PG-FLEX REMOTE TERMINAL ENCLOSURE
Model FRE-765, List 3x

List #	Part Number	CLEI Code
3	150-1365-03	–
3A	150-1365-31	–

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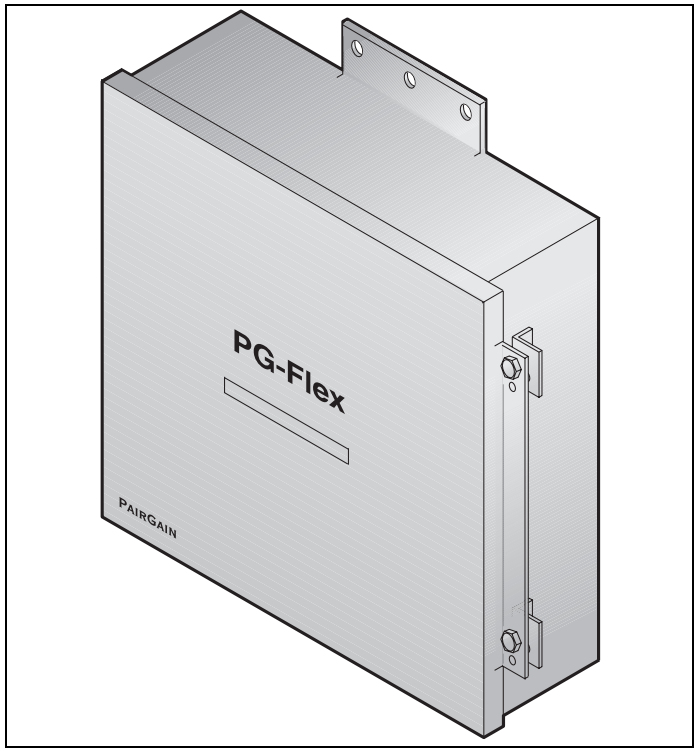

CAUTION
This product incorporates static sensitive components. Proper electrostatic discharge procedures must be followed.

A. PRODUCT OVERVIEW

1. DESCRIPTION AND FEATURES

1.01 The PairGain® PG-Flex™ FRE-765, List 3x Remote Terminal (RT) Enclosures provide convenient mounting of RT Line and Channel Units as well as termination points for subscriber circuits, power, and metallic bypass pair. The Enclosure supports up to 32 channels with one RT Line Card and up to four RT Channel Cards. AMP Quiet Front™ terminations with internal gas tube protectors are provided on the backplane for HDSL and Bypass connections. Refer to Table 1 for a list of features provided with each model of FRE-765, List 3x RT Enclosure. The enclosure may be pole or wall-mounted and is environmentally sealed for outside plant installations.

1.02 The RT Enclosure accommodates the following PairGain units:

- One Line Unit
- Four Channel Units

1.03 Revision History of this practice.

Revision 01-January 28, 1997

a) Initial release.

1.04 FRE-765 RT Enclosure, List 3x, features:

- Pole or Wall Mounting
- Line Powered from Central Office Terminal
- AMP Quiet Front™ Connections for HDSL Inputs, Metallic Bypass Pair, Subscriber Connections
- 5 Pin Protector Strips and AMP Quiet Front™ Connectors for Subscriber Connections (List 3A only)
- ¾", 1", 1½", 2" Cable Entrance Conduct Knockouts with Rubber Grommet
- Cover over electronics inside RT Enclosure

2. SPECIFICATIONS

Operating Temperature & Humidity
- 40° to + 65° Celsius,
5% to 95% (non-condensing)

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

Dimensions

Height:	19.25"	(48.9 cm)
Width:	16.50"	(41.9 cm)
Depth:	6.44"	(16.4 cm)

Weight

List 3:	24.4 lb	(11.1 kg)
List 3A:	35.7 lb	(16.2 kg)

3. CERTIFICATION

3.01 **FCC Compliance.** The FRE-765 RT Enclosure complies 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 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.

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

- Cabling
- Proper connections
- Grounding
- Line power

TABLE 1. FRE-765, LIST 3 RT ENCLOSURE FEATURES

	List 3 (Figure 1)	List 3A (Figure 2)
System:		
12 Channel	●	●
16 Channel	●	●
24 Channel	●	●
32 Channel	●	●
Subscriber Terminations:		
25-pr Amphenol (male)	●	
AMP Insulation Displacement		●
Subscriber Protection:		
5 pin sockets (short housing)		●
HDSL Terminations:		
AMP Insulation Displacement	●	●

3.03 All wiring external to the product should follow the provisions of the current edition of the National Electrical Code.

4. WARRANTY

4.01 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.

4.02 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.

4.03 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
ATTN: Repair and Return Dept.
(800) 638-0031

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

B. FUNCTIONAL DESCRIPTION

5. OPERATIONAL CAPABILITIES

5.01 The RT Enclosure is installed in the field, typically on a pole or wall. The Enclosure accepts any of the following plug-in units:

- One Line Unit
- One to four Channel Units

5.02 Each Enclosure requires one Line Unit and from one to four Channel Units. The RT is powered over the HDSL pairs connecting it to the PG-Flex Central Office Terminal (COT) which is installed in the COT Shelf in the Central Office.

6. BACKPLANE CONNECTIONS

6.01 The backplane of the FRE-765, List 3-series RT Enclosure (Figures 1 and 2) contains the following connectors and fuse:

- Subscriber Lines (Tables 2 through 5)
- Test and Configuration (Table 6)
- HDSL, Metallic Bypass Pair (Table 7)
- Local Power, Ground (Table 8)
- Fuse (Table 9)

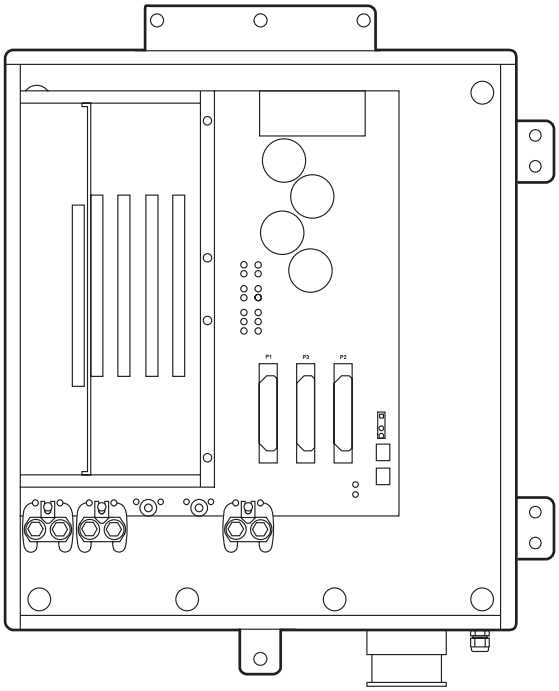

Figure 1. Inside view of the FRE-765, List 3 RT Enclosure.

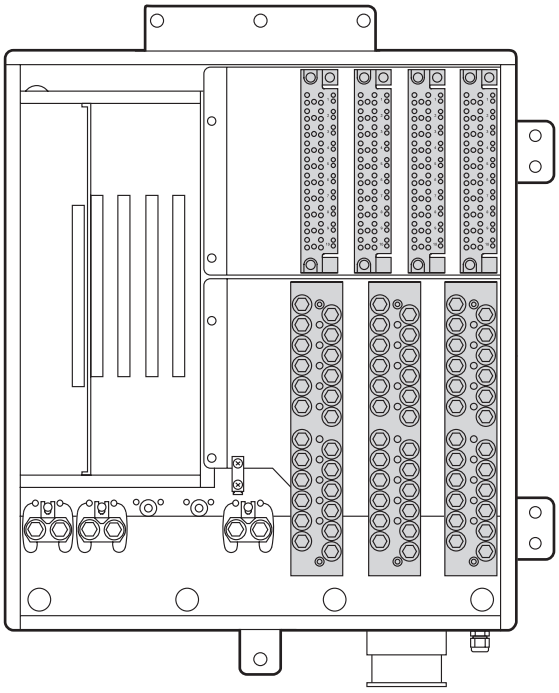

Figure 2. Inside view of the FRE-765, List 3A RT Enclosure.

TABLE 2. RT ENCLOSURE CIRCUIT ASSIGNMENTS

Line Unit	Channel Unit 1	Channel Unit 2	Channel Unit 3	Channel Unit 4
Refer	Ckt 1	Ckt 1	Ckt 1	Ckt 1
to	Ckt 2	Ckt 2	Ckt 2	Ckt 2
Tables 6, 7, and 8	Ckt 3	Ckt 3	Ckt 3	Ckt 3
for	Ckt 4	Ckt 4	Ckt 4	Ckt 4
Line	Ckt 5	Ckt 5	Ckt 5	Ckt 5
Unit	Ckt 6	Ckt 6	Ckt 6	Ckt 6
Terminations	Ckt 7	Ckt 7	Ckt 7	Ckt 7
	Ckt 8	Ckt 8	Ckt 8	Ckt 8

Notes:

1. Each PG-Flex channel unit provides four (4) or eight (8) circuits, depending on the service offering (i.e., POTS, ISDN, DDS, etc.) of the channel unit – refer to Table 3.
2. 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.

TABLE 3. CHANNEL UNIT CIRCUIT UTILIZATION

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

TABLE 4. RT ENCLOSURE SUBSCRIBER CONNECTIONS
(Use for 16/32 Channel Systems, List 3)

Channel Unit	Circuit	Connector P3		Connector P2		Cable 3		Cable 2	
		Tip	Ring	Tip	Ring	Tip	Ring	Tip	Ring
1	1	26	1			WH/BL	BL/WH		
	2	27	2			WH/OR	OR/WH		
	3	28	3			WH/GN	GN/WH		
	4	29	4			WH/BN	BN/WH		
	5			26	1			WH/BL	BL/WH
	6			27	2			WH/OR	OR/WH
	7			28	3			WH/GN	GN/WH
	8			29	4			WH/BN	BN/WH
2	1	30	5			WH/SL	SL/WH		
	2	31	6			RD/BL	BL/RD		
	3	32	7			RD/OR	OR/RD		
	4	33	8			RD/GN	GN/RD		
	5			30	5			WH/SL	SL/WH
	6			31	6			RD/BL	BL/RD
	7			32	7			RD/OR	OR/RD
	8			33	8			RD/GN	GN/RD
3	1	34	9			RD/BN	BN/RD		
	2	35	10			RD/SL	SL/RD		
	3	36	11			BK/BL	BL/BK		
	4	37	12			BK/OR	OR/BK		
	5			34	9			RD/BN	BN/RD
	6			35	10			RD/SL	SL/RD
	7			36	11			BK/BL	BL/BK
	8			37	12			BK/OR	OR/BK
4	1	38	13			BK/GN	GN/BK		
	2	39	14			BK/BN	BN/BK		
	3	40	15			BK/SL	SL/BK		
	4	41	16			YL/BL	BL/YL		
	5			38	13			BK/GN	GN/BK
	6			39	14			BK/BN	BN/BK
	7			40	15			BK/SL	SL/BK
	8			41	16			YL/BL	BL/YL

Note: Shaded terminations only used with the 8 Channel POTS or 4 Channel DDS Units.

TABLE 5. FRE-765, LIST 3A SUBSCRIBER TERMINATIONS

Channel Unit	Circuit	Subscriber		Protector	
		Connector	Pair	Strip	Socket
1	1	TB1	1	PB1	1
	2	TB1	2	PB1	2
	3	TB1	3	PB1	3
	4	TB1	4	PB1	4
	5	TB2	5	PB2	7
	6	TB2	6	PB2	8
	7	TB2	7	PB2	9
	8	TB2	8	PB2	10
2	1	TB1	5	PB1	5
	2	TB1	6	PB1	6
	3	TB1	7	PB1	7
	4	TB1	8	PB1	8
	5	TB2	9	PB3	1
	6	TB2	10	PB3	2
	7	TB2	11	PB3	3
	8	TB2	12	PB3	4
3	1	TB1	9	PB1	9
	2	TB1	10	PB1	10
	3	TB1	11	PB2	1
	4	TB1	12	PB2	2
	5	TB3	1	PB3	5
	6	TB3	2	PB3	6
	7	TB3	3	PB3	7
	8	TB3	4	PB3	8
4	1	TB2	1	PB2	3
	2	TB2	2	PB2	4
	3	TB2	3	PB2	5
	4	TB2	4	PB2	6
	5	TB3	5	PB3	9
	6	TB3	6	PB3	10
	7	TB3	7	PB4	1
	8	TB3	8	PB4	2

Notes: For the FRE-765, List 3A RT Enclosure the cables on the rear of the protector/termination module are installed in connectors P3 and P2 on the RT enclosure backplane.

Shaded terminations only used with the 8 Channel POTS or 4 Channel DDS Units.

TABLE 6. LINE UNIT TERMINATIONS - TEST & CONFIGURATION

Connector	Type	Function
ID_0 GND	0.45 mm Wire Wrap	*(No Connection - Future)*
ID_1 GND	0.45 mm Wire Wrap	*(No Connection - Future)*
ID_2 GND	0.45 mm Wire Wrap	*(No Connection - Future)*
TEST_IN_TIP TEST_IN_RING	0.45 mm Wire Wrap	*(No Connection - Future)*
TEST_OUT_TIP TEST_OUT_RING	0.45 mm Wire Wrap	*(No Connection - Future)*
SSC1_A SSC1_B	0.45 mm Wire Wrap	*(No Connection - Future)*
SSC2_A SSC2_B	0.45 mm Wire Wrap	*(No Connection - Future)*

TABLE 7. LINE UNIT TERMINATIONS - HDSL, METALLIC BYPASS

Connector	Type	Function
HDSL_1_T HDSL_1_R	AMP Quiet Front™	Tip and ring terminations for HDSL Pair #1 from the COT. -130 Vdc is simplexed on this line for powering the RT.
HDSL_2_T HDSL_2_R	AMP Quiet Front™	Tip and ring terminations for HDSL Pair #2 from the COT. +130 Vdc is simplexed on this line for powering the RT.
PWR_1_T PWR_2_R	AMP Quiet Front™	*(No Connection - Future)*
PWR_2_T PWR_2_R	AMP Quiet Front™	*(No Connection - Future)*
BYPASS_T BYPASS_R	AMP Quiet Front™	Termination for the metallic bypass pair to the COT.

TABLE 8. LINE UNIT TERMINATIONS - LOCAL POWER, GROUND

Connector	Type	Function
-48V	Screw	*(No Connection - Future)*
GND	Screw	*(No Connection - Future)*
CHASSIS GND	Screw	Chassis Ground
Note: The RT enclosure is shipped with the "CHASSIS GND" wire-wrap post connected to the adjacent "GND" wire-wrap post on the RT Backplane.		

TABLE 9. RT ENCLOSURE FUSE

Fuse	Type	Function
F1	GMT 2A	*(Not required - Future)*

C. INSTALLATION AND TEST

7. UNPACKING

7.01 Upon receipt of the equipment, proceed as follows:

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 versus the packing list to ensure complete and accurate shipment. If the shipment is short or irregular, contact PairGain as described in Section 4.03. If you must store the equipment for a prolonged period, store the equipment in its original container.

8. INSTALLATION REQUIREMENTS

8.01 The following installation requirements apply:

1. Environmental Considerations. The RT is designed to operate in an outside plant environment. It can operate in a temperature range of -40°C to +65°C and a humidity range of 5% to 95% (non-condensing).
2. Mounting. The RT enclosure is equipped with external mounting flanges with 3/8-inch holes for pole or wall mounting. The customer must provide the appropriate mounting hardware.
3. Power. The RT derives its power from the HDSL lines connected to the COT shelf in the central office.
4. HDSL Lines. Two HDSL pairs are terminated in the RT enclosure.
5. Subscriber Lines. The List 3 RT Enclosure provides three 25-pair, Amphenol connectors (male) for terminating the subscriber lines. The List 3A RT Enclosure provides AMP Quiet Front™ insulation displacement connections for subscriber terminations. Sockets for 5 pin short housing protectors are also included. Protectors are not included with the enclosures.
6. Metallic Bypass Pair. The metallic bypass pair for subscriber line testing is terminated in the RT Enclosure.
7. Cable Entry. Knockouts are located on the bottom of the RT Enclosure and accept ¾", 1", 1½", and 2" fittings. Grommets (provided with RT Enclosure), conduit, or cable strain relief fittings should be installed prior to wiring the RT Enclosure.
8. Protectors. 5 pin protectors (short housing) must be installed for each working subscriber circuit. These may be carbon, gas tube, or solid state protectors, depending on local practice.

9. MOUNTING

9.01 The FRE-765 RT Enclosure may be mounted on a pole or wall. Local practices should be followed to ensure a secure mounting. The RT enclosure should be mounted such that there is easy access to the cable entry points on the bottom of the enclosure and there is adequate room to open the door completely to facilitate installation.

10. WIRING

10.01 All cabling into the RT Enclosure is through the bottom entry points. Perform the wiring procedures described in Table 10.

11. TURN-UP AND TESTING

11.01 Refer to the COT Line Unit Technical Practice or RT Line Unit Technical Practice for complete COT and RT turn-up and testing procedure.

12. TROUBLESHOOTING

12.01 Refer to the COT Line Unit Technical Practice or RT Line Unit Technical Practice for complete COT and RT troubleshooting procedures.

TABLE 10. RT WIRING PROCEDURES

Step	Connection	Action
1	Chassis Ground	***Note:*** Use 6 AWG, or larger, wire to ensure a good ground connection to the RT. a. Route the chassis ground wire through the small hole in the strain relief on the bottom of the enclosure. b. Connect one end of the chassis ground wire to grounding lug CHASSIS GND. c. Connect the other end of the chassis ground wire to a suitable ground termination point (ground rod or cold water pipe). d. Secure with a cable tie to the bracket near the cable entrance.
2	HDSL Lines	a. Route the HDSL pairs through the strain relief on the bottom of the enclosure. b. Terminate HDSL Pair #1 on the Quiet-Front™ terminals HDSL_1_T (Tip) and HDSL_1_R (Ring). c. Terminate HDSL Pair #2 on the Quiet-Front™ terminals HDSL_2_T (Tip) and HDSL_2_R (Ring). d. Secure with a cable tie to the bracket near the cable entrance.
3	Bypass Pair	a. Route the bypass pair through the strain relief on the bottom of the enclosure. b. Terminate the bypass pair on the Quiet Front™ terminals BYPASS_T and BYPASS_R. c. Secure with a cable tie to the bracket near the cable entrance.
4	Subscriber Lines	a. Route the subscriber line cables through the strain relief on the bottom of the enclosure. b. Connect the Subscriber line cables according to Tables 2 through 7. c. Secure with a cable tie to the bracket near the cable entrance.
5	Verify Connections	***Note:*** The following verifications should be done before any cards are inserted in the COT shelf. a. Visually ensure the ground wire is tightly secured to the grounding lug inside the RT Enclosure and at the ground termination point. b. Visually verify the HDSL lines are terminated properly and with the correct orientation. If the HDSL lines are not connected properly, the COT will not communicate with the RT. c. Verify that the HDSL lines are “dry.” 1) There should be 0 Vdc between the tip and ring, tip and ground, and ring and ground of each of the HDSL pairs terminated at the RT. 2) There should be greater than 100 kohms resistance between tip and ground, and ring and ground of each of the HDSL pairs terminated at the RT.

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