DATA SET 105A

DESCRIPTION AND OPERATION

1. INTRODUCTION

1.01 This section includes description and operation of data set 105A (Fig. 1). It does not include information concerning the teletypewriter (TTY) equipment.

1.02 Illustrations used in this section are development models and may differ from production models. These differences will be corrected in later issues of this section.

2. GENERAL

2.01 Data set 105A is used with WADS-C and D and 4-row TWX services. A controller is required for WADS-D service

CARD RETAINING BAIL

POWER SUPPLY

SCREW SWITCHES

SPACE FOR MOUNTING CALL CONTROL UNIT

Fig. 1 - Data Set 105A

though the data set operation remains fundamentally the same. When the controller is used, several station functions are performed automatically that are otherwise performed manually.

2.02 Two types of TTYs are used with WADS and 4-row TWX services; they are the 33- and 35-type TTYs. For information covering the TTYs, dialers, 4-row to 3-row converters, and controller, consult appropriate sections.

2.03 A complete station consists of:

- TTY 33- or 35-type
- Data Set 105A
- Call Control Unit
- Controller (WADS-D and E)

The attendant circuit which is part of the call control unit connects to the data set and to the TTY machine.

2.04 Fig. 2 and 3 are block diagrams showing stations with and without controller.

3. DESCRIPTION

3.01 The data set 105A, when used with a 35-type TTY, is mounted on a pedestal which rests on the floor and slides under the front of TTY. A cover is provided to prevent accidental damage to the data set. Sufficient cabling is provided so the pedestal can be pulled out and the data set can be made accessible for tests.

3.02 The data set when mounted in the back of the 33-type TTY cabinet will be on slides for easy removal for test purposes.

3.03 Different attendant circuits are used for:

- Originate and originate-terminate stations
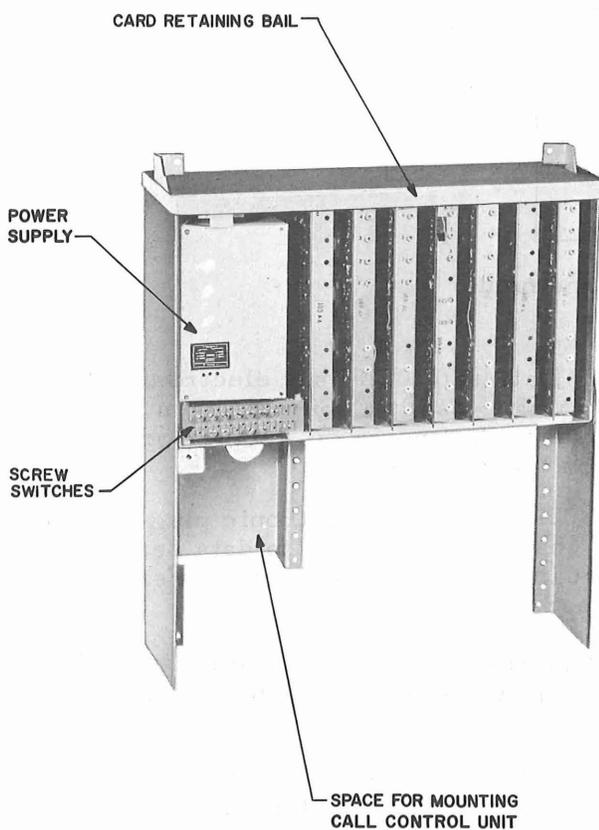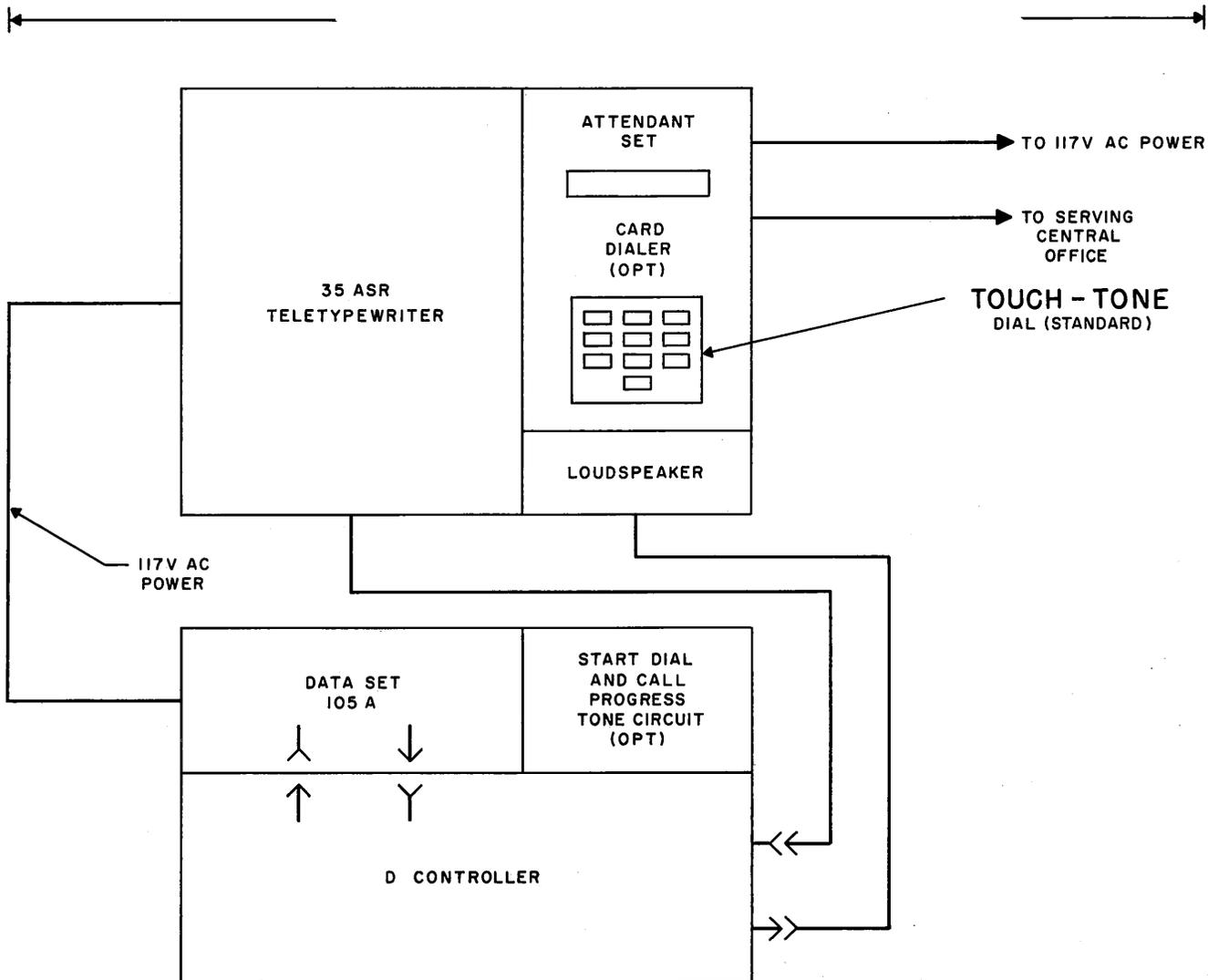- Receive only stations

Fig. 2 - WADS-D Arrangement

3.04 All circuit components including mini-
ature relays are mounted on electronic
plug-in units (cards). Fig. 4 shows the
MODULATOR card and its components.

3.05 The cards are held in place by a re-
taining bail. To remove a card, the
retaining bail must be raised. (See Fig. 1.)

3.06 Data set 105A uses a built-in recti-
fier J87240A to provide +20 and
-20 volts dc at 0.6 ampere.

3.07 Two rows of screw type switches are
located on the front of the data set under
the rectifier. The screw type switches are
used to provide the proper station function and
to test the data set circuitry. Other screw type
switches are mounted on the individual cards.

3.08 Data set 105A uses electronic plug-in
units (cards). Six or seven cards
are used, depending on whether or not
option "X" is used.

3.09 The following electronic plug-in units
(cards) are used with data set 105A in
accordance with station arrangement and
options:

- J1D105AA Logic contains five logic
circuit relays: OH, RR, RO, SR, and
SO.

- J1D105AB Timer contains timer cir-
cuit, monitoring stages, RC timing
networks, level sensing circuit, auto-
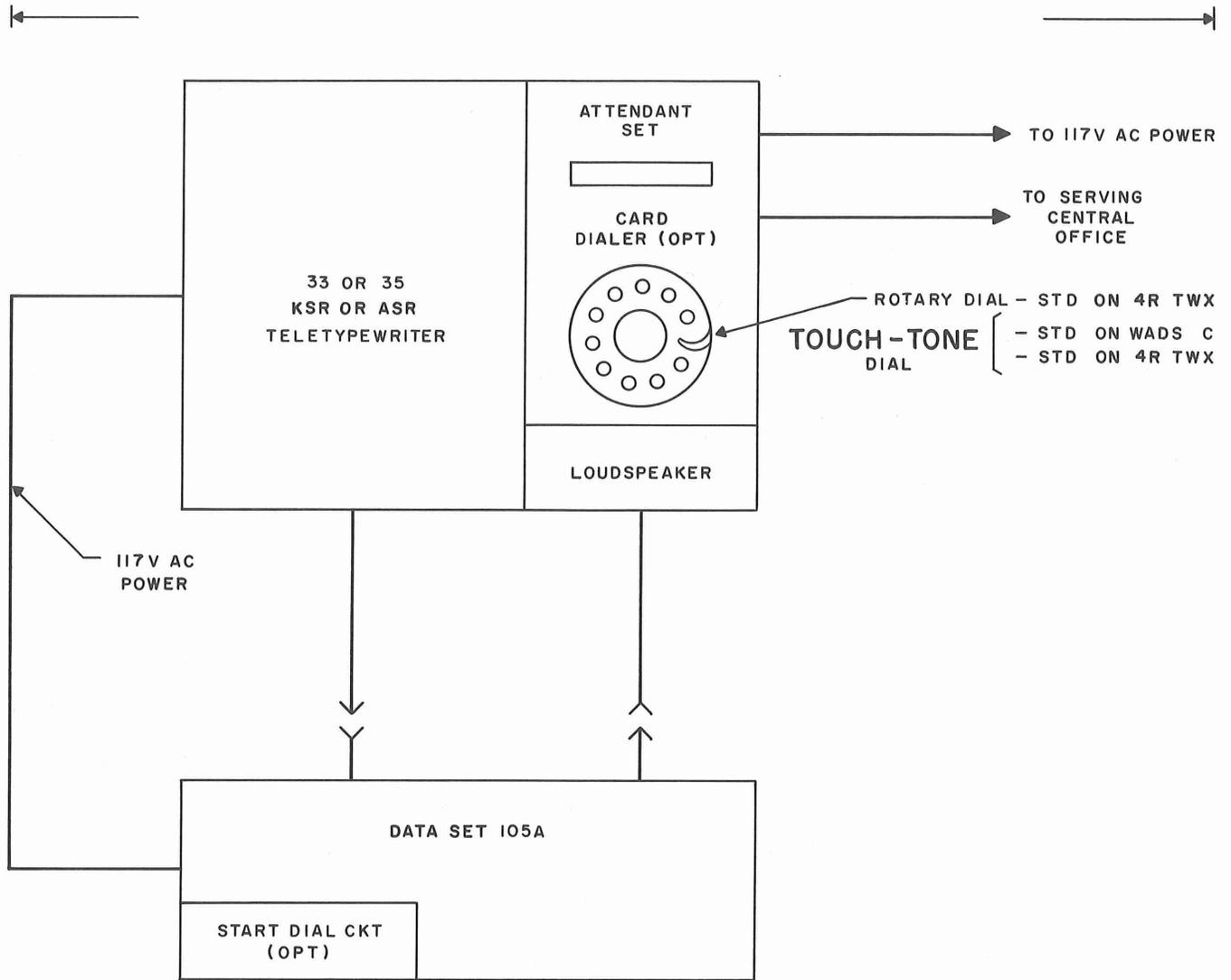matic disconnect timer, DC amplifiers,
and TM relay.

Fig. 3 - WADS-C and 4-Row TWX Arrangement

- J1D105AD Modulator contains keyer, oscillator, sending buffer amplifier, and hybrid coil circuits.

- J1D105AE Filter contains directional filters and operating circuit of RU relay.

- J1D105AF Demodulator contains receiving buffer amplifier, limiter, carrier fail detector, and discriminator.

- J1D105AG Call Progress Tone Detector option "X" contains detector circuit and call progress tone detector logic circuit.

- J1D105AH Restrainer option "Y" contains restrainer circuit.

- J1D105AC Restrainer dial tone detection, option "Z" contains restrainer and dial tone detection circuits.
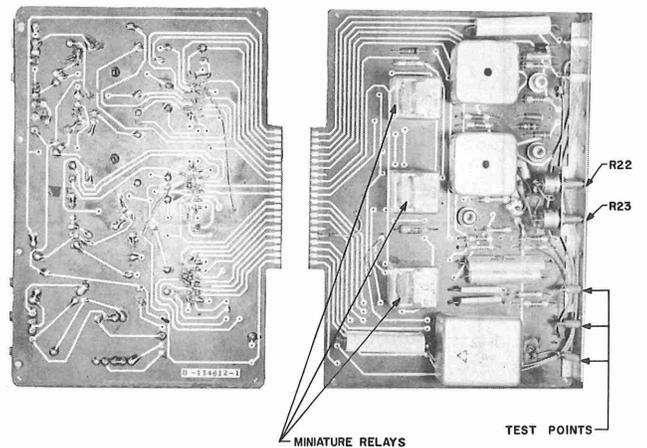

Fig. 4 - Modulator Card

4. OPERATION

4.01 Data set 105A provides a means for interconnecting TTY stations over WADS or DDD network. Fig. 5 is a block diagram of data set 105A. Each data set has a frequency shift transmitter and a frequency shift receiver which will be used to transmit and receive the teletypewriter information. Each transmitter and each receiver is able to switch to either of two frequency bands. The band selected depends on whether the station is originating or answering a call; thus, two frequency shift channels are available.

4.02 The lower frequency band will be denoted as the f_1 band. In this band the frequencies corresponding to mark and space signals are:

- f_1 mark (f_{1m}) 1270 cps

- f_1 space (f_{1s}) 1070 cps

4.03 The upper frequency band will be denoted as the f_2 band. In this band the frequencies corresponding to mark and space signals are:
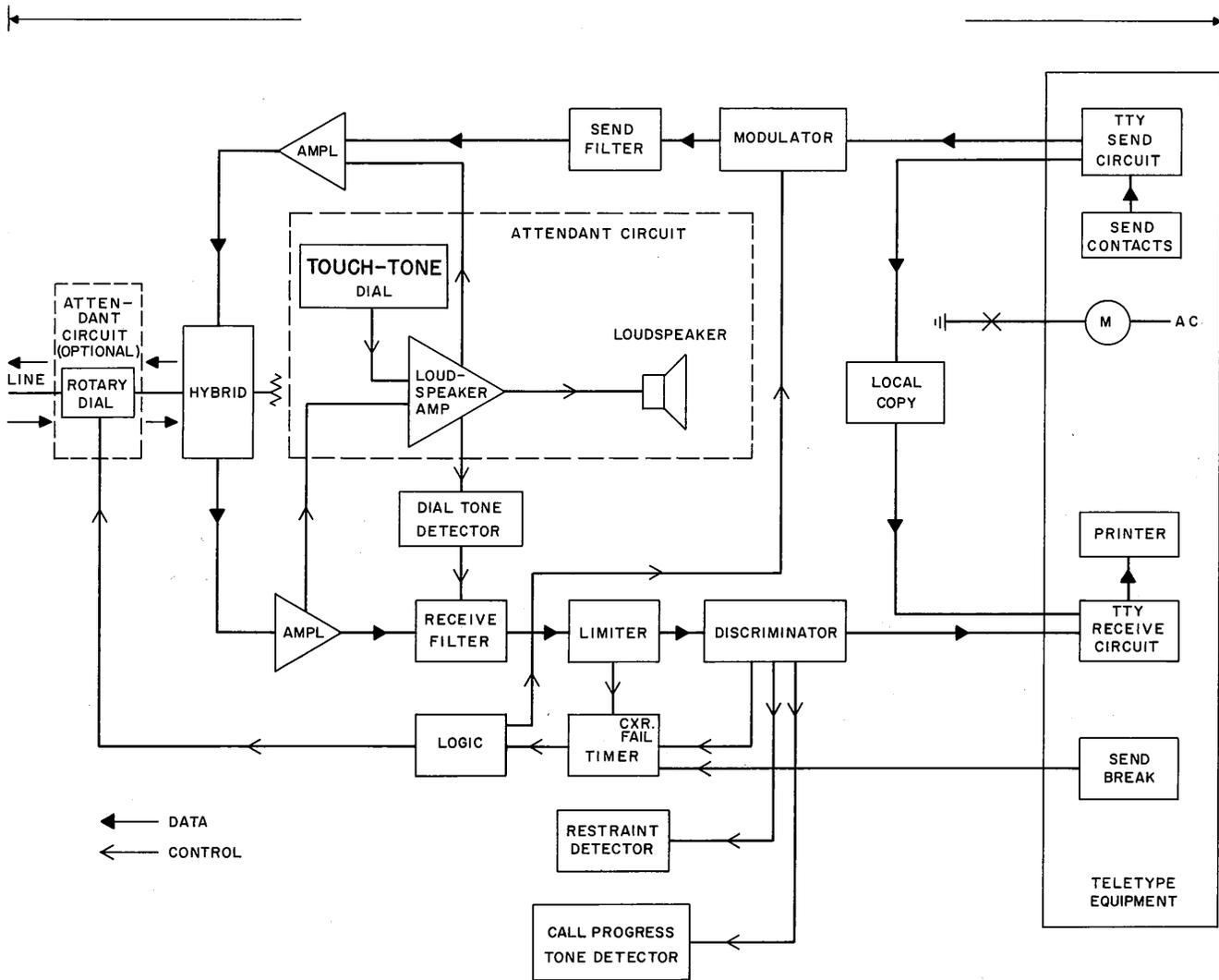

Fig. 5 - Data Set 105A, Block Diagram

● f_2 mark (f_{2m}) 2225 cps

● f_2 space (f_{2s}) 2025 cps

4.04 During data transmission, one of these frequency channels is used in one direction on the telephone line and the other frequency channel is used in the opposite direction. The marks and spaces from the TTY are transmitted by means of these frequency shift tones.

4.05 If option "Z" (dial tone detection) is provided, the reception of dial tone is indicated by lighting of DIAL lamp. If a controller is provided, automatic dialing can be initiated upon reception of the dial tone.

4.06 If option "X" (call progress tone detection) is provided, the reception of an "all trunks busy" or of a "station busy" tone is indicated by lighting of the BY (busy) lamp in the attendant circuit. In addition, reception of a tone signifying that there is no working subscriber connected to the number reached is indicated by the lighting of the IN (intercept) lamp. In either case, if a controller is provided, it will automatically take the appropriate steps.

4.07 The restrainer is provided to enable the station to communicate with the slower TWX stations via data converters. The restrainer is activated by the data converter in the central office to stop transmission from the station whenever the character storage device at the converter is nearly filled. The restrainer, when activated, stops any transmitter distributor at the station (if equipped) and lights the RESTR lamp as an indication for the typist to stop typing or to slow down. The transmitter distributor is restarted and the lamp extinguished upon cessation of the restrainer activating signal. If transmission from the station does not stop, the result is an overflow of the storage device; the data converter sends a break signal. In this case, both the RESTR and BREAK lamps will remain lit. This break signal is distinguished from a break sent by the connected station which lights the BREAK lamp only.

4.08 Data Set Timing Intervals

In order to provide for more efficient use of station and central office facilities, the timing intervals applicable to 4-row

TTY operation have been substantially reduced from those used in 3-row operation. Following are the timing intervals applicable to 4-row TWX and WADS service. Fig. 6 is a diagram of a call between 4-row TTY stations showing the data set timing intervals.

4.09 SF Guard Interval (Delay in Return of f_2 Tone from the Called Station)

The f_2 mark signal returned by the called station is delayed by 1.1 to 1.7 seconds. This delay is to permit the off-hook indication to be returned to the central office serving the calling station before the f_2 signal is applied.

4.10 Monitor Mark (Originating Station)

The originating stations data set will monitor the receipt of f_2 mark from the called station for 420 to 685 milliseconds. The minimum time is determined by the fact that it takes about 400 milliseconds to disable any echo suppressor that may be in the connection. The f_1 tone cannot be sent until the echo suppressor is disabled because the presence of energy in the f_1 band would prevent the echo suppressor from being disabled.

4.11 Monitor Mark (Terminating Station)

The terminating station monitors for the receipt of the f_1 signal from the originating station for 210 to 375 milliseconds. This time cannot be reduced further; otherwise, the called station would be apt to enable on noise impulses.

4.12 Monitor Space for Break Signal

In 3-row TWX stations, a double blank is used as a break signal. The double blank is detected in the 3-row machine stunt box. On 4-row machines, blank (called null on 4-row machines) is just another character. The detection of a break signal on 4-row machines is accomplished in the data set which looks for a spacing signal of 91 to 195 milliseconds.

4.13 Send-Break Signal

The spacing signal sent as a break-signal is 200 to 250 milliseconds.

ORIGINATING STATION   CALLED STATION

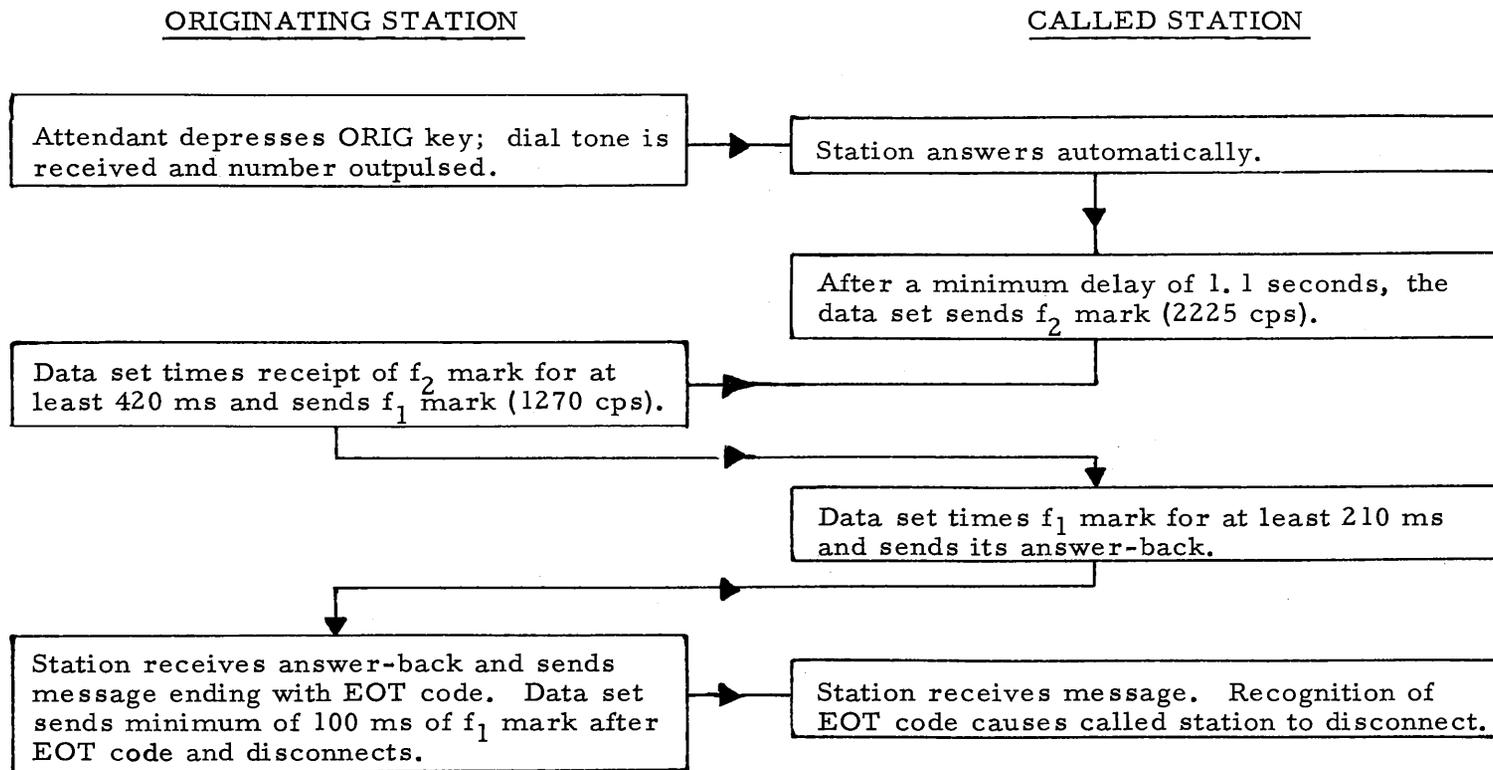|	
Attendant depresses ORIG key; dial tone is received and number outpulsed.	Station answers automatically.
	After a minimum delay of 1.1 seconds, the data set sends f_2 mark (2225 cps).
Data set times receipt of f_2 mark for at least 420 ms and sends f_1 mark (1270 cps).	
	Data set times f_1 mark for at least 210 ms and sends its answer-back.
Station receives answer-back and sends message ending with EOT code. Data set sends minimum of 100 ms of f_1 mark after EOT code and disconnects.	Station receives message. Recognition of EOT code causes called station to disconnect.

Fig. 6 - Flow Diagram of a Call Between 4-Row Teletypewriter Stations

4. 14 Monitor Space for Disconnect Signals

Normally, 4-row stations will disconnect by detecting the end of transmission (EOT) code. The EOT code will be followed by about 100 milliseconds of marking signal to keep the receiving station from generating a hit character while disconnecting. The data set is arranged to disconnect if it receives a long space, which it will receive if the other station disconnects by depressing the CLR key. The data set will disconnect if it sees a loss of signal or a spacing signal for 275 to 525 milliseconds.

4. 15 Send-Disconnect Signal

The spacing signal sent by the data set when the CLR key is depressed is 540 to 865 milliseconds.

4. 16 Called Station Time-out

All TWX and WADS stations will disconnect after they are called, if they do not receive f_1 marking signal within 4 to 12 seconds. This feature is provided to prevent TWX and WADS stations from being tied up if they receive a call from a telephone customer or some other type of station which is not equipped with a compatible data set.

4. 17 For detailed description and operation of circuits, refer to CD- and SD-3D008-01.