PG-FLEX REMOTE TERMINAL ENCLOSURE
MODEL FRE-765 LIST 4X

List Number	Part Number	CLEI Code
4	150-1365-04	VAMRBM0ARA
4A	150-1365-41	VAMRBN0ARA
4B	150-1365-42	VAMRBP0ARA
4D	150-1365-44	VAMRBR0ARA
4E	150-1365-45	VAMRBS0ARA
4F	150-1365-46	N/A
4G	150-1365-47	VAMRBT0ARA
4H	150-1365-48	VAMRBU0ARA

PAIRGAIN TECHNOLOGIES, INC.
ENGINEERING SERVICES TECHNICAL PRACTICE
SECTION 363-765-104-04

Revision History of This Practice
Revision 04—February 19, 1998
A) Initial Release

PAIRGAIN
THE COPPEROPTICS COMPANY

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Using This Technical Practice

Two types of messages, identified by icons, appear in the text.

These messages indicate special circumstances.

These messages indicate the possibility of either personal injury or equipment damage.

PRODUCT OVERVIEW

Description and Features

The PairGain® PG-Flex© FRE-765 List 4*x* Remote Terminal (RT) Enclosures (see Figure 1 through Figure 7) provide convenient mounting of one RT Line Unit and up to three Channel Units, supporting up to 24 channels. The enclosures provide termination points for subscriber circuits, power, and metallic bypass pair. Terminations, with internal gas tube protectors, are provided on the backplane for High bit-rate Digital Subscriber Line (HDSL) and Bypass connections. Terminations may be added for auxiliary power pairs when PG-Flex is used with a PG-Flex doubler. The enclosure can be pole or wall mounted and is environmentally sealed for outside plant installations. Listed below are the FRE-765 enclosures described in this practice:

- List 4—see Figure 1 on page 2
- List 4A—see Figure 2 on page 2
- List 4B—see Figure 3 on page 3
- List 4D and 4E—see Figure 4 on page 3
- List 4F—see Figure 5 on page 4
- List 4G—see Figure 6 on page 4
- List 4H—see Figure 7 on page 5

PG-Flex HDSL, Auxiliary Power, and Bypass Pair circuits must be protected with 3-mil carbon blocks, or equivalent. Subscriber circuits must also be protected with 3-mil carbon blocks, or equivalent, when these circuits are exposed to the outside plant.

Use the List 4*x* RT Enclosures only with the FCS-718 List 2 or higher, or the FCS-719 List 2 or higher COT Shelves.

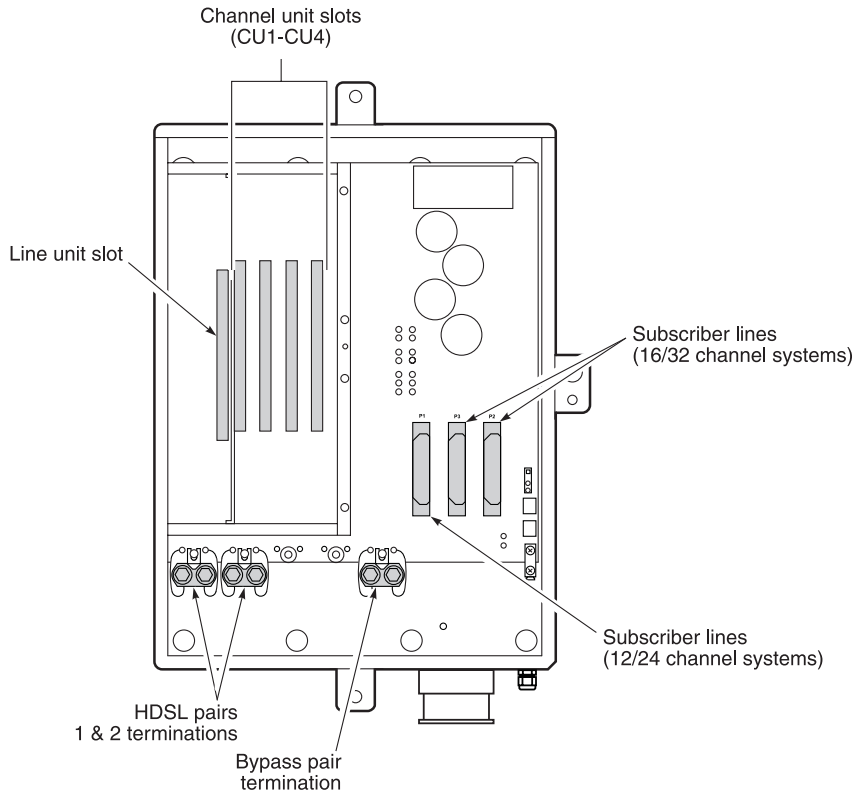

Figure 1. *FRE-765 List 4 RT Enclosure (Interior View)*

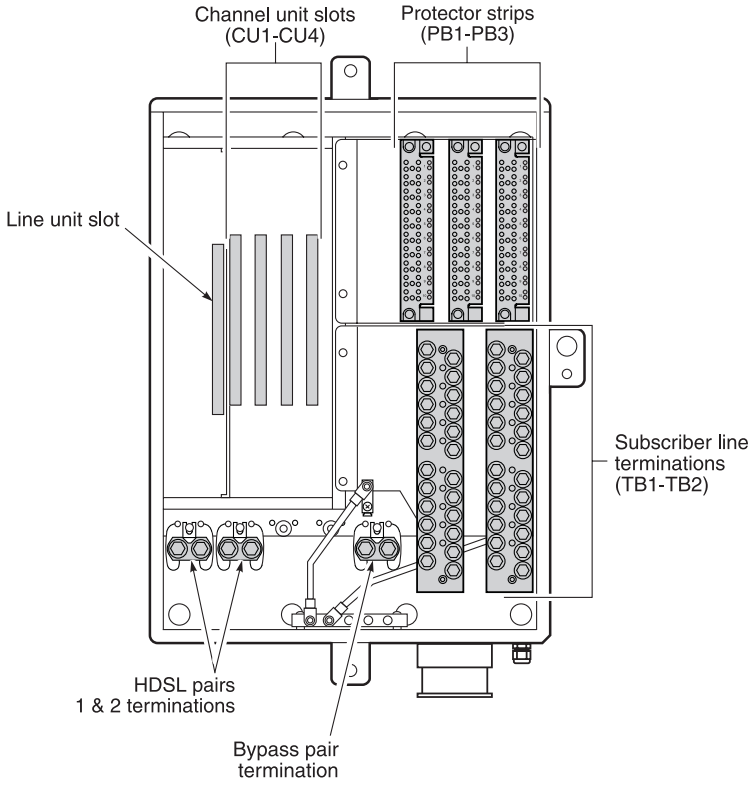

Figure 2. *FRE-765 List 4A RT Enclosure (Interior View)*

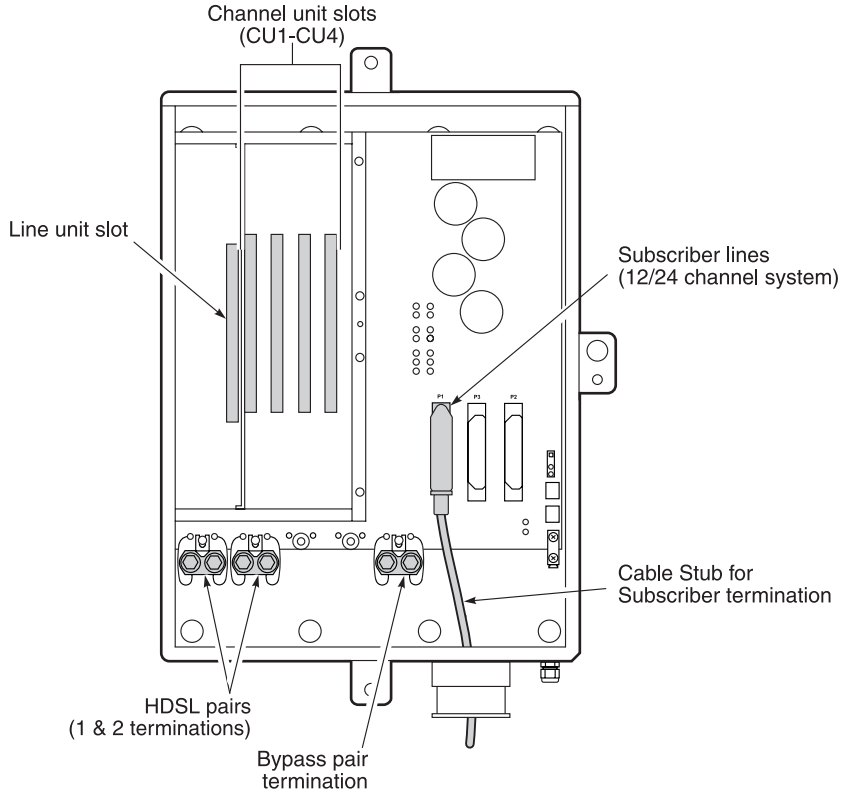

Figure 3. *FRE-765 List 4B RT Enclosure (Interior View)*

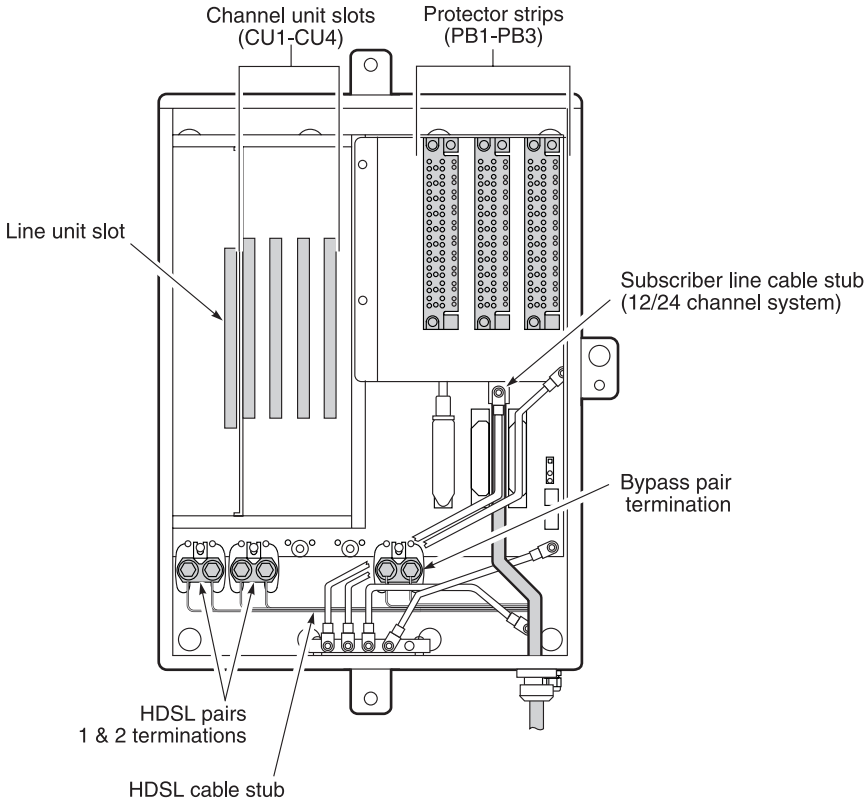

Figure 4. *FRE-765 List 4D and 4E RT Enclosure (Interior View)*

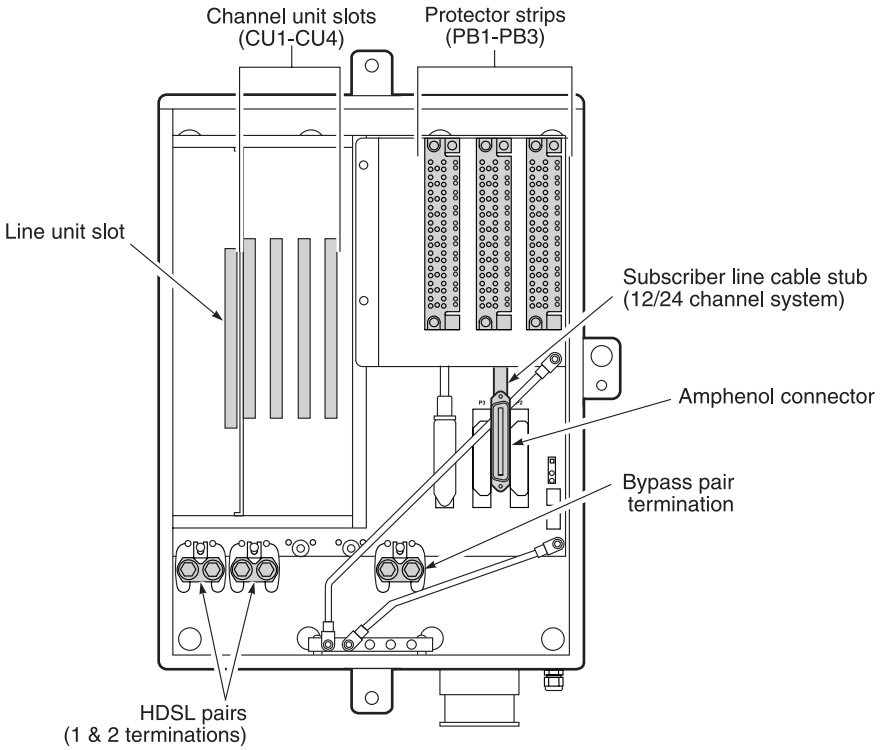

Figure 5. *FRE-765 List 4F RT Enclosure (Interior View)*

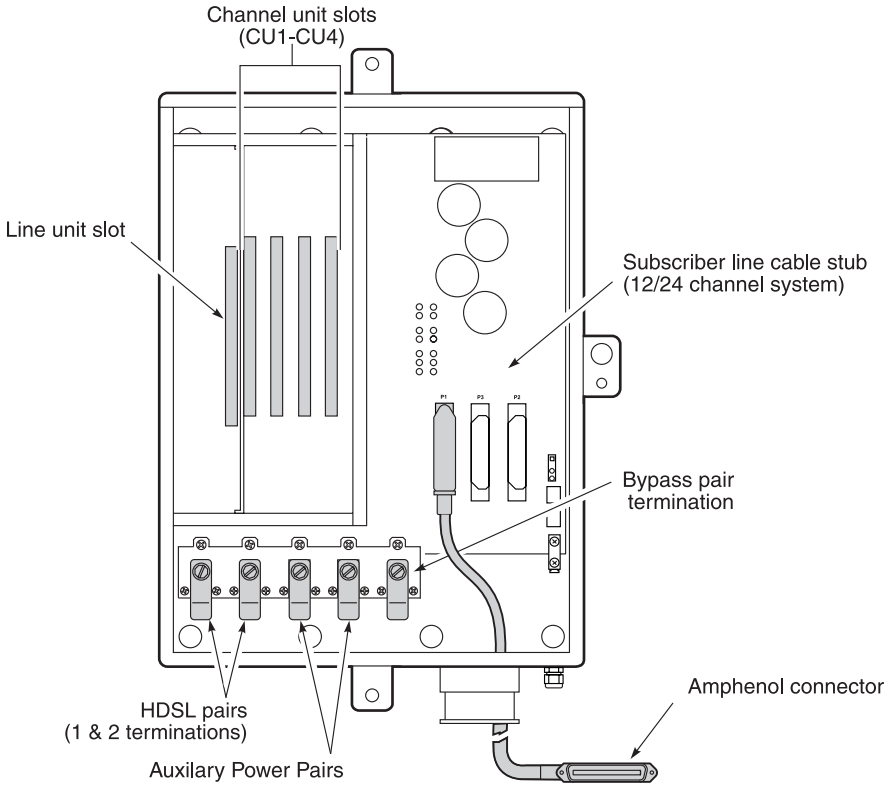

Figure 6. *FRE-765 List 4G RT Enclosure (Interior View)*

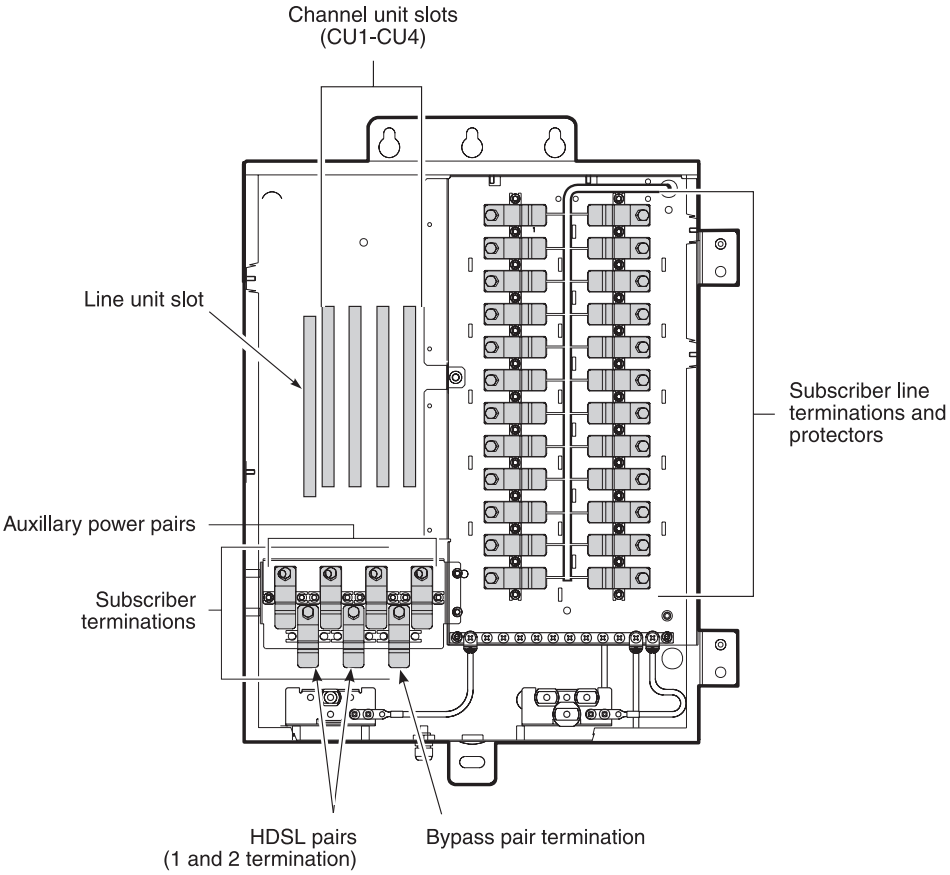

Figure 7. *FRE-765 List 4H RT Enclosure (Interior View)*

Features of the FRE-765 List 4*x* RT Enclosure include:

- pole or wall mounting
- line power from Central Office Terminal (COT)
- terminations with internal protectors for HDSL inputs and metallic bypass pair (except 4G which is unprotected)
- terminations can be added when PG-Flex is used with a doubler (included with 4G and 4H)
- $^{3}/_{4}$-, 1-, $1^{1}/_{2}$-, 2-inch cable entrance conduit knockouts with rubber grommet (provided)
- hinged cover for electronics inside RT Enclosure

See Table 1 on page 6 to identify which features are available with each RT Enclosure List 4*x* model.

Table 1. *Features of FRE-765 List 4x RT Enclosures*

		List 4	List 4A	List 4B	List 4D	List 4E	List 4F	List 4G	List 4H
System	12 Channel	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
	24 Channel	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Subscriber Terminations	25-pair Amphenol (male)	**X**							
	AMP Insulation Displacement		**X**						
	15-foot PVC Cable Stub			**X**					
	25-foot Air Core Cable Stub				**X**				
	25-foot Gel Filled Cable Stub					**X**			
	1-foot PVC Cable with Male Amphenol						**X**		
	12-foot PVC Cable with Male Amphenol							**X**	
	RayChem MSP								**X**
Subscriber Protection	5-pin sockets (short housing)		**X**		**X**	**X**	**X**		
	RayChem MSP								**X**
HDSL Terminations	AMP Insulation Displacement	**X**	**X**	**X**			**X**		
	RayChem MXC							**X**	
	RayChem MSP								**X**
	25-foot Non-filled Cable Stub				**X**				
	25-foot Gel Filled Cable Stub					**X**			

Specifications

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)

Dimensions

Weight:	
List 4	21.2 lb (09.6 kg)
List 4A	26.3 lb (11.9 kg)
List 4B	22.7 lb (10.3 kg)
List 4D	30.4 lb (13.8 kg)
List 4E	30.4 lb (13.8 kg)
List 4F	25.0 lb (11.3 kg)
List 4G	25.5 lb (12.5 kg)
List 4H	29.2 lb (13.3 kg)
Lists 4, 4A, 4B, 4D, 4E, 4F	
Height:	19.25 in. (48.9 cm)
Width:	14.25 in. (36.2 cm)
Depth:	05.93 in. (15.0 cm)
List 4H	
Height:	21.25 in. (53.9 cm)
Width:	16.75 in. (42.5 cm)
Depth:	06.44 in. (16.3 cm)

FUNCTIONAL DESCRIPTION

Operational Capabilities

The FRE-765 List 4x RT enclosure requires the following plug-in units:

- one RT Line Unit which is line powered via the HDSL pairs that connect the RT to the PG-Flex COT line units installed in a COT Shelf.
- one Channel Unit, minimum, with a maximum installation of three Channel Units, supporting up to 24 channels.

Table 2 shows how circuit assignments are configured in the FRE-765 with the following deployment rules:

- for channel units providing four (4) circuits, Ckt 1 through Ckt 4 are used for Tip and Ring terminations.
- for channel units providing eight (8) circuits, Ckt 1 through Ckt 8 are used for Tip and Ring terminations.
- for a 24-channel system, you can provision a maximum of 24 circuits.

Each PG-Flex channel unit provides four (4) or eight (8) circuits. Table 3 shows how the channels are assigned, dependent on the type of service provided, such as:

- Plain Old Telephone Service (POTS)
- Integrated Services Digital Network (ISDN)
- Digital Data System (DDS).

Table 2. *FRE-765 Circuit Assignments*

Line Unit	Channel Unit 1	Channel Unit 2	Channel Unit 3	Channel Unit 4
Refer to Table 8, Table 9, and Table 12 for Line Unit Terminations from the Backplane	Ckt 1	Ckt 1	Ckt 1	Not Used
	Ckt 2	Ckt 2	Ckt 2	
	Ckt 3	Ckt 3	Ckt 3	
	Ckt 4	Ckt 4	Ckt 4	
	Ckt 5	Ckt 5	Ckt 5	
	Ckt 6	Ckt 6	Ckt 6	
	Ckt 7	Ckt 7	Ckt 7	
	Ckt 8	Ckt 8	Ckt 8	

Table 3. *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

Backplane Connections

Table 4 lists the FRE-765 List 4*x* backplane connectors and where each connector is described in this practice.

Table 4. *FRE-765 List 4x Backplane Connectors*

List	Connector or Fuse	Go to	On
4, 4B, 4G	P1 Connector (12/24 channel systems)	Table 5	page 10
4A	Subscriber terminations (12/24 channel systems)	Table 13	page 22
4D, 4E	Subscriber terminations (12/24 channel systems)	Table 16	page 25
4F	Subscriber terminations (12/24 channel systems)	Table 17	page 26
4H	Subscriber terminations (12/24 channel systems)	Table 14	page 23
All	P3 and P2 Connectors (16/32 channel systems, reference)	Table 6 and Table 7	page 11
All	Test and Configuration Line-Unit Terminations	Table 8	page 13
All	HDSL, Metallic Bypass, and Auxiliary Power Line-Unit Terminations	Table 12	page 18
All	Power and Ground Line-Unit Terminations	Table 9	page 13

Table 5. *P1 Connector for Lists 4, 4B, and 4G**

Channel Unit	Circuit	Backplane Connector P1 (Lists 4, 4B, and 4G) †		Subscriber Cable Stub (List 4B only) ‡	
		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	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
2	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	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
3	1	42	17	YL/OR	OR/YL
	2	43	18	YL/GN	GN/YL
	3	44	19	YL/BN	BN/YL
	4	45	20	YL/SL	SL/YL
	5	46	21	VI/BL	BL/VI
	6	47	22	VI/OR	OR/VI
	7	48	23	VI/GN	GN/VI
	8	49	24	VI/BN	BN/VI

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

† For List 4, connect the subscriber termination cable to backplane connector P1. For List 4G, the Amphenol-ended cable is connected to P1.

‡ For List 4B, terminate subscriber lines to the cable stub that attaches to backplane connector P1 cable.

Table 6. *Connector P3 (16/32 Channel Systems)* * †

Channel Unit	Circuit	Backplane Connector P3		Subscriber Cable Stub	
		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	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
2	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	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

* Terminations in this table are used only with the 8 Channel POTS or 4 Channel DDS Units.

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

Table 7. *Connector P2 (16/32 Channel Systems)**

Channel Unit	Circuit	Backplane Connector P2		Subscriber Cable Stub	
		Tip	Ring	Tip	Ring
3	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	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
4	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	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

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

Table 8. *Test and Configuration Line Unit Terminations*

Connector	Type	Function
ID_0 GND	.045 in. Wire-wrap	No connection—reserved for future use.
ID_1 GND	.045 in. Wire-wrap	No connection—reserved for future use.
ID_2 GND	.045 in. Wire-wrap	No connection—reserved for future use.
TEST_IN_TIP TEST_IN_RING	.045 in. Wire-wrap	No connection—reserved for future use.
TEST_OUT_TIP TEST_OUT_RING	.045 in. Wire-wrap	No connection—reserved for future use.
SSC1_A SSC1_B	.045 in. Wire-wrap	No connection—reserved for future use.
SSC2_A SSC2_B	.045 in. Wire-wrap	No connection—reserved for future use.

Table 9. *Power and Ground Line Unit Terminations*

Connector	Type	Function
-48V	Screw	No connection—reserved for future use.
GND	Screw	No connection—reserved for future use.
CHASSIS GND*	Screw	Chassis Ground

* The RT enclosure is shipped with the “CHASSIS GND” wire-wrap post connected to the adjacent “GND” wire-wrap post on the RT Backplane.

INSTALLATION AND TEST

Unpacking

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 “TECHNICAL SUPPORT” on page 30. If you must store the equipment for a prolonged period, store the equipment in its original container.

Installation Requirements

Prior to installing the FRE-765, review installation requirements and conditions in Table 10.

Table 10. *Installation Requirements*

Requirement	Description
Environmental	The FRE-765 can operate in an outside plant environment in a temperature range of -40°C to +65°C and a humidity range of 5% to 95% (non-condensing).
Mounting	The RT enclosure has external mounting flanges with a clearance hole for a 3/8-inch bolt for pole or wall mounting. The customer must provide the appropriate mounting hardware. When mounting to a pole using the Pole Mounting Kit (part number 150-1397-0x), ensure that the kit and FRE-765 are fully installed before installing cabling.
Power	The FRE-765 gets power from the HDSL lines connected to the COT shelf in the Central Office (CO). When a doubler is installed between the PG-Flex COT Shelf and RT enclosure, two additional power pairs are required from the COT shelf to the RT enclosure.
HDSL Lines	Two HDSL pairs are terminated in the RT enclosure.
Subscriber Lines	
List 4	Provides three 25-pair Amphenol connectors (male) for terminating the subscriber lines.
List 4A	Provides AMP Quiet Front insulation displacement connections for subscriber terminations.
List 4B	Provides one 15-foot PVC 25-pair cable stub.
List 4D	Provides two 25-foot Air Core Cables for HDSL and Subscriber Terminations.
List 4E	Provides two 25-foot Gel Filled Cables for HDSL and Subscriber Terminations.
List 4F	Provides one 1-foot PVC Cable with Amphenol for Subscriber Terminations.
List 4G	Provides one 12-foot PVC Cable with Amphenol for Subscriber Terminations.
List 4H	Provides RayChem Modular Station Protector (MSP) for Subscriber Terminations.
Metallic Bypass Pair	The metallic bypass pair for subscriber line testing is terminated in the FRE-765. Do not connect the bypass pairs between PG-Flex systems or to other DLC systems.
Doubler (except 4H)	When using a doubler, add two terminals to the FRE-765 to terminate the auxiliary power pairs from the COT. Order the terminal kit (Amp Quiet Front p/n 150-1399-25), which contains two terminators, four jumpers, and two screws for mounting the terminations on the RT enclosure backplane.
Cable Entry	Knockouts are located on the bottom of the FRE-765 and accept $^{3}/_{4}$-, 1-, $1^{1}/_{2}$-, and 2-inch fittings. Install the grommet (provided with FRE-765), conduit, or cable strain relief fittings prior to wiring the FRE-765.
Protectors	Install 5-pin protectors (short housing) for each working subscriber circuit with the List 4A, List 4D, List 4E, and List 4F. These may be carbon, gas tube, or solid state protectors, depending on local practice.

Mounting

The FRE-765 mounts on a pole or a wall. Follow local practices to ensure a secure mounting. Mount the FRE-765 for easy access to the cable entry points on the bottom of the enclosure. Provide ample room to open the door completely.

For pole mounting the FRE-765, use the Pole Mounting kit, part number 150-1397-0x. Follow the instructions that are included to install the pole mounting bracket. Then mount the FRE-765 to the bracket. Do not install any cabling until the FRE-765 is securely mounted.

When required, install the grommet into the base of the FRE-765 (see Figure 8) prior to performing any wiring (Table 11 shows the wire gauges that you can install through the holes in the grommet):

1 Select only one concentric knockout hole on the FRE-765.

2 Remove the largest knockout so that the entire hole is open.

3 Install the grommet from the outside of the FRE-765.
(Hint - Hold it at an angle to the hole and roll it into position.)

4 Ensure that the lip of the grommet rests on the bottom of the FRE-765 around the knockout hole.

5 Use an appropriate tool to open the required hole(s) in the bottom of the grommet.

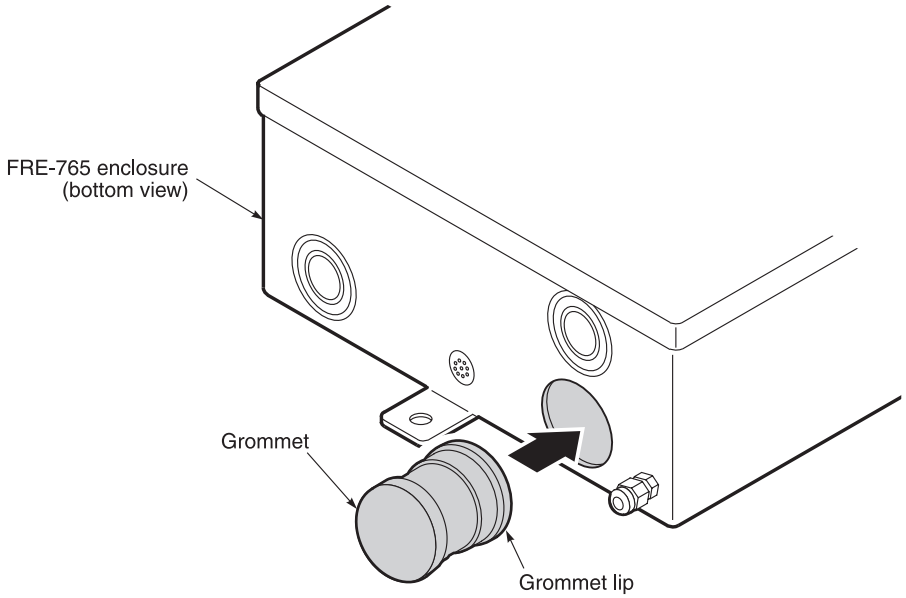

Figure 8. *Installing the Grommet*

Table 11. *Grommet Hole Diameters*

For this grommet hole size	Use this cable
.410 to .765 in. diameter (two) *	• 24 or 26 AWG, 25- or 50-pair Primary Interexchange Carrier (PIC) (filled or non-filled) • 22 AWG, 25-pair PIC (filled or non-filled) • 22, 24, or 26 AWG , 6- or 11-pair PIC (filled or non-filled)
.240 to .275 in. diameter (one)	ground wire †
.155 to .240 in. diameter (one)	ground wire †

* Recommend using one hole for both the HDSL and the bypass pairs (i.e., 6-pair cable) and using the second hole for POTS (subscriber) lines.
† Dependent upon gauge of wire used.

Wiring

The following section describes how to connect and verify the FRE-765 cable installations.

Chassis Ground Wiring. To install the chassis ground wire, follow the instructions below and refer to the specific illustrations:

For Lists 4, 4B and 4G refer to Figure 9.

For Lists 4A, 4D, 4E and 4F refer to Figure 10.

For List 4H refer to Figure 11.

Use 6 AWG wire to ensure a good ground connection to the FRE-765.

1. Route the chassis ground wire through the small hole in the strain relief on the bottom of the enclosure.
2. For Lists 4, 4B, and 4G, connect one end of the chassis ground wire to the grounding lug (see Figure 9). For Lists 4A, 4D, 4E, 4F (Figure 10 on page 17), and 4H (Figure 11 on page 17) connect one end of the chassis ground wire to the grounding bar.
3. Connect the other end of the chassis ground wire to a suitable ground termination point (ground rod or cold water pipe).
4. Tighten the strain relief around the wire.

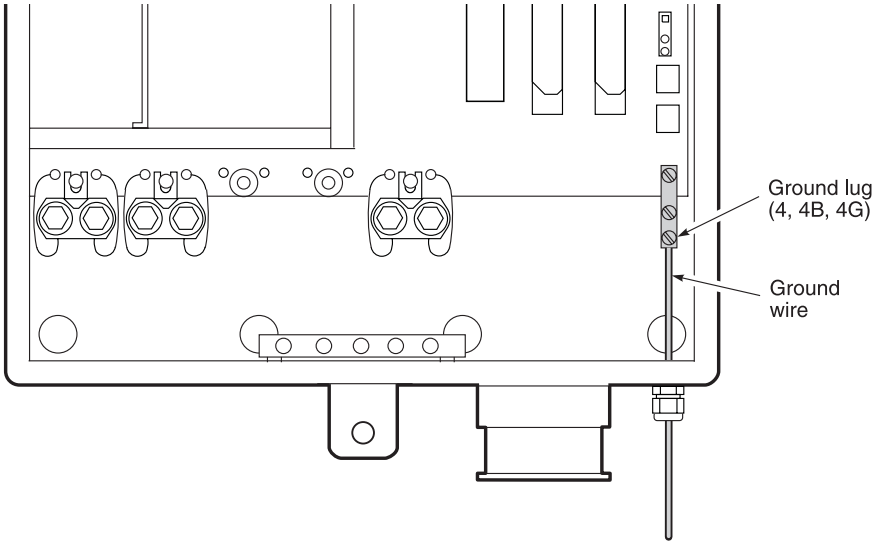

Figure 9. *Installing the Ground Wire (List 4, 4B, and 4G)*

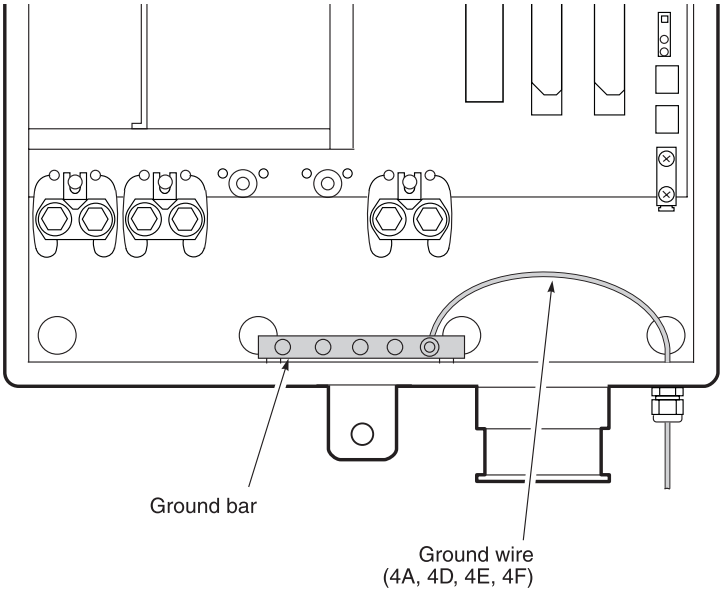

Figure 10. *Installing the Ground Wire (List 4A, 4D, 4E, and 4F)*

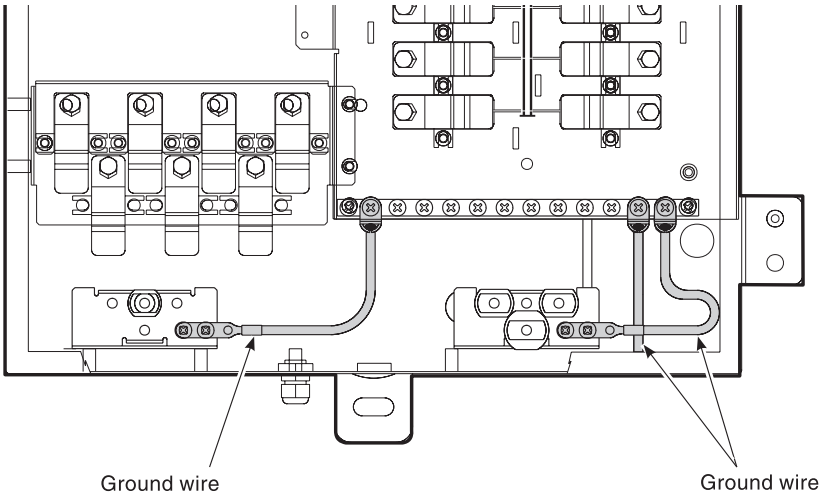

Figure 11. *Installing the Ground Wire (List 4H)*

HDSL Pairs. To connect the HDSL pairs, follow the instructions for the appropriate FRE-765 enclosure.

For List 4, 4A, 4B, and 4F FRE-765 enclosures do the following (see Figure 12):

1 Route the HDSL pairs through the strain relief on the bottom of the enclosure.

2 Terminate HDSL Pair #1 on the Quiet-Front terminals HDSL_1_T (Tip) and HDSL_1_R (Ring).

3 Terminate HDSL Pair #2 on the Quiet-Front terminals HDSL_2_T (Tip) and HDSL_2_R (Ring).

4 Secure with a cable tie to the bracket near the cable entrance.

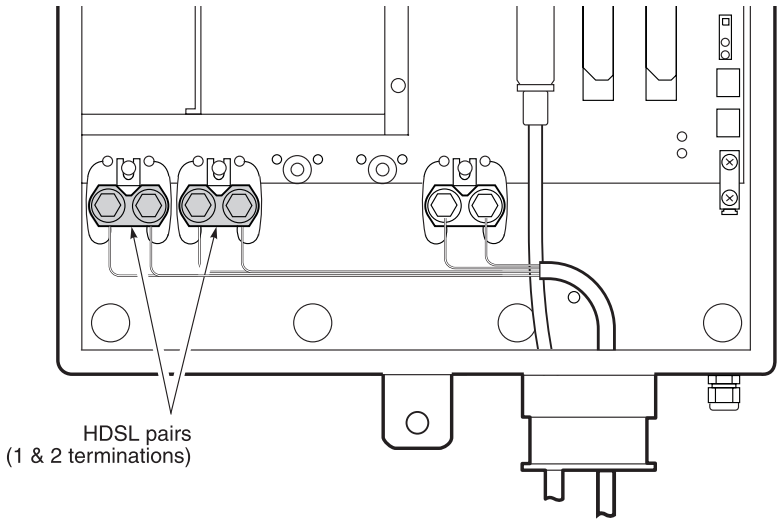

Figure 12. *Installing HDSL Lines (List 4, 4A, 4B, and 4F)*

For List 4D and 4E FRE-765 enclosures, splice the HDSL pairs to the cable stub per Table 12.

Table 12. *HDSL, Metallic Bypass, and Auxiliary Power Line Unit Termination*

Backplane Connector	6 Pair Cable Stub (Lists 4D, 4E)	Type	Function
HDSL_1_T HDSL_1_R	WH BL	AMP Quiet Front or RayChem terminals	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	WH OR	AMP Quiet Front or RayChem terminals	Tip and Ring terminations for HDSL Pair #2 from the COT. +130 Vdc is simplexed on this line for powering the RT.
BYPASS_T BYPASS_R	WH GN	AMP Quiet Front or RayChem terminals	Tip and Ring terminations for the metallic bypass pair to the COT. (Do not connect metallic bypass pairs between PG-Flex systems or between other DLC systems.)
PWR_1_T PWR_1_R	WH BN	AMP Quiet Front or RayChem terminals	Termination for auxiliary power pairs when using a PG-Flex doubler unit. Note that these connectors must be ordered separately: Amp Quiet Front (p/n 150-1399-25).
PWR_2_T PWR_2_R	WH SL	AMP Quiet Front or RayChem terminals	Termination for auxiliary power pairs when using a PG-Flex doubler unit. Note that these connectors must be ordered separately: Amp Quiet Front (p/n 150-1399-25).
(Spare)	RD BL	—	No connection—reserved for future use.

For Lists 4G (see Figure 13) and 4H FRE-765 (see Figure 14) enclosures do the following:

1. Route the HDSL pairs through the strain relief on the bottom of the enclosure.
2. Terminate HDSL Pair #1 on the RayChem terminals HDSL_1_T (Tip) and HDSL_1_R (Ring).
3. Terminate HDSL Pair #2 on the RayChem terminals HDSL_2_T (Tip) and HDSL_2_R (Ring).
4. Secure with a cable tie to the bracket near the cable entrance.

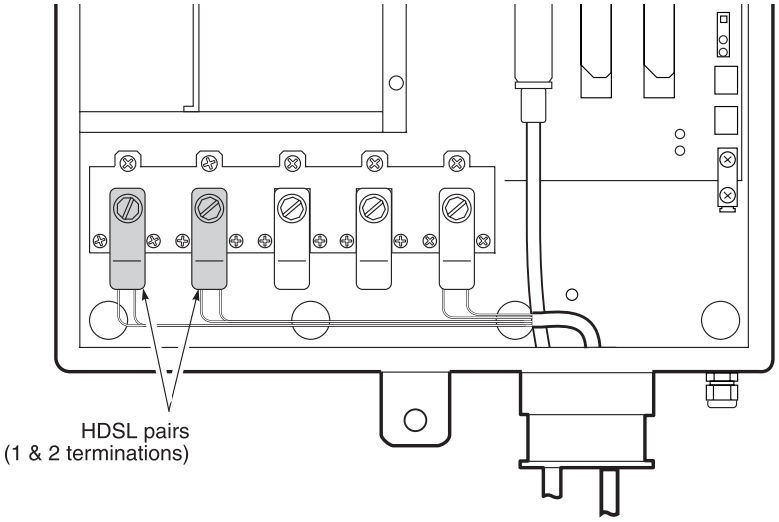

Figure 13. *Installing HDSL Lines (Lists 4G)*

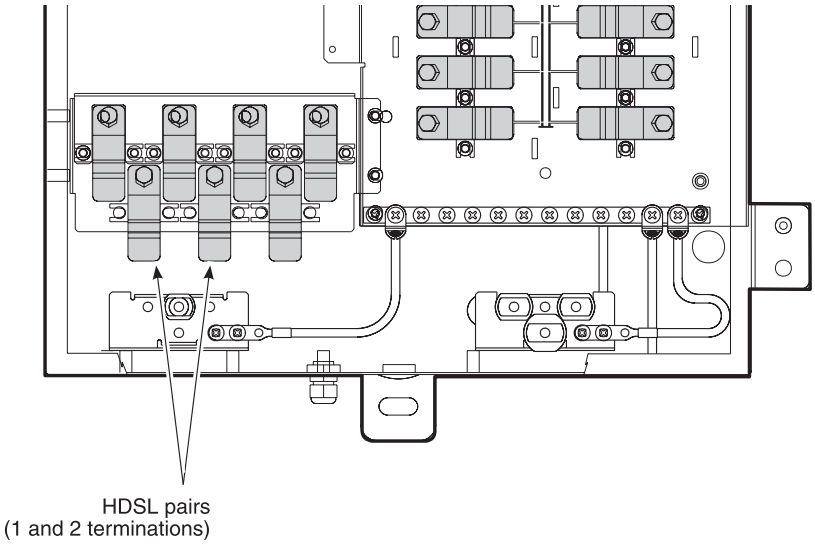

Figure 14. *Installing HDSL Lines (List 4H)*

Bypass Pair. To install the Bypass Pair, follow the instructions for the appropriate FRE-765 enclosure.

Do not connect metallic bypass pairs between PG-Flex systems or to other DLC systems.

For List 4, 4A, 4B, and 4F FRE-765 enclosures (see Figure 15):

1 Route the bypass pair through the strain relief on the bottom of the enclosure.

2 Terminate the bypass pair on the Quiet Front terminals BYPASS_T and BYPASS_R.

3 Use a cable tie to secure to the bracket near the cable entrance.

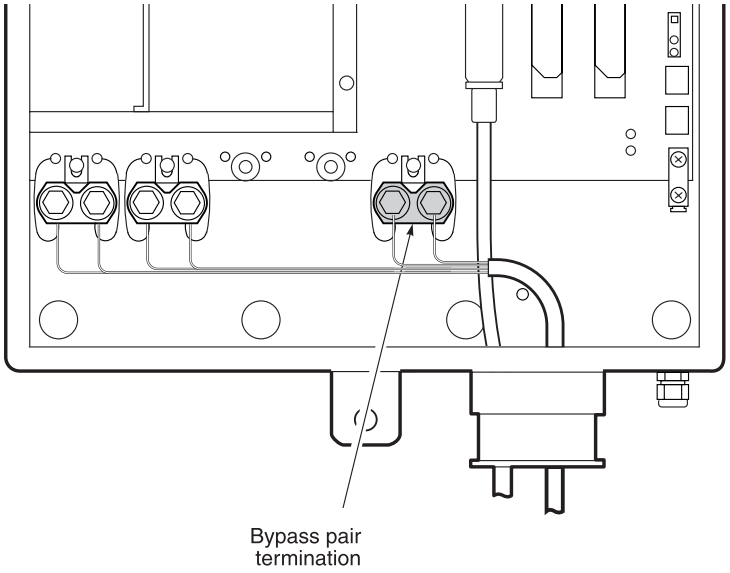

Figure 15. *Installing the Bypass Pair (List 4, 4A, 4B, and 4F)*

For List 4D and 4E FRE-765 enclosures, splice the bypass pair to the cable stub per Table 12 on page 18.

For the List 4G FRE-765 enclosure refer to Figure 16, and for the List 4H FRE-765 enclosure refer to Figure 17:

1. Route the bypass pair through the strain relief on the bottom of the enclosure.
2. Terminate the bypass pair on the RayChem terminals BYPASS_T and BYPASS_R.
3. Use a cable tie to secure to the bracket near the cable entrance.

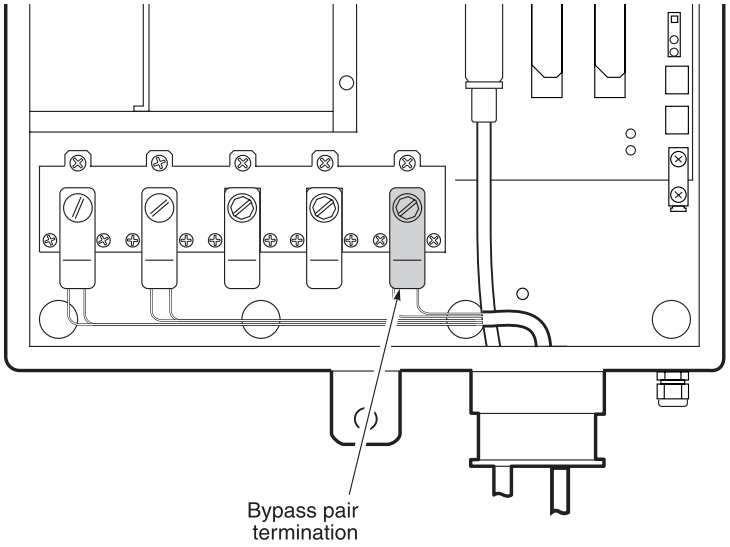

Figure 16. *Installing the Bypass Pair (Lists 4G)*

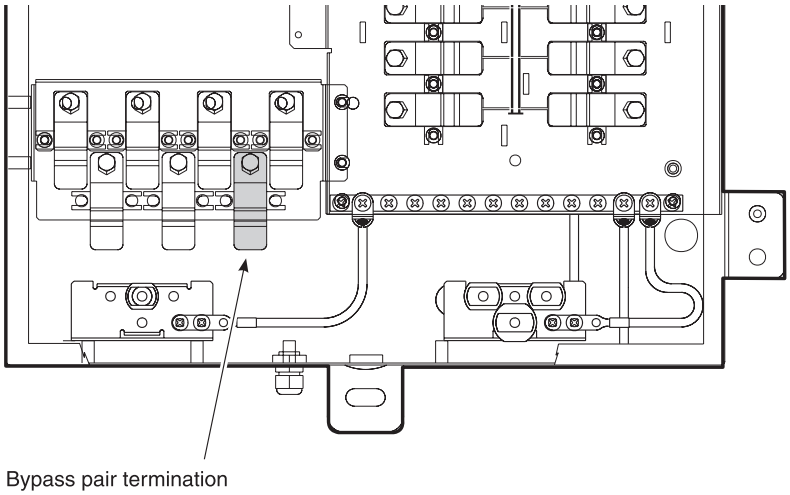

Figure 17. *Installing the Bypass Pair (List 4H)*

Subscriber Lines. To install the subscriber lines, follow the instructions for the appropriate FRE-765 enclosure.

To install subscriber lines for List 4A and 4H FRE-765 enclosures do the following:

1 Route the subscriber line cables through the bottom of the enclosure.

2 Terminate the cables per Table 13 or Table 14.

3 Secure with a cable tie to the bracket near the cable entrance.

Table 13. *Subscriber Terminations for List 4A* †*

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	TB1	5	PB1	5
	6	TB1	6	PB1	6
	7	TB1	7	PB1	7
	8	TB1	8	PB1	8
2	1	TB1	9	PB1	9
	2	TB1	10	PB1	10
	3	TB1	11	PB2	1
	4	TB1	12	PB2	2
	5	TB2	1	PB2	3
	6	TB2	2	PB2	4
	7	TB2	3	PB2	5
	8	TB2	4	PB2	6
3	1	TB2	5	PB2	7
	2	TB2	6	PB2	8
	3	TB2	7	PB2	9
	4	TB2	8	PB2	10
	5	TB2	9	PB3	1
	6	TB2	10	PB3	2
	7	TB2	11	PB3	3
	8	TB2	12	PB3	4

* For the FRE-765 List 4A RT Enclosure, the cable on the rear of the AMP Quiet Front termination module is installed in connector P1 on the RT enclosure backplane.

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

Table 14. *Subscriber Terminations (with internal proctectors) for List 4H* †*

Channel Unit	Circuit	Subscriber Termination Protector	Pair
1	1	1	1
	2	2	2
	3	3	3
	4	4	4
	5	5	5
	6	6	6
	7	7	7
	8	8	8
2	1	9	9
	2	10	10
	3	11	11
	4	12	12
	5	13	13
	6	14	14
	7	15	15
	8	16	16
3	1	17	17
	2	18	18
	3	19	19
	4	20	20
	5	21	21
	6	22	22
	7	23	23
	8	24	24

* For the FRE-765 List 4H RT Enclosure, the cable on the rear of the RayChem termination module is installed in connector P1 on the RT enclosure backplane.

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

For List 4, List 4B, and List 4G FRE-765 enclosures do the following:

1 Route the subscriber line cable through the bottom of the enclosure (List 4).

2 Connect the subscriber line cables per Table 15. For List 4, plug the Amphenol connector into P1. For List 4B, splice the subscribers to the cable stub. For List 4G, connect the subscriber cable to the Amphenol-ended cable.

3 Secure with a cable tie to the bracket near the cable entrance.

Table 15. *Subscriber Terminations for Lists 4, 4B, and 4G*[*]

Channel Unit	Circuit	Backplane Connector P1 (Lists 4, 4B, and 4G) [†]		Subscriber Cable Stub (List 4B only) [‡]	
		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	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
2	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	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
3	1	42	17	YL/OR	OR/YL
	2	43	18	YL/GN	GN/YL
	3	44	19	YL/BN	BN/YL
	4	45	20	YL/SL	SL/YL
	5	46	21	VI/BL	BL/VI
	6	47	22	VI/OR	OR/VI
	7	48	23	VI/GN	GN/VI
	8	49	24	VI/BN	BN/VI

* Shaded terminations used only with the 8 Channel POTS or 4 Channel DDS Units.
† For List 4, connect the subscriber termination cable to backplane connector P1. For List 4G, the Amphenol-ended cable is connected to P1.
‡ For List 4B, terminate subscriber lines to the cable stub that attaches to backplane connector P1 cable.

For the List 4D and List 4E FRE-765 enclosures, splice the subscriber connections to the cable stub per Table 16.

Table 16. *Subscriber Terminations for Lists 4D and 4E* †*

Channel Unit	Circuit	25-Pair Subscriber Cable Stub		Protector	
		Tip	Ring	Strip	Socket
1	1	WH	BL	PB1	1
	2	WH	OR	PB1	2
	3	WH	GN	PB1	3
	4	WH	BN	PB1	4
	5	WH	SL	PB1	5
	6	RD	BL	PB1	6
	7	RD	OR	PB1	7
	8	RD	GN	PB1	8
2	1	RD	BN	PB1	9
	2	RD	SL	PB1	10
	3	BK	BL	PB2	1
	4	BK	OR	PB2	2
	5	BK	GN	PB2	3
	6	BK	BN	PB2	4
	7	BK	SL	PB2	5
	8	YL	BL	PB2	6
3	1	YL	OR	PB2	7
	2	YL	GN	PB2	8
	3	YL	BN	PB2	9
	4	YL	SL	PB2	10
	5	VI	BL	PB3	1
	6	VI	OR	PB3	2
	7	VI	GN	PB3	3
	8	VI	BN	PB3	4

* For the FRE-765 List 4D and 4E RT Enclosure, the cable on the rear of the protection block subassembly is installed in connector P1 on the RT enclosure backplane.

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

For the FRE-765 List 4F enclosures, connect the subscriber connections to the Amphenol-ended cable stub per Table 17.

1 Route the subscriber line cable through the bottom of the enclosure.

2 Connect the subscriber line cable to the Amphenol-ended cable coming off the protector field.

3 Secure with a cable tie to the bracket near the cable entrance.

Table 17. *Subscriber Terminations for Lists 4F (12/24 channel systems)* * †

Channel Unit	Circuit	25-Pair Amphenol (male) Line Cable		Protector	
		Tip	Ring	Strip	Socket
1	1	26	1	PB1	1
	2	27	2	PB1	2
	3	28	3	PB1	3
	4	29	4	PB1	4
	5	30	5	PB1	5
	6	31	6	PB1	6
	7	32	7	PB1	7
	8	33	8	PB1	8
2	1	34	9	PB1	9
	2	35	10	PB1	10
	3	36	11	PB2	1
	4	37	12	PB2	2
	5	38	13	PB2	3
	6	39	14	PB2	4
	7	40	15	PB2	5
	8	41	16	PB2	6
3	1	42	17	PB2	7
	2	43	18	PB2	8
	3	44	19	PB2	9
	4	45	20	PB2	10
	5	46	21	PB3	1
	6	47	22	PB3	2
	7	48	23	PB3	3
	8	49	24	PB3	4

* For the FRE-765 List 4F RT Enclosure, the cable on the rear of the protection block subassembly is installed in connector P1 on the RT enclosure backplane.

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

For the FRE-765 List 4G enclosures, connect the subscriber lines to the Amphenol-ended cable coming out of the enclosure.

Installer must provide suitable primary protection for the subscriber drops. The list 4G does not incorporate primary protectors on the subscriber drops.

Protector Plugs. For FRE-765 Lists 4A, 4D, 4E, and 4F, install five-pin protector plugs into the protector strips for each subscriber line installed (see Figure 18).

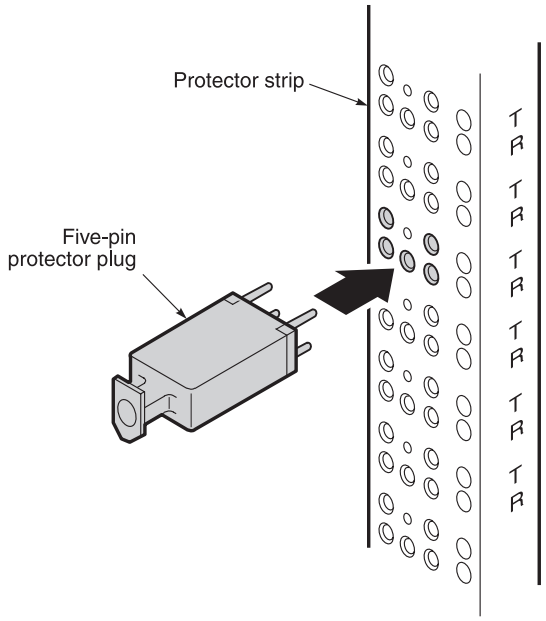

Figure 18. *Installing Five-Pin Protector Plugs*

See the following tables for protector socket assignments:

- Table 13, “Subscriber Terminations for List 4A,” on page 22.
- Table 16, “Subscriber Terminations for Lists 4D and 4E,” on page 25.
- Table 17, “Subscriber Terminations for Lists 4F (12/24 channel systems),” on page 26.

Auxiliary Power Pairs. When PG-Flex is used with a doubler, follow the instructions for the appropriate FRE-765 enclosure.

For the FRE-765 Lists 4, 4A, 4B, 4D, 4E, and 4F install the two AMP Quiet Front terminations (kit part number 150-1399-25) and wire for the doubler as follows (the kit provides white and blue jumper wires):

1 Install the two AMP Quiet Front terminations into the FRE-765 (see Figure 19):

a Connect a white jumper wire to PWR_1_T (J10A) and a blue jumper wire to PWR_1_R (J11A) wire-wrap pins.

b Connect a white jumper wire to PWR_2_T (J12A) and a blue jumper wire to PWR_2_R (J13A) wire-wrap pins.

c Loosen the Phillips-head screw for each connector and slide the bracket on the AMP Quiet Front termination under it.

d Tighten the Phillips-head screw.

e Insert and tighten the white and blue jumper wires into the AMP Quiet Front terminations.

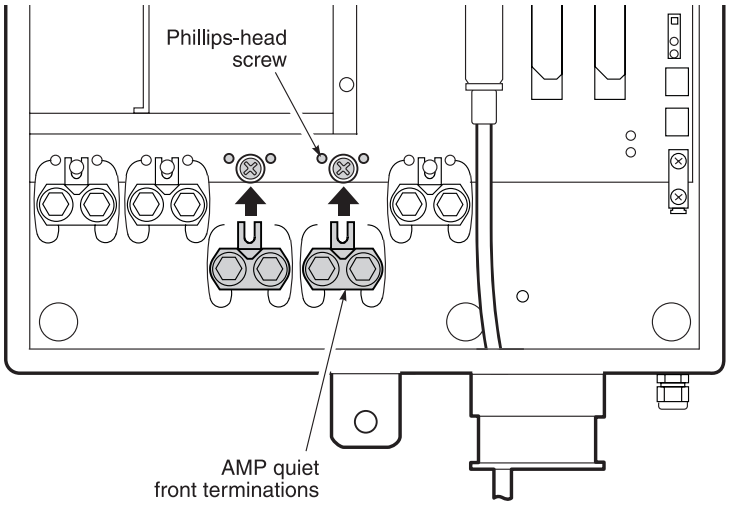

Figure 19. *Installing Power Pair Terminations*

2 For List 4, 4A, 4B, and 4F only, route the auxiliary power pairs:

a Route the auxiliary power pairs from the CO shelf to AMP Quiet Front terminations through the strain relief on the bottom of the enclosure. Use a cable tie to secure to the bracket near the cable entrance.

b Terminate the power pairs on the AMP Quiet Front terminations per Table 12.

3 For List 4D and 4E, connect the auxiliary power pairs per Table 12.

For the FRE-765 Lists 4G (refer to Figure 20) and 4H (refer to Figure 21), connect the auxiliary power pairs as follows:

The RayChem terminations are factory installed in the FRE-765 Lists 4G and 4H.

1. Route the auxiliary power pairs from the CO shelf to RayChem terminations through the strain relief on the bottom of the enclosure. Use a cable tie to secure to the bracket near the cable entrance.
2. Terminate the power pairs on the RayChem terminations per Figure 21.

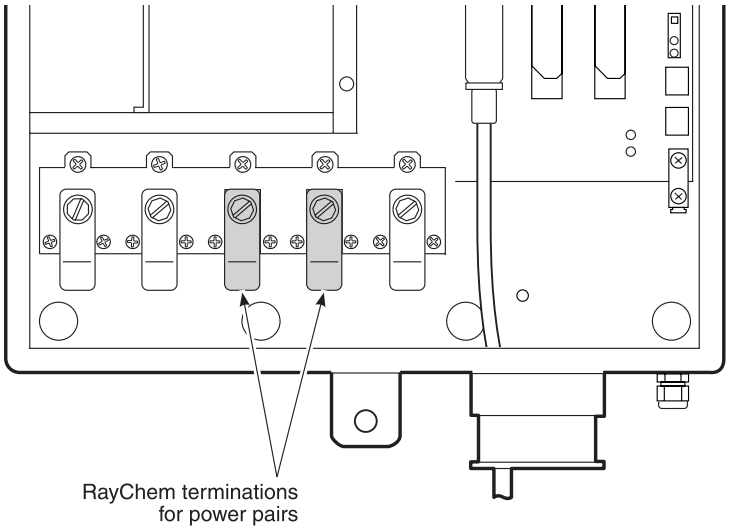

Figure 20. *Installing Power Pairs (List 4G)*

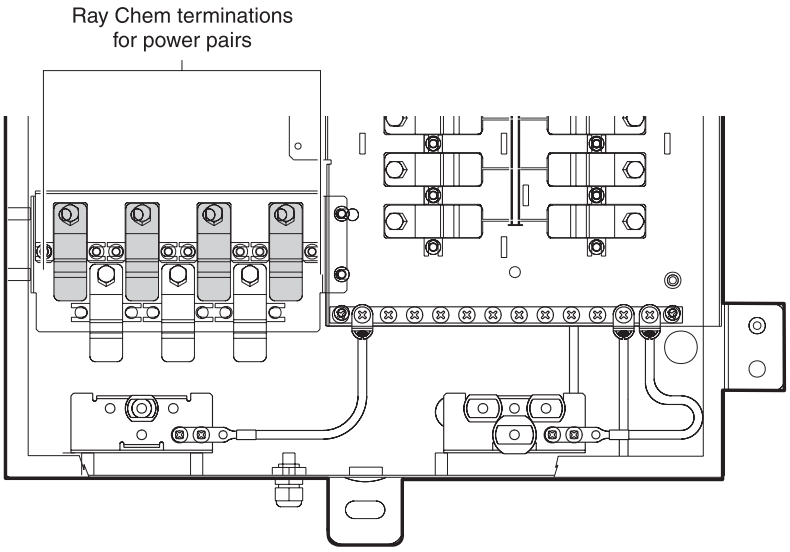

Figure 21. *Installing Power Pairs (List 4H)*

Cabling Verification. Verify the following connections:

Perform the following verifications before inserting any cards in the COT shelf.

1 Visually ensure that the ground wire is tightly secured to the grounding lug inside the FRE-765 and at the ground termination point.

2 Visually verify that 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 FRE-765.

3 Verify that the HDSL lines are "dry."

a Verify 0 Vdc between the Tip and Ring, Tip and ground, and Ring and ground of each of the HDSL pairs terminated at the FRE-765.

b Verify a value greater than 100 kΩ resistance between Tip and ground, and Ring and ground for each of the HDSL pairs terminated at the FRE-765.

Turn-Up and Testing

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

Troubleshooting

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

TECHNICAL SUPPORT

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

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

Fax: (714) 832-9924

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.

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.

WARRANTY AND CERTIFICATION

Warranty

PairGain Technologies warrants this product to be free of defects and to be fully functional for a period of 60 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.

Do not try to repair the unit. 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 voids the warranty.

If a unit needs repair:

1 Call PairGain for a Return Material Authorization (RMA) number at (800) 370-9670 or fax your request to (714) 730-2961.

2 Return the defective unit, freight prepaid, along with a brief description of the problem, to:

PairGain Repair Center
14352 Franklin Avenue
Tustin, California 92780-7013

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

Certification

Trade Name:	PG-Flex Remote Terminal Enclosure
Model Number:	FRE-765
Compliance Test Report Number:	B71022A1
Compliance Test Report Date:	October 30, 1997
Responsible Party (in USA):	PairGain Technologies
Address:	14402 Franklin Avenue Tustin, California 92780-7013
Telephone:	(800) 638-0031

FCC Compliance

The FRE-765 RT Enclosure has been tested and found to comply with the limits for Class B digital devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The user is cautioned that changes and modifications made to the equipment without the approval of the manufacaturer could viod the user's authority to operate this equipment.

I the undersigned, hereby declare that the equipment specified above conforms to the above requirement.

Place: Tustin, California

Signature: 

Date: October 30, 1997

Full Name: Carl S. Baldwin

Position: PG-Flex Project Manager

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

- cabling
- proper connections
- grounding

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

ABBREVIATIONS

AWG	American Wire Gauge
Ckt	Circuit
CO	Central Office
COT	Central Office Terminal
CU	Channel Unit
DDS	Digital Data System
FCC	Federal Communications Commission
FRE	PG-Flex Remote Enclosure
GND	Ground
HDSL	High bit-rate Digital Subscriber Line
ISDN	Integrated Services Digital Network
MSP	Modular Station Protector
PIC	Primary Interexchange Carrier
POTS	Plain Old Telephone Service
RT	Remote Terminal

Corporate Office

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ISO 9001
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Certificated Firm