

9294 2Wire Conference Amplifier

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1. description and application

1.01 The Tellabs 9294 2Wire Conference Amplifier module (figure 1) is designed specifically for use in the Tellabs 292R Conference/Alerting System. *The 292R System is a 2wire multistation ring-down conference system designed for emergency reporting and business conference applications. The System provides simultaneous conference access to up to 60 local stations either from a dedicated master telephone or from any local telephone via a listed directory number.* In the 292R System, the 9294 serves as a summing amplifier for receive signals and also provides the audio references and audio grounds to the System's audio circuits.

1.02 This practice section is revised to provide an updated *audio reference voltage* specification in section 5. Modules that meet this specification can be identified by a "rev. J" or later label on their front panels.

1.03 The 9294 module sums the speech signals that it receives from up to 65 lines (60 local stations plus 5 remote-access and/or remote-origination stations) via the 292R System's conference bus. The module then amplifies the sum and distributes it to all the conference station's transmit lines (up to 65) via the conference bus. Amplification of the sum is necessary to offset the attenuation introduced by the station modules.

1.04 A front-panel 310-type jack allows a test signal to be placed on the conference bus for transmission to all conference lines. This signal is used for initial alignment of all 9291 2Wire ARD Conference Terminate Line Circuit Modules in the 292R System.

1.05 The 9294 module generates audio ground and reference supply signals for all modules connected to the 292R System's conference bus. In this manner, the audio circuits and the switching circuits within the 292R System each have separate grounds and reference supplies. This arrangement reduces the amount of switching noise coupled to the audio circuits.

1.06 The 9294 is designed to respond to a summed transmit level greater than a preset level (approximately +6dBm) by removing the reference supply from all audio circuits in the 292R System. This arrangement quiets the conference bus and protects the System from oscillation. When the summed

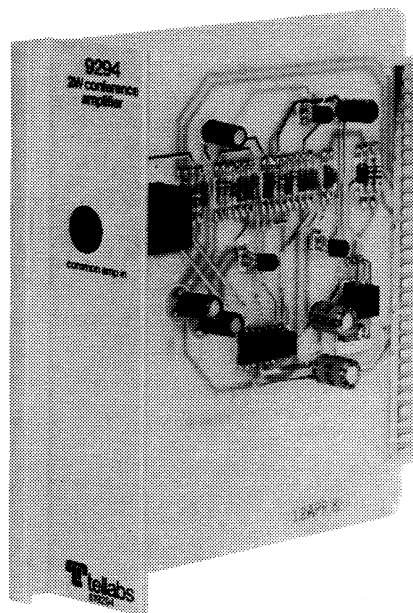


figure 1. 9294 2Wire Conference Amplifier module

transmit level drops below the preset level, the reference supply is restored to once again provide a normal audio reference level on the conference bus.

1.07 The 9294 operates on filtered, positive-ground-referenced -42 to -56 Vdc input. Current requirements range from 15mA at idle to a maximum of 30mA when busy.

1.08 A Type 10 module, the 9294 normally mounts in position 6 of the 292R System's pre-wired, connectorized common equipment shelf. The 9294 can also be mounted in one position of a standard Tellabs Type 10 Mounting Shelf, versions of which are available for relay-rack and apparatus-case installation. In relay-rack applications, up to 12 modules can be mounted across a 19-inch rack, while up to 14 modules can be mounted across a 23-inch rack. In either case, 6 inches of vertical rack space is used.

2. installation inspection

2.01 The 9294 2Wire Conference Amplifier module should be visually inspected upon arrival to find possible damage incurred during shipment. If damage is noted, a claim should immediately be filed with the carrier. If stored, the module should be visually inspected again prior to installation.

mounting

2.02 The 9294 module mounts in position 6 of the 292R System's common equipment shelf. The module plugs physically and electrically into a 56-pin connector at the rear of the shelf.

installer connections

2.03 Before making any connections to the mounting shelf, make sure that power is off and modules are removed. Modules should be put into place only after they are properly optioned and after wiring is completed.

2.04 When the 9294 module is supplied as part of the 292R System, all intermodule wiring is factory-wired and external wiring is simplified through the use of connectorized cables. Refer to the 292R System Installation Practice, section 81292R-2, for System wiring information. Table 1 lists external connections to the 9294 module for reference purposes only.

connect:	to pin:
C.A. OUT (output from common amplifier)	37
C.A. IN (input to common amplifier)	39
AUDIO REF. (reference to audio circuits)	19
—BATT (—42 to —56Vdc filtered, positive-ground-referenced input)	35
GND (ground)	17
AUDIO GROUNDS (audio grounds to line circuits)	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 15, 21, 22, 23, 25, 27, 28, 29, 30, 31, 33, 41, 42, 43, 45, 47, 49, 50, 51, 52, 53, 54, 55, 56

table 1. External connections to 9294

options and alignment

2.05 The 9294 module has no option switches and requires no alignment. However, the front-panel *common amp in* jack is used to inject a standard test signal into the 292R Conference/Alerting System for System alignment. Refer to the 292R System Installation Practice, section 81292R-2, for the System alignment procedure.

3. circuit description

3.01 This circuit description is intended to familiarize you with the 9294 2Wire Conference Amplifier module for engineering and application purposes only. Attempts to troubleshoot the 9294 module internally are not recommended. Procedures for recommended troubleshooting in the field are limited to those prescribed in section 6 of this Practice. Reference to the 9294 block diagram, section 4 of this Practice, will aid in following the circuit description.

3.02 The 9294 module contains a summing amplifier (*op amp*) that adds the speech signals from all conference stations connected to the conference bus of the 292R System. This sum is amplified and then distributed to all conference stations.

3.03 The 9294 module's front-panel *common amp in* jack is used to insert a standard test signal for initial 292R System alignment. This signal is distributed to all lines and can be used to set the line-circuit modules for best transhybrid loss. Refer to paragraph 2.05 for more information.

3.04 The module's *reference-value control* circuit and *power supply* generate the *audio references* and *audio grounds*, respectively, for the audio circuitry within the 292R System. The references and grounds for the audio circuitry are separate from those of the switching circuitry. This separation minimizes any coupling of noise from the switching circuits into the audio circuits.

3.05 The *level detector* monitors transmit levels and detects excessive signal levels on the System's conference bus. When signals on the conference bus exceed a preset level (approximately +6dBm), the *reference-value control* circuit switches the *audio reference* to ground potential. This quiets the conference bus and maintains stability. When the signal level drops below the preset level, the *reference-value control* circuit restores the normal *audio reference* level. In this manner, the *audio reference* supply is controlled by the signal amplitude on the conference bus.

3.06 The integral *power supply* uses an internal series-pass voltage regulator that allows operation from any filtered voltage source between —42 and —56Vdc, positive-ground-referenced. Maximum current requirements range from 15mA at idle to 30mA when busy.

5. specifications

maximum level at transmit output
+6dBm ±1dB

audio reference voltage
—11.6 ± 0.7Vdc at transmit levels less than +6dBm ± 1dB;
—0.5 ± 0.5Vdc at transmit levels greater than +6dBm ± 1dB

power requirements
input voltage: —42 to —56Vdc, filtered, positive-ground-referenced
input current: 15mA maximum at idle, 30mA maximum when busy

operating environment
32° to 122°F (0° to 50°C), humidity to 95%
(no condensation)

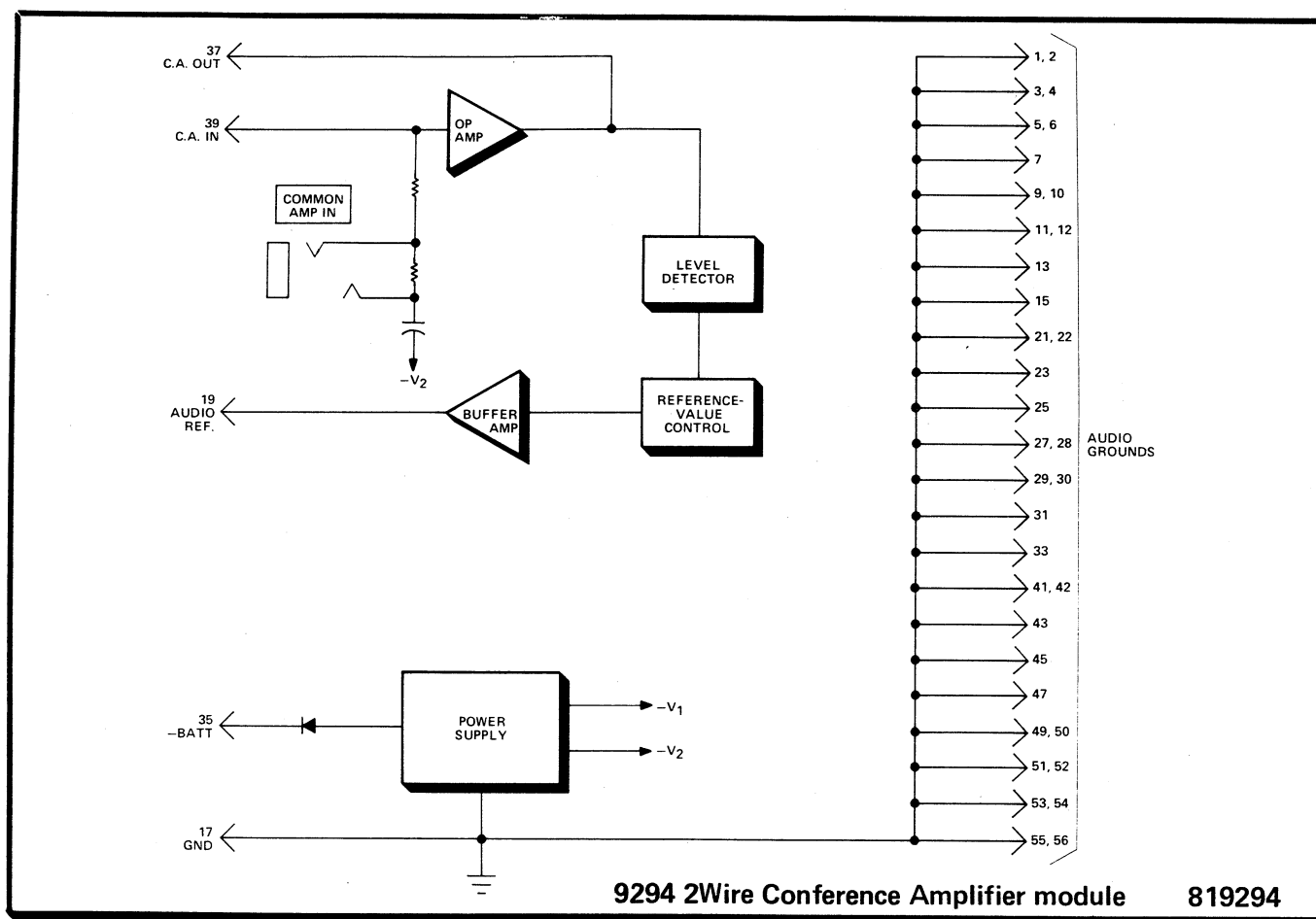
dimensions
5.58 inches (14.17cm) high
1.42 inches (3.61cm) wide
5.96 inches (15.14cm) deep

weight
4 ounces (113 grams)

mounting
position 6 of Tellabs 292R System's common equipment shelf. Can also be relay-rack or apparatus-case mounted via one position of a Tellabs Type 10 Mounting Shelf.

6. testing and troubleshooting

6.01 The *testing guide checklist* in this section may be used to assist in the installation, testing, or troubleshooting of the 9294 2Wire Conference Amplifier module. The checklist is intended as an aid in the localization of trouble to this specific equipment. If the equipment is suspected of being defective, substitute new equipment (if possible) and conduct the test again. If the substitute operates correctly, the original should be considered defective and returned to Tellabs for repair or replacement as directed below. We strongly recommend that no internal (component-level) testing or repairs be attempted on the equipment. Unauthorized testing or repairs may



4. block diagram

void its warranty. Also, if the equipment is part of a registered system, unauthorized repairs will result in noncompliance with Parts 15 and/or 68 of the FCC Rules and Regulations.

Note: Although repair service always includes an attempt to remove any permanent markings made by customers on Tellabs equipment, the success of such attempts cannot be guaranteed. Therefore, if equipment must be marked **defective** or **bad**, we recommend that it be done on a piece of tape or on a removable stick-on label.

technical assistance via telephone

6.02 If a situation arises that is not covered in the **testing guide checklist**, contact Tellabs Customer Service as follows:

USA customers: Contact your Tellabs Regional Office listed below.

region	telephone	office location
US Northeast	(203) 798-0506	Danbury, CT
US Capital	(703) 359-9166	Washington, DC
US Central	(708) 505-7800	Chicago, IL
US Southeast	(407) 834-8311	Orlando, FL
US Southwest	(214) 869-4114	Dallas, TX
US Western	(714) 850-1300	Orange County, CA

Canadian customers: Contact our Canadian headquarters in Mississauga, Ontario. Telephone (416) 858-2058.

International customers: Contact your Tellabs distributor.

selecting correct product service procedure

6.03 If equipment is diagnosed as defective or if in-service equipment needs repair, follow the **product return procedure** in paragraph 6.04 in all cases except those where a critical service outage exists (e.g., where a system or a critical circuit is down and no spares are available). In critical situations, or if you wish to return equipment for reasons other than repair, follow the **product replacement procedure** in paragraph 6.05.

product return procedure (for repair)

6.04 To return equipment for repair, first contact Tellabs Product

Services (see addresses and numbers below) to obtain a Material Return Authorization (MRA). A service representative will request key data (your company's name and address, the equipment's model and issue numbers and warranty date code, and the purchase order number for the repair transaction). The service representative will then give you an MRA number that identifies your particular transaction. After you obtain the MRA number, send the equipment prepaid to Tellabs (attn: Product Services).

in the USA:

Tellabs, Inc.
4951 Indiana Avenue
Lisle, Illinois 60532-1698
telephone (708) 969-8800

in Canada:

Tellabs Communications Canada, Ltd.
2433 Meadowvale Boulevard
Mississauga, Ontario, Canada L5N 5S2
telephone (416) 858-2058

Enclose an explanation of the malfunction, your company's name and address, the name of a person to contact for further information, and the purchase order number for the transaction. Be sure to write the MRA number clearly on the outside of the carton being returned. Tellabs will inspect, repair, and retest the equipment so that it meets its original performance specifications and then ship the equipment back to you. If the equipment is in warranty, no invoice will be issued. Should you need to contact Tellabs regarding the status of a repair, call or write the Product Services department at our Lisle or Mississauga headquarters as directed above.

product replacement procedure

6.05 For critical service outages, Tellabs offers a choice of two replacement services (if the product is in replacement stock) in lieu of the 15-day repair and return service described above. These are **overnight express service** (at extra cost) anywhere in the USA and **five-day expedited delivery** (at no extra cost) anywhere in the USA

and Canada. To obtain replacement equipment via either of these services, contact your Tellabs Regional Office in the USA or our Canadian headquarters in Mississauga, Ontario, for details, costs (if applicable), and instructions. Telephone numbers are given in paragraph 6.02. A service representative will request key data (your company's name and address, the equipment's model and issue numbers and warranty date code, and the purchase order number for the replacement transaction). Tellabs will then ship the replacement to you in accordance with the replacement service you request. An invoice in the amount of the replacement's current price plus any applicable service charges will be issued after the replacement is shipped. When you receive the replacement, pack the equipment to be

returned in the replacement's carton, sign and enclose the packing list, affix to the carton the preaddressed label provided, and ship the carton prepaid to Tellabs at our USA or Canadian headquarters. The defective equipment must be received within 30 days of the replacement's ship date. When we receive the defective equipment, a credit will be issued, leaving a balance due on the replacement's invoice that reflects only the express service and/or out-of-warranty charges, if any. Returns received more than 30 days after the replacement's ship date **will not be accepted for credit** but instead will be returned to you, thereby rendering the replacement's invoice due and payable. Please note that OEM, modified, and manufacture-discontinued equipment is not available via overnight express service.

testing guide checklist

Note: Because the connectorized backplate of each 292R System equipment shelf prevents access to the connector pins at the rear of most module positions, use of a Tellabs 9801 or 9802 Card Extender or equivalent is necessary for testing of this module in that System.

test	test procedure	normal result	if normal conditions are not met, verify:
normal operation of 9294 in idle state	Remove all 9291, 9293, and 9296 modules from their module positions for this test. Also, the transmission measuring set (TMS) used in this test must be floating (i.e., isolated from ground). Arrange the xmt portion of the TMS for 1004Hz tone output at 0dBm and for 600 ohms, if possible, and connect it to the 9294's <i>common amp in</i> jack. Arrange the rcv portion of the TMS for 600-ohm terminated measurement, and measure the output level across the <i>C.A. OUT</i> and <i>AUDIO REF.</i> leads (pins 37 and 19, respectively).	TMS indicates a 0dBm ± 0.5 dB level <input type="checkbox"/> .	Power <input type="checkbox"/> . Wiring <input type="checkbox"/> . Replace 9294 module and retest <input type="checkbox"/> .
	Connect VOM, set to 50Vdc voltage scale, across the <i>AUDIO REF.</i> and <i>GND</i> leads (pins 19 and 17, respectively).	VOM reads -11.6 ± 0.7 Vdc <input type="checkbox"/> .	Replace 9294 module and retest <input type="checkbox"/> .
normal operation of 9294 in active state	Retain TMS and VOM connections from previous step. Set all front-panel <i>listen only/2-way</i> switches on 9291 and 9293 modules to <i>listen only</i> positions. Insert a 9296 or 9293 module into the proper position and initiate a conference. Insert 9291 modules into their positions one at a time and observe level on TMS.	TMS indicates a constant 0dBm ± 0.5 dB level as 9291 modules are inserted <input type="checkbox"/> .	Replace any 9291 module that causes the level to deviate from 0dBm ± 0.5 dB level as it is inserted <input type="checkbox"/> . Replace 9294 module and retest <input type="checkbox"/> .
	Increase the TMS signal level from 0dBm to +10dBm. Use VOM (already connected) to monitor dc voltage.	VOM reads -0.5 ± 0.5 Vdc <input type="checkbox"/> .	Replace 9294 module and retest <input type="checkbox"/> .
	This concludes this test. Remove all test equipment connections and reset front-panel option switches to their correct positions.		