

Installation Guide: 6047 and 6047A 4Wire-to-4Wire SF-to-E&M Terminal Repeaters

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1. introduction

1.01 This abbreviated practice section provides condensed installation instructions, a block diagram, and testing and troubleshooting information for the Issue 3 versions of the 6047 and 6047A 4Wire-to-4Wire SF-to-E&M Terminal Repeater modules (Tellabs part numbers **836047** and **836047A**). If you require more information than is provided in this practice, please consult the full-coverage practice on the 6047 and 6047A modules (section 836047/836047A). The full-coverage practice also contains a general description, application information, function sequence flowcharts illustrating module operation, and complete 6047 and 6047A specifications. Copies of the full-coverage practice should be available, if needed, at your company's local headquarters. Copies can also be obtained by calling Tellabs' Publications/Literature Distribution Group at (312) 969-8800.

1.02 This practice section is revised to highlight certain mandatory alignment-procedure steps.

Note: In those parts of this practice that apply equally to the 6047 and 6047A, both modules are, for convenience, referred to collectively as the **6047/A**.

2. installation inspection

2.01 The 6047/A 4Wire-to-4Wire SF-to-E&M Terminal Repeater module should be visually inspected upon arrival to find any damage incurred during shipment. If damage is noted, a claim should immediately be filed with the carrier. If stored, the module should be visually inspected again prior to installation.

mounting

2.02 The 6047/A mounts in one position of a Tellabs Type 10 Mounting Shelf or in one position of a Tellabs 262-series NCTE/DST Mounting Assembly. Type 10 Shelves are available in versions for relay-rack and apparatus-case installation, while 262 Assemblies are available in versions for relay-rack, wall or desktop, and floor mounting. The 6047/A module plugs physically and electrically into a 56-pin connector at the rear of its shelf or assembly position.

2.03 In applications where a 6047/A module is to be installed in a 262 Assembly, no external connections to the module need be made. This is because all of the assembly's internal connections are factory-prewired and because external wiring is simplified through the use of 25-pair connector-ended cables arrange in accordance with Universal Service Order Code (USOC) RJ2HX. If the customer's terminal equipment is cabled in accordance with USOC RJ2HX, direct connection between the assembly and the customer's equipment is possible. If not, cross-connections between the assembly and the local terminal equipment must be made at an intermediate connectorized terminal block or by means of a special adapter cable available as a list number for selected assemblies.

installer connections

2.04 When a 6047/A module is to be installed in a conventional Type 10 Shelf or in an unwired apparatus case or mounting assembly, external connections to the module must be made. Before making any connections to the shelf, case, or assembly, ensure that power is **off** and modules are **removed**. Modules should be put into place only **after** they are properly optioned and **after** wiring is completed.

2.05 Table 1 lists external connections to the 6047/A module. All connections to non-prewired mountings are made via wire-wrapping to the 56-pin connector at the rear of the module's shelf, case, or assembly position. Pin numbers are found on the body of the connector.

connect:	to pin:
RCV IN TIP	7
RCV IN RING	13
XMT OUT TIP	41
XMT OUT RING	47
RCV OUT TIP	5
RCV OUT RING	15
XMT IN TIP	55
XMT IN RING	49
RCV IN SX (simplex, facility side)	9 and 11
XMT OUT SX (simplex, facility side)	43
E lead	23
M lead	21
SB lead	1
SG lead	19
EXT MNLB (external manual loopback, 6047A only) ...	18
-BATT (-42 to -56Vdc filtered input)	35
GND (ground)	17

table 1. External connections to 6047/A

option selection

2.06 Several option switches much be set before the 6047/A is placed into service. Locations of these switches and of certain alignment switches

on the module's printed circuit board are shown in figure 1. Table 2 summarizes all switch options and provides a convenient **checklist** that can be filled out either prior to installation for prescription optioning or during installation to serve as a record for later reference. Refer to figure 1 and table 2, and set each option switch on the 6047/A as required.

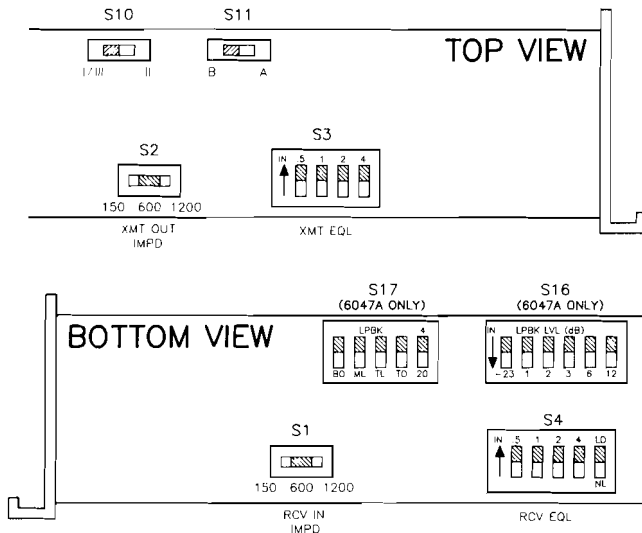


figure 1. 6047/A option switch locations

alignment overview

2.07 Alignment of the 6047/A comprises the following procedures (all option switches should already be properly set as described above):

- Setting the receive-channel facility-side and terminal-side levels.
- Introducing receive-channel equalization, if necessary.
- Setting the transmit-channel terminal-side and facility-side levels.
- Introducing transmit-channel equalization, if necessary.
- For the 6047A only, adjusting the loopback-path level.

prescription alignment

2.08 Prescription alignment of the 6047/A module involves setting all level-control, equalization, and loopback-level (6047A only) switches in accordance with specifications on the circuit layout record (CLR) before plugging the module into its shelf or assembly position. Table 3 in this practice summarizes all alignment switches on the 6047/A and provides a convenient **checklist** for prescription alignment. To use this table, simply indicate all required alignment-switch settings in the **checklist** column. Then, at installation time, align the 6047/A by setting each switch as indicated in the table (or on the CLR, if preferred).

equipment required for non-prescription alignment

2.09 In applications where prescription alignment settings are unavailable, non-prescription alignment

of the 6047/A is necessary. Access to the appropriate ports of the module is conveniently provided via six front-panel bantam jacks. Equipment required for non-prescription alignment consists of a transmission measuring set (TMS), preferably one with independent transmit and receive impedance settings. If the module's equalizers and/or loopback-level circuitry (6047A only) are to be used, a Tellabs 9801 or 9802 Card Extender (or equivalent) will facilitate alignment by allowing access to the switches on the module's printed circuit board while the module is in place and operating.

mandatory pre-alignment procedure for non-prescription alignment

2.10 Before beginning non-prescription alignment, do the following:

- Ensure that all option switches are properly set. For the 6047A, also ensure that the module is not in loopback.
- Set all front-panel receive and transmit level-control switches for no gain or loss.
- Set all receive and transmit equalization switches (S4 and S3) for no equalization.

Note: On the receive equalizer DIP switch (S4), the **LD/NL** position must be set to **NL**. Otherwise, bump equalization will be introduced even though no dB-value positions are set to **IN**.

- For the 6047A, set the loopback-level DIP switch (S16) for no loopback-path loss or gain.

non-prescription alignment

2.11 Align the 6047/A as directed in the **non-prescription alignment procedure**, figure 2 of this practice. As mentioned above, if you require more information than is provided here, please see the full-coverage 6047/A practice.

Note 1: The procedure in figure 2 is based on the assumption that certain required local input and output levels are available from circuit records. If this is not the case, some steps may have to be modified to include end-to-end measurements.

Note 2: During alignment, always ensure that the receive portion of the TMS is arranged for properly terminated measurement where appropriate. If the TMS has independent transmit and receive impedance settings, also ensure that the proper TMS transmit impedance is selected when inserting test tone.

4. testing and troubleshooting

4.01 The **troubleshooting guide** in this section may be used to assist in the installation, testing, or troubleshooting of the 6047/A 4Wire-to-4Wire SF-to-E&M Terminal Repeater module. 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

option	switch	selection	setting	checklist
terminating impedance, receive input port (facility side)	RCV IN IMPD (S1) on main board	1200 ohms (for loaded cable)	1200	
		600 ohms (for nonloaded cable or carrier)	600	
		150 ohms (extra equalization for nonloaded cable)	150	
terminating impedance, transmit output port (facility side)	XMT OUT IMPD (S2) on main board	1200 ohms (for loaded cable)	1200	
		600 ohms (for nonloaded cable or carrier)	600	
		150 ohms (extra equalization for nonloaded cable)	150	
Type I, Type II, or Type III E&M interface	S10 on baby board	Type I interface	I/III	
		Type II interface	II	
		Type III interface (available with A-side signaling only)	I/III	
A-side or B-side E&M signaling*	S11 on baby board	A-side signaling	A	
		B-side signaling	B	
Note: The following loopback options are available on the 6047A only.				
busying out of module's terminal side (E&M leads) during loopback**	BO position of S17 (LPBK DIP switch) on baby board	busy out	toward BO	
		no busy out	away from BO	
manual loopback activate/deactivate	ML position of S17 (LPBK DIP switch) on baby board	manual loopback activated	toward ML	
		manual loopback deactivated	away from ML	
tone loopback enable/disable***	TL position of S17 (LPBK DIP switch) on baby board	tone loopback enabled	toward TL	
		tone loopback disabled (for manual loopback only)	away from TL	
tone-loopback timeout enable/disable (with tone loopback enabled)***	TO position of S17 (LPBK DIP switch) on baby board	tone-loopback timeout enabled (see below for duration selection)	toward TO	
		tone-loopback timeout disabled (for second-tone deactivation only)	away from TO	
tone-loopback timeout duration (with tone-loopback timeout enabled)***	4/20 position of S17 (LPBK DIP switch) on baby board	4 minutes	4	
		20 minutes	20	
<p>* Select A-side signaling when the associated terminal-side equipment provides M-lead outputs and receives E-lead inputs. Select B-side signaling when the associated terminal-side equipment provides E-lead outputs and receives M-lead inputs.</p> <p>** Busying out the module's terminal side (E&M leads) during loopback prevents inadvertent seizure of the associated trunk circuit or line circuit.</p> <p>*** With tone loopback disabled, both the TO and 4/20 positions of S17 are nonfunctional. With tone loopback enabled but tone-loopback timeout disabled, the 4/20 position of S17 is nonfunctional.</p>				

table 2. Summary and checklist of 6047/A switch options

alignment function	switch	selection	setting	checklist
selection of receive-channel facility-side flat gain or loss	GN and LS positions of front-panel <i>rcv fac level</i> DIP switch	gain	GN to IN LS to OUT	
		loss	GN to OUT LS to IN	
amount of receive-channel facility-side gain or loss, as selected above*	dB-value positions of front-panel <i>rcv fac level</i> DIP switch*	0.1dB	0.1 to IN	
		0.2dB	0.2 to IN	
		0.4dB	0.4 to IN	
		0.8dB	0.8 to IN	
		1.5dB	1.5 to IN	
		3.0dB	3.0 to IN	
		6.0dB	6.0 to IN	
		12.0dB	12.0 to IN	
Important: During alignment, set these switches to achieve a +7dBm level (see figure 2) before setting <i>rcv term loss</i> switches to obtain final <i>rcv</i> output level.				
receive-channel terminal-side flat loss*	front-panel <i>rcv term loss</i> DIP switch*	0.1dB	0.1 to IN	
		0.2dB	0.2 to IN	
		0.4dB	0.4 to IN	
		0.8dB	0.8 to IN	
		1.5dB	1.5 to IN	
		3.0dB	3.0 to IN	
		6.0dB	6.0 to IN	
		12.0dB	12.0 to IN	
receive-channel equalizer selection	LD/NL position of DIP switch S4 on main board	compromise bump equalizer (for loaded cable) inserted	LD	
		compromise bump equalizer excluded (for no equalization or use of slope equalizer)	NL	
receive-channel slope equalization for nonloaded cable (gain at 2804Hz re 1004Hz)**	dB-value positions of DIP switch S4 on main board**	0.5dB	.5 to IN	
		1dB	1 to IN	
		2dB	2 to IN	
		4dB	4 to IN	
transmit-channel terminal-side flat loss*	front-panel <i>xmt term loss</i> DIP switch*	0.1dB	0.1 to IN	
		0.2dB	0.2 to IN	
		0.4dB	0.4 to IN	
		0.8dB	0.8 to IN	
		1.5dB	1.5 to IN	
		3.0dB	3.0 to IN	
		6.0dB	6.0 to IN	
		12.0dB	12.0 to IN	
Important: During alignment, set these switches to achieve a –16dBm level (see figure 2) before setting <i>xmt fac level</i> switches to obtain final <i>xmt</i> output level.				
selection of transmit-channel facility-side flat gain or loss	GN and LS positions of front-panel <i>xmt fac level</i> DIP switch	gain	GN to IN LS to OUT	
		loss	GN to OUT LS to IN	
amount of transmit-channel facility-side gain or loss, as selected above*	dB-value positions of front-panel <i>xmt fac level</i> DIP switch*	0.1dB	0.1 to IN	
		0.2dB	0.2 to IN	
		0.4dB	0.4 to IN	
		0.8dB	0.8 to IN	
		1.5dB	1.5 to IN	
		3.0dB	3.0 to IN	
		6.0dB	6.0 to IN	
		12.0dB	12.0 to IN	
transmit-channel slope-equalization for nonloaded cable (gain at 2804Hz re 1004Hz)**	DIP switch S3 on main board**	0.5dB	.5 to IN	
		1dB	1 to IN	
		2dB	2 to IN	
		4dB	4 to IN	

table 3 continued on next page

alignment function	switch	selection	setting	checklist
loopback-path loss (or gain) (6047A only)***	LPBK LVL DIP switch (S16) on baby board***	23dB loss	–23 to IN	
		1dB gain	1 to IN	
		2dB gain	2 to IN	
		3dB gain	3 to IN	
		6dB gain	6 to IN	
		12dB gain	12 to IN	
<p>* The eight dB-value positions of the front-panel <i>rcv fac level</i> and <i>xmt fac level</i> DIP switches are cumulative, as are all eight positions of the <i>rcv term loss</i> and <i>xmt term loss</i> DIP switches. Total facility-side gain or loss and total terminal-side loss introduced into a channel are the sums of that channel's <i>fac level</i> dB-value and <i>term loss</i> switch positions set to <i>IN</i>.</p> <p>** The dB-value positions (.5, 1, 2, and 4) of receive-equalizer DIP switch S4 and all four positions of transmit-equalizer DIP switch S3 are cumulative. Total gain introduced at 2804Hz (re 1004Hz) is the sum of those dB-value positions set to <i>IN</i>. For no receive equalization set the <i>LD/NL</i> position of S4 to <i>NL</i> and the four dB-value positions of S4 to <i>OUT</i>. For no transmit equalization, set all four positions of S3 to <i>OUT</i>.</p> <p>*** The six positions of the LPBK LVL DIP switch (S16) on the 6047A are cumulative. Total loss or gain, in dB, introduced into the module's loopback path is the sum of those LPBK LVL switch positions set to <i>IN</i>.</p>				

table 3. Summary and checklist of 6047/A alignment switches

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

4.02 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

4.03 If equipment is diagnosed as defective or if in-service equipment needs repair, follow the **product return procedure** in paragraph 4.04 in all cases except those where a critical service outage exists (e.g., where a system or a critical circuit is down and no spares are available). In critical situations, or if you wish to return equipment for

reasons other than repair, follow the **product replacement procedure** in paragraph 4.05.

product return procedure (for repair)

4.04 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

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

product replacement procedure

4.05 For critical service outages, Tellabs offers a choice of two replacement services (if the product is in replacement stock) in lieu of the 15-day repair

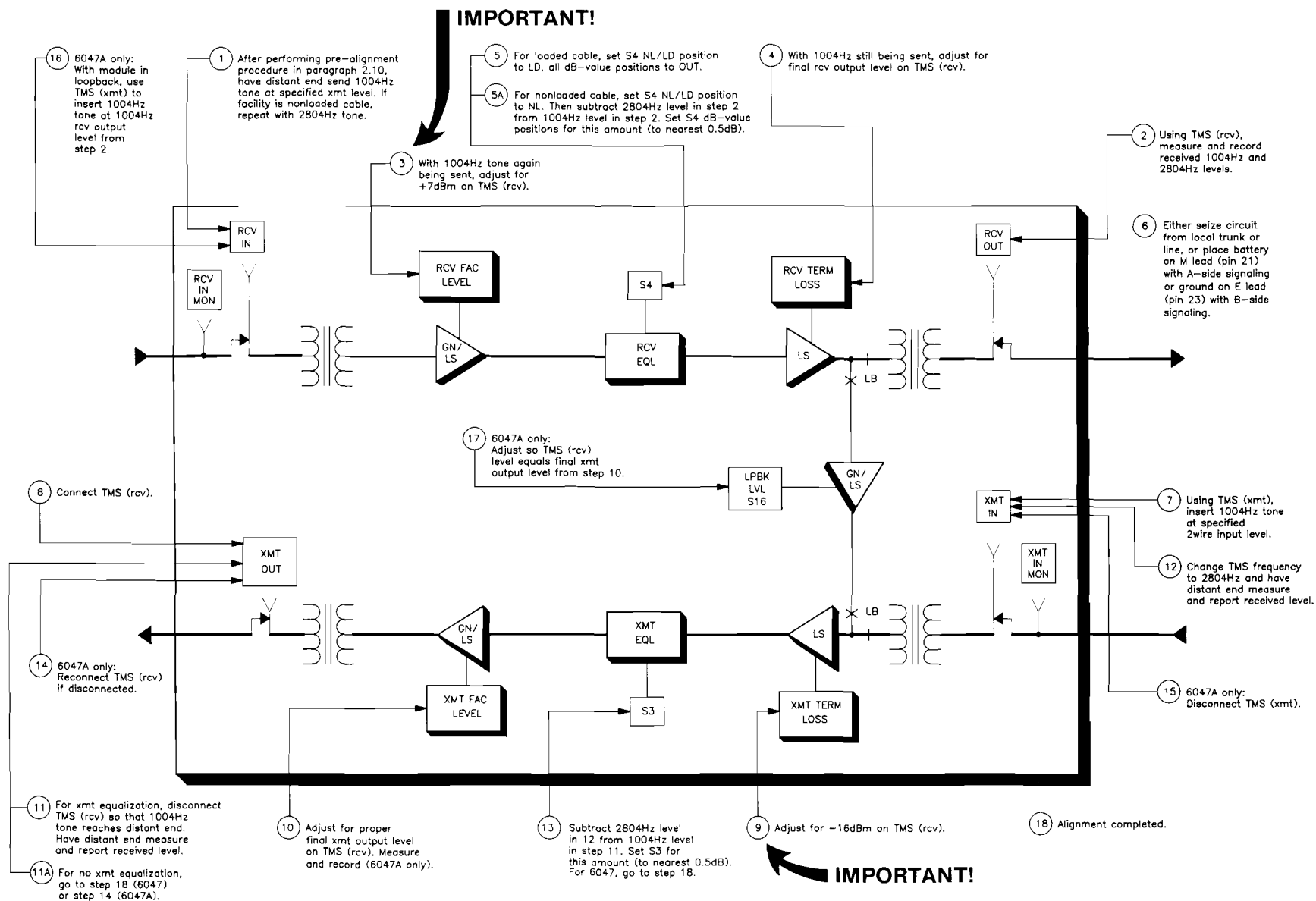
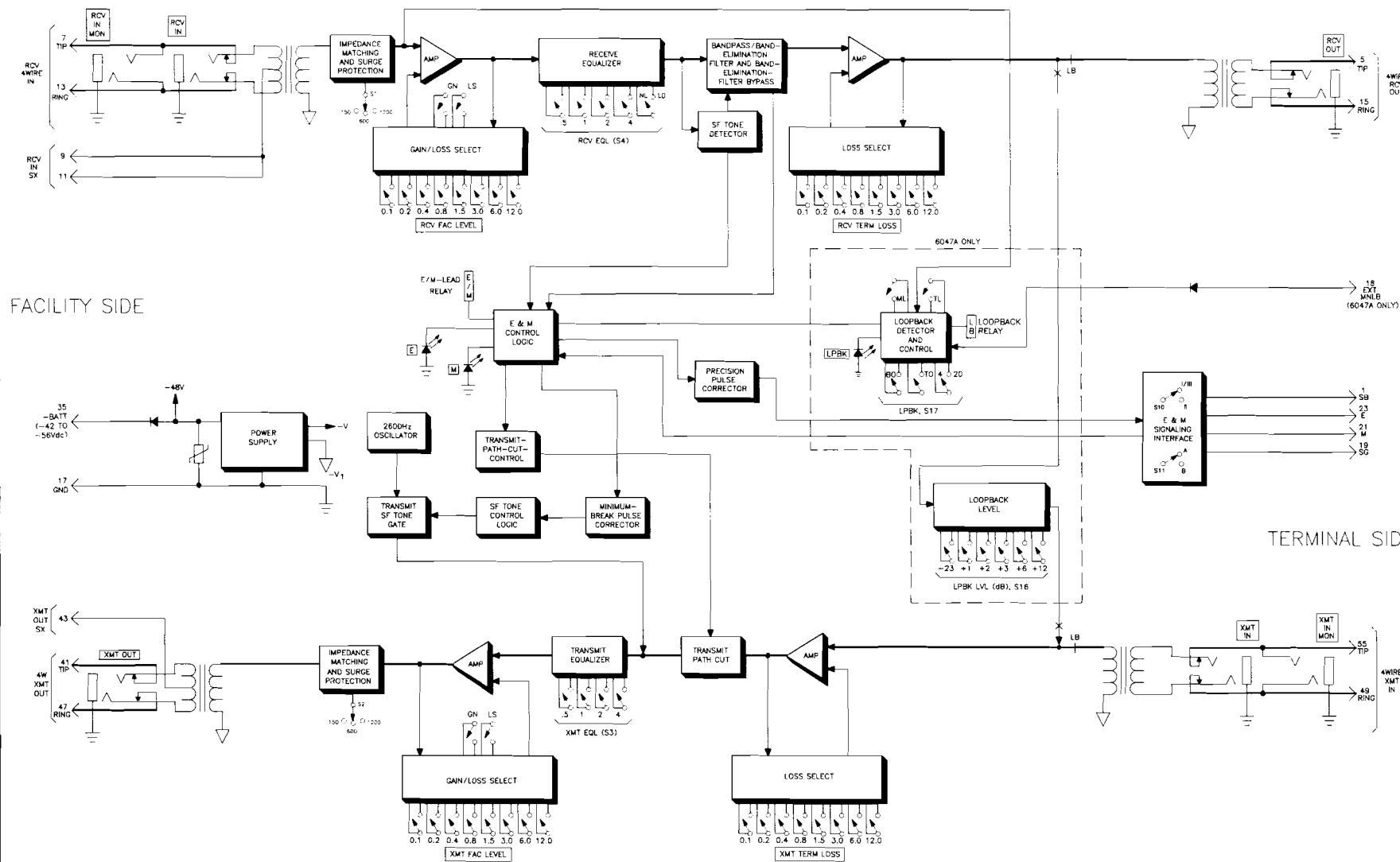


figure 2. Non-prescription alignment procedure for 6047/A



836047 and 836047A 4Wire-to-4Wire SF-to-E&M Terminal Repeaters

836047/836047A

3. block diagram

troubleshooting guide

trouble condition	possible causes
module completely inoperative	1) No input power. 2) Improper wiring.
cannot derive proper receive-channel transmission levels	1) Front-panel <i>rcv fac level</i> and/or <i>rcv term loss</i> DIP switches improperly set. 2) Main-board receive impedance DIP switch (S1) improperly set. 3) Circuit not seized. 4) Test-equipment impedance improperly set or test equipment not terminated.
cannot derive proper transmit-channel transmission levels	1) Front-panel <i>xmt term loss</i> and/or <i>xmt fac level</i> DIP switches improperly set. 2) Main-board transmit impedance DIP switch (S2) improperly set. 3) Circuit not seized. 4) Test-equipment impedance improperly set or test equipment not terminated.
improper signaling	1) Incorrect transmission level settings (see preceding trouble condition and possible causes). 2) E&M signaling interface switch (S10) improperly set. 3) E&M signaling mode (A-side/B-side) switch (S11) improperly set. 4) Internal receive and/or transmit TLP's improperly derived. 5) Excessive noise in circuit. 6) Excessive SF tone leak at receive input port. 7) Incorrect incoming SF tone level.
cannot activate or deactivate manual loopback via option switch (6047A only)	1) Ground on EXT MNLB (external manual loopback) lead (pin 18).
cannot activate or deactivate manual loopback via EXT MNLB-lead ground (6047A only)	1) EXT MNLB (external manual loopback) lead (pin 18) improperly wired. 2) Source of ground defective.
cannot activate or deactivate 2713Hz tone loopback (6047A only)	1) Loopback options improperly set; check <i>LPBK</i> DIP switch (S17). 2) Tone not applied for proper duration and, for activation only, then removed. 3) Tone at improper frequency or below -30dBm detection threshold. 4) Ground on EXT MNLB (external manual loopback) lead (pin 18).
cannot derive transmission loopback (6047A only)	1) Module not in loopback (<i>lpbk</i> LED unlit).
cannot derive proper loopback transmission level (6047A only)	1) Loopback-level (<i>LPBK LVL</i>) DIP switch (S16) improperly set. 2) Module not in loopback (<i>lpbk</i> LED unlit).