GL-T8200
1- to 25-Watt, 900-MHz Power Amplifier

USER MANUAL
PN 9110.01306
REV A

Specifications subject to change without notice

Document Change Record

Revision:	Revision A
Date:	03/23/99
Changes:	none, original

25w82001.toc

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1 GENERAL

1.1 Manual Scope

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This manual provides information for the 1 to 25-watt, 900-MHz power amplifier, part number 1000.02186.

1.2 Applicable Documents

This manual is incomplete without additional manuals. Refer to *Table 1-1* for a listing and function of these manuals.

Table 1-1 Applicable Documents

document	part number	function
GL-T8200 system manual	9110.01305	describes fully racked-up GL-T8200 transmitter
DSP VDT manual	9110.00259	describes DSP exciter software installed in exciter
DSP exciter user manual	9110.01021	describes DSP exciter hardware equipment in transmitter
GL-T8200 1 to 25-watt PA manual	9110.01306	this manual
power supply manual	9110.00622	describes GL2728 power supply equipment

1.3 Manual Sections

Table 1-2 lists the sections of this manual with a summary of their contents.

Table 1-2 Manual Sections

section	contents
1. General	introduction and purpose of manual
2. Specifications	significant measurements of power amplifier
3. Description	introduction and principal characteristics of power amplifier
4. Installation and Setup	initial installation and activation of power amplifier
5. Operation	operation of power amplifier
6. Theory of Operation	detailed functional description of circuitry within power amplifier
7. Maintenance	procedures to be performed on specific intervals to maintain optimum performance of power amplifier
8. Checkout and Troubleshooting	verification of proper operation, correction to proper operation of power amplifier
9. Removal and Reinstallation	removal and reinstallation procedures for the PA

2 SPECIFICATIONS

Table 2-1 lists the significant equipment-level specifications for the power amplifier.

25w82002

Table 2-1 Power Amplifier Specifications

measurement	condition	specification
Electrical		
RF output power (W)	continuous, at output of PA	1 to 25
RF bandwidth (MHz)		exceeds exciter bandwidth
RF input power (mW)	factory-set attenuation	200-400
RF input connector		type-N female
RF output connector	output of PA	type-N female
input and output RF impedance (ohms)		50
VSWR	max	1.5
dc input power voltage (Vdc) current, idle/operating (A)		28
Mechanical and Environmental		
humidity		5 to 95%, noncondensing
ambient storage temperature		-30^{o} to 70^{o}C
ambient operating temperature		-30^{o} to 60^{o}C
temperature derating factor above 5000 feet (1500 m)		0.5^{o}C per 100 m
vibration		Mil-Std 810E, Method 514.4 Category 1
maximum operating elevation		to 10,000 ft (3050 m)
height		3 RU (5.25 in, 13.4 cm)
width		19 in (48 cm)
depth		12 in (30.5 cm)
weight		25 lb (11.3 kg)

3 DESCRIPTION

This is a 1- to 25-watt PA intended for use on the 900-MHz band. This PA is characterized by integrated monitoring devices that supply critical status information to the DSP exciter. This exciter contains diagnostic software that can detect and report a faulty PA.

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3.1 Physical Description

Refer to *Figure 3-1* and *Figure 3-2*. The PA consists of a 3 RU high chassis, including convection fins and one fan.

The chassis contains a PA board which contains metering circuitry, power distribution circuitry, and RF amplification circuitry.

3.1.1 Mounting Provisions

The PA is mounted to the front of most standard 19-inch equipment racks by means of eight screws. The front panel of the PA may by removed while the PA is mounted in the rack for access to fuses. Thumbscrews secure the front panel to the PA.

3.1.2 PA Chassis Rear Connector Panel

Refer to *Figure 4-2* for a list of connections for the PA. The PA chassis rear connector panel has an RF input connector, an RF output connector, a dc power input connector, a dc power output connector, a fan, and a 15-pin connector for connection to the DSP exciter.

v0222.hgl

Figure 3-1 PA Front Isometric View

v0221.hgl

25w82003

Figure 3-2 Top View of PA Board, Showing I/O

3.2 Functional Description

The RF amplifier circuitry of the power amplifier is contained within the PA chassis. The monitoring of the RF amplifier system is accomplished by the digital exciter through the PA board located in the PA chassis.

3.2.1 RF Path

The PA chassis receives the exciter output at a rear-mounted type-N connector on the PA board. The RF output power leaves the PA board through a type-N RF output connector. A jumper delivers the signal to the lightning protector output on the cabinet.

3.2.2 Signal and Power Connections

All PA dc, signal monitoring, and control signals are routed through the PA board.

3.2.3 Isolator

intermodulation prevention

An isolator receives the RF output of the PA chassis. It prevents intermodulation of the RF signal that may occur from nearby transmissions and reduces radiated harmonics. A sample detector circuit in the isolator reject load input monitors the reflected power (VSWR) present at the cabinet's RF output connector. The VSWR RF sample is rectified and filtered, providing a dc voltage proportional to the VSWR connector on the third isolator, which voltage is supplied to the DSP exciter for transmitter control and monitoring. The VSWR-detection circuit of the third isolator is the only means of detecting whether there is an antenna fault, which can then be detected and reported.

reject load

The triple isolator provides the power amplifier module with a stable 50-ohm load. This is accomplished by directing any reflections from the output line to a reject load. Hence, the load presented to the PA final transistor is always acceptable.

power control

An RF sample of the forward output signal is obtained from the forward-power coupler and directed to the exciter, along with the reflected-power indication from the reflected-power coupler. Control circuits within the DSP exciter evaluate the forward power and the reflected power and control the output power according to conditions. Additionally, if the DSP exciter detects an RF fault, it passes the report to the GL-C2000 and VDT for system control.

4 INSTALLATION AND SETUP

4.1 Cabinet Installation and External Cabling

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4.1.1 Tools and Equipment Required

Refer to *Table 4-1*. Equipment listed by brand name may be substituted with equivalent. For installation, only common hand tools are necessary if at all, since equipment integration is usually completed at the factory.

Table 4-1 Required Tools and Equipment

nut driver - 5/16 in (7.9 mm)
screwdriver - #2 flat blade and #3 flat blade
screwdriver - #2 Phillips and #3 Phillips
Bird 4421 RF power meter
Bird 8327 dummy load
spectrum analyzer
barrel connector - type-N female
cable - 1 M long (max) with 7/16 Din to type-N male ends
Fluke 77 DVM
7/16 DIN male-to-type-N female adapter

4.1.2 Inspection

Refer to the system manual.

4.1.3 Rack Positioning

Refer to the system manual also. Rackup variations are generally not possible. Cooling and cabling restraints require that equipment pieces remain racked according to standard configurations.

4.1.4 External Cabinet Equipment Cabling

The equipment items that comprise the paging transmitter are usually contained in one cabinet. This section describes the various input and output connections required to bring power and signals into and out of the cabinet.

4.1.5 PA I/O Connections

Refer to *Figure 4-1* and the appropriate rear views in the transmitter system manual. Most connections are made to the rear of the PA chassis. Table 4-2 lists PA connections.

Table 4-2 PA I/O Connections

connector name	**function**	**note**
RF input	200 mW	type-N female
RF out	25 W	type-N female
TO EXCITER J6	control	See *Table 4-3*.
+TB1-1	positive 28-Vdc input	Anderson power pole (+) red
GROUND TB1-2	power supply negative return	Anderson power pole (-) black
auxiliary dc outputs	auxiliary power	See *Table 4-4*.
fan	supplies voltage to PA fan	

4.1.5.1 RF Output

Connect the antenna network to the lightning protector output. The connector is typically a 7/16-inch DIN mounted on top of the transmitter cabinet. It should be securely tightened to a torque specification of 250 inch-pounds (2900 g-m).

4.1.5.2 The RF Output Forward and Reflected Dc Samples

The RF output forward and reflected dc sample from the isolator are digitized and routed to the DSP exciter. High reflected power from either the antenna network or the output of the PA causes reduced output and eventual shutdown.

4.1.5.3 Signal and Dc Connections

Be certain that the connection between the exciter and the rear of the PA chassis is secure. Wiring details of the exciter/PA connector are shown in Table 4-3.

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Table 4-3 Exciter/PA Connector Pinout (For DSP Exciter)

PA J6-x	description	direction	PA J6-x	description	direction
1	analog 1	to exciter	9	analog 2	to exciter
2	analog 3	to exciter	10	analog 4/aux. for C.S.	to exciter
3	AGC reference	from exciter	11	PA fault	to exciter
4	PA ground		12	PA ground	
5	PA ground		13	mux select 1	from exciter
6	mux select 2	from exciter	14	mux select 3	from exciter
7	key input	from exciter	15	nc	
8	reflected sample (combiner)	to exciter			

4.2 Setup

4.2.1 Expected Exciter

The PA chassis is interfaced to the exciter. The connection is:

- J6 to J6 for the DSP exciter.

4.2.2 Setup Using VDT

Setup of the PA is performed at the system level using a VDT. Refer to the VDT manual and screens, which include instructions for these applicable setup procedures:

- adjust forward power
- set low-power alarm

Figure 3-2 shows controls, test points, and fuses on the PA board.

Figure 4-1 PA Rear View

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Table 4-4 PA Board Fuses

PA board fuse	**label**	**connection**
F1 (3A)		powers remaining circuitry of PA board
F2 (5A)	R9000	J2-2
F3 (3A)	RX	J2-6
F4 (5A)	C2000	J2-8
F5 (3A)	DSP exciter	J2-4
F6 (3A)		powers transistor, first stage and second stage of PA board
F7 (3A)		powers remaining circuitry of PA board

5 OPERATION

5.1 Controls and Indicators

The PA has no indicators nor controls which are suitable for user adjustment.

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5.2 Operation

The transmitter normally operates within the paging system in an unattended manner. Local control is not intended for operation, but for setup, checkout, or maintenance. Refer to the appropriate section:

- *Section 7, MAINTENANCE*
- *Section 8, CHECKOUT AND TROUBLESHOOTING*
- *Section 9, REMOVAL AND REINSTALLATION*

Also refer to VDT manual.

5.2.1 Turn PA On and Off

Power is supplied to the transmitter and PA whenever the power supply is energized.

5.2.2 Turn Fan On and Off

The fan does not contain an on/off switch, but turns on and off with the power supply. The fan is not equipped with a thermal switch, it runs continuously whenever the power supply equipment is energized.

5.2.3 Key and Unkey PA

The PA does not contain a key switch, but is keyed and unkeyed by the presence of the RF output signal from the exciter when it is keyed. The exciter is normally keyed and unkeyed remotely through transmitter controller, but it can be keyed and unkeyed locally through a video display terminal (VDT). Refer to the controller manual for remote key and unkey instructions, or to the DSP exciter VDT manual for local key and unkey instructions.

6 THEORY OF OPERATION

6.1 Power Distribution

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The PA requires a primary 28-volt dc power input, which is typically provided by the ac power supply.

6.1.1 Fan Power

Fan power is received directly from the fan plug.

6.1.2 High-Current Power to PA Board

Positive dc operating power is received through the Anderson power poles. The positive side of the 28-volt supply enters through TB1-1 on the PA board. Power to the board is distributed through fuses. Refer to *Table 4-4*.

6.1.3 Metering Circuit Regulators

The PA board has three on-board regulators which supply power to several circuits on the PA board. Refer to *Table 6-1* for the PA board voltages, test points, and functions.

Table 6-1 PA Board Voltages

voltage (Vdc)	**test point**	**function (PA board unless specified otherwise)**
+36	J1-6	supply voltage for current-sensing op-amps
+28	TB1-1	PA board +28-Vdc supply
+5VREF	J1-4	reference for measuring op-amps
+5	J1-3	supply voltage for metering and control circuits
ground	TB1-2	ground

6.2 RF Flow

Refer to *Figure 6-1*. The PA board receives its RF input through a type-N connector, via the PA chassis. A coupler reduces the RF input to an acceptable level. The RF input is amplified by means of two amplifier stages. A detector circuit in the input to the PA board monitors the RF input. The PA output is connected to the output type-N connector of the PA chassis.

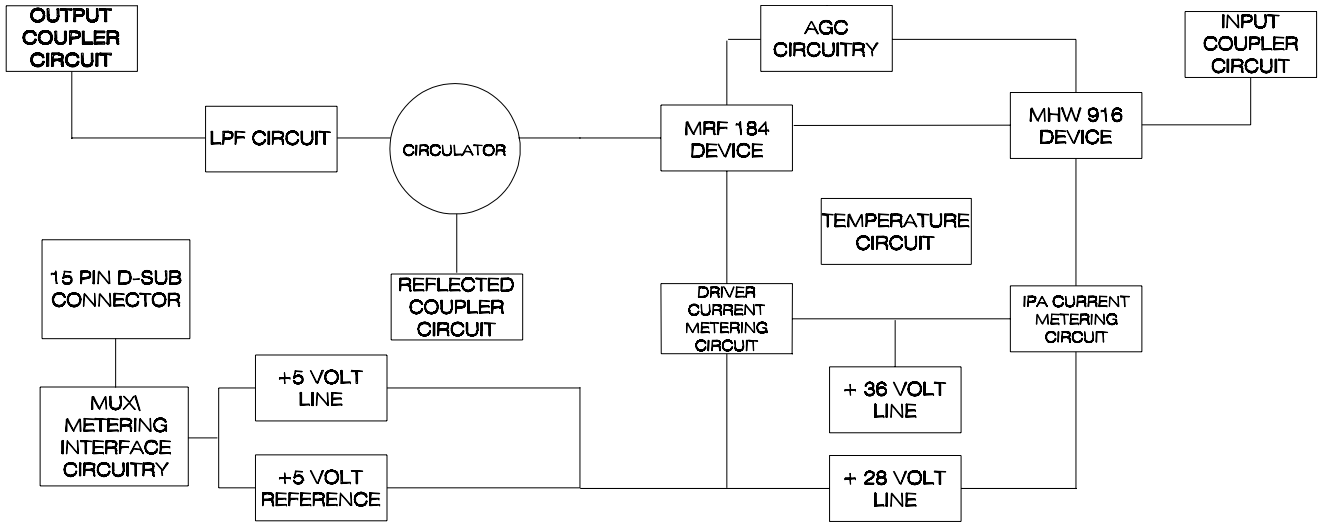

Figure 6-1 Simplified Power Amplifier Block Diagram

6.3 PA Board

The DSP exciter monitors currents, voltages, powers, and other valuable status information from the power amplifier through the PA board. The two main functions of the PA board are to channel information from the PA chassis to the exciter and to distribute dc power to the exciter, R9000, receiver and C2000.

Most of the information passed to the exciter is in the form of voltages that represent powers, currents, supply voltages and temperature. This information is multiplexed in the PA board onto two analog lines that feed the exciter's analog-to-digital converter (ADC). The PA board also detects overcurrent and high reflected power conditions in the PA. Once this condition is detected, the PA board pulls a PA fault line high initiating an interrupt in the exciter. This interrupt causes the exciter to reduce power or shut the transmitter down to protect it from damage.

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6.3.1 Input Voltage

dc power input

Refer to *Figure 6-2*. The +28-volt supply voltage from the main power supply feeds the distribution circuitry on the PA board through an Anderson power pole. The negative side of the supply is grounded to the black (-) connection. The positive side of the supply goes to the red (+) connection and on to the distribution circuitry on the PA board.

fuses

The +28-volt supply is distributed throughout the PA board through current monitoring circuits and fuses. The +28-volt supply voltage is also used in the metering circuitry. Refer to fuse information in *Table 4-4*.

internal voltages

The internal supply voltages described in *Paragraph 6.3.2* are derived from the main supply line. Refer to *Table 6-1* for more information concerning the PA board regulators, voltages, and test points.

6.3.2 Internally Generated Voltages

6.3.2.1 +36-Volt Internal Supply

The +36-volt supply is derived with a voltage doubling circuit. This supply has a very low current since it only drives the current monitoring op-amps in the PA board. These op-amps monitor the current of transistors Q1 and Q2 from the high side of the 28-volt supply, and therefore require a supply higher voltage. The +36-volt supply can be monitored at J1-6 with reference to ground

6.3.2.2 +5-Volt Precision Reference Internal Supply

The +5-volt reference supply also supplies very little current and is used for fault detections, where the trip point is critical. The +5-volt reference supply can be monitored at J1-4 with reference to ground.

6.3.2.3 +5-Volt Internal Supply

The +5-volt supply has to supply approximately 1 ampere at 5 volts to portions of the PA board. Filtering is required to keep RF from getting onto the PA board circuitry. The +5-volt supply can be monitored at J1-3 with reference to ground.

6.3.2.4 +28-Volt Supply

The +28-volt supply is monitored by the multiplexer 0 on the PA board. The +28-volt supply can be monitored at TB1-1.

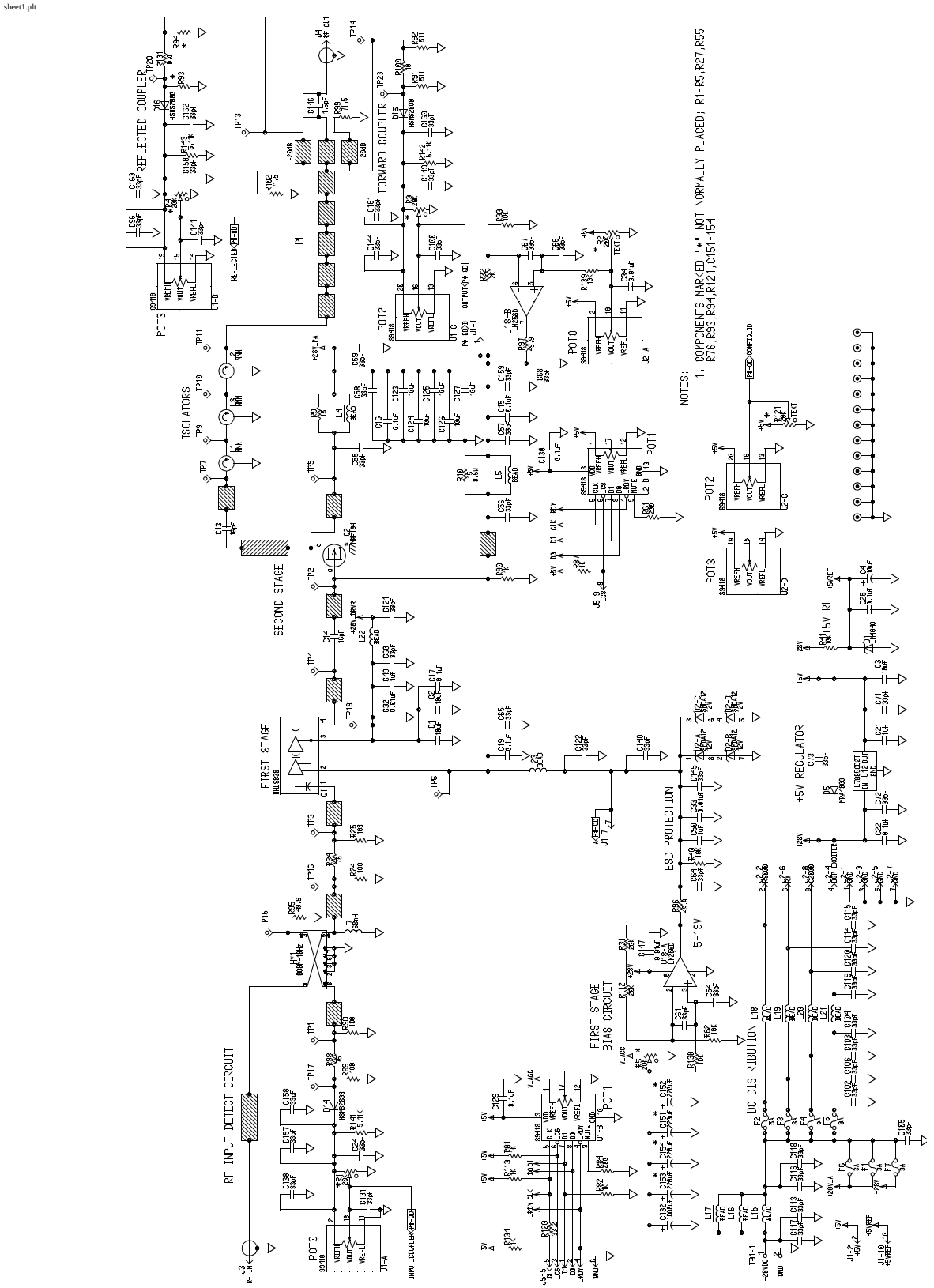

Figure 6-2 PA Board Functional Diagram

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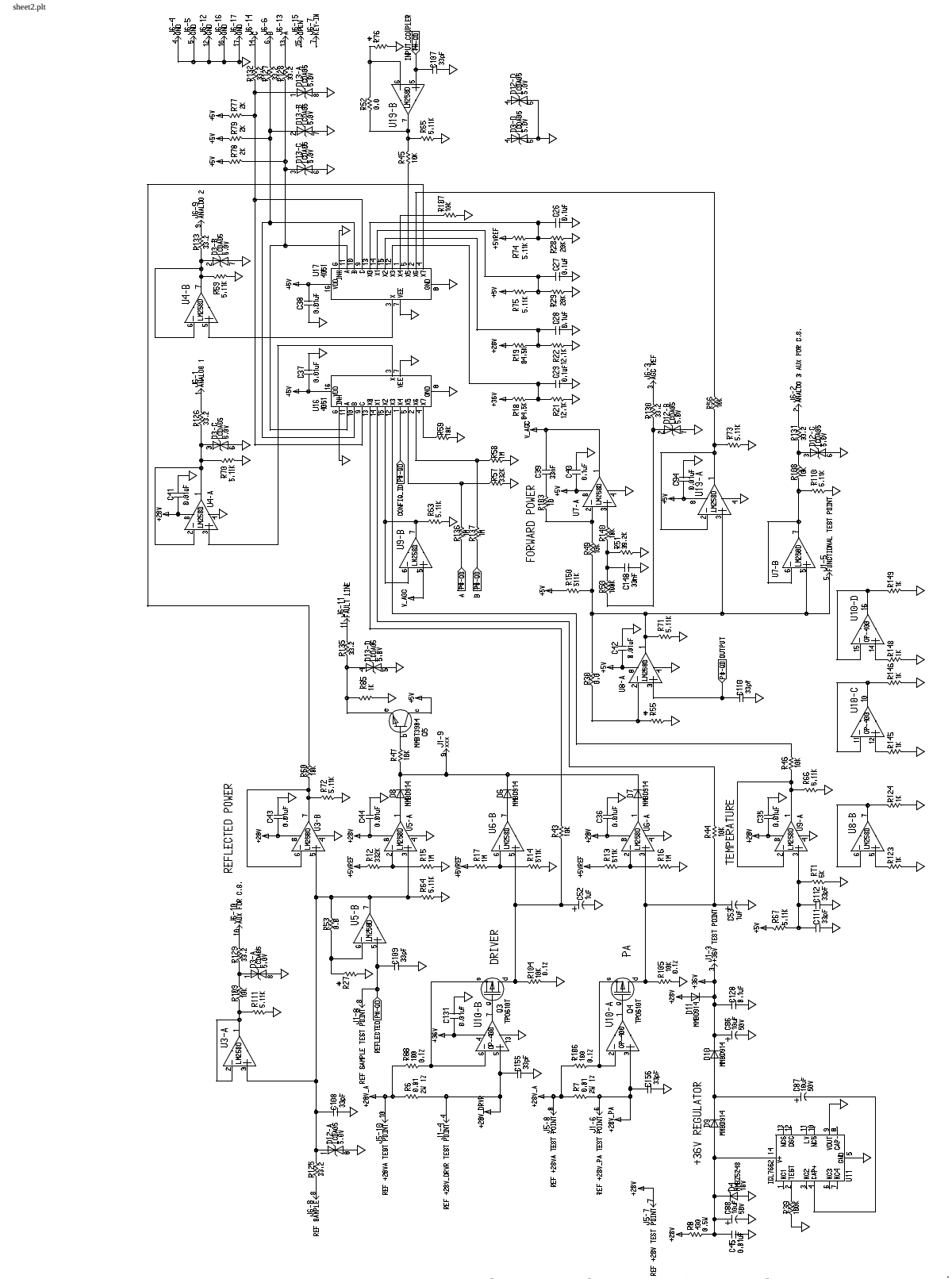

Figure 6-2, PA Board Functional Diagram (continued)

6.4 Exciter Interface

The physical interface is a 15-pin, filtered male connector on the exciter and the PA chassis. 15-pin connector J6 is mounted on the PA board.

More information concerning the DSP exciter interface connector pinout is given in *Paragraph 6.4.1*. For information on setting the PA to expect the standard DSP exciter, refer to *Paragraph 4.2.1*.

6.4.1 Exciter Interface Connector Pinout

Refer to *Table 4-3*. The interface connector pin numbers refer to the 15-pin exciter/PA interface connector on the rear of the PA chassis and the DSP exciter.

6.4.1.1 Analog 1 Output

Pins 1 (+) of the D-sub 15-pin interface connector is the analog 1 output from multiplexer 0 on the PA board. The output voltage range is 0-5 volts for the + pin, the - pin is referenced to PA ground. The analog value on the multiplexer output may be one of eight different channels and is selected by the microcontroller through the multiplexor select lines 0-2.

6.4.1.2 Analog 3 Output

Pins 2 (+) of the D-sub 15-pin interface connector is the analog 3 output which goes to J6-2 and is used for customer specials. The output voltage range is 0-5 volts for the (+) pin, the (-) pin is referenced to PA ground. This analog output operation is the same as the analog 0 output described above.

6.4.1.3 Mux Select Lines 0-2

Pins 13, 6, and 14 of the D-sub 15-pin interface connector are multiplex lines 0 through 2, respectively. These input lines from the exciter are digital in nature and are used to select the appropriate channel of the analog multiplexers on the PA board.

6.4.1.4 PA Fault Interrupt

Pin 11 of the D-sub 15-pin interface connector is the chassis fault-interrupt output line. This output goes from LO to HI to indicate that a high VSWR or high-current condition has occurred in the PA. This output is digital in nature and drives an interrupt input to the micro-controller in the exciter. This output from the PA board is ORed with the other PA board fault outputs; therefore only one line has to be active to indicate a fault.

6.5 Analog Readings Thresholds

Refer to *Table 6-2*.

6.5.1 PA Board Currents

The currents monitored in the PA board have various upper limits, as shown in *Table 6-2*. They are read on the VDT screen. When one or more of these thresholds is met, it causes an interrupt to the microcontroller in the exciter, which then reduces output power until the fault condition no longer exists or until shutdown occurs. As of this printing, no lower current limit has been programmed.

6.5.2 PA Forward Power

The PA board forward and reflected samples are digitized and sent out the I20 interface. The forward power reading from the PA board has a lower limit which is determined by the forward power setting of the transmitter. This limit is based on efficiency and losses in the PA. The lower limit is 1 watt. The upper limit for the forward power reading is 25 watts. This does not cause an interrupt to the exciter, but if a reading exceeds this level, the exciter shuts the transmitter down.

6.5.3 PA Reflected Power

The reflected power reading in the PA has a lower limit of 0 W, and an upper limit of 5 W average power. When this limit is achieved, it initiates an interrupt to the microcontroller in the exciter which reduces power until the fault goes away or until a shutdown condition occurs.

6.5.4 PA Board RF Input Power

The input power to the PA has a lower limit of 200 mW. If the threshold is not reached, the PA shuts down.

6.5.5 +28-Volt External Supply

The upper limit of the PA's 28 volt supply is +29 volts, and the lower limit is +22 volts. Excursions outside these limits are a fault state. The transmitter shuts down.

6.5.6 +36-Volt Internal Supply

The +36 volt supply to the current metering op-amps has a window of +33 volts and +39 volts. When these limits have been exceeded, it results in an alarm condition only, no power reduction.

Table 6-2 Metered Parameter Thresholds

	upper threshold	**lower threshold**
analog reading	**PA**	**PA**
total forward power (W)	25	1
total reflected power (W)	5	0
PA current Q1	1.6	none
PA current Q2	3.3	none
+36 Vdc	39	33
+28 Vdc	29	22
+5 Vdc	5.5	4.5
temperature	80^{o} (alarm) 85^{o} (fault)	-30^{o}

6.5.7 +5-Volt Internal Supplies

Both of the +5-volt supplies in the PA have an alarm window of +5.5 and +4.5 volts. Exceeding either parameter results in an alarm condition only.

6.5.8 Temperature

The ambient temperature in the PA has an upper limit of +85 C. If this limit is exceeded, the transmitter shuts down.

7 MAINTENANCE

If the PA becomes faulty, get a replacement from Glenayre customer service.

7.1 Cleaning

The PA chassis should be kept clean and free of dust. Dust and dirt can reduce the cooling efficiency of the PA which can lead to module failure. Dirt on the printed circuit boards can also lead to other types of failures. Most dust and dirt can be removed with a vacuum cleaner. Do not use air pressure to blow dust and dirt from the module, because it allows dust to resettle on other equipment which may have already been cleaned.

7.2 Power Calibration

The complete power calibration was done with precise measuring equipment at the factory; the accuracy exceeds that of field-quality test equipment. Refer to the DSP exciter user manual for details. The transmitter is adjusted to the desired power via the video display terminal.

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8 CHECKOUT AND TROUBLESHOOTING

8.1 Introduction

Checkout procedures can be performed at any time to verify that the power amplifier (and transmitter) is functioning properly. After the checkout procedures are successfully completed, the site can be returned to normal service. Pursue any troubleshooting procedure provided or referenced, which is a direct result of a failed checkout procedure before trying to complete the checkout procedure.

The following procedures presume that the installation and setup procedures in section 4 of this manual have already been successfully completed. Refer to the DSP exciter VDT user manual for more checkout procedures.

8.2 Checkout Procedures

8.2.1 VDT Power-Up Verification

Once powered, verify that the VDT is powered. Check list below:

- the VDT should have a cursor displayed and blinking
- or the VDT should have an instructional prompt displayed
- or the VDT should have an auto-loaded program running.

8.2.2 Dc Voltage Verification

Once powered, verify that the fan is operating. The fan is located on the rear of the PA. Also insure that air flow is not obstructed inside or outside of the transmitter cabinet, around the cabinet vents, and in the heat sink cooling fins of the PA.

8.3 Troubleshooting Procedures

Connect the VDT to the VT-100 connector on the front panel of the DSP exciter. Check the power amplifier parameters using the VDT, refer to the DSP exciter VDT user manual for assistance in using the VDT menus for troubleshooting.

8.3.1 Parameter Readings at Time of Fault

When the DSP exciter receives a fault indication from the transmitter or exciter, it records all of the transmitter parameters at that instant. This is a valuable source of PA troubleshooting data and should always be checked when transmitter problems occur. Connect the VDT to the VT-100 connector on the front panel of the exciter to access the transmitter fault information. Refer to the DSP exciter VDT user manual for assistance in reading the transmitter faults. Check the transmitter fault parameters against the normal transmitter operating parameters. The normal transmitter operating parameters can be obtained from the factory transmitter test data sheets; or (if available) from the transmitter parameters log mentioned in sections 4 and 7 of this manual.

8.3.2 GL-C2000 Transmitter Controller Alarms

Another valuable source of PA troubleshooting data is the GL-C2000 alarm history. It is accessed by connecting the VDT to the VT-100 connector on the front panel of the GL-C2000 transmitter controller. Consult the GL-C2000 user manual for assistance in accessing the controller alarm history.

If the GL-C2000 has a telephone line connected to its modem output, its alarm history can be accessed remotely through the use of the Glenayre GL-N2000 console, or with a computer which is running a communication program with VT-100 emulation and has a 2400-baud modem.

The GL-N2000 console equipped with version 3.5 or later software can also perform an over-the-air connection if telephone lines are not connected to the GL-C2000 controller.

8.3.3 Operational Checks

If the transmitter is operational, valuable troubleshooting information can be obtained by comparing the present transmitter operating parameters, obtained through the exciter VDT connection, to the parameters from the factory transmitter data sheets; or (if available) from the transmitter parameters log.

8.3.4 Power Amplifier Current Measurement

Refer to *Table 8-1, PA Board Current*. The PA board has provisions to measure the current flow of the first and second stage.

Table 8-1 PA Board Current

PA board function	**transistor current measured**
first stage	measure Q1 current
second stage	measures Q2 current

9 REMOVAL AND REINSTALLATION

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Caution

When fastening dc connectors, be certain that the plug is centered directly on its corresponding jack and that the polarity is correct. Do not make dc connections while power is applied to the chassis.

The PA is secured to the rails by eight screws.

9.1 PA

9.1.1 Removal

Note

Before removing the PA as a result of fault isolation, be certain that the fault is with it. The exciter and interconnecting wiring are essential to proper operation of the power amplifier.

1. Loosen the eight screws on the front of the PA.
2. Disconnect I20, dc power in, dc power out, RF in, and RF out from the back of the PA.
3. Pull PA out of rack until it is completely out.

9.1.2 Reinstallation

1. Place PA into location in rack.
2. Put in eight screws and lightly fasten.
3. Attach I20, dc power in, dc power out, RF in and RF out to the back of the PA.
4. Tighten screws.

This procedure is complete. Check out the transmitter to see that it functions properly.

GL-T8200
1- to 25-Watt 900-MHz Transmitter System

USER MANUAL
PN 9110.01305
REV A

Specifications subject to change without notice

Document Change Record

Revision:	A
Date:	03/24/99
Changes:	none; original

8200sys1.toc

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1 GENERAL

1.1 Manual Scope

This manual provides information for the following transmitter:

- 1 to 25-watt, 900-MHz transmitter, model GL-T8200.

1.2 Applicable Documents

This manual is incomplete without additional manuals. Refer to *Table 1-1* for a list of applicable documents, their part numbers, and a brief description of each.

Table 1-1 Applicable Documents

document	part number	description
9100.XXXXX	9100.XXXXX	assembled GL-T8200 manual. Requestors should ask for option manuals which match their configuration.
GL-T8200 system manual	9110.001305	this document
DSP VDT manual	9110.00259	describes DSP exciter software installed in exciter
DSP exciter User Manual	9110.01021	describes DSP exciter hardware equipment in transmitter
GL-C2000 User Manual	9110.01248	describes GL-C2000 controller hardware and software
GL-T8200 power amplifier manual	9110.001306	describes 1 to 25 watt, 900-MHz power amplifier
power supply manual	9110.00622	describes GL2728 power supply equipment

1.3 Manual Sections

Refer to *Table 1-2*. This table lists the sections in this manual, and provides a brief description of the content of each section.

Table 1-2 Manual Sections

section	contents
1. General	introduction and purpose of manual
2. Specifications	significant system measurements; also see individual equipment manuals
3. Description	introduction and principle characteristics of the equipment
4. Installation & Setup	initial installation and activation of the equipment
5. Operation	operation of equipment
6. Theory of Operation	detailed functional description of transmitter
7. Maintenance	procedures to be performed on specific intervals to maintain optimum performance of the equipment
8. Checkout and Troubleshooting	verification of proper operation, correction to proper operation
9. Removal and Reinstallation	replacement procedures for assemblies which do not have their own, separate equipment manuals

1.4 About Glenayre

Questions regarding the equipment or this manual should be directed to:

U.S.A.
Glenayre Customer Service - RF
One Glenayre Way
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569500 Singapore
Phone: 65 483-8787
Fax: 65 483-9663

For additional Glenayre contacts, refer to
`www.glenayre.com/corporate/contacts/default.asp`.

1.4.1 Product Warranty Information

Glenayre warrants to the original purchaser that Glenayre products are free from defects in material and workmanship for a period of twenty-four months from the original invoice date, subject to the provisions herein. Glenayre will repair or replace at its option, FOB our factory, free of charge within one year from the date of shipment, any component, assembly or subassembly of our manufacture found to be defective under conditions of normal use. The unit, if repaired, will be returned to its original specifications. Failures caused by unauthorized modifications, *force majeure*, lightning, physical, environmental, or electrical damage including use with incompatible equipment are specifically excluded from this warranty. Glenayre disclaims any and all liability for loss or other damage whether direct, consequential or of any nature whatsoever, resulting from product failure.

This warranty is in lieu of all other warranties expressed or implied and covers only those items manufactured by Glenayre. Equipment supplied by, but not manufactured by Glenayre, is subject only to any warranty offered by the manufacturer of said equipment.

1.4.2 Service Warranty Information

Return of a defective item must be authorized by Glenayre prior to shipment. A Return Authorization number can be obtained from Glenayre Customer Service. When requesting a Return Authorization number, give the serial number of the unit. A description of the fault should accompany the unit on its return and the RA number must be shown on labels attached to the item(s). The cost of shipping to Glenayre is to be paid by the customer. Shipping from Glenayre will be prepaid by the customer, and shipped via surface mail. If express shipping is required, the unit will be shipped collect.

Any repair service performed by Glenayre under this limited warranty is warranted to be free from defects in material or workmanship for ninety days from the date of repair. All other terms of this limited warranty apply to the service warranty.

1.5 Regulatory-Authority Compliance

1.5.1 FCC

Refer to *Table 2-1* for authorizations.

1.5.2 Industry Canada

Refer to *Table 2-1* for authorizations.

1.5.3 Other

Refer to *Table 2-1* for authorizations. Type approvals have been applied for in all major markets. Refer to *Paragraph* for more information.

2 SPECIFICATIONS

8200sys2

Table 2-1 contains transmitter and power supply specifications. The ac power supply is a purchased item. Refer to the power supply manual, PN 9110.00622, for more specifications. Refer also to the exciter and PA manuals for detailed specifications. Test and measurement equipment is, where possible, calibrated in accordance with standards established by the National Institute of Standards and Technology (NIST).

Table 2-1 Specifications

characteristic (unit of measurement)	**condition, model**	**specification**
Electrical		
RF output power (W)	continuous duty, at PA RF output connector	1-25
Physical and Environmental		
dimensions	16 RU in standard EIA cabinet (can be reduced to 14 RU in nonstandard configurations)	28 x 19 x 9 in (71 x 48 x 22 cm)
weight		50 lb (23 kg)
elevation	continuous operation at rated power	to 10,000 ft (3050 m) (see temperature derating factor)
temperature	operating	-30 to +60 degrees C
	storage	-30 to +70 degrees C
temperature derating factor	above 5000 ft (1525 m)	0.5 degrees C per 100 m
humidity	operating, noncondensing	5 to 95%
Certification		
country	**model**	**identifier**
USA	GL-T8200	BFL-GL-T8200
Canada	GL-T8200	

Table 2-1 Specifications (continued)

characteristic (unit of measurement)	condition, model	specification
other	Contact Glenayre Sales for country-by-country type-approval information	
Electrical (power supply)		
ac input voltage (Vac)		195 to 265
ac input frequency (Hz)		47 to 440
ac input current (A)		4 max at 195 Vac to 265 Vac

3 +DESCRIPTION

The purpose of the paging transmitter is to provide a modulated, high-level RF signal, which sets off pagers within the coverage area of its associated antenna. The paging transmitter receives modulation and control information from the transmitter controller, which receives information from a control site. In a simulcasting environment, the control site may feed several paging sites at once.

8200sys3

3.1 Physical Description

Figure 3-1 shows a front view of the PA chassis. Refer to the transmitter ID label on the rear of the unit for identification purposes.

3.1.1 Mounting Provisions

3.1.1.1 Transmitter Controller

The transmitter controller, normally a GL-C2000, is mounted above the exciter and may be packaged with blank panels.

Table 3-1 Site Equipment List

equipment	part number	function
power amplifier GL-T8200	1000.02186	amplifies 900 MHz RF for broadcast
digital DSP exciter with I20 option	DSP EX/I20 OPT	generates then modulates RF; controls PA I/O activities, receives fault signals and takes action based on status
GL-S2164 Receiver	See receiver manual for configurations and part No.	receives data and commands from the system controller
GL-C2000 (typical) transmitter controller	GL-C2000	controls paging transmitter activities; performs I/O functions for paging site
power supply module		ac switching power supply which converts main power to dc voltage for the transmitter

3.1.2 Exciter

The exciter is one rack unit high. It is racked where shown and is held in place with four machine screws. The top cover is removable for access to subassemblies, jumpers, and adjustments contained in the unit. All but one of its connectors are on the back of the unit. The front of this unit has a connector which allows the VDT to be connected to it.

3.1.3 Power Amplifier (PA)

The transmitter PA is mounted in the rack by screws which are inserted into the angle brackets on either side of the chassis. Access to PA fuses is gained from the front; access to the fan and I/O connections is from the rear.

A chassis-mounted fan draws air across the PA heat sink and out the back.

Most exciter and PA fault isolations can be performed with the units mounted in the rack. It is not recommended to troubleshoot the PA if is is defective. A defective PA should be sent back to Glenayre.

3.1.4 Power Supply

The power supply is contained in a separate chassis which is mounted separately from the transmitter, normally as the lowest assembly in the rack. The power supply used is an ac switching power supply which converts main power to dc voltage for the transmitter. Refer to power supply manuals for details.

3.1.5 Video Display Terminal (VDT)

A video display terminal (VDT) is not part of the racked-up equipment; instead, it is a piece of test equipment which the user brings to the site when setup, maintenance, or trouble-shooting is necessary; or it is used as a monitoring device. Refer to the VDT manual for details, including cable requirements.

3.2 Simplified Paging-Site Functional Description

3.2.1 Paging Site

The following paragraphs provide a block diagram-level functional description of a typical paging site.

Refer to *Figure 3-2*. This figure shows basic signal flows between the various paging site equipment pieces. The communications device which the transmitter uses in order to communicate with the control site is not shown and may vary from application to application.

3.2.2 Link Equipment and Transmitter Controller

A link receiver, satellite receiver, microwave drop, telephone link, or other similar device is used for communication between the transmitter controller and the control site. The particular device depends on the application.

The transmitter controller is typically a model GL-C2000. There are various ways of interfacing the transmitter controller to the I/O portions of the exciter. Refer to the transmitter controller manual and the exciter manual for details.

8200sys3

Figure 3-1 Transmitter Front View

3.2.3 Paging Transmitter

The paging transmitter converts the digital signal from the transmitter controller into modulated and amplified RF power.

Operation is in response to commands from the transmitter controller via the DSP exciter. The transmitter monitors its functions and reports its status to the VDT and the GL-C2000 via the exciter. The transmitter controller permits the transmitter to be controlled and monitored from a remote location. Local control and monitoring are performed through a VT-100 video deplay terminal (VDT).

The DSP exciter combines functions of an RF exciter and a PA controller. The exciter generates modulation using digital signal processing (DSP) to achieve accurate, stable modulation that does not vary with time or temperature. The PA-control section monitors transmitter status signals in the form of fault logic and voltage samples. The microprocessor in the exciter reports PA status to the transmitter controller, VDT, and the exciter front panel. If a malfunction occurs, the transmitter enters a reduced operating condition, depending on the seriousness of the fault. PA control and status monitoring are performed by the microprocessor, which consolidates control logic from the transmitter controller or the locally operated VDT. Both the exciter and transmitter controller receive continuous status reports from the microprocessor. The exciter is the control and status-monitoring interface between the transmitter and the user.

The DSP exciter provides up to 400 milliwatts of RF drive.

A power-reference signal from the PA is fed back to the exciter, via the PA board, to allow control and monitoring of output power. The exciter-supplied control voltage functions as AGC control for the PA.

3.2.4 Video Display Terminal

The VDT, though not part of the transmitter, is required for setup, local control, and local monitoring of the transmitter. The VDT can be any laptop or desktop terminal with a VT-100 type program. The VDT interfaces the transmitter through the connector on the front of the exciter. The VDT software is menu-driven.

3.2.5 Ac Power Supply

Refer to *Figure 3-1*. The switching power supply is mounted below the PA. The power supply is two rack units high. The front panel contains a dc power on indicator.

3.3 Site Signal Flows

3.3.1 Site RF-Signal Flow

The on-frequency carrier is created by the VCO circuitry in the DSP exciter. It is then modulated with paging information, amplified, and sent to the PA via connector J3 on the back of the DSP exciter. Through coaxial cable, the carrier goes to the back of the PA, where it is further amplified to a preset level under control of a microprocessor within the exciter. The amplified carrier is cabled from the PA output to a low-pass filter and a triple

isolator and then to a cabinet-mounted lightning protector/connector for connection to the antenna system. Note that some installations have a ten-MHz reference signal cabled from the transmitter controller to connector J8 on the back of the DSP exciter.

3.3.2 Site Audio/Modulation-Signal Flow

Modulation information arrives at the site either through a link receiver or by wireline. The digital signal is first routed through the transmitter controller, which checks for and responds to appropriate embedded commands. Paging information is supplied to the exciter. The exciter modulates this signal using digital signal processing, then up-converts this modulated signal to final output frequency. This modulated RF from the exciter is supplied to the PA, which amplifies the signal to the RF output level. This modulated, amplified RF from the PA is supplied to an antenna network for transmission.

3.3.3 Simplified Block-Diagram Description

Refer to *Figure 3-2*. The interface between the transmitter and the transmitter controller is the I20 interface. Refer to the exciter manual for details.

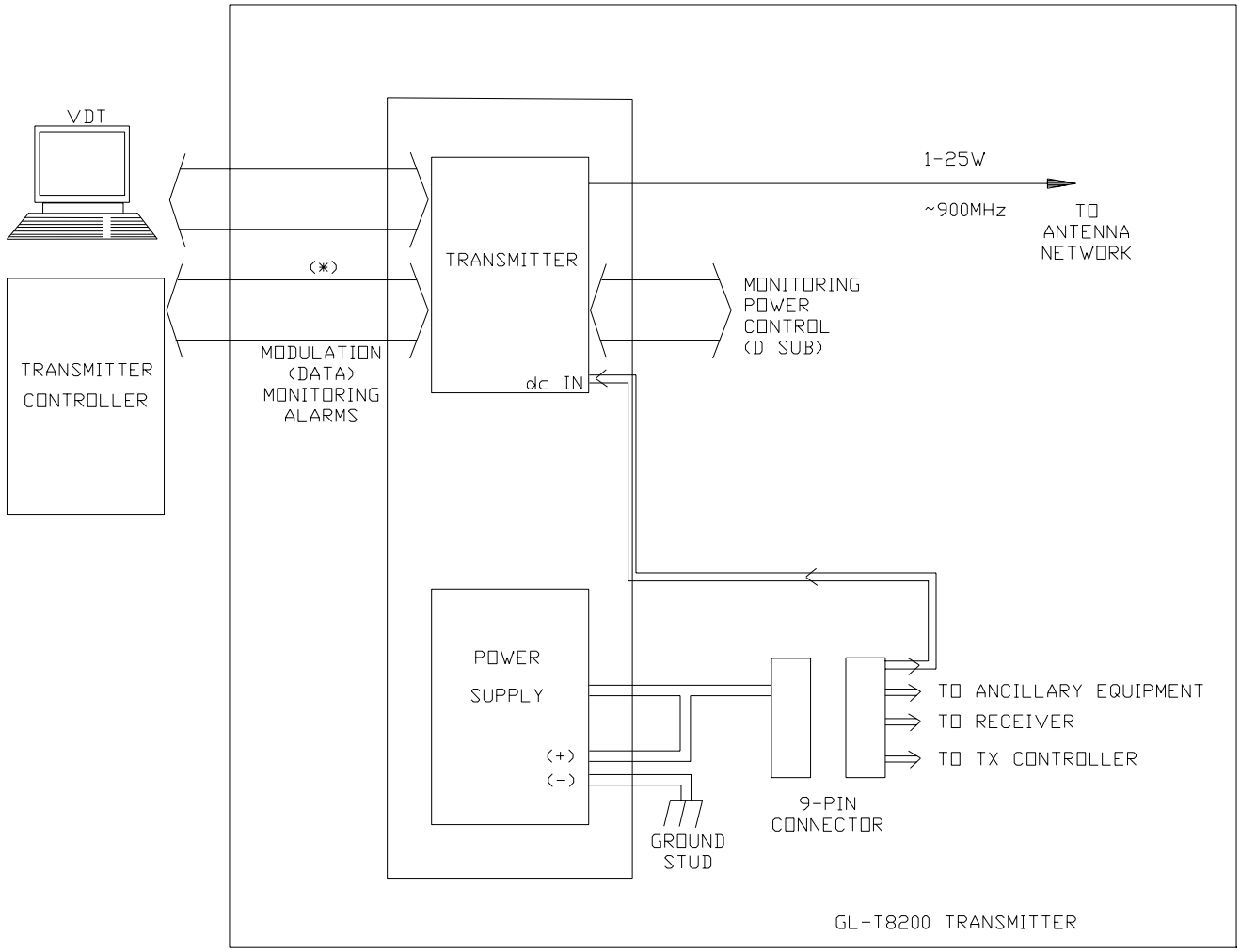

Figure 3-2 Transmitter Simplified Block Diagram

3.3.4 Site Control-Signal Flow

Transmitter paging-site control is done two ways:

- remotely (normally operation), and
- locally.

In either case, the paging transmitter is keyed when the transmitter controller commands it, via the DSP exciter, to key.

Control functions are shared by the transmitter controller and the DSP exciter, which controls the power amplifier. The DSP exciter also controls the power amplifier locally by responding to commands from the VDT.

Control signals enter and exit the paging site via the transmitter controller, which has overall control of the paging site. The transmitter controller is part of the larger paging control system even though it is racked with paging-site equipment. The transmitter controller has control functions which include these:

- transmitter alarm-gathering
- transmitter-alarm dispatching
- simulcast-parameter implementation
- remote control.

Remote control of the paging site is done through commands being sent to the transmitter controller from the external paging control system.

Control commands originating from a remote site are supplied to the exciter through the controlling device. Control and setup commands may be applied to the exciter locally through the VDT. A microprocessor within the exciter interprets each command and responds by performing the appropriate function.

3.3.5 Status-Signal Flow

The exciter monitors transmitter status signal in the form of fault logic and voltage samples. The microprocessor within the exciter reports transmitter status to the controlling device, VDT, and the exciter front panel. If a transmitter malfunction occurs, a reduced operating condition is entered, depending on the seriousness of the fault.

4 INSTALLATION AND SETUP

4.1 Site Checks

8200sys4

4.1.1 Transmitter Environment

The transmitter environment should be clean and well ventilated. Additionally, the temperature inside the transmitter room should be maintained within the equipment specifications. Refer to *Table 4-2*. The lower temperature limit is generally less of a problem due to the heat produced by the equipment during operation, but it can become a problem in the colder months of the year. The upper temperature limit is often a problem, especially in the summer months. In accordance with local building codes and the permission of the building owners, the advice of local heating and air conditioning professionals is recommended prior to installation.

4.1.2 Inspection

Inspect the equipment to be certain that the shipment is complete. Compare items received to the packing list. The packing list shows two portions of the equipment and options specified on the sales order: the portion presently being shipped, and the portion still on back order. It does not report the portion of the sales order that has already been shipped. Report shipping loss or damage to carrier within 15 days of receipt. Remove any packing material from the rack and check each assembly. Pay particular attention to the power amplifier modules and power supply; check them closely and remove any foreign material in the chassis or air cooling passages. Be certain to disconnect primary power from the power supply before removing any equipment covers

4.1.3 Primary Power Requirement

The primary power source must be capable of delivering adequate power to the equipment. Refer to the power supply manual. Electrical connections made to this equipment must be made in accordance with local electrical codes.

- A switching power supply which operates in 115-Vac range and 230-Vac range. Refer to power supply manual for specifications.
- Dc-to-dc converters may be used in some configurations.

The wire used to deliver the primary power must be large enough to safely carry the required current. If the run of wire is too long, a larger size wire must be used to prevent excessive voltage drop.

4.2 Installation

Refer to *Figure 4-1*, for general information.

4.2.1 Tools and Equipment Required

Refer to *Table 4-1*. Equipment listed by brand name may be substituted with equivalent. For installation, only common hand tools are necessary if at all, since installation is usually completed at the factory.

Table 4-1 Required Tools and Equipment

nut driver - 5/16 in (7.9 mm)
screw driver - #2 flat blade and # 3 flat blade
screw driver - #2 Phillips and #3 Phillips
Bird 4421 RF power meter
Bird 8327 dummy load
barrel connector - type-N
cable - 1 M long (max) with type-N ends
Fluke 77 DVM

4.2.2 Rack Positioning

Cooling and cabling restraints require that equipment pieces be racked so that there is adequate ventilation for exhaust air. The front and back of the rack should have at least ten inches of free space. The cabinet should be placed as close as possible to the transmitting antenna, and to the primary power source as a secondary consideration. To gain reasonable access to the back, 30 inches (75 cm) of free space should be allowed..

Caution

Never place the rack where moisture, steam, condensation, or standing water, can come in contact with it. The host room may need to be air conditioned or additionally ventilated to remove excess heat generated by this equipment.

4.2.3 Rack Grounding

The rack cabinet must be connected to a reliable earth ground. Connect the earth ground point to the ground stud provided in the bottom of the cabinet; use four gauge or larger copper conductor.

8200sys4

4.2.4 Positioning within the Rack

When it is used in a normal, one-transmitter-per-cabinet rackup, the transmitter should be placed just above the power supply.

The transmitter is normally shipped already installed in a cabinet. To remove or reinstall the transmitter, refer to Section 9.

DANGER

Rotating fan blades are a hazard to maintenance personnel who access equipment from the rear.

4.2.5 Equipment Cabling

4.2.5.1 Ac and Dc Connections

Refer to *Figure 4-1*. Be certain that the site-environmental requirement for available ac power has been met. A grommeted hole in the cabinet is recommended for ac power input cable. The ac input is fused at the back of the power supply. Generally, all ac connections internal to the rack are made at the factory and should not need to be modified. The high-current positive supply and negative return to the PA are between power-supply DC OUTPUT and the large jacks in the middle of the PA (as viewed from the rear). The PA board has fusing which connects to the transmitter controller, DSP exciter, receiver, or any other equipment.

4.2.5.2 Dc-Only Sites

This option is available. Some installations do not use ac input power. If the transmitter is not racked and wired at the factory, be sure to connect as shown in the documentation supplied with the retrofit option.

4.2.5.3 Signal Connections

Refer to *Figure 4-2*. Generally, all control and signal connections internal to the rack are made at the factory and should not need to be modified.

antenna-receiver — If a receiver is used, refer to the receiver manual for details.

receiver-transmitter controller — A cable runs from the rear of the receiver to the transmitter controller. Refer to the receiver manual and the transmitter controller manual for details. Alternately, a telephone line is connected to the transmitter controller. Some installations may have additional connections to the transmitter controller.

transmitter-controller-exciter — A multiconductor cable runs between the transmitter controller EXCITER connector to exciter J4. If the transmitter's 10-MHz output is used, it goes from transmitter controller 10 MHz OUTPUT to exciter J8.

exciter-PA	A multiconductor cable runs from exciter J6 to PA J6. The RF signal is via a coaxial jumper from exciter J3 to PA RF input (left side of PA).
PA-transmitting antenna	PA RF output connector (point at which rated power is measured) goes to a type-N connector on the cabinet.

4.3 Setup

Refer to the VDT manual and VDT screens for most setup information.

4.4 Ultimate Disposition

Caution

This equipment may contain hazardous materials. Check with the local EPA or other environmental authority before disposing of this equipment.

8200sys4

Figure 4-1 Rear View Showing Dc and Signal Connections

8200sys5

5 OPERATION

5.1 Controls and Indicators

These assemblies within the transmitter have controls and indicators:

- PA/compartment - see PA manual
- exciter - see exciter manual
- power supply-see Paragraph 5.2.1.

5.2 Operation

The transmitter normally operates within the paging system in an unattended manner. A control site remotely commands the transmitter controller, which, in turn, controls the exciter and PA. Local control is not intended for operation, but for setup, checkout, or maintenance. Refer to the appropriate section:

- *Section 7, MAINTENANCE*
- *Section 8, CHECKOUT AND TROUBLESHOOTING*
- *Section 9, REMOVAL AND REINSTALLATION*.

Also refer to the VDT manual.

5.2.1 Turn Transmitter On and Off

The transmitter turns off and on whenever the power supply is energized. When the PA is on, it remains in a standby condition until keyed.

5.2.2 Turn Fans On and Off

The fan does not contain an on/off switch, but turns on and off whenever the primary power equipment is turned on and off. The fan runs continuously whenever primary power is on.

DANGER

Rotating fan blades are a hazard to maintenance personnel who access equipment from the rear.

5.2.3 Key and Unkey PA

The PA does not contain a key switch, but is keyed and unkeyed by the exciter. The exciter must be keyed and unkeyed remotely through transmitter controller or locally through a video display terminal (VDT). Refer to the controller manual for remote key and unkey instructions or to the VDT manual for local key and unkey instructions.

6 THEORY OF OPERATION

6.1 Cabinet Power Distribution

Refer to *Figure 4-2*.

8200sys6

6.1.1 Ac Power Input

Ac power is routed from the ac mains to the power supply, which produces the dc voltage for the cabinet. Refer to the power supply manual. The input voltage and frequency should be within the specifications of the power supply. All electrical wiring should be done in compliance with local electrical codes.

6.1.2 Dc Power Distribution

High current for the power amplifier is routed from the power supply connectors directly to the main dc input on the power amplifier. Operating power for all assemblies is routed to a PA board which is connected to all assemblies in the cabinet which require 28 volts. The PA board has several conductors which route power from the power supply to PA circuits and other equipment within the rack cabinet.

6.2 Cabinet Signal Distribution

Refer to *Figure 4-2*.

6.2.1 Control, Data, and Modulation Paths

The transmitter controller is usually a GL-C2000. It receives information at its link input connector from a receiver, normally mounted within the cabinet, or else receive information from dedicated telephone lines. A connector from the DIGITAL LINK OUTPUT is routed to the exciter, which provides control and modulated RF drive to the PA. RF drive is delivered via a separate coaxial cable.

A reference signal from the exciter determines the nominal output power. Depending on the exciter interface, the level may be remotely adjustable. The REF SAMPLE signal is fed to the exciter, which uses it to control the power via a reference voltage. The reference voltage serves as an AGC input, which adjusts the gain of the power amplifier.

6.2.2 Alarm Reporting

Any alarms generated within the PA are summed to the PA-fault output, which is relayed to the exciter and transmitter controller for system response and alarm reporting.

7 MAINTENANCE

7.1 Introduction

8200sys7

Maintenance procedures in this section are listed below.

- PA-current check
- dc ripple check

7.2 Maintenance Procedures

7.2.1 PA Current Check

Occasionally, the power amplifier device currents should be compared to the levels listed on the data sheet that accompanied the transmitter. Be sure that the operating RF output is the same as listed on the data sheet. Also refer to the PA manual.

1. Put transmitter in local mode.
2. Key transmitter.
3. Monitor power amplifier currents on VDT.
4. Make comparison between data sheet and monitor.

Monitored currents should not vary more than ten percent from data sheet levels. An exception is when original components or modules have been replaced or modified; in this case, a new benchmark should be noted for future reference.

7.2.2 Dc Ripple Check

This procedure assumes that an ac power supply is part of the configuration. Occasionally the ac supply should be checked for excessive ripple. The supply should be under normal operating load for this procedure.

1. Put transmitter in local mode.
2. Key transmitter.
3. Connect oscilloscope between ground and supply output.
4. Set oscilloscope to read ripple.

The observed ripple level should be less than the specification given in the power supply manual.

8 CHECKOUT AND TROUBLESHOOTING

Checkout procedures can be performed at any time to verify that the transmitter and related paging site equipment is functioning properly. After the checkout procedures are successfully completed, the site can be returned to normal service. Refer to the VDT user manual and the VDT menus for more details on checkout procedures.

8200sys8

8.1 Preparation for Checkout Procedures

8.1.1 Dc-Voltage Verification

Once powered, verify that equipment is powered and refer to list below.

1. On power supply, PWR ON indicator is on.
2. On G/L exciter front panel, DC POWER indicator is on.
3. On the transmitter controller, the POWER indicator is on.
4. On receiver (if used), the POWER indicator is on.

8.1.2 VDT Power-up Verification

Verify that the VDT is powered and correctly attached to the exciter; continue with the checklist below.

- The VDT should have a cursor displayed and blinking; or,
- the VDT should have an instructional prompt displayed; or,
- the VDT should have an auto-loaded program running.

8.1.3 Cooling-Fan Check

Once the transmitter is powered, verify that the fan is operating; it should operate whenever the transmitter is powered.

8.2 Operational Verification

The following procedures use the VDT and its various menus to control the transmitter locally. Be certain to disable remote operation of the transmitter before performing local tests in order to avoid unintentional keying of the equipment.

8.2.1 RF Power and Antenna

Check the transmitter's RF output and the antenna's reflected power with the RF-output procedure.

RF Output and Antenna Checks

1. Using coax jumper no longer than 1 meter, attach calibrated thruline wattmeter between antenna network and cabinet RF output connector.
2. Key transmitter and measure output power; it should be within ten percent of expected output. Note that the expected output must take into account the attenuation of the coaxial cable and connectors after the isolator output. Expected attenuation is typically 0.5 to 2 dB. The transmitter power specification is for output from the PA output connector, not the transmitter cabinet. Adjust power output, if necessary.
3. If RF output is low or none, check exciter drive with thruline wattmeter and VDT; nominal output is 20 mW.
4. Measure reflected power on meter (Also compare with VDT indication.) and calculate VSWR. VSWR should be less that 1.2.
5. Using VDT, read and record PA currents.
6. Unkey transmitter.
7. Remove dummy load.
8. Key transmitter. Transmitter shuts down immediately, indicating that transmitter has detected excessive VSWR and has cut off RF output. A high-VSWR fault is recorded on VDT.
9. Unkey transmitter.
10. Reconfigure transmitter system normally. Verify that the PA currents correspond to full-power values obtained in step 5.

This procedure is complete.

8.2.2 Paging

Pager function should be checked after the RF output has been verified. Determine that the transmitter system sets off local pagers. Check pagers in all formats used by the system.

Use the normal pager-activation procedure to attempt to set off pagers. Check that pagers are activated as expected and are not falsely activated. Note that some pagers may be activated in a delayed manner if the system is busy or if the paging system batches paging types so that pages of the same format go out together, rather than being dispatched in the order in which the control site receives them.

Once pager activation has been verified, the station may be placed into service.

8.3 Field Replacement of Assemblies

Section 9 contains replacement procedures for rack assemblies which fail checkout. Refer to the individual equipment manuals for more detailed replacement procedures.

9 REMOVAL AND REINSTALLATION

The following paragraphs discuss removing and reinstalling the various assemblies which make up the transmitter. Refer to the individual equipment manuals for information on subassemblies which may be replaced in the field.

8200sys9

DANGER

Remove all input power to the cabinet before performing a removal or reinstallation procedure.

Note

The user may choose to remove the PA and exciter before removing the transmitter chassis in order to lighten the chassis for handling.

9.1 Power Supply

Refer to the power supply manual for removal and reinstallation of the power supply.

9.2 Exciter Removal and Reinstallation

Also refer to the exciter manual. The local reference oscillator, if used, can be adjusted while the unit is mounted in the rack.

Removal

1. From rear of transmitter chassis, label and remove signal connectors on rear of exciter. Note that some DB-style connectors require loosening screws which hole the mating receptacles in contact with one another.
2. Remove red (+) and black (-) wire from the exciter by loosening retaining screws. Tape exposed end of red wire so that it does not inadvertently come in contact with chassis.
3. Unfasten BNC RF output plug on right side of chassis.
4. Label and remove any other connections to exciter.
5. On chassis front, turn screw fasteners ccw to loosen; pull exciter chassis forward and out of transmitter chassis.

This procedure is complete.

Reinstallation

When replacing the exciter, be certain that all variable subassemblies in the replacement exciter are correct for system requirements. Subassemblies and settings which must be matched include those included in the list below.

- VCO/RF amplifier (must be for the correct frequency band)
- firmware chips (must be of the correct revision and type)
- controller interface (must be of the proper type and revision for interfacing with the transmitter controller)
- power level (approximately 10-20 mW).

Refer to the exciter manual for additional information.

1. Slide replacement exciter into top location of transmitter chassis.
2. Refasten front-panel screw fasteners.
3. Reattach and resecure connectors removed during removal process.

This procedure is complete. Refer to the exciter manual and VDT manual to check out and realign replacement exciter.

9.3 PA Removal and Reinstallation

Refer to the PA manual.