

DATA SET 402C-TYPE  
TRANSMITTER  
IDENTIFICATION AND OPERATION

1. GENERAL

1.01 This section is issued to provide an identification and description of the Data Set 402C-type (Fig. 1 and 2). Also included in this practice is information pertinent to the operation of the data set. Information concerning the busi-

ness machine associated with the data set is not included.

1.02 This section is reissued to include TOUCH-TONE capability. Due to the many general changes the change arrows have been omitted.



Fig. 1 — Data Set 402C-Type



Fig. 2 — Data Set 402C-Type, Rear View

**1.03** The data set is designed for one-way transmission of data over a voice channel on a 2-wire half-duplex basis to a 402-type data receiver.

**1.04** The Data Set 402C-type is the transmitter component of a parallel data transmission system. The system provides eight parallel binary channels for data transmission (Table A). A ninth channel is provided for timing information

which allows asynchronous operation at speeds up to 75 characters per second. Timing information must be furnished by the business machine when a data character is transmitted.

**1.05** The Data Set 402C-type can be installed separately when a transmit-only terminal is desired. If a transmit-receive terminal is required the Data Set 402C-type can be installed on a line with a Data Set 402D.

TABLE A

FREQUENCIES OF DATA CHANNELS

CHANNEL		1	2	3	4	TIMING	5	6	7	8
Freq. IN CPS	Mark	730	900	1070	1240	1410	1580	1750	1920	2090
	Space	800	970	1140	1310	1480	1650	1820	1990	2160

**1.06** The Data Set 402C-type has the following additional features:

- (a) To receive one of three Answer-Back signals transmitted from the receiving data set at the rate of 20 characters per second (Table B). When the data set is in this mode, transmission must be interrupted.
- (b) Operate as a telephone set for voice communication.

**TABLE B**  
**FREQUENCIES**  
**ANSWER-BACK AND REVERSE CHANNEL**

DESIGNATION	FREQUENCY CPS
Answer-Back A	1017
Answer-Back B	2025
Answer-Back AB	1785
Rest Tone	1152
Reverse Channel	387

- (c) Answer incoming calls automatically and transmit an Answer Tone.
- (d) Receive a Reverse Channel signal from the receiving data set during data transmission (optional).
- (e) Operate with an automatic calling unit (optional).
- (f) Communicate with a data test center for comprehensive testing of the data set.

**1.07** The features or options associated with the variously coded Data Set 402C-type are as follows:

FEATURE OR OPTION		DATA SET CODE			
		402C1	402C2	402C3	402C4
ROTARY DIAL		X	X		
Touch-Tone	12 Button			X	X
	Reverse-Channel		X		X
Reverse-Channel	Provided		X		X
	Not Provided	X		X	
Answering	Unattended				
	Attended	X	X	X	X

**2. DESCRIPTION**

**2.01** The data set is enclosed in an integrated housing (Fig. 1) and weighs approximately 20 pounds. The housing is available in gray only.

**2.02** The data set consists of a telephone set either rotary or TOUCH-TONE dialing, a key unit, and electronic and relay circuits for transmission of data signals. A 61B ringer provides an audible signal from the data set.

**2.03** Two cords are supplied with the data set.

(a) A D6AA-61 (5-1/2 foot) cord connects the data set to telephone line. If the Data Set 402C-type is connected to a Data Set 402D at a transmit-receive terminal, the cord must be replaced with a D50C-61 (5-1/2 foot) cord which is not supplied with the data set (see section covering connections).

(b) A KS-14532, List 16 (10 foot) 3-conductor power cord.

**2.04** The cord connecting the customer's business machine to the data set is furnished by the customer. This cord is equipped with a cinch DB-19604-432 plug or equivalent. A KS-19087, List 6 receptacle for this connection is located at the rear of data set. Interface lead functions and numbers are shown in Table C.

TABLE C

## INTERFACE LEAD FUNCTIONS

PIN NO.	LEAD	FUNCTION
1	Frame Ground	Common to data set ground and ac power service ground.
2	Data 1	Conditioned to mark (closure) or space (open) by customer equipment.
3	Data 2	
4	Data 3	
5	Data 4	
6	Timing	Alternately conditioned to mark or space by customer equipment.
7	Data 5	Conditioned to mark (closure) or space (open) by customer equipment.
8	Data 6	
9	Data 7	
10	Data 8	
11	Data Ground	Common to frame ground and ac power service ground.
13	Interlock	When closed to control common, signals business machine that data set is in data mode.
14	Remote Release	Opened from data ground to terminate call.
15	Remote Operate	Closed to data ground by customer for unattended answer feature (option N).
16	Reverse Channel Receive	Closed to control common when 387 cps is received.
17	Answer-Back AB	Closed to control common when corresponding answer-back tone is received.
18	Answer-Back A	
19	Answer-Back B	
20	Data Send	Closed by customer to data ground to send data, open to receive answer-back.
22	Ring Indicator	When closed to control common, indicates presence of ringing current to business machine on incoming calls.
24	Control Common	Common for all control functions.
25	-18 volts	Power supply (option M) — for telephone company test puposes only.

**2.05** The data set operates on 105 to 125 volts  $60 \pm 1$  cps ac supply. It is designed to operate within the temperature range of  $40^{\circ}$  to  $120^{\circ}$  F.

**2.06** A 6-button key unit is used to control the functions of the data set. The key button functions are shown below:

○	○	○	○	○	○
DIAL TONE		MON	TEST	TALK	DATA

**DIAL TONE key:** Nonlocking, used to start dial tone in case of power failure, when used with automatic calling unit. Not illuminated.

**MON key:** Nonlocking, monitor key held operated to hear line signal when in data mode. Not illuminated.

**TEST key:** Nonlocking, used in testing data set under direction of data test center. Illuminated.

**TALK key:** Locking, connects telephone circuit to data line. Illuminated.

**DATA key:** Nonlocking, used to shift from talk to data mode. Illuminate.

**2.07** A simplified block diagram of the Data Set 402C-type is shown in (Fig. 3).

**2.08** The data transmitter consists of three oscillators. Each oscillator is capable of generating three simultaneous frequencies thereby producing nine channels. The frequency of a particular channel depends upon whether or not contact closures are made in the business machine. The two frequencies on each channel are mark and space. The transmitter output, then, is 9 of 18 possible frequencies — 1 timing and 8 data. Combinations of these permit 256 possible code combinations.

**2.09** The answer-back circuitry and mode control is designed for low-speed reverse transmission for acknowledgment and error control between blocks of data. The answer-back detector consists of three detectors, each utilizing one transistor to monitor the input for answer-back frequencies (1017 cps, 1785 cps, and 2025 cps) and control relay drivers. There is a fourth frequency which is a Rest Tone. The Rest Tone is generated to keep noise from affecting the answer-back receiver when no intelligence is being transmitted. The contacts of the answer-back relays provide closures to Control Common lead for the three answer-back states.

**2.10** The Remote Test circuit consists of a 5-second timer and a test mode-relay driver. The timer is made up of a monostable multivibrator circuit which controls a transistor switch. When either the Answer-Back frequency or Reverse Channel frequency is received from the data test center, the timer is triggered and the data set switches to data send mode for the 5-second timer period, transmitting data tones to the test center.

**2.11** The Reverse Channel Receiver, which is optional, is capable of receiving 387 cps from the receiving data set when the 402C-type is in the data mode. It is designed as a circuit-assurance or interrupt feature and responds both when the data set is transmitting data and when it is receiving answer-back.

### 3. OPERATION

**3.01** For detailed operation of Data Set 402C-type, see CD- and SD-1D039-01, and 1D060-01-J201-206.

**3.02** To use the data set for voice communication depress the TALK key (TALK lamp lights) and proceed in a normal telephone manner.

**3.03** To originate a data call:

- (1) Depress the TALK key (TALK lamp lights) and establish connection with the distant terminal in a normal telephone manner.
- (2) After distant terminal has answered:
  - (a) *Manually:* After verbal agreement is reached to transmit data, depress the DATA key until DATA lamp lights.



can be placed on its cradle. When the data set is in the data mode and the handset is on its cradle, accidental or intentional operation of any key will not affect data transmission.

**3.03** To terminate a call, lift the handset, depress the TALK key, then hang up.

**3.04** The data set may be conditioned to answer incoming calls either manually or automatically.

(a) **Automatically (option N):** Sets conditioned for automatic-answer require no operation by the attendant.

(b) **Manually (remove option N):** Call is answered in normal manner. When verbal agreement is reached on when data transmission is to begin, depress DATA key until the DATA lamp lights. The set is now in the data mode and transmission can begin. Handset may be placed on its cradle.

**3.05 Test mode:**

(a) To put data set into test mode:

(1) Remove handset from cradle and operate TALK key. TALK lamp lights.

(2) Depress TEST key. Data set is now in test mode. TEST lamp should light. Handset may be put on cradle.

(b) Manual release of test mode:

(1) Remove handset from cradle.

(2) Operate and release DATA key.

(3) Operate TALK key.

The test mode is also released by power interruptions.