NO. 120
TELETYPEWRITER SUBSCRIBER SET

1. GENERAL

1.01 This addendum supplements Section P31.220, Issue 2, describing the 120 teletypewriter subscriber set.

1.02 This addendum is issued to provide preliminary information regarding the 120B1 set, which is to be used with the No. 19 type teletypewriter set.

2. DESCRIPTION OF 120B1 SET

2.01 The 120B1 set will be the same as the 120A1, except for the following:

(a) The line test key is mounted at the top of the assembly and the key lever extends through the cover.

(b) A relay is provided which opens the d-c. circuit to the R429 relay, causing it to release immediately when the a-c. power is turned off, without waiting for the m-g set to slow down.

2.02 This arrangement makes the line test key readily available for operation to the "Test" position in order to prepare tape locally. The power is automatically turned on when the key is operated to "Test" and cannot be turned off again as long as the key is left in the "Test" position. The additional relay provides for an immediate disconnect signal at the termination of a TWX call.

3. LINE CONNECTIONS

3.01 The line connections for the 120B1 set are the same as for the 120A1 set.

NO. 120
TELETYPEWRITER SUBSCRIBER SET

1. GENERAL

1.01 The No. 120 teletypewriter subscriber set consists of auxiliary equipment to be associated with a teletypewriter for furnishing unattended TWX service at stations associated with the No. 1 teletypewriter switchboard. The arrangement is such that the set may also be used for attended service in the ordinary way whenever desired. The set is designated as 120-A-1 Teletypewriter Subscriber Set and the following features are provided:

1. Bell signal when station is called.
2. Key for answering a call.
3. Key for making a call.
4. Key for recalling the switchboard operator.
5. Means whereby the switchboard operator may start and stop the teletypewriter.
6. Emergency stop key for stopping the teletypewriter in case of trouble.
7. Local test key for use in testing.

1.02 This section has been reissued to include the following principal changes:

(a) Provides additional information regarding the wave shaping network.

(b) Provides information covering the outstanding characteristics required of a teletypewriter to be used with the 120 set.

(c) Corrections have been made in Fig. 2.

2. DESCRIPTION

2.01 The equipment consists of a control box and a relay box. The control box, which is fastened to the right-hand side of the teletypewriter table near the front, contains the three signaling keys labeled "CALL," "ANSWER" and "RECALL," respectively.

2.02 The relay box houses the line circuit apparatus, the teletypewriter line relay, the power control relay by means of which the teletypewriter is started and stopped, and the ringer. The cover of the relay box is arranged so that it may be lifted off the box from the top, exposing the enclosed apparatus for inspection and adjustment. All connections between the teletypewriter and subscriber set are made by means of plug-ended cords so that the subscriber set may be conveniently and quickly connected or disconnected for maintenance purposes. There are also located in the relay box an emergency stop key and a line-test key, the function of which will be described later. For convenience these keys are arranged so that they may be operated without removing the cover from the relay box.

2.03 A schematic circuit of the subscriber set is shown in Fig. 1 and a more detailed arrangement in Fig. 2. The detailed wiring may be found on the circuit label inside the cover of the relay box.

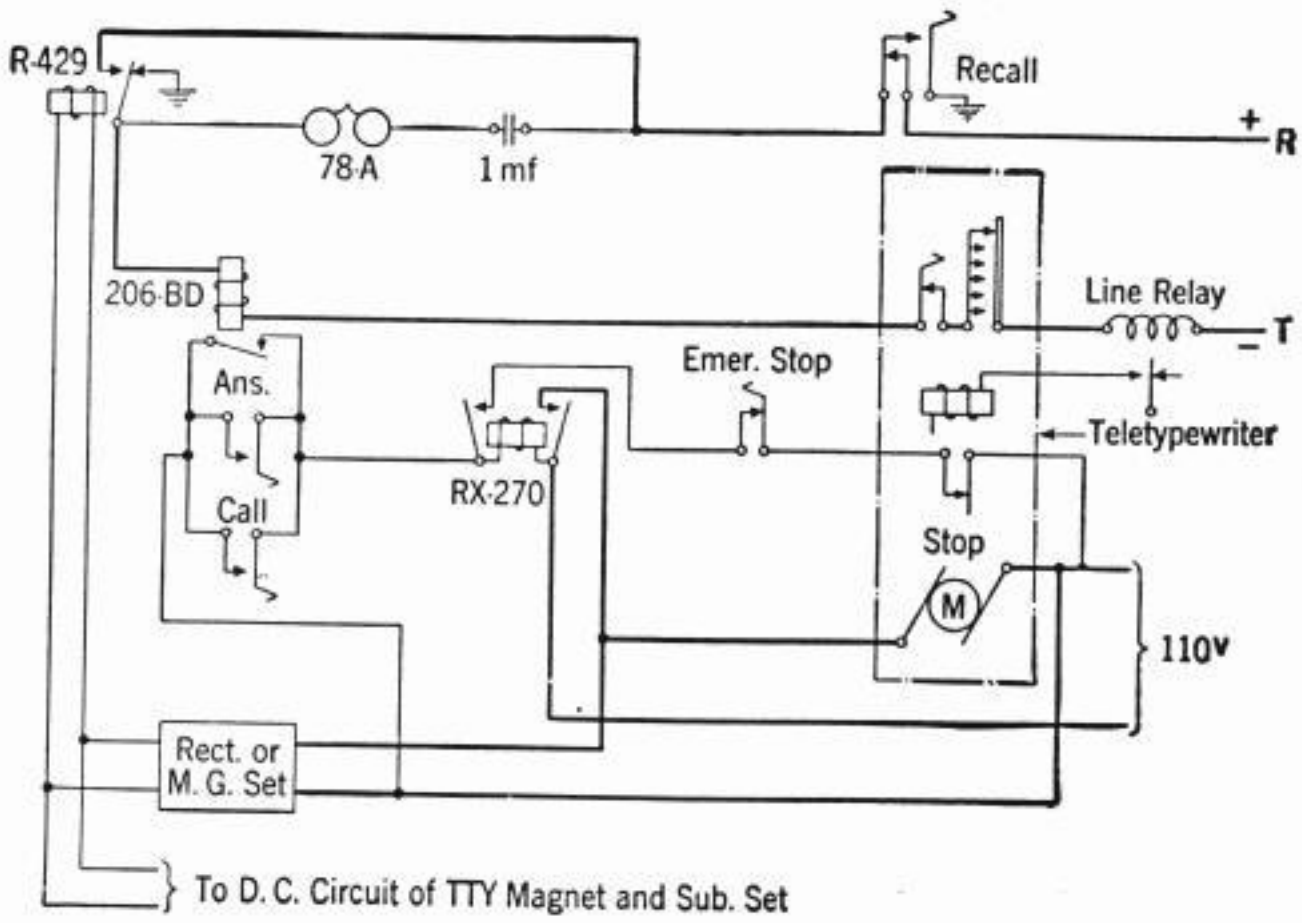
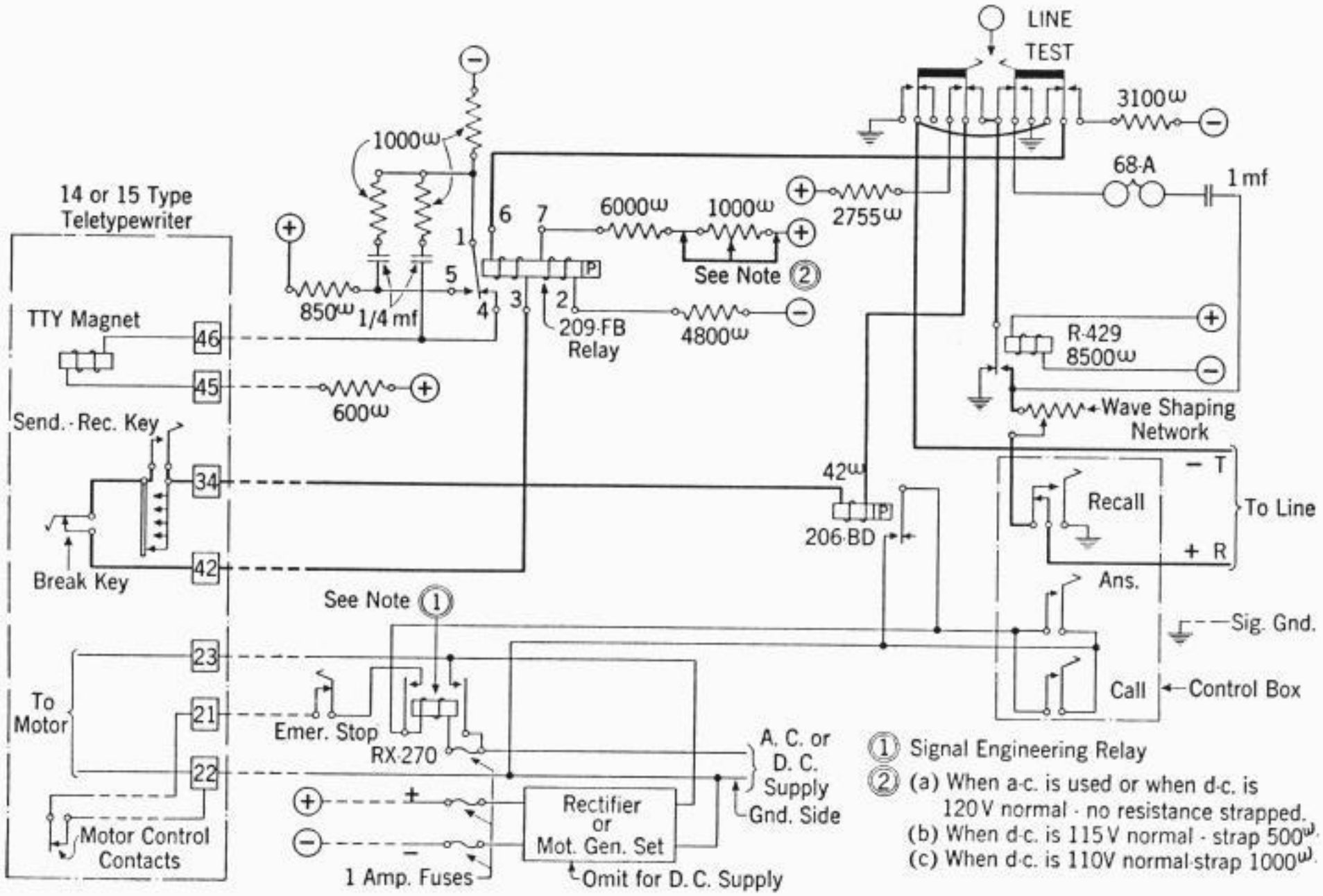


Fig. 1



(1) Signal Engineering Relay

(2) (a) When a-c. is used or when d-c. is 120 V normal - no resistance strapped.
(b) When d-c. is 115 V normal - strap 500ω.
(c) When d-c. is 110V normal-strap 1000ω.

Fig. 2

2.04 Figure 1 shows the circuit idle but in condition either to initiate or receive a call. At this time the tip side of the line circuit may be traced through the 209-FB (20-milliampere) line relay, through the teletypewriter, through the 206-BD relay and to ground through the back contact of the R-429 relay. The ring side of the circuit may be traced through the ringer, and to ground. When the bell is to be rung, ringing voltage is applied by the switchboard operator to the ring side of the line.

2.05 When the attendant answers, the answer key is momentarily depressed, applying power to relay RX-270 which operates and locks up through the emergency stop key and the motor stop contacts located on the teletypewriter. Operation of this relay applies power to the teletypewriter motor and d-c. voltage is applied to the apparatus in the relay box. The R-429 relay then operates which removes the ground from the tip, shorts out the ringer, and connects tip and ring through the teletypewriter. The teletypewriter is then in condition to operate.

2.06 At the termination of a call the attendant transmits a "STOP" signal (upper case "H") which momentarily opens the motor stop contacts on the teletypewriter. The RX-270 relay releases and power is removed from the teletypewriter, which brings in the disconnect signal at the switchboard. The station is then in condition to receive another cali.

2.07 When the attendant wishes to initiate a call the "CALL" key is depressed which operates the RX-270 relay. This applies power to the teletypewriter and apparatus in the relay box, thereby operating the R-429 relay. This latter operation completes the line circuit and signals the switchboard operator. After the switchboard operator responds, the attendant may then pass calling information.

2.08 When the station is unattended the switchboard operator upon receiving no answer to a call, momentarily applies reverse polarity voltage to the tip of the line. This causes the 206-BD relay to operate, the contacts of which are in parallel with the call key so that the teletypewriter station is started as before and the message is recorded on the unattended teletypewriter. After the message has been transmitted to this station, the teletypewriter is stopped by the switchboard operator transmitting the "STOP" signal.

2.09 If the attendant wishes to recall the operator while the connection is up, the "RECALL" key is depressed. This grounds the tip side and opens the ring side of the line which signals the switchboard operator.

2.10 A line-test key (shown in Fig. 2) is provided which permits the teletypewriter to be operated locally for test without signaling the switchboard operator. When this key is operated, the tip of the line is grounded and the ringer is connected between the ring of the line and ground. Thus, as far as operating or testing at the switchboard is concerned, the line appears to be normal. Operation of this line-test key applies a local voltage to the line windings of the line relay and the teletypewriter sending contacts, thus permitting the teletypewriter to be operated locally. The teletypewriter is then started by depressing the answer key and may be stopped either by depressing the emergency stop key or by transmitting the "STOP" signal.

3. WAVE SHAPING NETWORK

3.01 The set, as furnished, provides a 19-EW resistance having two 800-ohm sections. When 1600 ohms is specified for the wave shaping network, use both 800-ohm sections in series and when zero resistance is specified, short circuit the resistance.

3.02 For values of 600 ohms or 1200 ohms, substitute a 19-PS resistance in the place of the 19-EW. The 19-PS resistance has a 1200-ohm section and a 1600-ohm section. The two sections, when connected in parallel, provide a value somewhat greater than 600 ohms, but this is satisfactory when 600 ohms is specified.

3.03 Since the 19-PS resistance provides the three values of resistance likely to be specified for the wave shaping network, it is never necessary to change back to the old resistance.

3.04 There is space for mounting only one resistance unit and if the 19-PS resistance is not readily available other 19-type or 18-type resistances having the proper rated resistance and accurate to ±5 per cent. or better may be used as indicated in the following table:

	Recommended	Alternates
600 value	19-PS	18-GH, or 19-EY
1200 "	19-PS	18-BJ, or 19-EY
1600 "	19-PS	18-CY, or 19-EW*

*Furnished with the set.

4. TELETYPEWRITER FEATURES

4.01 A teletypewriter having the following characteristics may be used with the No. 120 set.

Item	No. 15	No. 14
1. Motor Control Contacts	Equipped with contact springs wired to terminals 9 and 10 which momentarily open on upper case H (stop) selection.	Equipped with contact springs wired to terminals 17 and 18 which momentarily open on upper case H (stop) selection.
2. Strap between TTY Base Terminals 9 and 10	Removed (Not done at factory).	Does not apply.
3. Line Test Key	Line test key connected so as to be wired for "line" position only (Not done at factory).	Line test key connected in line position only.
4. Power Switch	Circuit shorted at switch.	Circuit opened at switch.
5. Blank Function Lever to prevent printing and spacing on blank selection	Installed.	Does not apply.
6. Line Relay	209-FB relay provided in subscribers set—none in teletypewriter (formerly 209 relay per D-91711).	209-FB relay provided in subscribers set—none in teletypewriter (formerly 209 relay per D-91711).
7. End-of-Line Indicator	Does not apply.	Installed.
8. Type Bars and Pull Bars for upper and lower case comma and period removed	Does not apply.	Removed.
9. Wires from terminals 24 and 25 removed	Does not apply.	Removed.

10. Type Character Arrangement	Arrangement C.	Arrangement C.
11. Coded teletypewriters employed with this set	15DA, DK, DD.	14DA.

Note: In some sets the characteristics of the RX270 relay may be such that the relay fails to release on the STOP H selection when using a-c. power. To overcome this trouble disconnect and tape the lead from the power switch to the spark killer condenser in the motor circuit of the teletypewriter. If the TTY motor is series a-c. the condenser then should be connected to TTY terminal **No. 22.**

5. OPERATING METHODS

5.01 The following are the operating methods:

Call Operator: Depress "CALL" key on the control box.

Recall Operator: Depress "RECALL" key on the control box.

Answer: Depress "ANSWER" key on the control box.

Disconnect: Operate "FIGS" key and then "STOP" key (upper case "H") on the teletypewriter.

6. ADJUSTING REQUIREMENTS

6.01 Adjusting information for the relays is given in Table 1. The detailed adjusting procedure for the R-429 relay and the 206-BD relay is given in Bell System Practices—P.B.X. Installation and Maintenance. To test the R-429 and 206-BD relays, use a 35-C test set and the d-c. power supply. Information for adjusting the ringers is given in Bell System Practices —Station Installation and Maintenance, except for the adjustment of the biasing spring which is covered in the section of the P series covering tests on TWX Subscriber Stations.

7. INSTALLATION INFORMATION

7.01 The 120-A-1 subscriber set equipment is mounted on the 14-B or 15-A teletypewriter tables as shown in Figures 3 and 4.

7.02 A view of the inside of the relay box with the cover removed is shown by Figure 5.

7.03 A view of the subscriber set mounted on a 15-A table is shown by Figure 6.

7.04 The wiring to be placed by the installer is shown on the circuit label.

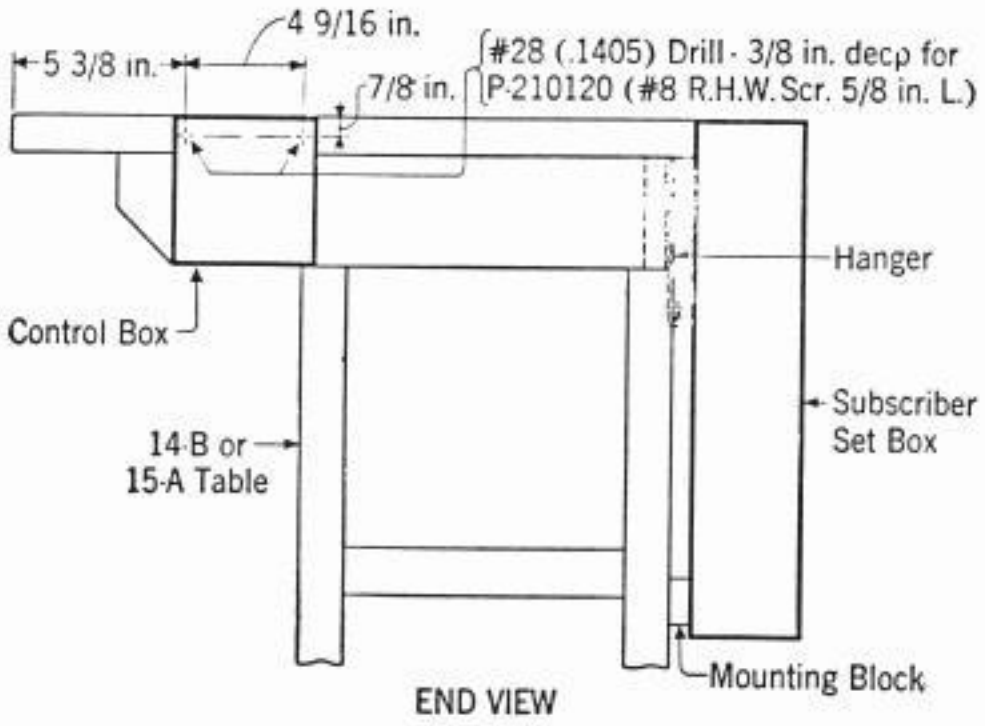


Fig. 3

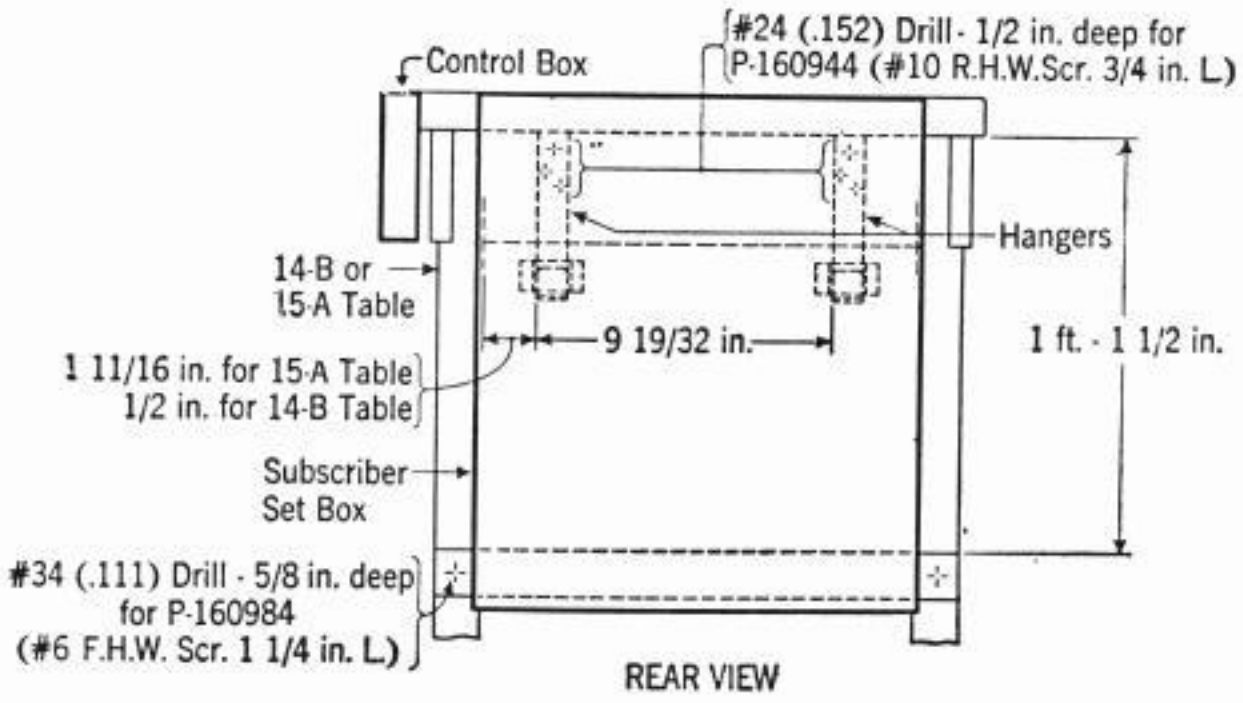


Fig. 4

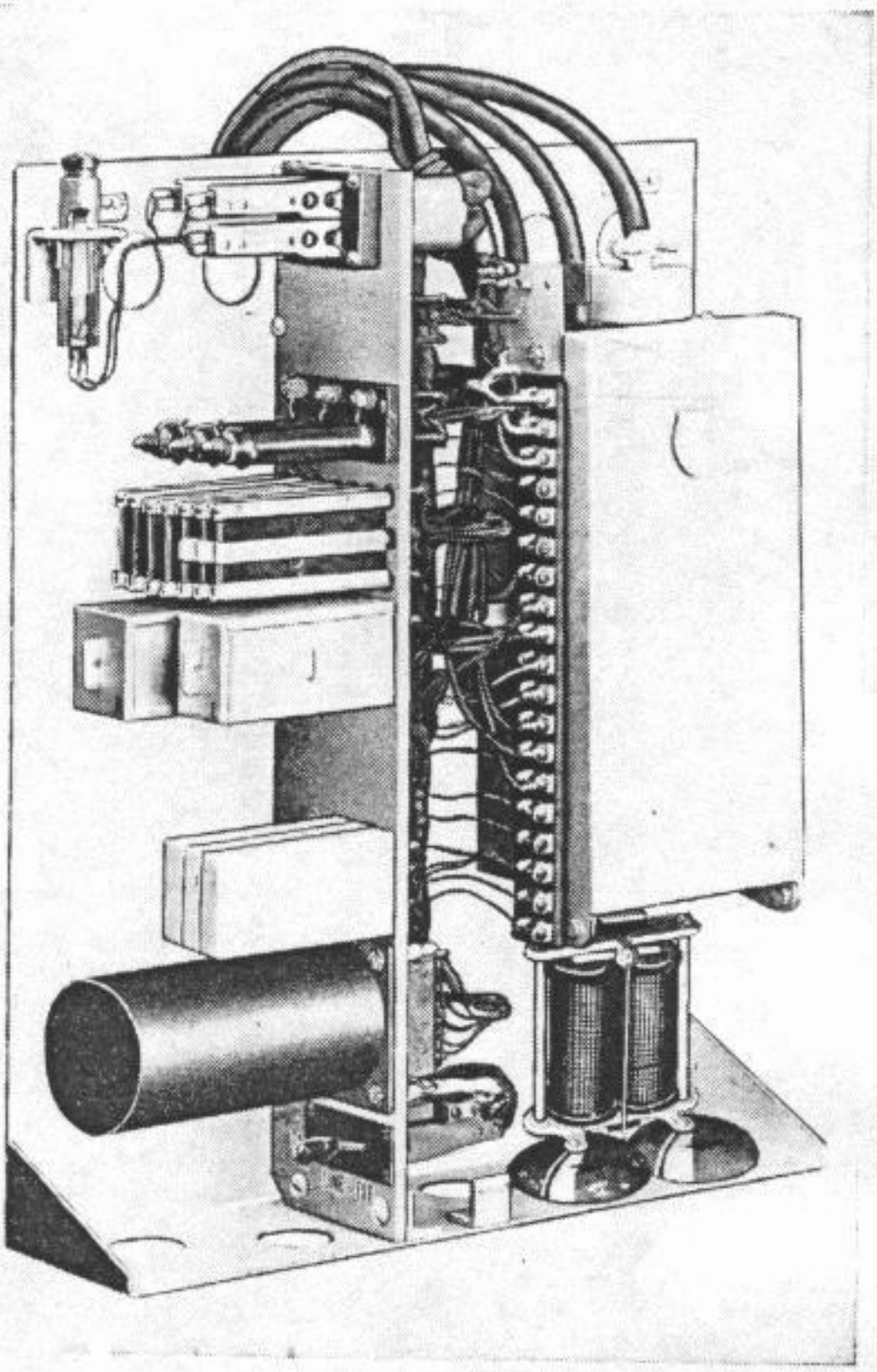


Fig. 5

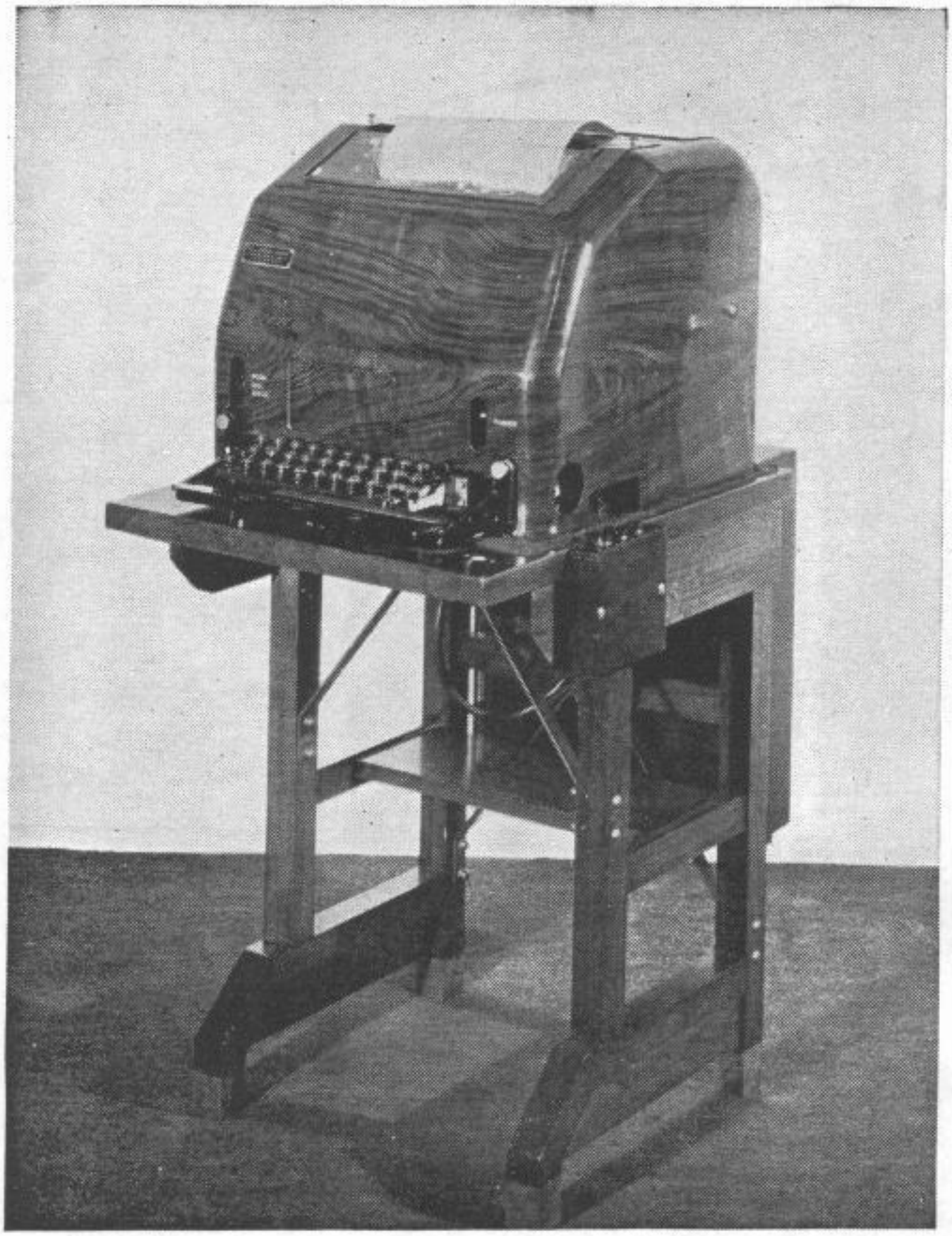


Fig. 6

CIRCUIT REQUIREMENTS
120-A-1 SUBSCRIBER SET CIRCUIT

Apparatus	Mech. Req.			Circuit Preparation				See	Direct Current Flow Req.					
	BSP				Test Clip Data		Test	Test			After			
	PBX	Cont.	Arm		Conn.	Conn.	Set	Note	Test	Test	Soak	Test	Readj.	
Code	Fig.	Press	Trvl.	Block	Bat.	Grd.	Prep.	No.	Wdg.	For	Amp.	Amp.	Amp.	Remarks
Relays 209-FB or 209 Per D-91711								2						
R-429	3	H	.020		RB(L)	RT(L)	B/G	1		O		.0057	.0054	Remove Line Relay from Ckt.
206-BD	1				3(R)	1(R)	B/G	1/4		O	—.050	.0085	.008	
					3(R)	1(R)	B/G	1		NO	.050	.0012	.0013	
Signal Eng. and Mfg. Co. Relay RX-270								3		O				Directly connected to 110 volt d-c. or 25 or 60 cycle a-c. supply

Test Notes:

1. Disconnect TTY and Power Plugs when making this test.
2. This relay shall be adjusted to meet requirements by relay test panel provided for adjusting this relay where panel is available. The mechanical adjustment procedure in BSP-CO Main as specified for the 209-FA relay shall be followed.
3. Operate line-test key in sub. set to "test" when making this test.
4. A negative sign (—) preceding a current value indicates that this current shall flow in a direction opposite to the direction of the circuit operating current.

Table 1

(Based on Drawing SD-62958-01 issue 6)