DESCRIPTION AND ADJUSTMENTS
SIGNAL DISTORTION TEST SET
(ED56GT, ED57GG)
TEST MESSAGE TRANSMITTER DISTRIBUTOR
(ED38) (CODE DISC OPERATED)

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SIGNAL DISTORTION TEST SET
(ED56GT with AP9 Adapter Plate)

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SECTION 1

DESCRIPTION

1. GENERAL

a. SIGNAL DISTORTION TEST SET (ED56GT)

(1) The Signal Distortion Test Set consists of a signal distortion test unit with cover and an adapter plate. The test unit is motor driven and arranged to transmit a printer test message from one set of code discs, or a reperforator test message from a second set of code discs; or to transmit repeated R or Y, either undistorted or with a predetermined degree of distortion up to 50 per cent (through the medium of a 7.42 unit distributor disc). It may be remotely or manually set for either printer or reperforator test message, or manually set for repeated R or Y; and remotely or manually set for spacing, marking, or zero bias, or spacing or marking end distortion.

(2) The test set is intended for use at concentration points for testing Teletype circuits and for checking the efficiency of start-stop selectors on Teletype apparatus. The remote control feature, which permits selection of the various types of test signals, is applicable only within the area of local operation. The test set is usually located in a maintenance room.

(3) The test unit (Figure 1) consists principally of a synchronous motor, a code disc transmitter and message control relay, a distributor mechanism, radio suppression filters, a panel equipped with test signal and distortion switches, a remote control solenoid magnet for operating the distortion switch, and a multiconductor cord and plug for control circuits, all mounted on a base casting equipped with slip connections for a.c. and d.c. power and line circuits. The mounting plate is provided with matching slip connections, a.c. and d.c. power cords, and a line cord and plug.

b. SIGNAL DISTORTION TEST SET (ED57GG, Signal Corps TS-2/TG)

(1) The Portable Signal Distortion Test Set is a motor driven unit arranged to transmit normal or distorted signals for testing Teletype circuits and checking the efficiency of start-stop selectors on Teletype apparatus.

(2) The type of distortion set up may be marking or spacing bias, or marking or spacing end distortion.

(3) The test set is arranged to transmit continuously any one of four test signals; R, Y, SPACE, or a test message. Since it may be desired to use the test set with Creed apparatus, the test message is a 68 character line. The test set is equipped with a governed motor so that the normal speed of 368.1 o.p.m. may be changed to 404 o.p.m.

(4) The test set (Figure 19) consists essentially of an a.c. governed motor, a code disc transmitter, a distributor mechanism, and a panel equipped with control switches and local test jacks, all mounted on a base casting. The base is equipped with a power fuse, radio suppression filters, an output signal cord, a local test battery cord, and a power cord.

(5) 115 volts a.c. (50 or 60 cycle) is required for operating the motor, and 115 volts d.c., for the operation of the local line circuits.

c. TEST MESSAGE TRANSMITTER DISTRIBUTOR (ED38)

The Test Message Transmitter Distributor is a motor driven unit arranged to transmit a test message.

The permutations in the code discs of this Test Message Transmitter Distributor are arranged for the continuous transmission of a one line test message sentence which is followed by two carriage return signals and a line feed signal.

2. DISTRIBUTOR TEST SIGNAL TRANSMISSION

a. SIGNAL DISTORTION TEST SET (ED56GT)

(1) CODE DISC TRANSMITTERS (Figures 1 and 3)

The transmitters, which set up combinations for transmitting the test messages, consist principally of ten code disc cams, two separate sets of five contact levers, contact tongues, and contacts (one set for each test message). The code disc cams actuate the contact levers which in turn position the contact tongues against their proper contacts.

Test Message No. 1 is used for testing units which produce a printed copy, and consists of the following characters and functions:

The (space) QUICK (space) BROWN (space) FOX (space) JUMPED (space) OVER (space) A (space) LAZY (space) DOG (figures) (letters) S (space) BACK (space) (figures) 1234567890 (letters) (space) *** (space) SENDING (carriage return) (carriage return) (line feed) (letters)

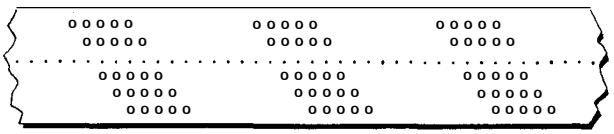
When the printer is functioning properly, Test Message No. 1 should appear as follows:

THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 *** SENDING the *** being any one, two, or three station call letters, or spaces.

Test Message No. 2 is used for testing non-typing reperforating units, and consists of the following character and function signals:

EAUK(letters)VMOT(blank)

The repetition of these signals produces a parallelogram pattern in the perforated tape as shown:



in which errors can easily be detected.

b. SIGNAL DISTORTION TEST SET (ED57GG, TS-2/TG)

(1) CODE DISC TRANSMITTER (Figure 3)

The transmitter, which sets up combinations for transmitting the test message, consists principally of five code disc cams, contact levers, contact tongues, and contacts. The code disc cams actuate the contact levers which in turn position the contact tongues against their proper contacts.

c. TEST MESSAGE DISTRIBUTOR (ED38)

(1) CODE DISC MECHANISM (Figure 13)

The permutations in the code discs of an ED38 type of Test Message Transmitter Distributor are arranged for operation of the contact levers to continuously transmit, through standard distributor brushes, the following test message followed by two carriage returns and a line feed:

THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 *** SENDING

Any one, two, or three call letters, or spaces, may be inserted in the three blank spaces represented by ***, through installation of the correct interchangeable code disc segment between the spring clips in the slot of each code disc. These segments and code discs, with an extraction tool, are included in the 115836 set of parts which are standard equipment on the later style ED38 units, and which may be installed as replacements on older style units.

d. The code disc cam assembly is driven through a series of gears from the distributor shaft and is thus synchronized with the distributor brush arm. A friction assembly located at the end of the code disc cam assembly shaft (Figure 19), applies a drag on the shaft and prevents backlash.

e. R, Y, and SPACE (applies to ED57GG only) SELECTIONS (Figure 1) for Signal Distortion Test Set

The repeated R, Y, and SPACE signals are obtained by electrically disconnecting the transmitting contacts and establishing, by means of the character control switch, the proper electrical circuit required for the transmission of the desired signal.

3. SIGNAL DISTORTION TEST SET

a. DISTRIBUTOR (Figures 1 and 2)

(1) The distributor completes electrical connections between the transmitting contacts or the character switch and the signal line in the correct sequence and at the required speed. This is accomplished by brushes which are drawn across the commutator segments by the distributor brush arm attached to the distributor shaft. The brush arm mounts two sets of brushes: one pair of brushes makes contact with the inner solid collector ring and the segments of the stationary ring; the other pair of brushes makes contact with the other solid collector ring and the segments of the outer movable ring. The latter brushes and rings only are used to transmit undistorted signals. Both sets of brushes and rings are used to transmit distorted signals by connecting electrically the corresponding segments of the movable ring and the stationary ring, either in series or in parallel.

(2) The outer segmented ring of the distributor is movable and is usually set to cause a 25% or 35% bias or end distortion of the transmitted signals; however, it may be adjusted to send any distortion from 0 to 50%. The amount of distortion is indicated on a scale at the side of the distributor disc.

b. DISTORTION SWITCH (Figures 1 and 19)

(1) For ED57GG, the distortion switch, motor switch (on and off), and character selecting switch are mounted on a panel above the motor.

(2) The distortion switch is used to select the type of signal distortion, and may be pos

tioned either manually or by a button on the remote control board, which operates a solenoid stepping arrangement (ED56GT).

(3) For ED56GT, at each position of the distortion switch a circuit is closed to the control board which may be equipped with lamps to indicate position of switch.

(4) The distortion switch may be set at any of the following positions:

(a) BIAS M (Bias-Marking), which advances the beginning of each marking impulse. The segments of the commutator rings are connected in parallel.

(b) BIAS S (Bias-Spacing), which delays the beginning of each marking impulse. The segments of the commutator rings are connected in series.

(c) ZERO (no distortion), normal signal transmission.

(d) EDM (End Distortion-Marking), which delays the end of each marking impulse. One stop segment and the selecting segments are connected in parallel.

(e) EDS (End Distortion-Spacing), which advances the end of each marking impulse. The corresponding segments of both segmented rings are connected in series, and the two stop segments are connected in parallel.

c. CHARACTER SWITCH (Figures 1, 2 and 19)

(1) ED56GT

(a) The character switch is controlled manually only and is used to select Y, Test Message, or R for repeated transmission. This switch must be placed in the test message position when the set is to be remotely controlled.

(b) The character switch may be set in any of the following positions:

1. Y, which sends repeated Y signals.

2. TEST MSG. (Test Message), which makes it possible by means of the message control relay switch to select either of the two test messages previously described.

3. R, which sends repeated R signals.

(2) ED57GG

(a) The character selecting switch is ed to select the type of repeated signals to be transmitted, and may be set in any of the following positions:

1. STOP, which short-circuits the signal line cord.

2. TEST MSG. (Test Message), which sends the following 68 character sentence repeatedly:

THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 TESTING

followed by carriage return and line feed combinations.

3. RPT SP (Repeat Space), which sends repeated SPACE signals.

4. R, which sends repeated R signals.

5. Y, which sends repeated Y signals.

d. FILTER CUTOUT SWITCH (Figure 2) for Signal Distortion Test Set

The filter cutout switch is a toggle switch located in the left wall of the base casting and is used to disconnect the radio filter from the signal line during periods of calibration when using a Teletype signal distortion test set (DXD) as the reference unit.

e. For ED56GT

(1) MESSAGE CONTROL RELAY SWITCH (Figure 2)

The message control relay switch is a toggle switch located at the left front of the test unit. With the toggle in the MSG. No. 1 (upper) position, test message No. 1 which transmits signals for printing a test sentence, is selected; in the MSG. No. 2 (lower) position a relay is energized and test message No. 2 which transmits signals for perforating a pattern, is selected. This selection is effective only when the character switch is in the test message position.

The selection of either test message No. 1 or No. 2 may be extended for remote operation, but is effective only when the toggle is in the upper or test message No. 1 position.

(2) MOTOR POWER SWITCH (Figure 2)

The motor power switch is a toggle switch located at the right front of the set.

(3) MOTOR DRIVE

The test unit is provided with a 60 cycle synchronous motor drive and with 9-44 gears which provide a sending speed of 368.1 o.p.m.

(4) MOUNTING

The test unit mounts in the slip connection base of the AP9 adapter plate. The adapter plate is equipped with a line cord and plug, a four-prong a.c. power cord and plug, and a three-prong d.c. power cord and plug, similar to those used on printer sets. Line and power circuits between the test set and the adapter plate are made by means of slip connections.

(5) WIRING

The set is wired in accordance with wiring diagram 2236WD.

4. TEST MESSAGE DISTRIBUTOR

a. DISTRIBUTOR MECHANISM (Figure 3)

(1) The distributor mechanism consists of the distributor disc and the distributor brush assembly.

(2) The distributor (Figure 4) is made up of two concentric conducting rings mounted on an insulated disc. The outer ring is divided into seven segments. The inner ring is a continuous conductor. Segment Nos. 1 to 5, inclusive, of the outer ring, correspond to the five intelligence intervals of the five unit code and are connected to the five contact tongues. Immediately preceeding No. 1 Segment is the start segment. The segment following No. 5 Segment is the stop segment. The stop segment and the lower contact screws are permanently connected to marking line battery. The start segment and the upper contact screws are connected to spacing line battery only when it is desired to transmit polar signals; otherwise, the upper contact screws and the start segment have no battery connections.

(3) The distributor brush assembly consists of a pair of brushes clamped in a metal brush holder. The brush holder is attached to the brush holder arm, which is mounted on the upper end of the main shaft. The brushes are spaced in the brush holder the same distance apart as the concentric rings on the distributor disc and revolve with the main shaft. The brush assembly makes one complete revolution to transmit the code combination for each character or function. When the distributor brush passes over the start segment, a spacing impulse is always transmitted, whereas a marking impulse always results when the brush traverses the stop segment. These two invariable impulses cause the receiving mechanism to operate in unison or synchronism with the distributor brush arm.

5. OPERATING INSTRUCTIONS - ED57GG (SIGNAL CORPS TEST SET TS-2/TG)

a. Connect motor power cord to 115 V 50-60 cycle a.c. and turn on motor switch.

b. To check motor speed open door on panel, turn on target lamp and sight on target with tuning fork. An 87.6 V.P.S. fork should be used for 368.1 o.p.m. and a 96.19 V.P.S. fork for 404 o.p.m. If necessary to change speed, turn off motor, remove chest cover and adjust governor as required.

c. Connect black shell plug of signal cord to circuit in which signals are to be utilized.

d. The test set is equipped with a 60 milliampere local test circuit. When required, connect circuit as follows:

(1) Connect local test circuit power cord to 115 V d.c.

(2) Connect red shell plug (receiving) from unit under test to one of local test jacks.

(3) Connect black shell plug (sending) of test set to other local test jack.

e. Set character selecting switch on right side of panel to position of character desired. A stop position is provided for applying a steady marking signal and sending positions to transmit a test message, repeated "space," repeated "R" or repeated "Y" signals.

f. Set distortion switch on left side of panel to send type of distortion required. Positions are provided for selecting zero distortion, marking or spacing bias and marking or spacing end distortion. The commutator distributor is usually set to select 35% bias or end distortion; however, it may be readjusted to send any value from 0 to 50%. The amount of distortion is indicated by pointer at side of distributor face plate.

g. Use toggle switch on right side of test set base casting to remove radio interference filter from transmitting circuit when output signals are being checked with a test set equipped with neon lamp indicator.

h. Connect binding post on panel to ground and set position of filter switch to reduce radio interference caused by set.

i. Remove chest cover occasionally to check condition of distributor brushes and distributor face plate. Commutator segments and space between them should be kept clean and brushes properly adjusted. When brushes are readjusted or replaced, set must be recalibrated.

SECTION 2

ADJUSTMENTS

1. GENERAL

a. The following adjustments are arranged in a sequence that would be followed if a complete readjustment of the unit were undertaken. This fact should be kept in mind when a single adjustment is to be made because a change in one adjustment may affect other adjustments. If one adjustment is changed, related adjustments should be checked.

b. The spring tension values given in this bulletin are scale readings which should be obtained when Teletype scales are used as specified. Springs which do not meet the requirements specified and for which no adjusting procedure is given should be replaced by new springs. Ordering information may be obtained from the Teletype parts bulletins.

2. ADJUSTING PROCEDURE

NOTE

Before proceeding to adjust, observe the following:

For ED56GT, remove the front cover and remove the unit from the mounting plate. Also remove the unit base plate, and intermediate shaft gear guard.

For ED57GG, remove the chest cover. Then remove the test set from the base of the chest and remove the base plate.

Do not rotate the distributor shaft in a counterclockwise direction, viewed from above, as this may mutilate the distributor brushes. A precaution which may be exercised to avoid mutilation of the brushes is to loosen the brush holder clamp screw and turn the brush holder so as to lift the brushes from the commutator.

a. SIGNAL DISTORTION TEST SET or TEST MESSAGE DISTRIBUTOR PROPER

(1) MAIN SHAFT POSITION (Figure 4)

The center of the main shaft gear should line up with the center of the motor shaft and pinion gear as gauged by eye. To adjust, position the main shaft by means of its upper and lower bearing cap mounting screws. Tighten the cap mounting screws.

(2) MOTOR POSITION (Figure 4)

There should be a minimum amount of backlash between the motor pinion and the main shaft gear throughout a complete revolution of the main shaft. To adjust, loosen the motor mounting screws and position the motor. Tighten the screws.

(3) INTERMEDIATE SHAFT GEAR (Figure 5)

The center of the intermediate shaft gear should be in line with the center of the main shaft pinion gear as gauged by eye, and the play between the gears should be a minimum without bind throughout a complete revolution of the gear.

To meet the foregoing requirements, proceed as follows:

(a) Loosen the intermediate shaft gear clamping screw and position the gear. Tighten the screw.

(b) Loosen the four mounting screws that fasten the code disc unit sub-base to the distributor base (located underneath the distributor base) and position the assembly by means of its mounting screws. Tighten the mounting screws. Recheck adjustment (a).

(4) INTERMEDIATE SHAFT END PLAY (Figure 5)

The intermediate shaft should have some end play, not more than .003". To adjust, unscrew the two intermediate shaft collar set screws and position the collar. Tighten the set screws.

(5) CODE DISC SHAFT END PLAY (Figure 5)

The code disc shaft should have some end play, not more than .006". To adjust, position the code disc assembly on its shaft by means of its mounting screw.

(6) CODE DISC SHAFT GEAR (Figure 5)

The code disc shaft gear should line up with the driving gear on the intermediate shaft as gauged by eye, and the play between the gears should be a minimum without bind throughout a complete revolution of the code disc shaft gear. To adjust, position the code disc bracket by means of its mounting screws (located underneath the distributor base).

(7) CONTACTS (Figure 6 for location of parts)

The contacts should be clean and contact tongues No. 1 and No. 5 should be straight (contact part of tongue approximately parallel to base and free of kinks or twists). To adjust:

(a) Loosen all contact set screws, back off upper and lower contact screws, and clean contacts with a burnisher.

(b) Straighten contact tongues No. 1 and No. 5 with a spring bending tool No. 88882, if available, and position bracket as directed below.

(8) CONTACT BRACKET ASSEMBLY ADJUSTMENTS

NOTE

To check these adjustments it will be necessary to remake them.

(a) UPPER CONTACT LEVER BRACKET POSITION (See Figure 6 for location of parts)

Loosen the contact screw set screws and back off the upper and lower contact screws all the way. With the No. 1 and No. 5 contact levers resting on a high part of their respective code discs, there should be .020" to .030" (.100" to .125" for Test Message Distributor) clearance between the No. 1 and No. 5 upper contacts and their respective contact tongues. To adjust, position the contact lever bracket by means of its mounting screws.

REMOVE THE UPPER CONTACT SPRING TERMINAL BLOCK

(b) LOWER CONTACT LEVER BRACKET POSITION

Adjust the position of the lower contact lever bracket in the same manner in which the upper contact lever bracket was adjusted.

(c) CONTACT TONGUES (Figure 6)

This adjustment applies to both upper and lower contact assemblies. With all the contact levers on the high part of their respective code discs, contact tongues No. 2, No. 3, and No. 4 should line up with contact tongues No. 1 and No. 5 with a variation not to exceed .030". Adjust by bending the contact tongues.

(d) CONTACT SCREWS

This adjustment applies to both upper and lower contact assemblies. With the No. 1 contact lever on the high part of its code disc, turn in the No. 1 upper contact screw so that it just makes contact with the No. 1 contact tongue, and then advance it 2-1/2 additional turns and tighten its set screw. Adjust the No. 1 lower contact screw so that there is a gap of .006" to .010" between the tongue and the lower contact. Tighten the set screw. Adjust Nos. 2, 3, 4, and 5 upper and lower contact screws in the same manner.

(9) CONTACT LEVERS SPRING TENSION (Figure 6)

This adjustment applies to both upper and lower contact assemblies. Since the adjustments are identical, Figure 6 shows only one contact assembly instead of two. With the No. 1 contact lever resting on the low part of its code disc, hook an 8 oz. scale under the contact lever so that the pull rod just clears the contact spring armature and pull upward at right angles to the contact lever. It should require from 3 to 3-3/4 ozs. to separate the contacts. To adjust the No. 1 contact lever spring tension, position the spring anchor by means of its clamping screws. Use a test lamp to determine when the contacts break. Adjust Nos. 2, 3, 4, and 5 contact lever springs in the same manner.

For ED56GT, after completing this adjustment for the lower contact assembly -

REPLACE THE UPPER CONTACT SPRING TERMINAL BLOCK

Proceed to adjust the upper contact assembly in the same manner.

(10) DISTRIBUTOR BRUSH (Figure 7)

(a) Signal Distortion Test Set

NOTE

For ED57GG, if either of the brushes that ride on the two segmented rings is readjusted or replaced, the calibration adjustment on page [illegible] should be remade.

Rotate the motor manually until the brush holder is parallel to the inscribed line on the commutator disc. Under this condition the trailing edge of the inner segment brush should make contact with its associated ring at a point in line (within .020") with the inscribed line on the stationary disc. All brushes should be centrally located with respect to their associated commutator rings. To adjust, loosen the brush spring clamping screws and position the brushes. Tighten the clamping screws.

(b) Test Message Distributor

Rotate the motor governor or fan until the distributor brush arm is parallel to the line scribed on the commutator disc.

1. The braided copper brushes should be straight and at right angle to the brush holder. The length of the brushes should be such that their ends are in line with the line scribed on the commutator disc when they just touch the commutator rings. To adjust, position the brush holder and brushes with their clamping screws loosened.

2. With the brush holder still positioned as above, there should be .015" to .020" clearance between the brush holder stop post and the eccentric stop. To adjust, position the eccentric stop with its locking screw loosened; then to adjust tension, turn the brush holder with its clamping screw loosened, so that its stop post rests against the eccentric stop.

(11) DISTRIBUTOR BRUSH SPRING TENSION (Figure 7)

CAUTION

Brush springs that are kinked or have sharp bends should not be used.

Hook an 8 oz. scale under the end of each distributor brush spring and pull upward at right-angles to the end of the brush spring. It should require 2-1/2 to 3-1/2 ozs. to lift the brush from its commutator ring. To adjust, loosen the brush holder clamp screw so that the brush holder is friction tight and rotate the brush holder clockwise until the brushes rest against the segments with a pressure of 2-1/2 to 3-1/2 ozs. Tighten the brush holder clamping screw.

NOTE

If it is found necessary to readjust the brush holder to obtain the proper spring tension, the brushes should be resurfaced in accordance with the following instructions.

Place a piece of No. 0000 sandpaper (approximately 1" wide) face up on the distributor disc so that the brush will pass over the 1" width and draw the brushes across it two or three times until the bottoms of the brushes are parallel to the surface of the segments. Recheck the spring tension and readjust if it does not meet the requirements.

(12) CODE DISC POSITION (See Figures 6 and 7 for location of parts)

Each lower (marking) contact should close before the distributor brush is within two segment lengths of the associated distributor segment and should remain closed until the brush has passed beyond the associated segment by two segment lengths. For Signal Distortion Test Set, use the inner stationary segmented ring when determining the adjustment. To adjust, proceed as follows:

Rotate the motor in its normal direction slowly by hand until the intermediate shaft gear clamping screw is accessible. Continue to rotate it slowly until the No. 3 lower (marking) contact just closes. Loosen the clamping screw and with the code disc held stationary, again rotate the motor until the brush riding on the inner segmented ring is within three segments plus or minus 1/2 a segment length of the front end of the No. 3 segment. (1/2 segment length refers to the length of 1/2 of any segment length except the stop segment.) Tighten the clamping screw on the intermediate shaft gear. Recheck the requirement for all contacts. Check the Code Disc Shaft End Play Adjustment.

(13) CODE DISC FRICTION ASSEMBLY TORQUE (See Figure 5 for location of parts)

With the motor running at least ten minutes, hook a 32 oz. scale in the bottom of the slotted end of the friction drag lever (next to the stop post) and pull up vertically. It should require 20 to 32 ozs. to start the arm moving away from the stop post. To adjust, loosen the lock nut on the end of the code disc shaft and regulate the tension by means of the capstan nut. Tighten the lock nut.

REPLACE THE INTERMEDIATE SHAFT GEAR GUARD

Signal Distortion Test Set Distortion Switch Adjustments

(14) SWITCH KNOB AND SHAFT DETENT CAM

(a) The switch knob set screw should engage the flat side on the shaft, and there should be some clearance, not more than .025" between the knob and the dial.

(b) The shaft detent cam set screw should engage the flat side on the small diameter end of the shaft, and the vertical position of the cam should be such that the detent lever roller rides centrally on the cam.

(c) Adjust by means of the set screws.

(15) DETENT (Figure 8)

(a) For ED57GG

With the detent roller in the center indent of the detent cam, the switch knob indicator should point to the center of the ZERO mark on the dial. To adjust, position the detent lever by means of its eccentric mounting screw.

(b) For ED56GT

With the knob in either of the two ZERO positions, the knob pointer should be in the center of the ZERO mark on the name plate. To adjust, position the detent lever by means of its eccentric mounting screw.

NOTE

If sufficient travel cannot be obtained by following the foregoing procedures, reposition the detent wheel on the switch shaft.

(16) CONTACT CAM (Figure 8)

(a) For ED56GT

With the switch knob in the rear ZERO position over which the directional arrow is located, the contact cam should be positioned on its shaft so that the heads of the set screws are toward the outside of the unit and at right angles to the side of the unit. The end of the contact cam stamped number 1 should be placed next to the top plate mounting bracket. Adjust by means of the set screws.

(b) For ED57GG

The set screws of the switch contact cam should be at right-angles to the switch knob pointer and the heads of the set screws should be toward the left side of the unit when the switch knob is in the ZERO position. To adjust, position the cam by means of its set screws.

(17) DISTORTION SWITCH DETENT LEVER SPRING TENSION (Figure 8)

With the detent lever roller in an indent on the cam, hook a 32 oz. scale over the roller and pull horizontally and at right-angles to the lever. It should require 10 to 17 ozs. (22 to 30 ozs. for ED57GG) to just start the roller moving away from the cam.

NOTE

For ED57GG, if necessary, loosen the mounting screws of the spring bracket and take up the play in the bracket mounting holes in the required direction to meet the spring tension requirement. Tighten the spring bracket mounting screws.

(18) DISTORTION SWITCH CONTACT ASSEMBLY (Figures 8 and 9)

With the switch knob in a ZERO position, the contact pile-ups (numbered 1 to 8, from top to bottom) should be as follows:

#1 - All open
#2 - All open
#3 - Open
#4 - Back closed, front open
#5 - Back closed, front open
#6 - Back closed, front open
#7 - Back closed, front open
#8 - Open

(a) With the switch knob in a ZERO position, the eight cam follower springs should bear against the cam. Holding the long contact springs (swingers) out of the way, hook an 8 oz. scale over the end of each cam follower spring at the cam and pull at right-angles to the spring. It should require some tension, not more than 1 oz. to start each spring moving away from the cam.

(b) Turn the knob to an EDM (End Distortion-Marking) position. The cam follower spring of pile-ups #3 to #8 inclusive should assume the same position (within .010") as in a ZERO position. If necessary, refine the Contact Cam Adjustment. Turn the knob to a BIAS S (Bias Spacing) position and check the cam follower springs of contacts #1 and #2 for the same requirements.

(c) With the switch knob in a ZERO position, the long contact springs (swingers) should bear against the cam follower spring or the next inner long contact spring (swinger). The short contact springs and the outer long contact springs (swingers) should be held out of the way while measuring the pressure of the inner long contact springs. The short contact springs should be held out of the way while measuring the pressure of the outer long contact springs (swingers) of pile-ups #5 and #6. Hook an 8 oz. scale over the end of the long contact springs (swingers) and pull at right-angles to the springs. It should require 1-1/2 to 3 ozs. to start the springs moving. Adjust by bending the springs.

NOTE

For the following requirements (d), and (e), refer also to the contact list above.

(d) Turn the switch knob to the EDS (End Distortion-Spacing) position. The contacts which were closed (when the switch knob was in a ZERO position) should now have a gap of .015" to .025". Adjust by bending the short contact springs.

(e) Turn the switch knob to the ZERO position. The contacts which are now open should have a contact gap of .015" to .025". Adjust by bending the short contact springs.

(f) With the switch knob in the ZERO position, the swinger spring studs of pile-ups #4 to #7 inclusive may not normally rest against the preceding swinger or cam follower springs. This is permissible if the requirements of (b) and (c) are met.

REMOTE CONTROL ADJUSTMENTS for ED56GT

(19) DISTORTION SWITCH SHAFT LOWER BEARING (See Figures 1 and 10 for location of parts)

The distortion switch shaft should rotate freely when both the detent roller and the solenoid stepping pawl are held away from the detent cam and the ratchet wheel respectively. To adjust, position the signal contact disc mounting bracket by means of its mounting screws.

(20) SOLENOID BACKSTOP (Preliminary) (Figure 10A)

Tighten the backstop solenoid plunger rear adjusting nuts so that the leather washer is held against the shoulder on the plunger.

(21) REMOTE CONTROL RATCHET (See Figure 10B for location of parts)

With the solenoid in its operated position (the plunger held forward against the backstop) the ratchet wheel should be positioned so that the stepping pawl, which is pivoted on the plunger extension, just engages a tooth on the ratchet wheel. To adjust, position the ratchet wheel by means of its mounting screws.

(22) SOLENOID FRONTSTOP (Figure 10A)

With the solenoid de-energized, and the distortion switch detent fully seated in an indent of its cam, there should be some clearance, not more than .015" between the leading point of the stepping pawl and the nearest part of the ratchet tooth. To adjust, position the frontstop (front) solenoid plunger adjusting nuts. Check all ratchet wheel teeth for this clearance.

(23) SOLENOID BACKSTOP (Final) (Figure 10B)

With the solenoid energized there should be some clearance, not more than .015" between the plunger stepping pawl and the front point of the ratchet wheel when the stepping pawl is held in a position that will make this clearance a minimum. To adjust, reposition the backstop (rear) solenoid plunger nuts. Check all teeth on the ratchet wheel for this clearance.

(24) STEPPING PAWL SPRING TENSION (See Figure 10A for location of parts)

With the solenoid de-energized, hook an 8 oz. scale over the end of the stepping pawl adjacent to the working face. It should require 4 to 6 ozs. to start the pawl moving away from the ratchet wheel.

(25) SOLENOID PLUNGER RETURN SPRING TENSION (See Figure 10A for location of parts)

It should require a push of 48 to 56 ozs. against the end of the plunger to just start it moving toward its energized position. Adjust the tension of the plunger return spring by means of the adjustable spring post.

(26) DISTORTION INDICATING BRUSH (Figure 11)

With the distortion switch control knob in the rear ZERO position over which the directional arrow is located, the outer brush of its distortion indicating brush holder assembly should make contact with the rearmost of the two contact buttons identified by the 0 on the small distributor block. To adjust, position the brush holder assembly on its shaft by means of its clamping screw.

(27) DISTORTION INDICATING BRUSH TENSION (See Figure 11 for location of parts)

The brushes should bear against the small distributor block with a pressure of 1 to 2 ozs. To adjust, either bend the brushes or lower the brush assembly on its shaft. Check to determine that the brush arm does not strike any portion of the small distributor block throughout a complete revolution of its shaft.

TEST MESSAGE RELAY ADJUSTMENTS for ED56GT

(28) CONTACT SPRINGS AND ARMATURE HINGE POSITIONS

The contact springs and the hinge brackets should be positioned to meet the following requirements:

(a) All contacts should line up within the limits indicated in Figure 12A.

(b) The spring tangs should rest on the spool head so that the free end of the tang extends back of the front face of the spool head. See Figure 12B.

(c) The width of each spring tang should line entirely within the projection of the top and

bottom edges of the slot in the spool head, but the tang should not rub on the spool head when moved from its normal position of rest on the spool head in the direction of travel of the spring.

(d) The hinge pins should not bind in the holes of the hinge brackets. See Figure 12C.

(e) With the A springstensions (see Figure 12D) approximately equal (if not, adjust as per paragraph (32)(a) under Contact Spring Tension Adjustments) both legs of the armature should bear against the hinge bracket when the relay is in the operated position and should also bear against the hinge bracket after the relay has been released. To adjust, slightly loosen the contact spring mounting screws and position the springs and the hinged brackets. Tighten the mounting screws.

(29) ADJUSTING STUD CLEARANCE

There should be some clearance between the armature and the adjusting stud over the entire armature travel. Bend the stud with a pair of long nose pliers to obtain this clearance.

(30) ADJUSTING NUT TIGHTNESS

The adjusting nut should be sufficiently tight on the stud to prevent its being readily turned with the thumb and forefinger. To adjust, back off the adjusting nut from the adjusting stud until its slotted portion is free of the stud, then force the slotted parts of the nut closer together, using a pair of long nose pliers.

(31) ARMATURE TRAVEL

There should be .062" to .068" clearance between the armature stop pins and the core. To adjust, turn the adjusting nut.

(32) CONTACT SPRING TENSION (See Figure 12D)

The springs should be tensioned toward the armature. All spring tensions should be measured with the armature in the unoperated position, except where the abbreviation "arm. oper." is shown.

(a) The A springs should have approximately the same tension and should hold the armature against the adjusting nut. It should require a pressure of 20 to 45 grams applied to the back of the armature at a point approximately midway between the stop pins to start the armature moving away from the adjusting nut. Adjust by bending the A contact springs.

(b) The C and H contact springs should be tensioned so that it requires a pressure of 30 to 50 grams (applied to the tip just in front of the contacts) to start the tang of each spring moving away from the side of the slot in the spool head next to the armature (some are measured with the armature in the operated position). Adjust by bending the C and H contact springs.

(c) The G contact spring should be tensioned toward the armature so that it requires a pressure of 5 to 20 grams (applied at the tip of the spring) to start its operating stud moving away from its operating spring. Adjust by bending the G spring.

(d) The E contact spring should be tensioned toward the armature so that it requires a pressure of 30 to 50 grams (applied to both prongs at the tip of the spring) to start its contacts moving away from its associated C break contacts. Adjust by bending the E spring.

(e) Each B and J contact spring should be tensioned toward the armature and together with the tensions of any G springs which may in turn be tensioned against it, should require a pressure of 20 to 40 grams (applied to both prongs at the tip of the spring) to start its contacts moving away from its associated C break contacts. Adjust by bending the B and J contact springs.

(33) STUD GAP

With the armature unoperated, there should be at least .006" clearance between the end of the armature operated stud and the B spring. To adjust, bend the associated C break contact spring tang and recheck its spring pressure. Recheck the B contact spring pressure.

(34) CONTACT SEQUENCE

On break-make contacts of the spring combinations, the normally closed contacts should break before the normally open contacts make. Gauge by eye. Adjust by modifying the spring tensions, stud gaps and contact adjustments as required.

(35) CONTACT MAKE ADJUSTMENTS

(a) Both contacts of the B bifurcated springs should make contact with their associated C break contact springs when the armature is in the unoperated position; they should also make contact with their associated C make contact springs when the relay is electrically energized. To adjust, bend the ends of the springs (obtain by bending only the ends of the B springs if possible). Recheck the spring pressures and the stud gap.

(b) Both contacts of the A and H contact springs should make contact with their associated C springs when the armature is in the operated position. To adjust, bend the bifurcated spring ends and recheck the spring pressures.

(c) Both contacts of the E spring should make contact with the C spring when the armature is in the unoperated position and both contacts of the G spring should make with the E spring when the armature is in the operated position. To adjust, bend the ends of the springs (obtain by bending only the ends of the E springs if possible). Recheck the spring pressures.

(d) Each of contact springs A, B, and H should meet the following requirements:

1. With the relay electrically energized against a gauge of .040" thickness, none of the make contacts should make contact with a mating contact on an associated H contact spring.

2. With the relay electrically energized against a gauge of .033" thickness, at least one of the contacts on each make contact spring should make contact with its mating contact on an associated H contact spring.

3. With the relay electrically energized against a gauge of .016" thickness, none of the make contacts should make contact with a mating contact on the associated C make contact spring.

4. With the relay electrically energized against a gauge of .009" thickness, at least one of the make contacts on each A and B contact spring should make contact with its mating contact on the associated C make contact spring.

5. With the relay electrically energized against a .005" gauge inserted between the armature and the core, both break contacts on each B spring should be separated from their mating contacts. To adjust, bend the tang on the associated C contact springs and recheck their pressures.

(e) Contact springs G, E, J, and their associated C contact spring should meet the following requirements:

1. With the relay unoperated, the contact separation designated U should be at least .010", and there should be a slight clearance at the point S.

2. With the relay electrically energized against a .020" gauge, the J contact should not leave its associated C contact spring.

3. When the relay is electrically energized against a .005" gauge inserted between the armature and the core, both break contacts on the E and J contact springs should be separated from their mating contacts on the C springs. To adjust, bend the tang on the associated C break contact spring and recheck the spring pressures.

(36) CALIBRATION for ED57GG

(a) Connect the local test circuit plug to 115 volts d.c.

(b) Insert the signal line plug into one of the local test jacks.

(c) Plug an ammeter that will register approximately .060 amperes into the other local test jack. (Any device that will indicate when the circuit opens and closes, such as a Teletype unit with receiving magnets and armature, may be used.)

(d) Turn the character selecting switch to the Y position.

(e) Loosen the adjustable distributor disc clamping screws and rotate the disc clockwise until the pointer is off the calibration scale.

(f) Place the distortion switch in the EDM (End Distortion-Marking) position and rotate the motor shaft slowly in the normal direction until the brush arm approaches the beginning of the No. 5 segment of the stationary disc. Continue slowly to rotate the motor shaft until the ammeter just registers current. Allow the brush arm to remain in this position and turn the distortion switch to the BIAS S (Bias-Spacing) position. The ammeter should now register no current. Now rotate the adjustable distributor disc ring slowly counterclockwise until the ammeter again just registers current. Clamp the adjustable disc ring in this position by means of the three ring clamping screws. Then adjust the position of the indicator by means of its mounting screws, to register 0 on the calibration scale. Tighten the indicator mounting screws.

After the disc and indicator have been adjusted according to the foregoing instructions, the disc is usually set for 35% bias or end distortion; however, it may be adjusted for any value from 0 to 50%.

A Teletype Signal Distortion Test Set with stroboscope may be used to check various operations of the test set. However, an accurate check of the calibration adjustment cannot be made due to variation in speed caused by the governed motor of the test set. These speed variations will cause a wavering of the impulse as viewed on the stroboscope, making it very difficult to measure accurately the impulse length.

NOTE

The radio filter cut-out switch should be replaced in the OUT position during the time that the test set is being checked by a Teletype Signal Distortion Test Set with stroboscope, to prevent signal distortion in the form of a "tailing" effect as viewed on the stroboscope.

b. SYNCHRONOUS MOTORS - STARTING SWITCH

(1) The following requirements should not be checked unless there is reason to believe that the starting switch is out of adjustment.

(a) Remove the motor unit from the base and remove the motor fan and pinion.

(b) Remove the switch end-shield screws and the switch-commutator mounting screws. Remove the switch end shield.

(c) Pull out the rotor until the brush holder spring is accessible and remove the spring.

(d) The tension of the spring for 60-cycle motors should measure 2 to 2-1/2 ozs. when extended to a length of five inches, using an 8 oz. scale. The tension of the spring for 50-cycle motors should measure 1-3/4 to 2 ozs. when extended to a length of five inches.

(e) The brush holders should be mounted by means of the center set of mounting holes and should be free.

(f) The brush-holder stop pins should be safely within the holes of the fiber disc when all the play in the brush holders has been taken up to make the engagement of the pins with the disc a minimum.

(g) Replace the brush-holder spring, making certain that the spring eyes are fully engaged with each other.

(h) Replace the switch-commutator screws and tighten the two screws alternately a little at a time until both screws are tight.

(i) Replace the switch end-shield screws, using the same precaution in tightening as above.

(j) Apply the push end of a 12 lb. scale against the fan end of the shaft and push parallel to the shaft. It should require at least 7 lbs. pressure to start the shaft moving.

(k) Replace the motor fan and pinion. Replace the motor unit on the base and remake the motor position adjustment.

c. GOVERNED MOTORS

(1) MOTOR ARMATURE THRUST SPRING COMPRESSION (Figure 16)

Apply the push end of a twelve pound scale horizontally against the governor outer contact disc and push toward the pinion end of the motor. It should require at least seven pounds to start to overcome the compression of the armature spring.

REMOVE THE BRUSH SPRING PLATE AND GOVERNOR COVER

REMOVE THE SPEED ADJUSTING SPRING

(2) GOVERNOR SHELL (Figure 15)

(a) The governor contact points should meet squarely and there should be at least .010" clearance between the governor spring bracket and the rim of the governor shell. To adjust, remove the governor from its shaft and position the governor spring bracket by means of its mounting screws.

NOTE

If necessary, reposition the "fixed contact" bracket to facilitate squaring up the contacts.

(b) There should be a gap of .015" to .040" between the governor contacts. To adjust, bend the governor contact spring.

REPLACE THE SPEED ADJUSTING SPRING

(3) GOVERNOR

There are two types of slip rings in use on governors, the peripheral ring and the end ring. The five adjustments immediately following are common to both types.

(a) ADJUSTMENTS FOR ALIGNMENT AND SQUARENESS OF GOVERNOR CONTACTS

1. All governor contacts can be adjusted for alignment of edges; only those governor shells which provide elongated mounting holes for the fixed contact bracket permit adjustment of the contact for height by positioning the contact bracket.

2. The governor contacts should be in line and meet squarely so that maximum contact surface is provided. (Check with the retractile spring tension adjusted so that the contacts just make, or to the limit of the adjusting screw.)

a. Line up edges of contacts by means of the floating-contact-hinge mounting screw.

b. Adjust contacts for squareness from right to left by positioning the height of the fixed contact bracket using the elongated mounting holes in the governor shell.

c. To adjust from front to back, twist the floating-contact hinge, applying pressure to the arm near the contact.

NOTE

Check by use of a .002" gauge (smaller if available). Check with gauge between edges of the contacts to see that the gauge enters (or does not enter) equally on all sides.

(b) SPEED-ADJUSTING-WHEEL FRICTION WASHER (Figure 15)

1. In order to check this adjustment, it is necessary that the speed adjusting spring be adjusted so that it requires a pull of 13 to 14 ozs. to separate the governor contacts. To measure, hook a 32 oz. scale over the contact spring next to the contact and pull parallel to the speed-adjusting spring. Adjust to the proper tension by means of the speed-adjusting wheel.

2. Insert a bank pin radially in the leather of the adjusting wheel, hook a 32 oz. scale over the pin at the periphery of the wheel and pull at right angle to the radius. It should require 16 to 24 ozs. to start the wheel moving. To adjust the friction, remove the friction washer and bend the large projections.

(c) SPEED-ADJUSTING-LEVER STOP PLATE (Figure 16 for location of parts)

There should be .006" to .050" clearance between the speed-adjusting-lever wearing strip and the governor shell when the speed-adjusting lever is held against the stop plate. To adjust, loosen the stop-plate mounting screws and position the plate. Tighten the screws.

(d) GOVERNOR SHIMS (Figure 16 for location of parts)

With the governor speed-adjusting lever in its unoperated position, there should be at least .006" clearance between the wearing strip and the adjusting wheel when the adjusting wheel is opposite the wearing strip and all the end thrust of the motor armature is taken up in a direction to make this clearance a minimum. Adjust by increasing or decreasing the number of shims on the armature shaft between the governor hub and the end frame casting of the motor.

(e) SPEED SETTING

1. When governed motors are used, a speed indicator (tuning fork) is required for the purpose of checking the motor speed. The fork is equipped with shutters attached to the ends of the tines. The governor is equipped with a target having white spots on a black background (Figure 16).

2. To check speed, the target should be well illuminated. Tap the speed indicator fork lightly to make it vibrate. Hold the fork so that the shutters are close to the eye, and view the target through the openings in the shutters. If the motor is running at the correct speed, the target will appear stationary. If the motor is running too fast, the spots will appear to be moving in the direction of the motor rotation; if too slow in the opposite direction.

NOTE

There is a possibility of setting the speed incorrectly due to getting a speed multiple; i.e., the speed could be half the desired speed, or some multiple thereof, but the spots would appear to be stationary when viewed through the fork shutters. This fact should be kept in mind if trouble due to incorrect speed is experienced.

3. To adjust the speed, stop the motor and turn the governor adjusting wheel in one direction or the other a little at a time, checking the speed after each adjustment until the correct speed is obtained.

(4) THE FOLLOWING FOUR ADJUSTMENTS APPLY ONLY TO UNITS WITH END-RING GOVERNORS (Figure 16). Remove the governor guard, brush spring plate and governor cover.

(a) INNER AND OUTER DISC CONTACT SPRING (Figure 17)

1. The distance from the inner surface of the governor cover to the highest point on the contact springs should be 25/32" to 27/32".

2. Place a "D" (89955) socket wrench over the nut located in the center of the governor cover. With a six-inch scale, measure the radial distance from the vertical surface of the wrench to the point where the scale touches the curved surface of the inner disc contact spring. This distance should be 17/32" to 19/32".

3. In a similar manner, measure the distance from the wrench to the point of contact on the outer disc contact spring. The distance should be 7/16" to 1/2".

4. To adjust for the above requirements, bend the inner and outer disc contact springs.

(b) GOVERNOR-BRUSH SPRING-PLATE BRACKET (Figure 16)

1. A line established by the center of the outer disc and the center of one of the brushes should pass through some portion of the other brush.

2. The surface of the brush spring-plate bracket on which the brush spring plate is mounted should be in line with the outer surface of that part of the governor cover on which the target is mounted.

3. The brush spring-plate bracket should be parallel to the edge of the motor base plate.

4. To adjust for the above requirements, loosen the brush spring-plate bracket mounting screws and position the bracket. Tighten the screws.

(c) GOVERNOR-BRUSH SPRING PRESSURE (Figure 16)

1. The carbon brushes should exert a pressure of 4-1/2 to 5-1/2 ozs. against their associated discs. To measure, apply an 8 oz. scale to the spring near the carbon brush and push (or pull) horizontally until the brush starts to move away from the disc.

2. Both carbon brushes should lie flat against their associated discs and the outer edges of the brushes should be flush with, or not more than 3/64" inside of, the outer edge of the discs.

3. To adjust for these requirements, remove the brush springs and bend them, if necessary. Reinstall springs and position them properly. Tighten the screws.

(d) GOVERNOR GUARD (Figure 16)

There should be at least 1/16" clearance between the governor guard and the edge of the target. Adjust by bending the governor guard if necessary.

(5) THE FOLLOWING TWO ADJUSTMENTS APPLY ONLY TO UNITS WITH PERIPHERAL-RING GOVERNORS (Figure 18)

(a) GOVERNOR-BRUSH BRACKET (Figure 18A)

The governor brushes should be centrally located with respect to the governor collector rings, and the ends of the brushes should project .015" to .050" beyond the brush holder. To adjust, loosen the brush-holder bracket mounting screws and position the bracket. Tighten the screws.

(b) GOVERNOR-BRUSH SPRING TENSION (Figure 18A)

In order to check this requirement, it will be necessary to remove the brush holder from its bracket. Apply the push end of an 8 oz. scale to the end of each brush and push in line with the brush. It should require 3 to 4 ozs. to depress each brush to within .015" to .050" of the brush holder. After checking this requirement, replace the brush holder and recheck (a).

SECTION 3

LUBRICATION

1. GENERAL

1.01 Proper attention to lubrication is of the utmost importance.

1.02 Use Teletype KS-7470 oil at all locations where the use of oil is indicated. Use KS-7471 grease on all surfaces where grease is indicated, except the motor bearings. Apply two drops of KS-7470 oil to motor bearings every four months (depress oiler with metal object). If the motor is disassembled at any time, repack the bearings with KS-7471 grease.

1.03 All spring wicks and felt oilers should be saturated. The friction surfaces of all moving parts should be thoroughly lubricated. Overlubrication, however, which will permit oil or grease to drip or be thrown on other parts, should be avoided. Special care must be taken to prevent any oil or grease from getting between the armature and its magnet pole face or between electrical contacts.

1.04 Apply a thick film of grease to all gears.

1.05 Apply oil to all cams, including the camming surfaces of each clutch disk.

1.06 The following lubricants have been standardized for use on all types of Teletype apparatus. These lubricants supersede those referred to in preceding Teletype specifications. The lubricants can be ordered from Teletype as follows:

88970	1 Qt. of KS-7470 Oil
88971	1 Gal. of KS-7470 Oil
88973	1 LB. of KS-7471 Grease
88975	KS-8319 Grease Gun
97116	4-oz. Tube of KS-7471 Grease

The above grease is recommended instead of oil for lubricating motors equipped with ball bearing. The 88975 grease gun should be used for injecting grease into the bearings of Teletype ball bearing motors. The gun may be used also for applying grease to other parts of the apparatus and no other grease container need be carried. If this grease gun is not available, the oil listed in the foregoing should be substituted for lubricating ball bearing motors.

1.07 Instructions for Filling the Grease Gun

1. Unscrew the lubricant tube from the cap sting of the grease gun.

2. Insert fresh lubricant through the open end of the tube with the fingers. Apply gradually to eliminate air pockets.

3. Tamp the lubricant down solidly in the tube by pounding the closed end solidly against the palm of the hand. Continue to add lubricant until the tube is completely filled and the metal follower rests against the perforated tube cover.

4. Fill the cap casting with lubricant flush to the bottom side of the tube threads.

5. Screw the lubricant tube into the cap casting part way only. Then insert a pencil or rod through the perforated tube cover and exert pressure against the metal follower so as to expel any entrapped air past the tube threads. When lubricant begins to ooze through the threads, tighten the lubricant tube securely in the cap casting.

6. Operate the handle back and forth for several strokes or until lubricant is pumped from the nozzle. The gun is then ready for use. If the lubricant does not flow from the nozzle in a solid stream, it is an indication that all air has not been expelled from the lubricant tube. Invert the gun and pound the cap casting end against the palm of the hand to jar the lubricant into the pump cylinder.

1.08 Instructions for Lubricating Motor Ball Bearings

The motor bearings are packed with grease before the motor leaves the factory and under ordinary operating conditions need no additional lubrication for approximately two months. At the regular lubricating intervals one or two strokes of the plunger of the gun should apply sufficient grease to each bearing. To lubricate, press the nozzle of the gun against the ball oiler and force the grease into the hole by pushing on the plunger of the gun. Care should be taken that the bearings are not overloaded. Overloading will result in the grease oozing out of the end castings and being forced into the motor or being thrown on other parts of the mechanism. After lubricating, the motor should be run for a few minutes and then any excess grease that has been forced out of the ends of the castings should be wiped off. Each time that the gun is used for lubricating a motor bearing, the plunger should first be depressed slightly to make sure that grease will be delivered.

1.09 Lubricate the following:

(1) Friction Assembly Felt Washers - saturate.

(2) Main Shaft - at bearings.

(3) Code Disc Shaft - at bearings.

(4) Contact Lever - at bearing (one drop of oil).

(5) Contact Spring Arms - at bearings (one drop of oil).

(6) Intermediate Shaft - at bearings.

(7) Contact Levers - at bearings and in slots of bearing blocks (one drop of oil).

(8) Contact Spring Arms - at bearings (one drop of oil).

(9) Oil both loops of all helical springs that exert a tension of less than 2-1/2 lbs.

(10) Apply grease to both loops of all helical springs that exert a tension of 2-1/2 lbs. or more.

(11) All Gears and Pinions - apply a thin film of grease.

(12) Apply a thick film of grease to stepping ratchet wheel, detent cam, and all code disc peripheries.

(13) Apply two drops of oil on the solenoid plunger, stepping pawl pivot, and detent pivot.

(14) Motor Speed Adjusting Lever - at pilot screw.

(15) Code Disks - operating surface (grease lightly).

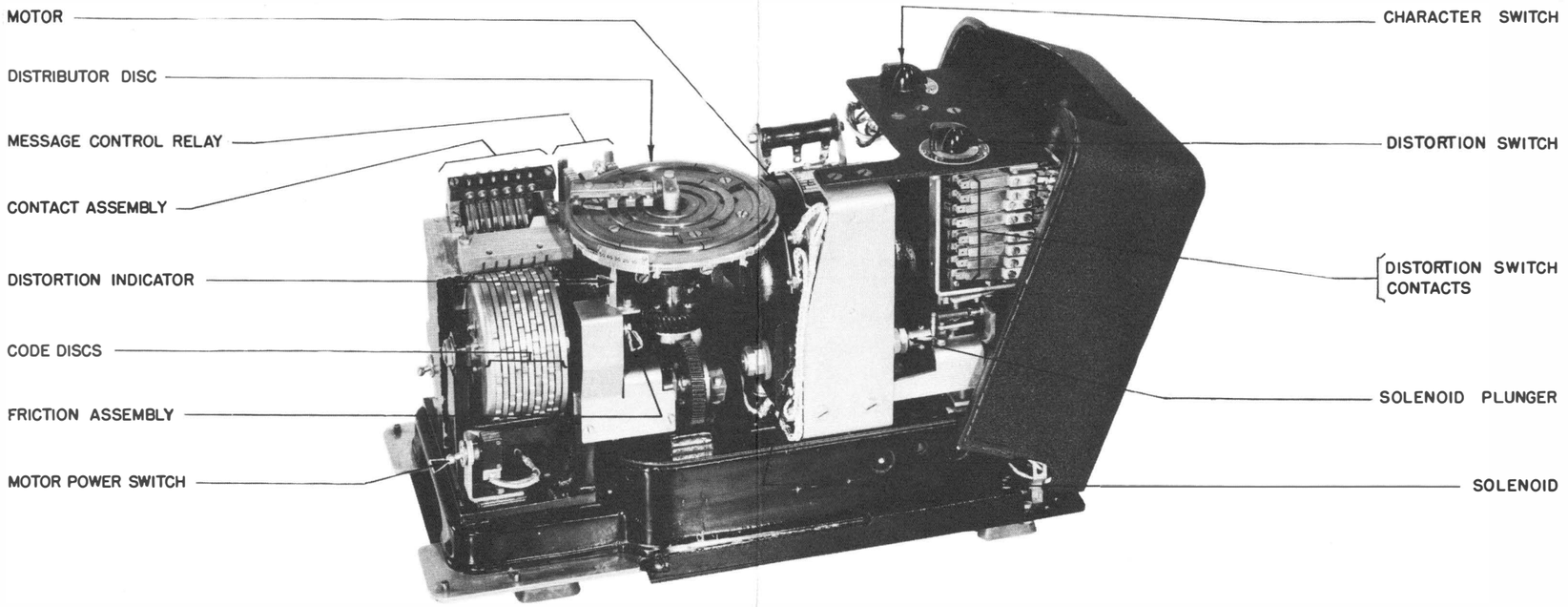


FIGURE 1

FIGURE 2

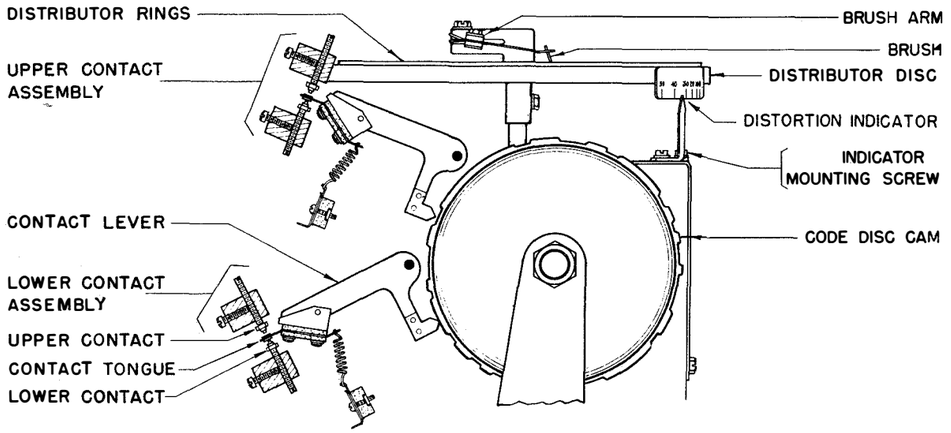


FIGURE 3

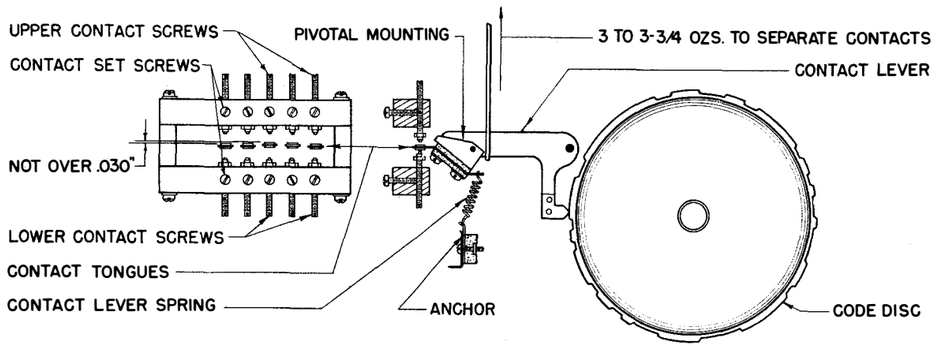


FIGURE 6

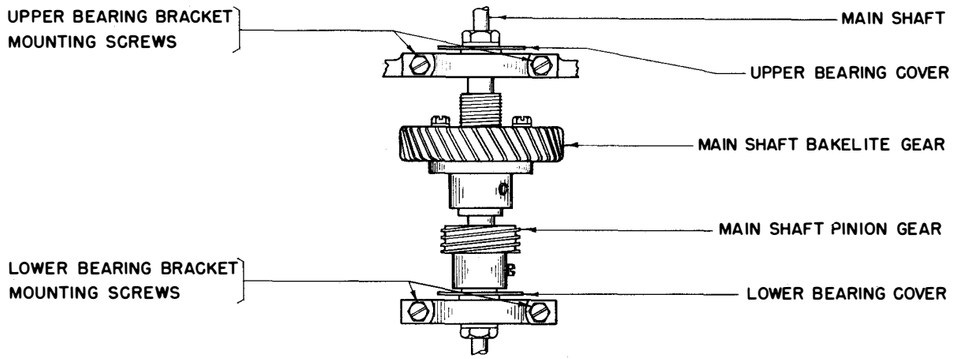


FIGURE 4

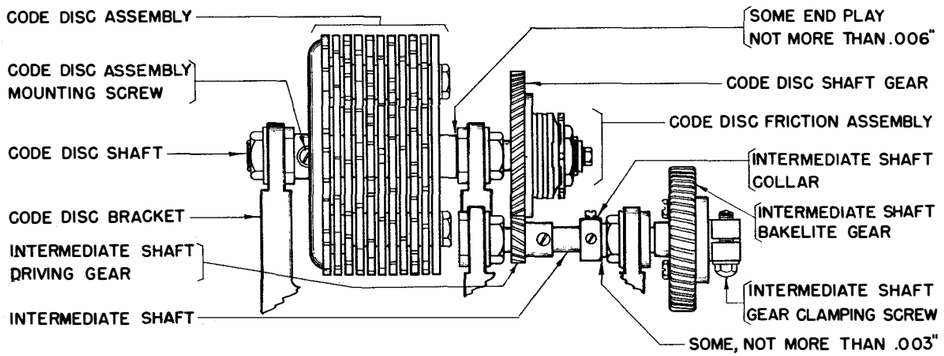


FIGURE 5

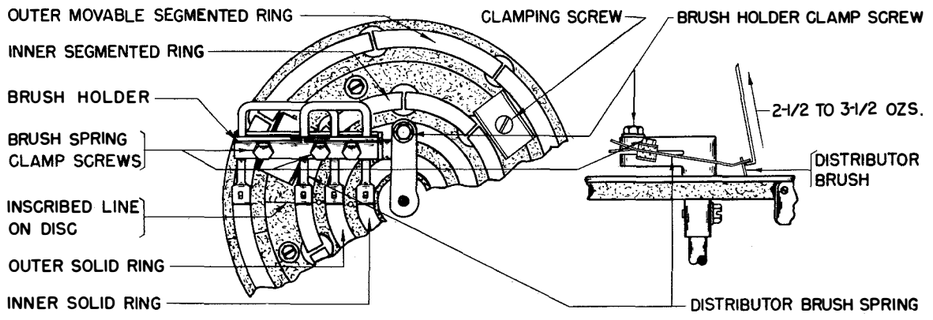


FIGURE 7

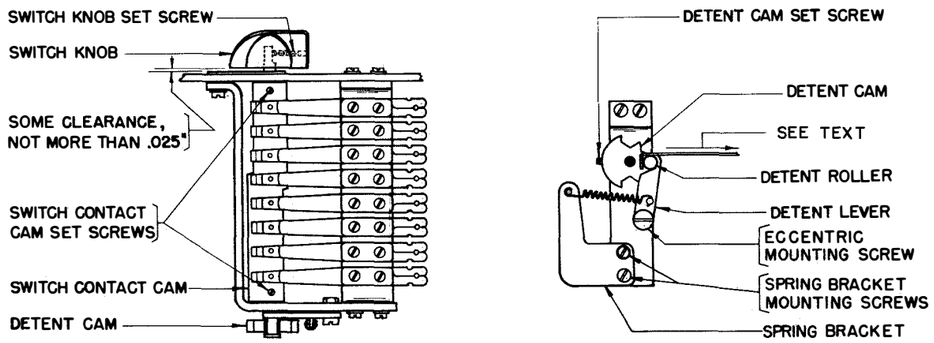
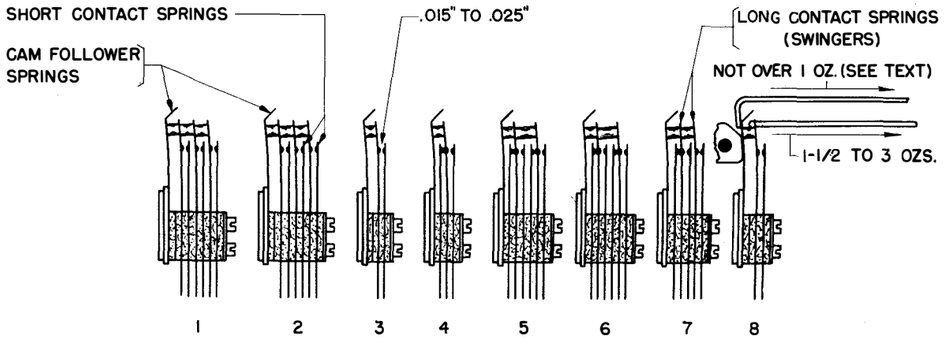


FIGURE 8



POSITION OF CONTACT SPRINGS WITH THE SWITCH KNOB IN ZERO POSITION

FIGURE 9

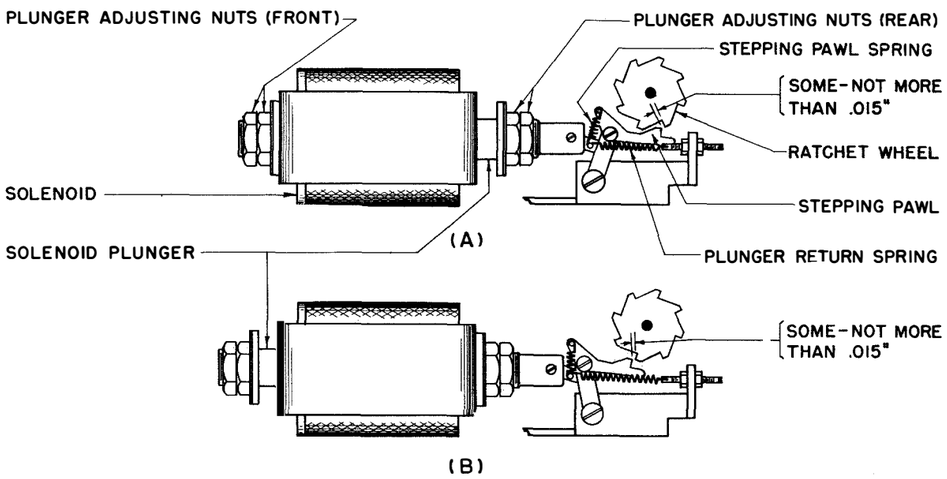


FIGURE 10

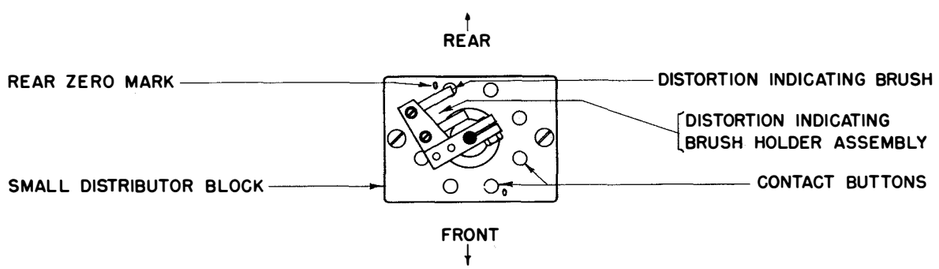
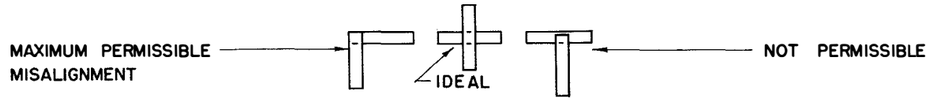
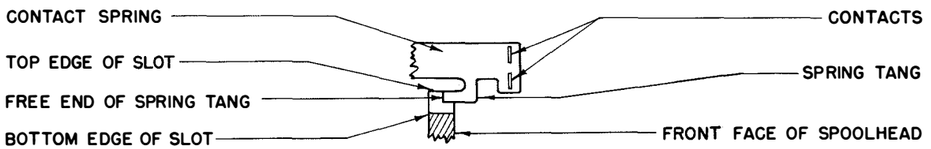


FIGURE 11

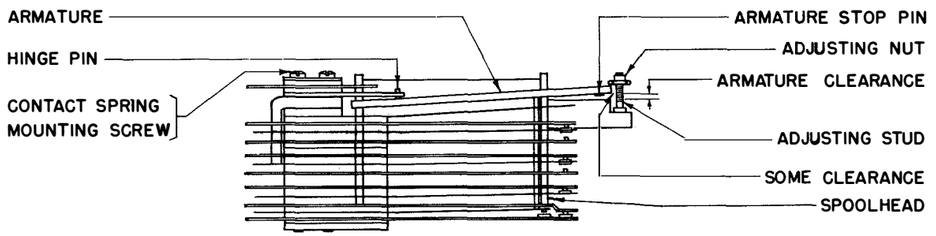


-CONTACTS-

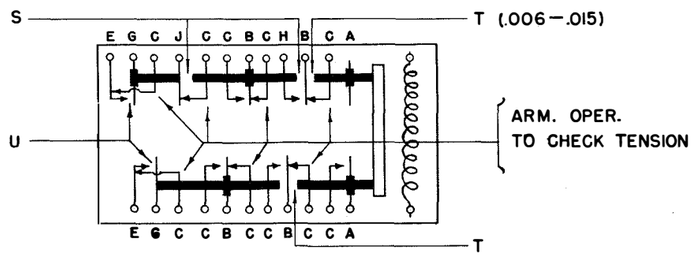
(A)



(B)



(C)



(D)

FIGURE 12

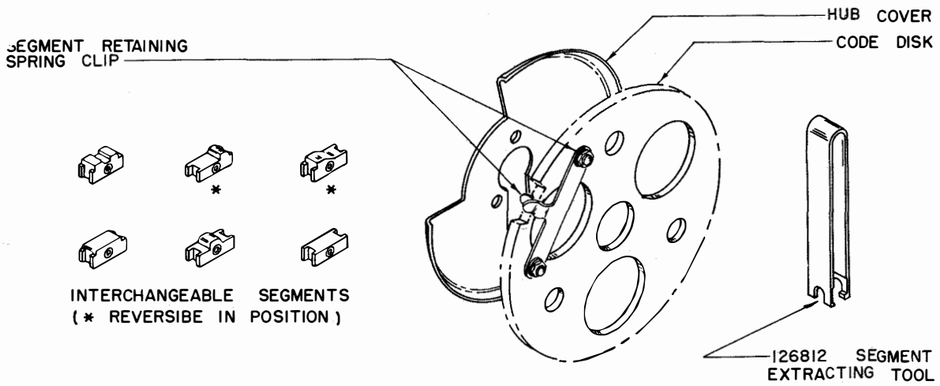


FIGURE 13

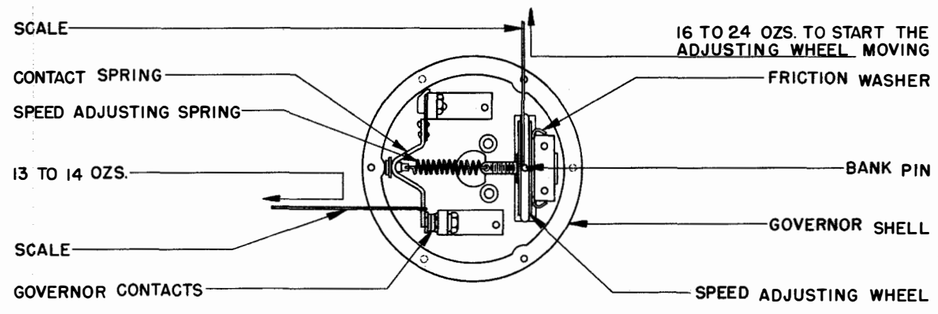


FIGURE 15

LETTERS	DISK #1	DISK #2	DISK #3	DISK #4	DISK #5
A	M	M	S	S	S
B	M	S	S	M	M
C	S	M	M	M	S
D	M	S	S	M	S
E	M	S	S	S	S
F	M	S	M	M	S
G	S	M	S	M	M
H	S	S	M	S	M
I	S	M	M	S	S
J	M	M	S	M	S
K	M	M	M	M	S
L	S	M	S	S	M
M	S	S	M	M	M
N	S	S	M	M	S
O	S	S	S	M	M
P	S	M	M	S	M
Q	M	M	M	S	M
R	S	M	S	M	S
S	M	S	M	S	S
T	S	S	S	S	M
U	M	M	M	S	S
V	S	M	M	M	M
W	M	M	S	S	M
X	M	S	M	M	M
Y	M	S	M	S	M
Z	M	S	S	S	M
BLANK	S	S	S	S	S
LETTERS	M	M	M	M	M
FIGURES	M	M	S	M	M
SPACE	S	S	M	S	S
C.R.	S	S	S	M	S
L.F.	S	M	S	S	S

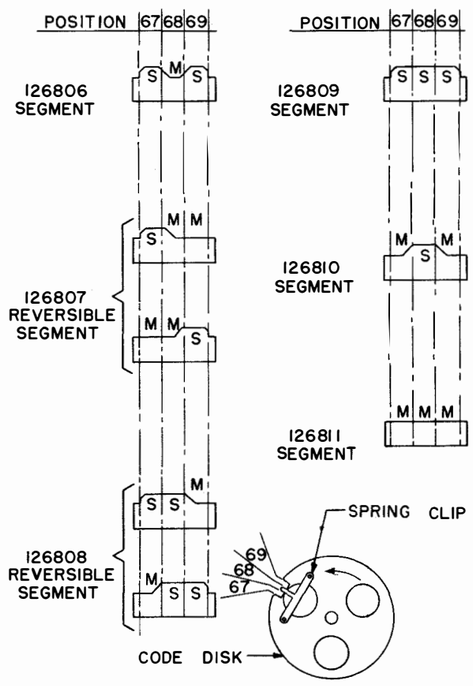


FIGURE 14

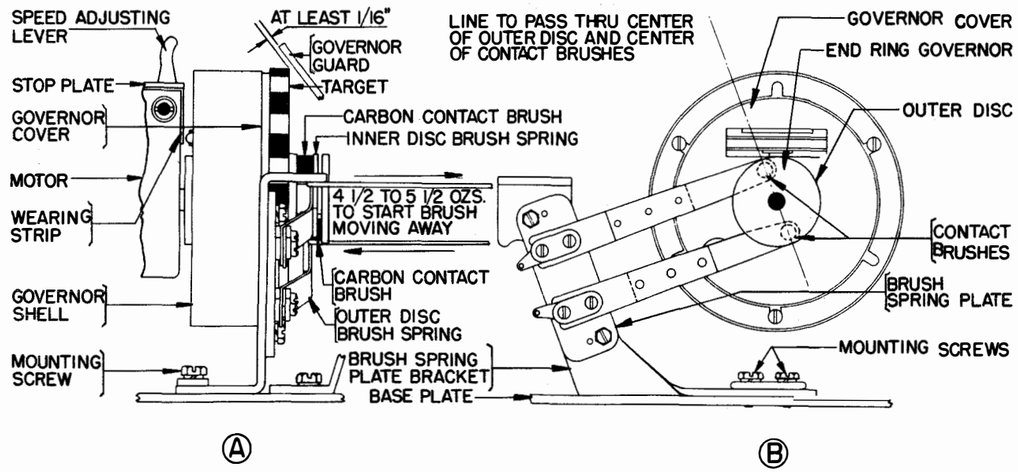


FIGURE 16

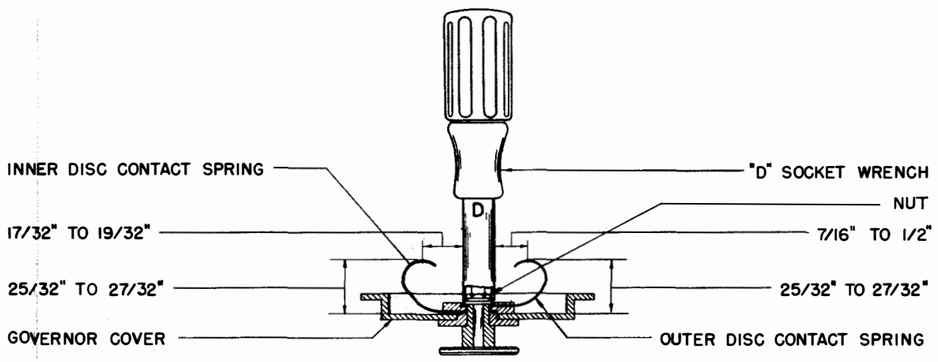


FIGURE 17

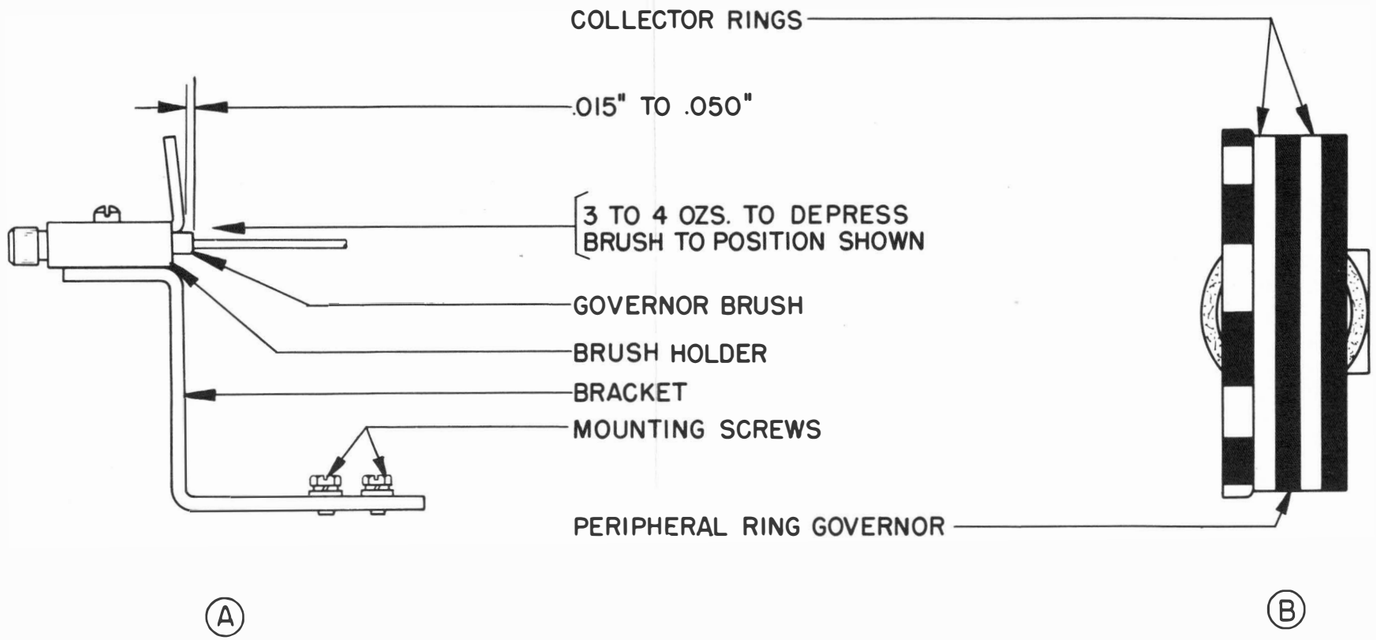


FIGURE 18

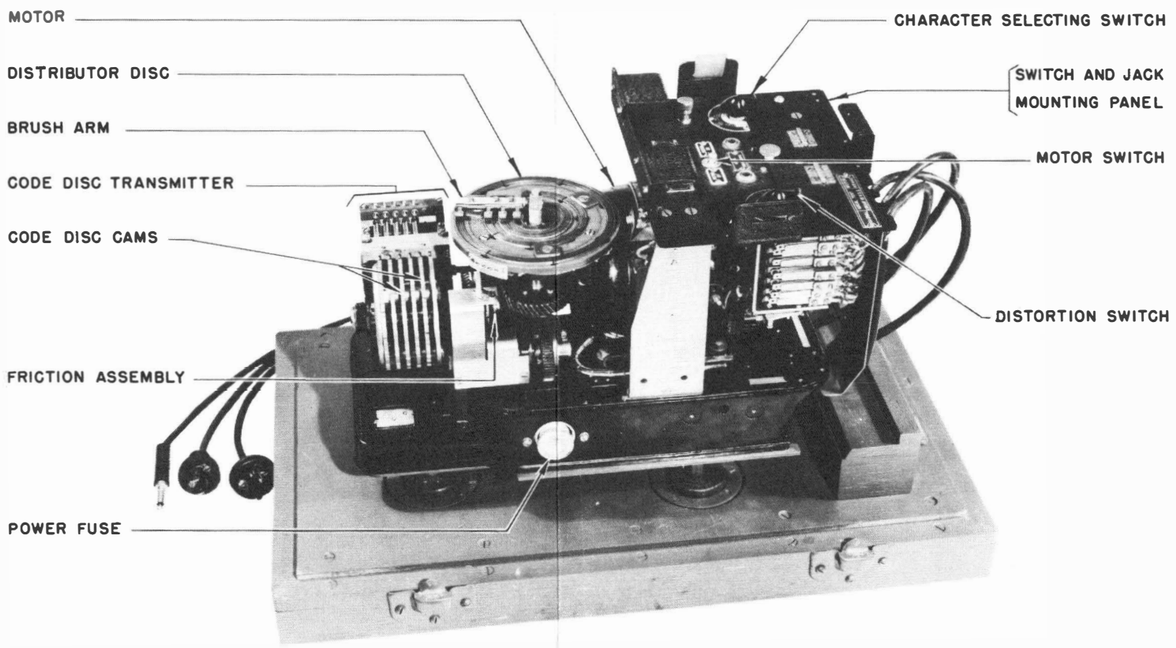


FIGURE 19