 2    | .12   | 50514 D   | 10      | 3    | 1.00    |
| 49733 DA  | 7       | 5    | 2.60   | 50012 DB  | 14      | 2    | .12   | 50515 D   | 10      | 2    | 1.00    |
| 49734 D   | 13      | 3    |        | 50013 DB  | 14      | 2    | .08   | 50516 D   | 10      | 3    | 6.00    |
| 49734 D   | 13      | 4    | .22    | 50015 D   | 14      | 2    | .65   | 50517 D   | 10      | 2    | 6.00    |
| 49735 D   | 13      | 1    | .70    | 50016 D   | 14      | 2    | 20.65 | 50518 DX  | 10      | 3    | 4.15    |
| 49736 D   | 13      | 1    | .12    | 50017 D   | 14      | 2    | 4.85  | 50519 DX  | 10      | 2    | 4.15    |
| 49738 DX  | 13      | 1    | 2.65   | 50018 D   | 14      | 2    | .14   | 50520 DX  | 10      | 3    | 1.65    |
| 49739 D   | 13      | 1    | .17    | 50021 D   | 14      | 2    | .17   | 50521 D   | 10      | 3    | .85     |
| 49740 D   | 13      | 1    | 10.75  | 50023 D   | 14      | 2    | .03   | 50523 D   | 15      | 8    | 2.75    |
| 49741 DAX | 13      | 1    |        | 50025 D   | 14      | 1    | .30   | 50524 D   | 10      | 2    | 16.00   |
| 49741 DAX | 13      | 3    | .85    | 50026 D   | 14      | 1    | .22   | 50525 D   | 10      | 3    | 16.00   |
| 49745 D   | 13      | 3    | 20.00  | 50027 D   | 14      | 1    | .12   | 50527 DX  | 4       | 17   | 3.30    |
| 49746 D   | 13      | 3    | 21.30  | 50082 D   | 14      | 1    | 1.00  | 50528 D   | 4       | 17   | .12     |
| 49748 DX  | 13      | 3    | 3.00   | 50083 D   | 14      | 2    | .09   | 50529 D   | 4       | 17   | .09     |
| 49749 D   | 13      | 3    | .14    | 50085 D   | 14      | 1    | .22   | 50532 D   | 4       | 17   | .40     |
| 49759 D   | 13      | 5    | .85    | 50087 D   | 14      | 2    | .07   | 50533 D   | 4       | 17   | .55     |
| 49760 D   | 13      | 5    | 1.50   | 50088 D   | 14      | 2    | .65   | 50607 D   | 8       | 3    |         |
| 49761 DA  | 13      | 5    | .70    | 50090 DB  | 14      | 2    | 1.10  | 50607 DX  | 8       | 3    | .60     |
| 49762 DA  | 13      | 5    | .088   | 50091 DAX | 4       | 19   | 2.25  | 50607 DX  | 8       | 10   |         |
| 49763 D   | 6       | 4    | .044   | 50092 D   | 15      | 8    | .22   | 50620 D   | 8       | 9    | 14.30   |
| 49768 D   | 7       | 1    | 3.15   | 50096 DA  | 12      | 3    | .45   | 50621 DX  | 8       | 9    | 3.65    |
| 49769 D   | 7       | 1    | .17    | 50098 DA  | 12      | 3    | .30   | 50622 DX  | 8       | 9    | 3.65    |
| 49771 DXA | 7       | 1    | 13.00  | 50098 DAX | 12      | 3    | .35   | 50623 DX  | 8       | 9    | 3.65    |
| 49773 D   | 7       | 7    | .50    | 50099 D   | 12      | 3    | .22   | 50624 DX  | 8       | 9    | 3.65    |
| 49775 D   | 7       | 7    | 69.50  | 50103 DA  | 12      | 2    | .03   | 50626 D   | 8       | 9    | .09     |
| 49776 D   | 7       | 7    | 1.75   | 50104 D   | 12      | 3    | 2.75  | 50664 D   | 4       | 4    | .07     |
| 49777 D   | 7       | 7    | 3.00   | 50117 DXA | 1       | 1    | 5.75  | 50665 DX  | 4       | 3    | 3.00    |
| 49778 D   | 7       | 7    | .17    | 50124 D   | 4       | 19   | .35   | 50668 D   | 4       | 4    | .03     |
| 49779 DX  | 7       | 7    | .25    | 50125 D   | 4       | 19   | 1.20  | 50669 D   | 4       | 4    | .22     |
|           |         |      |        | 50126 D   | 2       | 1    | .25   | 50670 DX  | 11      | 3    | 6.85    |

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| 50672 D   | 11      | 3    | \$.22 | 52332 D   | 6       | 4    | \$81.50 | 53387 DX  | 8       | 8    | \$.35  |
| 50673 D   | 11      | 3    | .90   | 52336 DA  | 7       | 9    | 44.00   | 53388 DX  | 8       | 8    | .35    |
| 50674 D   | 11      | 3    | .09   | 52337 DA  | 7       | 9    | 44.00   | 53389 D   | 12      | 3    | 5.25   |
| 50675 DA  | 4       | 3    | 2.10  | 52343 DB  | 12      | 2    | 104.50  | 53401 DX  | 4       | 12   | 137.50 |
| 50677 D   | 4       | 4    | .07   | 52344 DA  | 12      | 3    | 12.95   | 53402 DX  | 4       | 12   | 137.50 |
| 50677 D   | 4       | 14   |       | 52345 D   | 12      | 2    | 8.00    | 53410 DX  | 11      | 1    | 2.20   |
| 50678 D   | 11      | 3    | .22   | 52347 DA  | 6       | 3    | 30.25   | 53411 D   | 11      | 1    | .05    |
| 50682 D   | 8       | 8    | .12   | 52348 D   | 6       | 3    | 1.90    | 53413 D   | 11      | 3    | .70    |
| 50683 D   | 8       | 8    |       | 52350 DA  | 13      | 5    |         | 53414 DX  | 11      | 1    | .60    |
| 50683 DX  | 8       | 8    | .45   | 52351 DA  | 13      | 5    |         | 53415 DX  | 11      | 1    | .60    |
| 50687 D   | 4       | 14   | .18   | 52352 DA  | 13      | 5    | 1.20    | 53416 D   | 11      | 1    | .55    |
| 50688 D   | 4       | 14   | .15   | 52357 DX  | 6       | 4    | 10.75   | 53417 D   | 11      | 1    | 1.65   |
| 50688 D   | 4       | 15   |       | 52362 DB  | 7       | 5    | 93.50   | 53438 DA  | 6       | 3    | 16.50  |
| 50689 D   | 4       | 14   | .20   | 52363 DB  | 7       | 5    | 93.50   | 53439 D   | 6       | 3    | 1.25   |
| 50689 D   | 4       | 15   |       | 52364 D   | 7       | 5    | 36.00   | 53440 D   | 6       | 3    | 6.60   |
| 50697 D   | 4       | 15   | .45   | 52364 D   | 13      | 3    |         | 37.50     | 53444 D | 6    | 3      |
| 50698 D   | 4       | 15   | 1.05  | 52365 D   | 7       | 5    | 53446 D |           | 6       | 4    | 2.75   |
| 50705 D   | 4       | 15   | .05   | 52365 D   | 13      | 3    | .17     | 53447 D   | 6       | 4    | .17    |
| 50772 DX  | 1       | 1    | .60   | 52366 D   | 13      | 3    |         | 53447 D   | 6       | 4    |        |
| 50784 D   | 3       | 10   | .90   | 52367 D   | 13      | 3    | 10.45   | 53448 D   | 6       | 4    | .55    |
| 50790 D   | 2       | 3    | .05   | 52372 DA  | 14      | 2    | 1.05    | 53449 D   | 6       | 4    | 3.85   |
| 50801 D   | 8       | 7    | .55   | 52374 D   | 14      | 2    | 9.35    | 53450 D   | 6       | 4    | 2.25   |
| 50802 D   | 8       | 7    | .17   | 52375 D   | 14      | 1    | 9.35    | 53451 D   | 6       | 4    | .35    |
| 50803 D   | 8       | 7    | .05   | 52376 DX  | 14      | 1    | 21.75   | 53455 D   | 6       | 3    | 2.75   |
| 50807 D   | 8       | 7    | .09   | 52377 D   | 14      | 2    | 4.65    | 53456 D   | 6       | 4    | 2.45   |
| 50822 D   | 12      | 2    | .05   | 52378 D   | 14      | 2    | 7.45    | 53457 D   | 5       | 1    | 8.80   |
| 50826 D   | 4       | 7    | .12   | 52379 D   | 14      | 1    | 17.85   | 53458 DD  | 8       | 7    | 25.30  |
| 50827 D   | 11      | 1    | .17   | 52380 D   | 14      | 1    | 11.95   | 53459 DA  | 8       | 7    | .05    |
| 50829 D   | 4       | 7    | .12   | 52381 D   | 14      | 1    | 10.75   | 53560 D   | 4       | 7    | .09    |
| 50841 DX  | 13      | 2    | 5.00  | 52382 D   | 14      | 2    | 16.80   | 53612 D   | 4       | 11   | 1.55   |
| 50842 DX  | 13      | 2    | 5.00  | 52384 D   | 14      | 2    | 1.35    | 53613 DA  | 6       | 4    | 1.90   |
| 50873 D   | 15      | 2    | 3.55  | 52386 D   | 14      | 2    | 36.40   | 53643 D   | 4       | 7    | .07    |
| 50874 D   | 15      | 2    | 3.55  | 52387 D   | 7       | 3    | .09     | 53672 DX  | 4       | 15   | 1.55   |
| 50877 DAX | 15      | 2    | 4.15  | 52389 D   | 8       | 3    | 1.80    | 53673 DX  | 4       | 15   | 1.55   |
| 50880 D   | 4       | 5    | 27.35 | 52390 D   | 10      | 3    | 2.85    | 53675 D   | 6       | 1    | 5.35   |
| 50891 D   | 3       | 5    | 1.45  | 52392 D   | 7       | 3    | .85     | 53709 D   | 14      | 2    | .14    |
| 50892 DA  | 3       | 5    | .17   | 52394 D   | 7       | 1    | 18.45   | 53710 D   | 14      | 2    | 2.45   |
| 50893 D   | 3       | 5    | .70   | 52395 D   | 7       | 1    | 18.45   | 53717 DA  | 14      | 1    | .12    |
| 50894 D   | 3       | 7    | 2.75  | 52396 D   | 6       | 1    | .12     | 53836 D   | 8       | 7    | .30    |
| 50894 D   | 3       | 9    |       | 52397 D   | 6       | 1    | .12     | 53837 DX  | 8       | 7    | .22    |
| 50895 D   | 3       | 5    |       | 52398 D   | 6       | 1    | .14     | 53840 D   | 8       | 7    | .12    |
| 50895 D   | 3       | 7    |       | 52399 DA  | 6       | 1    | .10     | 53872 D   | 4       | 8    | 1.05   |
| 50895 D   | 3       | 8    |       | 52401 D   | 6       | 1    | 46.50   | 53973 D   | 7       | 10   | 24.75  |
| 50897 D   | 3       | 7    | 2.00  | 52403 D   | 11      | 2    | .45     | 53976 D   | 7       | 10   | .40    |
| 50897 D   | 3       | 9    |       | 52404 D   | 11      | 2    | .17     | 53977 D   | 7       | 10   | .45    |
| 50899 D   | 3       | 7    | 2.05  | 52405 D   | 11      | 2    | .17     | 53992 DAX | 7       | 5    | 12.35  |
| 50899 D   | 3       | 9    |       | 52406 D   | 11      | 2    | .22     | 53993 DAX | 7       | 5    | 12.35  |
| 50905 DAX | 9       | 2    | 16.25 | 52407 D   | 11      | 2    | .55     | 53994 DAX | 7       | 5    | 14.85  |
| 50917 D   | 4       | 14   | 4.15  | 52408 DC  | 1       | 1    | 14.55   | 53995 DAX | 7       | 5    | 14.95  |
| 51066 DBX | 8       | 4    | 1.65  | 52412 DAX | 15      | 1    | 12.65   | 54044 D   | 3       | 8    | 1.50   |
| 51074 DC  | 13      | 5    | 2.75  | 52419 D   | 6       | 3    | .05     | 54064 D   | 3       | 8    | .55    |
| 51205 D   | 4       | 13   | .17   | 52435 D   | 3       | 12   | .12     | 54086 D   | 11      | 1    | 1.00   |
| 51223 D   | 4       | 9    | .05   | 52514 D   | 4       | 15   | .03     | 54110 D   | 6       | 4    | .03    |
| 51234 DA  | 4       | 15   |       | 52515 DA  | 4       | 15   | .22     | 54118 D   | 15      | 3    | 7.45   |
| 51268 D   | 9       | 1    | .35   | 52519 D   | 4       | 15   | .17     | 54119 D   | 15      | 3    | 7.45   |
| 51269 D   | 9       | 1    | .12   | 52520 D   | 4       | 15   | .05     | 54121 D   | 15      | 3    | .35    |
| 51271 D   | 9       | 1    | .22   | 52605 D   | 4       | 7    | .09     | 54124 D   | 11      | 1    | .17    |
| 51329 D   | 11      | 1    | .05   | 52606 D   | 4       | 7    | .03     | 54125 D   | 11      | 1    | .12    |
| 51431 DX  | 12      | 3    | .70   | 52612 D   | 8       | 9    | 2.75    | 54158 D   | 4       | 4    | .17    |
| 51515 D   | 4       | 9    | 2.45  | 52613 D   | 8       | 9    | 13.75   | 54259 D   | 4       | 17   | 22.00  |
| 51516 D   | 4       | 9    | 2.45  | 52621 DX  | 11      | 1    | 1.10    | 54267 D   | 4       | 17   | 3.30   |
| 51527 D   | 8       | 5    | .03   | 52623 D   | 11      | 1    | .05     | 54290 D   | 8       | 10   | .10    |
| 51554 D   | 6       | 1    | .17   | 52624 D   | 11      | 1    | .12     | 54290 D   | 8       | 13   |        |
| 51610 DB  | 5       | 2    | 16.75 | 52626 D   | 11      | 1    | 1.05    | 54291 D   | 8       | 14   | .05    |
| 51611 DA  | 5       | 1    | 39.50 | 52855 D   | 8       | 4    | .30     | 54293 D   | 8       | 13   | 1.70   |
| 51666 D   | 3       | 1    | .12   | 53031 D   | 1       | 1    | .003    | 54294 DAX | 8       | 13   | 3.50   |
| 51667 D   | 3       | 2    | .03   | 53079 D   | 8       | 7    | 1.00    | 54295 D   | 8       | 13   | .60    |
| 51704 D   | 8       | 7    | .07   | 53083 D   | 4       | 15   | .60     | 54296 D   | 8       | 13   | .05    |
| 51887 D   | 3       | 10   | 5.50  | 53136 D   | 8       | 8    |         | 54297 D   | 8       | 13   | .05    |
| 51888 D   | 3       | 10   | 3.00  | 53187 D   | 15      | 6    | .75     | 54298 D   | 8       | 13   | .05    |
| 51889 D   | 3       | 10   | 2.00  | 53189 D   | 15      | 5    | 1.25    | 54299 D   | 8       | 14   | .25    |
| 51891 D   | 3       | 10   | 1.00  | 53192 D   | 15      | 6    | 11.00   | 54306 D   | 8       | 14   | .20    |
| 51892 D   | 3       | 10   | .05   | 53193 D   | 15      | 5    | 1.25    | 54320 D   | 8       | 13   | 1.25   |
| 51893 D   | 3       | 10   | .50   | 53196 D   | 15      | 6    | .75     | 54326 D   | 8       | 13   | 3.60   |
| 51894 D   | 3       | 10   | 1.00  | 53233 D   | 12      | 3    | 20.00   | 54329 D   | 8       | 13   | .30    |
| 51895 D   | 3       | 10   | .20   | 53262 D   | 3       | 4    | .45     | 54330 D   | 8       | 14   | .95    |
| 51898 D   | 3       | 10   | .05   | 53262 D   | 4       | 15   |         | 54331 D   | 8       | 14   | .90    |
| 51970 D   | 3       | 10   | .15   | 53263 DA  | 3       | 4    | 1.75    | 54332 D   | 8       | 14   | .05    |
| 52033 D   | 2       | 1    | .011  | 53264 D   | 3       | 3    | 2.75    | 54333 DA  | 8       | 15   | .95    |
| 52128 D   | 8       | 10   | .05   | 53380 D   | 4       | 3    | 21.50   | 54334 D   | 8       | 14   | .40    |
| 52176 DC  | 11      | 1    | .25   | 53386 DX  | 8       | 8    | .40     |           |         |      |        |

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| 54335 D   | 8       | 15   | \$.95 | 56471 D    | 14      | 2    | \$7.25 | 60204 DA  | 13      | 5    | \$8.80 |
| 54337 D   | 8       | 13   | 11.00 | 56472 D    | 14      | 1    | 27.50  | 60266 D   | 12      | 5    | .17    |
| 54345 D   | 8       | 15   | 4.20  | 56475 D    | 12      | 5    | .09    | 60267 DA  | 12      | 5    | 10.15  |
| 54346 D   | 8       | 15   | .20   | 56476 D    | 12      | 5    | .07    | 60430 DX  | 8       | 3    |        |
| 54347 D   | 8       | 15   | .10   | 56478 D    | 12      | 5    | .22    | 60430 DX  | 8       | 10   | .70    |
| 54348 DAX | 8       | 15   | 2.90  | 56537 DX   | 8       | 7    | .65    | 60740 D   | 8       | 18   | 1.40   |
| 54349 D   | 8       | 15   | .25   | 56538 DX   | 8       | 7    | .65    | 60805 D   | 1       | 1    | .10    |
| 54350 D   | 8       | 15   | .45   | 56542 DX   | 8       | 7    | .12    | 60870 D   | 8       | 2    |        |
| 54351 D   | 8       | 15   | .30   | 56679 D    | 8       | 7    | .35    | 60870 D   | 8       | 5    | 5.50   |
| 54364 DB  | 8       | 11   | .05   | 56996 D    | 5       | 2    |        | 60871 D   | 8       | 5    |        |
| 54365 D   | 8       | 11   | 1.25  | 57055 DX   | 3       | 7    |        | 60872 D   | 8       | 5    | .95    |
| 54366 D   | 8       | 11   | .90   | 57055 DX   | 3       | 9    | .40    | 60876 D   | 8       | 5    | .03    |
| 54367 D   | 8       | 11   | .45   | 57056 D    | 3       | 7    |        | 60877 D   | 8       | 5    | .15    |
| 54370 D   | 8       | 11   | .75   | 57056 D    | 3       | 9    | 2.60   | 60878 DX  | 8       | 5    | .95    |
| 54371 D   | 8       | 11   | .10   | 57056 D    | 3       | 12   |        | 60912 DNS | 3       | 7    |        |
| 54372 DB  | 8       | 13   | 3.10  | 57068 D    | 4       | 17   |        | 60912 DNS | 3       | 12   | 36.75  |
| 54373 DB  | 8       | 13   | 2.30  | 57068 DX   | 4       | 17   | .40    | 60938 D   | 3       | 7    |        |
| 54374 D   | 8       | 13   | .40   | 57236 D    | 7       | 9    | 8.50   | 60938 D   | 3       | 8    |        |
| 54411 D   | 8       | 14   | .05   | 57240 D    | 7       | 9    | 3.85   | 61111 D   | 8       | 11   | .10    |
| 54412 D   | 8       | 14   | .05   | 57245 D    | 2       | 2    | 38.00  | 61115 D   | 5       | 2    | .07    |
| 54413 D   | 8       | 14   | .05   | 57288 D    | 12      | 1    | .35    | 61127 D   | 5       | 2    | .15    |
| 54416 D   | 8       | 14   | .60   | 57307 D    | 15      | 8    | 6.50   | 61131 D   | 5       | 1    | .25    |
| 54434 D   | 8       | 19   | .15   | 57311 DX   | 3       | 7    |        | 61208 D   | 8       | 9    | .05    |
| 54435 D   | 8       | 19   | .15   | 57311 DX   | 3       | 8    |        | 61209 D   | 8       | 9    | .05    |
| 54462 D   | 8       | 19   | .10   | 57311 DX   | 3       | 11   |        | 61613 D   | 7       | 7    | 1.60   |
| 54481 D   | 8       | 15   | .10   | 57312 D    | 3       | 11   | .03    | 61645 D   | 3       | 9    | .25    |
| 54486 D   | 8       | 4    | .95   | 57313 D    | 3       | 11   | .12    | 61732 D   | 15      | 5    | .25    |
| 54491 DB  | 12      | 3    | 4.15  | 57314 D    | 3       | 2    | .17    | 61733 D   | 15      | 5    | .50    |
| 54520 DX  | 4       | 17   | .65   | 57384 D    | 7       | 3    | .35    | 61735 D   | 15      | 5    | .30    |
| 54652 D   | 12      | 3    | .12   | 57385 D    | 7       | 3    | .35    | 61736 D   | 15      | 5    | 5.50   |
| 54692 DA  | 8       | 8    | 3.55  | 57484 D    | 4       | 9    | 30.55  | 61737 D   | 15      | 5    | 2.00   |
| 54857 DA  | 3       | 5    | .95   | 57503 DX   | 8       | 15   | .45    | 61738 D   | 15      | 5    | 1.40   |
| 54953 D   | 5       | 2    | .05   | 57715 D    | 9       | 1    | .05    | 61739 D   | 15      | 5    | 1.00   |
| 54964 D   | 4       | 15   | .07   | 57733 D    | 13      | 1    | .17    | 61740 D   | 15      | 5    | 2.00   |
| 54968 D   | 12      | 3    | .12   | 57750 D    | 12      | 3    | .03    | 61808 D   | 4       | 3    | .70    |
| 55015 D   | 3       | 1    | .03   | 57790 D    | 15      | 8    | 6.60   | 61813 D   | 3       | 7    |        |
| 55338 D   | 7       | 9    | .30   | 57926 DX   | 3       | 1    | 6.35   | 61813 D   | 3       | 8    | .10    |
| 55354 D   | 11      | 1    |       | 58253 D    | 4       | 4    | .17    | 61909 D   | 8       | 13   |        |
| 55361 D   | 8       | 13   | .10   | 58458 D    | 4       | 3    | .05    | 61911 D   | 8       | 13   | 14.60  |
| 55371 DAX | 5       | 1    | 10.80 | 58835 D    | 8       | 7    | .09    | 61917 D   | 8       | 15   | .10    |
| 55428 DA  | 8       | 18   | .05   | 58836 D    | 8       | 7    | .05    | 61918 DX  | 8       | 15   | 53.50  |
| 55445 D   | 7       | 5    | 2.75  | 58837 D    | 8       | 7    | .07    | 61956 D   | 8       | 15   | .10    |
| 55446 D   | 7       | 5    | .05   | 58840 DX   | 8       | 7    | .35    | 61957 D   | 8       | 15   | .10    |
| 55467 D   | 3       | 7    |       | 58843 DX   | 8       | 7    | .40    | 61958 D   | 8       | 15   | .15    |
| 55467 D   | 3       | 12   |       | 58859 DX   | 8       | 7    | .45    | 61959 DX  | 8       | 14   | .30    |
| 55479 D   | 15      | 5    | .12   | 58920 DAX  | 15      | 8    | .85    | 61962 D   | 8       | 15   | .15    |
| 55748 D   | 11      | 2    | .07   | 58997 D    | 4       | 7    | .55    | 61963 D   | 8       | 14   | 3.65   |
| 55749 DAX | 4       | 17   | .90   | 58997 D    | 6       | 3    |        | 61965 D   | 8       | 14   | .25    |
| 55750 D   | 11      | 2    | .35   | 59119 D    | 7       | 3    | .85    | 61969 D   | 8       | 14   | .05    |
| 55752 D   | 1       | 1    |       | 59241 D4   | 8       | 7    |        | 61970 D   | 8       | 15   | .10    |
| 55752 D   | 3       | 8    | .40   | 59480 D    | 4       | 7    | .17    | 62115 D   | 8       | 14   | .90    |
| 55780 DA  | 3       | 3    | .05   | 59481 D    | 4       | 8    | .05    | 62118 D   | 8       | 14   | .10    |
| 55806 D   | 14      | 2    | 8.80  | 59482 D    | 4       | 7    | .17    | 62120 D   | 8       | 14   | .05    |
| 55855 D   | 3       | 1    | .03   | 59483 D    | 4       | 7    | .35    | 62121 D   | 8       | 14   | .15    |
| 56005 D   | 12      | 3    | .90   | 59484 D    | 4       | 8    | .20    | 62123 D   | 8       | 14   | .05    |
| 56006 D   | 12      | 3    | .09   | 59485 D    | 4       | 7    | .35    | 62124 D   | 8       | 15   | .50    |
| 56007 D   | 12      | 3    | .30   | 59541 D    | 7       | 8    | .35    | 62125 D   | 8       | 11   | 18.75  |
| 56008 D   | 12      | 3    | .05   | 59542 D    | 7       | 8    | .15    | 62126 DY  | 8       | 11   | 10.40  |
| 56009 D   | 12      | 3    | .05   | 59543 D    | 7       | 8    | .15    | 62129 D   | 8       | 11   | .05    |
| 56010 D   | 12      | 3    | .22   | 59544 D    | 7       | 8    | .12    | 62159 D   | 15      | 5    | .75    |
| 56011 D   | 7       | 3    | .35   | 59545 D    | 7       | 8    | 2.60   | 62191 D   | 8       | 17   | 84.00  |
| 56012 D   | 12      | 1    | 1.35  | 59546 D    | 7       | 8    | 2.60   | 62193 D   | 8       | 14   | 12.00  |
| 56013 DX  | 12      | 3    | .40   | 59547 D    | 7       | 8    | .60    | 62194 D   | 8       | 14   | 4.75   |
| 56014 D   | 7       | 3    | .07   | 59548 D    | 7       | 8    | 1.15   | 62195 D   | 8       | 14   | 5.40   |
| 56016 D   | 12      | 2    | 1.35  | 59549 D    | 7       | 8    | 6.50   | 62196 D   | 8       | 14   | .65    |
| 56017 D   | 12      | 3    | .12   | 59550 D    | 7       | 8    | 1.80   | 62197 D   | 8       | 14   | .65    |
| 56018 D   | 12      | 3    | 6.00  | 59551 D    | 7       | 8    | .10    | 62198 D   | 8       | 14   | .05    |
| 56019 DX  | 12      | 2    | .65   | 59708 D    | 8       | 15   | .22    | 62199 D   | 8       | 14   | .05    |
| 56020 D   | 12      | 3    | 8.00  | 59996 DX   | 5       | 2    |        | 62200 D   | 8       | 18   | 13.75  |
| 56021 DAX | 7       | 3    | 21.50 | 60012 D    | 15      | 5    |        | 62203 D   | 8       | 19   | .15    |
| 56066 D   | 3       | 2    | 3.85  | 60012 D    | 15      | 8    | 27.50  | 62204 D   | 8       | 18   |        |
| 56101 D   | 12      | 3    | 2.30  | 60014 DAX  | 8       | 2    | .65    | 62204 D   | 8       | 19   | .10    |
| 56107 D   | 4       | 15   | .17   | 60023 SX13 | 8       | 3    |        | 62205 D   | 8       | 17   |        |
| 56113 D   | 8       | 13   | .10   | 60023 DX13 | 8       | 10   |        | 62205 D   | 8       | 18   | .05    |
| 56148 DX  | 8       | 2    | .85   | 60023 DX13 | 8       | 13   |        | 62205 D   | 8       | 19   |        |
| 56149 DX  | 8       | 3    | .90   | 60094 D    | 3       | 1    | .65    | 62206 D   | 8       | 18   | .05    |
| 56278 D   | 3       | 7    |       | 60143 DAX  | 8       | 3    |        | 62207 D   | 8       | 19   | .05    |
| 56278 D   | 3       | 8    | .03   | 60143 DAX  | 8       | 10   |        | 62208 D   | 8       | 18   | .15    |
| 56291 D   | 8       | 9    | 2.75  | 60144 DX   | 8       | 10   | .35    | 62209 D   | 8       | 18   | .15    |
| 56469 D   | 14      | 2    | .14   | 60145 DAX  | 8       | 3    | .95    | 62210 D   | 8       | 18   | .30    |
| 56470 D   | 14      | 1    | .55   | 60145 DAX  | 8       | 10   |        | 62211 D   | 8       | 18   | .05    |

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| Q 1774   | 5       | 1    |         | Q 1852   | 4       | 8    |         | Q 1909   | 6       | 3    |         |
| Q 1774   | 8       | 8    | .017    | Q 1852   | 6       | 3    | \$ .059 | Q 1909   | 10      | 2    |         |
| Q 1774   | 8       | 9    |         | Q 1852   | 7       | 3    |         | Q 1909   | 10      | 3    |         |
| Q 1774   | 12      | 5    | .027    | Q 1852   | 13      | 4    |         | Q 1909   | 11      | 2    | \$ .025 |
| Q 1784   | 4       | 14   |         | Q 1852   | 14      | 1    |         | Q 1909   | 14      | 2    |         |
| Q 1784   | 12      | 1    | .019    | Q 1853   | 6       | 4    | .063    | Q 1909   | 15      | 2    |         |
| Q 1798   | 7       | 5    |         | Q 1853   | 10      | 3    |         | Q 1909   | 15      | 3    |         |
| Q 1798   | 10      | 2    | .021    | Q 1854   | 2       | 1    | .063    | Q 1910   | 4       | 14   |         |
| Q 1798   | 10      | 3    |         | Q 1856   | 4       | 8    |         | Q 1910   | 4       | 15   |         |
| Q 1799   | 4       | 11   | .021    | Q 1856   | 4       | 13   | .067    | Q 1910   | 14      | 2    | .025    |
| Q 1799   | 10      | 2    |         | Q 1856   | 14      | 2    |         | Q 1911   | 4       | 7    |         |
| Q 1799   | 10      | 3    | .072    | Q 1857   | 3       | 12   | .072    | Q 1911   | 4       | 8    |         |
| Q 1800   | 2       | 1    |         | Q 1858   | 15      | 8    |         | Q 1911   | 5       | 2    |         |
| Q 1800   | 3       | 8    | .077    | Q 1860   | 1       | 1    | .077    | Q 1911   | 6       | 1    | .042    |
| Q 1800   | 4       | 7    |         | Q 1862   | 2       | 2    |         | Q 1911   | 6       | 4    |         |
| Q 1800   | 4       | 9    | .082    | Q 1864   | 6       | 4    | .082    | Q 1911   | 7       | 1    | .042    |
| Q 1800   | 4       | 17   |         | Q 1864   | 8       | 5    |         | Q 1911   | 7       | 5    |         |
| Q 1800   | 6       | 3    | .021    | Q 1866   | 4       | 13   | .134    | Q 1911   | 12      | 5    | .042    |
| Q 1800   | 6       | 4    |         | Q 1866   | 4       | 17   |         | Q 1911   | 15      | 2    |         |
| Q 1800   | 7       | 3    | .098    | Q 1870   | 6       | 3    | .098    | Q 1912   | 12      | 5    | .042    |
| Q 1800   | 8       | 2    |         | Q 1870   | 7       | 1    |         | Q 1913   | 4       | 5    |         |
| Q 1800   | 10      | 2    | .104    | Q 1870   | 15      | 8    | .104    | Q 1913   | 7       | 1    | .06     |
| Q 1800   | 10      | 3    |         | Q 1871   | 6       | 4    |         | Q 1913   | 7       | 5    |         |
| Q 1800   | 14      | 1    | .104    | Q 1871   | 15      | 2    | .104    | Q 1913   | 12      | 5    | .06     |
| Q 1800   | 15      | 1    |         | Q 1872   | 6       | 3    |         | Q 1914   | 15      | 2    |         |
| Q 1801   | 4       | 19   | .023    | Q 1872   | 13      | 1    | .11     | Q 1915   | 3       | 10   | .002    |
| Q 1801   | 7       | 10   |         | Q 1873   | 7       | 1    |         | Q 1916   | 3       | 8    |         |
| Q 1802   | 1       | 1    | .116    | Q 1874   | 5       | 1    | .116    | Q 1916   | 4       | 8    | .002    |
| Q 1802   | 2       | 1    |         | Q 1875   | 15      | 2    |         | Q 1916   | 4       | 15   |         |
| Q 1802   | 3       | 8    | .133    | Q 1884   | 7       | 3    | .133    | Q 1916   | 8       | 2    | .002    |
| Q 1802   | 4       | 8    |         | Q 1885   | 7       | 5    |         | Q 1917   | 4       | 15   |         |
| Q 1802   | 4       | 11   | .149    | Q 1887   | 4       | 5    | .149    | Q 1918   | 2       | 3    | .002    |
| Q 1802   | 4       | 17   |         | Q 1888   | 6       | 4    |         | Q 1918   | 3       | 8    |         |
| Q 1802   | 8       | 5    | .149    | Q 1888   | 15      | 2    | .149    | Q 1918   | 3       | 10   | .002    |
| Q 1802   | 8       | 10   |         | Q 1889   | 7       | 1    |         | Q 1918   | 4       | 15   |         |
| Q 1802   | 8       | 13   | .157    | Q 1890   | 7       | 9    | .157    | Q 1918   | 6       | 3    | .002    |
| Q 1802   | 14      | 2    |         | Q 1890   | 9       | 2    |         | Q 1918   | 6       | 4    |         |
| Q 1804   | 2       | 1    | .165    | Q 1891   | 7       | 8    | .165    | Q 1919   | 2       | 3    |         |
| Q 1804   | 2       | 2    |         | Q 1891   | 7       | 8    |         | Q 1919   | 3       | 5    |         |
| Q 1804   | 4       | 7    | .173    | Q 1894   | 13      | 1    | .173    | Q 1919   | 3       | 10   |         |
| Q 1804   | 4       | 11   |         | Q 1895   | 7       | 5    |         | Q 1919   | 4       | 7    |         |
| Q 1804   | 14      | 2    | .22     | Q 1897   | 7       | 1    | .22     | Q 1919   | 4       | 15   |         |
| Q 1805   | 8       | 3    |         | Q 1901   | 2       | 3    |         | Q 1919   | 5       | 1    |         |
| Q 1806   | 3       | 1    | .027    | Q 1901   | 3       | 8    | .007    | Q 1919   | 5       | 2    | .003    |
| Q 1806   | 3       | 3    |         | Q 1901   | 4       | 3    |         | Q 1919   | 7       | 3    |         |
| Q 1810   | 4       | 9    | .033    | Q 1901   | 4       | 15   | .007    | Q 1919   | 8       | 7    |         |
| Q 1813   | 12      | 1    |         | Q 1901   | 11      | 3    |         | Q 1919   | 8       | 8    |         |
| Q 1814   | 11      | 1    | .039    | Q 1902   | 8       | 14   | .007    | Q 1919   | 8       | 9    |         |
| Q 1816   | 4       | 8    |         | Q 1902   | 8       | 19   |         | Q 1919   | 10      | 3    |         |
| Q 1820   | 4       | 9    | .043    | Q 1902   | 12      | 3    | .007    | Q 1919   | 11      | 1    |         |
| Q 1820   | 8       | 10   |         | Q 1902   | 12      | 3    |         | Q 1919   | 12      | 1    |         |
| Q 1820   | 8       | 13   | .065    | Q 1903   | 2       | 3    | .01     | Q 1920   | 1       | 1    |         |
| Q 1830   | 3       | 5    |         | Q 1903   | 4       | 4    |         | Q 1920   | 2       | 1    |         |
| Q 1832   | 4       | 18   | .032    | Q 1903   | 4       | 15   | .01     | Q 1920   | 2       | 2    |         |
| Q 1834   | 12      | 3    |         | Q 1903   | 5       | 1    |         | Q 1920   | 3       | 1    |         |
| Q 1845   | 10      | 3    | .035    | Q 1903   | 8       | 7    | .01     | Q 1920   | 3       | 3    |         |
| Q 1846   | 7       | 3    |         | Q 1903   | 8       | 9    |         | Q 1920   | 3       | 3    |         |
| Q 1846   | 8       | 3    | .047    | Q 1903   | 11      | 1    | .01     | Q 1920   | 3       | 5    | .004    |
| Q 1846   | 10      | 3    |         | Q 1904   | 3       | 5    |         | Q 1920   | 3       | 8    |         |
| Q 1847   | 3       | 8    | .047    | Q 1904   | 3       | 12   | .01     | Q 1920   | 4       | 3    |         |
| Q 1847   | 10      | 2    |         | Q 1904   | 4       | 14   |         | Q 1920   | 4       | 7    |         |
| Q 1847   | 10      | 3    | .051    | Q 1904   | 10      | 3    | .051    | Q 1920   | 4       | 8    |         |
| Q 1848   | 3       | 10   |         | Q 1905   | 3       | 5    |         | Q 1920   | 4       | 9    |         |
| Q 1848   | 4       | 7    | .051    | Q 1905   | 4       | 3    | .051    | Q 1920   | 4       | 12   |         |
| Q 1849   | 4       | 19   |         | Q 1905   | 4       | 4    |         | Q 1920   | 4       | 14   |         |
| Q 1849   | 6       | 3    | .051    | Q 1905   | 4       | 7    | .013    | Q 1920   | 4       | 17   | .004    |
| Q 1849   | 12      | 1    |         | Q 1905   | 4       | 19   |         | Q 1920   | 4       | 19   |         |
| Q 1849   | 12      | 3    | .055    | Q 1905   | 8       | 3    | .055    | Q 1920   | 6       | 3    |         |
| Q 1849   | 13      | 4    |         | Q 1905   | 9       | 1    |         | Q 1920   | 6       | 4    |         |
| Q 1849   | 14      | 2    | .055    | Q 1905   | 10      | 2    | .055    | Q 1920   | 7       | 3    |         |
| Q 1849   | 15      | 3    |         | Q 1905   | 10      | 3    |         | Q 1920   | 7       | 5    |         |
| Q 1850   | 2       | 3    | .055    | Q 1905   | 11      | 2    | .055    | Q 1920   | 7       | 10   |         |
| Q 1850   | 4       | 4    |         | Q 1906   | 3       | 8    |         | Q 1920   | 8       | 2    |         |
| Q 1850   | 4       | 17   | .055    | Q 1906   | 4       | 8    | .013    | Q 1920   | 8       | 3    |         |
| Q 1850   | 7       | 3    |         | Q 1906   | 10      | 2    |         | Q 1920   | 8       | 5    |         |
| Q 1850   | 8       | 3    | .055    | Q 1906   | 10      | 3    | .013    | Q 1920   | 8       | 10   |         |
| Q 1850   | 8       | 3    |         | Q 1906   | 11      | 2    |         | Q 1920   | 8       | 13   |         |
| Q 1851   | 12      | 3    | .059    | Q 1906   | 15      | 1    | .025    | Q 1920   | 8       | 13   |         |
| Q 1851   | 15      | 2    |         | Q 1909   | 3       | 8    |         | Q 1920   | 9       | 2    |         |

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| 1920     | 10      | 3    |        | 1925     | 7       | 2    | \$.01 | 4017     | 9       | 2    | .022  |
| 1920     | 11      | 1    |        | 1925     | 15      | 2    |       | 4017     | 14      | 1    |       |
| 1920     | 11      | 3    |        | 1927     | 4       | 5    |       | 4018     | 4       | 12   | .059  |
| 1920     | 12      | 1    | \$.004 | 1927     | 6       | 4    |       | 4020     | 10      | 2    |       |
| 1920     | 14      | 1    |        | 1927     | 7       | 1    |       | 4020     | 10      | 3    | .02   |
| 1920     | 14      | 2    |        | 1927     | 7       | 3    |       | 4042     | 7       | 5    | .049  |
| 1920     | 15      | 1    |        | 1927     | 7       | 5    |       | 4043     | 2       | 2    | .092  |
| 1921     | 3       | 5    |        | 1927     | 7       | 9    |       | 4046     | 4       | 13   | .11   |
| 1921     | 4       | 18   | .004   | 1927     | 7       | 8    | .017  | 4050     | 7       | 1    | .049  |
| 1921     | 12      | 3    |        | 1927     | 7       | 9    |       | 4075     | 3       | 3    | .079  |
| 1922     | 1       | 1    |        | 1927     | 9       | 2    |       | 4076     | 6       | 4    | .084  |
| 1922     | 2       | 1    |        | 1927     | 12      | 5    |       | 4078     | 13      | 3    | .094  |
| 1922     | 2       | 2    |        | 1927     | 13      | 1    |       | 4120     | 7       | 7    | .198  |
| 1922     | 2       | 3    |        | 1927     | 15      | 2    |       | 4125     | 7       | 9    | .255  |
| 1922     | 3       | 5    |        | 1929     | 4       | 5    |       | 4134     | 7       | 5    | .198  |
| 1922     | 3       | 8    |        | 1929     | 7       | 1    |       | 4146     | 7       | 1    | .246  |
| 1922     | 3       | 10   |        | 1929     | 7       | 5    |       | 4149     | 7       | 7    | .286  |
| 1922     | 4       | 4    |        | 1929     | 7       | 7    | .027  | 4164     | 7       | 5    | .258  |
| 1922     | 4       | 8    |        | 1929     | 7       | 8    |       | 4166     | 4       | 5    | .286  |
| 1922     | 4       | 9    |        | 1929     | 7       | 9    |       | 4166     | 7       | 5    | .286  |
| 1922     | 4       | 13   |        | 1929     | 7       | 10   |       | 4167     | 7       | 5    | .30   |
| 1922     | 4       | 17   |        | 1930     | 7       | 10   | .08   | 4168     | 7       | 5    | .315  |
| 1922     | 4       | 19   |        | 3505     | 3       | 12   | .05   | 4184     | 7       | 7    | .40   |
| 1922     | 5       | 1    |        | 3615     | 4       | 7    |       | 4184     | 7       | 8    | .40   |
| 1922     | 6       | 3    |        | 3615     | 5       | 1    |       | 5015     | 11      | 2    | .05   |
| 1922     | 6       | 4    |        | 3615     | 6       | 4    |       |          |         |      |       |
| 1922     | 7       | 3    | .005   | 3615     | 7       | 1    |       |          |         |      |       |
| 1922     | 7       | 5    |        | 3615     | 7       | 9    | .05   |          |         |      |       |
| 1922     | 8       | 3    |        | 3615     | 9       | 2    |       | <b>S</b> |         |      |       |
| 1922     | 8       | 5    |        | 3615     | 12      | 1    |       | SA 3215  | 13      | 1    | .085  |
| 1922     | 8       | 13   |        | 3615     | 12      | 3    |       | ST 202   | 9       | 2    | 4.80  |
| 1922     | 8       | 14   |        | 3617     | 12      | 2    |       | ST 205A  | 2       | 3    | 3.65  |
| 1922     | 10      | 2    |        | 3617     | 12      | 3    | .15   | ST 205   | 12      | 3    | 3.65  |
| 1922     | 10      | 3    |        | 3618     | 12      | 3    | .11   | ST 214   | 14      | 1    | 2.85  |
| 1922     | 12      | 1    |        | 3621     | 12      | 3    |       | ST 219   | 14      | 1    | 9.20  |
| 1922     | 12      | 3    |        | 3621     | 12      | 5    | .09   |          |         |      |       |
| 1922     | 12      | 5    |        | 3625     | 2       | 2    |       | <b>T</b> |         |      |       |
| 1922     | 13      | 2    |        | 3625     | 5       | 1    | .09   | 1924 T   | 3       | 4    | .03   |
| 1922     | 13      | 4    |        | 3625     | 5       | 2    |       | 1924 T   | 4       | 15   | .03   |
| 1922     | 14      | 1    |        | 3627     | 5       | 2    | .15   | 2583 T   | 15      | 8    | .90   |
| 1922     | 14      | 2    |        | 3628     | 2       | 3    | .15   | 2584 T   | 15      | 8    | 4.50  |
| 1922     | 15      | 2    |        | 3659     | 2       | 3    | .05   | 2587 T   | 15      | 8    | .35   |
| 1922     | 15      | 3    |        | 3794     | 15      | 7    | 4.00  | 2588 T   | 15      | 8    | .25   |
| 1924     | 3       | 8    |        | 3794     | 15      | 8    |       | 4167 T   | 3       | 2    | .007  |
| 1924     | 6       | 4    |        | 4000     | 6       | 3    | .014  | 4167 T   | 3       | 3    | .007  |
| 1924     | 7       | 5    | .008   | 4000     | 6       | 4    |       | 5312 T   | 4       | 9    | .03   |
| 1924     | 12      | 2    |        | 4001     | 3       | 10   | .015  | 7220 T   | 14      | 1    | .013  |
| 1924     | 13      | 3    |        | 4012     | 4       | 8    | .016  | 9982 T   | 4       | 18   | .60   |
| 1925     | 3       | 10   |        | 4013     | 4       | 7    | .018  |          |         |      |       |
| 1925     | 4       | 7    |        | 4014     | 3       | 5    | .016  |          |         |      |       |
| 1925     | 4       | 8    |        | 4016     | 1       | 1    |       |          |         |      |       |
| 1925     | 5       | 1    | .01    | 4016     | 2       | 1    |       |          |         |      |       |
| 1925     | 5       | 2    |        | 4016     | 3       | 8    | .02   |          |         |      |       |
| 1925     | 6       | 3    |        | 4016     | 10      | 2    |       |          |         |      |       |
| 1925     | 6       | 4    |        | 4016     | 10      | 3    |       |          |         |      |       |

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