tellabs
technical manual
76-816462
rev A

practice section 816462

6462 4W Common Signaling Module

contents

1. general description

1.01 The 6462 4Wire Common Signaling Module (figure 1) is designed to interface a 4wire transmission facility with a 4wire metallic loop or PBX trunk. As such, the 6462 functions as a 4wire-to-4wire pad/transformer module. Both adjustable transmission attenuation and switch-selectable choice of facility-side terminating impedance are provided. In addition, the 6462 accepts several types of optional signaling converter plug-on subassemblies that provide various modes of loop-to-E-and-M or E-and-M-to-duplex (DX) signaling conversion. The loop and DX converters extend signaling and supervision to a distant location by accessing simplex leads derived via the line transformers that interface the metallic 4wire facility.

1.02 Levels in both the transmit and receive channels may be prescription-set via front-panel switches that introduce up to 32.5dB of attenuation, in 0.1dB increments, into the equipment-side transmit and receive paths.

1.03 Switch-selectable 1200, 600, or 150-ohm impedance-matching options are provided on the facility side of the 6462 module. Equipment-side terminating impedance is fixed at 600 ohms.

1.04 The 6462 module is designed to accept Tellabs' series of 9961X loop-to-E-and-M and E-and-M-to-DX Signaling Converter plug-on subassemblies. The 9961A subassembly, when used on the 6462, provides conversion between E and M signaling over the 4wire facility and foreign exchange station-end (FXS) loop signaling. The 9961B subassembly provides conversion between E and M signaling and foreign exchange office-end (FXO) loop signaling. The 9961D subassembly provides conversion between E and M signaling and DX signaling. An option switch on the 6462's printed circuit board reverses simplex access to the facility-side tip and ring pairs in DX-signaling applications. For complete information on the 9961X subassemblies, refer to the separate Tellabs Practices on these subassemblies.

1.05 The front panel of the 6462 contains two light-emitting diodes (LED's) that light to indicate seizure in either direction (i.e., to indicate local E-lead and M-lead status).

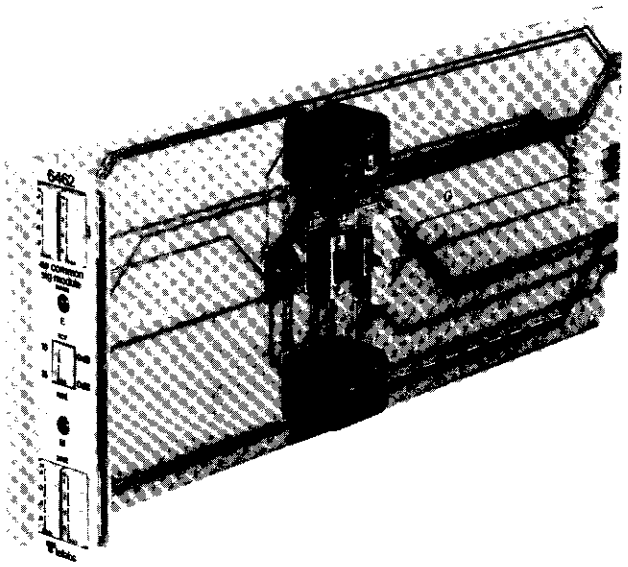


figure 1. 6462 4W Common Signaling Module

1.06 When used without an associated 9961X Signaling Converter subassembly, the 6462 module is completely passive except for its front-panel LED's, and thus requires no external power connections unless it is desired that these LED's be functional. Because the 9961X subassemblies are active devices, however, the 6462, when equipped with a 9961X, must be powered from filtered −42 to −56Vdc input.

1.07 The 6462 module mounts in one position of a Tellabs Type 15 Mounting Shelf, versions of which are available for 19-inch or 23-inch relay rack installation. Both versions accommodate up to 12 modules and occupy 3 rack mounting spaces (5¼ inches of vertical rack space).

1.08 A companion module, the Tellabs 6461 Common Signaling Module, is functionally equivalent to and pin for pin compatible with the 6462 module. Additionally, the 6461 provides 2wire-to-4wire conversion via a switch option.

2. application

2.01 The 6462 4Wire Common Signaling Module is designed to interface a 4wire transmission facility (typically, a carrier channel) with a 4wire metallic loop terminated in a CO or PBX line circuit, a station instrument, or a DX signaling unit. In the majority of its applications, the 6462 will be equipped with a Tellabs 9961X plug-on Signaling Converter subassembly to provide conversion between E and M signaling and either foreign-exchange or DX signaling. In this configuration (i.e., when equipped

with a 9961X subassembly), the 6462 is a compact, single-module unit that performs the functions of both a signaling converter module and an associated 4wire-to-4wire pad/transformer module.

2.02 The 6462 may also be used without a 9961X subassembly as an ordinary 4wire-to-4wire pad/transformer module. Use of the 6462 in this capacity however, will normally be limited to prewired bay applications because other applications requiring a term set or pad/transformer module without a companion signaling converter may often be accommodated more economically through use of other Tellabs modules (e.g., Tellabs' 420X Term Sets and 440X Pad/Transformer modules). *A companion module, the Tellabs 6461 Common Signaling Module, is functionally equivalent to and pin-for-pin compatible with the 6462. In addition to providing all the functions of the 6462, the 6461 module provides switch-selectable conversion from 4wire operation to 2wire-to-4wire operation.*

2.03 The 6462's facility-side impedance may be switch-optioned for 1200, 600, or 150 ohms. These impedance-matching options permit the 6462 to interface a variety of facility-side equipment. The 1200-ohm option is selected when the 6462 interfaces loaded cable. The 600-ohm option is selected when the 6462 interfaces nonloaded cable or station equipment, and the 150-ohm option is selected to interface nonloaded cable in applications where a nominal degree of slope equalization is required. The 6462's equipment-side impedance is fixed at 600 ohms.

use with 9961A subassembly

2.04 The 9961A Signaling Converter FXS (foreign exchange, station) subassembly, when mounted on the 6462 module, provides conversion between E and M signaling and loop signaling conventionally used at the station end of a foreign-exchange circuit (figure 2). Specifically, the 9961A converts E-lead signals to ringing and tip-ground supervision toward the station, and also converts loop supervisory and dialing signals from the station to M-lead outputs.

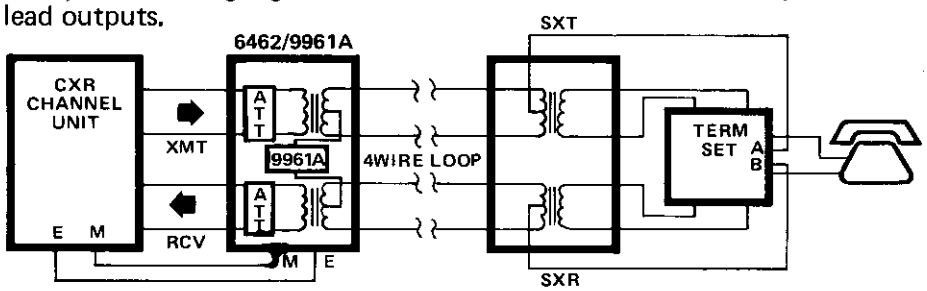


figure 2. Typical application of 6462 equipped with 9961A

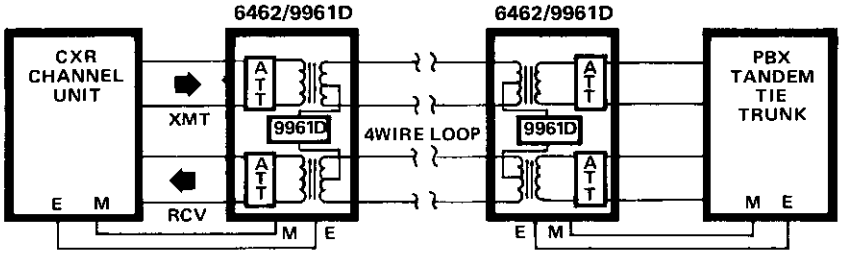


figure 3. Typical application of 6462 equipped with 9961D

2.05 The 9961A accommodates local ring trip during either ringing or silent intervals and includes an integral ringing interrupter that provides 2-second-on, 4-second-off ringing. Both loop-start and ground-start applications are accommodated.

2.06 Use of the 9961A subassembly and associated 6462 module is not restricted to foreign exchange applications. The 9961A and 6462 may be used, for example, to provide loop-to-E-and-M conversion at the station end of an off-premise extension circuit. Also, automatic ringdown operation may be accommodated by equipping both ends of an E and M facility with a 6462 and 9961A.

use with 9961B subassembly

2.07 The 9961B Signaling Converter FXO (foreign exchange, office) subassembly, when mounted on the 6462 module, provides conversion between E and M signaling and loop signaling conventionally used at the office (i.e., switching equipment) end of a foreign exchange circuit. Specifically, the 9961B converts E-lead signals to loop signaling for operation of the switching equipment, and also converts loop supervisory and ringing signals from the switching equipment to M-lead outputs.

2.08 Like the 9961A, the 9961B subassembly is not restricted to foreign exchange applications. With its companion 6462 module, the 9961B may be used to provide loop-to-E and M conversion at the office end of an off-premise extension circuit. The 9961B will also accommodate both loop start and ground start operation.

use with 9961D subassembly

2.09 The 9961D Signaling Converter DX subassembly, when mounted on the 6462 module, provides extended E-and-M-lead (DX) signaling, i.e., conversion from E-and-M-lead signaling to DX signaling, over a 4wire facility (figure 3). Maximum range of the 9961D is 5000 ohms loop resistance. The 9961D may be switch-optioned for either DX1 or DX2 operation. In the DX1 mode, M-lead signals are input to the module and E-lead signals are output. In the DX2 mode, M-lead signals are output, and E-lead signals are input.

Note: *The 9961D subassembly derives the DX signaling path via simplexes associated with the 4wire line interface transformer. When using the 9961D with the 6462 module, the A and B lead capacitor (switch S4 on the 9961D subassembly) is usually set to the 0μF position.*

2.10 A *NORM/REV* switch on the 6462 permits reverse simplex access to the facility-side tip and ring pairs. This reversal option may be used to accommodate signaling reversals without need for recabling when a standard wiring scheme is used at both ends of the circuit.

2.11 For complete application, installation, optioning, and alignment information of the 9961A, 9961B, and 9961D subassemblies, refer to the separate Tellabs Practice on each device.

3. installation

inspection

3.01 The 6462 4Wire Common Signaling Module 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 module should be visually inspected again prior to installation.

mounting

3.02 The 6462 module mounts in one position of the Tellabs Type 15 Mounting Shelf, which is available in configurations for both 19-inch and 23-inch relay rack installation. The module plugs physically and electrically into a 44-pin connector at the rear of the Type 15 Shelf.

installer connections

3.03 In many cases, the 6462 module will be installed in Type 15 Mounting Shelves with connectorized backplanes. External connections are made via plug-ended cables that are mated to connectors on the backplane of the Shelf. Before plugging modules into place, proper external connections and proper input fusing should be verified, and each module should be properly optioned.

3.04 If Type 15 Shelves without connectorized backplanes are used, external connections are made via wire-wrap to the 44-pin connector at the rear of each module's mounting shelf position. Pin numbers are found on the body of the 44-pin connector. Again, modules should be put into place only after verifying wiring, fusing, and option selection. Table 1 lists external connections required when non-connectorized Type 15 Shelves are used.

connect:	to pin:
XMT FACILITY T (facility-side transmit tip)	41
XMT FACILITY R (facility-side transmit ring)	43
RCV FACILITY T (facility-side receive tip)	7
RCV FACILITY R (facility-side receive ring)	9
XMT EQP T (equipment-side transmit tip)	10
XMT EQP R (equipment-side transmit ring)	8
RCV EQP T (equipment-side receive tip)	42
RCV EQP R (equipment-side receive ring)	44
M LEAD	21
E LEAD	25
RG (ring generator)	20
RGR (ring generator dc ringing bias)	16
SG (signal ground)	3
SB (signal battery)	22
−48V (−42 to −56Vdc input)	39
GND (ground)	1

table 1. External connections to 6462

option selection

3.05 Two option switches must be set before the 6462 is placed into service. The location of each switch on the 6462's printed circuit board is shown in figure 4. These switches and their functions are described in paragraphs 3.06 and 3.07.

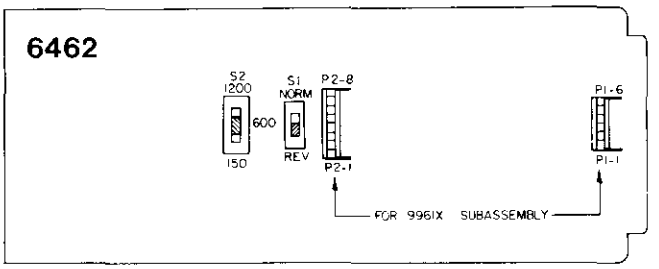


figure 4. Option switch locations

3.06 Switch *S1* selects either reverse or normal operation of the facility-side tip and ring pairs in DX-signaling applications. Set *S1* to the *NORM* position for normal operation or to the *REV* position for reversed operation, as required.

3.07 Switch *S2* is used to select either 1200, 600, or 150-ohm terminating impedance on the module's facility-side transmit and receive ports. Set *S2* to the *1200, 600,* or *150* position, as required. In general, select the *1200* position when the 6462 interfaces loaded cable, the *600* position when the 6462 interfaces nonloaded cable or station equipment, or the *150* position when the 6462 interfaces nonloaded cable and a nominal degree of slope equalization is required.

alignment

3.08 Alignment consists of adjusting the variable attenuators at the equipment-side ports in accordance with circuit requirements. Align the 6462 as directed below.

Note: *The following alignment procedure will be expedited if a Tellabs 9805 Card Extender or an external jackfield is used to access the module's equipment-side and facility-side ports. If a Card Extender or jackfield is not used, these ports may be accessed via the module's connector pins.* **Because external connections must be temporarily removed from these pins, this last method of access is not recommended.** *Pin numbers as well as 9805 jack designations are provided in the instructions that follow.*

3.09 **Transmit Attenuator.** Condition a transmission measuring set (TMS) to transmit a 1000Hz tone at the impedance and level specified for the circuit. Insert the signal at the facility-side transmit port (*fac in module* jack on 9805 or pins 41 and 43). With the TMS (receive) terminated into 600 ohms and connected to the equipment-side transmit port (*sw in module* jack or pins 8 and 10), measure the transmit level. Set the front-panel *xmt att* switches to derive the level specified for the circuit under test.

3.10 **Receive Attenuator.** Request the distant facility-side location to send 1000Hz tone toward the transmission equipment. If you are using a 9805 Card Extender, insert an opening plug into the *fac out module* jack. If you are accessing the module's ports via its connector pins, remove the module from its shelf position. Then, using the TMS (receive) terminated into 600 ohms, measure the received level at the equipment-side receive port

(*fac out module* jack or pins 42 and 44). When this level is consistent with circuit specifications, remove the opening plug (if used), disconnect the TMS from the equipment-side receive port, and, if the 6462 was removed from its shelf position, reinsert it. Then connect the TMS (terminated with the appropriate impedance) to the facility-side receive port (*sw out monitor* jack or pins 7 and 9). Set the front-panel *rcv att* switches to derive the receive level specified for the circuit at the facility-side receive port.

4. circuit description

Note: *The following circuit description covers only the 6462 module itself; the 9961X subassemblies are described in the separate Tellabs Practices on these units. Please refer to the 6462 block diagram, section 5 of this Practice, as an aid in understanding this circuit description.*

4.01 The 6462 4Wire Common Signaling Module is a conventional 4wire-to-4wire pad/transformer module. The transmit and receive sections are identical. Each section consists of an impedance-matching transformer, arranged as a repeat coil, a common switch that provides 1200, 600, or 150-ohm facility-side impedance options, and an adjustable T-pad attenuator that provides the means of level coordination.

4.02 A *NORM/REV* switch provides a means of reversing simplex access to the tip and ring pairs on the module's facility side.

6. specifications

equipment-side port impedance
600 ohms, resistive

facility-side port impedance
150, 600 or 1200 ohms, switchable

attenuation range
transmit and receive: 0 to 32.5dB in 0.1dB increments, switchable

echo return loss
20dB minimum

insertion loss
1dB nominal at 1000Hz

frequency response
±0.5dB re 1000Hz level, 300 to 4000Hz

longitudinal balance
60dB minimum, 200 to 4000Hz either port, facility side

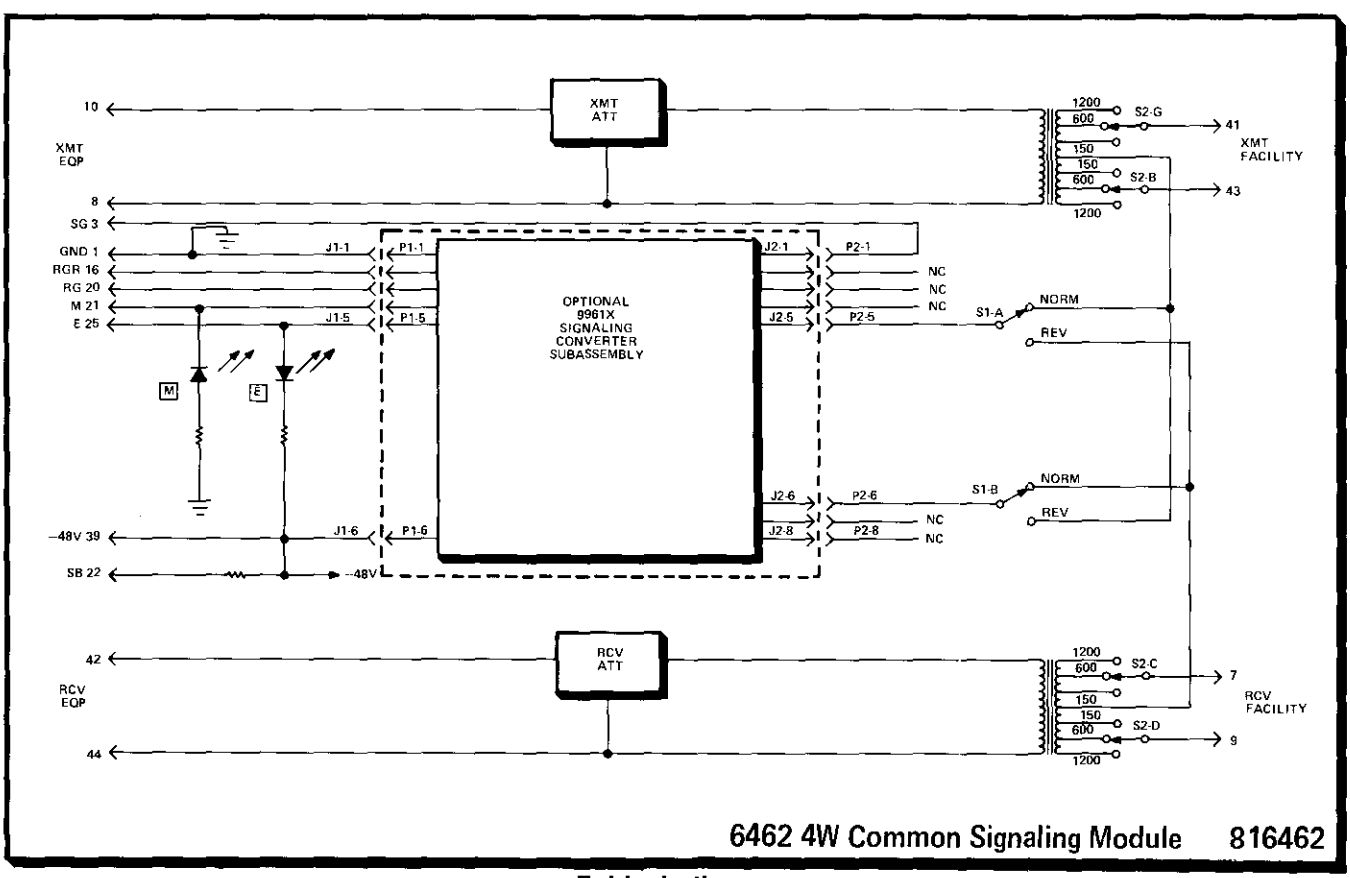
SX current capacity
100mA maximum, 5mA maximum unbalance

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

dimensions
4.95 inches (12.57cm) high
1.42 inches (3.61cm) wide
12.94 inches (32.87cm) deep

weight
10 ounces (280 grams)

mounting
relay rack via one positon of Tellabs Type 15 Mounting Shelf



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5. block diagram

7. testing and troubleshooting

7.01 The Testing Guide Checklist may be used to assist in the installation, testing or troubleshooting of the 6462 4W Common Signaling Module. The Testing Guide Checklist is intended as an aid in the localization of trouble to a specific module. If a module is suspected of being defective, a new module should be substituted and the test conducted again. If the substitute module operates correctly, the original module 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 6462 module. Unauthorized testing or repairs may void the 6462's warranty.

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

7.03 If a 6462 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 6462 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 8X6462 part number (from which we can determine the issue of the module in question). Upon notification, we shall ship a replacement 6462 to you. If the warranty period of the defective module has not elapsed, the replacement module will be shipped at no charge. Package the defective 6462 in the replacement module's carton; sign the packing list included with the replacement 6462 and enclose it with the defective module (this is your return authorization); affix the preaddressed label provided with the replacement module to the carton being returned; and ship the equipment prepaid to Tellabs.

repair and return

7.05 Return the defective 6462 module, shipment prepaid, to: Tellabs Incorporated
4951 Indiana Avenue
Lisle, Illinois 60532
Attn: repair and return dept.
Enclose an explanation of the module's malfunction. Follow your company's standard procedure with respect to administrative paperwork. Tellabs will repair the module and ship it back to you. If the module is in warranty, no invoice will be issued.

testing guide checklist

Note 1: *The following test procedure will be expedited if a Tellabs 9805 Card Extender or an external jackfield is used to access the module's 4wire ports. If a Card Extender or jackfield is not used, these ports may be accessed via the module's connector pins.* **Because external connections must be temporarily removed from these pins, this last method of access is not recommended.** *Pin numbers as well as 9805 jack designations are provided in the checklist.*
Note 2: *For testing and troubleshooting information on the 9961X Signaling Converter subassemblies, refer to the separate Tellabs Practices on these units.*
Note 3: *If either the 1200 or 150 ohm impedance-matching option has been selected (paragraph 3.07), option switch S2 for 600 ohms while performing the following test procedure. Be sure to reoption S2 after completing the test.*

test	test procedure	normal result	if normal conditions are not met, verify:
transmission continuity	Using a TMS terminated into 600 ohms measure transmission continuity at 1000Hz from equipment-side transmit port (*sw in module* jack or pins 10 and 8) to facility-side transmit port (*fac in module* jack or pins 41 and 43) and from facility-side receive port (*sw out module* jack or pins 7 and 9) to equipment-side receive port (*fac out module* jack or pins 42 and 44).	Signal appears at output port at specified level ☐.	Power ☐. Wiring ☐. Attenuator settings ☐. Impedance properly set ☐. Facility on either side of module ☐. Replace and retest ☐.
transmission level	Vary signal levels via front-panel *rcv att* and *xmt att* switches.	Signal levels follow switch settings ☐.	Power ☐. Wiring ☐. Attenuator settings ☐. Impedance setting ☐. Replace 6462 and retest ☐.

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