

**DATA SET 403E-TYPE**  
**SINGLE RECEIVER STATION**  
**DESCRIPTION AND OPERATION**

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**1. GENERAL**

**1.01** Data set (DS) 403E-type is a low-speed parallel data receiver designed to receive two-out-of-eight signals generated by a TOUCH-TONE® telephone and transmitted over the DDD network or private 2-wire switched network facilities. DS 403E-type is for single-set installations, and uses a DS 403D-type receiver. These data sets supersede DS 403A-type, which is rated Manufacture Discontinued (MD). This section contains a physical and functional description of DS 403E-type and covers the operation of the data set in its various modes. A list of references is given to provide additional information on the data set and peripheral components.

**1.02** This section is reissued to revise Table C to show level instead of attenuation for options S, T, and V; to add levels for these options for data sets rated MD; and to add a footnote concerning external padding. Because many of the DS 403E2, 3, and 4 (MD) are still used in the field, information on these units is retained.

**1.03** The current standard data sets provide for operation with ESS and on Unigauge loops, and meet the signal level constraints of FCC Tariff No. 263. An attendant alert feature (except on

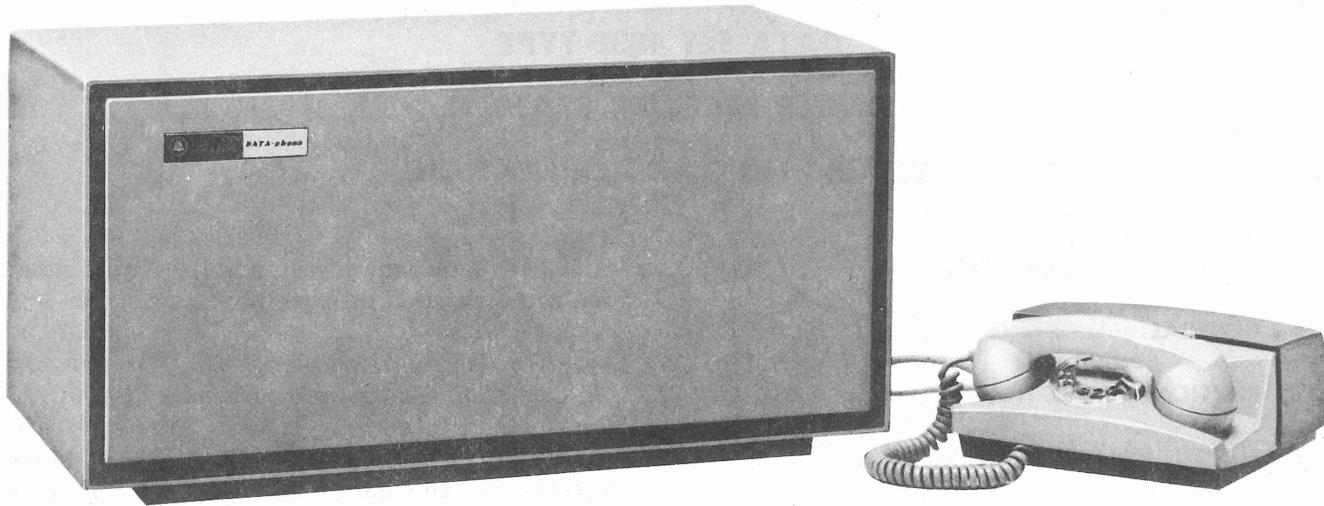
DS 403E7) and a third-wire out-of-service feature are also provided on the current standard sets.

**1.04** DS 403E-type consists of DS 403D-type and an 8A-type data unit housed in a KS-20018-L1 cabinet. A data auxiliary set (DAS) 804G-type is required to provide data, talk, and test mode controls for the data station and to provide conventional telephone service (Fig. 1). A DAS 801A or 801C automatic calling unit (ACU) may also be provided as a component of the station on an optional basis. If a ground-start ACU is used [DAS 801A5, 801A6, 801C3, or an 801C4 with ground-start (option V)], then only an 8A5 data unit and a DAS 804G3 or 804G4 series 2 and above must be used to provide a DIAL TONE key. See Section 598-048-100 for information concerning DAS 804G-type with DIAL TONE key.

**1.05** DS 403E-type is intended for those installations that require one, two, or possibly three DS 403D-type. If more than three data sets are required at a receiving station, a data station employing DS 403D-type should be considered as explained in the section entitled Data Set 403D-Type. Multiple Data Set Station—Description and Operation (594-025-101).

**1.06** The data set is designed to operate on the switched telephone network and various private line networks to receive numeric data generated by any one of a class of transmitting terminals using a 2-out-of-8 code (TOUCH-TONE signals), and to provide the means for interfacing with any compatible business machine.

**1.07** Facilities are also provided within the DS 403E-type for automatic call answering and for generation and transmission of an answer tone and answer-back tones. DS 403E5 and 403E6 also accept customer-originated voice signals, regulate their amplitudes, and transmit them over the telephone line. Provision is made for the data set to be tested remotely by a data test center.



**Fig. 1—Data Set 403E-Type With Associated Data Auxiliary Set 804G-Type Making a Single Data Set Station**

**1.08** The data set is designed for proper operation in an environment with an ambient temperature range of +40 to +120°F and a relative humidity range of 20 to 90 percent.

**1.09** DS 403E-type requires approximately 12 watts of customer-supplied 117-Vac 60-Hz power for operation.

## **2. PHYSICAL DESCRIPTION**

**2.01** Externally, DS 403E-type is a two-toned gray cabinet with the front and back panels a darker shade than the rest of the cabinet (Fig. 1). The housing sits on four 2/3-inch rubber feet. The front and back panels are removed by applying an outward pressure at the top of each of the panels until the top may be removed by pulling forward, then lifting up and out, from the cabinet. All the cables which are external to the data set are fed through two 2-inch by 4-inch holes at the bottom of the cabinet.

**2.02** Overall dimensions of the housing are 11-3/4 inches high by 24-1/4 inches wide and 12 inches deep. The total weight of DS 403E-type is approximately 46 pounds.

**2.03** For more details on the KS-20018-L1 cabinet, refer to the section entitled Data Sets—Multiple Installation Information (590-010-201).

**2.04** A DAS 804G-type is used with the data set to provide line control functions for the switched network and some private line uses.

**2.05** DS 403E-type contains an 8A-type data unit and a DS 403D-type as listed in Table A. They are mounted on 23-inch mountings in the KS-20018-L1 cabinet (Fig. 2).

**2.06** The 8A-type data unit contains a power supply and two 50-pin connectors for connection to the associated DS 403D-type (Fig. 3). It also contains two terminal boards for connections to an ACU, and a 9-pin connector for distribution of power to the associated data set. For more detailed information on the 8A-type data unit, refer to the section entitled 8A-type Data Unit—Identification (590-100-110).

**2.07** DS 403D-type consists of a 3A2 (MD) or 3A3 data mounting, a complement of circuit packs (Table B), and either a 15A1, 15A2, or 15A3 data unit (Table A). The 3A-type data mounting contains 9-pin jack for interconnection of power with the 8A-type data unit. There is also a 50-pin connector for interconnection between the data set and the DAS 804G-type or 8A-type data unit.

**2.08** Two cords are supplied with the data set: a KS-14532-L16 or -L20 power cord and a M7P (9-inch) power cord for interconnection of the 8A-type data unit and DS 403D-type. A M50H

TABLE A  
 DATA SETS 403D-TYPE BASIC RECEIVER AND INTERFACE UNIT  
 USED WITH DATA SETS 403E-TYPE  
 SINGLE RECEIVER STATION

SINGLE RECEIVER STATION CODE AND DATA UNIT		USES DATA SET AND INTERFACE COUPLER (DU)		TYPE OF INTERFACE PROVIDED
DATA SET	DATA UNIT	DATA SET	DATA UNIT	
403E2*	8A3*, 8A4*	403D4*	15A1	} 2-out-of-8 } Contact
403E5	8A5	403D10	15A1	
403E3*	8A3*, 8A4*	403D6*	15A2	} 4-Level Binary Coded } Matrix (EIA Voltage)
403E6	8A5	403D12	15A2	
403E4*	8A3*, 8A4*	403D8*	15A3	} Serial ASCII } (EIA Voltage)
403E7	8A5	403D14	15A3	

\* Rated MD

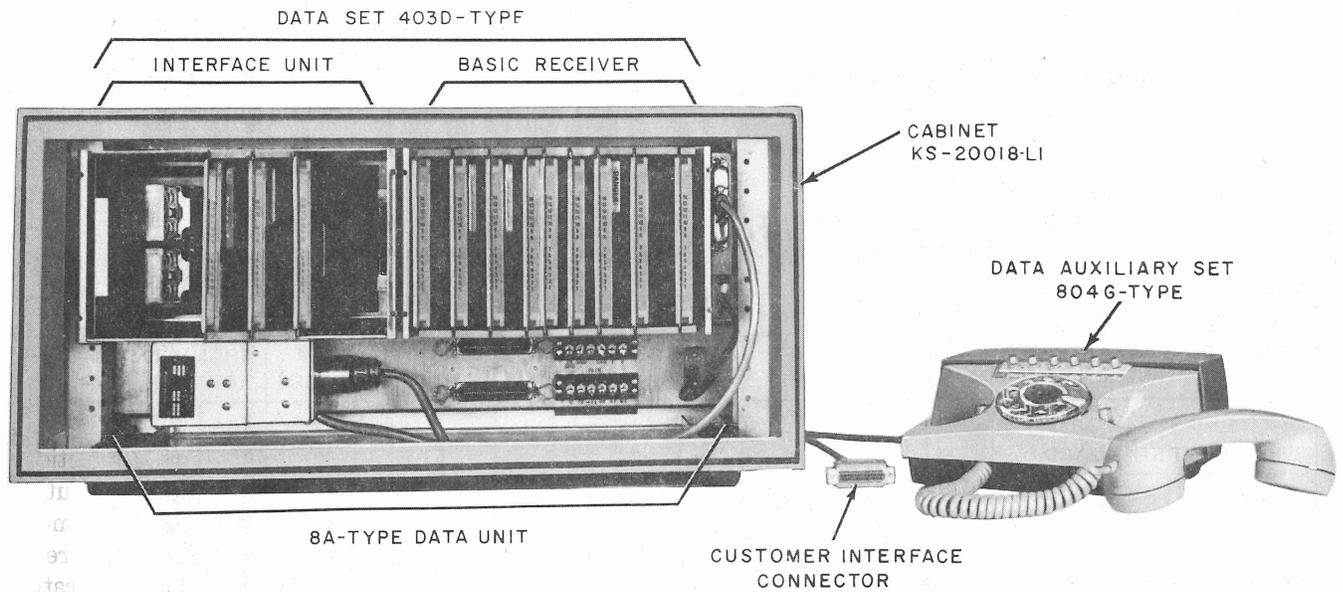


Fig. 2—Data Set 403E-Type With Front Cover Removed Showing Internal Components

(3-foot) cord must be ordered for connecting the 8A-type data unit and DS 403D-type when the data set is to be used with an ACU.

### 3. FUNCTIONAL DESCRIPTION

**3.01** Functionally, DS 403E-type is the same as DS 403D-type. For a detailed functional

description, refer to the section entitled Data Set 403D-type—Description (594-025-100).

### 4. OPERATION

**4.01** The operation of a DS 403E-type installation may be made completely automatic for both calling and answering by the addition of a DAS 801-type ACU (Fig. 4). Manual control of the data

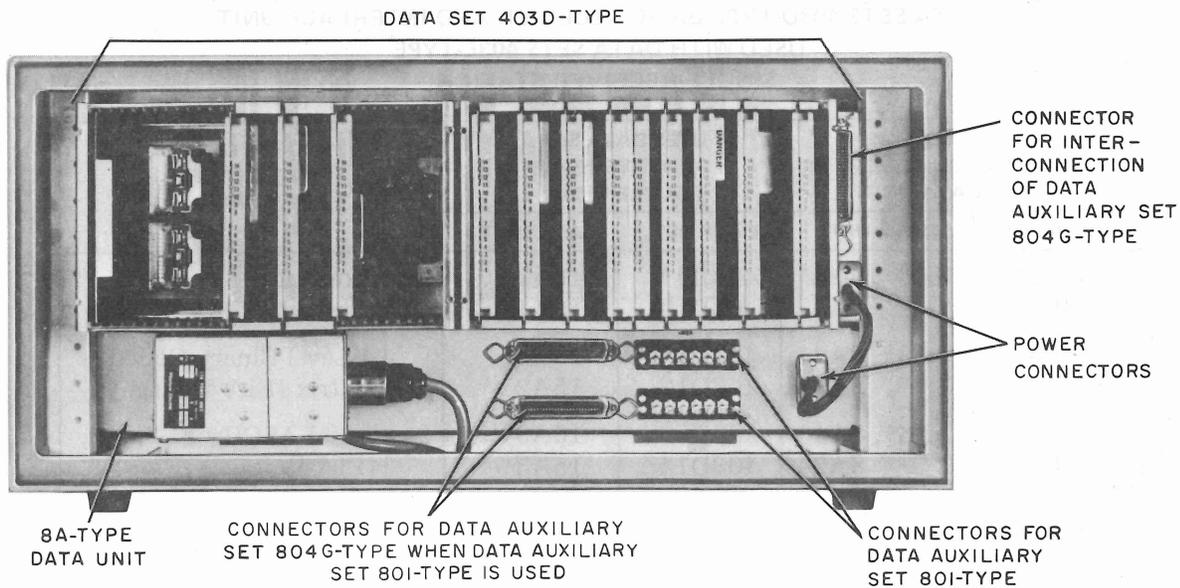


Fig. 3—Data Set 403E-Type Showing Connectors for Data Auxiliary Sets 804G-Type and 801-Type

TABLE B  
CIRCUIT PACK COMPLEMENT OF DATA SET 403D-TYPE BASIC RECEIVERS  
USED WITH DATA SET 403E-TYPE SINGLE RECEIVER STATION

DATA SET 403E-TYPE	DATA SET 403D-TYPE	CIRCUIT PACK USED							
		CONT UNIT	LINE CONT	OPTION BOARD	AGC	FLT'R	GROUP LIMITERS	CHANNEL DET'R	TIMERS, DET'R
CURRENT STANDARD		↑	↑	↑	↑	↑	↑	↑	↑
403E5	403D10	AR429	AR422	AR461	AR249	755A	AR248	AR246 & AR247	AR245
403E6	403D12	↓	↓	↓					
403E7	403D14	↓	↓	↓					
RATED MD		↑	↑	↑	↓	↓	↓	↓	↓
403E2	403D4	AR253 <sup>1</sup>	AR251 <sup>1</sup>	AR250 <sup>2</sup>	↓	↓	↓	↓	↓
403E3	403D6	↓	↓	↓	↓	↓	↓	↓	↓
403E4	403D8	↓	↓	↓	↓	↓	↓	↓	↓

Note 1: Rated MD  
Note 2: Rated A&M

set and normal telephone communications are provided by associated DAS 804G-type (Fig. 2).

4.02 The DS 403E-type may be operated in either an attended or unattended mode. For information on options, see Table C.

4.03 When the unattended option is used, the data set will automatically function as follows:

- (a) Answer incoming calls using the 20-Hz ring voltage to operate a relay to initiate timing and switching.

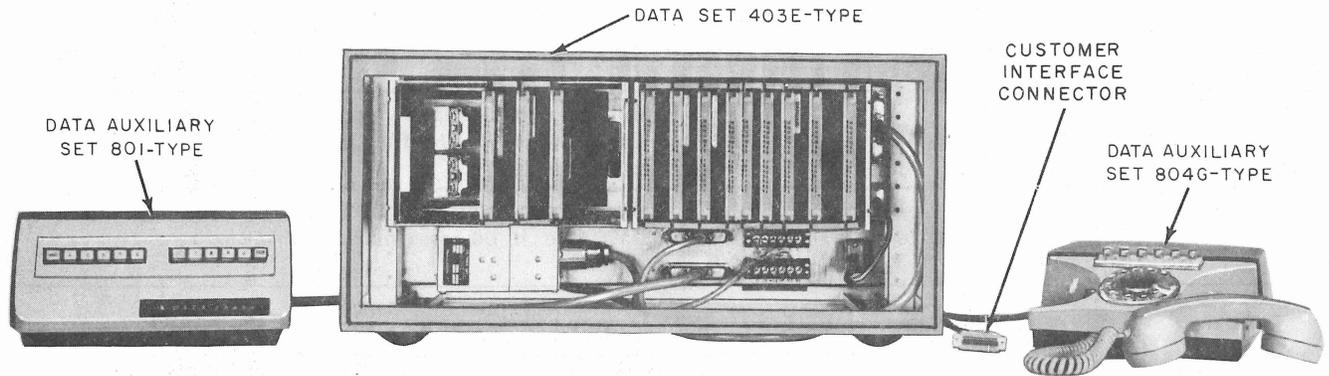


Fig. 4—Data Set 403E-Type With Associated Data Auxiliary Sets 804G-Type and 801-Type

- (b) Provide a 1.1-second quiet period after call is answered to provide protection for supervisory signals.
- (c) Transmit 2025-Hz answer-tone signal for 0.574 or 1.25 seconds (installer option).
- (d) Transfer telephone line to the data receiver upon completion of answer-tone transmission.
- (e) Return all circuits to the off state upon completion of data transmission.

#### OPERATION ON SWITCHED NETWORK

**4.04** Modes of operation when DS 403E-type is used on the switched network are controlled manually by DAS 804G-type. When manual operation is used, the attendant option should be installed. The modes of operation are as follows:

- (a) **Talk Mode:** The talk mode is entered and the line is transferred away from the data set to DAS 804G-type by lifting the handset and depressing the locking TALK key. The TALK lamp will light.
- (b) **Data Mode:** The data mode may be entered either automatically or manually. It is entered manually by first initiating the talk mode as in (a) above, and then by depressing the nonlocking DATA key and hanging up the handset. Operation of the DATA key removes a short circuit across the line-holding relay in the data set, thereby permitting the line-holding relay to operate. Operation of the line-holding

relay initiates a series of events which permits the transmission of the answer tone and then the transfer of the line to the data receiver. Release of the DATA key also releases the TALK key. The release operation is mechanically sequenced so that the closed key contacts open before the DATA key break contact is closed. This mechanical sequencing prevents the line-holding relay from being shorted and the data set remains in the data mode. If the unattended option has been strapped into the data set and the data terminal ready (DTR) lead is activated, the data set may enter the automatic mode of operation in the following manner:

- (1) The data set receives a 20-Hz ringing signal, and circuitry within the data set provides timing for the ringing signal before it activates the line-holding relay.
- (2) Activation of the line-holding relay deactivates the ring relay network, and operates the DATA lamp (if a DAS 804G-type is associated with the station).
- (3) Releasing of the ring relay initiates a 1.1-second quiet interval followed by a 2025-Hz answer-tone transmission and transfer of the line to the data receiver.
- (4) Upon completion of data transmission, all circuits in the data receiver are restored to the off state by opening the DTR lead, which releases the line-holding relay. The receiver is also restored to the off state by lifting the handset, depressing the TALK key,

→TABLE C←

## DESCRIPTION OF FEATURES AND OPTIONS OF DATA SET 403E-TYPE

FEATURE	OPTION	DESIGNATION		DESCRIPTION	WHERE USED
Answering	Z	Attended		Call answered manually. Manual transfer to data mode if business machine ready.	All 403E-type
	Y	Unattended		Call automatically answered in data mode if business machine ready.	
Termination	X	600Ω		Match 600Ω line impedance — principally private line service.	All 403E-type
	W	900Ω		Match 900Ω line impedance — principally switched network service.	
Answer-Back Level	V	STD SETS	MD SETS <sup>1</sup>	Option chosen at time of installation to make received level of answer-back signal no greater than -12 dBm at serving office. Nominally, data set answer-back signal output with no attenuation is -3 dBm.	All 403E-type
		-3 dBm	-3 dBm		
		T	-7 dBm		
S	-12 dBm	-9 dBm			
6-dB Input Pad	R	In		Normal sensitivity — principally used for TOUCH-TONE or mixed TOUCH-TONE/401-type transmitting stations.	All 403E-type
	Q	Out		Increased sensitivity — principally used for 401-type transmitting stations.	
2025-Hz Answer-Tone Duration	N	0.57 Sec		Normal answer-tone timing.	All 403E-type
	M	1.25 Sec		Answer-tone timing for use with ACU at transmitting station.	
Answer-Back	A	Internal		Answer-back circuit in data set used.	All 403E-type
	F <sup>2</sup>	External		Customer-provided answer-back generator used.	403E2,3,5,6
Out-of-Service (Make-Busy)	K	Control Circuit OFF	Third Wire Control	Provides means for making data line appear busy by placing ground on third wire (sleeve). Line is made busy either by turning control circuit ON or OFF, depending on customer equipment.	403E5,6,7
	J	Control Circuit ON			403E5,6
	H	Control Circuit OFF	Tip to Ring Shorted	This feature should be used as outlined in AT&T Co. PEM 9197, dated April 19, 1965.	All 403E-type
	G	Control Circuit ON			403E2, 3 (MD) 403E5,6
	ZC	Disabled			All 403E-type

TABLE C (Cont)

FEATURE	OPTION	DESIGNATION	DESCRIPTION	WHERE USED	
Private Line Service Without Ringing	ZA	Dry Line (without talk battery)	Allows incoming data calls to be received when ringing signal is not provided. Data set is controlled by DTR interface circuit. Alternate voice service available only with wet line.	All 403E-type	
	ZB	Wet Line (with talk battery)			
Control Function (15A3 Data Unit Only)	Initial ## Character Insertion	XA	Enabled	Provides automatic initial ASCII character for separation of messages.	403E4 (MD) 403E7
		XB	Disabled		
	Interdigit Timeout	XC	45 Sec	Permits data set to terminate call after specified period of inactivity.	403E4 (MD) 403E7
		XD	15 Sec		
		XE	Disabled		
	* Answer-Back	XF	Enabled	Provides answer-back tone (2025 Hz) when TOUCH-TONE star (*) is received.	403E4 (MD) 403E7
		XG	Disabled		
	# Answer-Back	XH	Enabled	Provides answer-back tone (2025 Hz) when TOUCH-TONE number sign (#) is received.	403E4 (MD) 403E7
		XJ	Disabled		
	## Answer-Back	XK	Enabled	Provides answer-back tone (2025 Hz) when second consecutive TOUCH-TONE number sign (##) is received.	403E4 (MD) 403E7
		XL	Disabled		

*Note 1:* External padding may be required to meet the requirement of -12 dBm at the central office.

*Note 2:* Not recommended for use on DS 403E4 and E7 because there is no interface control.

and hanging up the handset. The data receiver may also be returned to the off state by central office supervisory lead control. (Opening the DTR lead is the preferred method for restoring the data set to the off state.)

(c) **Test Mode:** The test mode may be entered by lifting the handset, depressing the locking TALK key, then depressing the nonlocking TEST key and replacing the handset on-hook. Depressing the TEST key provides a current path to initiate operation of the remote-test relay. Operation of the remote-test relay initiates switching to condition the data set for automatic answering and loop-back testing. Automatic answering is provided for testing even though the data set may be strapped to operate in the attended mode. The data set is released from the test mode manually from DAS 804G-type by initially being in the talk mode and then by depressing the DATA key. Depressing the DATA key provides a current path to turn off the transistor holding the remote-test relay, causing the remote-test relay to release. The data test center may also remove the data set from the test mode by transmitting a test termination signal.

#### OPERATION ON PRIVATE LINE

4.05 DS 403E-type may be used in private line systems with or without ringing and talk battery.

#### Operation With Talk Battery (Wet Line)

**Note:** When wet line service is provided, a DAS 804G-type must be supplied with the data set and option ZB must be installed in the data set to provide the service (Table C).

4.06 The three modes of operation on private line with talk battery are as follows:

(1) **Talk Mode:** The talk mode is entered and the line is transferred from the data set by lifting the handset and depressing the TALK key. The TALK lamp lights.

(2) **Data Mode:** From the talk mode the data set may be placed in the data mode by depressing the DATA key, then placing the handset on the cradle.

(3) **Test Mode:** To go into the test mode, remove the handset, depress the TALK key and then the TEST key, and then replace the handset. The data set goes into the test mode immediately upon replacement of the handset, and test tones are transmitted to the data test center. The data test center must be ready to receive these tones when the handset is placed on the cradle.

**Note:** If the attendant inadvertently goes into the test mode from either the talk or data mode and the handset is on-hook, the attendant may return to the proper mode of operation by lifting the handset from the cradle and depressing the TALK key (for returning to talk mode) and then depressing the DATA key (for returning to the data mode).

#### Operation Without Talk Battery (Dry Line)

**Note:** Option ZA must be installed in the data set to provide private dry line service (Table C).

4.07 The two modes of operation on private line without talk battery are as follows:

(1) **Data Mode:** The data mode is entered by the business machine operating the DTR lead, and is released from the data mode by releasing the DTR lead.

(2) **Test Mode:** To provide for testing, the data set must be equipped with an external test mode switch, as shown in Fig. 5. To enter the test mode, momentarily operate the test mode switch to TEST position. When the switch is operated to TEST, test tones are transmitted to the data test center immediately; therefore, the test center should be prepared to receive them. To release the data set from the test mode, momentarily operate the test mode switch to TEST RELEASE position.

**Note:** A DAS 804G-type is not required for dry line operation. No talk battery is available, hence there is no talk mode.

NOTES:

1. OPTION ZA SHALL BE CONNECTED IN THE DATA SET.
2. THE TEST MODE SWITCH SHALL BE A 479BC,BD,BF,BH,BW, CS, J OR EQUIVALENT. THE KEY IS A THREE-POSITION SWITCH, CENTER POSITION OFF AND THE OTHER TWO POSITIONS ARE NON-LOCKING.
3. TEST MODE SWITCH MUST BE ORDERED SEPARATELY AND INSTALLED PER THIS FIG.

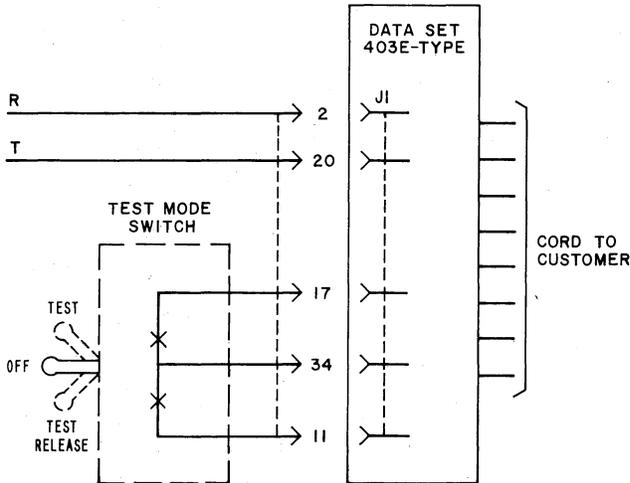


Fig. 5—Data Set 403E-Type Test Key for Dry Line Operation

5. REFERENCES

5.01 For further information on DS 403E-type and associated equipment, refer to the following documents:

SECTION	TITLE
590-004-106	Data Sets 403A-, D, and E-Types—Reference Guide

SECTION	TITLE
590-100-110	8A-Type Data Unit—Identification
594-025-100	Data Set 403D-Type—Description
594-026-200	Data Set 403E-Type—Installation and Connections
594-026-300	Data Set 403E-Type Single Receiver Station—Maintenance
594-026-500	Data Set 403E-Type Single Receiver Station—Test Procedures
598-048-100	Data Auxiliary Set 804G-Type—Description and Operation
SD-&CD-1D092-01	Data Systems Station—Data Unit 8A-Type
SD-&CD-1D093-01	Data Systems Station—Data Set 403E-Type
SD-&CD-1D102-01	Data Systems Station—Data Auxiliary Set 804G-Type
SD-&CD-1D130-01	Data Systems Station—Data Set 403D-Type Receiver Circuit