1A DATA STATION
SINGLE CHANNEL ARRANGEMENTS
BINARY MODE
DESCRIPTION AND OPERATION

CONTENTS PAGE

CONTENTS PAGE

CONTENTS PAGE

1. GENERAL

A. Scope

1.01 This section covers the general description, operating principles, and equipment features of the 1A Data Station, Single Channel Arrangements (SCA), hereafter referred to as the 1A Data Station, in ***binary mode*** operation.

1.02 This section has been reissued to add the following new equipment:

- 37A1 data mounting
- Line current interface (DP67 circuit pack).

1.03 The description of the circuit details of the 1A Data Station are necessarily brief. If more detail is required, it can be found in the reference material listed in Part 6 of this section.

B. Purpose

1.04 The purpose of the 1A Data Station is to provide a terminal with one 75-baud single width (SW) or one 150-baud double width (DW) channel on voice facilities.

1.05 The 1A Data Station may be used to terminate one end of a private line telegraph channel which may have originated in a 43A1 Voice Frequency Carrier Telegraph (VFCT) System, Fig. 1A, or a 43B1 Voice Frequency Carrier Data (VFCD) System, Fig. 1B.

1.06 A 1A Data Station may also be used in conjunction with a private line voice (PLV) circuit where a point-to-point low-speed data channel is desired. In this case both ends will be terminated in a 1A Data Station, Fig. 1C.

C. Design Features

1.07 The 1A Data Station is a solid state, frequency-shift-keyed, serial, full-duplex channel terminal capable of generating and deriving a telegraph grade or low-speed data channel (up to 150 baud) over a 2- or 4-wire voice-frequency (VF) facility.

1.08 The 1A Data Station may be equipped with one of 17 SW or 8 DW channels. Each of the 17 SW channels will transmit and/or receive serial data at speeds up to 75 baud. Each of the 8 DW channels will transmit and/or receive serial data at speeds up to 150 baud.

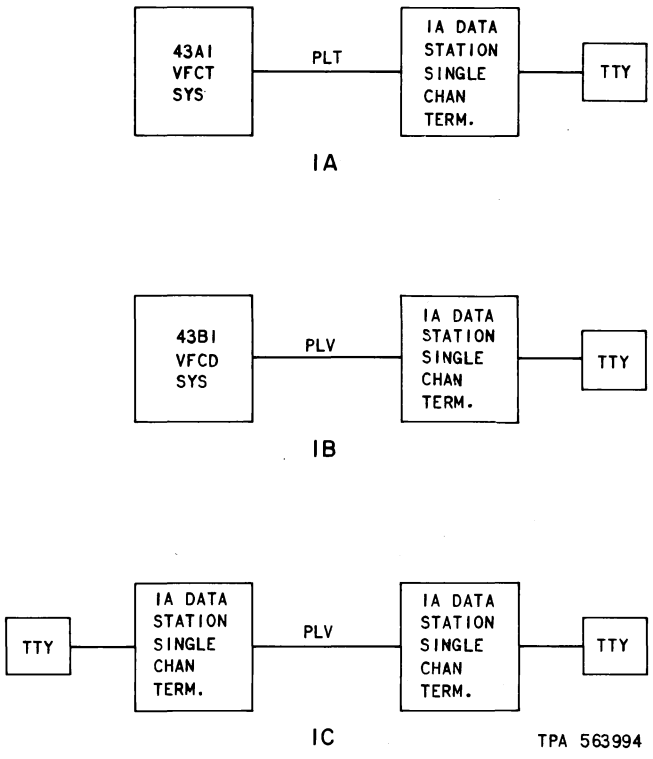


Fig. 1—Typical System Configurations—1A Data Station, SCA

1.09 The channels of the 1A Data Station in this practice are arranged to work in one transmission mode:

- Binary—two information levels (mark and space frequencies).

1.10 The baseband interface may be one of three types:

- Voltage—per EIA Standard RS-232-B
- 20-mA neutral current ▶3-wire, FDX or HDX◀
- ▶20- or 62.5-mA current 2-wire, HDX◀

1.11 Each channel terminal is comprised of a 31A2 or 37A1 data mounting and four circuit packs (CPs): a transmitter, a demodulator, a receive interface, a line/station interface.

1.12 The line/station interface CP contains both line interface and station interface circuits.

1.13 ▶The single channel arrangement is available in three configurations:

- Send and receive station consisting of a transmitter (DP1-DP25 circuit packs); demodulator (DP26-DP50 circuit packs); receive interface (DP51 circuit pack); and line EIA interface (DP66* circuit pack), or line CUR interface (DP61 or DP67 circuit pack).

  *Early units may have DP60 circuit pack (MD) installed. DP66 is standard.

- Send only station consisting of a transmitter (DP1-DP25 circuit packs) and a line EIA interface (DP66 circuit pack) or line CUR interface (DP61 or DP67 circuit pack).
- Receive only station consisting of a demodulator (DP26-DP50 circuit packs); receive interface (DP51 circuit pack); and line EIA interface DP66 circuit pack) or line CUR interface (DP61 or DP67 circuit pack).

Note: If remote test capability is desired (using data loop), the station must be equipped as a send and receive station even if it is to be used as a receive only or send only station.

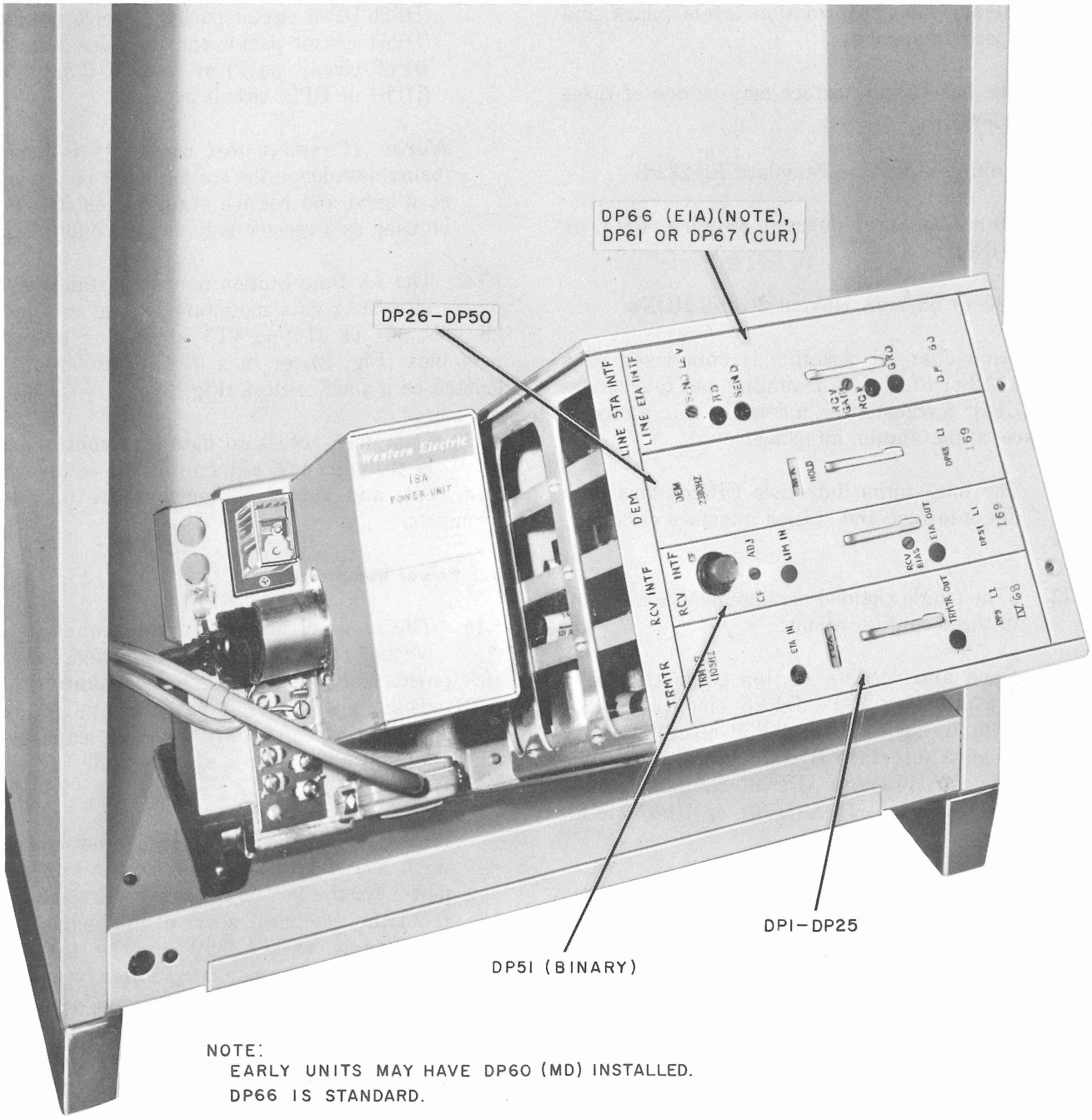
1.14 The 1A Data Station may be installed either in a 31A2 data mounting located in a model 28-, 33-, 35-, or 37-type TTY station on customer premises (Fig. 2), or in a 37A1 data mounting located on a shelf or desk (Fig. 3).◀

1.15 Customer access to data and control leads is through a 25-pin female connector. The line, test, and alarm connections are on screw terminals.

D. Power Requirements

1.16 The channel may require as much as 3.6 watts of power. This is supplied from an 18A power unit ▶on a 31A2 data mounting or a 18B1 power unit on a 37A1 data mounting.◀ Each is a self-limiting ac supply which is capable of providing 200 milliamperes at +24 and −24 volts, ▶±10 percent.◀

Note: When the station TTY is not equipped with a 117-volt ac power terminal strip, power for the 18A power unit must be obtained from the electrical service unit convenience receptacle or the TTY utility strip. ***A KS-14532-L16 power cord must be ordered separately for this application.***



NOTE:
EARLY UNITS MAY HAVE DP60 (MD) INSTALLED.
DP66 IS STANDARD.

Fig. 2—1A Data Station, SCA, With 31A2 Data Mounting Installed in a TTY Cabinet

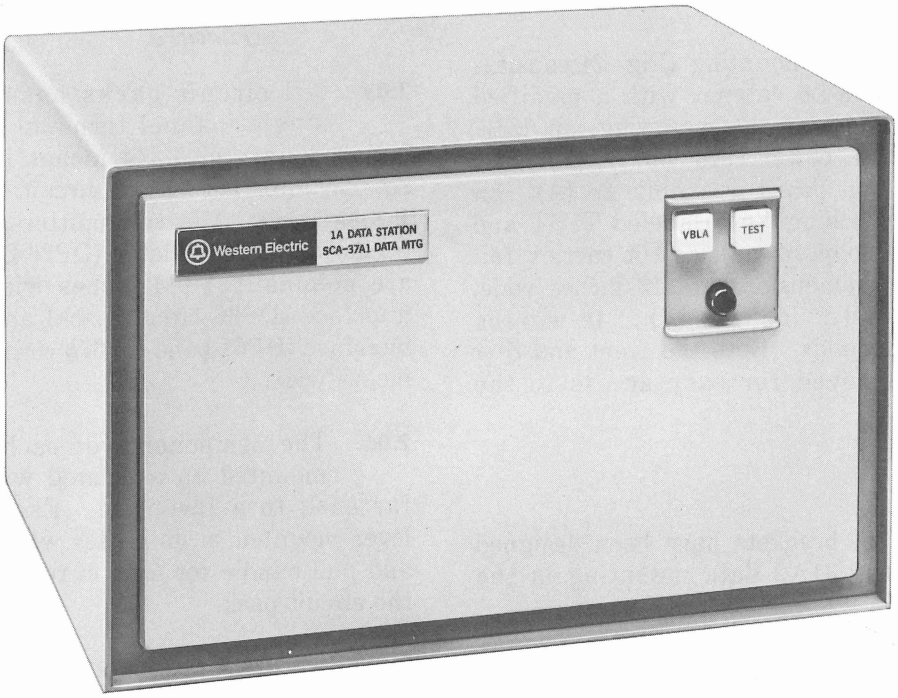


Fig. 3—1A Data Station, SCA, Installed in 27A1 Data Mounting

2. PHYSICAL DESCRIPTION

A. General

2.01 This part describes the physical appearance of the 1A Data Station components. Basically, the units of the station consist of the following:

- 31A2 ▶*or* 37A1◀ data mounting
- Brackets (to mount the 31A2 data mounting on the TTY)
- Circuit packs

B. 31A2 Data Mounting

2.02 The 31A2 data mounting (Fig. 4) consists of a 73A apparatus mounting, a KS-19087-L2 connector, a terminal board assembly TS (A), a bottom cover, a M3AY power cord, an 18A power unit, and an MA5E relay, all mounted on a chassis. The overall dimensions of the 31A2 data mounting are 12-1/2 inches wide, 6 inches deep, and 11-3/4 inches high. It weighs approximately 12 pounds.

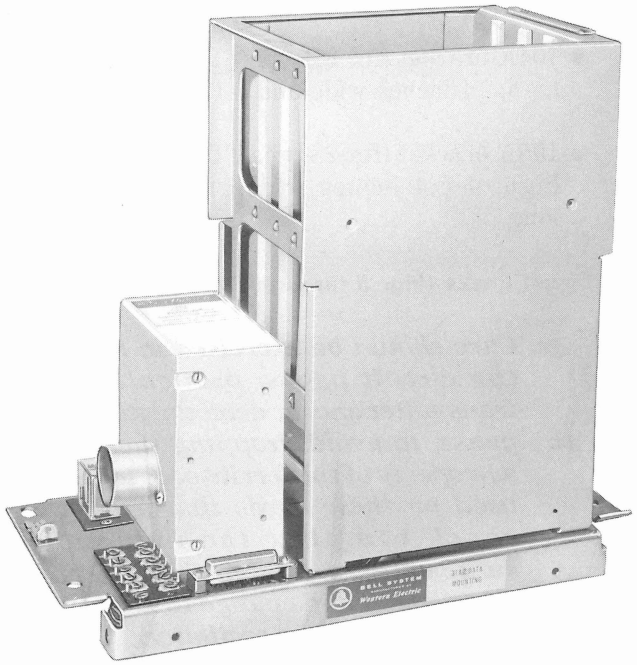


Fig. 4—31A2 Data Mounting

C. ▶37A1 Data Mounting◀

2.03 ▶The 37A1 data mounting (Fig. 3) consists of a KS-20018-L6 cabinet with a modified front panel, a 73A apparatus mounting, an 18B1 power unit, a M3AY power cord, one 25-pair EIA connector, a terminal board assembly TS (A), an MA5E relay, two locking keys labeled TEST and VBLA (voiceband looparound), and a carrier fail lamp. The overall dimensions are 13 inches wide, 12 inches deep and 9 inches high. It weighs approximately 23 pounds. Both the front and rear panels can be removed for easy access to the equipment.◀

D. Brackets

2.04 Four types of brackets have been designed to mount the 31A2 data mounting in the TTYs:

- 100A bracket (for 33-type TTY)—1-5/16 inches high, 13/16-inch wide and 6 inches long
- 101A bracket (for 35-type TTY)—2 inches high, 12-1/2 inches wide and 5-5//16 inches long
- 104A bracket (for 37-type TTY)—1-1/2 inches high, 14 inches wide and 8-13/16 inches long
- 105A bracket (for 28-type TTY)—5-1/4 inches high, 4-1/4 inches wide and 6-1/8 inches long.

E. Circuit Packs (Fig. 5 through Fig. 10)

Care should be exercised in handling the circuit packs, particularly the transmitter and/or demodulator circuit packs, to avoid dropping them. It is a property of the ferrite core inductors used on these cards that a physical shock can alter the inductance sufficiently to change the BIAS by a few percent and change the frequency of the transmitter oscillator. A severe physical shock can crack the ferrite structure.

2.05 All circuit packs associated with the single-channel terminal are nominally 10 inches long and 5-3/4 inches high. The binary receive interface (DP51 circuit pack) is nominally 1 inch wide. The transmitter (DP1-DP25 circuit packs) and demodulator (DP26-DP50 circuit packs) are nominally 1-1/4 inches wide. The line EIA interface (DP66 circuit pack) and the line current interface (DP61 ▶and DP67◀ circuit packs) are 1-1/2 inches wide.

2.06 The components of each circuit pack are mounted on a printed wire board which is fastened to a faceplate. Each faceplate has a lever mounted in its center which serves as a lock and pull handle for ease in removing and installing the circuit pack.

3. FUNCTIONAL DESCRIPTION

A. General

3.01 The 1A Data Station, SCA is identical to the 1A Data Station multichannel arrangements (MCA) and the 43B1 VFCD System with regard to the number of channels that can be used, channel bandwidth, channel spacing, modulation rates, and send and receive levels.

Binary Transmission Mode

3.02 This method of transmission is identical to that employed in the 1A Data Station, MCA and the 43B1 VFCD System. All channels provide either half-duplex or full-duplex low-speed serial data transmission by means of frequency modulation (FM). Two information levels are transmitted over a channel. One information level is associated with the space frequency and the other with the mark frequency. The SW channels employ a frequency shift from the nominal center frequency of +35 Hz for mark and −35 Hz for space. The DW channels employ a frequency shift of +70 Hz for mark and −70 Hz for space. The binary mode of transmission is applicable with any of the three station interfaces listed in 1.10.

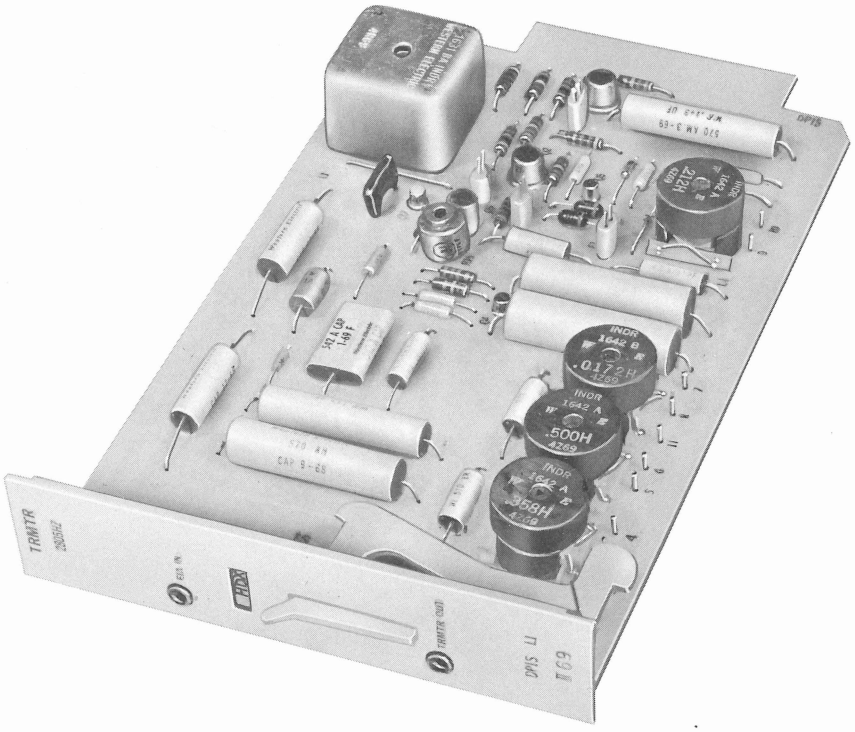


Fig. 5—Transmitter (DP1-DP25 Circuit Packs)

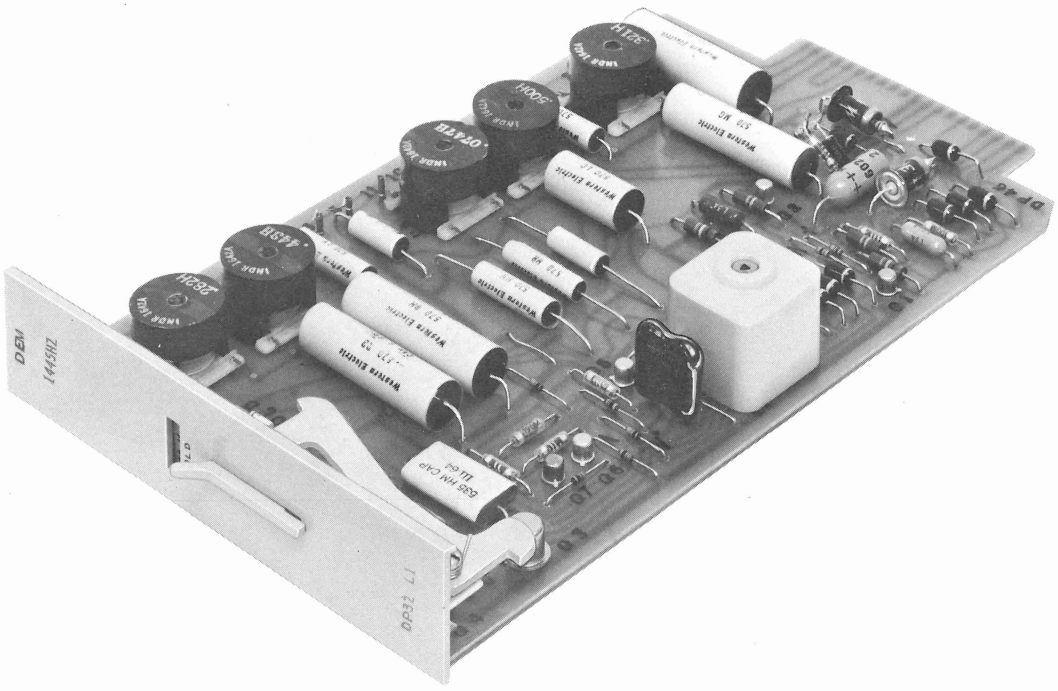


Fig. 6—Demodulator (DP26-DP50 Circuit Packs)

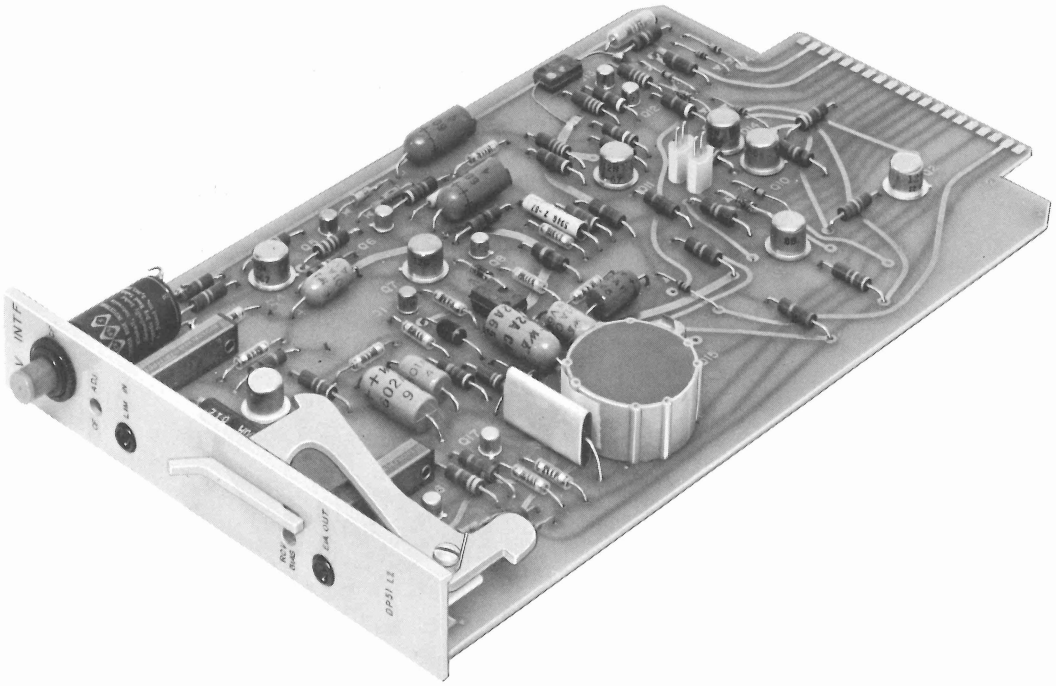


Fig. 7—Receive Interface (Binary) (DP51 Circuit Pack)

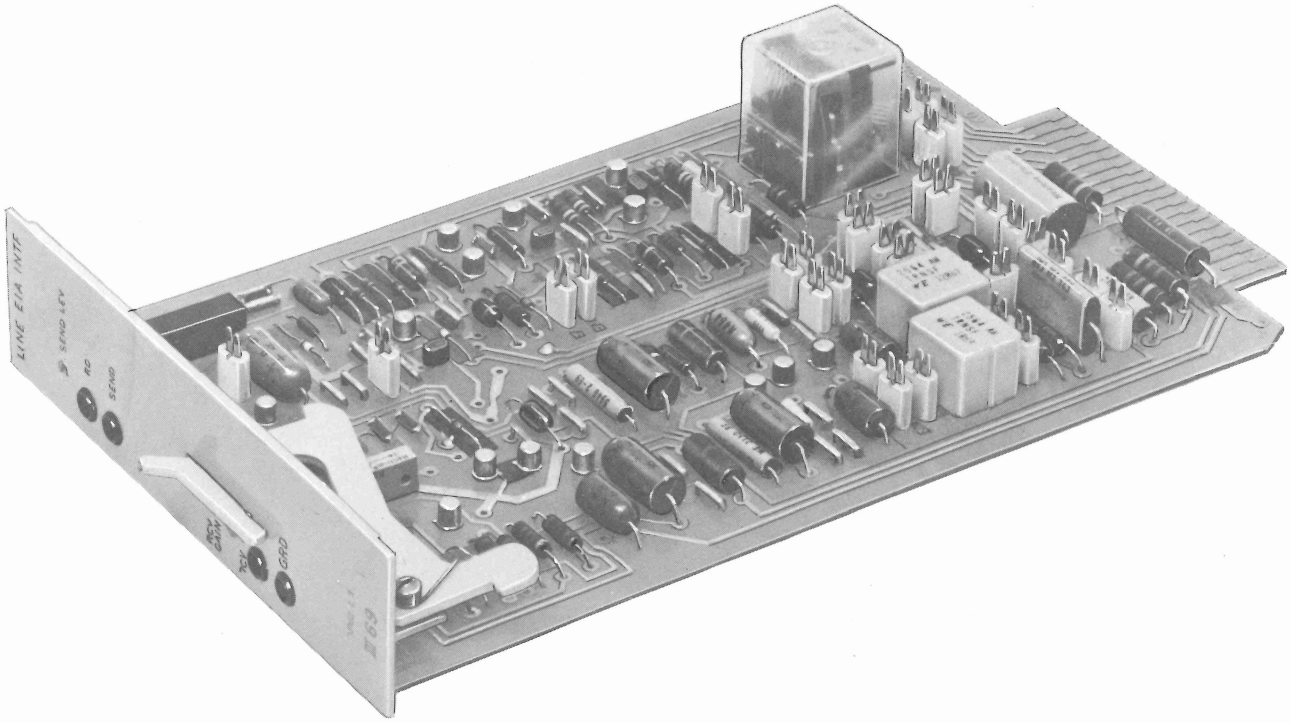


Fig. 8—Line EIA Interface (DP66 Circuit Pack)

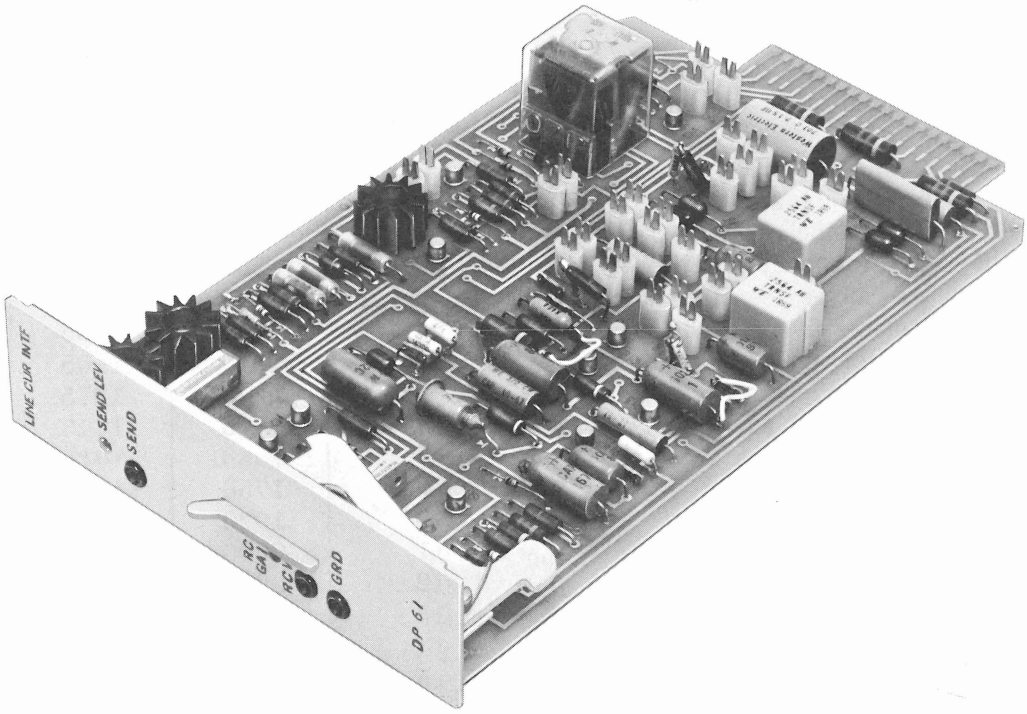


Fig. 9—Line Current Interface (DP61 Circuit Pack)

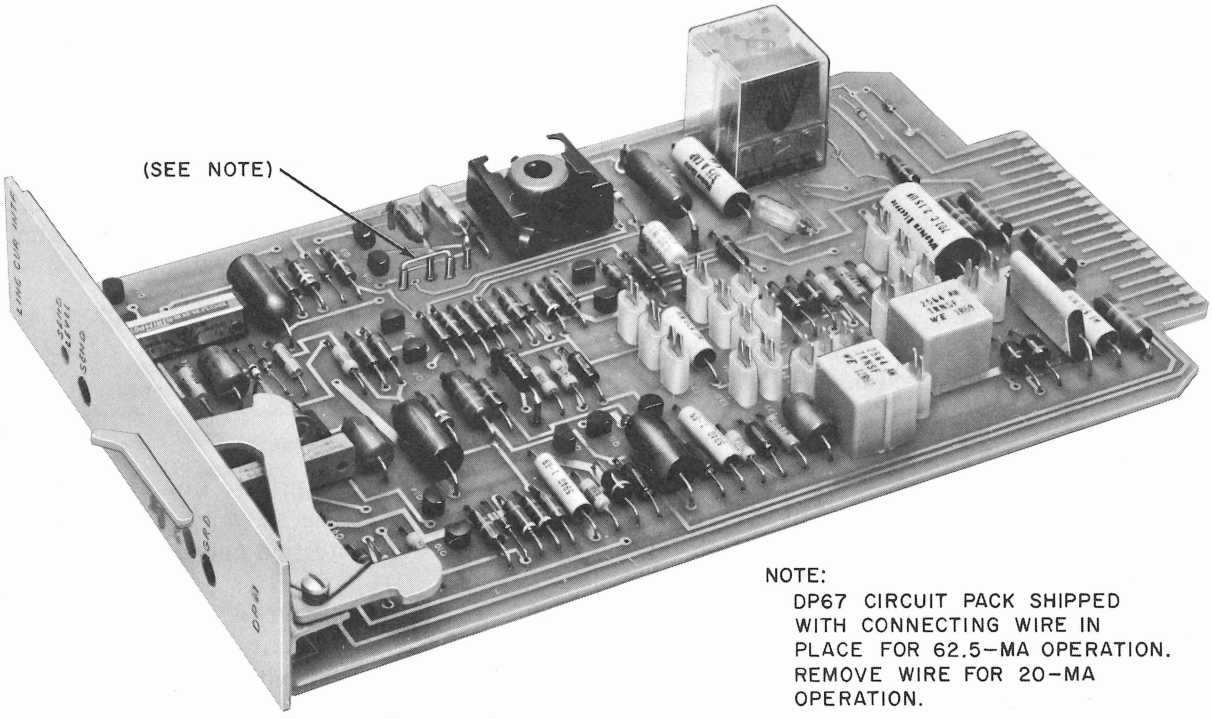


Fig. 10—Line Current Interface (DP67 Circuit Pack)

B. Channel Frequency Assignments

3.03 Table A lists the center frequencies as well as the mark and space frequencies for each of the 25 channels.

3.04 The chart in Fig. 11 shows the relative position of DW channels with respect to SW channels in the voice frequency spectrum for the 1A Data Station. As can be seen from the chart, each DW channel replaces two SW channels. The frequency shifts and channel assignments are identical to those employed in the 1A Data Station, MCA, the 43B1 VFCD System, and the 43A1 VFCT System. Thus, the four systems are electrically compatible for end-to-end operation.

> ***Note:*** The two lower DW channels of the 1A Data Station, both SCA and MCA, and the 43B1 VFCD System do not have corresponding channels in the 43A1 VFCT System.

3.05 The same frequencies may be used in both directions when operating on a 4-wire facility. However, when operating on a 2-wire facility, different frequencies must be used in the transmit and receive paths.

3.06 The bandpass filters on both the transmitter (DP1-DP25 circuit packs) and the demodulator (DP26-DP50 circuit packs) are permanently associated with their respective modulators and discriminators. Changing a channel terminal transmitting frequency assignment, therefore, involves replacing the transmitter circuit pack. Similarly, to change the receiving frequency assignment, it is necessary to replace the demodulator circuit pack.

> ***Note:*** All ferrite inductors are factory-adjusted and are not to be adjusted in the field.

Modulation Rates

3.07 Each of the 17 SW and 8 DW channels is designed to accept and deliver serial data at speeds up to 75 baud and 150 baud, respectively.

C. Connection to the Voice Facility

3.08 Connection of an SW or DW channel to a voiceband facility is accomplished by means of the line circuit portion of the line/station interface ▶(DP61, DP66, or DP67 circuit pack).◀ The line circuit portion of the circuit contains a transmitting and a receiving amplifier, line transformers, a compromise balancing network, strapping options, and a lightning protection network.

3.09 The output of the channel transmitter (DP1-DP25 circuit packs) is connected to the input of the transmitting amplifier on the line circuit. The output of the amplifier is balanced and can be arranged for either 600- or 900-ohm line terminations. The gain of the transmitting amplifier is adjustable by means of the SEND LEV potentiometer.

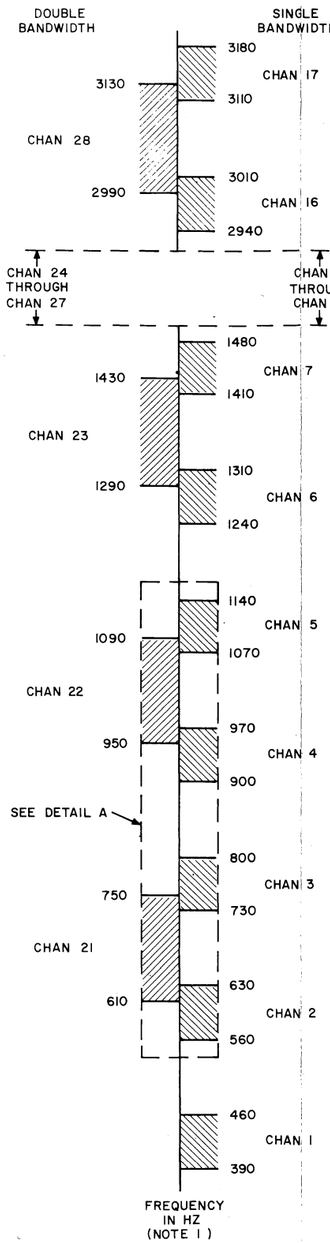
TABLE A

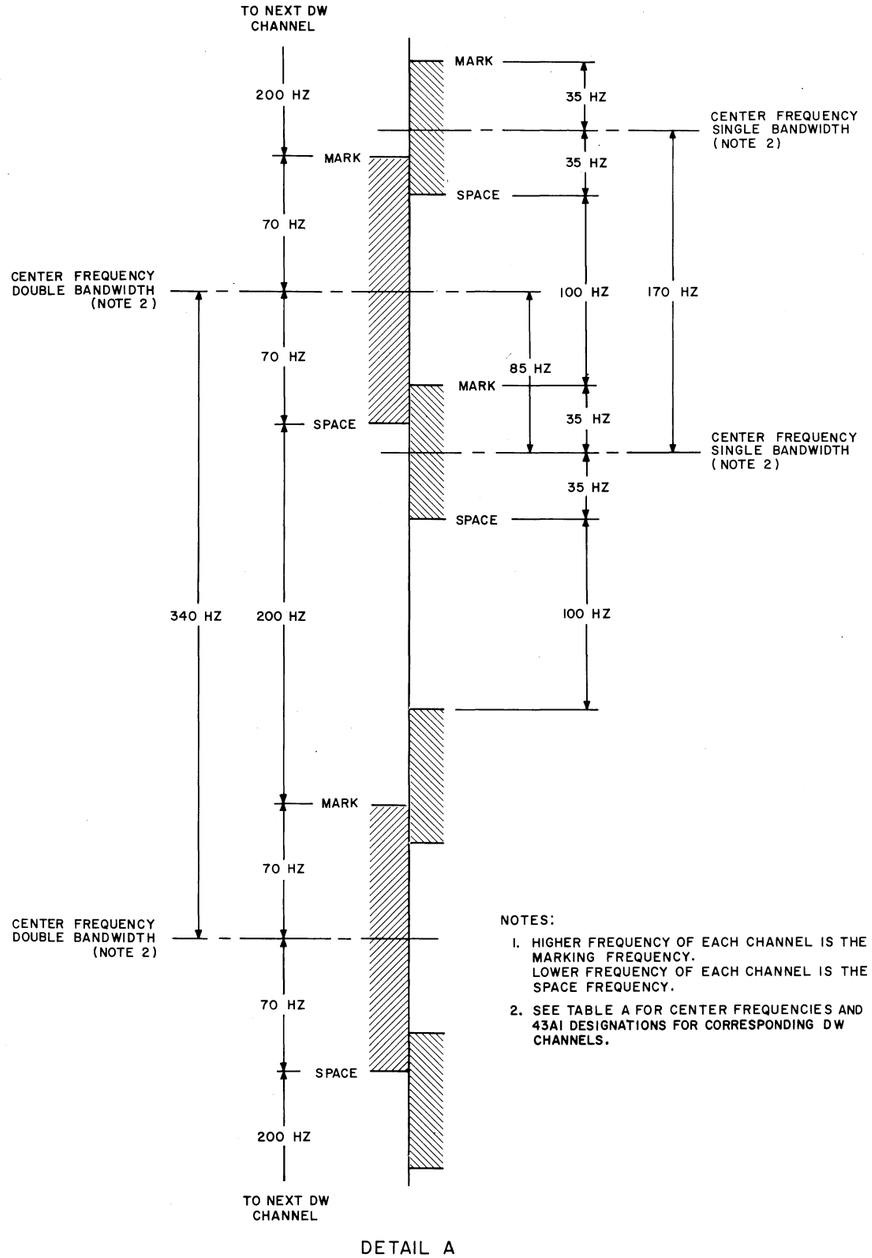
CHANNEL FREQUENCY ASSIGNMENTS

CHANNEL NUMBER	SPACE FREQUENCY	CENTER FREQUENCY	MARK FREQUENCY
SINGLE BANDWIDTH			
1	390	425	460
2	560	595	630
3	730	765	800
4	900	935	970
5	1070	1105	1140
6	1240	1275	1310
7	1410	1445	1480
8	1580	1615	1650
9	1750	1785	1820
10	1920	1955	1990
11	2090	2125	2160
12	2260	2295	2330
13	2430	2465	2500
14	2600	2635	2670
15	2770	2805	2840
16	2940	2975	3010
17	3110	3145	3180
DOUBLE BANDWIDTH			
21 (57)	610	680	750
22 (58)	950	1020	1090
23 (51)	1290	1360	1430
24 (52)	1630	1700	1770
25 (53)	1970	2040	2110
26 (54)	2310	2380	2450
27 (55)	2650	2720	2790
28 (56)	2990	3060	3130

( ) These designations appear on the Stelma KS-19935 Telegraph Carrier Test Set.

Designations (51) through (56) corespond to double-width channels of the 43A1 VFCD System.





DETAIL A

NOTES:

1. HIGHER FREQUENCY OF EACH CHANNEL IS THE MARKING FREQUENCY. LOWER FREQUENCY OF EACH CHANNEL IS THE SPACE FREQUENCY.
2. SEE TABLE A FOR CENTER FREQUENCIES AND 43A1 DESIGNATIONS FOR CORRESPONDING DW CHANNELS.

Fig. 11—Frequency Chart

3.10 The input to the receiving amplifier is balanced and can be arranged to terminate either 600- or 900-ohm lines. The receiving amplifier is adjustable by means of the RCV GAIN potentiometer and can provide up to approximately 20-dB voltage gain at its output referred to its input (the voice facility side of the receiving amplifier). This gain offsets the loss between the output of the receiving amplifier and the input to the channel amplifier-limiter on the receive interface circuit pack.

3.11 The line circuit portion of the line/station interface also contains strapping options to permit connection to 2- or 4-wire, 600-ohm or 2-wire, 900-ohm facilities which are balanced to ground.

3.12 The compromise hybrid balancing network provided on the line circuit will permit satisfactory 2-wire operation on nonloaded or loaded cable when the difference between the transmitted and received signals on the voice facility side of the line circuit is 30 dB or less. For a more detailed description concerning 2- and 4-wire connections, including the compromise network, refer to Section 591-813-201.

3.13 Multiplexing or combining several 1A Data Stations onto one voiceband facility may be accomplished by one of several commonly used ac bridging methods employed with the 43A1 VFCT System. In general these methods employ resistive networks, bridging filters, or hybrids.

D. Binary Channel Terminal

3.14 The binary channel terminal, either SW or DW, consists of four plug-in circuit packs: a transmitter (DP1-DP25 circuit packs), a demodulator (DP26-DP50 circuit packs), a receive interface (binary) (DP51 circuit pack), and one of three line/station interface circuit packs:

- Line EIA interface (DP66 circuit pack)
- Line CUR interface (DP61 circuit pack)
- ▶Line CUR interface (DP67 circuit pack)◀

3.15 The transmitter circuit pack contains a buffer amplifier, a keyer, an oscillator, a transmitting bandpass filter, a carrier squelch circuit, and some of the baseband interface circuitry.

3.16 The demodulator circuit pack contains an FM discriminator and the receiving bandpass filter.

3.17 The binary receive interface circuit pack contains an amplifier-limiter, a carrier detector, a low-pass filter, a data slicer, a carrier indicator lamp, and an EIA output amplifier.

3.18 The line circuit portion of the line/station interface circuit is described in 3.08. The station interface portion is covered in Part 3E.

E. Connection to Customer Circuit (Baseband Interface)

3.19 The station interface portion of the line/station interface circuit pack is designed to drive one of three different terminations:

- Voltage per EIA Standard RS-232-B
- 20-mA neutral current ▶(3-wire, FDX or HDX)◀
- ▶20-/62.5-mA current (2-wire, HDX)◀

3.20 The three terminations are meant to interface either Bell System or non-Bell Sytem data terminal equipment. Bell System teletypewriters only may be used with the 20-mA neutral current termination for speeds higher than 75 baud. The choice of interface is made by selecting the proper line/station interface circuit pack. The standard 25-pin connector is used as the baseband exit and entry point in the channel terminal. The pin assignments are given in Table B.

Voltage

3.21 The line EIA interface (DP66 circuit pack) is intended for use with data terminal equipment which conforms to EIA Standard RS-232-B. When the channel operates in the binary mode, as it would for private line telegraph service, circuit CD is not required.

3.22 The station interface portion of the line EIA interface contains a lamp driver, an RD (receive data) driver, a TD (transmit data) driver, a CC (data set ready) driver with a fail-safe circuit, and a CF (carrier fail) driver. In addition, the circuit pack has a relay whose operation places the channel in the test mode (data loop at baseband level).

TABLE B

PIN ASSIGNMENTS FOR THE 25-PIN CONNECTOR

PIN NO.	CIRCUIT	DESCRIPTION	STA INT	
			CUR	EIA
1	AA	Protective Ground	X	X
2	BA	Transmitted Data (From Customer Equipment)	X	X
3	BB	Received Data (To Customer Equipment)	X	X
4	CA	Request to Send	—	X
5	CB	Clear to Send	—	X
6	CC	Data Set Ready	—	X
7	AB	Signal Ground	X	X
8	CF	Data Carrier Detector	X	X
9	*	Data Set Test (+24V)	X	X
10	*	Data Set Test (—24V)	X	X
11-19	*	Not Used	—	—
20	CD	Data Term Ready	—	X
21-25	*	Not Used	—	—

— Pin Not Used
X Pin is Used
* Circuit not designated.

3.23 Options are provided on the line EIA interface for binary operation to provide for the following:

- Monitoring the line on the BB lead while in the test mode
- Local copy, eg, half-duplex
- Lead CB (clear-to-send) to follow lead CA (request-to-send)
- Lead CB (clear-to-send) to follow lead CC (data set ready)
- Binary operation of receive only

20-mA Neutral Current ▶(3-wire, FDX or HDX)◀

3.24 The line current interface (DP61 circuit pack) is intended for use with a teletypewriter or an equivalent data terminal for 75-baud and lower speed services. Speeds as high as 110 baud or lower may be obtained when operated with a DW channel. It provides 20-mA neutral signals to drive a data terminal. The send loop may have in series with it a maximum of 500 ohms plus 1/2 henry inductance. This permits a receiver to be placed in series with the send loop for monitoring purposes, provided the combined resistance of the loop and receiver does not exceed 500 ohms. The receive loop may have as much as 500 ohms resistance and 1/2 henry inductance for 20-mA operation. The 1A Data Station provides the power for the send and receive loops. No loop current adjustments are required.

3.25 The line current interface circuit pack contains a lamp driver, a send loop detector, a receive loop driver, and a CF (carrier fail) driver. In addition, the circuit has a relay whose operation places the channel in the test mode. Because lightning protection is not provided, connection to outside plant is ***not*** allowed.

3.26 Options are provided on the line current interface to provide for the following:

- Local copy, eg, half-duplex
- Holding lead BB (receiving data) marking during test mode
- Monitoring the line while in the test mode
- Receive only operation
- Send only operation.

62.5- or 20-mA Current (2-Wire, HDX)

3.27 The line current interface (DP67 circuit pack) is intended for use with a teletypewriter or an equivalent data terminal for 75-baud and lower speed services. Speeds as high as 110 baud or lower may be obtained when operated with a DW channel. It provides either 20- or 62.5-mA neutral signals on a closed loop (2-wire) to drive a data terminal. The 2-wire loop may contain any value of inductance from 0 to 1/2 henry and any value of resistance from 0 to 300 ohms for 62.5-mA operation, and 0 to 500 ohms for 20-mA operation.

3.28 The line current interface contains logic such that a break signal may be transmitted from the data terminal to the ac line facility while it is receiving from the ac facility. The extra logic is necessary since the baseband interface is ***half-duplex*** while the modem part of the channel terminal is full duplex.

3.29 The line current interface provides the same customer services as the 3-wire, 20-mA current interface (DP61 circuit pack): local copy or mark-hold in test, mark- or space-hold upon loss of incoming carrier, and outgoing carrier squelch upon loss of incoming carrier. Because lightning protection is not provided, connection to outside plant is ***not*** allowed.

3.30 Options on the line current interface provide the following:

- 62.5-mA current operation with strap installed between points A and B (the DP67 circuit pack is shipped from the factory with the strap in place and ready for 62.5-mA current operation).
- 20-mA current operation with strap ***removed*** from points A and B.

F. Transmission Through a Binary Channel—Transmitting Direction (Fig. 12 and 13)

Line EIA Interface (DP66 Circuit Pack)

3.31 EIA signals on the transmitted data lead (BA) of the line EIA interface (DP66 circuit pack) are applied to the input of the TD driver, which is designed to terminate an EIA circuit. Signals at the output of the TD driver are applied to the input of the modulator through a buffer circuit via the TD lead on the transmitter (DP1-DP25 circuit packs). A mark signal (−5 to −25 volts) on the BA lead will cause the modulator to produce its mark frequency, while a space signal (+5 to +25 volts) will cause the modulator to produce its space frequency. Data signals will cause the modulator to switch between mark and space frequencies at the data signal rate. The output of the modulator passes through the buffer amplifier and into the transmitting bandpass filter. This filter reduces the magnitude of those frequency components generated by the modulation process which fall in the band of the adjacent channels so that interchannel interference is virtually eliminated. The output signal from the filter appears on the B LIN lead and is applied to the transmitting amplifier input on the line EIA interface. The signal is then amplified by the transmitting amplifier for transmission on the voice facility.

3.32 If terminals E3 and E4 of the transmitter (DP1-DP25 circuit packs) are connected together, a negative signal voltage on the CF lead will result in no signal being transmitted (carrier squelch). This signal will occur whenever the receiving part of the channel terminal detects a no-carrier condition.

20-mA Current Interface (DP61 Circuit Pack)

3.33 If the send lead (BA) is connected to −24 volts through an impedance of 500 ohms and 1/2 henry inductance or less, a current of 20 mA will flow into the send loop detector on the line current interface (DP61 circuit pack). The 20 milliamperes of current in the BA lead is translated by the send loop detector into a negative voltage. This negative signal appears on the TD lead and hence at the input of the modulator, on the

transmitter (DP1-DP25 circuit packs), resulting in mark frequency being generated. A space signal (no current) in the BA lead is translated by the send loop detector into a positive voltage. This results in space frequency being generated by the modulator. Keying the BA lead in such a manner as to open and close it will cause the modulator to switch between space and mark frequencies, respectively, at the data rate. In all other aspects the operation of the binary channel is the same as described in 3.31 and 3.32.

62.5/20-mA Current Interface (DP66 Circuit Pack)

3.34 ▶A current of 62.5 mA (20 mA is optional) in the loop is recognized by the loop driver and receiver as a mark and translated to a negative voltage. The negative signal appears on the TD lead and hence at the input of the modulator on the transmitter, resulting in a mark frequency being generated. A space signal (no current) in the loop is recognized by the loop receiver as a space and translated to a positive voltage. This results in a space frequency being generated by the modulator. Thus, keying the loop (BA and BB) by opening and closing it will cause the modulator to switch between space and mark frequencies, respectively, at the data signal rate. In all other respects the operation of the binary channel is the same as described in 3.31 and 3.32.◀

G. Transmission Through a Binary Channel—Receiving Direction

Line EIA Interface (DP66 Circuit Pack)

3.35 At the receiving end of the voice circuit, the VF signal is coupled into the line circuit receiving amplifier by means of an input transformer. After amplification, the signal is fed from the low impedance output of the receiving amplifier (A LIN lead) to the input of the receiving bandpass filter on the demodulator (DP26-DP50 circuit packs). After passing through the receiving bandpass filter, the signal is amplified and limited on the receive interface (DP51 circuit pack). The limited signal drives the discriminator on the demodulator. The output of the discriminator has a low frequency component which is the desired baseband signal, plus some higher frequency components which are removed by the low pass filter. The output of the low-pass filter is then sliced and amplified on the receive interface to reproduce a replica of the signal used to drive the channel modulator. This signal then appears on the A lead which is connected to the line EIA interface (DP66 circuit pack). The signal passes through a gating circuit (RD driver) and is then looped back on the B lead to the receive interface (DP51 circuit pack). Here it is amplified and appears as a bipolar signal (plus for space and minus for mark) on the RD lead from the receive interface. It then passes through the line EIA interface and appears on the BB lead. Terminal E32 must be strapped to terminal E31 for binary operation; if not, the RD driver circuit will hold the BB lead marking.

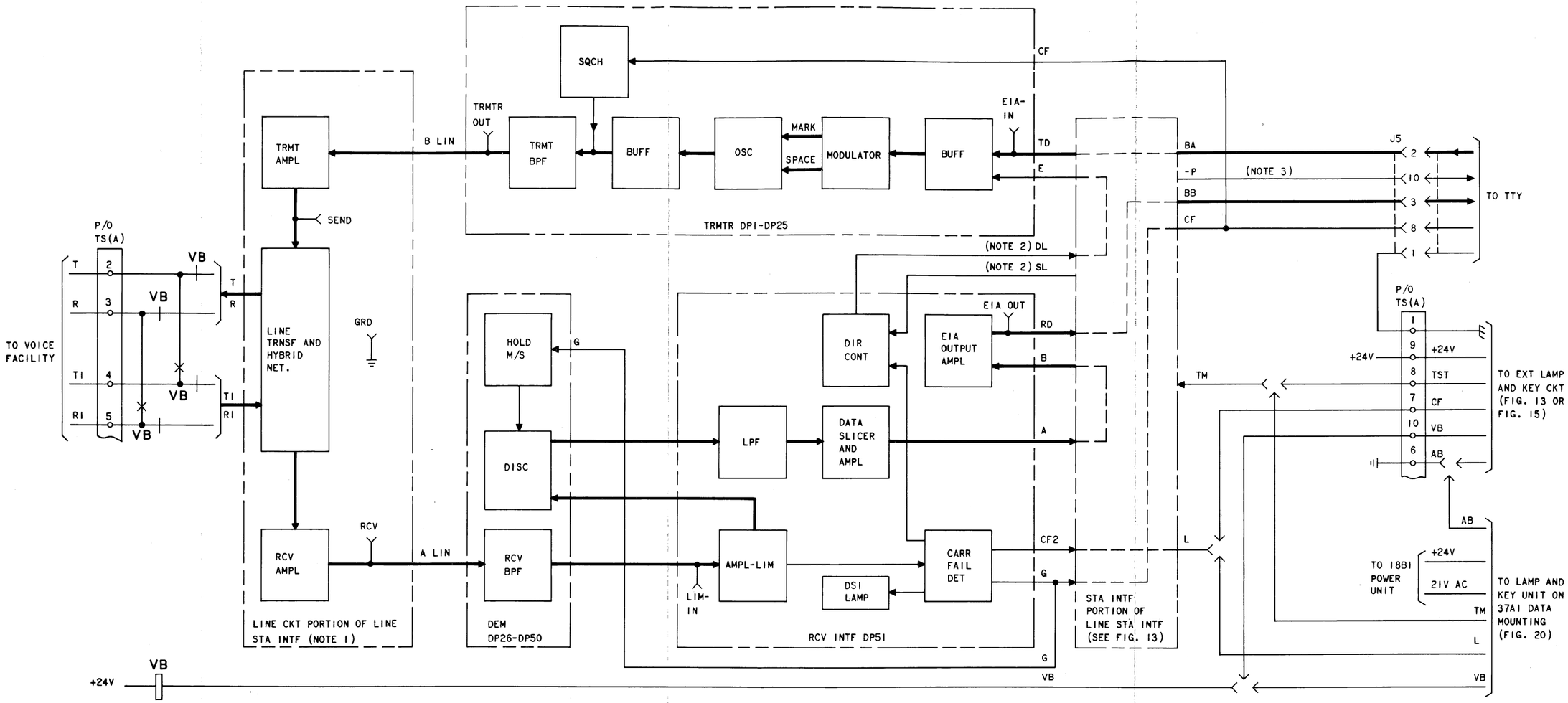
20-mA Current Interface (D61 Circuit Pack)

3.36 Until the signal reaches the A lead from the receive interface, operation of a binary channel with a line current interface (DP61 circuit pack) is the same as in 3.35. The A lead from the receive interface is looped through a diode on the line current interface and back over the B lead to the receive interface, where it is amplified and converted to a bipolar signal (plus for space and minus for mark). This signal is then coupled to the receive loop driver via the RD lead. The output of the receive loop driver is 20 mA for mark and 0 mA for space, provided the receive lead (BB) is connected to −24 volts through an impedance of 500 ohms and 1/2-henry inductance or less.

62.5-/20-mA Current Interface (DP67 Circuit Pack)

3.37 ▶Until the signal arrives on the A lead from the receive interface (DP51 circuit pack), operation of the binary channel with a line current interfacee (DP67 circuit pack) is the same as in 3.35. The A lead from the receive interface is looped through a diode on the station interface portion of the line current interface and back over lead B to the receive interface where it is amplified and converted to a bipolar signal (plus for space and minus for mark). This signal is then applied through RD (receive data) on the line current interface to the loop driver where the loop is keyed mark and space.

3.38 The loop detector monitors the data signals from both the loop and the receive interface. When the loop detector recognizes data received from the receive interface, the transmitter is inhibited from option via the SL lead (directional control), the DC lead, and the E lead on the receive interface.



NOTES:
1. THE LINE CKT PORTION OF THE LINE STA INTF IS IDENTICAL IN DP6I, DP66 AND DP67.
2. USED WITH DP67 ONLY.
3. NOT USED WITH DP67.

Fig. 12—Transmit and Receive Signal Path, Binary Channel, 1A Data Station, SCA

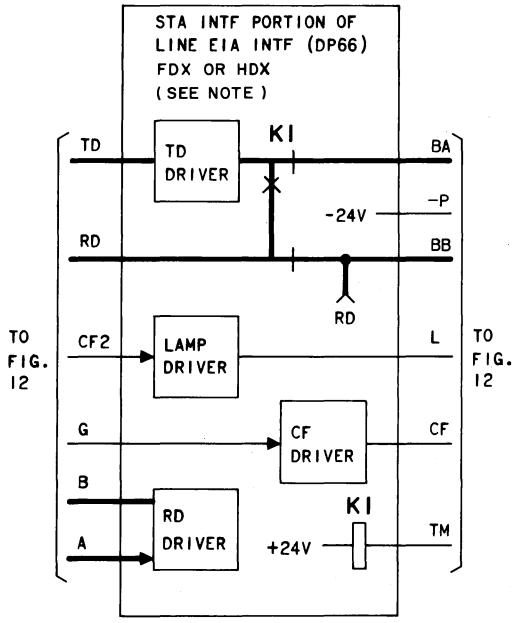


FIG. 13A

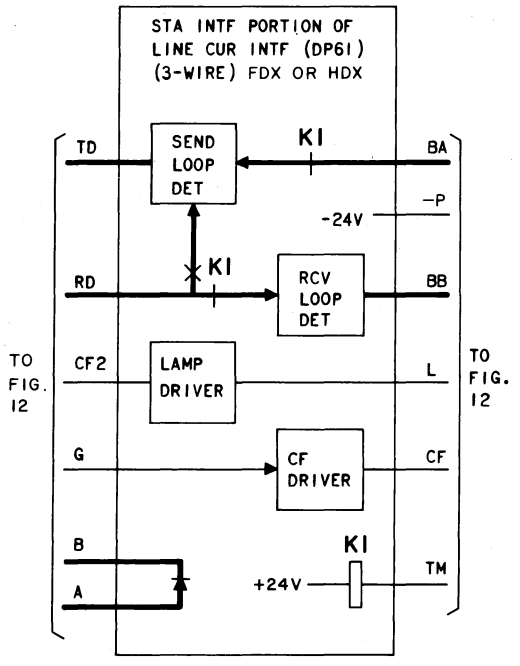


FIG. 13B

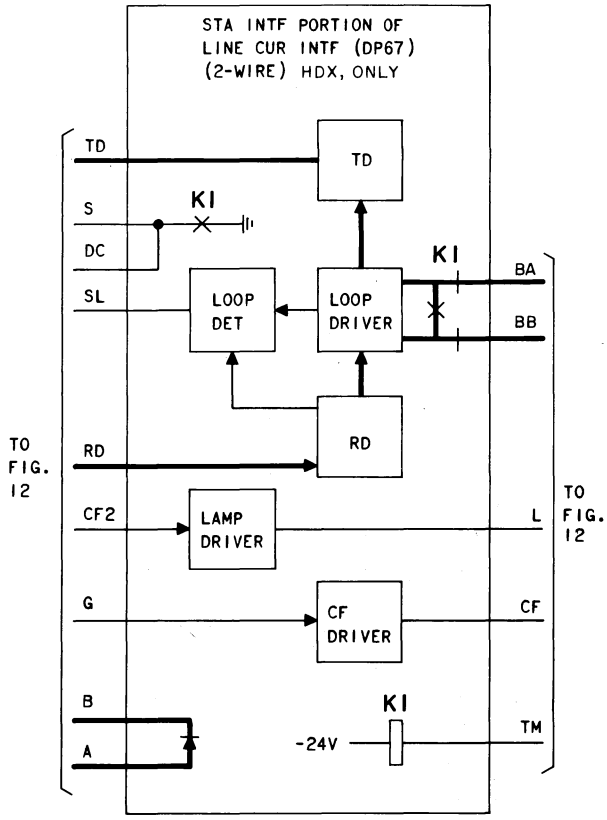


FIG. 13C

NOTE:
EARLY UNITS MAY HAVE DP60 (MD) INSTALLED.
DP66 IS STANDARD.

TPA 570042

Fig. 13—Line/Station Interface Circuit Packs—Signal and Signal Control Circuits—1A Data Station, SCA—Block Diagram

3.39 The loop detector on the station current interface and the directional control on the receive interface also provide for recognizing a break signal transmitted from the terminal (via the loop) while it is receiving data from the VF facility. The directional control interprets the break signal as a double-space condition and causes the modulator of the transmitter to transmit a space while data is being received on the RD lead.

3.40 The output of the loop driver is 62.5 mA (20 mA by option) for mark and 0 mA for space.◀

H. Back-to-Back Operation (Fig. 14)

3.41 Back-to-back operation of two channel terminals is possible if both are equipped with a line EIA interface (DP66 circuit pack). For this arrangement the BB lead of one channel terminal is connected to the BA lead of the other, and vice versa. A common signal ground (AB) should also be provided.

I. Channel Send Level

3.42 The send transmission level of the transmitter (DP1-DP25 circuit packs) for each SW channel mark and space frequency is −16 dBm, and the level for the DW channel mark and space frequency is −13 dBm, as measured at the TRMTR OUT test point. These levels are factory-set (not adjustable). This measurement must be made with a high impedance voltmeter.

3.43 The maximum output level of the channel terminal is 0 dBm for all line connections, ie, 2- or 4-wire and 600- or 900-ohm arrangements. The send level is adjustable over at least a 26.0-dB range (measured at the SEND LEV test point) by means of a potentiometer located in the transmitting amplifier of the line/station interface (DP61, DP66 or ▶DP67◀ circuit pack). Lower levels are attainable, but the coarseness of the adjustment may be objectionable.

J. Gain Adjustments in the Receiver

3.44 The SW or DW channel is designed to operate with receive levels in the range from −11 to −50 dBm for a 600-ohm termination, and from −9 to −48 dBm for a 900-ohm termination. The required amplification is provided by the receiving amplifier on the line/station interface (DP61, DP66 or ▶DP67◀ circuit pack) and the amplifier-limiter on the receive interface (DP51 circuit pack). The gain on the line/station interface is adjusted with the RCV GAIN potentiometer to provide a nominal −32 dBm at the LIM IN test point on the receive interface for either SW or DW channels.

K. Carrier Fail

3.45 The channel continuously measures the power in its frequency band with a carrier detection circuit on the receive interface. When the received level drops 12 dB from the initial lineup level, a carrier fail indication is given via the G lead to the CF driver circuit on the line/station circuit pack. The output of the CF driver is the CF lead.

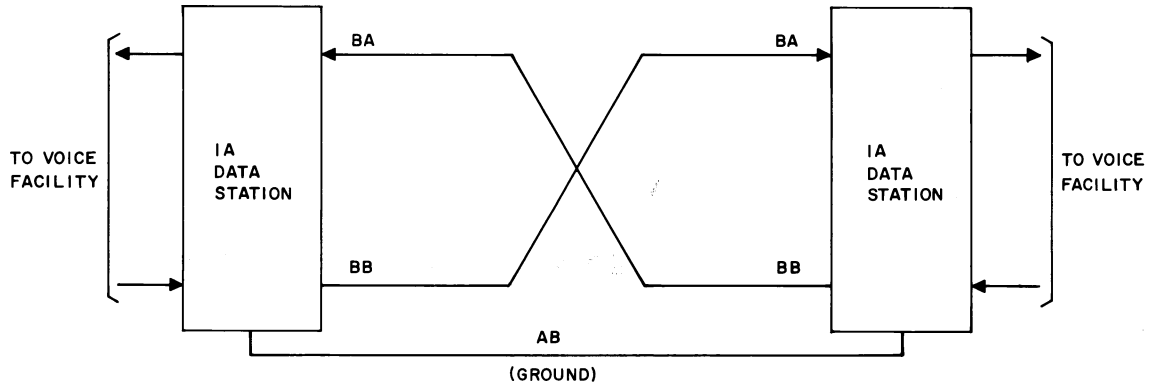


Fig. 14—Back-to-Back Operation—1A Data Station, SCA—Block Diagram

3.46 When activated, the carrier fail circuit initiates several actions within the channel terminal.

(a) It lights the carrier fail (CF) lamp on the receive interface (DP51 circuit pack).

(b) It changes the state of the CF2 lead from a positive voltage to a negative voltage.

(c) It clamps the output of the demodulator marking or spacing, depending upon the position of the HOLD switch.

(d) With proper strapping on the line EIA interface (DP66 circuit pack), it sends an OFF indication to the customer equipment.

(e) With the proper strapping on the transmitter (DP1-DP25 circuit packs), it provides means to squelch the output of the channel oscillator.

(f) It monitors for the presence of incoming carrier.

L. Alarm Features

3.47 As noted in 3.45, activation of the CF circuit causes the CF2 lead to change state. The CF2 lead drives the lamp driver circuit on either of the line/station interfaces (DP61, DP66, or ▶DP67◀ circuit pack). The lamp associated with the lamp driver circuit is mounted externally to the 1A Data Station. This lamp is intended to be the primary indication of the absence of carrier to the operator of the data terminal and is in addition to the CF lamp provided on the receive interface.

M. Test Features

3.48 In order to facilitate fault location, a TEST key and a VBLA (voiceband looparound) key are provided. These keys are located external to the single-channel terminal and are accessible to the customer so that he may operate them at the request of the maintenance center or the distant end.

3.49 Operation of the TEST key causes the K1 relay on the line/station interface (either DP61, DP66, or ▶DP67◀ circuit pack) to operate via the TM lead, which causes the following to occur: The transmit and receive data (baseband) leads of the channel are disconnected from the customer and the receive lead (BB) is connected to the transmit lead (BA), resulting in the received data being looped back at the baseband level and transmitted back to the sender.

3.50 When the VBLA key is operated, the send pair is connected to the receive pair (for 4-wire operation). This will permit a check of the integrity of the 4-wire facility from the maintenance center. If the 1A Data Station is arranged for 2-wire operation, the transmission pair is terminated in an open circuit. Under these circumstances, tip and ring appear on screw terminals on TS(A) on the 31A2 ▶or 37A1 data mounting.◀ If desired, a known impedance (a resistor or capacitor) may be used to terminate the pair to permit testing from the maintenance center. Note that this impedance is not supplied with the equipment and must be locally engineered. In both the 2-wire and 4-wire situations, operation of the VBLA key removes the line circuit portion of the line/station interface (DP61, DP66, or ▶DP67◀ circuit pack) from the voiceband facility. This is accomplished through the operation of the K1 relay on the 31A2 ▶or 37A1 data mounting◀ via the VB lead.

4. MOUNTING ARRANGEMENTS

A. 31A2 Data Mounting

4.01 Mounting arrangements for the 1A Data Station (when installed in a 31A2 data mounting) are designed to facilitate installation within a model 28, 33, 35, or 37 TTY on customer premises. All connections are made by means of plug and socket arrangements or screw terminals.

4.02 The 31A2 data mounting includes an 18A power unit, EIA connector, terminal strip, and a 73A apparatus mounting with space for four circuit packs. Four mounting brackets designated 100A, 101A, 104A and 105A are employed to mount the 31A2 data mounting for the models 33, 35, 37, and 28 TTYs, respectively.

4.03 The EIA connector (KS-19087-L2) provides the 25-pin interface connections between the single-channel terminal and the station TTY. The terminal board assembly, TS(A), provides screw terminals for connecting to the external VBLA key, TEST key, and CF lamp. Other connections available are to the 2- and 4-wire facility, option of connecting frame ground to signal ground, and a source of poitive and negative 24-volt dc power.

B. ▶37A1 Data Mounting◀

4.04 ▶The 37A1 data mounting is intended for table or shelf mounting to provide service to customer-provided terminals (CPT).

4.05 Except for its physical appearance, the 37A1 data mounting is identical to the 31A2 data mounting.◀

5. OPERATION AND KEY ARRANGEMENTS

A. 31A2 Data Mounting

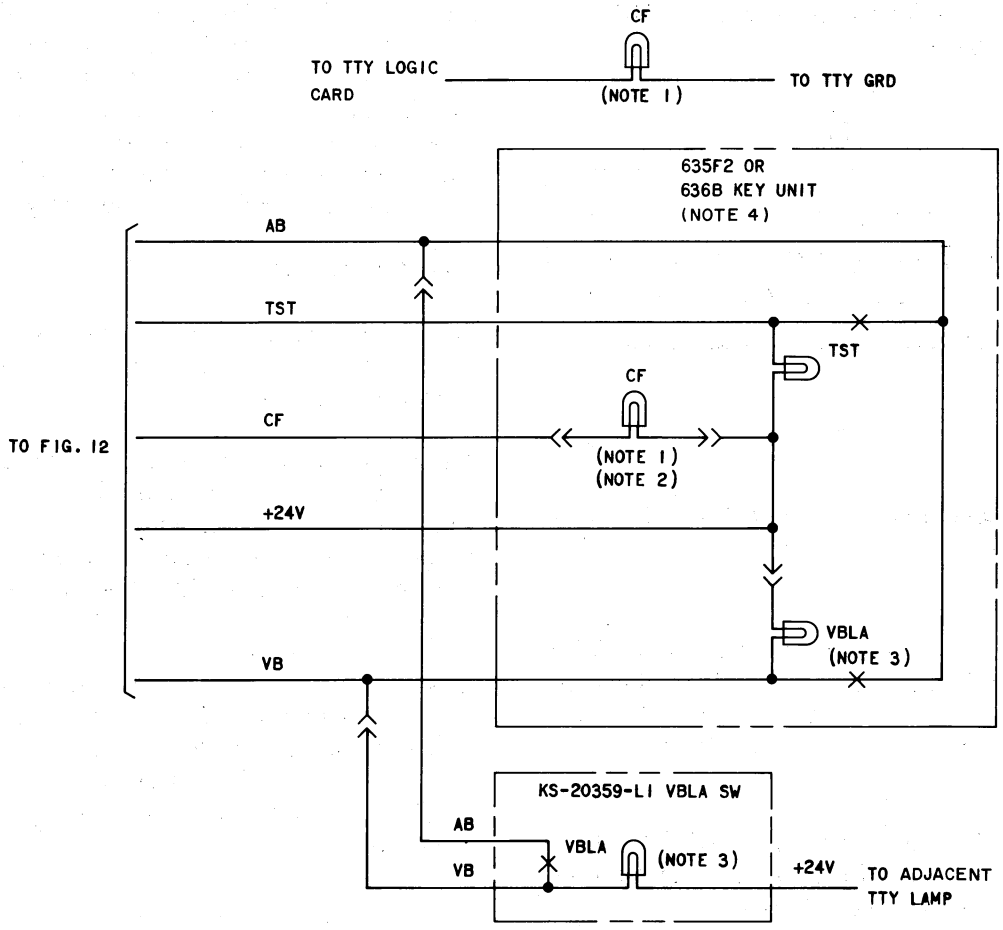
5.01 When the 1A data station is installed in a 31A2 data mounting it is continuously ready for operation when the M3AY or KS-14532-L16 power cord is connected to the 117-volt ac power source. There is no OFF/ON switch.

5.02 The keys and lamps used for testing are mounted on the TTY cabinet external to the 1A Data Station. Two key types are used.

5.03 The 635F2 key is an illuminated key unit providing test and indication features. It is used with the models 33, 35, and 37 TTY.

5.04 The 6041H-51 key containing a 636B key unit is a separately mounted illuminated key unit providing test and alarm features for the 1A Data Station binary mode. It is used with model 28 TTYs. It is available in a green housing for mounting on the side of an appropriately modified green model 28 TTY. The 6041H-61 key is the same as the 6041H-51 key except that it is gray in color to match a gray model 28 TTY.

5.05 Figure 15 shows the key and lamp circuit for controlling the test features of the 1A Data Station when it is associated with the 31A2 data mounting.



NOTES:

1. FOR M37 TTY, EIA, THE CF LAMP DOES NOT APPEAR ON THE KEY UNIT. IT IS IN THE TTY, ABOVE THE KEYBOARD, AND ENERGIZED THROUGH THE TTY LOGIC CARD FROM THE 25 PIN EIA CONN.
2. FOR M33 AND M35 TTY, EIA, THE KEY IN WHICH THE CF INDICATION IS LOCATED SERVES A DUAL PURPOSE - IT IS USED FOR BOTH OUT-OF-SERVICE AND CARRIER FAIL (NOT AT THE SAME TIME).
3. FOR M33 AND M35 TTY, EIA, THE VBLA SW AND LAMP KEY IS MOUNTED SEPARATELY FROM THE 635F2 KEY UNIT.
4. 635F2 KEY UNIT USED WITH MODELS 33, 35, AND 37 TTY'S. 636B KEY UNIT USED WITH MODEL 28 TTY.

TPA 564015

Fig. 15—Key and Lamp Circuits Associated With 31A2 Data Mounting, 1A Data Station, SCA

Models 33 and 35 TTY, EIA

5.06 Figure 16 shows the 635F2 key unit arrangement for the models 33 and 35 TTY, EIA (general purpose).

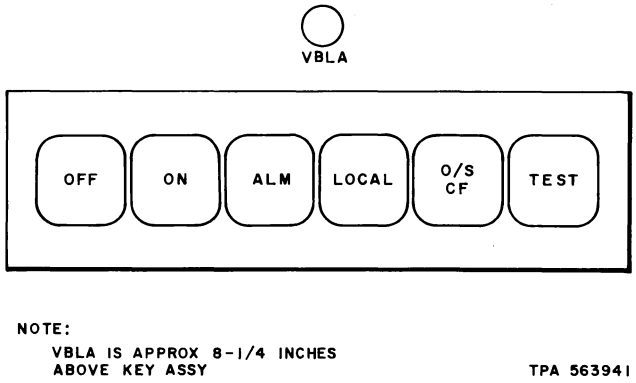


Fig. 16—Key Arangements for Models 33 and 35 TTY, EIA

5.07 The keys on both models 33 and 35 TTY, EIA are located in the bezel on the right top side of the TTY cabinet. The VBLA key is located approximately 8-1/4 inches above the key assembly.

5.08 The OFF, ON, ALM, and LOCAL keys pertain to the TTY and have no function with respect to the 1A Data Station.

5.09 The O/S-CF key serves a dual purpose. When the O/S (out-of-service) key is operated, the lamp will light. When the key is released, the lamp is extinguished and connected to the CF (data detector lead) interface lead. While connected to the CF lead, the lamp will provide an indication of an absence of carrier or low power level.

5.10 The VBLA push-on push-off key is used to condition the 1A Data Station for a remote test of the voice facility by the distant end. This is accomplished by means of a relay which connects the receive circuit (T1 and R1) to the transmit circuit (T and R).

Caution: Operation of the VBLA key disconnects the 1A Data Station from the voice facility. Therefore, care MUST be exercised to ensure that the key is not accidentally operated, such as by placing an object on the bezel over the VBLA key.

5.11 The TEST key is used to condition the 1A Data Station for a test from the distant end. (The near end is tested "remotely" from the distant end). This is accomplished by means of a relay which connects the receive lead to the send lead at the baseband level. The lamp will light when the TEST key is operated.

Model 37 TTY, EIA

5.12 Figure 17 shows the 635F2 key unit arrangement for the model 37 TTY, EIA (general purpose).

5.13 The keys are located on the pedestal door. The function of the VBLA and TEST keys are the same as described in 5.10 and 5.11, respectively. The remaining four keys are blank and serve no purpose for either the 1A Data Station or the TTY.

5.14 Note that there is no carrier fail key. The carrier fail indication is presented in one of the existing lamps located above the model 37 TTY keyboard. The indication is given via the TTY logic card from the 25-pin EIA customer connector.

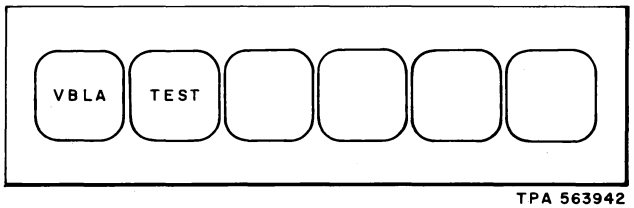


Fig. 17—Key Arrangements for Model 37 TTY, EIA

Model 28 TTY, Current

5.15 Figure 18 shows the 6041H-type key (part of 636B key unit) arrangement for the model 28 TTY, KSR, RO and ASR models.

5.16 The key assembly is mounted on the left side of the cabinet for the KSR and RO models. For the ASR model, the key assembly is mounted on the right side of the TTY cabinet.

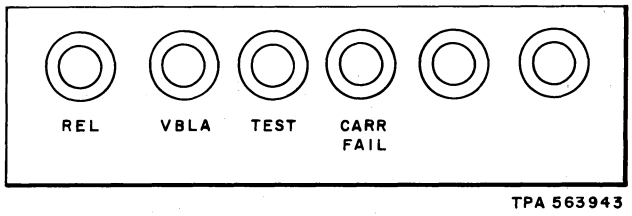


Fig. 18—Key Arrangements for Model 28 TTY, Current

5.17 The REL key is for mechanical release of the other keys. It provides no electrical or electronic function.

5.18 The VBLA and TEST keys perform the same functions as described in 5.10 and 5.11, respectively.

5.19 The CARR FAIL key (nonoperable) provides for indication only of the absence of carrier or low carrier power level. The indication is in addition to the CF lamp provided on the receive interface (DP51 circuit pack).

5.20 The other two keys are blank and serve no purpose.

Model 35 TTY, Current

5.21 Figure 19 shows the 635F2 key unit arrangement for the model 35 TTY, current.

5.22 The keys are located in the bezel on the right top side of the TTY cabinet.

5.23 The VBLA, TEST, and CARR FAIL keys perform the same functions as described in 5.10, 5.11, and 5.19, respectively.

5.24 The other three keys are blank and serve no purpose.

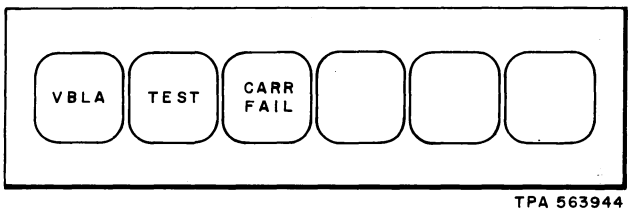


Fig. 19—Key Arrangements for Model 35 TTY, Current

B. ▶37A1 Data Mounting◀

5.25 ▶When the 1A Data Station is installed in a 37A1 data mounting, it is continuously ready for operation when the power cord is connected to the 117-volt ac power source. There is no OFF/ON switch.

5.26 The keys and lamp used for testing are mounted on the 37A1 data mounting.

5.27 The 630A4 key is an illuminated key unit providing test and indication features. It is used with the models 28, 33, 35 and 37 TTY. The CF lamp assembly is KS-20438-L2.

5.28 Figure 20 shows the key and lamp circuit for controlling the test features of the 1A Data Station when it is associated with the 37A1 data mounting.

5.29 Figure 21 shows the 630A4 key and lamp arrangement on the 37A1 data mounting for the models 28, 33, 35 and 37 TTY.

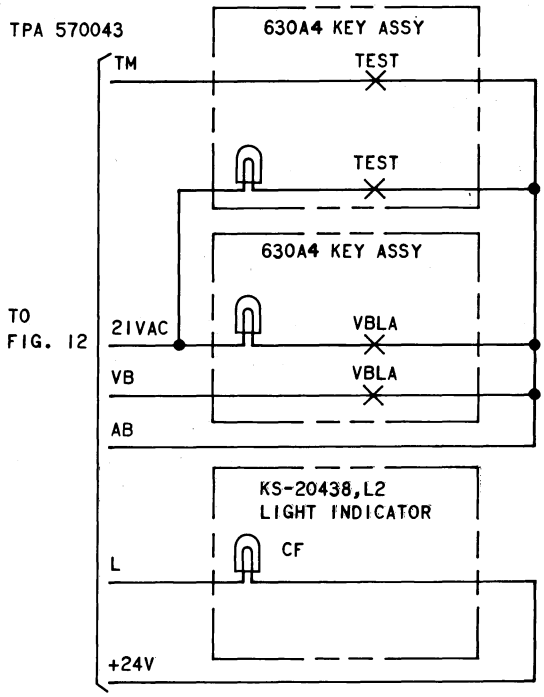


Fig. 20—Key and Lamp Circuits Associated With 37A1 Data Mounting, 1A Data Station, SCA

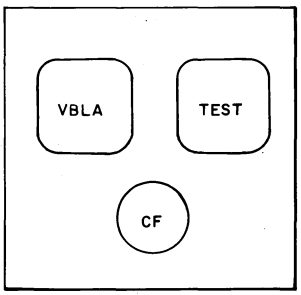


Fig. 21—Key and Lamp Arrangements on 37A1 Data Mounting for Use With Models 28, 33, 35, and 37 TTY

5.30 The keys and lamps are located in the upper right corner of the front removable cover of the 37A1 data mounting.

5.31 The VBLA and TEST keys perform the same functions as described in 5.10 and 5.11, respectively. The CF lamp provides an indication of the absence of carrier or low carrier power level. The indication is in addition to the CF lamp provided on the receive interface (DP51 circuit pack).◀

6. REFERENCES

6.01 For additional information relating to this section, refer to the following list:

SECTION	TITLE
591-813-201	1A Data Station—Single Channel Arrangements—Installation
591-813-301	1A Data Station—Single Channel Arrangements—Maintenance
591-813-501	1A Data Station—Single Channel Arrangements—Tests
591-813-181	Data System, 1A Data Station—Single Channel Arrangements—Summarizing Specification
591-813-100	1A Data Station—Multichannel Arrangements—Description and Operation
591-813-200	1A Data Station—Multichannel Arrangements—Installation
591-813-300	1A Data Station—Multichannel Arrangements—Maintenance
591-813-500	1A Data Station—Multichannel Arrangements—Tests
CD-&SD-70958-01	43B1 Voice Frequency Carrier Data System
CD-&SD-1D148-01	1A Data Station, Multichannel Arrangements
CD-&SD-1D184-01	1A Data Station, Single Channel Arrangements
AB83.048.01	43B1 Voice Frequency Carrier Data System—General Engineering Considerations
CD-&SD-70553-01	Carrier Telephone Line Connection Circuit
ED-1D159-01	1A Data Station, Single Channel Arrangements, Teletypewriter Applications.