GAI-TRONICS® CORPORATION
A HUBBELL COMPANY

Model 69320-101
Voice Network Adapter

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General Information

The Model 69320-101 Voice Network Adapter (VNA) allows voice communication between interconnected SmartSeries systems. It is installed in a 10457 Series Card Rack (Card Rack) and is controlled by a 69254 Series or 69440 Series Master Control Unit (MCU) installed in that same card rack. The VNA is designed exclusively for use in a SmartSeries system, and is not intended for use with other types of equipment.

Description of Major Components

Front Panel LEDs

The following table describes the LEDs mounted on the VNA's front panel:

LED	Status	Description
ON LINE (green)	On	The MCU is running and is configured to recognize the VNA.
	Off	The VNA is not receiving power from the card rack or the MCU is not properly configured to recognize the VNA.
VNA FLT (red)	On	The MCU has lost communication with the VNA. The MCU and the VNA continuously update handshaking information. If the VNA is not updating that information as the MCU expects, then the MCU turns on this LED.
	Off	The "On" condition is not occurring.

LED	Status	Description
MCU FLT (red)	On	The VNA has lost communication with the MCU. The MCU and the VNA continuously update handshaking information. If the MCU is not updating that information as the VNA expects, then the VNA turns on this LED. This LED may be On during maintenance of the MCU.
	Off	The "On" condition is not occurring.
RAI/RYEL (yellow)	On	The VNA is receiving the T1 Yellow Alarm (Remote Alarm Indication), and is not transmitting the T1 Yellow Alarm.
	Flashing 90% On	The VNA both is receiving and is transmitting the T1 Yellow Alarm. The frequency of flashing is approximately one Hertz.
	Flashing 50% On	The VNA is transmitting the T1 Yellow Alarm, and is not receiving the T1 Yellow Alarm. The frequency of flashing is approximately one Hertz.
	Flashing 10% On	The T1 transceiver on the VNA is not initialized. The frequency of flashing is approximately one Hertz.
	Off	All of the above four conditions are not occurring.
AIS/RBL (blue)	On	The VNA is receiving the T1 Blue Alarm (Alarm Indication Signal), and is not transmitting the T1 Blue Alarm.
	Flashing 90% On	The VNA both is receiving and is transmitting the T1 Blue Alarm. The frequency of flashing is approximately one Hertz.
	Flashing 50% On	The VNA is transmitting the T1 Blue Alarm, and is not receiving the T1 Blue Alarm. The frequency of flashing is approximately one Hertz.
	Flashing 10% On	The T1 transceiver on the VNA is not initialized. The frequency of flashing is approximately one Hertz.
	Off	All of the above four conditions are not occurring.
LOF/RLOS (red)	On	The VNA is not synchronized with the received T1 signal (Loss of Frame or Receive Loss of Synchronization), and does not detect a short on its T1 transmit line.
	Flashing 90% On	The VNA both is not synchronized with the received T1 signal and detects a short on its T1 transmit line. The frequency of flashing is approximately one Hertz.
	Flashing 50% On	The VNA detects a short on its T1 transmit line, and is synchronized with the received T1 signal. The frequency of flashing is approximately one Hertz.
	Flashing 10% On	The T1 transceiver on the VNA is not initialized. The frequency of flashing is approximately one Hertz.
	Off	All of the above four conditions are not occurring.

LED	Status	Description
LOS/RCL (red)	On	The VNA is not receiving a T1 signal (Loss of Signal or Receive Carrier Loss), and does not detect an open on its T1 transmit line.
	Flashing 90% On	The VNA both is not receiving a T1 signal and detects an open on its T1 transmit line. The frequency of flashing is approximately one Hertz.
	Flashing 50% On	The VNA detects an open on its T1 transmit line, and is receiving a T1 signal. The frequency of flashing is approximately one Hertz.
	Flashing 10% On	The T1 transceiver on the VNA is not initialized. The frequency of flashing is approximately one Hertz.
	Off	All of the above four conditions are not occurring.

Connections to the Field Wiring Terminal Blocks

69320-101 Voice Network Adapter Connections to the Field Wiring

Connections to the field are made via the upper DB25 connector on the rear of the 10457 Series Card Rack assembly. This connector can be utilized by a direct connection of a DB25 cable to the field equipment, a DB25 cable to a DIN rail-mounted terminal block adapter, or with the use of a DB25-to-RJ45 connector adapter. The pinout definition for the DB25 connection is shown is the table below.

Upper DB25 Connector	
Pin	**Signal**
1	Tx (ring)
2	Tx (tip)
5	Rx (ring)
6	Rx (tip)

Included with the VNA are two DB25-to-RJ45 connector adapters. The 21246-014 Connector Adapter brings the transmit pair to the RJ45 pins 1 and 2 and the receive pair to pins 4 and 5. The 21246-008 Connector Adapter brings the transmit pair to the RJ45 pins 4 and 5 and the receive pair to pins 1 and 2. These adapters permit the use of non-crossover Ethernet cables for the connections to field equipment utilizing these same pins on an RJ45 connector.

Cabling to the field equipment should be a twisted pair design.

Switch and Jumper Settings

Overview

Several switch and jumper settings are required for proper operation of the VNA Card. The following settings are set during the system commissioning and programming and should not be changed. If replacing an existing 69266-001 T1 card or VNA card for maintenance purposes, be sure to replicate the switch and jumper setting of the card being replaced. Refer to Figure 1 for the switch and jumper locations.

Front Panel DIP Switch (SW5) Settings

NOTE: The front panel DIP switches (SW5) can be updated without powering down the card rack and without resetting the MCU.

Position	Number	Name
Top	1	Line Build 0 (LB0)
	2	Line Build 1 (LB1)
	3	Line Build 2 (LB2)
	4	Receive Equalizer Gain Limit
	5	Lamp Test
	6	Customer Disconnect Enable
	7	Local Loop Back
Bottom	8	Remote Loop Back

The Line Build # switches control the "line build" (signal's amplitude) of the T1 transmit line. Set the Line Build # switches according to the following table:

LB0	LB1	LB2	T1 Line Length
Open	Open	Open	DSX-1 (0 to 133 feet) / 0 dB CSU
Open	Open	Closed	DSX-1 (133 to 266 feet)
Open	Closed	Open	DSX-1 (266 to 399 feet)
Open	Closed	Closed	DSX-1 (399 to 533 feet)
Closed	Open	Open	DSX-1 (533 to 655+ feet)
Closed	Open	Closed	-7.5 dB CSU
Closed	Closed	Open	-15 dB CSU
Closed	Closed	Closed	-22.5 dB CSU

The Receive Equalizer Gain Limit switch controls the similarly named feature of the T1 transceiver. Set the Receive Equalizer Gain Limit switch according to the following table:

Open	-36 dB (long haul)
Closed	-15 dB (limited long haul)

The Lamp Test switch turns on all LEDs on the VNA's front panel. It is used during production of the VNA. The Lamp Test switch will not function when the VNA detects the MCU (MCU FLT LED is Off). Set the Lamp Test switch according to the following table:

Open	All front panel LEDs function normally.
Close	All front panel LEDs are ON

The Customer Disconnect function presents a well-behaved signal on the T1 line. This signal is sometimes useful during troubleshooting and verification. Set the Customer Disconnect Enable switch according to the following table:

Open	The T1 transceiver is operating normally.
Closed	The Customer Disconnect signal is being transmitted on the T1 line. This setting disrupts the T1 signal and the MCU reports a T1 line fault.

The Local Loop Back feature sometimes is used during troubleshooting. Set the Local Loop Back switch according to the following table:

Open	The T1 transceiver is operating normally.
Closed	The "Framer Loopback" feature of the T1 transceiver is enabled. The T1 transceiver transmits the Blue Alarm on the T1 transmit line during this condition. This setting disrupts the T1 signal and the MCU reports a T1 line fault. This setting causes the VNA to receive the T1 signal it normally would transmit, while actually transmitting the Blue Alarm.

The Remote Loop Back feature sometimes is used during troubleshooting. Set the Remote Loop Back switch according to the following table:

Open	The T1 transceiver is operating normally.
Closed	The "Remote Loopback" feature of the T1 transceiver is enabled. This setting disrupts the T1 signal and the MCU reports a T1 line fault. This setting causes the VNA to transmit its received T1 signal. The T1 standards mention two types of loopbacks: "line" and "payload"; this loopback is a "line" loopback.

First Internal DIP Switch (SW4) Settings

NOTE: First internal DIP switch (SW4) changes only take effect after powering down the card rack; resetting the MCU is insufficient.

Position	Number	Name
Left	1	ST-Bus Clock Master
	2	T1 Clock Master
	3	T1 Synchronous
	4	E1 Select
	5	Sampling Rate Select
	6	Reserved
	7	Reserved
Right	8	Reserved

Set the ST-Bus Clock Master switch according to the following table:

Open	The VNA generates the Card Rack's backplane ST-Bus clock signals. The VNA is the ST-Bus Clock Master.
Closed	The VNA receives the Card Rack's backplane ST-Bus clock signals. The VNA is a ST-Bus Clock Slave.

Set the T1 Clock Master switch according to the following table:

Open	The VNA uses its received T1 signal's timing to generate its transmitted T1 signal's timing. The VNA is a T1 Clock Slave.
Closed	The VNA uses the Card Rack's backplane ST-Bus clock signals to generate its transmitted T1 signal's timing. The VNA is the T1 Clock Master.

Set the T1 Synchronous switch according to the following table:

Open	The VNA is frequency locked to the received T1 signal. This setting is ignored if the VNA is both a ST-Bus Clock Slave and a T1 Clock Slave.
Closed	The VNA is not frequency locked to the received T1 signal. "Elastic store" buffers in the T1 transceiver integrated circuit either duplicate or drop a frame as needed.

Set the E1 Select switch according to the following table:

Open	The VNA uses T1 signaling.
Closed	The VNA uses E1 signaling. **NOTE:** Upon initial release of the VNA, this feature does not function properly.

The Sample Rate Select switch configures the VNA's codec's sampling rate. The VNA's codec can run at either 8,000 samples per second (8 kHz), or 16,000 samples per second (16 kHz). The VNA accepts and generates 69266-001 T1 Interface wide bandwidth page audio regardless of the setting of this switch. Set the Sampling Rate Select switch according to the following table:

Open	The VNA's codec uses 8 kHz sampling. Always use this setting if wide bandwidth paging is disabled. This setting is recommended.
Closed	The VNA's codec uses 16 kHz sampling.

Set the Reserved switches according to the following table:

Open	Use this setting to help insure future compatibility.
Closed	Do not use this setting. Using this setting may increase the risk of unexpected behavior when upgrading the VNA.

Second Internal DIP Switch (SW1) Settings

SW1 is unused. Leave all switches open to aid in future compatibility.

Rotary Switch and Jumper Settings

The 2xx/3xx Address (P2) shorting clip selects part of the base input/output address used by the MCU when accessing the VNA.

The Board Address (SW3) rotary switch selects part of the base input/output port address used by the MCU when accessing the VNA.

The Board Identification (SW2) rotary switch lets the MCU distinguish between multiple VNAs installed in the same card rack.
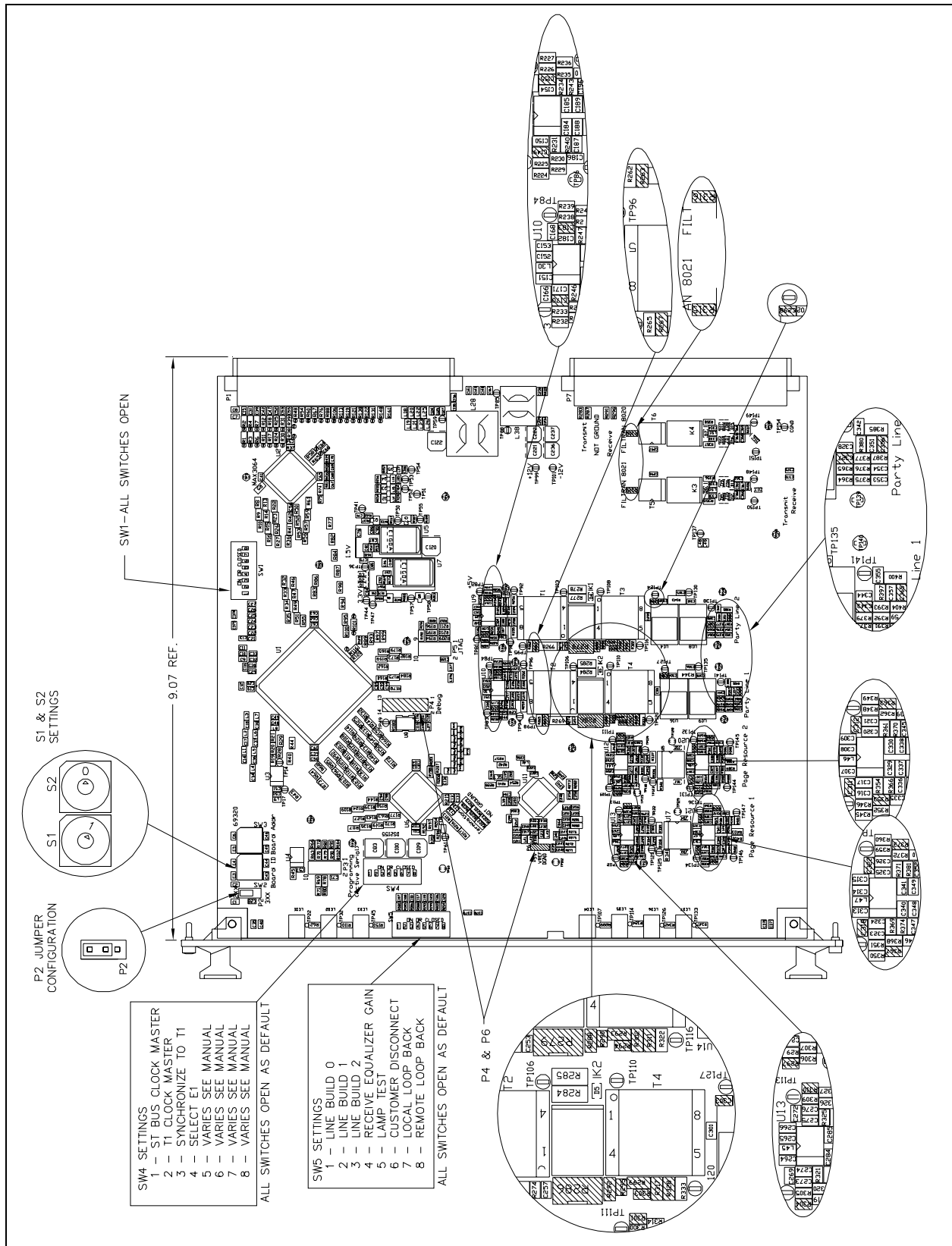
Figure 1. Model 69320-101 Voice Network Adapter Board Layout Diagram

Changing to a 69320-101 VNA from a 69266-001 T1 Interface

NOTES:

1. The 69320-101 VNA is not electrically compatible with its predecessors. If further information on the differences is needed, please contact the GAI-Tronics Field Service Department at 800-492-1212.

2. When upgrading to a 69320-101 VNA, the following four upgrades are required:

    *   Any 69266-001 or 69320-001 VNAs must be upgraded to the 69320-101 VNA.

    *   Any 69257-003, 69257-002, or 69257-001 APIs must be upgraded to the 69257-101 API.

    *   Any 69510-001, 69215-003, 69215-002, or 69215-001 backplane termination boards must be upgraded to the 69510-101 Termination board. Two of these boards are required per card rack.

    *   The upgraded cards must be installed in the proper backplane slot. This task involves moving the card and the associated ribbon cable at the rear of the card rack assembly.

The 69266-001 T1 Interface uses a different switch and jumper collection than the VNA. The following text states how to convert the T1 Interface switch and jumper setting to the VNA switch and jumper settings.

The 2xx/3xx Address (P2) shorting clip should be set to the 2xx position if the shorting clip on J1 of the T1 Interface is closer to the back of the T1 Interface. Otherwise, set to the 3xx position when the shorting clip on J1 of the T1 Interface is closer to the front of the T1 Interface.
NOTE: The silkscreen for J1 on the T1 interface should be blacked out; if not blacked out, then that silkscreen shows the 2xx / 3xx position reversed from the actual meaning of J1.

The Board Address (SW3) rotary switch on the VNA should match the Board Address rotary switch on the T1 Interface.

The Board Identification (SW2) rotary switch on the VNA should match the Board Identification rotary switch on the T1 Interface.

First internal DIP switch #1 (SW4) (ST-Bus Clock Master) should be set to CLOSED if J3 of the T1 Interface is set to ING (ignore – shorting clip towards front). Otherwise, set to OPEN when J3 of the T1 Interface is set to GEN (generate – shorting clip towards back).

First internal DIP switch #2 (SW4) (T1 Clock Master) should be set to CLOSED if J4 of the T1 Interface is set to GEN (generate – shorting clip towards front). Otherwise, set to OPEN when J4 of the T1 Interface is set to REC (receive – shorting clip towards back).

First internal DIP switch #3 (SW4) (T1 Synchronous) should be set to OPEN.

First internal DIP switch #4 (SW4) (E1 Select) should be set to OPEN.

First internal DIP switch #5 (SW4) (Sampling Rate Select) should be set to OPEN.

First internal DIP switch #6 (SW4) through #8 (Reserved) should be set to OPEN.

For front panel DIP switch #1 (SW5) (Line Build 0), front panel DIP switch #2 (Line Build 1), and front panel DIP switch #3 (Line Build 2) select the closest matching distance from the following two tables. If the S3 T1 Interface switch settings are not listed in the table, then select all OPEN for the VNA Line Build switches.

S3 (XMIT EQUALIZATION) on T1 Interface

	0'	75'	150'	225'	300'	375'	450'	525'	600'	675'	750'	825'+
S3-1	-	-	-	X	X	X	-	-	-	X	X	X
S3-2	-	-	-	-	-	-	X	X	X	X	X	X
S3-3	-	-	-	X	X	X	-	-	-	X	X	X
S3-4	-	-	-	-	-	-	X	X	X	X	X	X
S3-5	X	-	-	X	-	-	X	-	-	X	-	-
S3-6	-	X	-	-	X	-	-	X	-	-	X	-
S3-7	-	-	X	-	-	X	-	-	X	-	-	X
S3-8	-	-	-	-	-	-	-	-	-	-	-	-

"**X**" means closed; "-" means open.

Line Build on VNA

Build 0	Build 1	Build 2	Distance
Open	Open	Open	DSX-1 (0 to 133 feet) / 0 dB CSU
Open	Open	Closed	DSX-1 (133 to 266 feet)
Open	Closed	Open	DSX-1 (266 to 399 feet)
Open	Closed	Closed	DSX-1 (399 to 533 feet)
Closed	Open	Open	DSX-1 (533 to 655+ feet)
Closed	Open	Closed	-7.5 dB CSU
Closed	Closed	Open	-15 dB CSU
Closed	Closed	Closed	-22.5 dB CSU

Front panel DIP switch #4 (SW5) (Receive Equalizer Gain Limit) should be set to OPEN.

Front panel DIP switch #5 (SW5) (Lamp Test) should be set to OPEN.

Front panel DIP switch #6 (SW5) (Customer Disconnect Enable) should be set to OPEN.

Front panel DIP switch #7 (SW5) (Local Loop Back) should be set to OPEN.

Front panel DIP switch #8 (SW5) (Remote Loop Back) should be set to OPEN.

Operation

After installation, the Model 69320-101 Voice Network Adapter (VNA) should start automatically. The VNA requires no direct user intervention during normal operations.

Installation and Maintenance

Direct questions about installation of this product to the GAI-Tronics Field Service Department at 800-492-1212 inside the USA or 610-777-1374 outside the USA.

Installation Guidelines

⚠WARNING⚠ **Disconnect power to the card rack before performing any maintenance.**

Warning: Observe precautions for handling electrostatic sensitive devices.

Installation Instructions

1. Remove the VNA from its protective carton.

2. Verify that power is disconnected to the card rack prior to installation.

3. Verify that the switch and jumper settings described in the Switch and Jumper Settings section on page 4 are set in accordance with the instructions in your system manual.

4. Align the VNA into the upper and lower tracks for the card rack slot.

5. Slide the VNA toward the rear of the card rack until it comes in contact with the connector on the backplane.

6. Firmly press on the front bezel until the VNA is seated in the backplane connector, and tighten the two screws located on the front bezel to secure it to the card rack.

Removing the VNA Card from the Card Rack

1. Remove power from the card rack.

2. Remove the two screws on the front bezel that secures the VNA to the card rack.

3. Gently disengage the VNA from the connector on the backplane and slide the VNA out of the card rack.

Frequently Asked Questions

Q: Is the 69320-101 VNA compatible with the public switched telephone network?

A: No.

Q: When does the 69320-101 VNA generate at T1 Yellow Alarm?

A: Never.

Q: When does the 69320-101 VNA generate a T1 Blue Alarm?

A: Never.

Q: What is the T1 Red Alarm?

A: The T1 Red Alarm is the Loss of Signal (LOS) or Receive Carrier Loss (RCL) condition.

Q: Why do the LEDs have two labels?

A: One label is the newer vernacular; the other is the older vernacular.

Q: Why does the front panel "Lamp Test" switch not function while the VNA detects the MCU is running (the MCU FLT LED is off)?

A: That behavior is by design. That design choice helps prevent the diagnostic function of the front panel LEDs from being defeated while the system is in use.

Q: What feature does setting all front panel DIP switches to closed enable?

A: Doing so enables all four relays on the VNA, lights all LEDs on the VNA, and routes a 2.0000 kHz tone (assuming a different signal has not been loaded after power up) to all backplane audio lines and backplane ST-Bus data lines. This feature is used to approximate the maximum power consumption and electromagnetic emissions of the VNA. This feature interferes with normal system operations, and is disabled while the VNA detects the MCU is running.

Q: Is the 69320-101 VNA capable of generating E1 timing instead of T1 timing.

A: No.

Specifications

Electrical

Board

Power .... 950 mA maximum @ +5 V dc ± 5%

125 mA maximum @ +12 V dc ± 10%

125 mA maximum @ -12 V dc ± 10%

T1 Parameters

NOTE: the 69320-101 VNA is not compatible with the public switched telephone network.

Encoding .... (Bipolar with 8 Zero Substitution) B8ZS

Framing .... (Extended Superframe) ESF

T1 Cabling

Type .... Twisted pair (i.e., CAT.5 ethernet)

Cable characteristic impedance .... 100 ohms nominal

Maximum cable length .... 6,000 feet

Digital Audio - Party Line or Narrow Bandwidth Paging

Encoding .... μ-Law per CCITT Recommendation G.711

Sampling rate .... 8 kHz ± 32 ppm

Digital Audio - Wide Bandwidth Paging

Encoding .... ADPCM 32 kbps, μ-Law per CCITT Recommendation G.726

Sampling rate encoding .... 8 kHz up sampled to 16 kHz ± 32 ppm

Sampling rate decoding .... 16 kHz down sampled to 8 kHz ± 32 ppm

Card Rack Page Audio from one VNA to another VNA in a different Card Rack – Narrow Bandwidth

Frequency response .... 250 Hz to 3.5 kHz ± 0.5 dB

Distortion .... THD <2.0% @ 1,020 Hz sine wave, -10 dB ref. 1.5 Vrms

Card Rack Page Audio from one VNA to another VNA in a different Card Rack – Wide Bandwidth

Frequency response .... 250 Hz to 3.5 kHz ± 0.5 dB

Distortion .... THD <2.0% @ 1,020 Hz sine wave, -10 dB ref. 1.5 Vrms

Card Rack Party Audio from one VNA to another VNA in a different Card Rack

Frequency response .... 250 Hz to 3.5 kHz ± 0.5 dB

Distortion .... THD <2.0% @ 1,020 Hz sine wave, -10 dB ref. 1.5 Vrms

Environmental

Temperature range (operating/storage).. +32 °F to +122 °F (0 °C to +50 °C)

Relative humidity: .... 10% - 85% non-condensing

Mechanical

Unit dimensions .... 10.3 H × 0.780 W × 9.07 D inches (262 × 19.9 × 231 mm)

Unit weight .... 0.86 lbs. nominal (0.39 kg)

Approval

CE Mark .... Complies with Low Voltage Directive 73/23/EEC, and the
EMC Directive 89/336/EEC amended by the Directive 93/68/EEC.

Replacement Parts

The 69320-101 VNA has no field replaceable components.

Warranty

Equipment. GAI-Tronics warrants for a period of one (1) year from the date of shipment, that any GAI-Tronics equipment supplied hereunder shall be free of defects in material and workmanship, shall comply with the then-current product specifications and product literature, and if applicable, shall be fit for the purpose specified in the agreed-upon quotation or proposal document. If (a) Seller's goods prove to be defective in workmanship and/or material under normal and proper usage, or unfit for the purpose specified and agreed upon, and (b) Buyer's claim is made within the warranty period set forth above, Buyer may return such goods to GAI-Tronics' nearest depot repair facility, freight prepaid, at which time they will be repaired or replaced, at Seller's option, without charge to Buyer. Repair or replacement shall be Buyer's sole and exclusive remedy. The warranty period on any repaired or replacement equipment shall be the greater of the ninety (90) day repair warranty or one (1) year from the date the original equipment was shipped. In no event shall GAI-Tronics warranty obligations with respect to equipment exceed 100% of the total cost of the equipment supplied hereunder. Buyer may also be entitled to the manufacturer's warranty on any third-party goods supplied by GAI-Tronics hereunder. The applicability of any such third-party warranty will be determined by GAI-Tronics.

Services. Any services GAI-Tronics provides hereunder, whether directly or through subcontractors, shall be performed in accordance with the standard of care with which such services are normally provided in the industry. If the services fail to meet the applicable industry standard, GAI-Tronics will re-perform such services at no cost to buyer to correct said deficiency to Company's satisfaction provided any and all issues are identified prior to the demobilization of the Contractor's personnel from the work site. Re-performance of services shall be Buyer's sole and exclusive remedy, and in no event shall GAI-Tronics warranty obligations with respect to services exceed 100% of the total cost of the services provided hereunder.

Warranty Periods. Every claim by Buyer alleging a defect in the goods and/or services provided hereunder shall be deemed waived unless such claim is made in writing within the applicable warranty periods as set forth above. Provided, however, that if the defect complained of is latent and not discoverable within the above warranty periods, every claim arising on account of such latent defect shall be deemed waived unless it is made in writing within a reasonable time after such latent defect is or should have been discovered by Buyer.

Limitations / Exclusions. The warranties herein shall not apply to, and GAI-Tronics shall not be responsible for, any damage to the goods or failure of the services supplied hereunder, to the extent caused by Buyer's neglect, failure to follow operational and maintenance procedures provided with the equipment, or the use of technicians not specifically authorized by GAI-Tronics to maintain or service the equipment. THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES AND REMEDIES, WHETHER EXPRESS OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Return Policy

If the equipment requires service, contact your Regional Service Center for a return authorization number (RA#). Equipment should be shipped prepaid to GAI-Tronics with a return authorization number and a purchase order number. If the equipment is under warranty, repairs or a replacement will be made in accordance with the warranty policy set forth above. Please include a written explanation of all defects to assist our technicians in their troubleshooting efforts.

Call 800-492-1212 (inside the USA) or 610-777-1374 (outside the USA) for help identifying the Regional Service Center closest to you.