407C MULTIPLE DATA STATION
DESCRIPTION

CONTENTS PAGE

1. GENERAL

1.01 This section provides information on the 407C multiple data station. The 407C multiple data station performs functions similar to 407A and 407B multiple data stations, but provides a much larger selection of options. Data set (DS) 407C is designed primarily for TOUCH-TONE® inquiry/FSK (frequency shift keyed) response systems requiring a serial interface at the computer. It can provide a serial interface according to Electronic Industries Association (EIA) Standard RS-232-C. It may be optioned to perform as a DS 407A or B, with either EIA voltage or contact closure equivalent customer interface.

1.02 This section is reissued to show DS 407C-L1, series 1 rated manufacture discontinued (MD), and to show DS 407C-L1, series 2 as the replacing data set. Four new end-of-message options have been added in DS 407C-L1, series 2, which are customer options.

1.03 Unlike DS 407A or 407B, DS 407C-type is a functionally inseparable dual, or twin, data set which serves two incoming lines and two data ports simultaneously. DS 407C-type contains two circuit packs (CP1 and CP2), each made up of three printed wiring boards, as follows:

CP1

- Central Processor Unit
- RM1 Line Board
- Option Board

CP2

- TOUCH-TONE Detector Board
- RM1 Line Board

- Option Board

The two circuit packs are fastened together and electrically interconnected by two plug-in ribbon cables. The input and output signals from each of the two RM1 line boards and the TOUCH-TONE detector board are multiplexed to the central processor unit. The detector and central processor are common to both input and output lines.

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

- DS 407C-L1 (one for every two data lines served).

- 57A-type data mounting (houses up to four DSs 407C) equipped with:

  229A power unit.

  KS-14532-L24 power cord. This 6-foot power cord is used for connection to the 81A detector.

  51A-type data unit (supplied ***only*** with 57A-type data mounting).

  47A-type data unit (supplied ***only*** with 57A-type data mounting).

- 57B-type data mounting (houses an additional four data sets). Equipped the same as 57A-type data mounting except it does not contain 51A-type and 47A-type data units.

- A KS-20018-L20 cabinet.

Note: The KS-20018-L20 cabinet will accommodate two 57-type data mountings with a maximum of eight DS 407Cs.

- 81A (thermal) detector.

- KS-14532-L25 power cord. This 3-meter (10-foot) power cord is used to connect 117 Vac to the 407C multiple data station.

1.05 The 407C multiple data station is used primarily for TOUCH-TONE inquiry/FSK data response 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 clerk may call a credit bureau computer and receive credit approval via a telephone. DS 407C-type may transmit the response via FSK signals, keyed answer-tone signals, or audio signals generated by the customer's equipment. For operation with TOUCH-TONE telephone sets, these audio signals 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 DS 407C-type contains a low-speed, parallel receiver that detects 2-out-of-8 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. In parallel mode only, the data set provides a two-way voice channel. In the serial mode, ▶only a transmit◀ channel is provided. The data set has the capability of generating 2025- and 2225-Hz tones ▶under certain conditions◀ . Status light-emitting diodes (LEDs), as shown in Fig. 2, are provided on the front panel of DS 407C to indicate the state of various functions and customer interface signals. DS 407C provides a serial data interface in accordance with EIA Standard RS-232-C, or a parallel data interface using either a 2-out-of-8 code or a binary coded matrix (BCM) code. The signals used for these outputs conform to EIA voltage specifications of RS-232-C. In addition, for the 2-out-of-8 output, a contact ***equivalent*** output is available.

The contact equivalent interface is not compatible with all customer equipment. Refer to Section 594-800-152 for details.

1.07 The 57A-type data mounting will accommodate up to four DS 407Cs. The 57A-type data mounting contains a 229A power unit, one 51A-type data unit, and one 47A-type data unit. The 57B-type data mounting is identical to the 57A-type data mounting except that it does not contain the 51A-type and 47A-type data units (test unit). The 57A-type data mounting is used to accommodate the first four DS 407Cs and the 51A-type and 47A-type data units. When additional DS 407Cs are used, one 57B-type data mounting is used for four additional data sets. When more than eight data sets are required at a particular installation, another KS-20018-L20 cabinet is required for each eight additional data sets.

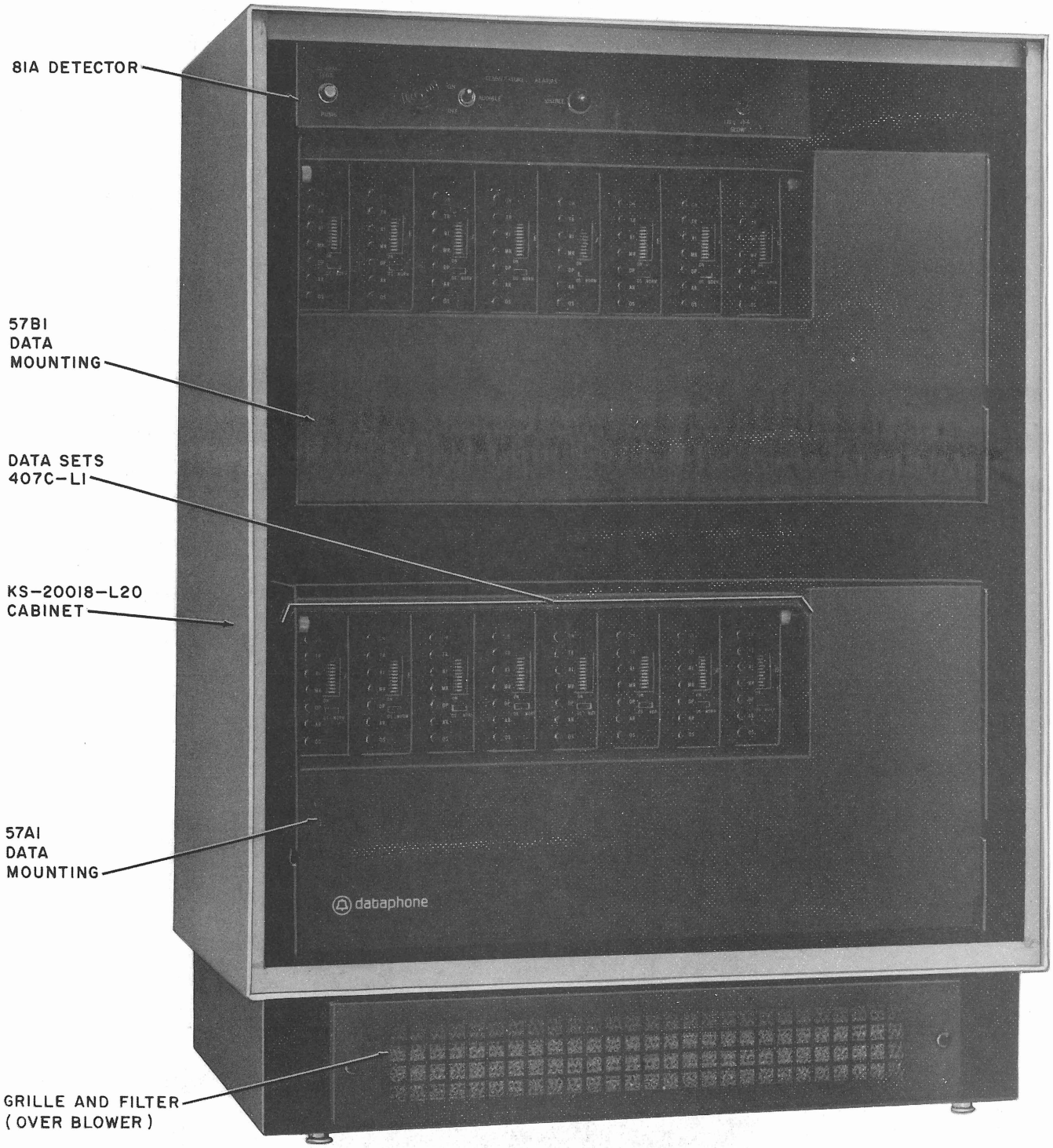


Fig. 1—Front View of 407C Multiple Data Station With Plastic Front Cover Removed

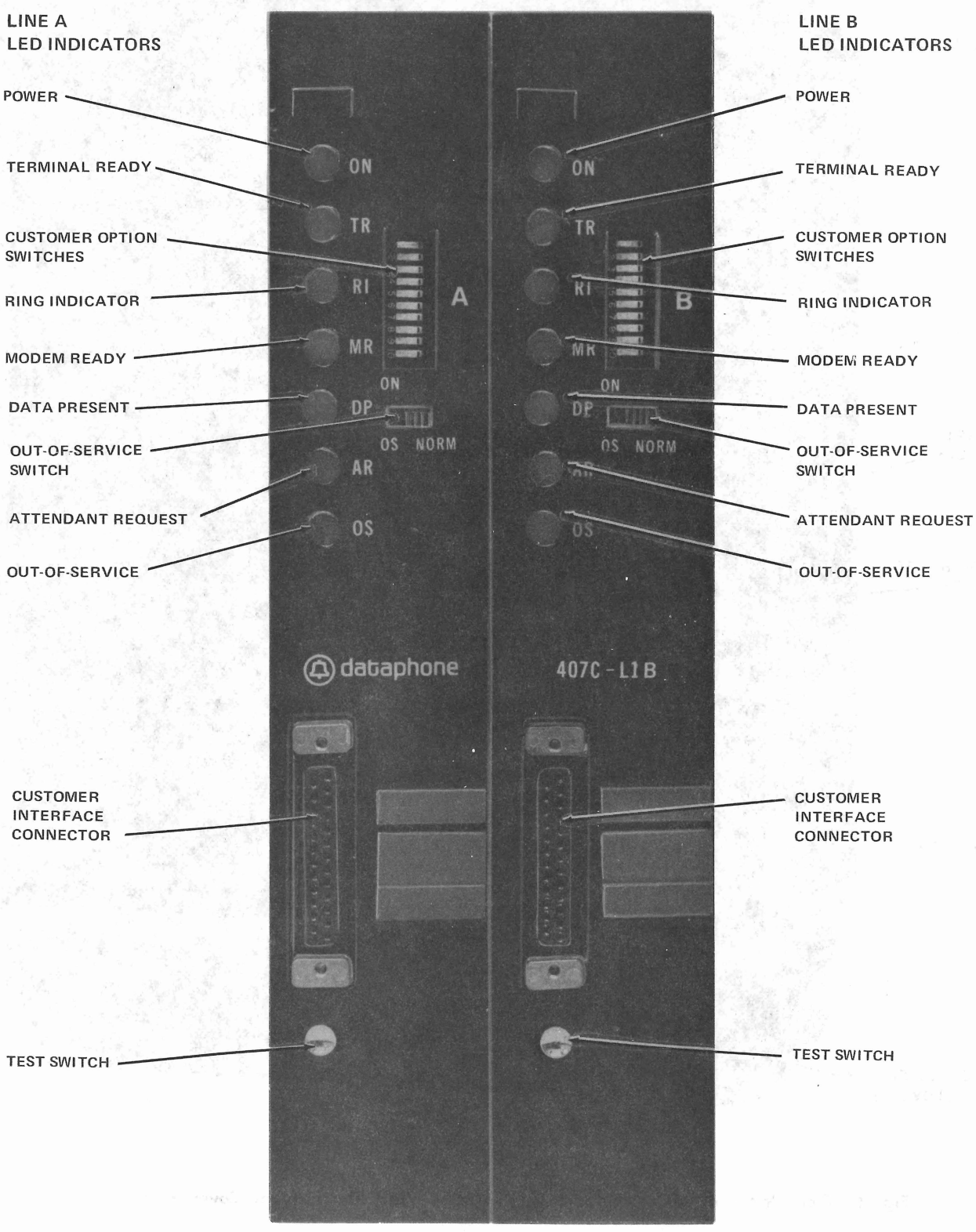


Fig. 2—Data Set 407C-L1—Front View

1.08 The 51A-type data unit, together with the 47A-type data unit, (Fig. 1) provided with the 57A-type data mounting, enable local or remote testing of any DS 407C in the cabinet.

The 407C multiple data station is housed in a KS-20018-L20 cabinet. Because of thermal limitations, any other housing is not recommended.

1.09 The 407C multiple data station is compatible with key-type telephone sets or a CALL DIRECTOR®. These units provide REFERRAL, TALK and return to DATA functions as well as normal telephone set functions if required. The 407C multiple data station is also compatible with automatic call distributors (ACDs) and automatic calling units (ACUs).

2. PHYSICAL DESCRIPTION

2.01 The 407C multiple data station will operate in an ambient temperature range from 4 to 49° Celsius (40 to 120°F), with a relative humidity of less than 95 percent.

Data Set 407C-L1

2.02 DS 407C (Fig. 3) consists of two circuit packs (CP1 and CP2) mounted together. Two KS-19087-type 25-pin connectors are located on the front of the data set, which provide the interface with customer-provided terminal equipment. Printed wiring board terminals are located on the rear of the data set which enable the data set to plug into the 57-type data monting. The data set is 25 cm high, 33 cm deep, and 9 cm wide (10 in. high, 13.2 in. deep, 3.7 in. wide), and weighs about 2.5 kg (5.5 lb). The data sets require power sources of +12 volts, -12 volts, +5 and -5 volts, which are provided by the 229A power unit. DS 407C is not interchangeable with any other data set.

57-Type Data Mountings

2.03 The 57A-type data mounting (Fig. 4) contains a test unit (which is comprised of a 51A-type data unit and a 47A-type data unit) and is approximately 51 cm wide, 27 cm high, and 42 cm deep (21 in. wide, 10.6 in. high, and 16.6 in. deep). It mounts in a KS-20018-L20 cabinet and weighs about 17 kg (37 lb) without the 229A power unit. The 57B-type data mounting (Fig. 5) has the same physical dimensions as the 57A-type data mounting

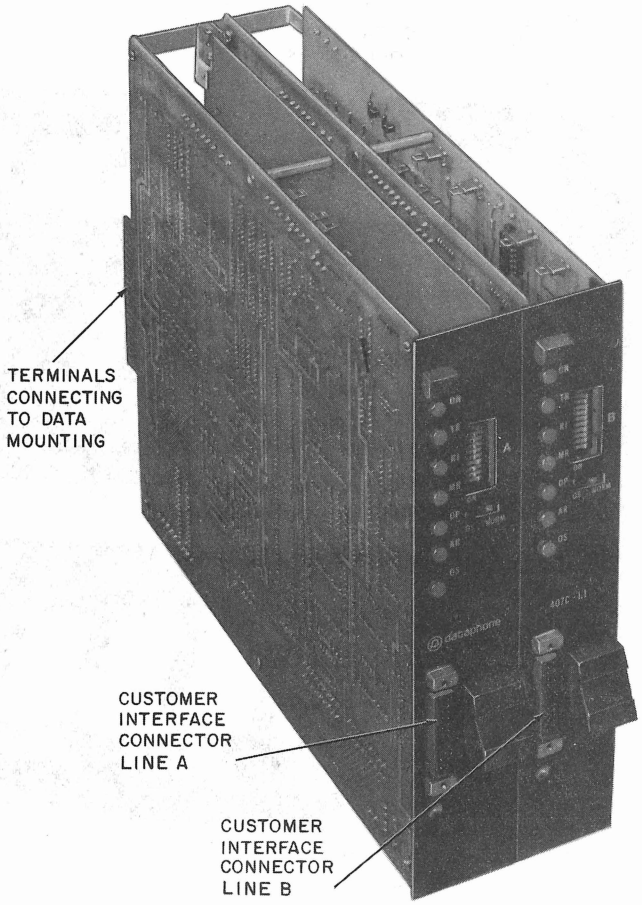


Fig. 3—Data Set 407C-L1—Overall View

and weighs about 15 kg (33 lb) without the 229A power unit. The 57A-type and 57B-type data mountings are supplied with a KS-14532-L24 2 meter (6-ft)-long power cord. The power cord has a Hubbel Twist-lock receptacle on one end and a three-prong male plug on the other end. The 57B-type does ***not*** contain a test unit. Data sets in the 57B-type are tested by the test unit in the 57A-type data mounting. Both data mountings are equipped with a 229A power unit; however the power units are shipped separately to prevent intransit damage to the data mountings. The power unit weighs about 14 kg (30 lb). Each data mounting when equipped with four data sets requires approximately 250 watts of 117-Vac 60-Hz power.

2.04 The 57-type data mountings are provided with eight 908J1 connectors, to mate with the two printed wiring board connectors on each

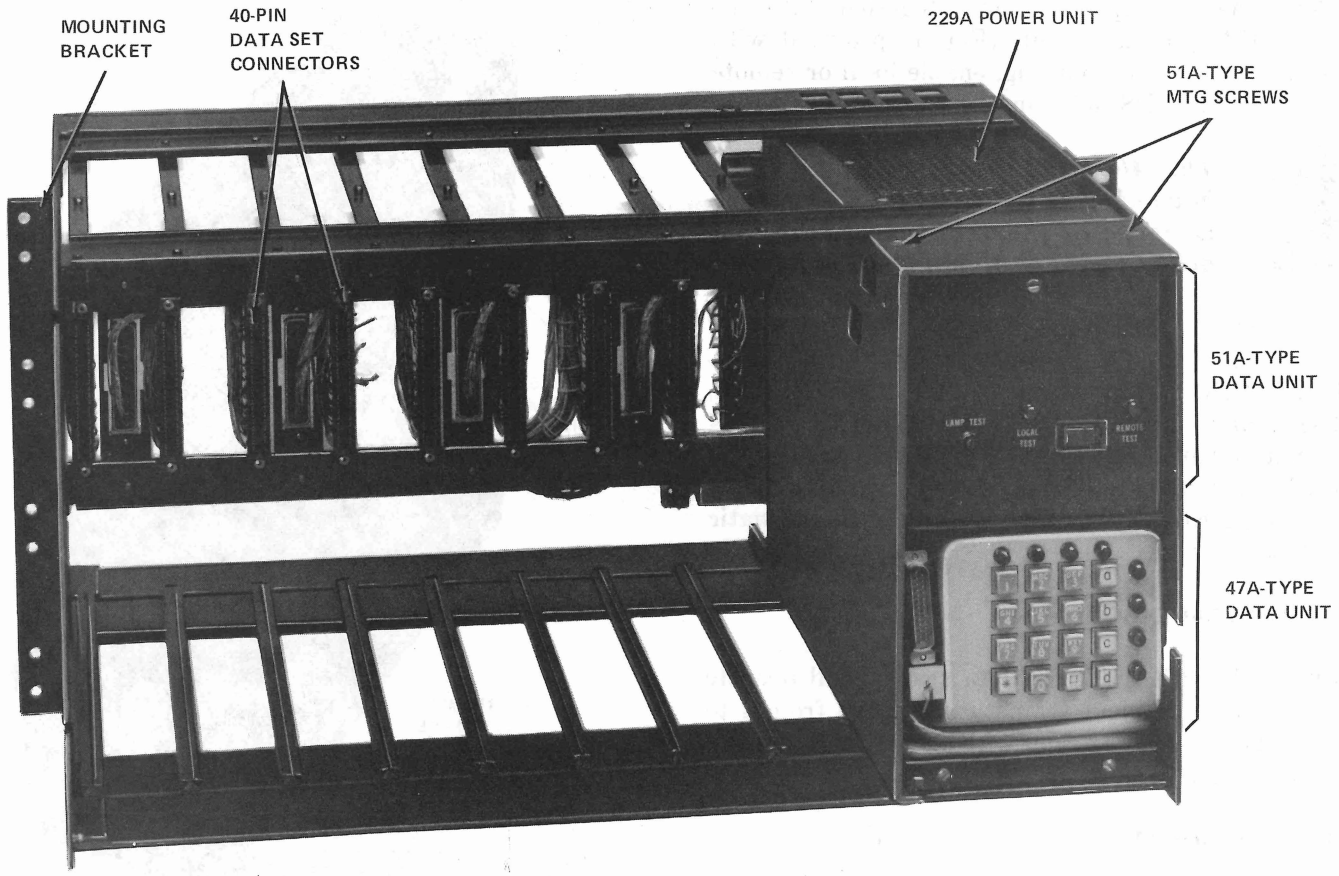


Fig. 4—57A-Type Data Mounting With Front Cover Removed

data set. Backplane wiring is provided with the data mountings.

2.05 The 57-type data mountings are provided with a removable front cover. Decals are attached to the inside of this cover. One decal provides data set number location as well as computer port assignment and telephone number for each data set in the 57-type data mounting and a second decal shows which options have been selected by the customer for each data set. These decals appear on both 57-type data mountings. A third decal is located on the 57A-type data mounting to provide local test information.

2.06 A25D connector cables equipped with KS-16689-L3 plugs are used to make the necessary line facility connections per four data sets. The KS-16689-L3 plugs are connected to the KS-16672-L3 connectors (J9, J10, J11, and J12) on the rear of the 57-type data mounting. A 1-1/2 meter (5 ft)-long test connector cable is provided with the 57A-type data mounting to facilitate testing of any data set in the cabinet.

229A Power Unit

2.07 The dc voltages are supplied to the data sets via the data mounting by the 229A power unit (Fig. 6). The 229A power unit is mounted on the right side of the data mounting. Four regulated voltages (+12, -12, +5, and -5 volts) are required for each DS 407C. The 229A power unit supplies four sets of these voltages, (one per data set). The four sets of voltages are independent of each other; thus, a failure of one set of voltages does not cause a failure of all data sets in the data mounting. The power unit is designed to operate on an input voltage of 106 to 127 volts at 60 ±0.1 Hz.

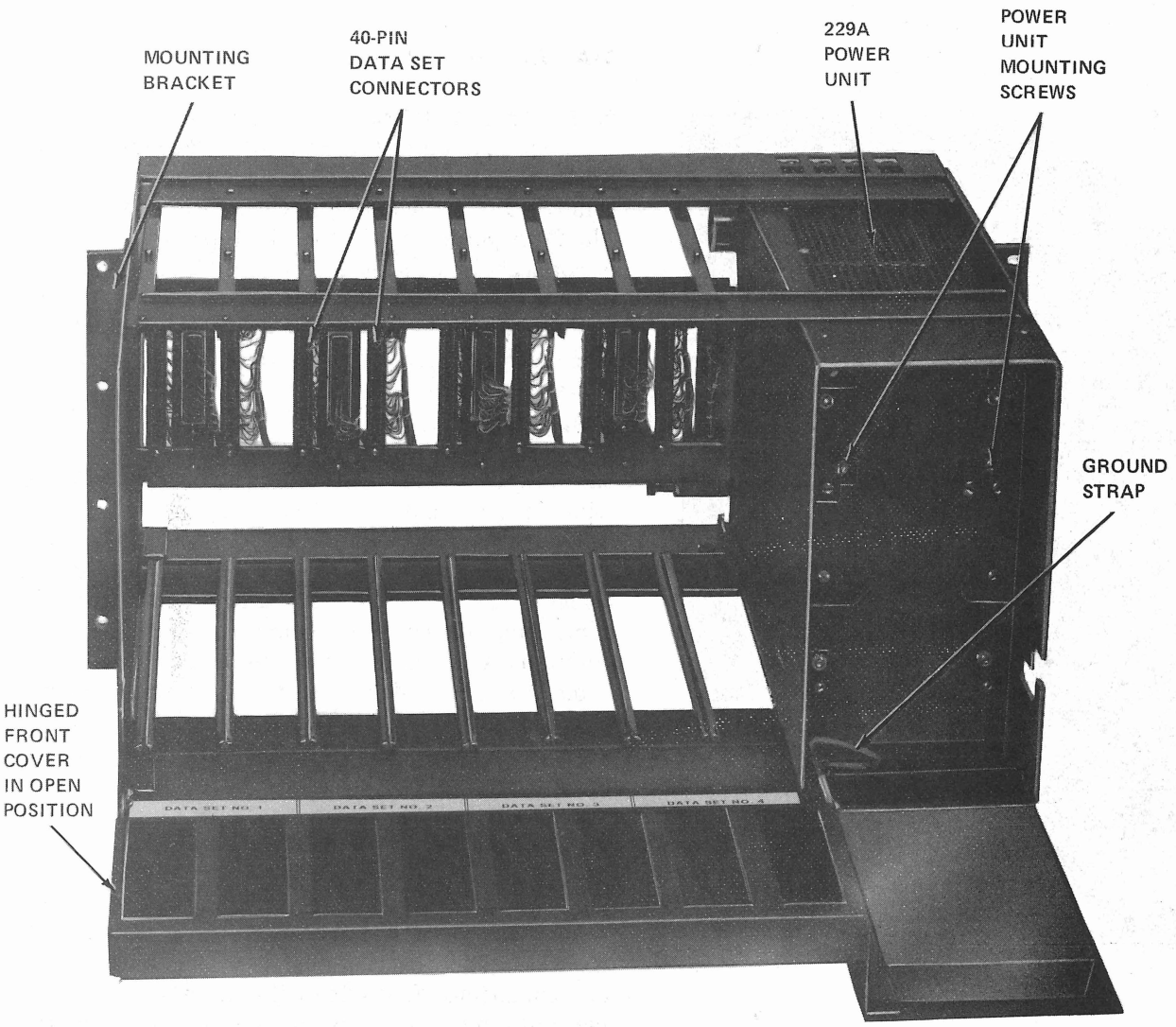


Fig. 5—57B-Type Data Mounting With Front Cover Open

51A-Type Data Unit

2.08 The 51A-type data unit (Fig. 4) is 13 cm wide, 13 cm high, 7 cm deep (5.2 in. wide, 5 in. high, 2.8 in. deep), and weighs about 1 kg (2.5 lb). This data unit contains a LOCAL TEST-REMOTE TEST switch, test indication LEDs, and a LAMP TEST switch for testing all LEDs in the cabinet.

47A-Type Data Unit

2.09 The 47A-type data unit (Fig. 4) is approximately 11 cm wide, 6 cm high, 11 cm deep (4.5 in. wide, 2.5 in. high, 4.5 in. deep), and weighs about 0.7 kg (1.5 lb). 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.

KS-20018-L20 Cabinet

2.10 The 407-type multiple data station can be housed only in the KS-20018-L20 cabinet. ***Any other cabinet is not recommended.*** The front panel of each cabinet is tinted plastic, while the back panel is perforated metal. The cabinet exteriors are aluminum with a clear finish. The KS-20018-L20 cabinet can house one 57A-type and one 57B-type data mounting with a maximum

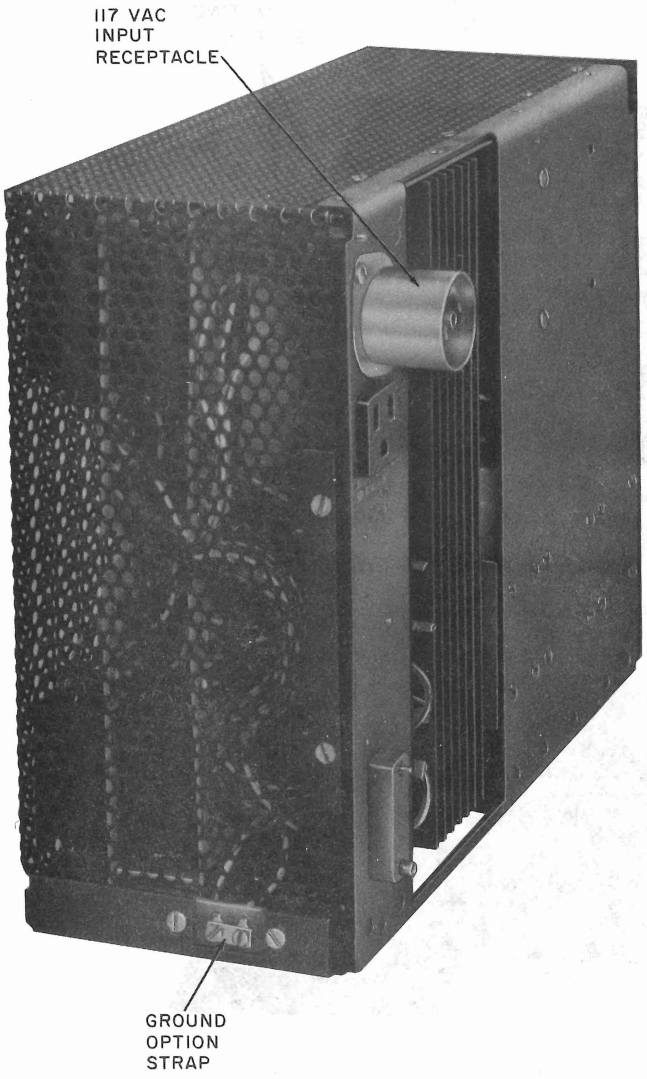


Fig. 6—229A Power Unit

of eight DS 407Cs. The cabinet is 61 cm wide, 81 cm high, 48 cm deep (24 in. wide, 32 in. high, 19 in. deep), and weighs 14 kg (31 lb). The cabinet is equipped with a 4250 liters per minute [150 cubic feet per minute (CFM)] blower in the bottom. The blower uses approximately 80 watts of 117-Vac, 60-Hz power. A replaceable throw-away filter is provided over the blower intake. Replacement filters are available from McLean Company as their part number S-1032-21.

2.11 Stations requiring more than eight data sets can be accommodated by using multiple KS-20018-L20 cabinets. Interconnection between cabinets must be made at time of installation.

81A (Thermal) Detector

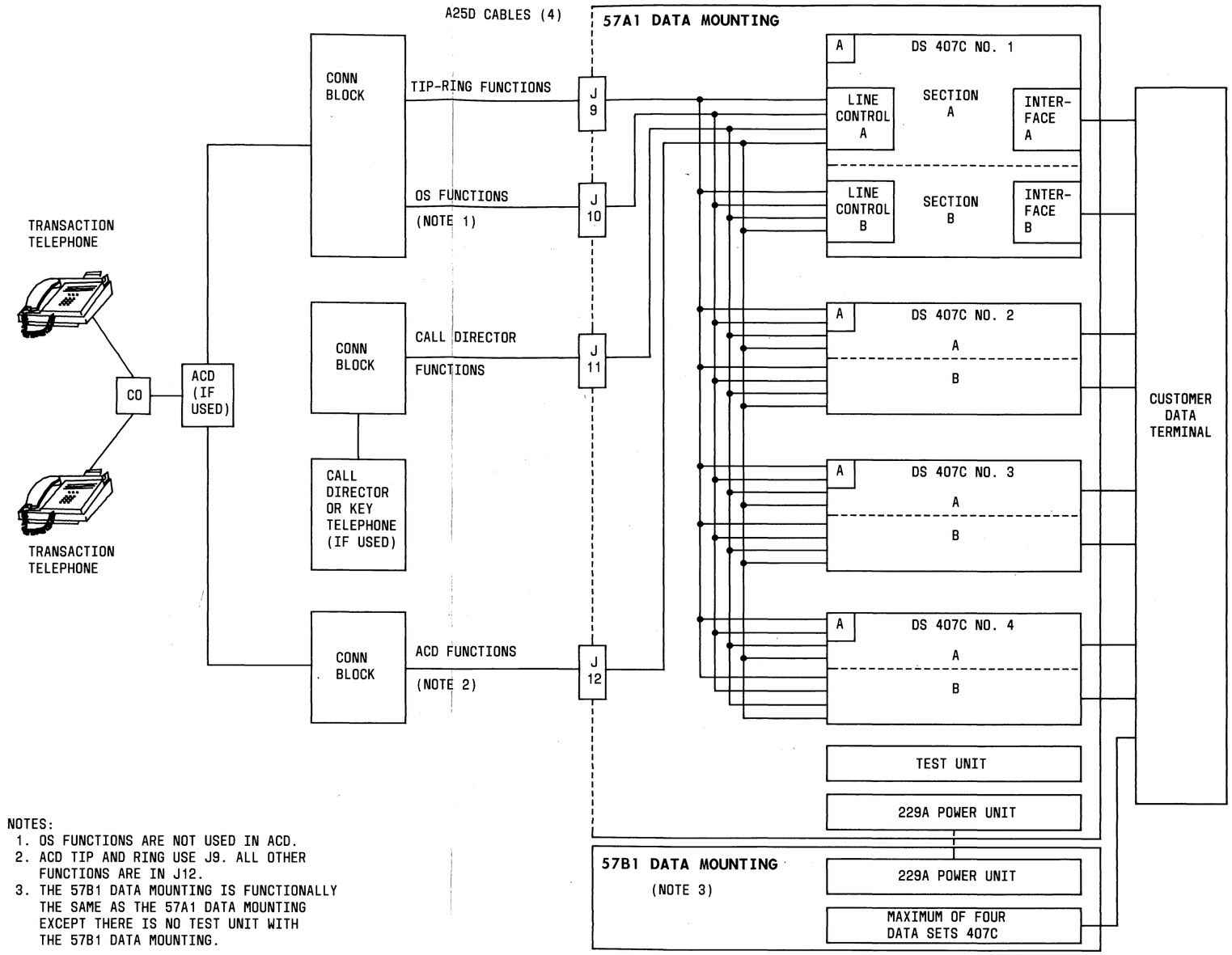
2.12 An 81A (thermal) detector must be installed in the top of the KS-20018-L20 cabinet. The 229A power unit in the 57A-type data mounting is connected to an ac outlet on the side of the detector. The 229A power unit in the 57B-type data mounting is connected to an outlet on the 229A power unit in the 57A-type data mounting. The detector will shut off all ac power to the cabinet except alarms if cabinet temperature rises to 57° Celsius (135°F). Power will automatically be restored when cabinet temperature drops below 47° Celsius (118°F). Visual and audible alarms are provided on the front of the detector. The 81A detector measures 58 cm wide by 6 cm high by 22 cm deep (23 in. wide by 2-1/4 in. high by 8.6 in. deep), and weighs about 2.3 kg (5 lb). The detector is provided with a 3-meter (10-ft)-long KS-14532-L25 power cord for connecting to a customer-supplied source of 117-Vac 60-Hz power. The customer-provided power outlet should ***not*** be under control of a switch, to ensure uninterrupted service. The detector is not provided as part of the KS-20018-L20 cabinet, and must be ordered separately.

3. FUNCTIONAL DESCRIPTION

3.01 The 407C multiple data station provides a maximum of eight interfaces between the data sets and the customer-provided terminal per data mounting. Four line facility interface connectors per data mounting are also provided. The four line facility connectors provide the necessary interface to connect four data sets to the switched telecommunications network and referral equipment. The telephone network connections are made via a connecting block, as required. A functional block diagram is shown in Fig. 7.

Data Set 407C-L1

3.02 DS 407C is a dual unit; that is, each DS 407C serves two incoming telephone lines and two computer ports simultaneously. Furthermore, the data set may be optioned to function in either parallel or serial interface mode. In the ***parallel mode,*** the data set translates incoming TOUCH-TONE signals into a 2-out-of-8 code or BCM for parallel presentation to the computer. In the parallel mode, DS 407C functions similar to a DS 407A or 407B in audio response DIVA (digital inquiry voice answer) systems. No translation is made to ASCII characters. Responses are in the form of keyed



NOTES:
1. OS FUNCTIONS ARE NOT USED IN ACD.
2. ACD TIP AND RING USE J9. ALL OTHER FUNCTIONS ARE IN J12.
3. THE 57B1 DATA MOUNTING IS FUNCTIONALLY THE SAME AS THE 57A1 DATA MOUNTING EXCEPT THERE IS NO TEST UNIT WITH THE 57B1 DATA MOUNTING.

Fig. 7—407C Multiple Data Station—Functional Block Diagram

answer tone or audio signals generated by the customer's equipment. However, FSK "words" can be recorded on an audio response unit and transmitted through the voice port to provide FSK response in the parallel mode. In the ***serial mode,*** TOUCH-TONE signals are translated into ASCII characters according to Table A. Outgoing ASCII data from the computer is transmitted as FSK data or translated to keyed answer tone (KAT). Operation in serial mode is half-duplex, since reliable detection of TOUCH-TONE signals cannot be made in the presence of outgoing FSK.

TABLE A

TOUCH-TONE TO ASCII TRANSLATION

TOUCH-TONE CHARACTER	ASCII CHARACTER
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0
*	<
#	:
a	;
b	=
c	>
d	?

3.03 A comparison of features and options available on all DS 407-type is given in Table B.

3.04 The receiver portion of the data set accepts 2-out-of-8 TOUCH-TONE signals. The TOUCH-TONE signals consist 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. 8. The receiver detects TOUCH-TONE signals at a maximum rate of ten characters per second. A character consists of one frequency from each group. Therefore, the 2-out-of-8 code provides 16 different frequency pairs (characters). DS 407C recognizes all of these characters.

3.05 ▶The transmitter portion of the data set is equipped with a tone generator which operates at two frequencies: 2025 Hz and 2225 Hz. This oscillator is activated during the call answering sequence to generate 2025-Hz answer tone. With the data set optioned for parallel mode, the oscillator will generate 2025-Hz tone whenever the tone answer-back (TAB) customer interface lead is in the ON state. When the data set is optioned for serial mode, the oscillator is activated by data set control logic to generate frequency shift keyed (FSK) signals, 1.5 and 3.0 second 2025-Hz tones, or a beeping 2025-Hz tone. These signals are generated in response to commands from the customer equipment. 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.◀

3.06 Seven status LEDs are provided on the front of each line of the data set 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 that the data set is ready to receive a call or is in the process of handling a call.
- 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.
- The data present (DP) LED indicates that the data set is receiving valid data.
- The attendant request (AR) LED indicates the occurrence of a computer-generated or terminal-initiated referral request.
- The out-of-service (OS) LED indicates that the data set has been placed out of service.

TABLE B

SUMMARY OF FEATURES AND OPTIONS ON DS 407-TYPE

FEATURE OR OPTION	AVAILABLE ON DS 407		
	A	B	C
TOUCH-TONE reception up to 10 characters/second	X	X	X
Voice answer-back	X	X	X
Private line or switched network	X	X	X
Used with automatic call distributor	X	X	X
EIA or contact parallel interface	X	X	X
Normal voice telephone service w/key telephone set	X	X	X
Return to data	X	X	X
Tone answer-back	X	X	X
Local and remote test capability	X	X	X
Indicator LEDs	X	X	X
ACU compatibility	X	X	X
Separate or common ground	X	X	X
Adjustable answer-back level	X	X	X
Terminal initiated referral		X	X
Out of service controlled by DTR		X	X
Computer down detection		X	X
Remote call termination		X	X
Limited call-handling capability w/computer down		X	X
Error control			X
Logon/sign-on procedure			X
Serial (ASCII) interface			X
BCM with parallel EIA interface			X
Buffered data			X
Speed selection (10, 15 or 30 characters/second)			X
Message blocking			X
Automatic punctuation			X
Positive acknowledgment			X
End-of-message characters			X
Data flow control protocol			X
Multiple message segments			X
Common audible signal			X
Out-of-service switch			X

3.07 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 (option AE).
- If DTR is ***off*** for more than 200 ms (option AC).
- If OS switch is ***on.***
- The data set line is under test.
- Power is lost to the data set. (All LEDs extinguished.)
- The data set is not plugged into the nest.
- The connector to the customer terminal is not plugged in. This does not occur when options F and H are installed.
- The computer fails to respond to a disconnect message from the data set (option E).

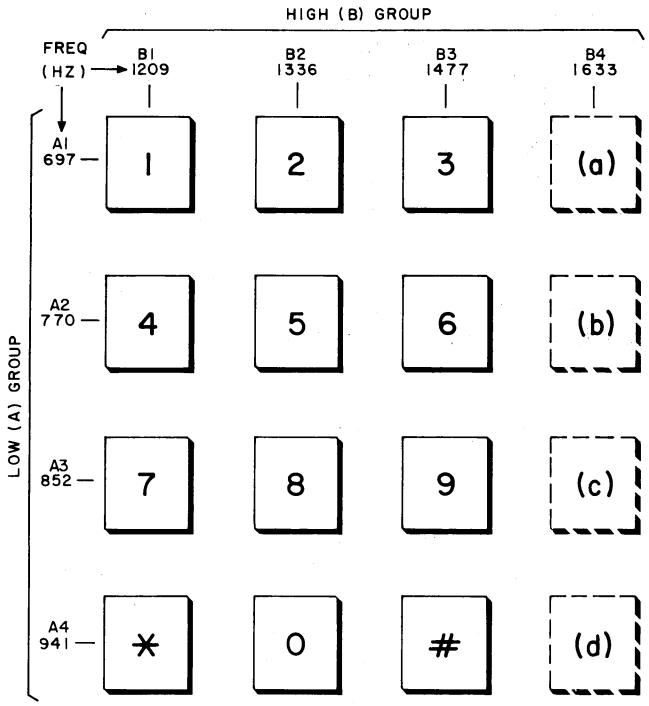


Fig. 8—TOUCH-TONE Dial Frequency Assignments

3.08 The data set detects ringing current on its associated line circuit and generates an RI signal on the customer interface. If the customer terminal is ready to accept the call [data terminal ready (DTR) is turned on], the line control circuit will answer the call automatically and then sense dc loop current. After a 1.5-second delay, a 2025-Hz answer tone is transmitted for 1.5 seconds to the calling station, indicating the call has been answered. The data set ready (DSR) lead is turned ***on*** indicating that 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 key-type telephone station 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 is made, the lamp flashes.
- In the ***talk*** or ***referral*** mode the lamp is ***on.***
- In the ***out-of-service*** mode the lamp is ***on.***

Note: An arrangement for a common audible signal in the referral mode is available.

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

- TALK or REFERRAL mode—attendant hangs up.
- DATA mode—DTR ***off*** or disconnect sequence is received.

3.09 DS 407C performs all the functions of DS 407A and 407B, and also provides the following additional features:

- Serial interface
- ▶FSK or keyed answer-tone responses◀
- ▶Several end-of-message indicators◀
- Data flow control protocol
- Error control
- Logon/sign-on procedure
- Buffering of incoming TOUCH-TONE messages
- Automatic punctuation of outgoing ASCII messages
- OS switch.

Note: See Table B for a complete listing of features and options on DS 407-type.

Telco Options

3.10 There are twenty-two telephone company (telco) options on DS 407C. Thirteen of these options are implemented by means of Cambion shorting plugs which fit into numbered jacks; seven are implemented by back-plane wiring, and two are implemented by a strap on the 229A power unit. Telco options for DS 407C are listed in Table C.

Customer Options

3.11 Customer options are provided by two 10-segment switches (total 20) on the front of the data set, ▶providing a total of 40◀ customer options. These options are listed in Table D.

Note: All options selected apply to both lines of the data set.

3.12 Descriptions of telco and customer options are given in Section 594-800-202.

Customer Interface Information

3.13 Either serial or parallel operation is provided in DS 407C by option. Interface lead functions and mnemonics for DS 407C operating in the serial mode are given in Table E. Interface lead functions and mnemonics for parallel operation with 2-out-of-8 output are given in Table F. Interface lead functions and mnemonics for parallel operation with BCM output are given in Table G. The BCM code is given in Table H.

57-Type Data Mounting

3.14 The 57-type data mounting is a multiple apparatus housing which will accommodate a maximum of four data sets. Connectors J9 through J12 on the 57-type data mounting provide interconnection from the eight mounting slots to the telephone network via a connecting block. The 908J1 connectors (eight per mounting) accept DS 407C.

3.15 Each 57-type data mounting is equipped with one 229A power unit. The 229A power unit supplies power to a maximum of four data sets. Separate outputs on the power unit provide +12 volts, -12 volts, +5 volts, and -5 volts regulated dc power for each data set in the 57-type mounting. The power unit is powered from a 117-volt 60-Hz three-wire (with ground) source.

3.16 The test unit (two data units) in the 57A-type data mounting provides both local and remote test capabilities for all the data sets within a single cabinet.

Test Unit—47A-Type and 51A-Type Data Units

3.17 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 51A-type data unit (CA1) is connected directly to the data set line A or line B interface connector. 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) lead of the set under test is connected to the test circuit.

- The interface leads are placed in the parallel contact equivalent mode.

- If an ACD is used for voice access and call distribution, the DTR indication to the ACD is disabled. This makes the data set under test appear busy to the ACD.

- The incoming line is placed out-of-service so no calls will be directed to the data set under test.

3.18 The 51A-type data unit provides local, remote, and LED testing of up to eight DS 407Cs in a multiple data station. The LOCAL TEST-REMOTE TEST test switch is operated to REMOTE TEST, thereby placing the data set line in the remote test mode. In the remote test mode, the data set line under test is connected to a service line and then called from a remote data test center.

3.19 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.

3.20 The 47A-type data unit provides means for local testing of up to eight data sets by the customer or telco employee, by operating the LOCAL TEST-REMOTE TEST switch on the 51A-type data unit to LOCAL TEST, thereby connecting the data set line to the 47A-type data unit. When a TOUCH-TONE button on the 47A-type 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.

TABLE C

TELCO OPTIONS

OPTION			REMARKS
FEATURE	SELECTION	DESIG	
Type of Operation	Switched Network	A	
	Private Line	B	
Used With ACD	Yes	C	
	No	D	
Interface Mode	Serial	E	If option E is selected, options G and I must also be selected.
	Parallel	F‡	
Interface* Type	EIA Voltage	G	If option E is selected, option G must also be selected. *
	Contact Equivalent	H	
Call Control Code Detector	Enable	I	Option I enables terminal initiated referral, computer down, and automatic disconnect features of DS 407C. If option E is selected, option I must be selected.
	Disable	J	
Computer Down Detection	Switch	K	These options are implemented by backplane wiring.
	All DTR OFF	L	
	Switch or All DTR OFF	M	
	Disabled	N	
Out-of-Service Wiring	Tip-Ring Short	O	OS1-T OS2-R (in J9 and J10)
	Third Wire Ground	P	OS1-FG OS2-third wire (in J10)
	Separate Pair Short	Q	OS1 OS2 } OS pair (in J10)
Grounding	Frame Ground Connected to Signal Ground	R	Option R connects strap on power unit.
	Frame Ground and Signal Ground Not Connected	S†	Option S removes strap on power unit.
Transmit Level	−4 dBm	T	Sets transmit level between −12 dBm and −16 dBm at serving CO.
	−8 dBm	U	
	−13 dBm	V	

* If option G is selected, customer option BH must be selected; if option H is selected, customer option BG must be selected.

† SG paralleled to all data mountings.

‡ Switch must be operated.

TABLE D

CUSTOMER OPTIONS

OPTION				REMARKS
FEATURE	AVAIL*	SWITCH SELECTION	DESIG	
# Line Disconnect	P or S	A1 ON	AA	Data set disconnects line when a TOUCH-TONE *#* is received with option AA. Option AB disables option AA.
		A1 OFF	AB	
OS Controlled by DTR	P or S	A2 ON	AC	Data set is out of service if DTR is *off* more than 200 ms with option AC. Option AD disables option AC.
		A2 OFF	AD	
OS Controlled by OS Lead	P or S	A3 ON	AE	Data set is out of service whenever OS lead is *on* with option AE. Option AF disables option AE.
		A3 OFF	AF	
Terminal Initiated Referral— Computer Up	P or S	A4 ON	AG	Data set will initiate a referral when computer is operative on receipt of a TOUCH-TONE ** with option AG.
		A4 OFF	AH	
Terminal Initiated Referral — Computer Down	P or S	A5 ON	AI	Data set will initiate a referral when computer is down on receipt of a TOUCH-TONE ** with option AI.
		A5 OFF	AJ	
End of Message 1 End of Message 2 End of Message 3	S	A6 OFF A6 ON A7 OFF A7 ON A8 OFF A8 ON		Selects end of message (EOM) characters given to computer after all control sequences and end of block (EOB) characters expected from computer. Selected as follows:
			AK0	A6 OFF, A7 OFF, A8 OFF — EOM: None — EOB: DC3 or ENQ
			AL0	A6 ON, A7 OFF, A8 OFF — EOM: CR — EOB: DC3 or ENQ
			AM0	A6 OFF, A7 ON, A8 OFF — EOM: CR LF DC3 — EOB: DC3 or ENQ
			AN0	A6 ON, A7 ON, A8 OFF — EOM: DC3 — EOB: DC3 or ENQ
			AK1	A6 OFF, A7 OFF, A8 ON — EOM: ETX — EOB: DC3 or ENQ
			AL1	A6 OFF, A7 ON, A8 ON — EOM: EOT — EOB: DC3 or ENQ
			AM1	A6 ON, A7 OFF, A8 ON — EOM: ETX — EOB: DC3, ENQ, or ETX
			AN1	A6 ON, A7 ON, A8 ON — EOM: EOT — EOB: DC3, ENQ, or EOT
Binary Coded Matrix	P	A8 ON	AO	BCM output from data set (with options F, G, and BH only).
		A8 OFF	AP	2-out-of-8 output from data set, with option F only.

TABLE D (Contd)

CUSTOMER OPTIONS

OPTION				REMARKS
FEATURE	AVAIL*	SWITCH SELECTION	DESIG	
Speed Select 1	S	A9 ON	AQ	Data speed is 110 bps with option AQ. Data speed is 150 bps with option AR unless overridden by option BI.
		A9 OFF	AR	
Message Blocking	S	B1 ON	AS	Data set translates TOUCH-TONE ## into X EOM; computer must "block" outgoing messages by ending them with DC3 or with ENQ, option AS. If option AT is selected, switches B2 through B8 must be *off*.
		B1 OFF	AT	
STX/ETX Punctuation	S	B2 ON	AU	Data set will add ASCII characters STX and translate DC3 to ETX on all FSK messages, with options AU *and* AS. With option AV, DC3 will be transmitted.
		B2 OFF	AV	
Error Control	S	B3 ON	AW	Option AW (with option AS) provides data set compatibility with error control features of transaction telephone, as follows: (1) Adds STX, ETX, and LRC to all FSK messages. (2) On incoming messages, data set checks LRC and CCT, and notifies computer of validity of message: good, bad, or no check. (3) When FSK messages or timed answer-tones are sent out, a data set timer is set and computer is notified if anticipated response is not received in time. (4) Option AW is disabled if the leading TOUCH-TONE "b" is not received. Option AX disables option AW.
		B3 OFF	AX	
Positive Acknowledgment	S	B4 ON	AY	Option AY (with options AS and AW) provides an acknowledgment of receipt of a correct message within the time-out period by sending the ASCII sequence A EOM to the computer. Option AZ disables this feature.
		B4 OFF	AZ	
Data Flow Control Protocol	S	B5 ON	BA	Option BA (with option AS) allows data set to control flow of data across customer interface. Permits computer to put FSK on-line only when remote terminal is not transmitting and passes data to computer only when computer signifies it is ready.
		B5 OFF	BB	

TABLE D (Contd)

CUSTOMER OPTIONS

OPTION				REMARKS
FEATURE	AVAIL*	SWITCH SELECTION	DESIG	
Logon/Sign-on	S	B6 ON	BC	Option BC (with options AS and BA) allows transaction telephone to communicate with computers which require Logon characters. If option BE is also present, then option BD provides for a fixed sign-on in addition to a Logon.
		B6 OFF	BD	
Multiple Message Segments	S	B7 ON	BE	Option BE (with options AS and BA) permits data set "handshaking" required by certain computers which allow multiple-segmented messages. The type of "handshaking" depends on option BC or BD.
		B7 OFF	BF	
Closure Type/ EIA Voltage Interface	P	B8 ON	BG	Contact equivalent or closure type
		B8 OFF	BH	EIA voltage; option BH must be used with telco option G. This option is required whenever option E or AO is used. Option BG must be used with telco options F and H and option AP only.
Speed Select 2	S	B9 ON	BI	Option BI (with option AR) provides data speed of 300 bps. Options BI and AQ cannot be used together.
		B9 OFF	BJ	

* P denotes parallel interface; S denotes serial interface.

Note: Switches A10 and B10 unassigned.

TABLE E

CUSTOMER INTERFACE LEAD FUNCTIONS – SERIAL MODE

PIN NO.	FUNCTION	DATA SET MNEMONIC	EIA DESIGNATION (RS-232-C)
1	Frame Ground	FG	AA
2	Send Data	SD	BA
3	Receive Data	RD	BB
4	Request to Send (Not Used)	RS	CA
5	Clear to Send	CS	CB
6	Data Set Ready	DSR	CC
7	Signal Ground	SG	AB
8	Data Carrier Detector	DCD	CF
9	(Connected to 8)	—	—
10-13	Not Used	—	—
14	(Connected to 22)	—	—
15,16	Not Used	—	—
17	Voice Answer-Back A	VAA	Non-EIA
18	Voice Answer-Back B	VAB	Non-EIA
19	Not Used	—	—
20	Data Terminal Ready	DTR	CD
21	Not Used	—	—
22	Ring Indicator	RI	CE
23,24	Not Used	—	—
25	Out-of-Service	OS	Non-EIA

TABLE F

CUSTOMER INTERFACE LEAD FUNCTIONS – PARALLEL MODE WITH 2-OUT-OF-8 OUTPUT

PIN NO.	FUNCTION	DATA SET MNEMONIC
1	Frame Ground	FG
2	One-Half of Voice Receive Pair	VRA
3	A-Group Frequency Identifier	A1
4	A-Group Frequency Identifier	A2
5	A-Group Frequency Identifier	A3
6	A-Group Frequency Identifier	A4
7	Not Used	—
8	One-Half of Voice Receive Pair	VRB
9	B-Group Frequency Identifier	B1
10	B-Group Frequency Identifier	B2
11	B-Group Frequency Identifier	B3
12	B-Group Frequency Identifier	B4
13	Not Used	—
14	Ring Indicator	RI
15	Attendant Request	AR
16	Data Present Indicator	DP
17	Voice Answer-Back A	VAA
18	Voice Answer-Back B	VAB
19	Data Mode Indicator	DM
20	Tone Answer-Back Control	TAB
21	Data Receiver Enable	DR
22	Data Terminal Ready	DTR
23	Data Set Ready	DSR
24	Signal Ground	SG
25	Out-of-Service	OS

TABLE G

CUSTOMER INTERFACE LEAD FUNCTIONS – PARALLEL MODE WITH BCM OUTPUT

PIN NO.	FUNCTION	DATA SET MNEMONIC
1	Frame Ground	FG
2	One-half of Voice Receive Pair	VRA
3	Received Data 1	RD1
4	Received Data 2	RD2
5	Received Data 3	RD3
6	Received Data 4	RD4
7	Not Used	—
8	One-half of Voice Receive Pair	VRB
9—13	Not Used	—
14	Ring Indicator	RI
15	Attendant Request	AR
16	Data Present Indicator	DP
17	Voice Answer-Back A	VAA
18	Voice Answer-Back B	VAB
19	Data Mode Indicator	DM
20	Tone Answer-Back Control	TAB
21	Data Receiver Enable	DR
22	Data Terminal Ready	DTR
23	Data Set Ready	DSR
24	Signal Ground	SG
25	Out-of-Service	OS

TABLE H

BCM CODE

SYMBOL	RECEIVE DATA LEADS			
	RD1	RD2	RD3	RD4
1	1	0	1	0
2	1	0	0	1
3	1	0	1	1
4	0	1	1	0
5	0	1	0	1
6	0	1	1	1
7	1	1	1	0
8	1	1	0	1
9	1	1	1	1
0	0	0	0	1
*	0	0	1	0
#	0	0	1	1
a	1	0	0	0
b	0	1	0	0
c	1	1	0	0
d	0	0	0	0

1 = MARK = — voltage
0 = SPACE = + voltage

4. GLOSSARY OF TERMS AND ABBREVIATIONS

4.01 Terms and abbreviations used in this and related sections are defined as follows:

TERM OR ABBREVIATION	DEFINITION
ACD	Automatic Call Distributor
AR	Attendant Request (LED indicator)
ARU	Audio Response Unit
ASCII	American Standard Code for Information Interchange (standard)
"b", Leading	Identifies caller as a transaction telephone
BCM	Binary Coded Matrix—Parallel interface provides translation of TOUCH-TONE signals to BCM signals on interface leads 3, 4, 5, and 6
BPS	Bits per Second
Buffering	Temporary storage (of TOUCH-TONE signals)
CCT	Character Count—Transmitted by transaction telephone for error control
CFM	Cubic Feet per Minute
CPE	Customer Provided Equipment (terminal)
CPU	Customer Computer
CR	Carriage Return (ASCII)
DC3	Control Character (ASCII)
DIVA	Digital Inquiry Voice Answer
DP	Data Present (LED indicator)
DSR	Data Set Ready
DTR	Data Terminal Ready
EIA	Electronic Industries Association (standard)
ENQ	Enquiry (ASCII)
EOB	End of Block (from computer)
EOM	End of Message (to computer)
EOT	End of Transmission
ETX	End of Text

TERM OR ABBREVIATION	DEFINITION
FSK	Frequency Shift Keyed
KAT	Keyed Answer Tone
Leading, "b"	Identifies caller as a transaction telephone
LED	Light-Emitting Diode
LF	Line Feed (ASCII)
Logon	Procedure for assuring security of system; identification of caller
LRC	Longitudinal Redundancy Check—Transmitted by transaction telephone and DS 407C in FSK mode for error control
LTS	Local Test Start
MR	Modem Ready (LED indicator)
OS	Out-of-Service (LED indicator)
Protocol, Data Flow Control	Option is which data set controls direction of data flow across interface with computer
RD	Receive Data (interface lead)
REFERRAL	Computer or terminal may request attendant intervention. Computer requests referral by transmitting : : before the first ? in any message. Terminal requests referral by transmitting * * any time.
RI	Ring Indicator (LED indicator)
STX	Start of Text (ASCII)
Telco	Telephone Company
Terminal	Transaction I or II telephone
TIR	Terminal Initiated Referral
TR	Terminal Ready (LED indicator)
TT	TOUCH-TONE (signals)
* *	Referral signal from terminal (TIR)
* # *	Disconnect signal from terminal

5. REFERENCES

5.01 The following documents pertain to the 407C multiple data station.

NUMBER	TITLE
SD & CD 1D279-01	Data System Station—407C Data Station
SD & CD 82414-01	229A Power Unit
41409	▶Technical Reference◀
41805	▶Technical Reference◀

SECTION	TITLE
314-811-100	1A Transaction Telephone Test Line Station—Description
476-270-203	2B Automatic Call Distributing System—Cabling and Cross Connects
581-235-101	2B Automatic Call Distributor—General Description Information
590-100-133	47A1 Data Unit—Identification
590-100-137	51A1 Data Unit—Identification
590-102-143	57-Type Data Mountings—Description
594-030-101	Data Set 407C—Identification
594-800-182	407C Multiple Data Station—Summarizing Specification
594-800-202	407C Multiple Data Station—Installation and Connections
594-800-302	407C Multiple Data Station—Maintenance
594-800-502	407C Multiple Data Station—Test Procedures
594-800-501	407-Type Multiple Data Station Using 2B Automatic Call Distributor—Test Procedures
668-104-541	Data Test Center 904A- and 904C-Types—407C Multiple Data Station—Loopback Test