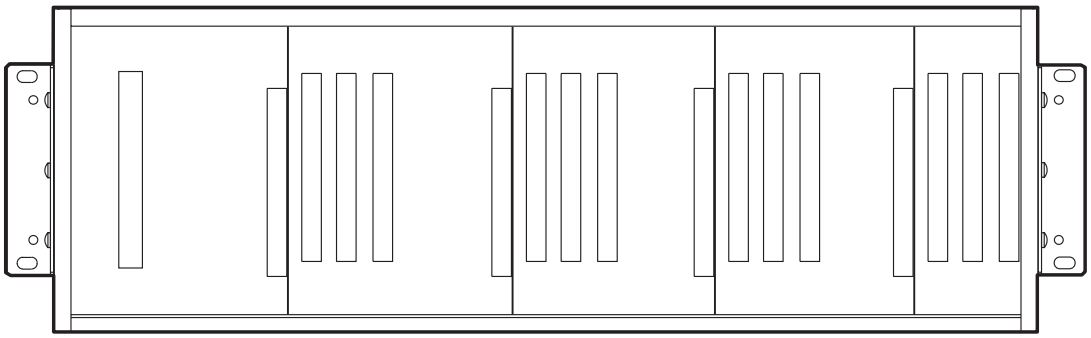
PG-FLEX CO TERMINAL SHELF

MODEL FCS-719

List Number	Part Number	CLEI Code
1	150-1319-01	VAMCBE0ARA



PAIRGAIN TECHNOLOGIES, INC.
ENGINEERING SERVICES TECHNICAL PRACTICE
SECTION 363-719-100

Revision History of this practice.
Revision 03—December 18, 1996
a) Added List 2

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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 warns you of possible damage to equipment.

A warning indicates the possibility of personal injury.

A. PRODUCT OVERVIEW

1. DESCRIPTION AND FEATURES

1.1 The PairGain® PG-Flex™ FCS-719, List 1D Central Office Terminal (COT) 23" Shelf supports four PG-Flex subscriber carrier systems (Figure 1). The FCS-719 provides convenient mounting of COT Alarm, Line, and Channel Units, as well as termination points for subscriber circuits, alarm, power, and metallic test access. The FCS-719, List 1 COT Shelf provides 25-pair male Amphenol connectors for subscriber connections. All circuit boards are installed from the front of the shelf. Interconnections for the PG-Flex units are located on the backplane at the rear of the shelf.

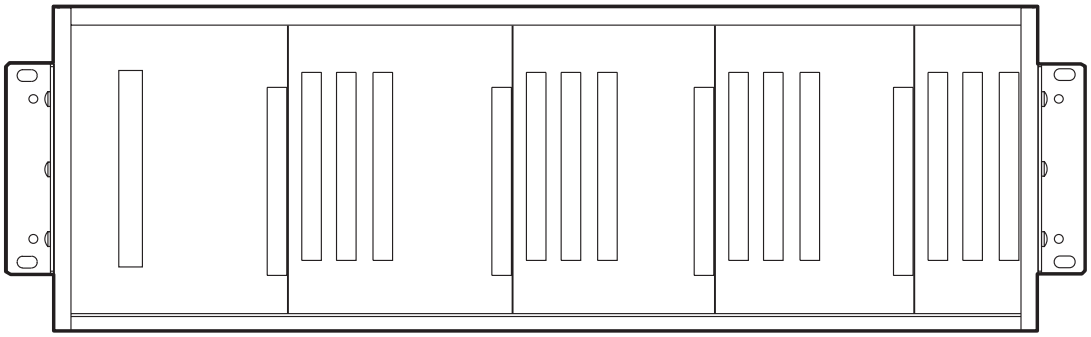

Figure 1. *Front View of FCS-719 COT Shelf*

1.2 The FCS-719 COT shelf accommodates the following PG-Flex units:

- One alarm unit or Pair Gain Test Controller (PGTC) interface unit
- Four line units
- Twelve channel units

1.3 PG-Flex FCS-719 COT Shelf features:

- Universal mounting brackets for installation into a 23-inch equipment rack
- Wire-wrap connections for HDSL, alarm, metallic bypass pairs, and alarm relays
- Screw terminal connections for frame ground and Central Office (CO) battery
- DB-25 connector for Network Management Access communications
- 25-pair Amphenol connectors for connection to CO lines
- 25-pair Amphenol connector for PGTC Test Interface

2. SPECIFICATIONS

Physical Dimensions

Height:..... 7.00" (17.8 cm)
Width: ..... 23.00" (58.4 cm)
Depth:..... 11.75" (29.9 cm)
Weight:..... 15.0 lb. (6.8 kg)

Mounting

23" equipment rack using universal mounting brackets

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)

B. FUNCTIONAL DESCRIPTION

3. OPERATIONAL CAPABILITIES

3.1 Each shelf can support four subscriber carrier systems; each system requires one line unit and one channel unit. Each shelf can contain up to four line units (one per system), 12 channel units (three per system) and one alarm unit or PGTC Interface unit (common to all systems).

4. BACKPLANE CONNECTIONS

4.1 The backplane of the FCS-719 COT Shelf List 1 contain the following connectors (Figure 2):

- CO Power, (Table 7)
- Local Area Network (Table 8)
- Data (Table 9)
- HDSL, Test, and Miscellaneous (Table 10)
- Composite Clock Termination Resistors (Table 10)
- Inhibit Pin (Table 10)
- Alarm (Table 11)
- Subscriber Lines (Tables 12 through 14)
- PGTC Test Interface (Table 15)

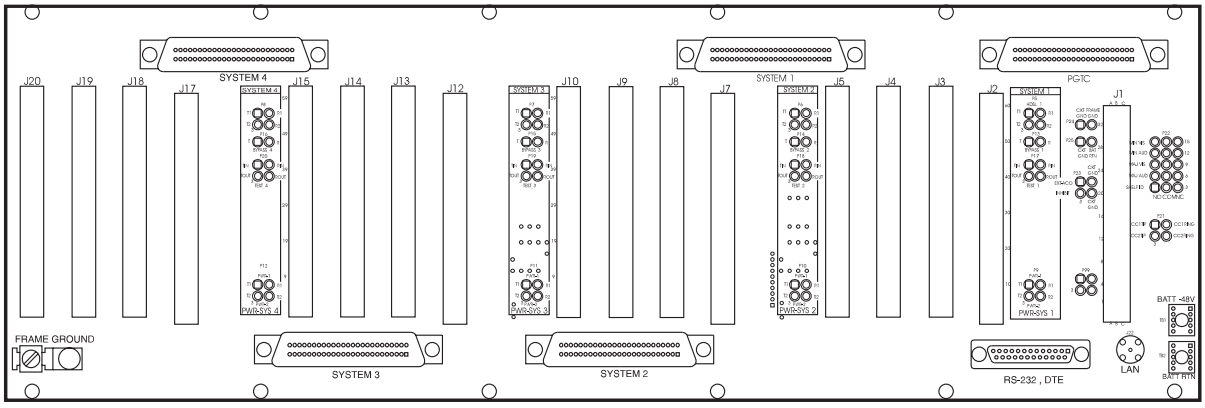

Figure 2. *FCS-719, List 1 COT Shelf Backplane*

4.2 Refer to the installation section of the appropriate instruction manual to get information on:

- Cabling
- Proper connections
- Grounding

4.3 Wiring external to the product(s) should follow the provisions of the current edition of the National Electrical Code.

4.4 Tables 1 through 15 identify each connector by type and list the function of each connector terminal.

Information in tables 2 through 6 may be used for diagnostic and troubleshooting procedures under the direction of an authorized PairGain technical support representative.

Table 1. *COT Shelf Connectors*

Connector ID	Description	Table
G1	Frame Ground (Protection Ground)	7
J1	Alarm Unit/PGTC Interface Unit	2
J2	Line Unit #1	3
J3	Channel Unit #1	4
J4	Channel Unit #2	5
J5	Channel Unit #3	6
J7	Line Unit #2	3
J8	Channel Unit #4	4
J9	Channel Unit #5	5
J10	Channel Unit #6	6
J12	Line Unit #3	3
J13	Channel Unit #7	4
J14	Channel Unit #8	5
J15	Channel Unit #9	6
J17	Line Unit #4	3
J18	Channel Unit #10	4
J19	Channel Unit #11	5
J20	Channel Unit #12	6
J21	RS-232 DTE	9
J22	LAN connector	8
P1	System 1 Subscriber connector	14
P2	System 2 Subscriber connector	14
P3	System 3 Subscriber connector	14
P4	System 4 Subscriber connector	14
P5, P9, P13, P17	System 1 wirewrap fields	10
P6, P10, P14, P18	System 2 wirewrap fields	10
P7, P11, P15, P19	System 3 wirewrap fields	10
P8, P12, P16, P20	System 4 wirewrap fields	10
P21	Composite Clock Timing Input	10
P22	Alarms	11
P23	Ext. ACO, PGTC Inhibit	10
P24, P25	Circuit, Frame, Battery Grounds	10
P27	PGTC Connector	15
P99	Spare pins; not connected	---
TB1, TB2	CO Power	9

***Table 2**. Alarm Unit/PGTC Interface Unit (J1-A, J1-B, J1-C) Connector Pinouts*

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	NAM_TX	18	NMA_RX	18	NMA_DTR
19	NAM_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	SYS_ID_NO	24	SYS_ID_COM	24	SYS_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 3. *Line Unit Connector Pinouts*

System	Line Unit	Connector
1	**1**	**J2**
2	**2**	**J7**
3	**3**	**J12**
4	**4**	**J17**

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	CID3
41	CID2	42	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	HDSLTIP1_***n***	54	HDSLTIP2_***n***
55	HDSLRING1_***n***	56	HDSLRING2_***n***
57	N/C	58	N/C
59	PROTGND	60	PROTGND

* Where ***n*** is 1 on System 1, 2 on System 2, 3 on System 3, and 4 on System 4.

Table 4. *Channel Unit Connector Pinouts for J3, J8, J13, J18*

System	Channel Unit	Connector
1	1	J3
2	4	J8
3	7	J13
4	10	J18

Pin	Signal	Pin	Signal
1	PROTGND	2	PROTGND
3	TIPEX01_***n****	4	RINGEX01_***n***
5	TIPEX02_***n***	6	RINGEX02_***n***
7	TIPEX03_***n***	8	RINGEX03_***n***
9	TIPEX04_***n***	10	RINGEX04_***n***
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	N/C	32	SCL_***n***
33	+5_1	34	+5_1
35	GND	36	GND
37	-5_1	38	-5_1
39	N/C	40	GND
41	GND	42	GND
43	GND	44	N/C
45	TESTIN-T_***n***	46	TESTIN-R_***n***
47	GND	48	GND
49	TESTOUT-T_***n***	50	TESTOUT-R_***n***
51	TIP01_***n***	52	RING01_***n***
53	TIP02_***n***	54	RING02_***n***
55	TIP03_***n***	56	RING03_***n***
57	TIP04_***n***	58	RING04_***n***
59	PROTGND	60	PROTGND

***** Where ***n*** is 1 on System 1, 2 on System 2, 3 on System 3, and 4 on System 4.

Table 5. *Channel Unit Connector Pinouts for J4, J9, J14, J19*

System	Channel Unit	Connector
1	**2**	**J4**
2	**5**	**J9**
3	**8**	**J14**
4	**11**	**J19**

Pin	Signal	Pin	Signal
1	PROTGND	2	PROTGND
3	TIPEX05_***n***	4	RINGEX05_***n***
5	TIPEX06_***n***	6	RINGEX06_***n***
7	TIPEX07_***n***	8	RINGEX07_***n***
9	TIPEX08_***n***	10	RINGEX08_***n***
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	N/C	32	SCL_***n***
33	+5_1	34	+5_1
35	GND	36	GND
37	-5_1	38	-5_1
39	N/C	40	GND
41	GND	42	GND
43	GND	44	N/C
45	TESTIN-T_***n***	46	TESTIN-R_***n***
47	GND	48	GND
49	TESTOUT-T_***n***	50	TESTOUT-R_***n***
51	TIP05_***n***	52	RING05_***n***
53	TIP06_***n***	54	RING06_***n***
55	TIP07_***n***	56	RING07_***n***
57	TIP08_***n***	58	RING08_***n***
59	PROTGND	60	PROTGND

***** Where ***n*** is 1 on System 1, 2 on System 2, 3 on System 3, and 4 on System 4.

Table 6. *Channel Unit Connector Pinouts for J5, J10, J15, J20*

System	Channel Unit	Connector
1	**3**	**J5**
2	**6**	**J10**
3	**9**	**J15**
4	**12**	**J20**

Pin	Signal	Pin	Signal
1	PROTGND	2	PROTGND
3	TIPEX09_***n***	4	RINGEX09_***n***
5	TIPEX10_***n***	6	RINGEX10_***n***
7	TIPEX11_***n***	8	RINGEX11_***n***
9	TIPEX12_***n***	10	RINGEX12_***n***
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	N/C	32	SCL_***n***
33	+5_1	34	+5_1
35	GND	36	GND
37	-5_1	38	-5_1
39	N/C	40	GND
41	GND	42	GND
43	GND	44	N/C
45	TESTIN-T_***n***	46	TESTIN-R_***n***
47	GND	48	GND
49	TESTOUT-T_***n***	50	TESTOUT-R_***n***
51	TIP09_***n***	52	RING09_***n***
53	TIP10_***n***	54	RING10_***n***
55	TIP11_***n***	56	RING11_***n***
57	TIP12_***n***	58	RING12_***n***
59	PROTGND	60	PROTGND

***** Where ***n*** is 1 on System 1, 2 on System 2, 3 on System 3, and 4 on System 4.

Table 7. *COT Shelf Connectors (CO Power) List 1*

Connector	Type	Function
TB1	Screw	CO battery (-48 V dc)
TB2	Screw	CO BATT RTN
G1	Screw	Frame Ground (Protection Ground)

CO ground is separate from FRAME GROUND in PG-Flex. These can be connected on the COT shelf Backplane by connecting the "FRAME GND" wire-wrap post to the adjacent "CKT GND" wire-wrap post. Follow local grounding practices.

Table 8. *COT Shelf Connectors (LAN)*

Connector	Type	Function
J22	BNC	(Not currently used)

Table 9. *COT Shelf Connector (DATA)*

Connector	Type	Function
J21	RS-232 DTE	(Not currently used)

Table 10. *COT Shelf Connectors (HDSL, Test, And Miscellaneous)*

System	Connector	Type	Function
System ***n****	HDSL_T1 HDSL_R1	0.45 mm 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_T2 HDSL_R2	0.45 mm Wire Wrap	Tip and ring terminations for HDSL Pair #2 of System ***n*** to Remote Terminal ***n***. -130 V dc is simplexed on this line for powering the Remote Terminal.
System ***n***	PWR_OUT_T1 PWR_OUT_R1	0.45 mm Wire Wrap	System ***n*** Power Pair #1 (Not currently used)
System ***n***	PWR_OUT_T2 PWR_OUT_R2	0.45 mm Wire Wrap	System ***n*** Power Pair #2 (Not currently used)
System ***n***	BYPASS_T BYPASS_R	0.45 mm Wire Wrap	Termination for the metallic bypass pair into COT System ***n*** from RT ***n***.
System ***n***	TEST_IN_T TEST_IN_R	0.45 mm Wire Wrap	Test connection looking into the COT channel unit for the selected subscriber for System ***n***. This connection must be set up through the PG-Flex RS-232 maintenance port.
System ***n***	TEST_OUT_T TEST_OUT_R	0.45 mm Wire Wrap	Test connection looking into the central office equipment of 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_IN_T CC1_IN_R	0.45 mm Wire Wrap	Composite Clock #1. Used for 64 kbps DDS Composite Clock for synchronization to central office switch. These pins may be daisy chained to additional Composite Clock inputs in other PG-Flex systems.
	CC2_IN_T CC2_IN_R	0.45 mm Wire Wrap	Composite Clock #2. Used for 64 kbps DDS Composite Clock for synchronization to central office switch. These pins may be daisy chained to additional Composite Clock inputs in other PG-Flex systems.
	FRAME_GND	0.45 mm Wire Wrap	Frame ground. This is isolated from central office battery ground in PG-Flex.
	EXT_ACO CKT_GND	0.45 mm Wire Wrap	External Alarm Cutoff. A momentary connection between EXT_ACO and circuit ground will silence the PG-Flex audible alarms.
	INHIBIT	0.45 mm Wire Wrap	PGTC Inhibit connection. This pin should not be connected to any other Inhibit pins in PG-Flex or other DLC systems.
	GND	0.45 mm Wire Wrap	Central office battery ground. This is isolated from frame ground in PG-Flex.

***** Where ***n*** is 1 on System 1, 2 on System 2, 3 on System 3, and 4 on System 4.

Table 11. *COT Shelf Connectors (ALARM)*

Posts	Contact Post NO	Contact Post COM	Contact Post NC	FUNCTION
SHELF_ID	1	2	3	Shelf ID. A single form "C" relay is utilized to indicate a major or minor shelf alarm is active.
MAJ_AUD	4	5	6	A single form "C" relay is utilized to indicate a major alarm. The alarm may be silenced with the ACO button. This relay may be connected to the central office alarm system's major alarm audible indicator.
MAJ_VIS	7	8	9	A single form "C" relay is utilized to indicate a major alarm. The alarm cannot be disabled. This relay may be connected to the central office alarm system's major alarm visual indicator.
MIN_AUD	10	11	12	A single form "C" relay is utilized to indicate a minor alarm. The alarm may be silenced with the ACO button. This relay may be connected to the central office alarm system's minor alarm audible indicator.
MIN_VIS	13	14	15	A single form "C" relay is utilized to indicate a minor alarm. The alarm may be silenced with the ACO button. This relay may be connected to the central office alarm system's minor alarm visual indicator.

Table 12. *COT Shelf Circuit Assignments**

cu 1	cu 2	cu 3	cu 4	cu 5	cu 6	cu 7	cu 8	cu 9	cu 10	cu 11	cu 12
ckt 1	ckt 1	ckt 1	ckt 1	ckt 1	ckt 1	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

* Refer to Table 11 for alarm unit terminations, and to Table 14 for line unit terminations.

Each PG-Flex channel unit provides four (4) or eight (8) circuits, depending on the service offering (that is, POTS, ISDN, DDS, etc.) of the channel unit – refer to Table 13 below.

For channel units providing four (4) circuits, circuits Ckt 1 through Ckt 4 are used for tip and ring terminations. For channel units providing eight (8) circuits, circuits Ckt 1 through Ckt 8 are used for tip and ring terminations.

For a 24-channel system, a maximum of 24 circuits may be provisioned.

Table 13. *Channel Unit Circuit Utilization*

Channel Unit	Channel Unit Service Configurations 4-Channel POTS	Channel Unit Service Configurations 8-Channel POTS	Channel Unit Service Configurations 4-Channel ISDN	Channel Unit Service Configurations 4-Channel DDS
Ckt 1	●	●	●	●
Ckt 2	●	●	●	●
Ckt 3	●	●	●	●
Ckt 4	●	●	●	●
Ckt 5		●		●
Ckt 6		●		●
Ckt 7		●		●
Ckt 8		●		●

Table 14. *COT Shelf Subscriber Connections*

Channel Unit	Circuit	Connector P*n** Ring	Connector P*n** Tip
1	1	1	26
	2	2	27
	3	3	28
	4	4	29
	5	13	38
	6	14	39
	7	15	40
	8	16	41
2	1	5	30
	2	6	31
	3	7	32
	4	8	33
	5	17	42
	6	18	43
	7	19	44
	8	20	45
3	1	9	34
	2	10	35
	3	11	36
	4	12	37
	5	21	46
	6	22	47
	7	23	48
	8	24	49
Bypass #n		25	50

Shaded terminations are used only with 8 Channel POTS and DDS Units.
* Where *n* is 1 on System 1, 2 on System 2, 3 on System 3, and 4 on System 4.

Table 15. *PGTC Telco Connector P27*

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 RT. The wire pairs should have identical electrical make-ups. Differences in total wire length, wire gauge, bridge taps, and exposure to crosstalk should be kept to a minimum. Pair isolation, (tip-ring, tip-ground, and ring-ground) must be ≥ 100 kohms.

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

- Nonloaded cable only.
- Multigauge is restricted to two gauge changes, except for stubbing or fusing.
- Total bridge taps may 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 16 and 17 identify these distances (at a cable temperature of 68°F).

Table 16. *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 17. *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 onto a standard 23" central office frame and requires 7" in height of mounting space (four vertical mounting units). Shipped with the COT shelf are universal mounting brackets and mounting screws.

8. WIRING

8.1 All wiring to the COT shelf is done on the backplane. To access the backplane, remove the clear Plexiglas cover.

8.1.1 To connect the frame ground (Figure 3):

1 Remove the fuse in the equipment bay's fuse panel for the circuit where the PG-Flex central office battery wire will be terminated until the COT is wired and ready for turn-up.

2 Connect the frame ground:

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.

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 central office ground termination point.

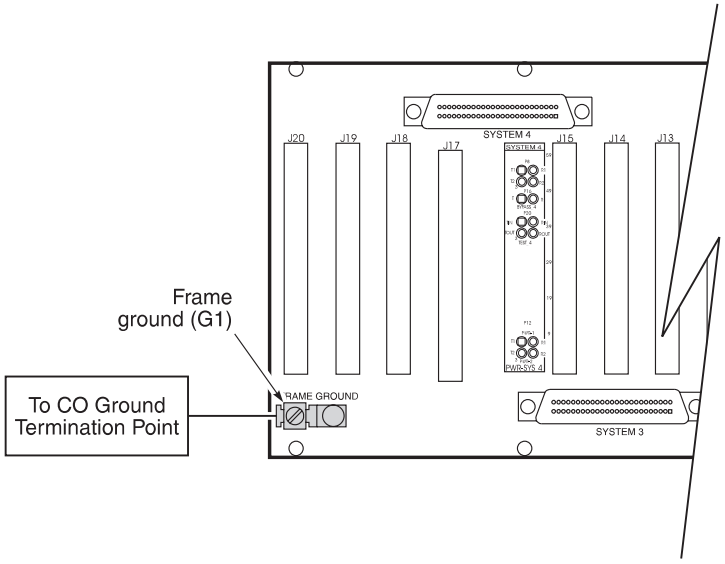

Figure 3. *Connecting the Frame Ground (Protection Ground)*

8.1.2 To connect the CO battery for the List 1 COT Shelf (Figure 4):

Use 12 AWG or larger wire to ensure good power connections to PG-Flex.

1. Connect the wires used for the central office battery and the central office battery return to the TB1 (-48 V) and TB2 (BATT RTN) screw terminals.
2. Connect the central office battery return wire from TB2 on the COT Shelf to the central office battery return termination point.
3. Connect the central office battery wire from TB1 on the COT Shelf to the equipment bay's fuse panel termination point.

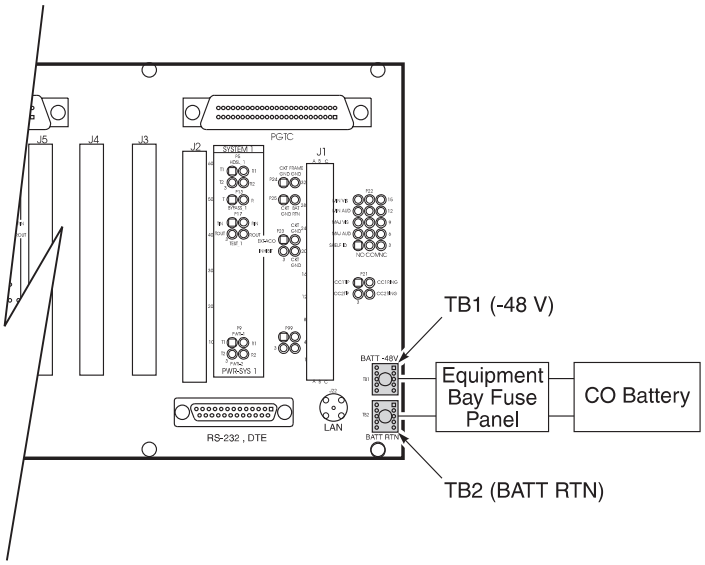

Figure 4. *Connecting the CO Battery for the List 1 COT Shelf*

8.1.3 To connect the HDSL lines (Figure 5):

1. Connect the HDSL Pair #1 onto wire-wrap pins HDSL_T1_***n*** (Tip) and HDSL_R1_ ***n*** (Ring) on the COT shelf, where ***n*** is 1 for System 1, 2 for System 2, 3 for System 3, and 4 for System 4.
2. Connect the HDSL Pair #2 onto wire-wrap pins HDSL_T2 _***n*** (Tip) and HDSL_R2 _***n*** (Ring) on the COT shelf, where ***n*** is 1 for System 1, 2 for System 2, 3 for System 3, and 4 for System 4.
3. Repeat steps 1 and 2 for each system being installed.

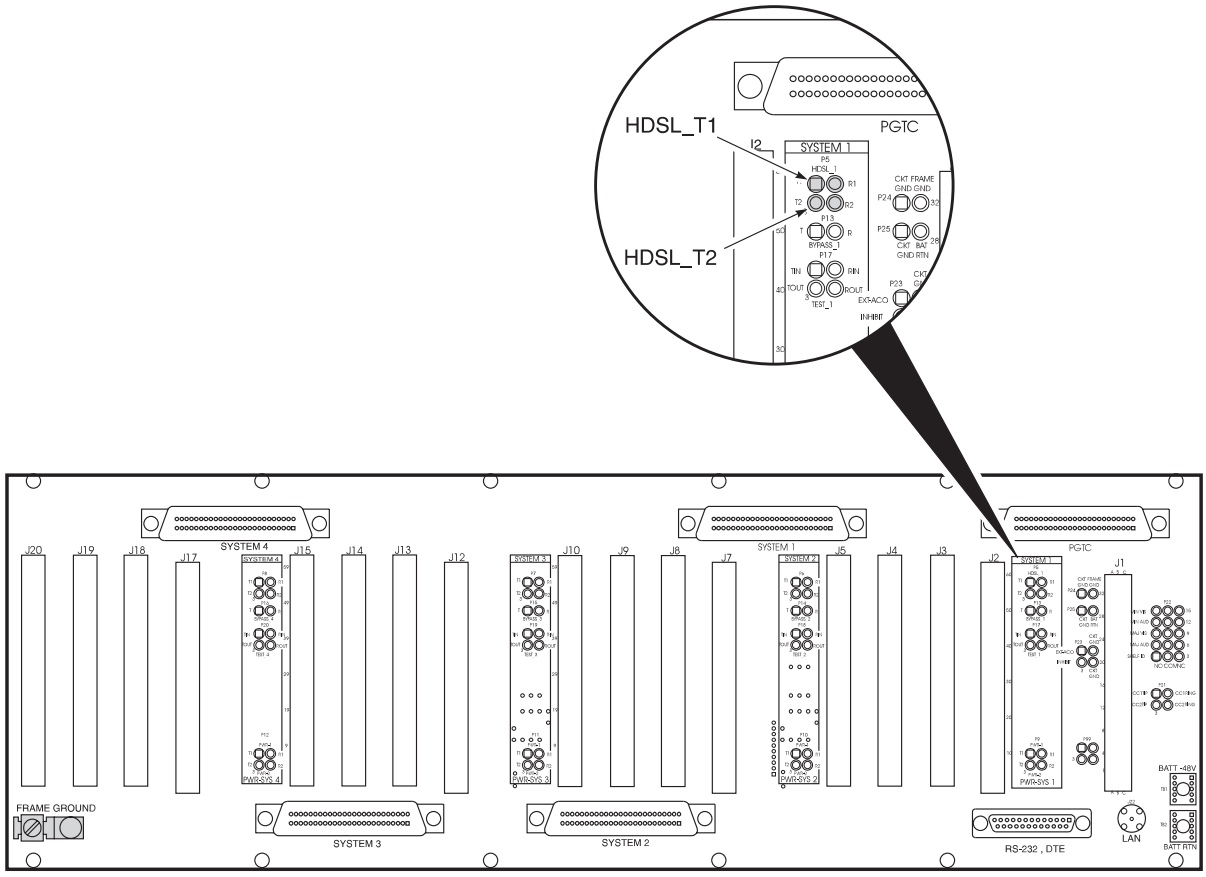

Figure 5. *Connecting the HDSL Lines*

8.1.4 If subscriber drop testing is required, connect the metallic bypass pair from the MDF to wire wrap posts BYPASS_T_***n*** and BYPASS_R_***n*** on the COT shelf, where ***n*** is 1 for System 1, 2 for System 2, 3 for System 3, and 4 for System 4 (Figure 6):

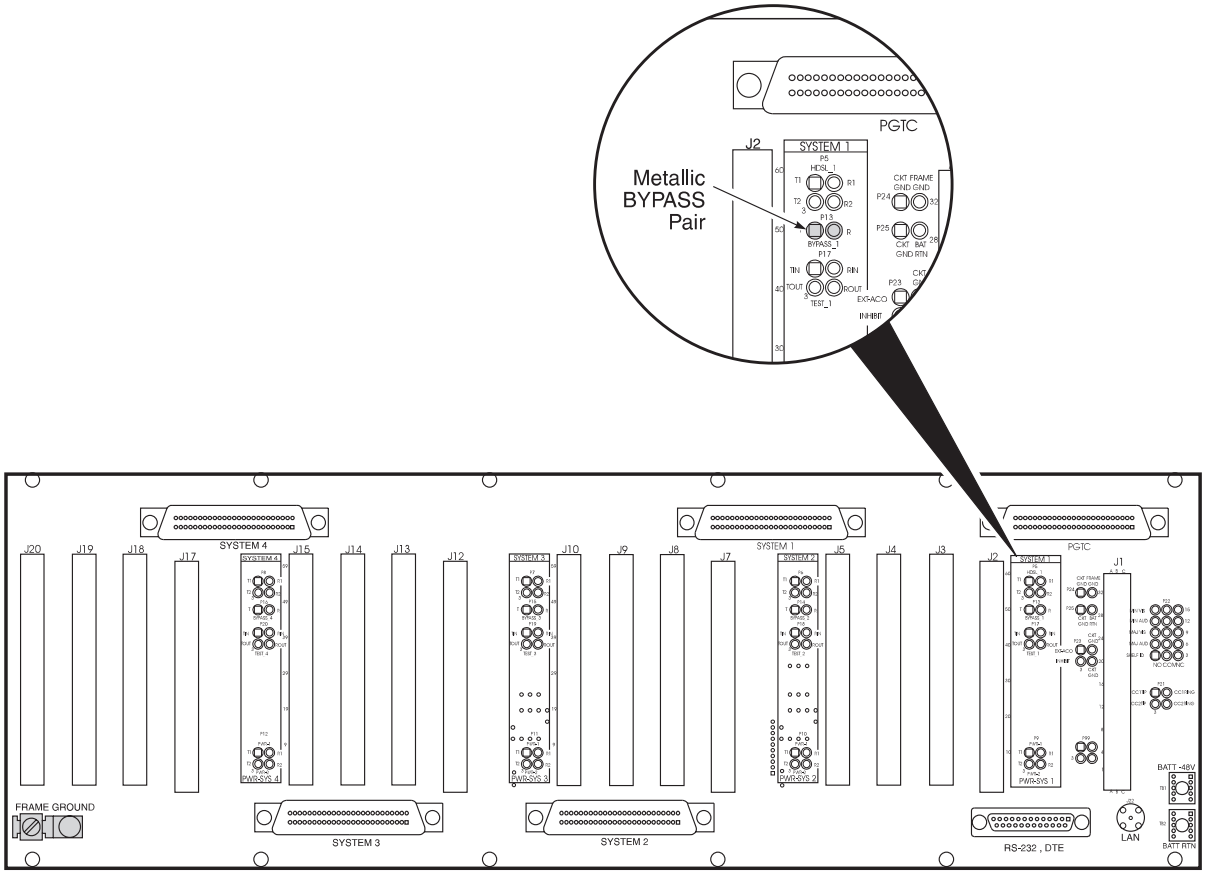

Figure 6. *Connecting the Metallic Bypass Pair.*

The metallic bypass pair is also present on the 25th pair of the Amphenol connector for each PG-Flex system (see Table 14).

8.1.5 If external audible and/or visual alarm indications are required, connect the audible and visual alarm leads from the central office alarm panel to the COT. Refer to Table 11 for the alarm pin connections and their related functions.

8.1.6 Connect the composite clock. Refer to Table 10 for information on connecting the composite clock terminations to the office clock supply. These leads may be cascaded to multiple PG-Flex COT Shelves. Termination resistors may be wire wrapped to these pins; follow local practice on selecting the value of the termination resistor and determining which shelf should have these resistors.

8.1.7 Connect the subscriber lines. Provide one 25-pair female Amphenol cable for each PG-Flex system. Use connectors P1 through P4 to connect the PG-Flex COT shelf to the central office switch subscriber line circuits at the MDF.

8.1.8 Insert a 12 amp fuse in the equipment bay's fuse panel for the circuit where the PG-Flex central office battery wire is terminated.

8.1.9 Verify connections:

The following verifications should be done before any cards are inserted into the FCS-719.

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

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

3 Verify that the HDSL lines are "dry":

a There should be 0 V dc between the tip and ring, tip and ground, and ring and ground of each of the HDSL circuits terminated on the shelf.

b There should be > 100 kohm resistance between the tip and ring, tip and ground, and ring and ground of each of the HDSL circuits terminated on the shelf.

8.1.10 Replace the clear Plexiglas cover removed in section 8.1.1.

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

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 The FCS-719 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.
2120 Ritchey St.
Santa Ana, CA 92705-5101
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.

Corporate Office
14402 Franklin Avenue
Tustin, CA 92780

Tel: (714) 832-9922
Fax: (714) 832-9924

For Technical Assistance:
(800) 638-0031

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