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INSTRUCTIONS FOR INSTALLING 179614 MODIFICATION KIT (NAVY
NOMENCLATURE MK-839/UG) TO REDUCE RADIO-FREQUENCY NOISE
IN TELETYPEWRITER DISTRIBUTOR-TRANSMITTER TT-187/UG, TT-187A/UG,
OR TT-273/UG

1. GENERAL

a. The general function of the 179614 modification kit is to provide a signal generator circuit, that is essentially free of radio-frequency interference, for Teletypewriter Distributor-Transmitters TT-187/UG, TT-187A/UG or TT-273/UG (NAVSHIPS Manual 92733(A)). This is accomplished by the provision of a 192740 low-level keyer, 179643 filter network, and the other signal generator components to provide a current of low-level energy through the signal generator contacts. The function of the 192740 low-level keyer and 179643 filter network is to provide a low-level voltage and current through the transmitter-distributor signal generator contacts and subsequent amplification of these signals to produce standard current levels of 20 and 60 milliamperes at 48 volts dc loop potential. Also, the low-level keyer provides a 20 or 60 milliamperes 24 volt dc power source which may be used to furnish battery for a test loop or signal line where a maximum of five low-level keyers and five selector magnet drivers are used.

b. The 179614 modification kit is intended for: Installations which require suppression of radio-frequency noise; local transmission circuits only; short signal line loops, generally less than 1000 feet in length and with loads having low radio-frequency interference characteristics. The kit will operate satisfactorily with up to ten 192730 selector magnet drivers and ten 192740 low-level keyers on one signal line; however, if the electrical motor control feature is used on these units, the number of each of these units that can be placed on the signal line is limited to no more than eight at 60 milliamperes signal line current and six at 20 milliamperes line current (assuming zero line resistance). External resistance must be added in series with the signal line loop to limit the current to either 60 to 20 milliamperes, whichever is used.

c. The 179614 modification kit is operable in conjunction with the following or similar radio-frequency noise suppression components:

(1) A 192730 selector magnet driver, the purpose of which is to furnish driving current to the selector magnets of the associated receiving unit.

(2) A 192750 power supply, the purpose of which is to supply a source of 60 milliamperes 48 volt direct current for the signal line.

d. The 179614 modification kit is operable on 48 volt dc (maximum), 20 or 60 milliamperes neutral signal line current only through a strapping option in the 192740 low-level keyer. The ac power input to the self-contained power supply of the keyer should be

115 ± 10 per cent volts, 50 or 60 cps.

e. The 179614 modification kit is operable at speeds up to 100 wpm (7.42 unit code). Brackets and associated hardware are provided in the kit for tabletop, shelf, or wall mounting of the 192740 low-level keyer. The kit provides a contact assembly containing gold plated contacts for the transmitter-distributor signal generator. Current through the gold plated contacts during operation, testing, or repair of the signal generator should be limited to 70 microamperes at 3 volts dc. Operation of the contacts with standard 20 or 60 milliampere current may damage the gold plating of the contacts sufficiently to impair low-voltage operation.

f. The 179614 modification kit consists of:

2	1293	Screw	1	179639	Contact Assembly
4	2449	Lockwasher	1	179643	Filter Network Assembly
1	7204WD	Diagram, Actual Wiring	1	192740	Keyer Assembly, Low-Level
8	85559	Washer, Flat	1	195187	Screw
4	89305	Screw	1	195651	Box, Contact
4	92146	Nut	1	195652	Cover, Contact Box
3	110743	Lockwasher	1	199193	Bushing
1	121243	Clamp, Cable	1	199196	Link Assembly
1	121247	Clamp, Cable	1	304561	Cable Assembly
2	151631	Screw	2	304671	Bracket
1	151880	Nut	1	304914	Bracket
1	153538	Screw	1	304917	Cable Assembly
1	153817	Screw	1	310147	Plate, Identification (Navy Only)

2. THEORY OF OPERATION - The signal generator is equipped with a contact assembly which has the toggle and spacing contact strapped together and contains gold plated contacts. A non-metallic link is used to drive the toggle of the signal generator in place of the standard steel link. A low voltage and current (3v dc at about 70 microamps) is supplied to the transmitter-distributor signal generator contacts. This low-level signal is fed to the low-level keyer through shielded leads to prevent a pick-up of stray radio-frequency noise in the cabinet or cover. In the keyer, the low-level signal from the signal generator is amplified for use in keying a 48 volt dc 20 or 60 milliampere signal line. A 20 or 60 milliampere 24 volt dc power source is provided on the low-level keyer to furnish battery for a test loop or signal line where a maximum of five low-level keyers and five selector magnet drivers are used. The signal line loop battery is normally supplied from a 192750 rectifier assembly which provides a source of 48 volt dc power that is relatively free of radio-frequency noise for the signal line.

3. INSTALLATION

NOTE

For parts referred to, other than those included in the modification kit, refer to NAVSHIPS Manual 92733(A).

- a. The 179614 modification kit is wired for 60 milliampere operation as shipped from the factory. For 20 milliampere operation change the strapping as follows before installation:
- b. 192740 low-level keyer - Remove the circuit card from the assembly by removing the four cover mounting screws and the circuit card nut. The keyer circuit card is the left circuit card as the unit is viewed with the power resistor on top of the unit toward the observer. Change strapping as shown in Figure 1. Replace the circuit card, circuit card nut, cover, and the four cover mounting screws.
- c. Remove the LXDC200 or LXDC201 cover from the base. Unplug the input power to the transmitter-distributor set. Remove the 156608 cover plate and 156765 snap panel from the LXD unit.
- d. Remove the LXD from the base by removing its three 151723 mounting screws, 2669 lockwashers, and 117535 flat washers. Remove and discard the 154131 contact box cover from the LXD signal generator by removing the 110743 lockwasher and 3599 nut. Retain the nut and lockwasher.
- e. Remove the signal generator cable and 154166 arc suppressor connections to the contact box by removing the 1293 screws and 110743 lockwashers. Remove the cable grommet from the contact box and tie the cable leads back to the main cable. Discard the 154166 suppressor.
- f. Remove the 125126 screw, 90791 lockwasher, 151182 insulating washer, and 156663 bushing that secure the 151171 contact toggle to the 156644 link. Discard the 156663 bushing and 156644 link.
- g. Remove the two 156747 screws, 2191 lockwashers, and 7002 flat washers that secure the 156643 contact box mounting bracket to the LXD front plate. Remove the contact box and bracket assembly from the unit.
- h. Remove the 151731, 151686, and 151152 screws with 3640 lockwashers, and 151880 nut that secure the 154130 contact box with contact assembly to the 156643 bracket. Retain the 151152 screw, three 3640 lockwashers, 151880 nut and 156643 bracket. Discard the remainder. Mount the 195651 contact box to the 156643 bracket using the retained 151152 screw and 3640 lockwasher. Mount the 179639 contact assembly in the 195651 contact box using the 195187 screw, 153817 screw, and the retained 151880 nut, and 3640 lockwashers. See Figure 2.
- i. Insert the 199196 link assembly in the contact box slot and connect it to the contact toggle using the retained 125126 screw, 90791 lockwasher, 151182 insulating washer and 199193 bushing. Reinstall the contact box assembly and 156643 bracket in the LXD while engaging the link with the 156511 contact bail. Use the retained 156747 screws, 2191 lockwashers and 7002 flat washers. Connect the 86304 link spring. See Figure 2.

j. Make the signal contacts adjustment as specified in Paragraph 4. of this specification.

k. Install the 179643 filter network assembly in the contact box (as shown in Figure 2) by means of its mounting screws and lockwashers. Connect the red and blue leads of the 304561 cable to the 179643 filter network in accordance with 7204WD Wiring Diagram (included in the kit), using two 1293 screws and 110743 lockwashers. Dress the leads and terminals so as not to stress the red inductors. Twist the terminals, if necessary. Connect the ground lead (G) of the 304561 cable to the 179643 filter network by means of the 195187 screw, 151880 nut, and 110743 lockwasher.

l. Remove and retain the 151630 screw, 2191 lockwasher, 93587 flat washer, and 156782 cover plate retaining nut from the LXD front plate. Insert the grommet of the 304561 cable in the 195652 contact box cover cut-out; secure the 195652 cover on the 195651 contact box using the 110743 lockwasher and 3599 nut retained in Paragraph d. above. Replace the 151630 screw, 2191 lockwasher, 93587 washer and 156782 cover plate retaining nut on the LXD front plate. Replace the 156608 LXD cover plate. With the cover plate held flush against the LXD top plate, and with the 156782 nut engaged with the cover plate plunger, tighten the 151630 screw. If necessary, remake the cover plate adjustment.

m. Route the 304561 cable down from the contact box and to the front of the LXD. Tie the cable to the LXD front plate (2 places), and route the cable under and to the rear of the LXD. On LXD1, remove the 151632 screw, 2191 lockwasher and 7002 flat washer retaining the 121244 cable clamp to the bottom of the 156598 post. Discard the 151632 screw. Using the 153538 screw, 2191 lockwasher and 7002 flat washer, secure the 304561 cable to the 156598 post on LXD1 or LXD4 with the 121243 cable clamp, as shown in Figure 3 or 4 respectively.

n. Route the 304651 cable underneath the 156755 or 162204 base plate and mount the LXD on the base using the three 151723 screws, 2669 lockwashers, and 117535 flat washers retained in Paragraph c. above.

o. Remove the two 151630 screws and 2191 lockwashers that secure the 156757 switch bracket to the LXDB base. Discard the screws. Mount the 304914 connector bracket underneath the 156757 switch bracket using two 151631 screws and the retained 2191 lockwashers. See Figure 3 or 4 as applicable.

p. Insert the wires of the 304561 cable through the 304914 bracket opening; secure the 179748 connector plug of the cable to the 304914 bracket using the connector nut and lock ring. See Figure 3 or 4 as applicable. Take up the excess cable play to the rear of the base to insure adequate cable and base intermediate gear clearance.

q. Remove and retain the 151630 screws and 2191 lockwashers that secure the two 151412 insulators to the base terminal blocks. Wire the 304917 cable assembly to the base terminal blocks in accordance with 7204WD Wiring Diagram. Tighten all terminal screws securely.

- r. Connect and lock the connector receptacle of the 304917 cable assembly to the 304561 cable connector plug on the 304914 bracket.
- s. On LXDB4 base, secure the 304917 cable assembly in the 165082 cable clamp by means of the 165083 keeper clamp. See Figure 4. Remount the two 151412 insulators removed in above Paragraph q. using the retained 151630 screws and 2191 lockwashers.
- t. On LXDB1 base, remove the 151632 screw, 2191 lockwasher, 7002 flat washer, and left (as viewed from rear of unit) 121244 cable clamp which secure the signal line cable to the base. Using the 121247 cable clamp, secure the 304917 cable and the signal line cable to the base by means of the 151632 screw, 2191 lockwasher, and 7002 flat washer. See Figure 3. Remount the two 151412 insulators removed in above Paragraph q. using the retained 151630 screws and 2191 lockwashers.
- u. Replace the 156765 snap panel, 156608 cover plate, LXDC, and LXDC200 or LXDC201 cover removed in Paragraphs d. and c. above.
- v. Wire the 304917 cable to the 192740 low-level keyer in accordance with 7204WD Wiring Diagram. See Figure 8 for keyer frame ground location.
- w. All sets must be connected to office ground to insure proper suppression of radio-frequency interference.

x. 192740 LOW-LEVEL KEYER ASSEMBLY MOUNTING

NOTE

Two 304671 brackets are provided for mounting of the 192740 low-level keyer external to the transmitter-distributor set. The 304671 brackets contain three mounting flanges to enable either "Tabletop or Shelf" or "Wall" mounting of the 192740 low-level keyer. The 192740 low-level keyer mounting location is limited to a distance from the transmitter-distributor set equal to the length of the 304917 keyer cable assembly.

(1) Tabletop or Shelf Mounting of the 192740 Low-Level Keyer Assembly

(a) Insert the flanges of the two 304671 brackets between the mounting flanges and 192727 clamps of the 192740 low-level keyer. The 304671 brackets should be positioned with the mounting holes below the low-level keyer. With the 304671 brackets held squarely against and approximately centered with the keyer, secure the brackets to the keyer by means of the keyer mounting stud and screw. See Figure 5.

(b) With the lower end of the mounted 304671 brackets held flush against the low-level keyer, use the brackets as a template to scribe the centers of the two mounting holes in each 304671 bracket on the tabletop or shelf. The brackets should be positioned to face the keyer ac cover to the rear of the table or shelf. Drill a 0.257 inch diameter hole (F Drill) at each of four scribed centers.

(c) Secure the 304671 brackets to the tabletop or shelf using the four 89305 screws, eight 85559 flat washers, four 2449 lockwashers, and four 92146 nuts as shown in Figure 5.

(2) Wall Mounting of the 192740 Low-Level Keyer Assembly

(a) Insert the flanges of the two 304671 brackets between the mounting flanges and 192727 clamps of the 192740 low-level keyer. The 304671 brackets should be positioned with the mounting holes located toward the keyer ac cover. Position the 304671 brackets until the leading edge of the bracket mounting flange is flush with the forward edge of the keyer mounting flange as shown in Figure 6. With the 304671 brackets held squarely against the keyer, secure the brackets to the keyer by means of the keyer mounting stud and screw. See Figure 6.

(b) With the lower end of the 304671 brackets held flush against the low-level keyer, use the brackets as a template to scribe the centers of the two mounting holes in each 304671 bracket on the wall. Drill a 0.257 inch diameter hole (F Drill) at each of the four scribed centers.

(c) Secure the 304671 brackets to the wall using the four 89305 screws, eight 85559 flat washers, four 2449 lockwashers, and four 92146 nuts as shown in Figure 6.

y. Navy Only - Remove backing from the 310147 identification plate and apply plate (on clean surface) below the present overall set plate.

4. ADJUSTMENTS - SIGNAL CONTACTS - The marking and spacing contact gaps should be equal when there is maximum clearance between the contacts as determined by engaging the clutch and rotating the main shaft. To adjust, loosen the two mounting screws on the signal generator front plate to friction tightness, then move the entire contact box assembly left or right by means of the eccentric located between the two mounting screws. Tighten the mounting screws after obtaining equalized contact clearance.

CAUTION

The signal generator should not be electrically adjusted in accordance with standardized signal generator adjustment information unless there is an intermediate device available to key the signal test set from the 3 volt 70 microampere signal generator circuit.

5. SERVICING

a. GENERAL

(1) This servicing section covers trouble shooting of the 179614 modification kit when installed in Teletypewriter Distributor-Transmitters TT-187/UG, TT-187A/UG, and TT-273/UG.

(2) It is suggested that field servicing be limited to replacement of a complete unit (192740 low-level keyer) only, and that repairs of this unit should not be attempted in the field. Repair service should be made at a maintenance center which is properly equipped and should be handled only by personnel who are familiar with transistor circuitry and with radio-frequency interference test equipment.

(3) Field tests and replacement of units can be handled by personnel familiar with standard Teletype equipment.

b. 192740 LOW-LEVEL KEYER - REMOVAL AND REPLACEMENT

(1) Removal - Loosen the low-level keyer mounting screw and stud and disengage the keyer from the 304671 brackets. See Figure 5 or 6 as applicable.

(2) Replacement

(a) For tabletop or shelf mounted 304671 brackets, install the low-level keyer on the brackets with the ac cover toward the rear of the table or shelf. With the keyer approximately centered on the brackets, tighten the keyer mounting screw and stud. See Figure 5.

(b) For wall mounted 304671 brackets, install the low-level keyer on the brackets with the ac cover toward the wall. Position the low-level keyer on the brackets until the forward edges of the keyer mounting flanges are aligned with the forward edge of the bracket mounting flanges and tighten the keyer mounting screw and stud. See Figure 6.

c. SIGNAL GENERATOR CONTACTS - Errors in the signal may be an indication that the signal generator contacts require cleaning in order to remove any accumulation of dirt, oil, etc. Burnishers, files, etc, should never be used as they will remove the gold from the gold-plated contacts. The contacts should be cleaned with twill jean cloth (K S2423), as follows: Open the contacts; drop a strip of twill jean cloth between them; close the contacts; draw the cloth part way through; reopen the contacts and withdraw the cloth. This procedure prevents small fibers, from the edges of the cloth from lodging between the contacts.

CAUTION

See the portion of Paragraph 1.e. pertaining to the signal generator contacts.

d. STORAGE TEMPERATURE - Temperature should not exceed +85C (185F).

e. FIELD TESTS

(1) Special Equipment Required - An accurate voltmeter and milliammeter (2 per cent).

(2) Checks for Locating Trouble

(a) Receiving Unit Running Open - Measure voltage drop across the low-level keyer at transmitter-distributor base (LXDB) terminal strips (J1 and J2), with the transmitter-distributor in the stopped position. Terminal J1 is positive; terminal J2 is negative (wiring must conform). If voltage drop is more than 5 volts, perform the following checks: Remove cover from signal generator contact box assembly. With the transmitter-distributor in the stopped position, check voltage across the marking contact in accordance with Figure 7 (A and I2). If a voltage drop is present, readjust the signal generator contacts. If no voltage is present make a voltage check across the 179643 filter network (O1 and O2). If the voltage across the network does not meet requirements, replace the filter network. If the filter network meets requirements, check the wiring of the low-level keyer. If the wiring is correct, replace the low-level keyer.

(b) Receiving Unit not Being Keyed by Transmitter-Distributor - With transmitter-distributor in the stopped position, disconnect one side of the signal line. If the receiving unit runs open, check the low-level keyer as outlined below. On LXDB4 base, also check the line shunt switch for a signal line shunting malfunction. If the receiving unit does not run open, replace the selector magnet driver of the receiving unit. To check the low-level keyer perform the following: Remove the cover of the signal generator contact box assembly. With the signal generator contacts in the spacing position, check voltage across the marking contact in accordance with Figure 7 (A and I 2). If a voltage drop of 3 volts is not present, readjust the contacts. Check the voltage across terminals O1 and O2 when the contacts are in the spacing position. If a voltage drop of 5 volts is not present, replace the 179643 filter network. If the filter network and contacts meet requirements, replace the low-level keyer assembly.

(c) Receiving Unit Being Keyed by Transmitter-Distributor but Garbling Message

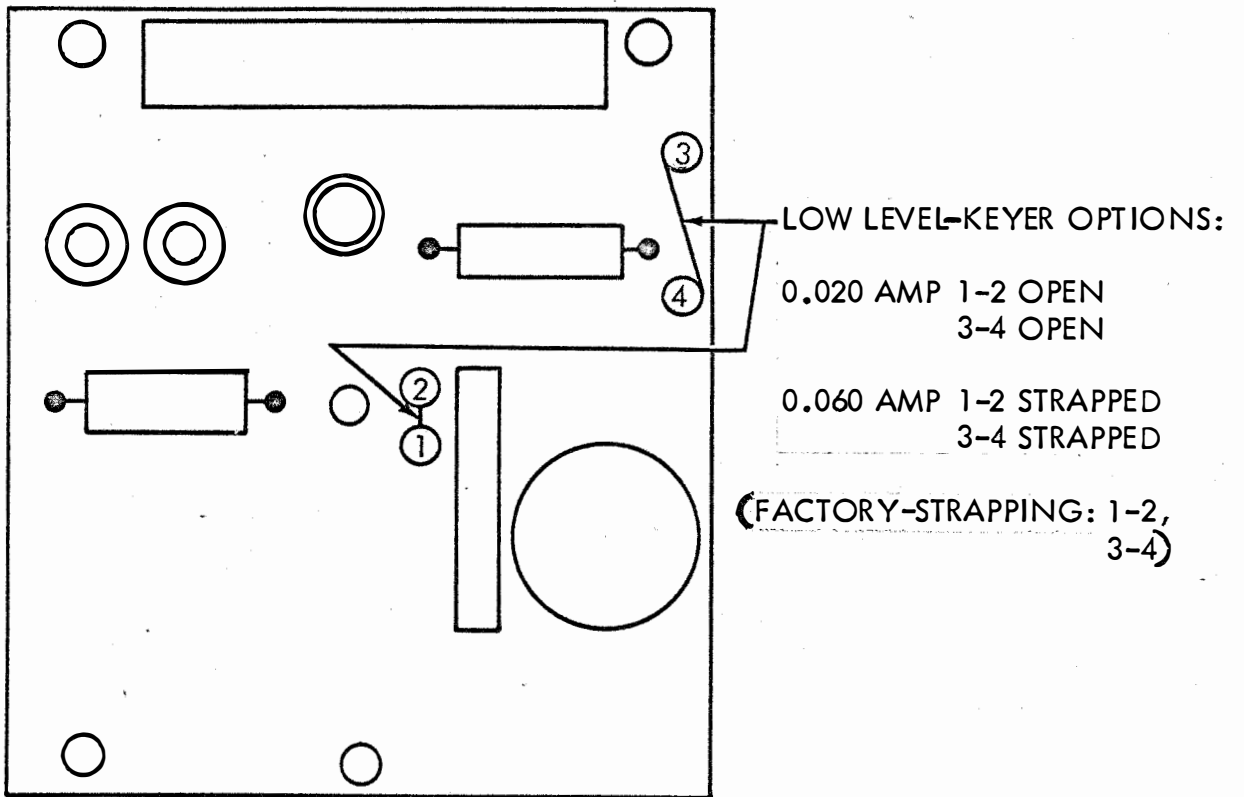
1. Check signal line current.
2. Check signal generator contacts for any accumulation of dirt, oil, etc.

3. Check adjustments of signal generator contacts.
4. Check range scale adjustment on selector of receiving unit.

(d) Replace the signal generator contact box cover.

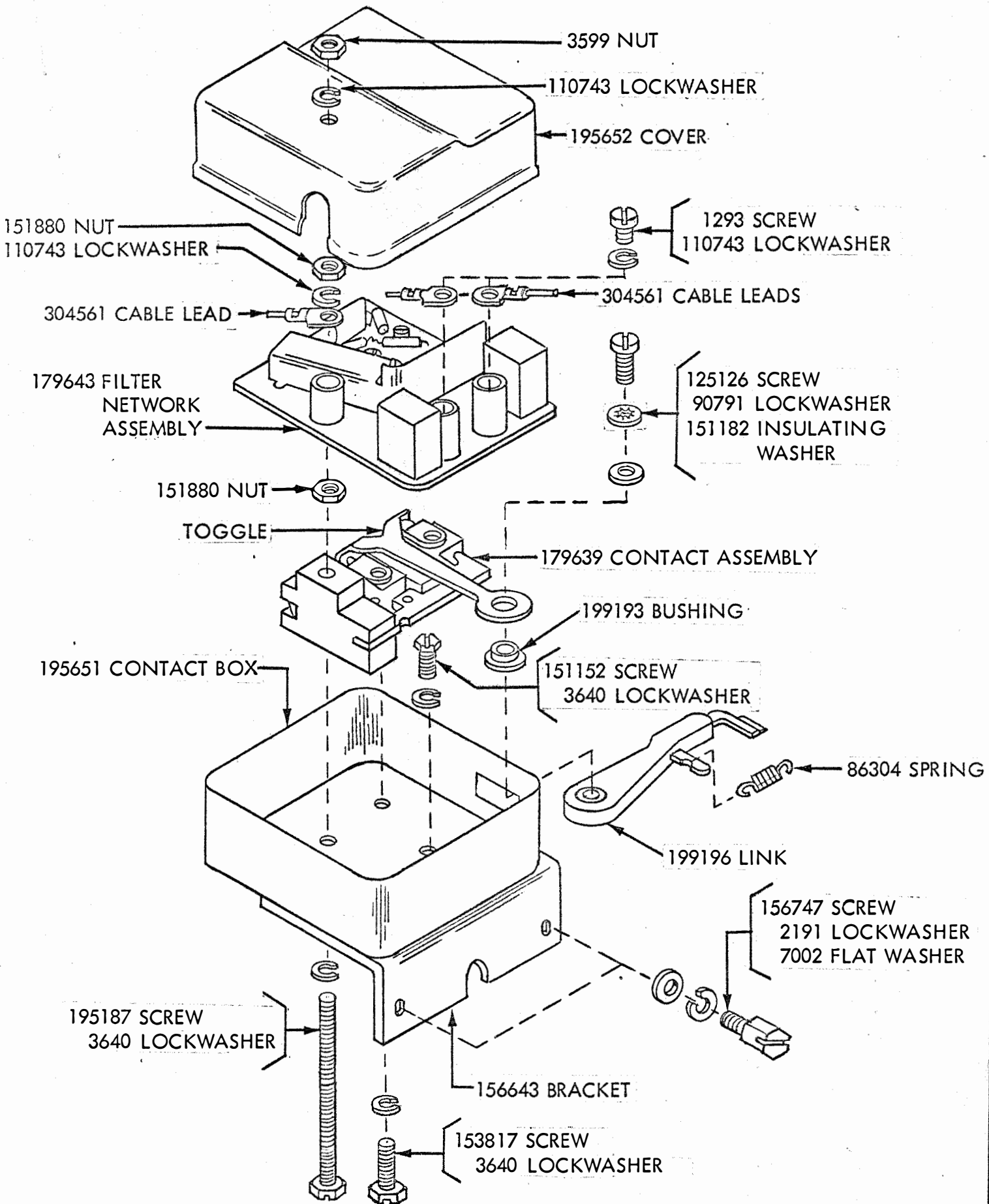
50251S

TOP OF 199003 CIRCUIT CARD ASSEMBLY



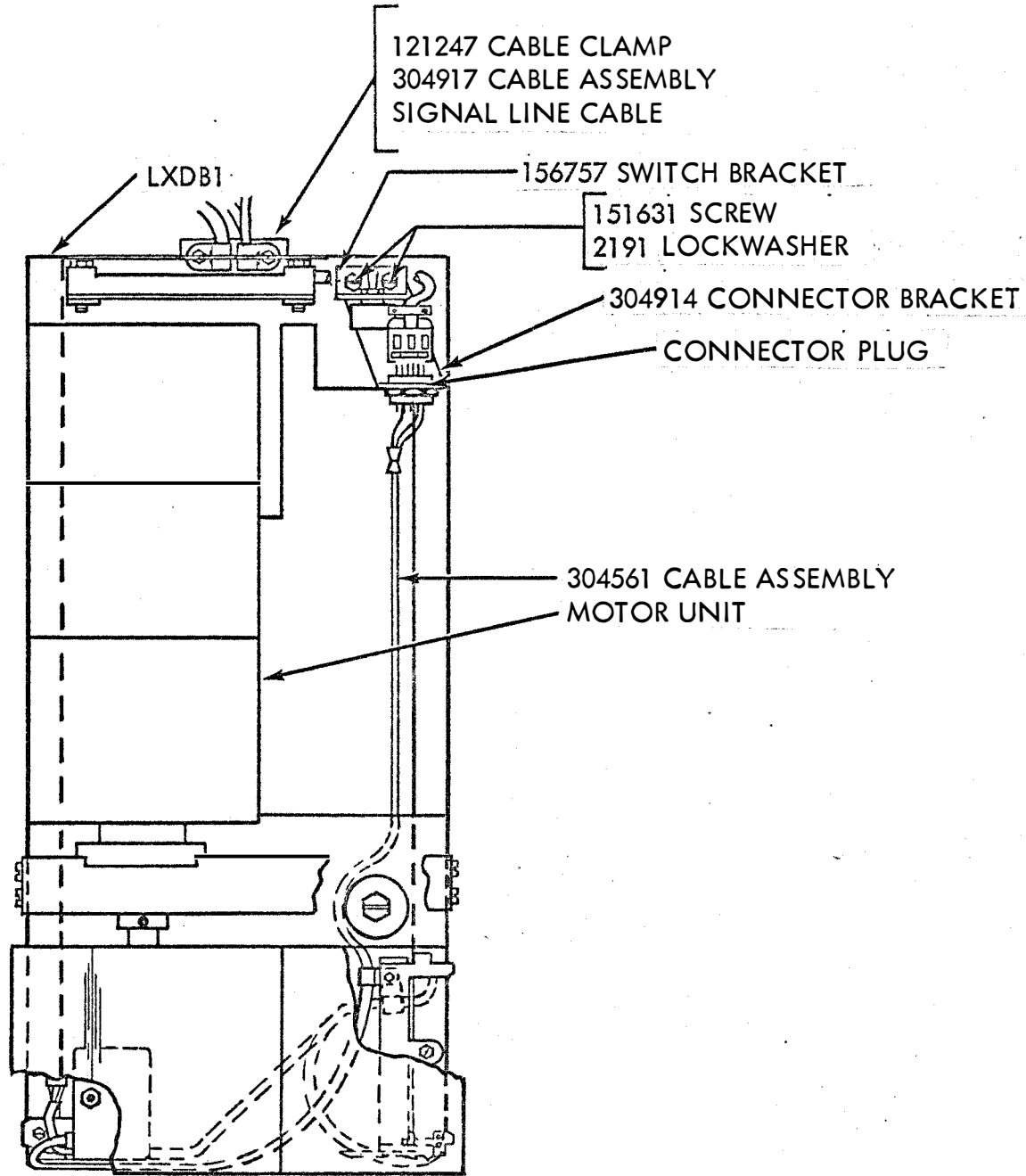
192740 LOW-LEVEL KEYER SIGNAL LINE WIRING OPTIONS

FIGURE 1

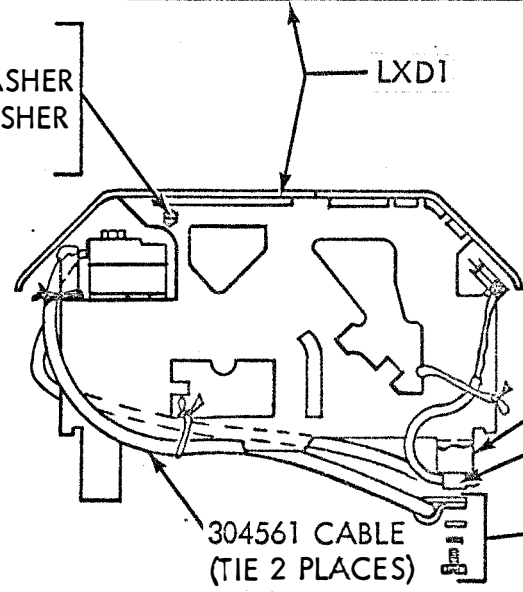


SIGNAL GENERATOR COMPONENTS

FIGURE 2



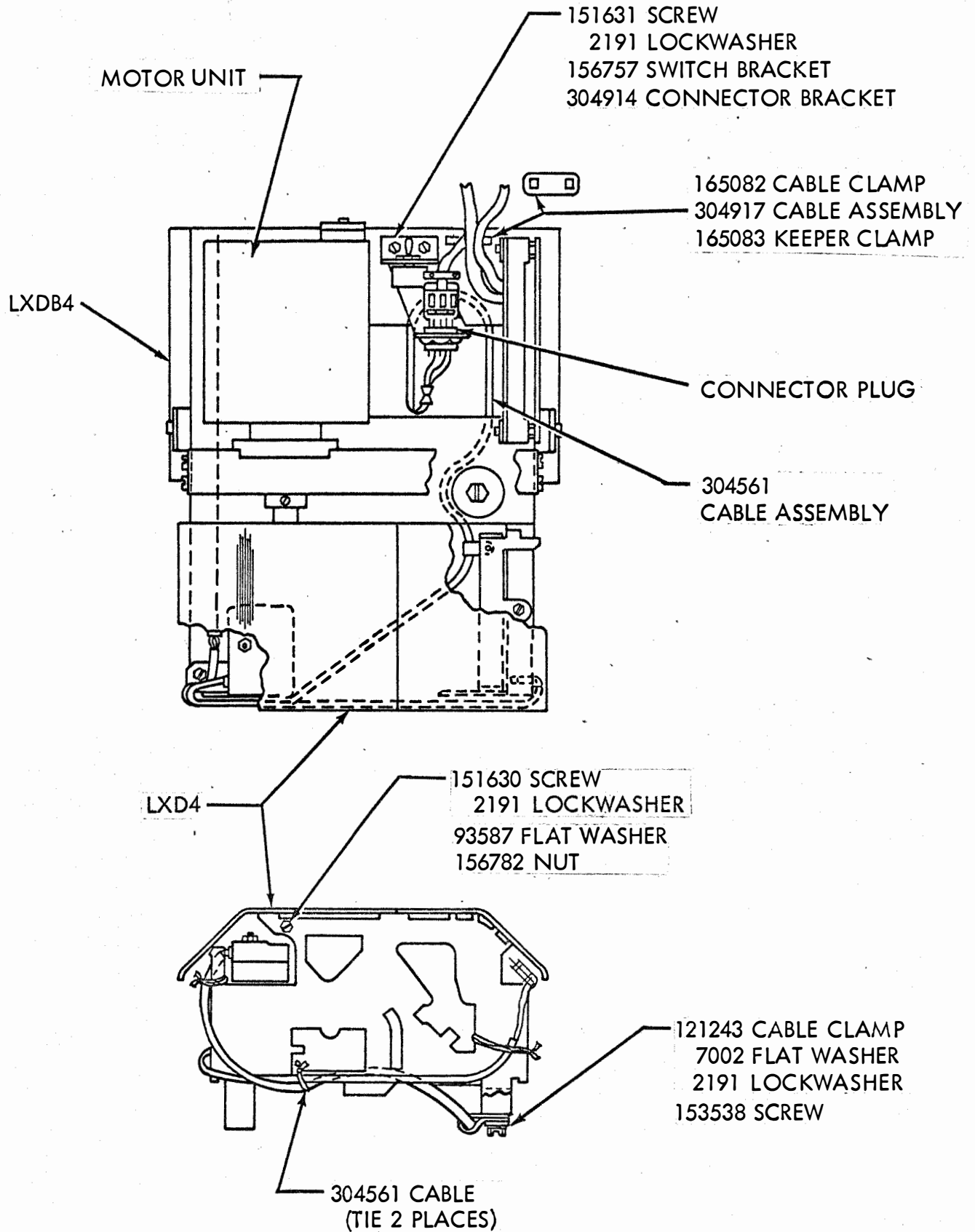
- 151630 SCREW
- 2191 LOCKWASHER
- 93587 FLAT WASHER
- 156782 NUT



LXD1 AND LXDB1 CABLE ROUTING AND SECUREMENT - FOR TT-187/UG,
 OR TT-273/UG SET

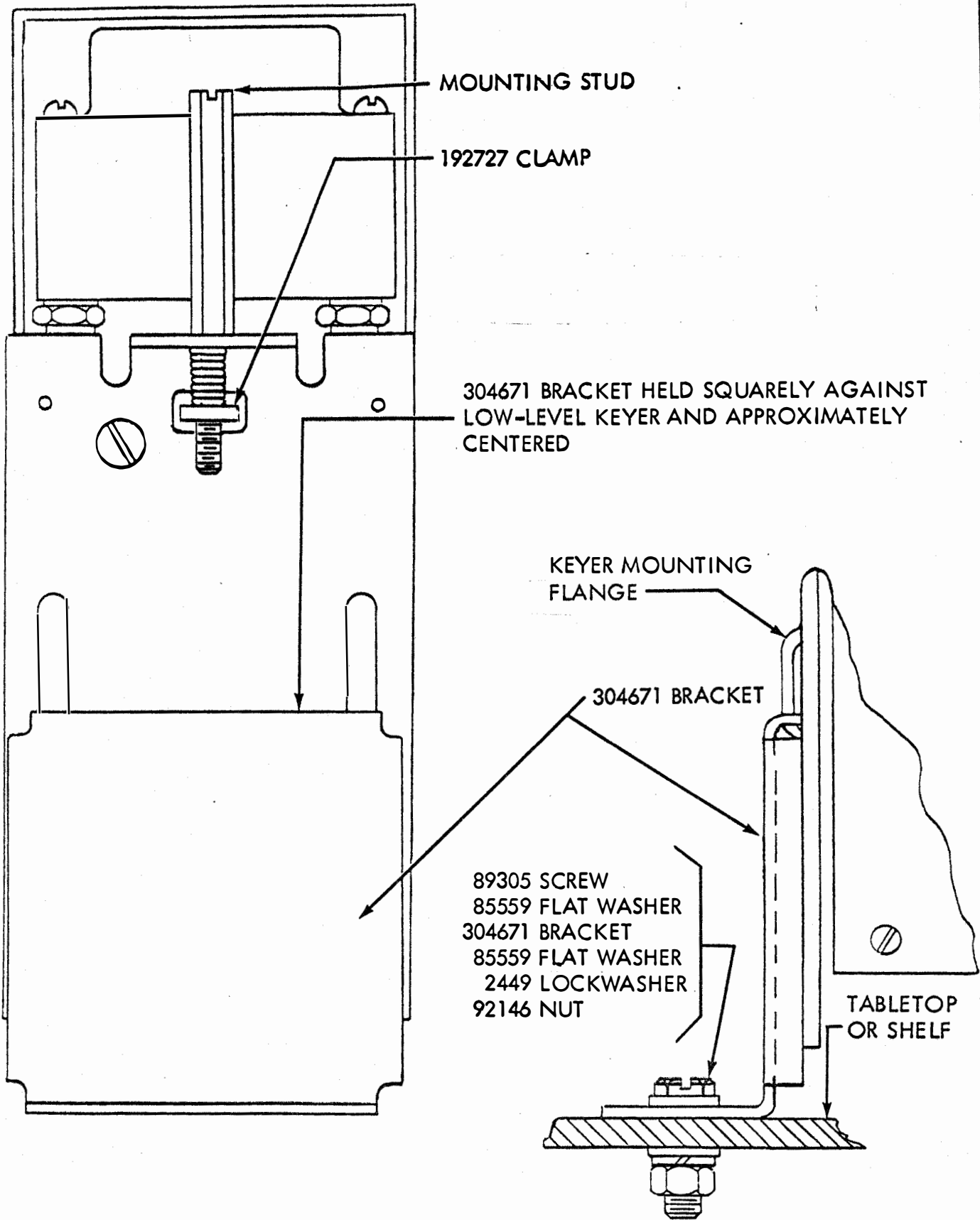
FIGURE 3

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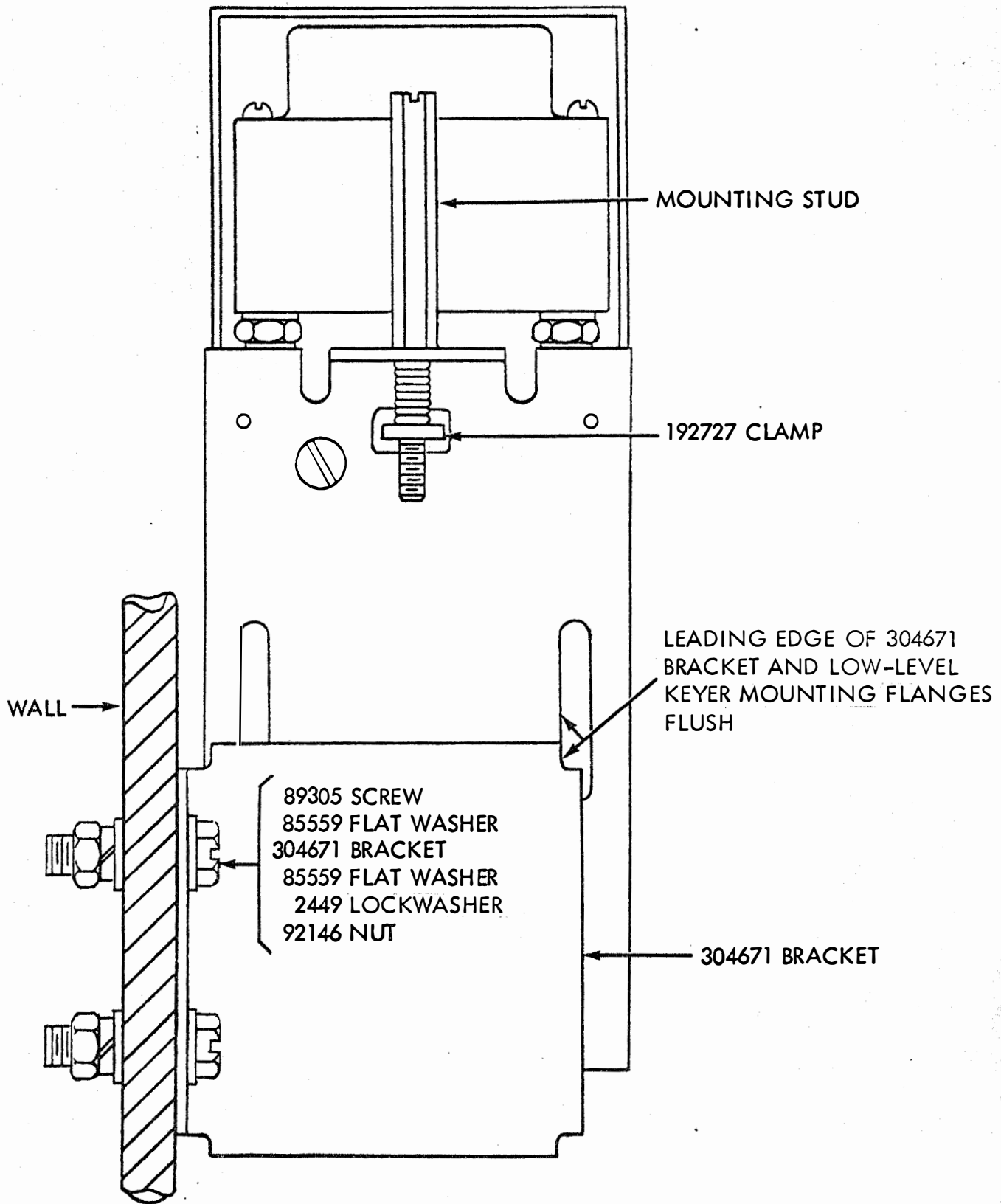


LXD4 AND LXDB4 CABLE ROUTING AND SECUREMENT - FOR TT-187A/UG SET

FIGURE 4



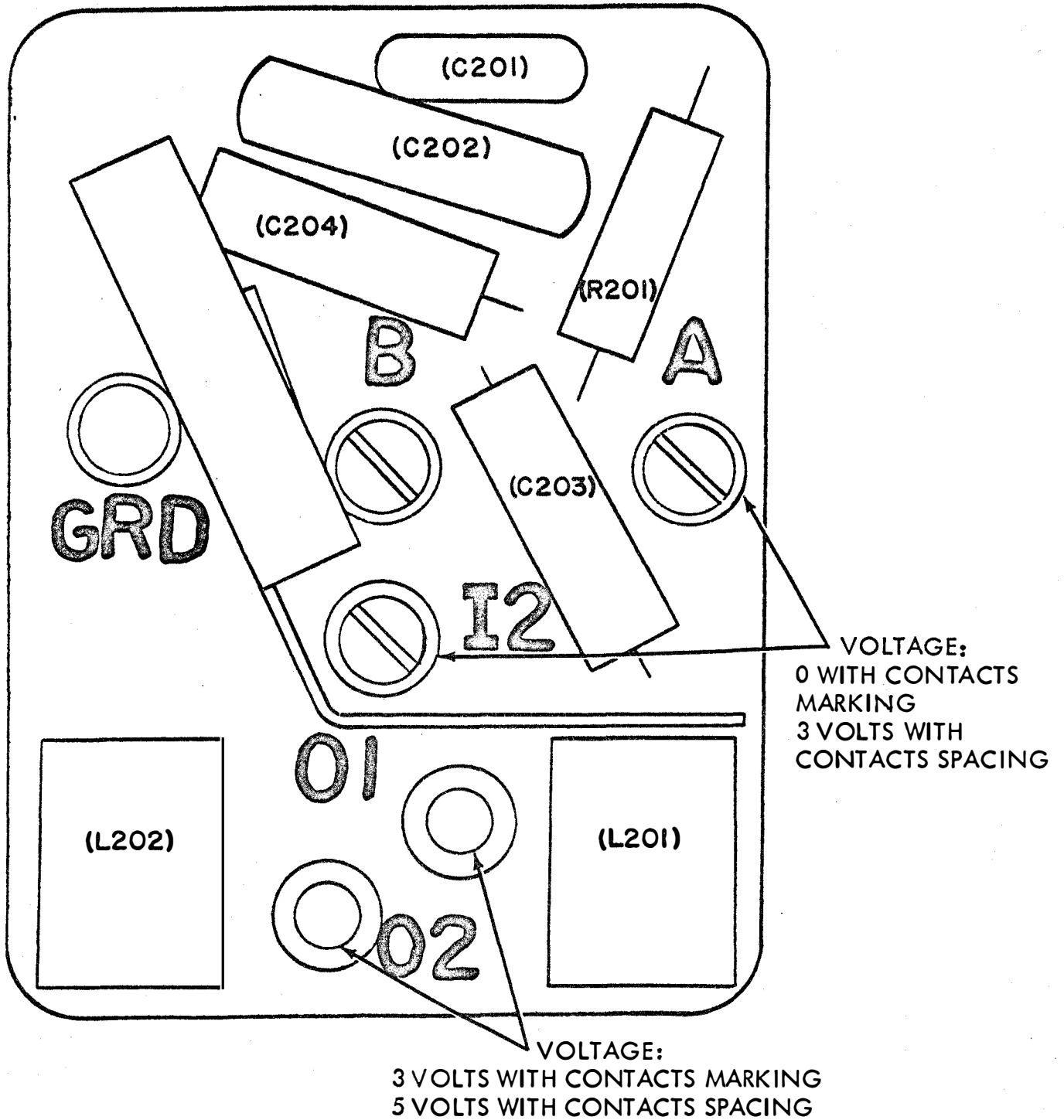
TABLETOP OR SHELF MOUNTING OF 192740 LOW-LEVEL KEYSER



WALL MOUNTING OF 192740 LOW-LEVEL KEYSER

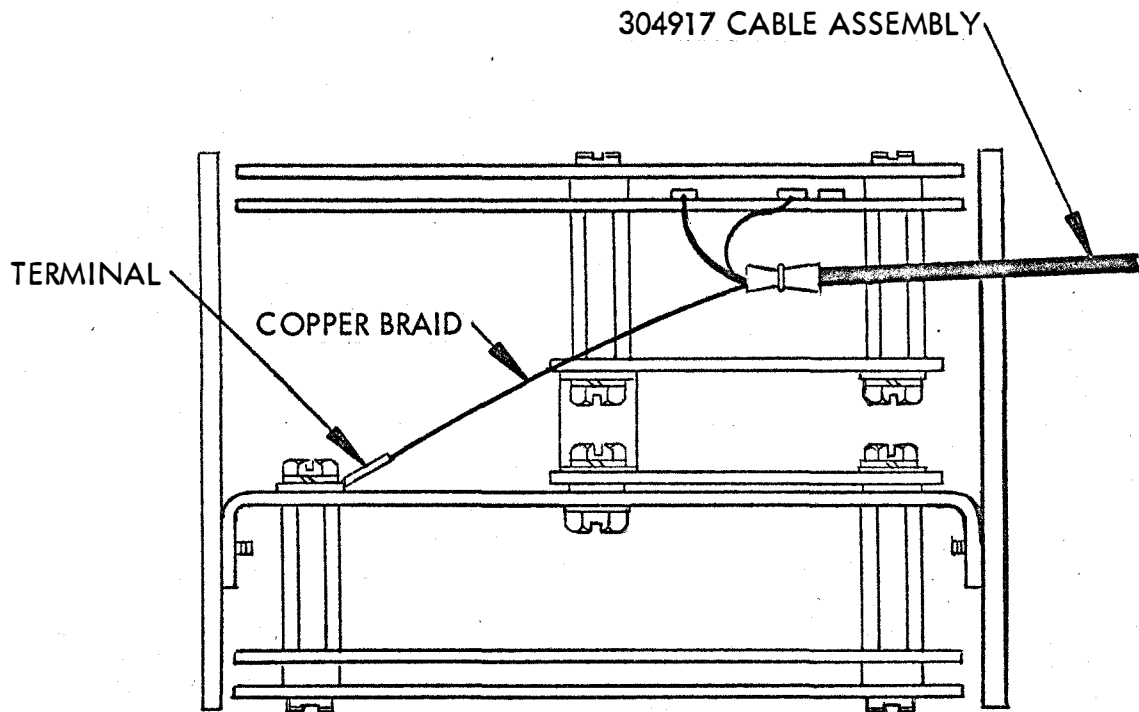
FIGURE 6

179643 FILTER NETWORK



SIGNAL GENERATOR TEST VOLTAGES

FIGURE 7



PARTIAL BOTTOM VIEW OF LOW-LEVEL KEYSER SHOWING
FRAME GROUNDING LOCATION

FIGURE 8