WIDE AREA DATA SERVICE (WADS)

STATION ARRANGEMENT B
GENERAL DESCRIPTIVE INFORMATION

CONTENTS

1. INTRODUCTION

1.01 This section gives a general description of a Wide Area Data Service that provides semiautomatic operation of teletypewriters. This service, to be known as WADS Station Arrangement B, will be provided first for the Boeing Airplane Company. WADS-B stations are similar to dial-converted TWX stations in that they use the same data set and a similar attendant unit. They exchange messages in a manner similar to TWX operation, since the messages are sent over a connection established between two stations on a per call basis. They differ from TWX stations in that they exchange messages with other WADS-B stations over specially switched circuits and at 100 words per minute. WADS-B stations also provide more automaticity than TWX stations. Interconnection with TWX stations at 60 words per minute also is provided.

2. GENERAL PRINCIPLES

OVER-ALL SYSTEM

2.01 Each station of this type will be connected to a selected No. 5 crossbar office via either a local loop or a remote exchange (RX) loop. The RX circuit might be a simple interexchange cable pair or a complex intercity toll circuit (see Fig. 1 for a sample arrangement).

2.02 These selected No. 5 offices will be designated as Primary and Secondary offices interconnected with a trunk network that initially will handle only calls between WADS stations. There will be no more than three trunk links required to interconnect any two of these offices (see Fig. 2).

2.03 Calls to and from dial TWX stations will be handled by the No. 5 crossbar office serving the WADS station but will be routed over the DDD network.

2.04 Prior to the TWX cutover to dial, a second loop will be used to connect the station to a TWX switchboard or to a concentrator unit where calls to and from these stations will be handled on a manual basis.

2.05 Prior to the TWX cutover, a "transfer and make-busy" unit at the station will connect the teletypewriter to one or the other of these loops and make the idle loop busy to incoming calls. At stations that originate and also terminate calls, a signal circuit to the No. 5 office will be required. It will be used to carry the busy indication to that office. (This circuit and the transfer and make-busy unit will not be needed after TWX service cuts to dial operation.)

2.06 The loop between the serving No. 5 office and stations that originate calls may be arranged for ground start. This will be used to

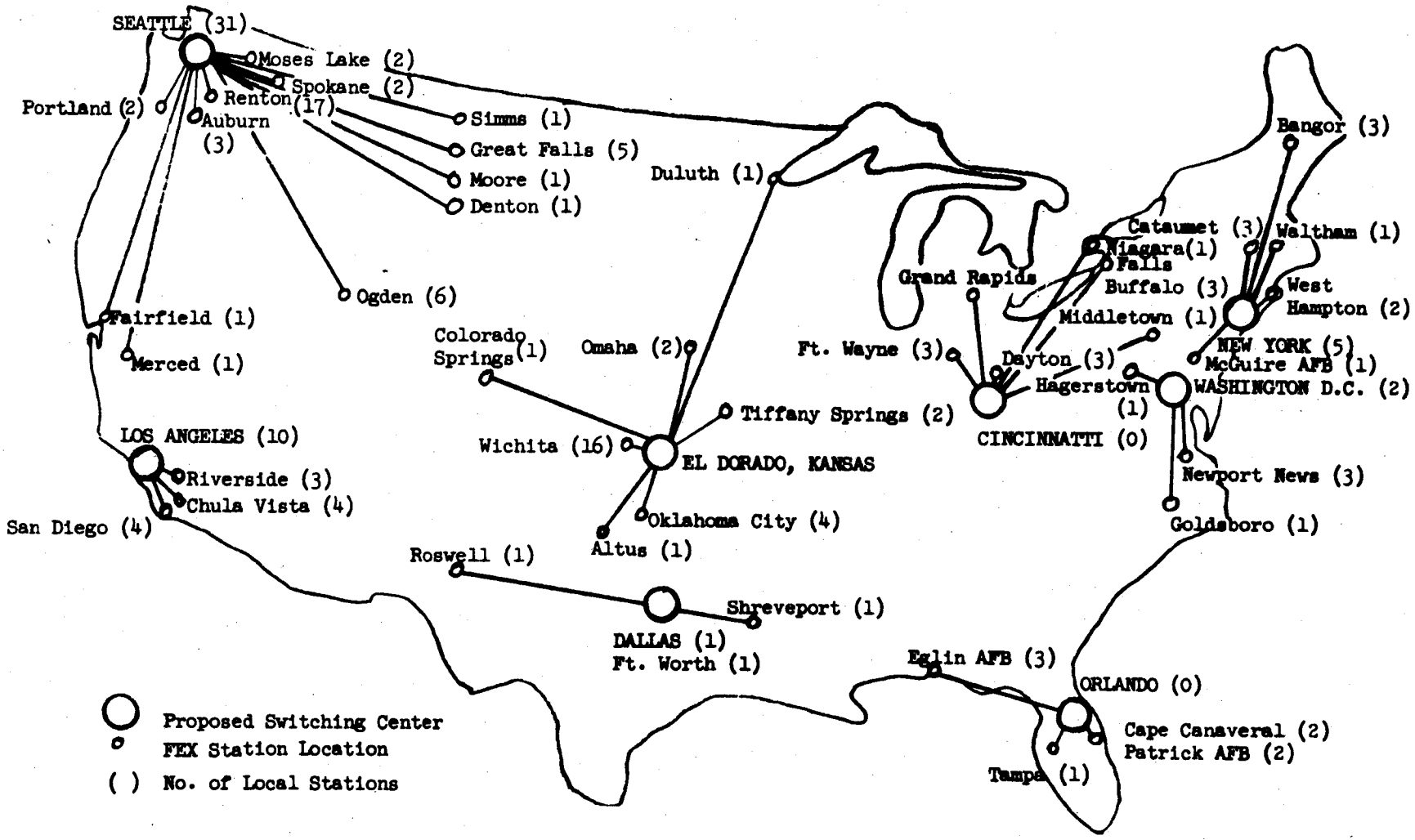

Fig. 1 – WADS Station Arrangement B, Initial Station Locations and Tentative Homing Arrangements

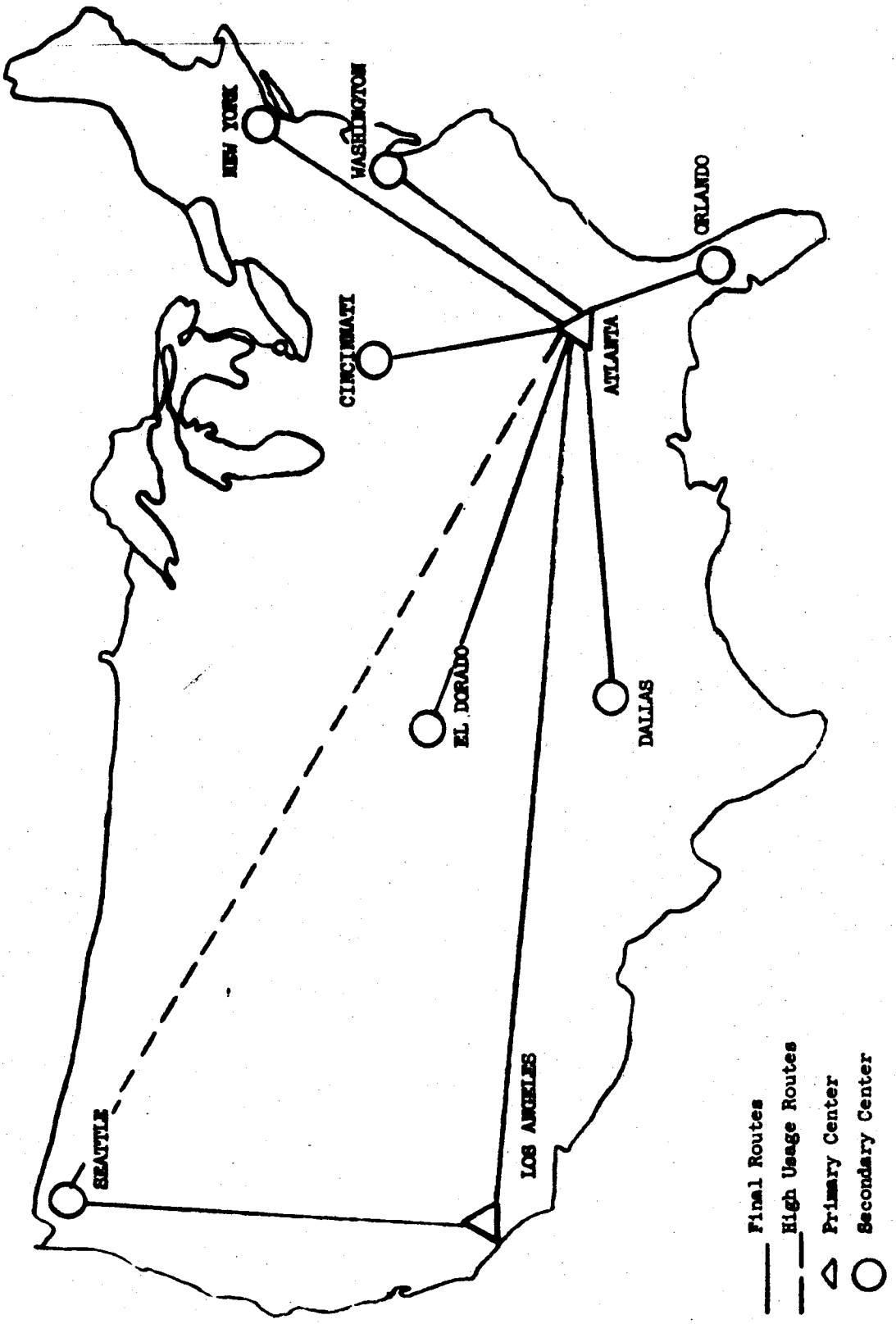

Fig. 2 – Portion of WADS Network Homing Arrangements Serving Initial WADS-B Requirements

light a lamp as a "start dial" indication. The loop between the No. 5 office and each station that will terminate calls must be equipped for two party ringing. This will be used to indicate, on incoming calls, whether the teletypewriter should operate at 100 wpm or be shifted to 60 wpm.

CENTRAL OFFICE ARRANGEMENTS

2.07 With the exception of minor changes in the originating register and trunk circuits, calls for WADS stations will originate or terminate through No. 5 crossbar offices that use standard equipment and options. These offices will determine by class of service mark, which stations may be connected to the dedicated trunks to originate a call. Outgoing calls will be directed to the dedicated trunks or DDD trunks depending on the area code dialed. The proper type of charge recording equipment will be connected to the circuit depending on the area code dialed, and the specific rate treatment to which the customer has subscribed.

CHARGING ARRANGEMENTS

2.08 There are two rates under which calls from WADS stations may be billed. They are as follows:

(a) ***Full Time:*** The customer pays a flat rate for an unlimited number of calls within a prescribed zone. The rate is determined by the size of the zone to which the customer elects to subscribe. All calls to points outside of the subscribed full-time zone will be recorded as message rate calls by regular AMA equipment.

(b) ***Measured Time:*** The customer pays for the hours of usage of the circuits to points within the subscribed zone (recorded by clock). Calls to points outside the zone will be handled on a message rate basis.

Note: Certain Boeing stations may be charged wholly on a message rate basis.

DESCRIPTION OF THE STATION

2.09 Each station will consist of a 3-row 5-unit 28-type teletypewriter equipped with data set 101A and a 689B subscriber set. WADS-B stations will, in these respects, be similar to 28-type dial TWX stations. However, WADS-B stations will also include a 155A station control unit and will provide the following special features:

(a) A start dial lamp.

(b) Automatic transmitter start.

(c) Automatic disconnect.

(d) Automatic page feed-out.

(e) Automatic answer.

(f) Automatic answer-back.

(g) Request for answer-back during tape transmission.

(h) Distribution of calls at multistation locations.

(i) Various alarms.

(j) Control of a reperforator.

Note: Automatic answer and automatic answer-back are optional features for TWX stations but standard features on these stations.

2.10 The transfer and make-busy unit mentioned in 2.05 is packaged in either an 11- or a 15-plate apparatus cabinet (see Fig. 3). The cabinet may be located in a closet, if desired, and cabled to the station. A cutover key is furnished. This key, to be operated on the day that TWX cuts to dial operation, will disable the transfer and make-busy unit.

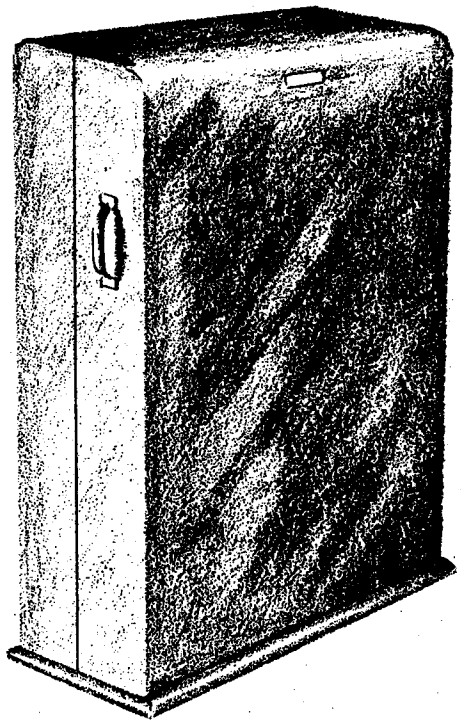

Fig. 3 – Transfer and Make-Busy Unit

2.11 There are three type of stations but only two types of equipment. Locations that handle a small volume of traffic use a combined originate-terminate station built around a 28 ASR teletypewriter (see Fig. 4 and 5). Locations that handle a large volume of traffic will use one or more originate-only stations equipped with the same 28 ASR teletypewriter station assembly but with a central office termination arranged for originating only. These locations will have one or more terminate-only stations for incoming traffic. These will be built around a 28 KSR teletypewriter and the termination in the central office will not be equipped for use with an originating register (see Fig. 6 and 7).

2.12 At locations having more than one terminating station the lines will be arranged in the serving No. 5 office for terminal hunting. At these locations, an allotter circuit in the station control unit will distribute the calls so that each station will receive an equal number of calls.

2.13 At locations where it is necessary to make a perforated tape of certain received messages for retransmission on another circuit or for data-processing purposes, a 28 ROTR is provided in addition to the page machine (see Fig. 8). The page machine will control the ROTR.

2.14 The ASR and the KSR are equipped with gearshift units to change the operating speed from 100 wpm to 60 wpm for operation with TWX stations. The ROTR, however, will operate only at 100 wpm and cannot be connected to the circuit on 60-wpm calls.

2.15 The following keys and lamps will be provided at each station:

(a) ORIGINATE key — nonlocking. Used to originate 100-speed calls. (Lit when operated.)

(b) TWX key — nonlocking. Used to originate 60-speed calls. (Lit when operated.)

(c) CLEAR key — nonlocking. Used to clear all other keys and to disconnect all operative conditions.

(d) LOCAL key — locking. Used to permit attendant to practice. Prevents automatic answer of incoming calls. (Lit when operated.)

(e) TEST key — locking. Used to make loop-around tests. (Lit when operated.)

(f) REVERSE key — nonlocking. Used to test station in the answer mode.

(g) BUZZER RELEASE key — nonlocking. Retires audible alarm.

(h) DIAL lamp. Indicates start dialing.

(i) REORDER lamp. Indicates the called station was not reached.

(j) SERVICE lamp. Indicates a call in progress requires servicing.

(k) PAPER ALARM lamp. Indicates low paper or low tape in an associated ROTR.

(l) COMMON ALARM lamp (a yellow plastic insert in the teletypewriter cover). Indicates an alarm condition exists on this machine.

2.16 A dial will be furnished on all stations; however, on terminate-only stations it is provided only for maintenance reasons and is normally disabled. A Rapidial unit may be provided as an optional unit (see Fig. 9). Touch-tone dialing may be offered at a later date.

3. METHOD OF OPERATION

OPERATION WITH ANOTHER WADS-B STATION AT 100 WPM

3.01 Messages to be sent will be prepared by cutting a tape on the 28 ASR with the selector switch in the TAPE ONLY position. A detailed message heading will not be required, since the message will be sent directly to the addressee. The end of each message will be followed by a request for answer-back (Figs. C letters) and the paper feed code (blank Z letters). The end of transmission will be indicated by a code (Figs. H). When a message is to be taken on a reperforator at the receiving station, the reperforator connect code (blank N letters) must be sent preceding each message to be so handled.

3.02 When the tape is ready for transmission, the attendant will place it in the transmitter-distributor, place the control lever in the run position, operate the SEND key on the keyboard, depress the ORIGINATE key on the subscriber set and, when the dial light is lit, dial

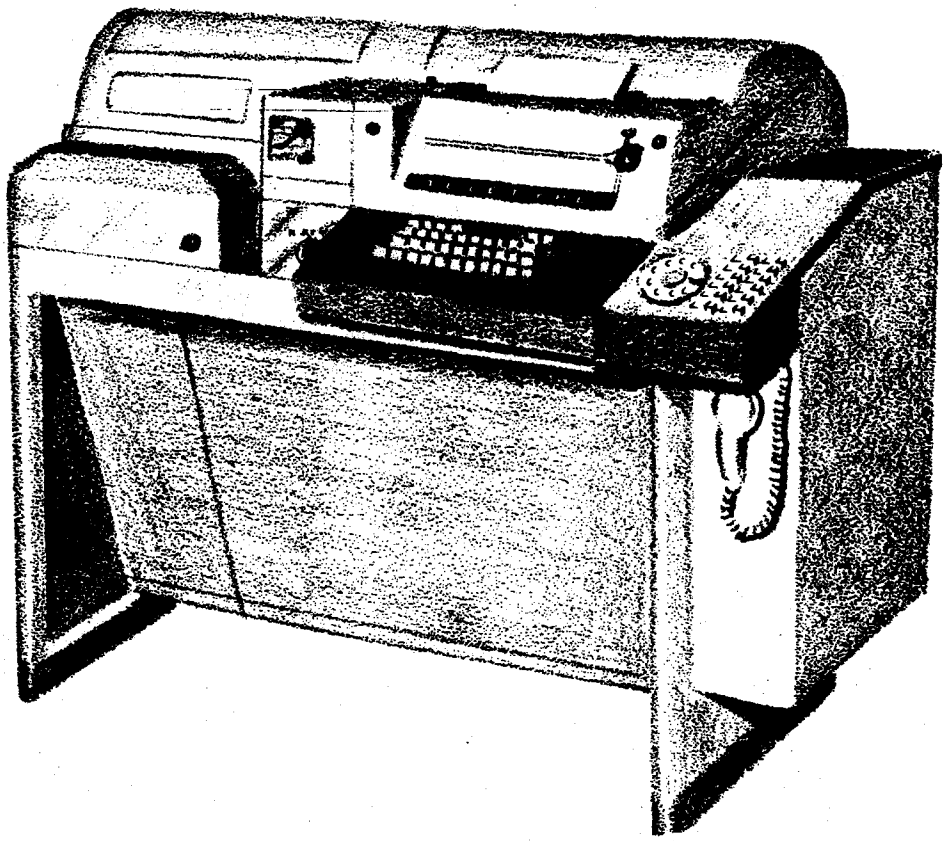

Fig. 4 – Originate-Terminate and Originate-Only Stations

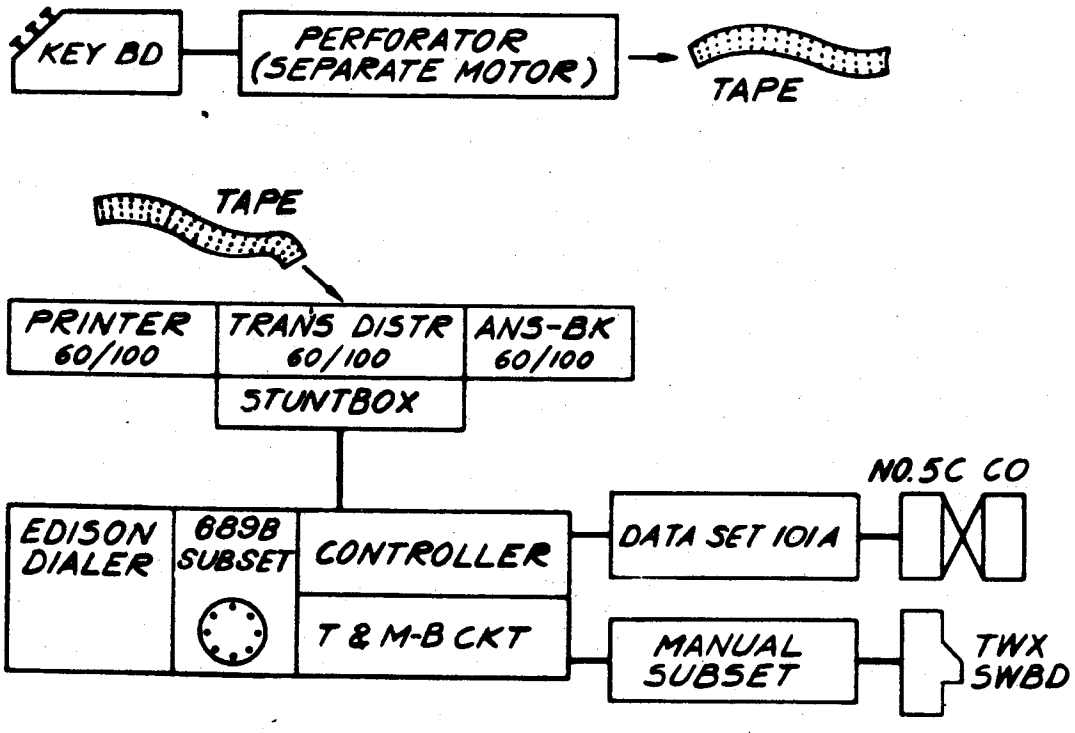

Fig. 5 – WADS-B Originate-Only and Originate-Terminate Stations 28 ASR

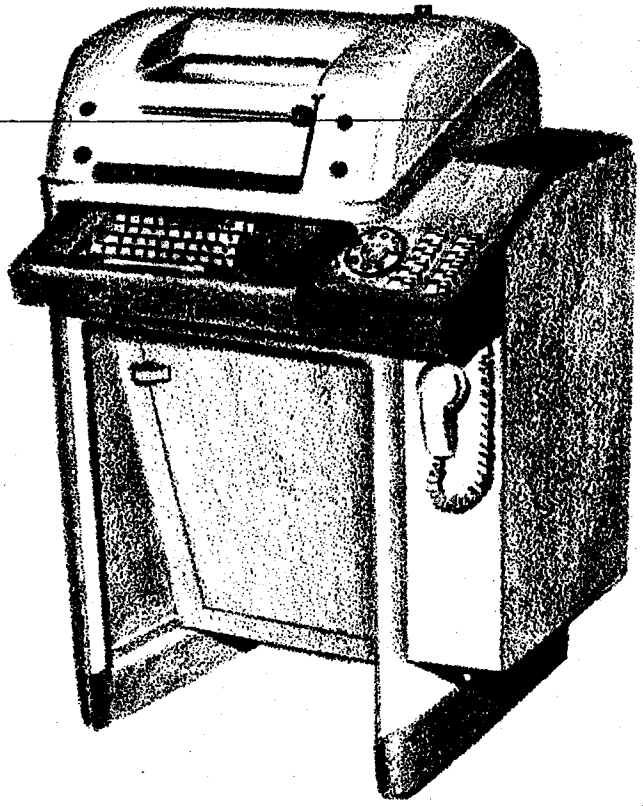

Fig. 6 – Terminate-Only Station

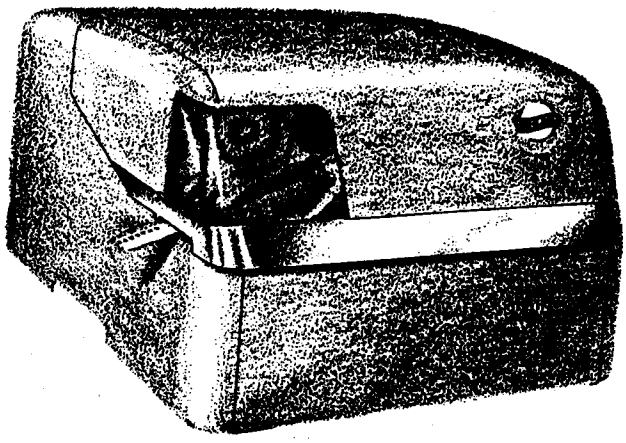

Fig. 8 – Reperforator

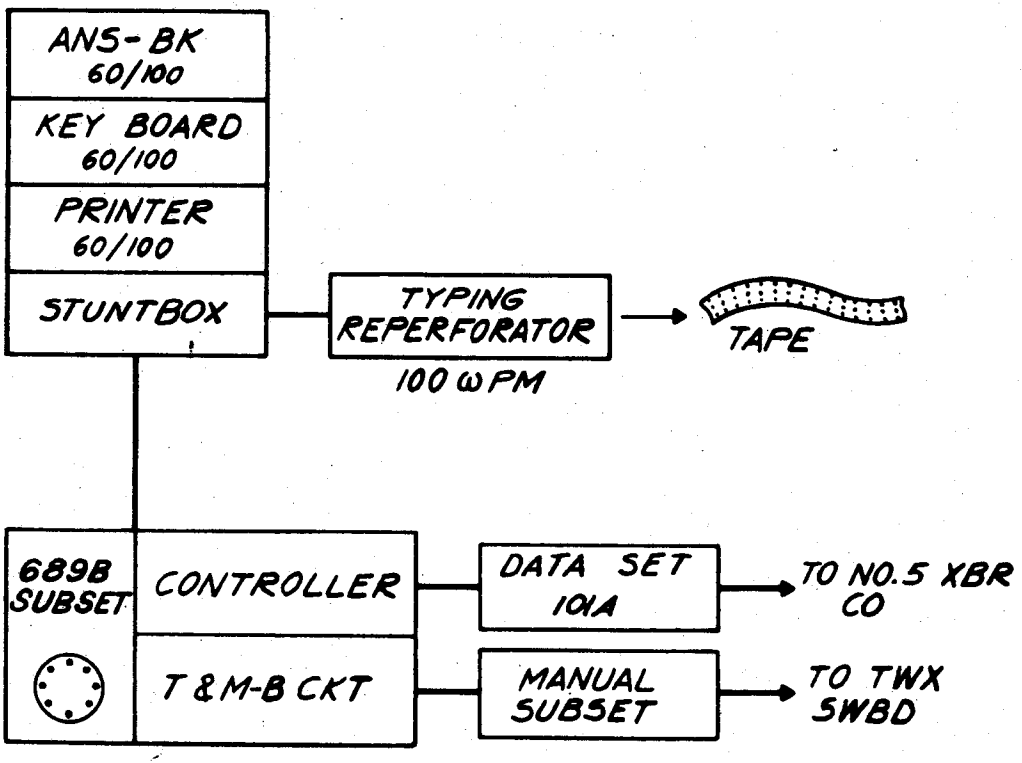

Fig. 7 – WADS-B Terminate-Only Stations 28 ASR

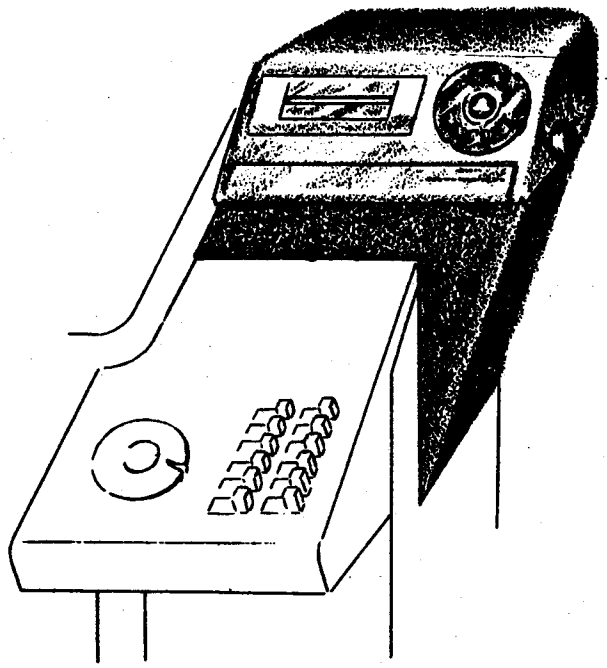

Fig. 9 – Rapidial

the desired station's number. When the connection is established, and the called station is in a condition to receive a call, it will trip the ringing and, after one second, will transmit a 2225-cycle steady marking signal. The calling station will monitor one second of this F2 marking signal and then transmit a steady 1870-cycle marking signal. The called station will monitor one second of this F1 marking signal and transmit an answer-back. The end of answer-back will always be "line-feed, blank, letters" and when this code is recognized by the calling station stuntbox, the control unit there will start the transmitter.

3.03 When the stuntbox at the sending station recognizes the request for a subsequent answer-back, the control unit will stop the transmitter. The answer-back from the distant station restarts the transmitter. (Logic built into the station prevents the transmitting station from answering its own request for answer-back.) When the stuntbox at the transmitting station recognizes the page feed-out code (blank Z letters), the controller again stops the transmitter. Both stations feed the remainder of a page of paper, and the completion of this operation restarts the transmitter. When the stuntbox at each station recognizes the end of transmission code, each station will send one second of spacing signal and disconnect. (No page feed-out code is sent at the end of transmission because a page feed-out is automatically generated by each station at the end of each call.) When a reperforator is called in by the selecting code, it will be released at the end of the message by the transmission of a request for answer-back code which will be recognized by the stuntbox of the page machine associated with the reperforator. The control unit there will then release the reperforator. This provides for any one message being taken on the reperforator.

3.04 If the called station is not reached for any reason such as misdialing, all trunks busy, station busy or in trouble, the control unit will clear the connection, light the REORDER lamp, and sound the buzzer 30 seconds after the completion of dialing. The attendant will then reoperate the ORIGINATE key which will retire the alarm condition and redial the call. (Alarm can also be retired by operation of the BUZZER RELEASE key.) After one or two unsuccessful attempts, attendant should listen on the monitor receiver to determine the reason for the "no answer."

3.05 If the called station is an originate-terminate station, it could be in the local mode when called. In this case the bell will ring, the CLEAR lamp will light, and the attendant will keyboard carriage-return and page feed-out to position the paper and then operate the CLEAR key on the subscriber set. The next ring will then cause the station to answer automatically.

3.06 After the called station answers, any of the following conditions will light the SERVICE lamp and sound the buzzer:

(a) The called station fails to answer-back when so requested.

(b) A double blank or a break signal is received.

(c) Transmission fails to start or stops when in progress. (About 30 seconds with no transmission will initiate the alarm.)

3.07 A (Figs. H) in the tape, the end of tape, or operation of the CLEAR key will cause the sending station to send one second of spac-

ing signal and disconnect. The receipt of steady spacing signal will cause the answering station to disconnect.

3.08 If during the call the circuit failed, the loss of all signal from the distant station would cause each station to disconnect after about one second. No alarm will sound, but it will be apparent to the attendant that the full message has not been transmitted.

3.09 The paper used at WADS-B stations will be of the fanfold sprocket-feed type with a notch cut in the left border that will open a sprocket hole to the edge of the paper. This notch is located near the end of the supply of paper and is provided to actuate the low-paper alarm. This will light the PAPER ALARM lamp and sound the buzzer. The buzzer may be silenced, but the lamp will remain lit until the paper supply is replenished. If the paper supply should run out, the control unit will disconnect the call in progress and not answer subsequent calls until the supply is replenished. The paper-out condition will sound the buzzer a second time.

3.10 Since all teletypewriters will be equipped with a keyboard, it is possible to transmit messages directly from the keyboard. It is also possible to handle question and answer or chit-chat calls using the keyboard at both stations.

OPERATION WITH A MANUAL TWX STATION AT 60 WPM

3.11 Prior to the cutover of TWX from manual to dial operation, stations on this system will communicate with TWX stations by a connection established through the TWX switchboards. A message to be so handled will be prepared in tape form as described in the above section, except that the request for answer-back and page feed-out will not be used because the called station will not be equipped to accept these codes.

3.12 When the station is ready to send, the TWX key will be operated to arrange the station for 60-speed operation and to direct the transfer and make-busy circuit to connect the teletypewriter to the loop to the manual TWX switchboard. The operator will handle the call on a manual basis. When the TWX station has acknowledged the call, the T-D control lever at the originating station can be operated to run and the message will be transmitted.

3.13 If there is a request for answer-back in the tape, the control unit will not stop the T-D, since the TWX station cannot comply with the request.

3.14 A page feed-out code will be acted upon by this station but not by the TWX station. This condition could cause separate messages to be typed at the TWX machine without separation.

3.15 The call can be disconnected by (Figs. H) in the tape, the end of tape, or operation of the CLEAR key. This station will perform a automatic page feed-out.

3.16 An incoming call from a manual TWX station can be answered by the station attendant by operating the TWX key, or the station can be made to answer automatically by action of the TWX operator. In either case the transfer and make-busy circuit will connect the teletypewriter to the manual loop, make the line to the No. 5 office busy, and cause the control unit to shift the teletypewriter speed to 60 wpm.

3.17 If this station is busy on a call over the dial line when the operator rings, the line will be terminated to trip ringing and give the operator connect supervision. Attendant will connect the teletypewriter, and the station's transfer and make-busy unit will send about ten K characters. This is recognized as a busy signal.

3.18 If the call is answered by the attendant, operation of the HERE IS key on the teletypewriter will initiate an automatic answer-back.

3.19 At the completion of an incoming manual TWX call the station can be made to disconnect by either of the following methods regardless of the manner in which the call was answered.

(a) Operation of the CLEAR key by the attendant.

(b) Upper-case H received over the line from either the calling station or the operator.

(c) Tape clears 6th pin in T-D.

OPERATION WITH A DIAL-CONVERTED TWX STATION AT 60 WPM

3.20 On the day that all TWX stations cut over to dial operation, the attendant at each station on this service will operate a cut-over key that will disable the transfer and make-busy unit at that station. (This unit, the circuit to the manual TWX switchboard, and the signal circuit to the No. 5 office may then be disconnected.) From that date on, all calls will be handled over the single loop and on a dialed-up basis.

3.21 Messages to be sent to dial-converted TWX stations will be prepared as they were for manual TWX, that is, with no (Figs. C letters) or (blank Z letters) codes.

3.22 When a message tape is placed in the T-D and a TWX station is called, using the TWX key to cause the teletypewriter to shift to 60 wpm, the tape will be started by the end of answer-back code or by inactivity if none is received 5 seconds after sending F1. This timing is recycled by the receipt of characters from the line.

3.23 If the called station is not reached for any reason such as misdialing, all trunks busy, station busy or in trouble, the control unit will clear the connection, light the RE-ORDER lamp, and sound the buzzer 60 seconds after the completion of dialing. The attendant will reoperate the ORIGINATE key, which will retire the alarm condition, and redial the call. After one or two unsuccessful attempts, the attendant should listen on the monitor receiver to determine the reason for the "no answer."

3.24 The call can be disconnected by (Figs. H), end of tape, or the operation of the CLEAR key.

3.25 Incoming calls from dial TWX stations will be answered automatically, and the teletypewriter will be shifted to 60-wpm operation. This is accomplished by the ringing power being on the tip for TWX calls and on the ring wire for 100-wpm calls.

3.26 These calls can be disconnected by receipt of (Figs. H), a continuous space signal on the line, or operation of the CLEAR key. The station would also disconnect if it lost carrier as described in 3.08.