ENGINEERING LIBRARY

830C NETWORK

INSTALLATION AND INITIAL SETTINGS

CONTENTS PAGE

1. GENERAL

1.01 This section gives the installation procedure and initial settings for the 830C network, which is a component of the E6 repeater and, with an 837C or D network terminating the other end of the cable, is used to improve impedance and equalize insertion loss of nonloaded cable. The description of the 830C network is found in Section 332-206-123.

2. INSTALLATION

2.01 The 830C network is mounted in either of the network positions of the E6 repeater chassis and is secured by four screws on the chassis connector block. These screws also make the required electrical connections between the network and the repeater.

3. INITIAL SETTINGS

3.01 Tables A, B, and C show the initial inductor (L) settings for the 830C network when complemented with an 837C or 837D network at the far end. Table A is for 22-gauge cable; Table B is for 24-gauge cable, and Table C is for 26-gauge cable. Table D gives the building-out resistance (BOR) required in 837C, 837D, and 830C networks for various loop resistances. To compute equivalent length of bridge taps, see Section 851-300-101.

3.02 Where the working length (WL) of a link is less than 4 kft without a bridged tap (BT), an external building-out capacitance (BOC) of 0.05 μF must be added to the line as indicated in the tables. Table E provides initial settings for cable without bridged taps.

3.03 The 830C network is capable of providing an echo return loss in the order of 40 dB at its junction with the gain unit of the E6 repeater. Since return losses of that order cannot be achieved with initial settings, all four of the 830C network adjustments (R1, R2, R3 and L) require optimizing. This optimizing is done using a return loss measuring set (RLMS) such as the 54C or KS-20501. Echo return losses in the order of 20 dB, when measured through the gain unit, with an 837C or D network terminated in a compromise-network termination at the other end of the link, should be obtained.

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TABLE A

INITIAL L SETTINGS FOR 830C* NETWORK

COMPLEMENTED WITH

AN 837C OR 837D NETWORK

22 GAUGE

22 GA WL† (KFT)	L SETTINGS FOR VARIOUS BT LENGTHS				
	0 TO 1 KFT	1.1-3.0 KFT	3.1-4.0 KFT	4.1-5.0 KFT	5.1-6.0 KFT
BT LOCATED FROM 0 TO 2.0 KFT FROM CO					
3.0	.10	.30	.55	.70	.90
4.0	.10	.40	.60	.80	1.00
6.0	.35	.65	.90	1.05	1.20
8.0	.70	.80	1.05	1.20	1.30
9.0	.80	.85	1.15	1.25	1.35
10.5	.85	1.00	1.25	1.35	1.40
12.0	.90	1.10	1.30	1.40	1.45
13.5	1.00	1.15	1.35	1.45	—
15.0	1.10	1.25	1.45	1.50	—
16.5	1.20	1.30	1.50	—	—
18.0	1.30	1.35	—	—	—
BT LOCATED FROM 2.1 TO 4.0 KFT FROM CO					
3.0	0	.20	.45	.65	.80
4.0	.05	.30	.55	.75	.90
6.0	.35	.60	.85	1.00	1.20
8.0	.70	.85	1.05	1.15	1.30
9.0	.80	.90	1.15	1.25	1.35
10.5	.85	1.00	1.20	1.30	1.40
12.0	.90	1.05	1.25	1.35	1.50
13.5	1.00	1.20	1.30	1.40	1.55
15.0	1.10	1.30	1.35	1.45	—
16.5	1.20	1.35	1.40	—	—
18.0	1.30	1.45	—	—	—

22 GA WL† (KFT)	L SETTINGS FOR VARIOUS BT LENGTHS				
	0 TO 1 KFT	1.1-3.0 KFT	3.1-4.0 KFT	4.1-5.0 KFT	5.1-6.0 KFT
BT LOCATED FROM 4.1 TO 8.0 KFT FROM CO					
6.0	.30	.55	.80	.95	1.10
8.0	.60	.80	1.00	1.10	1.25
9.0	.75	.80	1.05	1.15	1.30
10.5	.80	.90	1.15	1.25	1.35
12.0	.90	1.05	1.25	1.35	1.45
13.5	1.05	1.20	1.35	1.45	1.50
15.0	1.15	1.30	1.45	1.50	1.55
16.5	1.25	1.40	1.50	1.50	—
18.0	1.35	1.55	1.55	1.55	—
BT LOCATED FROM 8.1 TO 10.0 KFT FROM CO					
9.0	.80	.85	.95	1.05	1.15
10.5	.85	.95	1.05	1.15	1.25
12.0	.90	1.05	1.15	1.20	1.30
13.5	1.00	1.15	1.25	1.30	1.40
15.0	1.10	1.20	1.30	1.40	1.50
16.5	1.20	1.30	1.40	1.45	1.55
18.0	1.30	1.40	1.45	1.50	1.55
BT LOCATED FROM 10.1 TO 13.5 KFT FROM CO					
10.5	.80	.85	1.00	1.05	1.15
12.0	.85	.95	1.10	1.15	1.20
13.5	1.00	1.10	1.20	1.25	1.30
15.0	1.10	1.20	1.30	1.40	1.40
16.5	1.20	1.25	1.35	1.45	1.50
18.0	1.30	1.35	1.40	1.45	1.55
BT LOCATED FROM 13.6 TO 18.0 KFT FROM CO					
13.5	1.00	1.10	1.15	1.20	1.25
15.0	1.10	1.15	1.25	1.30	1.35
16.5	1.20	1.25	1.30	1.35	1.40
18.0	1.30	1.35	1.35	1.40	1.45

Notes:

* For conditions of a 114 ohm BOR in 830C and proper BOR in 837C/D from Table D.

† WL denotes working length.

TABLE B
INITIAL L SETTINGS FOR 830C* NETWORK COMPLEMENTED WITH AN 837C OR 837D NETWORK

24 GAUGE

24 GA WL† (KFT)	L SETTINGS FOR VARIOUS BT LENGTHS				
	0 TO 1 KFT	1.1-3.0 KFT	3.1-4.0 KFT	4.1-5.0 KFT	5.1-6.0 KFT
BT LOCATED FROM 0 TO 2.0 KFT FROM CO					
2.0	—	—	—	—	—
3.0	—	—	.35	.60	.75
4.0	0.00	.05	.45	.70	.90
5.0	.10	.30	.60	.80	.95
6.0	.20	.45	.70	.90	1.00
7.5	.40	.65	.90	1.05	1.20
9.0	.55	.80	1.00	1.15	1.30
10.5	.65	.85	1.10	1.20	1.35
12.0	.70	.90	1.15	1.25	1.35
13.5	.80	.95	1.20	1.30	1.40
15.0	.85	1.05	1.25	1.35	1.40
16.5	.95	1.10	1.25	1.35	—
18.0	1.00	1.15	1.30	1.35	—
BT LOCATED FROM 2.1 TO 4.0 KFT FROM CO					
3.0	—	—	.35	.50	.70
4.0	0.00	.05	.45	.65	.80
5.0	.10	.25	.55	.75	.85
6.0	.25	.45	.65	.80	.85
7.5	.40	.65	.85	1.00	1.15
9.0	.55	.75	.95	1.10	1.25
10.5	.65	.85	1.05	1.15	1.30
12.0	.75	.90	1.10	1.25	1.35
13.5	.85	1.00	1.15	1.30	1.40
15.0	.95	1.10	1.25	1.35	1.45
16.5	1.00	1.15	1.25	1.35	1.45
18.0	1.00	1.15	1.30	1.40	1.50

24 GA WL† (KFT)	L SETTINGS FOR VARIOUS BT LENGTHS				
	0 TO 1 KFT	1.1-3.0 KFT	3.1-4.0 KFT	4.1-5.0 KFT	5.1-6.0 KFT
BT LOCATED FROM 4.1 TO 8.0 KFT FROM CO					
5.0	.10	.25	.50	.65	.75
6.0	.20	.35	.60	.70	.80
7.5	.40	.55	.75	.85	.95
9.0	.55	.70	.85	1.00	1.10
10.5	.65	.80	.90	1.05	1.15
12.0	.75	.85	1.00	1.10	1.20
13.5	.85	.95	1.10	1.20	1.25
15.0	.90	1.05	1.15	1.25	1.35
16.5	.95	1.10	1.20	1.30	1.40
18.0	1.00	1.15	1.30	1.40	1.50
BT LOCATED FROM 8.1 TO 10.0 KFT FROM CO					
9.0	.45	.65	.70	.75	.80
10.5	.60	.75	.75	.85	.85
12.0	.70	.80	.85	.90	.95
13.5	.80	.90	.95	1.00	1.05
15.0	.85	1.00	1.10	1.10	1.15
16.5	.95	1.05	1.15	1.15	—
18.0	1.00	1.10	1.15	1.20	—
BT LOCATED FROM 10.1 TO 14.0 KFT FROM CO					
10.5	.60	.65	.65	.70	.70
12.0	.70	.75	.75	.75	.80
13.5	.80	.85	.85	.85	.90
15.0	.85	.90	.95	1.00	1.00
16.5	.95	.95	1.00	1.05	1.05
18.0	.95	1.00	1.05	1.05	1.10
BT LOCATED FROM 14.1 TO 18.0 KFT FROM CO					
14.0	.85	.85	.90	.90	.90
15.0	.85	.85	.95	.95	.95
16.5	.90	.90	.95	.95	.95
18.0	.95	.95	1.00	1.00	1.00

Notes:

* For conditions of a 114 ohm BOR in 830C and proper BOR in 837C/D from Table D.

† WL denotes working length.

TABLE C

INITIAL L SETTINGS FOR 830C* NETWORK COMPLEMENTED WITH AN 837C OR 837D NETWORK

26 GAUGE

26 GA WL† (KFT)	L SETTINGS FOR VARIOUS BT LENGTHS					
	0 TO 1 KFT	1.1-2.0 KFT	2.1-3.0 KFT	3.1-4.0 KFT	4.1-5.0 KFT	5.1-6.0 KFT
BT LOCATED FROM 0 TO 2 KFT FROM CO						
2.0	—	—	—	.05	.35	.60
3.0	—	—	.15	.25	.50	.70
4.0	0.00	.15	.25	.40	.60	.80
4.5	.05	.15	.30	.50	.65	.85
5.5	.05	.15	.30	.55	.75	.90
6.0	.10	.25	.45	.65	.85	.90
7.5	.15	.30	.55	.75	.85	1.00
9.0	.20	.40	.60	.80	.90	1.05
10.5	.30	.45	.65	.85	.95	1.05
12.0	.40	.55	.70	.90	1.00	1.10
BT LOCATED FROM 2.1 TO 4.0 KFT FROM CO						
3.0	—	—	.05	.20	.35	.50
4.0	0.00	0.00	.10	.25	.40	.60
4.5	0.00	.05	.10	.30	.50	.65
5.5	0.00	.10	.20	.40	.55	.75
6.0	.10	.30	.40	.70	.80	.85
7.5	.15	.35	.45	.75	.85	.90
9.0	.20	.40	.55	.80	.90	1.00
10.5	.30	.50	.60	.85	.95	1.00
12.0	.40	.60	.70	.90	1.00	1.05

26 GA WL† (KFT)	L SETTINGS FOR VARIOUS BT LENGTHS					
	0 TO 1 KFT	1.1-2.0 KFT	2.1-3.0 KFT	3.1-4.0 KFT	4.1-5.0 KFT	5.1-6.0 KFT
BT LOCATED FROM 4.1 TO 5.0 KFT FROM CO						
4.5	0.00	0.00	0.00	.05	.20	.30
5.5	0.00	05	.15	.30	.45	.55
6.0	.05	.20	.30	.45	.50	.60
7.5	.10	.30	.40	.50	.60	.70
9.0	.20	.40	.50	.55	.70	.80
10.5	.30	.45	.60	.65	.75	.85
12.0	.40	.55	.70	.70	.80	.90
BT LOCATED FROM 5.1 TO 7.0 KFT FROM CO						
5.5	0.00	0.00	.10	.15	.25	.30
6.0	.05	.10	.10	.20	.25	.30
7.5	.10	.20	.25	.40	.40	.45
9.0	.15	.30	.40	.50	.60	.65
10.5	.25	.40	.50	.60	.65	.70
12.0	.30	.50	.60	.70	.75	.75
BT LOCATED FROM 7.1 TO 8.0 KFT FROM CO						
7.5	.10	.10	.20	.25	.25	.30
9.0	.15	.25	.30	.40	.40	.50
10.5	.25	.35	.40	.45	.50	.55
12.0	.30	.40	.45	.50	.55	.60
BT LOCATED FROM 8.1 TO 10.0 KFT FROM CO						
9.0	.10	.15	.20	.25	.25	.25
10.5	.20	.30	.40	.40	.40	.40
12.0	.30	.40	.45	.50	.50	.55
BT LOCATED FROM 10.1 TO 12.0 KFT FROM CO						
10.5	.25	.25	.25	.30	.30	.30
12.0	.30	.35	.35	.40	.40	.40

Notes:

* For conditions of a 114-ohm BOR in 830C and proper BOR in 837C/D from Table D.

† WL denotes working length.

TABLE D

BUILDING-OUT RESISTANCE REQUIRED IN 837C, 837D, AND 830C NETWORKS

RESISTANCE OF CABLE PAIR	BOR (OHMS)
837C OR 837D (114-OHM BOR ASSUMED IN 830C)	
< 258 Ohms	342 (All Screws Up)
258 — 371	228 (114 Screws Up; Others Down)
> 371*	114 (57 Screws Up; Others Down)
830C (REGARDLESS OF BOR AT FAR END)	
≤ 1000 Ohms*	114 (Screws Up)
> 1000*	0 (Screws Down)

* When necessary for gaining signaling range, the BOR may be reduced to zero if the following conditions are met:

(a) resistance of cable pair itself is at least 800 ohms

(b) underground cable of at least 2 dB attenuation is adjacent to the network.

TABLE E

INITIAL L SETTINGS FOR 830C* NETWORK COMPLEMENTED WITH AN 837C OR 837D NETWORK

FACILITY WITHOUT BRIDGE TAP

WL† (KFT)	22 GA L SETTING	24 GA L SETTING	26 GA L SETTING
.25‡			0.00
.50‡		0.00	
.75‡	0.00		
1.00‡	.10	0.00	0.00
1.50‡	.15	.05	.05
2.00‡	.30	.10	.20
3.00‡	.40	.30	.25
3.00‡	.10		
4.00	.50	.50	.40
4.00	.10	0.00	0.00
4.50			.05
5.00		.10	
5.50			.05
6.00	.35	.20	.10
7.50		.40	.15
8.00	.70		
9.00	.80	.55	.20
10.50	.85	.65	.30
12.00	.90	.70	.40
13.50	1.00	.80	
15.00	1.10	.85	
16.50	1.20	.95	
18.00	1.30	1.00	

* For conditions of a 114 ohm BOR is 830C and proper BOR in 837C/D from Table D.

† WL denotes working length.

‡ See paragraph 3.02.