

DATA SETS 401B, D

RECEIVERS

IDENTIFICATION AND OPERATION

1. INTRODUCTION

1.01 This section covers identification and operation of data sets 401B and 401D. It does not include information for the business machine associated with the data set.

1.02 This section is reissued to:

- Delete installation, connection, maintenance, and test information for data sets 401B and 401D.
- Delete all information concerning data set 401F.

1.03 Information formerly covered in Section 594-011-100, Issue 4 will be covered as shown in Table A.

TABLE A

DATA SET INFORMATION

Data Set	Material Covered	Section
401B, D	Installation and Connections	594-011-200
	Maintenance	594-011-300
	Test Procedures	594-011-500
401F	Description and Operation	594-015-100
	Installation and Connections	594-015-200
	Maintenance	594-015-300
	Test Procedures	594-015-500

1.04 Due to extensive changes marginal arrows have been omitted.

2. GENERAL

2.01 Data sets 401B and 401D are primarily designed for use in DATA-PHONE service on central office or PBX

station lines. They also can be arranged for use on 2-wire private lines (local battery).

2.02 Data received from the telephone line consists of either two tones (data set 401B) or three tones (data set 401D). Each tone may be one of several frequencies. The data set converts these tones into contact closures. These closures are delivered to the associated business machine as received data.

2.03 The data set is used with a 502BR-61 telephone set equipped with a D6AC-61 cord and modified to permit control of the data set (Fig. 1). The DATA key is located on the switchhook assembly in the same position as an exclusion key and operates in the same manner.

2.04 When used on a private line the data set is always in data mode and the telephone set is not required.

3. DESCRIPTION

3.01 The data set is composed of several major components enclosed in a two-tone gray cabinet. Components are listed below:

- Control Circuit
- Channel Circuits
- Power Supply
- Cut-Apart Filter
- Automatic Answer Circuit
- Data Output Relays

3.02 Electronic circuits are arranged on plug-in printed board assemblies. Fig. 2 shows a typical assembly.

3.03 Dry reed relays are used for data output to the business machine. Wire



Fig. 1 - Data Set and Telephone Set, Front View

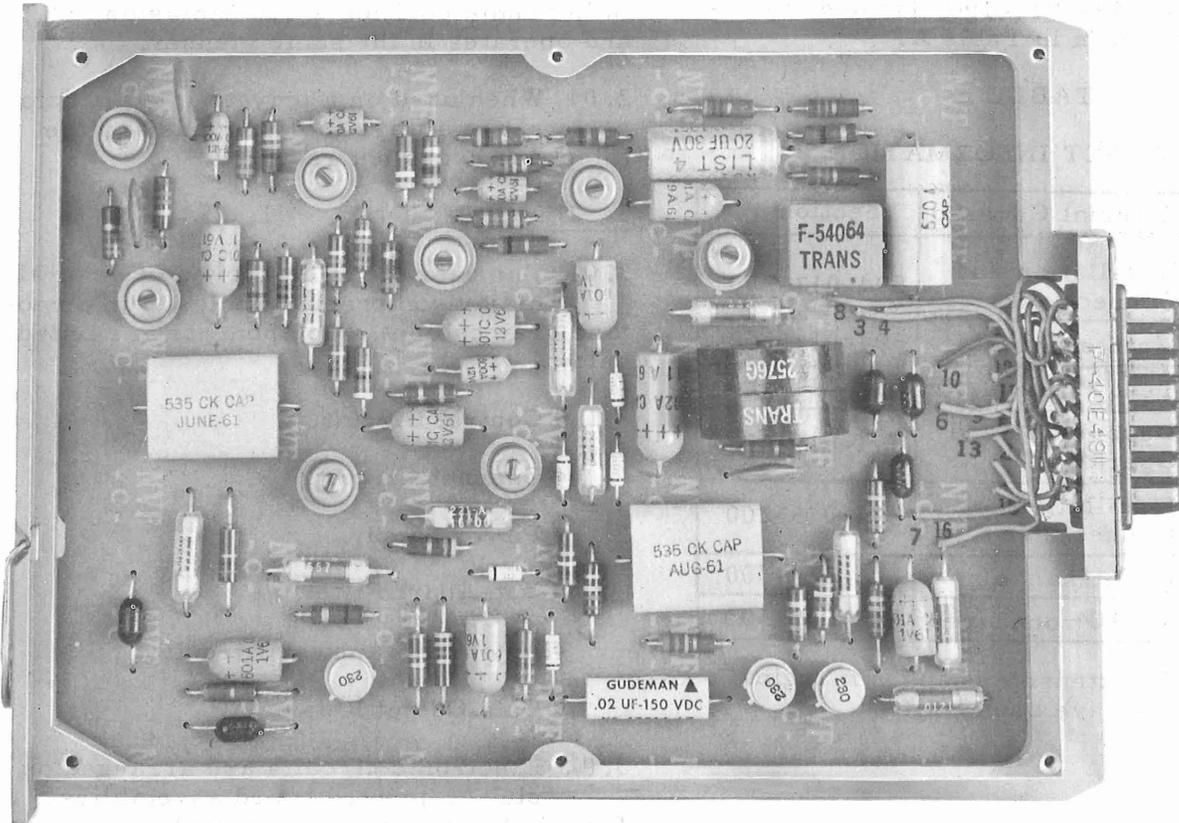


Fig. 2 - Printed Board Assembly

spring relays are used in automatic-answer and control circuits. The control circuit also uses three dry reed relays which are mounted in combination with the data out-

put relays. Fig. 3 shows arrangement of components in the cabinet

3.04 Fig. 4 shows a simplified block diagram of data set 401B. Interface leads and pin assignments are shown in Table B.

TABLE B
INTERFACE PIN ASSIGNMENT

Interface Lead	Data Set 401B		Data Set 401D	
	Early Model	Current Model	Early Model	Current Model
A1	A	3	A	3
A2	B	4	B	4
A3	C	5	C	5
A4	D	6	D	6
A Common	K	7	K	7
B1	E	9	E	9
B2	F	10	F	10
B3	H	11	H	11
B4	J	12	J	12
B Common	Z	13	Z	13
C1			V	14
C2			W	15
C3			X	16
C4			Y	17
C Common			a	18
Start-Ans Back	T	19	T	19
Check or Aud Answer Back	P	20	P	20
Squelch	L	21	L	21
Line Control	S	22	S	22
Line Status	R	23	R	23
Line Status	U	24	U	24
Frame Ground	N	1	N	1
Ground	M		M	

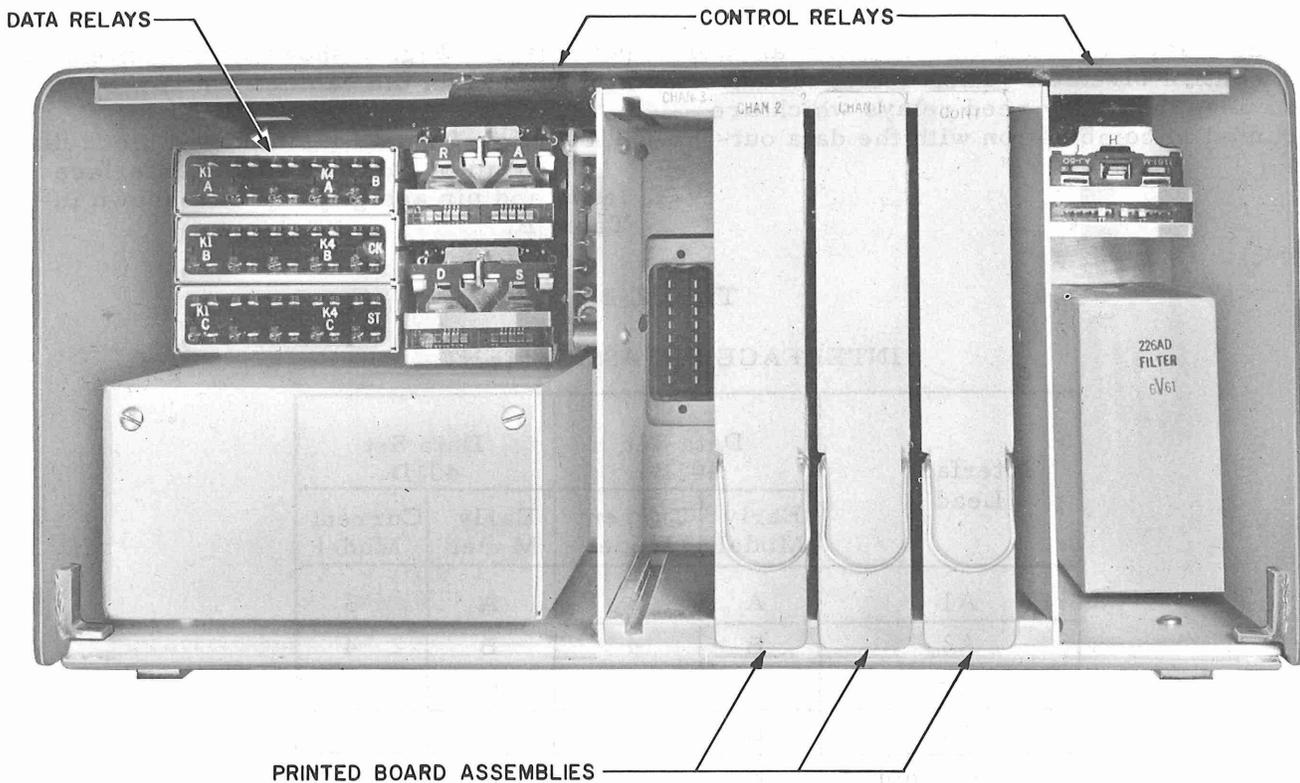


Fig. 3 - Data Set, Front View, Cover Removed

3.05 Frequencies accepted by the data sets are shown in Table C. Minimum receiving level for each frequency is -39 dbm for frequencies below 2050 cps and -49 dbm for frequencies of 2050 cps and above.

3.06 Frequencies of 600, 1098, and 1950 cycles are termed REST frequencies and are used for echo suppression.

3.07 The answer-back oscillator responds to signals from the business machine and transmits tones to the distant station. Frequencies of the tones are 1017 and 1785 cps.

3.08 A D3BT-61 cord, 5-1/2 feet long, equipped with a Cannon MC-14E-8-3SN plug on one end, is furnished for connection between the TEL LINE jack on the data set and the telephone line.

3.09 A KS-14532, List 15 gray cord assembly, 10 feet long, is provided for connection to a 117-volt ac 3-wire recepta-

TABLE C

DATA FREQUENCIES

Frequency cps	Relay Operated
697	K1A
770	K2A
852	K3A
941	K4A
1209	K1B
1336	K2B
1477	K3B
1633	K4B
2050	K1C
2150	K2C
2250	K3C
2350	K4C

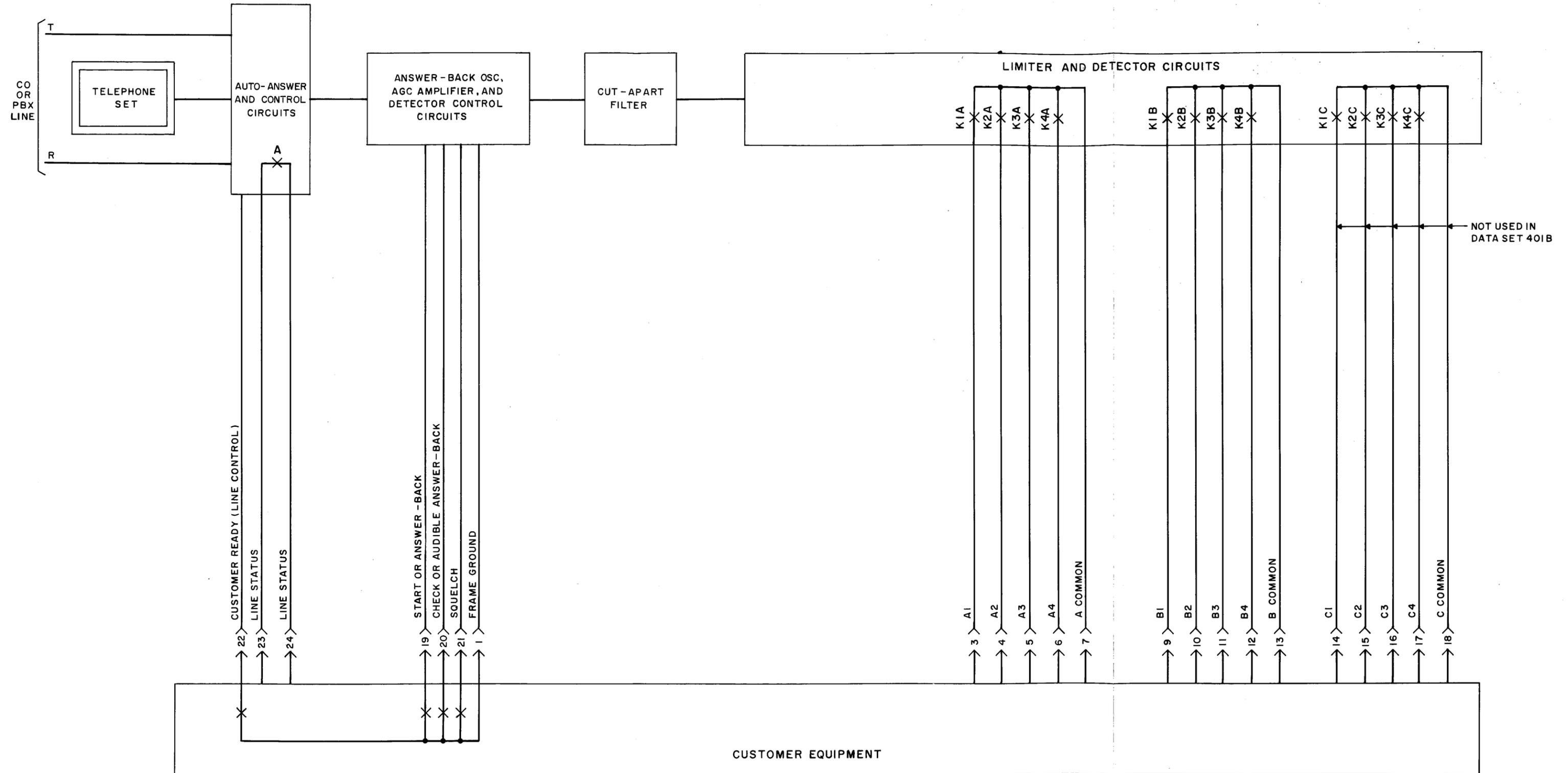


Fig. 4 - Block Diagram

cle (two parallel blades and a U-shaped grounding pin).

3.10 A KS-19087, List 2 receptacle, designated CUST EQUIP, is provided for interface connections to associated business machine. The business machine cord, equipped with a Cinch or Cannon DB-19604-432 plug, must be furnished by the customer.

- Some early model data sets were equipped with a Cannon KO2-21-30SN socket. Adapter cords are available to permit connection of an early model data set to a later model business machine or to connect a later model data set to an early model business machine. Table D shows the adapter cords and their use.

TABLE D
ADAPTER CORDS

Adapter Cord	Data Sets 401B, D	Business Machine
M26D-61	Early model	Later model
M26E-61	Later model	Early model

Note: Early model data sets and business machines were equipped with a Cannon-type round connector. On later model equipment the connectors are Cinch-type and are rectangular. In some cases it may be necessary to strap pins M and N on the business machine end of the adapter cord to provide ground to the business machine contacts. Refer to Table B.

3.11 A jack, designated TEL SET, is provided for connection of the D6AC-61 cord from the telephone set.

3.12 Fig. 5 shows the rear of the data set and location of the various connectors.

3.13 A complete data set, coded J1D401B, Lists 1 and 3, or J1D401D, Lists 1 and 2, includes both the data set (list 1) and the modified 502BR-61 telephone set (lists 2 and 3).

4. OPERATION

4.01 For detailed operation refer to CD- and SD-1D002-01.

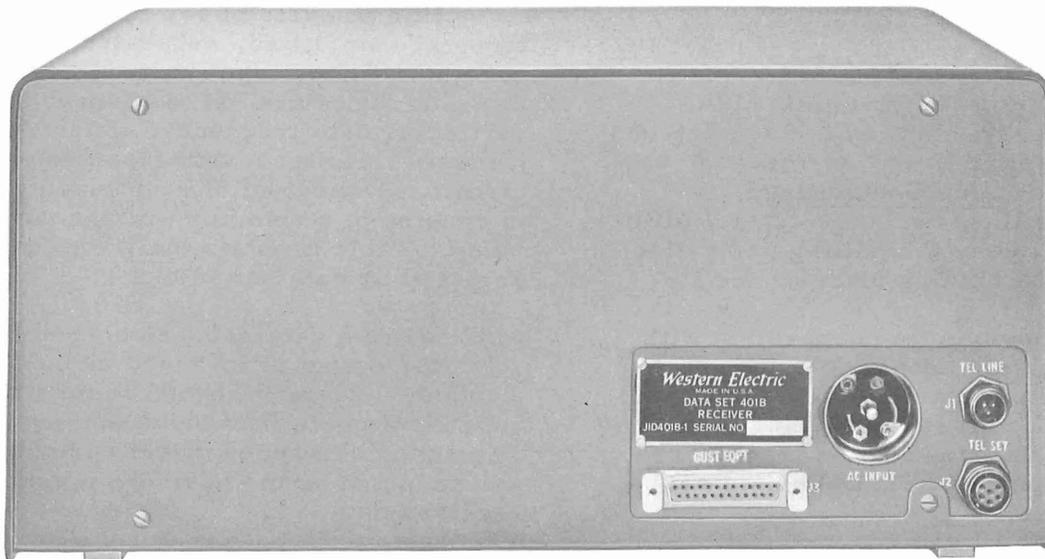


Fig. 5 - Data Set, Rear View

4.02 To use the telephone set for voice communication, lift handset and proceed in a normal telephone manner.

4.03 To receive data, the data set may be operated either attended or unattended. In either mode of operation, the Line Control lead (customer equipment lead) must be grounded in the customer's business machine to receive data.

- The wiring arrangement of the telephone set determines the method of operation. However, in some cases, the customer can remove ground from the Line Control lead to switch from unattended to attended operation even though the telephone set is wired for unattended operation.

4.04 Unattended Operation

(1) When ringing current is applied to the line, the receiving data set automatically trips the ringing and connects a holding bridge across the line. In most installations, the data set, under control of the business machine, will return a 2- to 5-second answer-back tone (1785 cycles) to the calling party. This tone indicates that the receive equipment is ready to accept data.

- The telephone ringer will not operate when in the unattended mode.

(2) At end of data transmission the business machine at the sending end normally sends an end-of-message signal, opening Line Control lead, releasing the line. In some central offices, disconnection by the calling party also releases the holding bridge.

(3) It is possible, in cooperation with the distant station, to establish voice communication after completion of data transmission by lifting the handset. The line will be transferred to the telephone set and the data set will release.

(4) To return to data mode, pull up DATA key. This transfers the line back to the data set and the handset may be replaced on its mounting.

4.05 Attended Operation

(1) Calls are received in the normal telephone manner. The parties agree verbally to begin data transmission.

(2) The attendant pulls up the DATA key, transferring the line from telephone set to data set. The handset must remain off hook.



Caution customer not to restore DATA key or hang up handset during data transmission.

(3) Data is received,

(4) At end of data transmission replace the handset on its mounting. The data set restores to normal and the telephone line is released.

(5) To return to voice communication after completion of data transmission, restore DATA key to normal. The data set is released and the line is under control of the telephone set.

4.06 Data received from the telephone line consists of two tones. These tones are amplified, separated by the cut-apart filter, then limited and detected. Tuned circuits are set to respond to a particular data frequency. Each received frequency excites a corresponding tuned circuit. The output of each tuned circuit is coupled to a detector which controls a relay. Table C shows the frequencies accepted by data set 401B.

4.07 When a data relay is operated by the output of its tuned circuit, it provides a 25-millisecond contact closure between its data lead and a common lead. The contact closures of the various relays are accepted by the business machine as received data.