

**PRIVATE LINE STATION ARRANGEMENTS
USING DATA SETS 108F and 108G
WITH DATA AUXILIARY SETS 830B AND 830C
DESCRIPTION**

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1. GENERAL

1.01 This section contains the physical and functional descriptions and test facilities for data sets (DSs) 108F and 108G (Fig. 1) in private line (PL) service. These data sets function alone or with data auxiliary sets (DASs) 830B-L1A and 830C-L1A using customer-provided equipment (CPE) or Bell System teletypewriters (TTYs) hereafter referred to, collectively, as terminal equipment. Station arrangements with DS 108F and DS 108G used alone and in conjunction with DASs 830B-L1A and 830C-L1A are shown in Fig. 2.

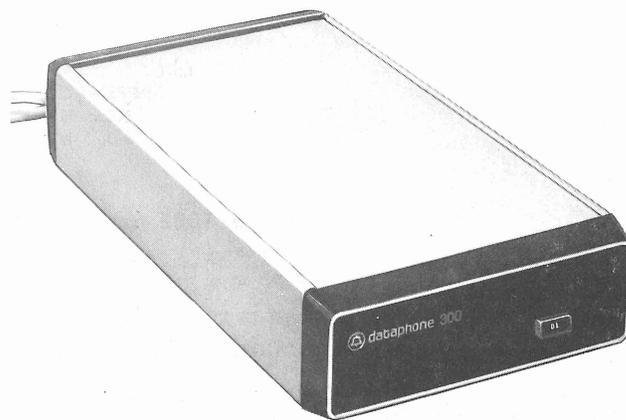


Fig. 1—DS 108F or 108G

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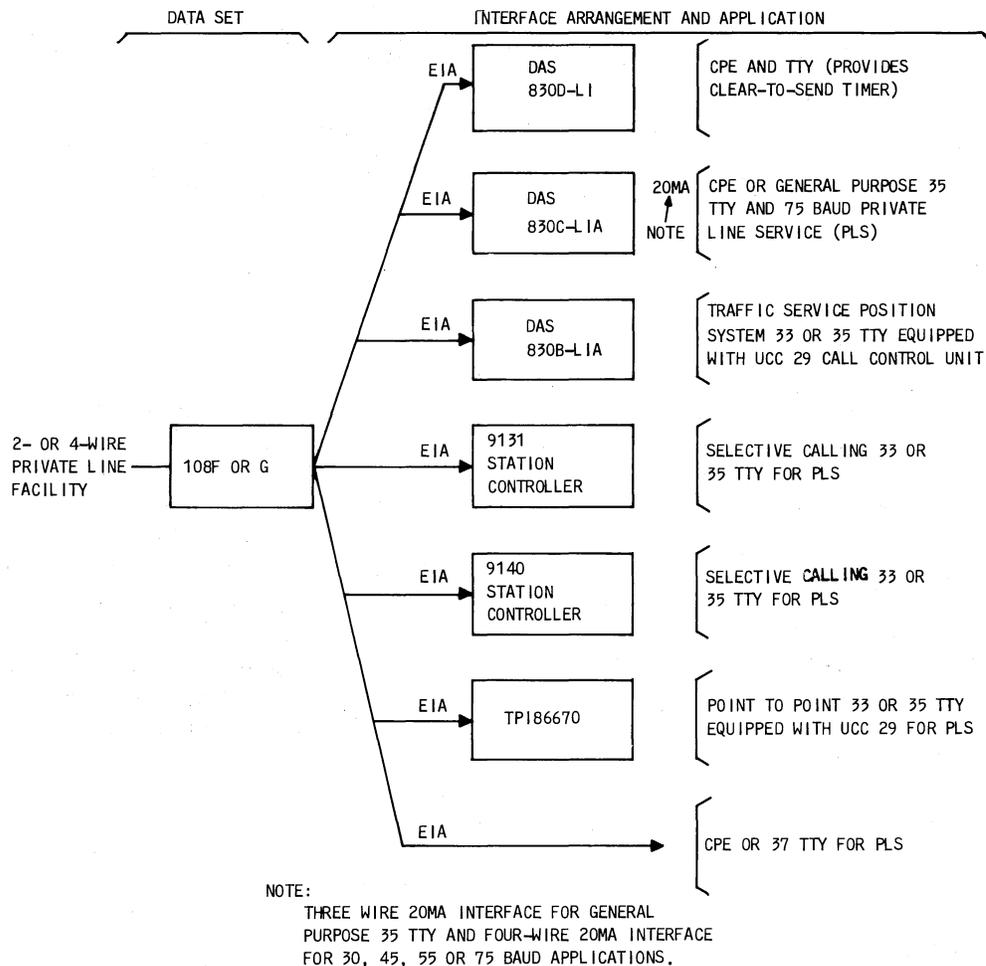


Fig. 2—DS 108F and G Interface Arrangements and Applications

1.02 Whenever this section is reissued, the reason for reissue will be contained in this paragraph.

1.03 DS 108F and G differ only in send and receive frequencies and data set connect characteristics. DS 108F and G send and receive frequencies complement each other.

1.04 DS 108G connects upon detection of either **marking or spacing** carrier, whereas DS 108F connects only upon detection of incoming marking carrier.

COMPARISON OF DS 108F AND 108G WITH DS 108D AND 108E

1.05 DS 108F and G provide the same services and features as DS 108D and E, respectively,

when the latter data sets are used with a DAS 830A.

1.06 The indicator lamp and the test switch in the older arrangement are located on the DAS 830A and are unlabeled. DS 108D and E are equipped with an indicator lamp (also unlabeled). DS 108F and G are equipped with two indicator lights designated CO and TM and a switch designated DL.



The indicator lamp on DS 108D or E is lighted when the incoming carrier frequency is off. Indicator CO on DS 108F or G is lighted when the incoming carrier frequency is on.

1.07 DS 108F and G make extensive use of integrated circuits, including active filters.

DS 108D and E use discrete transistors throughout, as well as LC filters and tuned circuits. DS 108F and G are substantially smaller and lighter than the DS 108D and E installed in a DAS 830A.

1.08 DS 108F and G have switches to set the output in 2-dB steps from -1 to -15 dBm. There is no option to set the hybrid balance. DS 108D and E have a continuous output adjustment, requiring a meter for proper setting, as well as several hybrid balance setting options. DS 108F and G always present a 600-ohm impedance to the line. DS 108D and E present a 600-ohm impedance for 4-wire and a 900-ohm impedance for 2-wire facilities.

1.09 In DS 108F and G the housing is never grounded. In DS 108D and E, the housing is always connected to the "green wire" ground via the third prong of the transformer.

1.10 DS 108F and G are not compatible with DAS 830B-L1, nor with DAS 830C-L1. All sets are compatible with DAS 830B-L1A and DAS 830C-L1A.

DS 108H and J

1.11 DS 108H and J provide 20-mA current interface between a 2-wire private line facility and terminal equipment for serial, low-speed (0 to 150 baud), asynchronous, half- or full-duplex operation.

CRITERIA FOR SELECTING DS 108F AND G WITH DAS 830C-L1A IN LIEU OF DS 108H AND J

1.12 DS 108F and G with DAS 830C-L1A *must* be used when any of the following are required:

- Connection to a 4-wire facility
- Carrier squelch on carrier fail feature
- Broadcast feature
- Remote operation of test mode
- Carrier on (CO) indicator lamp
- Receiver sensitivity of -42 dBm rather than -36 dBm

- Carrier detection characteristics of 108F and G required (see 3.05).

1.13 DS 108F and G provide interface signals as specified in Electronic Industries Association (EIA) Standard RS-232.

1.14 DS 108F and G alone or in conjunction with DAS 830-type provide low-speed, serial, asynchronous, full-duplex operation at the following data rates:

- DS 108F and G used with EIA terminal equipment—300 baud
- DS 108F and G with DAS 830B-L1A used with M33 or M35 TTY—110 baud
- DS 108F and G with DAS 830C-L1A used with CPE or 45-, 55-, or 75-baud TTYs—up to 75 baud
- DS 108F and G with DAS 830C-L1A used with general purpose 35 TTY—110 baud.

1.15 DAS 830B-L1A connects DS 108F or G (EIA interface) to a Model 33- or 35-type TTY interface and replaces DAS 830A (with DS 108-type) in arrangement with DAS 830B-L1. DS 108F and G with DAS 830B-L1A replaces Teletype TP186627 set logic assembly in the TTY interface and most PL and telegraph services provided by DAS 820D (with control card AR17 or AR430). In addition, these DS 108F and G arrangements replace *all* services of DAS 830A with DS 108-type.

1.16 DAS 830C-L1A connects with DS 108F or G to convert EIA voltages from the data set to a 3- or 4-wire 20-mA current interface for a maximum rate of 150 baud to terminal equipment requiring a 20-mA current interface of up to 75 baud. Operation of DAS 830C-L1A with the Bell System general purpose 35 TTY is limited to 110 baud by the TTY.

1.17 The 52A1 data unit connects to DS 108F or G to provide remotely activated digital loopback test capability.

1.18 The technical specification for these private line station arrangements follows:

AC Power: 117 volts ± 10 percent, 60 Hz ± 5 percent. A single data set consumes

approximately 7 watts. The power outlet should be a conventional 3-wire grounded outlet not under switch control.

Operation: Low-speed, asynchronous, binary, serial.

Operating Mode: Full-duplex (with half-duplex operation optional with DAS 830C-L1A).

Data Rates: Up to 300 baud.

Line Impedance: 600 ohms.

Operating Frequencies: DS 108F transmission is in the f_1 band (mark—1270 Hz, space—1070 Hz) and reception is in the f_2 band (mark—2225 Hz, space—2025 Hz). DS 108G transmits in the f_2 band and receives in the f_1 band.

Interface Voltages: Per EIA RS-232-C.

Line Compatibility: DS 108F, an "originate" mode set, is compatible with DS 103F (in the answer mode), 108A, 108E, 108G, and 108J. DS 108G, an "answer" mode set, is compatible with DS 103F (in the originate mode), 108B, 108C, 108D, 108F, and 108H.

Environmental Requirements:

- Ambient temperature range from 40 to 120°F.
- Relative humidity from 20 to 95 percent with no condensation.

2. PHYSICAL DESCRIPTION

A. DS 108F and 108G

2.01 DS 108F and G consist of a single printed circuit pack, an extruded aluminum housing with two plastic covers, and a KS-21239-L4 or -L5 power transformer. Overall dimensions are approximately 5.75 inches wide, 10.9 inches long, and 2.2 inches high. The set weighs approximately 3 pounds and the KS-21239-L4 or -L5 power transformer weighs approximately 1 pound.

2.02 DS 108F or G may be wall mounted using a 193A backboard (ordered separately), desk or table-top mounted. The top surface of each data set mounting is depressed to allow nesting of several data sets.

2.03 The housing is externally similar in appearance to the 47-type data mounting. The housing assembly consists of an aluminum extrusion which provides card guides for mounting the circuit pack (Fig. 3) and front and rear covers. No interface assembly or electrical connections are provided. All connectors are mounted directly on the circuit pack. The circuit pack is held in position by the latching mechanism shown in Fig. 4.

Note: The circuit pack should be installed and removed from the rear of the data mounting.

2.04 The data set is equipped with a 25-pin customer interface connector to provide EIA interface to either CPE or DAS 830-type (Fig. 5). Telephone line interface is provided by locally furnished D4BT mounting cord (either 2- or 4-wire lines). A locally furnished D4BT mounting cord must also be provided between power transformer KS-21239-L4 or -L5 and each data set. Terminals are also provided for remote test switch connection.

2.05 DS 108F or G is equipped with two light-emitting diode (LED) status lamps:

- The test mode (TM) lamp is lighted whenever pushbutton DL is depressed or the data mode is entered remotely.
- The carrier on (CO) lamp is lighted whenever the data set is in the data mode.

2.06 The data set is equipped with one locking-type pushbutton switch, designated DL (digital loopback), which is accessible at the front panel. Depressing the DL switch causes the TM lamp to light, internally connects the received data (BB) lead to the transmitted data (BA) lead (with option F installed) and disconnects these interface leads as well as the data set ready (CC) lead.

B. DAS 830B-L1A

2.07 DAS 830B-L1A (Fig. 6) is a 6-button key unit designed for mounting under the faceplate of the TTY in front of the UCC29 (Fig. 7). The

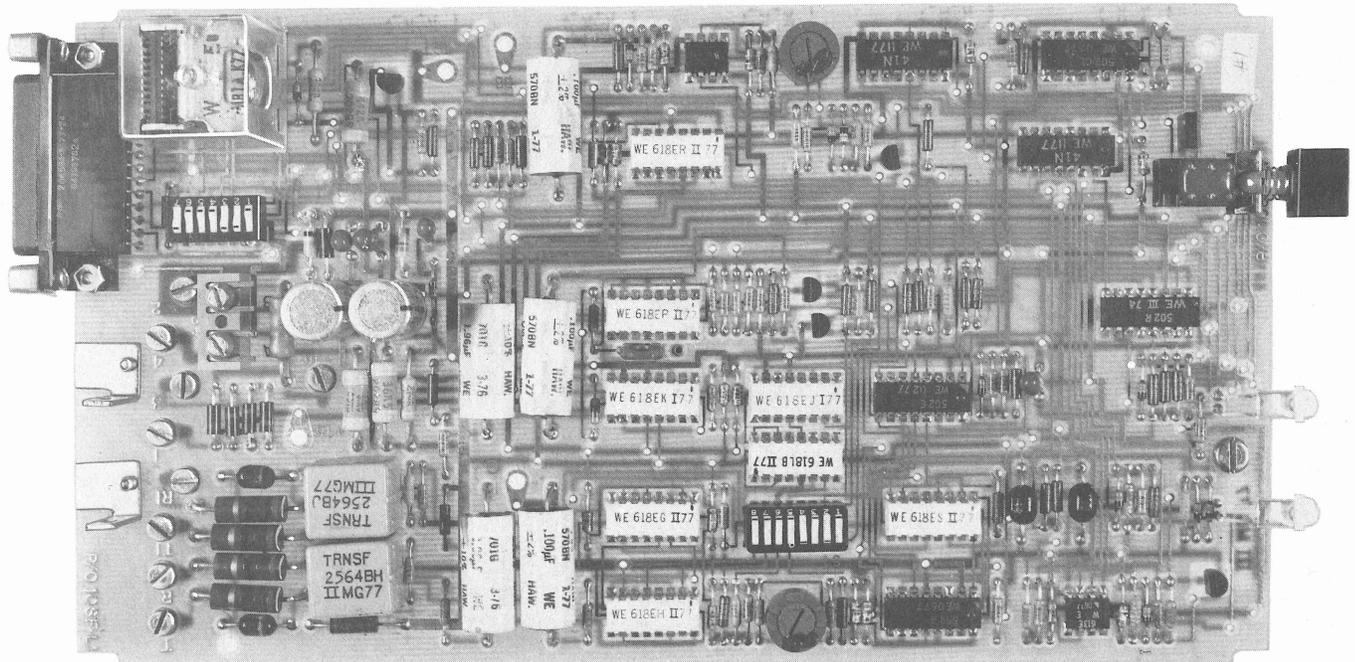


Fig. 3—Circuit Pack of DS 108F (Similar to DS 108G Circuit Pack)

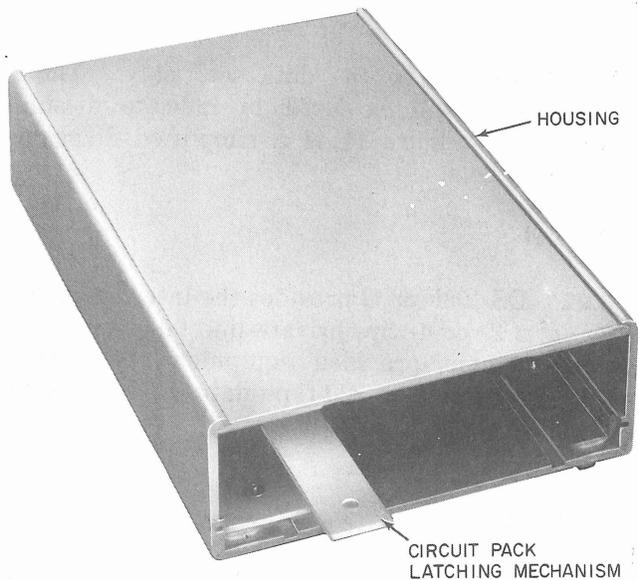


Fig. 4—DS 108F or G Housing

DAS is installed in the TTY by the service center. Table A provides physical and power information for DAS 830B-L1A. DAS 830B-L1A can also be used with DAS 830A or DAS 820D but DAS 830B-L1 **cannot** be used in this station arrangement.

C. DAS 830C-L1A

2.08 DAS 830C-L1A (Fig. 8) consists of a printed circuit board mounted on a 168D-49 backboard equipped with a 101A-49 cover. The terminal board (Fig. 9) provides option jacks and screw terminals for connections to terminal equipment.

2.09 DAS 830C-L1A is equipped with a 6-foot cord. One end of the cord is connected to the DAS 830C-L1A and the other end is equipped with a male 25-pin EIA interface plug for connection to either DS 108F or 108G. Leads used in the EIA cord are as indicated below:

- Pin 2—Transmitted data (BA)
- Pin 3—Received data (BB)
- Pin 7—Signal ground (AB)
- Pin 8—CF (not connected on DAS 830C-L1A—lead taped and stored. Lead can be used for local engineering to provide a carrier detector indication)
- Pin 9—positive volts (+P)

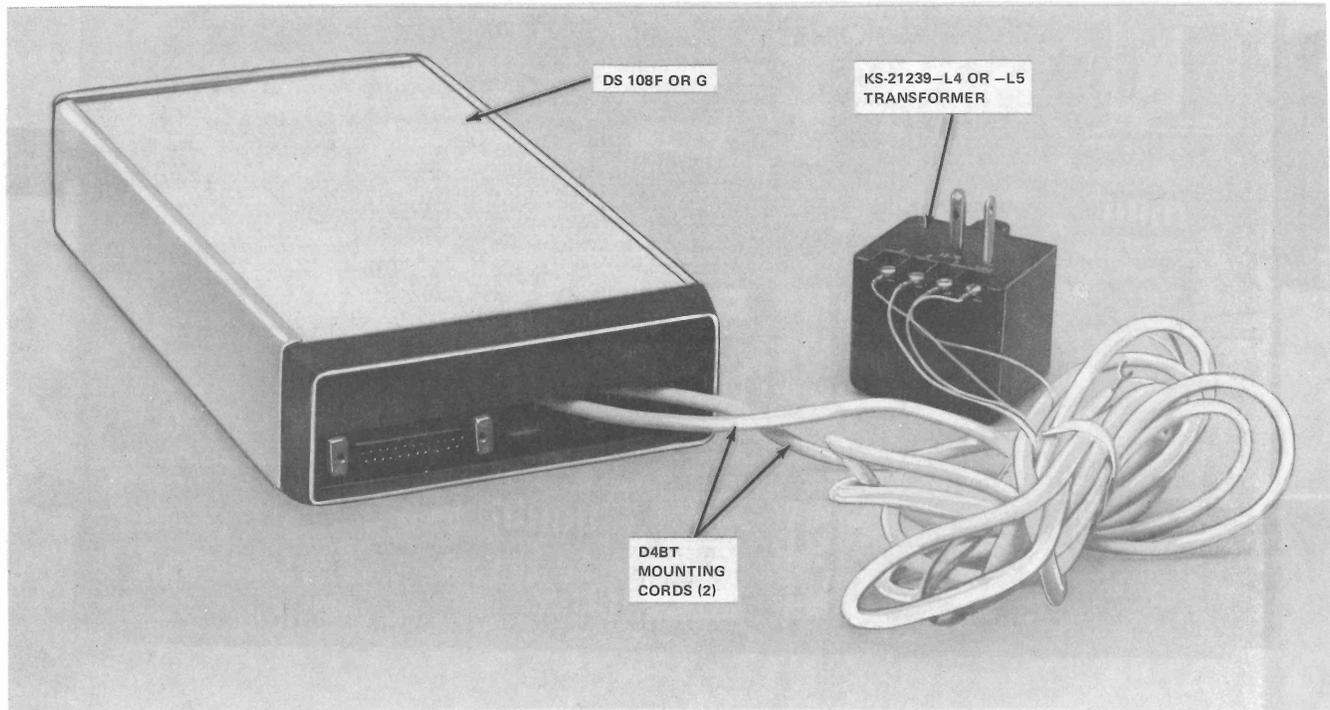


Fig. 5—DS 108F or G Rear View

- Pin 10—negative volts (-9).

2.10 DAS 830C-L1A can be used with DAS 830A or DAS 820D but DAS 830C-L1 **cannot** be used in this station arrangement. Table A provides physical and power information for DAS 830C-L1A.

D. 52A1 Data Unit

2.11 The 52A1 data unit (Fig. 10) consists of a printed circuit board which is mounted directly to the circuit pack of DS 108F or G.

2.12 The 52A1 power and signal leads are derived from the DS 108F or G via the metal standoffs used to mount the printed circuit board to the data set.

3. FUNCTIONAL DESCRIPTION

A. DS 108F or 108G

3.01 This part contains information pertaining to DS 108F or G modulation, transmission, reception, interface, and options. Because of functional similarity, all references to DS 108F

and 108G will be to "data set" only. The full designation will be used to indicate dissimilar functions. Figure 11 is a simplified diagram of the data sets.

General

3.02 DS 108F or G provides the interface between a 2- or 4-wire private line telephone facility and customer-provided equipment, Bell System teletypewriters, or 830-type data auxiliary sets in various applications.

Modulation

3.03 The data set employs frequency-shift keying (FSK) with a shift of +100 Hz for a mark and -100 Hz for a space. DS 108F converts the dc signals at the customer interface into ac signals in the f_1 frequency band (see Table B) for transmission over the telephone line and receives ac signals in the f_2 frequency band for conversion to dc signals and output to the customer interface. DS 108G transmits in the f_2 band and receives in the f_1 band (see Table B).

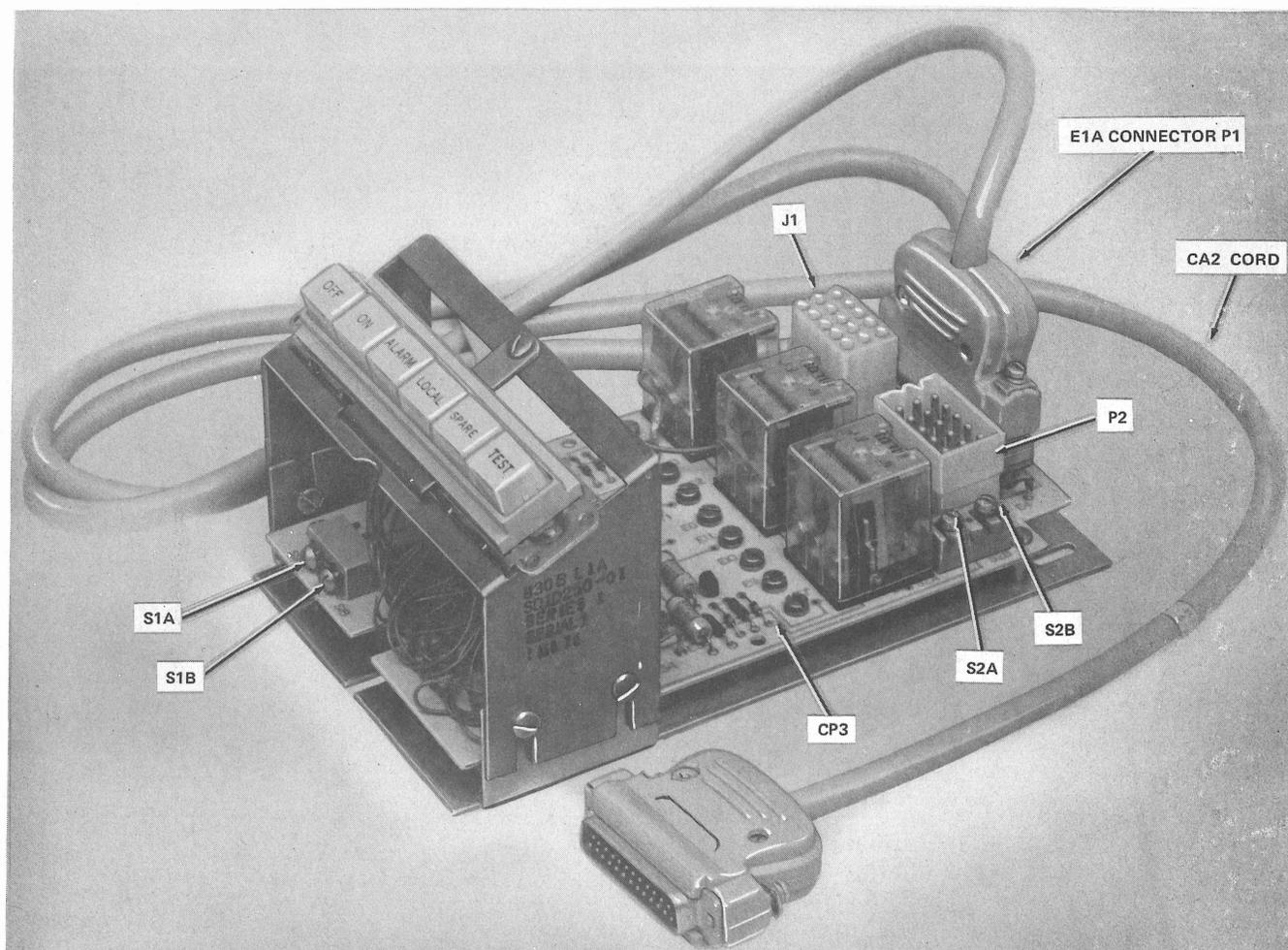


Fig. 6—DAS 830B-L1A

Transmission

3.04 The data set FSK modulates data signals at an output power range of nominally -1 to -15 dBm into a 600-ohm 2- or 4-wire line. The data set transmit level is adjustable in 2-dB steps (refer to Section 591-818-200 for procedures for setting output level).

Reception

3.05 The data set enters the data mode upon receipt of the appropriate carrier frequency (f_1 mark or space for DS 108G, f_2 mark for DS 108F) for at least 300 ms. The data set remains in the data mode until loss of carrier occurs or the signal level drops below approximately -45 or (optionally) -39 dBm.

EIA Interface

3.06 The EIA interface is accessible through the connector at the rear of the data set. The connector pin numbers, EIA designation, and function are shown in Table C.

3.07 Customer interface lead functions are as follows:

- (a) **Transmitted Data (BA) (Pin 2):** This lead accepts information from the terminal equipment or DAS 830-type.
- (b) **Received Data (BB) (Pin 3):** This lead outputs demodulated data received from the telephone line to the terminal equipment or DAS 830-type.

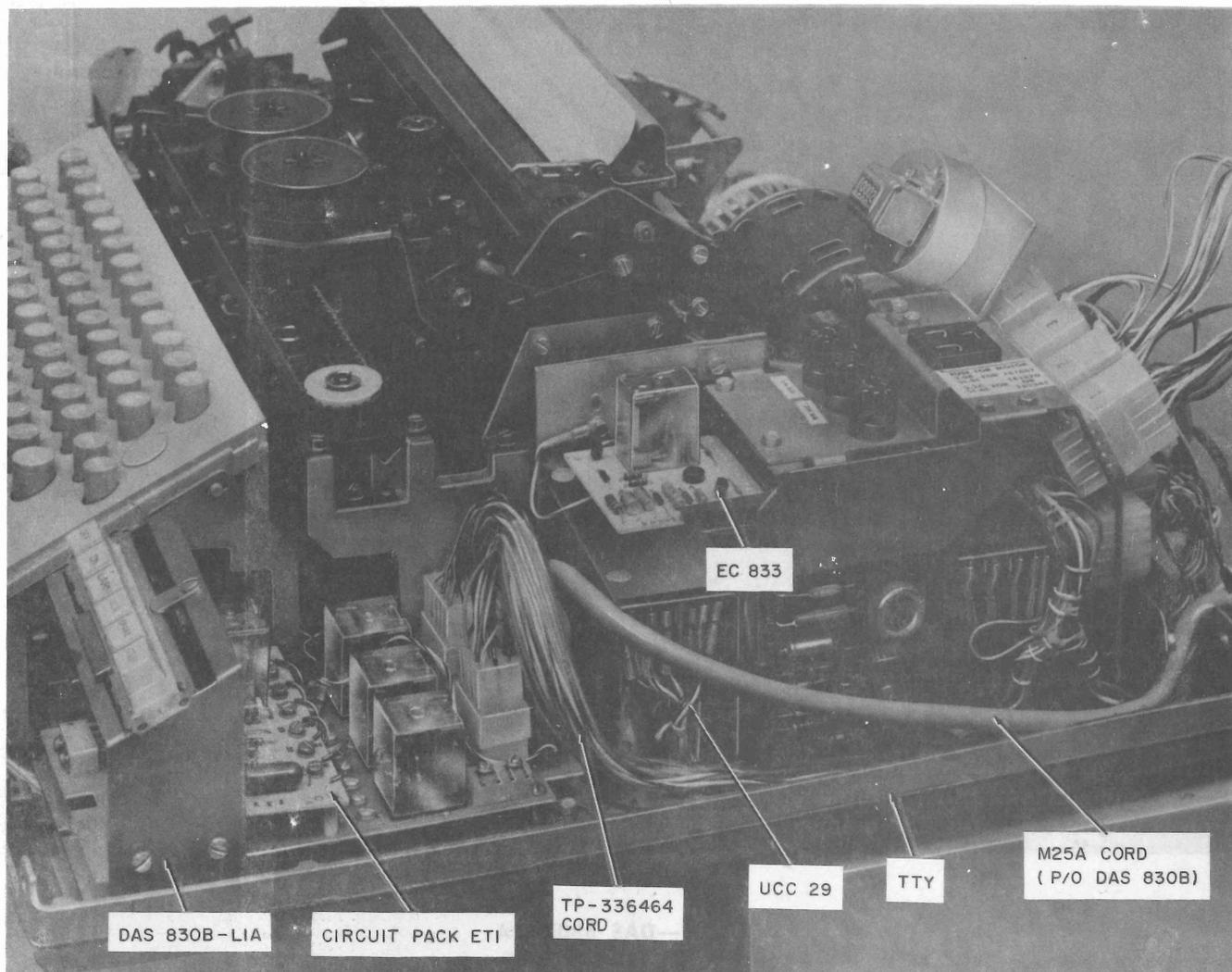


Fig. 7—DAS 830B-L1A Mounted in TTY

(c) **Request-to-Send (CA) (Pin 4):** An *on* condition of this lead is an indication to the data set that the terminal equipment intends to transmit data.

(d) **Clear-to-Send (CB) (Pin 5):** The *on* condition of this lead is in response to the *on* condition of CA (above) and indicates (optionally) that the data set has detected data carrier.

(e) **Data Set Ready (CC) (Pin 6):** An *on* condition of this lead indicates the data set is in the data mode and capable of transmitting and receiving data.

(f) **Signal Ground (AB) (Pin 7):** This lead establishes a common ground reference for all interface leads.

(g) **Received Line Signal Detector (CF) (Pin 8):** An *on* condition of this lead indicates to the terminal equipment that the data carrier is being received by the data set.

(h) **Positive Voltage (+P) (Pin 9):** This lead provides +16V for telephone company (telco) test purposes.

(i) **Negative Voltage (-P) (Pin 10):** This lead provides -16V for telco test purposes.

TABLE A

DAS 830B-L1A AND 830C-L1A GENERAL INFORMATION

| DAS | SIZE (INCHES) | WEIGHT (POUNDS) | VOLTAGE | POWER (WATTS) | INTERFACE TO TERMINAL EQUIPMENT |
|----------|-----------------------------------|-----------------|---|---------------|--|
| 830B-L1A | 3.5 high 10.5 wide 8.7 deep | 8 | +20 to +28V from TTY -12 to -26V from DS | 3 1/2 | Current for 33 and 35 TTY equipped with UCC29 (<i>Notes 1 and 2</i>) |
| 830C-L1A | 1.2 high 3.9 wide 2.0 deep | 6 oz | +12 to +26V -12 to -26V from DS | 3/4 3/4 | Current for up to 150 baud PL service or 35 general purpose PL TTY (<i>Note 1</i>) |

Note 1: DAS 830B-L1A and 830C-L1A provide EIA interface to DS 108F or 108G.

Note 2: A TP-336464 cord is required to interconnect the DAS 830B-L1A to the UCC29 of the TTY.

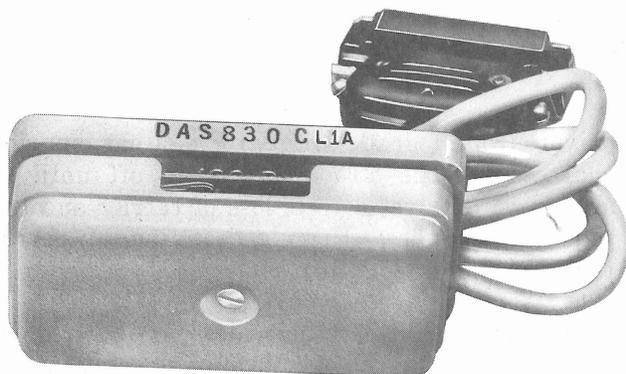
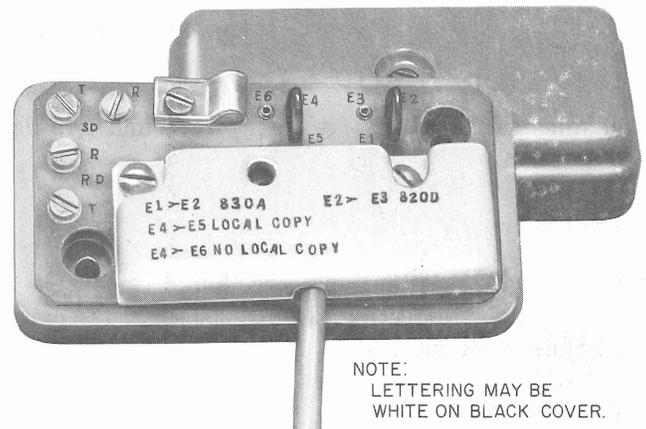


Fig. 8—DAS 830C-L1A



NOTE:
LETTERING MAY BE
WHITE ON BLACK COVER.

Fig. 9—DAS 830C-L1A Terminal Board

(j) **Test (Pin 18):** This is a non-EIA lead (normally open) activated by option P. Refer to Section 591-818-200 for a description of this option.

Telephone Line Interface

3.08 The data set can be connected to either a 2- or a 4-wire telephone facility. Refer to Section 591-818-200 for a complete description of these options.

Test Mode

3.09 Depressing the DL switch places the data set in the test mode and lights indicator TM. In the test mode, data set lead BA is (optionally) internally connected to BB and these customer interface leads as well as CC and CF are disconnected from the terminal equipment or DAS 830-type. This allows a data connection to be established between the data set and the test center and

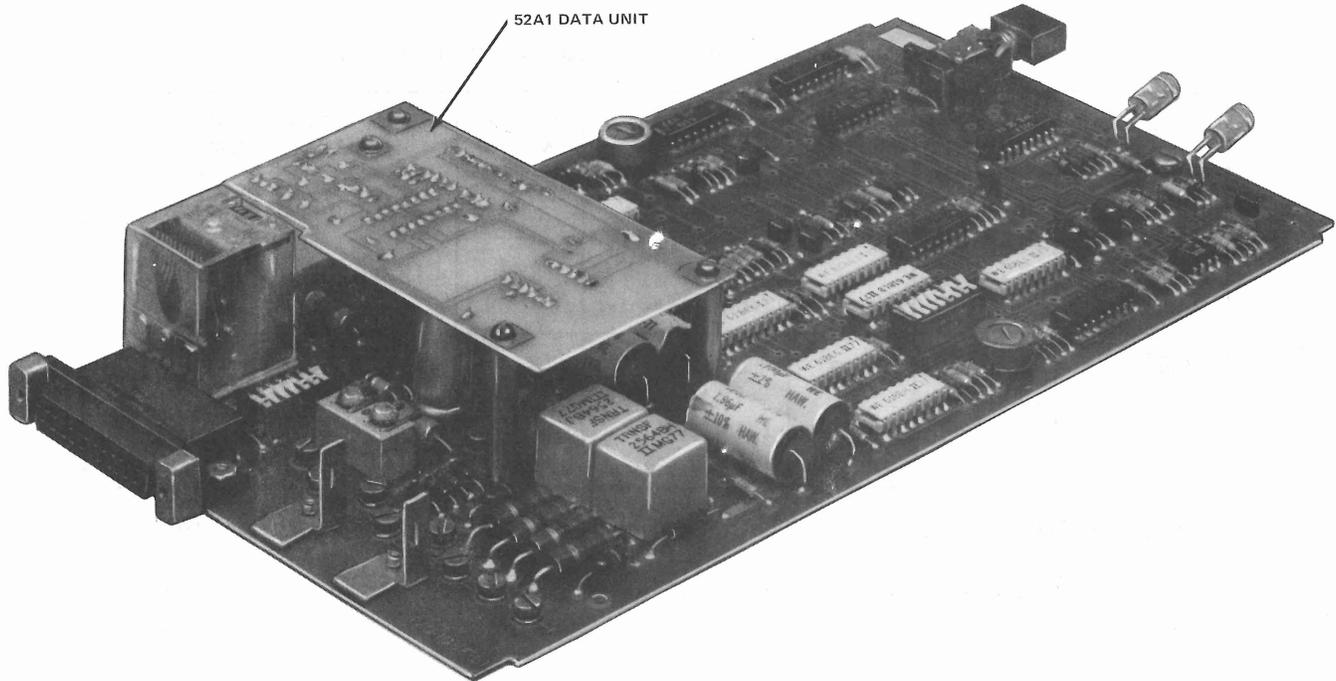


Fig. 10—52A1 Data Unit Mounted on DS 108F

enables the test center to measure round trip data distortion.

Options

3.10 Data set options are listed in Table D. Refer to Section 591-818-200 for a description of these options.

B. DAS 830B-L1A

3.11 DAS 830B-L1A provides current to EIA conversion between a CPE or TTY and the DS 108F or G. In addition, it provides the options or control features shown in Table E.

3.12 When transmitting data, the TTY current-no-current signals are converted by DAS 830B-L1A to EIA signals for use by the data set. When receiving data, the EIA signals are converted to current-no-current signals for use by the TTY.

3.13 DAS 830B-L1A also provides for TTY machine control by end of text (EOT) character. When an EOT is received, the TTY motor is turned off and a mark is placed on the select magnet

driver (SMD) lead to guard against spurious characters. The TTY will remain off until the associated data set detects loss of carrier and then redetects carrier. Upon redetection of carrier, the TTY motor will turn on.

3.14 DAS 830B-L1A provides six buttons for controlling the operation of the station. The 6-button key and the functions provided by each button are shown in Fig. 12.

DAS 830B-L1A With ET1 Circuit Pack

3.15 Two additional arrangements can be implemented by using an ET1 circuit pack (Fig. 13) with DAS 830B. The circuit pack provides:

- a send space timing (SST) circuit.
- a message waiting lamp circuit for use with Traffic Service Position System (TSPS) No. 1 Hotel Billing Information Center TTY.

Screw terminals and holes are provided on DAS 830B-L1A for connecting and mounting of the ET1 circuit pack.

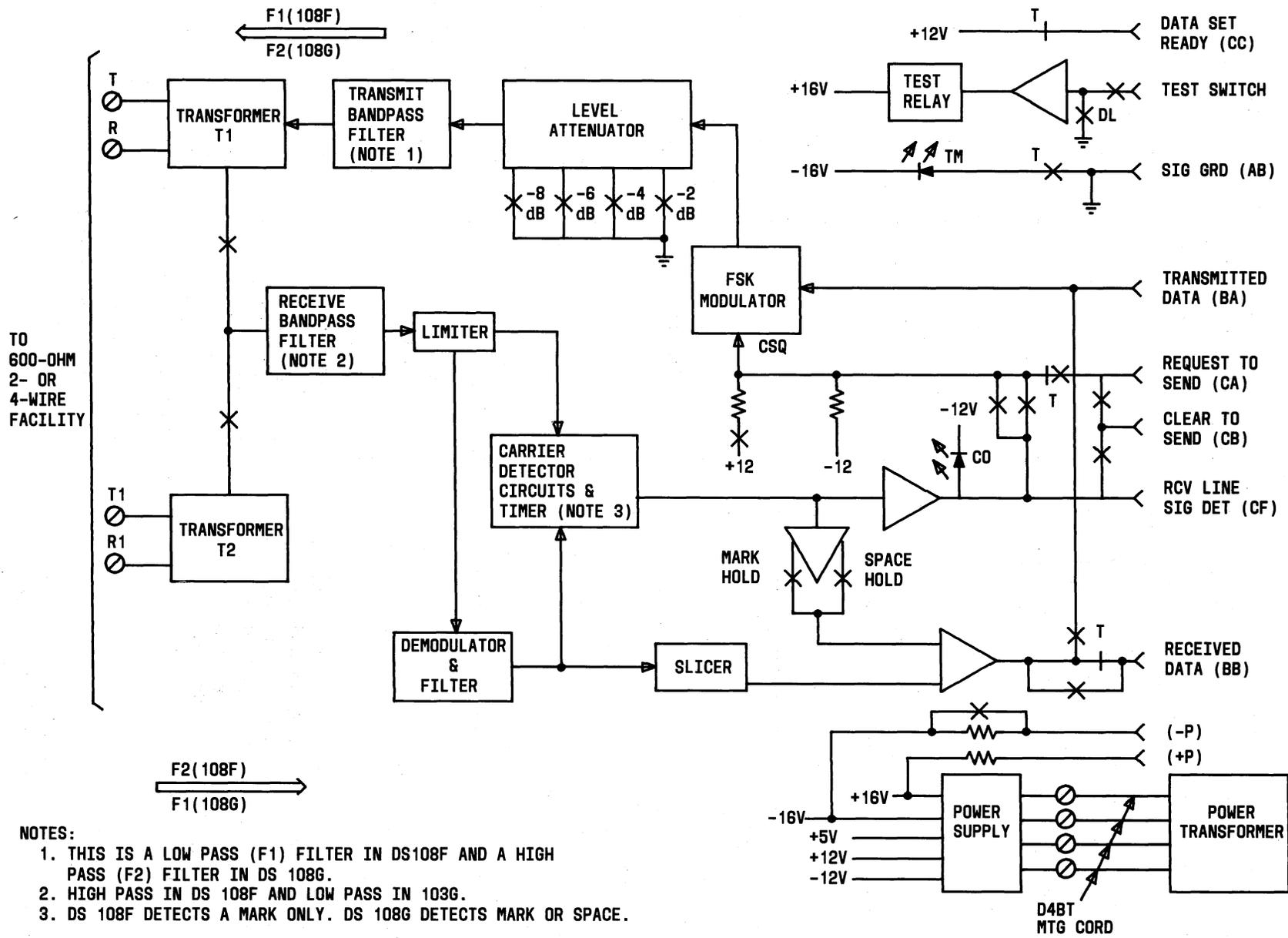


Fig. 11—DS 108F and G Simplified Diagram

TABLE B

DATA SET FREQUENCY DATA

| DATA SET | TRANSMIT | | | RECEIVE | | |
|----------|-----------|------|-------|-----------|------|-------|
| | FREQ BAND | MARK | SPACE | FREQ BAND | MARK | SPACE |
| 108F | F1 | 1270 | 1070 | F2 | 2225 | 2025 |
| 108G | F2 | 2225 | 2025 | F1 | 1270 | 1070 |

TABLE C

EIA INTERFACE CONNECTOR

| PIN | FUNCTION | EIA DESIGNATION (RS-232-C) |
|-----|-------------------------------|----------------------------|
| 2 | Transmitted Data | BA |
| 3 | Received Data | BB |
| 4 | Request to Send | CA |
| 5 | Clear to Send | CB |
| 6 | Data Set Ready | CC |
| 7 | Signal Ground | AB |
| 8 | Received Line Signal Detector | CF |
| 9 | Positive Voltage | +P |
| 10 | Negative Voltage | -P |
| 18 | Test (Note) | |

Note: Used in some Bell System applications.

DAS 830B-L1A With TTY Break Detection Circuit EC-833

3.16 The TTY break detection circuit EC-833 (part of Teletype TP186630 modification kit), installed within the UCC29, is compatible with DAS 830B-L1A. The spare lamp and button contacts are already wired to appropriate connectors which interface with the EC-833. The TTY break detection circuit cannot be used in conjunction with the message waiting lamp circuit.

C. DAS 830C-L1A

3.17 DAS 830C-L1A is used to convert the standard EIA voltages of DS 108F and G to a 20-mA, 3- or 4-wire current interface for CPE or Bell

TABLE D

DATA SET 108F OR G OPTIONS

| FEATURE | OPTION | |
|---|--------------------------|----|
| Facility | 4-Wire | Z |
| | 2-Wire ✓ | Y* |
| Mark or Space Hold | Mark ✓ | U* |
| | Space | V |
| CB Internally Connected to | None | E |
| | RS ✓ | W |
| | CA | X* |
| Carrier Control | Via CA | D |
| | Via RS | T |
| | Always on in Data Mode ✓ | S* |
| | Always off in Data Mode | H |
| Remote Test Connection via J1 | Yes | P |
| | No ✓ | N* |
| Local Copy in Test Mode | Yes | G |
| | No ✓ | F* |
| Receiver dB Gain Reduction | 6 ✓ | K* |
| | 0 | J |
| Ground Wire (GRD) Connected to Signal Ground (SG) | Yes ✓ | M* |
| | No | L |
| Resistor Bypass for Negative Voltage (-P) on J1 | Yes | R |
| | No ✓ | Q* |

* Factory furnished option.

TABLE E

DAS 830B-L1A OPTIONS

| FEATURE | OPTION | REMARKS |
|-----------------------------------|--------|---|
| Mark clamp | S | Mark clamp on the BA lead when TTY is in the OFF condition. (See Note.) |
| Space clamp | T | Space clamp on the BA lead when TTY is in the OFF condition. (See Note.) |
| No EOT disconnect | U | The TTY will not turn OFF upon receiving EOT. |
| EOT disconnect | V | The TTY will turn OFF upon receiving EOT and place a mark on select magnet driver to guard against spurious characters. |
| Paper alarm — motor stops | X | The TTY motor is stopped upon a low-paper or out-of-paper condition. |
| Paper alarm — motor does not stop | W | The TTY motor is not stopped upon a low-paper or out-of-paper condition. |
| Full-duplex | Y | No local copy of transmitted data provided. |
| Half-duplex | Z | Local copy of transmitted data provided. |

Note: When option X is provided, the BA lead can be clamped to the selected option (mark or space) when a low-paper or out-of-paper condition occurs.

System TTY terminals requiring current interface. The options provided are shown in Table F.

D. 52A1 Data Unit

3.18 The 52A1 data unit connects to the "test" and received data (BB) leads of DS 108F or G. The 52A1 data unit detects marking and spacing signals received by the data set. Upon receipt of a steady spacing signal of at least 1-second in duration, the data unit places a ground on the test lead causing the data set to enter the test mode. A steady marking signal of at least 250 ms in duration removes the test lead ground and allows the data set to enter the data mode.

4. DATA STATION TEST FACILITIES

4.01 DS 108F or G provides a test mode which may be entered by depressing the DL switch. The test mode may also be entered remotely via

two screw terminals or by the TEST switch of DAS 830B-L1A or the test facility of some TTYs. Any of the above actions light indicator TM.

4.02 The 52A1 data unit causes DS 108F or G to enter the test mode upon receipt of the proper line signal. This feature allows the digital loopback test to be exercised without customer assistance.

5. REFERENCES

5.01 The following Bell System Practices provide additional information on DS 108F and G and associated equipment:

| SECTION | TITLE |
|-------------|--|
| 591-042-100 | Data Sets 108F and 108G—Identification |

SECTION 591-818-100

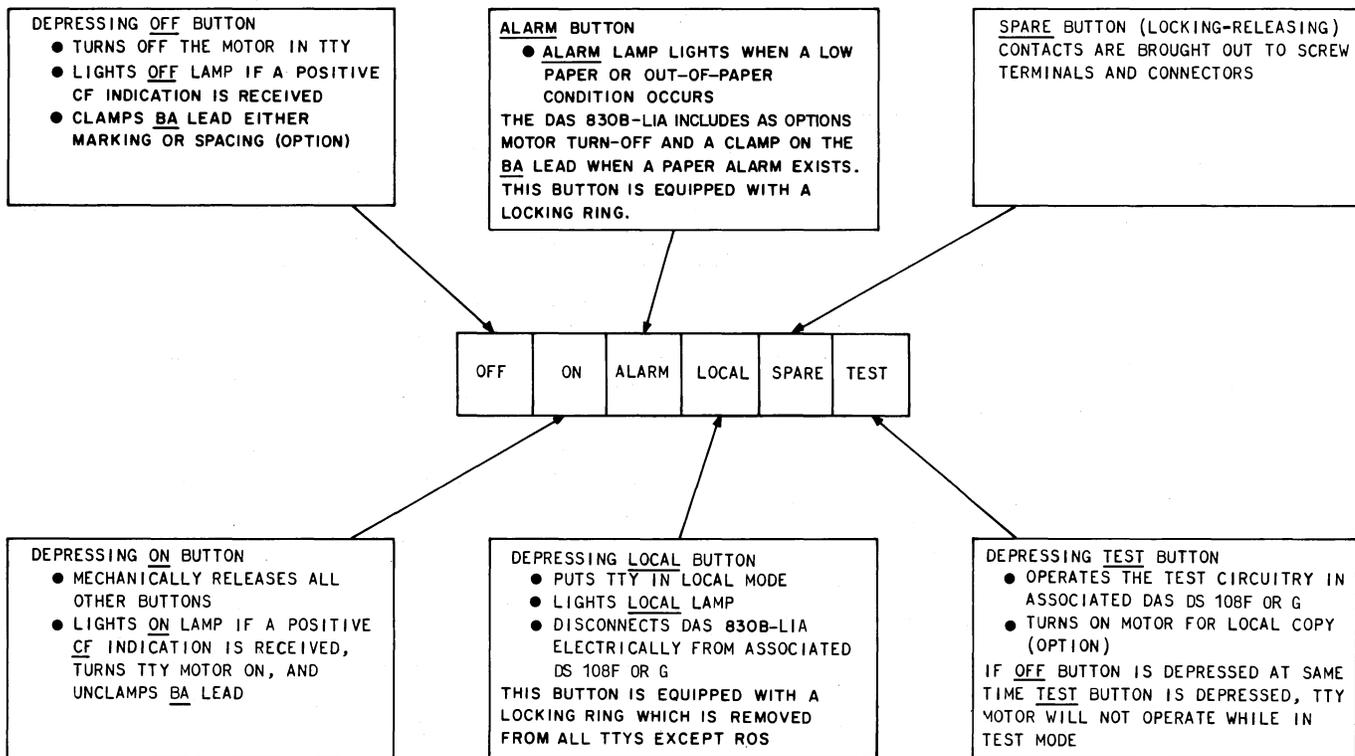


Fig. 12—DAS 830B-L1A—Key Designations and Functions

| SECTION | TITLE |
|-------------|--|
| 591-818-200 | Private Line Station Arrangements Using Data Sets 108F and 108G With Data Auxiliary Sets 830B and 830C—Installation and Connections |
| 591-818-500 | Private Line Station Arrangements Using Data Sets 108F and 108G With Data Auxiliary Sets 830B and 830C—Maintenance and Test Procedures |
| 598-083-102 | Data Auxiliary Set 830B—Identification |
| 598-083-103 | Data Auxiliary Set 830C—Description |

5.02 The following schematic drawings (SDs) and circuit descriptions (CDs) contain information on DS 108F and 108G or associated equipment.

| NUMBER | TITLE |
|-------------------|--|
| SD- & CD-1D250-01 | Data Auxiliary Sets 830A, 830B, and 830C |
| SD- & CD-1D285-01 | Data Set 108F |
| SD- & CD-1D286-01 | Data Set 108G and 52A1 Data Unit |

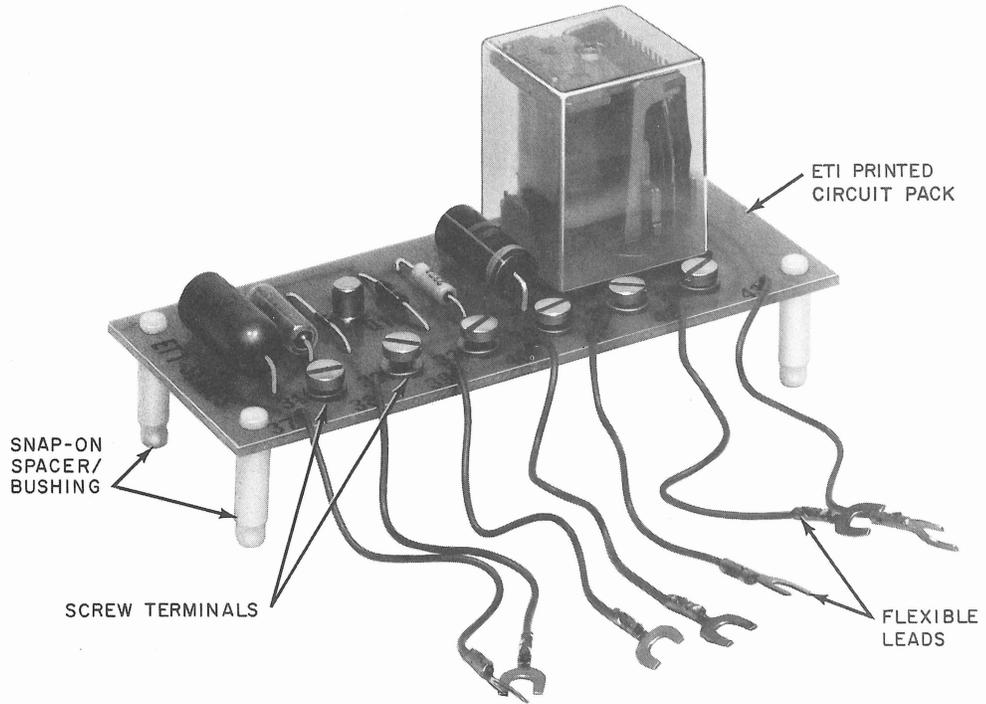


Fig. 13—ET1 Circuit Pack

TABLE F

DAS 830C-L1A OPTIONS

| FEATURE | OPTION |
|------------------------------------|--------|
| Local copy | Z |
| No local copy | Y |
| Arranged for use with DS 108F or G | X |
| Arranged for use with DAS 820D | W |