tellabs
technical manual

practice section 816101

6101 SF Transceiver

contents

1. general description

1.01 The 6101 SF Transceiver module (figure 1) provides integral SF tone supply and tone gates for the transmission of SF tone over a 4wire facility. In the receive direction, the 6101 provides SF detection, filtering, level control and timing circuitry for the reception and processing of incoming SF signals.

1.02 The 6101 transceiver is always used in conjunction with a Signaling Converter module that interfaces the terminal-side input and output of the 6101 with the mode of signaling at the termination. Signaling Converter modules are available to accommodate E and M, Foreign Exchange-Station, Foreign Exchange-Office, and Ringdown modes of signaling termination. Other less common modes of interface, for example, with an SSN Trunk Circuit, may also be provided through use of other Signaling Converter modules.

1.03 The 6101 SF Transceiver module and various associated Signaling Converter modules together meet all F-type SF signaling specifications.

1.04 Both tone generation (tone on/off supervisory states) and cut-and-terminate relay provided by the 6101 are under control of the associated Signaling Converter module, which converts the signal derived from the termination to an internal-logic-level M-lead (transmit input) to the 6101. The 6101 provides an internal-logic-level E-lead output to the Signaling Converter module.

1.05 Voice frequency gain in the receive path may be adjusted from −4 to +4dB by a front-panel-accessible receive level control.

1.06 Receive SF filtering circuitry is contained in a plug-in subassembly mounted to the printed circuit board of the 6101. While 2600Hz is the standard SF signaling frequency, other frequencies may be implemented (at the factory or in the field) by changing out the filter subassembly.

1.07 SF tone level provided by the 6101 is −20dBm0 for low level and −8dBm0 for high-level signaling states.

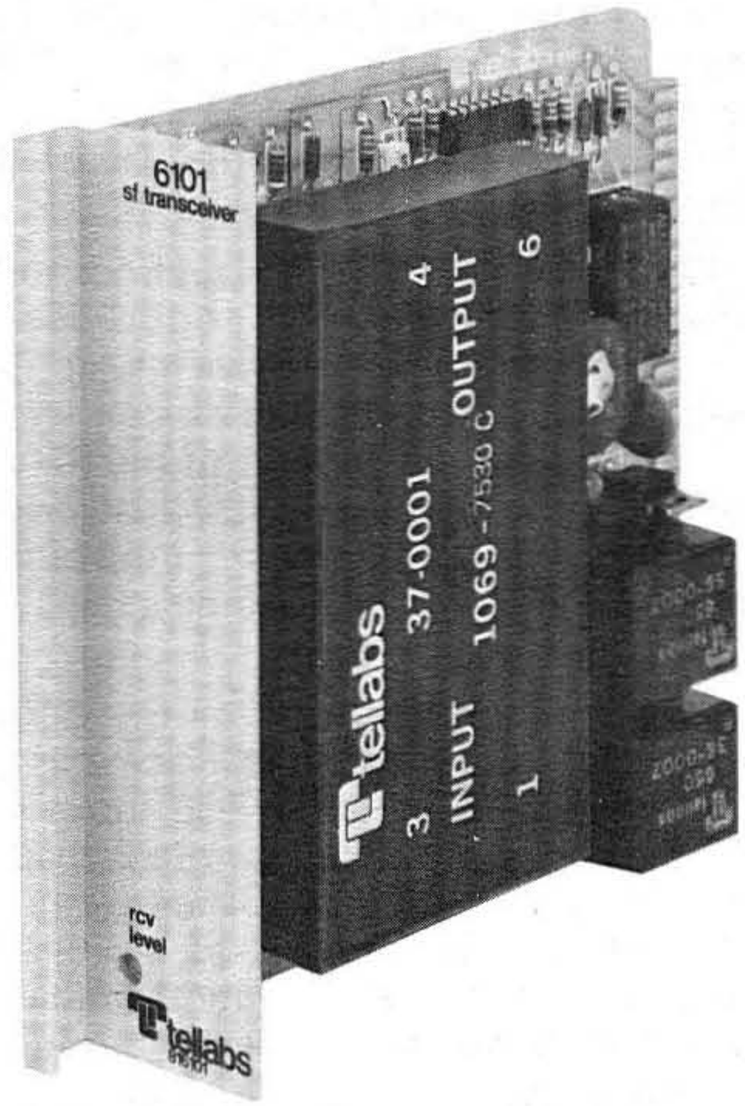


figure 1. 6101 SF Transceiver module

1.08 The 4wire facility interface levels utilized by the 6101 are conventional −16dBm transmit and +7dBm receive. The receive level, as mentioned in paragraph 1.05, may be adjusted from +3 to +11dBm for non-standard applications.

1.09 The 6101 SF Transceiver module mounts in one position of the Tellabs Type 10 Shelf, variations of which provide for relay rack or apparatus case installation. In relay rack applications, up to 12 modules may be mounted across 6 vertical inches of a 19″ rack, while a 23″ rack can accommodate up to 14 modules across the same vertical space.

2. application

2.01 The four most common applications of the 6101 SF Transceiver module involve its use with Signaling Converter modules to provide the following modes of F-type SF signaling.

Signaling Converter module	**interface mode**
6102	*E and M*
6103	*Foreign Exchange (Station-end)*
6104	*Foreign Exchange (Office-end)*
6105	*Ringdown (automatic or manual)*

2.02 The 6101 SF Transceiver module is designed to interface 4wire metallic or carrier facilities at standard +7 and −16dBm receive and

transmit levels. A Line Amplifier (Tellabs 4001 or equivalent) is often required to establish proper transmission levels between the facility and the 6101. On the terminal side, the 6101 also provides transmit and receive transmission pairs. If interfacing a 2wire termination, a standard 4wire/2wire Term Set (Tellabs 420X, or equivalent) will be required. The combination of Line Amplifier, SF Transceiver, Signaling Converter, and Term Set provides the basis of Tellab's Type 261 Signaling and Terminating System. See Practice Section 81261 for details concerning the use of the 6101 in the 261 System.

2.03 A front-panel receive level control on the 6101 module provides −4 to +4dBm level adjustment to compensate for excessive loss or non-standard levels required in the transmission leads to the terminal equipment. Placement of the RCV LEVEL adjustment in the 6101 circuitry just prior to the module's receive output prevents interference with receive input levels and the module's signal-to-guard ratio.

2.04 On the terminal-side of the 6101, logic-level pseudo E and M-leads interface the Signaling Converter module. Pseudo M-lead input states are battery and ground, and pseudo-E-lead output states are open and ground. Because the terminal side interface of the 6101 is at solid-state logic levels, the unit must interface the terminal through the appropriate Signaling Converter module.

2.05 The 6101 provides a cut-and terminate relay (under control of the associated Signaling Converter) that isolates the drop from the facility just prior to and during tone transmission to prevent noise on the drop from interferring with signaling on the facility.

2.06 A plug-in SF filtering subassembly allows convenient field interchangeability to signaling frequencies other than the standard 2600Hz tone.

2.07 Dial pulse correction, when required, is provided by the associated Signaling Converter module.

2.08 Through use of Signaling Converter modules other than those listed in paragraph 2.01, the 6101 may be adapted for use in a variety of unusual applications. For example, the 6101 may be used in conjunction with a 6251 SSN Trunk module (as a Signaling Converter) to provide signaling and interface between the Common Control Switching Arrangement (CCSA) equipment of a Switched Service Network (SSN) and a central office line circuit.

2.09 For a more thorough explanation of the most typical forms of application of the 6101 module, see the "application" section of the 261 Signaling and Terminating System Practice. Wiring and circuit configurations for common applications are presented in figures 2, 3, 4, and 5 in Section 3 of this Practice.

3. installation

inspection

3.01 The 6101 SF Transceiver 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 shipper. If stored, the module should be visually inspected again prior to installation.

mounting

3.02 The 6101 mounts in one position of the Tellabs Type 10 Mounting Shelf, which is available in configurations for both relay rack and apparatus case installation. Each module plugs physically and electrically into a 56-pin connector at the rear of the Type 10 Shelf.

installer connections

3.03 Before making any connections to the Mounting Shelf, make sure that power is **off**, and modules are **removed**. The 6101 module should be put into place only **after** wiring has been completed.

3.04 The following, Table 1, shows connections to the 6101 SF Transceiver. All connections are made at the 56-pin connector at the rear of the module's Mounting Shelf. Pin numbers are found on the body of the connector.

connect	**to pin**
receive in (tip)	5
receive in (ring)	15
receive out (tip)	7
receive out (ring)	13
transmit out (tip)	55
transmit out (ring)	49
transmit in (tip)	51
transmit in (ring)	53
M-lead (signal in)	31
E-lead (signal out)	29
transmit cut and terminate relay (CT)	27
ringback tone (6105 only)	39
negative battery (−22 to −52Vdc)	33 or 35
ground	17

table 1. Connections to 6101 SF Transceiver module

3.05 Because the 6101 is always used in conjunction with a Signaling Converter module, and these two modules are often used within the context of a Tellabs Type 261 Signaling and Terminating System, block Wiring Diagrams (figures 2 through 5), showing necessary connections for the four most common applications of the 6101, follow.

options & alignment

3.06 The 6101 does not require any optioning. The RCV LEVEL control is shipped from the factory adjusted for 0dB loss and may be adjusted for levels between −4dB and +4dB, as required. Because the circuit should already be adjusted to provide a +7dBm (+7TLP) input to the 6101, this control is not often used. In those cases where it is used, it should be adjusted to provide +7dBm (+7TLP) at the 4W RCV jack of the associated Term Set.

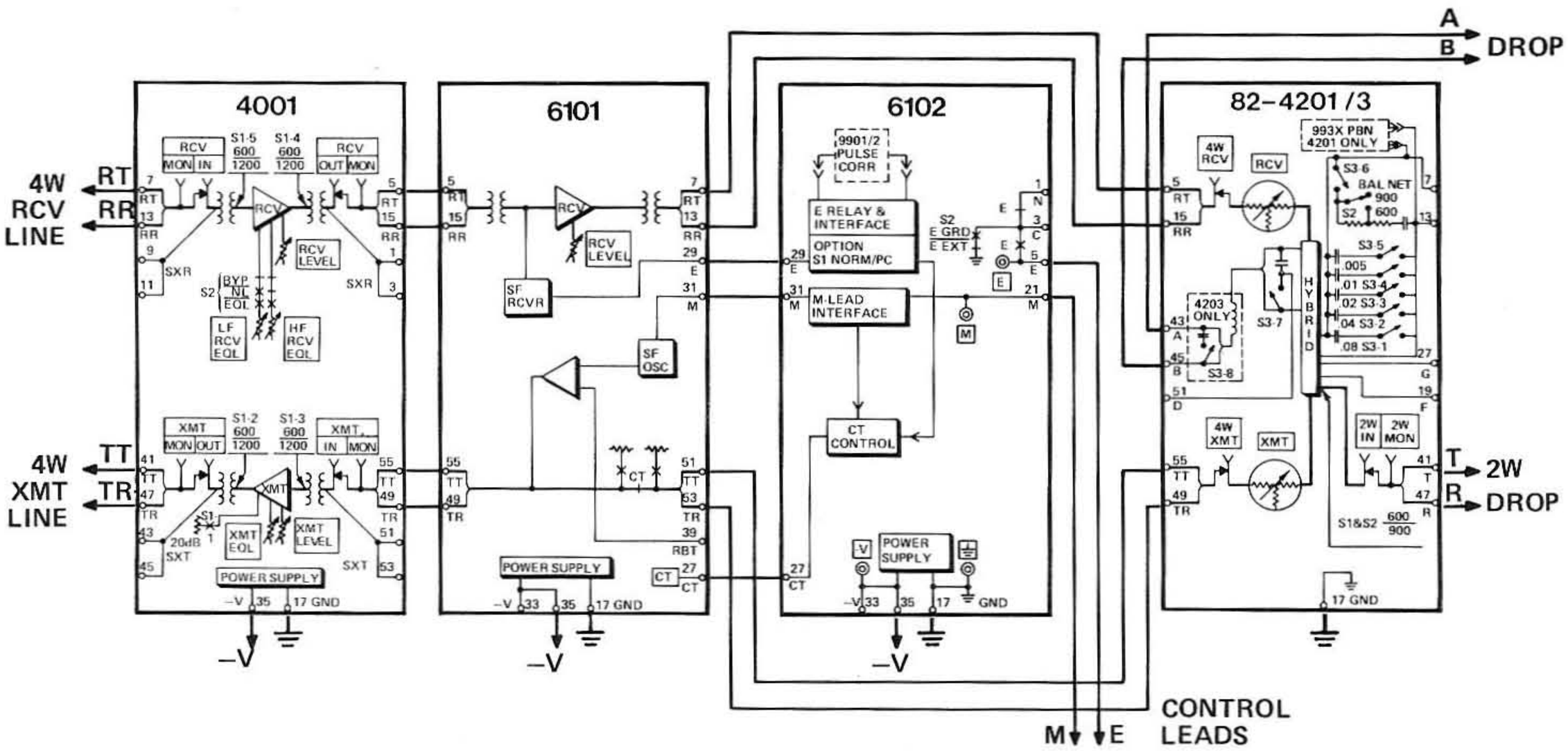


figure 2. Wiring diagram showing leads required when 6101 is used with 6102 Signaling Converter (E and M) in a 261 System.

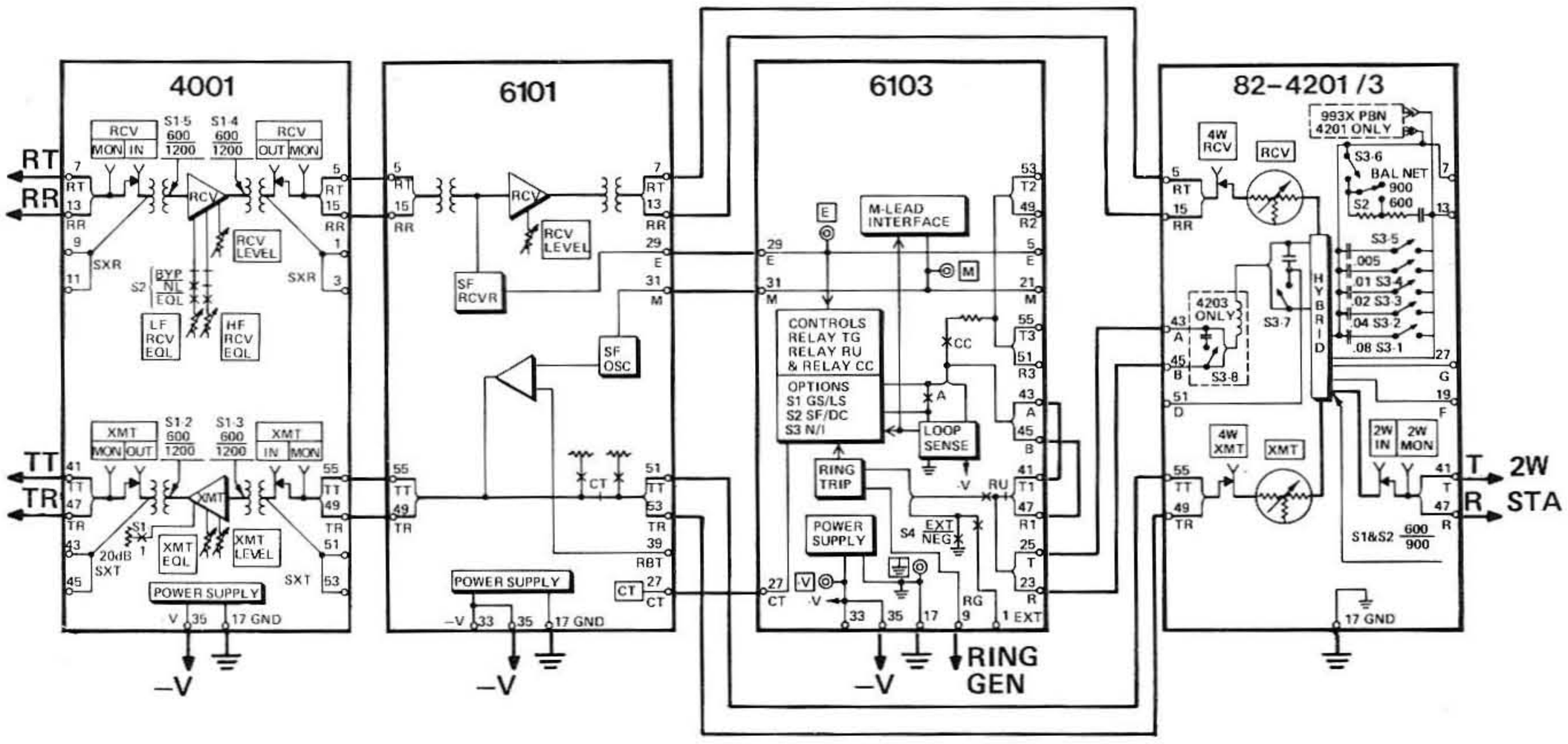


figure 3. Wiring diagram showing leads required when 6101 is used with 6103 Signaling Converter (FX-station) in a 261 System.

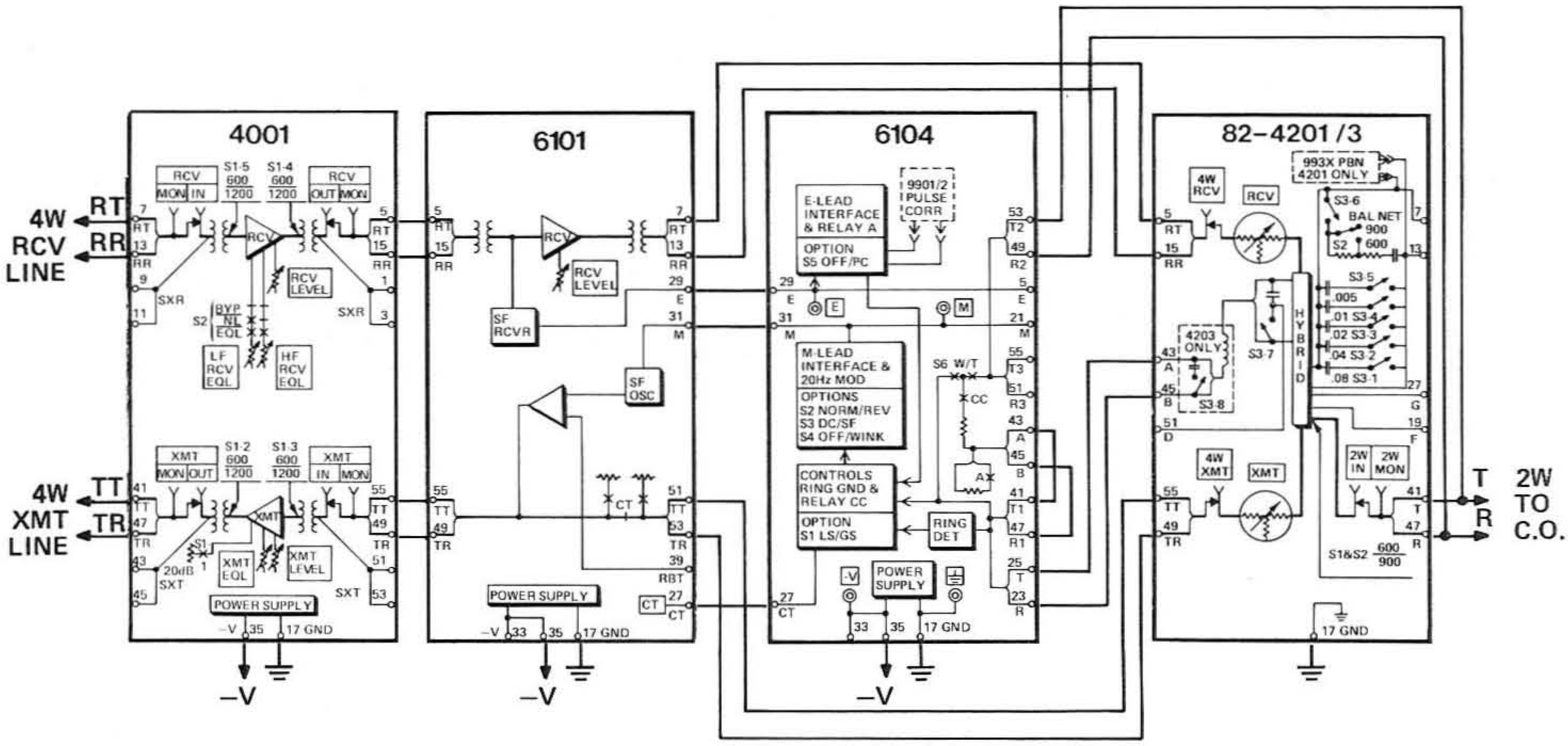


figure 4. Wiring diagram showing leads required when 6101 is used with 6104 Signaling Converter (FX-office) in a 261 System.

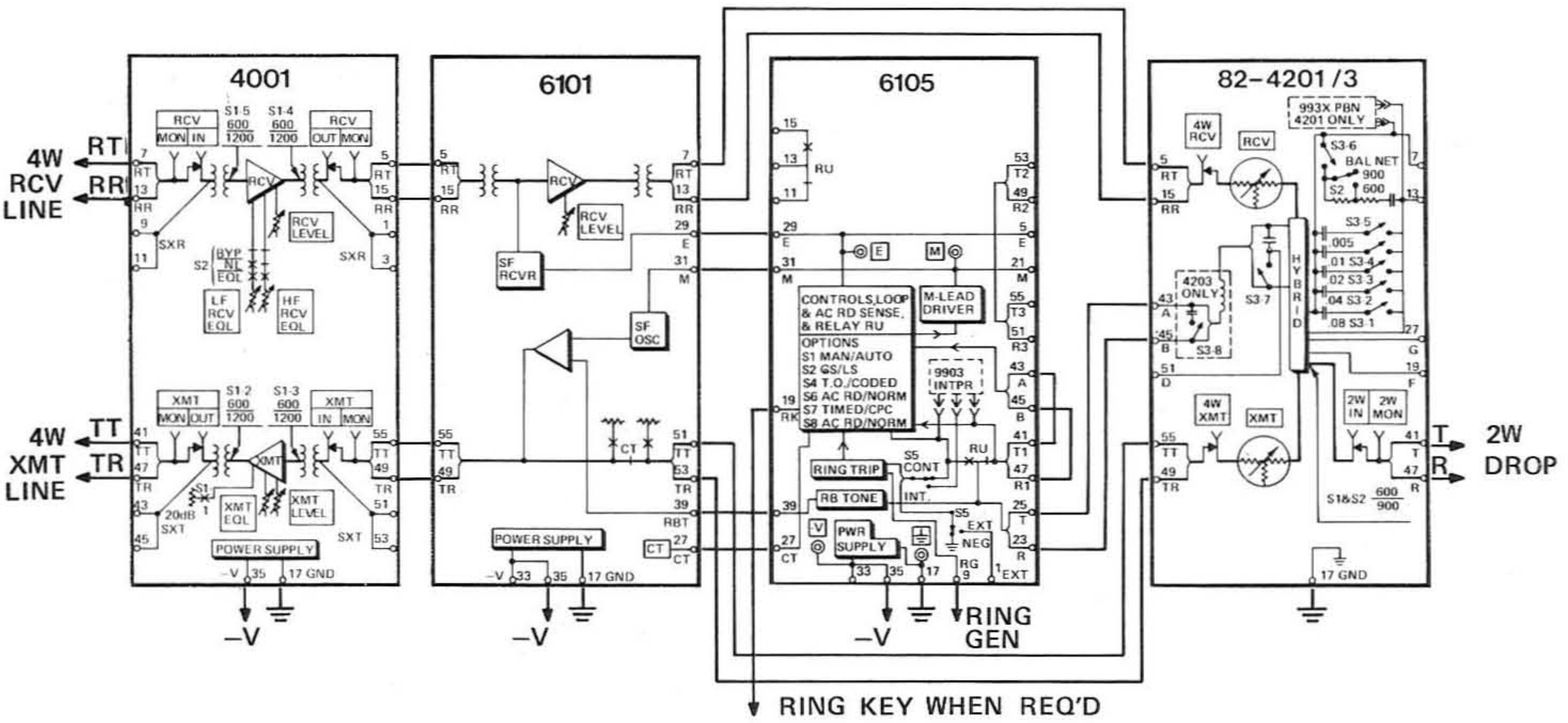


figure 5. Wiring diagram showing leads required when 6101 is used with 6105 Signaling Converter (Ringdown) in a 261 System.

3.07 The receive filter may be changed in the field to adapt the 6101 to other signaling frequencies. Four machine screws mount the filter assembly to the module's printed circuit board, while two connectors provide electrical connection. The filter may be changed out by removing these four screws, plugging in a new filter, and replacing the screws. (The receive filter is the large subassembly occupying the majority of the 6101 printed circuit board.)

4. circuit description

transmit portion

4.01 A ground potential on the M-lead causes the OSC timing and level control circuit to transmit SF tone from the 2600Hz Oscillator to the transmit pair through an amplifier. The OSC timing and level control circuit increases the gain of the AMPLIFIER for 300 to 500 milliseconds following the transition of the M-lead to the ground state. After a sustained M-lead ground, the amplifier gain is decreased to the low transmission signal level. A ground potential on the CT lead operates the CT relay. When operated, the CT relay breaks (cuts) the connection between XMT IN and the XMT OUT pairs and terminates the pairs in both directions.

receive portion

4.02 The E-lead is open when SF tone is detected by the receiver and is at ground when SF tone is removed. The receive input is transformer-coupled to the BAND ELIMINATION FILTER, FILTER SWITCH and the BAND PASS FILTER. The BAND PASS FILTER is connected to a signal level DETECTOR and one side of the signal level COMPARITOR.

4.03 The BAND ELIMINATION FILTER connects attenuated SF tone and all other frequencies unattenuated through the guard DETECTOR and the other side of the COMPARITOR. Thus, the COMPARITOR and DETECTORS determine the signal-to-guard ratio of the receiver.

4.04 When the receiver is in the low guard state, (continuous received SF tone), the BAND ELIMINATION FILTER is connected to the receive AMPLIFIER by the FILTER SWITCH. Insertion, of the filter in the transmission path attenuates the signaling frequency below the normal audible level. Additionally, the guard DETECTOR is disabled by the TIMING & LOGIC CIRCUIT, which enhances the signaling tone detector during high circuit noise conditions. The TIMING & LOGIC CIRCUITRY also prevents the E-lead from changing to a ground state during losses of SF tone for less than 50 milliseconds when the receiver is in the low-guard state.

4.05 SF tone removed from the input of the receiver causes the TIMING & LOGIC CIRCUITRY to activate the FILTER SWITCH and bypass the BAND ELIMINATION FILTER. Additionally, the receiver is placed into the high-guard detection state by the enabling of the guard DETECTOR.

4.06 The RCV LEVEL control varies the gain of the receive AMPLIFIER. The receive AMPLIFIER is transformer-coupled to the RCV output for connection to the terminal equipment.

6. specifications

transmit

insertion loss
.2B at 1kHz

frequency response
300Hz to 4kHz ±0.2dB maximum, relative to 1kHz

alignment level
−16dBm (−16TLP)

precut time delay
1 - 15ms (precut under control of associated signaling converter module)

SF tone stability
±5Hz/6 months

transmit tone level
low level: −36±1dBm
high level: −24±1dBm

high level duration
300 to 500ms

signaling frequency
2600±2Hz standard (others optional)

pulse distortion
within ±.5ms of input (appropriate delays provided in associated module)

input
−22 to −56Vdc resistance battery during off-hooks (sf off); ground during on-hooks (sf on)

receive

alignment level
+7dBm (+7TLP)

frequency response
(with band elimination filter removed): 300 to 3400Hz±0.2dB, relative to 1kHz.
(with band elimination filter inserted): 250 to 2000Hz±0.1dB 3000 to 4000Hz±0.5dB

tone rejection
2590 to 2610Hz, 55dB min. (with band elim. filter inserted)

gain range
±4dB relative to nominal +7TLP

facility terminating impedance
600 ohms ±5%

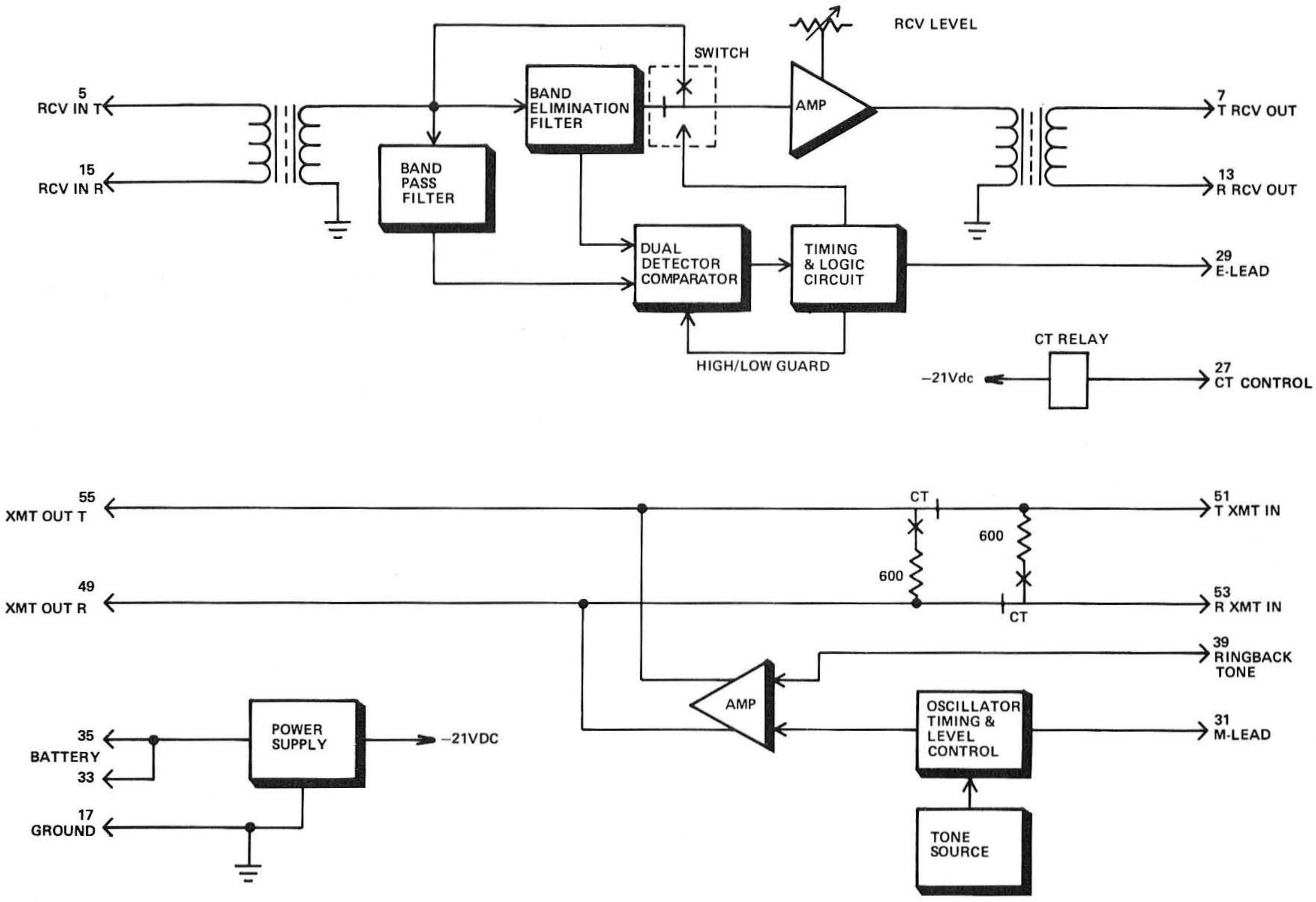
signaling tone threshold
−24dBm

signal-to-guard ratio
10dB nominal

bandwidth
75Hz nominal (high guard); 300Hz nominal (low guard)

high to low guard timing
225±60ms

low to high guard timing
50±10ms



5. BLOCK DIAGRAM

specifications (cont.)

band elimination filter timing
insertion: 13±7ms minimum
removal: 225±60ms minimum, or 50ms after end of tone burst longer than (225±60ms) minimum filter removal time

total harmonic distortion
less than 1%

maximum line noise
56dBrnC0

E-lead timing
sf recognition delay (high guard) 17±2ms; loss of sf recognition time (low guard) 40ms nominal

E-lead output
50mA maximum, 60Vdc maximum

common specifications

input power
–22 to –56Vdc, 20mA nominal

operating environment
20° to 130° F (–6° to 54° C), humidity to 95% (no condensation)

mounting
one position Tellabs Type 10 Shelf or Wescom Type 400 Shelf

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

weight
21 ounces (595 grams)

7. testing and troubleshooting

7.01 This Troubleshooting Guide may be used to assist in the installation, testing or troubleshooting of the 6101 SF Transceiver module. The Guide 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" testing or repairs be attempted on the 6101 module. Unauthorized testing or repairs may void the 6001's warranty.

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

TEST	TEST PROCEDURE	NORMAL CONDITIONS	TROUBLESHOOTING:IF NORMAL CONDITIONS ARE NOT MET, VERIFY:
Receive Signal and Noise Levels SF	Using Transmission Test Set (TTS), measure received SF tone level (tone applied at –20dbm0 from distant location).	Tone level between –10 and –16dBm (terminated 600 ohm measurement) ☐.	If Line Amplifier used, gain and equalization properly adjusted ☐.
	Request the distant location remove tone from the facility, and measure noise with TTS.	Noise level measures less than 56dBrNC ☐.	Transmission facility properly aligned, and levels correctly set ☐.
E-lead Signaling State SF	Using VOM, measure potential between E-lead and ground with tone alternately applied to and removed from facility.	With tone applied to facility, measure open circuit voltage ☐. With tone removed, measure 0 volts (ground potential) ☐.	Replace 6101 module and retest ☐. If 6102 used, and trouble persists, verify switch S2 in "E GND" position and S3 in "NORM" position ☐. Replace 6102 and retest ☐.
RCV Dial Pulsing SF	Request the distant location send dial pulses at 60% break, 10pps.	Received E-lead pulses between 50 and 64% break ☐. If 9901 Pulse Corrector used, pulses at 58±2% break ☐.	Replace 6101 and retest ☐. Replace Signaling Converter module and retest ☐. Replace 9901 Pulse Corrector (if used) on Signaling Converter module and retest ☐.
Transmit Dial Pulsing SF	Pulse local M-lead at 30 and 60 percent break, 10pps. Measure outgoing SF pulses.	At 30% break pulsing on M-lead, output pulses at 30±2% break ☐. At 60% break input, outgoing pulses at 60±2% break ☐.	Replace 6101 and retest ☐. Replace Signaling Converter module and retest ☐.
Transmit Cut	With circuit idle, insert 1000Hz tone (0dBm0 level) at the XMT IN part of associated equipment (normally Term Set), and measure signal level at XMT OUT of 6101 (or of Line Amp, if used).	2600Hz signal level -36±2dBm☐.	Circuit idle in both directions☐. Replace 6101 and retest ☐. Replace Signaling Converter module and retest ☐.

7.03 If a 6101 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. (i.e.; service outages, etc.).

replacement

7.04 If a defective 6101 is encountered, notify Tellabs directly, via telephone, letter or twx. Notification should include all relevent information, including the 8X6101 part number (from which we can determine the Issue of the 6101 in question). Upon notification, we shall ship a replacement 6101 to you. If the Warranty date of the 6101 has not elapsed, the replacement module will be shipped at no charge. Package the defective 6101 in the replacement module's carton; sign the packing list included with the replacement 6101 and enclose it with the defective module (this is your return authorization); affix the preaddressed label(s) provided with the replacement module to the carton(s) being returned; and ship the equipment prepaid to Tellabs.

repair and return

7.05 Return the defective 6101, shipment prepaid, to Tellabs. 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.