NO. 1 ELECTRONIC SWITCHING SYSTEM ADF FULL-DUPLEX—100 WORD PER MINUTE DATA STATION USING 4-ROW TELETYPEWRITERS MAINTENANCE

1. GENERAL

1.01 This section describes the maintenance requirements for a full-duplex, 100 word per minute 33- and 35-type Teletypewriter (TTY) used with No. 1 Electronic Switching System Arranged with Data Features (No. 1 ESS ADF).

1.02 Routine maintenance for the station is limited to the 33- or 35-type TTY. There is no routine maintenance required for Data Set 108A-type or for Data Auxiliary Set (DAS) 820A1, 820A2, 804N1, 804N2, or 804R3.

1.03 Routine maintenance of the 33- and 35-type TTY's should be in accordance with the 574 Division (BSP) covering the appropriate type of TTY.

1.04 Stations suspected of being in trouble should be tested as described in the section entitled No. 1 Electronic Switching System ADF, Full-Duplex—100 Word Per Minute Data Station Using 4-Row Teletypewriters, Test Procedures (580-301-501).

1.05 Data Set 108A-type or DAS 820A1 or 820A2 not meeting test requirements should be replaced in order to restore the customer's service as quickly as possible. Data set replacement is covered in Part 7 of this section. For DAS 820A1 or 820A2 replacement, refer to the section entitled No. 1 Electronic Switching System ADF, Full-Duplex—100 Word Per Minute Data Station Using 4-Row Teletypewriters, Disassembly and Reassembly (580-301-701).

1.06 When the data set or DAS 820A1 or 820A2 is replaced, the replacement should be tested according to the section referenced in 1.04.

To prevent damage to circuit packs, disconnect power cord plug from the customer's power receptacle before connecting or disconnecting circuit packs, connectors, or options.

1.07 Exercise care in handling and transporting data sets and data auxiliary sets. If possible, use original cartons to store, transport, or ship them.

1.08 If maintenance spares are stocked, verify that they are checked and ready for immediate installation.

When DAS 820A1 or 820A2 is replaced and CP AR18 and CP AR25 are also replaced, the replacing CP's must be encoded as given in Part 3 of this section.

2. ACCESS TO DATA AUXILIARY SET 820A1 OR 820A2

33-TYPE TTY

2.01 Access to DAS 820A2 is by removing the rear panel of the TTY stand. To facilitate ease in maintenance, the DAS 820A2 has a maintenance position. To position the DAS 820A2 for maintenance:

(1) Rotate latch counterclockwise. This allows DAS 820A2 to pivot on the 91A bracket.

(2) With both hands on DAS 820A2, gently pull top towards rear of station (Fig. 1).

35-TYPE TTY

2.02 Access to DAS 820A1 or 820A2 is available by removing the lower compartment panel. There is no maintenance position in the 35-type

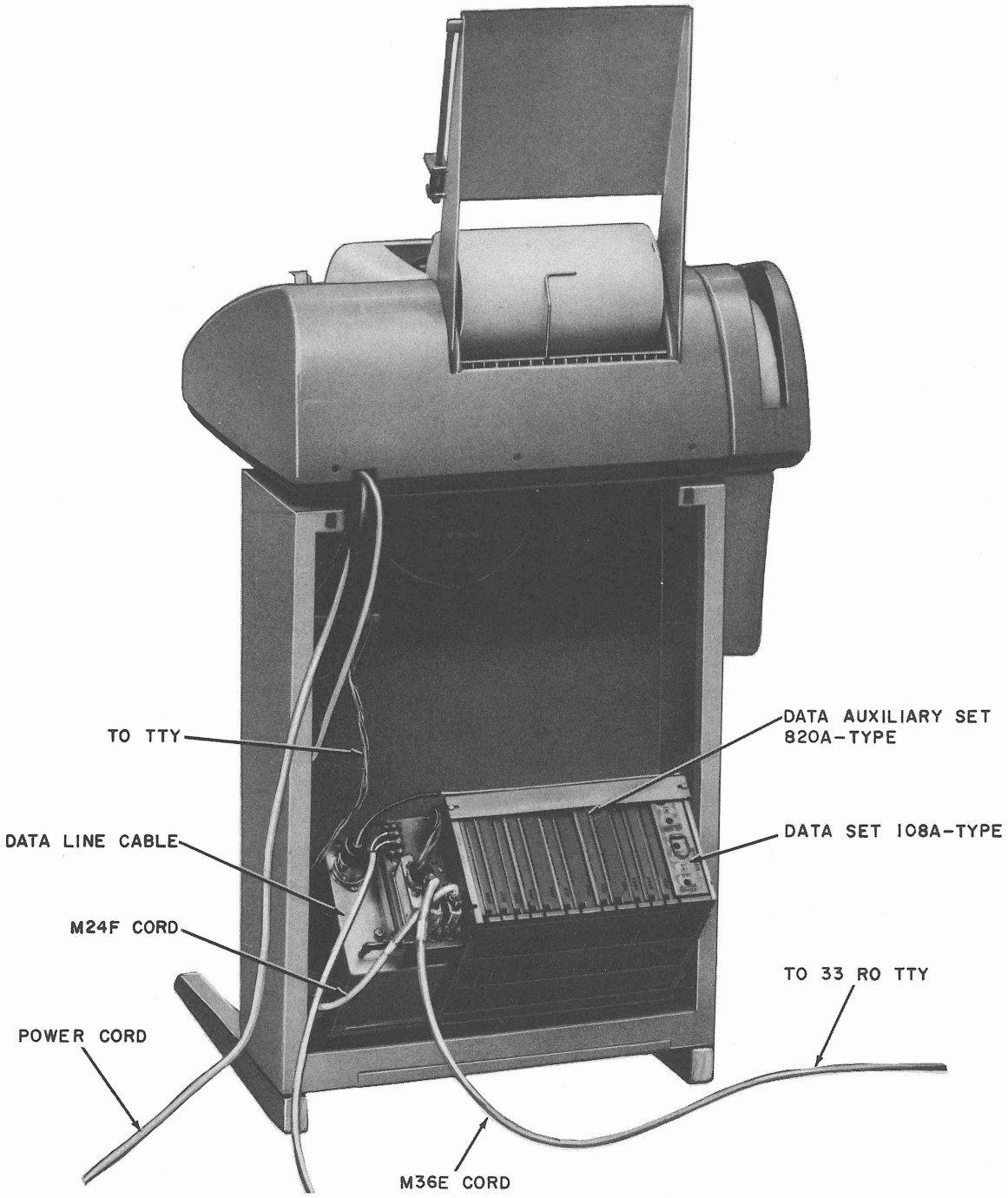

Fig. 1—Model 33 ASR, Rear View With Data Auxiliary Set 820A2 in Maintenance Position

TTY. Maintenance of DAS 820A1 or 820A2 is performed in the normal position (Fig. 2).

35 ROTR

2.03 The data set and DAS 820A2 are ***not*** mounted in the 35 ROTR stand (due to space limitation) when a 35 ROTR is used as a primary station. A KS-20018 L1, L2, L3, ***or*** L4 cabinet is required. In addition, DAS 804R3 is mounted on the door of the 35 ROTR stand.

(1) Apply outward pressure at the top of the KS-20018 type cabinet panel until the catches disengage.

(2) Lift the panel up to remove it from framework.

3. CP AR18 AND AR25—ENCODING THE SHIFT REGISTERS

3.01 The shift registers of CP AR18 and AR25 are encoded by connecting conductors to a specific terminal on the CP, routing the conductors through the eight tubes of the shift register (in a specified direction), and connecting them to another specific terminal on the same CP.

Extreme care must be exercised when threading the conductors through the eight tubes. The conductors should be relatively taut, but not to the point that sharp bends occur in the conductors. Any excessive strain on the conductors may damage the shift register. After threading, protect the conductors by applying an insulating tape (E Vinyl, or equivalent) to prevent interference with adjacent circuit packs.

3.02 The CP's should be positioned as shown in Fig. 3. It is suggested that the encoding of the shift register be performed on a flat surface properly protected.

3.03 The following procedure is recommended for encoding the shift register:

(1) Obtain the SPC, CEC, and SIC codes from the faceplate of the CP being replaced, or,

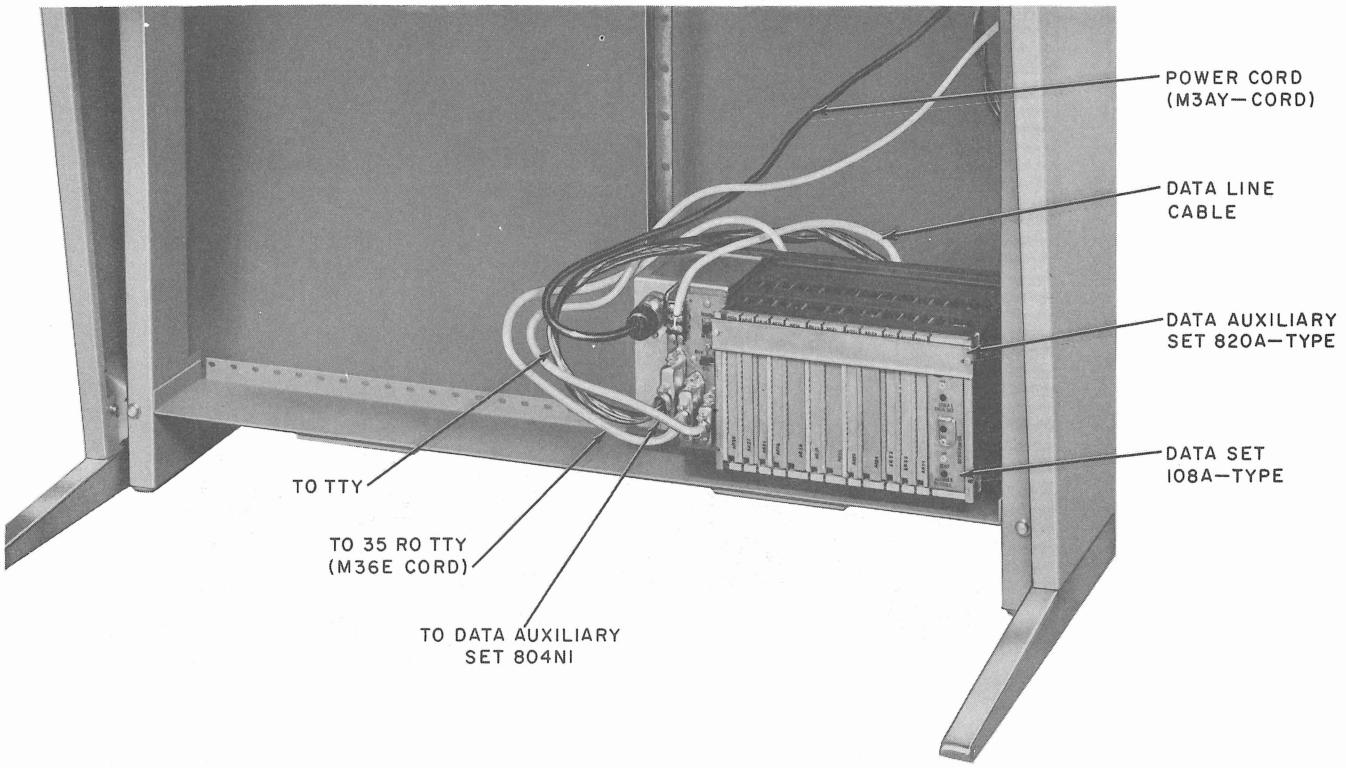

Fig. 2—Model 35 ASR, Location of Data Auxiliary Set 820A1

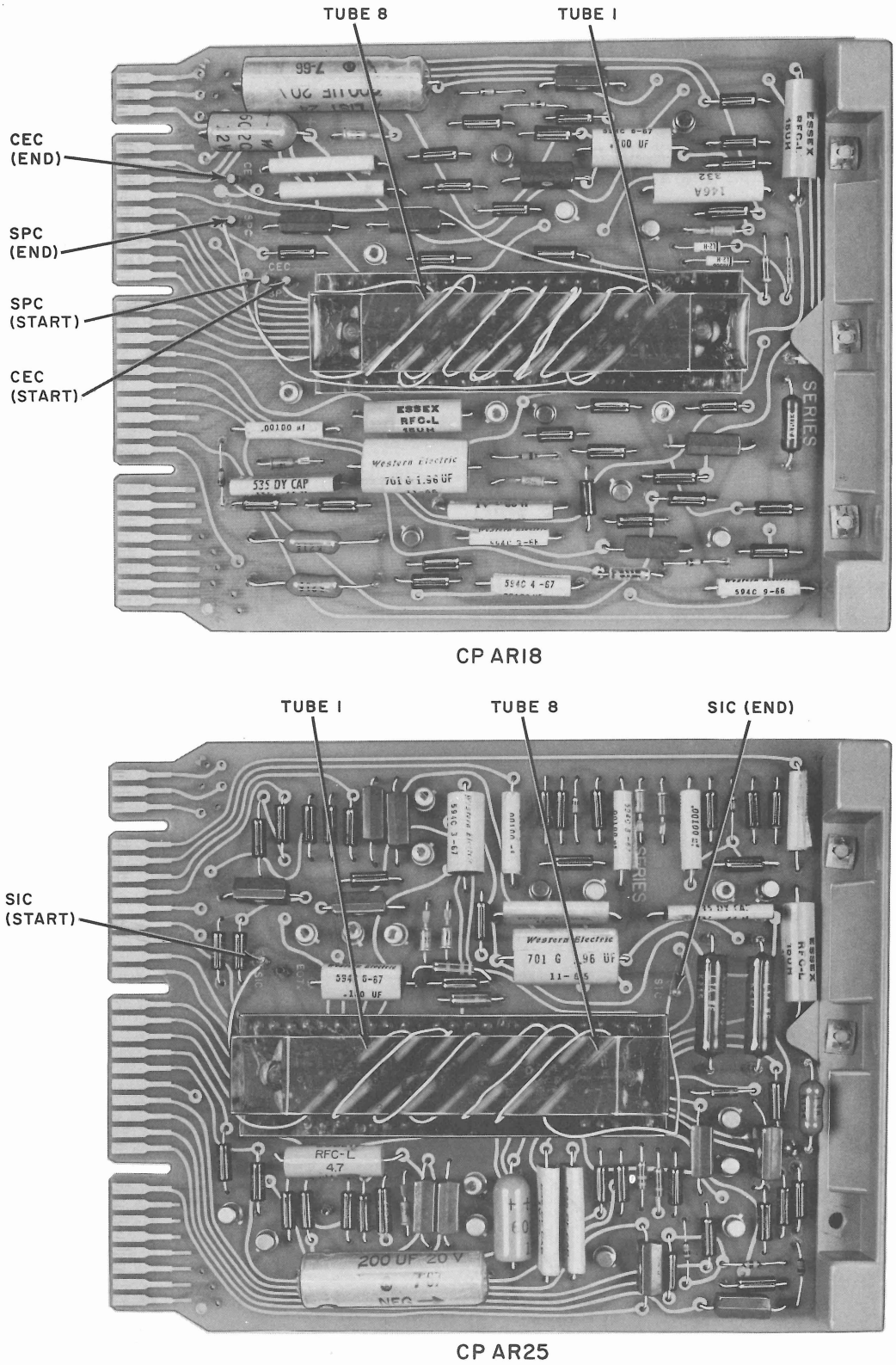

Fig. 3—Circuit Packs AR18 and AR25, Location of Terminals For Wiring the Shift Registers

for a new installation, from the service order and/or circuit layout record card.

(2) Select proper mark and space sequence for each code by using Fig. 4.

(3) Cut three pieces of Formex No. 24—No. 28 American Wire Gauge (AWG), or equivalent, in two-foot lengths.

The following operations require the use of a KS-16346 L1 or L2 soldering iron (or an equivalent low wattage rated iron). Extreme care must be exercised when soldering the conductors to the specified terminal at the completion of threading operations.

SIC CODE—CP AR25

(4) Connect an end of one above-mentioned conductor (3) to the SIC terminal (Fig. 3).

(5) Starting with tube 1 (for bit one), thread the free end of this conductor through the eight tubes in the shift register as indicated in Fig. 5.

(6) At the completion of threading, remove the excess length of wire and connect the free end of this conductor to the SIC terminal (Fig. 3).

SPC CODE—CP AR18

(7) Connect one end of another above-mentioned conductor to the SPC terminal (Fig. 3).

(8) Starting with tube 1 (for bit one), thread the free end of this conductor through the eight tubes in the shift register as indicated in Fig. 5.

(9) At the completion of threading, remove the excess length of wire and connect the free end of this conductor to the SPC terminal (Fig. 3).

CEC CODE—CP AR18

(10) Connect one end of the last of the three mentioned conductors to the CEC terminal (Fig. 3).

(11) Starting with tube 1 (for bit one), thread the free end of this conductor through the eight tubes in the shift register as indicated in Fig. 5.

(12) At the completion of threading, remove the excess length of wire and connect the free end of this conductor to the CEC terminal (Fig. 3).

4. MAINTENANCE PHILOSOPHY

4.01 Maintenance of the full-duplex, 100 word per minute data station should be in accordance with the flow chart shown in Fig. 6. This flow chart is recommended for an organized trouble investigation with a minimum amount of time spent in locating the cause of the customer's trouble report.

4.02 When a trouble report is dispatched for clearance, the report should be analyzed to eliminate the obvious trouble conditions (ribbon, paper jams, appearance, etc.).

4.03 When the report is obviously TTY trouble, troubleclearing procedures and adjustments should be in accordance with the appropriate Field Maintenance Practice (FMP) covering the type of TTY. The FMP's are:

- Model 33 Teletypewriters, Field Maintenance Practice (579-200-350)
- Model 35 Teletypewriters, Field Maintenance Practice (579-300-350)

4.04 When the report is not obviously TTY trouble, inquire whether a remote loop-back test of DAS 820A1 or 820A2 has been performed by the Serving Test Center (STC) or the Control Serving Test Center (CSTC). If the remote loop-back test has been performed, were the results satisfactory. If a remote loop-back test has not been performed, request the STC or CSTC to perform the test.

4.05 Assuming that the results of the remote loop-back test indicate a failure, a loop-back test of the data set should be performed to isolate the trouble to either the data set or to DAS 820A1 or 820A2. If the data set fails the loop-back test, replace the data set with one known to be good and repeat the loop-back test. The replacement data set should pass the test which indicates that the replaced data set caused the trouble report.

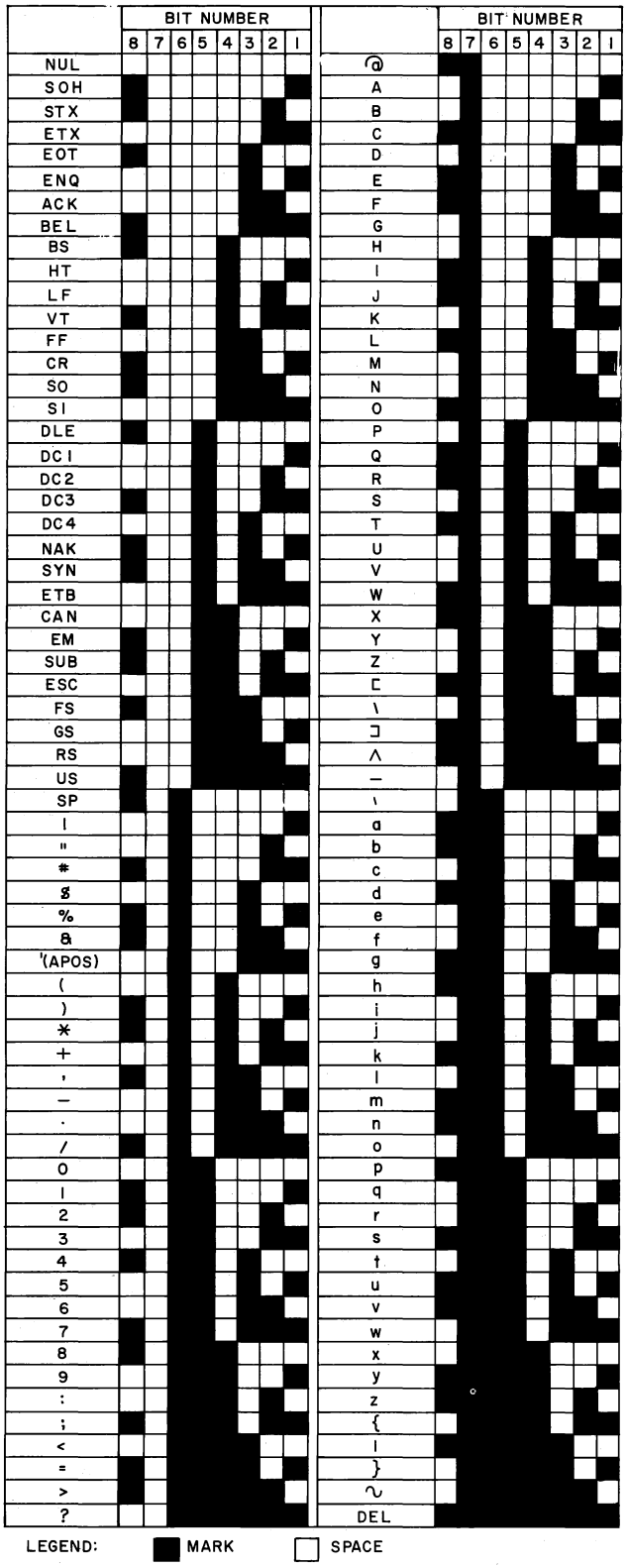

Fig. 4—USA Standard Code For Information Interchange (USAS X3.4 - 1967)

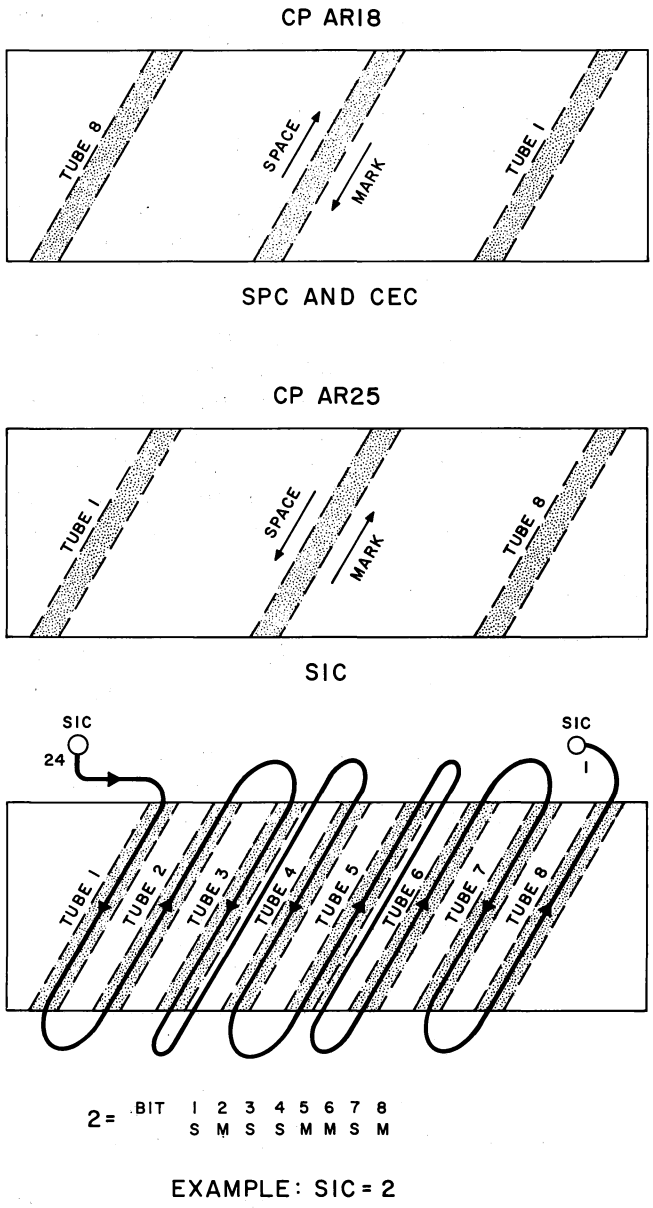

Fig. 5—Direction of Wires For Encoding Shift Registers, CP AR18 and CP AR25

If the replacement data set fails the test, the line must be checked. Should the line fail the test requirements given in the section entitled Private Line Data Circuits, Voice Bandwidth Circuits For Miscellaneous Data, Overall Tests and Requirements (314-410-500), the line facilities should be replaced in order to restore the customer's service with a minimum amount of outage.

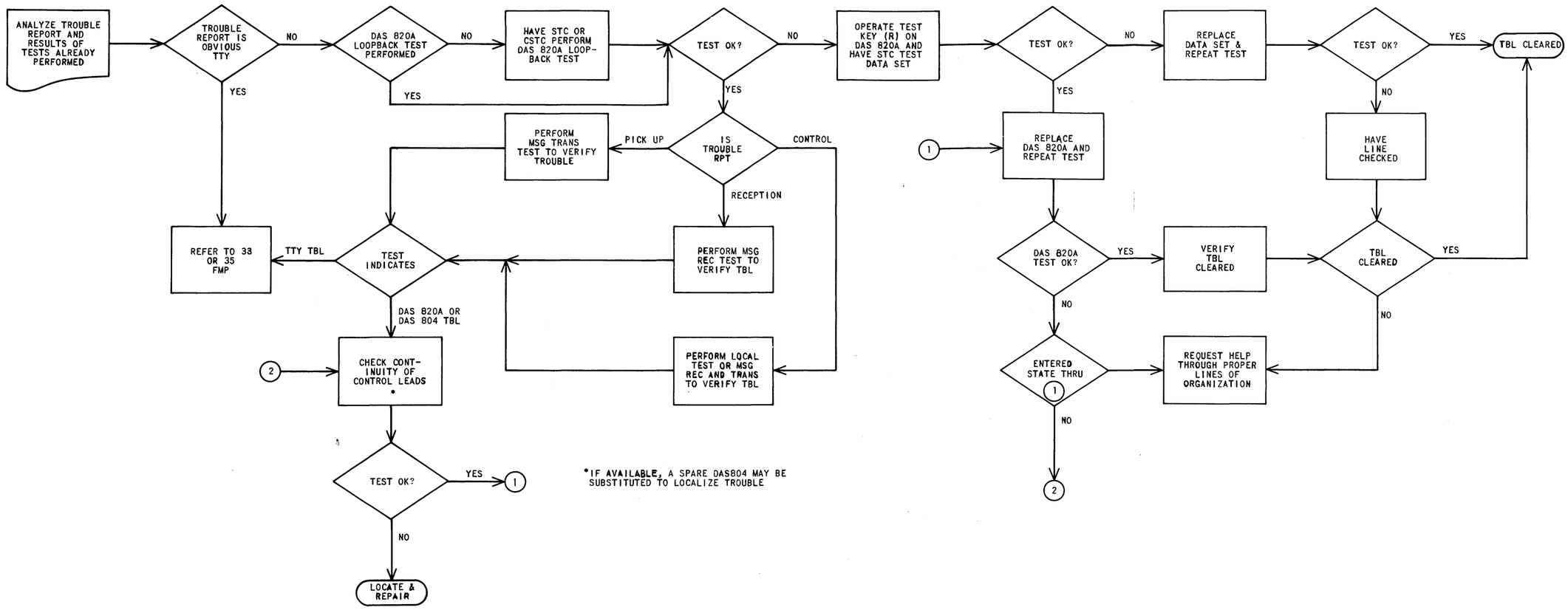

Fig. 6—Flow Chart, Maintenance Test Procedure

4.06 If the data set passes the loop-back test, the trouble may be located in DAS 820A1 or 820A2.

Replacement procedures for DAS 820A1 or 820A2 are covered in Section 580-301-701. To reduce the time required, it is suggested that CP AR18 and CP AR25 of DAS 820A1 or 820A2, that is to be replaced, should be installed in the replacing DAS 820A1 or 820A2. If DAS 820A1 or 820A2 fails again on the repeated test, CP AR18 and/or CP AR25 of the replacing DAS 820A1 or 820A2 will have to be encoded for the station. See Part 3 of this section for the encoding procedure.

4.07 Should DAS 820A1 or 820A2 pass the remote loop-back test after the replacement, the trouble was in DAS 820A1 or 820A2.

4.08 If DAS 820A1 or 820A2 fails the repeated test, the next test should be the continuity check of DAS 804N2 (RO), 804N1 (ASR), or 804R3 (ROTR).

> ***Note:*** In the event that a spare DAS 804 is available, substitution of the spare may redure the time required for the repeated test of DAS 820A1 or 820A2. Should DAS 820A1 or 820A2 pass the repeated test, either perform the continuity check to locate the trouble in the original DAS 804 and clear by repair, or replace DAS 804 with the spare.

4.09 If a spare DAS 804 is not available and the continuity check fails, clear the trouble by repair or replacement.

4.10 In the event that DAS 820A1 or 820A2 (4.04) passes the loop-back test, further analysis of the trouble report is required to determine which mode is in trouble (message pick-up or transmission, message reception, or control functions).

4.11 Message pick-up trouble is verified by the message transmission test. If the results of the test indicate TTY trouble, refer to the appropriate FMP for clearance procedures. If results indicate DAS 820A1, 820A2, or 804-type trouble, a continuity test of DAS 804 should be performed. If the continuity test fails, locate the trouble and either repair or replace the defective part.

4.12 If DAS 804 passes the continuity test, DAS 820A1 or 820A2 should be replaced. Refer to 4.06 for replacement procedure.

4.13 Analysis of message reception (4.10) trouble should be verified by performing a message reception test. Should the results of the test indicate TTY trouble, refer to the appropriate FMP for clearance procedures. If results indicate DAS 820A1, 820A2, or 804-type trouble, a continuity test of DAS 804 should be performed. If the continuity test fails, locate the trouble and either repair or replace the defective part.

4.14 If DAS 804 passes the continuity test, DAS 820A1 or 820A2 should be replaced. Refer to 4.06 for replacement procedures.

4.15 Analysis of control function (4.10) trouble should be verified by performing a local test or message transmission (4.11) ***and*** message reception (4.13) tests to determine the cause of the trouble report.

4.16 If all of the tests do not isolate the trouble to a specific component, it is recommended that additional help be requested through proper lines of organization in order to restore the customer's service.

5. DATA AUXILIARY SET 804N-TYPE

5.01 Maintenance of DAS 804N-type is limited to the replacement of lamps, keys, cord, and/or loudspeaker.

5.02 Table A summarizes the codes for the replacement parts.

LAMPS

5.03 To replace lamps:

(1) Remove the faceplate from the cover by removing the two mounting screws.

(2) Remove key cap.

TABLE A

	MODEL	KEY	LAMP	CORD	LOUDSPEAKER
33	RO	635J2	53A	M24G	KS-16908 L1
	ASR			M24F	
35	RO	635K2		M24G	
	ASR			M24F	
35	ROTR			M24G	KS-16107 L2

(3) Using a 553A tool (lamp extractor), remove lamp.

(4) Replace lamp.

(5) Replace key cap.

(6) Replace faceplate.

33-TYPE TTY

5.04 Replacement of keys, cord, and/or loudspeaker will require the removal of the TTY cover.

5.05 To remove the cover:

(1) Remove the faceplate from the cover by removing the two mounting screws.

(2) Remove nameplate by pulling it down and out. This will expose four cover mounting screws in front.

(3) Remove these four screws and the three cover mounting screws located at the rear of the cover.

Note: On 33 ASR TTY's, also remove the screw from the left rear corner of the tape reader cover.

(4) Remove platen knob.

(5) Gently lift the cover from the subbase.

35 ASR OR RO TTY

5.06 Replacement of keys, cord, and/or loudspeaker will require opening the lower cover.

5.07 To open the lower cover:

(1) Open the upper cover to its partially open latched position.

(2) Remove the faceplate from the cover by removing the two mounting screws.

(3) Open the latch on the right-hand side of the TTY.

(4) Grasp the hand grips located in the front of the lower cover and raise the cover.

(5) Verify that the left rear stop arm is latched when cover is opened fully.

KEYS

5.08 After opening or removing the cover, key replacement is as follows:

(1) Loosen the key locking bar retaining screw (Fig. 7) on DAS 804N-type.

(2) Remove cord-retaining screw and nut.

(3) Lift the 635J2 key sufficiently to clear the bracket.

(4) Release spring-retaining clips which hold the plug to the key and remove plug.

(5) Rotate the front key locking bar to clear the 635K2 key.

(6) Lift the 635K2 key sufficiently to clear the bracket.

(7) Release spring-retaining clips which hold the plug to the key and remove plug.

(8) Connect plugs to 635K2 key and 635J2 key to be installed.

(9) Lower keys into bracket. Seat the 635K2 key into the keying pins and rotate the front key locking bar to retain the key.

(10) Seat the 635J2 key in the keying pins and replace the key locking bar retaining screw.

(11) Replace cord-retaining screw and nut.

CORD

5.09 To replace cord:

(1) Perform Steps 1 through 7 of 5.08.

(2) Disconnect the cord plug from DAS 820A1, 820A2, or the connector assembly, whichever is applicable.

(3) Using a screwdriver, loosen the two screws on TS B which connect the cord to the loudspeaker terminal strip. Remove spade tips from TS B.

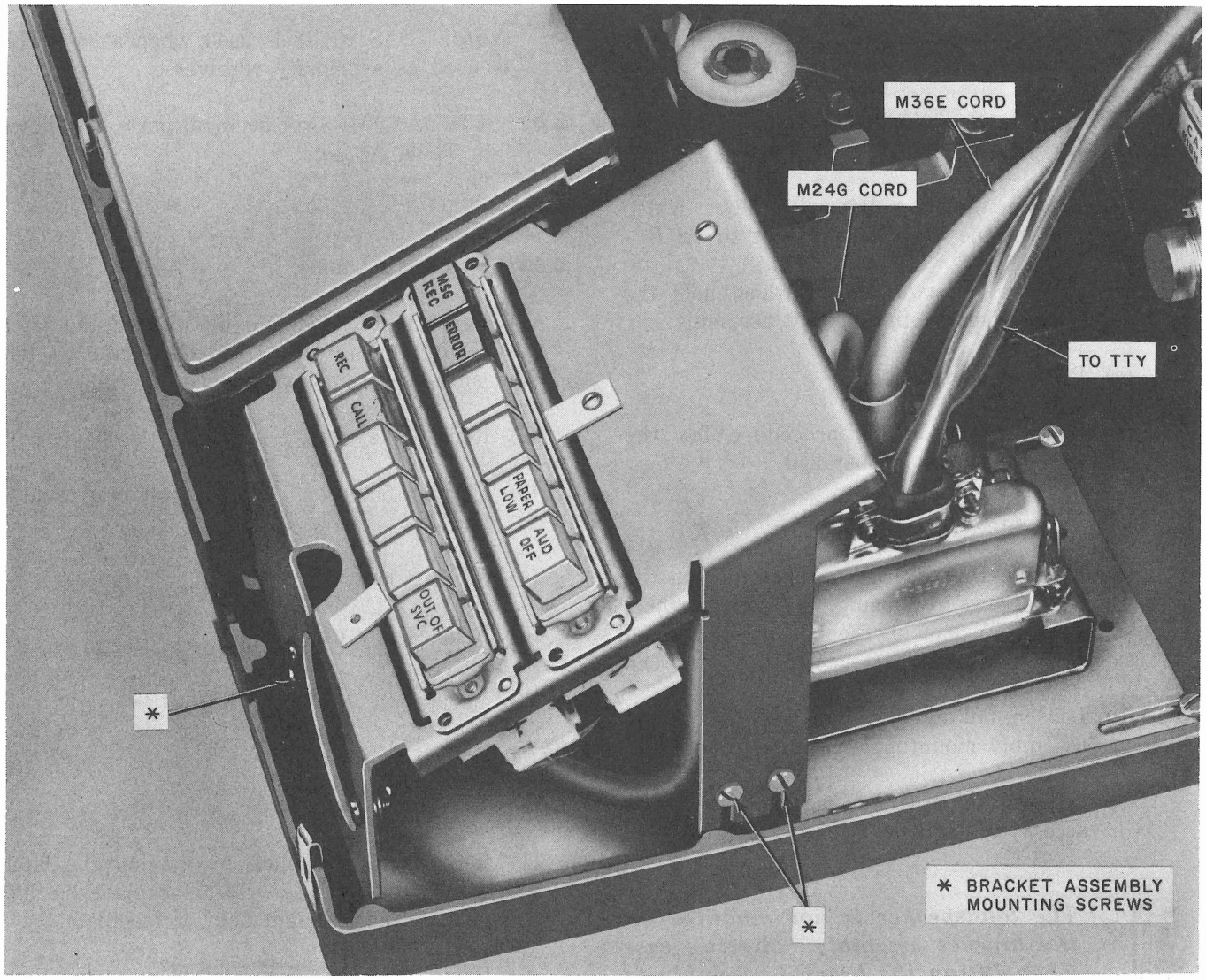

Fig. 7—Data Auxiliary Set 804N2, Mounted in Model 33 RO Teletypewriter

(4) Remove cord.

(5) Reverse the procedure for installing the cord.

LOUDSPEAKER

5.10 To replace loudspeaker:

(1) 33-type TTY

(a) Remove DAS 804N-type by removing the four screws on the mounting plate.

(b) Loosen, but do not remove the five bracket assembly mounting screws (Fig. 7).

(c) Lift bracket assembly sufficiently to clear mounting screws.

(d) Turn DAS 804N-type over to expose TS B.

(e) Loosen the two bottom screws which connect the loudspeaker leads to TS B.

(f) Remove the two screws which hold the loudspeaker to the bracket assembly.

(g) Remove loudspeaker.

(h) Reverse the above procedure for the loudspeaker to be installed.

(2) 35 ASR or RO TTY

(a) Remove DAS 804N-type by removing the two screws (by using an Allen wrench) from the TTY pan on the bottom right-hand side.

(b) Loosen, but do not remove the five bracket assembly mounting screws (Fig. 8).

(c) Lift bracket assembly sufficiently to gain access to TS B.

The loudspeaker is not mounted on the bracket assembly. Exercise care when lifting the bracket assembly to prevent damaging conductors to the loudspeaker.

(d) Loosen the two bottom screws which connect the loudspeaker leads to TS B.

(e) Remove the four loudspeaker mounting screws (by using an Allen wrench) located at the right front bottom of the TTY pan.

(f) Remove loudspeaker.

(g) Reverse the procedure for the loudspeaker to be installed.

6. DATA AUXILIARY SET 804R3

6.01 Maintenance of DAS 804R3 is limited to the replacement of lamps, keys, cord, and/or loudspeaker (Fig. 9).

Note: DAS 804R3 is used when a 35 ROTR is used as a primary receiver.

6.02 The DAS 804R3 replacement parts are shown in Table A.

LAMPS

6.03 To replace lamps:

(1) Remove the faceplate by moving the latch spring to the left. Lift faceplate by left side and disengage right side of faceplate.

(2) Remove key cap.

(3) Using a 553A tool (lamp extractor), remove lamp.

(4) Replace lamp.

(5) Replace key cap.

(6) Replace faceplate.

KEYS

6.04 To replace keys:

(1) Remove the faceplate by moving the latch spring to the left. Lift faceplate by left side and disengage right side of faceplate.

(2) Using a KS-6854 screwdriver, or equivalent, remove the four 4-40 Fillister head screws which hold the key to the bracket.

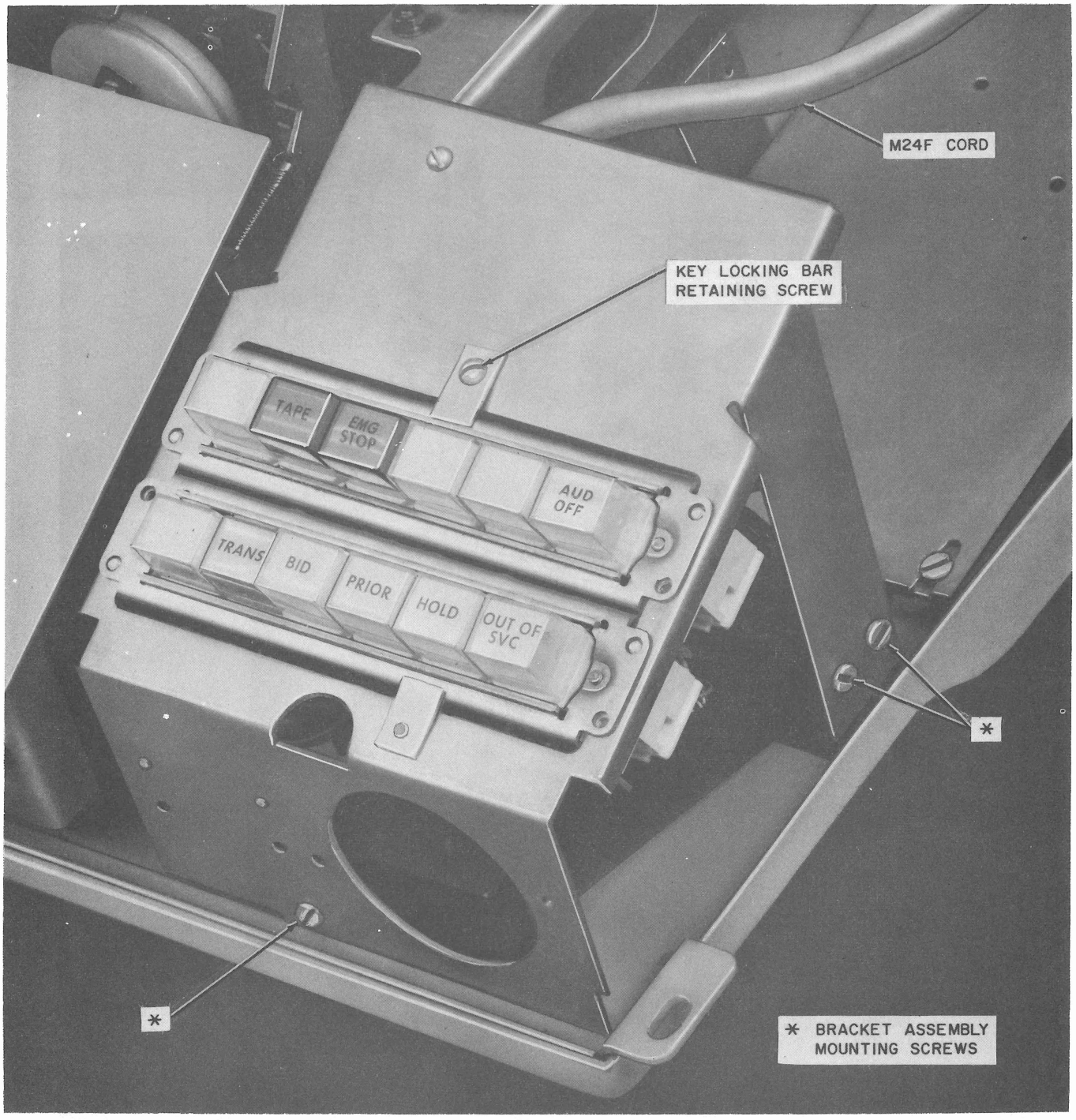

Fig. 8—Data Auxiliary Set 804N1, Mounted in Model 35 ASR Teletypewriter

(3) Lift key (to be replaced) sufficiently to clear the bracket.

(4) Release spring-retaining clips which hold the plug to the key and remove plug.

(5) Connect plug to the key to be installed.

(6) Lower key into bracket.

(7) Replace the four 4-40 Fillister head screws. ***Do not tighten the screws.***

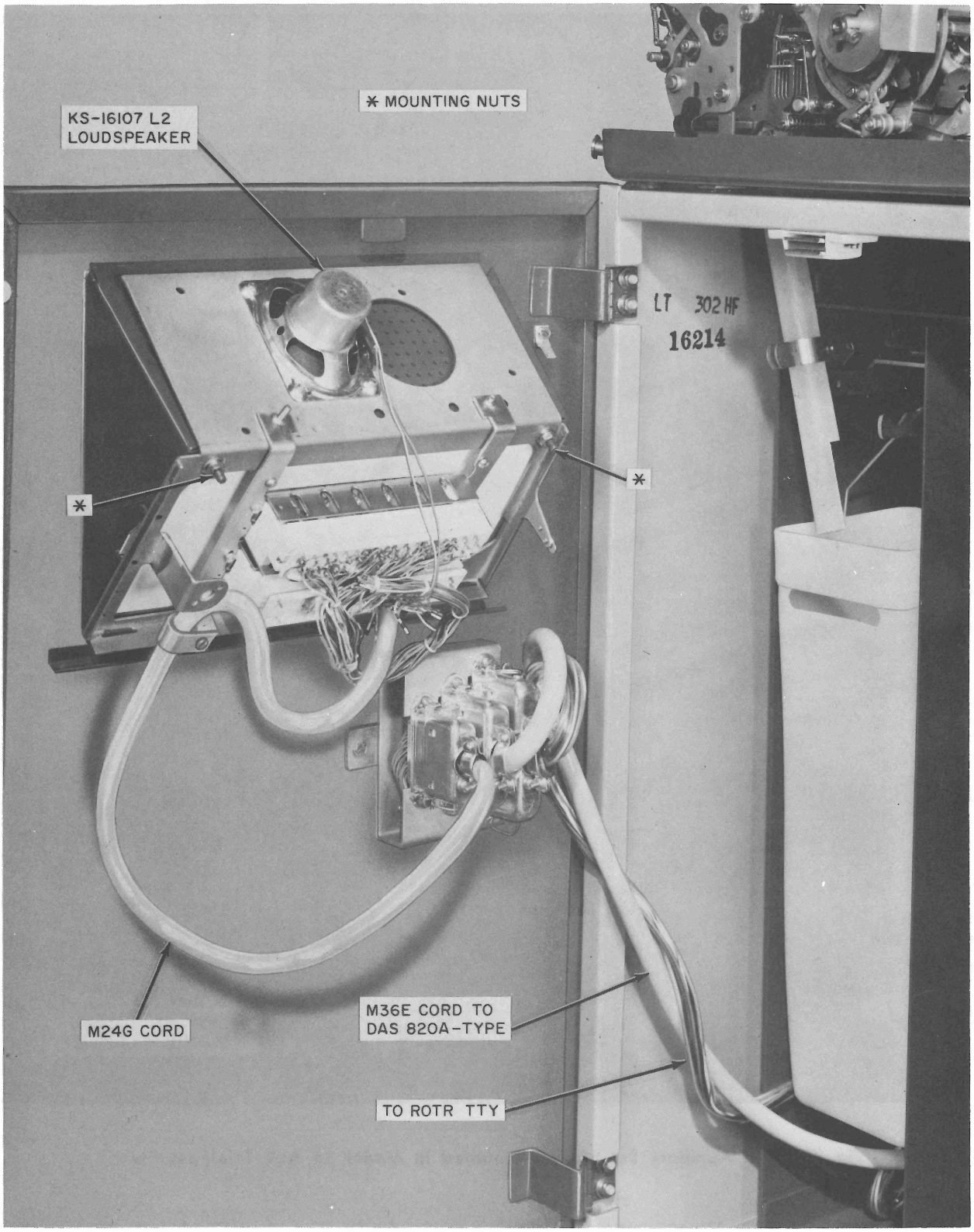

Fig. 9—Data Auxiliary Set 804R3, Mounted in Door of Model 35 ROTR Stand

(8) Align the key, then tighten the screws.

(9) Replace faceplate.

CORD

6.05 To replace M24G cord:

(1) Perform Steps 1 through 4 of 6.04.

(2) Repeat Steps 2 through 4 of 6.04 for the remaining key.

(3) Disconnect the M24G cord plug from the connector assembly.

Note: Access to the connector assembly will require opening the door of the ROTR stand.

(4) Loosen the two screws which connect the cord to the loudspeaker. Remove spade tips from the loudspeaker.

Note: The conductors are YEL-BL and YEL-OR.

(5) Remove the screw which holds the S hook assembly and the VIO-SL conductor.

(6) Remove cord.

(7) Reverse the above procedure for the cord to be installed.

LOUDSPEAKER

6.06 To replace loudspeaker:

(1) Open the door of the ROTR stand.

(2) Loosen the two screws on the loudspeaker which connect the YEL-BL and YEL-OR conductors to the loudspeaker. Remove spade tips from the loudspeaker.

(3) Remove the two mounting nuts which hold DAS 804R3 to the door (Fig. 9).

(4) Remove the four screws which hold the loudspeaker to the mounting plate assembly.

(5) Remove loudspeaker.

(6) Reverse the procedure for the loudspeaker to be installed.

7. DATA SET REPLACEMENT

7.01 The replacement of the data set is as follows:

(1) Obtain access to DAS 820A1 or 820A2 (Part 2).

(2) Remove lock strip (card-retaining bar) by loosening the two screws which hold it to the apparatus mounting. Slide lock strip from beneath screws to remove lock strip.

(3) Grasp handle on Data Set 108A-type and pull straight out.

8. ADJUSTMENT OF DATA SET 108A-TYPE

Verify that proper options are installed in the replacement Data Set 108A-type.

8.01 Disconnect incoming data line from the T and R terminals on TS A of DAS 820A1 or 820A2.

8.02 Connect terminals + and - of Portable Station Test Set TTS-28 to TP 1 and TP 2 of the data set (Fig. 10). Set FINCTION switch of TTS-28 to DBM 900Ω TERM O position.

8.03 Connect TTY power cord to the customer-provided ac receptacle.

8.04 Adjust R11 potentiometer on data set for output level specified on service order and/or circuit layout record card.

Note: If no output level is measured, operate carrier squelch (CS) switch on DAS 820A1 or 820A2 to OFF. Restore CS switch after adjustment of R11 and remove TTS-28.

8.05 Connect the incoming data line to the T and R terminals on TS A located on DAS 820A1 or 820A2.

8.06 Perform installation tests on the replacement data set in accordance with Section 580-301-501.

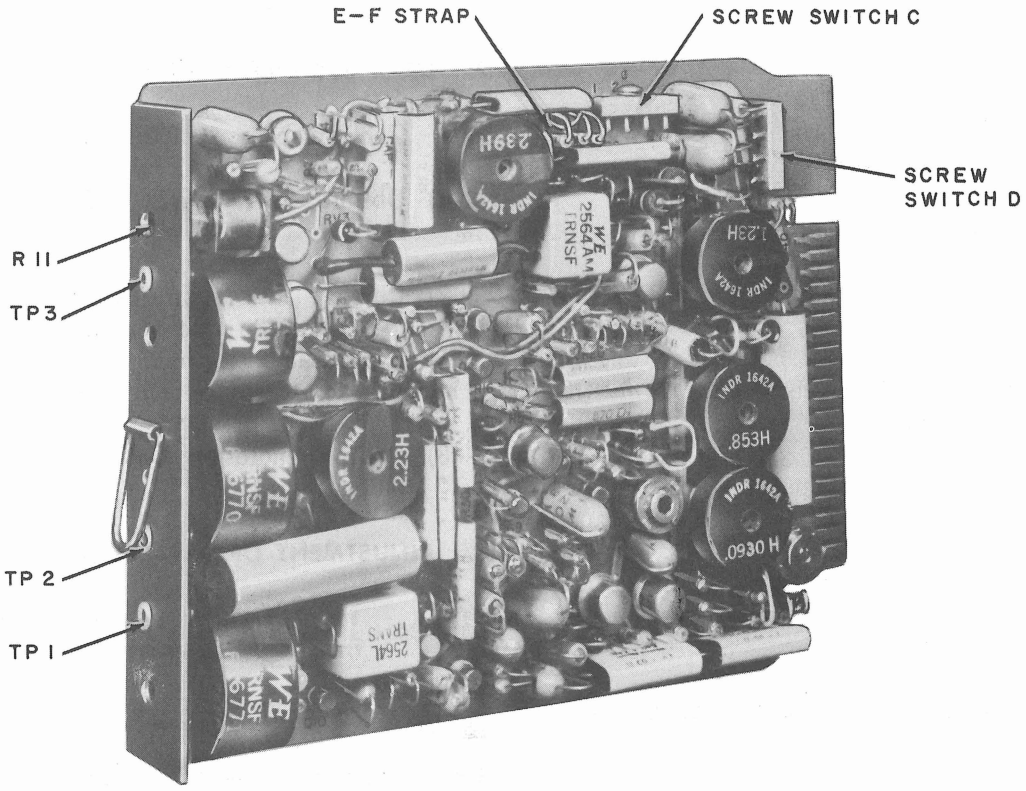

Fig. 10—Data Set 108A-Type, Location of Test Points and Screw Switches