QVF7D AND QVF7E 4-WIRE REPEATER UNITS DESCRIPTION AND INITIAL ADJUSTMENTS PROGRAM OPERATING CENTER

CONTENTS PAGE

1. GENERAL

1.01 The QVF7D and QVF7E 4-wire repeater units (see Fig. 1) provide net-gain adjustment (with a continuous range of −9 through 36 dB), 20-dB insertion loss switches for both the Transmit (TRMT) and receive (RCV) paths, and switch selectable input and output impedances. In addition, the QVF7D repeater unit provides switch selected adjustable equalization. All adjustment settings for gain and equalization are selected independently for the transmit and receive transmission paths.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 The QVF7D and QVF7E units are compatible with the universal wiring of the VF-300 system. Input power can be either −48 V or −24 Vdc.

Applications

1.04 Applications for the QVF7D and QVF7E 4-wire repeater units include data or voice services using either terminal or intermediate repeater configurations.

References

SD6777-01	QVF7A, B, D, E Plug-in Units, 4-Wire Repeater
SD6751-01	Unified Voice Frequency VF-300, Application Schematic

2. DESCRIPTION

Adjustment Controls

2.01 Figure 1 shows the locations of the adjustment controls and monitor points used in the field.

- The continuous range TRMT and RCV gain controls are screwdriver adjusted through holes on the faceplate.
- Each of the two 20-dB pad switches is a 2-position switch for inserting or bypassing the respective pad.
- The impedance selection switches are 3-position, slide switches corresponding to 150, 600, 1200 ohms.
- QVF7D Only. The two equalizers are adjusted by appropriate combinations of closed and open switches in the corresponding group.
- Optional dc-signaling paths and external connections are selected by switches.

Impedance Selection

2.02 Except where a deliberate mismatch is desired for some equalization of the frequency response of nonloaded cable, the impedances will be selected to suit the impedance of the external cable or equipment connected to the unit (Fig. 2, S1 through S4).

EQUALIZATION SELECTION (QVF7D only)

Nonloaded Cable

2.03 The nonloaded cable is usually equalized using the mismatch-termination method by setting the impedance switches to either 600 or 150 ohms as indicated in Table B, and bypassing the loaded cable equalizer of the repeater unit. However, if the length of the nonloaded cable and the equalization requirements exceed those specified in the table, refer to the line-up procedure in Chart 2 of this section.

Loaded Cable

2.04 The loaded-cable equalizers are capable of equalizing H88-, D66-, and H44-loaded cables. The prescription settings for various gauges and lengths of H88-loaded cable are given in Tables B and C. The equalizer switches are set closed or open in combinations that either bypass the equalizer or select the equalization required. As a general rule, both equalizers are used where the QVF7D is an intermediate repeater, or the transmit equalizer is bypassed where the unit is used as a terminal repeater.

GAIN (Fig. 2)

2.05 The amplifiers are composed of integrated circuits with external negative-feedback networks designed to give fixed gains of 36 dB, nominal. A potentiometer (TRMT gain or RCV gain) at the input to each amplifier provides a continuous range of adjustment of the input level for the required value of insertion loss or gain. A scale, marked in 3-dB increments, from −9 dB through +36 dB, is printed on the faceplate of the unit to provide an approximate indication of the overall insertion loss or gain of the unit. Typically the gain controls may be set to give output levels as follows:

(a) To transmission cables: 0 through +3 dBm

(b) To switching equipment: −2 through 0 dBm

(c) To adjacent unit of 2- or 3-unit arrangement: up to +10 dBm (but should never be set for an output level higher than +10.5 dBm).

An additional 20-dB loss can be switched into the TRMT and RCV transmission paths using switches SP and SQ, respectively.

SIGNALING PATH SELECTION

2.06 Signaling paths through this unit are selected by suitable combinations of closed and open contacts on switches SE, SF, and SL according to the requirements for the particular circuit; see Fig. 3 and Table D. If simplex signaling is not required, contacts SE-2 and SE-5 are closed and all other contacts of SE, SF, and SL are open. This combination provides a direct connection from the input (drop) side to the output (line) side of the unit for the leads designated SX1 and SX2, which may be used for E&M or other connections.

Monitor Points (Fig. 1, 2)

2.07 These are high impedance bridging points at the outputs of the transmit and receive sec-

tions which are intended for use in tracing a source of trouble with a high impedance handset (QSE4B2 with W2QL cord) or transmission measuring set.

3. INITIAL ADJUSTMENTS AND TESTS

3.01 The procedures are given in the following charts:

Chart 1 — QVF7D and QVF7E, Preliminary Adjustments

Chart 2 — Equalizer Adjustment, QVF7D, Nonloaded Cable

Chart 3 — Gain Measurement and QVF7D and QVF7E, Adjustment.

The steps of each procedure should be followed in the sequence given.

Test Apparatus

3.02 The portable test apparatus and cords required for Charts 2 and 3 are listed in Table A. Figures 4 and 6 show the arrangements of the test apparatus.

CHART **PAGE**

CHART 1

QVF7D AND E, PRELIMINARY ADJUSTMENTS

APPARATUS:

None

REFERENCES: Circuit layout information, Fig. 1.

Note: Use the referenced table only if actual settings are not given in the circuit layout information.

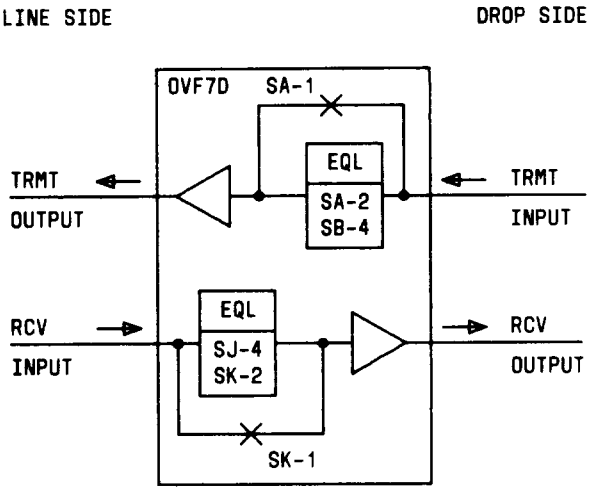
STEP	PROCEDURE
1	IMPEDANCE SWITCHES. Set switches S1 through S4 to the 600-ohm position. ***Note:*** The above settings may require changing to the settings specified in the circuit information after gain measurement and adjustment (Chart 2).

CHART 1 (Contd)

STEP	PROCEDURE

Transmit: Close SA-1 switch
Open SA-2 and SB-3 switches.

Receive: Close SK-1 switch
Open SJ-4 and SK-2 switches.



3 SIGNALING PATH SWITCHES. Set switches SE, SF, and SL (Table D).

4 GAIN CONTROLS. Set the TRMT and RCV controls to a scale value approximately equal to the values specified in the circuit layout information. Proceed to Chart 2.

CHART 2

QVF7D—EQUALIZER ADJUSTMENT NONLOADED CABLE

APPARATUS:

Table A

REFERENCES: Circuit layout information, Fig. 1 and 4.

Note: The following end-to-end measurement and adjustment procedure is used only when the mismatch-terminating method of equalization is inadequate, such as where the cable is very long or C3 line-conditioning is a specified requirement.

STEP	PROCEDURE
1	Connect the QVF7D units, to Transmission Measuring Set (TMS), and the oscillator as shown in Fig. 4.
2	Set equalizer-selection switches as shown in Table B. Set impedance switches as shown in Fig. 4.
3	Set TRMT and RCV gain controls to approximately 0 dB.
	Note: Part A covers the procedure for adjusting the receive-side equalizer. Part B covers the procedure for adjusting the transmit side equalizer.
A. Receive-Side Equalizer Line-Up	
4	Bypass the transmit equalizer: SA-1 closed, SA-2 and SB-4 open.
5	Set oscillator output to 600-ohm balanced and 0 dBm.
6	Set the TMS to 600-ohm balanced and terminated.
7	Short-out the LF section of the equalizer by closing SK-1.
	Note: For most nonloaded cables of up to 8 kilometres (5 miles) it is possible to equalize the facility using only the HF section of the equalizer.
8	Connect the HF section by closing SK-2.
9	Set R20 fully clockwise; and close switches SJ-1, SJ-2, SJ-3, SK-3, SK-4, and SK-5.

CHART 2 (Contd)

STEP	PROCEDURE
10	Adjust oscillator for 3 kHz; measure and record received level.
11	Adjust oscillator for 500 Hz; measure received level, and: (a) If received level is lower than that of Step 10, the resistance in series with the LC tank circuit must be increased in steps of 80 ohms by setting switches SJ-1 through SJ-3, and SK-3 through SK-5; see Fig. 5. Fine adjustment is by means of R20 until the levels are equal. (b) If the received level is higher than that at Step 10 turn R20 counterclockwise for equals levels.
12	Repeat Steps 10 and 11, and record received levels.
13	Adjust oscillator to 1000 Hz; measure and record received level.
14	Adjust oscillator to 300 Hz; measure and record received level. If the levels measured at Steps 12, 13, 14 are within the specified limits, the procedure is complete—proceed to Chart 3. ***Note:*** Where equalization using only the HF section is not adequate (usually for cables longer than 8 kilometres [5 miles]) the LF section of the equalizer must be used with the HF section; proceed with Step 15.
15	Open SK-1.
16	As a starting point, select the largest capacitance and smallest resistance values of the LF section (Fig. 5): (b) 1.87 μF: switches SG-1 through SG-4 closed. (b) 180 ohms: switch SH-5 open.
17	Repeat Steps 10 through 14. If necessary, adjust the LF resistance in steps of 80 ohms by SJ-5 and SH-1 through SH-5. ***Note 1:*** The LF section affects the slope as well as the attenuation of the equalizer. ***Note 2:*** The LF-capacitance value should be kept constant while setting the LF and HF resistance values. If adequate equalization cannot be obtained using 1.87 μF, gradually decrease the capacitance value and repeat Steps 10 through 17.

CHART 2 (Contd)

STEP	PROCEDURE

Proceed to Chart 3 when equalization is within specified requirements.

B. Transmit-Side Equalizer Line-Up (Nonloaded Cable)

18 Bypass the receive equalizer: SK-1 closed, SJ-4 and SK-2 open.

19 Set oscillator output to 600-ohm balanced and 0 dBm.

20 Set TMS to 600-ohm balanced and terminated.

21 Short-out the LF section of the equalizer by closing SA-1.

Note: For most nonloaded cables of up to 8 kilometres (5 miles) it is possible to equalize the facility using only the HF section of the equalizer.

22 Connect the HF section by closing SA-2.

23 Set R19 fully clockwise; and close switches SB-1, SB-2, SB-3, SA-3, SA-4, and SA-5.

24 Adjust oscillator for 3 kHz; measure and record received level.

25 Adjust oscillator for 500 Hz; measure received level, and:

(a) If received level is lower than that of Step 24, the resistance in series with the LC tank circuit must be increased in steps of 80 ohms by setting switches SB-1 through SB-3, and SA-3 through SA-5; see Fig. 5. Fine adjustment is by means of R19 until the levels are equal.

(b) If the received level is higher than that at Step 24, turn R19 counterclockwise for equal levels.

26 Repeat Steps 24 and 25, and record received levels.

27 Adjust oscillator to 1000 Hz; measure and record received level.

28 Adjust oscillator to 300 Hz; measure and record received level.

If the levels measured at Steps 26, 27, 28 are within the specified limits, the procedure is complete; proceed to Chart 3.

Note: Where equalization using only the HF section is not adequate (usually for cables longer than 8 kilometres [5 miles]) the LF section of the equalizer must be used with the HF section; proceed with Step 29.

CHART 2 (Contd)

STEP	PROCEDURE
29	Open SA-1.
30	As a starting point, select the largest capacitance and smallest resistance values of the LF section (Fig. 5): (a) 1.87 μF: switches SD-1 through SD-4 closed. (b) 80 ohms: switch SC-5 open.
31	Repeat Steps 24 through 28. If necessary, adjust the LF resistance in steps of 80 ohms by SB-5, and SC-1 through SC-5. ***Note 1:*** The LF section affects the slope as well as the attentuation of the equalizer. ***Note 2:*** The LF-capacitance value should be kept constant while setting the LF and HF resistance values. If adequate equalization cannot be obtained using 1.87 μF, proceed by gradually decreasing the capacitance value and repeating Steps 24 through 31. Proceed to Chart 3 when equalization is within specified requirements.

CHART 3

QVF7D AND QVF7E—GAIN MEASUREMENT AND ADJUSTMENT

APPARATUS:

Table A

REFERENCES: Circuit layout information, Fig. 1 and 6.

CHART 3 (Contd)

STEP	PROCEDURE
1	Connect the QVF7D or QVF7E repeater unit to its shelf receptacle as follows: (a) Insert the unit in the test extender unit, and connect the cord of the extender unit to the shelf receptable if a bay jackfield is not provided, ***OR*** (b) Insert the unit directly in its shelf position if a bay jackfield is provided. If the QVF7D or QVF7E unit is part of a circuit assembly of two or more units, replace the other units(s) with through-connector unit(s) QVF20A for the duration of this procedure. ***Note:*** If other units of a circuit assembly of two or more units are not replaced by through-connector units the gain indicated at the bay jackfield will be the net gain of the overall assembly, not that of the repeater unit alone.
	TRANSMIT GAIN
2	Using cord 3P7B connect the output of the oscillator to the input of the transmission measuring set.
3	Set the frequency of the oscillator to 1000 Hz. Set the output impedance of the oscillator and the input impedance of the transmission measuring set to 600 ohms.
4	Refer to the circuit layout information for the transmit gain required. The gain figure is the same as the negative value of dBm output level required from the oscillator. Set the oscillator output level for this value as indicated on the transmission measuring set.
5	Without disturbing the settings of the oscillator, remove cord 3P7B. Connect the oscillator and transmission measuring set as shown for Step 5 on Fig. 6.
6	Read the level indication on the transmission measuring set and adjust the transmit gain control (Fig. 1) as required. ***Requirement:*** −0.1 to +0.1 dBm.
	RECEIVE GAIN
7	Refer to the circuit layout information for the gain required and repeat Steps 2 through 6 as applicable to the receive section. ***Requirement:*** −0.1 to +0.1 dBm.

CHART 3 (Contd)

STEP	PROCEDURE

INPUT AND OUTPUT IMPEDANCES

8 Disconnect all test apparatus and remove the repeater from the test extender or shelf.

9 Set each of the four impedance switches as specified in the circuit layout information. If the settings are not specified the following may be used as a guide:

CIRCUIT LAYOUT INFORMATION (CONNECTIONS)	IMPEDANCE SWITCHES (OHMS POSITIONS)
Office Equipment	600
Loaded Cable	1200
Nonloaded Cable	150* or 600*

* See Table B.

INSTALLATION AND PRESERVICE TEST

10 Insert the QVF7D or QVF7E unit in its assigned shelf position.

If the unit forms part of a circuit assembly of two or more units, perform the initial procedures given in practice(s) for the other units(s). Then proceed to Step 11.

11 Perform final end-to-end tests in accordance with existing standard practice.

TABLE A

TEST APPARATUS REQUIRED

NAME AND CODE-TYPE (Note 1)	QUANTITY
APPARATUS	
1000 Hz, 600-ohm Oscillator Hewlett-Packard 236A (Note 2)	1
600-ohm Transmission Measuring Set, Northeast Electronics TTS-37B, or Hewlett-Packard 3555B (Note 2)	1
Test Extender Unit, Northern Telecom J6738F (Note 3)	1
CORDS	
Cord with 310 plug on end and miniature plug on other end: Northern Telecom P3Q3A.	2
Cord with 310 plug on each end: Northern Telecom 3P7B	1

Notes:

1. Alternative test apparatus should be electrically equivalent to those given above.

2. If available, the Northeast Electronics, Transmission Test Set TTS-35B may be used instead of the separate oscillator and transmission measuring set.

3. Where a bay jackfield is provided, it may be used instead of the test extender unit. If the 4-wire repeater unit is part of a circuit assembly of two or more units, the other unit(s) must be temporarily replaced by through connector unit(s) QVF20A. The temporary replacement is necessary to isolate the unit under test, and to through-connect it directly to the jackfield.

TABLE B

QVF7D—EQUALIZER SELECTION SWITCH SETTINGS

CABLE TYPE	SWITCH SETTINGS (X IS CLOSED, — IS OPEN)								EQUALIZATION SETTINGS
	S1 (TRMT), S3 (RCV)			SM (TRMT), SN (RCV)					
	150	600	1200	1	2	3	4	5	
H88-Loaded	—	—	X	—	X	X	X	—	See Table C
Nonloaded (Note)	—	—	X	X	—	—	—	X	See Chart 2

TABLE C

QVF7D — EQUALIZER SWITCH SETTINGS, H88-LOADED CABLES (SEE NOTE)

CIRCUIT INFORMATION		SWITCH SETTINGS (X IS CLOSED, — IS OPEN)																			
CABLE GAUGE AND LENGTH (NOTE)		SA-(TRMT) SK-(RCV)					SB-(TRMT) SJ-(RCV)					SC-(TRMT) SH-(RCV)					SD-(TRMT) SG-(RCV)				EQL LOSS AT 1 kHz
KILOMETRES	KILOFEET	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	(DB)
19 GAUGE																					
0 to 3.66	0 to 12	—	X	X	—	—	—	—	X	X	X	—	X	X	X	X	X	X	X	X	7.1
3.66 to 5.49	12 to 18	—	X	X	—	X	X	—	—	X	—	—	X	—	—	X	X	—	X	—	7.6
5.49 to 7.31	18 to 24	—	X	X	—	X	—	—	—	X	—	—	—	—	—	—	X	X	—	—	7.4
7.31 to 9.14	24 to 30	—	X	X	X	—	—	—	—	X	X	—	—	—	—	—	X	X	X	X	8.0
9.14 to 10.9	30 to 36	—	X	X	—	—	X	X	—	X	—	—	—	—	—	—	X	X	X	X	7.3
10.9 to 12.8	36 to 42	—	X	X	X	—	—	X	—	X	—	—	X	X	X	—	X	X	X	X	8.2
12.8 to 14.6	42 to 48	—	X	X	—	X	—	—	X	X	X	X	X	X	—	X	X	X	X	X	7.6
14.6 to 16.4	48 to 54	—	X	X	—	X	X	—	X	X	X	X	X	X	—	X	X	X	X	X	7.9
16.4 to 18.3	54 to 60	—	X	X	—	—	—	X	—	X	X	X	X	X	—	X	X	X	X	X	7.3
18.3 to 20.1	60 to 66	—	X	—	X	X	—	X	X	X	X	X	X	X	X	—	X	X	X	X	7.2
20.1 to 21.9	66 to 72	—	X	X	X	—	X	—	X	X	X	X	X	X	—	—	X	X	X	X	7.4
21.9 to 23.7	72 to 78	—	X	X	—	—	X	—	X	X	X	X	X	X	—	—	X	X	X	X	7.4
23.7 to 25.6	78 to 84	—	X	X	—	—	X	—	—	X	X	X	X	X	—	—	X	X	X	X	7.4
25.6 to 27.4	85 to 90	—	X	—	X	—	—	X	X	X	X	X	X	X	—	—	X	X	X	X	6.9
27.4 to 29.3	90 to 96	—	X	—	—	—	—	—	—	X	X	X	X	X	—	X	X	X	X	X	6.8
29.3 to 31.1	96 to 102	—	X	—	—	—	—	—	—	X	X	X	X	X	—	X	X	X	X	X	6.8
31.1 to 32.9	102 to 108	—	X	X	—	X	X	—	X	X	X	X	X	—	X	X	X	X	X	X	7.8
32.9 to 34.7	108 to 114	—	X	—	—	—	—	—	—	X	X	X	X	X	—	—	X	X	X	X	6.7
34.7 to 36.6	114 to 120	—	X	—	—	—	—	—	—	X	X	X	X	X	—	—	X	X	X	—	6.8
36.6 to 38.4	120 to 126	—	X	—	—	—	—	—	—	X	X	X	X	X	—	—	X	X	—	—	6.8
38.4 to 40.2	126 to 132	—	X	—	—	—	—	—	—	X	X	X	X	X	—	—	X	—	X	—	6.9
40.2 to 42.1	132 to 138	—	X	—	—	—	—	—	—	X	X	X	X	X	—	—	X	—	X	—	6.9
42.1 to 43.9	138 to 144	—	X	—	—	—	—	—	—	X	X	X	X	—	—	—	X	—	—	X	6.8
43.9 to 45.7	144 to 150	—	X	—	—	—	—	—	—	X	X	X	X	X	—	—	X	—	—	—	7.1
45.7 to 49.4	150 to 162	—	X	—	—	—	—	—	—	X	X	X	X	X	—	—	—	X	X	X	7.2

Note: This table is valid only for end-sections in the range between 0.46 and 1.37 kilometers (1.5 and 4.5 kilofeet). Switch settings for cables with end-sections outside this range must be given in the circuit information.

TABLE C (Contd)

QVF71—EQUALIZER SWITCH SETTINGS, H88-LOADED CABLES*

CIRCUIT INFORMATION		SWITCH SETTINGS (X IS CLOSED, — IS OPEN)																			
CABLE GAUGE AND LENGTH (NOTE)		SA-(TRMT) SK-(RCV)					SB-(TRMT) SJ-(RCV)					SC-(TRMT) SH-(RCV)					SD-(TRMT) SG-(RCV)				EQL LOSS AT 1 kHz
KILOMETRES	KILOFEET	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	(DB)
49.4 to 52.0	162 to 174	—	X	—	—	—	—	—	—	X	X	X	X	X	—	—	—	X	X	—	7.3
52.0 to 56.7	174 to 186	—	X	—	—	—	—	—	—	X	X	X	X	—	X	X	—	X	—	X	7.4
56.7 to 60.3	186 to 198	—	X	—	—	—	—	—	—	X	X	X	X	—	X	X	—	X	—	X	7.4
60.3 to 64.0	198 to 210	—	X	—	—	—	—	—	—	X	X	X	X	—	X	X	—	X	—	X	7.4
64.0 to 67.7	210 to 222	—	X	—	—	—	—	—	—	X	X	X	X	—	X	—	—	X	—	—	7.4
67.7 to 71.3	222 to 234	—	X	—	—	—	—	—	—	X	X	X	X	—	X	—	—	—	X	X	7.9
71.3 to 75.0	234 to 246	—	X	—	—	—	—	—	—	X	X	X	X	—	X	—	—	—	X	X	7.9
75.0 to 78.6	246 to 258	—	X	—	—	—	—	—	—	X	X	X	X	—	—	X	—	—	X	X	7.9
78.6 to 82.3	258 to 270	—	X	—	—	—	—	—	—	X	X	X	X	—	—	X	—	—	X	—	7.4
82.3 to 89.6	270 to 298	—	X	—	—	—	—	—	—	X	X	X	X	—	—	—	—	—	X	—	8.5
22 GAUGE																					
0 to 3.66	0 to 12	—	X	X	—	—	—	—	—	X	X	X	X	—	—	—	—	—	—	—	8.3
3.66 to 5.49	12 to 18	—	X	X	—	X	—	—	X	X	X	—	X	—	—	—	X	—	—	X	7.5
5.49 to 7.31	18 to 24	—	X	X	—	—	X	X	—	X	X	X	X	—	—	—	X	—	—	—	7.6
7.31 to 9.14	24 to 30	—	X	X	—	—	X	—	X	X	—	—	—	—	—	—	X	—	—	—	7.3
9.14 to 10.9	30 to 36	—	X	X	—	X	—	X	X	X	—	—	—	—	—	—	X	—	—	—	7.6
10.9 to 12.8	36 to 42	—	X	X	—	X	—	—	X	X	—	—	—	X	X	X	X	—	—	—	7.5
12.8 to 14.6	42 to 48	—	X	X	—	X	—	X	X	X	—	—	—	—	—	—	X	—	—	—	7.6
14.6 to 16.4	48 to 54	—	X	X	—	X	X	—	X	X	—	—	—	—	—	—	X	—	—	—	7.8
16.4 to 18.3	54 to 60	—	X	X	—	X	—	X	X	X	—	—	—	—	—	—	X	—	—	—	7.6
18.3 to 20.1	60 to 66	—	X	X	—	X	X	—	—	X	—	—	—	—	—	—	—	X	X	X	7.7
20.1 to 21.9	66 to 72	—	X	X	—	X	X	—	—	X	—	—	—	—	—	—	—	X	X	X	7.7
21.9 to 23.7	72 to 78	—	X	X	—	X	—	X	—	X	—	—	—	—	—	—	—	X	X	X	7.6
23.7 to 25.6	78 to 84	—	X	X	—	X	X	—	X	X	—	—	—	—	—	—	—	X	X	—	7.8
25.6 to 27.4	84 to 90	—	X	X	—	X	X	—	—	X	—	—	—	—	—	—	—	X	X	—	7.8
27.4 to 29.3	90 to 96	—	X	X	—	X	X	—	—	X	—	—	—	—	—	—	—	X	X	—	7.8
29.3 to 31.1	96 to 102	—	X	X	—	X	X	—	—	X	—	—	—	—	—	—	—	X	X	—	7.8
31.1 to 32.0	102 to 108	—	X	X	—	X	X	—	—	X	—	—	—	—	—	—	—	X	X	—	7.8

Note: This table is valid only for end-sections in the range between 0.46 and 1.37 kilometers (1.5 and 4.5 kilofeet). Switch settings for cables with end-sections outside this range must be given in the circuit information.

TABLE C (Contd)

QVF7D — EQUALIZER SWITCH SETTINGS, H88-LOADED CABLES (SEE NOTE)

CIRCUIT INFORMATION		SWITCH SETTINGS (X IS CLOSED, — IS OPEN)																			
CABLE GAUGE AND LENGTH (NOTE)		SA-(TRMT) SK-(RCV)					SB-(TRMT) SJ-(RCV)					SC-(TRMT) SH-(RCV)					SD-(TRMT) SG-(RCV)				EQL LOSS AT 1 kHz
KILOMETRES	KILOFEET	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	(DB)
24 GAUGE																					
0 to 3.66	0 to 12	—	X	—	—	—	—	—	X	X	X	—	X	—	—	X	X	—	X	—	6.6
3.66 to 5.49	12 to 18	—	X	X	—	X	—	X	—	X	—	X	X	X	X	X	—	X	X	X	7.6
5.49 to 7.31	18 to 24	—	X	X	—	X	—	—	—	X	—	—	—	X	—	X	—	X	X	—	7.5
7.31 to 9.14	24 to 30	—	X	X	—	—	X	—	—	X	—	—	—	—	—	—	—	X	—	X	7.4
9.14 to 10.9	30 to 36	—	X	X	—	—	—	—	X	X	—	—	—	—	—	—	—	X	—	X	7.3
10.9 to 12.8	36 to 42	—	X	X	—	X	X	—	—	X	—	—	—	X	—	—	—	X	—	X	7.9
12.8 to 14.6	42 to 48	—	X	X	—	X	—	X	—	X	—	—	—	X	X	—	—	X	—	X	7.7
14.6 to 16.4	48 to 54	—	X	X	—	X	X	—	—	X	—	—	X	—	X	—	—	X	—	X	7.9
16.4 to 18.3	54 to 60	—	X	X	—	X	—	X	X	X	—	—	X	—	—	—	—	—	X	X	8.1
18.3 to 20.1	60 to 66	—	X	X	—	X	—	X	—	X	—	—	—	—	X	X	—	X	—	—	7.9
20.1 to 21.9	66 to 72	—	X	X	—	X	—	X	—	X	—	—	—	X	X	X	—	X	—	—	7.9
21.9 to 23.7	72 to 78	—	X	X	—	X	—	X	—	X	—	—	—	X	—	X	—	—	X	X	8.1
26 GAUGE																					
0 to 3.66	0 to 12	—	X	X	—	—	X	X	—	X	X	X	—	X	X	X	—	X	X	X	7.7
3.66 to 5.49	12 to 18	—	X	X	—	X	—	—	X	X	—	X	—	X	X	X	—	X	—	X	7.8
5.49 to 7.31	18 to 24	—	X	X	—	—	X	X	X	X	—	—	X	—	—	—	—	X	—	—	7.8
7.31 to 9.14	24 to 30	—	X	X	—	—	X	X	—	X	—	—	—	X	—	—	—	—	X	X	7.9
9.14 to 10.9	30 to 36	—	X	X	—	—	—	—	—	X	—	—	—	—	X	—	—	—	X	X	7.6
10.9 to 12.8	36 to 42	—	X	X	—	—	X	—	—	X	—	—	—	—	—	X	—	—	X	—	8.4

Note: This table is valid only for end-sections in the range between 0.46 and 1.37 kilometers (1.5 and 4.5 kilofeet). Switch settings for cables with end-sections outside this range must be given in the circuit information.

TABLE D

SIGNALING PATH SWITCH SETTINGS

	CIRCUIT INFORMATION (SEE NOTES)	SWITCH SETTINGS (X IS CLOSED, — IS OPEN)											
		SE-					SF-					SL-	
		1	2	3	4	5	1	2	3	4	5	1	2
1.	SX1 and SX2 or E- and M-leads passed through QVF7-type unit with no connections to input and output transformers.	—	X	—	—	X	—	—	—	—	—	—	—
2.	Simplexed signaling is through-connected.	—	—	—	—	—	—	—	—	—	—	X	X
3.	Simplexed signaling on line-side cable connected to:												
	(a) SX1 and SX2 leads on drop side (and line side)	X	X	—	X	X	—	—	—	—	X	—	—
	OR												
	(b) SX1 and SX2 leads on line side	X	—	—	X	—	—	—	—	—	—	—	—
	OR												
	(c) SX3 and SX4 leads	—	—	—	—	—	—	—	X	—	X	—	—
	OR												
	(d) SX3 and SX4 leads with E and M leads passed through the QVF7-type unit.	—	X	—	—	X	—	—	X	—	X	—	—
4.	Simplexed signaling on drop-side cable connected to:	—	X	X	—	X	X	—	—	—	—	—	—
	(a) SX1 and SX2 leads on line side (and drop side)	—	X	X	—	X	X	—	—	—	—	—	—
	OR												
	(b) SX1 and SX2 leads on drop side	—	—	X	—	—	X	—	—	—	—	—	—
	OR												
	(c) SX3 and SX4 leads	—	—	—	—	—	—	X	—	X	—		
	OR												
	(d) SX3 and SX4 leads with E and M leads passed through the QVF7-type unit.	—	X	—	—	X	—	X	—	X	—	—	—

TABLE D (Contd)

SIGNALING PATH SWITCH SETTINGS

	CIRCUIT INFORMATION (SEE NOTES)	SWITCH SETTINGS (X IS CLOSED, — IS OPEN)											
		SE-					SF-					SL-	
		1	2	3	4	5	1	2	3	4	5	1	2
5.	Simplex signaling on line-side cable connected to SX1 and SX2 leads on line side, and simplex signaling on drop-side cable connected to SX1 and SX2 leads on drop side (Note 3).	X	—	X	X	—	X	—	—	—	—	—	—
6.	Signaling leads not used.	—	—	—	—	—	—	—	—	—	—	—	—

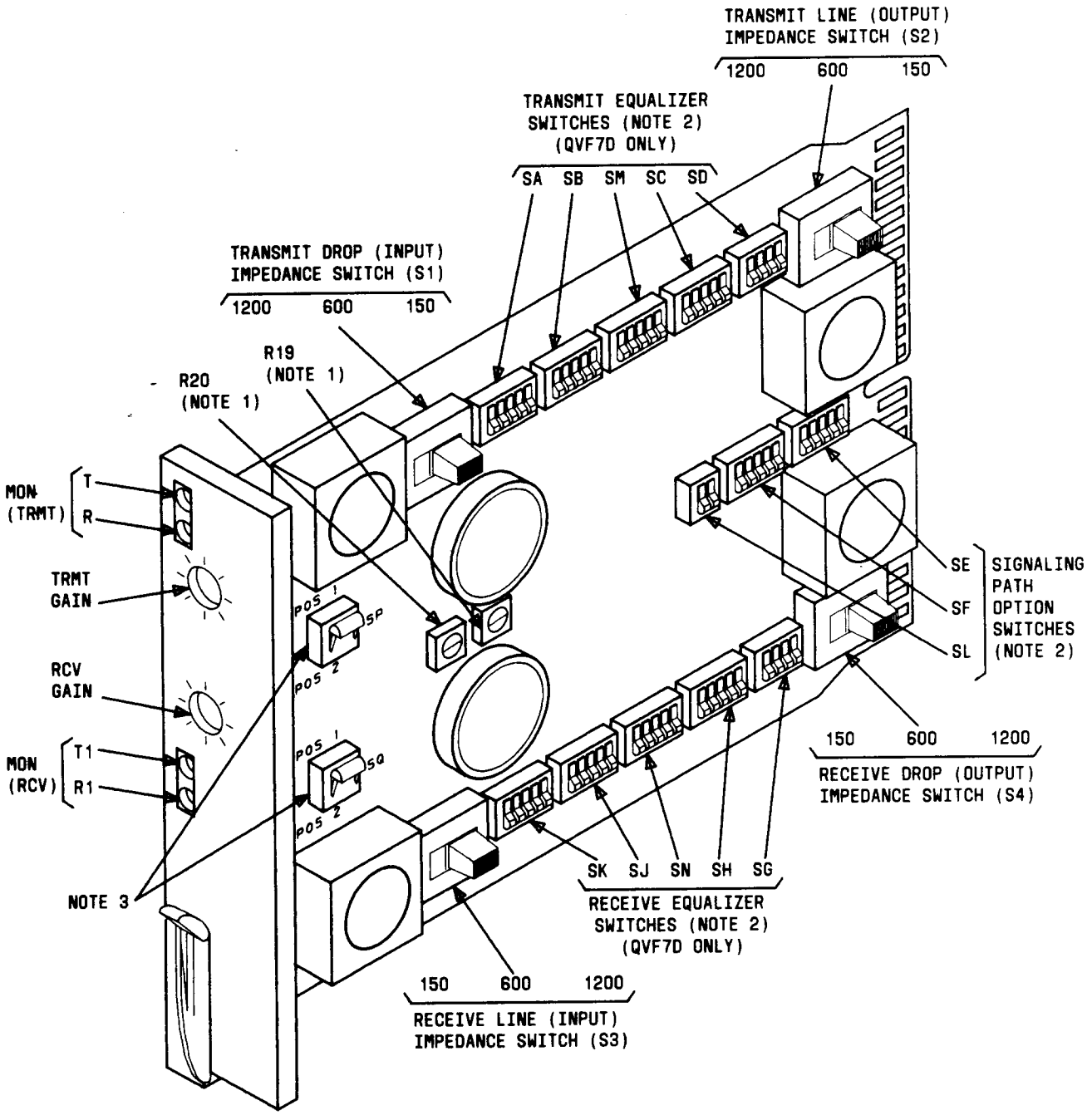
Notes:

1. Simplexed signaling as used in this table refers to the signaling path over the transmission leads T, R, and T1, R1.

2. Lead connections are given in Fig. 3.

3. Where a series A (SER.A) QVF7-type unit is distribution-frame connected to either:
   (a) a loop signaling repeater unit (QVF12-type), or
   (b) a dial-long line circuit (eg, SD96555)

   The drop side SX1 and SX2 leads of the QVF unit must be reversed at the distribution frame. Cross-connecting details are found in Application Schematic SD6751-01.



NOTES:
1. POTENTIOMETERS R19 (TRMT) AND R20 (RCV) PROVIDE FOR FINE ADJUSTMENT OF EQUALIZATION OF NONLOADED CABLE. (QVF7D ONLY)
2. SWITCH - CONTACT POSITIONS (1, 2, 3, ETC.) ARE STENCILLED ON THE SWITCHES.
3. WHEN IN POS 2, SWITCHES SP (TRMT) AND SQ (RCV) INSERT A 20-dB PAD IN EACH OF THE TRMT AND RCV PATHS.

Fig. 1—QVF7D and QVF7E 4-Wire Repeater Units, Physical Layout

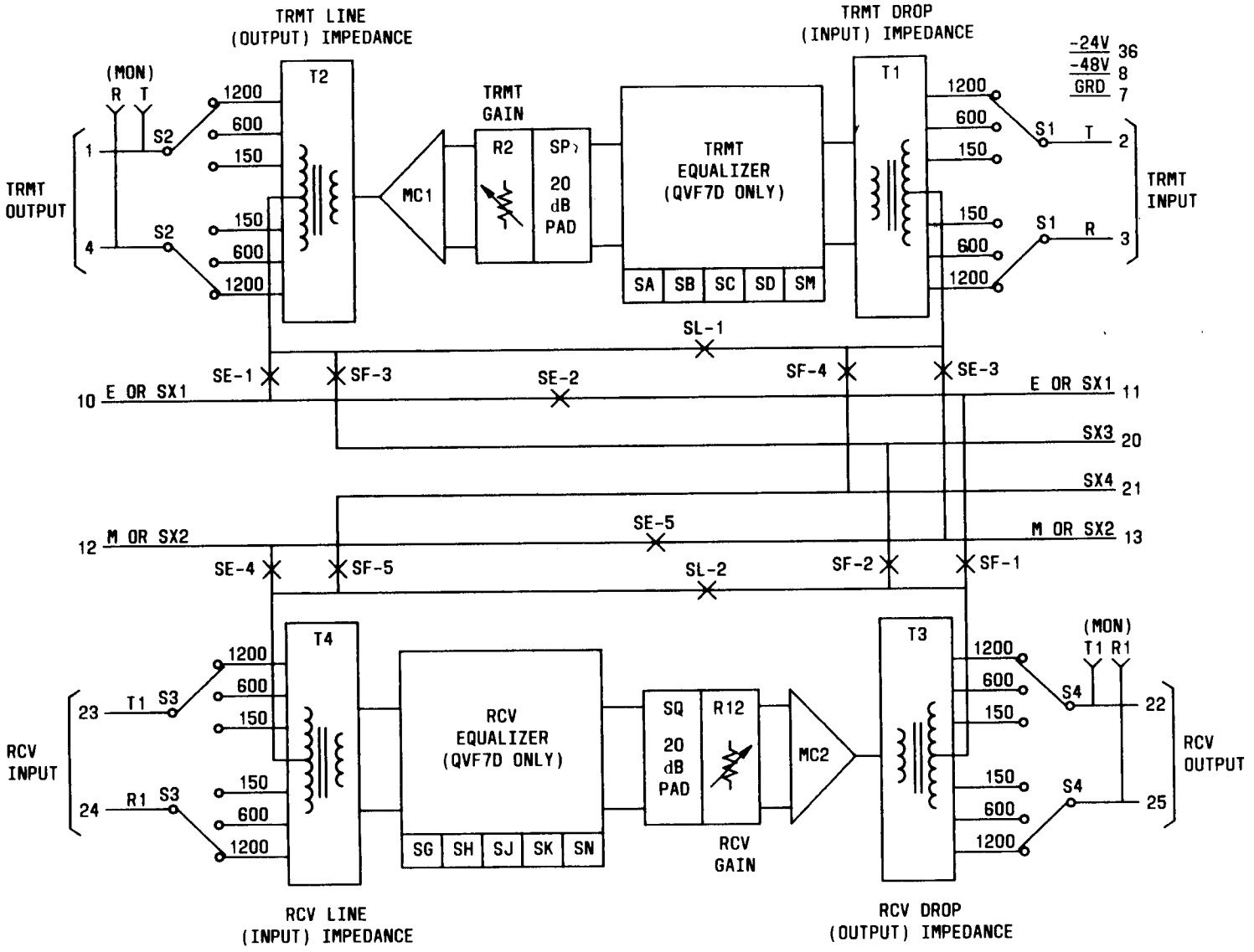


Fig. 2—QVF7D and QVF7E 4-Wire Repeater Units, Simplified Schematic

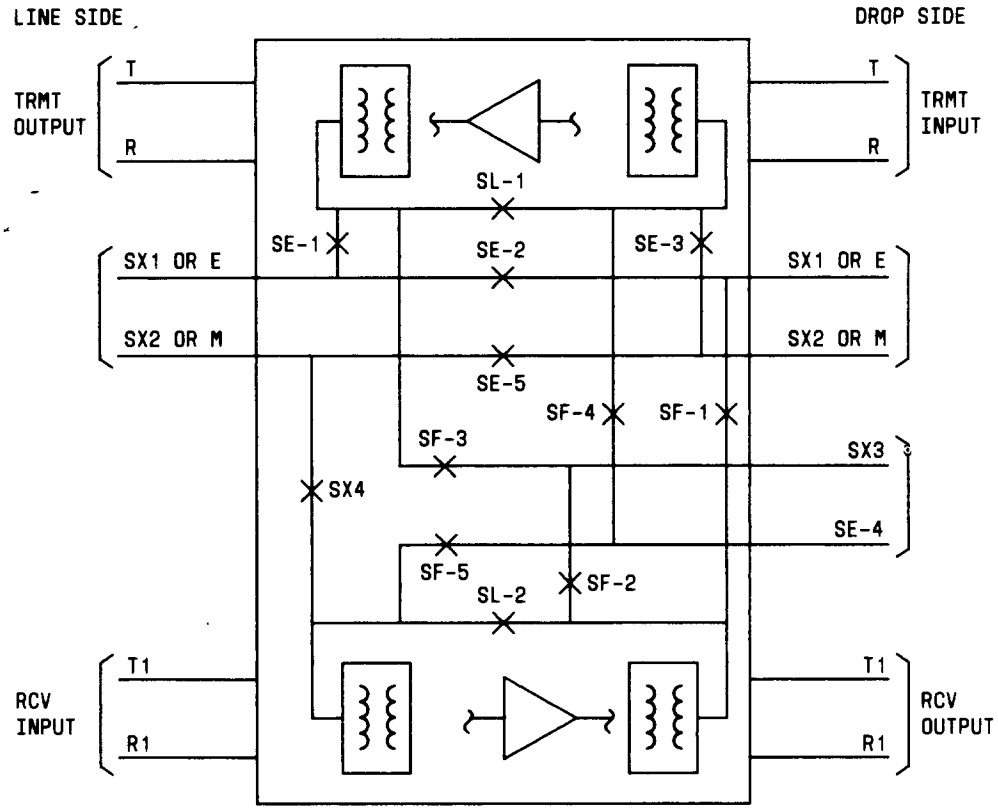


Fig. 3—Simplified Schematic of Signaling Paths Through QVF7-Type Repeater Units

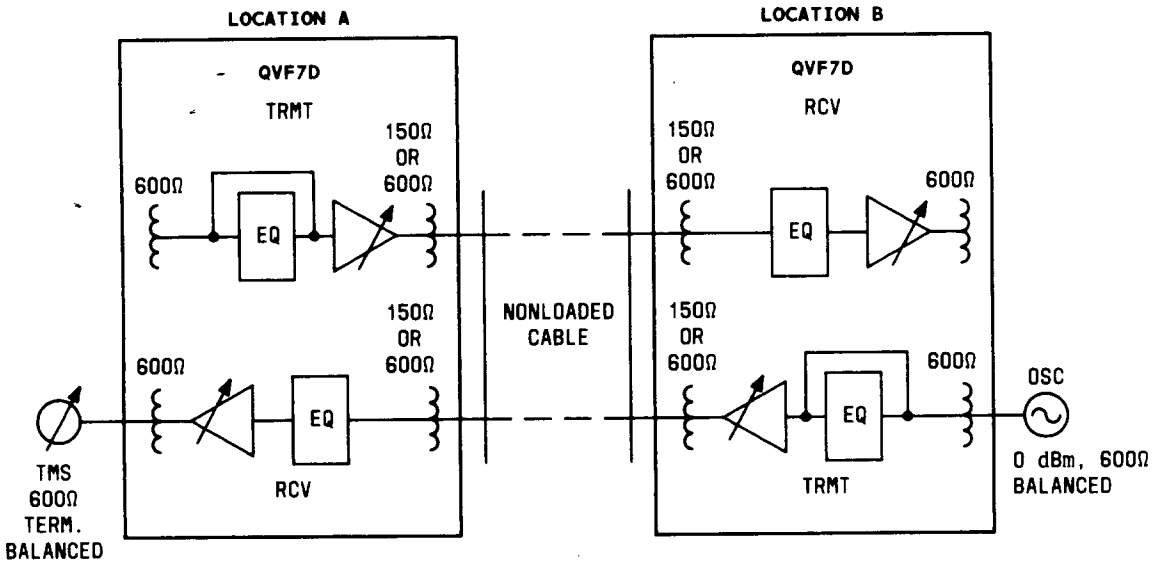
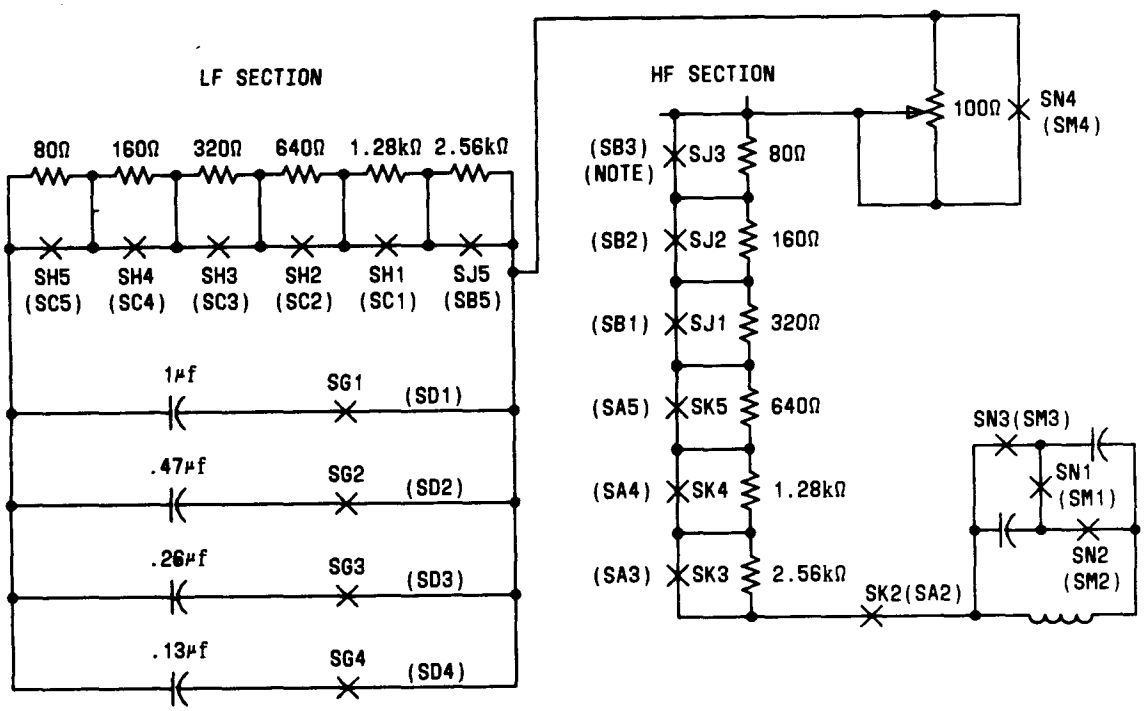
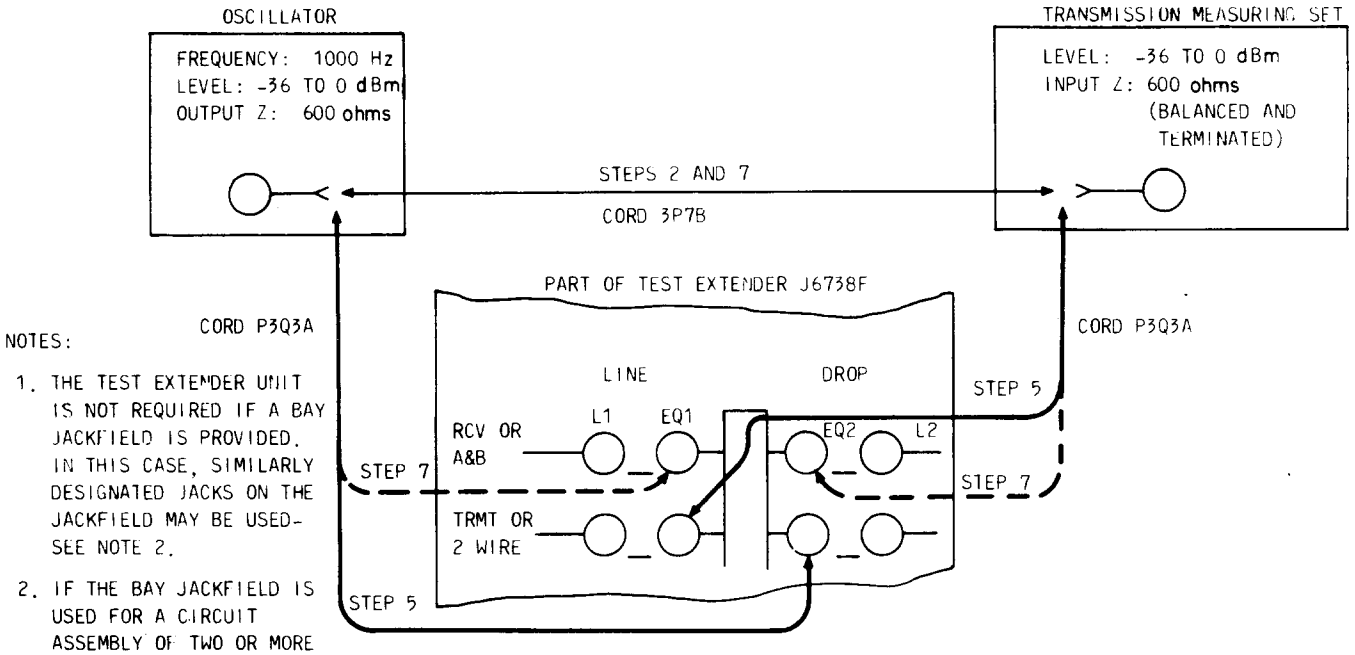


Fig. 4—Test Arrangement for Equalization of Nonloaded Cable



NOTE:
THE DESIGNATIONS SHOWN IN PARENTHESES ARE FOR THE SWITCHES OF THE TRANSMIT EQUALIZER.

Fig. 5—Equalizer-Adjustment Components



NOTES:

1. THE TEST EXTENDER UNIT IS NOT REQUIRED IF A BAY JACKFIELD IS PROVIDED. IN THIS CASE, SIMILARLY DESIGNATED JACKS ON THE JACKFIELD MAY BE USED-SEE NOTE 2.
2. IF THE BAY JACKFIELD IS USED FOR A CIRCUIT ASSEMBLY OF TWO OR MORE UNITS, A THROUGH CONNECTOR UNIT QVF20A WILL BE REQUIRED FOR EACH OF THE OTHER UNIT POSITIONS IN THE CIRCUIT ASSEMBLY.

Fig. 6—QVF7D and QVF7E, Gain Measurement Test Arrangement