

359H EQUALIZER DESCRIPTION

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1. GENERAL

1.01 This section describes the 359H equalizer, which is a plug-in apparatus unit designed for use in V4 telephone repeater applications.

1.02 The 359H equalizer is an unbalanced 600-ohm constant-resistance bridged-T loss equalizer with insertion loss characteristics which increase with increasing frequency. This equalizer provides positive slope loss equalization with a choice of nine loss-frequency characteristics with up to 4.5 dB of loss shape in the frequency band from 400 to 3200 Hz. It is used primarily in 44V4B repeater data and special-service circuit applications to loss equalize the overall voice-frequency characteristics of loaded cable or carrier channels.

2. EQUIPMENT DESCRIPTION

2.01 The 359H equalizer (see Fig. 1) is a plug-in unit equipped with a 20-pin connector designed to be plugged directly into the equalizer socket of a repeater mounting shelf.

2.02 The 359H equalizer consists of 14 resistors, 2 inductors, and 3 capacitors mounted on two printed wiring boards and housed in a metal can approximately 1-3/4 inches high by 1-3/4 inches wide by 7 inches long. Tabs are provided on the front of the can to facilitate removal of the equalizer from the repeater mounting shelf by the use of a 602C or 602D tool.

2.03 Twelve screw-type switches mounted on the faceplate permit adjustment of the equalizer. The equalizer arms (series and shunt) and the

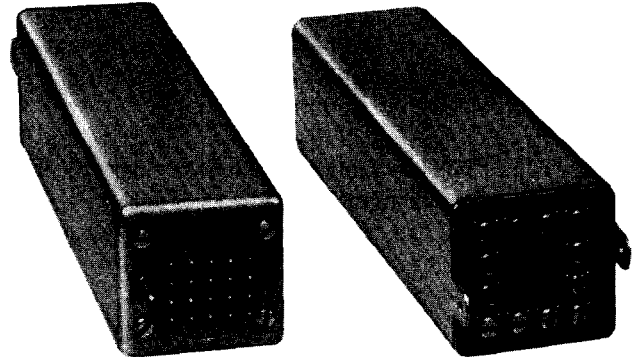


Fig. 1—359H Equalizer

resistors controlled by each switch are permanently marked on the faceplate.

3. CIRCUIT DESCRIPTION

3.01 Figure 2 is the schematic of the 359H equalizer and shows typical circuit connections for the equalizer as used in a 44V4B repeater for association with a data trunk. For this application, shelf wiring provides connections from the 4-wire line through the equalizer to the 600-ohm sides of the 227-type amplifiers. At the same time, the equalizer proper (terminals 6, 8, 9) is wired in tandem with the receiving amplifier input circuit, where it works between nominal 600-ohm terminations. Also provided on the transmitting 4-wire side are connections to the AMPL OUT and MON jacks through terminals 19, 14 and 12, 17. For some other repeater applications, connections are made through shelf wiring to the equalizer alone (terminals 6, 8, 9).

3.02 The actual equalizer circuit consists of a one-section bridged-T loss equalizer with an input between terminals 6 and 8 and an output between terminals 9 and 8, with terminal 8 being the common ground terminal. The series arm is made up of a series LC circuit in parallel with a series string of six resistors (R7 through R12)

which are individually added to or removed from the circuit by operating their associated faceplate screw-type switches. The shunt arm consists of a parallel LC circuit in tandem with a series string of six resistors (R1 through R6) which are individually controlled by operating their associated faceplate screw-type switches. The bridge arm consists of two 600-ohm resistors, R13 and R14. The resistors in both the series and shunt arms are bypassed when their associated screw-type switches are closed (turned in) and are included in the circuit when the switches are opened (turned out).

3.03 The 359H equalizer insertion loss between 600-ohm terminations increases with increasing frequency. As the frequency increases above 350

Hz, the series arm impedance increases and the shunt arm impedance decreases (both LC circuits resonate at 350 Hz). This results in an increasing insertion loss with increasing frequency, with the slope being controlled by the values of the resistors in each arm. Figure 3 shows nine insertion loss curves and the faceplate switch settings necessary to produce them. The insertion loss at 2225 Hz is provided for each of the characteristic curves.

3.04 Representative values of the envelope delay distortion of the 359H equalizer for five settings of the faceplate screw-type switches are provided in Table A. The distortion is in microseconds relative to 1800 Hz, and the switch settings for each curve are given in Fig. 3.

TABLE A
359H EQUALIZER — ENVELOPE DELAY DISTORTION

EQL CURVE NO.	FREQUENCY IN HZ										
	300	500	800	1000	1500	1800	2100	2600	2800	3000	3200
1	85	20	-5	0	0	0	0	0	0	0	0
2	130	60	5	0	0	0	0	0	0	0	0
3	140	85	25	10	0	0	0	0	0	0	0
4	150	95	40	25	0	0	0	0	0	0	0
6	150	90	50	35	5	0	-5	-10	-10	-10	-10

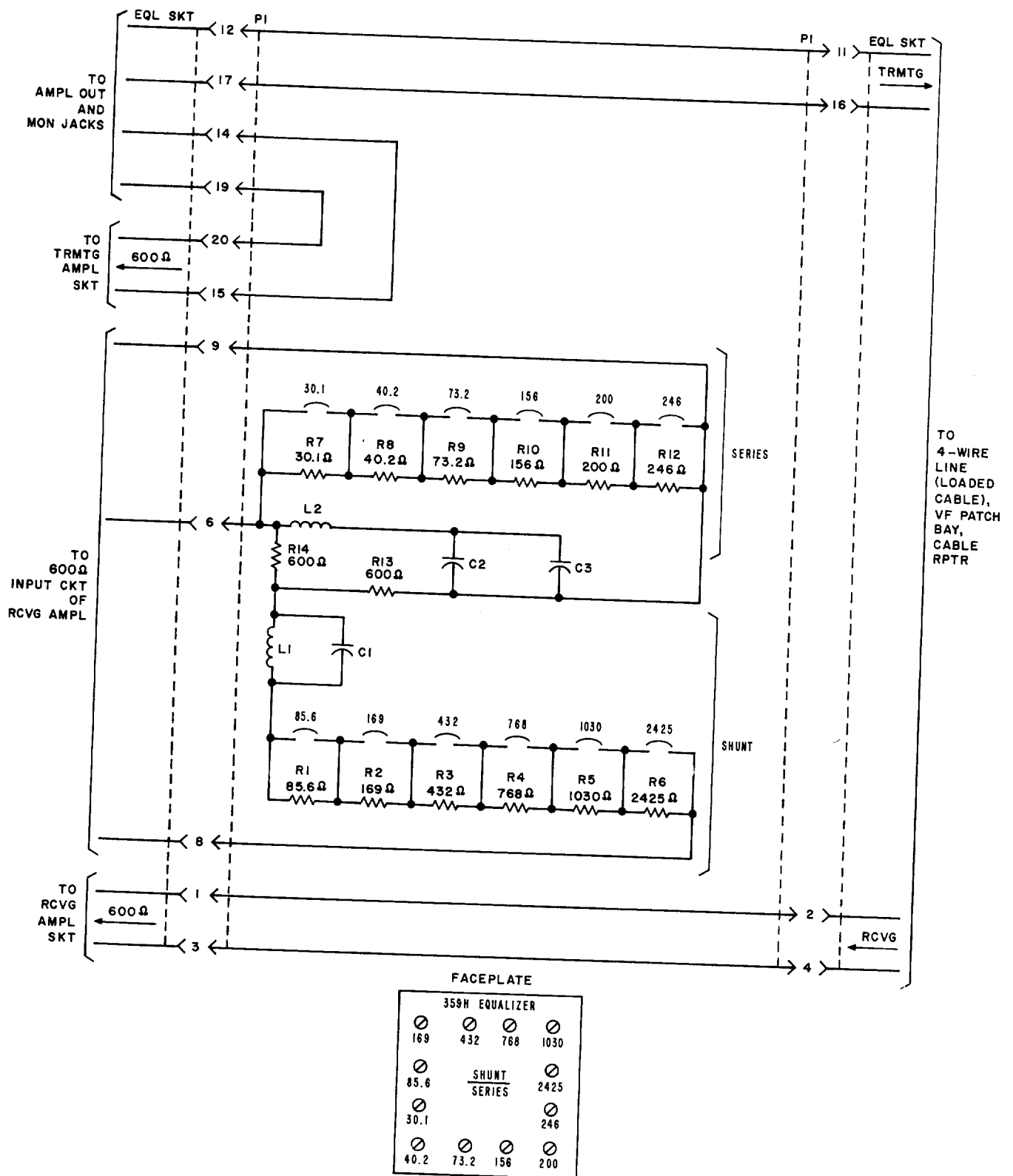
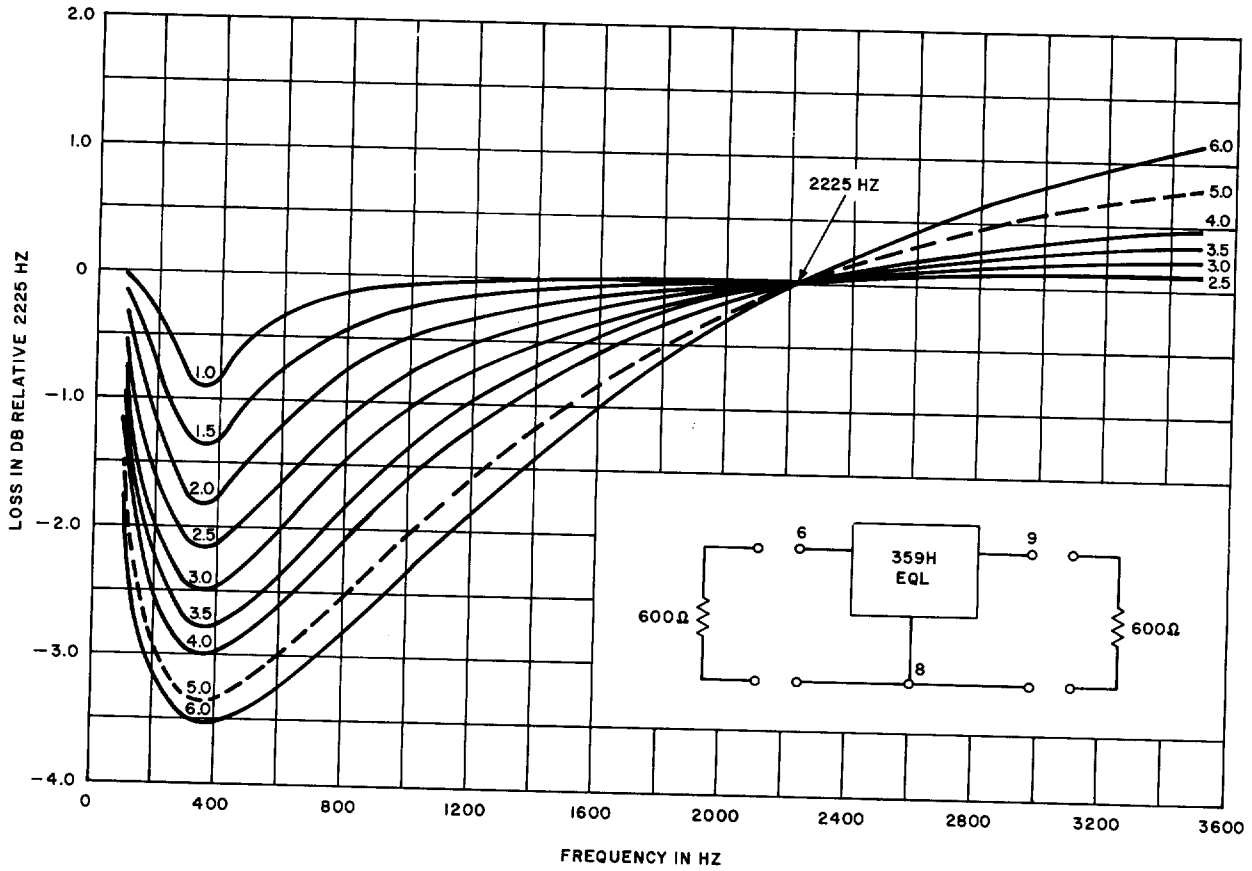


Fig. 2—359H Equalizer—Schematic—Typical Circuit Connections for 44V4B Repeater Associated With Data Trunk



CURVE NO.	INSERTION LOSS (DB) AT 2225 HZ	SCREW SETTINGS X INDICATES SCREWS TO BE TURNED OUT (SW OPEN)													
		SERIES						SHUNT							
		30.1	40.2	73.2	156	200	246	TOTAL OHMS	85.6	169	432	768	1030	2425	TOTAL OHMS
6	3.7				X	X	X	602		X	X				601
5	3.6	X	X		X		X	469.4				X			768
4	3.2	X		X			X	349.3					X		1030
3.5	3.0	X	X	X	X			299.5		X	X				1200
3	2.6						X	246		X		X			1462
2.5	2.4					X		200				X	X		1798
2	2.0				X			156	X		X	X	X		2315.6
1.5	1.5		X	X				113.4				X		X	3193
1	1			X				73.2	X	X	X	X	X	X	4909

Fig. 3—359H Equalizer—Insertion Loss-Frequency Characteristics—600-Ohm Terminations