407AR AND 407BR MULTIPLE DATA STATIONS

DESCRIPTION

CONTENTS PAGE

1. GENERAL

1.01 This section provides information on the 407AR and 407BR multiple data stations optioned for either an Electronic Industries Association (EIA) voltage or a contact equivalent customer interface. The 407AR and 407BR multiple data stations perform functions similar to data set 403D-type multiple data station.

1.02 When this section is reissued, the reason for reissue will be presented in this paragraph.

1.03 A 407AR multiple data station, shown in Fig. 1, consists of the following units:

- Data set (DS) 407AR-L1B
- 41-type data mounting (houses a maximum of eight DSs 407AR) equipped with—

  101A power unit.

  P3BJ power cord (one supplied ***only*** with the 41B3 data mounting). This power cord enables interconnection to other power units.

  KS-14532-L16 power cord (one supplied ***only*** with the 41A3 data mounting). This 10-foot power cord is used for connection to the customer-provided ac power outlet.

  46A1 data unit (one supplied ***only*** with 41A3 data mounting).

  47A1 data unit (one supplied ***only*** with 41A3 data mounting).

- An appropriate housing such as a KS-20018-L11A or -L12A.

1.04 A 407BR multiple data station is similar to the 407AR shown in Fig. 1, but uses DS 407BRs, and 41A3 and 41B3 data mountings.

Note: The KS-20018-L11A cabinet will hold 24 DS 407ARs, but only 16 DS 407BRs, due to thermal limitations.

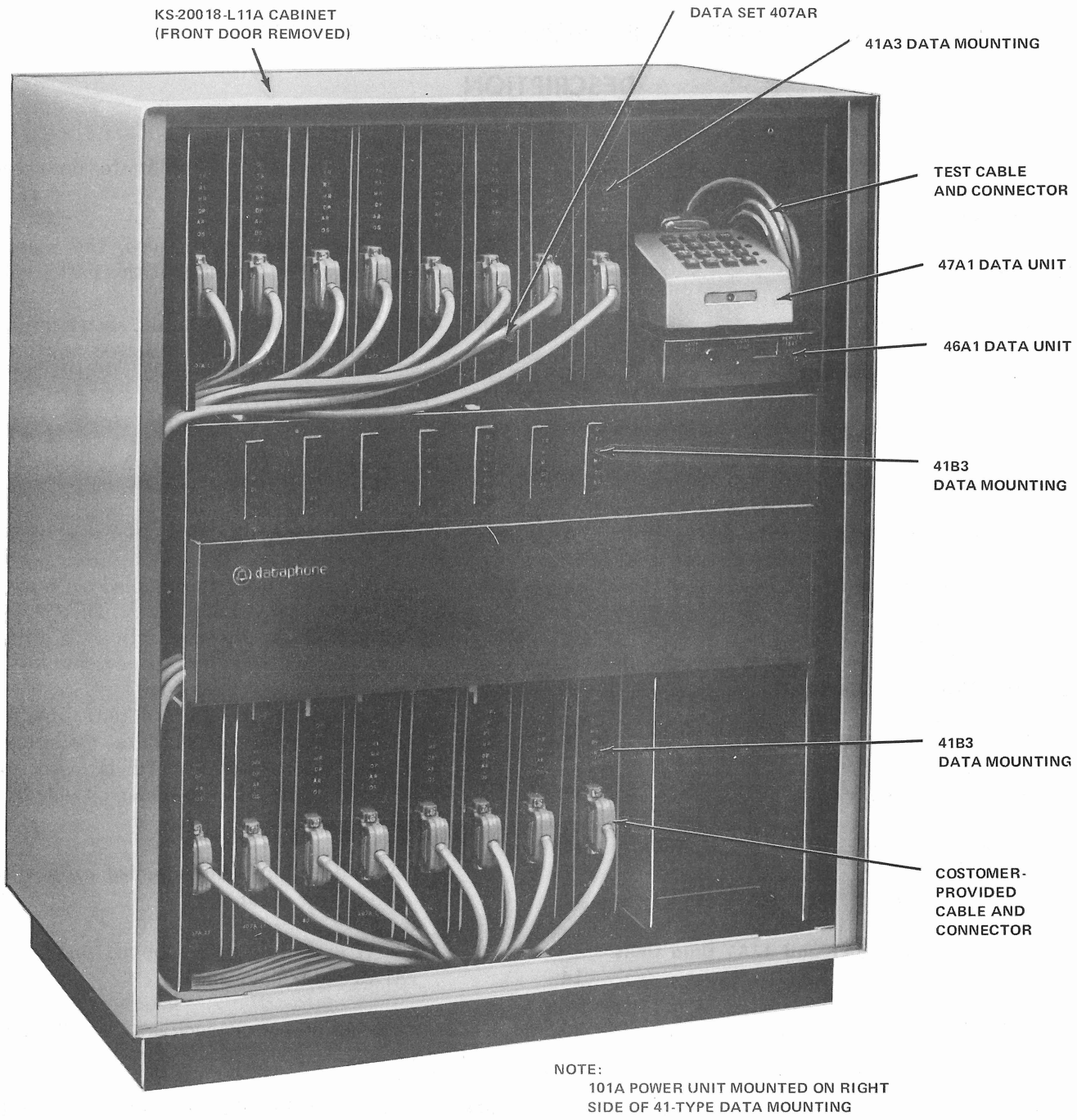

Fig. 1—407AR Multiple Data Station Mounted in a KS-20018-L11A Cabinet—Typical

1.05 The 407AR and 407BR multiple data stations are used primarily for Digital Inquiry Voice Answer-Back (DIVA) systems. These systems may be used in such applications as credit checking or retrieving information from a customer-provided computer. Using a TOUCH-TONE® telephone dial or transaction telephone as the input device, a customer may call the computer and receive a voice or tone answer over the telephone handset. This answer may consist of machine-generated or

prerecorded phrases. These phrases are under control of a customer-provided computer equipped with an audio response unit.

1.06 To operate with the transaction telephone, a DS 407AR-L1B or 407BR-L1A must be used. The DS 407AR-L1B uses a JU1C line control and interface board.

1.07 Data set 407-type is a low-speed, parallel receiver that detects two-out-of-eight multifrequency signals generated by a TOUCH-TONE-type telephone. The data set receives data from either the 2-wire switched telecommunications network or an unconditioned private line facility. The data set provides a two-way voice channel as well as full-time remote control. The remote control feature enables the data set to receive TOUCH-TONE signals in the presence of outgoing voice or tone answer-back. The data set has the capability of generating a 2025-Hz answer-back tone. Status light emitting diodes (LEDs), as shown in Fig. 2 and 3, are provided on the front panel of DS 407AR and 407BR to indicate the state of various functions and customer interface signals.

1.08 The 41-type data mounting will accommodate up to eight data sets 407AR or 407BR. The 41A3 data mounting contains the 101A power unit, one 46A1 data unit, and one 47A1 data unit. The 41B3 data mounting is the same as the 41A3 data mounting but does ***not*** contain the 46A1 and 47A1 data units (test unit). The 41A3 data mountings may be used to accommodate the first eight DS 407ARs or 407BRs and the 46A1 and 47A1 data units. When additional DS 407ARs or 407BRs are used, one 41B3 data mounting is used for each eight additional data sets.

1.09 The 46A1 data unit (Fig. 1) provided with the 41A3 data mounting enables local or remote testing of any data set 407AR or 407BR in the cabinet.

1.10 The 47A1 data unit also provided with the 41A3 data mounting enables local testing by a telephone company (telco) employee or customer of any data set housed in the cabinet.

1.11 The 407AR or 407BR multiple data station may be housed in a KS-20018-L11A or -L12A cabinet, or equivalent, or any mounting rack that will accept the 23-inch 41-type data mounting. Only one 41A3 data mounting will be mounted in each cabinet to house the first eight data sets. Additional data sets will be housed in 41B3 data mountings, as required.

1.12 The 407AR or 407BR multiple data station is compatible with a CALL DIRECTOR® or the following telephone sets:

Rotary Dial

831CM

630DAM

TOUCH-TONE Dial

2831CM

2630 DAM.

These units provide TALK and return to DATA functions as well as normal telephone set functions if required. The 407AR or 407BR multiple data station is also compatible with the 2B automatic call distributor (ACD).

2. PHYSICAL DESCRIPTION

2.01 The 407AR or 407BR multiple data station will operate in an ambient temperature range from 40 to 120°F. The relative humidity operating ranges for the data station are as follows.

- Between 40 to 75°F, the humidity may vary from 20 to 95 percent.
- At 100°F the humidity range is 20 to 70 percent.
- At 120°F the humidity range is 20 to 40 percent.

A. Data Set 407AR-L1B

2.02 Data set 407AR-L1B (Fig. 2) consists of two printed wiring circuit packs (CPs) (JU1C and JU2) mounted together in sandwich fashion. A KS-19087-type 25-pin connector is located on the front of the data set and provides the interface with customer-provided terminal equipment. Printed CP terminals are also located on the rear of the data set which enables the data set to plug into the 41-type data mounting. The data set is about

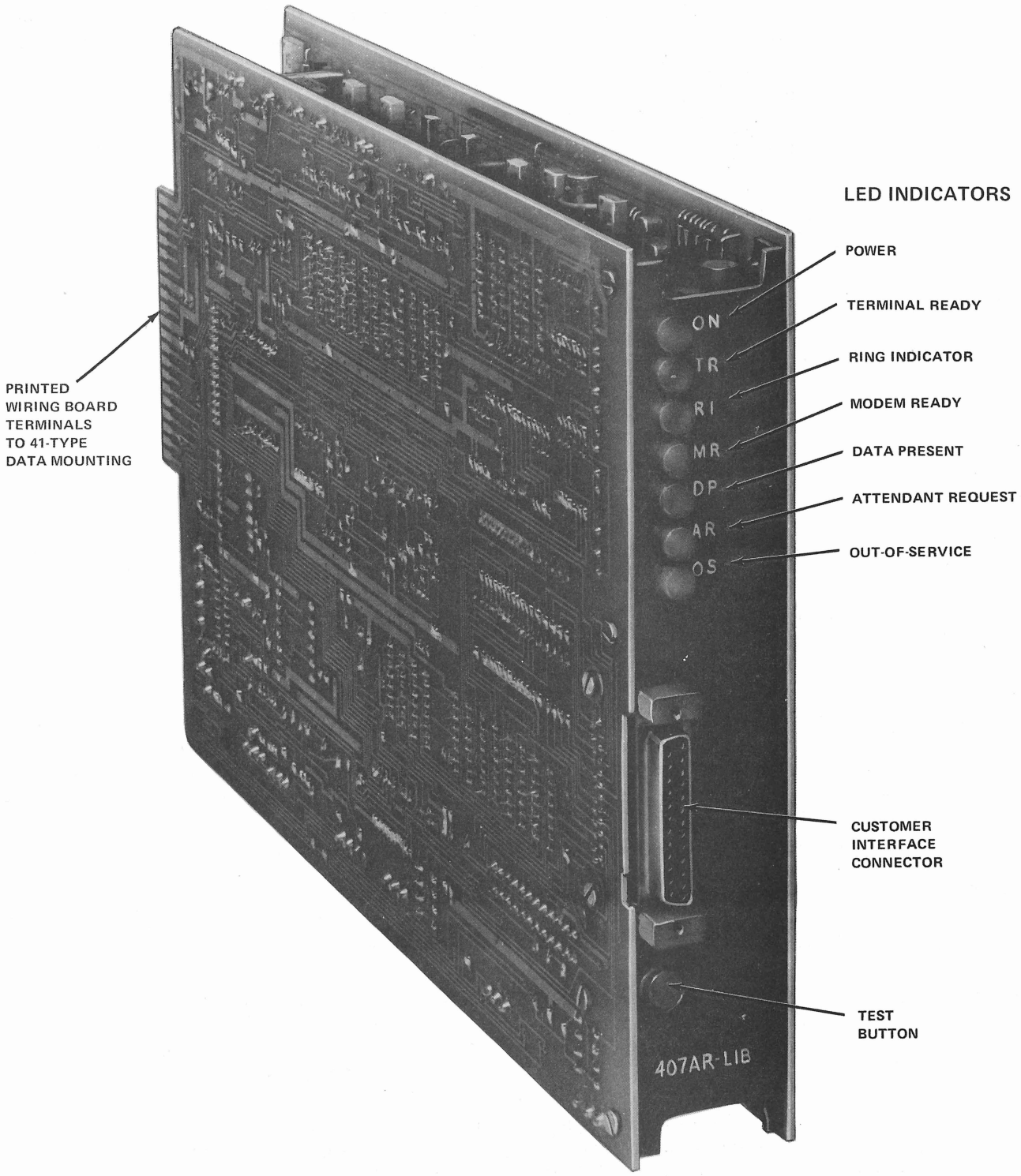

Fig. 2—Data Set 407AR-L1B

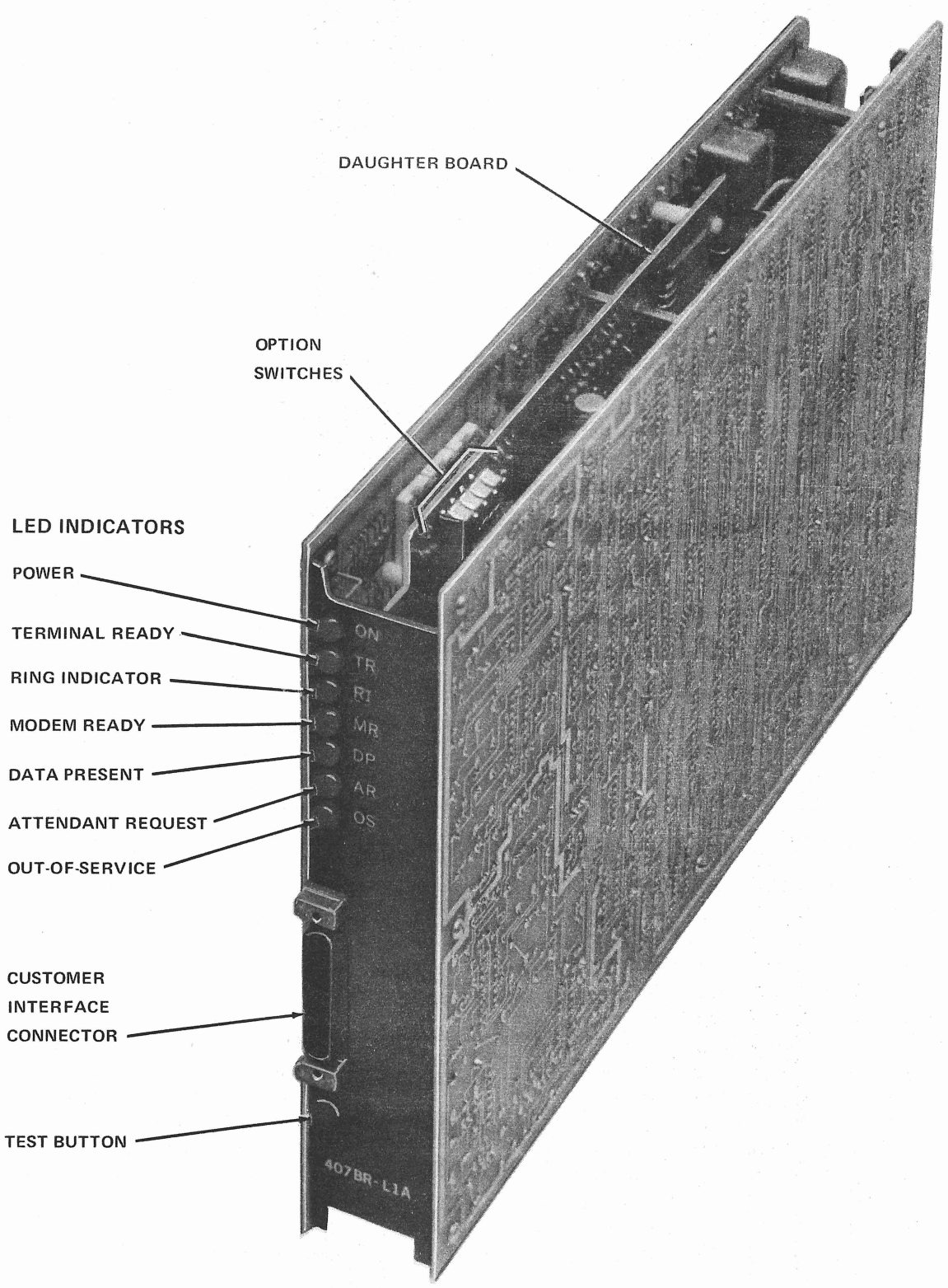

Fig. 3—Data Set 407BR-L1A

8 inches high, 12-1/8 inches deep, 1-1/2 inches wide, and weighs approximately 2-3/4 pounds. The data sets require power sources of +12 volts, -12 volts, and +5 volts.

B. Data Set 407BR-L1A

2.03 Data set 407BR-L1A (Fig. 3) consists of two CPs (JU2 and JU3B) similar to DS 407AR-L1B, with a daughter board CM1 (circuit module) as part of JU3B. Dimensionally, the DS 407BR is the same as DS 407AR, and the set weighs about 3 pounds. The power source requirements are the same as DS 407AR. A 25-pin interface connector is located on the front of the set.

C. 41-Type Data Mountings

2.04 The 41A3 data mounting (Fig. 4) contains a test unit and is approximately 23 inches wide, 8-2/3 inches high, and 16-1/2 inches deep. It mounts on a 23-inch rack and weighs about 42 pounds. The 41A3 data mounting is supplied with a KS-14532-L16 power cord. The 41B3 data mounting has the same physical dimensions as the 41A3 data mounting and weighs about 38 pounds. The 41B3 data mounting is supplied with a P3BJ power cord. The P3BJ power cord consists of a Hubbel Twist-lock receptacle and a three-prong male plug. The 41B3 does ***not*** contain a test unit.

2.05 The 41-type data mountings are provided with eight 908J1 connectors, two KS-16672-L3 50-pin connectors, and one 101A power unit. All data mountings provide a locking strip across the front of the mounting to ensure the data sets remain properly connected in the nest. A pack of spare option plugs (for data set 407-type) is also provided with the data mountings. The 41-type data mountings are also provided with a removable cover. Decals are attached to the inside of this front cover. One decal provides data set number location as well as computer port assignment for each data set in the 41-type data mounting. This decal appears on all 41-type data mountings. A second decal is located on the 41A3 data mounting to provide local test information. Backplane wiring is also provided with the data mountings.

2.06 A 25D connector cable equipped with one KS-16689-L3 plug is used to make the necessary line facility connections. The KS-16689-L3 plug is connected to (J3) KS-16672-L3 connector on the rear of the 41-type data mounting. In addition, connector J4 contains the tip and ring pair of the service line used in remote testing. A 5-foot long test connector cable is provided with the 41A3 data mounting to facilitate testing of any data set in the cabinet.

D. 101A Power Unit

2.07 The dc voltages are supplied to the data sets via the data mounting by the 101A power unit (Fig. 5). The 101A power unit is mounted on the right side of the data mounting and weighs about 20 pounds. If more than one data mounting is required, the 101A power units are interconnected (via P3BJ power cords) with the bottom power unit supplying the external power connection via the KS-14532-L16 power cord.

E. 46A1 Data Unit

2.08 The 46A1 data unit (Fig. 1) is about 5-1/4 inches wide, 2 inches high, 4-1/4 inches deep, and weighs about 1-1/2 pounds. This data unit contains a LOCAL-REMOTE test switch, test indication LEDs, and a LAMP TEST switch for testing all LEDs in the cabinet.

F. 47A1 Data Unit

2.09 The 47A1 data unit (Fig. 1) is about 4-1/2 inches wide, 2-1/2 inches high, 4-1/2 inches deep, and weighs about 1-1/2 pounds. This data unit is a modified 16-button TOUCH-TONE dial. The data unit contains LEDs across the top and down the right side of the dial.

G. Cabinets

2.10 The 407AR or 407BR multiple data station may be housed in one of two KS-20018-type cabinets. The front panel of each cabinet is tinted plastic, while the back panel is perforated metal. The cabinet exteriors are textured aluminum with a clear finish. The cabinets and physical characteristics are as follows.

- KS-20018-L11A cabinet can house one 41A3 and up to two 41B3 data mountings with a maximum of twenty-four DS 407ARs or sixteen DS 407BRs. The cabinet is about 24 inches wide, 30 inches high, 19 inches deep, and weighs about 31 pounds.

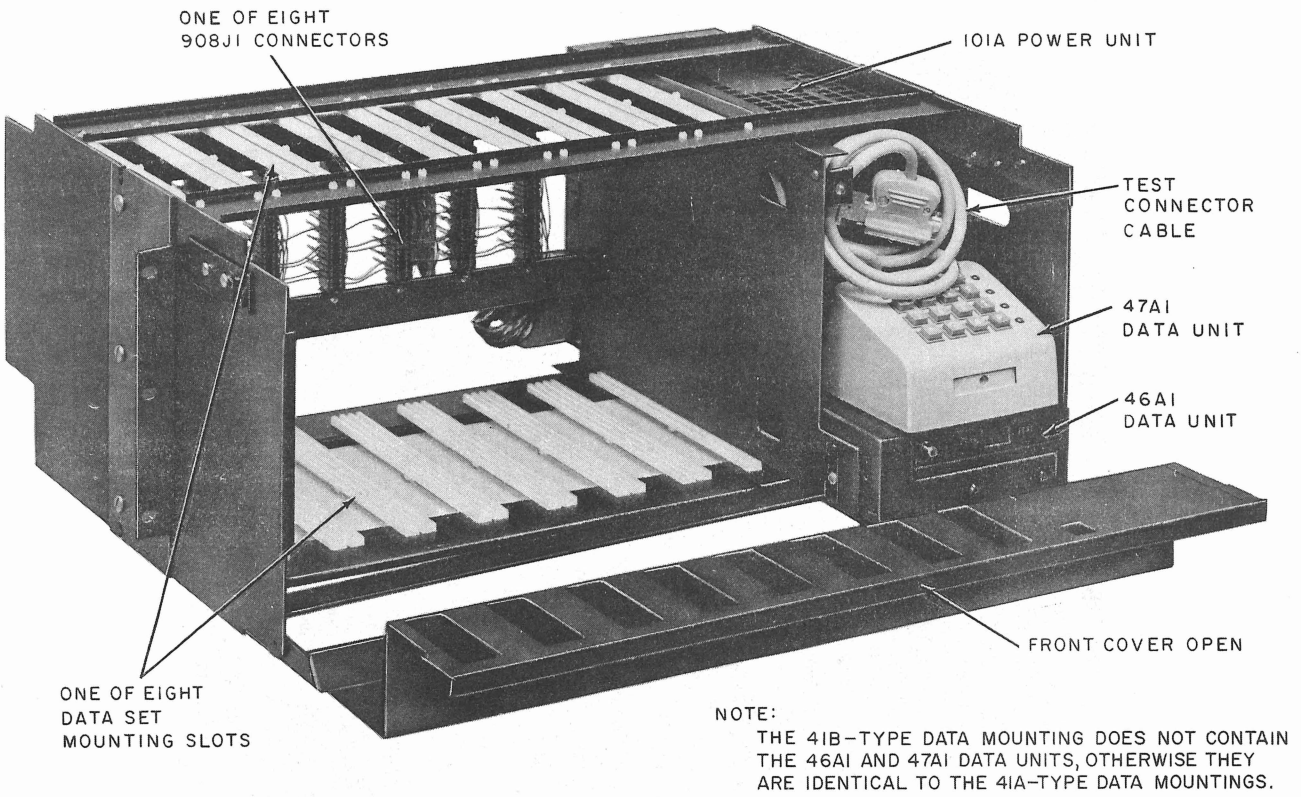

Fig. 4—41A3 Data Mounting With Front Cover Open

- KS-20018-L12A cabinet can house one 41A3 data mounting with a maximum of eight data sets. The cabinet is about 24 inches wide, 17 inches high, 19 inches deep, and weighs about 22 pounds.

Stations requiring more data sets that can be accommodated in the KS-20018-L11A cabinet can be served by using additional cabinets. Interconnection between cabinets must be made at time of installation.

3. FUNCTIONAL DESCRIPTION

3.01 The 407AR or 407BR multiple data station provides a maximum of eight interface connections between the data sets and customer-provided terminals per data mounting. Two line facility interface connectors per data mounting are also provided. Each of the line facility connectors provide the necessary interface to connect four data sets to the telephone network. The telephone network connections are made as shown in Fig. 6.

A. Data Set 407AR-L1B

3.02 Data set 407AR-L1B is functionally, as well as physically, divided into two halves; a line control and interface CP (JU1C) and a receiver CP (JU2).

3.03 The JU1C CP provides the interface between the telephone lines and the data set. This CP is also the interface between the data set and customer-provided terminal via the KS-19087-type 25-pin connector. An impedance match of 600 ohms (private line) or 900 ohms direct distance dialing [(DDD) line] is provided by the data set via the JU1C CP. The JU1C CP provides the following additional functions.

- Automatic answer.
- Normal voice telephone service with an associated key telephone set, if required.
- Two-way voice channel.

Fig. 5—101A Power Unit

- Return to data.
- Tone answer-back (2025 Hz)
- Local and remote test capability.
- Indicator LEDs.
- Call referral.
- Automatic Call Distributor (ACD) interface.

3.04 The hybrid network located on JU1C CP allows detection of valid data signals in the presence of near-end signals such as voice answer-back or tone answer-back (full-time remote control).

3.05 The JU2 CP is the receiver portion of the data set and accepts a two-out-of-eight TOUCH-TONE transmission code. The transmission code consists of two groups of frequencies, a low group and a high group, each containing four frequencies. These frequencies are grouped and designated as shown in Fig. 7.

3.06 The receiver detects the TOUCH-TONE signals at a maximum rate of ten characters per second. A character consists of one frequency from each group shown in Fig. 7. Therefore, the two-out-of-eight code provides 16 different frequency pairs (characters). Data sets 407AR and 407BR recognize all of these characters.

3.07 The transmitter portion of the data set is equipped with a tone generator which operates at 2025 Hz. This oscillator is activated during the call answering sequence to generate 2025-Hz answer tone. The oscillator will generate 2025-Hz tone

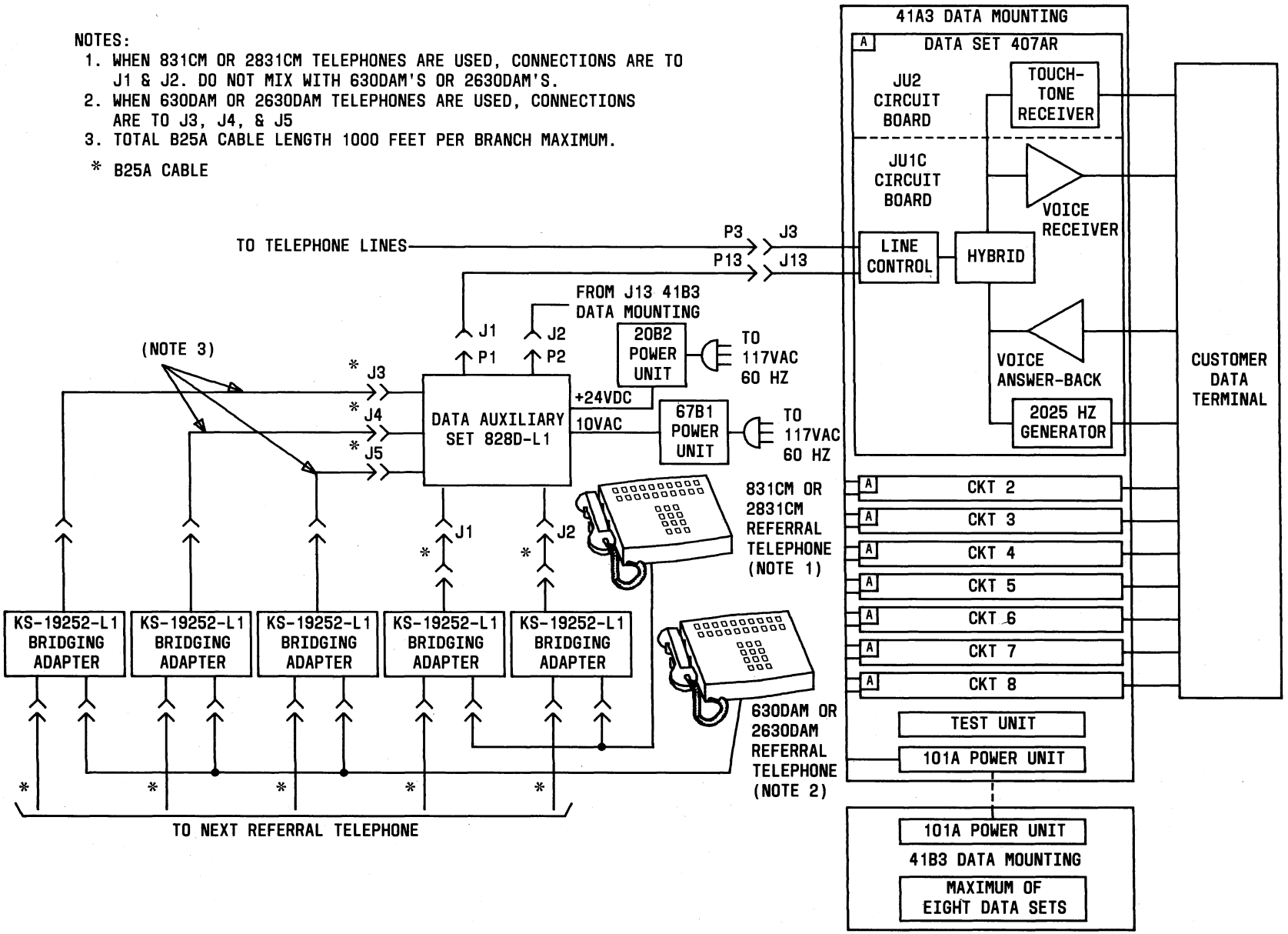

Fig. 6—407AR Multiple Data Station Arrangement Functional Block Diagram—Typical

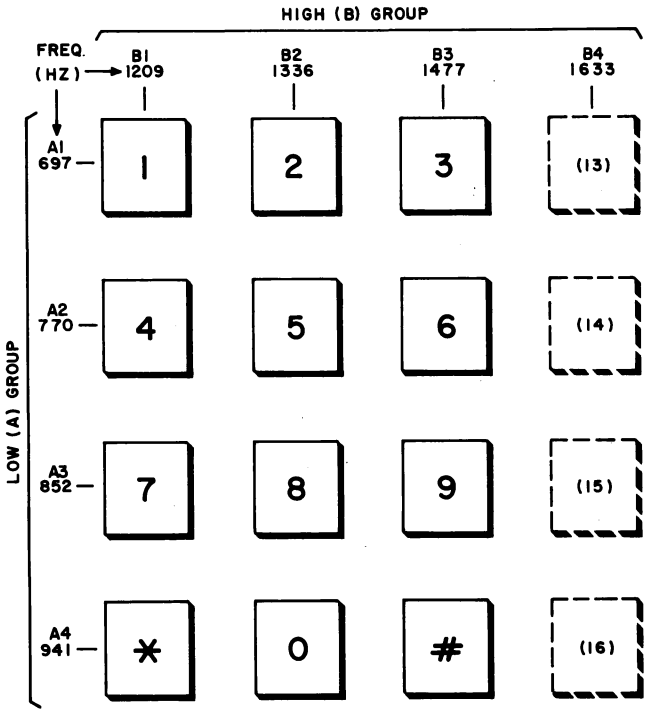

Fig. 7—TOUCH-TONE Dial Frequency Assignments

whenever the tone answer-back (TAB) customer interface leads is in the ***on*** state. A voice answer-back channel is also provided for customer use. It accepts a voice signal, on a balanced 600-ohm pair, up to 0 dBm and passes it to the telephone line. The voice answer-back channel is disabled whenever the tone generator is activated.

3.08 Seven status LEDs are provided on the front of data set 407AR-L1B as shown in Fig. 2. The LED names and functions are defined as follows.

- The "ON" LED indicates that power is applied to the data set.
- The terminal ready (TR) LED indicates the status of the data terminal ready signal from the customer interface.
- The ring indicator (RI) LED indicates that ringing is being applied to the data set.
- The modem ready (MR) LED indicates the status of data set ready signal to the customer interface. This LED comes ***on*** 3 seconds after ringing is tripped, if the station is in the data mode and TR is ***on***. Once it comes ***on***, it stays ***on*** until termination of the call, whether the line is in the talk or the data mode.
- The data present (DP) LED indicates the status of the data present signal to the customer interface. This signal (DP LED ***on***) indicates that the data set is receiving data.
- The attendant request (AR) LED indicates the status of attendant request signal from the customer interface.
- The out-of-service LED indicates that the data set has been placed out of service.

3.09 The data set has the capability of giving an out-of-service indication to the connecting data facility under any of the following conditions.

- Out-of-service customer interface lead is placed in the ***on*** state by the customer terminal.
- The data set is under test.
- Power is lost to the data set.
- The data set is not plugged into the nest correctly or has been removed from the nest.
- The connector to the customer terminal is not plugged in correctly and the EIA interface option is used.

3.10 The data set detects ringing current on its associated line circuit and generates a ring indicator (RI) signal on the customer interface. If the customer terminal is ready to accept the call (DTR is turned ***on***), the line control circuit will answer the call automatically and then sense DC loop current. A 2025-Hz answer tone is then transmitted for about 1-1/2 seconds to the calling station, indicating the call has been answered. The DSR lead is turned ***on*** indicating the data set is connected to the line. During a call, the line control circuit will indicate line and data set status by means of a lamp indication on the associated Call Director or telephone set as follows.

- In the ***Idle*** mode the lamp is ***off.***
- In the ***Data*** mode the lamp is ***on.***
- In the ***Data*** mode, when the attendant request lead is ***on,*** the lamp flashes.
- In the ***Talk*** Mode the lamp is ***on.***
- In the ***Out-of-Service*** mode the lamp is ***on.***

The call is terminated when the loop current is interrupted during a call after the automatic answering sequence is over. The call is also disconnected by the following means:

- TALK mode—attendant hangs up
- DATA mode—DTR ***off***
- ACD—DTR ***off.***

B. Data Set 407BR-L1A

3.11 Data set 407BR-L1A (Fig. 2) performs all the functions of DS 407AR-L1B, and also provides the following three additional features:

- Terminal-initiated referral capability
- Remote call termination
- Limited call-handling capability when customer-provided equipment is out of service.

The DS 407BR-L1A is also functionally and physically divided into two halves; a line control and interface (JU3B) and a receiver (JU2). The additional functions listed above are provided by a daughter board which is part of JU3B CP; the JU2 CP provides the same functions for both data sets.

3.12 When DS 407BR-L1A is optioned for "terminal initiated referral—always," the calling terminal may request an attendant any time (computer "up" or "down") by sending the "attendant request" signal (* *).

3.13 In addition to the features described above, when the 407BR-L1A data station goes into "computer down" mode, the data sets answer incoming calls, generate a 3.5-second answer tone to indicate "computer down" to the calling terminal and can respond to an "attendant request" signal (* *) from a terminal. A 15-second time-out feature is provided so that calls that do not get referred are promptly terminated.

3.14 Data set 407BR-L1A responds to the TOUCH-TONE sequence * # * (star, number sign, star) by momentarily turning ***off*** data terminal ready (DTR) regardless of the status of the DTR lead at the customer interface. This causes the data set to terminate the call.

3.15 Out of service may be controlled by DTR by option.

OPTION AND INTERFACE INFORMATION

Data Sets 407AR-L1B and 407BR-L1A

3.16 On DS 407AR option strapping is provided by means of two-pronged plugs which fit into numbered jacks on the JU1C CP. On DS 407BR the same options are furnished as part of JU3B CP. Additional options required when DS 407BR is used with a transaction telephone are provided by lettered switches on the daughter board (CM1) which is part of JU3B. Options for DS 407AR and 407BR are listed in Table A.

3.17 Interface pin numbers, lead designations, abbreviations, and functions for data sets 407AR and 407BR are shown in Table B. Twenty-three of the twenty-five leads on the customer interface connector are assigned. The two unassigned leads are spares.

C. 41-Type Data Mounting

3.18 The 41-type data mounting is a multiple apparatus housing which will accommodate a maximum of eight data sets. Connectors J3 and J4 on the 41-type data mounting provide interconnection from the eight mounting slots to the telephone network per Fig. 6. The 908J1 connectors (eight per mounting) accept data set 407AR or 407BR.

3.19 Each of the 41A3 and 41B3 data mountings is equipped with one 101A power unit. The 101A power unit supplies power to a maximum of eight data sets. Separate outputs on the power unit provide +12 volts, -12 volts, and +5 volts filtered dc power for each data set in the 41-type

TABLE A

DATA SET 407AR AND 407BR OPTIONS

OPTION	SELECTION	DESIG	AVAILABLE IN
Type of Operation	Switched Network	A*	Both 407AR and 407BR
	Private Line	B	
Used With ACD	No	C*	Both 407AR and 407BR
	Yes	D	
Answer Back Level	–4 dBm	E	Both 407AR and 407BR
	–8 dBm	F	
	–6 dBm	G*	
	–10 dBm	P	
Customer Interface	EIA	H*	Both 407AR and 407BR
	Contact Equivalent	J	
Terminal Initiated Referral	Always	K	407BR Only
	During Computer Down Only	L*	
OS Controlled by DTR	No	M*	407BR Only
	Yes	N	
Computer Down Detection	Switch Only	AA	407BR Only
	All DTR ***off*** Only	BB	
	Switch or All DTR ***off***	CC	
	Not Used	DD	
Out-of-Service Wiring	Tip-Ring Short	EE	Not Used
	Third Wire Ground	FF	
	Separate Pair Short	GG	
Grounding	Frame Ground Connected to Signal Ground	HH*	Both 407AR and 407BR
	Frame Ground and Signal Ground Not Connected	JJ	

*Factory Furnished Option.

TABLE B

CUSTOMER INTERFACE LEAD FUNCTIONS

PIN NO.	LEAD DESIGNATION	ABBREVIATION	FUNCTION
1	Frame Ground	FG	Common to ac power service ground.
2	Voice Receive A	VRA	Provides one-half of a 600Ω balanced pair for line signals being passed to the customer.
3 4 5 6	A1 Data A2 Data A3 Data A4 Data	A1 A2 A3 A4	Low group outputs from data set when a valid TOUCH-TONE character is present.
7	Spare	—	Not used.
8	Voice Receive B	VRB	Provides one-half of a 600Ω balanced pair for line signals being passed to the customer.
9 10 11 12	B1 Data B2 Data B3 Data B4 Data	B1 B2 B3 B4	High group outputs from data set when a valid TOUCH-TONE character is present.
13	Spare	—	Not used.
14	Ring Indicator	RI	An ***on*** condition on this lead indicates that ringing signal is being received.
15	Attendant Request	AR	An ***on*** condition on this lead (data set in data mode) indicates that an attendant is requested on the line.
16	Data Present	DP	An ***on*** condition on this lead indicates that the data set is receiving a valid TOUCH-TONE signal. This lead is considered a data lead and therefore an ***on*** condition is a negative voltage.
17 18	Voice Answer-Back A Voice Answer-Back B	VAA VAB	Provides a 600Ω balanced pair for answer-back signal from customer to data set.
19	Data Mode	DM	An ***on*** condition on this lead and the DSR lead (Pin 23) indicates the data set is in the data mode. An ***off*** condition on the DM lead and an ***on*** condition on the DSR lead indicates the data set is in the talk mode.

TABLE B (Contd)

CUSTOMER INTERFACE LEAD FUNCTIONS

PIN NO.	LEAD DESIGNATION	ABBREVIATION	FUNCTION
20	Tone Answer-Back	TAB	An ***on*** condition on this lead causes the data set to disable the voice answer-back port and generate an answer-back tone (2025 Hz).
21	Data Receive	DR	An ***on*** condition ***must*** be placed on this lead (by the customer) to connect the TOUCH-TONE receiver to the telco line. This enables the data set to receive data.
22	Data Terminal Ready	DTR	An ***on*** condition on this lead prepares the data set to be connected to the telco line. In DS 407BR, the out-of-service function can be optionally controlled by the DTR lead. When that option (N) is selected, the OS lead has no effect and the set is out of service when DTR is ***off***.
23	Data Set Ready	DSR	An ***on*** condition on this lead indicates the data set is ***either*** in the data mode and ready to receive data, transmit answer-back signals, or both, depending on the condition of the DR lead (Pin 21), or is in the talk mode (DM lead Pin 19 is ***off***).
24	Signal Ground	SG	This conductor establishes the common ground for signals referenced to it and is optionally connected to frame ground via a strap located on the power unit.
25	Out of Service	OS	An ***on*** condition on this lead makes the data set appear busy to incoming calls. When an ACD is employed, this lead is placed in the ***off*** condition at all times. In DS 407BR, the out-of-service function can be optionally controlled by the DTR lead. When that option (N) is selected, the OS lead has no effect and the set is out of service when DTR is ***off***.

mounting. The power unit is powered from a 117-volt 60-Hz three-wire (with ground) source.

3.20 The test unit in the 41A3 data mounting provides both local and remote testing capabilities for all the data sets within a single cabinet.

D. Test Unit—46A1 and 47A1 Data Units

3.21 When a data set is placed under test (local or remote), the customer interface cable is removed from the data set and the test cable from the 46A1 data unit (CA1) is connected directly to the data set interface connector. A retainer on

this 25-pin test connector automatically operates the TEST switch located on the front of the data set. When the data set is placed in the test mode, the following functions occur.

- Data set is transferred from its associated line to a test line.
- The local test start (LTS) and remote test release (RTR) leads of the set under test are connected to the test circuit.
- The interface leads are placed in the contact equivalent option.
- If an ACD is used for voice access and call distribution, the data terminal ready indication to the ACD is disabled. This makes the data set under test appear busy to the ACD.
- The incoming line is made busy so no calls will be directed to the data set under test.

3.22 The 46A1 data unit provides local, remote, and LED testing of up to 24 of the 407AR or 16 of the 407BR data sets in a multiple data station. The LOCAL-REMOTE test switch is operated to REMOTE TEST, thereby placing the data set in the remote test mode. In the remote test mode, the data set under test is connected to a service line and then called from a remote data test center. When the LAMP TEST switch is depressed, the status LEDs on the data sets and test unit should light. This test feature checks that all LEDs are in working condition.

3.23 The 47A1 data unit provides means for local testing of up to 24 data sets by the customer or telco employee, by operating the LOCAL-REMOTE test switch on the 46A1 data unit to LOCAL TEST. When a TOUCH-TONE button on the 47A1 data unit is depressed and held, the two LEDs representing the horizontal and vertical coordinates of the depressed button will flash at a steady rate. This test enables the customer or telco employee to obtain a rapid check of a data set.

4. REFERENCES

4.01 The following documents pertain to 407AR and 407BR multiple data stations.

NUMBER	TITLE
SD & CD 1D240-02	Data System Station—407AR or 407BR Data Station
SD & CD 1D241-02	Power Unit 101A

SECTION	TITLE
314-811-100	1A Transaction Telephone Test Line Station—Description
476-270-203	2B Automatic Call Distributing System—Cabling and Cross Connects
590-100-132	46A1 Data Unit—Identification
590-100-133	47A1 Data Unit—Identification
590-102-132	41-Type Data Mounting—Identification
594-031-100	Data Sets 407AR and 407BR—Identification
594-800-101	407-Type Multiple Data Station Using 2B Automatic Call Distributor—Description
594-800-501	407-Type Multiple Data Station Using 2B Automatic Call Distributor—Test Procedures
594-801-200	407AR and 407BR Multiple Data Station—Installation and Connections
594-801-300	407AR and 407BR Multiple Data Stations—Maintenance
594-801-500	407AR and 407BR Multiple Data Stations—Test Procedures
668-104-540	Data Test Center 904A- and 904C-Types—407-Type Multiple Data Station—Loopback Test