PG-FLEX

8 CHANNEL POTS
CENTRAL OFFICE CHANNEL UNIT

Model	List Number	Part Number	CLEI Code
FLC-704	2A	150-1304-21	

PAIRGAIN TECHNOLOGIES, INC.
ENGINEERING SERVICES TECHNICAL PRACTICE
SECTION 363-704-121-01

Revision History of This Practice

Revision	Release Date	Revisions Made
01	July 30, 1999	Initial release.

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USING THIS TECHNICAL PRACTICE

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

Notes indicate information about special circumstances.

Cautions indicate the possibility of equipment damage or the possibility of personal injury.

You must wear an antistatic wrist strap connected to the ESD jack on the PG-Flex chassis to perform the installation procedures. You must also observe normal ESD precautions when handling electronic equipment. Do not hold electronic plugs by their edge. Do not touch components or circuitry.

INSPECTING YOUR SHIPMENT

Upon receipt of the equipment:

- 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.
- Check the packing list to ensure complete and accurate shipment of each listed item. If the shipment is short or irregular, contact PairGain as described in the Warranty. If you must store the equipment for a prolonged period, store the equipment in its original container.

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OVERVIEW

This practice describes, and defines the features and specifications for the PairGain® PG-Flex® FLC-704 List 2A Channel Unit.

DESCRIPTION AND FEATURES

The FLC-704 provides eight Plain Old Telephone Service (POTS) interfaces between the Central Office and the PG-Flex, and uses A-Law pulse code modulation (PCM) encoding. The FLC-704 Channel Unit includes green status LEDs for each line indicating idle, ringing, and off-hook conditions, as well as a red LED indicating a fault condition. The channel unit provides metallic test access to the subscriber line connection through an optional metallic bypass pair.

Features of the PG-Flex FLC-704 COT Channel Unit:

- eight POTS subscriber interfaces
- 64 kbps A-Law PCM encoding
- metering tones (12 kHz, 16 kHz)
- front panel ACTIVE LEDs indicate idle, ringing, metallic test access, and off-hook for each channel
- front panel FAULT LED indicator simplifies troubleshooting.

FRONT PANEL

Figure 1 shows the FLC-704 front panel. Table 1 lists the different states and indications for the FLC-704 front panel LEDs.

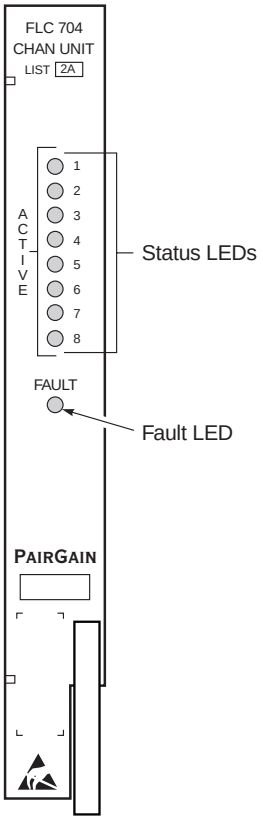

Figure 1. *FLC-704 Front Panel*

Table 1. *FLC-704 Front Panel LEDs*

LED	LED State	Indicates
	Solid green	Channel is off hook.
ACTIVE	Fast flashing green	Channel is in test access mode.
(1 through 8)	Slow flashing green	Channel is ringing.
	Off	Channel is on hook.
FAULT	Red	Fault detected by the unit. Refer to Table 2 for troubleshooting procedures.
	Off	No faults detected.

SPECIFICATIONS

Electrical Characteristics

Analog Impedance.....600 Ω

Loop Resistance.....100 Ω (CO switch to COT)

End-to-End Loss.....-2.5 dB ± 1.0 dB

DC Off-Hook Current.....30 mA

Channel Signature

Tip-Ring .....475 kΩ, 1%

Tip-Ground.....332 kΩ, 1%

Ring-Ground.....(open)

COT 20 Hz Input Impedance.....0.5 REN

Environmental

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

Temperature and Humidity.....-40° F to +150° F (-40° C to +65° C) 5% to 95% (non condensing)

Physical

Weight.....0.8 lb (0.4 kg)

Dimensions

Height .....6.75 in. (17.2 cm)

Width .....1.00 in. (2.5 cm)

Depth .....10.50 in. (26.7 cm)

FUNCTIONAL DESCRIPTION

The FLC-704 provides eight POTS interfaces to the CO switch. The unit performs the interface function between the analog POTS circuit and the internal digital PCM bus. In addition, each channel unit:

- converts analog signals to 64 kbps A-Law PCM digital format
- detects ringing voltage
- detects loop current feed
- detects forward disconnect
- detects a subscriber test access signal
- detects metering tones
- provides loop closure.

A block diagram of the FLC-704 is shown in Figure 3. One 8-Channel COT Channel Unit supports eight POTS interfaces.

A status LED is associated with each line to indicate whether the line is off-hook, idle, ringing, or being tested. A common fault LED indicates a general fault has been detected on the card and it should be replaced.

Test access connections to a specific line circuit are made through the maintenance terminal or by the CO switch applying the appropriate voltages on the subscriber line as described in the "Subscriber Drop Testing" section.

SUBSCRIBER DROP TESTING

For subscriber drop testing from the CO, PG-Flex is able to select and connect any subscriber drop to a metallic test pair at the RT. PG-Flex extends this connection back to the COT where technicians can switch it onto a test access bus, or to the corresponding subscriber line on the COT channel card.

Metallic access is performed by momentarily placing +116 Vdc (from the CO) on the subscriber's Tip lead. (The Ring lead should be between GND and the Tip value.) Depending on the PG-Flex system configuration, the selected subscriber drop (assuming a working metallic bypass pair) connects to the corresponding COT subscriber line.

The metallic connection drops when -116 Vdc is momentarily applied to the subscriber's COT Tip.

Metallic access may also be activated through and ASCII terminal connected to the RS-232 Craft Maintenance port located on the front of the FLL-716 line unit or through the FAU-728 or FPI-729 units.

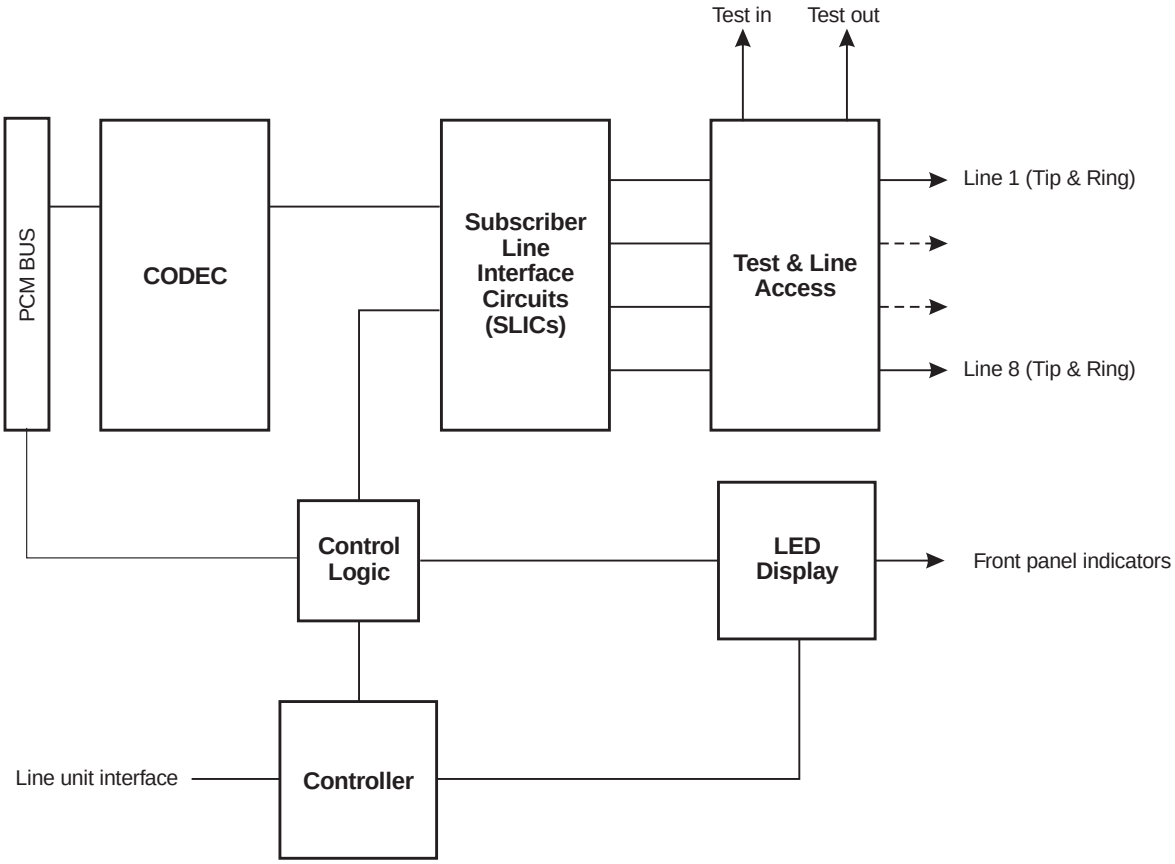

Figure 2. *FLC-704 Block Diagram*

INSTALLATION AND TEST

UNPACKING THE FLC-704

Upon receipt of the equipment, proceed as follows:

- Unpack each container and visually inspect the contents 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.
- 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 the "Warranty" on page 9.

If you must store the equipment for a prolonged period, store the equipment in its original container.

TURN-UP AND TESTING

Install COT Channel Units

1 Insert each FLC-704 into the COT shelf.

All LEDs on the Channel Unit will turn *on* for approximately $^1/_2$ second, then scan from top to bottom, then flash all on, then off.

2 After the system has powered up, established HDSL synchronized communications, and no calls are in progress, verify that the Channel Unit front panel indicators ACTIVE 1 through ACTIVE 8 and FAULT LEDs are all off.

Test Subscriber Circuits. Test each subscriber circuit by placing and receiving calls; ACTIVE 1 through 8 LEDs track call progress.

TROUBLESHOOTING

Table 2, "FLC-704 Troubleshooting," on page7 provides troubleshooting procedures based on indications displayed by the front panel indicators of FLC-704.

Table 2. *FLC-704 Troubleshooting*

Indication	Problem	Action
FAULT LED ON	The FLC-704 processor has detected a fault.	Remove and re-insert the FLC-704. If the FAULT LED does not extinguish, replace the FLC-704.
	Troubleshooting based on customer-originated trouble reports	
No dial tone, Can not dial	• faulty RT or COT Channel Unit • facility short/open • CO switch problem	**1** Lift the subscriber pair at the network interface. If the dial tone is present and you can place a call, refer the problem to the customer per local practice. **2** If you cannot hear dial tone or cannot place a call at the network interface (with the subscriber pair lifted), check for dial tone at the RT. If dial tone is present, check the pair between the RT and the network interface. If no dial tone is present, replace the RT Channel Unit. **3** If the problem still exists, re-insert the original RT Channel Unit and replace the COT Channel Unit. Test for operation. **4** If the problem still exists, refer the problem to the CO switch.
Phone does not ring	• high-resistance subscriber line short • faulty RT or CO Channel Unit • loop length too long	**1** Lift the subscriber pair at the network interface. If ringing is present, refer the problem to the customer per local practice. **2** If ringing is not present, check for ringing at the RT. If ringing is present, check the pair between the RT and the network interface. If no ringing is present, replace the RT Channel Unit. If ringing is still not present, check a circuit on another Channel Unit. If ringing is still not present, replace the Lin eUnit. **3** If ringing is still not present at the RT, re-insert the original Channel Unit and Line Unit. Test for ringing at the COT. **4** Test for ringing into the COT from the CO switch. If no ringing is present, refer the trouble to the CO switch. If ringing is present, replace the COT Channel Unit. Test again for ringing at the network interface. If ringing is still not present, contact PairGain technical assistance per "Warranty" on page 9. **5** Verify the resistance of the copper loop between the RT Enclosure and the network interface is less than 530 Ω.
Phone does not stop ringing	• faulty subscriber instrument • faulty RT Channel Unit • loop length too long	**1** Test for ring trip at the network interface. If the ringing is tripped, refer the trouble to the customer per local practice. **2** If the ringing is not tripped, test for tripping at the RT. If ring trip does occur, check the loop for excessive length. If ring trip does not occur, replace the RT Channel Unit. If ring trip still does not occur, contact PairGain technical assistance per "Warranty" on page 9. **3** Verify the resistance of the copper loop between the RT Enclosure and the network interface is less than 530 Ω.
Can not hear, Can not be heard	• subscriber problem • faulty RT or COT Channel Unit	**1** Lift the subscriber line at the network interface and check the signal level. If correct, refer trouble to the customer per local practice. **2** If the level is too low, check the level at the RT. If the level is correct at the RT, check the pair between the RT and the network interface. If the level is too low at the RT, replace the RT Channel Unit. **3** If the level is still too low, re-insert the original RT Channel Unit. **4** Check the level at the COT coming from the CO switch. If it is correct, replace the COT Channel Unit. If it is not correct, refer the problem to the CO regarding the switch. **5** If the level is still not correct, re-insert the original COT Channel Unit. Contact PairGain technical assistance per "Warranty" on page 9.

ABBREVIATIONS

CO	Central Office
COT	Central Office Terminal
DTMF	Dual Tone Multi Frequency
HDSL	High-bit-rate Digital Subscriber Line
PCM	Pulse Code Modulation
POTS	Plain Old Telephone Service
RMA	Return Material Authorization
RT	Remote Terminal

PRODUCT SUPPORT

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

Email: support@pairgain.com

During normal business hours (7:30 AM to 5:30 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.

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, call PairGain for a Return Material Authorization (RMA) number at (800) 638-0031.

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

PairGain Technologies, Inc.
14352 Franklin Avenue
Tustin, CA 92780
ATTN: Repair and Return Dept.
(800) 638-0031

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

FCC COMPLIANCE

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

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

- Cabling
- Correct connections
- Grounding

MODIFICATIONS

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by PairGain Technologies, Inc. may void the user's authority to operate the equipment.

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

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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