20-HZ RINGDOWN AUXILIARY UNIT

DESCRIPTION

TYPE F SIGNALING SYSTEM

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1. GENERAL

1.01 This section describes the FGM, FGN, FHM, and FHN single frequency auxiliary signaling units (SD-1C153-01), a component part of the Type F Signaling System. These units, along with an FU( ) unit, convert dc pulses or ac ringing signals to 2600-Hz signals which are suitable for transmission over carrier facilities, and convert the 2600-Hz signals to ac ringing for terminal equipment on voice frequency line.

1.02 This section is being reissued for the following reasons:

- To delete the duplication in paragraph 6.02.
- To interchange the H and L impedance matching switch designations in Fig. 8. These switches are located on the same switch block as the A and B lead switches.
- To change the FSN designation in Table B heading to FGN.
- To add (white number showing) to the footnote of Table B.

Change arrows have not been used to indicate these changes.

A. System and Unit Description

1.03 Figure 1 is a photograph showing an FGM unit (left) and an FHM unit. Some of the circuit components which are used in unit construction can be seen in the photograph. Figure 2 shows the details of the faceplates of the FGM, FGN, FHM, and FHN units.

1.04 The FGM or FGN unit must be used in conjunction with an FUA or FUD converter unit and the FHM or FHN unit must be used in conjunction with the FUA converter unit only in order to have a complete type F signaling circuit. The FUA and FUD are described in Section 179-363-101. The FGM, FGN, FHM, or FHN unit is mounted adjacent to the FU( ) unit in the type F signaling bay.

1.05 The FGM, FGN, FHM, or FHN unit can be incorporated with the signaling system by inserting the unit into the guide of the appropriate shelf position. When the unit makes sufficient

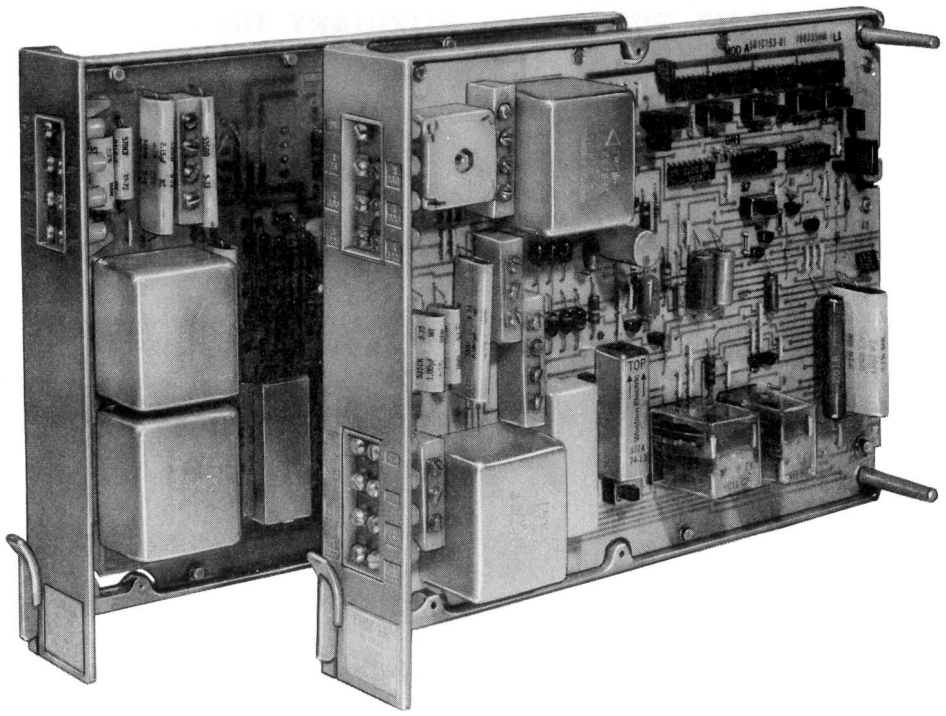

Fig. 1—FGM and FHM Units

contact with the connector at the rear of the shelf, a locking device, which is located on the face of the unit, locks the unit in place. To remove the unit, pull the locking device down, which unlocks the unit, and withdraw the unit from the shelf.

1.06 The identification label on the faceplates of the FGM and FHM units has a cream colored background with gold lettering. The identification labels on the FGN and FHN units are not color coded.

1.07 On the faceplate of the FGM and FGN units are screw switches which provide a compromise balancing network and network build-out capacitance (NBOC). When the FGM or FGN unit is used in conjunction with the FUD unit, the compromise balancing network and NBOC screw switches must be in the open position. The faceplates of the FHM and FHN units have screw switches to provide gain-frequency equalization for H88 loaded cable extensions.

1.08 The printed wiring board has slide switches to provide for code mode, code selection, and ac or dc signaling. The FHM and FHN units have additional screws for impedance matching.

1.09 All circuit components of the FGM, FGN, FHM, and FHN units are mounted on a printed wiring board. The board is attached to a die cast aluminum frame which is approximately 7 inches high by 1-1/2 inches wide by 10-1/2 inches deep. All interconnections between the bay and the unit are via 40-pin gold finger contacts which are part of the printed wiring board.

B. Application and Compatibility

1.10 The FGM, FGN, FHM, and FHN auxiliary units must interface with an FU( ) signaling converter unit in order to function properly (see Fig. 3, 4, and 5). Figure 6 shows a typical special service circuit employing FGM, FGN, FHM, and FHN units. Any combination of the FGM, FGN, FHM, and FHN units may be used in the signaling system.

1.11 The FGM and FGN units have a built-in, 900-ohm terminating set for 2-wire extensions. The 4-wire side of the terminating set faces the

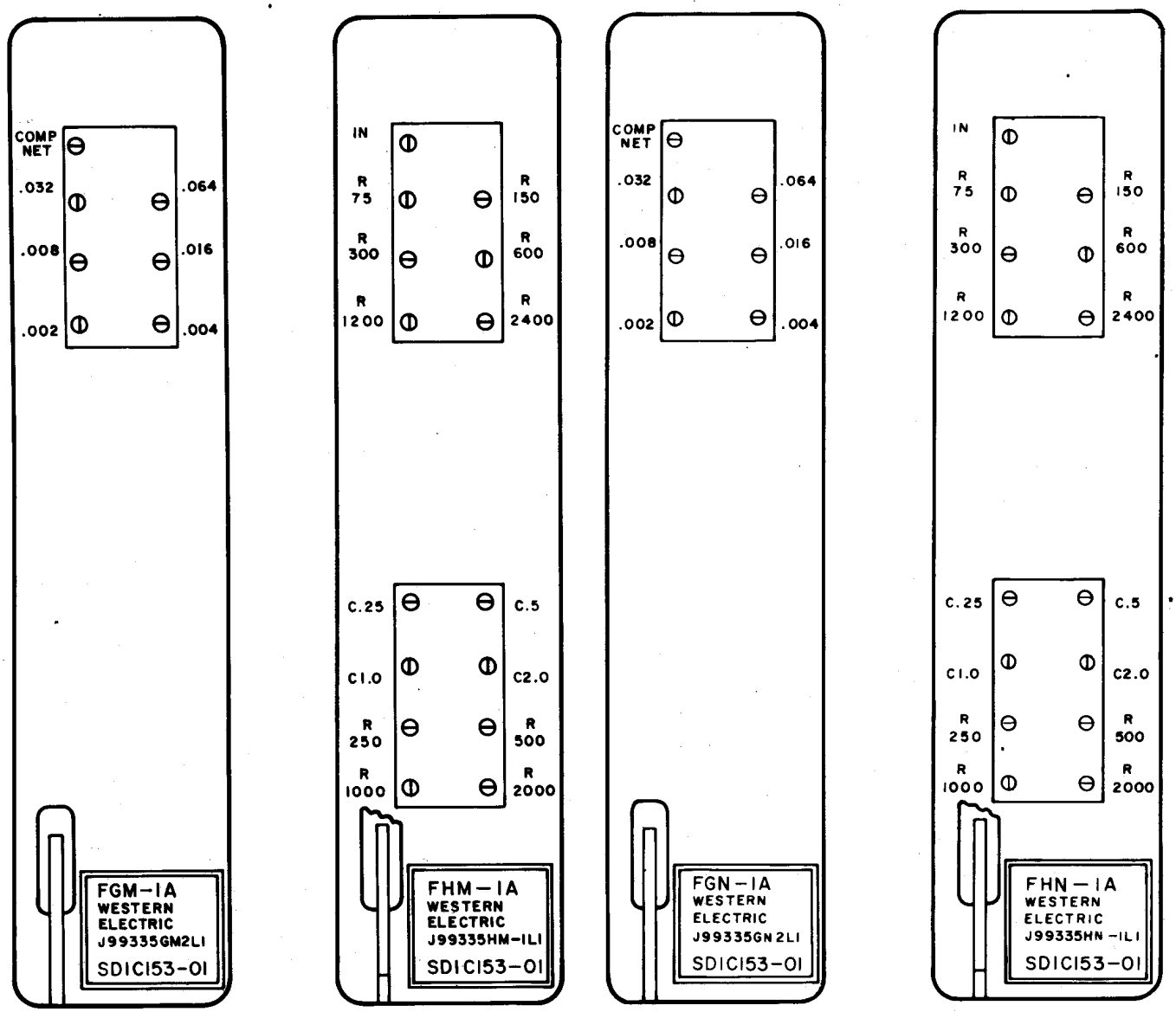

Fig. 2—FGM, FHM, FGN, and FHN Unit Faceplates

FUA or FUD converter unit and the 2-wire side faces the 2-wire extension. The FHM and FHN units have a built-in, 4-wire line matching circuit. The simplex leads, which appear as A and B leads on the unit, are provided for access to the ringing detector.

1.12 The FGM, FGN, FHM, and FHN units are not compatible with any other type F signaling units. When an FGM or FGN unit is used at one end of the carrier facility, an FGM, FGN, FHM, or FHN or equivalent unit must be used at the distant end.

2. OPERATION

2.01 The FGM, FGN, FHM, and FHN auxiliary units were designed to be used at either end of the signaling link.

2.02 The FGM, FGN, FHM, and FHN units are divided into four major subsections: an internal power supply, a transmitter and receiver

relative to the carrier, and either a terminating set circuit (FGM or FGN) or line matching circuit (FHM or FHN).

3. INTERNAL POWER SUPPLY

3.01 The internal power supply consists of a dropping resistor and a series string of seven varistors for regulating the -0.7, -2.1, and -5 volts. There are also three capacitors which provide filtration of high- and low-frequency power transients.

4. TRANSMITTER

4.01 The FGM, FGN, FHM, or FHN auxiliary unit may be signaled from the station side of the signal link in two different ways, ac ringing bursts by way of the transmission path or dc pulse signals over the S1 or the S1 and S2 leads.

A. AC Ringing Detector

4.02 The ringing detector is connected to the A and B leads of the 2-wire terminating circuit (FGM or FGN) and the simplex leads in the 4-wire line matching circuit (FHM or FHN) by closing the A and B screw switches (Fig. 7, 8, 9, and 10). The ringing detector consists of a high impedance bridge, which permits detection of the ac ringing voltages on either the A or B conductors; a low-pass filter, which attenuates induced 60-Hz noise; a time delay circuit, which provides nominally 160 ms delay before recognizing the presence of the ringing signal; and a second time delay circuit, which provides a nominally 60 ms delay before recognizing the removal of the ringing signal. The purpose of the time delay circuits is to provide nominally 100 ms protection against erroneous detection of voice frequency line transients as a ringing signal.

B. DC Ringing Detector

4.03 The ringing detector operates basically the same for dc pulses as it does for ac signaling with the exception that the first stage high impedance bridge and low-pass filter are not used. When dc pulses are applied to the S1 lead and the S2 lead is grounded, the B relay operates, applying ground to the time delay circuit. Ground can be applied to the S2 lead either by using switch S6 or externally in a loop configuration. Subsequent operation of the dc ringing detector operate and release timers is identical to that of the ac ringing detector.

4.04 When the ringing voltage is applied and removed from the voice frequency line, the M relay is energized and deenergized, respectively, which causes 2600-Hz tone to be applied and removed from the carrier side. The difference between the operate and release timers of the ringing detector causes the ringing duration to be reduced by nominally 100 ms.

5. RECEIVER

5.01 The receiver subsection of the FGM, FGN, FHM, and FHN units, together with the appropriate FU( ) unit, receives bursts of 2600-Hz from the carrier side and times the duration of the bursts to guard against false simulations by speech or transients. The units contain switches, as shown in Fig. 7, 8, 9, and 10, which allow the telephone company to select one of three modes of registration of the 2600-Hz bursts and to select a ringdown code. The modes available in the FGM and FHM through the manipulation of switch S5 is code-no code and switch S7 is off-ext code. The FGN and FHN units have the same modes except switch S2 is code-no code and S5 is off-ext code. In the FGN and FHN units, the ext code mode has two modes of operation which are controlled by switch S3. When switch S3 is closed, the FGN and FHN units are in an unlimited pulse length mode. In this mode all input pulses are repeated for the same duration of time as received except for approximately 160 ms error guard. When switch S3 is open, the unit is in a pulse limited mode. In this mode the pulses are limited to 2 seconds.

A. Code Mode

5.02 The code mode, when switch S5 is operated to C (code) position and switch S7 is operated to O (off) position, provides for ringing the drop station if the number of 2600-Hz bursts received from the distant station matches the ringdown code number assigned to the unit. This ringing of the drop station can be obtained in the FGN and FHN units by operating switch S2 to the C (code) position and switch S5 to the O (off) position. A code number of 1 through 15 for the FGM and FHM units can be selected by manipulating slide switches S1 through S4 (Fig. 7 and 8). Code numbers 1 through 7 for the FGN and FHN units can be

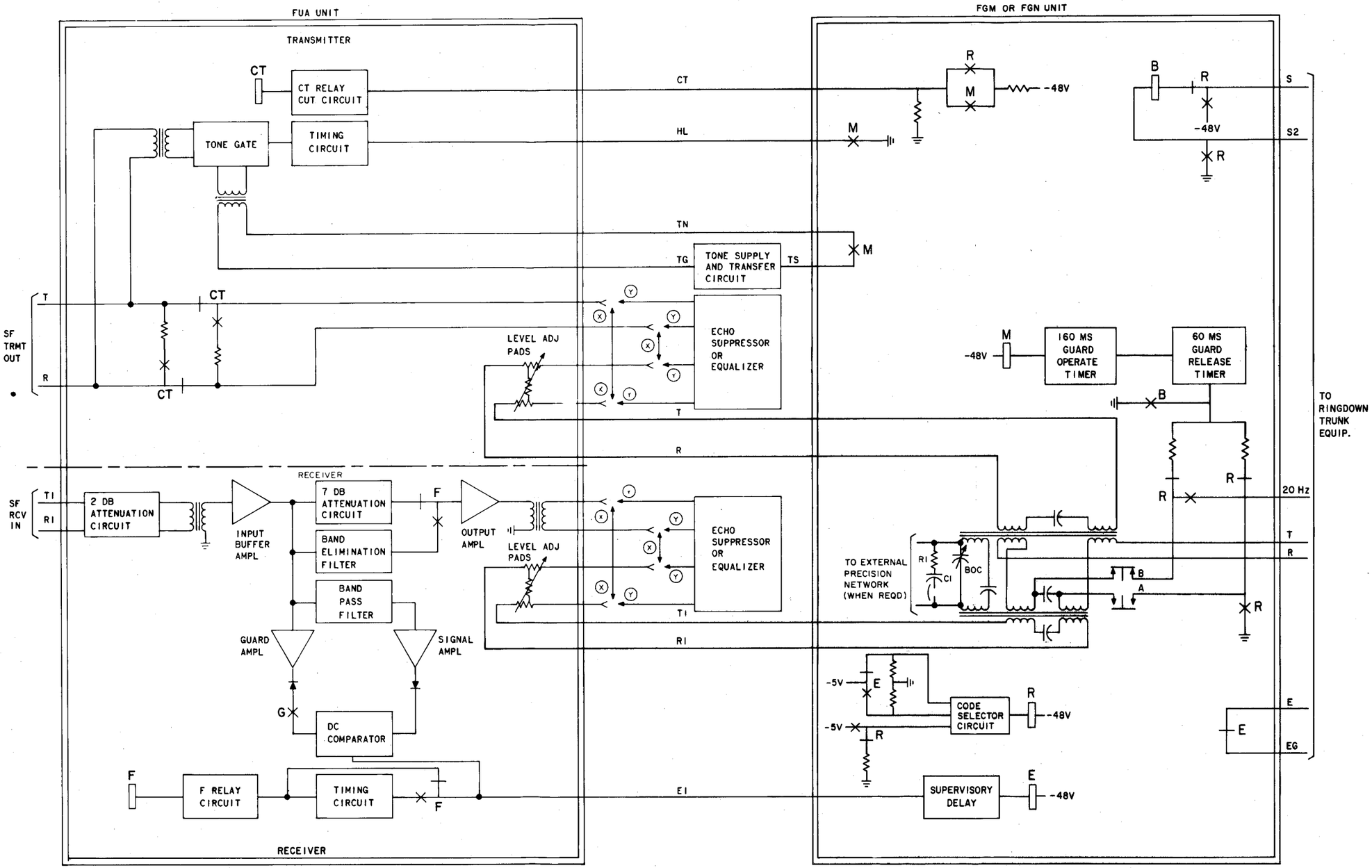

Fig. 3—FUA Plus FGM or FGN Unit

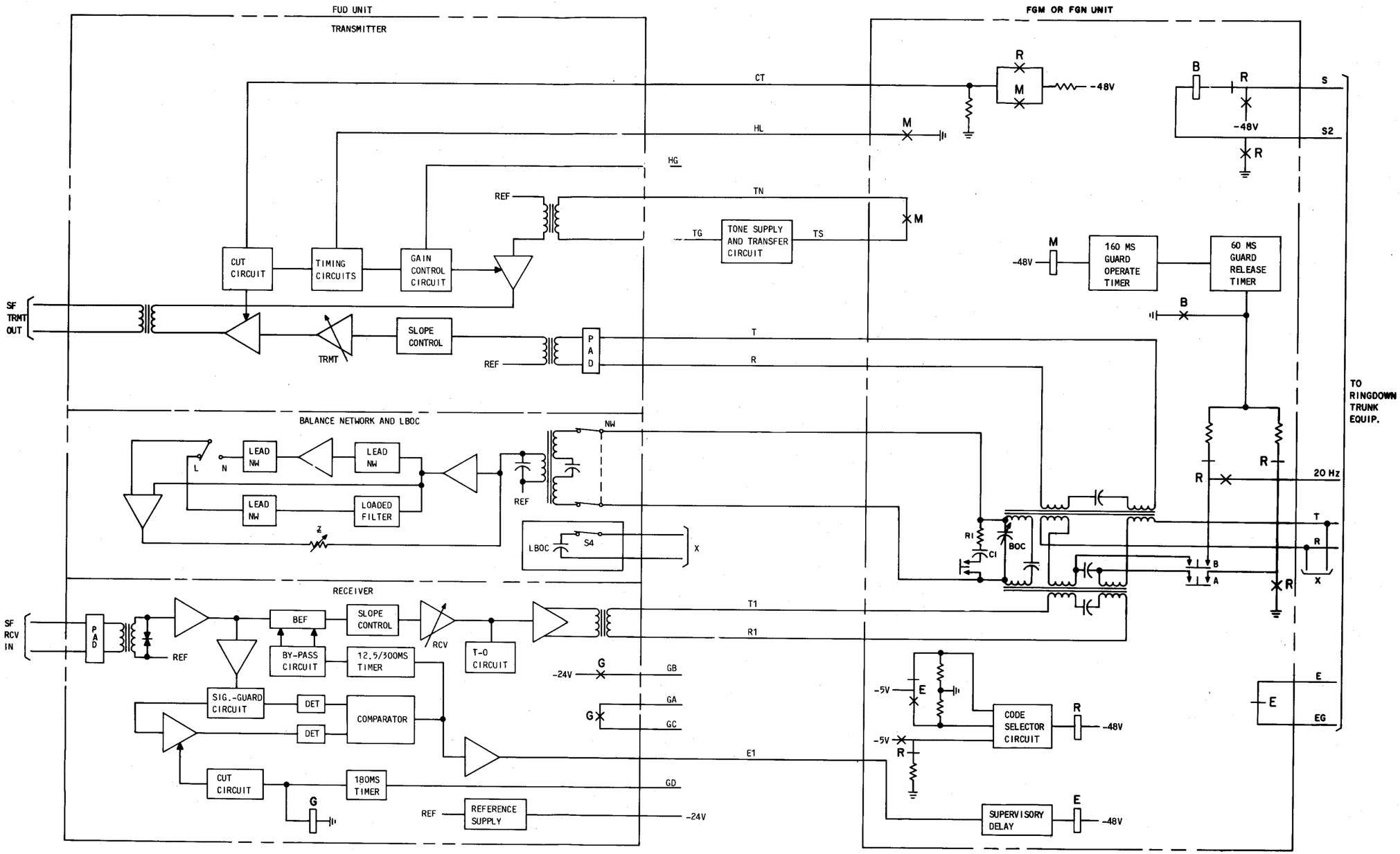

Fig. 4—FUD Plus FGM or FGN Unit

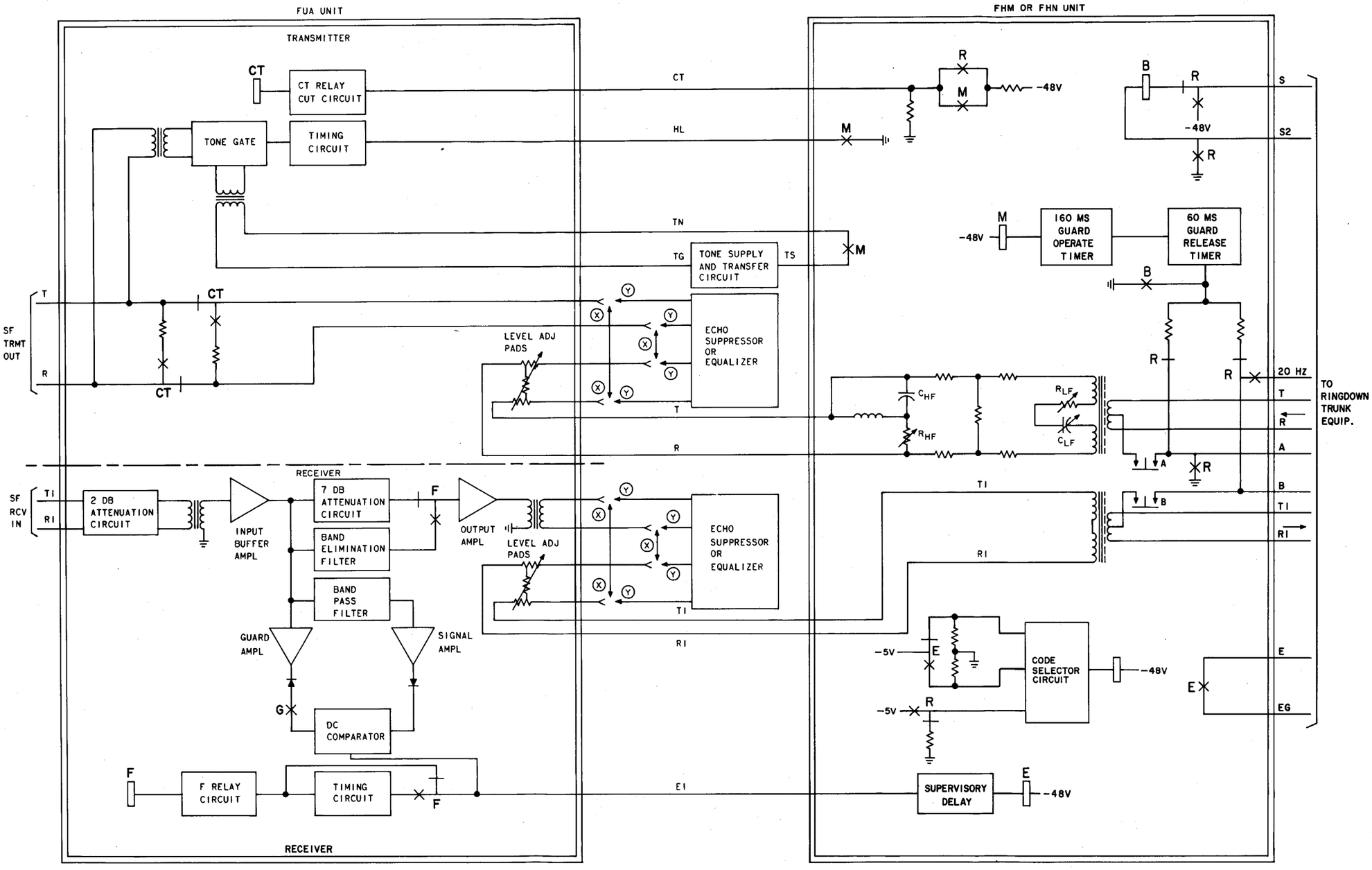

Fig. 5—FUA Plus FHM or FHN Unit

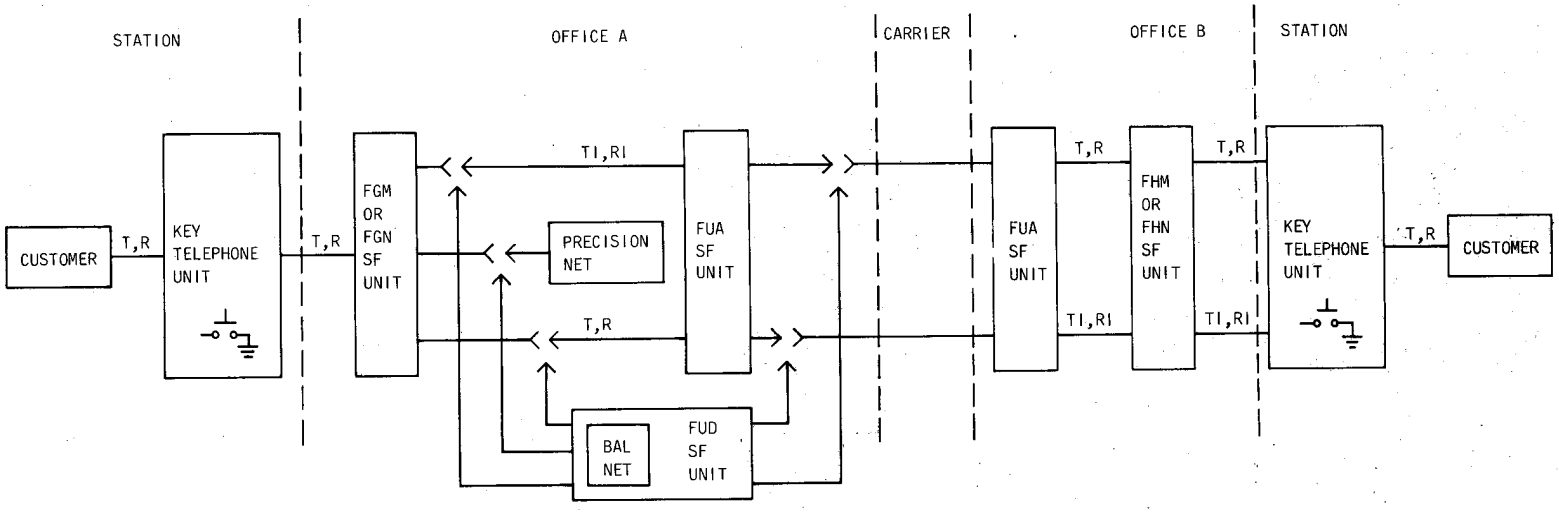

Fig. 6—Typical Application of FGM, FGN, FHM, and FHN SF Auxiliary Signaling Units

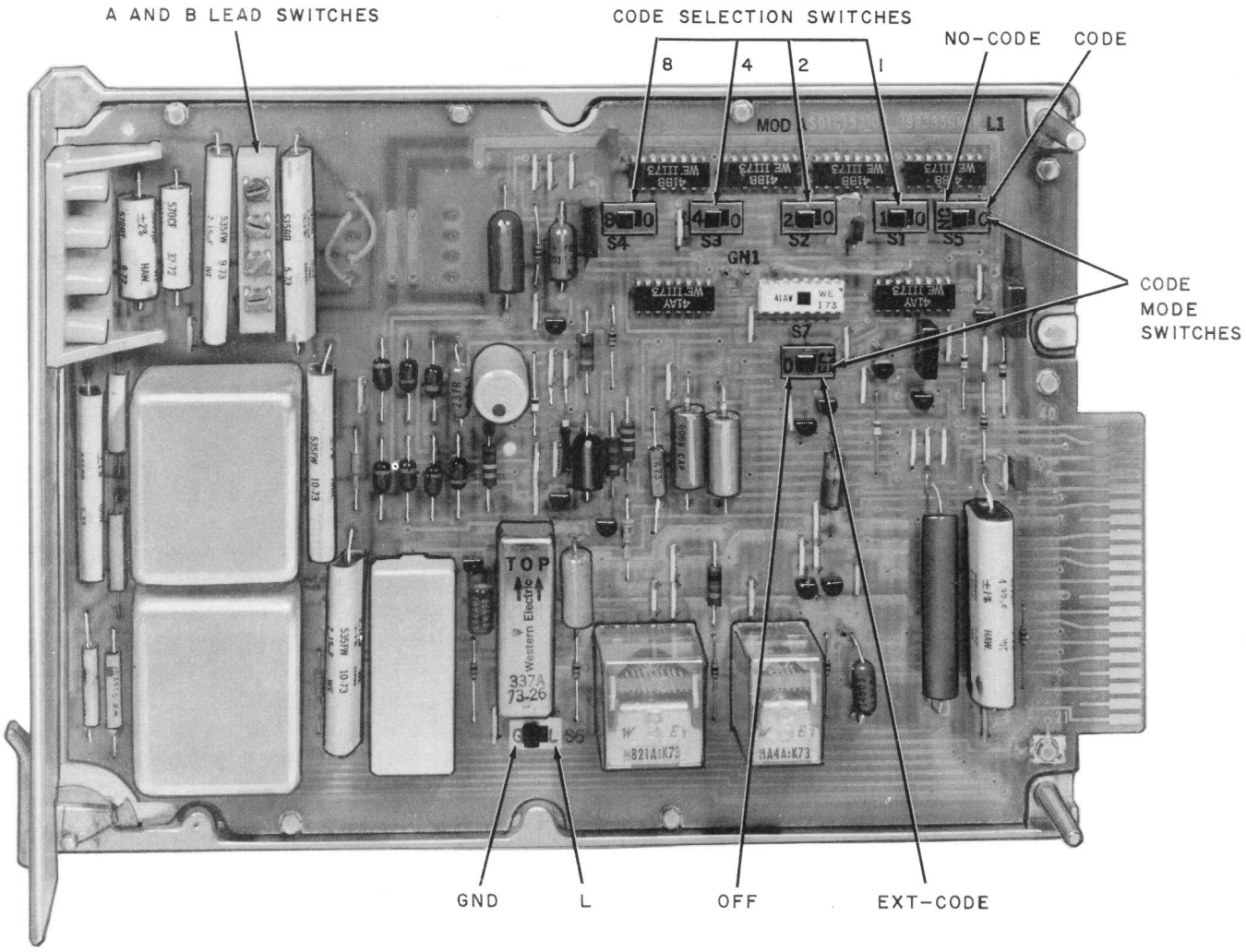

Fig. 7—FGM PC Assembly Showing Coding and Impedance Matching Switches

selected by manipulating switches 1 through 7 of S1 and code numbers 8 through 15 can be selected by manipulating switches 1 through 8 of S4 (see Fig. 9, 10, and 11). Code number 1 corresponds to switch S1-1 and code number 8 corresponds to switch S4-1. The FGN and FHN units have the capability of code selection of one code number or a group of code numbers whereas the FGM and FHM units can only select one code number. Tables A and B illustrate the position of the switches in order to assign a specific code number to the units.

5.03 When 2600-Hz signal is received from a distant station, the FU( ) converter applies -24 volts to the E1 lead which operates the E relay through a timer circuit. The entire sequence, from application of -24 volts to E1 lead to operation of E relay, occurs in nominally 160 ms. This 160 ms time delay provides guard time against false simulation of 2600-Hz bursts from the carrier side. The operation of the E relay provides an open loop to the E and EG leads.

5.04 When the 2600-Hz signal from the distant station is removed, the associated FU( ) converter unit removes the -24 volts from the E1 lead. When the -24 volts is removed from the E1 lead, there is a time delay of 22 ms before the E relay releases. This 22 ms time delay guards against a temporary fade or loss of 2600-Hz (split), which would cause a double operation of the E

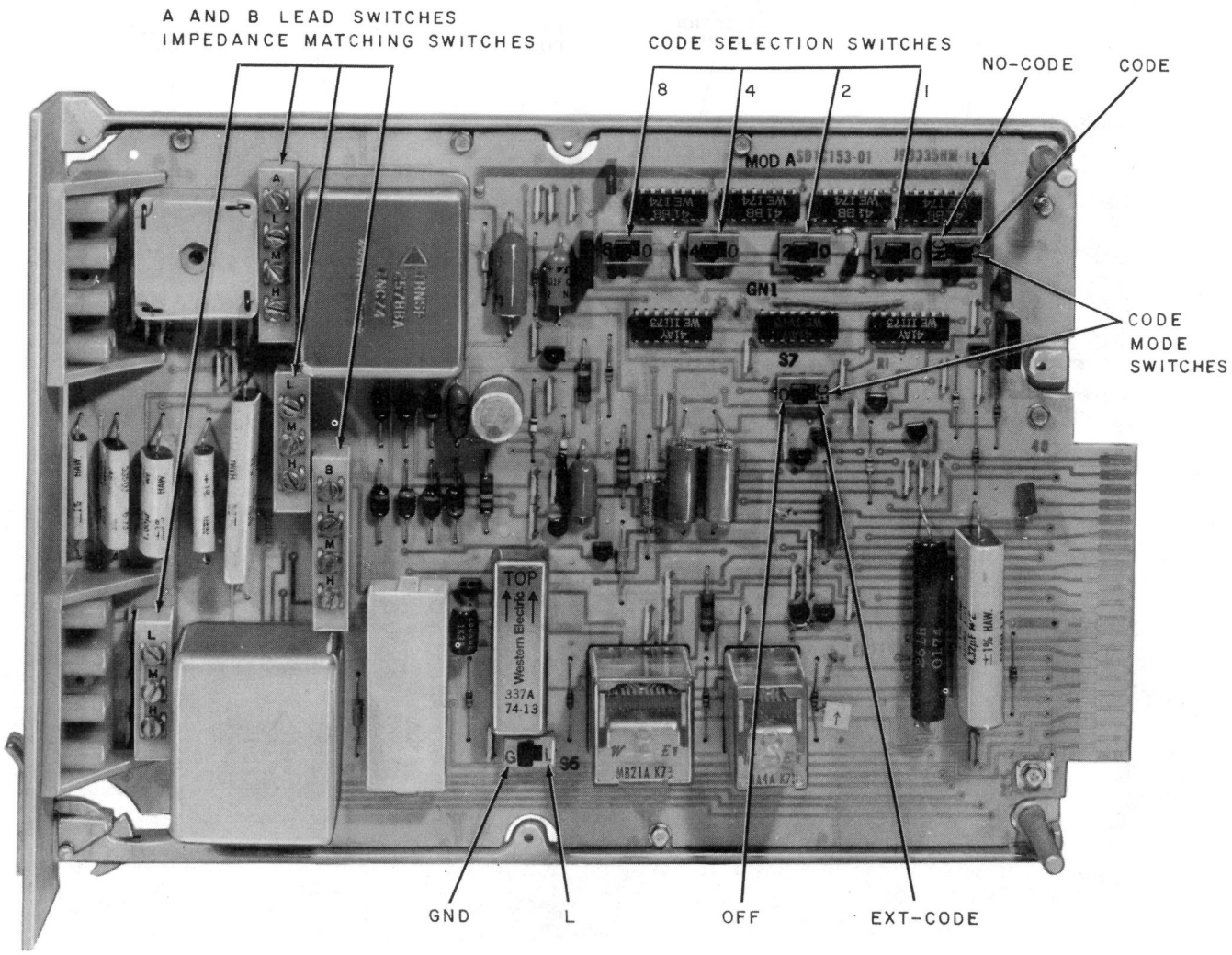

Fig. 8—FHM PC Assembly Showing Coding and Impedance Matching Switches

relay. The release of the E relay provides a closed loop to the E and EG leads for dc output.

5.05 There are two other timer circuits which are used in conjunction with the E relay operate and release timers. They are the end-of-sequence timer and ring timer which are also referred to as 2-second timers. The two circuits are identical with the exception of the input controls and output functions. When the end-of-sequence timer is recycled, ground is applied to the input which in turn puts a ground condition at the output. The grounded output provides a logical 1 on the input of the succeeding logic stages. When the ground is removed from the input, the timer circuit transistors become saturated which provides a logical 0 on the input of the logic circuit. The time interval between the grounded condition and saturation condition is nominally 2 seconds. When the logic circuit is triggered, the R relay operates. Operation of the R relay:

(a) Starts the 2-second timer to time the interval that the relay remains operated.

(b) Applies a local source of ringing voltage to the station loop (assuming the A and B screw switches are closed).

(c) Applies battery to S1 lead and ground to S2 lead.

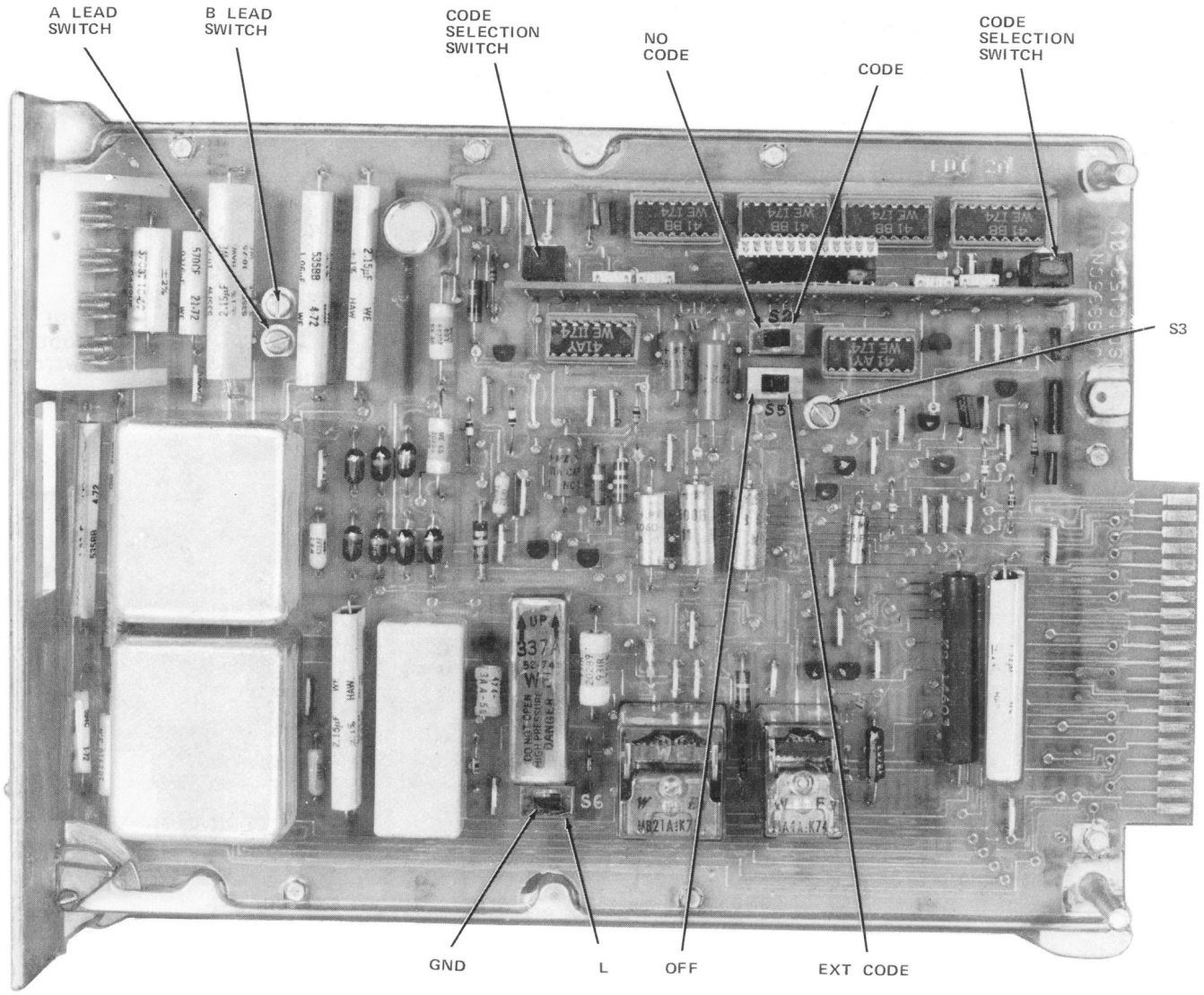

Fig. 9—FGN PC Assembly Showing Coding and Impedance Matching Switches

(d) Applies a cut signal toward the associated FU( ) unit to prevent the ringing voltage from sending noise toward the distant station through the terminating set or line matching network.

B. No-Code Mode

5.06 In the no-code mode of operation, the S5 switch in the FGM and FHM units is in the NC (no-code) position and switch S7 is in the O (off) position. The no-code mode of operation is obtained in the FGN and FHN units by operating switch S2 to the NC position and switch S5 to the O position. The no-code mode is similar to the code mode with the exception that in the no-code mode a single incoming signal burst exceeding 160 ms from the carrier side causes 2 seconds of ringing to be applied to the drop station. When switches S5 and S7 in the FGM and FHM units are operated to the no-code mode, switches S1 through S4 can be operated to any position. When switches S2 and S5 in the FGN and FHN units are operated to the no-code mode, switches S1-1 through S1-7 and S4-1 through S4-8 can be operated to any position. In this mode of operation the end-of-sequence timer is operational but not functional other than to apply a permanent clearing signal when the unit is in idle condition.

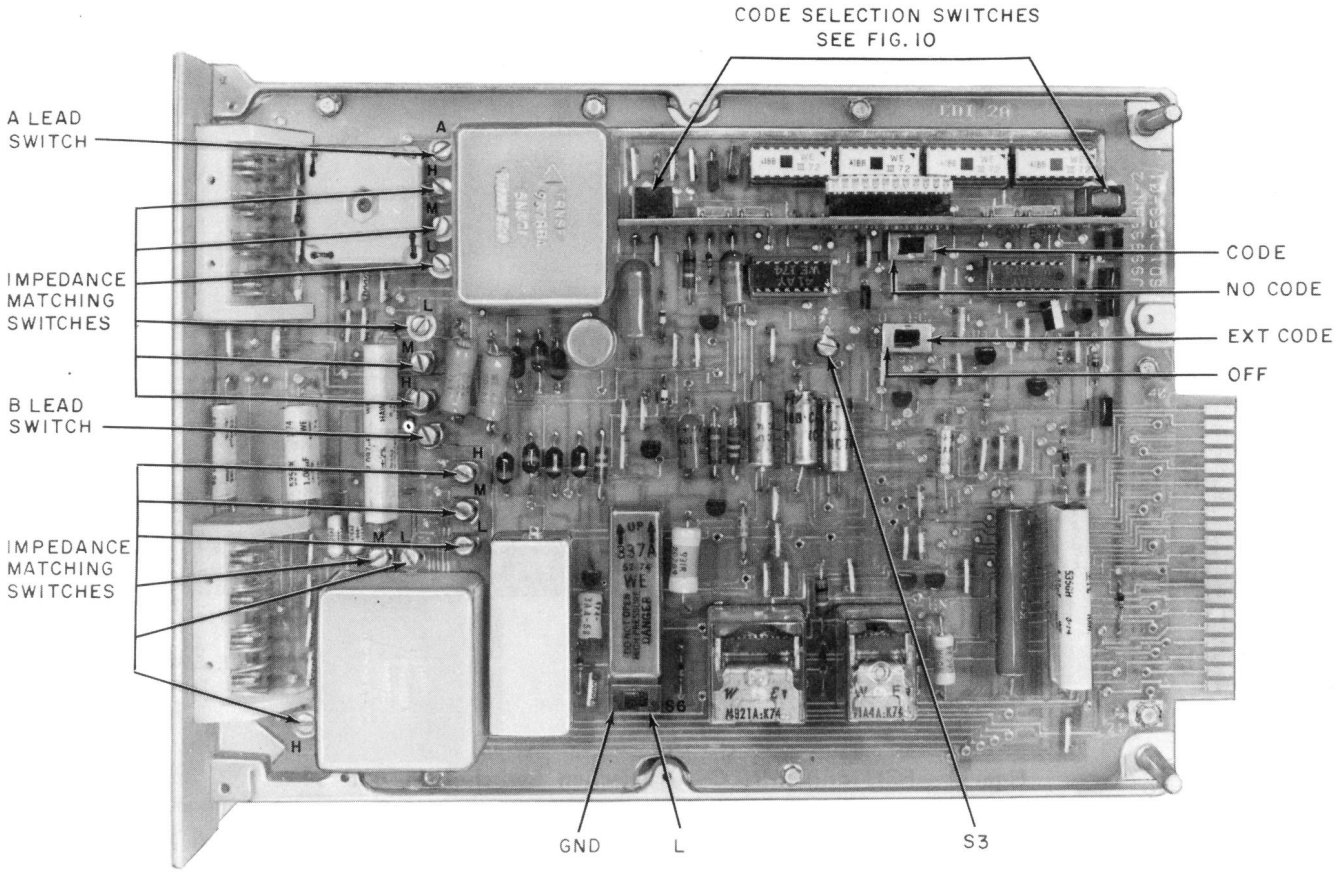

Fig. 10—FHN PC Assembly Showing Coding and Impedance Matching Switches

C. External-Code Mode

5.07 In the external-code mode, the S7 switch in the FGM and FHM units is in the EC (external code) position. The FGN and FHN units are in the external-code mode when switch S5 is operated to the EC position. Switches S1 through S5 in the FGM and FHM units can be operated to any position. In the FGN and FHN units, switches S1-1 through S1-7, S4-1 through S4-8, and S2 can be operated to any position. When a logic 1 signal is applied, the R relay driver operates the R relay. If the E relay is released or remains energized for a long period of time such that the ring timer times out, the R relay will deenergize. Thus, if a 2600-Hz burst is present for longer than nominally 2 seconds, the R relay is deenergized to prevent excessive application of ringing toward the drop station. In this mode, the ring timer is controlled by the E relay operation instead of the R relay as was the case in the two previously discussed modes. The external code mode in the FGN and FHN units has two modes of operation which are controlled by switch S3. When switch S3 is closed (switch is screwed down) the FGN and FHN units are in an unlimited pulse length mode. In this mode, all input pulses are repeated for the same duration of time as received except for approximately 100 ms error guard. When switch S3 is open, the unit is in a pulsing limited mode. In this mode, the pulses are limited to 2 seconds.

6. TRANSMISSION CIRCUITS

6.01 The FGM and FGN units contain a built-in terminating set. It provides conversion from

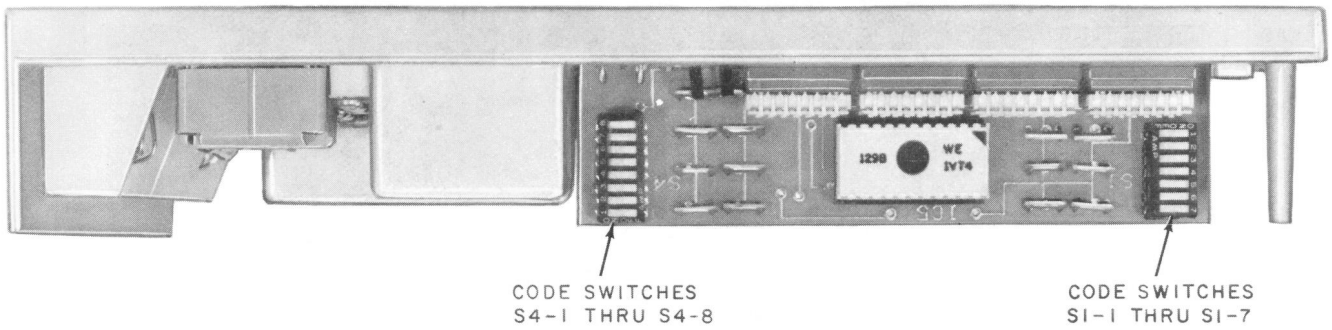

Fig. 11—FGN and FHN Code Selection Switches S1 and S4

2-wire 900-ohm (station side) to 4-wire 600-ohm (FUA or FUD converter side) operation. The conversion is obtained by a 2-transformer hybrid. Build-out capacitance permits balancing against office cabling on the 2-wire side. Capacitance from 0.0 to 0.127μF in .002 steps can be added into the circuit by turning the associated screws down on the face of the FGM unit (Fig. 2). A compromise 900-ohm 2μF network can be used if desired by turning down the COMP NET screw. Access is also provided for connecting to an external precision balancing network if desired. When the FGM or FGN unit is used in conjunction with the FUD converter unit, the COMP NET and NBOC screw switches must be in the open position. Also, when the FUD is used, it is not necessary to use an external precision balancing network since the FUD has a built-in balancing network.

6.02 The FHM and FHN units contain a line matching network which is used with 4-wire cable facilities. Impedance matching is obtained by selecting the proper transformer impedance ratio by the use of screw switches located on the printed wiring board (Fig. 8 and 10). Both transmitting and receiving cable pairs must be matched. Transformer T401 is associated with the T and R leads, and transformer T402 is associated with the T1 and R1 leads. The L(150), M(600), and H(1200) screw switches associated with each transformer are to be turned down as determined by the following:

SCREW SWITCH	SPECIFIC USE
H(1200)	To be used when cable extension associated with FHM and FHN signaling link is loaded H88 cable (see Tables C through G).
M(600)	To be used when associated FHM and FHN signaling link is a nonloaded short length cable (see Table H, column 1).
L(150)	To be used when cable extension associated with FHM and FHN signaling link is a nonloaded, long length cable (see Table H, columns 2 and 3).

Note: When screw switches L(150) and M(600) are operated per Table H, the IN switch on the faceplate should be screwed out and the screw switches R250, R500, R1000, and R2000 on the faceplate should be screwed in. Screw switches C.25, C.5, C1.0, and C2.0 can be in any position.

6.03 When the 4-wire extension is H88 loaded cable, additional resistance and capacitance can be added for equalization by opening or closing the screw switches located on the faceplate (see Fig. 2). The additional resistance and capacitance is independently controlled for low and high frequency equalization. The insertion loss, from the cable toward the FUA unit, of the FHM and FHN units will vary from 3.5 to 6.5 dB at 1000 Hz when the equalization controls are adjusted. The insertion loss, from the FUA toward the cable, of the FHM and FHN units is 0.5 dB minimum. If these controls are not set as prescribed in the Prescription Adjustment Tables (Tables C through G), the insertion losses could be as high as 20 dB. The high-frequency section is controlled by screw switches IN, R75, R150, R300, R600, R1200, and R2400. The low-frequency section is controlled by screw switches C.25, C.50, C1.0, C2.0, R250, R500, R1000, and R2000. Screwing down capacitance screw switches adds capacitance whereas screwing down resistance screw switches reduces the total resistance. Prescription settings for various gauges and lengths of H88-type cables are shown in Tables C through G. These tables assume operation into a 24V4 repeater or equivalent at the far end of the cable.

7. MAINTENANCE

7.01 There are no field maintenance adjustments provided on the FGM, FGN, FHM, or FHN units. When a unit does not meet circuit requirements, it should be sent to Western Electric Company for repair. Defective units should be replaced with spare units.

7.02 The type F test extender SD-1C241-02 is provided to gain access to the transmission and signaling ports. When the test extender is used, it will be necessary to remove the single frequency units from the bay. The test extender provides jack access to all transmission and signaling ports of the single frequency units. (See Section 179-361-101.)

7.03 Descriptive or test practices on other related components within the Type F Signaling System can be found under individual component headings in the BSP index 179-000-000.

TABLE A

FGM AND FHM SWITCH SETTINGS FOR SWITCHES S1 THROUGH S4 FOR CODE NUMBERS 1 THROUGH 15

TABLE OF SWITCH SETTINGS FOR CODE NUMBER SELECTION WHEN OPERATING IN CODE SELECT MODE (S5 IN "CODE", S7 IN "OFF")				
CODE NUMBER	SWITCH SETTING			
	S1	S2	S3	S4
01	1	0	0	0
02	0	2	0	0
03	1	2	0	0
04	0	0	4	0
05	1	0	4	0
06	0	2	4	0
07	1	2	4	0
08	0	0	0	8
09	1	0	0	8
10	0	2	0	8
11	1	2	0	8
12	0	0	4	8
13	1	0	4	8
14	0	2	4	8
15	1	2	4	8

TABLE B

FGN AND FHN SWITCH SETTINGS FOR CODE NUMBERS 1 THROUGH 15

TABLE OF SWITCH SETTINGS FOR CODE NUMBER SELECTION WHEN OPERATING IN CODE SELECT MODE (S2 IN "CODE", S5 IN "OFF")		
SWITCH SETTINGS		CODE NUMBER
GROUP SWITCHES S1___*	GROUP SWITCHES S4___*	
1		01
2		02
3		03
4		04
5		05
6		06
7		07
	1	08
	2	09
	3	10
	4	11
	5	12
	6	13
	7	14
	8	15

* Code is on when switches are in off position (white numbers showing).

TABLE C

PRESCRIPTION ADJUSTMENTS AND COMPONENT VALUES OF EQUALIZER SECTION OF FHM AND FHN FOR CABLE END SECTIONS 1500 THROUGH 4500 FEET

CABLE GAUGE: 19H88HC								
CABLE LENGTH KILOFEET*		12-42	42-60	60-78	78-96	96-108	108-114	114-150
CABLE LENGTH MILES*		2-8.0	8.0-11.4	11.4-14.8	14.8-18.2	18.2-20.5	20.5-21.6	21.6-28.4
SCREW DESIGNATION		SCREW SETTINGS						
HF	IN	o	•	•	•	•	•	•
	75	o	•	•	•	•	•	o
	150	o	•	•	o	•	o	•
	300	o	o	•	o	o	•	•
	600	o	•	•	o	o	o	o
	1200	o	o	o	•	•	•	•
	2400	o	•	•	•	•	•	•
LF	.25	o	o	o	o	o	o	o
	.50	o	o	o	o	o	o	o
	1.00	o	o	o	o	o	o	o
	2.00	o	o	o	o	o	o	o
	250	•	•	•	•	•	•	•
	500	•	•	•	•	•	•	•
	1000	•	•	•	•	•	•	•
	2000	•	•	•	•	•	•	•
HF TOTAL RES. (OHMS)		∞	1500	1200	1050	900	750	675
LF TOTAL CAP. (UF)		0	0	0	0	0	0	0
LF TOTAL RES. (OHMS)		0	0	0	0	0	0	0

* For an exact cable length shown at the top of the table, use the adjustment for the shorter lengths.
Example: For 60 kilofeet, use the adjustment for the range 42-60 kilofeet.

o Indicates "screw up" (3 full turns).

• Indicates "screw down".

TABLE D

PRESCRIPTION ADJUSTMENTS AND COMPONENT VALUES OF EQUALIZER SECTION OF FHM AND FHN FOR CABLE END SECTIONS 1500 THROUGH 4500 FEET

CABLE GAUGE: 22H88						
CABLE LENGTH KILOFEET*		12-18	18-24	24-60	60-90	90-108
CABLE LENGTH MILES*		2-3.4	3.4-4.5	4.5-11.4	11.4-17.0	17.0-20.5
SCREW DESIGNATION		SCREW SETTINGS				
HF	IN	o	●	●	●	●
	75	o	●	●	●	●
	150	o	●	●	●	
	300	o	●	●	o	o
	600	o	●	●	●	o
	1200	o	o	●	o	●
	2400	o	o	o	●	●
LF	.25	o	●	o	o	●
	.50	o	●	●	o	o
	1.00	o	●	●	o	●
	2.00	o	●	●	●	o
	250	●	●	●	●	●
	500	●	●	●	●	●
	1000	●	o	o	o	●
	2000	●	o	o	o	o
HF TOTAL RES. (OHMS)		∞	3600	2400	1500	1050
LF TOTAL CAP. (UF)		o	3.75	3.50	2.0	1.25
LF TOTAL RES. (OHMS)		o	3000	3000	3000	2000

*For a act cable length shown at the top of the table, use the adjustment for the shorter length.

Example: For 60 kilofeet, use the adjustment for the range 24-60 kilofeet.

o Indicates "screw up" (3 full turns).

● Indicates "screw down."

TABLE E

PRESCRIPTION ADJUSTMENTS AND COMPONENT VALUES OF EQUALIZER SECTION OF FHM AND FHN FOR CABLE END SECTIONS 1500 THROUGH 4500 FEET

CABLE GAUGE: 24H88						
CABLE LENGTH KILOFEET*		12-18	18-30	30-42	42-60	60-72
CABLE LENGTH MILES*		2-3.4	3.4-5.7	5.7-8.0	8.0-11.4	11.4-13.6
SCREW DESIGNATION		SCREW SETTINGS				
HF	IN	○	●	●	●	●
	75	○	●	●	●	●
	150	○	●	●	●	●
	300	○	●	●	○	●
	600	○	○	●	●	●
	1200	○	○	●	○	○
	2400	○	○	○	●	●
LF	.25	○	○	○	○	●
	.50	○	●	●	○	●
	1.00	○	●	●	●	○
	2.00	○	○	○	○	○
	250	●	○	●	○	●
	500	●	●	○	○	●
	1000	●	●	●	●	○
	2000	●	●	●	●	●
HF TOTAL RES. (OHMS)		∞	4200	2400	1500	1200
LF TOTAL CAP. (UF)		○	1.5	1.5	1.0	0.75
LF TOTAL RES. (OHMS)		○	250	500	750	1000

*For an exact cable length shown at the top of the table, use the adjustment for the shorter lengths.

Example: For 42 kilofeet, use the adjustment for the range 30-42 kilofeet.

○ Indicates "screw up" (3 full turns).

● Indicates "screw down".

TABLE F

PRESCRIPTION ADJUSTMENTS AND COMPONENT VALUES OF EQUALIZER SECTION OF FHM AND FHN FOR CABLE END SECTIONS 1500 THROUGH 4500 FEET

CABLE GAUGE: 25H88 MAT						
CABLE LENGTH KILOFEET*		10-12	12-18	18-24	24-42	42-60
CABLE LENGTH MILES*		2-2.3	2.3-3.4	3.4-4.5	4.5-8.0	8.0-11.4
SCREW DESIGNATION		SCREW SETTINGS				
HF	IN	o	o	o	o	o
	75	o	o	o	o	o
	150	o	o	o	o	o
	300	o	o	o	o	o
	600	o	o	o	o	o
	1200	o	o	o	o	o
	2400	o	o	o	o	o
LF	.25	o	o	o	●	o
	.50	o	●	o	●	●
	1.00	o	●	●	o	o
	2.00	o	o	o	o	o
	250	●	o	●	●	●
	500	●	●	o	o	o
	1000	●	●	●	o	o
	2000	●	●	●	●	o
HF TOTAL RES. (OHMS)		∞	∞	∞	∞	∞
LF TOTAL CAP. (UF)		o	1.5	1.0	.75	.5
LF TOTAL RES. (OHMS)		o	250	500	1500	3500

*For an exact cable length shown at the top of the table, use the adjustment for the shorter lengths.

Example: For 60 kilofeet, use the adjustment for the range 24-60 kilofeet.

o Indicates "screw up" (3 full turns).

●Indicates "screw down".

Note: No HF equalization is required for MAT cable.

TABLE G

PRESCRIPTION ADJUSTMENTS AND COMPONENT VALUES OF EQUALIZER SECTION OF FHM AND FHN FOR CABLE END SECTIONS 1500 THROUGH 4500 FEET

CABLE GAUGE: 26H88							
CABLE LENGTH KILOFEET*		0-12	12-18	18-24	24-30	30-36	36-42
CABLE LENGTH MILES*		2-2.3	2.3-3.4	3.4-4.5	4.5-5.7	5.7-6.8	6.8-8.0
SCREW DESIGNATION		SCREW SETTINGS					
HF	IN	o	●	●	●	●	●
	75	o	o	o	o	o	o
	150	o	o	o	o	o	o
	300	o	o	o	o	o	o
	600	o	o	o	o	o	o
	1200	o	o	o	o	o	o
	2400	o	o	o	o	o	o
LF	.25	o	●	●	●	o	o
	.50	o	●	●	●	●	●
	1.00	o	o	o	o	o	o
	2.00	o	o	o	o	o	o
	250	●	o	●	o	o	●
	500	●	●	o	o	●	●
	1000	●	●	●	●	o	●
	2000	●	●	●	●	●	o
HF TOTAL RES. (OHMS)		∞	4725	4725	4725	4725	4725
LF TOTAL CAP. (UF)		o	0.75	0.75	0.75	0.50	0.50
LF TOTAL RES. (OHMS)		o	250	500	750	1250	2000

* For an exact cable length shown at the top of the table, use the adjustment for the shorter lengths.

Example: For 30 kilofeet, use the adjustment for the range 24-30 kilofeet.

o Indicates "screw up" (3 full turns).

● Indicates "screw down".

TABLE H

NONLOADED REPEATER SECTION				
	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	(600-600)	(150-600)	(150-150)	(150-150)
WIRE GAUGE	SHORT LENGTH	MEDIUM LENGTH	LONG LENGTH	EXTRA LONG LENGTH
19LC*	8 — 11 Kf	11.1 — 18 Kf	18.1 — 33Kf	33.1 — 45 Kf
19HC†	7 — 9	9.1 — 16	16.1 — 28	28.1 — 38
22	4 — 8	8.1 — 14	14.1 — 22	22.1 — 30
24	3 — 7.5	7.6 — 12	12.1 — 17	17.1 — 22
25 MAT	3 — 9.0	9.1 — 12.5	12.6 — 17	17.1 — 24
26	2 — 7	7.1 — 10	10.1 — 15	15.1 — 20

* Low Capacitance

† High Capacitance

Note 1: In computing the length of a facility, include the length of all bridged taps. Gauge of bridge taps is immaterial.

Note 2: The upper lengths in columns 1 through 3 have been chosen to limit the loss at 3-kHz to about 1.0 dB more than at 1 kHz.

Note 3: The ranges of lengths in column 4 confine the 3-kHz roll-off to the range 1.0 to 3.0 dB.

Note 4: The impedance values (600-600), (150-600), and (150-150) shown above indicate the impèdance at the F-signaling unit (first value) and at the far end equipment (second value).