

## DATA SET 401L-TYPE TRANSMITTER DESCRIPTION AND OPERATION

CONTENTS	PAGE
1. GENERAL . . . . .	1
2. DESCRIPTION . . . . .	2
GENERAL DESCRIPTION . . . . .	2
FUNCTIONAL DESCRIPTION . . . . .	3
A. Data Set 401L1 . . . . .	4
B. Data Set 401L2 . . . . .	6
3. OPTIONS . . . . .	8
4. OPERATION . . . . .	8
5. REFERENCES . . . . .	8

machine equipment associated with the data set is not included.

**1.02** This section is reissued to reflect new series numbers of two circuit packs used in data set 401L2.

**1.03** There are two models of data set 401L-type—data set 401L1 and data set 401L2. Similarities and differences between the two models are shown in Table A.

**1.04** Data set 401L1 provides transmit-only service from an unattended remote station at speeds up to 20 characters per second over the switched message network (DDD). The data set uses a parallel multifrequency (3 out of 14) transmission code.

**1. GENERAL**

**1.01** This section contains a description of data set 401L-type and information pertinent to its operation. Information concerning the business

**1.05** Data set 401L2 provides the same features as data set 401L1, and in addition, provides an electrical answer-back (EAB) feature and additional remote test circuitry.

**TABLE A  
DATA SET 401L-TYPE FEATURES**

MODEL	COMMON FEATURES					DIFFERENCES		
401L1	Auto- matically dials number	25A1 Data Mounting	Parallel Modulator	Line Coupler	Remote Test Capability	Transmits max of 20 characters/ sec	Powered from CO	—
401L2	Auto- matically dials number	25A1 Data Mounting	Parallel Modulator	Line Coupler	Remote Test Capability	Transmits max of 20 characters/ sec or re- ceives 4 characters/ sec	Powered from CO and utility power	Electri- cal Answer- Back

## SECTION 594-027-100

**1.06** Data set 401L-type is an automatic data reporting set, and its function is to dial a predetermined telephone number stored in the data set and to make a report to a remote station equipped with a receiving data set 401J-type, 403D-type, or 403E-type.

**1.07** An associated telephone set (558F) is bridged at the connecting block to provide voice communication in conjunction with data service.

**1.08** The data set is designed to operate within an ambient temperature range of  $-20$  to  $+150^{\circ}\text{F}$ , with a relative humidity of 10 to 100 percent with light condensation. The data set, however, must be housed inside a building or enclosure which will protect it from the weather.

## 2. DESCRIPTION

### GENERAL DESCRIPTION

**2.01** Data set 401L-type is modular in makeup and consists of a 25A1 data mounting and the necessary circuit pack (CP) complement to comprise the desired data set model. The data set is designed to be vertically mounted and is housed in a gray plastic cover. (See Fig. 1 for dimensions.)

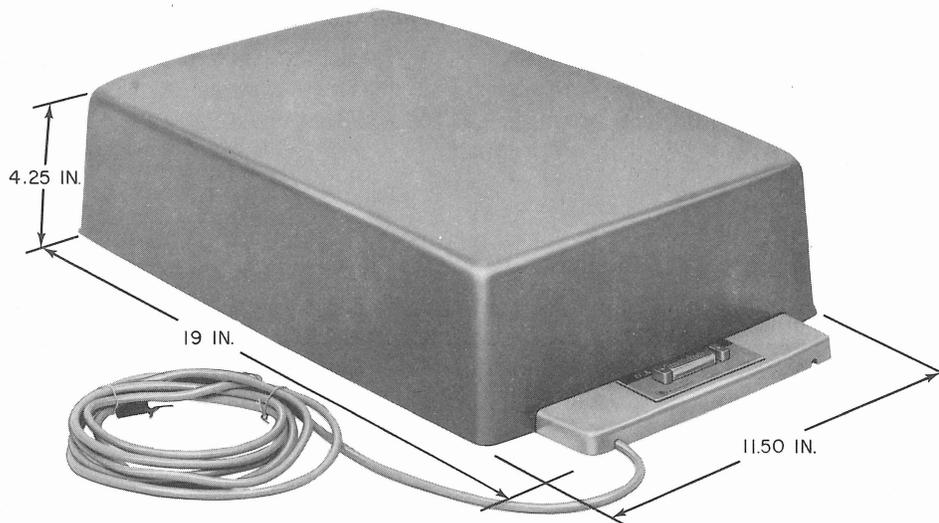
Data set 401L1 weighs approximately 10 pounds; data set 401L2 weighs 12 pounds.

**2.02** Data set 401L2 with cover removed is shown in Fig. 2. The accompanying table shows the circuit packs used in both data sets 401L1 and 401L2, and their respective locations. The KS-16886-L2 or KS-20426-L1 transformer is used to supply commercial power for the EAB circuit in data set 401L2.

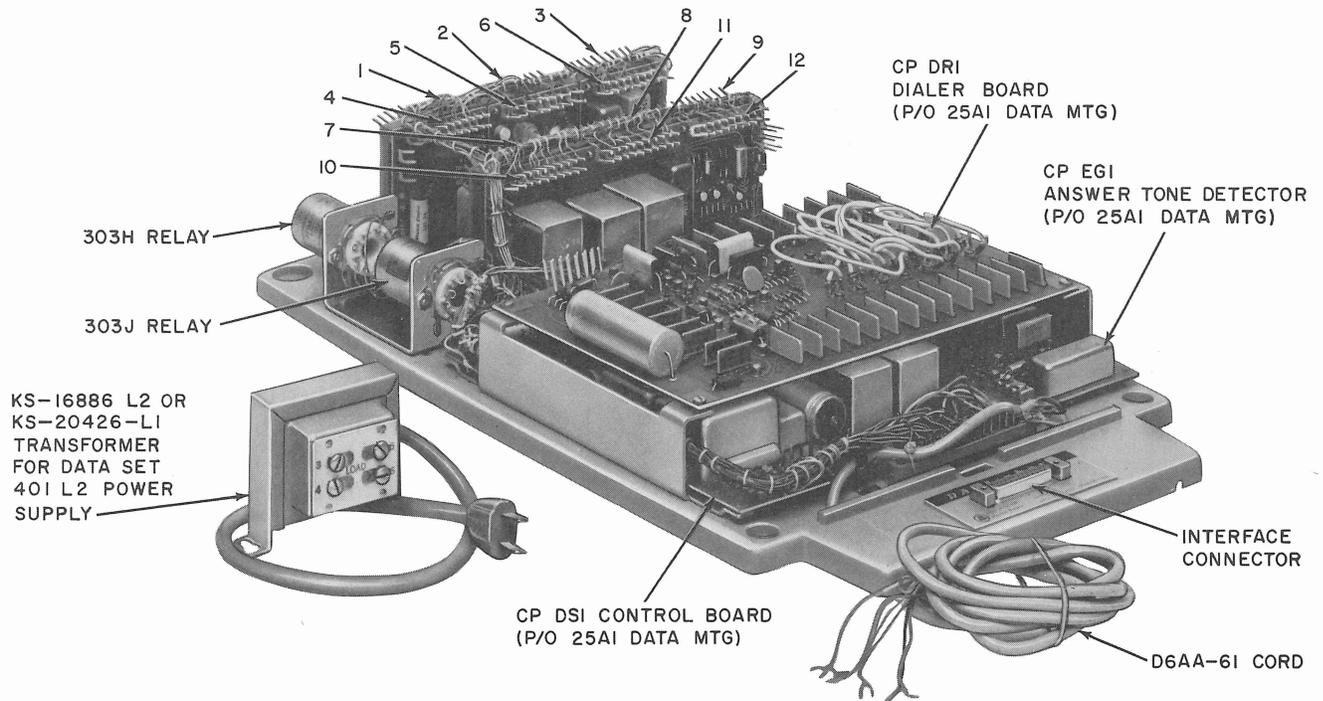
**2.03** The data set construction permits easy telephone number changes by altering strapping on DR1 CP dialer board. For details on changing the telephone number, refer to Section 594-027-200.

**2.04** A 25-pin connector, external to the data set cover, is provided for making connection to the business machine through a customer-provided 25-conductor cord. The cord should not exceed 5-1/2 feet in length. Connection to the telephone line is made with a D6AA-61 cord.

**2.05** Functions and designations of the interface leads to the associated business machine used with data set 401L1 and data set 401L2 are shown in Tables B and C, respectively.



**Fig. 1—Data Set 401L-Type—Dimensions**



DATA SET CODE	CIRCUIT PACKS AND MOUNTING POSITION NUMBERS											
	1	2	3	4	5	6	7	8	9	10	11	12
401L1	BE 64 <sup>1,5</sup>		BE 61 <sup>2</sup>	BE 13	—	—	—	—	—	—		
401L2	BE 65 <sup>1,5</sup>		BE 61 <sup>2</sup>	BE 13	BE 1	BE 18 <sup>3</sup>	BE 19 <sup>4</sup>	BE 20 <sup>4</sup>	BE 21	BE 28 <sup>6</sup>		

NOTES:

1. DATA SET SERIES 2 AND HIGHER. SERIES 1 USES BE 14.
2. DATA SET SERIES 2 AND HIGHER. SERIES 1 USES BE 58.
3. CIRCUIT PACK SERIES 1 OR 3.
4. CIRCUIT PACK SERIES 2 OR 4.
5. POSITIONS 1 AND 2 USE ONLY ONE BE 64.
6. POSITIONS 10,11 AND 12 USE ONLY ONE BE 28.

Fig. 2—Data Set 401L-Type Without Cover—Circuit Pack Location

**FUNCTIONAL DESCRIPTION**

**2.06** Data set 401L-type converts business machine contact closures into tones which are transmitted over the telephone lines to a receiving data set. It also dials the remote station to which it is to transmit information. The following is a

functional description of the circuits which are contained in both models of the data set. Since data set 401L2 is an extension of data set 401L1, this description covers data set 401L1 first, and then covers the additional circuits for data set 401L2.

TABLE B  
INTERFACE LEADS FOR DATA SET 401L1

PIN NO.	DESIGNATION	FUNCTION
1	(Not used)	
2	(Not used)	
3	A1	Data Channel (A1)
4	A2	Data Channel (A2)
5	A3	Data Channel (A3)
6	A4	Data Channel (A4)
7	DCN	Data Common
8	PCI	Polling Call Indication
9	B1	Data Channel (B1)
10	B2	Data Channel (B2)
11	B3	Data Channel (B3)
12	B4	Data Channel (B4)
13	CRQ	Call Request
14	C1	Data Channel (C1)
15	C2	Data Channel (C2)
16	C3	Data Channel (C3)
17	C4	Data Channel (C4)
18	(Not used)	
19	TCL	External Timer Control
20	CCN	Control Common
21	SCN	Signal Common
22	(Not used)	
23	(Not used)	
24	DSR	Data Set Ready
25	(Not used)	

#### A. Data Set 401L1

**2.07** Data set 401L1 contains a 25A1 data mounting, a parallel modulator, and a line coupler (Fig. 3).

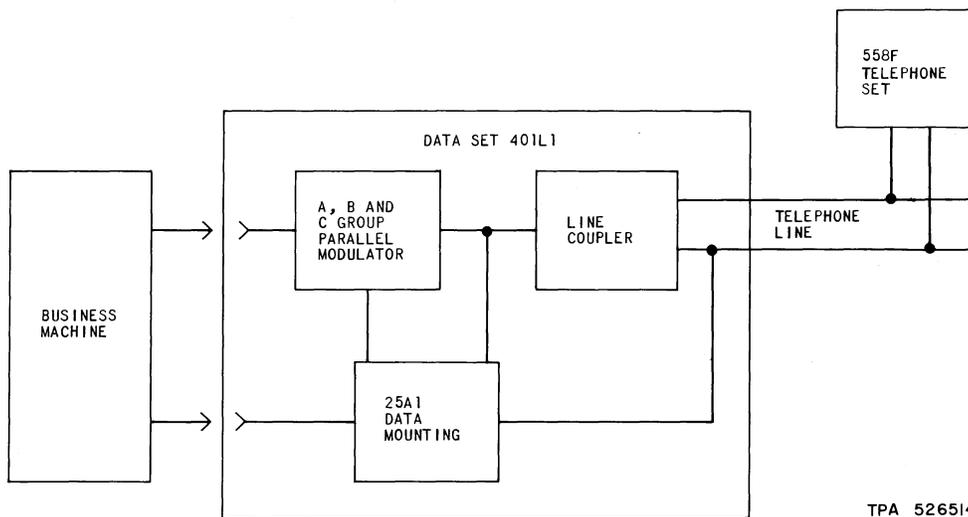
(a) **25A1 Data Mounting:** The 25A1 data mounting is the basic unit for both models of the data set. The data mounting includes three circuit packs, which provide ring detection, automatic dialing, answer-tone (2025-Hz) detection, and timing functions for making outgoing calls. The data mounting is under control of the business machine, which provides contact closures over the call request (CRQ) lead to cause the data set to make call attempts. The data mounting also includes number encoding circuitry, answer-tone detection circuitry, call termination circuitry, and the ring detector circuitry.

(1) **Number Encoding:** A telephone number with a maximum of 13 digits may be encoded on CR1 CP, which is a component of the data mounting. The coding of a digit is accomplished by connecting a strap associated with the desired digit to the appropriate terminal representing the number of dial pulses in that digit. After the last digit has been encoded on the board, an end-of-number (EON) code must be encoded. This terminates dialing and places the data set in answer-tone detection mode.

(2) **Answer-Tone Detector:** The data mounting also contains answer-tone detection circuitry with an associated option which establishes the time at which the signal will be detected. If the option is installed, detection will occur after the answer tone ceases. The option is

TABLE C  
INTERFACE LEADS FOR DATA SET 401L2

PIN NO.	DESIGNATION	FUNCTION
1	SGD	Signal Ground
2	(Not used)	
3	A1	Data Channel (A1)
4	A2	Data Channel (A2)
5	A3	Data Channel (A3)
6	A4	Data Channel (A4)
7	DCN	Data Common
8	PCI	Polling Call Indication
9	B1	Data Channel (B1)
10	B2	Data Channel (B2)
11	B3	Data Channel (B3)
12	B4	Data Channel (B4)
13	CRQ	Call Request
14	C1	Data Channel (C1)
15	C2	Data Channel (C2)
16	C3	Data Channel (C3)
17	C4	Data Channel (C4)
18	C	Supervisory Receive C
19	TCL	External Timer Control
20	CCN	Control Common
21	SCN	Signal Common
22	A	Supervisory Receive A
23	B	Supervisory Receive B
24	DSR	Data Set Ready
25	RS	Request to Send



TPA 526514

Fig. 3—Data Set 401L1—Block Diagram

used in situations in which the answer-tone frequency might interfere with data frequencies. If the option is not installed, the answer tone will be detected shortly after the beginning of the tone.

(3) **Call Termination:** A timer circuit on the data mounting determines the time at which a message is terminated. A number of options for call termination are available. (See Part 3 for option information.) The answer-tone mode is also timed. If an answer tone is not received prior to the timer interval and the call request contact is open, the data set will go on-hook. The CRQ lead must remain open for a minimum of 20 seconds before another closure can initiate a new call. If the answer-tone frequency is not received after 70 seconds and the call request contacts remain closed, the data set will go on-hook and automatically repeat the call attempt in a few moments.

(4) **Ring Detector:** The ring detector detects ringing voltage when the data set is called for test purposes or used for polling purposes. The ringing voltage is applied to the ring detector circuit through a rectifier that rectifies the current and charges two capacitors. If the call being made is a polling call, the calling party must hang up after two or three rings. Upon cessation of ringing, the two charged capacitors discharge at different rates, and in turn, operate the polling call (PC) relay. The PC relay causes the data set to pulse out the encoded telephone number. If the call is being made for testing, the data sets must contain the remote test option. The calling party must ring for at least 30 seconds to operate the PC relay, which causes the data set to go off-hook ready for testing.

(b) **Parallel Modulator:** The parallel modulator is the same in both models of the data set and consists of three oscillators and associated circuitry. The frequency of oscillation is controlled by tuning a tertiary winding of the oscillator transformer. In the absence of business machine contact closures, the group A oscillator generates a 600-Hz signal, the group B oscillator generates a 1098-Hz signal, and the group C oscillator generates a 1950-Hz signal. When business machine contact closures are made, the group A oscillator will generate a 697-, 770-, 852-, or

941-Hz signal depending upon the amount of tertiary windings that are shunted. The group B and group C oscillators work in the same manner. The group B oscillator generates a 1209-, 1336-, 1477-, or 1633-Hz signal; the group C oscillator generates a 2050-, 2150-, 2250-, or 2350-Hz signal. The 2350-Hz signal is not detected by data set 401J-type; therefore, both models of the data set are described as 3-out-of-14 multifrequency parallel transmitters.

(c) **Line Coupler:** The same type of line coupler provides coupling for both models of the data set to the telephone line. This circuit contains a polarity guard to assure correct polarity of the voltage applied to the modulator. The coupler also contains components used to adjust the output power level of the data set and to maintain the output impedance within a range of 814 to 1220 ohms with an average of 900 ohms.

#### B. Data Set 401L2

**2.08** Data set 401L2 has the same basic circuitry as data set 401L1, with the following added features: remote test circuit, power rectifier, and EAB limiter and detectors (Fig. 4).

(a) The remote test circuit provides a means of remotely testing the EAB tone detection circuitry and the A, B, and C group modulators. When the remote test option is installed, the test circuit responds to ringing of a test call, conditions the data set to answer the test call, then dials its programmed number. This procedure permits audible testing of the data set dialing circuitry. The data set is placed in test mode upon reception of a 2025-Hz answer tone. The data set timer circuit is deactivated, and the set goes alternately in to the data transmit and EAB modes under control of the data test center. The EAB signals are detected, and successful answer detection is indicated during the next data mode interval. When the EAB circuit receives a 1017-Hz tone, it causes the data set to release the telephone line, and consequently to terminate the test call.

(b) A KS-16886-L2 (wall-mounted) or a KS-20426-L1 (plug-in) transformer is supplied with data set 401L2 and is used to supply 25 Vac to a power rectifier. The 25 Vac is rectified and filtered by transistorized circuitry. The output

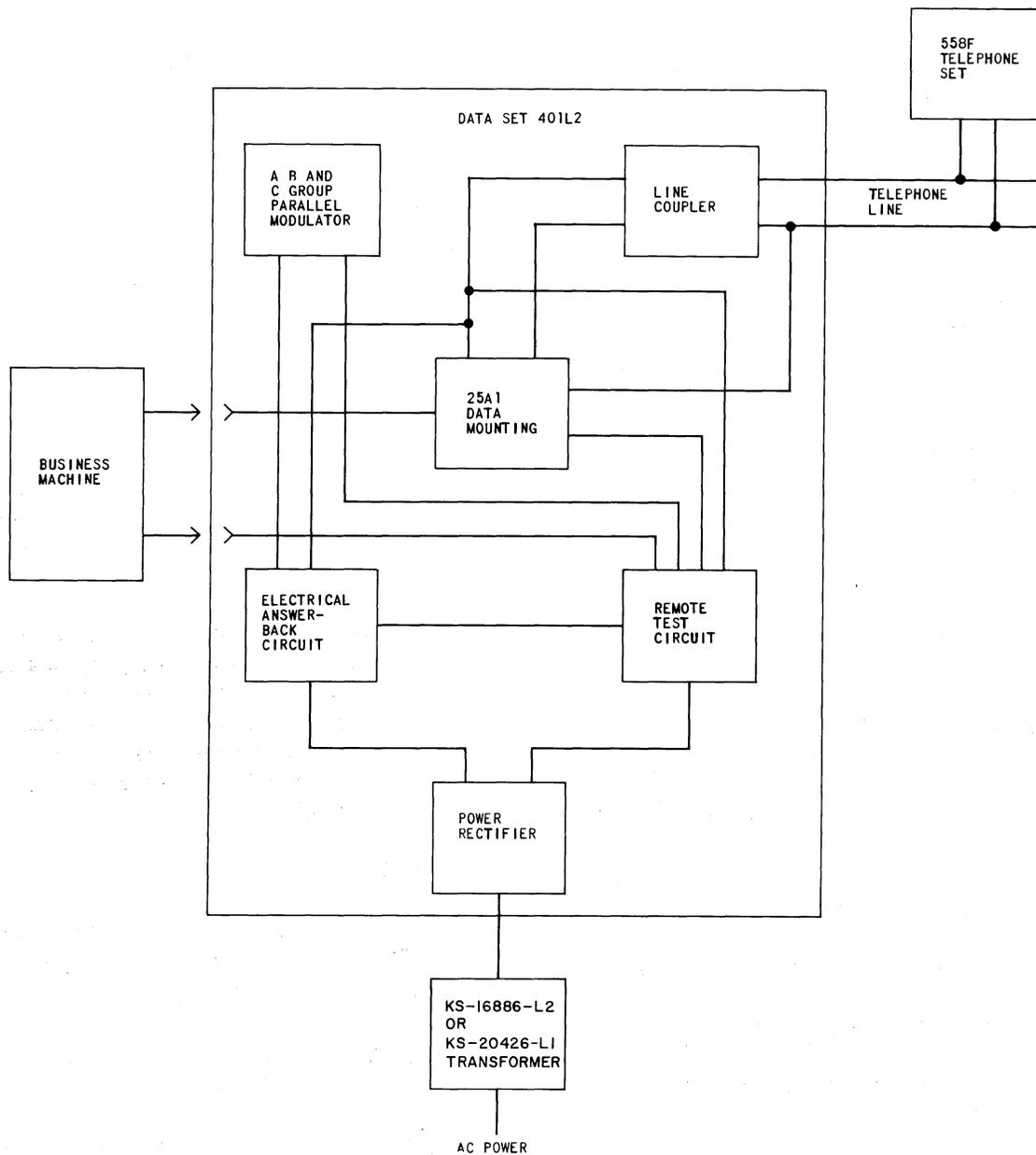


Fig. 4—Data Set 401L2—Block Diagram

of the rectifier supplies regulated +8 Vdc and +16 Vdc, and an unregulated voltage ( $E_c$ ), which varies from +22 Vdc to +35 Vdc. The rectifier supplies the EAB limiter with +8 Vdc, the three answer-tone detectors with both +8 and +16 Vdc, and the remote test circuitry with +16 Vdc and  $E_c$ .

(c) Data set 401L2 has receive data capabilities in which the EAB circuits can receive three

tones. Each tone must be received individually for at least a 250-ms duration. Reception of these EAB tones is possible only when ground is removed from the request-to-send (RS) lead of data set 401L2. Ground applied to the RS lead disables the EAB limiter circuit, and the A, B, and C group modulators are biased on. When ground is removed, the limiter circuitry operates and the modulators are biased off.

**3. OPTIONS**

**3.01** The following options may be strapped into the data set to provide the respective features.

(a) ***Call Termination Options:***

- After answer tone is received, data set remains in data mode for 10 seconds before terminating the call.
- After answer tone is received, data set remains in data mode for 70 seconds before terminating the call.
- Customer controls the termination of the call by closure of timer control (TCL) lead after a minimum of 10 seconds in the data mode.
- Customer terminates the call at any time with TCL closure.

(b) ***Remote Test Options:***

- Remote test option allows data set 401L2 to be remotely tested; exclusion of the option means this feature is not provided.
- Remote test option allows data set 401L1 to be remotely tested; exclusion of the option means this feature is not provided.

(c) ***Answer-Tone Detection Options:***

- Data set 401L-type detects end of answer tone.
- Data set 401L-type detects beginning of answer tone.

(d) ***End of Number Options:***

- EON circuit operates 1 second after dialing ceases. This option must be used when working into No. 1 and No. 5 crossbar exchanges.

- EON circuit operates immediately after dialing ceases. This option is used with exchanges other than No. 1 and No. 5 crossbar exchanges.

For information on installation of options, refer to Section 594-027-200.

**4. OPERATION**

**4.01** Data set 401L-type is an automatic reporting data set and does not require operation by an attendant. All tests, except for installation tests, may be accomplished without having anyone at the station. For installation tests, refer to Section 594-027-500. A telephone is connected across the line at the data station; the telephone may be used in the normal manner after dial tone has been obtained by pressing the start button on the front of the telephone set.



*Improved telephone communications may be achieved by operating the exclusion key. Care must be taken when the line is to be used in this manner, for the use of the telephone set interferes with the data set operations.*

**5. REFERENCES**

**5.01** The following documents provide additional information on data set 401L-type.

SECTION	TITLE
SD-&CD-1D089-01	Data Systems Station—Data Set 401L-type
SD-&CD-1D090-01	Data Systems Station—25A-Type Data Mounting
594-027-200	Data Set 401L-Type—Installation and Connections
594-027-300	Data Set 401L-Type—Maintenance
594-027-500	Data Set 401L-Type—Test Procedures