PAIRGAIN TECHNOLOGIES
PG-FLEX™ REMOTE TERMINAL ENCLOSURE
MODEL FRE-765, List 1
PairGain #150-1365-01
CLEI Code: VAMRBB0ARA

CONTENTS PAGE

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

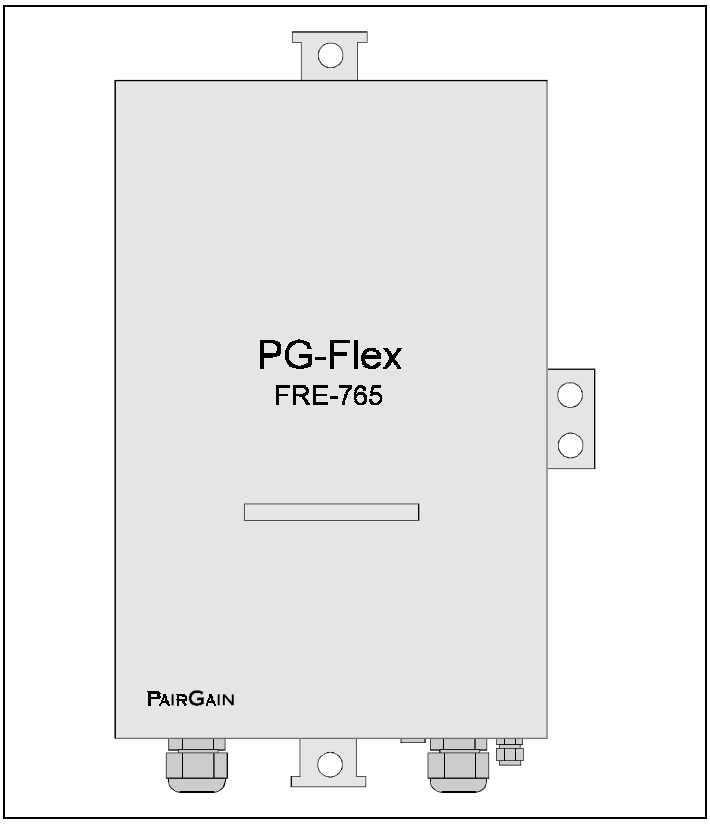

Figure 1. FRE-765 RT Enclosure, List 1. The PairGain FRE-765 houses the RT Line and Channel Units and connections for subscriber circuits.

A. PRODUCT OVERVIEW

1. DESCRIPTION AND FEATURES

1.01 The PG-Flex FRE-765 Remote Terminal (RT) Enclosure (Figure 1) provides convenient mounting of RT Line and Channel Units as well as termination points for subscriber circuits, power, and metallic test access. The Enclosure supports up to 32 channels with one RT Line Card and up to four RT Channel Cards. Amp Quiet Front™ terminations are provided on the backplane for HDSL and Bypass connections. 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

February 12, 1996

a) Initial release.

1.04 FRE-765 RT Enclosure, List 1, features:

- Pole or Wall Mounting
- Backplane Amp Quiet Front™ Connections for HDSL Inputs, Metallic Bypass
- Line Powered from Central Office Terminal

2. SPECIFICATIONS

Operating Temperature & Humidity

-40° to + 65° Celsius, 5% to 95% (non condensing)

Operating Elevation

200 feet (60 m) below sea level to 13,000 (4,000 m) feet above sea level.

Dimensions

Height:	19.25”	(48.3 cm)
Width:	11.75”	(29.2 cm)
Depth:	5.40”	(13.3 cm)

Weight

19.4 lb. (8.8 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

3.03 All wiring external to the product(s) 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 36 months 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 92680
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 1 to 4 Channel Units. The RT is powered over the HDSL pairs connecting it to the FCS-718 Central Office Terminal (COT) Shelf.

6. BACKPLANE CONNECTIONS

6.01 The backplane of the FRE-765 RT Enclosure (Figure 2) contains the following connectors and fuse:

- Subscriber Lines (Tables 1 through 3)
- Test and Configuration (Table 4)
- HDSL (Table 5)
- Local Power (Table 6)
- Fuse (Table 7)

6.02 Tables 1 through 7 identify each connector and fuse by type and describes the function of each connector terminal.

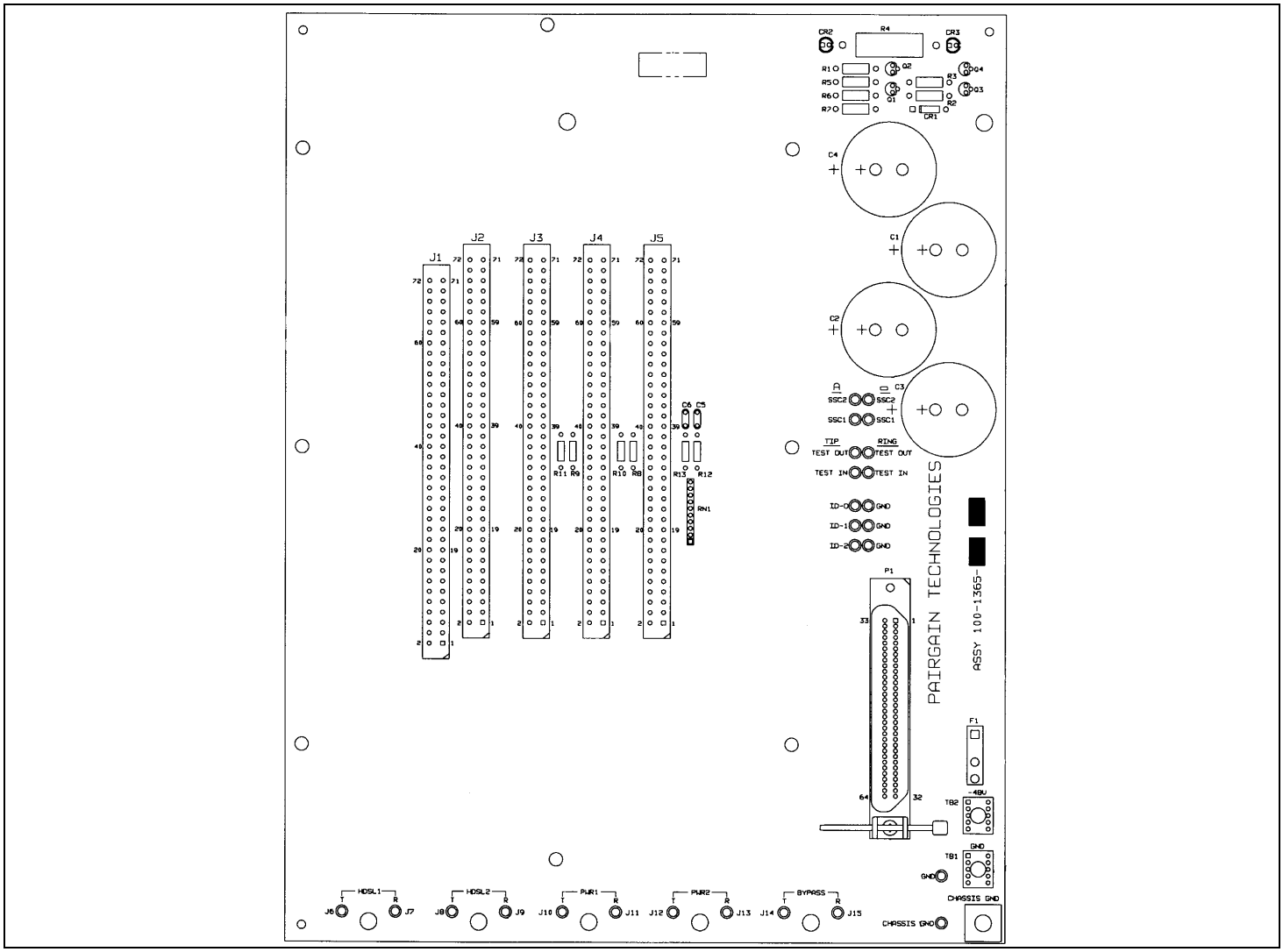

Figure 2. Backplane of the FRE-765 RT.

TABLE 1 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
Table x	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
Termination	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 2.
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.
3. For a 24-channel system, a maximum of 24 circuits may be provisioned.

TABLE 2 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 3 RT ENCLOSURE CONNECTOR P1

Channel Unit	Circuit	Connector P1	
		Ring	Tip
1	1	33	1
	2	34	2
	3	35	3
	4	36	4
	5	49	17
	6	50	18
	7	51	19
	8	52	20
2	1	37	5
	2	38	6
	3	39	7
	4	40	8
	5	53	21
	6	54	22
	7	55	23
	8	56	24
3	1	41	9
	2	42	10
	3	43	11
	4	44	12
	5	57	25
	6	58	26
	7	59	27
	8	60	28
4	1	45	13
	2	46	14
	3	47	15
	4	48	16
	5	61	29
	6	62	30
	7	63	31
	8	64	32

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

TABLE 4. RT ENCLOSURE CONNECTORS (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	Test connection looking into the RT channel unit for the selected subscriber. This connection must be set up through the PG-Flex RS-232 maintenance port.
TEST_OUT_TIP TEST_OUT_RIN G	0.45 mm Wire Wrap	Test connection looking into the drop of the selected subscriber. This connection must be set up through the PG-Flex RS-232 maintenance port.
BYPASS_T BYPASS_R	0.45 mm Wire Wrap	Termination for the metallic bypass pair to the COT.
SSC1_A SSC1_B	0.45 mm Wire Wrap	Special Signaling Channel #1. A user-definable input (through the RS-232 Maintenance Port at the COT) that produces an alarm at the COT based on a condition at the RT. This requires a contact closure between SSC1_A and SSC1_B.
SSC2_A SSC2_B	0.45 mm Wire Wrap	Special Signaling Channel #2. A user-definable input (through the RS-232 Maintenance Port at the COT) that produces an alarm at the COT based on a condition at the RT. This requires a contact closure between SSC2_A and SSC2_B.

TABLE 5. RT ENCLOSURE CONNECTORS (HDSL)

Connector	*Type*	*Function*
HDSL_1_T HDSL_1_R	AMP Quiet Front™	Tip and ring terminations for HDSL Pair #1 of System #1 from the COT. +130 V dc 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 of System #1 from the COT. -130 V dc 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)*

TABLE 6. RT ENCLOSURE CONNECTORS (LOCAL POWER)

Connector	*Type*	*Function*
-48V	Screw	CO Battery (-48 V dc)
GND	Screw	CO Ground
CHASSIS GND	Screw	Chassis Ground

Note: CO Ground is separate from Chassis Ground in PG-Flex. Technicians can connect them on the RT Backplane by connecting the “CHASSIS GND” wire-wrap post to the adjacent “GND” wire-wrap post.

TABLE 7. RT ENCLOSURE FUSE

Fuse	*Type*	*Function*
F1	GMT 2A	Provides over-current protection between RT enclosure and local -48 V dc battery. This fuse is not used when the RT is line powered from the COT.

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. 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 technician 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.** One 32-pair, Amphenol connector (male) is provided for extending the subscriber lines from the RT to a suitable termination block. If the RT is mounted outside, then the subscriber lines may require primary protection using gas tube (or solid state) protectors.
6. **Metallic Test Pair.** One (optional) metallic test pair for subscriber line testing is terminated in the RT enclosure.

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 8.

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 8. 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 cable clamp on the bottom right side of the enclosure. b. On the RT backplane, 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).
2	HDSL Lines	a. Route the HDSL lines through the large cable clamp on the bottom left side of the enclosure. b. Terminate HDSL Pair #1 onto the Quiet-Front™ terminals HDSL_1_T (Tip) and HDSL_1_R (Ring). c. Terminate HDSL Pair #2 onto the Quiet-Front™ terminals HDSL_2_T (Tip) and HDSL_1_R (Ring).
3	Bypass Pair	a. Route the bypass pair through the large cable clamp on the bottom right side of the enclosure. b. Terminate the bypass pair on the Quiet Front™ terminals BYPASS_T and BYPASS_R.
4	Subscriber Lines	a. The unterminated end of the subscriber line cable should be passed through the large cable clamp on the right side of the enclosure from the inside of the enclosure. b. Connect the 16-pair Amphenol connector to P1 and secure with the connector mounting screw and cable tie. c. Attach the wires at the unterminated end of the subscriber cable onto a suitable connector block or the protector module.
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 V dc 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.