

6008A FXS-to-E&M Signaling Converter Subassembly

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1. general description

1.01 The 6008A FXS-to-E&M Signaling Converter plug-on subassembly (figure 1) provides bidirectional conversion between foreign-exchange station-end (FXS) signaling, which is the type of loop signaling normally used at the station end of a foreign-exchange (FX) or off-premises-station (OPS) circuit, and the E&M signaling used by a carrier channel (or a PBX). As an alternative, the 6008A can be used at both ends of an E&M facility to provide automatic ringdown operation. In its primary application (FXS to E&M), the 6008A converts FXS signaling from the station end of the circuit to E-lead outputs (with A-side signaling) or M-lead outputs (with B-side signaling) toward the carrier channel or PBX, and converts M-lead inputs (with A-side signaling) or E-lead inputs (with B-side signaling) from the carrier channel (or PBX) to FXS-type supervisory and ringing signals toward the station end. The 6008A subassembly is designed expressly for optional use on the Tellabs 6131 2Wire-to-4Wire or 4Wire-to-4Wire Terminal Interface Module.

1.02 This practice section is revised to indicate that the loop-to-E&M delay of 6008A's built after March, 1987, is lengthened to 25ms nominal. This prevents possible premature ring trip when more than two associated telephone sets are used.

1.03 Functions, features, and options of the 6008A include the following:

- Switch-selectable A-side or B-side E&M signaling.
- Independently switch-selectable normal or inverted input operation and output operation on the subassembly's E&M side.
- Switch-selectable loop-start, ground-start, or reverse-battery supervision.
- Switch-selectable minimum-break pulse correction for the loop-to-E&M path.
- Switch-selectable integral ringback tone source.
- Switch-selectable 2-second-on, 4-second-off ringing interruption.
- Precision balanced loop-current detection circuitry for reliable operation in the presence of high longitudinal voltages.
- Active station-side loop-current limiting.
- Transmission-path-cut control.
- A busy-indicating LED that is visible on the host

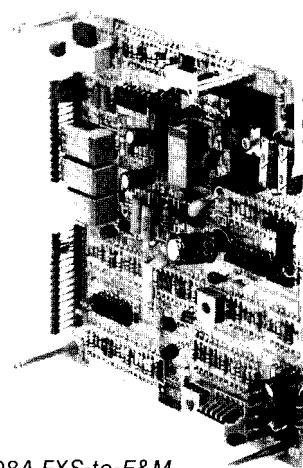


figure 1. 6008A FXS-to-E&M
Signaling Converter subassembly

module's front panel when the 6008A is installed on the 6131.

1.04 The 6131 module on which the 6008A subassembly is used provides transmission interface between a 2wire or 4wire loop-signaling facility and a 4wire E&M trunk. Along with switch-selectable 2wire or 4wire facility-side interface, transformer coupling is provided at all ports of the 6131, and prescription bidirectional level control (loss only in FCC-registered applications, gain or loss in non-registered applications) is also available on the module. Thus, in the 2wire-to-4wire mode, the 6131 itself functions as a hybrid terminating set with pads (registered) or as a 2wire-to-4wire repeater (non-registered). In the 4wire-to-4wire mode, the 6131 functions as a pad/transformer module (registered) or as a 4wire-to-4wire repeater (non-registered). When the 6008A subassembly is installed on the 6131 module, the resulting module-subassembly combination is referred to as a **6131A**. The 6008A makes physical and electrical connection to its host 6131 via two 15-pin male connectors on the 6008A and corresponding female connectors on the printed circuit board of the 6131.

Note: While the 6008A subassembly and 6131 module can be ordered separately, the 6131 can also be ordered with the 6008A factory-installed on the module. To do this, simply specify the **6131A module** on the order.

1.05 With the 6008A subassembly installed, the host 6131 can be switch-optional for either of three facility-side signaling-lead arrangements:

- **Bypass:** In the *bypass* mode, the 6008A subassembly is electrically bypassed so that no signaling conversion takes place.
- **Normal:** In the *normal* mode with 2wire facility interface selected, the 6131's A lead is associated with the 2wire tip lead, and the B lead is

associated with the 2wire ring lead. In the *normal* mode with 4wire facility interface selected, the 6131's receive output simplex (SX) lead (or A lead) is associated with the 4wire receive output pair, and the transmit input SX lead (or B lead) is associated with the 4wire transmit input pair.

- **Reverse:** In the *reverse* mode with 2wire facility interface selected, the 6131's A lead is associated with the 2wire ring lead, and the B lead is associated with the 2wire tip lead. In the *reverse* mode with 4wire facility interface selected, the 6131's receive output SX lead (or A lead) is associated with the 4wire transmit input pair, and the transmit input SX lead (or B lead) is associated with the 4wire receive output pair.

1.06 Input power is supplied to the 6008A subassembly via the host 6131 module. Integral voltage regulators on the 6008A and the 6131 allow the 6131A to operate on filtered, ground-referenced -22 to -56Vdc input. Maximum current required by the 6008A and its host 6131 together is 140mA plus loop current. Both M-lead and B-lead power (A-lead power in reverse-battery applications) are derived from input power prior to regulation to allow operation with conventional external M-lead and B-lead (or A-lead) potentials.

1.07 As stated above, the 6008A plugs onto the printed circuit board of its host 6131, a Type 10 module. The resulting 6131A, in turn, plugs into one position of a 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. application

2.01 The 6008A FXS-to-E&M Signaling Converter subassembly, when installed on its host 6131 2Wire/4Wire-to-4Wire Terminal Interface Module, interfaces a 2wire or 4wire FX or OPS facility that uses FXS-type loop signaling with a 4wire E&M trunk that normally interfaces a carrier channel. The FXS facility is normally terminated in a 2wire or 4wire telephone station instrument. When the host 6131 module is optioned for 2wire facility interface, signaling is derived via the module's 2wire tip and ring leads. When the 6131 is optioned for 4wire facility interface, signaling is derived via the module's receive output SX and transmit input SX leads.

2.02 The 6131A module-subassembly combination is typically used with a Tellabs 6131B combination at the office (switching-equipment) end of the FX or OPS circuit. This combination consists of a host 6131 module and a Tellabs 6008B FXO-to-E&M Signaling Converter subassembly, which together provide both 2wire-to-4wire or 4wire-to-4wire transmission interface and bidirectional signaling conversion between the foreign-exchange office-end (FXO) loop signaling used by the switching equipment and the E&M signaling used by an associated carrier channel.

2.03 Use of the 6008A subassembly is not limited to station-end FX and OPS applications. A two-way automatic ringdown circuit can be provided simply by equipping both ends of an E&M facility with a 6131A combination.

2.04 In any application, the 6008A can be switch-optioned for A-side or B-side E&M signaling; loop-start, ground-start, or reverse-battery supervision; normal or inverted E&M-lead inputs; and normal or inverted E&M-lead outputs. Table 1 summarizes, for various combinations of signaling and supervisory options, the E&M (terminal-side) inputs that result in seizures from that side and activate local ringing. In all cases, local ringing (continuous or interrupted, as selected via 6008A switch option) persists for the duration of the incoming seizure condition, as does the tip-ground connection (ring-ground connection when host 6131 is optioned for the **reverse** signaling mode) in ground-start operation.

2.05 In high-priority or high-security circuit applications, it may be desirable to use a signaling arrangement that results in an incoming loop seizure (continuous ringing) at the local (station) end if the E&M facility fails. The continuous ringing thus provided serves as an immediate audible indication of the facility failure. Such an arrangement requires M-lead negative battery (A-side signaling) or E-lead ground (B-side signaling) at the local (station) end during idle. To implement this arrangement, the 6008A must be optioned for **normal** E&M inputs in loop-start and reverse-battery applications or for **inverted** E&M inputs in ground-start applications. Please be aware, however, that in most applications it is not desirable to permanently ring the station instrument when the facility fails. In such cases, the 6008A should be optioned for **inverted** E&M inputs in loop-start and reverse-battery applications or for **normal** E&M inputs in ground-start applications.

Note: If a Tellabs 6131B combination is being used at the distant (office) end of the circuit, the distant-end 6008B subassembly can be optioned so that failure of the E&M facility causes an outgoing loop seizure (forced busy) at that end. See the Tellabs 6008B practice for details.

2.06 In all applications of the 6008A (station-end FX, station-end OPS, and ringdown), ringing energy to the associated station must be provided from a local ringing source external to the 6131A. To accommodate local ring trip during the ringing interval, the ringing generator used must be of the ground-return (battery-bias) type.

2.07 In loop-start FX and OPS applications, the 6008A must be optioned for continuous ringing, in which case the 6008A follows ringing from the distant-end switching equipment. In ground-start FX and OPS applications and also in all ringdown applications, either continuous ringing or interrupted (2-second-on, 4-second-off) ringing may be selected.

A-side/B-side E&M signaling*	normal or inverted E&M input states	supervisory mode	input to 6008A	comments
A side*	normal	loop start	M-lead ground	
		reverse battery	M-lead ground	
		ground start	M-lead negative battery	tip lead** connected to ground
A side*	inverted	loop start	M-lead negative battery	
		reverse battery	M-lead negative battery	
		ground start	M-lead ground	tip lead** connected to ground
B side*	normal	loop start	E-lead open	
		reverse battery	E-lead open	
		ground start	E-lead ground	tip lead** connected to ground
B side*	inverted	loop start	E-lead ground	
		reverse battery	E-lead open	
		ground start	E-lead open	tip lead** connected to ground

* The 6008A subassembly is optioned for A-side signaling when it interfaces equipment that provides M-lead outputs and receives E-lead inputs. The 6008A subassembly is optioned for B-side signaling when it interfaces equipment that provides E-lead outputs and receives M-lead inputs. Thus, when the 6008A is optioned for A-side or B-side signaling, this means that it is properly conditioned **to interface** equipment that provides A-side or B-side signaling, respectively.

** Ring lead if host 6131 module is optioned for the **reverse** signaling mode.

table 1. Input states that cause E&M-side seizure

2.08 While all internal circuitry of the 6008A receives power via internal regulators (which permit operation on -22 to -56 Vdc filtered input) on both the host 6131 and the 6008A itself, M-lead and B-lead (A-lead in reverse-battery applications) potentials are derived directly from the external power source. This means that if the E&M-side carrier channel (or other signaling equipment) requires nominal -48 Vdc M-lead potential, the 6131A must be powered from a nominal -48 Vdc source. This also means that loop-sensing limits depend upon the external power source. The 6008A's loop-sensing circuitry operates at up to 3000 ohms at -48 Vdc and at up to 1200 ohms at -24 Vdc. Loop limits (cable plus station instrument) for 23mA loop current are 1700 ohms at -48 Vdc B-lead (or A-lead) potential and 700 ohms at -24 Vdc B-lead (or A-lead) potential. In short-loop applications (500 ohms or less), -24 Vdc operation is recommended.

2.09 Table 2 lists a variety of possible operating modes for the 6131A, along with the switch options required to implement these modes and the E&M-side logic states that accomplish signaling. When referring to table 2, please note the following:

- The input and output switch settings (SIG for normal, INV for inverted) apply to the 6008A's **E&M-side** inputs and outputs.
- The 6008A's A-side/B-side signaling optioning depends upon the E&M signaling equipment that interfaces the 6131A. The 6008A is optioned for A-side signaling when the 6131A interfaces equipment that provides M-lead outputs and receives E-lead inputs. B-side signaling is selected when the 6131A interfaces equipment that provides E-lead outputs and receives M-lead inputs.

- When the 6131 module is optioned for 2wire facility-side (loop-signaling) interface, its A&B leads are derived via the 2wire tip and ring leads. When the 6131 module is optioned for 4wire facility-side interface, its A&B leads are derived via the facility-side SX leads.

3. installation inspection

3.01 The 6008A FXS-to-E&M Signaling Converter subassembly 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 subassembly should be visually inspected again prior to installation.

mounting and connections

3.02 The 6008A subassembly makes physical and electrical connection to the host 6131 module via two 15-pin male connectors, *P1* and *P2*, located on the subassembly's component side. To install the 6008A on the host 6131, proceed as follows:

- Remove the small plastic filler panel at the upper righthand corner of the 6131's front panel by pushing it outward from the rear of the panels.
- Orient the 6008A subassembly so that male connector *P1* on the 6008A lines up with female connector *J1* on the 6131, male connector *P2* on the 6008A lines up with female connector *J2* on the 6131, and the small rectangular plastic panel labeled *A* and containing the *busy* LED on the 6008A lines up with the opening at the upper righthand corner of the 6131's front panel adjacent to the 6131 model module.
- Carefully plug the 6008A onto the host 6131, ensuring that all connector pins on the 6131 fit properly into their receptacles on the 6131's

facility interface	operating/supervisory mode	required switch options*		E&M-side logic signals
		6008A	6131	
2wire	automatic ringdown	S12 = LS (loop start) S15-A (input) = INV S15-B (output) = SIG** S15-D (ringback tone) = ON***	S14 (sig. mode) = NORM S5 = 2WIRE	incoming: on-hook = not ringing off-hook = ringing outgoing: open loop = on-hook closed loop = off-hook
4wire	automatic ringdown	S12 = LS (loop start) S15-A (input) = INV S15-B (output) = SIG** S15-D (ringback tone) = ON***	S14 (sig. mode) = NORM S5 = 4WIRE	incoming: on-hook = not ringing off-hook = ringing outgoing: open loop = on-hook closed loop = off-hook
2wire	ground start	S12 = GS (ground start) S15-A (input) = SIG** S15-B (output) = SIG** S15-D (ringback tone) = OFF	S14 (sig. mode) = NORM S5 = 2WIRE	incoming: on-hook = A-lead open/ not ringing off-hook = A-lead ground/ringing outgoing: open loop = on-hook closed loop/B-lead ground = off-hook
4wire	ground start	S12 = GS (ground start) S15-A (input) = SIG** S15-B (output) = SIG** S15-D (ringback tone) = OFF	S14 (sig. mode) = NORM S5 = 4WIRE	incoming: on-hook = A-lead open/ not ringing off-hook = A-lead ground/ringing outgoing: open loop = on-hook closed loop/B-lead ground = off-hook
2wire	loop start	S12 = LS (loop start) S15-A (input) = SIG** S15-B (output) = SIG** S15-D (ringback tone) = OFF	S14 (sig. mode) = NORM S5 = 2WIRE	incoming: off-hook = not ringing on-hook = ringing outgoing: open loop = on-hook closed loop = off-hook
4wire	loop start	S12 = LS (loop start) S15-A (input) = SIG** S15-B (output) = SIG** S15-D (ringback tone) = OFF	S14 (sig. mode) = NORM S5 = 4WIRE	incoming: off-hook = not ringing on-hook = ringing outgoing: open loop = on-hook closed loop = off-hook
2wire	reverse battery	S12 = RB (reverse battery) S15-A (input) = INV S15-B (output) = SIG** S15-D (ringback tone) = OFF	S14 (sig. mode) = REV S5 = 2WIRE	incoming: on-hook = normal battery/not ringing off-hook = reverse battery/ringing outgoing: open loop = on-hook closed loop = off-hook
4wire	reverse battery	S12 = RB (reverse battery) S15-A (input) = INV S15-B (output) = SIG** S15-D (ringback tone) = OFF	S14 (sig. mode) = REV S5 = 4WIRE	incoming: on-hook = normal battery/not ringing off-hook = reverse battery/ringing outgoing: open loop = on-hook closed loop = off-hook

* See the 6131 practice and section 3 of this practice for switch options not listed in this table.

** The *SIG* setting provides **normal** inputs (*S15-A*) and outputs (*S15-B*).

*** If ringback tone is not desired in ringdown applications, set switch *S15-D* on the 6008A subassembly to *OFF*, i.e., away from its *RT* position.

table 2. Typical 6131A operating modes

female connectors and also ensuring that the small plastic panel labeled A on the 6008A fits properly into the opening in the 6131's front panel.

- D. Finally, install and tighten the screws (supplied) that secure the 6008A's four standoff posts to the 6131's printed circuit board.

options and alignment

3.03 The 6008A subassembly itself requires no alignment. Before the 6008A is placed into service, however, three option switches on the subassembly itself must be set. One is a two-position slide switch, another is a three-position slide switch, and the third is a five-position DIP switch. Figure 2 shows the locations of these switches on the subassembly's printed circuit board. In addition to the 6008A's switches, several option switches on the host 6131 module must be set as well. Instructions for setting the 6131's option switches are provided in the Tellabs 6131 practice, while instructions for setting the 6008A's option switches are provided below.

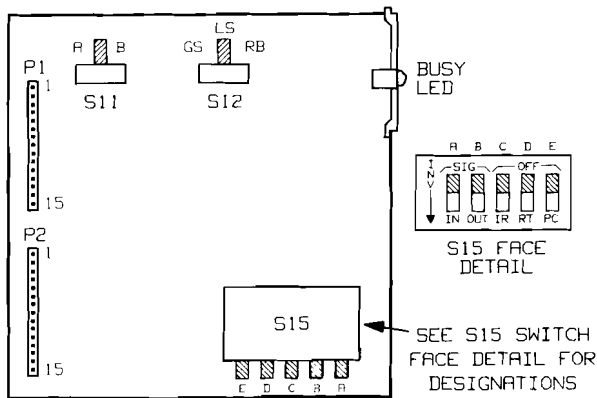


figure 2. 6008A option switch locations

prescription optioning

3.04 For prescription optioning of the 6008A, all required option-switch settings should be determined from circuit records prior to installation of the 6131A. These required options should then be noted in the checklist column of table 3 or on the circuit layout record (CLR). During installation, the 6008A can be quickly and easily optioned without referring to the detailed optioning instructions in the text. Simply refer to the checklist column of table 3 (or to the CLR) and set all option switches as indicated.

Note: A similar table and checklist are provided in the Tellabs 6131 practice for prescription optioning and alignment of the host 6131 module.

non-prescription optioning

3.05 If prescription option-switch settings are not available for the 6008A, set its three option switches as directed below.

3.06 **A-Side or B-Side E&M Signaling.** Two-position slide switch S11 conditions the 6008A to interface, on its E&M side, equipment that uses either A-side or B-side E&M signaling. Set S11 as follows:

- If the equipment interfaced on the 6008A's E&M side uses A-side signaling (i.e., provides M-lead outputs and receives E-lead inputs), set S11 to the A position.
- If the equipment interfaced on the 6008A's E&M side uses B-side signaling (i.e., provides E-lead outputs and receives M-lead inputs), set S11 to the B position.

3.07 **Supervisory Mode.** Three-position slide switch S12 selects either the loop-start, ground-start, or reverse-battery supervisory mode. Set S12 as follows:

switch option	switch	selection	setting	checklist
A-side*/B-side** E&M signaling	S11	A-side signaling*	A	
		B-side signaling**	B	
supervisory mode	S12	loop start	LS	
		ground start	GS	
		reverse battery	RB	
normal or inverted E&M inputs	S15-A (IN)	normal inputs	SIG (i.e., away from IN)	
		inverted inputs	INV (i.e., toward IN)	
normal or inverted E&M outputs	S15-B (OUT)	normal outputs	SIG (i.e., away from OUT)	
		inverted outputs	INV (i.e., toward OUT)	
continuous or interrupted (2-second-on, 4-second-off) ringing	S15-C (IR)	continuous ringing	OFF	
		interrupted ringing	IR	
ringback tone	S15-D (RT)	ringback tone	RT	
		no ringback tone	OFF	
minimum-break pulse correction for loop-to-E&M path	S15-E (PC)	pulse correction	PC	
		no pulse correction	OFF	

* Option for A-side signaling if 6008A's E&M side interfaces equipment that provides M-lead outputs and receives E-lead inputs.

** Option for B-side signaling if 6008A's E&M side interfaces equipment that provides E-lead outputs and receives M-lead inputs.

table 3. Summary and checklist of 6008A switch options

- For loop-start supervision, set *S12* to the *LS* position.
- For ground-start supervision, set *S12* to the *GS* position.
- For reverse-battery supervision, set *S12* to the *RB* position.

3.08 Normal or Inverted E&M Inputs. Position *A* (labeled *IN*) of five-position DIP switch *S15* selects either normal or inverted E&M-side inputs. Set *S15-A* as follows:

- For normal E&M-side inputs, set *S15-A* to *SIG* (i.e., away from *IN* and the *INV* arrowhead).
- For inverted E&M-side inputs, set *S15-A* to *INV* (i.e., toward *IN*).

3.09 Normal or Inverted E&M Outputs. Position *B* (labeled *OUT*) of five-position DIP switch *S15* selects either normal or inverted E&M-side outputs. Set *S15-B* as follows:

- For normal E&M-side outputs, set *S15-B* to *SIG* (i.e., away from *OUT* and the *INV* arrowhead).
- For inverted E&M-side outputs, set *S15-B* to *INV* (i.e., toward *OUT*).

3.10 Continuous or Interrupted Ringing. Position *C* (labeled *IR*) of five-position DIP switch *S15* selects either continuous or interrupted (2-second-on, 4-second-off) ringing. Set *S15-C* as follows:

- For continuous ringing, set *S15-C* to *OFF*.
- For interrupted ringing, set *S15-C* to *IR*.

3.11 Ringback Tone. Position *D* (labeled *RT*) of five-position DIP switch *S15* selects either ringback tone or no ringback tone. Set *S15-D* as follows:

- For ringback tone, set *S15-D* to *RT*.
- For no ringback tone, set *S15-D* to *OFF*.

3.12 Pulse Correction. Position *E* (labeled *PC*) of five-position DIP switch *S15* selects either minimum-break pulse correction or no pulse correction for the loop-to-E&M path. Set *S15-E* as follows:

- For minimum-break pulse correction, set *S15-E* to *PC*.
- For no pulse correction, set *S15-E* to *OFF*.

4. circuit description

4.01 This circuit description is intended to familiarize you with the 6008A FXS-to-E&M Signaling Converter subassembly for engineering and application purposes only. Attempts to troubleshoot the 6008A 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 this circuit description.

4.02 The 6008A provides ringing and loop supervision toward a PBX trunk circuit or a local telephone instrument. Incoming E&M signaling (either A-side or B-side, depending upon the associated equipment) is detected by the 6008A's E&M interface circuitry. Option switch *S15-A* (which selects either normal or inverted E&M inputs) conditions the 6008A to derive the appropriate logic states for control of local ringing, application of ground to the local tip lead, and application of

reverse battery to the local loop. Selection of either the loop-start, ground-start, or reverse-battery supervisory mode is made via option switch *S12*. In the loop-start mode and with normal E&M inputs, an incoming E-lead open (M-lead ground) activates the *ring-up (RU)* relay after a nominal 80ms delay. The *RU relay*, when activated, applies ringing to the local loop. In the loop-start mode and with inverted E&M inputs, an E-lead ground (M-lead negative battery) activates the *RU relay*.

4.03 When the 6008A is optioned for ground-start supervision, a sensing circuit operating from the E lead or M lead activates the *tip-ground (TG)* relay upon receipt of E-lead ground or M-lead negative battery when the 6008A is optioned for normal E&M inputs. This sensing circuit activates the *TG relay* upon receipt of E-lead open or M-lead ground when the 6008A is optioned for inverted E&M inputs. The *TG relay* applies ground to the local tip lead. This same input also activates the *RU relay*, which applies ringing to the local loop. A nominal 80ms delay occurs between the input seizure and local application of tip-lead ground. When the 6008A is optioned for reverse-battery supervision, a sensing circuit operating from the input activates the *reverse-battery (RB)* relay upon receipt of an E-lead ground or M-lead negative battery when the 6008A is optioned for normal E&M inputs. With inverted E&M inputs, an E-lead open or M-lead ground activates the *RB relay*. The *RB relay* reverses battery to the local loop. As in the ground-start mode, this input also activates the *RU relay*. A nominal 80ms delay occurs between the input seizure and local application of reverse battery. (Please note that in the foregoing description, the 6131A's A&B loop-signaling leads are interchanged with respect to the tip and ring leads if switch *S14* on the host 6131 is optioned for the reverse [*REV*] signaling mode. See table 2 in this practice for more information.)

4.04 An integral *ringing interrupter* can be optioned into the circuit via switch *S15-C* in the loop-start, reverse-battery, or ground-start mode. This *interrupter* provides nominal 2-second-on, 4-second-off ringing interruption. Continuous ringing is provided when the *interrupter* is optioned out of the circuit.

4.05 Local ring trip is provided via an optocoupler and associated circuitry in the *ring-trip circuit*. A ground-return ring generator must be used in all applications.

4.06 At the station (or PBX) interface port, the 6008A supplies local loop current through a *current limiter* and a pair of matched 100-ohm battery-feed resistors. The *current limiter* limits loop current to a nominal 35mA. A balanced *loop-current detector* senses loop current and, after a nominal 15ms delay, provides the output signal level (busy state) indicated in table 4, depending upon the settings of option switches *S15-B* and *S11*. Table 4 also includes the idle-state and busy-state signal levels

for the various signaling output option-switch settings.

4.07 An integral *minimum-break pulse corrector* can be optioned into the loop-to-E&M path via switch *S15-E*. This *pulse corrector* outputs pulses with a nominal 50ms break for input breaks from 20 to 50ms.

4.08 An active *series regulator* integral to the 6008A supplies power to the subassembly's relays from -22 to -56Vdc input. Other supplies and references (-20 and -10Vdc) are supplied by the host 6131 module. The 6008A's *series regulator* uses a zener diode for establishing the relay supply and a series-pass transistor for voltage limiting.

switch settings		signal levels for output to E&M leads	
S11	S15-B (E&M outputs)	idle	busy
A side	normal	E-lead open	E-lead ground
A side	inverted	E-lead ground	E-lead open
B side	normal	M-lead ground	M-lead negative battery
B-side	inverted	M-lead negative battery	M-lead ground

table 4. Idle and busy signal levels for output to E&M leads

6. specifications

general

external E&M-lead resistance

500 ohms maximum

ringing frequency and voltage ranges

16 to 67Hz, 80 to 130Vrms

ring-trip range

3000 ohms maximum with -48Vdc battery

1200 ohms maximum with -24Vdc battery

pre-trip margin

will not pre-trip with up to 8 μ F load

ring-up delay

50 to 90ms

ring-release delay

50 to 90ms

ringing interrupter

2 seconds ringing, 4 seconds silent, nominal, excludable via switch option for continuous ringing

tip-ground seizure delay

50 to 90ms

tip-ground release delay

50 to 90ms

reverse-battery seizure delay

50 to 90ms

reverse-battery release delay

50 to 90ms

loop-to-E&M delay

25 \pm 4ms

loop-sensing range

3000 ohms maximum with -48Vdc battery

1200 ohms maximum with -24Vdc battery

dial-pulsing rate

7.5 to 12.5pps

dial-pulse distortion

maximum 3.0% distortion for input breaks longer than 50ms

loop-to-E&M dial-pulse correction

minimum-break, with minimum break duration of 50 \pm 2ms, excludable via switch option

transmission-path-cut control

57dB attenuation minimum

ringback tone level

-23 to -13dBm

input power requirements

voltage: -22 to -56Vdc, filtered, earth-ground-referenced (supplied via host 6131 module)

current: 140mA maximum, including host 6131 but not including loop current

operating environment

32° to 130°F (0° to 54°C), humidity to 95% (no condensation)

dimensions

5.25 inches (13.35cm) high

1.14 inches (2.90cm) wide

5.20 inches (13.21cm) deep

weight

5 ounces (142 grams), not including host 6131 module

mounting

plugs onto printed circuit board of a Tellabs 6131 2W/4W-4W Terminal Interface Module, which, in turn, plugs into one position of a Tellabs Type 10 Mounting Shelf (relay-rack- or apparatus-case-configured)

transmission specifications affected by 6008A

2wire-port echo return loss

22dB ERL minimum vs. 600 or 900 ohms in series with 2.15 μ F

transhybrid loss

30dB ERL minimum with precision termination of 600 ohms plus 2.15 μ F

insertion loss

0.3dB nominal at 1000Hz and 600 ohms

nominal frequency response (re 1000Hz)

receive path, 2wire facility interface:

300 to 1000Hz: -2.2, +0.1dB

1000 to 4000Hz: -1.0, +1.0dB

receive path, 4wire facility interface:

300 to 1000Hz: -0.8, +0.1dB

1000 to 4000Hz: -0.8, +0.5dB

transmit path, 2wire facility interface:

300 to 1000Hz: -2.2, +0.1dB

1000 to 4000Hz: -1.0, +1.0dB

transmit path, 4wire facility interface:

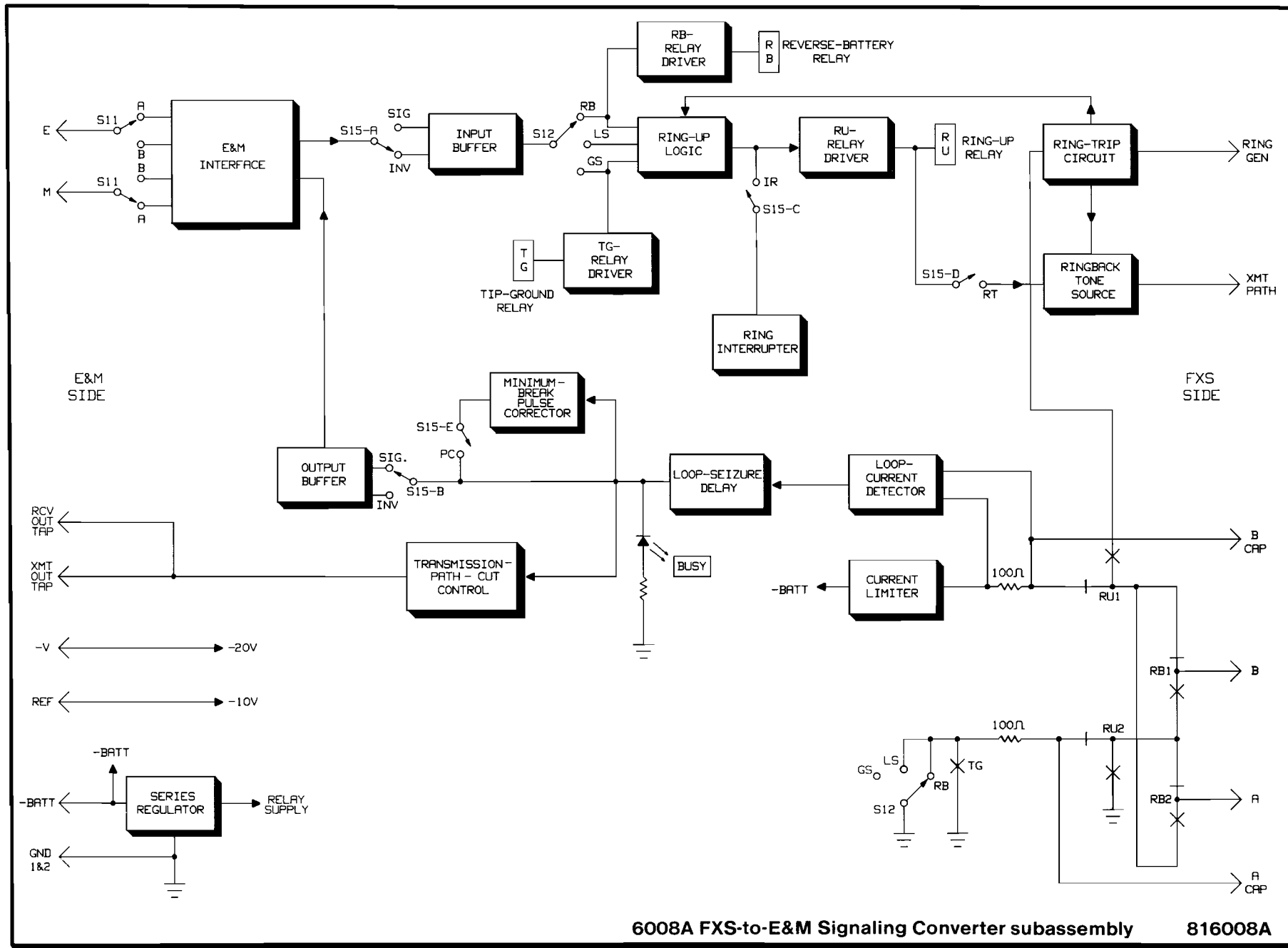
300 to 1000Hz: -0.8, +0.1dB

1000 to 4000Hz: -0.5, +0.5dB

longitudinal balance

60dB minimum, 200 to 1000Hz

50dB minimum at 4000Hz



5. block diagram

7. testing and troubleshooting

7.01 The **troubleshooting guide** in this section may be used to assist in the installation, testing, or troubleshooting of the 6008A FXS-to-E&M Signaling Converter subassembly. The guide 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 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

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

USA customers: Contact your Tellabs Regional Office listed below.

region	telephone	office location
US Atlantic	(203)798-0506	Danbury, CT
US Capital	(703)359-9166	Washington, DC
US Central	(312)357-7400	Chicago, IL
US Southeast	(305)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)624-0052.

International customers: Contact your Tellabs distributor.

selecting correct product service procedure

7.03 If equipment is diagnosed as defective or in-service equipment needs repair, follow the **product return procedure** in paragraph 7.04 in 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 7.05.

product return procedure (for repair)

7.04 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
telephone (312)969-8800

in Canada:

Tellabs Communications Canada, Ltd.
1200 Aerowood Drive, Unit 39
Mississauga, Ontario, Canada L4W 2S7
telephone (416)624-0052

text continued on next page

troubleshooting guide

Note 1: *The 6008A must be tested in place (i.e., while mounted on the host 6131 module).*

Note 2: *See host 6131 module's Tellabs practice for additional tests.*

trouble condition	possible causes (check before assuming 6008A and/or host 6131 is defective)
module completely inoperative	1) No input power. 2) Improper wiring. 3) Host 6131's card-edge connector not properly aligned. 4) Connectors between 6008A and 6131 not properly aligned. 5) Improperly set option switches on host 6131 (check S14 and S5).
improper signaling conversion	1) Improperly set option switches on 6008A (check S11, S12, S15-A, S15-B). 2) Improper supply voltage (should be between -22 and -56Vdc). 3) Card-edge connector on 6131 not properly aligned.
improper dial pulsing	1) Improperly set option switches on 6008A (check S15-E for dial pulse correction). 2) Improper supply voltage (should be between -22 and -56Vdc). 3) Excessive longitudinal voltage on facility. 4) Connectors between 6008A and 6131 not properly aligned.
station not ringing	1) Improperly set option switches on both 6008A and 6131. 2) Local ringing generator not functioning properly. 3) Station improperly connected. 4) Connectors between 6008A and 6131 not properly aligned.