TRAFFIC SERVICE POSITION SYSTEM NO. 1
TSPS HOTEL/MOTEL AUTOMATED QUOTATION SYSTEM
DESCRIPTION, TESTING, AND MAINTENANCE OF
DATA FACILITIES

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1. GENERAL

1.01 This section describes the hotel/motel (H/M) feature used with the Traffic Service Position System (TSPS) No. 1. Although the entire automated quotation system will be described, the emphasis in this section will be on the data facilities.

1.02 Whenever this section is reissued, the reasons for reissue will be listed in this paragraph.

1.03 The H/M feature offers several advantages to both the customer and the telephone company (telco) over previous systems used to provide time and charge information. Before H/M was available, toll calls made by guests at hotels and motels were timed and ticketed by a telco operator. The charges for these calls were then computed and either telephoned or teletyped to the hotel or motel. This method requires a large number of traffic operators and at times causes loss of revenue because guests may check out before time and charges are quoted. The number of operators required was of concern to the telcos because their work load increased dramatically at peak traffic periods and then slacked off.

1.04 The H/M feature is an option available with TSPS No. 1 that automatically computes time and charge information, then provides hard copies to the telco Hotel Billing Information Center (HOBIC) or a record teletypewriter (RTTY), and to those hotels equipped with an auto-quote (AQ) teletypewriter (TTY). The billing information is transmitted over private line facilities to 33- or 35-type receive-only (RO) TTYs using data sets 108E at the TSPS location and 108D at the receiving station (see Fig. 1). Hotels and motels equipped for AQ receive the time and charge information (in a form similar to that shown in Fig. 2) immediately after the call is completed. Those not equipped for AQ are served by a voice-quote (VQ) arrangement in which the information is received on a 35-type RO TTY at the HOBIC in a form similar to that shown in Fig. 2. Clerks then relay the information by telephone to the originating hotel.

1.05 A duplicate copy of all the messages sent to the AQ or VQ TTY is sent to the associated RTTY, which may be located locally near the TSPS or remotely at the HOBIC. In either case, this TTY provides a backup for the normal service.

A. METHOD OF OPERATION

1.06 When the desired AQ or VQ TTY is available, the processor selects an idle teletypewriter buffer (TTYB) as the initial step in the sequence of transmitting the quote message containing the billing information. The buffer and its associated RTTY are then checked for their operational capabilities.

1.07 The checks are made by loading a test character into the buffer which, in turn, transmits it to the RTTY. The buffer is read 100 milliseconds later. If the original test character is present, the buffer may be used since this indicates that the buffer is operational and the TTY is in the correct operating mode.

1.08 Simultaneous with the above test, a path is set up through the network. Once this is completed, a relay is operated in the teletypewriter cut-through (TTYCT) circuit connecting battery and ground to the tip and ring network path. Battery and ground applied to the tip and ring path operates the relay in the teletypewriter trunk (TTYT) circuit which removes the idle line termination from the trunk facility and connects the transmission path through to the trunk facilities.

1.09 A scanner ferrod associated with the TTYCT circuit informs the processor when continuity has been established through the network. With the cut-through relay operated, the scanner ferrod saturates due to the current flowing through the network and trunk relay. This indicates proper dc continuity across the link network to the processor.

1.10 Once the network connection is made and the previous tests have proved successful, the near-end data set sends marking carrier to the AQ or VQ data set. This, in turn, causes the data set at the AQ or VQ TTY to be unsquelched and to respond with marking carrier. Proper reception of carrier at the AQ or VQ TTY causes the motor to turn on. In addition, a ferrod associated with the TTYB data set indicates when the near-end data set detects the carrier, thereby testing ac continuity over the data channel. If spacing carrier rather than marking carrier is detected by the buffer, it is assumed that a paper change mode exists at the TTY, and a timing period is begun. This also applies to the test of the RTTY in 1.07.

1.11 After the path has been established from the buffer to either the VQ or the AQ TTY, an enquiry (ENQ) character is sent to trip the answer-back mechanism in the AQ or VQ TTY.

1.12 When the selected TTY is in the normal mode, an acknowledgment (ACK) character is transmitted to the buffer circuit in response to the ENQ character. Once the acknowledgment character is received, transmittal of billing information (message) is begun. Upon completion of the message, the TTY is turned off by transmittal of an end-of-transmission (EOT) character, and the network path is disconnected and placed in the idle state unless there are additional messages to be sent to that TTY. In such a case, disconnect procedures are deferred until all messages are sent.

2. PHYSICAL DESCRIPTION

A. Station Arrangement

2.01 The H/M station equipment can be divided into two broad categories for description purposes: equipment located at the customer premises, and equipment located at the telco premises.

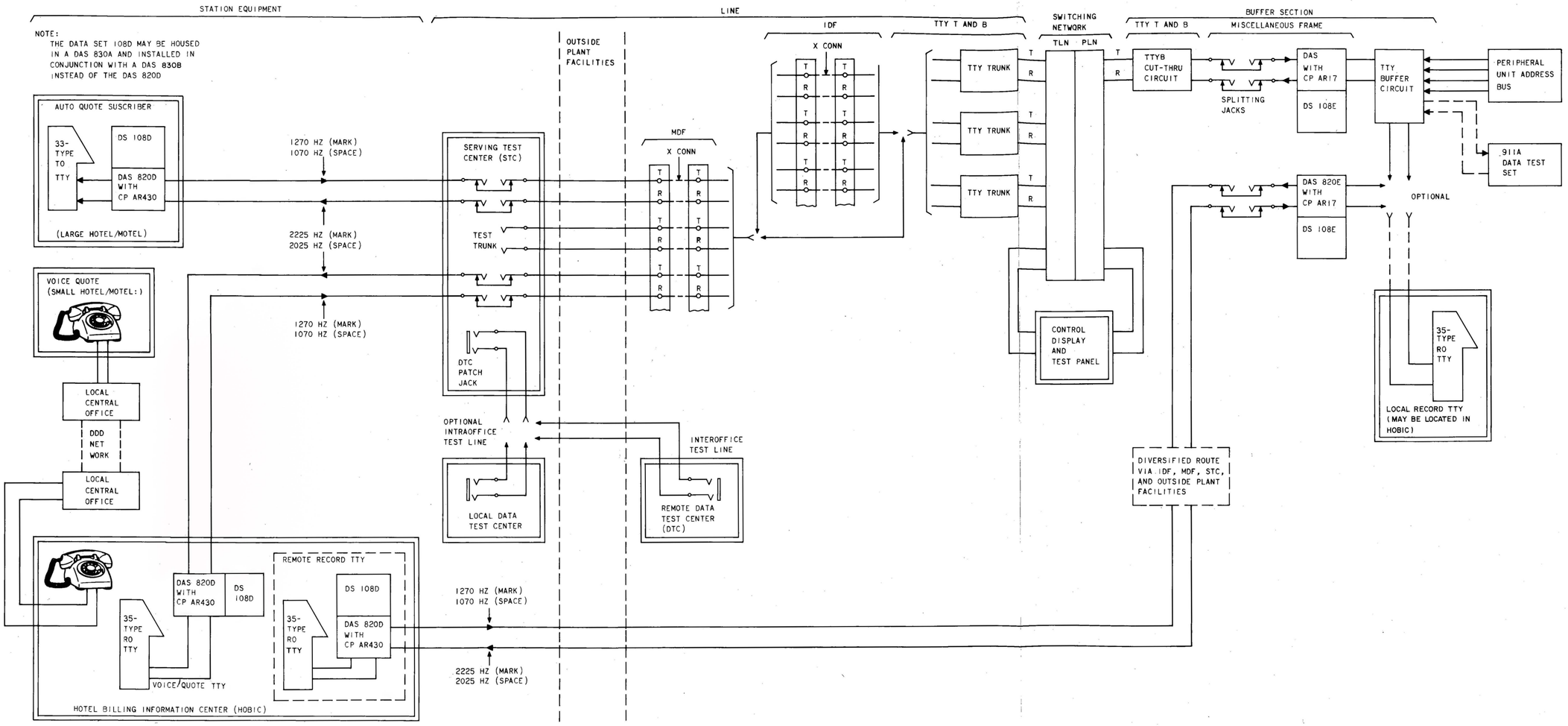


Fig. 1—Typical Hotel/Motel Interconnection Arrangement

MSG. #	BUFFER I.D.	HOTEL NAME	DATE	*	ROOM #	CONNECT TIME	ELAPSED MINUTES	CHARGE	CALLED #	FIELD FOR SPECIAL CALL IDENTIFICATION L = LOCAL
104	C	STA	08/01		24607	05:15	9999	$007.26	313-281-1234 813XXXX	F = FOREIGN (ICH) BLANK = DOMESTIC TOLL

LONG DISTANCE TELEPHONE CALL

104C STA 08/01 24607 05:15 9999 $007.26 313-281-1234 (IF DOMESTIC TOLL)
813XXXXF (IF ICH)

TEL. CO. CHARGE	
FED. TAX	
STATE TAX	
SERVICE CHARGE	
TOTAL	

A. AUTO-QUOTE HOTEL MESSAGE FORMAT

MSG #	BUFFER I.D.	HOTEL OFFICIAL #	DATE	*	ROOM #	CONNECT TIME	ELAPSED MINUTES	CHARGE	CALLED #	FIELD FOR SPECIAL CALL IDENTIFICATION L = LOCAL
123	G	312-242-1234	08/01		24607	05:15	9999	$007.26	313-281-1234 813XXXX	F = FOREIGN (ICH) BLANK = DOMESTIC TOLL

LONG DISTANCE TELEPHONE CALL

123G312-242-1234 08/01 24067 05:15 9999 $007.26 313-281-1234 (IF DOMESTIC TOLL)
813XXXXF (IF ICH)

TEL. CO. CHARGE	
FED. TAX	
STATE TAX	
SERVICE CHARGE	
TOTAL	

B. VOICE-QUOTE HOTEL MESSAGE FORMAT

Fig. 2—Typical Auto-Quote and Voice-Quote Message

2.02 The equipment located at the customer premises will be either:

- DAS 820D (2.10) equipped with data set (DS) 108D-type (2.05) and mounted in an M33 or M35 TTY (2.21 and 2.23).
- DAS 830A (2.13) equipped with DS 108D-type and DAS 830B (2.17). The DAS 830A and 830B are mounted in an M33 or M35 TTY (2.21 and 2.23).

A complete list of the station equipment installed at the customer premises using the model 33 TTY is given under the code NTFNP in the Bell System Teletypewriter Station Engineering Arrangements (BSTSEA) plan. A station using the model 35 TTY is covered under the code NTFNQ.

2.03 The equipment located at the telco premises consists of the following:

- The VQ and remote record stations are configured similar to the customer station location described in 2.02. The TTY will always be a model 35 RO (coded NTFNR in the BSTSEA plan).
- The local record station, which is model 35 RO TTY ***without*** a data set (coded NTFNS in the BSTSEA plan).

B. Central Office Data Equipment Arrangement

2.04 The H/M data set equipment in the TSPS office consists of one of the following arrangements. The earlier version consists of:

- A data set 108E (described in 2.05)
- A DAS 820E2 (described in 2.24 and 2.25).

The later version, which is the standard arrangement, consists of:

- Data sets 108E
- A 28A1 data mounting (described in 2.26)
- A 28C data mounting (described in 2.27)
- A 27B1 data unit (described in 2.28 and 2.29).

C. Equipment Description

Data Sets 108D and 108E

2.05 Data sets 108D and 108E (Fig. 3 and 4) are full duplex, frequency shift-keyed, serial binary transmission data sets which provide data transmission over private line facilities at speeds up to 300 baud. These sets have transmission features which make them compatible with each other, ie, data set 108D always transmits in the f_1 frequency band and receives in the f_2 frequency band, whereas data set 108E transmits in f_2 and receives in f_1 (Fig. 1). Mark and space are transmitted as 1270- and 1070-Hz signals, respectively, in the f_1 frequency band and as 2225- and 2025-Hz signals in the f_2 frequency band.

2.06 Data sets 108D and 108E are each approximately 5.5 inches high, 7.2 inches deep, 1.1 inches wide, and weigh approximately 2 pounds. The faceplates of data sets 108D (series 1 and 2) and 108E (series 1) are shown in Fig. 3 and 4, while the faceplates of data sets 108D (series 3) and 108E (series 2) are shown in Fig. 5. Data sets 108D (series 1 and 2) and 108E (series 1) are equipped with three slide switches (S1, S2, and S3) that are used to install or remove some of the data set options. The slide switches are visible from the front faceplate of the data set; however, the data set card must be removed from the data auxiliary set in order to change the settings. Data sets 108D (series 3) and 108E (series 2) are equipped with a 3-part rotary-screw switch that can be changed without removing the data set from the data auxiliary set. Each switch section may be individually adjusted to one of two positions by using a small screwdriver to rotate the screw to either the upper or lower position.

2.07 Data sets 108D and E are capable of operating over either 2- or 4-wire private line circuits; however, only 2-wire arrangements will be discussed in this section.

2.08 These sets provide a loss of received carrier indication when and if the level of the received carrier drops below a predetermined level (−41 dBm at a TSPS office, −47 dBm at a station) for a minimum period of 110 ms. The data sets

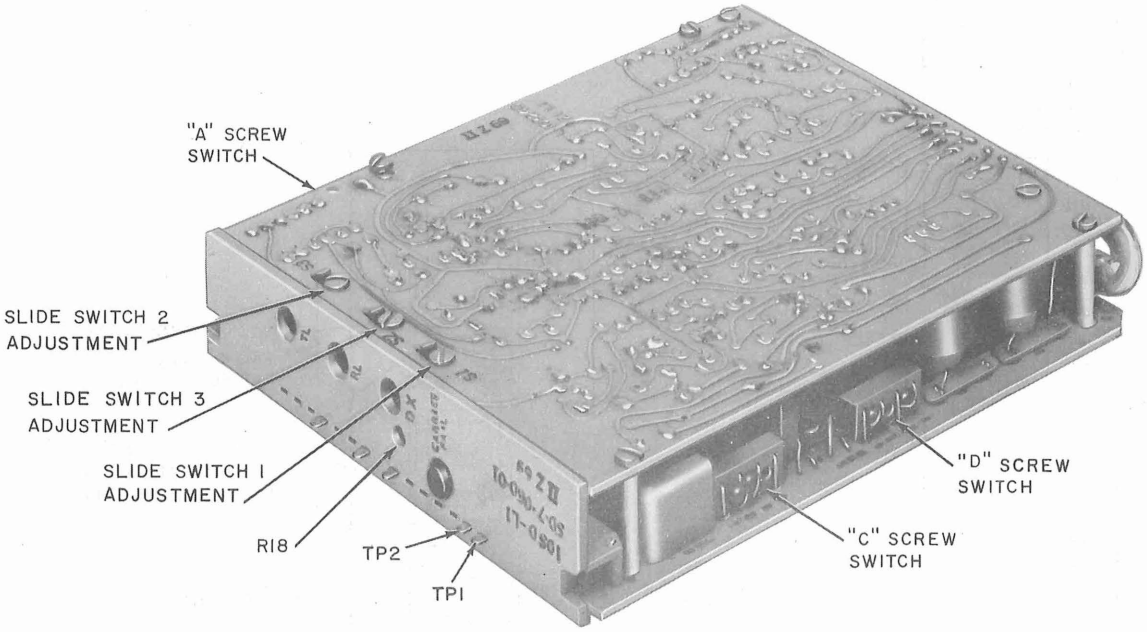


Fig. 3—Data Set 108D

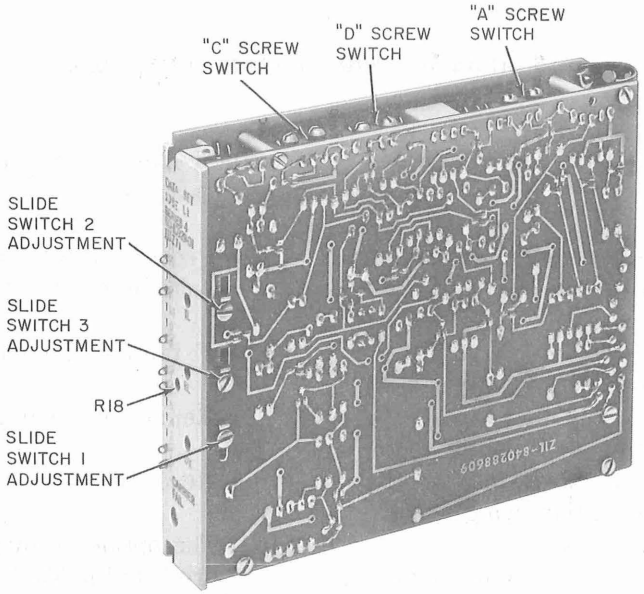
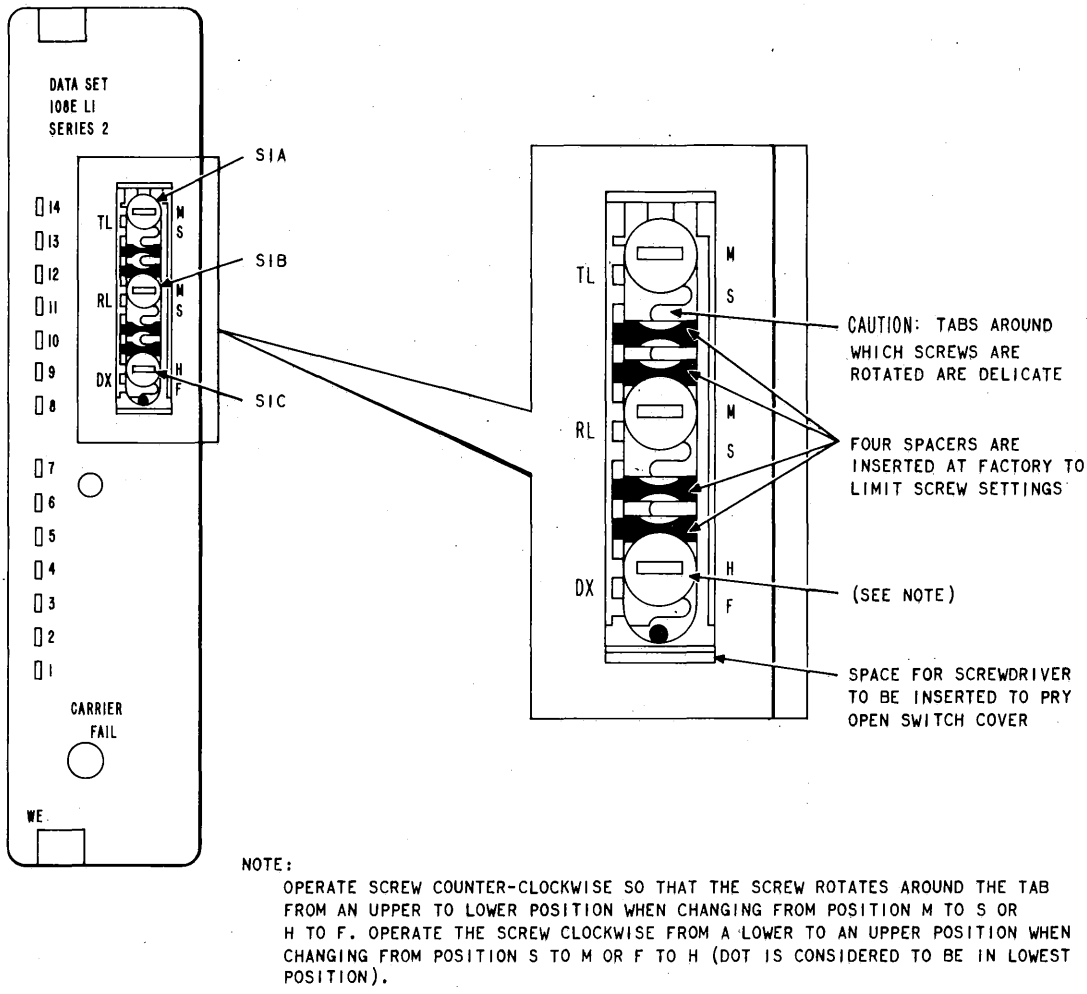


Fig. 4—Data Set 108E



NOTE:
OPERATE SCREW COUNTER-CLOCKWISE SO THAT THE SCREW ROTATES AROUND THE TAB FROM AN UPPER TO LOWER POSITION WHEN CHANGING FROM POSITION M TO S OR H TO F. OPERATE THE SCREW CLOCKWISE FROM A LOWER TO AN UPPER POSITION WHEN CHANGING FROM POSITION S TO M OR F TO H (DOT IS CONSIDERED TO BE IN LOWEST POSITION).

Fig. 5—Data Set 108D- and E-Type Faceplate

perform the following functions when loss of received carrier is detected:

- Provide a loss of received carrier indication (a negative voltage) on the RS and CF1 leads.
- Illuminate the CF lamps.
- Cause constant marking or spacing to be transmitted to the terminal devices on the BB leads (depending on option being used).
- Revert to a preconnect mode and monitor for marking or spacing (108E) or for marking only (108D).

2.09 The data sets will perform the following functions if the appropriate carrier frequency (constant marking or constant spacing) is detected for at least 200 ms:

- Provide a carrier-on indication (a positive voltage) on the RS and CF1 leads.
- Extinguish the CF lamps.
- Remove the clamp from the BB lead.
- Reset the carrier fail detector circuit.

2.10 The options provided by DS 108D and 108E are listed in Table A.

Data Auxiliary Set 820D-L1A

2.11 DAS 820D-L1A (Fig. 6) will be provided for most applications. This DAS provides the

TABLE A

OPTIONS INSTALLED IN DATA SETS 108D
USED IN H/M STATION INSTALLATIONS

OPTION DESIGNATION	FUNCTION OF OPTION	SCREW SWITCH	
		OPEN	CLOSE
X	Full duplex operation—this option disables the directional control circuitry of the data set.		S1
Y	2-Wire operation.		A2—A3
U	TL-Mark Hold—provides a marking signal on the TL interface lead when loss of receive carrier is detected.	S2	
S	RL-Mark Hold—provides a marking signal on the RL interface lead when loss of receive carrier is detected.	S3	
H	Hybrid network option for a 900-ohm line.	*SW-C* 1—2 3—4 *SW-D*	2—3 3—4

housing interface circuits and power supply for one data set 108D and an associated AR430 circuit pack. The DAS is mounted inside the pedestal of either a model 33 or 35 TTY (Fig. 7). It is approximately 11 inches wide, 5.5 inches high, 11 inches deep, and weighs 11.5 pounds.

2.12 The basic functions of the DAS are to provide an EIA interface between the data set 108D and the TTY, and to loop back the received data to the line when the DAS is in the test mode (see (Fig. 8).

2.13 A test relay is provided on the AR430 circuit pack that can be operated by either the TEST key on the DAS or remotely by the TEST key on a TP186627 logic unit. When the remote key (which is readily available to the customer or craftsman on the 6-button keyset) is used, connections are made between terminals 5 and 6 on the DAS TB-1 and terminals 2 and 4 of the logic unit terminal board. DAS 820D-L1A is equipped with the options shown in Table B when it is used with the H/M stations.

Data Auxiliary Set 830A

2.14 DAS 830A (Fig. 9) provides the housing, power, interface, and test circuits for the data set 108D when used with H/M.

2.15 DAS 830A measures 2.7 inches high, 10.5 inches wide, 8.7 inches deep, and weighs approximately 8 pounds.

2.16 The set is equipped with a test relay that can be operated by the TM switch on the front of the DAS 830A (Fig. 9) or by a remote test switch on the DAS 830B (described in 2.17). When the test relay is operated, the BA and BB leads of the data set are disconnected from DAS 830B and connected together. The CC lead is opened, the data set RS and CSQ leads are connected together, and the TEST lamp on the front of the DAS 830A is illuminated.

2.17 Connections to DAS 830A (Fig. 10) are made to eight screw terminals and a 25-pin EIA connector on the back of the set. Four screw terminals are provided for the connection to the line facility and four are provided to connect a

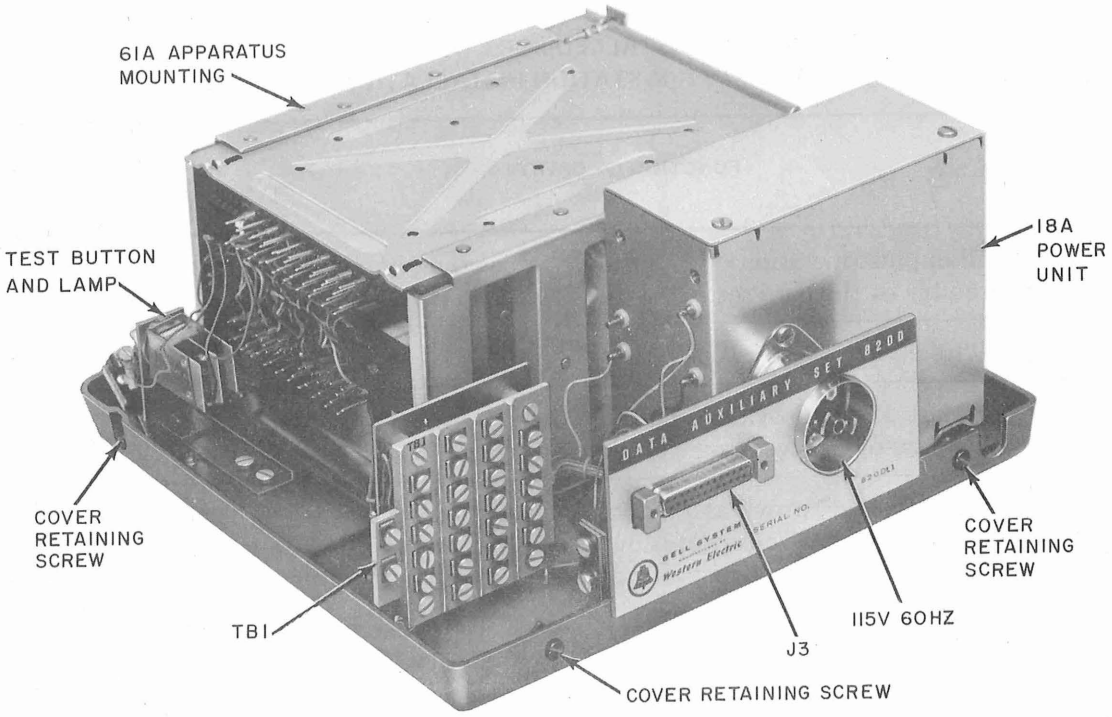


Fig. 6—Data Auxiliary Set 820D-L1A

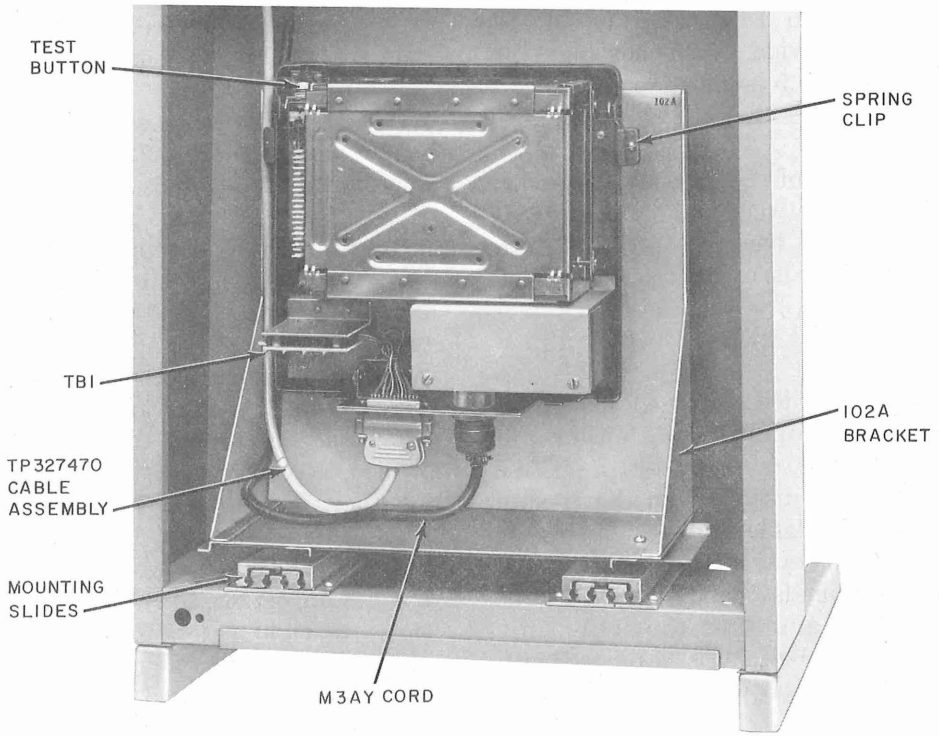


Fig. 7—Data Auxiliary Set 820D-L1A Mounted in Model 33 TTY

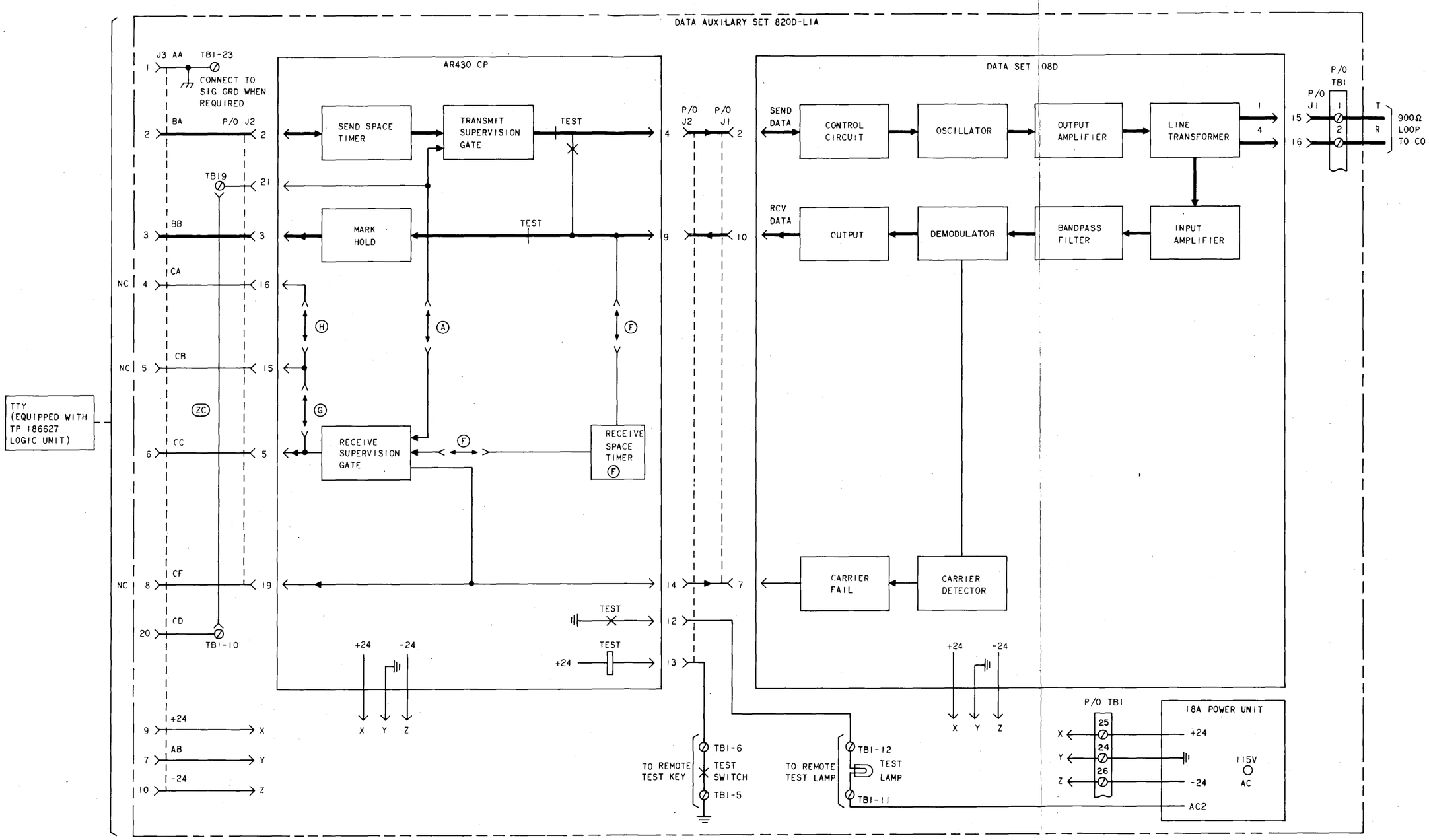


Fig. 8—Functional Block Diagram of Data Auxiliary Set 820D and Data Set 108D

TABLE B

OPTIONS INSTALLED IN DAS 820D-L1A
USED IN H/M STATION INSTALLATIONS

OPTION DESIGNATION	FUNCTION OF OPTION
ZC	CD control of transmit supervision.
ZE	AR430 circuit pack (equipped with the following options): H—CA looped to CB F—Receive Space timer ZA—CC independent of CD (AQ and VQ TTYs) or A—CC turned off by CD (RTTY)
Special options	Carrier squelch Spurious character suppression

remote test switch, test lamp, ground, +24 Vdc and −24 Vdc. The 25-pin EIA connector is used to connect the DAS 830A to the associated DAS 830B. DAS 830A-L1 (Fig. 11) equipped with data set 108- or 109-type provides the basic data arrangement for private line (PL) service using customer-provided equipment or Bell System terminals.

Data Auxiliary Set 830B

2.18 DAS 830B (Fig. 12) consists of a metal bracket, a 6-button keyset, and a printed circuit board. It is 3.5 inches high, 4.5 inches wide, 7 inches deep, and is installed on the front part of the UCC29 call control unit of model 33- or 35-type TTY. Power for the DAS is supplied from two sources; +28 Vdc is furnished by the call control unit, and −24 Vdc is furnished by the DAS 830A.

2.19 The DAS 830B-L1 interconnects the model 33- or 35-type TTY with the DAS 830A (Fig. 13). It provides all the necessary features that have been previously supplied by the AR430 circuit pack and the TTY TP186627 set logic assembly. The 6-button keyset on the front is used to select the station mode of operation.

(a) Depressing the OFF button turns off the motor in the TTY, lights the OFF lamp, and clamps the BA lead either marking or spacing (marking at H/M stations).

(b) The ON key does not perform any control functions other than mechanically releasing the other keys. The ON lamp lights when the ON button is depressed if a positive CF indication is presented to DAS 830B. When these conditions are met, the TTY motor is turned on and the BA lead is unclamped, allowing data transmission.

(c) The ALARM key lights when either a low paper or out-of-paper condition exists.

(d) The SPARE key contacts and lamps are wired to screw terminals and connectors. The SPARE key may be used for a TTY break detection option or as a message waiting lamp circuit.

(e) The LOCAL key is used to place the TTY in the local mode, in which case DAS 830B is electrically disconnected from the associated DAS 830A.

(f) The TEST key operates the test relay in the DAS 830A (described in 2.15) and turns on the TTY motor to allow local copy (optional) while in the test mode.

2.20 ***ET1 Circuit Pack:*** This circuit pack can be installed on the DAS 830B to provide a message waiting lamp circuit for use with the HOBIC VQ TTY.

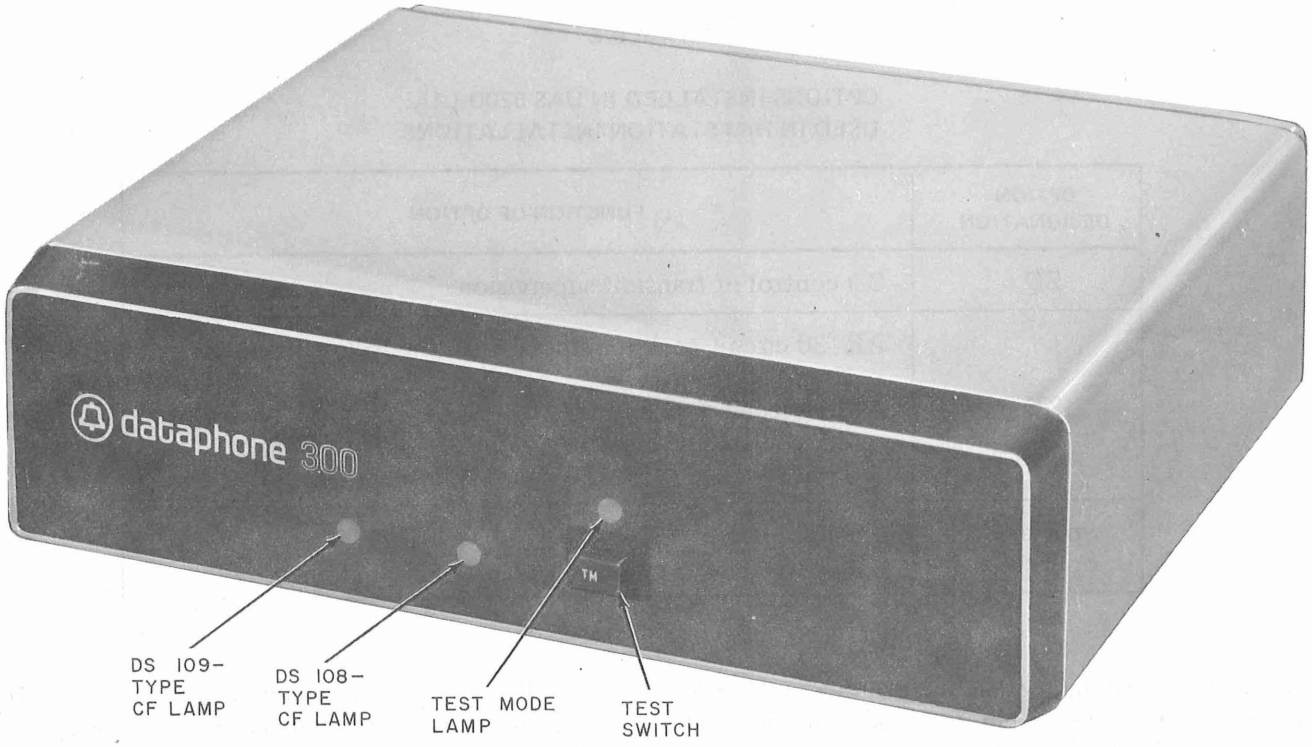


Fig. 9—Data Auxiliary Set 830A

Model 33- and 35-Type TTYs

2.21 Both 33- and 35-type TTYs (Fig. 14 and 15) are used with the H/M feature, with the 35-types normally located at the HOBIC and the 33-types located at the customer premises. The basic difference between a 33- and 35-type TTY is that the 35-type is more rugged and is intended for use in high traffic situations.

2.22 The following features are common to both 33- and 35-type TTYs used with H/M.

- 100 words-per-minute transmission rate.
- Receive only (RO).
- Motor turns on when carrier is received and the ON lamp lights.
- Motor turns off when EOT or carrier fail is received (except record TTY).
- The TTY causes the data set to transmit constant spacing when there is a low paper alarm or the machine is out of service.
- All the TTYs, ***except the record TTY,*** transmit an ACK character in response to an ENQ.
- All the TTYS except the record TTY are equipped to handle a form 3 × 8-1/2 inches wide.

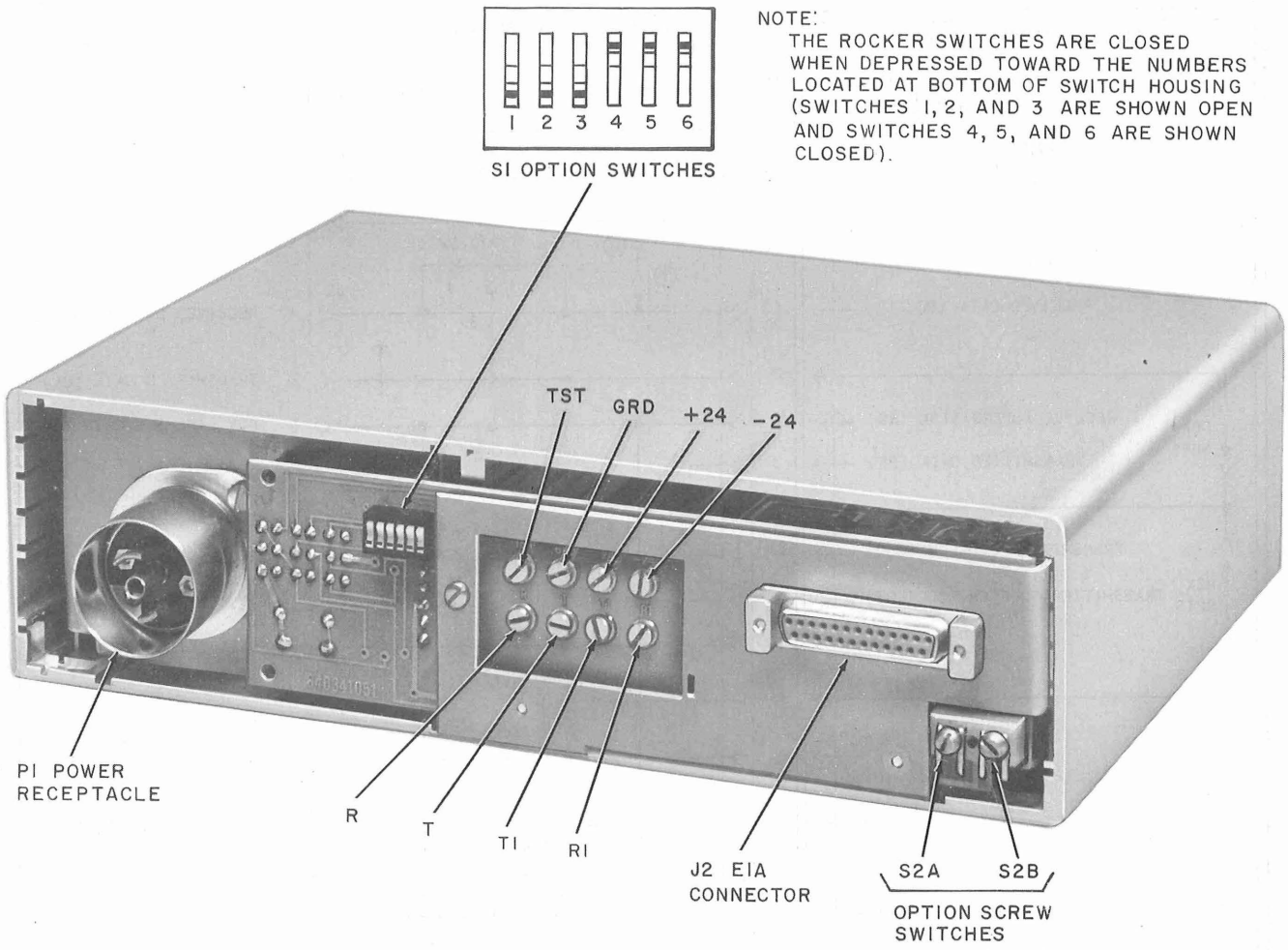


Fig. 10—Data Auxiliary Set 830A (Rear View with Cover Removed)

- All the TTYs are equipped with a line feed (LF) key to advance the paper and perform the carriage return function.

2.23 The following exceptions to the TTYs will apply:

- RTTY (RO) will be a model 35 and will remain *ON* at all times.
- AQ TTY (RO) will be a model 33 located at the hotel or motel.
- VQ TTY (RO) will be a model 35 located at the HOBIC.

2.24 All TTYs except the RTTY may be equipped with a message waiting lamp and control for remote message waiting indicator. All TTYs may be equipped with control for remote low paper alarm.

Data Auxiliary Set 820E2

2.25 DAS 820E2 (Fig. 16) provides the housing for three data sets 108D or 108E and the interface circuits that connect the data sets to the TSPS TTY buffer circuit.

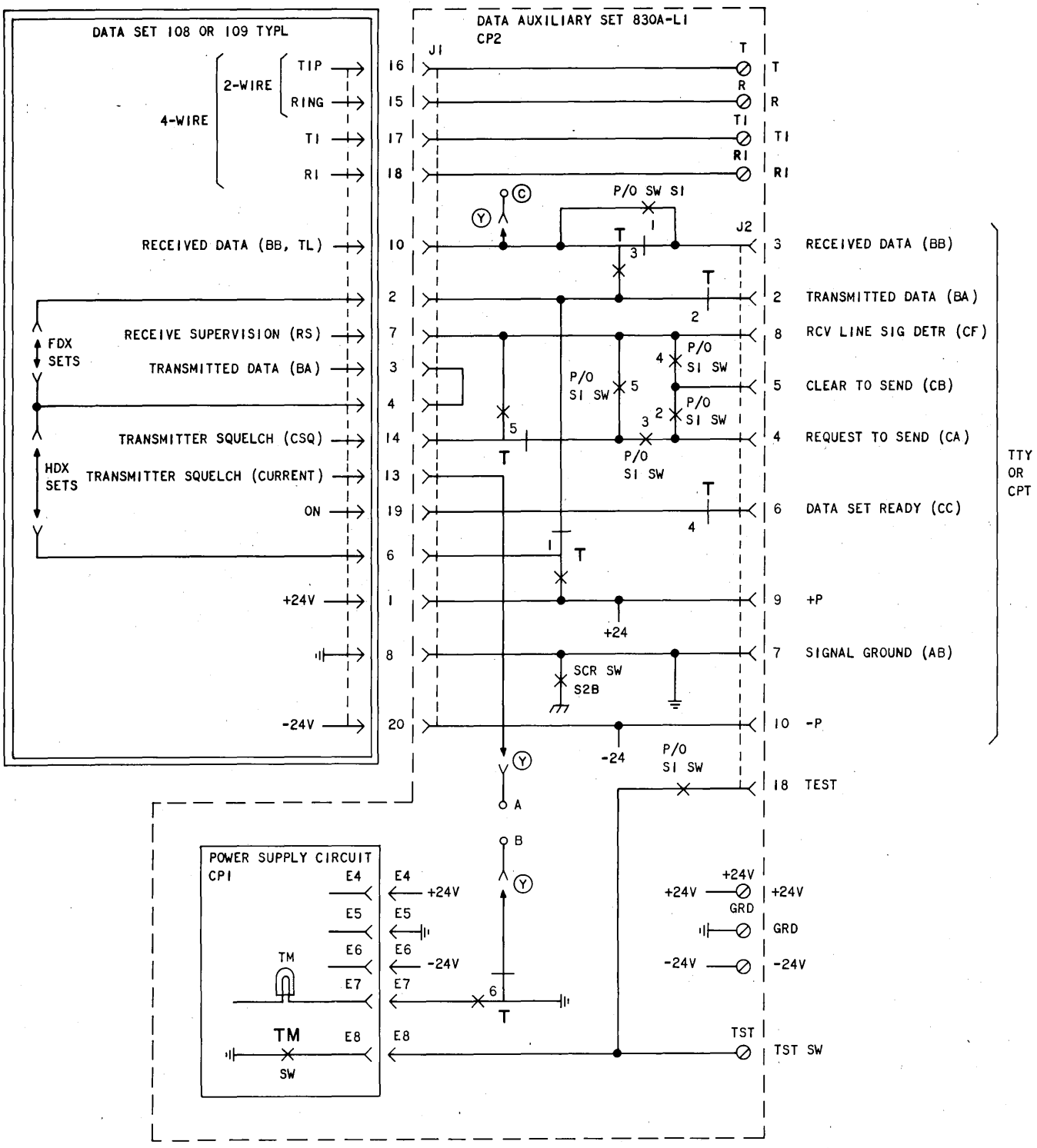


Fig. 11—Functional Block Diagram of Data Auxiliary Set 830A-L1 and Data Set 108- or 109-Type

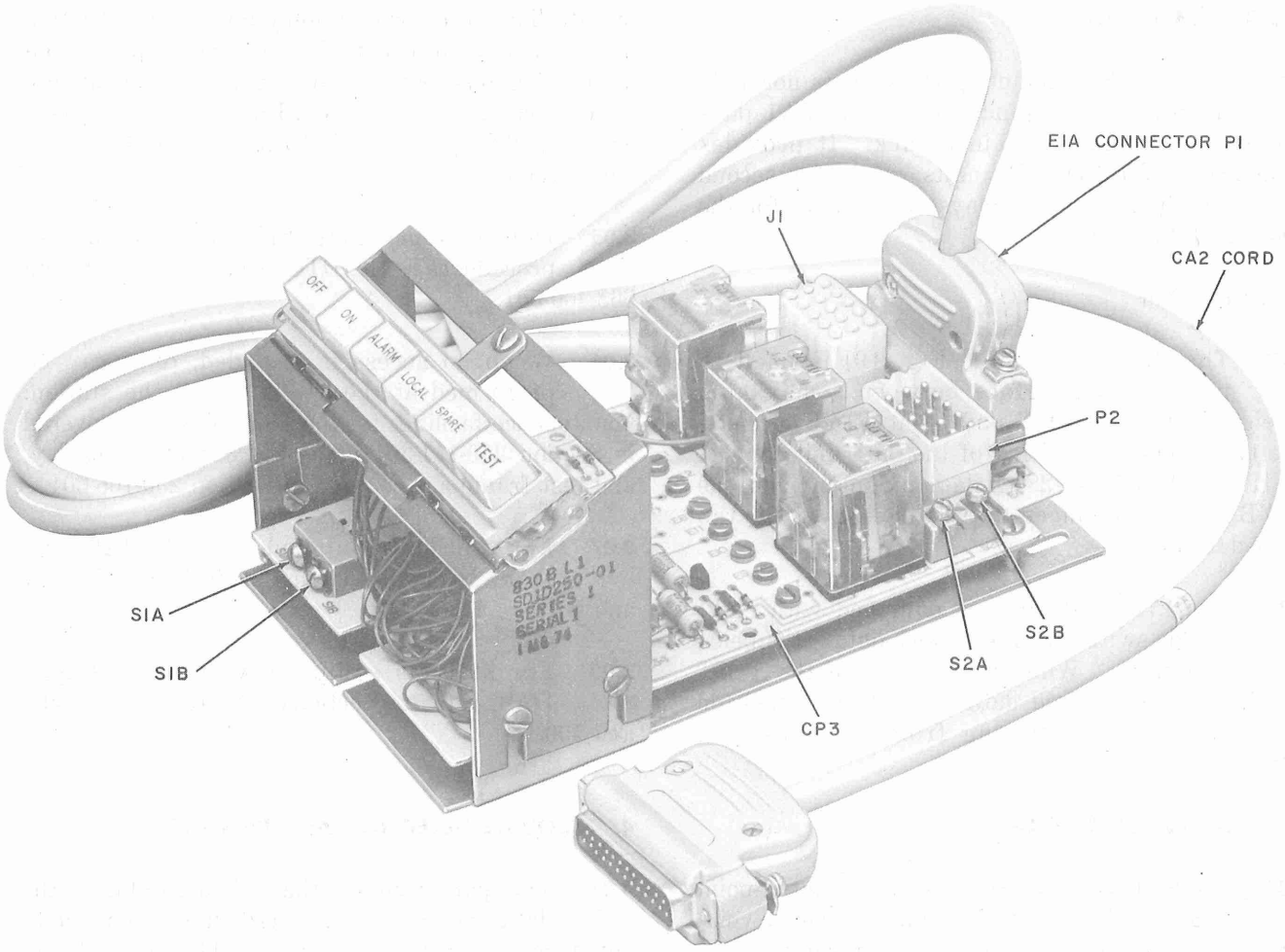


Fig. 12—Data Auxiliary Set 830B

2.26 DAS 820E2 consists of three AR17 circuit packs, three 18B power units, a 59A apparatus mounting, three KS-19087-L2 connectors (used to interface with the TTY buffer circuit), and a 26-terminal board (used to interface the telephone lines). These are all mounted on a 23-inch by 6-inch relay rack mounting plate. DAS 820E2 is equipped with the options given in Table C when it is used with the H/M feature. AR17 circuit pack options are listed in Table D.

28A1 Data Mounting

2.27 The 28A1 data mounting (Fig. 17) provides the housing for a maximum of eight data sets 108E and one KS-20575 rectifier. It consists of one 59C apparatus mounting, two KS-16786-L4 connectors, one KS-16671-L1 plug, one terminal block, and sixteen 927D connectors. The positive and negative 24 Vdc voltages required by the data sets can be supplied to the 28A1 data mounting from an external source ***or*** the KS-20575 rectifier.

Note: The KS-20575 rectifier must be ordered separately. The 28A1 data mounting is designed to mount in either a 23- or 25-inch rack.

28C Data Mounting

2.28 The 28C data mounting (Fig. 18) is normally installed in conjunction with a 28A1 data mounting in a 23- or 25-inch rack. It provides front access for the 27B1 units, space for second power supply and alarm relays, and fusing for the associated data sets.

27B1 Data Unit

2.29 The 27B1 data unit (Fig. 19) is used to provide an interface between a maximum of eight data sets 108E and eight TTYB circuits. The two plugs (P1 and P2) of the data unit connect to J1 and J2 of the 28A1 data mounting and the TTYB circuits connect to J1 through J8 on the 27B1 data unit.

2.30 The 27B1 data unit is equipped with eight toggle switches (one for each data set) labeled TEST-NORMAL. When a switch is in the TEST position, the associated data set is looped back on the digital side for testing from a remote test position.

3. TRANSMISSION PLAN

3.01 TSPS H/M data circuits utilize point-to-point (TSPS office to station) unconditioned voice grade private line facilities. The requirements contained in Section 880-420-100 are applicable.

3.02 The transmission engineering considerations covered in Section 880-350-100 are to be used, with the following exceptions.

(1) The send level will be engineered in compliance with Section 880-420-100.

(2) The receive level may be engineered to a value as low as −35 dBmO.

3.03 Figure 20 reflects the transmission levels applicable to the TSPS H/M data circuits when carrier is present. The transmission levels indicated coincide with the overall objective of the transmission plan for a −13 dBmO data signal level at the main distributing frame (MDF).

3.04 In the typical arrangement, per Fig. 20, the TSPS data circuits are routed via a private line serviceboard (PLS) located at a serving test center (STC). The requirements governing private line data services apply and sectionalization of the facilities to isolate failures will be performed at the STC testboards (standard procedures apply). A test trunk between the PLS and the data test center (DTC) provides DTC access to the TSPS data circuits.

3.05 Details concerning the step-by-step test procedures at the DTC are covered in Section 668-400-501.

3.06 When no access is provided, tests can be performed at the TSPS and at the station. Maintenance facilities for the TSPS office are covered in Section 250-141-301. The TSPS control, display, and test frame are covered in Section 250-106-301.

3.07 For stations equipped with the 820-type DAS, refer to Sections 591-023-101, 201, 301 and 501.

3.08 For stations equipped with the 830 type DAS, refer to Sections 598-816-100, 200, 300 and 500.

4. TROUBLE DETECTION AND REPORTS

4.01 This part assumes that when trouble in the data facility is suspected, it is reported to some central reporting point. The text of the TSPS output message will aid in determining the type of test actually required.

4.02 All TTY circuits should have access to an STC, or equivalent. The STC is given control of the installation, administration, and maintenance of that portion of these circuits existing outside of the TSPS distributing frame.

4.03 The RTTY is located at the HOBIC, not at the TSPS office. If the HOBIC and TSPS are not located in the same building, it is imperative that route diversification be used for the TTYs (VQ and RTTY) located at the HOBIC. The RTTYs should be fed through data sets.

4.04 The customer (hotel or motel) should be instructed to direct all billing questions to the HOBIC and all reports of trouble to the STC. The STC is responsible for receipt, handling, and summarizing of all H/M trouble reports whether received from the customer, the HOBIC, or the TSPS office.

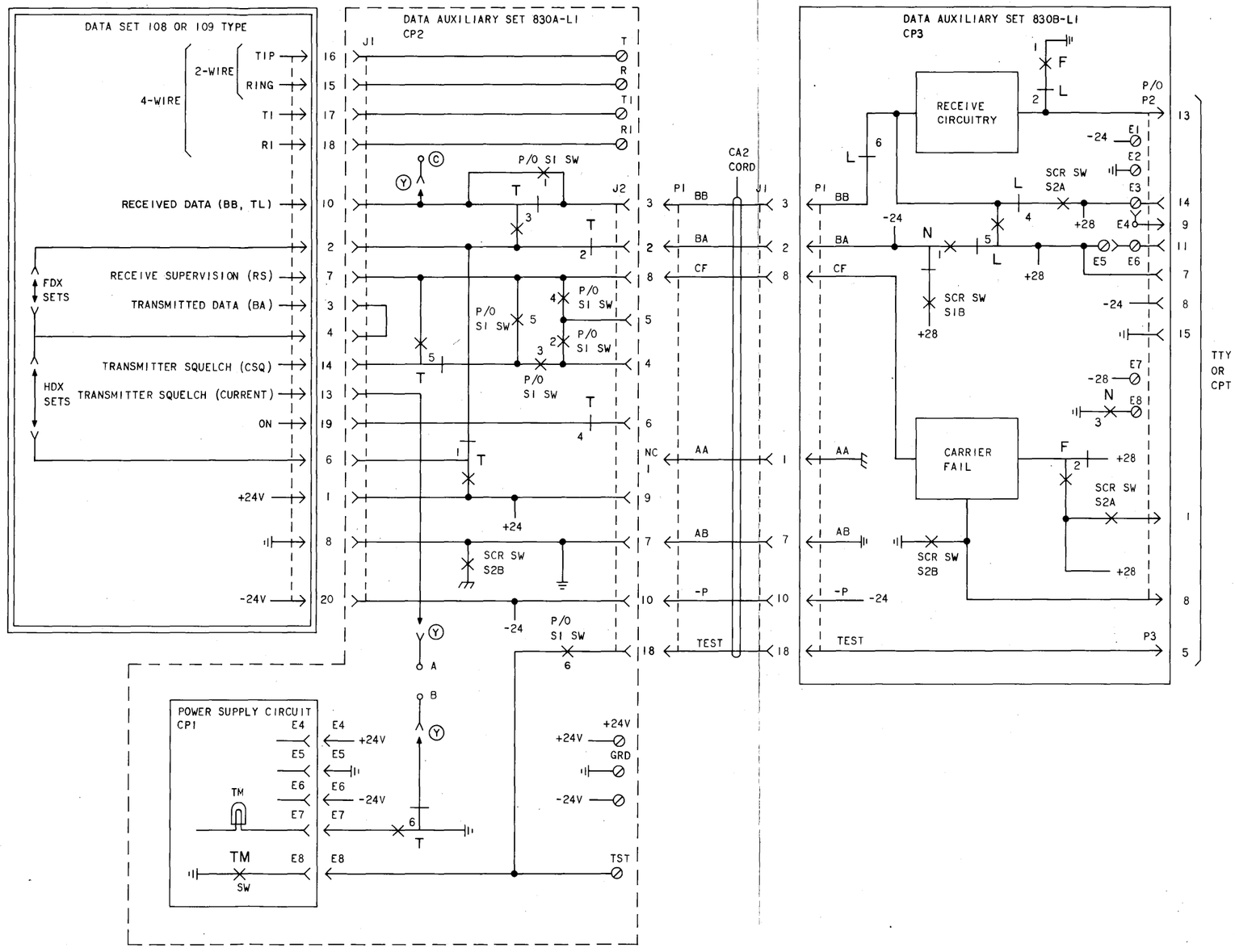


Fig. 13—Functional Block Diagram of Data Auxiliary Set 830B-L1 and Data Set 108 or 109-Type

Fig. 14—Model 33 Receive-Only TTY

Fig. 15—Model 35 Receive-Only TTY

4.05 To ensure proper operation of the AQ TTY, the following checks are made at the time of installation. In order to accomplish these checks, it is imperative that the installation work be coordinated so that STC and TSPS plant personnel are available to conduct their respective tests while the TTY installer is at the hotel.

- The TTY is examined to ensure it is the proper type with all the required features.
- The hotel's 120 Vac supply for the TTY must be within the limits specified by the Teletype Corporation. The outlet should be located close to the TTY so as to eliminate or minimize inadvertent disconnect. Power plug fasteners should be used where permitted.
- All transmission levels between the STC and the TTY are adjusted to be within limits.
- The "quick brown fox" test message is transmitted successfully from the STC to the TTY.
- The STC establishes that it can reliably receive an ACK character from the TTY in response to an ENQ character transmitted from the STC.
- The STC connects the TTY loop through to a fictitious hotel TTY trunk. At this point the TSPS plant craft personnel transmits the "fox test" message to the TTY using the H0TO2 test facility input message. The TTY installer confirms receipt of the test message and the STC checks the level of the signal at the STC. The STC then

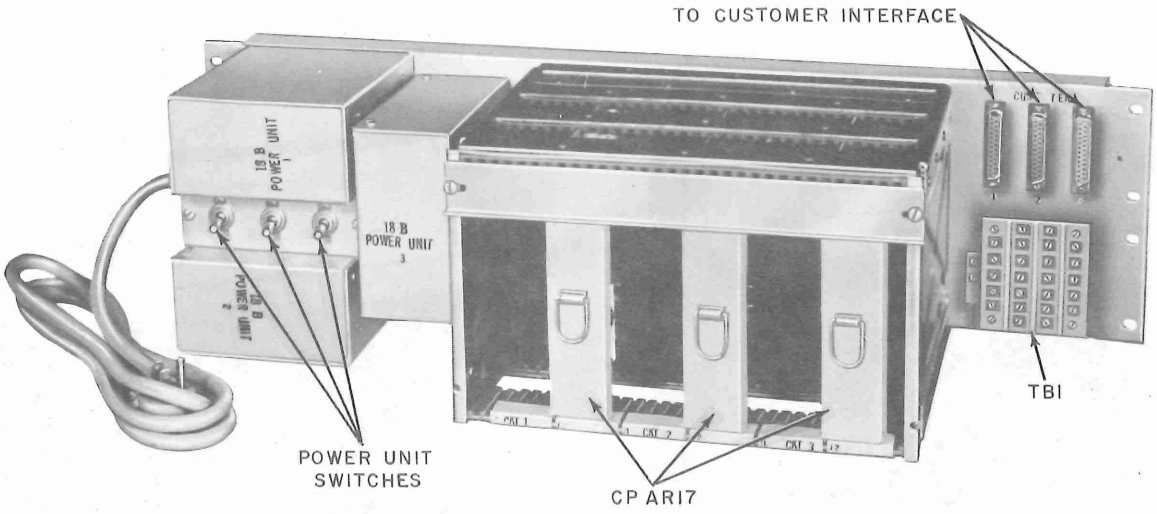


Fig. 16—Data Auxiliary Set 820E2

TABLE C

DAS 820E2 OPTIONS

OPTION	DESCRIPTION
X	Signal and protective ground strap
Y	AR17 circuit pack (see Table D for circuit pack options)

TABLE D

AR17 CIRCUIT PACK OPTIONS

OPTION	DESCRIPTION
W	EIA interface
N	Mark-hold on carrier fail
J	No carrier squelch

originates a toll call using the fictitious hotel telephone, and the installer confirms the receipt of this message. This allows additional tests not performed in the transmission of the fox message to be completed.

- The STC connects the TTY to the TTY trunk assigned to the hotel, and the TSPS maintenance force places the AQ TTY in service. If this circuit is placed in service using the H0TO2 TTY input message, a fox message will be automatically sent to the TTY. The installer should confirm receipt of this message.

4.06 The two sources of detected trouble are the station and the TSPS system. Station-initiated reports include both the AQ and HOBIC stations. Normally, these reports refer to a malfunction of station equipment and are reported to the control office. System-initiated reports provide the stimulus for maintenance actions in the TSPS office. Occasionally, abnormal trouble situations will cause trouble reports to be generated by the HOBIC station and/or control office that provide the stimulus for maintenance actions in the office.

4.07 Station-detected troubles can be categorized as equipment or service connected. For example, troubles can be caused by a TTY motor not operating or the TTY printing garbled messages. Service troubles are indicated by an AQ station receiving verbal quotes from the HOBIC or a gap in message sequence numbers (missing quotes). At the HOBIC, service troubles are indicated by

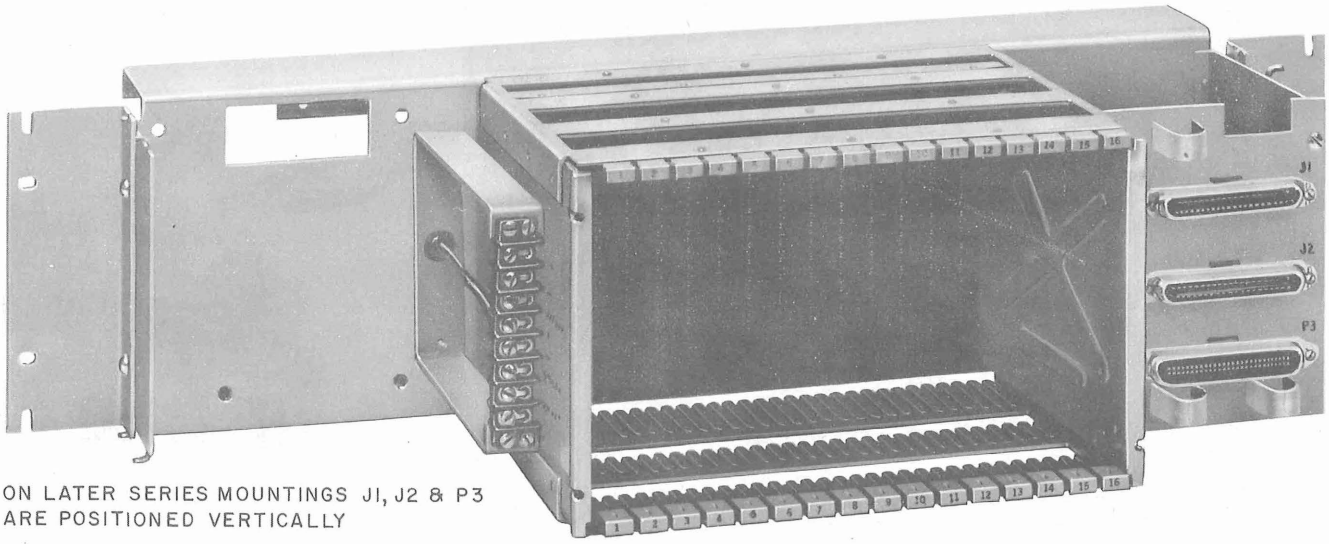


Fig. 17—28A1 Data Mounting

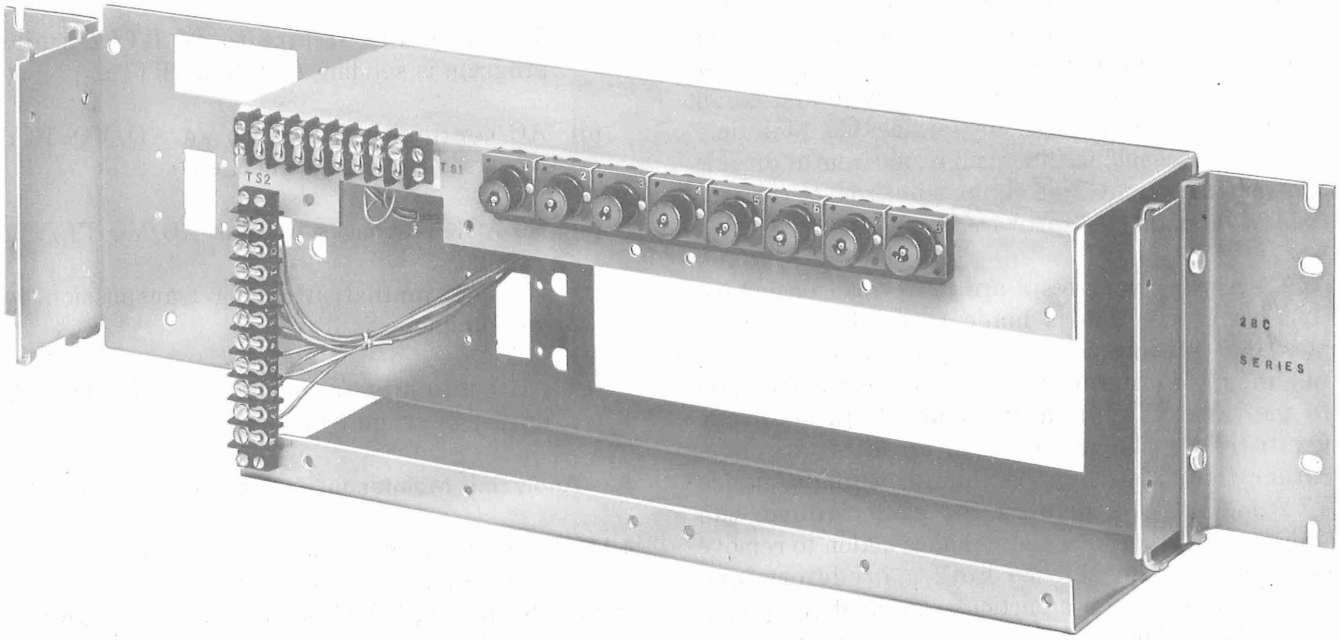


Fig. 18—28C Data Mounting

receiving AQ messages, no VQ messages, and/or no RTTY messages.

4.08 System-detected troubles for either equipment or service are indicated primarily by TTY output maintenance messages. Other office indications that may be used to isolate troubles are central office reports, HOBIC reports, and routine test results. The TSPS No. 1 can perform automatic fault recognition to locate troubles in individual

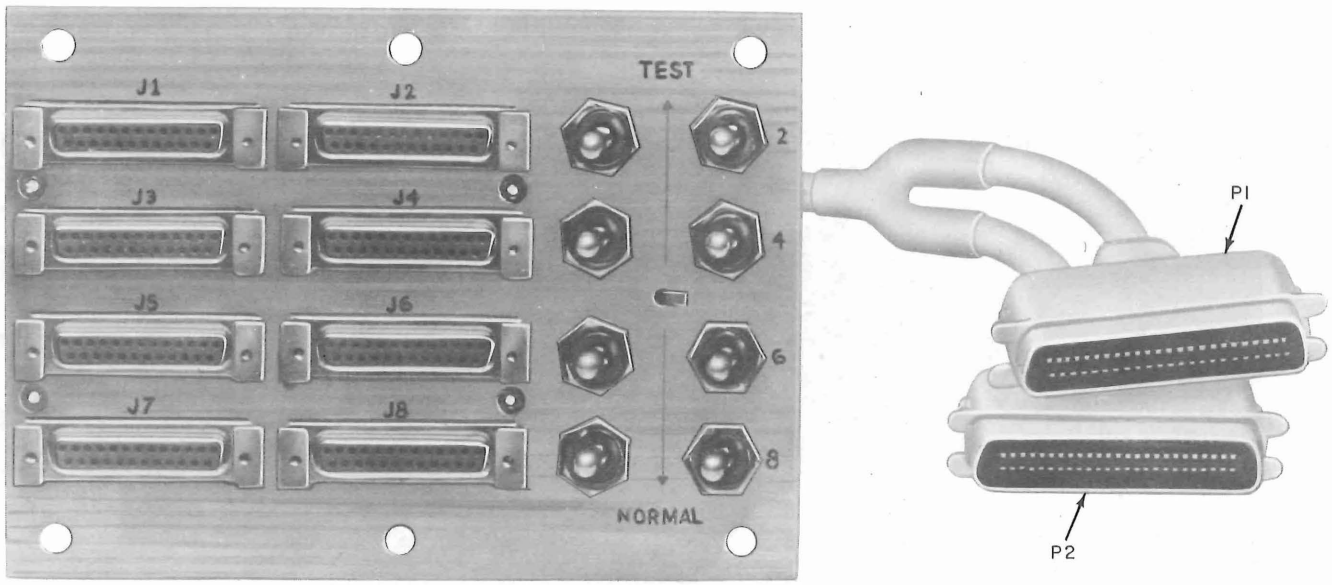


Fig. 19—27 B1 Data Unit

H/M equipment, software mutilation, common equipment such as the signal distributor central pulse distributor, and the network. The system can also recognize combinations of the above that result in the aborting of HOBIC service and/or all quoting due to the lack of serviceable facilities. Lack of serviceable facilities can result from automatic and manual removal of equipment from service or the unavailability of software registers.

4.09 A variety of tests are performed each time a connection is made to a TTY for H/M message transmission. Should any of these tests fail, the H/M program attempts to send the message to the same TTY via a different TTYB, or it may try to route the message to an alternate TTY rather than aborting. Although a maintenance TTY message is printed for each failure, the program does not take maintenance action to remove equipment from service until a predetermined number of errors for a particular piece of equipment is reached. The maintenance message printed as a result of each failure indicates the type of failure, which TTYT and TTYB were connected, and which facility was removed from service (if applicable).

4.10 The normal type of failures reported are as follows:

(a) DC continuity failure through the switching network.

(b) AC continuity failure to an RTTY.

(c) AC continuity failure to an RTTY while program is sending only to an RTTY.

(d) AC continuity failure to an AQ/VQ TTY while setting up a connection.

(e) No ACK responses from an AQ/VQ TTY.

(f) Message mutilation during transmission by hits on line.

(g) AC continuity failure to an AQ/VQ TTY during message transmission.

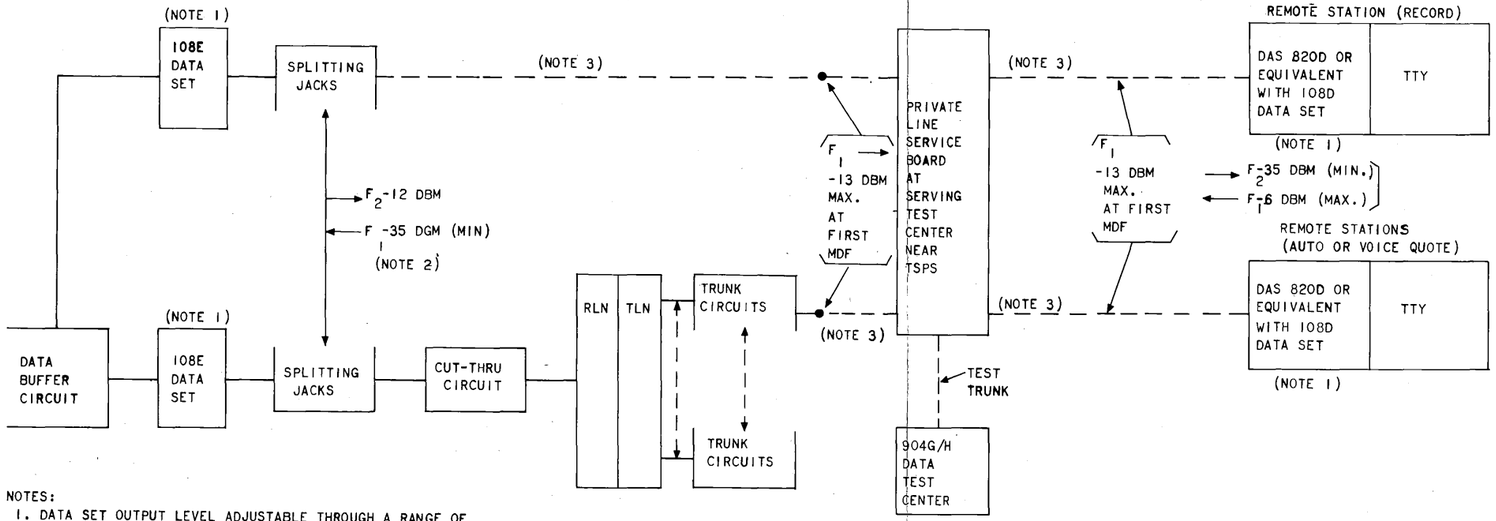
A. Analyzing Maintenance Output Message Format

4.11 Each trouble is indicated by one or more maintenance TTY message and is normally located by testing based on the analysis of certain messages. Examples of each message, along with an explanation of what the message most often indicates, is listed as follows.

(a) HØT01

(1) ***Output Message Format:***

HØT01 BUF=aa TTY: TGN=bb MEMN=ccc Fail=d.



NOTES:
1. DATA SET OUTPUT LEVEL ADJUSTABLE THROUGH A RANGE OF
   MINUS (-) 6 TO 26 DBM FOR 108D
   0 TO-26 DBM FOR 108E
   BSP 591-028-100 ISS, IPB. 12 PAR. 404.
2. DATA SETS 108 TYPE TERMINATING A 2-WIRE FACILITY, AS IS THE CASE FOR TSPS DATA CIRCUITS, THE SEND LEVEL SHOULD BE ENGINEERED IN COMPLIANCE WITH BSP AB27.350, BUT THE REVEIVE LEVEL MAY BE ENGINEERED TO A VALUE AS LOW AS -35DBMO. SEE BSP AB27.426 ISS.2, 1971 PG.12 PART OF PAR. 3.08.
3. UNCONDITIONED VOICEBAND PRIVATE LINE FACILITIES ENGINEERED IN COMPLIANCE WITH BSP AB27.350.

Fig. 20—Typical Arrangement of TSPS Data Circuits Using Unconditioned Voiceband Private Line Facilities Terminating in 108-Type Data Sets

(2) ***Explanation of Message:*** This message is printed when a failure other than a network failure occurs when trying to send an H/M billing message from an H/M buffer to an AQ or VQ TTY.

(3) ***Explanation of Variable Field:***

aa = Member number of buffer involved in failure.

bb = Trunk group number of TTY involved in failure.

= 37 for test trunk group.

= 38 for VQ trunk group.

= 39 for AQ trunk group.

ccc = Member number of TTY involved in failure.

d = 1, if dc continuity check failed after network connection was established.

= 2, if ac continuity check to RTTY failed (refer to 4.12).

= 3, if ac continuity check to AQ or VQ TTY failed. Establishment of a connection to an AQ or VQ TTY causes carrier to be transmitted from the TTY buffer data set at TSPS to the data set at the AQ or VQ TTY. On receiving this carrier, the remote data set transmits carrier back to the TTY buffer data set. Receipt of this carrier constitutes good ac continuity (refer to 4.13).

= 4, if AQ or VQ TTY fails to send an ACK character to TSPS in response to an ENQ character. The ENQ character is transmitted by TSPS only after a good ac continuity check. See d = 3, fail condition. This fail message may also be generated following transmission of a test message to VQ or AQ TTY. This report is valid only if the test message was successfully received and printed on the TTY. See HØT02 input message (refer to 4.14).

= 5, if AQ or VQ message was mutilated by a hit on the line during transmission. The program checks the state of the TTY buffer just before each successive message character is loaded for transmission. If the state indicates the buffer received information since the last check, it is assumed that the last message character transmitted was mutilated by a hit (refer to 4.15).

= 6, if ac continuity to an AQ or VQ TTY failed during message transmission. After message transmission the program checks that carrier is still being received from the remote data set. If not, ac continuity failed during transmission (refer to 4.16).

= 7, if ac continuity to an RTTY failed during message transmission, the program checks that carrier is still being received from the RTTY data set. If not, the associated buffer is removed from service (refer to 4.12).

Note: The failure checks are made in the numerical order indicated. If check "n" fails, it is true that all checks before "n" passed and no checks after "n" were attempted. This information is useful for isolating troubles in the TSPS network transmission buffer and/or VQ or AQ TTY.

(4) ***Action to be Taken:*** If this message appears repeatedly with a common circuit involved each time, that circuit should be removed from service and tested.

(b) HØT02

(1) ***Output Message Format:***

HØT02 aa-bbb PAPER CHANGE TØØ LØNG

(2) ***Explanation of Message:*** An H/M RTTY, AQ TTY, or VQ TTY has been in the paper change state too long. For RTTYs, this message appears after the first 5 minutes and every 64 minutes after that. For VQ or AQ TTYs, this message appears after they are in paper change for at least 10 minutes. Buffers are not used or are automatically placed out of service while in this condition.

TTYs, however, are placed out of service automatically after the 10-minute period.

(3) ***Explanation of Variable Field:***

aa = 21 for record TTY

= 38 for VQ TTY

= 39 for AQ TTY

bbb = member number of TTY (refer to 4.17).

(4) ***Action to be Taken:*** Change paper at TTY. If the TTY is not out of paper, remove it from service for testing.

(c) HØT07

(1) ***Output Message Format:***

* HØT07 HOTEL TTY ØØS aa-ƀƀb

(2) ***Explanation of Message:*** An H/M TTY is out-of-service and available for testing. While any H/M TTY is out-of-service, quoting service to hotels is impaired. In the case of TGN39, direct quoting of charges to a given hotel is completely suspended until the TTY is returned to service.

(3) ***Explanation of Variable Field:***

aa = trunk group of H/M TTY out-of-service

= 39, if AQ TTY

= 38, if HOBIC (VQ) TTY

= 37, if test trunk

ƀƀb = member number of H/M TTY out-of-service

(4) ***Action to be Taken:*** The TTY facilities are out-of-service and can now be tested from the trunk test panel or serving test center. Testing and repair, if necessary, should be expedited. In the case of trunk group 39, AQ service to a particular hotel is completely suspended until the teletypewriter is restored to service. The urgency of restoring a VQ TTY, TG38, to service depends on the volume of traffic currently being processed by the HOBIC.

B. Trouble Investigation

4.12 The following tests are to be performed when investigating trouble conditions associated with Remote RTTY AC Continuity Failure Indication, HØT01 FAIL = 2 or 7, shown in Fig. 21.

(1) Coordinate the station test with someone at the station, either the station attendant or telco installation/repair personnel.

(2) Inspect the station to ensure that the ac power is plugged into the TTY, data set, and DAS; paper is properly loaded in the TTY; and TTY and data equipment are turned ON.

(3) STC checks that f_1 frequency is present. If not, dispatch data repairmen.

(4) STC sends test messages to the station. If received good at record TTY, inform the TSPS that the station checks out good.

(5) STC coordinates troubleshooting efforts with TSPS.

4.13 The following tests are to be performed when investigating trouble conditions associated with AQ/VQ AC Continuity Failure Indication HØT01 FAIL = 3, shown in Fig. 22.

(1) Coordinate the station test with someone at the station, either the station attendant or Telco installation/repair personnel.

(2) Inspect the station to ensure that ac power is plugged into the TTY, data set, and DAS; paper is loaded properly in the TTY; and TTY and data equipment are turned ON.

(3) STC checks for f_2 carrier frequency. If f_2 frequency is not being received, inform TSPS.

(4) STC checks that f_1 frequency is being transmitted from the station.

- Dispatch data repair personnel if f_1 frequency is not being transmitted.
- Inform TSPS that f_1 frequency is not being sent to them.

(5) STC sends test message to the station.

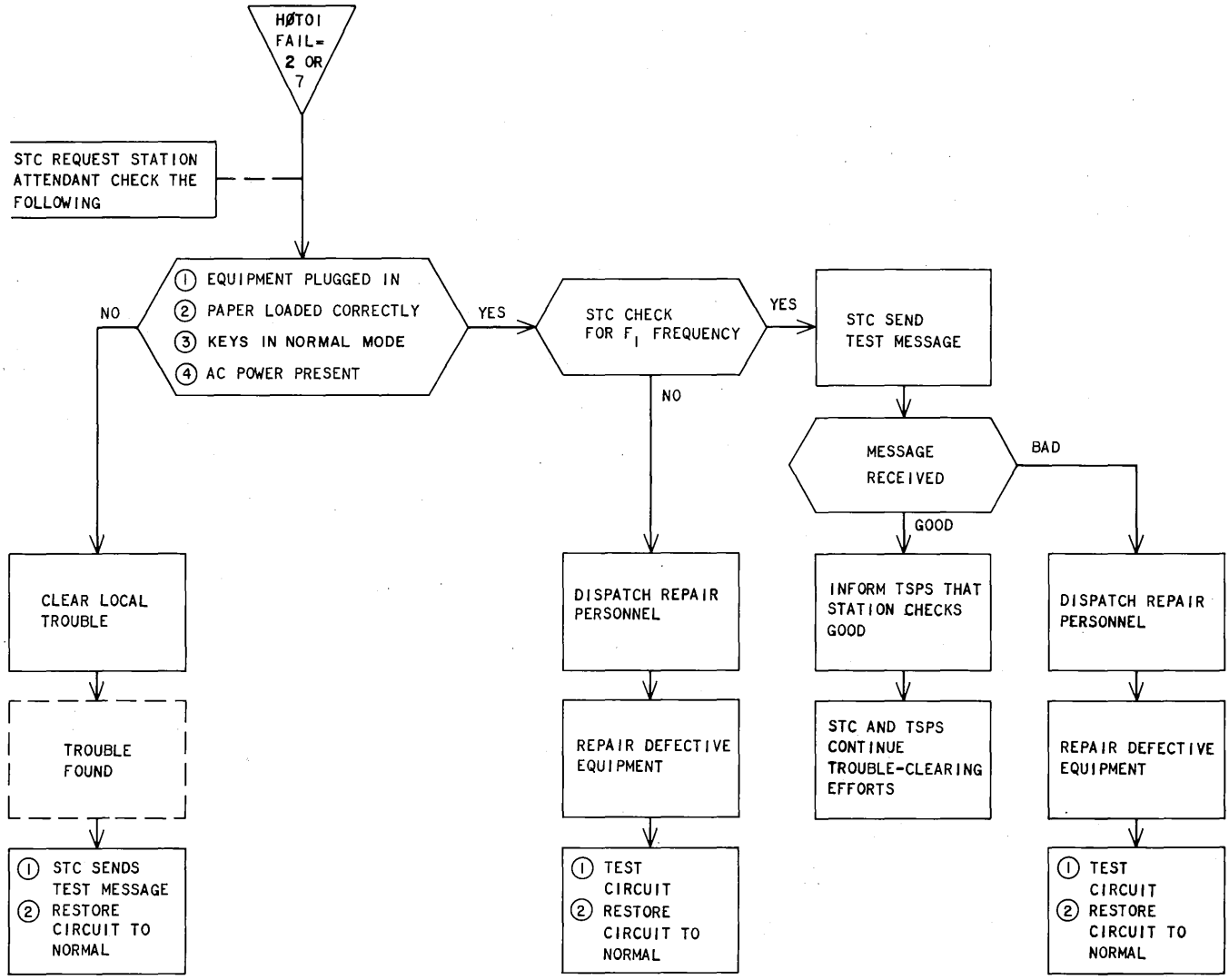


Fig. 21—Record TTY AC Continuity Failure Indication—Fail 2 or 7

(6) STC personnel should remain available for joint testing and restoring the circuit to service after the trouble is cleared.

4.14 The following tests are to be performed when investigating trouble conditions associated with a No ACK Received From an AQ/VQ TTY—HØT01 FAIL = 4, shown in Fig. 23.

(1) Coordinate the station test with someone at the station, either the station attendant or telco installation/repair personnel.

(2) Inspect the station to ensure that ac power is plugged into the TTY, data set, and DAS; paper is loaded properly in the TTY; and TTY and data equipment are turned ON.

(3) STC sends ENQ character to TTY, and ensures that station TTY is responding with an ACK character. If TTY does not respond, dispatch repair personnel to the station.

(4) STC sends test message to the station.

(5) Restore circuit to normal condition.

4.15 The following tests are to be performed when investigating trouble conditions associated

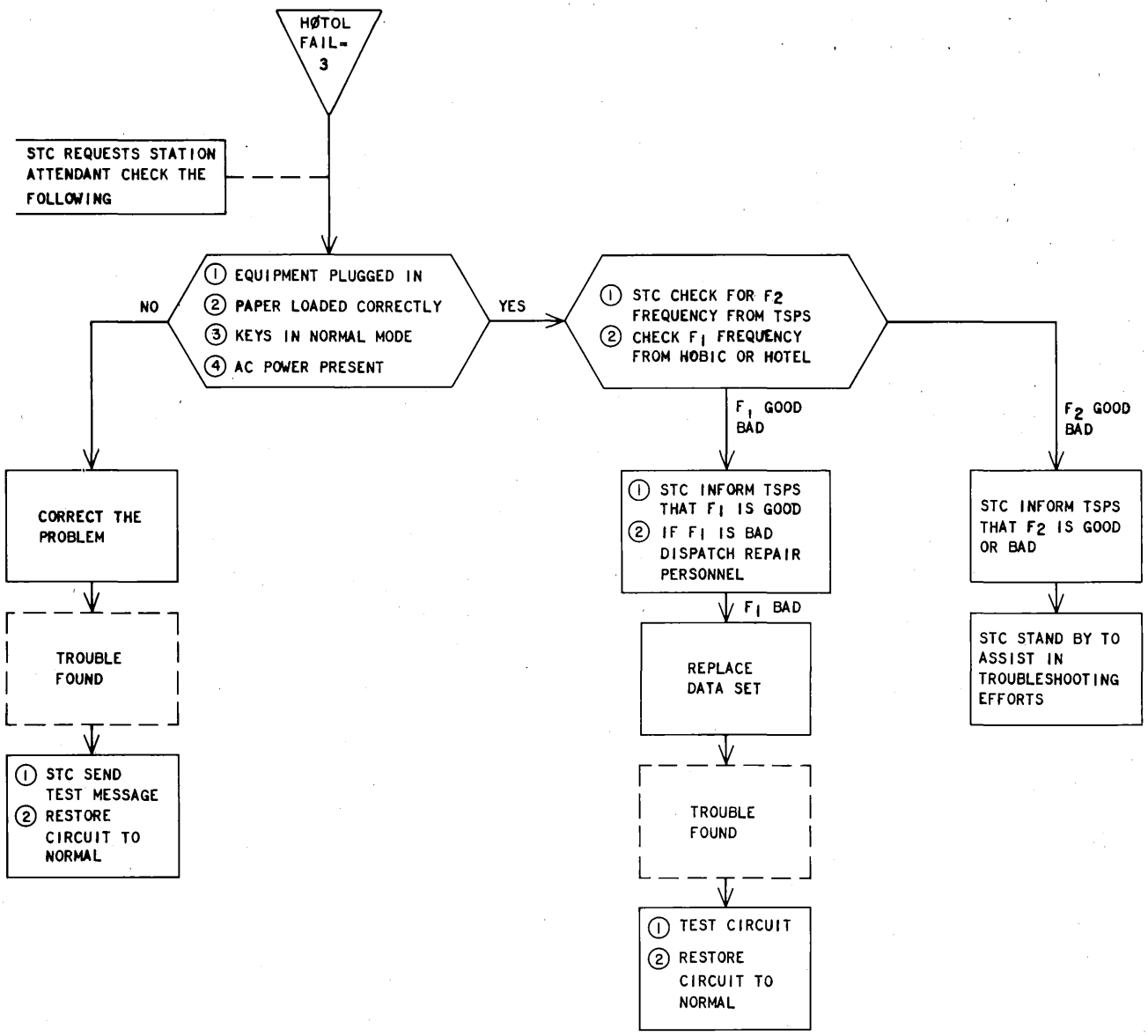


Fig. 22—Auto-Quote/Voice-Quote Continuity Failure Indicator—Fail = 3

with Mutilation/Hit Failure Indication—HØT01 FAIL = 5, shown in Fig. 24.

(1) Coordinate the station test with someone at the station, either the station attendant or Telco installation/repair personnel.

(2) Inspect the station to ensure that ac power is plugged into the TTY, data set, and DAS; paper is loaded properly in the TTY; and TTY and data equipment are turned ON.

(3) Ordinarily, this type of failure is transistional in nature. Only if the condition persists is it possible to locate the trouble. A wide variety of trouble conditions can cause hit failure indications.

(4) STC makes necessary noise test on the line facilities.

(5) STC sends test message to the station.

(6) Restore circuit to normal condition.

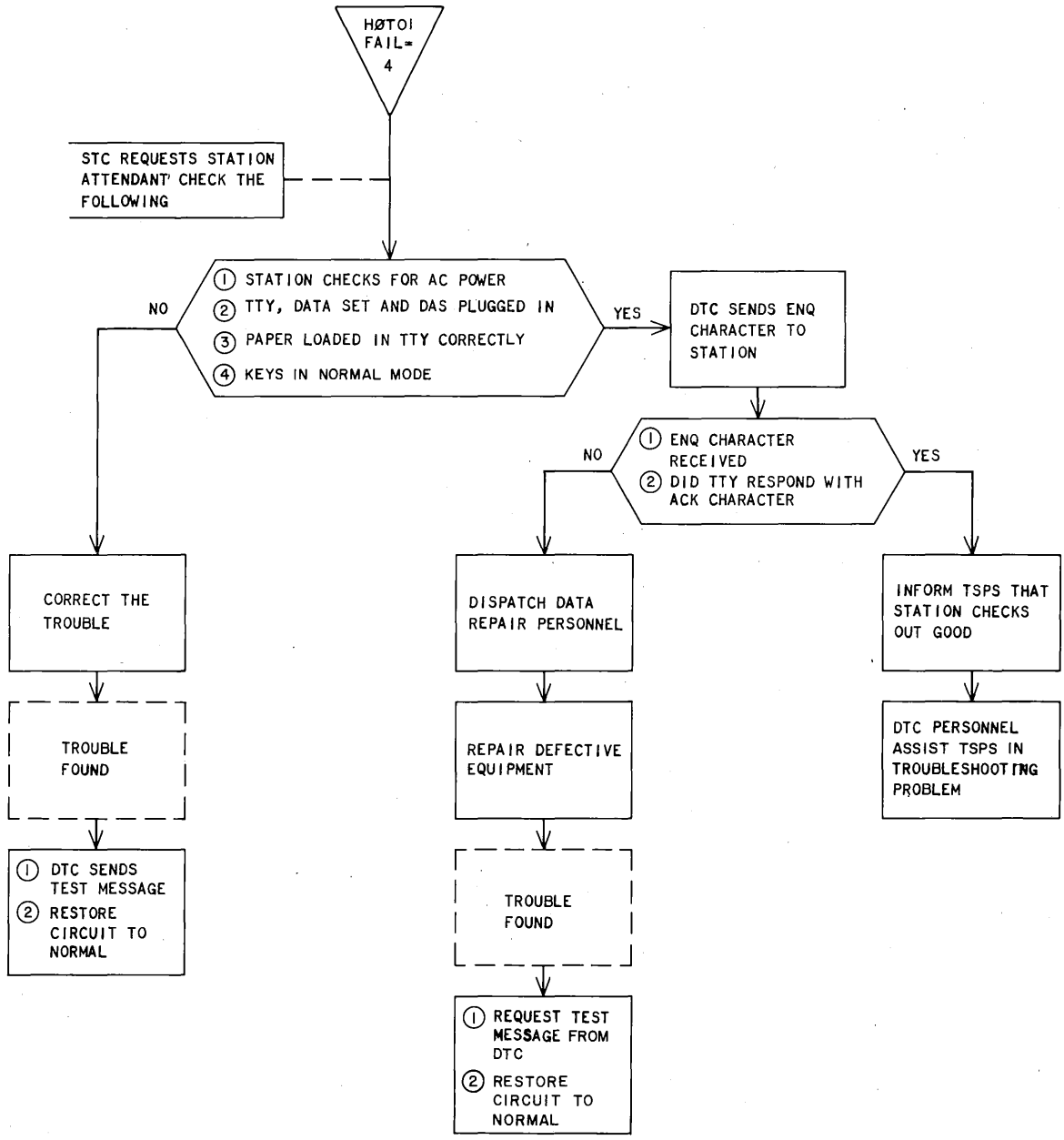


Fig. 23—NO ACK Received From Auto-Quote/Voice-Quote TTY—Fail = 4

4.16 The tests that are to be performed when investigating trouble conditions associated with AC Continuity Failure During Message Transmission HØT01 FAIL = 6 are the same as the procedure shown in Fig. 22.

4.17 The following tests are to be performed when investigating trouble conditions associated with Paper Change Mode Indicated—HØT02, shown in Fig. 25.

(1) Coordinate the station test with someone at the station, either the station attendant or Telco installation/repair personnel.

(2) Inspect the station that ac power is plugged into the TTY, data set, and DAS; paper is

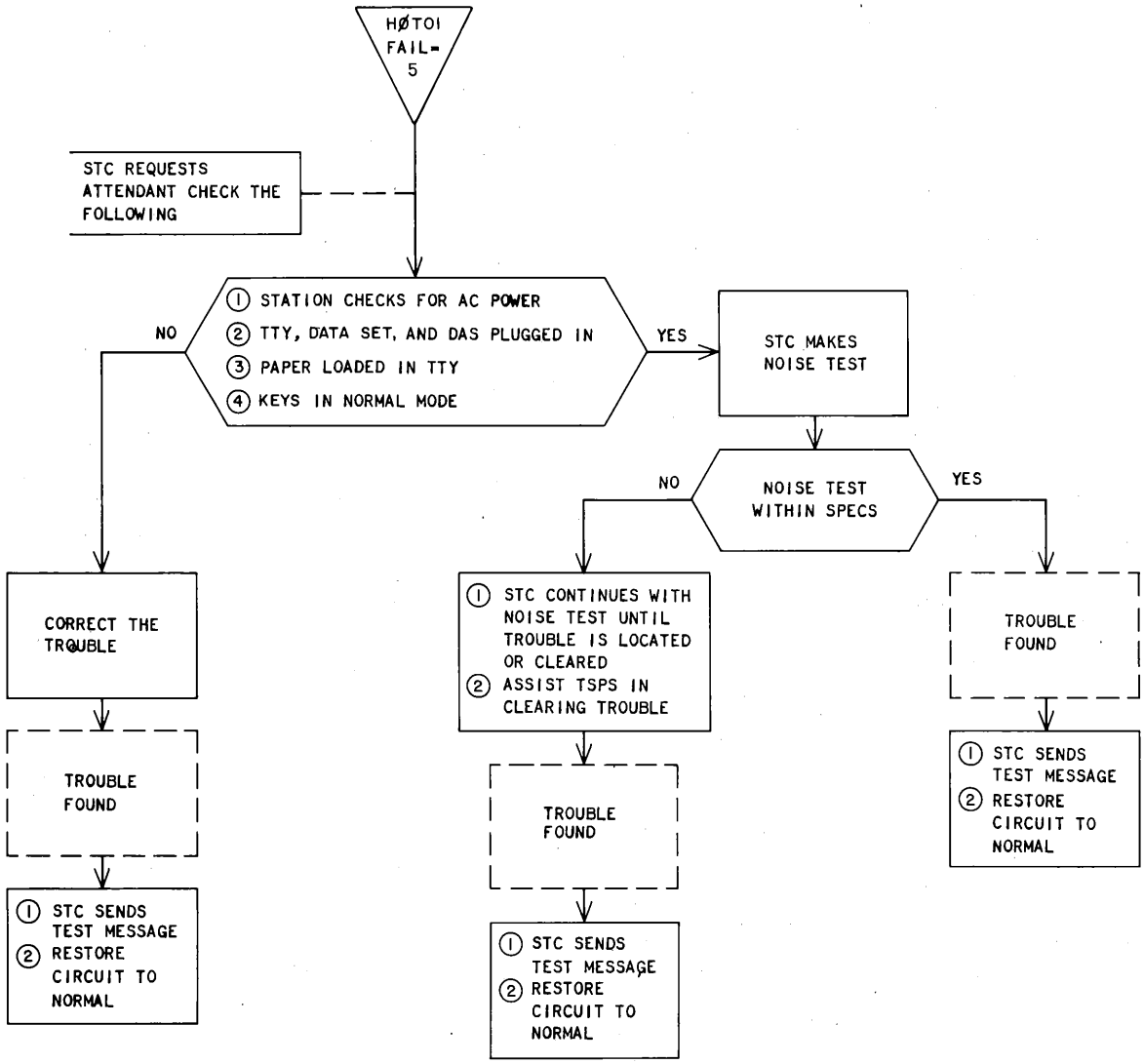


Fig. 24—Mutilation/Hit Failure Indication—Fail = 5

loaded properly in the TTY; and TTY and data equipment are turned ON.

(3) Determine if the TTY is in the paper change mode for a legitimate reason or due to a trouble condition.

(4) Determine that the TTY out-of-service key is operated.

(5) Dispatch craft personnel.

(6) Test circuit and restore to normal condition.

5. SYSTEM AIDS FOR HOTEL/MOTEL TESTING

5.01 This part describes the aids used in testing the H/M feature of TSPS No. 1.

5.02 It will be necessary to coordinate the station test with someone at the station, either the station attendant or telco installation/repair personnel.

A. Teletypewriter

5.03 After proper wiring and signal levels for a TTY channel are verified, any combination of two test messages can be requested from TSPS. One message repeatedly sends the "quick brown

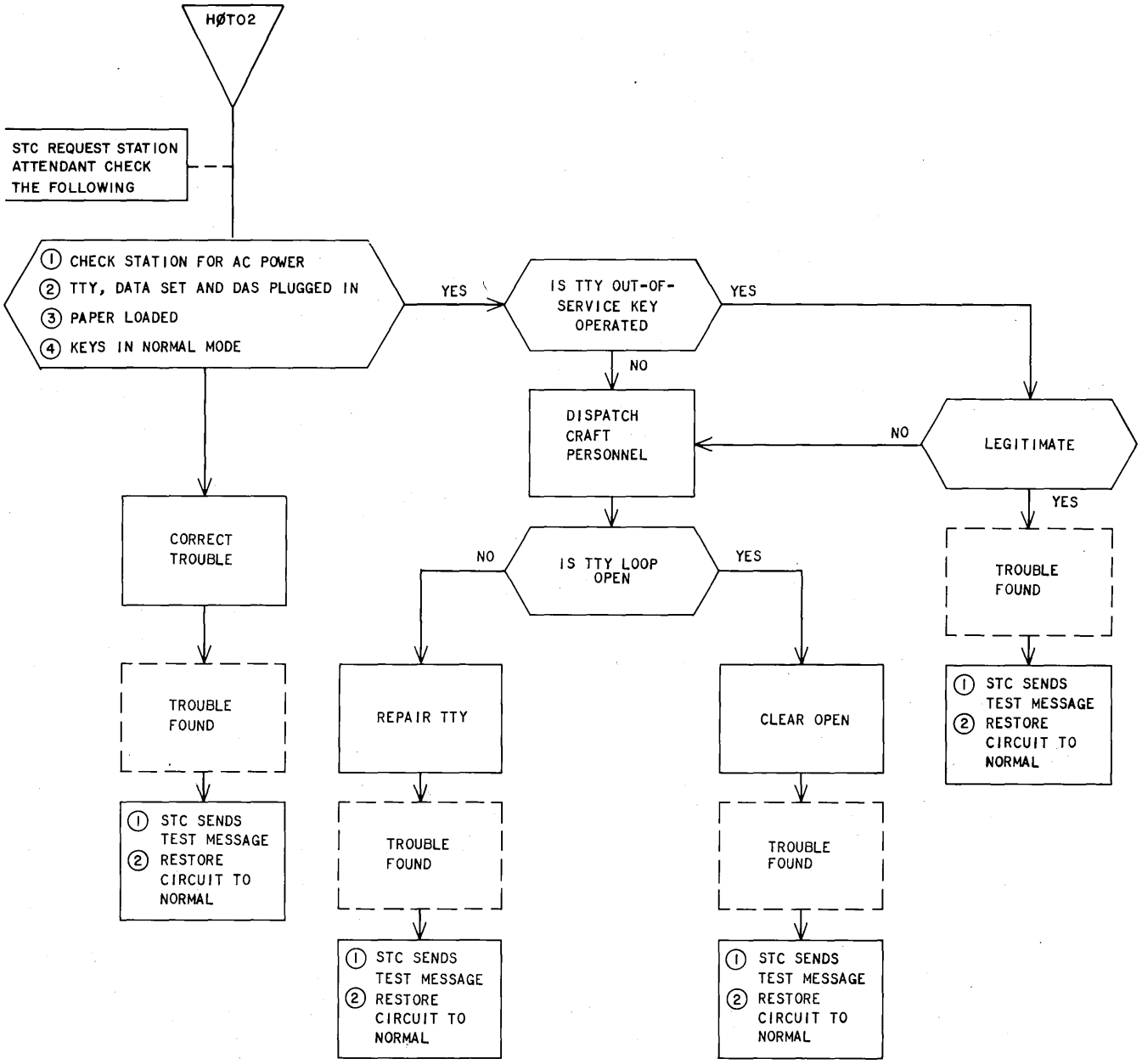


Fig. 25—Paper Change Mode Indication HØT02

fox" test message and does minimal network checks, while the other sends the actual hotel quotation, and thus performs all checks carried out on a hotel/motel quotation.

5.04 Through the use of the HØT02 input message, the TSPS craft force can cause from 1 to 31 test messages to be sent via a specified buffer to a station TTY. At the completion of the last message, an ENQ-ACK check is performed on the channel, and a failure message is printed at the TSPS master control center (MCC) TTY if this check fails. This failure message will be HØT01 with failure type 4.

The possible findings are summarized as follows:

MESSAGE PRINTED CORRECTLY	ENQ-ACK CHECKS	CONCLUSION
Yes	Passed	All seems well.
Yes	Failed	Fault in return path from TTY to buffer; or fault in answer-back mechanism and/or drum coding.
No	Passed	Fault in print mechanism of TTY.
No	Failed	Fault in channel from buffer to TTY; TTY failed to turn ON; or power is OFF on circuitry to TTY.

B. Data Set 108-Type

5.05 The following procedures are contained in Section 591-816-500 for testing data set 108-type:

- Power Supply Test
- Data Set Exchange Procedure
- Carrier Shift Test
- Carrier Monitoring Test
- Loop-Back Voltage Test
- Distortion Measurement Test Using 911A or 911NA DTS
- Distortion Measurement Test Using 914-Type DTSs
- Loop Loss Test.

C. 904G, H, or L Data Test Center

5.06 The STC/DTC should check the following:

- Presence of carrier frequency (f_1 mark, 1270 Hz)
- Measure frequency and level (per circuit layout card).
- Provide TTY tests as required.

5.07 AQ stations operate with carrier off, and the 904G, H, or L must initiate the activity to turn on the TTY.

- Send f_2 mark (2225 Hz) by depressing ANS key. If the TTY key is depressed, the local position TTY runs open until f_1 mark is returned by station.
- TTY goes to marking, indicating that f_1 frequency has been received.
- Station attendant must depress test key to provide station loop-back.
- Measure frequency and level of f_1.
- Transmit ENQ character from position TTY.
- Station TTY should return ACK characters, which are printed on position TTY, indicating that the TTY is on and up to speed.
- Measure distortion on ACK character. Distortion should be less than 18 percent.
- Request station attendant or craft force employees to depress out of service key or simulate out of forms condition. The f_1 spacing frequency (1070 Hz) is sent by the station.
- Request that station attendant restore out of service key. Verify service restoral by sending ENQ character and receiving ACK character.

6. REFERENCES

6.01 The following Bell System Practices provide additional information on H/M AQ System and associated equipment:

SECTION	TITLE
103-813-100	911A, B, and C Data Test Sets—Description, Operation, and Maintenance

SECTION	TITLE
250-141-301	Hotel/Motel Feature—Analyzing and locating Trouble Procedures—TSPS No. 1
579-200-350	Model 33 Teletypewriter Stations for Private Line
579-210-350	Model 35 Private Line Stations
590-102-124	28-Type Data Mounting—Identification
591-023-101	Data Set 108-Type Single Private Line Station Using Data Auxiliary Set 820D-Type—Description and Operation
591-023-201	Data Set 108-Type Single Private Line Station Using Data Auxiliary Set 820D-Type—Installation and Connections
591-023-301	Data Set 108-Type Single Private Line Station Using Data Auxiliary Set 820D-Type—Maintenance
591-023-501	Data Set 108-Type Single Private Line Station Using Data Auxiliary Set 820D-Type—Test Procedures
591-028-100	Data Sets 108D- and 108E-Types Used in Station Applications—Description
591-028-102	Data Set 108D- and E-Types Multiple Private Line Station Arrangement Using 28A1 Data Mounting and 27B1 Data Unit—Description
591-816-100	Private Line Station Arrangements Using Data Auxiliary Sets 830A and 830B with Data Sets 108- and 109-Type—Description and Operation
591-816-200	Private Line Station Arrangements Using Data Auxiliary Sets 830A and 830B with Data Sets 108- and 109-Type—Installation
591-816-300	Private Line Station Arrangements Using Data Auxiliary Sets 830A and 830B with Data Sets 108- and 109-Type—Maintenance
591-816-500	Private Line Station Arrangements Using Data Auxiliary Sets 830A and 830B with Data Sets 108- and 109-Type—Test Procedures
598-059-100	Data Auxiliary Set 820E-Type—Identification
598-083-100	Data Auxiliary Set 830A—Identification
598-083-102	Data Auxiliary Set 830B—Identification
668-400-100	Data Test Center 904G- and H-Type—Description and Operation
984-100-101	Hotel/Motel Feature—General Description—TSPS No. 1