#6416

TM 11-5815-338-15

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE MANUAL

DEVICE, LOW LEVEL SIGNALING

TT-523/GGC (NSN 5815-00-937-6146) AND TT-523A/GGC (NSN 5815-00-999-3048)

This copy is a reprint which includes current pages from Changes 1 through 4.

HEADQUARTERS, DEPARTMENT OF THE ARMY
OCTOBER 1967

CHANGE
NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *28 February 1980*

Operator, Organizational, Direct Support, General Support, and Depot Maintenance Manual: DEVICE, LOW LEVEL SIGNALING TT-523/GGC (NSN 5815-00-937-6146) AND TT-523A/GGC (NSN 5815-00-999-3048)

TM 11-5815-338-15, 23 October 1967, is changed as follows:

1. The title of the manual is changed as indicated above.
2. A vertical bar appears in the margin opposite the changed or new material.
3. Remove and insert pages as indicated in the page list below.

Remove	*Insert*
i and ii	i and ii
1-1 through 1-3	1-1 through 1-3

4. File this change sheet in the front of the manual for reference purposes.

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ARNG: None
USAR: None
For explanation of abbreviations used, see AR 310-50.

TECHNICAL MANUAL
No. 11-5815-338-15

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *23 October 1967*

Operator, Organizational, Direct Support, General Support, and Depot Maintenance Manual:

DEVICE, LOW LEVEL SIGNALING TT-523/GGC (NSN 5815-00-937-6146) AND TT-523A/GGC (NSN 5815-00-999-3048)

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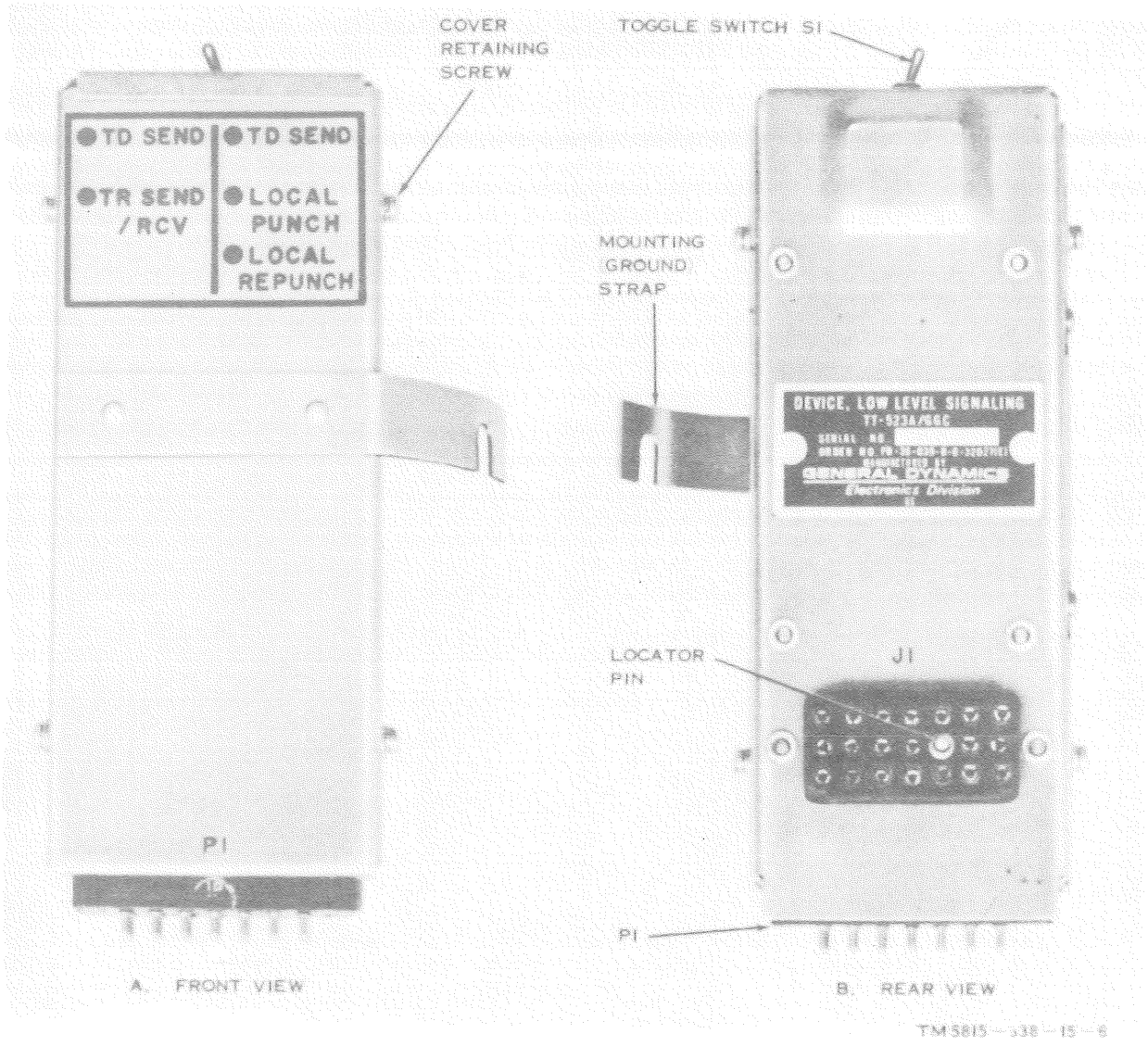


Figure 1-1. Device, Low Level Signaling TT-523A/GGC.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual describes Device, Low Level Signaling TT-523/GGC and TT-523A/GGC (fig. 1-1), hereafter referred to as the TT-523(*)/GGC unless otherwise noted. It includes instructions for installation, operation, maintenance, and functioning of the equipment.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine, whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. Maintenance Forms, Records, and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (Army).

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DLAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33B/AFR 75-18/MCO P4610.19C and DLAR 4500.15.

1-3.1. Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703.

1-3.2. Reporting Equipment Improvement Recommendations (EIR)

If TT-523(*)/GGC needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. We'll send you a reply.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. Purpose. The purpose of the TT-523(*)/GGC is to reduce electromagnetic radiation from Teletypewriter Reperforator-Transmitter TT-76A/GGC, TT-76B/GGC, and TT-76C/GGC, hereafter referred to as the TT-76(*)/GGC, by providing a means of performing the off-line tape punching functions of the TT-76(*)/GGC at much lower current and voltage levels.

b. Use. The TT-523(*)/GGC is used in tactical configurations or assemblages with the TT-76(*)/GGC. The TT-523(*)/GGC *cannot be used with the plain model, TT-76/GGC.* The TT-523(*)/GGC is used in an offline condition only, that is, for the local preparation of message tapes. The TT-523(*)/GGC low-level circuitry is by-passed during on-line operation.

1-5. Technical Characteristics

Power source requirements.	None; derives power from TT-76(*)/GGC.
Power drain from TT-76(*)/GGC.	1.5 watts.
Current delivered to teletypewriter contacts in mark condition.	68 microamperes, ±10%.

Voltage across teletypewriter contacts in space condition.	0.6 volt, ±10%.
Current delivered to teletypewriter selector-magnets in mark hold condition.	27.5 milliamperes, ±10%.
Voltage in selector magnets in space condition.	26 volts, ±10%.
Dimensions (overall, excluding ground strap).	7 in. × 2 1/2 in. × 1 in.
Weight	12 oz.

1-6. Description

a. The TT-523(*)/GGC is a transistorized, compact (slightly larger than a pack of kingsize cigarettes), electronic device housed in a metal case with a removable cover (fig 1-2 and 1-3). A two-position toggle switch, mounted on the top of the metal case, is the only switch or control. The circuit components are mounted on a printed circuit board which is secured within the metal case by four mounting screws. A multicontact plug is mounted on the bottom of the case, and a multipin receptacle is mounted on the rear of the case. The plug and the receptacle are used for connections to the TT-76(*)/GGC.

b. The TT-523(*)/GGC permits normal operation of the TT-76(*)/GGC in all of its original modes, in other words, no operational features of the TT-76(*)/GGC are eliminated when the TT-523(*)/GGC is used. The only difference is that the original 130-volt power supply is not used for off-line tape punching and it is replaced by an electronic circuit which provides microampere current to the teletypewriter contacts and lower voltage (approx 26 vdc) to the teletypewriter selector magnets during off-line tape punching operations.

c. When it is desired to operate the TT-76(*)/GGC directly with the associated security equipment (i.e., the keyboard, TD, and selector magnets are all required to be operationally on-line), it is not necessary to remove the TT-523(*)/GGC. Merely switching the TT-523(*)/GGC switch to the TD SEND-TR SEND/RCV position bypasses the low-level circuitry within the TT-523(*)/GGC and provides the required continuity to operate the TT-76(*)/GGC in an on-line condition.

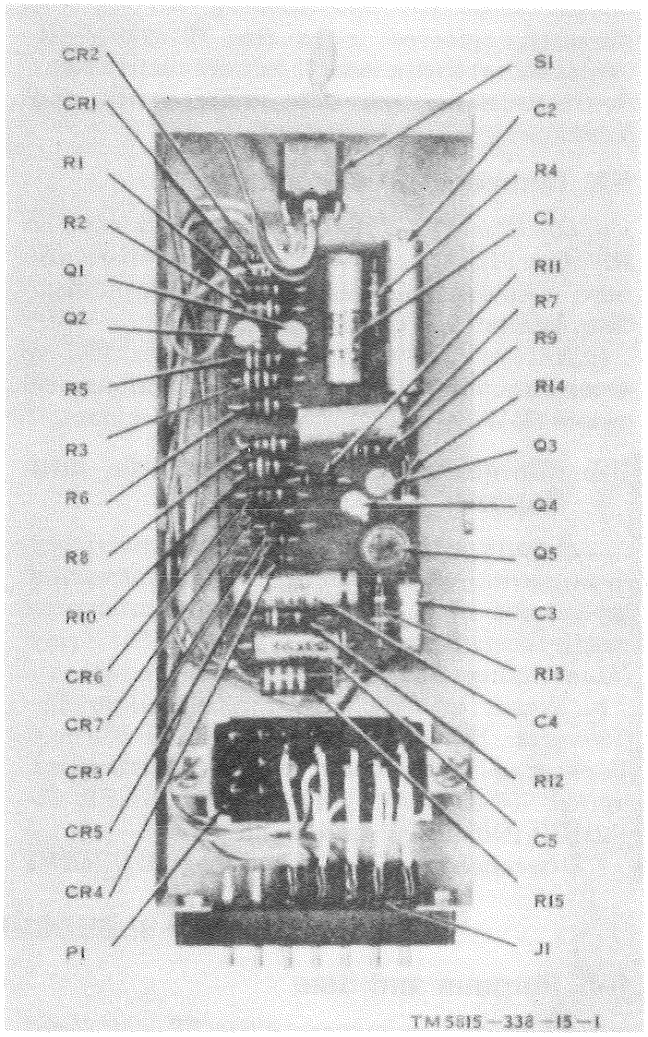


Figure 1-2. TT-523/GGC, cover removed.

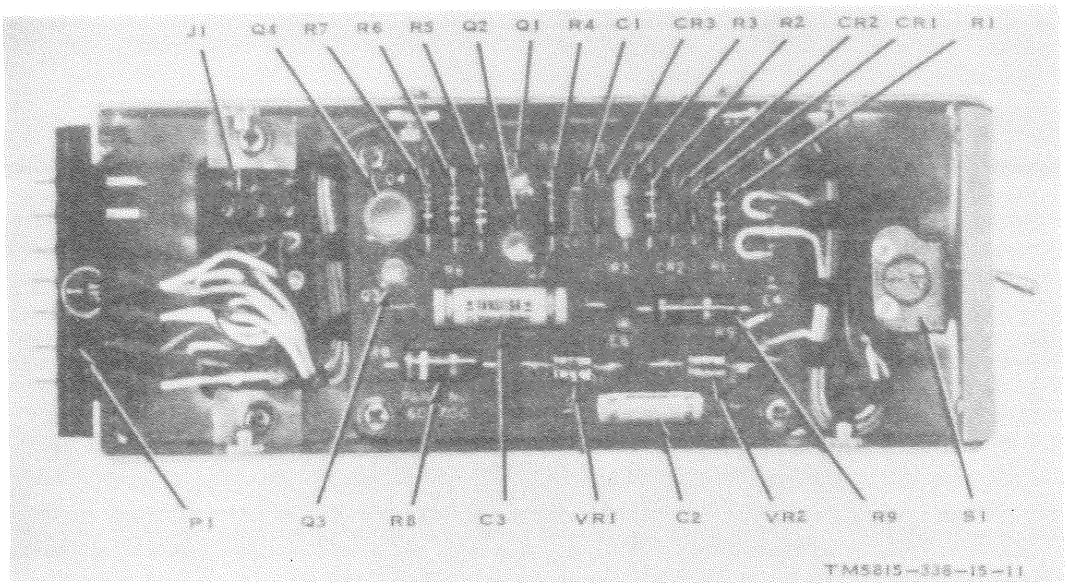


Figure 1-3. TT-523A/GGC, cover removed.

1-7. Differences in Models

There are no differences between the TT-523/GCC and the TT-523A/GGC that affect operation or installation. Input and output voltages and currents are the same. The differences may be found in the number and values of circuit components (transistors, diodes, resistors) that are used to achieve end results. As an example, the TT-523/GGC utilizes five transistors and seven diodes to provide low-level signaling, whereas, the TT-523A/GGC utilizes four transistors and five diodes to provide low-level signaling. Detailed differences between the two low-level signaling devices can be seen in the schematic diagrams (fig. 5-3 and 5-4).

1-8. Items Comprising an Operable Equipment

Low Level Signaling Device TT-523/GGC (NSN 5815-00-937-6146) or Low Level Signaling Device TT-523A/GGC (NSN 5815-00-999-3048).

1-9. Additional Items Required

A 5,600-ohm, ± 10 percent, 1 watt resistor (NSN 5905-00-209-2038) is required for operation of the TT-523(*)/GGC with the TT-76(*)/GGC.

CHAPTER 2

INSTALLATION

2-1. Unpacking

a. Open the cardboard shipping container.
b. Remove packing or filler material.
c. Remove the TT-523(*)/GGC.

2-2. Checking Unpacked Equipment

a. Inspect the TT-523(*)/GGC for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 1-3).

b. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel, near the nomenclature plate. Check to see whether the MWO number (if any) and appropriate notations concerning the modification have been entered in the equipment manual.

Note. Current MWO's applicable to the equipment are listed in DA Pam 310-7.

2-3. Tools and Materials Required for Installation

No tools or materials are required for installation of the TT-523(*)/GGC.

2-4. Alteration of TT-76(*)/GGC for Use With TT-523(*)/GGC

Use of the TT-523(*)/GGC requires alteration of the TT-76(*)/GGC, as follows:

a. Place the TT-76(*)/GGC MOTOR, LIGHT, and POWER switches at OFF.

b. On the TT-76(*)/GGC power supply and terminal unit, disconnect the existing strap across the BIAS TEST MA terminals.

c. Connect a 5,600-ohm, ±10 percent, 1-watt resistor across the BIAS TEST MA terminals (fig. 2-1).

2-5. TT-76(*)/GGC Switch Settings and Cable Connection

The TT-76-(*)/GGC will be used and operated in a 20-milliampere (ma) mode in which case the following setting and connection are required when the TT-523(*)/GGC is installed.

a. Set the SIGNAL/BIAS switch on the power supply and terminal unit (fig. 2-1) to 60MA.

Note. Although the TT-76(*)/GGC will be used in a 20-ma neutral circuit, *the* SIGNAL/BIAS *switch must be set to the* 60MA *position* to provide the required operational power for the TT-523(*)/GGC.

b. Insert the plug from the selector magnet cable into the SELECTOR MAGNET socket marked 20MA on the power supply and terminal unit.

2-6. Installation of TT-523(*)/GGC

a. Place the TT-76(*)/GGC MOTOR, LIGHT, and POWER switches at OFF.

b. Remove plug P7 (fig. 2-2) from its associated receptacle J7, located at the rear of the TT-76(*)/GGC.

c. Insert male plug P1 at the bottom of the TT-523(*)/GGC into receptacle J7 of the TT-76(*)/GGC.

d. Connect plug P7 of the TT-76(*)/GGC to female receptacle J1 on the rear of the TT-523(*)/GGC.

e. Secure the TT-523(*)/GGC ground strap to the adjacent ground binding post on the dust cover of the TT-76(*)/GGC.

2-7. TT-76(*)/GGC Adjustments When Using TT-523(*)/GGC

a. The preliminary adjustments described in TM 11-5815-238-12, paragraph 2-8, remain

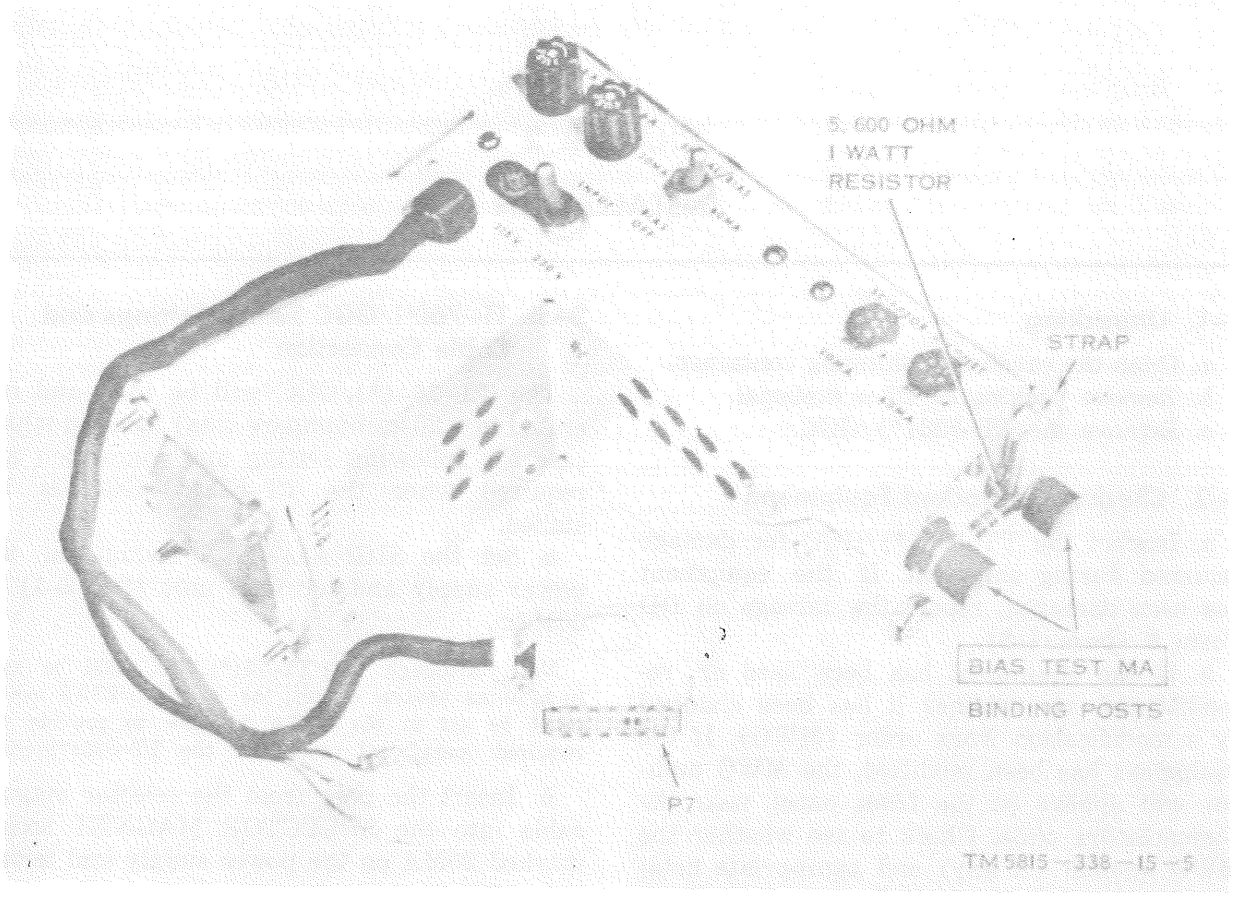


Figure 2-1. TT-76(*)/GGC power supply and terminal unit.

the same when the TT-523(*)/GGC is installed except that the bias potentiometer setting check should be made with the milliammeter in series with the 5,600-ohm resistor. The reading should be 8.75 ma.

b. The TT-76(*)/GGC must be cleaned and adjusted for optimum performance before operation. The contacts must be kept clean and dry at all times.

CAUTION: Use of the TT-523(*)/GGC requires more frequent maintenance of the teletypewriter transmitter contacts than is required when the device is not used. The low level keying current is of insufficient value to perform the self-cleaning contact function that occurs when the teletypewriter transmitter is used for high-level (20- or 60-ma) operation. No timetable or schedule can be set up at this time for cleaning the transmitter contacts; clean, burnish, and recheck the contact adjustments (para 4-100 and 4-208, TM 11-5815-238-35) as frequently as is found necessary.

CAUTION: Be sure to check the position of the two-position switch of the TT-523(*)/GGC (ch 3) before applying power to the equipment.

CAUTION: The TT-523(*)/GGC is designed to provide sufficient output for the reperforator of the TT-76(*)/GGC ONLY. DO NOT CONNECT A MONITOR DEVICE TO THE MONITOR JACK OF THE TT-76(*)/GGC.

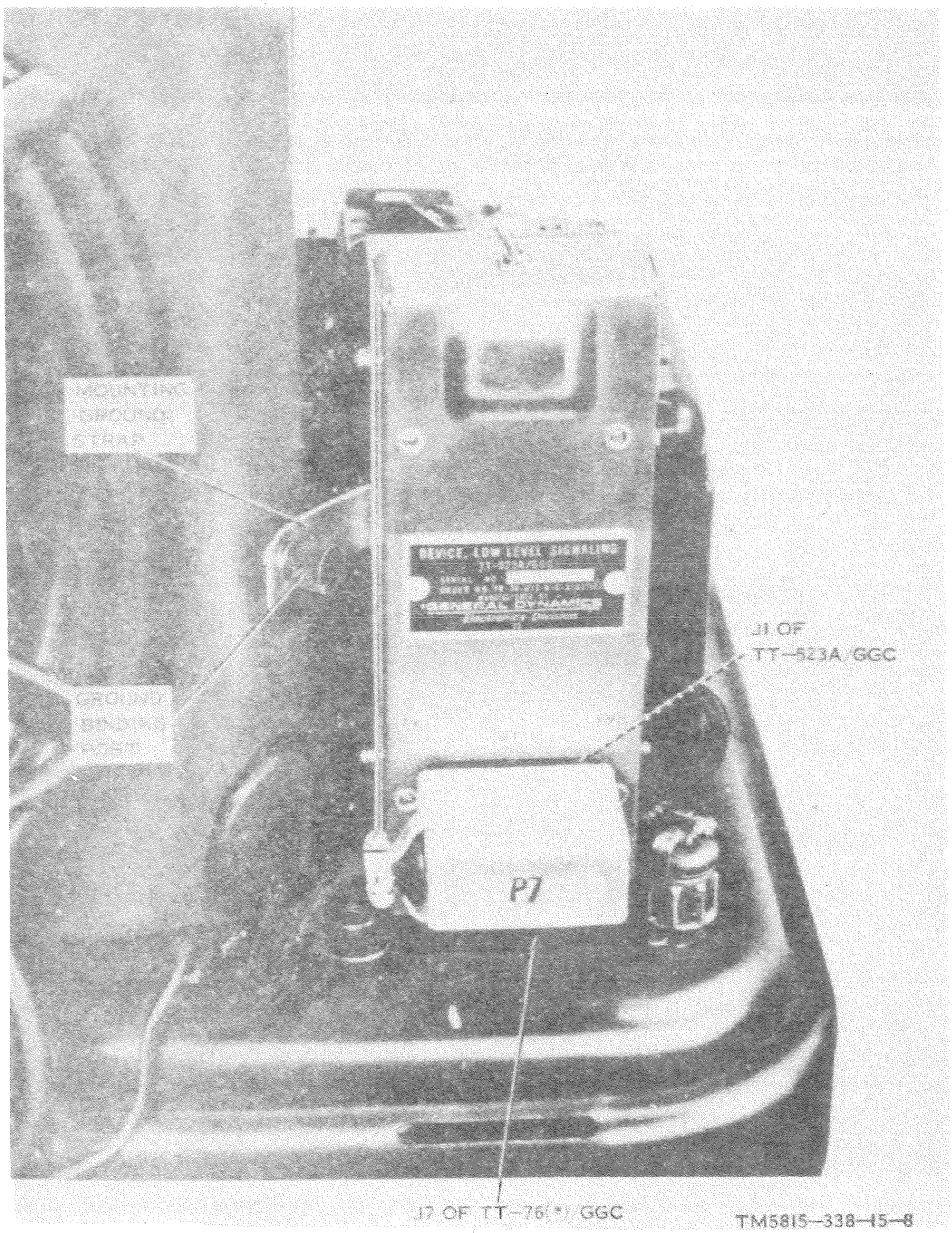


Figure 2-2. TT-523A/GGC mounted on TT-76(*)/GGC.

CHAPTER 3

OPERATION

3-1. Control

A two-position switch on top of the TT-523(*)/GGC is the only control. The function of the switch is as follows:

Switch setting	Function
TD SEND-TR SEND/RCV	Corresponds to TT-76(*)/GGC SELECTOR switch position 1, TD SEND-TR SEND RECEIVE. This switch setting on the TT-523(*)/GGC is used for on-line operation of the TT-76(*)/GGC and permits bypassing the low-level signaling circuitry of the TT-523(*)/GGC.
TD SEND-LOCAL PUNCH-LOCAL REPUNCH	Corresponds to TT-76(*)/GGC SELECTOR switch position 2, TD SEND-LOCAL PUNCH and position 3, LOCAL REPUNCH. This switch setting on the TT-523(*)/GGC is used for punching tapes off-line. Low-level signaling circuitry of the TT-523(*)/GGC is energized with the switch in this position.

3-2. Local Tape Preparation Using TT-523(*)/GGC

The TT-523(*)/GGC should be used when preparing message tapes (off-line (low-level) operation. Proceed as follows:

a. Set the TT-523(*)/GGC toggle switch in the TD SEND-LOCAL PUNCH-LOCAL REPUNCH position (fig. 3-1).

b. Set the TT-76(*)/GGC SELECTOR switch to position 2, TD SEND-LOCAL PUNCH position or position 3, LOCAL REPUNCH position, as required for the desired mode of operation.

c. Cut the message tape.

3-3. Sending or Receiving Messages Using TT-76(*)/GGC

a. When sending or receiving messages with the TT-76(*)/GGC, proceed as follows:

(1) Set the TT-523(*)/GGC toggle switch to TD SEND-TR SEND/RCV (TT-523(*)/GGC low-level circuitry by-passed).

(2) Set the TT-76(*)/GGC SELECTOR switch to position 1, TD SEND-TR SEND RECEIVE.

b. It is possible to receive messages on the TT-76(*)/GGC when the TT-523(*)/GGC toggle switch is in the TD SEND-LOCAL PUNCH-LOCAL REPUNCH position; however, this condition is not desirable because it may damage the TT-523(*)/GGC. The toggle switch of the TT-523(*)/GGC should always be set in a position which is compatible with the SELECTOR switch position of the TT-76(*)/GGC (para 3-2 and 3-3a).

3-4. Simultaneous Tape Preparation and TD Sending

To transmit to the external (on-line) send circuit while preparing messages on a local (off-line) basis:

a. Set the TT-523(*)/GGC switch in the TD SEND-LOCAL PUNCH-LOCAL REPUNCH position.

b. Set the TT-76(*)/GGC SELECTOR switch to position 2, TD SEND-LOCAL PUNCH position.

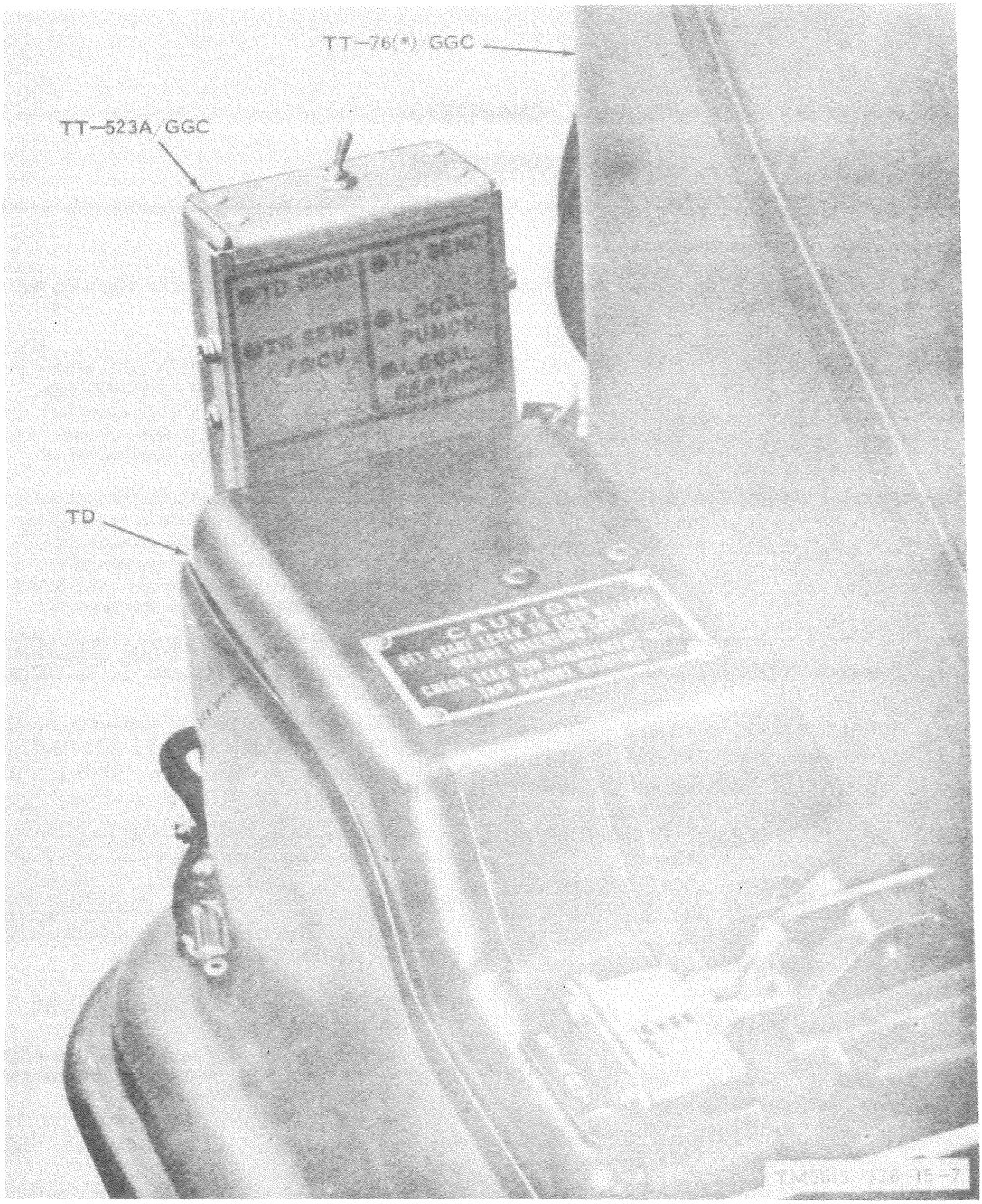


Figure 3-1. TT-523A/GGC mounted in operating position.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

4-1. General

a. No operator or organizational maintenance is performed on the TT-523(*)/GGC. There are no moving parts that require adjustment, calibration, or lubrication. Maintenance of the TT-523(*)/GGC will consist of the replacement of defective parts or components at the direct and general support categories. If performance of the authorized direct and general support maintenance procedures does not result in a serviceable TT-523(*)/GGC, higher category of maintenance is required.

b. Direct and general support maintenance of the TT-523(*)/GGC includes the following:

(1) All tests commensurate with the test equipment assigned to depot and general support categories.
(2) Continuity tests on electrical components within the equipment case.
(3) Replacement of the toggle switch or a defective plug or receptacle.
(4) Input and output voltage tests and replacement of defective components.

4-2. Direct and General Support Tools, Test Equipment, and Materials

Note. All parts authorized for replacement by direct and general support maintenance personnel are listed in appendix D.

a. Tools.

(1) Tool Kit, Electronic Equipment TK-101/G, Federal stock No. 5180-064-5178, and Tool Kit, Electronic Equipment TK-105/G, Federal stock No. 5180-610-8177.
(2) Pencil-type soldering iron, maximum rating of 25 watts.

b. Test Equipment. Multimeter TS-352B/U is the only item of test equipment required for maintenance of the TT-523(*)/GGC at the direct and the general support categories.

c. Materials.

(1) Two test leads connected to a standard two-conductor teletypewriter plug (fig. 4-1).
(2) Trichloroethylene.
(3) Protective coating EC1103.
(4) Naptha.
(5) Toggle switch SPST, FSN 5930-655-1514.
(6) Female receptacle, FSN 5935-257-8695.
(7) Male plug, FSN 5935-552-7026.
(8) Resistor, 2,200-ohm, 10-watt, FSN 5905-549-5629.
(9) Resistor, 270-ohm, 1-watt, FSN 5905-279-1559.
(10) Power supply capable of delivering 150 volts dc at 100 ma.

4-3. Removal and Replacement of Toggle Switch S1

a. Removal.

(1) Remove the four screws and washers that secure the cover to the case and lift off the cover.
(2) Unsolder and tag all wires from the switch.
(3) Remove the hexagonal nut from the switch and remove the switch from the assembly.

b. Replacement.

(1) Position the replacement switch through the mounting hole in the case. Secure the switch to the case with the hexagonal nut.
(2) Solder the wires to the switch.

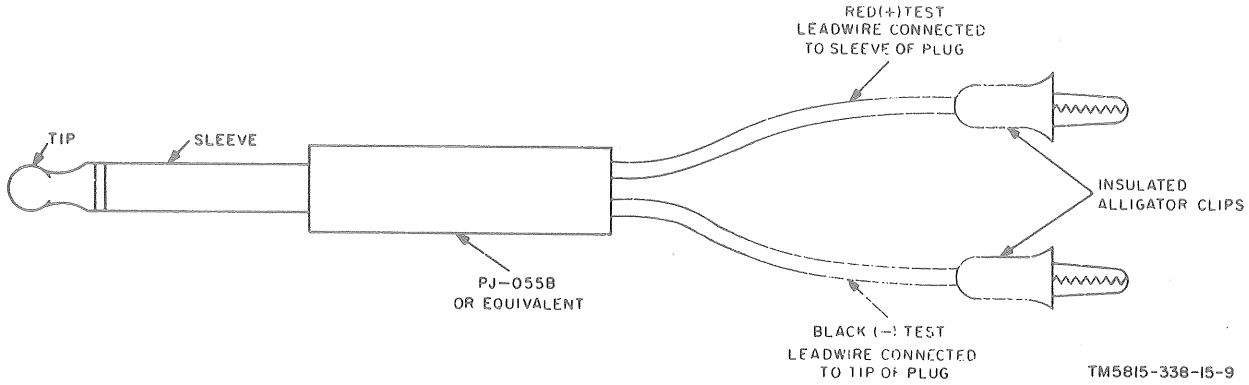


Figure 4–1. Test leads connected to standard two-conductor teletypewriter plug.

(3) Replace the cover on the case and secure it with the four washers and screws.

4–4. Removal and Replacement of Connectors

a. Removal.

(1) Remove the four screws and washers that secure the cover to the case and lift off the cover.
(2) Slide the insulating sleeves off the terminals before unsoldering wires. Unsolder and tag all wires connected to the connector to be removed.
(3) Remove the two screws that secure the connector to the case and remove the connector.

b. Replacement. Reverse the steps and procedures outlined in *a* above to replace a connector.

4–5. Removal and Replacement of Printed Circuit Board

a. Removal.

(1) Remove the four screws and washers that secure the cover to the case and lift off the cover.
(2) Unsolder and tag the five wires connected to the printed circuit board.
(3) Remove the four screws and washers that hold the printed circuit card in the case and lift the printed circuit card from the case.

b. Replacement. Reverse the steps and procedures outlined in *a* above to replace the printed circuit card.

4–6. Troubleshooting Procedure

a. General. Since the TT–523(*)/GGC operates with the TT–76(*)/GGC, faulty operation of the TT–76(*)/GGC in the TD SEND-LOCAL PUNCH-LOCAL REPUNCH modes must first be isolated to the TT–523(*)/GGC or to the TT–76(*)/GGC. Isolation may be accomplished by replacing the TT–523(*)/GGC with one known to be in good operating condition. If replacing the TT–523(*)/GGC does not remedy the trouble, the TT–76(*)/GGC is defective. Refer to TM 11–5815–238–35 for the procedures necessary to locate the trouble in the TT–76(*)/GGC. If a spare TT–523(*)/GGC is not available, perform the sectionalization checks described in *b* below. If either replacing the TT–523(*)/GGC or the sectionalization checks indicates that the TT–523(*)/GGC is defective, perform the bench troubleshooting procedures listed in *c* below to localize the trouble to the defective part in the TT–523(*)/GGC.

b. Sectionalization. Use the TS–352B/U and two test leads connected to a standard two-conductor teletypewriter plug to sectionalize a trouble to either the TT–523(*)/GGC or the TT–76(*)/GGC.

(1) Set the switches on the TT–76(*)/GGC as follows: POWER switch to OFF; KEYBOARD switch to SEND;

MOTOR switch to ON; SELECTOR switch to position 3, LOCAL REPUNCH.

(2) Remove the TT-523(*)/GGC from the rear of the transmitter-distributor (TD) of the TT-76(*)/GGC. Connect plug P7 to connector J7 at the back of the TD.

(3) Connect the leads of the test probe to the TS-352B/U and set the TS-352B/U to indicate dc volts on the 250-volt scale. Remove any plugs that may be connected to the TR jack and the TD jack at the right-hand side of the TT-76(*)/GGC keyboard. Insert the plug of the test probe into the TD jack and set the POWER switch to ON.

(4) The TS-352B/U should indicate 152 volts dc ±10 percent. If the voltage is not present or is out of limits, the power supply and terminal unit in the TT-76(*)/GGC is defective. Check the fuses on the power supply and terminal unit if voltage is not present or check the line voltage if the voltage reading is low, before troubleshooting the power supply.

(5) Set the POWER switch to OFF and reinstall the TT-523(*)/GGC.

(6) Set the toggle switch on the TT-523(*)/GGC to the TD SEND-LOCAL PUNCH-LOCAL REPUNCH position. With the multimeter still connected to the TD jack, set the TS-352B/U to the 2.5 dc volt range and set the POWER switch to ON.

(7) The TS-352B/U should indicate 0.6 volt ±20 percent. Set the power switch to OFF and set the TS-352B/U to the 1-ma current range. Set the POWER switch to ON. The TS-352B/U should indicate 0.07 ma ±10 percent. If the voltage and/or current are not present or are out of limits, the TT-523(*)/GGC is defective.

(8) Set the POWER switch to OFF and raise the dust cover on the TT-76(*)/GGC. Remove connector P8 from 20 MA SELECTOR MAGNET connector J8 on the power supply and terminal unit. Using pin type test prods, connect the TS-352B/U to pin A (-) and pin E (+) on connector J8. Set the TS-352B/U to indicate dc volts on the 50-volt scale and set the POWER switch to ON. The TS-352B/U should indicate 26 volts dc ±10 percent. If voltage is not present or is out of limits, the TT-523(*)/GGC is defective.

(9) If the voltage and current checks in (6), (7), and (8) above are correct, the TT-76(*)/GGC is defective. Refer to TM 11-5815-238-35 for the procedures necessary to locate the trouble in the TT-76(*)/GGC.

c. Localization. Trouble can be localized to a defective part on the printed circuit board of the TT-523(*)/GGC by the application of dc power to the TT-523(*)/GGC through a resistor network and the measurement of dc voltages at various points on the printed circuit card with the input both open and closed circuited. The bench test setup required to perform this procedure is shown in figure 4-2. Connectors that mate with J1 and P1 on the TT-523(*)/GGC are required for connection of the dc power and toggle switch to the TT-523(*)/GGC to be checked. Prepare the test connectors by wiring the resistor network, power supply leads, and the toggle switch to the pins indicated in figure 4-2. To locate a defective part on the TT-523(*)GGC printed circuit card, proceed as follows:

(1) Remove the cover of the TT-523-(*)/GGC.

(2) Connect the equipment as shown in figure 4-2.

(3) Set the toggle switch on the TT-523-(*)/GGC to TD SEND-LOCAL PUNCH-LOCAL REPUNCH.

Caution: **Be extremely careful when making measurements near a terminal of any transistor or semiconductor diode. A momentary short circuit may permanently damage the transistor or diode.**

(4) Use the TS-352B/U to measure voltages. Connect the negative (-) side

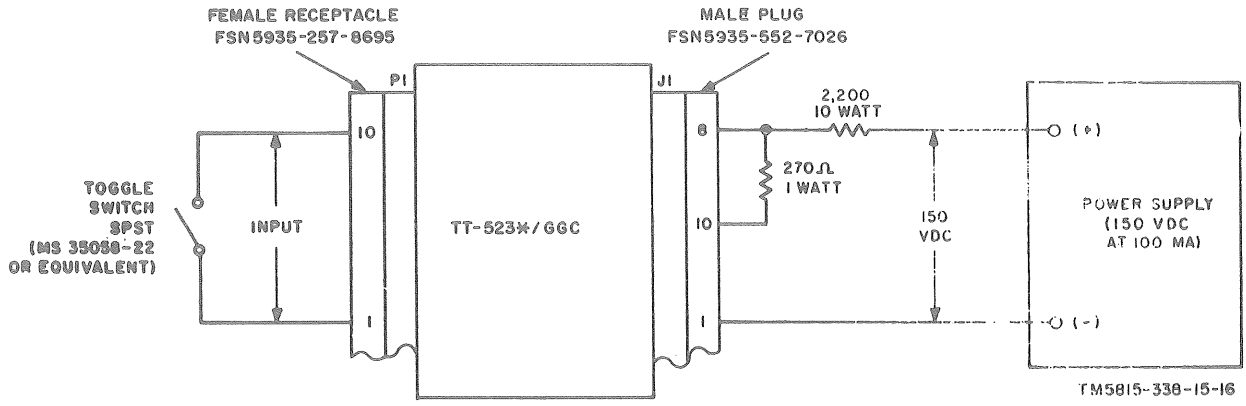


Figure 4–2. Bench test setup to check TT–523(*)/GGC.

of the meter to the negative (–) terminal of the power supply. Measure the voltage at the checkpoints indicated on the printed circuit card wiring diagram shown in figure 4–3 or 4–4 to isolate the trouble to a defective circuit. Measure the voltage at each checkpoint with the input toggle switch open and with the switch closed. The nominal voltage levels (±10 percent) for each checkpoint are indicated in the charts in *d* and *e* below.

(5) After the trouble has been isolated to a defective circuit or stage, use the schematic diagram (fig. 5–3 or 5–4) and the TS–352B/U to check the components associated with the defective circuit or stage. When the defective component has been located, refer to paragraph 4–7 for the appropriate repair procedures.

d. Voltage Chart, TT–523/GGC.

Voltage checkpoint (fig. 4–3)	Nominal voltage with input circuit open (vdc)	Nominal voltage with input circuit closed (vdc)
E1	1.05	0.52
E2	0.50	5.80
E3	8.90	5.20
E4	4.50	3.00
E5	4.00	6.90
E6	0.05	1.80
E7	0.00	0.65
E8	27.50	0.05
E9	27.50	11.00
E10	27.50	26.00
E11	15.00	14.00
E12	15.00	0.75
E13	7.50	7.00
E14	21.00	20.00

e. Voltage Chart, TT–523A/GGC.

Voltage checkpo nt (fig. 4–4)	Nominal voltage with input circuit open (vdc)	Nominal voltage with input circuit closed (vdc)
E1	26.5	26.0
E2	0.6	0
E4	26.5	19.0
E5	0	0
E6	26.0	10.5
E7	0.525	0.2
E8	0.05	0.552
E9	0.65	0.05
E10	0.10	0.75

4–7. Printed Circuit Card Repair Procedures

a. General. Defective printed circuit cards can often be repaired by general support or depot maintenance personnel. The troubles usually encountered on printed circuit cards are caused by defective component parts, defective printed circuit wiring (cracked or open circuited), or blistered cards. When a defective part is discovered on the printed circuit card, the part can readily be replaced by following the procedures given in *d* below. An open circuit in the printed circuit wiring can often be repaired by following the procedure

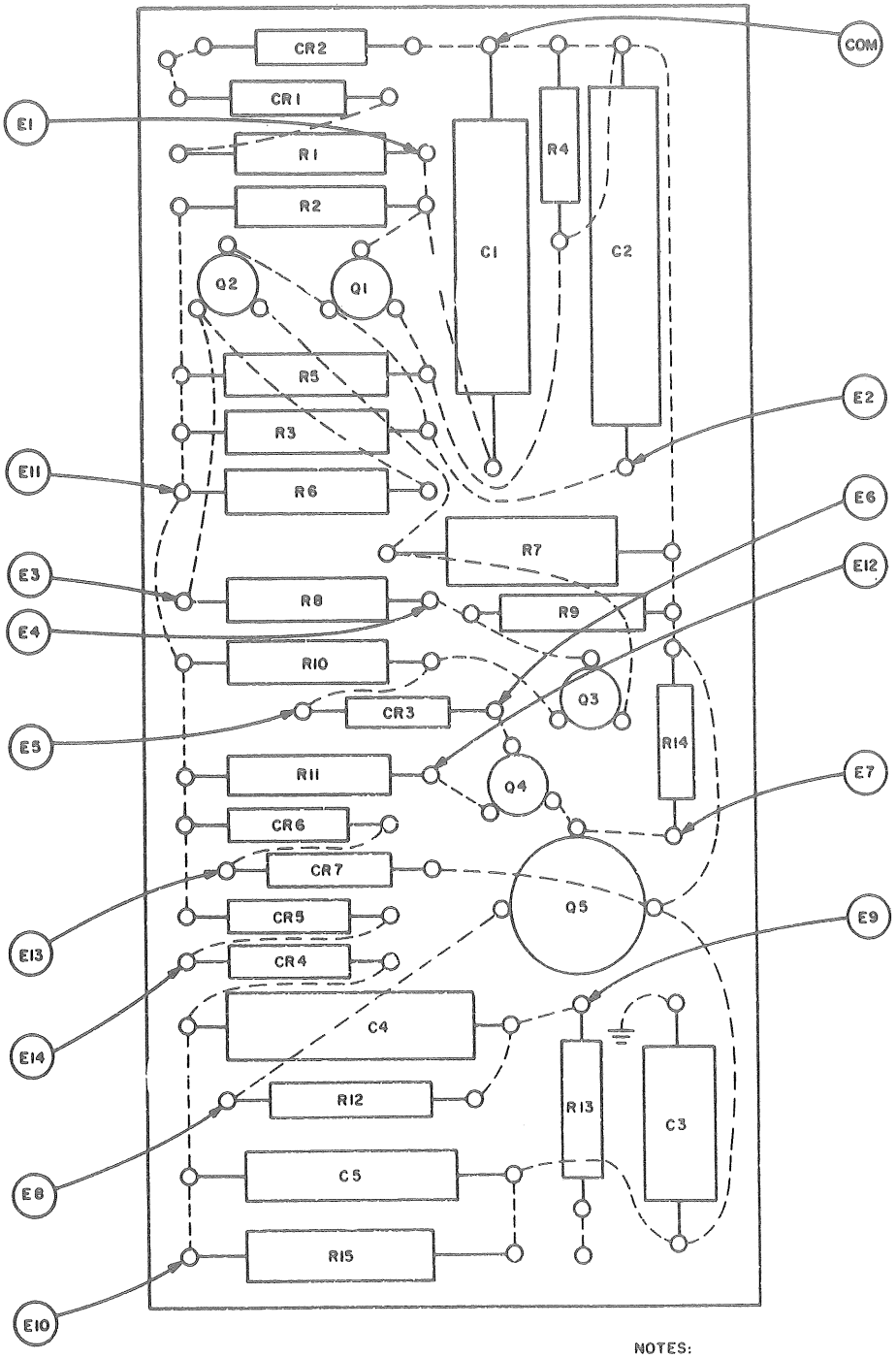


Figure 4-3. Voltage checkpoints on printed circuit card of TT-523/GGC.

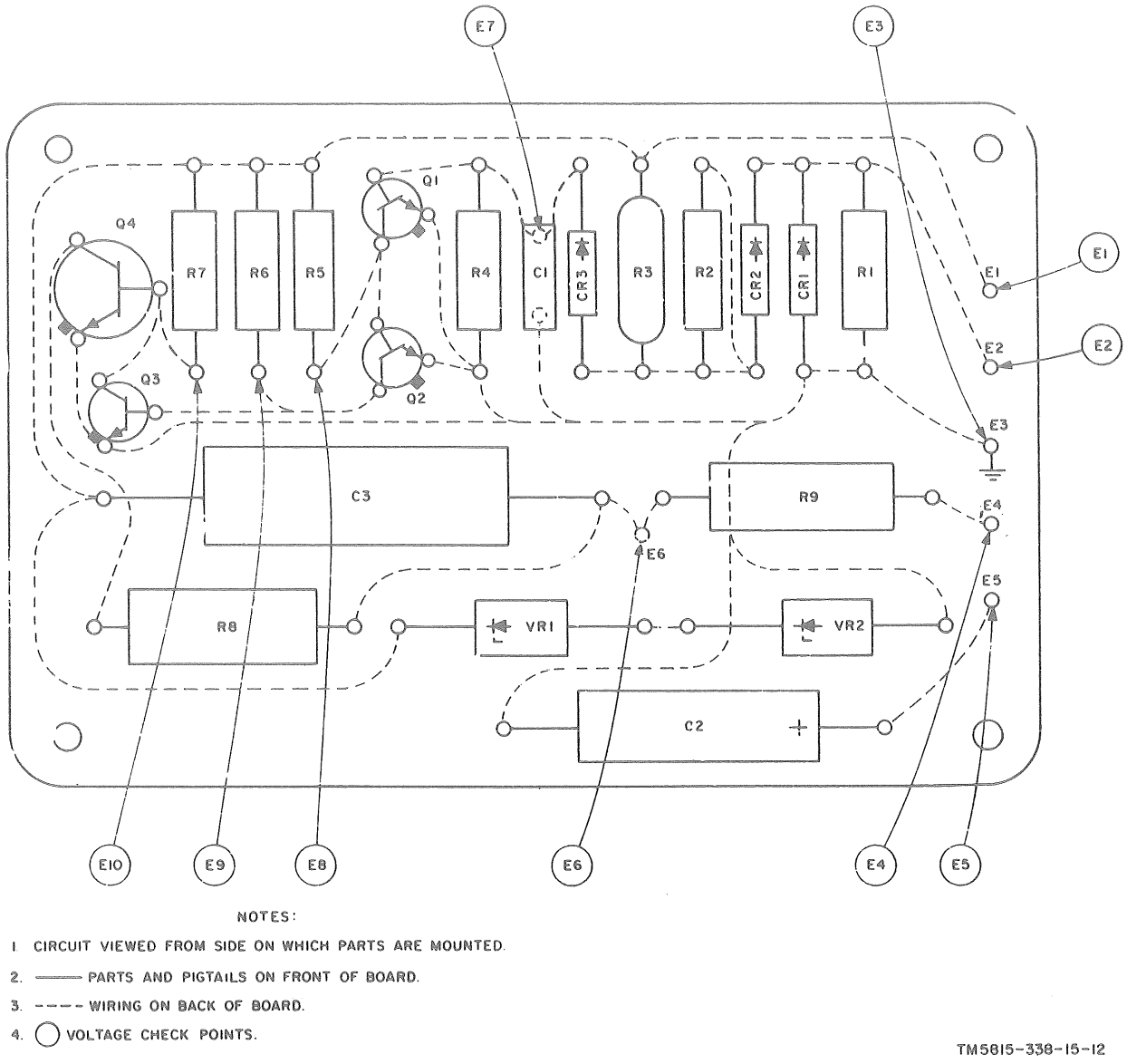


Figure 4–4. Voltage checkpoints on printed circuit card of TT–523A/GGC.

given in *c* below. If the printed circuit card itself is broken, cracked, or blistered, the board must be replaced.

Caution: **Use only pencil-type soldering irons with a maximum rating of 25 watts when repairing printed circuit cards. Excessive or prolonged heating of the printed wiring conductors will cause them to separate from the board. For additional soldering techniques, refer to TB SIG 222.**

b. Removal of Protective Coating. The printed circuit card in the TT–523(*)/GGC is coated with protective coating EC1103, which must be removed from the immediate area before repairs can be accomplished. Remove the protective coating as follows:

(1) Determine the exact area on the printed circuit card where the defective part is located or where the repairs are to be made.

Warning: **Trichloroethylene is flammable and its fumes are toxic. Do not use near an open flame and provide adequate ventilation.**

(2) If the area requiring repairs is large, soak the printed circuit card in trichloroethylene to soften the protective coating; then wipe the area clean with a lint free cloth.

(3) If the necessary repairs are confined to a small area, carefully scrape the protective coating from the area; use a knife or other sharp tool.

c. Repairing Defective Printed Circuit Wiring. Printed circuit wiring that has a crack, pinhole, cut, or notch that exceeds 30 percent of its width is defective and must be repaired. To repair defective printed circuit wiring, proceed as follows:

(1) Remove the protective coating (*b* above).

(2) Place a short length of flat bus wire over the defective printed circuit wiring and hold it firmly in place.

Caution: **Do not apply heat longer than necessary. Prolonged heating may damage the printed circuit card by separating the conductor from the the card. If the conductor separates from the card, the printed circuit card must be discarded.**

(3) Solder the entire length of the bus wire to the printed circuit wiring.

(4) Apply protective coating (*e* below) to the exposed repaired area after all repairs have been completed.

d. Replacing Defective Parts. Replace defective parts on the printed circuit card as follows:

(1) Remove the defective part from the printed circuit card by cutting the leads between the part and the mounting holes of the printed circuit card. Cut the leads as close to the mounting holes as possible.

(2) Remove the protective coating (*b* above) around the area of the part on the printed wiring side of the printed circuit card.

Caution: **Do not apply heat longer than necessary; prolonged heating will cause the printed wiring to separate from the card, which will damage the printed circuit card.**

(3) Heat the printed wiring at the mounting holes with the soldering iron until the solder melts; remove the remaining pieces of wire leads and the excess solder.

(4) Bend the leads of the replacement part to fit the mounting holes.

(5) Insert the leads in the mounting holes from the parts side of the card and press the part firmly against the printed circuit card.

(6) On the wiring side of the printed circuit card, cut the leads of the part so that approximately one-eighth inch of the lead protrudes from the card.

(7) Bend and press these leads against the printed circuit conductor.

(8) Using a heat sink, solder the replacement part leads to the printed circuit conductor.

(9) Apply protective coating to the repaired area (*e* below).

e. Application of Protective Coating. After all repairs to the printed circuit card have been completed (*c* and *d* above), apply protective coating to the exposed areas on the printed circuit card as instructed below.

Warning: **Protective coating EC1103 is toxic. The work area must be well ventilated; avoid inhaling the fumes. If the coating comes in contact with the skin, immediately wash the skin with soap and water.**

(1) Thoroughly clean the exposed areas to be coated; use a rubber eraser.

(2) Prepare the protective coating mixture by mixing 70 parts by volume of protective coating EC1103 with 30 parts by volume of naptha. Stir the mixture thoroughly.

(3) Apply the protective coating to the card by spraying, dipping, or brushing. Be very careful when brushing the coating on the card to prevent the formation of bubbles.

(4) Set the coated card aside and allow the coating to dry in free air for approximately 5 hours.

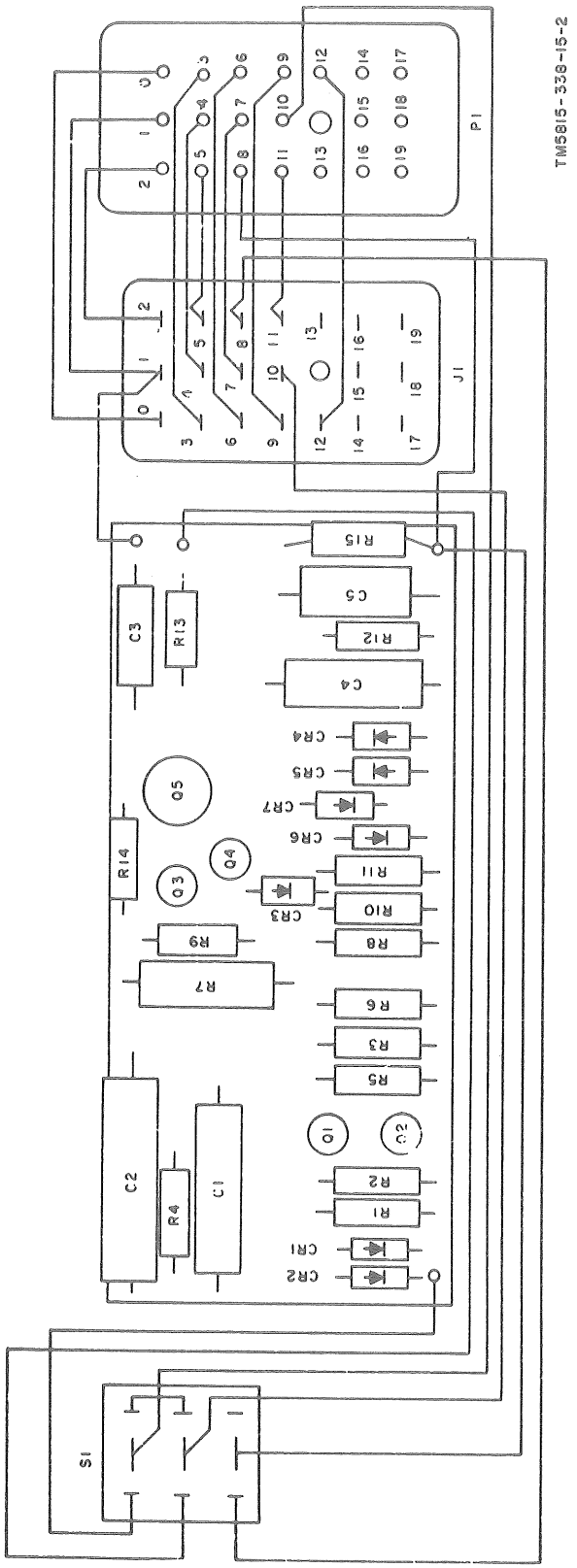


Figure 4-5. Printed circuit card for TT-523/GGC, parts location diagram.

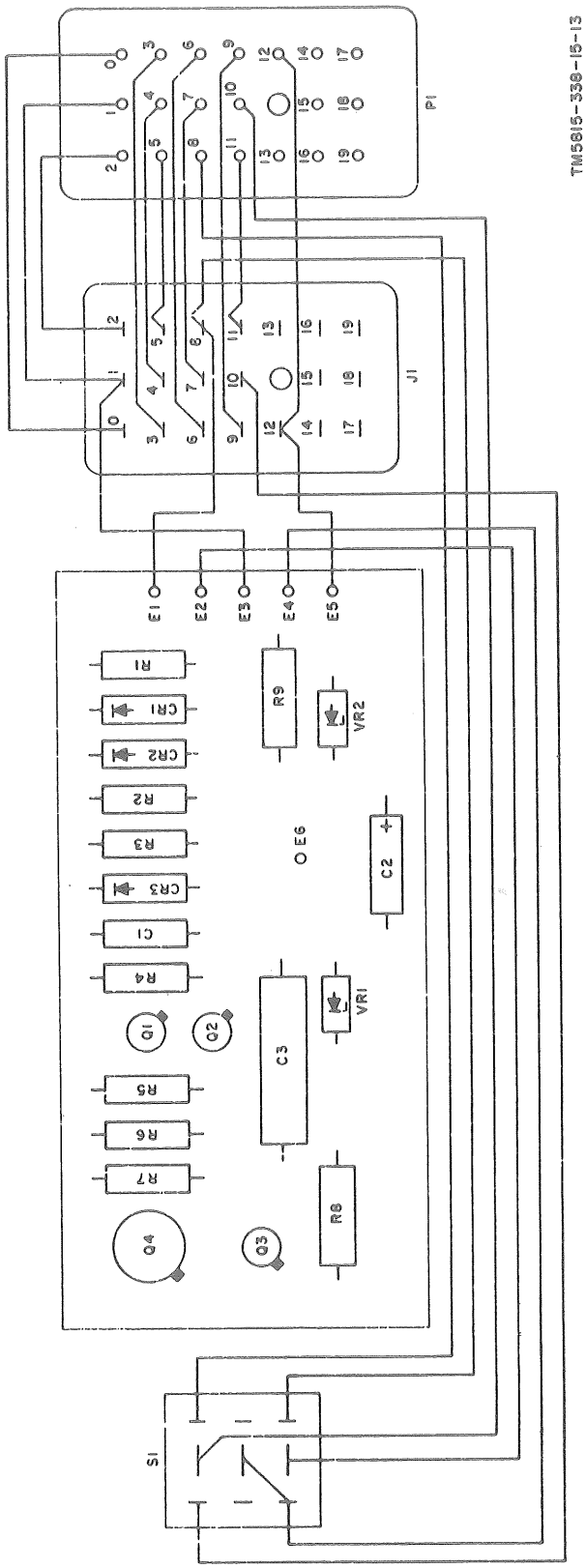


Figure 4-6. Printed card for TT-523A/GGC, parts location diagram.

CHAPTER 5

FUNCTIONING OF EQUIPMENT

5-1. Functioning of TT-523(*)/GGC With TT-76(*)/GGC

The TT-523(*)/GGC is used with the TT-76(*)/GGC to provide low level current (approximately 70 microamperes) operation of the TD and TR contacts and still maintain sufficient current to operate the tape punch selector magnets during local tape punch or local tape repunch. Low level current through the send contacts is required to reduce radiated signals during local tape preparation (off-line operation). The 5,600-ohm resistor is placed in the circuit (para 2-4*c*) to limit the current to the bias windings of the selector magnets. During normal (on-line) operation (sending or receiving), the TT-523(*)/GGC provides straight-through wiring for the TT-76(*)/GGC. Figures 5-1 and 5-2 show the TT-523(*)/GGC as used with the TT-76(*)/GGC with the TT-76(*)/GGC SELECTOR switch S1 set to position 3, LOCAL REPUNCH. When SELECTOR switch S1 is set to position 2, TD SEND-LOCAL PUNCH, the TT-523(*)/GGC operates in the same manner except that the TD send contacts are not in the circuit.

5-2. Functioning of TT-523/GGC (figs. 5-1 and 5-3)

a. The TT-523/GGC contains a four-stage circuit consisting of a gate, Schmidt Trigger, driver, and 20 ma output stages. Additionally, a voltage regulator converts the 130 volts supplied by the teletypewriter to the lower voltage and current levels necessary for operation of the TT-523/GGC.

b. The gate, transistor Q1, is controlled by the teletypewriter keyboard or TD contacts. Transistor Q1 is in an *on* state (conducting) when the contacts are open and in an *off* state (nonconducting) when the contacts are closed.

c. The Schmidt Trigger (transistors Q2 and Q3) restores the waveform to a rectangular shape of constant amplitude to eliminate distortion caused by the suppression filters of the teletypewriter.

d. The driver (transistor Q4) and output (transistor Q5) stages amplify the current to the approximately 27 ma to operate the selector magnets.

e. The voltage regulator consists of zener diodes CR4, CR5, CR6, and CR7, resistor R15, and capacitor C5. Current from the teletypewriter enters pin 1 of the TT-523/GGC. It is applied to the Zener diodes (CR4 through CR7) and switch S1 of the TT-523/GGC, to pin 8 of the TT-523/GGC, back to the teletypewriter.

f. Since the teletypewriter SIGNAL/BIAS switch is set to 60 ma, approximately 60 ma is flowing through the teletypewriter and through the TT-523/GGC. Approximately 20 ma is used to keep the zener diodes at their reference voltage levels and to operate the circuitry of the TT-523/GGC. Another approximately 27 ma is used to operate the selector magnets, and the remainder goes through resistor R15 of the TT-523/GGC which prevents the Zener diodes from being overloaded. The voltage regulator acts as a battery supplying the TT-523/GGC the 13 volts and 26 volts required for operation.

g. When the teletypewriter contacts are open, current flows from the negative side of CR7 through resistor R4, the base of transistor Q1, and resistor R2 of the TT-523/GGC to the high positive side of CR6, causing transistor Q1 to conduct. This, in turn, causes the potential at the collector of transistor Q1 to drop below the threshold voltage of the Schmidt

Trigger which causes transistor Q2 to be at cutoff and transistor Q3 to be at saturation. The potential at the collector of transistor Q3 is now at about 4.0 volts. Zener diode CR3 prevents current from flowing through it until the potential difference of at least 6 volts exists between the anode and cathode. With only 4 volts present, current will not flow through transistor Q4 and thus transistor Q5 does not conduct because the potential difference between the emitter and base of transistor Q5 is not enough to trigger it. Since transistor Q5 is not conducting, current will not flow through the selector magnets of the teletypewriter.

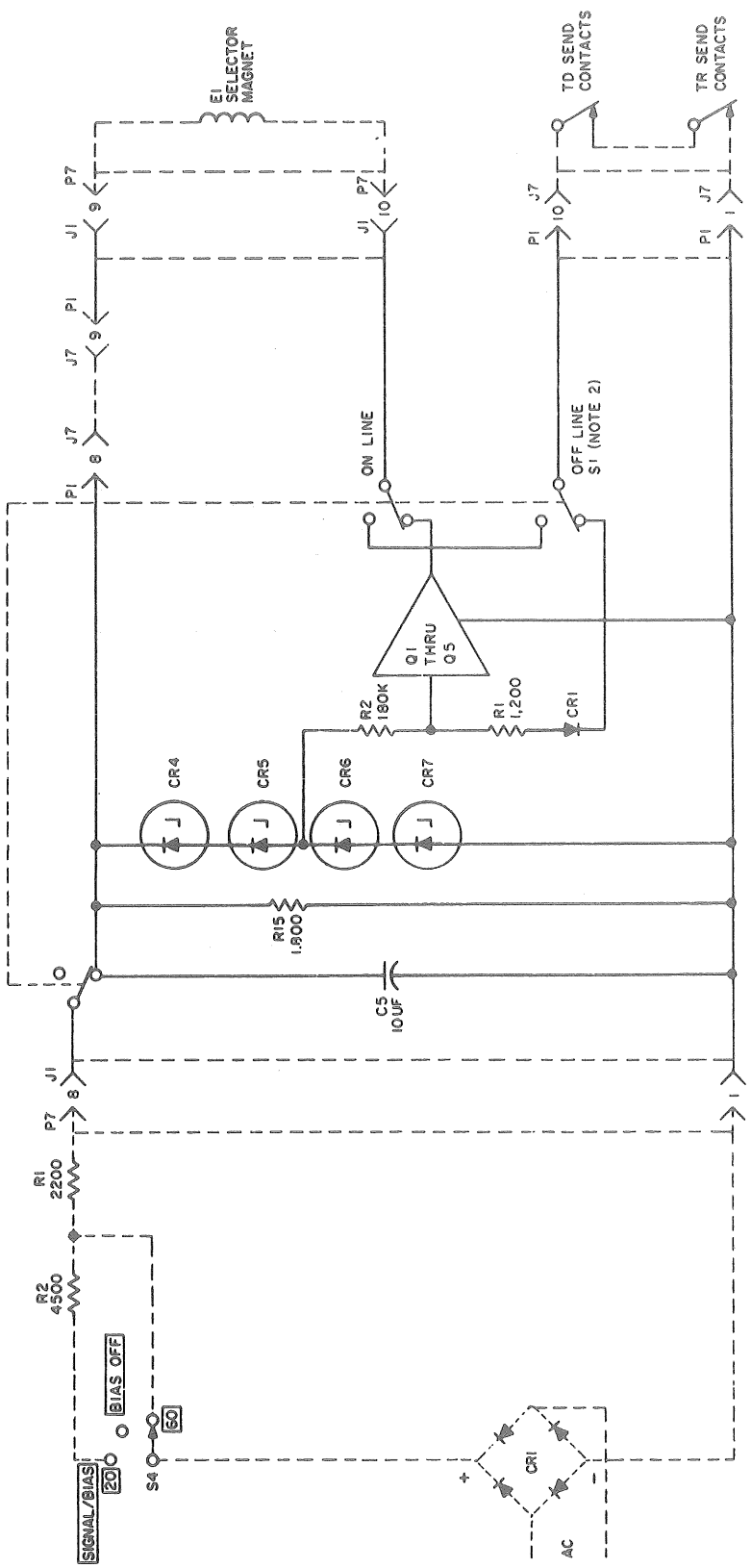
h. When the teletypewriter contacts are closed, current flows from CR7 (–) through the teletypewriter contacts, switch S1 (set to TD SEND-LOCAL PUNCH, LOCAL REPUNCH), diode CR1, resistors R1 and R2 of the TT–523/GGC, to the junction of CR5 and CR6 (±13 volts). The potential at the base of transistor Q1 is not high enough to allow Q1 to conduct. The potential at the collector of transistor Q1 rises above the threshold voltage of the Schmidt Trigger (transistors Q2 and Q3) causing transistor Q2 to conduct to saturation and transistor Q3 to be at cutoff. The potential at the collector of transistor Q3 rises above that required to allow zener diode CR3 to conduct. Current flows through resistor R14, transistor Q4, resistor R11 and R10, and zener diode CR3. The potential difference between the emitter and base of transistor Q5 is enough to drive Q5 into conduction. Current of about 25 ma flows from CR7 (–) through transistor Q5, resistors R12 and R13, through the switch S1 of the TT–523/GGC, and through the selector magnets of the teletypewriter to CR4 (+26 volts).

5–3. Functioning of TT–523A/GGC (figs. 5–2 and 5–4)

a. The TT–523A/GGC is a four-stage amplifier which delivers approximately 70 microamperes (uamp) of current to the teletypewriter contacts and approximately 27 ma to the teletypewriter selector magnets. The TT–523-A/GGC has a voltage regulator consisting of VR1 and VR2 which lowers the 130 volt supply of the teletypewriter to the 25 volts required by the TT–523A/GGC.

b. When the teletypewriter contacts are open, current from pin 1 of the TT–523A/GGC flows through transistor Q1, diode CR3, and resistor R3. Transistor Q1 is driven into saturation, lowering the potential between the base and emitter of Q2, which puts transistor Q2 at cutoff. Transistor Q3 conducts to saturation and transistor Q4 goes to cutoff, stopping current flow through the selector magnets of the teletypewriter.

c. When the teletypewriter contacts are closed, current from pin 1 of the TT–523A/GGC flows through the teletypewriter contacts, through CR2, resistors R2 and R3 of the TT–523A/GGC, through the teletypewriter. Transistor Q1 does not conduct, transistor Q2 conducts to saturation, transistor Q3 is cutoff, and transistor Q4 conducts, allowing approximately 27 ma to flow through the selector magnets of the teletypewriter.

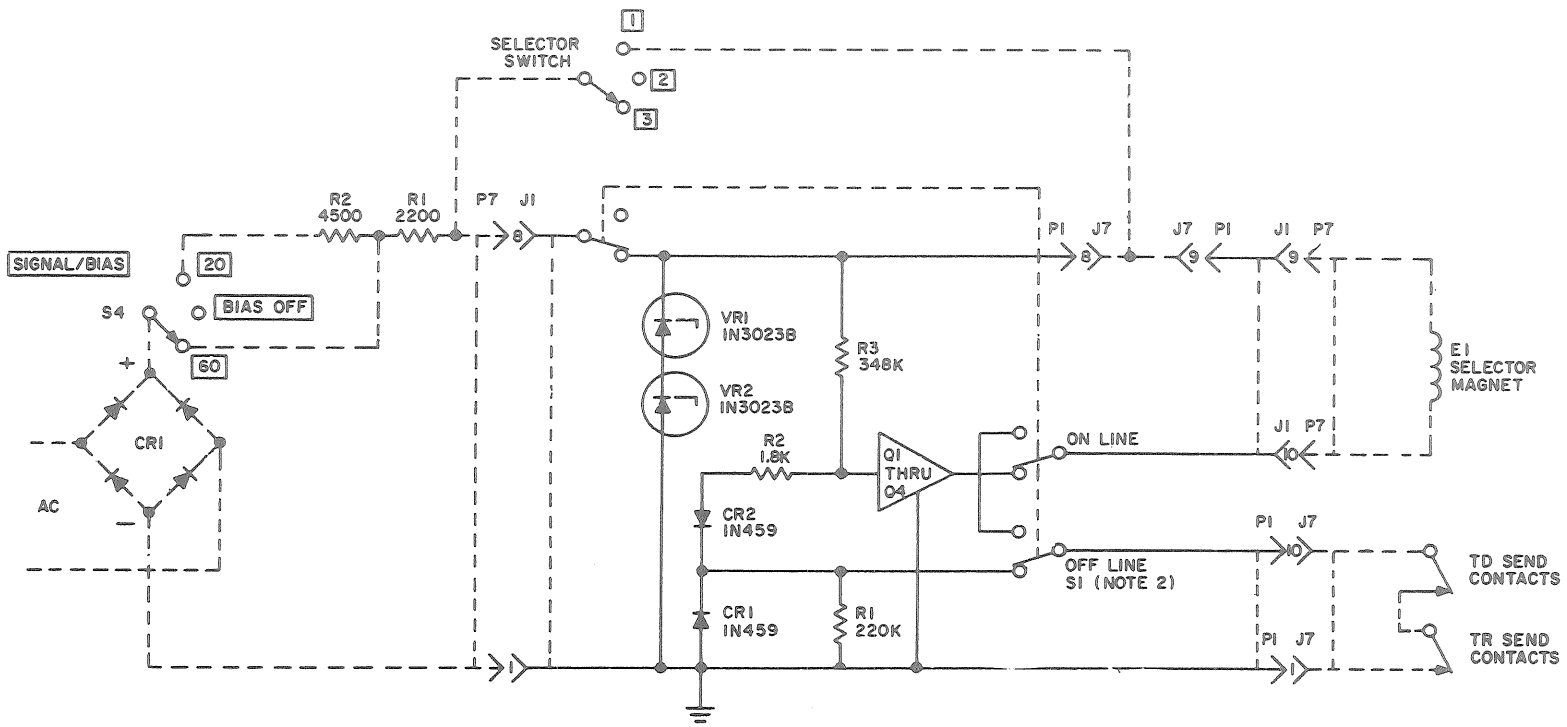


NOTES:

1. ALL CIRCUITS SHOWN AS DOTTED LINES ARE PART OF TT-76A,B OR C WITH SELECTOR SWITCH IN POSITION 3 (LOCAL REPUNCH).
2. SWITCH S1 ON THE TT-523/GGC WILL BE REFERRED TO AS THE ON LINE/OFF LINE SWITCH. THE ON LINE POSITION IS MARKED TD SEND, TR SEND/RCV ON THE TT-523/GGC. THE OFF LINE POSITION IS MARKED TD SEND, LOCAL PUNCH, LOCAL REPUNCH ON THE TT-523/GGC.
3. ALL CONNECTIONS NOT SHOWN FOR TT-76A/GGC MATING CONNECTORS J7 AND P7 ARE MATED PIN-TO-PIN THROUGH THE TT-523/GGC.

TM5815-338-15-10

Figure 5-1. TT-523/GGC and TT-76(*)/GGC, simplified schematic diagram.



NOTES:

1. ALL CIRCUITS SHOWN AS DOTTED LINES ARE PART OF TT-76A.B OR C WITH SELECTOR SWITCH IN POSITION 3 (LOCAL REPUNCH)
2. SWITCH S1 ON THE TT-523A/GGC WILL BE REFERRED TO AS THE ON LINE/OFF LINE SWITCH. THE ON LINE POSITION IS MARKED TD SEND, TR SEND/RCV ON THE TT-523A/GGC. THE OFF LINE POSITION IS MARKED TD SEND, LOCAL PUNCH, LOCAL REPUNCH ON THE TT-523A/GGC.
3. ALL CONNECTIONS NOT SHOWN FOR TT-76A/GGC MATING CONNECTORS J7 AND P7 ARE MATED PIN-TO-PIN THROUGH THE TT-523A/GGC.

TM5815-338-15-14

Figure 5-8. TT-523A/GGC and TT-76(*)/GGC, simplified schematic diagram.

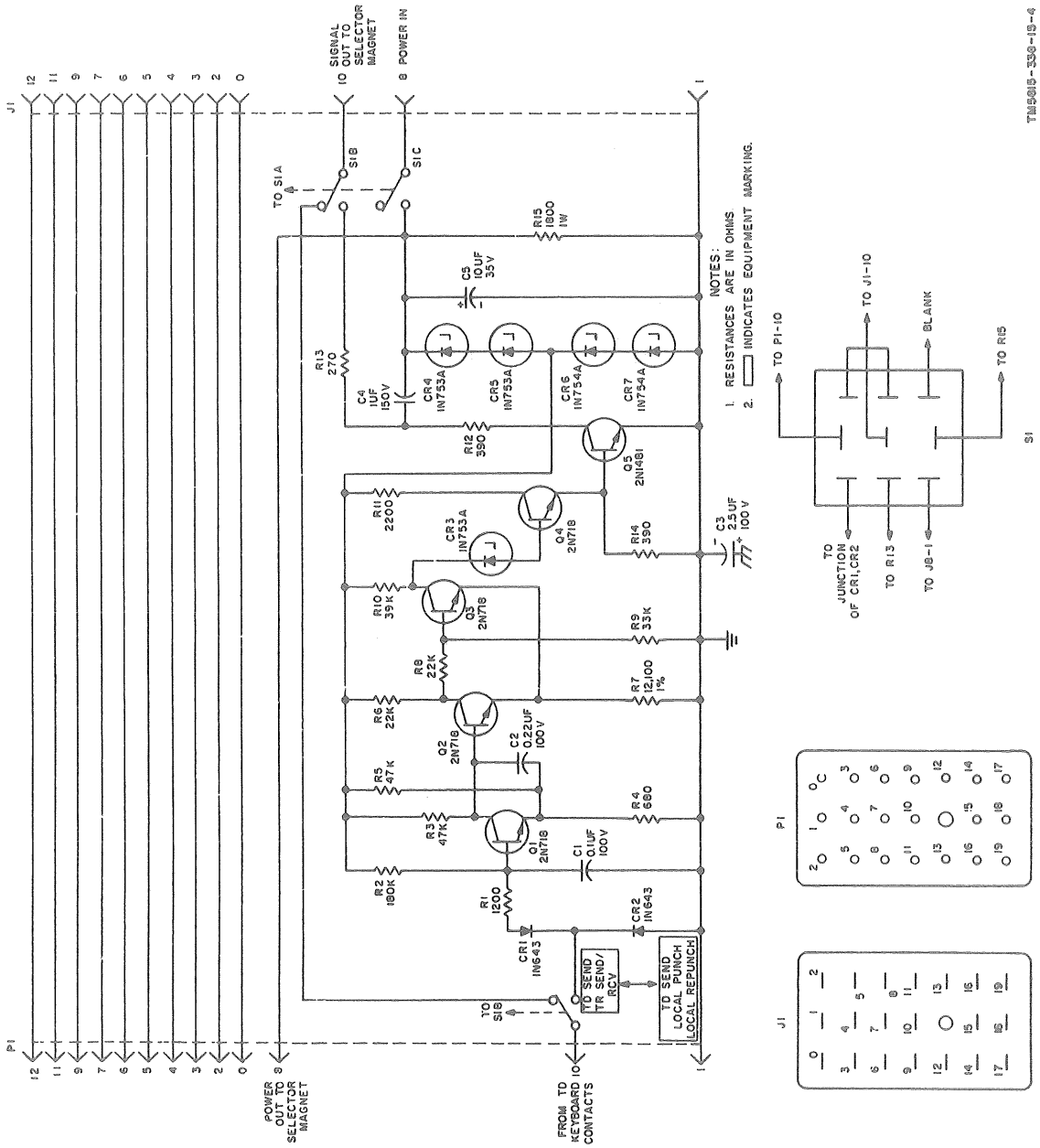


Figure 5-3. TT-523/GGC, schematic diagram.

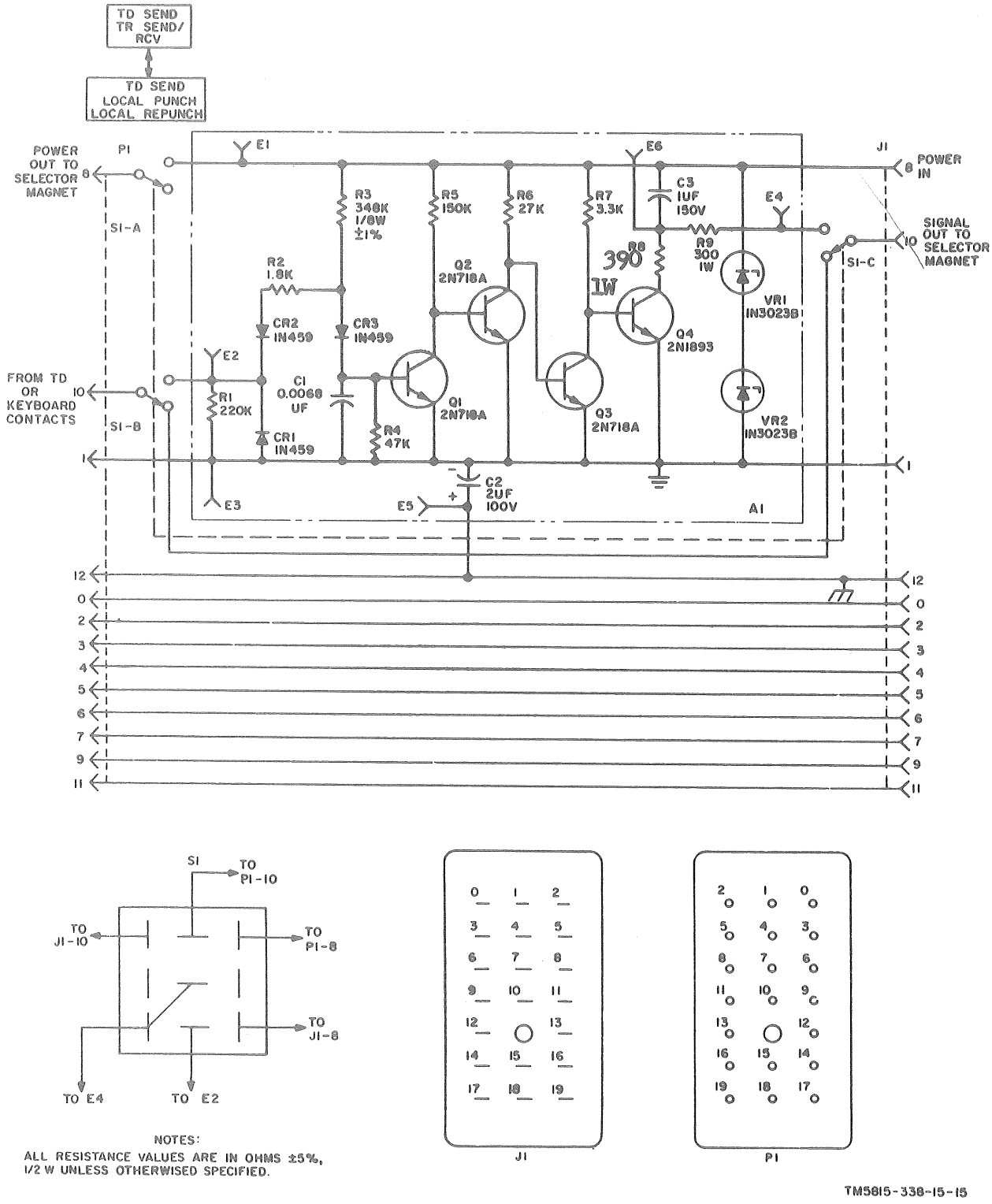


Figure 5-4. TT-523A/GGC, schematic diagram.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

6–1. Removal of TT–523(*)/GGC

Remove the TT–523(*)/GGC from the TT–76(*)/GGC and restore the TT–76(*)/GGC for normal operation, as follows:

a. Place the TT–76(*)/GGC MOTOR, LIGHT, and POWER switches at OFF.

b. Remove TT–76(*)/GGC P7 from J1 of the TT–523(*)/GGC.

c. Loosen the knurled nut of the ground binding post on the TT–76(*)/GGC and remove the TT–523(*)/GGC from J1 of the TT–76(*)/GGC. Replace the ground strap on the ground binding post of the TT–76(*)/GGC and tighten the ground binding post.

d. Connect TT–76(*)/GGC P7 and J7.

e. Remove the 5,600-ohm resistor from the BIAS TEST MA terminals on the TT–76(*)/GGC power supply and terminal unit and reconnect the strap between these two terminals.

f. Be sure the plug from the selector magnet cable is plugged into the appropriate (20-MA or 60MA) socket on the power supply and terminal unit.

g. Be sure the power supply and terminal unit SIGNAL/BIAS switch is set to the appropriate (20MA or 60MA) position.

6–2. Repackaging for Shipment or Limited Storage

Whenever possible, utilize the packaging material in which the TT–523(*)/GGC was received. If the original packaging material is not available, obtain or make a cardboard box of appropriate size to adequately protect the TT–523(*)/GGC during shipment or storage.

6–3. Authority for Demolition

Demolition of the TT–523(*)/GGC will be accomplished only upon the order of the commander. The destruction procedures outlined in paragraph 6–4 will be used to prevent further use of the TT–523(*)/GGC.

6–4. Methods of Destruction

Use any of the following methods to destroy the TT–523(*)/GGC:

a. Smash. Smash the TT–523(*)/GGC. Use sledges, axes, handaxes, pickaxes, hammers, or crowbars.

***Warning:* Be extremely careful in the use of explosives and incendiary devices; these items should not be used unless extreme urgency demands their use.**

b. Burn. Burn wiring diagrams and technical manuals; use gasoline, kerosene, oil, flamethrowers, or incendiary grenades.

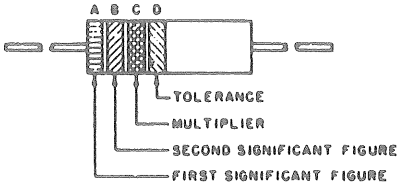
c. Bend. Bend the equipment case.

d. Explode. If explosives are necessary, use firearms, grenades, or TNT.

e. Dispose. Bury or scatter the destroyed parts in slit trenches, foxholes, or throw them into streams.

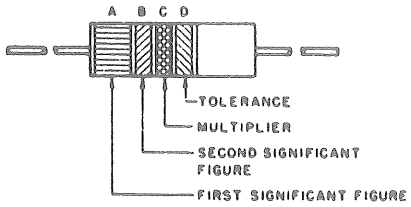
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

COMPOSITION-TYPE RESISTORS



BAND A— Equal Width Band Signifies Composition-Type

WIREWOUND-TYPE RESISTORS

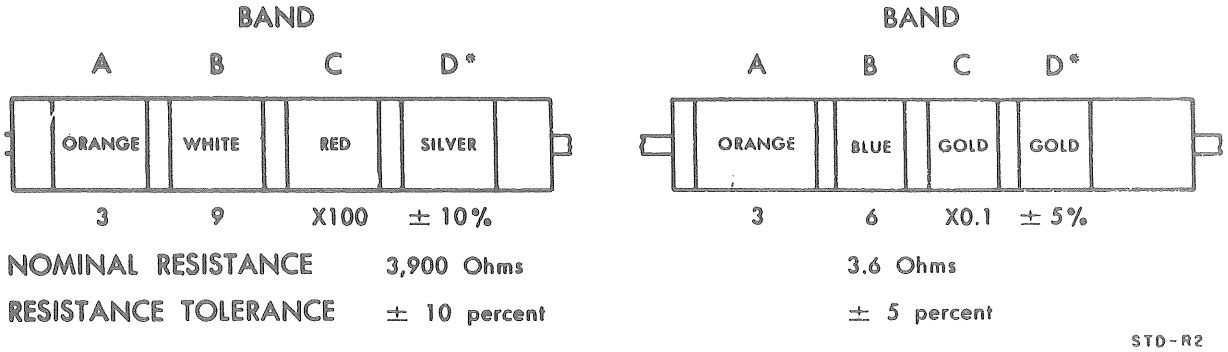


BAND A— Double Width Signifies Wire-wound Resistor

COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

EXAMPLES OF COLOR CODING



*If Band D is omitted, the resistor tolerance is ± 20%, and the resistor is not Mil-Std.

Figure 6-1. Color code marking for MIL STD resistors.

APPENDIX A
REFERENCES

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders
DA Pam 310-7	U.S. Army Equipment Index of Modification Work Orders
TB SIG 222	Solder and Soldering
TM 11-5815-238-12	Operator's and Organizational Maintenance Manual (Including Repair Parts and Special Tools List): Teletypewriter Sets AN/GGC-3, AN/GGC-3A, AN/GGC-53 and AN/GGC-53A and Teletypewriter Reperforator-Transmitters TT-76/GGC, TT-76A/GGC, TT-76B/GGC, TT-76C/GGC, TT-699/GGC, TT-699A/GGC, TT-699B/GGC and TT-699C/GGC
TM 11-5815-238-35	DS, GS and Depot Maintenance Manual: Teletypewriter Sets AN/GGC-3, AN/GGC-3A, AN/GGC-53 and AN/GGC-53A and Teletypewriter Reperforator-Transmitters TT-76/GGC, TT-76A/GGC, TT-76B/GGC, TT-76C/GGC, TT-699/GGC, TT-699A/GGC, TT-699B/GGC and TT-699C/GGC
TM 11-6625-366-10	Operator's Manual: Multimeter TS-352B/U. (NSN 6625-00-552-0142).
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 11-5815-338-40P	General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Device, Low Level Signaling TT-523A/GGC (NSN 5815-00-999-3048).

APPENDIX C
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations for Low Level Signaling Device TT-523(*)/GGC. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition; i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

C-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of task-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C — Operator/Crew
O —Organizational
F — Direct Support
H — General Support
D — Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

C-4. Tool and Test Equipment Requirements (Sec III)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

C-5. Remarks (Sec IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

SECTION II MAINTENANCE ALLOCATION CHART
FOR
DEVICE, LOW LEVEL SIGNALING TT-523/GGC and TT-523A/GGC

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
00	DEVICE, LOW LEVEL SIGNALING TT-523/GGC and TT-523A/GGC	Test				.5		2,3	
		Repair				1.5		1,2,3	
01	ELECTRONIC COMPONENT ASSEMBLY SM-D-603700	Replace				.3		2	
		Repair				1.3		1,2,3	

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR

DEVICE, LOW LEVEL SIGNALING TT-523/GGC and TT-523A/GGC

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL NATO STOCK NUMBER	TOOL NUMBER
1	H	MULTIMETER AN/USM-223	6625-00-999-7465	
2	H	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	
3	H	POWER SUPPLY PP-3135/U	6130-00-635-7991	

DRSEL-MA Form 1 Oct 77 6013

(Edition of 1 Oct 74 may be used until exhausted)

By Order of the Secretary of the Army:

HAROLD K. JOHNSON
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

CNGB (1)
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TSG (1)
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USCONARC (2)
USAMC (2)
USAMICOM (2)
USAECOM (2)
ARADCOM (2)
ARADCOM Rgn (1)
OS Maj Comd (2)
USACDCEC (10)
USASTRATCOM (2)
USAESC (70)
Armies (1)
USASESS (10)
USASA (2)
USACDCCEA (1)
USACDCCEA (Ft Huachuca) (1)
Army Dept (1) except
LBAD (14)
SAAD (30)
TOAD (14)
LEAD (7)
NAAD (8)
SVAD (8)
ATAD (10)
Svc Colleges (1)
1st Cav Div (1)
USARMA (2)
Gen Dep (1)
Sig Sec, Gen Dep (4)
Sig Dep (6)
Sig FLDMS (1)
USACRREL (2)
Ft Huachuca (5)
WSMR (2)
Ft Carson (7)
USAERDAA (2)
USAERDAW (2)
Units org under fol TOE (1 ea.):
11-155
11-157
11-158
11-587
11-592
11-597
29-134

NG: State AG (3).

USAR: None.

For explanation of abbreviations used, See AR 320-50.

☆U.S. Government Printing Office : 1984 - 445-211/18636