

9961C Signaling Converter Ringdown Subassembly

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1. general description

1.01 The 9961C Signaling Converter Ringdown subassembly (figure 1) provides conversion between E and M signaling and ac switchboard or dc manual ringdown signaling. Specifically, the 9961C converts E-lead signals to ringing signals toward the local termination (a local station or PBX) and converts ringing signals or a keyed ground input from the local station or PBX to M-lead outputs.

1.02 The 9961C subassembly is designed expressly for use with the Tellabs 6461 Common Signaling (2Wire/4Wire) Module. The 9961C makes electrical and physical connection to the 6461 by means of male connectors on the 9961C and receptacles on the 6461 module's printed circuit board. A standoff mounting near the center of the subassembly adds rigidity. *The 6461 module provides transmission interface between a 4wire facility and 2wire or 4wire telephone station equipment or a PBX trunk. Both adjustable transmission level control (attenuation) and switch-selectable 4wire-to-2wire or 4wire-to-4wire interface are provided. In the 4wire-to-2wire mode, the 6461 functions, in effect, as a hybrid terminating set; in the 4wire-to-4wire mode, it functions as a pad/transformer. In addition, the 6461 may (and, in most applications, will) be equipped with a Tellabs 9961X Signaling Converter subassembly such as the 9961C described herein. These subassemblies are available in several versions to provide various modes of loop-to-E and M conversion. For complete information on the 6461 module and the other 9961X subassemblies, refer to their respective Tellabs Practices.*

1.03 In addition to accommodating both ac switchboard and dc manual ringdown, the 9961C provides switch selection of superimposed or grounded ring generator biasing and of normal or inverted E-lead operation.

1.04 Input power is supplied to the 9961C subassembly via the host 6461 module. A voltage regulator integral to the subassembly permits operation on -22 to -56Vdc input. Current requirement is 45mA; M-lead potentials are derived directly from the external power source.

1.05 As stated above, the 9961C plugs onto the printed circuit board of its host 6461 module. The 6461, in turn, plugs into one position of the Tellabs

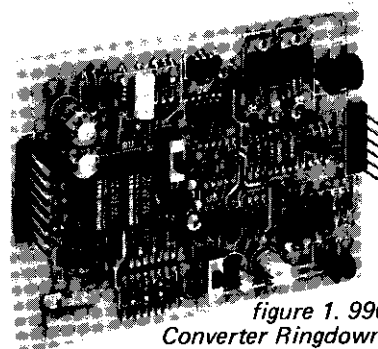


figure 1. 9961C Signaling Converter Ringdown subassembly

Type 15 Mounting Shelf, versions of which are available for both 19 and 23 inch relay rack installation. All Type 15 Shelves accommodate up to 12 modules and occupy 3 mounting spaces (5¼ vertical inches) in a standard relay rack.

2. application

2.01 The 9961C Signaling Converter Ringdown subassembly, when mounted on a host 6461 Common Signaling Module, interfaces a 4wire E and M transmission facility (typically, a carrier channel) with a termination employing either ac switchboard or dc manual ringdown signaling. This termination may be either a manual switchboard or a 2wire or 4wire telephone set with manual ringdown key. (The host 6461 module accommodates either 2wire or 4wire loop operation via switch option.)

2.02 In either the ac switchboard or dc manual ringdown mode, M-lead ground is transmitted from the local termination to initiate ringing at the distant end. In the ac switchboard ringdown mode, this is effected via local application of ringing voltage across the 2wire or 4wire tip and ring conductors. In the dc manual ringdown mode, this is effected via local application of ground to the manual ringdown control lead. Ringing at the distant end persists throughout the duration of the transmitted M-lead ground unless the distant station answers the call and trips local ringing. A 4wire noise cut is provided by contacts of the CC relay to minimize impulse spiking and noise coupling to the 4wire tip and ring leads during ringing.

2.03 The 9961C may be switch-optional for normal or inverted E-lead operation. During **normal** E-lead operation in either ringdown mode, receipt of incoming E-lead **open** is interpreted as incoming seizure and activates local ringing. During **inverted** E-lead operation in either ringdown mode, receipt of incoming E-lead **ground** is interpreted as incoming seizure and activates local ringing. Local ringing persists throughout the duration of the incoming seizure condition unless the local station answers during the ringing interval, which removes ringing from the local loop.

2.04 To accommodate local ring trip during the ringing interval, some type of dc ringing bias must be provided. Either negative or positive superimposed ringing or grounded ringing may be employed to this end. (In superimposed ringing applications, one side of the ringing generator is connected through the 9961C to the ring side of the line; the other side of the ringing generator is connected to a dc potential, e.g., office battery. In grounded ringing applications, one side of the ringing generator is connected through the 9961C to the ring side of the line; the other side of the ringing generator is connected to ground; and an external dc potential must be provided between the ring generator bias lead of the 9961C and ground.) An option switch on the 9961C conditions the subassembly for superimposed or grounded ringing.

2.05 Maximum station-loop range for local ring trip is 3000 ohms with $\pm 48\text{Vdc}$ ring generator bias and 1200 ohms with $\pm 24\text{Vdc}$ ring generator bias.

3. installation inspection

3.01 The 9961C Signaling Converter Ringdown subassembly should be visually inspected upon arrival in order to find possible damage incurred during shipment. If damage is noted, a claim should immediately be filed with the carrier. If stored, the subassembly should be visually inspected again prior to installation.

mounting and connections

3.02 The 9961C subassembly makes physical and electrical connection to the host 6461 module via six-pin connector *P1* and eight-pin connector *P2* located on the component side of the subassembly. Connector *P1* on the 9961C plugs into receptacle *J1* on the 6461, and connector *P2* plugs into receptacle *J2*. The subassembly is further secured to the 6461's printed circuit board via a standoff mounting. Connections to the subassembly and their corresponding pinouts on the host 6461 module are listed in table 1.

options and alignment

3.03 No alignment of the 9961C subassembly is required. Before the subassembly is placed into service, however, two option switches must be set. Locations of these switches on the module are shown in figure 2.

3.04 Option switch *S1* conditions the subassembly for normal or inverted E-lead operation. Set *S1* to the *NORM* position if local ringing is to be activated by an incoming E-lead open. Set *S1* to the *INV* position if local ringing is to be activated by an incoming E-lead ground.

3.05 Option switch *S2* conditions the subassembly for superimposed or grounded ringing. If the local ringing source is referenced to a dc potential (superimposed ringing), set *S2* to the *INT* (internal ground) position. If the ringing source is grounded,

set *S2* to the *EXT* (external battery) position and connect a source of dc potential (± 24 or $\pm 48\text{Vdc}$) to the ring generator return lead (pin 16) of the host 6461 module.

4. circuit description

4.01 This circuit description is intended to familiarize you with the 9961C Signaling Converter Ringdown subassembly for engineering and application purposes only. Attempts to troubleshoot the 9961C internally are not recommended. Troubleshooting procedures should be limited to those prescribed in section 7 of this Practice. Refer to the block diagram, section 5 of this Practice, as an aid in understanding the circuit description.

9961C connector pin*	designation/function	externally accessible via 6461 pin
P1-1	GND (ground input)	1
P1-6	-BATT (battery input)	39
P2-8	A LEAD (external)	7
P2-7	B LEAD (external)	9
P1-3	RING GEN (ring generator)	20
P1-2	RING GEN BIAS (ring generator dc ringing bias)**	16**
P2-2	MANUAL (dc) RING- DOWN CONTROL	22
P1-5	E1 LEAD	25
P1-4	M1 LEAD	21
P2-6	A1 LEAD (internal)	none
P2-5	B1 LEAD (internal)	none
P2-1	none	none
P2-3	RING LEAD	43
P2-4	TIP LEAD	41

* Corresponding receptacles on 6461 module are designated J1-1, J1-6, J2-8, etc., respectively.
 ** This connection is required only in grounded ringing applications (see paragraph 2.04).

table 1. Connections to 9961C subassembly via host 6461

4.02 Local ringing is controlled by dc input to the E lead of the host 6461 module. Ringing may be initiated either by an E-lead open condition (in normal E-lead operation) or by E-lead ground (in inverted E-lead operation). A transistorized E-lead sensor and time-delay circuit respond to the input E-lead condition, and switch *S1* provides selection of the normal or inverted E-lead operating mode. Ringing is applied toward the local terminal equipment through contacts on the RU relay. In 4wire circuits, a noise cut provided by contacts of the CC relay minimizes impulse spiking and noise coupling to the tip and ring leads during ringing.

4.03 An opto-coupler is used in the ring-trip circuit to sense local station answer and to remove ringing when the local station answers. A positive-temperature-coefficient thermistor in the ring generator input lead prevents excessive current flow during the ring-trip sequence.

4.04 Outgoing signaling is controlled either by detection of ringing voltage between the local external tip and ring terminals in the ac switchboard ringdown mode or by application of ground to the manual ringdown control lead (M lead, pin 22, of associated 6461) in the dc manual ringdown mode. The M-lead output of the 9961 is derived via a pair of Darlington transistors configured such that one

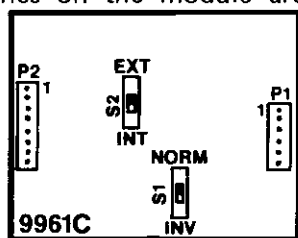


figure 2. Switch locations

is ON and the other OFF for each signaling state. Detection of ringing or of manual input ground causes the M lead to be at ground potential. An absence of either of these signaling conditions causes the M lead to be at local battery potential. A second positive-temperature-coefficient thermistor is used to limit M-lead current when the M lead is at local battery potential.

4.05 Power for the 9961C circuitry is derived via a simple series voltage regulator using a zener diode as a reference. The regulator circuitry is located on the 9961C subassembly.

6. specifications

E-lead (incoming) signaling states

normal operation: E lead at ground during idle and busy;
local ringing activated by application of E-lead open
inverted operation: E lead open during idle and busy;
local ringing activated by application of E-lead ground

M-lead (outgoing) signaling states

M lead at input battery during idle and busy, and at ground upon local application of ground to dc manual ringdown lead or ringing voltage across 2wire/4wire transmit port

external E-lead resistance

maximum resistance to ground: 10 kilohms in normal mode, 1 kilohm inverted mode

M-lead current

200mA maximum

ring-trip sensitivity (local loop limits)

3000 ohms external loop resistance with 48-volt ring generator bias; 1200 ohms with 24-volt bias

ring sensitivity (ac ringdown applications)

50Vac rms, 20 to 67Hz

dc manual ringdown sensitivity

500 ohms maximum dc resistance to ground to initiate seizure

power requirements

-22 to -56Vdc (ground referenced); 10mA plus M-lead current, busy and idle; 30mA during local ringing

operating environment

20° to 130°F (-7° to 54°C), humidity to 95% (no condensation)

dimensions

**4.1 inches (10.4cm) high
 1.2 inches (3.0cm) wide
 5.1 inches (13.0cm) deep**

weight

3 ounces (85 grams)

mounting

mounts on printed circuit board of 6461 Common Signaling Module via two male connectors on 9961C and two receptacles on 6461

7. testing and troubleshooting

7.01 The Testing Guide Checklist may be used to assist in the installation, testing or troubleshooting of the 9961C Signaling Converter Ringdown subassembly. The Testing Guide Checklist is intended as an aid in the localization of trouble to a specific module and subassembly. If a subassembly is suspected of being defective, a new subassembly should be substituted and the test conducted again. If the substitute subassembly operates correctly, the original subassembly should be considered defective and returned to Tellabs for repair or replacement. It is strongly recommended that no internal (component level) testing or repairs be attempted on the 9961C subassembly. Unauthorized testing or repairs may void the 9961C's warranty.

7.02 If a situation arises that is not covered in the Checklist, contact Tellabs Customer Service at (312) 969-8800 for further assistance.

7.03 If a 9961C is diagnosed as defective, the situation may be remedied by either **replacement** or **repair and return**. Because it is the more expedient method, the **replacement** procedure should be followed whenever time is a critical factor (e.g., service outages, etc.).

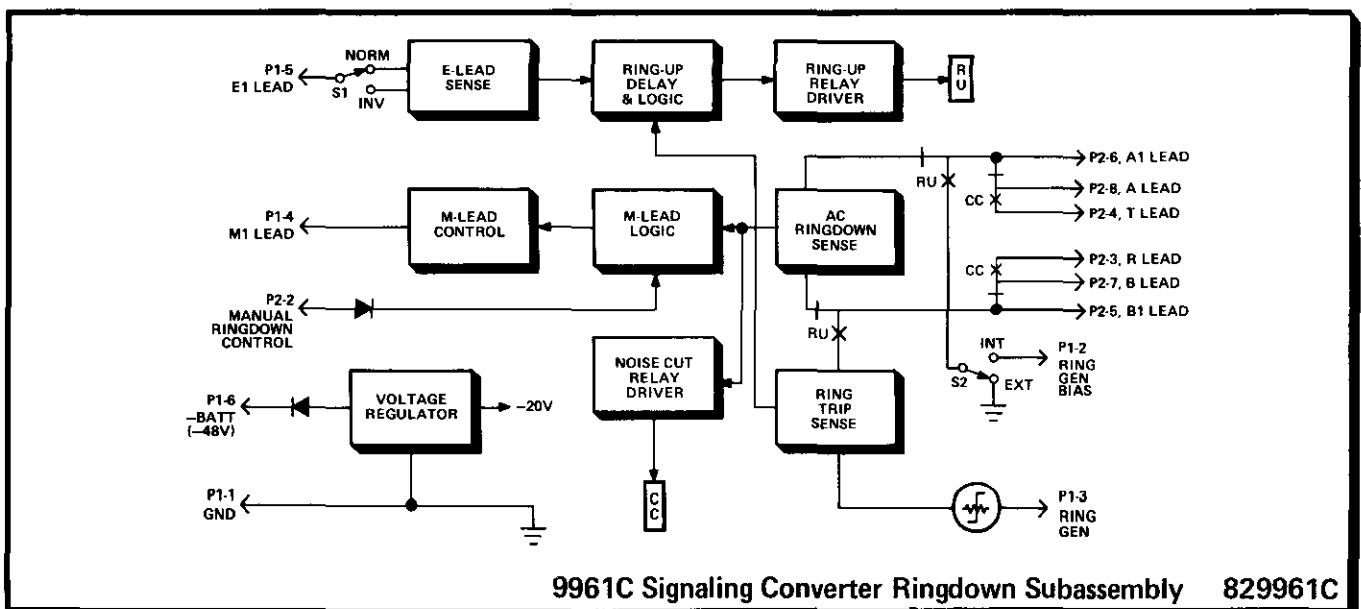
replacement

7.04 If a defective 9961C is encountered, notify Tellabs via telephone [(312) 969-8800], letter [see below], or twx [910-695-3530]. Notification should include all relevant information, including the 8X9961C part number (from which we can determine the issue of the subassembly in question). Upon notification, we shall ship a replacement subassembly to you. If the warranty period of the defective subassembly has not elapsed, the replacement subassembly will be shipped at no charge. Package the defective 9961C in the replacement subassembly's carton; sign the packing list included with the replacement subassembly and enclose it with the defective subassembly (this is your return authorization); affix the pre-addressed label provided with the replacement subassembly to the carton being returned; and ship the equipment prepaid to Tellabs.

repair and return

7.05 Return the defective 9961C subassembly, shipment prepaid, to: Tellabs Incorporated
 4951 Indiana Avenue
 Lisle, Illinois 60532
 Attn: repair and return dept.

Enclose an explanation of the subassembly's malfunction. Follow your company's standard procedure with respect to administrative paperwork. Tellabs will repair the subassembly and ship it back to you. If the subassembly is in warranty, no invoice will be issued.



testing guide checklist

Note: The 9961C must be tested in place (i.e., while mounted on the host 6461 module).

test	test procedure	normal result	if normal conditions are not met, verify:
power and ringing	Measure voltage at pins 39 (<i>-BATT</i>) and 1 (<i>GND</i>) of host 6461 module. Measure ringing potential at pins 20 and 16 of 6461.	From -22 to -56Vdc (referenced to ground) present at pin 39 <input type="checkbox"/> . Ringing voltage of 50 to 130Vac (20 to 67Hz) present across pins 20 and 16 <input type="checkbox"/> .	External power <input type="checkbox"/> . External ringing source <input type="checkbox"/> .
circuit idle, normal E-lead operation	During idle circuit condition, measure E-lead voltage (to ground) at pin 25 of host 6461.	Voltage less than 2Vdc, indicating E-lead ground <input type="checkbox"/> . Ringing voltage does not appear across station tip and ring leads <input type="checkbox"/> .	Switch <i>S1</i> set to <i>NORM</i> position <input type="checkbox"/> . Host 6461 properly optioned <input type="checkbox"/> . Associated signaling equipment properly connected <input type="checkbox"/> . Distant-end M lead idle <input type="checkbox"/> . Replace 9961 C and retest <input type="checkbox"/> .
circuit idle, inverted E-lead operation	During idle circuit condition, measure E-lead voltage (to ground) at pin 25 of host 6461.	Voltage -36Vdc or greater with -48Vdc input power, approx. -20Vdc with -24Vdc input power, indicating E-lead open <input type="checkbox"/> . Ringing voltage does not appear across station tip and ring leads <input type="checkbox"/> .	Option switch <i>S2</i> set to <i>INV</i> position <input type="checkbox"/> . Host 6461 properly optioned <input type="checkbox"/> . Associated signaling equipment properly connected <input type="checkbox"/> . Distant-end M lead idle <input type="checkbox"/> . Replace 9961C and retest <input type="checkbox"/> .
incoming seizure, normal E-lead operation	Open E lead to host 6461 either by transmitting M-lead ground from distant location or by temporarily disconnecting E1 lead from pin 25 of 6461. Observe station ringing (or observe T and R leads with ac meter). Reconnect E1 lead before proceeding to next test.	Local ringing commences within 150ms of occurrence of E-lead open <input type="checkbox"/> .	Option switch <i>S1</i> set to <i>NORM</i> position <input type="checkbox"/> . Host 6461 module properly optioned <input type="checkbox"/> . Station wiring correct and station on-hook <input type="checkbox"/> . Replace 9961C and retest <input type="checkbox"/> .
incoming seizure, inverted E-lead operation	Ground E lead to host 6461 either by transmitting M-lead battery from distant location or by applying ground to E1 lead (pin 25) of host 6461. Observe station ringing (or observe T and R leads with ac meter).	Local ringing commences within 150ms of occurrence of E-lead ground <input type="checkbox"/> .	Option switch <i>S1</i> set to <i>INV</i> position <input type="checkbox"/> . Host 6461 module properly optioned <input type="checkbox"/> . Station wiring correct and station on-hook <input type="checkbox"/> . Replace 9961C and retest <input type="checkbox"/> .
local ring trip	While local station ringing, place station in off-hook condition.	Ringing ceases as soon as station goes off-hook, with no audible ringing in station receiver <input type="checkbox"/> .	Ringing source referenced to dc potential and option switch <i>S2</i> set to <i>INT</i> position <input type="checkbox"/> ; or ringing source grounded, dc bias potential connected to pin 16 of host 6461, and <i>S2</i> set to <i>EXT</i> position <input type="checkbox"/> . Station wiring correct <input type="checkbox"/> . Local loop limits not exceeded <input type="checkbox"/> . Replace 9961C and retest <input type="checkbox"/> .
circuit idle, M lead	Measure voltage between M1 lead (pin 21) and ground.	With circuit idle, M1 lead at supply voltage (-24 or -48Vdc) <input type="checkbox"/> .	Local station on-hook <input type="checkbox"/> . Replace 9961C and retest <input type="checkbox"/> .
outgoing seizure, dc manual ringdown	Either place local station off-hook and depress local ringdown key or apply ground to pin 22 of host 6461. Observe M-lead voltage (referenced to ground) at pin 21 of host 6461.	When station goes off-hook, no change in M-lead potential <input type="checkbox"/> . While ringdown key depressed, M-lead voltage at ground <input type="checkbox"/> ; when key released, M-lead voltage at supply potential <input type="checkbox"/> .	Ground (through maximum 2 kilohm resistance) supplied to pin 22 of host 6461 when ringdown key depressed <input type="checkbox"/> . Input power to host module <input type="checkbox"/> . Temporarily remove external connection at pin 21 of host 6461 and verify that no external impedances are affecting signaling state <input type="checkbox"/> . Replace 9961C and retest <input type="checkbox"/> .
outgoing seizure, ac (switchboard) ringdown	Depress switchboard ringdown key and observe M-lead voltage (referenced to ground) at pin 21 of host 6461.	M-lead potential same as supply potential except while ringdown key depressed <input type="checkbox"/> . M lead at ground while ringdown key depressed <input type="checkbox"/> .	Ringing voltage (50Vac rms minimum) present between pins 41 and 43 of host 6461 when ringdown key depressed <input type="checkbox"/> . Replace 9961C and retest <input type="checkbox"/> .