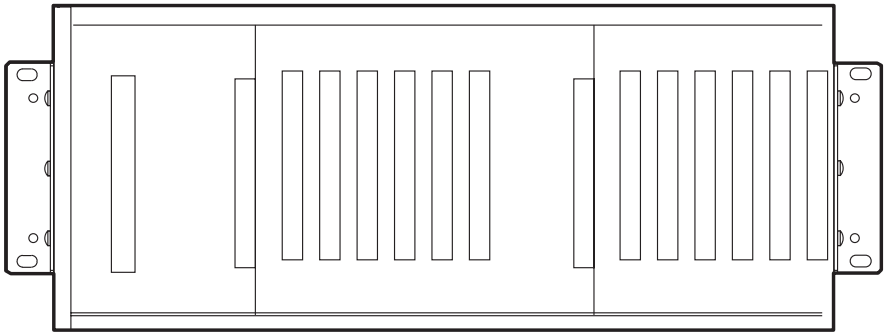
PG-FLEX 19" CENTRAL OFFICE TERMINAL SHELF

Model	List Number	Part Number	CLEI Code
FCS-718	4	150-1318-04	VAMCEC0ARA



PAIRGAIN TECHNOLOGIES, INC.
ENGINEERING PLANT SERIES TECHNICAL PRACTICE
SECTION 363-718-104-01

Revision History of this practice.
Revision 01—May 30, 1997
A) Initial Release.

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USING THIS TECHNICAL PRACTICE

Three types of messages, identified by icons, appear in the text:

A note informs you of special circumstances.

A caution indicates the possibility of equipment damage.

A warning indicates the possibility of personal injury.

A. PRODUCT OVERVIEW

1. Description and Features

1.1 The PairGain® PG-Flex™ FCS-718 List 4 19-inch Central Office Terminal (COT) Shelf (Figure 1) supports:

- one Alarm Unit or PGTC Interface Unit that is common to both systems
- two PG-Flex subscriber carrier systems where each system comprises one Line Unit and from one to six Channel Units (for a shelf maximum of two Line Units and 12 Channel Units)

Additionally, the shelf provides termination points for alarms, power, metallic bypass pairs, auxiliary power pairs when using a doubler, and subscriber circuits (located on the backplane at the rear of the shelf). The List 4 COT Shelf provides cable adapters with 25-pair Amphenol connector terminations for the subscriber circuits.

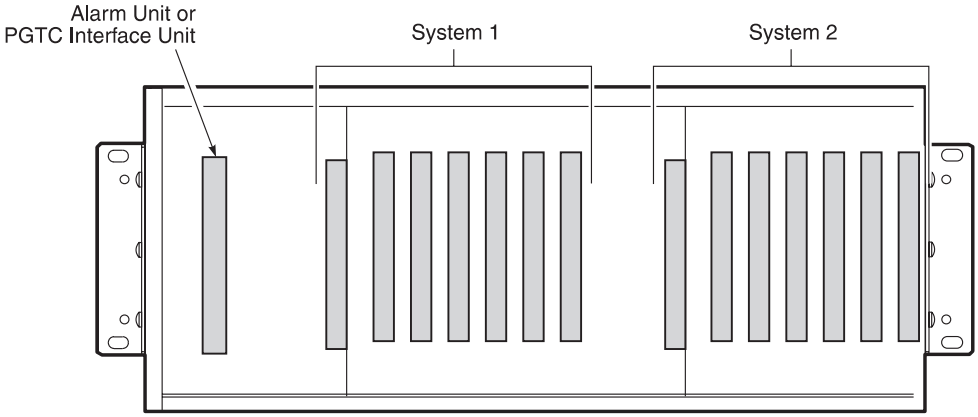

Figure 1. *FCS-718 COT Shelf*

Use the List 4 FCS-718 COT 19-inch Shelf only with a List 4x (or higher) FRE-765 Remote Terminal Enclosure.

1.2 Features of the PG-Flex FCS-718 COT Shelf are:

- universal mounting brackets for installing in a 19- or 23-inch equipment bay
- wire-wrap connections for HDSL, alarm, metallic bypass pairs, and auxiliary power pairs (when using a doubler)
- screw terminal connections for frame ground and dual Central Office (CO) battery
- DB-25 connector for Network Management Analysis (NMA) communications
- 25-pair Amphenol cable adapters for connection to CO switch subscriber lines
- 25-pair Amphenol connector for PGTC test interface

2. Specifications

Electrical Characteristics

Power ..... –48Vdc CO battery

Environmental

Operating Temperature ..... –40° F to +150° F (–40° C to +65° C)

Operating Humidity ..... 5% to 95% (non-condensing)

Operating Elevation ..... –200 feet to 13,000 feet (–60 m to 4,000 m)

Physical

Mounting ..... 19- or 23-inch equipment rack using universal mounting brackets

Dimensions

Height ..... 07.00 in. (17.8 cm)

Width ..... 17.25 in. (43.8 cm)

Depth ..... 11.75 in. (29.9 cm)

Weight ..... 11.10 lb (05.0 kg)

B. FUNCTIONAL DESCRIPTION

3. Operational Capabilities

3.1 Each system (one Line Unit and from one to four Channel Units) shown in Figure 1 can support up to 24 or 32 subscriber channels. Each Channel Unit can provide four (4) or eight (8) channels, depending on the service offered. Services offered are:

- Plain Old Telephone Service (POTS)
- Integrated Services Digital Network (ISDN)

A label on the FCS-718 shelf indicates numbering for the Line and Channel Units. When the Line Units are a List 1 or 2, black numbers indicate sequential Channel Unit numbering 1 through 12. When the Line Units are List 3 or higher, blue numbers indicate Channel Unit numbering 1 through 6 for each system.

3.2 Tables 1 and 2 show how to utilize channels, dependent on the Channel Unit (4 or 8 channels) and the type of subscriber service (i.e., POTS, ISDN) selected.

Table 1. *Channel Unit Circuit Utilization*

Channel Unit	Channel Unit Service Configurations			
	4-Channel POTS	8-Channel POTS	4-Channel ISDN	4-Channel DDS
T/R 1	Ckt 1	Ckt 1	Ckt 1	Ckt 1 Tx
T/R 2	Ckt 2	Ckt 2	Ckt 2	Ckt 1 Rcv
T/R 3	Ckt 3	Ckt 3	Ckt 3	Ckt 2 Tx
T/R 4	Ckt 4	Ckt 4	Ckt 4	Ckt 2 Rcv
T/R 5	—	Ckt 5	—	Ckt 3 Tx
T/R 6	—	Ckt 6	—	Ckt 3 Rcv
T/R 7	—	Ckt 7	—	Ckt 4 Tx
T/R 8	—	Ckt 8	—	Ckt 4 Rcv

Table 2. *Systems 1 and 2 Circuit Assignments for COT Shelf*

System 1*							System 2*						
Line Unit	CU 1 (CU 1)	CU 2 (CU2)	CU 3 (CU 3)	CU 4 (CU 4)	CU 5 (CU 5)	CU 6 (CU 6)	Line Unit	CU 7 (CU 1)	CU 8 (CU 2)	CU 9 (CU 3)	CU 10 (CU 4)	CU 11 (CU 5)	CU 12 (CU 6)
1	Ckt 1	Ckt 1	Ckt 1	Ckt 1	Ckt 1	Ckt 1	2	Ckt 1	Ckt 1	Ckt 1	Ckt 1	Ckt 1	Ckt 1
	Ckt 2	Ckt 2	Ckt 2	Ckt 2	Ckt 2	Ckt 2		Ckt 2	Ckt 2	Ckt 2	Ckt 2	Ckt 2	Ckt 2
	Ckt 3	Ckt 3	Ckt 3	Ckt 3	Ckt 3	Ckt 3		Ckt 3	Ckt 3	Ckt 3	Ckt 3	Ckt 3	Ckt 3
	Ckt 4	Ckt 4	Ckt 4	Ckt 4	Ckt 4	Ckt 4		Ckt 4	Ckt 4	Ckt 4	Ckt 4	Ckt 4	Ckt 4
	Ckt 5	Ckt 5	Ckt 5	Ckt 5	Ckt 5	Ckt 5		Ckt 5	Ckt 5	Ckt 5	Ckt 5	Ckt 5	Ckt 5
	Ckt 6	Ckt 6	Ckt 6	Ckt 6	Ckt 6	Ckt 6		Ckt 6	Ckt 6	Ckt 6	Ckt 6	Ckt 6	Ckt 6
	Ckt 7	Ckt 7	Ckt 7	Ckt 7	Ckt 7	Ckt 7		Ckt 7	Ckt 7	Ckt 7	Ckt 7	Ckt 7	Ckt 7
	Ckt 8	Ckt 8	Ckt 8	Ckt 8	Ckt 8	Ckt 8		Ckt 8	Ckt 8	Ckt 8	Ckt 8	Ckt 8	Ckt 8

* CU numbers shown on top are for a List 1 or 2 Line Unit. CU numbers on the bottom in parentheses are for a List 3 or higher Line Unit. CU is a Channel Unit.

4. Backplane Connections

4.1 Section 4.2 provides connector pinouts located on the backplane for Alarm or PGTC Interface Unit, Line Units, and Channel Units.

Section 4.3 provides connectors and termination points located on the backplane for:

- battery and CO battery return
- frame ground
- Local Area Network (LAN)
- data
- HDSL, test, composite clock, auxiliary power pairs, and ACO cutoff switch
- alarm or PGTC test interface
- subscriber lines

4.2 Table 3 lists the FCS-718 List 4 connectors (Figure 1) and where each is described in this practice.

Table 3. *FCS-718 List 4 Card Connectors*

Connector/Fuse	Go to Table(s)	On page
Alarm Unit or PGTC Interface Unit	4	5
Line Unit Connectors (Systems 1 and 2)	5	6
Channel Unit Connectors (System 1)	6	7 thru 9
Channel Unit Connectors (System 2)	7	10 thru 12

Use the information in tables 4 through 7 for diagnostic and troubleshooting procedures under the direction of an authorized PairGain technical support representative. User terminations are not required on J1.

***Table 4**. Alarm Unit or PGTC Interface Unit Connector*

J1-C Pin	J1-C Signal	J1-B Pin	J1-B Signal	J1-A Pin	J1-A Signal
1	LAN	1	LGND (CDS)	1	LGND (CDS)
2	N/C	2	INHIBIT	2	N/C
3	PGTC_TIP1	3	SLEEVE1	3	TESTIN-T_1
4	PGTC_RING1	4	SLEEVE2	4	TESTIN-R_1
5	PGTC_TIP2	5	SLEEVE3	5	TESTIN-T_2
6	PGTC_RING2	6	SLEEVE4	6	TESTIN-R_2
7	PGTC_TIP3	7	OH1	7	TESTIN-T_3
8	PGTC_RING3	8	OH2	8	TESTIN-R_3
9	PGTC_TIP4	9	OH3	9	TESTOUT-T_1
10	PGTC_RING4	10	OH4	10	TESTOUT-R_1
11	(BURN-IN)	11	PROCEED1	11	TESTOUT-T_2
12	LOCK1	12	PROCEED2	12	TESTOUT-R_2
13	LOCK2	13	PROCEED3	13	TESTOUT-T_3
14	LOCK3	14	PROCEED4	14	TESTOUT-R_3
15	LOCK4	15	SEIZE	15	TESTOUT-T_4
16	TMAJ	16	SEZBY	16	TESTOUT-R_4
17	+5_2	17	TSTALM	17	+5_1
18	NMA_TX	18	NMA_RX	18	NMA_DTR
19	NMA_DSR	19	NMA_TCLK	19	NMA_RCLK
20	NMA_BUS_1	20	NMA_BUS_2	20	TESTIN-T_4
21	NMA_BUS_3	21	NMA_BUS_4	21	TESTIN-R_4
22	CC1TIP	22	CC1RING	22	EXT_ACO
23	CC2TIP	23	CC2RING	23	8KHZ_CC
24	SHELF_ID_NO	24	SHELF_ID_COM	24	SHELF_ID_NC
25	MAJ_AUD_NO	25	MAJ_AUD_COM	25	MAJ_AUD_NC
26	MAJ_VIS_NO	26	MAJ_VIS_COM	26	MAJ_VIS_NC
27	MIN_AUD_NO	27	MIN_AUD_COM	27	MIN_AUD_NC
28	MIN_VIS_NO	28	MIN_VIS_COM	28	MIN_VIS_NC
29	FUSEALARM	29	MAJORALARM	29	MINORALARM
30	BATTERY-	30	BATTERY-	30	BATTERY-
31	BATTERY+	31	BATTERY+	31	BATTERY+
32	PROTGND	32	GND	32	GND

Table 5. *Line Unit Connectors*

System	Line Unit	Connector
1	1	J2
2	2	J10

Pin	Signal*	Pin	Signal
1	PROTGND	2	PROTGND
3	N/C	4	N/C
5	HDSLTIP1EX_***n***	6	HDSLTIP2EX_***n***
7	HDSLRING1EX_***n***	8	HDSLRING2EX_***n***
9	N/C	10	N/C
11	BATTERY+	12	BATTERY+
13	-48_***n***	14	-48_***n***
15	BATTERY-	16	BATTERY-
17	8KHZ_CC	18	N/C (BURN-IN)
19	TSYNC_***n***	20	TSIG_***n***
21	TCLK_***n***	22	TSER_***n***
23	GND	24	RSYNC_***n***
25	RSIG_***n***	26	RCLK_***n***
27	RSER_***n***	28	GND
29	SDA_***n***	30	CSYNC_***n***
31	FUSEALARM	32	SCL_***n***
33	+5_***n***	34	+5_***n***
35	GND	36	GND
37	-5_***n***	38	-5_***n***
39	NMA_BUS_***n***	40	N/C (CID3)
41	GND (CID2)	42	GND (CID1)
43	MAJORALARM	44	MINORALARM
45	TESTIN-T_***n***	46	TESTIN-R_***n***
47	TESTOUT-T_***n***	48	TESTOUT-R_***n***
49	N/C	50	N/C
51	BYPASS-T_***n***	52	BYPASS-R_***n***
53	HDSL_TIP1_***n***	54	HDSL_TIP2_***n***
55	HDSL_RING1_***n***	56	HDSL_RING2_***n***
57	N/C	58	N/C
59	PROTGND	60	PROTGND

* Where ***n*** is 1 on system 1 and 2 on system 2.

Table 6. *Channel Unit Connectors for System 1*

System 1	Channel Unit 1	Connector J3		System 1	Channel Unit 2	Connector J4	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	PROTGND	2	PROTGND	1	PROTGND	2	PROTGND
3	TIPEX01_1	4	RINGEX01_1	3	TIPEX05_1	4	RINGEX05_1
5	TIPEX02_1	6	RINGEX02_1	5	TIPEX06_1	6	RINGEX06_1
7	TIPEX03_1	8	RINGEX03_1	7	TIPEX07_1	8	RINGEX07_1
9	TIPEX04_1	10	RINGEX04_1	9	TIPEX08_1	10	RINGEX08_1
11	BATTERY+	12	BATTERY+	11	BATTERY+	12	BATTERY+
13	-48_1	14	-48_1	13	-48_1	14	-48_1
15	BATTERY-	16	BATTTERY-	15	BATTERY-	16	BATTERY-
17	8KHZ_CC	18	N/C (BURN-IN)	17	8KHZ_CC	18	N/C (BURN-IN)
19	TSYNC_1	20	TSIG_1	19	TSYNC_1	20	TSIG_1
21	TCLK_1	22	TSER_1	21	TCLK_1	22	TSER_1
23	GND	24	RSYNC_1	23	GND	24	RSYNC_1
25	RSIG_1	26	RCLK_1	25	RSIG_1	26	RCLK_1
27	RSER_1	28	GND	27	RSER_1	28	GND
29	SDA_1	30	CSYNC_1	29	SDA_1	30	CSYNC_1
31	N/C	32	SCL_1	31	N/C	32	SCL_1
33	+5_1	34	+5_1	33	+5_1	34	+5_1
35	GND	36	GND	35	GND	36	GND
37	-5_1	38	-5_1	37	-5_1	38	-5_1
39	N/C	40	GND	39	N/C	40	GND
41	GND	42	GND	41	GND	42	GND
43	GND	44	N/C	43	GND	44	N/C
45	TESTIN-T_1	46	TESTIN-R_1	45	TESTIN-T_1	46	TESTIN-R_1
47	GND	48	GND	47	GND	48	GND
49	TESTOUT-T_1	50	TESTOUT-R_1	49	TESTOUT-T_1	50	TESTOUT-R_1
51	TIP01_1	52	RING01_1	51	TIP05_1	52	RING05_1
53	TIP02_1	54	RING02_1	53	TIP06_1	54	RING06_1
55	TIP03_1	56	RING03_1	55	TIP07_1	56	RING07_1
57	TIP04_1	58	RING04_1	57	TIP08_1	58	RING08_1
59	PROTGND	60	PROTGND	59	PROTGND	60	PROTGND

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Table 6. *Channel Unit Connectors for System 1 (continued)*

System 1	Channel Unit 3	Connector J5		System 1	Channel Unit 4	Connector J6	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	PROTGND	2	PROTGND	1	PROTGND	2	PROTGND
3	TIPEX09_1	4	RINGEX09_1	3	TIPEX13_1	4	RINGEX13_1
5	TIPEX10_1	6	RINGEX10_1	5	TIPEX14_1	6	RINGEX14_1
7	TIPEX11_1	8	RINGEX11_1	7	TIPEX15_1	8	RINGEX15_1
9	TIPEX12_1	10	RINGEX12_1	9	TIPEX16_1	10	RINGEX16_1
11	BATTERY+	12	BATTERY+	11	BATTERY+	12	BATTERY+
13	-48_1	14	-48_1	13	-48_1	14	-48_1
15	BATTERY-	16	BATTERY-	15	BATTERY-	16	BATTERY-
17	8KHZ_CC	18	N/C (BURN-IN)	17	8KHZ_CC	18	N/C (BURN-IN)
19	TSYNC_1	20	TSIG_1	19	TSYNC_1	20	TSIG_1
21	TCLK_1	22	TSER_1	21	TCLK_1	22	TSER_1
23	GND	24	RSYNC_1	23	GND	24	RSYNC_1
25	RSIG_1	26	RCLK_1	25	RSIG_1	26	RCLK_1
27	RSER_1	28	GND	27	RSER_1	28	GND
29	SDA_1	30	CSYNC_1	29	SDA_1	30	CSYNC_1
31	N/C	32	SCL_1	31	N/C	32	SCL_1
33	+5_1	34	+5_1	33	+5_1	34	+5_1
35	GND	36	GND	35	GND	36	GND
37	-5_1	38	-5_1	37	-5_1	38	-5_1
39	N/C	40	GND	39	N/C	40	GND
41	GND	42	GND	41	GND	42	GND
43	GND	44	N/C	43	GND	44	N/C
45	TESTIN-T_1	46	TESTIN-R_1	45	TESTIN-T_1	46	TESTIN-R_1
47	GND	48	GND	47	GND	48	GND
49	TESTOUT-T_1	50	TESTOUT-R_1	49	TESTOUT-T_1	50	TESTOUT-R_1
51	TIP09_1	52	RING09_1	51	TIP13_1	52	RING13_1
53	TIP10_1	54	RING10_1	53	TIP14_1	54	RING14_1
55	TIP11_1	56	RING11_1	55	TIP15_1	56	RING15_1
57	TIP12_1	58	RING12_1	57	TIP16_1	58	RING16_1
59	PROTGND	60	PROTGND	59	PROTGND	60	PROTGND

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Table 6. *Channel Unit Connectors for System 1 (continued)*

System 1 Channel Unit 5 Connector J7				System 1 Channel Unit 6 Connector J8			
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	PROTGND	2	PROTGND	1	PROTGND	2	PROTGND
3	TIPEX17_1	4	RINGEX17_1	3	TIPEX21_1	4	RINGEX21_1
5	TIPEX18_1	6	RINGEX18_1	5	TIPEX22_1	6	RINGEX22_1
7	TIPEX19_1	8	RINGEX19_1	7	TIPEX23_1	8	RINGEX23_1
9	TIPEX20_1	10	RINGEX20_1	9	TIPEX24_1	10	RINGEX24_1
11	BATTERY+	12	BATTERY+	11	BATTERY+	12	BATTERY+
13	-48_1	14	-48_1	13	-48_1	14	-48_1
15	BATTERY-	16	BATTERY-	15	BATTERY-	16	BATTERY-
17	8KHZ_CC	18	N/C (BURN-IN)	17	8KHZ_CC	18	N/C (BURN-IN)
19	TSYNC_1	20	TSIG_1	19	TSYNC_1	20	TSIG_1
21	TCLK_1	22	TSER_1	21	TCLK_1	22	TSER_1
23	GND	24	RSYNC_1	23	GND	24	RSYNC_1
25	RSIG_1	26	RCLK_1	25	RSIG_1	26	RCLK_1
27	RSER_1	28	GND	27	RSER_1	28	GND
29	SDA_1	30	CSYNC_1	29	SDA_1	30	CSYNC_1
31	N/C	32	SCL_1	31	N/C	32	SCL_1
33	+5_1	34	+5_1	33	+5_1	34	+5_1
35	GND	36	GND	35	GND	36	GND
37	-5_1	38	-5_1	37	-5_1	38	-5_1
39	N/C	40	GND	39	N/C	40	GND
41	GND	42	GND	41	GND	42	GND
43	GND	44	N/C	43	GND	44	N/C
45	TESTIN-T_1	46	TESTIN-R_1	45	TESTIN-T_1	46	TESTIN-R_1
47	GND	48	GND	47	GND	48	GND
49	TESTOUT-T_1	50	TESTOUT-R_1	49	TESTOUT-T_1	50	TESTOUT-R_1
51	TIP17_1	52	RING17_1	51	TIP21_1	52	RING21_1
53	TIP18_1	54	RING18_1	53	TIP22_1	54	RING22_1
55	TIP19_1	56	RING19_1	55	TIP23_1	56	RING23_1
57	TIP20_1	58	RING20_1	57	TIP24_1	58	RING24_1
59	PROTGND	60	PROTGND	59	PROTGND	60	PROTGND

Table 7. *Channel Unit Connectors for System 2*

System 2 Channel Unit 7 Connector J11				System 2 Channel Unit 8 Connector J12			
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	PROTGND	2	PROTGND	1	PROTGND	2	PROTGND
3	TIPEX25_2	4	RINGEX25_2	3	TIPEX29_2	4	RINGEX29_2
5	TIPEX26_2	6	RINGEX26_2	5	TIPEX30_2	6	RINGEX30_2
7	TIPEX27_2	8	RINGEX27_2	7	TIPEX31_2	8	RINGEX31_2
9	TIPEX28_2	10	RINGEX28_2	9	TIPEX32_2	10	RINGEX32_2
11	BATTERY+	12	BATTERY+	11	BATTERY+	12	BATTERY+
13	-48_2	14	-48_2	13	-48_2	14	-48_2
15	BATTERY-	16	BATTERY-	15	BATTERY-	16	BATTERY-
17	8KHZ_CC	18	N/C (BURN-IN)	17	8KHZ_CC	18	N/C (BURN-IN)
19	TSYNC_2	20	TSIG_2	19	TSYNC_2	20	TSIG_2
21	TCLK_2	22	TSER_2	21	TCLK_2	22	TSER_2
23	GND	24	RSYNC_2	23	GND	24	RSYNC_2
25	RSIG_2	26	RCLK_2	25	RSIG_2	26	RCLK_2
27	RSER_2	28	GND	27	RSER_2	28	GND
29	SDA_2	30	CSYNC_2	29	SDA_2	30	CSYNC_2
31	N/C	32	SCL_2	31	N/C	32	SCL_2
33	+5_2	34	+5_2	33	+5_2	34	+5_2
35	GND	36	GND	35	GND	36	GND
37	-5_2	38	-5_2	37	-5_2	38	-5_2
39	N/C	40	GND	39	N/C	40	GND
41	GND	42	GND	41	GND	42	GND
43	GND	44	N/C	43	GND	44	N/C
45	TESTIN-T_2	46	TESTIN-R_2	45	TESTIN-T_2	46	TESTIN-R_2
47	GND	48	GND	47	GND	48	GND
49	TESTOUT-T_2	50	TESTOUT-R_2	49	TESTOUT-T_2	50	TESTOUT-R_2
51	TIP25_2	52	RING25_2	51	TIP29_2	52	RING29_2
53	TIP26_2	54	RING26_2	53	TIP30_2	54	RING30_2
55	TIP27_2	56	RING27_2	55	TIP31_2	56	RING31_2
57	TIP28_2	58	RING28_2	57	TIP32_2	58	RING32_2
59	PROTGND	60	PROTGND	59	PROTGND	60	PROTGND

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Table 7. *Channel Unit Connectors for System 2 (continued)*

System 2 Channel Unit 9 Connector J13				System 2 Channel Unit 10 Connector J14			
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	PROTGND	2	PROTGND	1	PROTGND	2	PROTGND
3	TIPEX33_2	4	RINGEX33_2	3	TIPEX37_2	4	RINGEX37_2
5	TIPEX34_2	6	RINGEX34_2	5	TIPEX38_2	6	RINGEX38_2
7	TIPEX35_2	8	RINGEX35_2	7	TIPEX39_2	8	RINGEX39_2
9	TIPEX36_2	10	RINGEX36_2	9	TIPEX40_2	10	RINGEX40_2
11	BATTERY+	12	BATTERY+	11	BATTERY+	12	BATTERY+
13	-48_2	14	-48_2	13	-48_2	14	-48_2
15	BATTERY-	16	BATTERY-	15	BATTERY-	16	BATTERY-
17	8KHZ_CC	18	N/C (BURN-IN)	17	8KHZ_CC	18	N/C (BURN-IN)
19	TSYNC_2	20	TSIG_2	19	TSYNC_2	20	TSIG_2
21	TCLK_2	22	TSER_2	21	TCLK_2	22	TSER_2
23	GND	24	RSYNC_2	23	GND	24	RSYNC_2
25	RSIG_2	26	RCLK_2	25	RSIG_2	26	RCLK_2
27	RSER_2	28	GND	27	RSER_2	28	GND
29	SDA_2	30	CSYNC_2	29	SDA_2	30	CSYNC_2
31	N/C	32	SCL_2	31	N/C	32	SCL_2
33	+5_2	34	+5_2	33	+5_2	34	+5_2
35	GND	36	GND	35	GND	36	GND
37	-5_2	38	-5_2	37	-5_2	38	-5_2
39	N/C	40	GND	39	N/C	40	GND
41	GND	42	GND	41	GND	42	GND
43	GND	44	N/C	43	GND	44	N/C
45	TESTIN-T_2	46	TESTIN-R_2	45	TESTIN-T_2	46	TESTIN-R_2
47	GND	48	GND	47	GND	48	GND
49	TESTOUT-T_2	50	TESTOUT-R_2	49	TESTOUT-T_2	50	TESTOUT-R_2
51	TIP33_2	52	RING33_2	51	TIP37_2	52	RING37_2
53	TIP34_2	54	RING34_2	53	TIP38_2	54	RING38_2
55	TIP35_2	56	RING35_2	55	TIP39_2	56	RING39_2
57	TIP36_2	58	RING36_2	57	TIP40_2	58	RING40_2
59	PROTGND	60	PROTGND	59	PROTGND	60	PROTGND

(continued on next page)

Table 7. *Channel Unit Connectors for System 2 (continued)*

System 2 Channel Unit 11 Connector J15				System 2 Channel Unit 12 Connector J16			
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	PROTGND	2	PROTGND	1	PROTGND	2	PROTGND
3	TIPEX41_2	4	RINGEX41_2	3	TIPEX45_2	4	RINGEX45_2
5	TIPEX42_2	6	RINGEX42_2	5	TIPEX46_2	6	RINGEX46_2
7	TIPEX43_2	8	RINGEX43_2	7	TIPEX47_2	8	RINGEX47_2
9	TIPEX44_2	10	RINGEX44_2	9	TIPEX48_2	10	RINGEX48_2
11	BATTERY+	12	BATTERY+	11	BATTERY+	12	BATTERY+
13	-48_2	14	-48_2	13	-48_2	14	-48_2
15	BATTERY-	16	BATTERY-	15	BATTERY-	16	BATTERY-
17	8KHZ_CC	18	N/C (BURN-IN)	17	8KHZ_CC	18	N/C (BURN-IN)
19	TSYNC_2	20	TSIG_2	19	TSYNC_2	20	TSIG_2
21	TCLK_2	22	TSER_2	21	TCLK_2	22	TSER_2
23	GND	24	RSYNC_2	23	GND	24	RSYNC_2
25	RSIG_2	26	RCLK_2	25	RSIG_2	26	RCLK_2
27	RSER_2	28	GND	27	RSER_2	28	GND
29	SDA_2	30	CSYNC_2	29	SDA_2	30	CSYNC_2
31	N/C	32	SCL_2	31	N/C	32	SCL_2
33	+5_2	34	+5_2	33	+5_2	34	+5_2
35	GND	36	GND	35	GND	36	GND
37	-5_2	38	-5_2	37	-5_2	38	-5_2
39	N/C	40	GND	39	N/C	40	GND
41	GND	42	GND	41	GND	42	GND
43	GND	44	N/C	43	GND	44	N/C
45	TESTIN-T_2	46	TESTIN-R_2	45	TESTIN-T_2	46	TESTIN-R_2
47	GND	48	GND	47	GND	48	GND
49	TESTOUT-T_2	50	TESTOUT-R_2	49	TESTOUT-T_2	50	TESTOUT-R_2
51	TIP41_2	52	RING41_2	51	TIP45_2	52	RING45_2
53	TIP42_2	54	RING42_2	53	TIP46_2	54	RING46_2
55	TIP43_2	56	RING43_2	55	TIP47_2	56	RING47_2
57	TIP44_2	58	RING44_2	57	TIP48_2	58	RING48_2
59	PROTGND	60	PROTGND	59	PROTGND	60	PROTGND

(continued on next page)

4.3 Table 8 lists the FCS-718 backplane connectors (Figure 2) and where each is described in this practice.

Table 8. *FCS-718 List 4 Backplane Connectors*

Connector/Fuse	Go to Table(s)	On page
Battery, CO Battery Return, and Frame Ground	9	14
LAN	10	14
Data	11	14
HDSL, Auxiliary Power Pairs, Bypass Pair, Channel Unit Test, Composite Clock, Frame Ground, External Alarm Cutoff	12	15
Alarm	13	15
System 1 Subscriber Terminations	14	16
System 2 Subscriber Terminations	15	17
PGTC	16	18

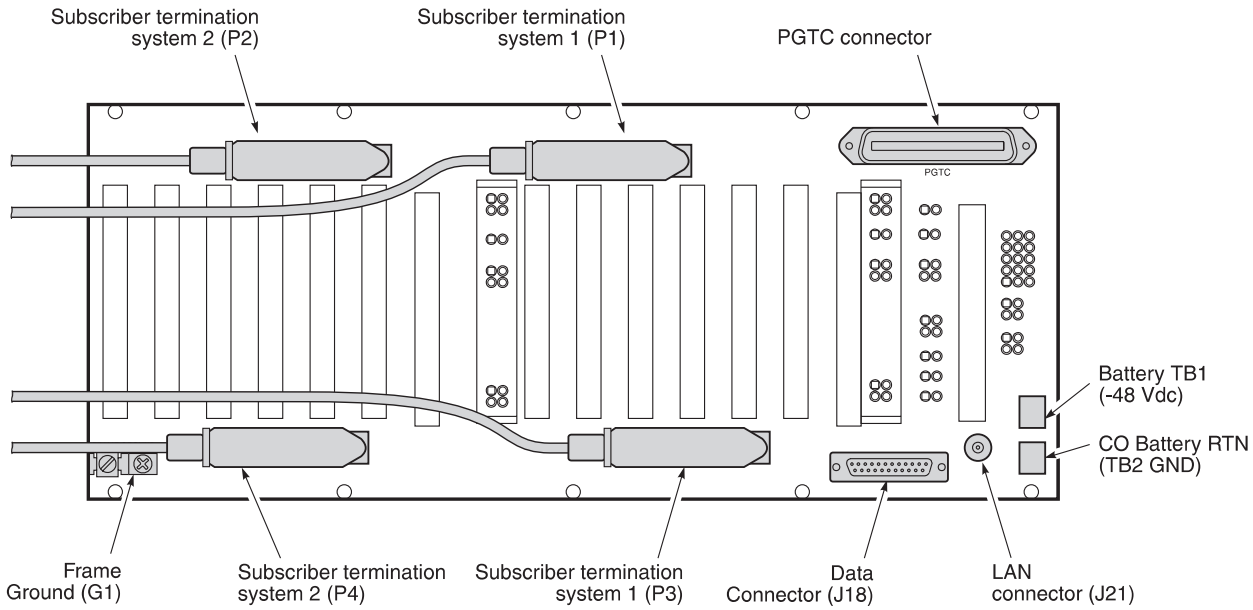

Figure 2. *COT Shelf Backplane*

CO BATTERY RETURN is separate from FRAME GROUND in PG-Flex.

CKT GND and CO BATTERY RETURN are connected inside the PG-FLEX Line Unit but are not connected on the backplane.

Table 9. *Battery, CO Battery Return, and Frame Ground*

Connector	Type	Function
TB1 -48V	Screw	Battery (-48 Vdc)
TB2 GND	Screw	CO battery return
G1	Screw	Frame ground

Table 10. *LAN Connector*

Connector	Type	Function
J21	BNC	(Not currently used)

Table 11. *Data Connector*

Connector	Type	Function
J18	DB-25(F)	(Not currently used)

Table 12. *HDSL, Test, And Miscellaneous Terminations*

System*	Connector	Type	Function
System ***n***	HDSL_***n***_T1 HDSL_***n***_R1	.045 in. Wire-Wrap	Tip and Ring terminations for HDSL Pair #1 of System ***n*** to Remote Terminal ***n***. +130 Vdc is simplexed on this line for powering the Remote Terminal.
System ***n***	HDSL_***n***_T2 HDSL_***n***_R2	.045 in. Wire-Wrap	Tip and Ring terminations for HDSL Pair #2 of System ***n*** to Remote Terminal ***n***. -130 Vdc is simplexed on this line for powering the Remote Terminal.
System ***n***	PWR_***n***_T1 PWR_***n***_R1	.045 in. Wire-Wrap	System ***n*** Power Pair #1 Used for auxiliary RT power when a doubler is used.
System ***n***	PWR_***n***_T2 PWR_***n***_R2	.045 in. Wire-Wrap	System ***n*** Power Pair #2. Used for auxiliary RT power when a doubler is used.
System ***n***	BYPASS_***n***_T BYPASS_***n***_R	.045 in. Wire-Wrap	Termination for the metallic bypass pair into COT System ***n*** from RT ***n***.
System ***n***	TEST_***n***_T IN TEST_***n***_R IN	.045 in. Wire-Wrap	Test connection looking into the CO for the selected subscriber for System ***n***. This connection must be set up through the PG-Flex RS-232 maintenance port.
System ***n***	TEST_***n***_OUT TEST_***n***_OUT	.045 in. Wire-Wrap	Test connection looking into the COT channel for the selected subscriber for System ***n***. This connection must be set up through the PG-Flex RS-232 maintenance port. In some applications, this pair will be jumpered to the BYPASS pair from RT ***n***.
	CC1_TIP CC1_RING	.045 in. Wire-Wrap	Composite Clock #1. Used for primary synchronization to CO timing. When cascaded, terminate only on the last shelf in the cascade.
	CC2_TIP CC2_RING	.045 in. Wire-Wrap	Composite Clock #2. Used for secondary synchronization to CO timing. When cascaded, terminate only on the last shelf in the cascade.
	FRAME_GND	.045 in. Wire-Wrap	Frame ground (G1). This is isolated from CO battery return in PG-Flex.
	EXT_ACO CKT_GND	.045 in. Wire-Wrap	External Alarm Cutoff. A momentary connection between EXT_ACO and circuit ground will silence PG-Flex audible alarm relays.
	BAT RTN CKT GND	.045 in. Wire-Wrap	CO battery return. This is isolated from frame ground in PG-Flex.

***** Where ***n*** is 1 on System 1 and 2 on System 2.

Table 13. *Alarm Termination*

Posts	Contact Post NO*	Contact Post COM*	Contact Post NC*	FUNCTION†
SHELF_ID	1	2	3	Shelf ID indicates a major or minor shelf alarm is active.
MAJ_AUD	4	5	6	Indicates a major alarm. The alarm can be silenced using the ACO button. Connect this relay to the major alarm audible indicator of the CO alarm system.
MAJ_VIS	7	8	9	Indicates a major alarm. This alarm cannot be disabled. Connect this relay to the major alarm visual indicator of the CO alarm system.
MIN_AUD	10	11	12	Indicates a minor alarm. The alarm can be silenced using the ACO button. Connect this relay to the minor alarm audible indicator of the CO alarm system.
MIN_VIS	13	14	15	Indicates a minor alarm. This alarm cannot be disabled. Connect this relay to the minor alarm visual indicator of the CO alarm system.

* For the relay contacts, NO is normally opened, NC is normally closed, and COM is common.

† All relays provide form “C” contacts.

You must use the cable adapter (PN 120-1111-01) to ensure the subscriber terminations follow the information shown in Table 14.

Table 14. *System 1 Subscriber Terminations*

CU	Circuit	Conn P1 Tip	Conn P1 Ring	Tip	Ring	Conn P3 Tip	Conn P3 Ring	Circuit	CU
	1	26	1	WH/BL	BL/WH	26	1	1	
	2	27	2	WH/OR	OR/WH	27	2	2	
	3	28	3	WH/GN	GN/WH	28	3	3	
	4	29	4	WH/BN	BN/WH	29	4	4	
1	5	30	5	WH/SL	SL/WH	30	5	5	**4**
	6	31	6	RD/BL	BL/RD	31	6	6	
	7	32	7	RD/OR	OR/RD	32	7	7	
	8	33	8	RD/GN	GN/RD	33	8	8	
	1	34	9	RD/BN	BN/RD	34	9	1	
	2	35	10	RD/SL	SL/RD	35	10	2	
	3	36	11	BK/BL	BL/BK	36	11	3	
	4	37	12	BK/OR	OR/BK	37	12	4	
2	5	38	13	BK/GN	GN/BK	38	13	5	**5**
	6	39	14	BK/BN	BN/BK	39	14	6	
	7	40	15	BK/SL	SL/BK	40	15	7	
	8	41	16	YL/BL	BL/YL	41	16	8	
	1	42	17	YL/OR	OR/YL	42	17	1	
	2	43	18	YL/GN	GN/YL	43	18	2	
	3	44	19	YL/BN	BN/YL	44	19	3	
	4	45	20	YL/SL	SL/YL	45	20	4	
3	5	46	21	VI/BL	BL/VI	46	21	5	**6**
	6	47	22	VI/OR	OR/VI	47	22	6	
	7	48	23	VI/GN	GN/VI	48	23	7	
	8	49	24	VI/BN	BN/VI	49	24	8	

Shaded terminations are used only with 8 channel POTS and DDS CUs.

You must use the cable adapter (PN 120-1111-01) to ensure the subscriber terminations follow the information shown in Table 15.

Table 15. *System 2 Subscriber Terminations*

CU*	Circuit	Conn P2 Tip	Conn P2 Ring	Tip	Ring	Conn P4 Tip	Conn P4 Ring	Circuit	CU*
	1	26	1	WH/BL	BL/WH	26	1	1	
	2	27	2	WH/OR	OR/WH	27	2	2	
	3	28	3	WH/GN	GN/WH	28	3	3	
7	4	29	4	WH/BN	BN/WH	29	4	4	**10**
(1)	5	30	5	WH/SL	SL/WH	30	5	5	**(4)**
	6	31	6	RD/BL	BL/RD	31	6	6	
	7	32	7	RD/OR	OR/RD	32	7	7	
	8	33	8	RD/GN	GN/RD	33	8	8	
	1	34	9	RD/BN	BN/RD	34	9	1	
	2	35	10	RD/SL	SL/RD	35	10	2	
	3	36	11	BK/BL	BL/BK	36	11	3	
8	4	37	12	BK/OR	OR/BK	37	12	4	**11**
(2)	5	38	13	BK/GN	GN/BK	38	13	5	**(5)**
	6	39	14	BK/BN	BN/BK	39	14	6	
	7	40	15	BK/SL	SL/BK	40	15	7	
	8	41	16	YL/BL	BL/YL	41	16	8	
	1	42	17	YL/OR	OR/YL	42	17	1	
	2	43	18	YL/GN	GN/YL	43	18	2	
	3	44	19	YL/BN	BN/YL	44	19	3	
9	4	45	20	YL/SL	SL/YL	45	20	4	**12**
(3)	5	46	21	VI/BL	BL/VI	46	21	5	**(6)**
	6	47	22	VI/OR	OR/VI	47	22	6	
	7	48	23	VI/GN	GN/VI	48	23	7	
	8	49	24	VI/BN	BN/VI	49	24	8	

* The CU numbers in parentheses are for a List 3 or higher LU. The numbers not in parentheses are for a List 1 or 2 LU.

Shaded terminations are used only with 8 channel POTS and DDS CUs.

Table 16. *PGTC Telco Connector P12*

Pin	Signal	Pin	Signal
1	PGTC_RING1	26	PGTC_TIP1
2	PGTC_RING2	27	PGTC_TIP2
3	PGTC_RING3	28	PGTC_TIP3
4	PGTC_RING4	29	PGTC_TIP4
5	SLEEVE2	30	SLEEVE1
6	SLEEVE4	31	SLEEVE3
7	OH2	32	OH1
8	OH4	33	OH3
9	PROCEED2	34	PROCEED1
10	PROCEED4	35	PROCEED3
11	LOCK2	36	LOCK1
12	LOCK4	37	LOCK3
13	N/C	38	N/C
14	N/C	39	N/C
15	N/C	40	N/C
16	N/C	41	N/C
17	TMAJ	42	TSTALM
18	N/C	43	N/C
19	N/C	44	N/C
20	N/C	45	N/C
21	N/C	46	N/C
22	SEZBY	47	SEIZE
23	N/C	48	N/C
24	N/C	49	N/C
25	N/C	50	N/C

C. INSTALLATION AND TEST

5. Unpacking

5.1 Upon receipt of the equipment:

1 Unpack each container and visually inspect it for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to PairGain. Order replacement equipment if necessary.

2 Check the contents against the packing list to ensure complete and accurate shipment. If the shipment is short or irregular, contact PairGain as described in Section 12. If you must store the equipment for a prolonged period, store the equipment in its original container.

6. Pre-Provisioning—HDSL Lines

6.1 The HDSL transmission scheme uses two pairs between the COT and the Remote Terminal (RT). The wire pairs should have identical electrical make-ups. Keep exposure to crosstalk and the differences in total wire length, wire gauge, bridge taps to a minimum. Pair isolation (Tip-Ring, Tip-Ground, and Ring-Ground) must be ≥ 100 kΩ.

6.2 The wire pairs from the COT to the RT must meet the following design guidelines:

- nonloaded cable only
- multi-gauge restricted to two gauge changes, except for stubbing or fusing
- total bridge taps can not exceed 2.5 kft. No single bridge tap may exceed 2.0 kft

6.3 The distance limitation for HDSL transmission is based on a maximum signal attenuation of 35 dB. Since signal attenuation decreases as cable size increases, the larger the gauge (i.e., 19 AWG vs. 26 AWG), the greater the distance between the COT and the RT. Tables 17 and 18 identify these distances (at a cable temperature of 68°F).

Table 17. *12/24 Channel HDSL Transmission Distance*

Gauge	Loop Length	Resistance
19 AWG 0.9 mm	22.8 kft 7.0 km	367 Ω
22 AWG 0.6 mm	16.1 kft 4.9 km	521 Ω
24 AWG 0.5 mm	12.3 kft 3.7 km	638 Ω
26 AWG 0.4 mm	9.0 kft 2.7 km	750 Ω

Table 18. *16/32 Channel HDSL Transmission Distance*

Gauge	Loop Length	Resistance
19 AWG 0.9 mm	19.4 kft 5.9 km	312 Ω
22 AWG 0.6 mm	13.7 kft 4.2 km	444 Ω
24 AWG 0.5 mm	10.7 kft 3.3 km	554 Ω
26 AWG 0.4 mm	8.1 kft 2.5 km	672 Ω

7. Mounting

7.1 The COT shelf mounts in a standard 19- or 23-inch CO equipment bay. Use rack adapters when installing onto a 23-inch frame or reverse the mounting bracket (short flange against the shelf) to fit into the 23 inch frame. The shelf has a mounting height requirement of 7 inches.

1 Align the shelf (Figure 3) universal mounting brackets with the four vertical mounting holes.

2 Install the mounting screws.

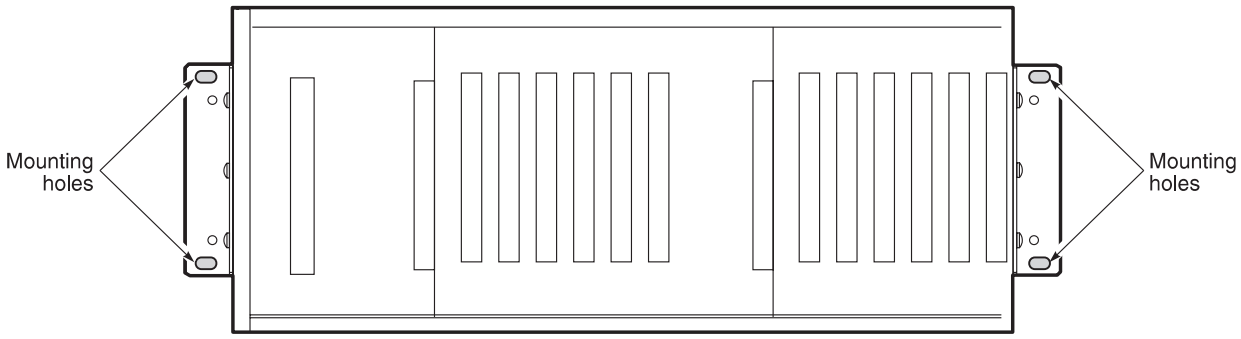

Figure 3. *Mounting the FCS-718 COT Shelf*

8. Wiring

8.1 Sections 8.2 through 8.9 describe how to connect the FCS-718. Section 8.10 verifies the installation. All wiring to the COT shelf is performed on the backplane (Figure 2) on the back side of the shelf.

Follow the provisions of the current edition of the National Electric Code for wiring external to the product(s).

8.2 **Frame Ground and Battery.** Connect the frame ground and battery:

1 Remove the clear Plexiglas™ from the backplane.

2 Remove the fuse in the equipment bay fuse panel for the circuit where the PG-Flex CO battery wire will be terminated.

Follow local grounding practices to ensure a good frame ground connection to PG-Flex. This frame grounding is required for secondary voltage protection of the PG-Flex equipment.

3 Connect the frame ground (Figure 4):

a Connect one end of the frame ground wire to the grounding lug G1 (Frame Ground).

b Connect the other end of the frame ground wire to the CO ground termination point.

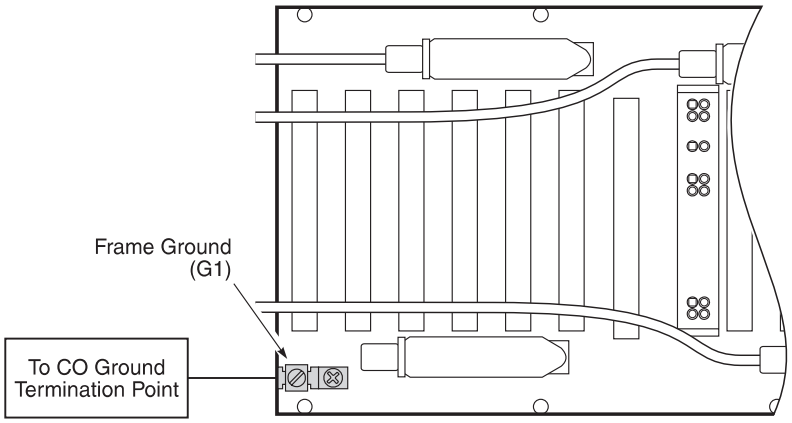

Figure 4. *Connecting the Frame Ground*

Use 12 AWG or larger wire (or multiple wires of a smaller gauge) to ensure good power connections to PG-Flex.

4 Connect the CO battery (Figure 5):

a Connect wires used for the CO battery and the CO battery return to TB1 (-48 Vdc) and TB2 (BATT RTN) screw terminals.

b Connect the CO battery return wire from TB2 on the COT Shelf to the CO battery ground return termination point.

c Connect the CO battery wire from TB1 on the COT Shelf to the equipment bay fuse panel termination point.

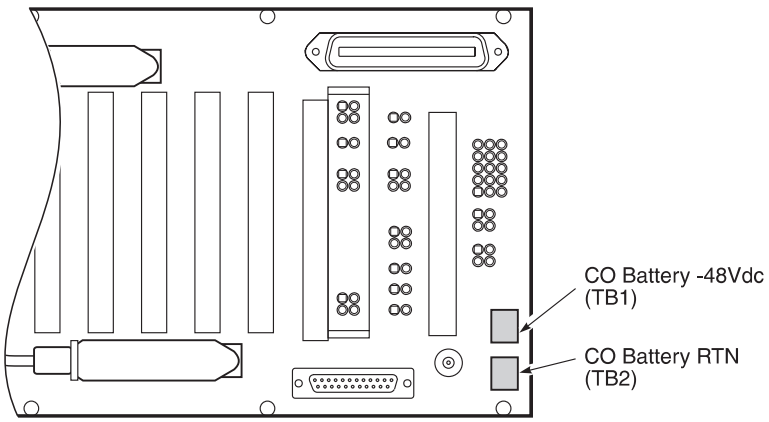

Figure 5. *Connecting the Battery*

8.3 HDSL Lines. Connect the HDSL lines (Figure 6):

1 For System 1 installation:

a Connect the HDSL Pair #1 on System 1 onto wire-wrap pins HDSL_1_T1 (Tip) and HDSL_1_R1 (Ring) on the COT shelf.

b Connect the HDSL Pair #2 on System 1 onto wire-wrap pins HDSL_1_T2 (Tip) and HDSL_1_R2 (Ring) on the COT shelf.

2 For System 2 installation:

a Connect HDSL Pair #1 on System 2 onto wire-wrap pins HDSL_2_T1 (Tip) and HDSL_2_R1 (Ring) on the COT shelf.

b Connect HDSL Pair #2 on System 2 onto wire-wrap pins HDSL_2_T2 (Tip) and HDSL_2_R2 (Ring) on the COT shelf.

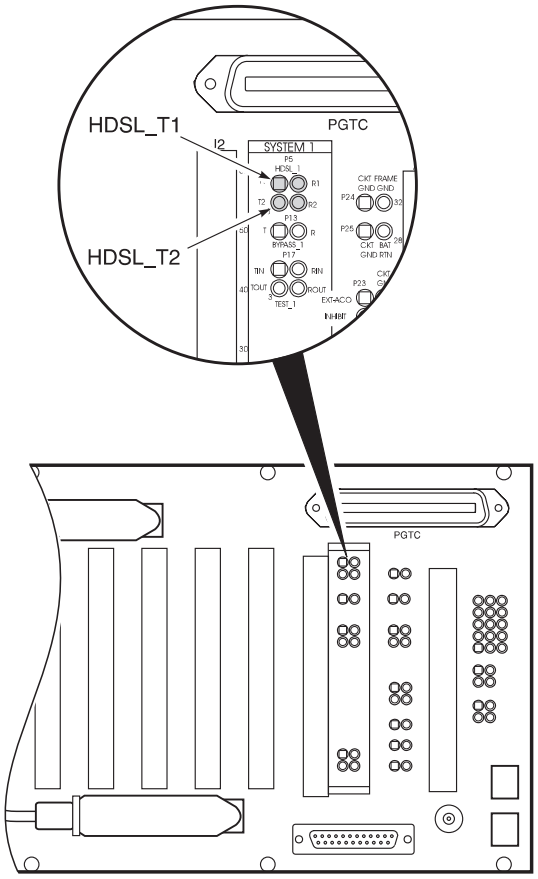

Figure 6. *Connecting the HDSL Lines*

8.4 Bypass Pairs. If subscriber drop testing is required, connect the metallic bypass pairs (Figure 7):

Metallic bypass pairs can not be shared between PG-Flex systems or to other digital loop carrier (DLC) systems.

1. For System 1 installation, connect the metallic bypass pair from the main distribution frame (MDF) to wire wrap posts BYPASS_T and BYPASS_R on the COT shelf.
2. For System 2 installation, connect the metallic bypass pair from the MDF to wire wrap posts BYPASS_T and BYPASS_R on the COT shelf.

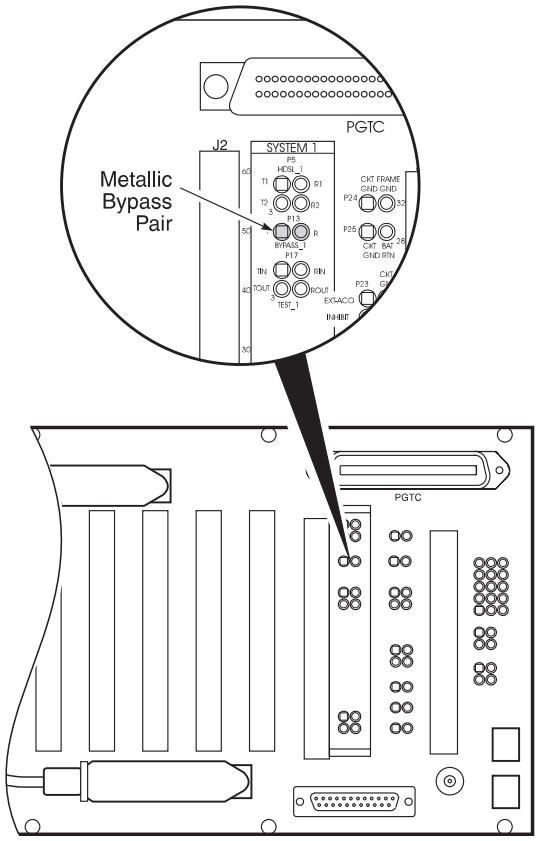

Figure 7. *Connecting the Metallic Bypass Pair*

8.5 **Composite Clock.** When required, connect the composite clock (Figure 8). You can cascade the composite clock to other PG-Flex shelves. When cascading the composite clock to other PG-Flex shelves, terminate only on the last shelf in the cascade.

1 Connect the primary composite clock leads from the master clock source in the CO to CC1_TIP and CC1_RING termination pins on the backplane.

2 Connect the secondary composite clock leads from the master clock source in the CO to CC2_TIP and CC2_RING termination pins on the backplane.

When using a List 2 or higher FPI-729 PGTC interface card with a List 4 shelf, terminate the composite clock by attaching resistors across the CC1 Tip and Ring wire-wrap pins and the CC2 Tip and Ring wire-wrap pins as described in step 3.

3 For a List 2 or higher FPI-729 PGTC interface module, wire-wrap a 130 to 135 Ω resistor on the CC1 Tip and Ring pins to terminate clock 1 (Figure 8). Wire-wrap a 130 to 135 Ω resistor on the CC2 Tip and Ring pins to terminate clock 2.

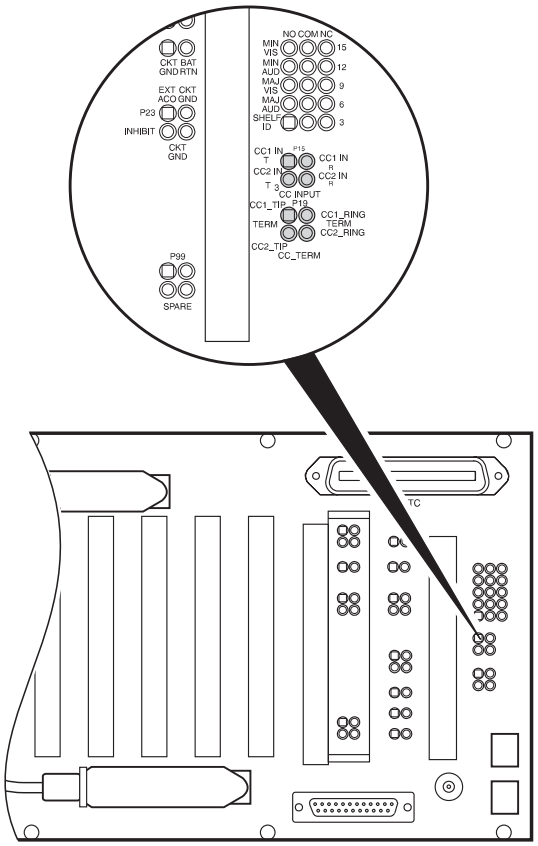

Figure 8. *Connecting the Composite Clock and Alarms*

8.6 **Alarms.** If external audible and/or visual alarm indications are required, connect the audible and visual alarm leads from the CO alarm panel to the COT (Figure 8).

8.7 Subscriber Lines. Connect the subscriber lines:

You must use the cable adapter (PN 120-1111-01) to ensure the subscriber terminations follow the information shown in Tables 14 and 15.

1 For PG-Flex system 1, use Table 14 to connect the CO switch cables to the cable adapters for P1 and P3 terminations.

2 For PG-Flex system 2, use Table 15 to connect the CO switch cables to the cable adapters on P2 and P4 terminations.

8.8 Auxiliary Power Pairs. When PG-Flex is used with a doubler, wire the COT shelf:

1 Wire-wrap auxiliary power pair 1 to PWR_OUT_T1 (Tip) and PWR_OUT_R1 (Ring) for system 1.

2 Wire-wrap auxiliary power pair 2 to PWR_OUT_T2 (Tip) and PWR_OUT_R2 (Ring) for system 1.

3 Repeat steps 1 and 2 when required for systems 2.

8.9 Fuse. Insert a 6 amp fuse in the equipment bay fuse panel for the circuit where the PG-Flex CO battery wire is terminated.

8.10 Cabling Verification. Verify the following:

The following verifications should be done before any cards are inserted in the COT shelf.

1 Verify a minimum of -42 Vdc and a maximum of -56 Vdc between TB1 (–48 Vdc) and TB2 (BATT RTN) screw terminals on the COT shelf.

2 Verify the following for the HDSL lines:

If the HDSL lines are not connected properly, the COT will not communicate with the RT.

a Visually verify the HDSL lines are terminated properly and with the correct orientation.

b Verify that the HDSL lines are "dry."

c Verify 0 Vdc between the Tip and Ring, Tip and Ground, and Ring and Ground of each of the HDSL circuits terminated on the shelf.

d Verify > 100 kΩ resistance between the Tip and Ring, Tip and Ground, and Ring and Ground of each of the HDSL circuits terminated on the shelf.

3 Replace the clear Plexiglas cover on the rear of the COT shelf.

9. Turn-Up and Testing

9.1 Refer to the COT or RT Line Unit Technical Practices for complete COT and RT turn up and testing procedures.

10. Troubleshooting

10.1 Refer to the COT or RT Line Unit Technical Practices for complete COT and RT troubleshooting procedures.

11. Technical Support

11.1 PairGain Technical Assistance is available 24-hours-a-day, 7-days-a-week by contacting PairGain Customer Service at:

Telephone:	**(800) 638-0031 or (714) 832-9922**
Fax:	**(714) 832-9924**

11.2 During normal business hours (8:00 AM to 5:00 PM, Pacific Time, Monday-Friday, excluding holidays), technical assistance calls are normally answered directly by a Customer Service Engineer. At other times, a request for technical assistance is handled by an on-duty Customer Service Engineer through a callback process. This process normally results in a callback within 30 minutes of initiating the request.

11.3 In addition, PairGain maintains a computer bulletin board system for obtaining current information on PairGain products, product troubleshooting tips and aids, accessing helpful utilities, and for posting requests or questions. This system is available 24-hours-a-day by calling (714) 730-3299. Transmission speeds up to 28.8 kbps are supported with a character format of 8-N-1.

D. WARRANTY AND CERTIFICATION

12. Warranty

12.1 PairGain Technologies warrants this product to be free of defects and to be fully functional for a period of 5 years from the date of original shipment, given proper customer installation and regular maintenance. PairGain will repair or replace any unit without cost during this period if the unit is found to be defective for any reason other than abuse or improper use or installation.

12.2 This module should not be field repaired. If it fails, replace it with another unit and return the faulty unit to PairGain for repair. Any modifications of the unit by anyone other than an authorized PairGain representative will void the warranty.

12.3 If a unit needs repair, call PairGain for a Return Material Authorization (RMA) number and return the defective unit, freight prepaid, along with a brief description of the problem, to:

PairGain Technologies, Inc.
14402 Franklin Avenue.
Tustin, CA 92780-7013
Attn: Customer Repair Facility.
(800) 638-0031

12.4 PairGain will continue to repair faulty modules beyond the warranty program at a nominal charge. Contact your PairGain sales representative for details and pricing.

13. Certification

13.1 **FCC Compliance.** The FCS-718 List 4 COT Shelf has been tested and found to comply with the limits for Class A digital devices pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

13.2 Refer to the installation section of the appropriate instruction manual for the unit you are installing to obtain information on:

- Cabling
- Proper connections
- Grounding
- Line powering

13.3 All wiring external to the product(s) should follow the provisions of the current edition of the National Electrical Code or local standards.

E. ABBREVIATIONS

14. Abbreviations

COT	Central Office Terminal
DDS	Digital Data System
DLC	Digital Loop Carrier
HDSL	High bit-rate Digital Subscriber Line
ISDN	Integrated Services Digital Network
LAN	Local Area Network
MDF	Main Distribution Frame
NMA	Network Management Analysis
POTS	Plain Old Telephone Service
RT	Remote Terminal

Corporate Office
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ISO 9001
DNV
DNV Certification, Inc.
Certificated Firm

PAIRGAIN
THE COPPEROPTICS COMPANY