TM 11-6940-200-35

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD AND DEPOT MAINTENANCE

KEYERS TG-34-A TG-34-B AND KY-127/GG

HEADQUARTERS, DEPARTMENT OF THE ARMY

27 AUGUST 1959

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 115-volt ac line connections, the motor connections, or power supply connections. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

TECHNICAL MANUAL
No. 11-6940-200-35

HEADQUARTERS,
DEPARTMENT OF THE ARMY,
WASHINGTON 25, D. C., *27 August 1959*

KEYERS TG-34-A, TG-34-B, AND KY-127/GG

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*This manual together with TM 11-6940-200-10 and TM 11-6940-200-20 supersedes TM 11-443, 25 October 1943.

CHAPTER 1

THEORY

Section I. GENERAL

1. Scope

a. This manual covers field and depot maintenance for Keyers TG–34–A, TG–34–B, and KY–127/GG. It includes instructions appropriate to third, fourth, and fifth echelons for troubleshooting, testing, adjusting and repairing the equipment, replacing maintenance parts, and repairing specified maintenance parts. It also lists tools, materials, and test equipment for third, fourth, and fifth echelon maintenance. Detailed description of functions of the circuits are covered in the theory section.

b. The complete technical manual for this equipment includes two other publications:

TM 11–6940–200–10, Operator's Manual, Keyers TG–34–A, TG–34–B, and KY–127/GG.

TM 11–6940–200–20, Organizational Maintenance, Keyers TG–34–A, TG–34–B, and KY–127/GG.

c. Forward comments concerning this manual to the Commanding Officer, United States Army Signal Publications Agency, Fort Monmouth, N. J.

Note. For applicable forms and records, see paragraph 2, TM 11–6940–100.10.

2. Differences in Models

Keyer TG–34–A employs different types of circuitry for its operation than Keyers TG–34–B and KY–127/GG; therefore, the values of the components (fig. 14 and 15) used for the stages differ. Differences in the stages are given in the chart below.

3. General Theory

(fig. 1)

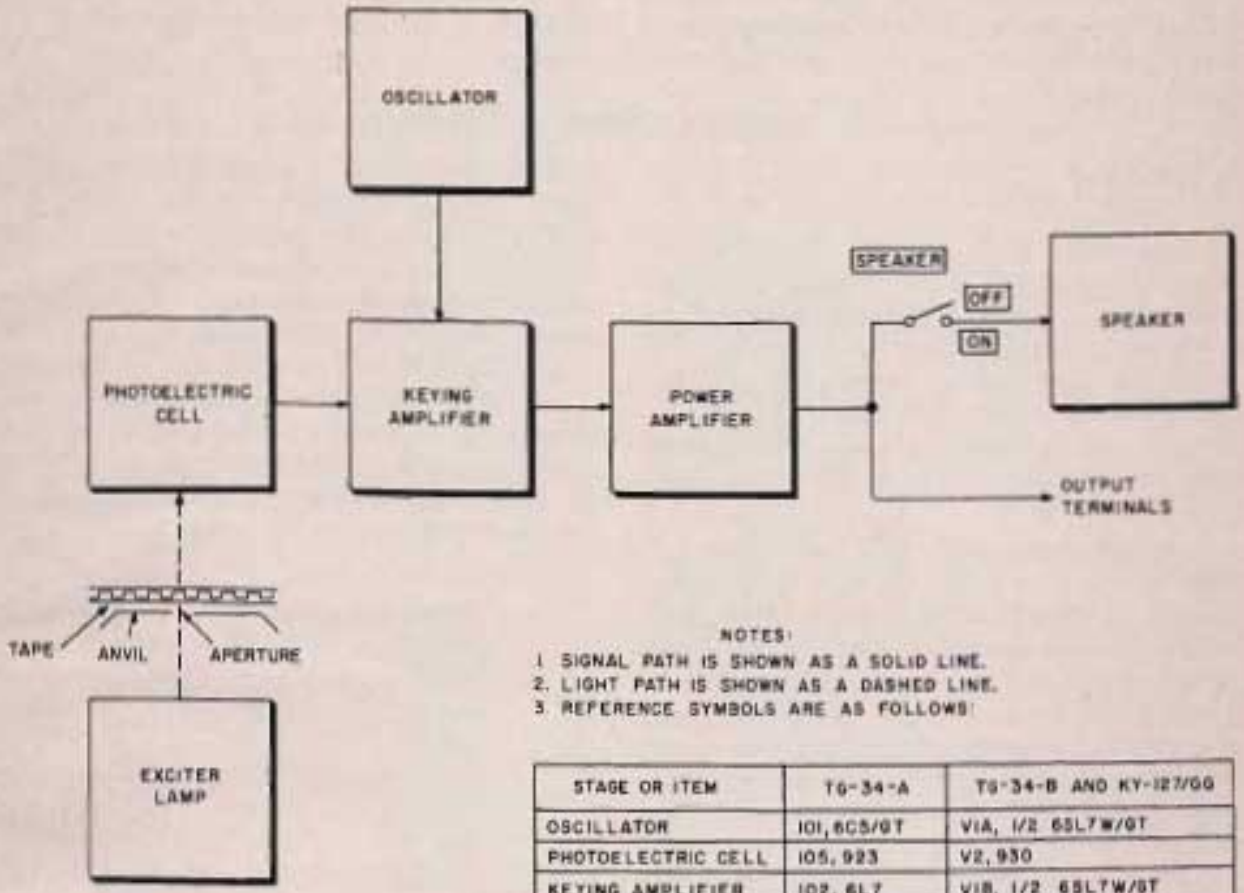
The keyer is an oscillator-amplifier unit that produces audible code practice signals automatically or manually. For automatic operation, the output signals are controlled by a paper tape passing in front of an exciter lamp. The tape allows light from an exciter lamp to strike a photoelectric cell. The length of time that the photoelectric cell conducts, producing an output at the speaker, is determined by an inked pattern on the paper tape. For the duration of the inked portion, no light strikes the photoelectric cell and there is no output. For manual operation, the output signals are controlled by an externally connected key. While the key is closed, an output will be produced by the keyer.

a. *Oscillator.* The oscillator produces a continuous audio frequency of 800 cycles per second (cps). This signal is fed to the keying amplifier.

b. *Photoelectric Cell.* When light from the exciter lamp passes through the white portions of the paper tape and activates the photoelectric cell, the photoelectric cell conducts. Its output is then applied to the keying amplifier.

c. *Keying Amplifier.* The plate current of the keying amplifier is normally cutoff and no output signal is developed until both signals (os-

Item	TG-34-A	TG-34-B and KY-127/GG
Oscillator.	Series-fed Hartley oscillator, tube type 6C5/GT.	RC phase-shift oscillator, tube type ½ 6SL7/GT.
Keying amplifier.	Pentagrid tube, type 6L7.	Triode tube, type ½ 6SL7/GT.
Power supply.	Employs tapped resistors for voltage division.	Employs individual resistors for voltage division.
Photoelectric cell.	Tube type 923.	Tube type 930.
Auxiliary cell control.	Resistor 126.	None.
Power supply filter.	LC Pi-type.	RC type.



NOTES:
1. SIGNAL PATH IS SHOWN AS A SOLID LINE.
2. LIGHT PATH IS SHOWN AS A DASHED LINE.
3. REFERENCE SYMBOLS ARE AS FOLLOWS:

STAGE OR ITEM	TG-34-A	TG-34-B AND KY-127/GG
OSCILLATOR	101, 6C5/6T	V1A, 1/2 6SL7W/GT
PHOTOELECTRIC CELL	105, 923	V2, 930
KEYING AMPLIFIER	102, 6L7	V1B, 1/2 6SL7W/GT
POWER AMPLIFIER	103, 6V6/GTY	V3, 6V6/GT
EXCITER LAMP	138	E2
SPEAKER SWITCH	133	SW3
SPEAKER	141	LS1

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Figure 1. Keyer, block diagram.

cillator signal and photoelectric cell signal) are present at the keying amplifier. The output frequency is determined by the oscillator; the length of time of the output (dot or dash) is determined by the white spaces on the paper tape (time the photoelectric cell conducts) or by the length of time that a manual key is closed.

d. Power Amplifier. The output of the keying amplifier, applied to the power amplifier, is further amplified and coupled to the speaker or to code practice equipments through the output terminals.

e. Power Supply. The power supply (not shown) is a full-wave rectifier that supplies the necessary dc voltages for the proper operation of the equipment. Filament voltages for the electron tubes are furnished by a low-voltage winding of the secondary of the power transformer.

Section II. DETAILED THEORY OF KEYER TG–34–A

4. Oscillator
(fig. 14)

a. Oscillator 101 is a series-fed Hartley oscillator that generates a continuous 800-cps audio signal. Inductor 128 and capacitor 106 form the tank circuit and determine the frequency of oscillation. Positive (regenerative) feedback is developed from the plate (pin 3), through tapped inductor 128, and feed through coupling capacitor 107–1, to the control grid (pin 5).

b. Coupling capacitor 107–1 and resistor 115 provide grid leak bias. Cathode resistor 114 introduces a small amount of degenerative feedback to stabilize the output. Resistor 116–1 and capacitor 108–1 form a decoupling network. Resistor 116–1 is made large to limit the plate voltage. The low plate voltage will allow a minimum amount of current flow through the tube even if oscillations cease. The output of the oscillator is taken from the tank circuit and coupled to the control grid of the keying amplifier through coupling capacitor 107–2 and limiting resistor 117–1.

5. Keying Amplifier
(fig. 14)

a. General. Bias is established between the control grid (cap) and the cathode (pin 8) by a voltage divider consisting of resistors 123–1, 123–2, 123–3, and 123–4. The amount of bias, thus developed by resistor 123–2, is not sufficient to stop cathode current from flowing through the control grid to the screen grid (pin 4). With photoelectric cell 105 in a nonducting condition (no light from the exciter lamp), no current flows through injector resistors 119 or 120. The injector grid (pin 5) is at ground potential. The amount of bias established (voltage drop across resistors 123–1 and 123–2) between the injector grid (pin 5) and the cathode (pin 8) of the keying amplifier is sufficient to cut off plate current. The oscillator signal (coupled through coupling capacitor 107–2 and limiting resistor 117–1) is developed across resistor 117–2. Under the above conditions, there is no output from the keying amplifier. Dropping resistor 116–2, bypassed by decoupling capacitor 108–2, develops the proper dc potential on the screen grid.

b. Automatic Keying.

(1) When the paper tape, over the aperture of the anvil, allows light to strike the photoelectric cell (white portion of the tape in the aperture), the photoelectric cell conducts. Current flows from ground, through resistors 119, 120, and 118, through the photoelectric cell, through PE CELL control 125, through limiting resistor 121, to B+. The direct current (dc) potential developed across injector resistors 119 and 120 (positive on the injector grid (pin 5)) allows 800-cps signal current produced by the oscillator signal) to flow in the plate circuit. When the injector grid becomes positive, current flows from the injector grid through resistor 118, through the photoelectric cell. Resistor 118 is made very large (5-megohms) and the resultant voltage dropped across it prevents the injector grid from rising any appreciable amount above the cathode voltage. The output signal is developed across plate load resistor 117–3.

(2) PE CELL control 125, resistors 121, 122, and 126 (auxiliary cell control) form a voltage divider to provide the necessary dc voltages for the operation of the photoelectric cell. PE CELL control 125 varies the dc voltage applied to the plate of the photoelectric cell, thus varying the amount of light necessary to cause conduction of the photoelectric cell. Auxiliary cell control 126 determines the maximum plate voltage that can be applied to the photoelectric cell. The proper amount of light striking the photoelectric cell causes keying to occur only during the white portions of the paper tape.

(3) When dark (inked) portions of the paper tape are in the aperture of the anvil, insufficient light strikes the photoelectric cell and the photoelectric cell does not conduct. The injector grid of the keying amplifier is at ground potential and plate current is cut off.

c. Manual Operation.

(1) When a manual keying device is used in place of the paper tape to key the keying amplifier, the operation of the oscillator and keying amplifier is essentially the same. The oscillator output is coupled to the control grid (cap) of the keying amplifier. The injector grid (pin 5) is at ground potential. Plate current of the keying amplifier is cut off and there is no output.

(2) When the manual key is closed, current flows from ground, through injector resistor 120, through the closed key. The dc voltage drop developed across injector resistor 120 is equal to the B+ voltage. This high positive potential on the injector grid (pin 5), and plate current flows. Current will flow from the injector grid through resistor 119. The voltage dropped across resistor 119 will reduce the injector potential to a valve slightly higher than the cathode potential. The oscillator signal is developed at the plate of the keying amplifier. The output signal (800-cps signal from the oscillator) is developed as long as the key is closed. Bypass capacitor 112–2 is a spark suppressor used to reduce arcing across the key contacts. Arcing produces noise and distorts the signal from the oscillator.

6. Power Amplifier
(fig. 14)

The signal from the keying amplifier is coupled to the control grid (pin 5) of power amplifier 103 through coupling capacitor 110–1 and developed across grid resistor 127. Grid resistor 127 provides volume control of the output signal. Cathode resistor 124–1 develops cathode bias for class A operation of the power amplifier and is bypassed by capacitor 111 to prevent degeneration. Bypass capacitor 112–1 maintains the screen grid (pin 4) at a constant dc potential. The output signal of the power amplifier is developed across the primary winding of transformer 131. Capacitor 110–2 acts as a parasitic suppressor and bypasses undersired high frequency around the primary of transformer 131. The output of the keyer is taken from the secondary winding of transformer 131. The secondary winding is tapped to provided impedances of 4, 8, and 15 ohms for use with code practice equipments. Resistor 124–2 is the load resistor for the secondary winding of transformer 131 when the SPEAKER switch is operated to OFF.

7. Power Supply
(fig. 14)

The power supply is a full-wave rectifier (104 that can be used with an ac input voltage of 115 volts or 230 volts. Changeover switch 132 is utilized for this purpose. In the 115-volt position, the changeover switch connects the primary windings of transformer 130 in parallel and the windings of motor 142 in parallel. In the 230-volt position, the changeover switch connects the primary windings of transformer 130 in series and the windings of motor 142 in series. Bleeder resistors 123–1, 123–2, 123–3, and 123–4 form a voltage divider for distribution of proper dc voltages to the circuits in the keyer. Capacitors 113–1 and 113–2 in conjunc-

tion with inductor 129 form a pi-type filter. Two low-voltage secondary windings provide the necessary ac filament, pilot lamp, and exciter lamp voltages.

Section III. DETAILED THEORY OF KEYERS TG–34–B AND KY–127/GG

8. General

The operation of Keyers TG–34–B and KY–127/GG is the same as that of Keyer TG–34–A. A phase-shift oscillator (par. 9) is used in Keyers TG–34–B and KY–127/GG. The keying amplifier is a triode mixer (par. 10). The power amplifier used in the keyers is identical. For information concerning the power amplifier stage in Keyers TG–34–B and KY–127/GG, refer to paragraph 6. The power supply (fig. 15) used with Keyers TG–34–B and KY–127/GG is operationally the same as that used with Keyer TG–34–A. A different type of filter arrangement and voltage divider is used for obtaining the necessary operating potentials for the keyer. For details of the power supply, refer to paragraph 7.

9. Oscillator
(fig. 15)

a. Phase-shift oscillator V1A produces a constant audio output frequency of 800 cps. The frequency of oscillation is determined by three resistance-capacitance (RC) networks R3–C2, R4–C3, and R5–C4. Each RC network provides approximately 60° phase shift (at the desired frequency of 800 cps) so that the feed-back voltage from the plate (pin 2) of the oscillator tube to the gride (pin 1) is regenerative (180° shift). The feed-back voltage is coupled through coupling capacitor C1 and developed across resistor R1. The phase shift produced by each RC network will vary with frequency, and positive feedback (regeneration) occurs only at the desired frequency of 800 cps.

b. Cathode resistor R8 develops fixed cathode bias due to the dc current flow through the voltage divider consisting of R8, R16, R15, and R18. Resistor R8 is unbypassed to provide a small amount of degenerative feedback. Load resistors R11 and R12 form a split load to limit the amount of signal coupled to the control grid of the keying amplifier. Coupling capacitor C1 and resistor R1 and R2 develop grid bias for the oscillator. Rectifying crystal CR1 provides a low-resistance path to charge capacitor C1. During discharge of the capacitor, the crystal does not conduct and the capacitor must discharge through the high resistance of resistor R2. The rapid charging of capacitor C1 prevents large dc variations at the plate of the oscillator.

10. Keying Amplifier
(fig. 15)

a. General. Keying amplifier V1B is a triode mixer. It is normally held cut off by the positive voltage at the cathode (pin 4) developed by cathode resistors R6 and R7. The amplifier conducts when the signal from the photoelectric cell is applied to the control grid. The voltage developed at the cathode of the keying amplifier is a result of current flow through dropping resistors R6, R7, R9, R10, R17, and R18. Resistor R18 also reduces the power supply voltage to the necessary value required for the keying amplifier and the photoelectric cell. The signal from the phase-shift oscillator is coupled to the control grid of the keying amplifier through coupling capacitor C6.

b. Automatic Keying.

(1) When the paper tape, over the aperture of the anvil, allows light to strike the photoelectric cell, current flows from ground, through resistor R14 and R13, through the photoelectric cell, through PE CELL control R15, through resistor R18, to the power supply. The resultant positive dc potential at the cathode of the photoelectric cell is applied to the control grid (pin 4) of the keying amplifier and the keying amplifier conducts.

(2) Plate load resistor R19 develops the output signal. Decoupling capacitor C7 bypasses the key clicks to ground and prevents distortion of the output. The output signal is fed to the control grid (pin 5) of the power amplifier through coupling capacitor C8 and VOLUME control R20. PE CELL control R15 varies the voltage applied to the plate of the photoelectric cell. The

PE CELL control also controls the maximum output of the keyer.

(3) When dark (inked) portions of the paper tape are in the aperature of the anvil, the photoelectric cell does not conduct. No positive voltage is applied to the control grid (pin 4) of the keying amplifier and the keying amplifier is cutoff.

c. Mannal Operation. When the manual key is closed, current flows from ground through load resistor R14, through the closed key, to the positive potential at the junction of cathode resistors R6 and R7 (*b* above). Current flows from the control grid through resistor R13. The resultant voltage drop across resistor R13 prevents the control grid from rising any appreciable amount above the cathode potential. The positive dc voltage developed across load resistor R14 is applied to the control grid (pin 4) of the keying amplifier. The keying amplifier conducts and an output (800 cps) is produced as long as the key is closed. Capacitor C5 is a spark suppressor for the key contacts.

CHAPTER 2

TROUBLESHOOTING

Section I. GENERAL TROUBLESHOOTING TECHNIQUES

Warning: **When servicing the keyer, be extremely careful of high voltages. Always disconnect the power cable from the alternating current (ac) input receptacle and discharge the power supply filter capacitors before performing any repair work inside the equipment.**

11. General Instructions

Troubleshooting at field and depot maintenance level includes all the techniques outlined for organizational maintenance and any special or additional techniques required to isolate a defective part. The field and depot maintenance procedures are not complete in themselves but supplement the procedures described in operator's maintenance (TM 11–6940–200–10) and organizational maintenance (TM 11–6940–200–20). The systematic troubleshooting procedures, which began with the operational and localization checks that can be performed at an organizational level, must be completed by means of localizing and isolating techniques.

12. Troubleshooting Procedures

a. General. The first step in servicing a defective keyer is to localize the fault. Localization means tracing the fault to a stage or circuit responsible for abnormal operation. The second step is to isolate the fault. Isolation means tracing the fault to the defective part responsible for the abnormal condition. Some faults, such as burned-out resistors, leaking capacitors, and arcing or shorted transformers, can often be located by sight, smell, and hearing. The majority of faults, however, must be isolated by detailed checks.

b. Localization and Isolation. The tests listed below will aid in isolating the trouble. First, localize the trouble to a single stage or circuit, and then isolate the trouble within that circuit by voltage, resistance, and continuity measurements. Use the following methods to localize and isolate the trouble.

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring the circuits. Brightness of exciter lamp, turning of take-up reel, and other visual signs should be observed to localize the fault to a particular circuit.

(2) *Signal substitution.* Signal substitution charts (par. 16 or 17) will aid in localizing the trouble to an individual stage or circuit.

(3) *Troubleshooting chart.* The trouble symptoms listed in the chart (par. 14*c* and *d*) will aid in isolating trouble to a defective stage or part.

(4) *Intermittent troubles.* In all these tests ((1), (2), and (3) above), the possibility of intermittent troubles should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the equipment. Check all wiring and connections in the keyer (fig. 16 or 17).

(5) *Voltage and resistance measurements.* These measurements will help locate the individual component at fault after the defective stage has been localized by means of the troubleshooting chart (par. 14) or the signal substitution method (par. 16). Use resistor and capacitor color codes (fig. 12 and 13) to determine the correct value of the components. Use voltage and resistance diagrams (fig. 6 and 7) to find normal readings, and compare them with readings taken.

13. Tools, Materials, and Test Equipment Required

The following chart lists the tools, materials, and test equipment required for trouble shooting and adjusting the keyer. The chart also lists the associated technical manuals and the assigned common name.

Test equipment	Technical manual	Common name
Multimeter TS-352/U	TM 11-5527	Multimeter
Electron Tube Test Set TV-2/U	TM 11-2661	Tube tester
Test Set TS-140/PCM	TM 11-2096	Signal generator
Tool Equipment TE-113		
Stop watch		
Test tape, 100-foot (marked at 1-foot intervals		

Section II. TROUBLESHOOTING PROCEDURES

14. Localizing Troubles

a. General. The procedures outlined in the chart (*c* or *d* below) will localize the trouble to a particular section or stage of the keyer and sometimes to the particular defective part. When the procedures given in the troubleshooting chart results in the localization of the trouble to a defective stage, follow the isolating techniques outlined in paragraph 18 to isolate the trouble to the particular defective part. When the trouble is localized to two or more possible stages, use the signal substitution techniques (par. 15) to localize the defective stage; then isolate the trouble to the defective part.

b. Use of the Chart. The troubleshooting chart (*c* or *d* below) supplements the equipment performance check list (TM 11-6940-200-20). If previous checks have resulted in reference to a particular trouble listed in the chart, refer directly to that symptom for the possible troubles and the corrective measures. If no operational symptoms are known, begin with item No. 1 of the equipment performance check list and proceed until the trouble is located. For location of parts in the keyers, see figures 2, 3, 4, and 5.

Note. The resistor, consisting of resistors 123-1, 123-2, 123-3, and 123-4, must be replaced as a unit if any part of the resistor is defective.

c. Troubleshooting Chart, TG-34-A.

Symptom	Probable trouble	Corrective measures
Pilot lamp does not light when AC OFF VOLUME control is operated clockwise.	Defective switch on AC OFF VOLUME control 127.	Replace AC OFF VOLUME control.
	Defective changeover switch 134.	Replace switch.
	Defective transformer 120.	Replace transformer (par. 23).
Exciter lamp does not light when PE CELL control is operated clockwise and AC OFF VOLUME control is operated clockwise.	Defective switch on PE CELL control 125.	Replace PE CELL control.
Motor does not operate when MOTOR switch is operated to ON and AC OFF VOLUME control is operated clockwise.	Defective MOTOR switch 134.	Replace switch.
	Defective motor 142.	Replace motor (par. 22).
Keying click is heard in speaker; 800-cps signal is not head.	Defective oscillator stage:	Use isolating techniques (par. 18):
	Open resistor 114.	Replace resistor.
	Defective resistor 115.	Replace resistor.
	Open capacitor 107-1.	Replace capacitor.
	Defective capacitor 106.	Replace capacitor.
	Defective oscillator coil 128.	Replace coil (par. 25).
	Open resistor 116-1.	Replace resistor.
	Open capacitor 107-2.	Replace capacitor.

Symptom	Probable trouble	Corrective measures
	Open resistor 117–1.	Replace resistor.
	Shorted resistor 117–2.	Replace resistor.
No keying click or 800-cps signal heard in speaker; normal 60-cps hum is heard.	Defective photoelectric cell stage:	Use signal substitution techniques (par. 16):
	Open resistor 121.	Replace resistor.
	Open resistor 118.	Replace resistor.
	Open resistor 119.	Replace resistor.
	Open resistor 120.	Replace resistor.
	Shorted capacitor 109.	Replace capacitor.
	Aperture clogged with lint.	Clean aperture.
	Defective keying amplifier stage:	
	Open resistor 123–1.	Replace resistor.
	Open resistor 123–2.	Replace resistor.
	Shorted resistor 123–3.	Replace resistor.
	Shorted resistor 123–4.	Replace resistor.
	Open resistor 116–2.	Replace resistor.
	Shorted capacitor 108–2.	Replace capacitor.
	Open resistor 117–3.	Replace resistor.
	Open capacitor 110–1.	Replace capacitor.
	Defective power amplifier stage:	
	Shorted VOLUME control 127.	Replace VOLUME control.
	Open resistor 124–1.	Replace resistor.
	Shorted capacitor 111.	Replace capacitor.
	Shorted capacitor 110–2.	Replace capacitor.
No keying click or 800-cps signal heard in speaker; no hum is heard.	Defective transformer 131.	Replace transformer.
	Defective SPEAKER switch 133.	Replace switch.
	Shorted capacitor 110–2.	Replace capacitor.
	Defective power supply:	
	Shorted capacitor 113–1.	Replace capacitor.
	Shorted capacitor 113–2.	Replace capacitor.
	Open choke coil 129.	Replace coil.
	Defective transformer 130.	Replace transformer (par. 23).
Keyer operates properly for 115-volt operation; fuses blow for 230-volt operation.	Defective changeover switch.	Replace switch.
800-cps signal continuously heard in speaker.	Shorted keying jack 139.	Replace jack.
	Shorted capacitor 112–2.	Replace capacitor.
	Shorted resistor 121.	Replace resistor.
	Open resistor 122.	Replace resistor.
	Open resistor 126.	Replace resistor.
Tape speeds are incorrect.	Defective drive cone mechanism.	Repair drive cone mechanism (par. 21).

d. Troubleshooting Chart, TG–34–B and KY–127/GG.

Symptom	Probable trouble	Corrective measures
Pilot lamp does not light when AC OFF VOLUME control is operated clockwise.	Defective switch SW1 on AC OFF VOLUME control.	Replace AC OFF VOLUME switch.
	Defective changeover switch SW5.	Replace switch.
	Defective transformer T1.	Replace transformer (par. 24).
Exciter lamp does not light when PE CELL control is operated clockwise and AC OFF VOLUME control is operated clockwise.	Defective switch SW2 on PE CELL control R15.	Replace PE CELL control.
Motor does not operate when MOTOR switch SW4 is operated to ON and AC OFF VOLUME control is operated clockwise.	Defective MOTOR switch SW4.	Replace switch.
	Defective motor B1.	Replace motor (par. 22).

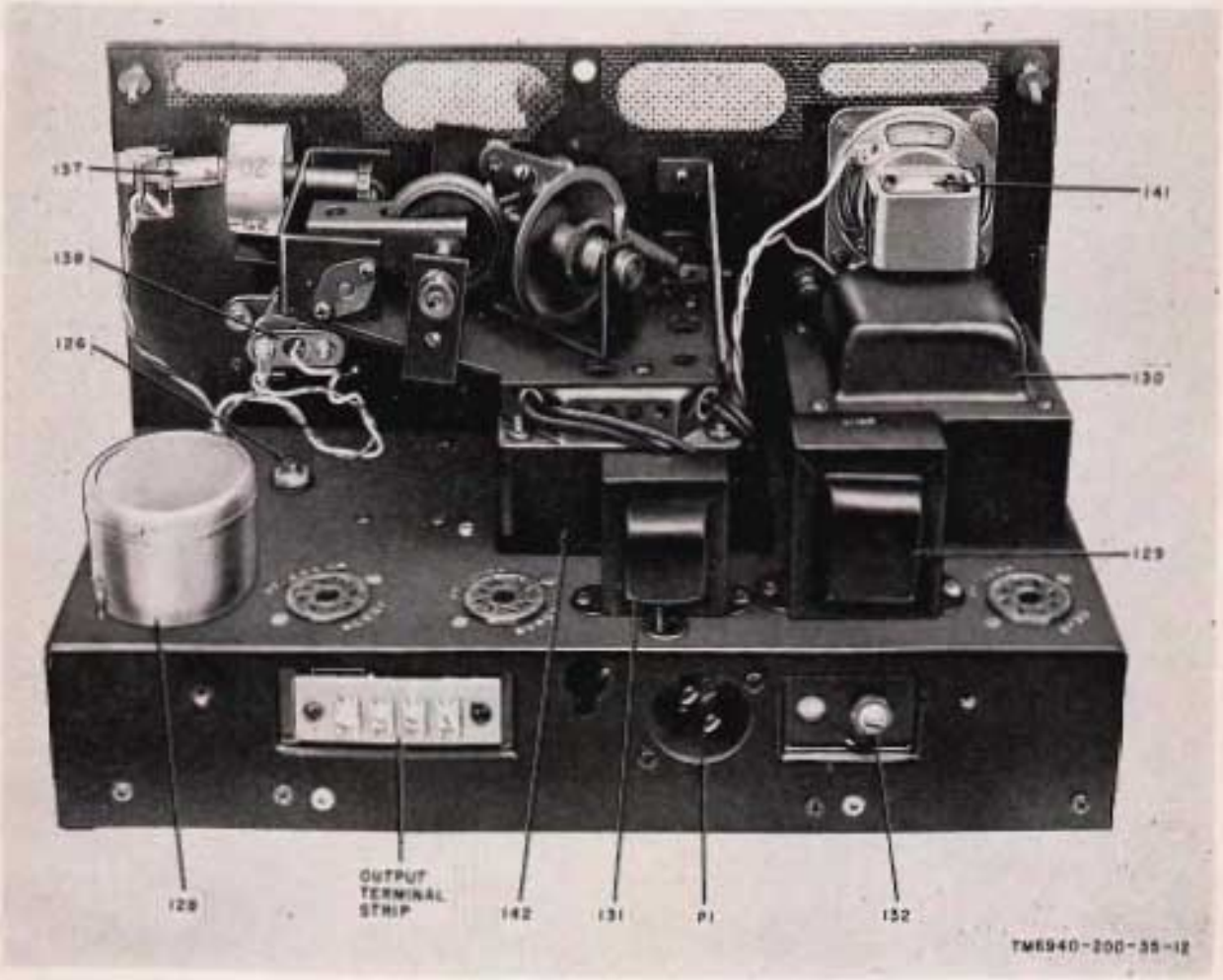


Figure 2. Keyer TG–34–A, location of parts, top view.

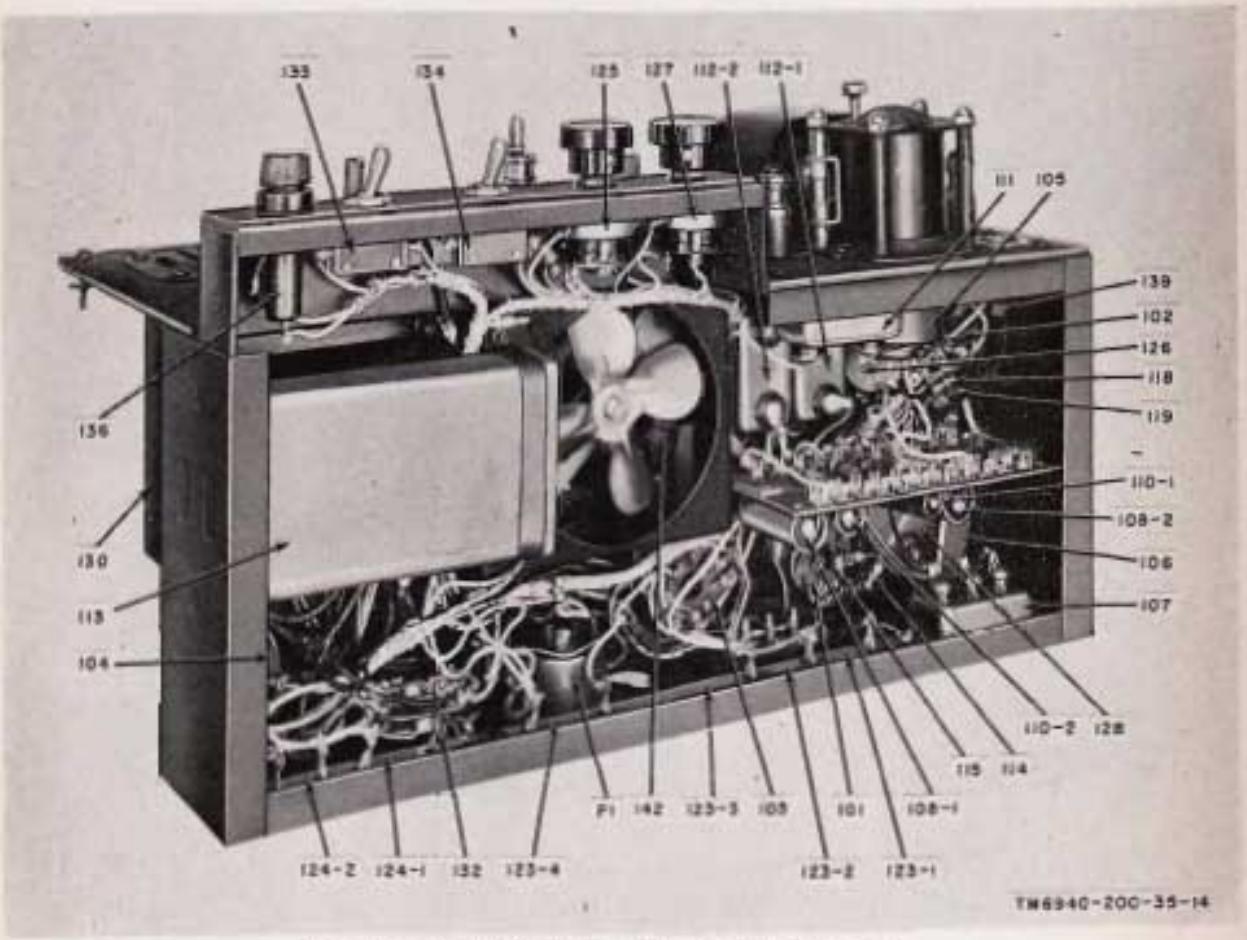


Figure 3. Keyer TG-34-A, location of parts, bottom view.

Symptom	Probable trouble	Corrective measures
Keying click is heard in speaker; 800-cps signal is not heard.	Defective oscillator stage:	
	Defective resistor R3.	Replace resistor.
	Defective resistor R4.	Replace resistor.
	Defective resistor R5.	Replace resistor.
	Defective capacitor C2.	Replace capacitor.
	Defective capacitor C3.	Replace capacitor.
	Defective capacitor C4.	Replace capacitor.
	Open capacitor C1.	Replace capacitor.
	Open resistor R11.	Replace resistor.
	Open resistor R8.	Replace resistor.
	Open resistor R12.	Replace resistor.
	Open capacitor C6.	Replace capacitor.
No keying click or 800-cps signal heard in speaker; normal 60-cps hum is heard.	Defective photoelectric cell stage:	Use signal substitution techniques (par. 17).
	Open resistor R13.	Replace resistor.
	Open resistor R15.	Replace resistor.
	Open resistor R14.	Replace resistor.
	Defective keying amplifier stage:	
	Open resistor R19.	Replace resistor.
	Open resistor R18.	Replace resistor.
	Open resistor R6.	Replace resistor.
	Open resistor R7.	Replace resistor.
	Shorted capacitor C7.	Replace capacitor.
	Open capacitor C8.	Replace capacitor.
	Defective power amplifier stage:	
	Shorted resistor R20.	Replace resistor.
	Shorted capacitor C11.	Replace capacitor.
	Open resistor R22.	Replace resistor.
No keying click or 800-cps signal heard in speaker; no hum is heard.	Defective transformer T2.	Replace transformer.
	Defective SPEAKER switch SW2.	Replace switch.
	Shorted capacitor C14.	Replace capacitor.
	Defective power supply:	
	Open resistor R23.	Replace resistor.
	Shorted capacitor C10.	Replace capacitor.
	Shorted capacitor C12.	Replace capacitor.
	Shorted capacitor C13.	Replace capacitor.
	Defective transformer T1.	Replace transformer (par. 24).
Keyer operates properly for 115-volt operation; fuses blow for 230-volt operation.	Defective changeover switch SW5.	Replace switch.
		Replace jack.
		Replace capacitor.
800-cps signal is continuously heard in speaker.	Shorted keying jack J1.	Replace capacitor.
	Shorted capacitor C5.	Replace resistor.
	Shorted capacitor C6.	Replace resistor.
	Open resistor R9.	Replace resistor.
	Open resistor R10.	
	Open resistor R17.	
Tape speeds are incorrect.	Defective drive cone mechanism.	Repair drive cone mechanism (par. 21).

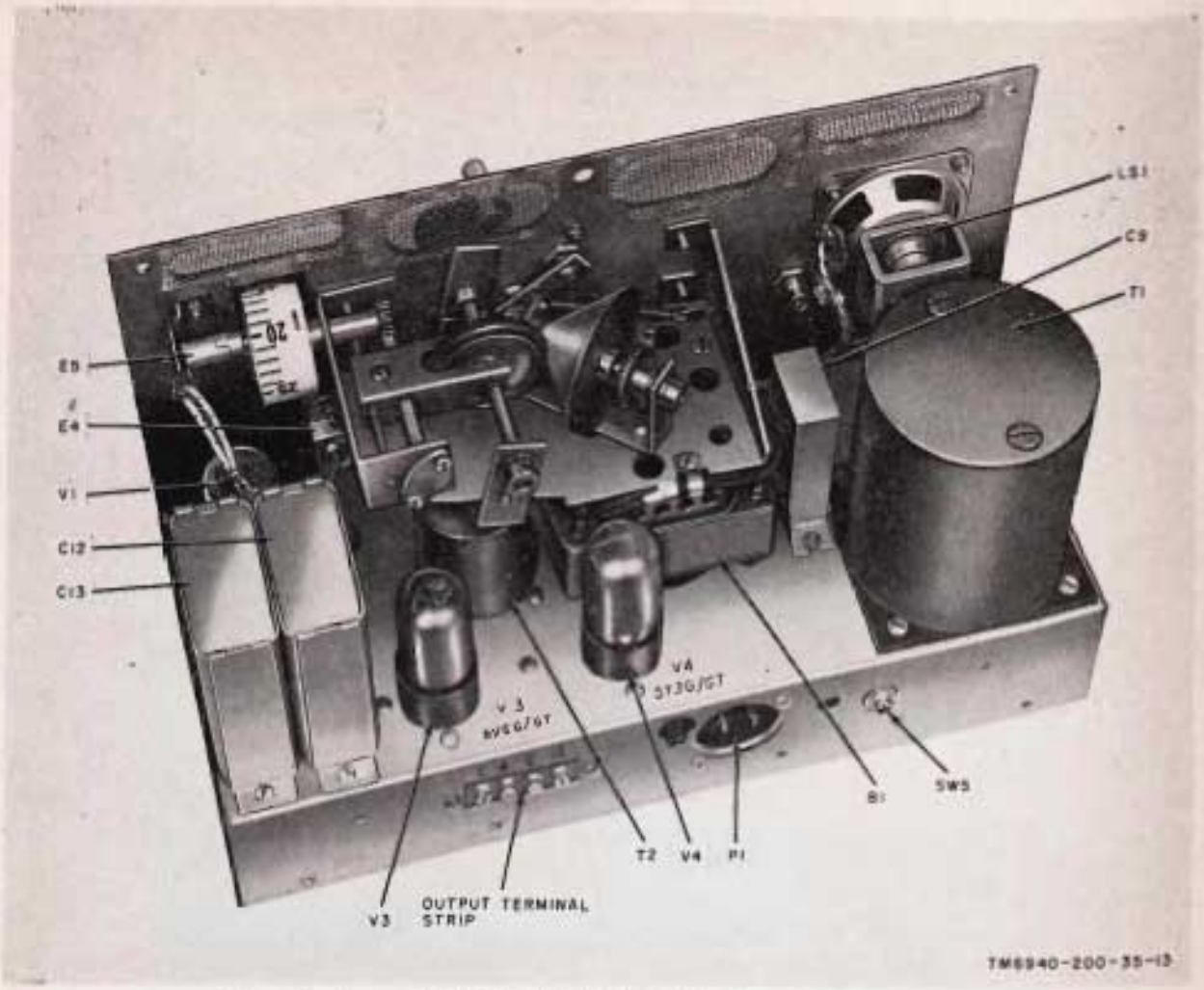


Figure 4. Keyers TG–34–B and KY–127/GG, location of parts, top view.

15. Signal Substitution Techniques

a. General. Signal substitution procedures help to localize troubles in the equipment to a particular stage. An externally generated signal is substituted for the signal normally present at each stage in the equipment. The signal is injected at the output of the keyer and then substituted at the output and input of each stage, working from the last stage and proceeding to the first stage. If a particular stage or section of the keyer is suspected either as a result of previous operational checks or by the use of the troubleshooting chart (par. 14*c* or *d*), inject the signal at the check point (indicated in the signal substitution chart) that will provide a quick check on the suspected stage or section.

Note. The indication of normal operation of a stage or section in the keyer is an audible 800-cps tone at the speaker.

b. Preliminary Substitution Procedures.

(1) Turn on the keyer; use 115-volt operation (TM 11–6940–200–10).

Make certain that light from the exciter lamp is striking the photoelectric cell.

(3) Operate the SPEAKER switch to ON.

(4) Operate the MOTOR switch to OFF.

(5) Set the AC OFF VOLUME control to the mid-position.

(6) Set the signal generator to produce an output signal of 800 cps at a level of .6 volt.

16. Signal Substitution Chart, Keyer TG–34–A

a. Perform the preliminary substitution procedures (par. 15*b*).

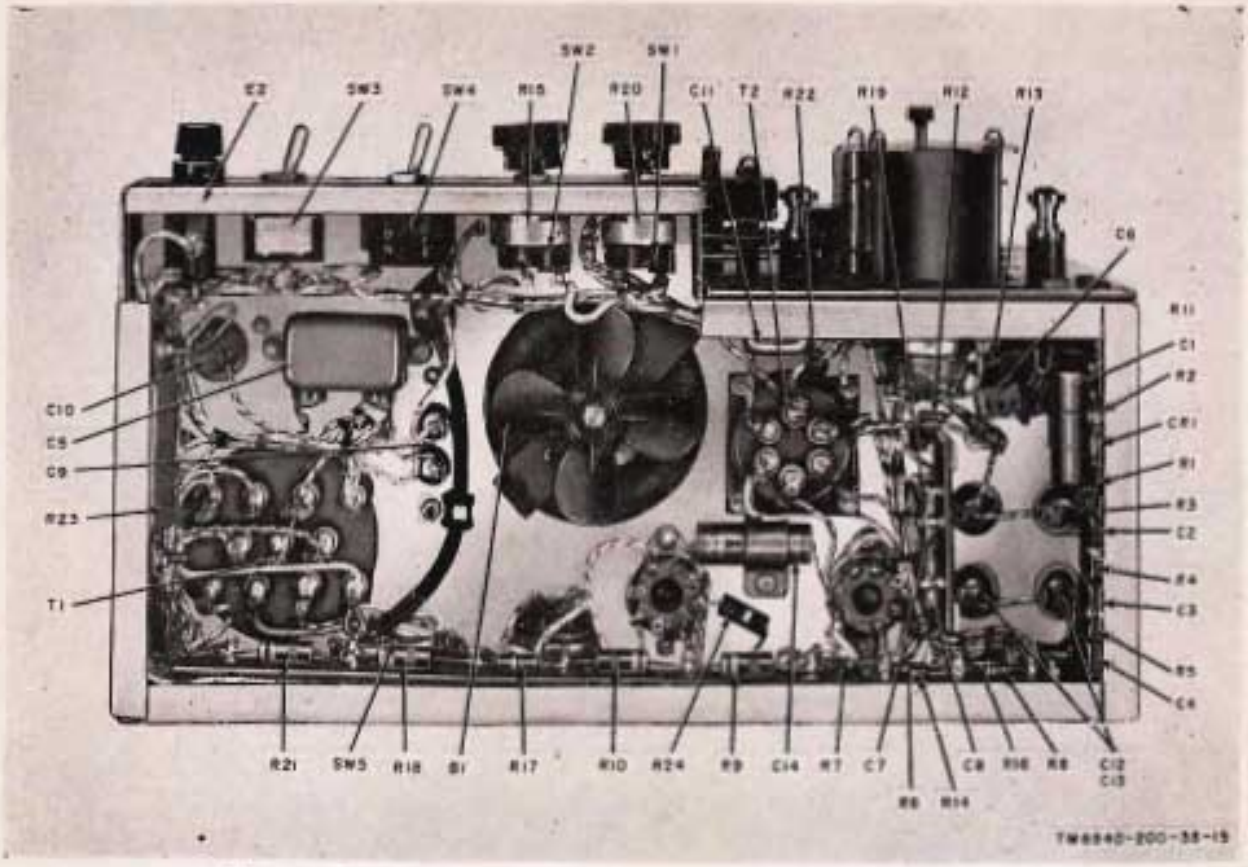


Figure 5. Keyers TG–34–B and KY–127/GG, location of parts, bottom view.

b. Apply the output of the signal generator to each of the check points listed in the chart below.

c. Check for the audible tone at the speaker.

Note. For tubes 101 and 102 the tone will be louder for the grid check point than for the plate check point.

d. If the tone is not heard, refer to the *Probable trouble* column of the chart and isolate the defective component (par. 18).

e. If normal indications are obtained for all the check points listed in the chart, the oscillator stage is defective. Isolate the defective oscillator component (par. 18).

Check point	Probable trouble
103, pin 3 (plate)	Shorted capacitor 110–2, defective transformer 131, defective SPEAKER switch 133, defective speaker 141.
103, pin 5 (control grid)	Shorted capacitor 112–1, open resistor 124–1, defective power supply.
102, pin 3 (plate)	Open resistor 117–3, shorted capacitor 110–1, defective resistor 127.
102, cap (control grid)	Shorted capacitor 108–2, open resistor 116–2, open resistor 118, open resistor 119, open resistor 120, open PE CELL control 125, open resistor 121.
101, pin 3 (plate)	Open capacitor 107–1, open capacitor 107–2, open resistor 117–1.
101, pin 8 (cathode)	Open resistor 116–1.

17. Signal Substitution Chart, Keyers TG–34–B and KY–127/GG

a. Perform the preliminary substitution procedures (par. 15*b*).

b. Apply the output of the signal generator to each of the check points listed in the chart below.

c. Check for the audible tone at the speaker.

Note. For tubes V1A and V1B the tone will be louder for the grid checkpoint than for the plate checkpoint.

d. If the tone is not heard, refer to the portable trouble column and isolate the defective component (par. 18).

e. If normal indications are obtained for all the check points listed in the chart, the oscillator stage is defective. Isolate the defective component (par. 18).

Check point	Probable trouble
V3, pin 3 (plate)	Shorted capacitor C14, defective transformer T2, defective SPEAKER switch SW3, defective speaker LS1.
V3, pin 5 (control grid)	Open resistor R22, defective power supply.
V1B, pin 5 (plate)	Shorted capacitor C7, open capacitor C8, defective resistor R20.
V1B, pin 4 (control grid)	Open resistor R6, open resistor R7, open resistor R19, open resistor R18, open resistor R13, open resistor R14, open PE CELL control R15, open resistor R21.
V1A, pin 2 (plate)	Open resistor R11, open capacitor C6.
V1A, pin 1 (grid)	Open resistor R8, open resistor R12, shorted capacitor C4.
V1A, junction of resistors R1 and R3	Open capacitor C1.

18. Isolating Trouble within a Stage

When trouble has been localized to a stage, either through operational checks, trouble-shooting chart (par. 14), or signal substitution (par. 16 and 17), use the following techniques to isolate the defective part:

a. Test the tube involved with a tube tester or substitute a similar type tube which is known to be good.

b. Take voltage measurements at the tube sockets (fig. 6 or 7) and other points related to the stage in question.

c. If voltage readings are abnormal, take resistance measurements at those points to isolate open and short circuits. Resistance measurements of tube sockets and related points are found on figure 6 or 7; the dc resistance of transformers and coils is covered in paragraph 19.

d. Use the wiring diagrams (fig. 16 or 17) to trace circuit connections and isolate the faulty part.

19. Dc Resistance of Transformers and Coils

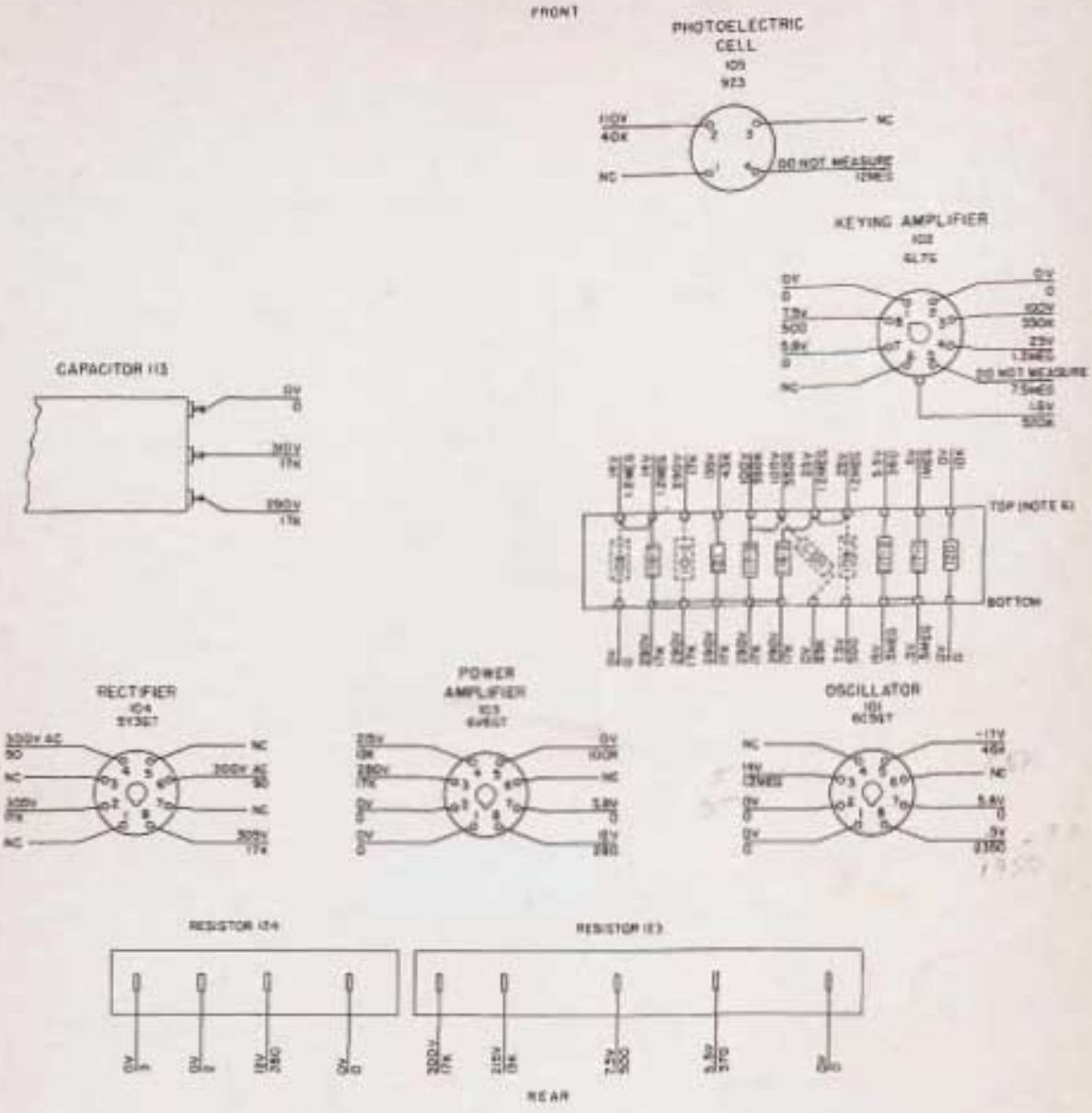
The dc resistances of the transformer windings and the coils in the keyer are listed in *a* and *b* below.

a. Keyer TG–34–A.

Transformer or coil	Terminals	Resistor (ohms)
	Red to black	100
	Red to black	100
	Red to red	200
	Red with yellow tracer to red with yellow tracers	Less than 1
130	Black to green with yellow tracer	Less than 1
	Blue to orange	2
	Brown to white	2
	Blue to white (changeover switch 132 in the 230 position)	4
	F to T	435
128	T to S	375
	F to S	810
129	Red to red with black and red tracers	235
	Red to red with black tracers	285
	Black to white with black tracers	4
	White with black tracers to black	4
131	Orange to green with yellow tracers	7
	Black to green with yellow tracers	8
	Black to orange	15
	Orange to white with black tracers	11

b. Keyer TG–34–B and KY–127/GG.

Transformer	Terminals	Resistance (ohms)
T1	1–2	2
	3–4	2
	5–6	150
	6–7	150
	5–7	300
	8–9	Less than 1
	10–11	Less than 1
	1–2	8500
	3–4	4
	4–5	4
T2	5–6	7
	3–5	8
	3–6	15
	4–6	11



NOTES:

1. DC VOLTAGES MEASURED TO GROUND WITH A 20,000 OHMS-PER-VOLT VOLTMETER.
2. AC VOLTAGES MEASURED TO GROUND WITH A 1,000 OHMS-PER-VOLT VOLTMETER.
3. VOLTAGES MEASURED WITH INPUT OF 115V AC.
4. RESISTANCE VALUES ARE BELOW LINE AND ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
5. VOLTAGE VALUES ARE ABOVE LINE AND ARE DC UNLESS OTHERWISE SPECIFIED.
6. TOP OF TERMINAL BOARD IS SIDE NEAR CHASSIS.
7. NC INDICATES NO CONNECTION.
8. FOR VOLTAGE MEASUREMENTS SET CONTROLS AS FOLLOWS:

CONTROL	POSITION
SPEAKER SWITCH	OFF
MOTOR SWITCH	OFF
P.E. CELL CONTROL	MID-RANGE
AC OFF VOLUME CONTROL	MID-RANGE

TM6840-300-35-3

Figure 6. Keyer TG-34-A, voltage and resistance diagram.

NOTES

1. DC VOLTAGES MEASURED TO GROUND WITH A 20,000 OHMS-PER-VOLT METER.
2. AC VOLTAGES MEASURED TO GROUND WITH A 1,000 OHMS-PER-VOLT METER.
3. VOLTAGES MEASURED WITH INPUT OF 115V AC.
4. RESISTANCE VALUES ARE BELOW LINE AND ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
5. VOLTAGE VALUES ARE ABOVE LINE AND ARE DC UNLESS OTHERWISE SPECIFIED.
6. TOP OF TERMINAL BOARD IS SIDE NEAR CHASSIS.
7. NC INDICATES NO CONNECTION.
8. FOR VOLTAGE MEASUREMENTS SET CONTROLS AS FOLLOWS:

CONTROL	POSITION
SPEAKER SWITCH	OFF
MOTOR SWITCH	OFF
PE CELL CONTROL	MID-RANGE
AC OFF VOLUME CONTROL	MID-RANGE

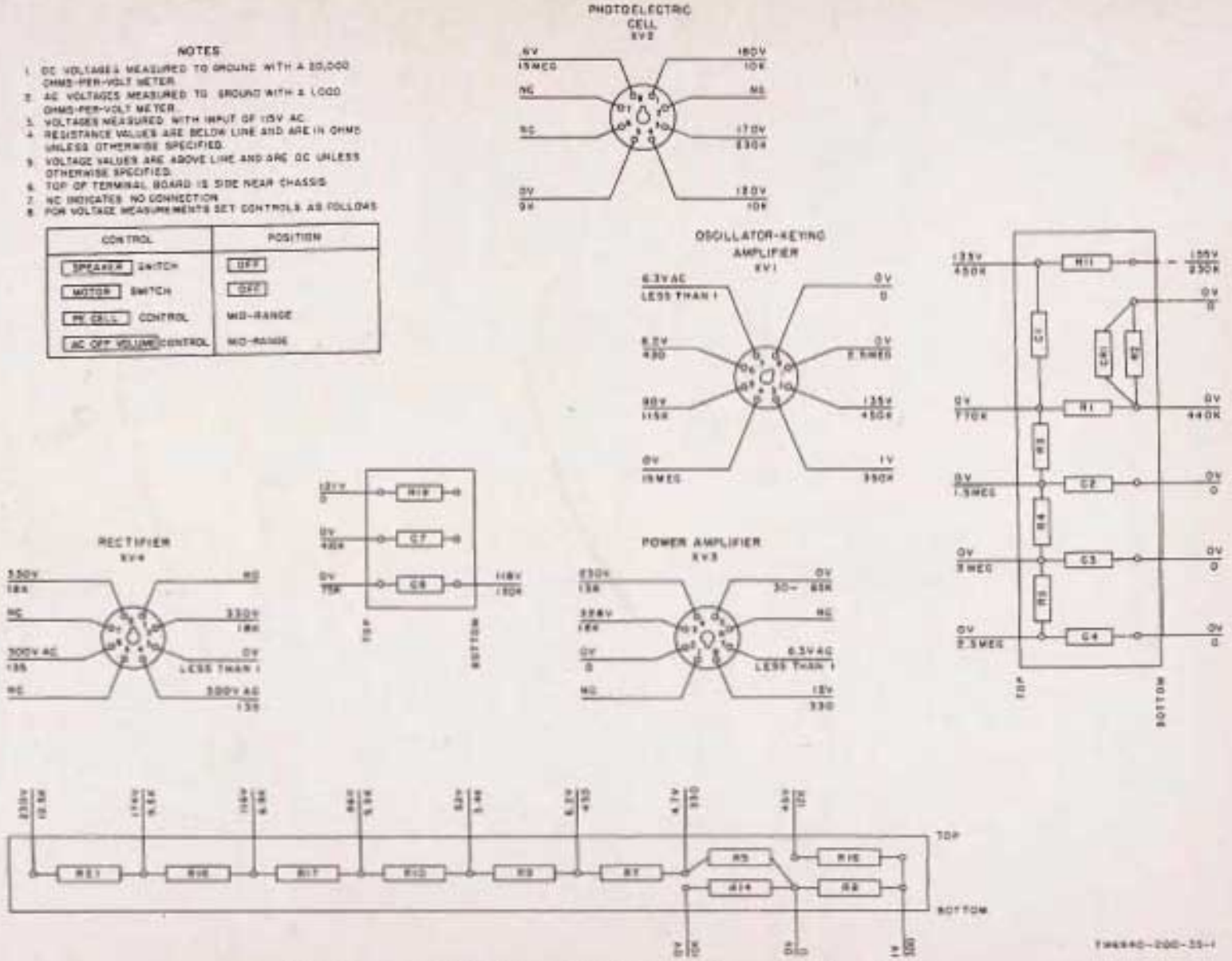


Figure 7. Keyers TG-34-B and KY-127/GG, voltage and resistance diagram.

CHAPTER 3

REPAIRS AND ADJUSTMENTS

20. General Parts Replacement Techniques

a. Most of the parts in the keyer can be reached without special procedures. Paragraphs 21 through 26 describe replacement procedures for parts in the keyer. Paragraph 27 describes the disassembly and reassembly procedures for the motor.

b. When a belt or drive cone has been removed or replaced, it may be necessary to calibrate the tape speed control (par. 28).

c. When replacing an electrical component be sure to tag all wires that will be unsoldered.

21. Replacement of Drive Cone, Cone Shaft, and Cone Gear

(fig. 8)

a. Removal.

(1) Loosen the set screws (5 and 6) in the cone gear (8) and drive cone (9).

(2) Loosen the set screws (1 and 3) on the cone shaft collars (2 and 4); remove the collars.

(3) Hold the drive cone (9) and the cone gear (8) and slide the cone shaft (7) out of the mounting bracket (12).

(4) Remove the cone gear (8) and the drive cone (9) from the mounting bracket (12).

b. Replacement.

(1) Insert the cone shaft (7) approximately 1 inch into the opening on the mounting bracket (12).

(2) Place the cone gear (8) and the drive cone (9) in the mounting bracket (12); slide the cone shaft (7) through the cone gear (8) and the drive cone (9) and through the opening in the other side of the mounting bracket (12).

Caution: **Be sure that the set screw (5) on the cone gear (8) faces the rear of the chassis.**

(3) Place the cone shaft collars (2 and 4) on the ends of the cone shaft (7); tighten the set screws (1 and 3). Be sure that the cone shaft collars (2 and 4) fit snugly (not tight) against the bearing (not shown).

(4) Position the cone gear (8) so that it engages the worm gear on the top of the motor shaft (24); tighten the set screw (5).

(5) Tighten the set screw (6) on the drive cone (9).

22. Replacement of Motor

(fig. 8)

a. Removal.

(1) Loosen the holding screws (not shown) located on the upper corners of the front panel and at the sides of the rear cover; remove the keyer chassis.

(2) Disconnect the motor leads from the changeover switch (132, fig. 14) and from the motor switch (134, fig. 14).

(3) Loosen the set screw (13) and remove the speed control knob (14).

(4) Remove the weldless chain (not shown).

(5) Loosen the set screw (15) on the disk shaft collar (16); remove the collar.

(6) Hold the drive disk (18) and remove the disk shaft (17).

(7) Lift up the yoke (25) as far as it will go and remove the drive disk (18).

(8) Remove the cone shaft (7), drive cone (9), and cone gear (8) (par. 21).

(9) Remove the screws (10) and washers (11) from the mounting bracket (12); remove the bracket.

(10) Remove the pressure roller cam spring (not shown) from the motor support (21).

(11) Remove the screws (19) and washers

(20) that hold the motor support (21) to the panel (22).

(12) Remove the screws (23) that hold the motor (24) to the motor support (21); remove the motor (24).

b. Replacement.

(1) Secure the motor (24) to the motor support (21) by tightening the screws (23).

(2) Replace the washers (20) and screws (19) that hold the motor support (21) to the panel (22); tighten the screws (19).

(3) Reconnect the pressure roller cam spring (not shown) to the motor support (21).

(4) Replace the mounting bracket (12) and washers (11) and tighten the screws (10).

(5) Replace the drive cone (9), cone gear (8), and cone shaft (7) (par. 23*b*).

(6) Place the drive disk (18) in the slot of the yoke (25) and press the yoke down.

(7) Insert the disk shaft (17) into the panel (22), aligning the keyway on the disk shaft (17) and the key on the drive disk (18).

(8) Replace the disk shaft collar (16) on the disk shaft (17); tighten the set screw (15).

(9) Replace the weldless chain (not shown) and be sure that it is twisted ½ turn.

(10) Replace the speed control knob (14); tighten the set screw (13).

(11) Reconnect the motor leads to the changeover switch (132, fig. 14) and the motor switch (134, fig. 14).

(12) Replace the chassis in the cabinet; tighten the holding screws (not shown) that secure the chassis to the cabinet.

23. Replacement of Power Transformer (TG–34–A)

a. Removal.

(1) Disconnect the leads to the speaker (141, fig. 2).

(2) Remove the screws and nuts that secure the speaker to the panel; remove the speaker.

(3) Remove the mounting bracket screws, nuts, and the lockwashers on capacitor 113 (fig. 3).

(4) Pull capacitor 113 from its clip and swing it over the fan opening without disconnecting the capacitor wiring.

(5) Tag and unsolder the transformer wires.

(6) Remove the transformer mounting nuts and lock washers and lift out the defective transformer.

b. Replacement.

(1) Install the new transformer and lockwashers, and tighten the mounting nuts.

(2) Reconnect and solder the tagged transformer leads.

(3) Replace capacitor 113 (fig. 3) in its clip.

(4) Replace the lockwashers and tighten the nuts and mounting bracket screws that secure capacitor 113 to the chassis.

(5) Reinstall speaker 141 (fig. 2) and secure the speaker to the front panel with the screws and nuts.

(6) Reconnect the speaker leads to the speaker.

24. Replacement of Power Transformer (TG–34–B and KY–127/GG)

a. Removal.

(1) Tag and unsolder the transformer (T1) wires (fig. 5).

(2) Remove the transformer mounting nuts and lock washers.

(3) Remove the holding screws at the top of the transformer can (fig. 4) and lift out the defective transformer.

b. Replacement.

(1) Insert the holding screws through a new transformer can and install the transformer on the chassis.

(2) Replace the lockwashers and tighten the nuts that secure the transformer to the chassis.

(3) Solder the tagged transformer wires to the transformer.

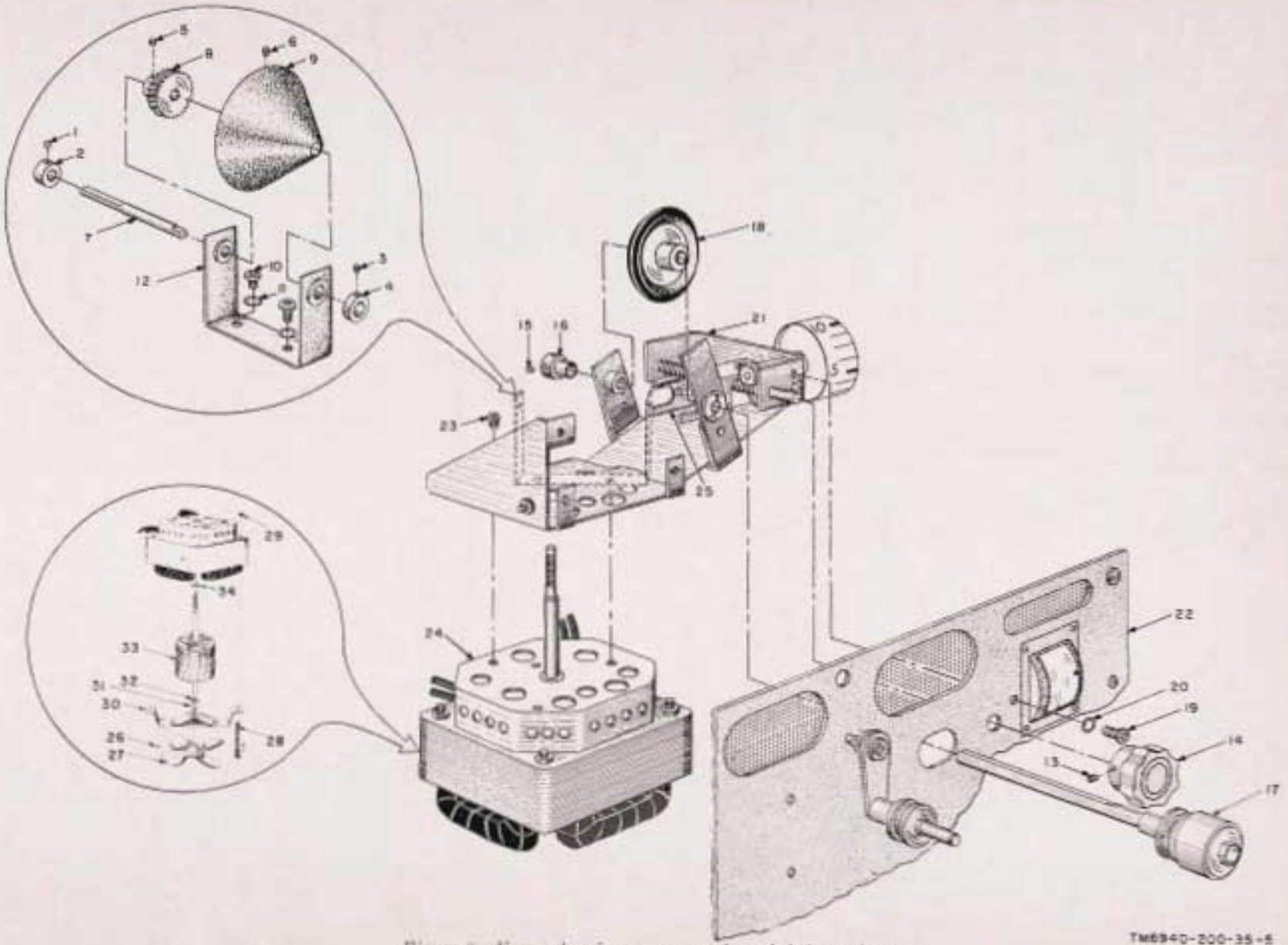


Figure 8. Keyer chassis, case removed, exploded top view.

25. Replacement of Oscillator Coil (TG–34–A)

a. Removal.

(1) Loosen the screws that hold the terminal board brackets to the chassis, and tip the terminal board (fig. 8) toward the front panel.

(2) Tag and unsolder the wires connected to oscillator coil 128.

(3) Remove the coil, holding nuts, and lockwashers.

(4) Lift oscillator coil 128 (fig. 2) from the top of the chassis.

b. Replacement.

(1) Install a new oscillator coil (T terminal towards the front panel) on the chassis. Replace the lock washers and tighten the holding nuts.

(2) Solder the tagged leads to the oscillator coil.

(3) Straighten the terminal board and tighten the screws that hold the terminal board bracket to the chassis.

26. Replacement of Auxiliary Cell Control (TG–34–A)

a. Removal.

1 Set screw.
2 Cone shaft collar (147).
3 Set screw.
4 Cone shaft collar (147).
5 Set screw.
6 Set screw.
7 Cone shaft (144).
8 Cone gear (143).
9 Drive cone (146).
10 Screw.
11 Washer.
12 Mounting bracket (145).
13 Set screw.
14 Speed control knob (168).
15 Set screw.
16 Disk shaft collar.
17 Disk shaft (153).
18 Drive disk (150).
19 Screw.
20 Washer.
21 Motor support.
22 Panel.
23 Screw.
24 Motor (142).
25 Yoke.
26 Set screw.
27 Fan.
28 Set screw.
29 Nut.
30 Bracket.
31 Washer.
32 Washer.
33 Armature.
34 Washer.

Figure 8—Cont.

(1) Remove the photoelectric cell housing and photoelectric cell (TM 11–6940–200–10).

(2) Tag and unsolder the wires that connect to the auxiliary cell control 126 (fig. 3).

(3) Remove the screws, nuts, and lock washers that hold the photoelectric cell socket to the chassis and swing it towards the terminal board.

(4) Remove the nut, and lock washer from the auxiliary cell control 126 (fig. 2).

(5) Remove the defective auxiliary cell control.

b. Replacement.

(1) Install a new auxiliary cell control in the chassis (fig. 2).

(2) Replace the lock washer and nut on the auxiliary cell control; tighten the nut.

(3) Solder the tagged wires to the auxiliary cell control 126.

(4) Swing the photoelectric cell socket back to its original position; install the screws, lock washer, and nut; tighten the nut.

(5) Replace the photoelectric cell and photoelectric cell housing (TM 11-6940–200–10).

27. Repair of Motor (fig. 8)

a. Disassembly. To disassemble the motor, follow the procedures listed below.

(1) Remove the motor (par. 22).

(2) Loosen the set screw (26) on the fan (27); remove the fan (27) from the armature shaft (33).

(3) Remove the nut (29) and the screw (28).

(4) Remove the bracket (30).

(5) Remove the washers (31 and 32) from the armature (33); note the order of removal.

(6) Remove the armature (33) from the motor (24); be careful not to lose the washer (34).

b. Inspection and Cleaning.

(1) Inspect the fan (27) for dents and misalignment of blocks; replace if necessary.

(2) Inspect the bracket (30) for dents; replace if necessary.
(3) Inspect the armature (33) for wear or pitting; resurface if necessary.
(4) Check the armature (33) for continuity; replace if necessary.
(5) Check the field windings for open or short circuits; replace winding if necessary.
(6) Check the washers (31), (32), and (33) for damage; replace damaged washers.
(7) Check the set screw (26) and nut (29) for stripped threads; replace screw and nut if necessary.
(8) Clean all parts with Cleaning Compound before reassembly (*c* below).

c. Reassembly. To reassemble the motor, follow the procedures listed below.

(1) Replace the washer (34) on the armature (33).
(2) Insert the armature (33) into the motor (24).
(3) Slide the washers (32 and 31) on the armature shaft in the same order as they were removed.
(4) Replace the bracket (30) on the armature (33).
(5) Insert the screw (28); replace and tighten the nut (29).
(6) Replace the fan (27) on the armature shaft (33) and tighten the set screw (26).

28. Adjustment of Speed Indicator Dial

Calibration of the speed indicator dial may become incorrect when repairs are made which necessitate the removal of the drive cone or the belt on the drive cone. Incorrect calibration of the speed indicator dial results in incorrect tape speeds. Check the calibration of the speed indicator dial (par. 32*d*) before proceeding with the adjustment.

a. Remove the keyer chassis from the case.

b. Thread the 100-foot paper tape (marked at 1-foot intervals) into the keyer (TM 11–6940–200–10).

c. Turn the tape speed control (located to the left of the speed indicator dial) until the line representing the number 12 appears opposite the index arrow.

d. Remove the speed indicator dial lamp socket (fig. 3) from the front panel (TM 11–6940–200–10).

e. Loosen the nut inside the speed indicator dial so that the indicator dial moves freely.

f. Apply power to the keyer (115-volt operation).

g. Operate the MOTOR switch to ON.

h. Turn the tape speed control until 12 feet of tape per minute passes the aperture of the photoelectric cell assembly. Use the stop watch for the time measurement.

i. Disconnect the power to the keyer and tighten the nut inside the speed indicator dial; be sure that the speed indicator dial is set on the line representing 12.

j. Check the calibration at 6 feet and 24 feet per minute; at 6 feet and 24 feet per minute, the indicator dial should indicate the speed of the tape ±5 per cent.

k. If calibration is incorrect, repeat steps *e* through *i* above.

l. Replace the indicator dial lamp socket (fig. 3).

m. Replace the keyer chassis in its case and tighten the holding screws.

CHAPTER 4

FINAL TESTING

29. Purpose of Final Testing

a. The tests outlined in this section are designed to measure the performance capability of a repaired equipment. Equipment that meets the minimum standards stated in the tests will furnish satisfactory operation, equivalent to that of new equipment.

b. Perform the procedures given in paragraph 31 and 32; first use 115-volt operation and then use 230-volt operation. Be sure that the proper fuse is installed in the keyer for each operational test.

30. Test Equipment and Materials Required

In addition to the tools, materials, and test equipment listed in paragraph 13, the following items are required for final testing:

Item	Common name
Transformer CN–16/U	Variac
Code practice tapes MC–650	Tape
Frequency Meter FR–67/U	Frequency meter (TM 11–2698)
Decibel Meter ME–22/PCM	Output meter (TM 11–2396)
Oscilloscope OS–8c/U	Oscilloscope (TM 11–1214A)
Resistor (15 ohms, 5 watts)	
Resistor 300 ohms, ¼ watt), 2 ea	

31. Preliminary Test Procedures

a. Operate the changeover switch to the 115- or 230-volt position (par. 29*b*).

b. Install the proper fuse (2-ampere for 115-volt operation; 1-ampere for 230-volt operation) in the keyer.

c. Operate the SPEAKER switch to OFF.

d. Operate the MOTOR switch to OFF.

e. Operate the PE CELL control to its mid-position.

f. Connect the power cable and variac as illustrated in figure 9.

g. Operate the variac ON-OFF switch to ON.

h. Operate the AC-OFF-VOLUME control maximum clockwise and adjust the variac output for 115 volts (230 volts for 230-volt operation).

i. Turn on the test equipment and allow at least 3 minutes for the equipment to warm up.

32. Tests

a. Frequency Test.

(1) Connect the frequency meter to the output terminals of the keyer (fig. 9).

(2) Indication on the frequency meter should be 800 cps ±8 cps.

(3) Operate the variac ON-OFF switch to OFF.

b. Power Output Test.

(1) Connect the equipment as illustrated in figure 10.

(2) Select a test tape from Code Practice Tape MC–650 and install it in the keyer.

(3) Operate the variac ON-OFF switch to ON.

(4) Position the paper tape so that an inked portion of the tape is over the aperture of the photoelectric cell assembly; note the indication on the output meter.

(5) Position the paper tape so that a white portion of the tape is over the aperture of the photoelectric cell as-

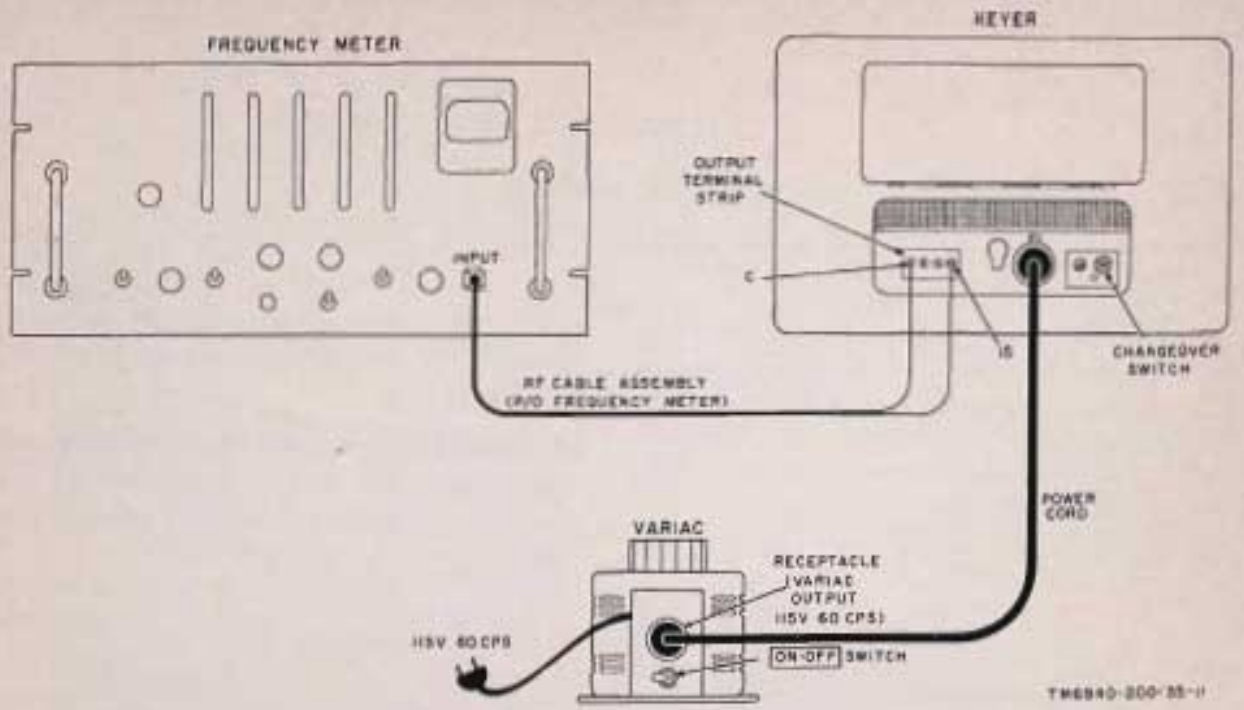


Figure 9. Test setup, frequency test.

sembly; the indication on the output meter should be at least 40 decibels (db) greater than the indication obtained in (4) above.

(6) Operate the variac ON-OFF switch to OFF.

c. Voltage Output Test.

(1) Connect the equipment as shown in figure 11.

(2) Operate the variac ON-OFF switch to ON.

(3) Indication on the multimeter should be a minimum of 7 volts ac.

(4) Operate the variac ON-OFF switch to OFF and disconnect the multimeter from the keyer.

d. Tape Speed Test.

Note. All timing of the tape speed shall be accomplished with the stop watch.

(1) Thread the 100-foot length of tape (marked at 1-foot intervals) into the keyer (TM 11-6940-200-10).

(2) Operate the variac ON-OFF switch to ON.

(3) Operate the MOTOR switch to ON.

(4) Operate the tape speed control from fully clockwise to fully counterclockwise; the speed of the tape shall vary from a maximum of 25 feet per minute to a minimum of 5 feet per minute.

(5) Adjust the tape speed control for a tape speed of 12 feet per minute; tape speed (as indicated by the stop watch) shall be 12 feet per minute.

Note. If the tape speed is not 12 feet per minute, adjust the speed indicator dial (par. 28).

(6) Adjust the tape speed control for a tape speed of 6 feet per minute; tape speed (as indicated by the stop watch) shall be 6 feet per minute ±.3 foot.

(7) Adjust the tape speed control for a tape speed of 24 feet per minute; tape speed (as indicated by the stop watch) shall be 24 feet per minute ±1.2 feet.

(8) Operate the variac ON-OFF switch to OFF.

e. Distortion Test.

(1) Operate the variac ON-OFF switch to ON.

(2) Adjust the tape speed control for maximum tape speed.

(3) Adjust the oscilloscope for a sweep frequency of 10–15 cps and connect

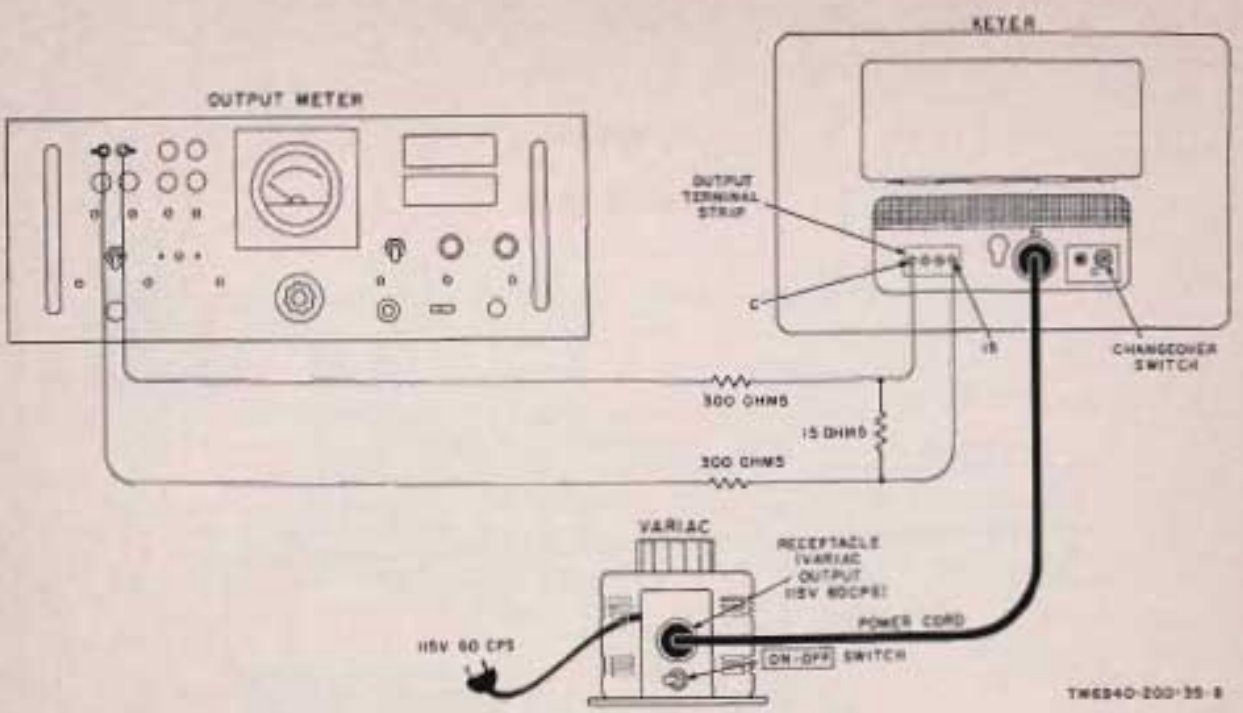


Figure 10. Test setup, power output test.

it between ground and the points indicated in (4) below.

(4) Observe the output wave shape of the keying amplifier (fig. 14) (plate), power amplifier (plate), and the output terminals. The wave shapes observed on the oscilloscope should be clear, undistorted, keyed wave shapes with clean division between pulses; the wave shapes within the envelopes should be undistorted sine waves.

f. Signal Requirements.

(1) Install a practice tape in the keyer and operate the keyer. Use automatic keying (TM 11–6940–200–10).

(2) Operate the SPEAKER ON-OFF switch to ON.

(3) Adjust the tape speed control for maximum tape speed; the keying (as heard in the speaker) shall be clear, sharp, and readable.

(4) Adjust the tape speed control for minimum tape speed; the audio signal (as heard in the speaker) shall go on and off sharply with no buzz or gradient tones.

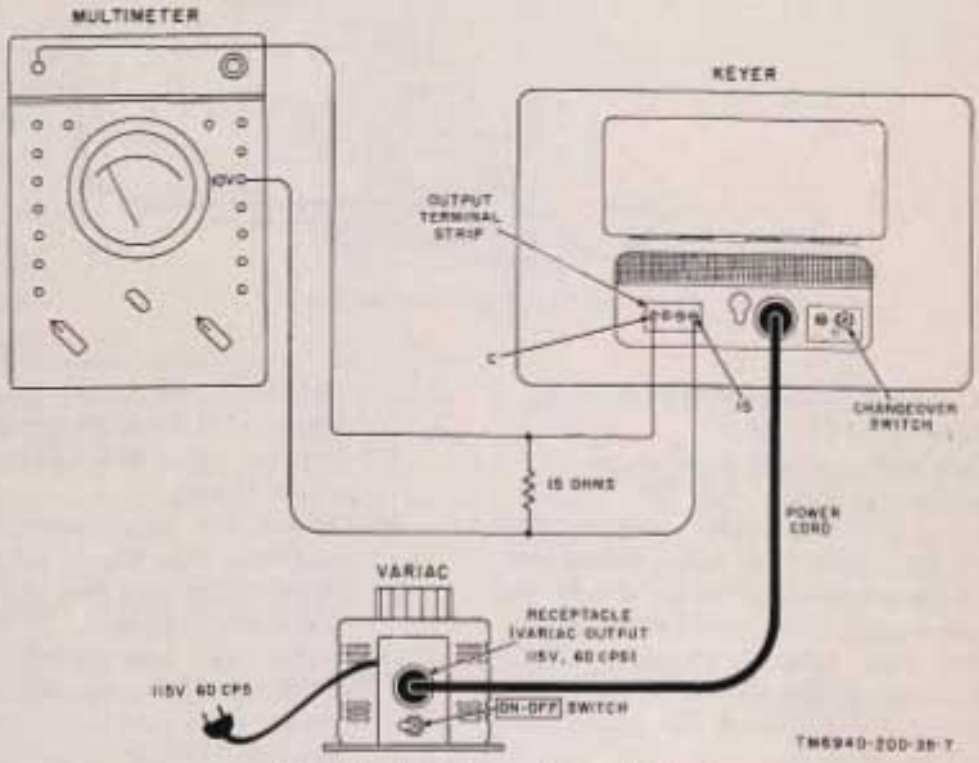


Figure 11. Test setup, voltage output test.

APPENDIX

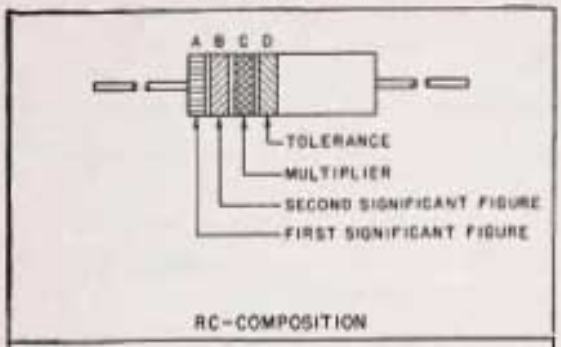
REFERENCES

The following publications contain information applicable to field and depot maintenance personnel of Keyers TG–34–A, TG–34–B, and KY–127/GG.

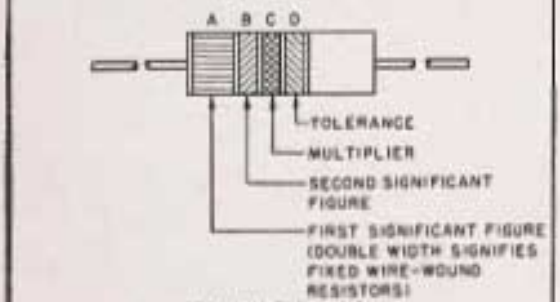
TM 11–6940–200–10	Operator's Manual, Keyer TG–34–A, TG–34–B and KY–127/GG.
TM 11–6940–200–20	Organizational Maintenance Keyer TG–34–A, TG–34–B, and KY–127/GG.
TM 11–2661	Electron Tube Test Sets TV–2/U and TV–2A/U.
TM 11–5527	Multimeters TS–352/U, TS–352A/U, and TS–352B/U.
TM 11–2096	Test Set TS–140/PCM, Signal Generators SG–15/PCM and SG–15A/PCM and Decibel Meters ME–22/PCM and ME–22A/PCM.
TM 11–2698	Frequency Meter FR–67/U.
TM 11–1214A	Oscilloscope OS–8C/U.

RESISTOR COLOR CODE MARKING
(MIL-STD RESISTORS)

AXIAL-LEAD RESISTORS (INSULATED)

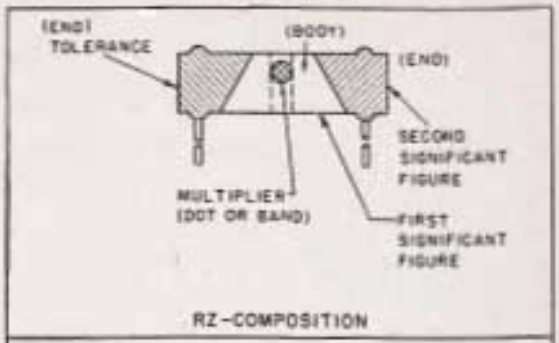


RC-COMPOSITION

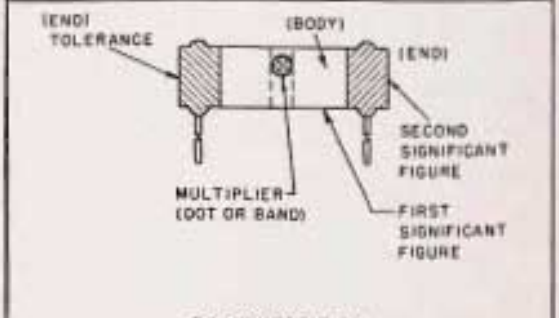


RU-WIRE-WOUND

RADIAL-LEAD RESISTORS (UNINSULATED)



RZ-COMPOSITION



RZ-COMPOSITION

RESISTOR COLOR CODE

BAND A OR BODY*		BAND B OR END*		BAND C OR DOT OR BAND*		BAND D OR END*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1	BODY	±20
BROWN	1	BROWN	1	BROWN	10	SILVER	±10
RED	2	RED	2	RED	100	GOLD	±5
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000		
GREEN	5	GREEN	5	GREEN	100,000		
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	GOLD	0.1		
WHITE	9	WHITE	9	SILVER	0.01		

*FOR WIRE-WOUND-TYPE RESISTORS, BAND A SHALL BE DOUBLE-WIDTH. WHEN BODY COLOR IS THE SAME AS THE DOT (OR BAND) OR END COLOR, THE COLORS ARE DIFFERENTIATED BY SHADE, GLOSS, OR OTHER MEANS.

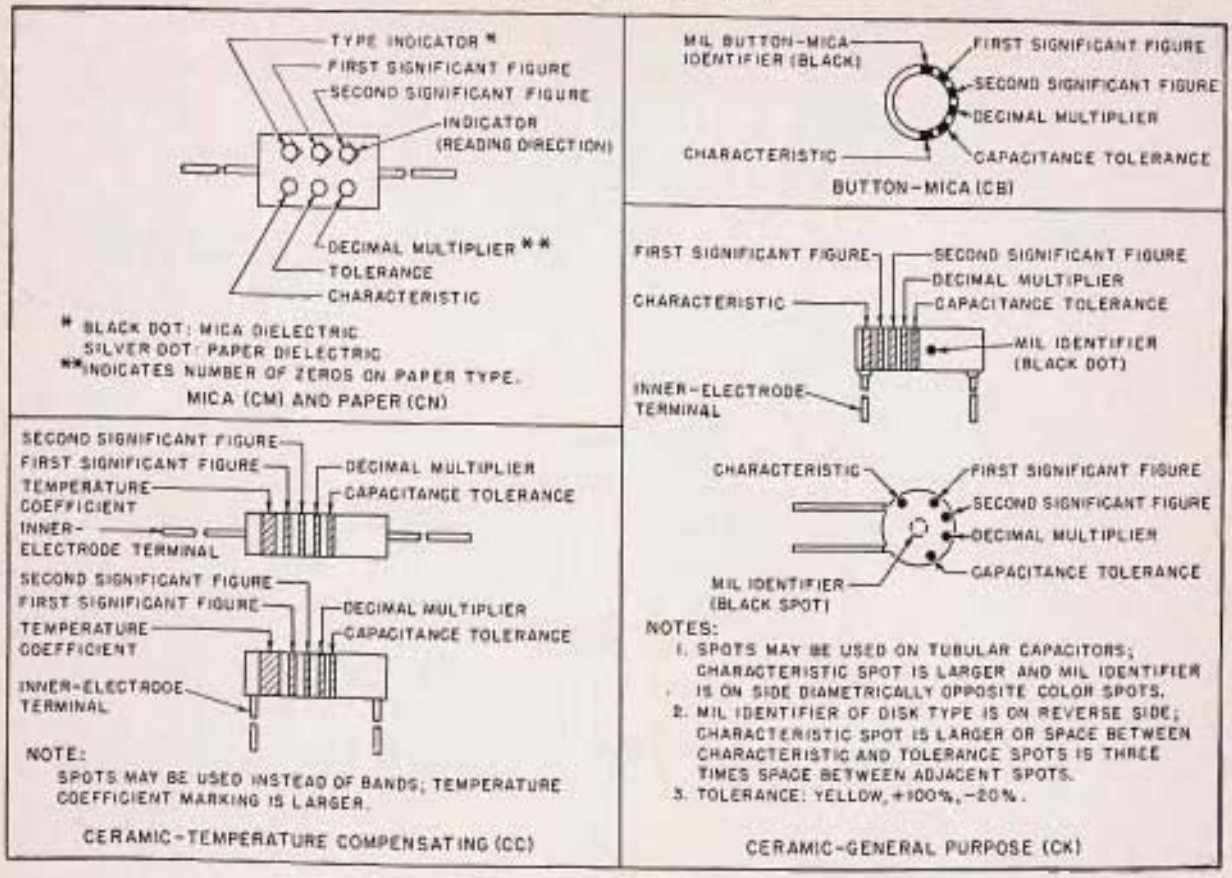
EXAMPLES (BAND MARKING):
10 OHMS ±20 PERCENT: BROWN BAND A; BLACK BAND B; BLACK BAND C; NO BAND D.
4.7 OHMS ±5 PERCENT: YELLOW BAND A; PURPLE BAND B; GOLD BAND C; GOLD BAND D.

EXAMPLES (BODY MARKING):
10 OHMS ±20 PERCENT: BROWN BODY; BLACK END; BLACK DOT OR BAND; BODY COLOR ON TOLERANCE END.
3,000 OHMS ±10 PERCENT: ORANGE BODY; BLACK END; RED DOT OR BAND; SILVER END.

STD-R1

Figure 12. MIL-STD resistor color code markings.

CAPACITOR COLOR CODE MARKING
(MIL-STD CAPACITORS)



CAPACITOR COLOR CODE

COLOR	SIG FIG.	MULTIPLIER		CHARACTERISTIC[1]				TOLERANCE [2]					TEMPERATURE COEFFICIENT (UUF/UF/°C)
		DECIMAL	NUMBER OF ZEROS	CM	CN	CB	CK	CM	CN	CB	CC		
											OVER 10UUF	10UUF OR LESS	CC
BLACK	0	1	NONE		A			20	20	20	20	2	ZERO
BROWN	1	10	1	B	E	B	W				1		-30
RED	2	100	2	C	H		X	2		2	2		-80
ORANGE	3	1,000	3	D	J	D			30				-150
YELLOW	4	10,000	4	E	P								-220
GREEN	5		5	F	R						5	0.5	-330
BLUE	6		6		S								-470
PURPLE (VIOLET)	7		7		T	M							-750
GRAY	8		8			X						0.25	+30
WHITE	9		9								10	1	-330 (±500) [3]
GOLD		0.1						5		5			+100
SILVER		0.01						10	10	10			

1. LETTERS ARE IN TYPE DESIGNATIONS GIVEN IN MIL-C SPECIFICATIONS.
2. IN PERCENT, EXCEPT IN UUF FOR CC-TYPE CAPACITORS OF 10 UUF OR LESS.
3. INTENDED FOR USE IN CIRCUITS NOT REQUIRING COMPENSATION.

STD-CI

Figure 13. MIL-STD capacitor color code markings.

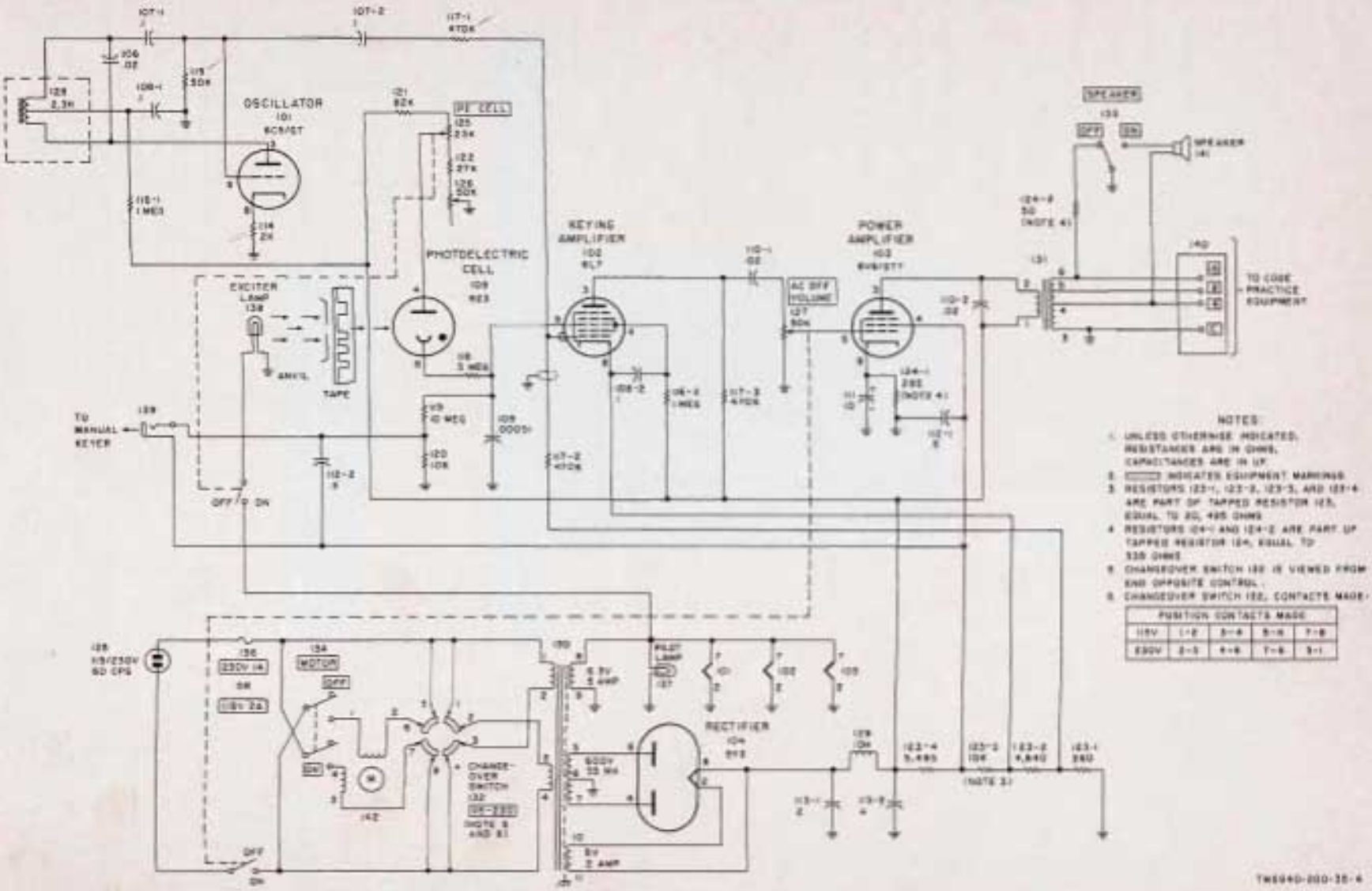


Figure 11. Keyer TG–31–A, schematic diagram.

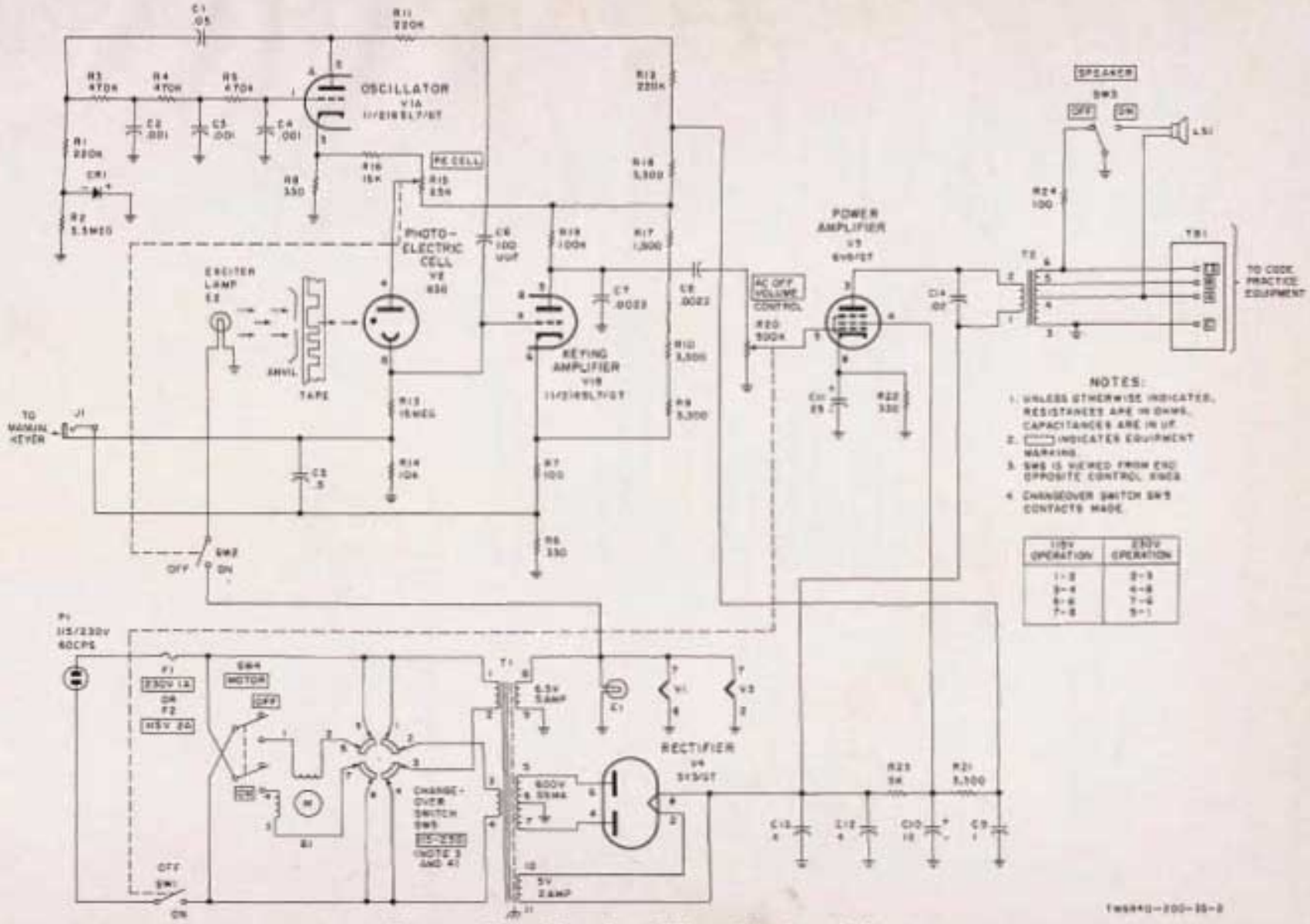


Figure 15. Keyer TG-34-B and KY-137/GG, schematic diagram.

[AG 413.44 (30 June 59)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

L. L. LEMNITZER,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
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(Res) (1)
JBUSMC (2)
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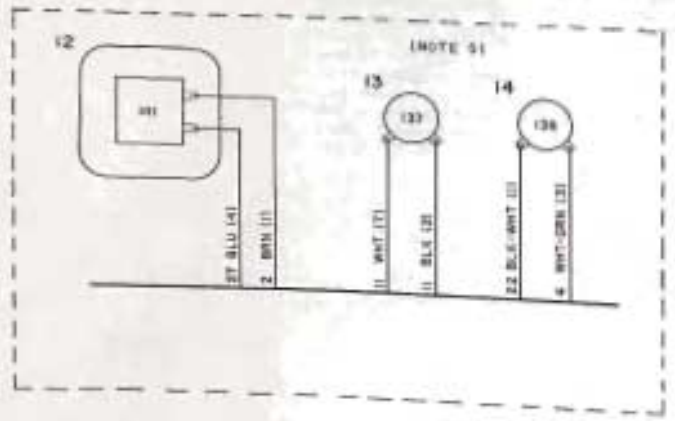
11-16 (2)
11-57 (2)
11-97 (2)
11-117 (2)
11-155 (2)
11-500 (AA-AE) (2)
11-537 (2)
11-587 (2)
11-592 (2)
11-597 (2)

NG: State AG (3).

USAR: None.

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

☆ U. S. GOVERNMENT PRINTING OFFICE: 1959—520562



NOTES:

1. CODE USED IS AS FOLLOWS:
   (3) STATION NO. RED WIRE COLOR (5) TERMINAL NO.
2. RS DENOTES 22 GAGE TINNED, ANNEALED COPPER WIRING.
3. WIRES NOT OTHERWISE SPECIFIED ARE 22 GAGE WITH COTTON JACKETS.
4. ⊡ DENOTES A SHIELDED LEAD.
5. STATIONS 12, 13 AND 14 ARE LOCATED ON THE FRONT PANEL, ABOVE THE CHASSIS.
6. THE SYMBOLS <D> AT STATION 17 INDICATE MARKINGS ON THE WIRE JACKETS.

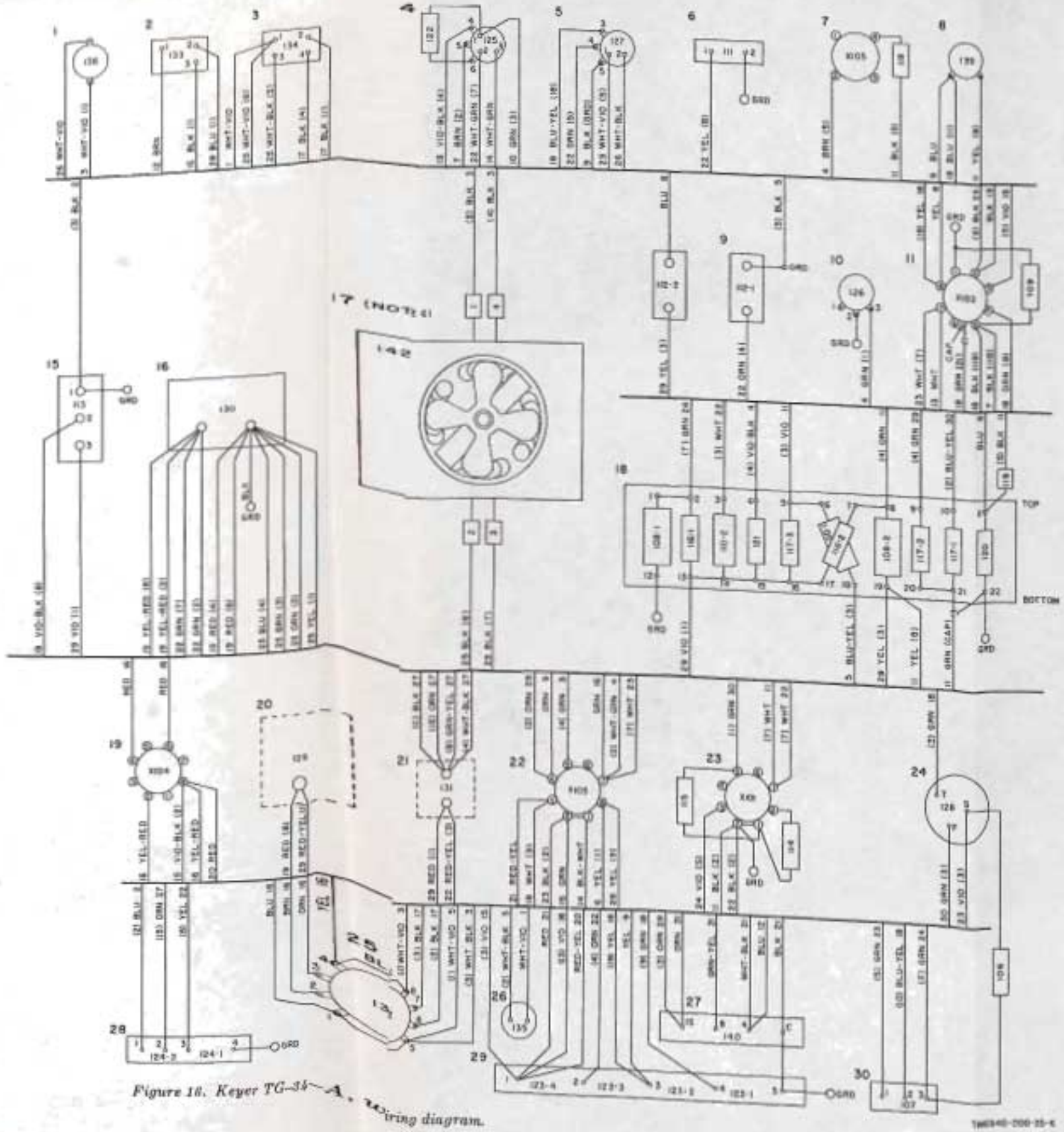


Figure 18. Keyer TG-34-A, wiring diagram.

NOTES:

1. ALL WIRING WHITE WITH COLORED TRACER UNLESS OTHERWISE DESIGNATED.
2. COLORS SHOWN ON LEADS INDICATE TRACER COLORS.
3. 45 DENOTES 22 GAGE, TINNED ANNEALED COPPER WIRING (STRAP).
4. LS1, S1, E1, AND E2 ARE WIRED FROM APPARATUS SIDE OF CHASSIS.
5. BROWN LEADS NO. 1 THROUGH 4 ARE PART OF S1.
6. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASE LINE) CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE CONNECTS.

Figure 27. Keyers TG-34-B and KY-127/GG, wiring diagram.

TM 11-5040-200-35-3

Field and Depot Maintenance Manual

KEYERS TG-34-A, TG-34-B, AND KY-127/GG

TM 11-6940-200-35
TO 43E7-5-5-61
CHANGES No. 1

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D.C., *27 May 1960*

TM 11-6940-200-35, 27 August 1959, is changed as follows:

Page 9, paragraph 14*c*, chart, "Symptom" column, last word. Change "head" to: heard.

Page 25, paragraph 32*b*(2). Add subparagraph (2.1) after subparagraph (2):

(2.1) When Telegraphic Code Trainer AN/FGC-T2 or AN/FGC-T3 is being used, select a practice tape from Record Set, Tape AN/GGA-T1 and install it in the keyer.

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

T2 11-2093-10
TM

L. L. LEMNITZER,
General, United States Army,
Chief of Staff.

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R. V. LEE,
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NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

TAGO 6227A—June 530478°—60

Copy 1