tellabs
technical manual
76-81292R-2
rev A

system-installation practice section 81292R-2

292R Conference/Alerting System Installation

FCC Registration No. BPX826-68172-KF-N

contents

1. general information

1.01 The Tellabs 292R Conference/Alerting System (figure 1) is a multistation ringdown telephone conference circuit designed primarily for use in local emergency reporting and alerting applications and in business conferencing applications. The 292R System provides simultaneous access to up to 60 local stations (see note below) either from a dedicated telephone (i.e., a "master" station) or from any local telephone line via a listed directory number. Conferees are provided with emergency conference capability at their everyday home or business telephones with no disruption of normal telephone service except during an emergency call. All stations assigned to the conference network are signaled via a distinctive ringing format on conference calls. The 292R System can be used with any conventional Class 5 or FCC-registered PBX switching system. Services provided by the 292R System are typically used by paramedic teams, airport emergency crews, banks, stores, factories with multiple branch locations, and the like.

Note: *Systems larger than 60 lines can be configured for specific applications. For additional information, please contact Tellabs' Application Engineering Group at your Tellabs Regional Office or our U.S. or Canadian Headquarters. Telephone numbers are listed in paragraph 4.03.*

1.02 In the event that this Practice section is reissued, the reason for reissue will be stated in this paragraph.

1.03 The 292R System offers a choice of three methods of originating a conference: automatic origination, manual origination, or a combination of the two. The method chosen will, of course, depend upon local requirements.

1.04 When an emergency conference is **not** in effect, all stations assigned to the conference network are provided with normal residential (or PBX) telephone service. When a conference **is** in effect, anyone involved in the conference need only depress the hookswitch momentarily to be disconnected from the conference and restored to normal service unless the system is optioned otherwise.

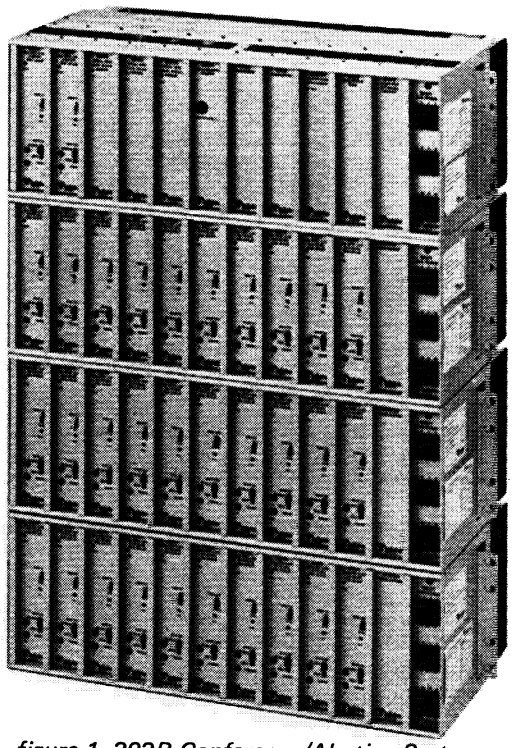


figure 1. 292R Conference/Alerting System

1.05 Designed for either central-office or PBX-equipment-room installation, the 292R System mounts in either a 19- or 23-inch relay rack. In CO applications, all cabling between the System's equipment shelves, as well as cabling from shelves to office distributing frames, is simplified by connectorized cables that plug into connectors on the backplanes of the System's equipment shelves (see figure 2). For PBX-equipment-room applications, cabling between the equipment shelves and from the shelves to USOC (Universal Service Order Code) connectors (network interface connections) is similarly simplified by connectorized cable adapters that plug into connectors on the backplanes of the System's equipment shelves. Cable adapters that conform to the USOC RJ21X format are used for connections from the 292R's manual, automatic, and remote-access ports to the PBX. Cable adapters that conform to the USOC RJ71C format are used for connections from the 292R's line circuit modules to their associated PBX conference stations.

1.06 In CO applications, the 292R System is powered from filtered, ground-referenced −48Vdc CO battery. For PBX-equipment-room applications of up to 30 stations, the optional Tellabs 8007 Power Supply (−48Vdc, 10 amperes) should be used. PBX-equipment-room applications of up to 60 stations (fully loaded) require two optional 8007 Power Supplies.

figure 2.
292R System, rear view

1.07 In CO applications, the 292R System normally uses the office ringing generator. Ringing for a fully equipped 292R System in a PBX-equipment-room application can be provided by three optional Tellabs 8108 20Hz Ringing Generators (20 watts each).

2. installation

inspection

2.01 The 292R Conference/Alerting System and its component modules should be 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 equipment should be inspected again prior to installation.

2.02 The 292R System mounts in a 19-inch or 23-inch relay rack. In the most common arrangement, the common equipment shelf is uppermost, followed immediately below by one to six line equipment shelves, depending upon the number of lines required (see figures 3a and 3b).

2.03 The 292R System is designed for installation either in a CO or a PBX equipment room. Paragraphs 2.04 through 2.08 describe CO installation procedures. Paragraphs 2.09 through 2.14 describe PBX-equipment-room installation procedures.

central-office installation procedures

2.04 To begin the wiring procedure, install the wiring between the individual shelves, and the wiring between the System and the office battery supply and ringing generators as directed below. Refer to figure 4 and/or the System wiring diagram (section 7) as necessary. If desired, check the box next to each step when that step is completed.

☐ A. Interconnect the common equipment shelf with each line equipment shelf by means of the short double-ended connectorized cables provided. These interconnections must be made between the following connectors on the backs of the shelves:

☐ *J1A* on the common equipment shelf and *J1* on the first line equipment shelf.

☐ *J1B* on the common equipment shelf and *J1* on the second line equipment shelf.

☐ *J1C* on the common equipment shelf and *J1* on the third line equipment shelf.

☐ *J1* on the first line equipment shelf and *J1* on the fourth line equipment shelf.

☐ *J1* on the second line equipment shelf and *J1* on the fifth line equipment shelf.

☐ *J1* on the third line equipment shelf and *J1* on the sixth line equipment shelf.

Note: *An* auxiliary *bypass plug (Tellabs part number 50-4001) must be inserted into connector* J5 *on the common equipment shelf for proper System operation.*

☐ B. Connect –48Vdc power and office fuse alarm leads to terminal block 1 (*TB1*) on each shelf. Battery must be connected to the *negative (–)* terminal and ground to the *positive (+)* terminal. The battery lead should be fused (externally to the 292R System) with a fuse rated at no less than 15 amperes, and the wire gauge of the power leads should be no smaller than 14 gauge, because a fully equipped (60 station) 292R System requires 13 amperes (maximum) of current when busy.

☐ C. Connect continuous (biased or grounded) ringing generator from the central office to the 292R System as follows: Connect the ringing generator input leads to the 292R System directly to terminals *GA* through *GC* of terminal block 2 (*TB2*) on the common equipment shelf. A ringing machine start lead is provided and can be connected, if required, to terminal *M. ST.* of *TB2*. If less than three frequencies are used, more than one terminal may be used for the most common ringing frequency to divide the ringing load equally among the three inputs on the 9003A module.

Note: *If more than one ringing generator is used, all ringing generators* **must** *be biased in the same way to provide for proper ring trip.*

2.05 When all the ringing generator input leads have been connected to *TB2*, the 9291 2Wire ARD Conference Terminate Line Circuit Modules must be connected to the interrupted ringing generator. This is done by installing jumpers between terminal block 3 (*TB3*) of the common equipment shelf and terminal block 2 (*TB2*) on the station equipment shelf. Before installing these jumpers, however, note the following (reference to figure 4 and the System wiring diagram [section 7] will be necessary):

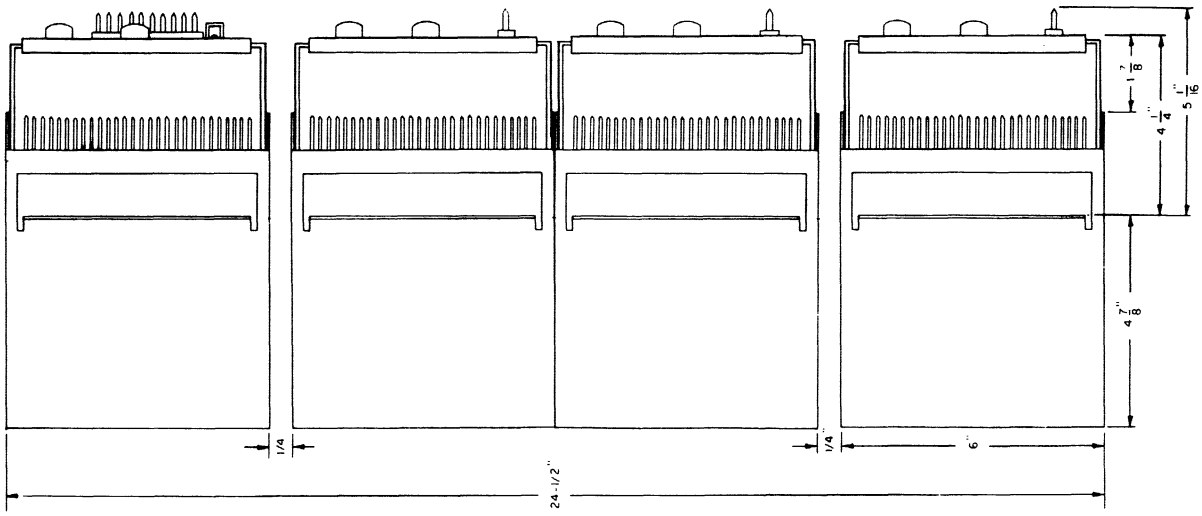


figure 3b. 292R System, side view (30-station System)

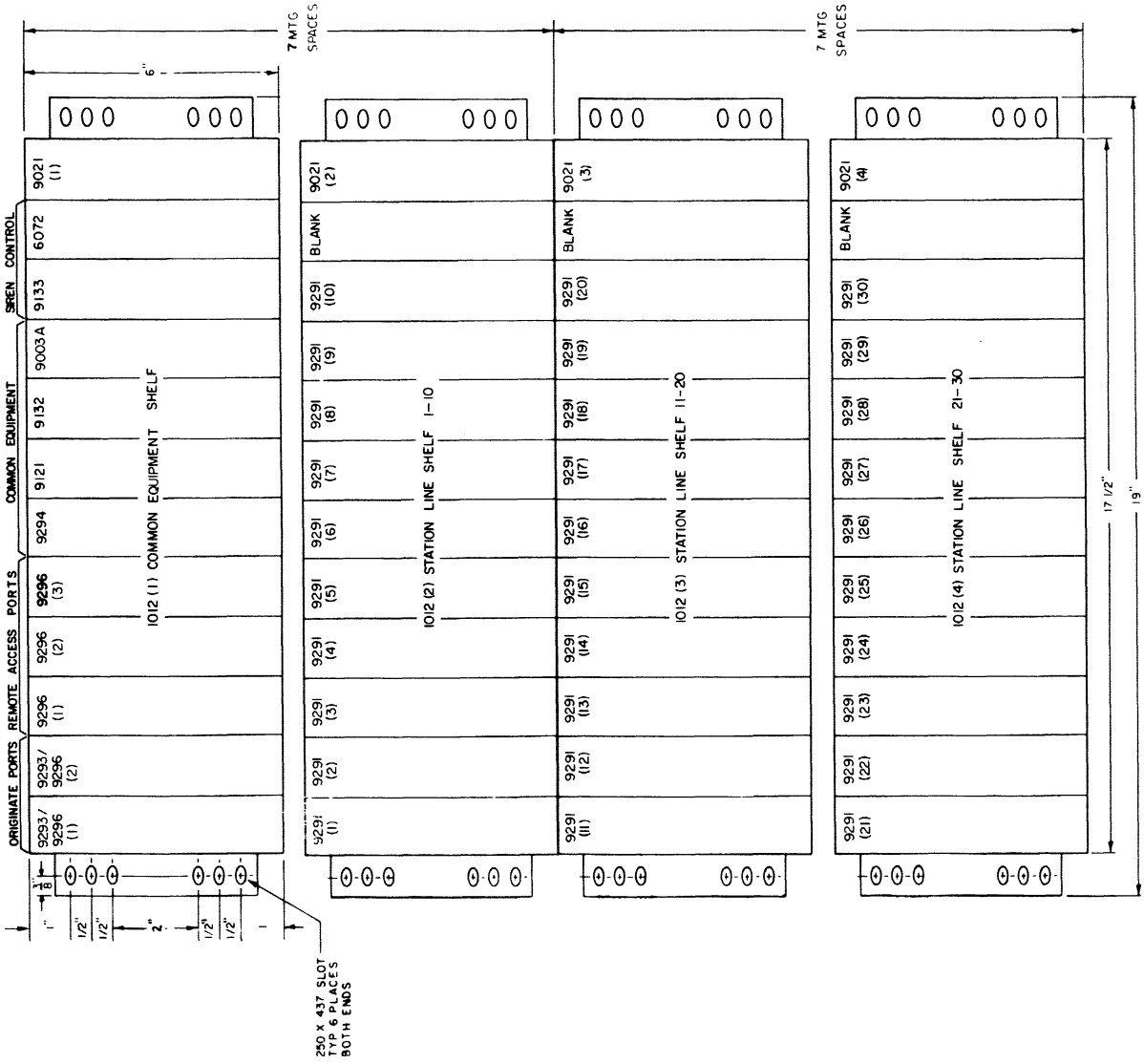


figure 3a. 292R System, front view, showing module configuration (for a 30-station System)

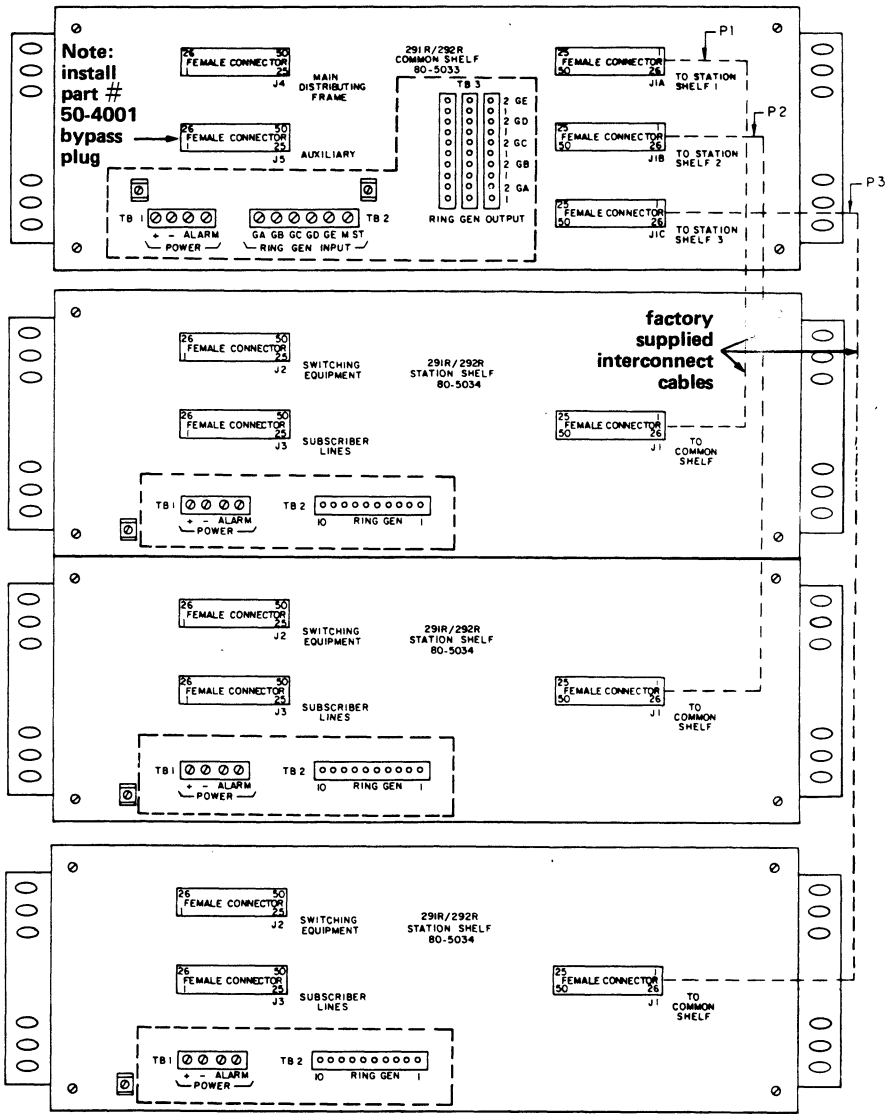


figure 4. 292R System, rear view (30-station System)

TB3 consists of 10 horizontal rows of 3 terminals each. The terminals in each row are bussed together; three terminals are used per row simply to provide enough room for several jumpers to be installed. The six outputs from the 9003A Ringing Interrupter Control Module are factory-wired to *TB3*. Specifically, each of the 9003A's six outputs terminates on one horizontal row of *TB3*. Two horizontal rows are used per ringing frequency; these rows (*G1A* and *G2A* through *G1C* and *G2C*) are numbered in accordance with the three terminals (*GA* through *GC*) on *TB2* that represent the 292R System's three possible ringing frequencies. The System provides alternate ringing between the pairs of rows on *TB3*, i.e., while the lines connected to rows *G1A* through *G1C* are ringing, the lines connected to rows *G2A* through *G2C* are silent (and vice versa).

Note: *Option switch* S3 *on the 9003A permits all outputs to supply continuous ringing. In this application, only the* GA, GB, *and* GC *terminals are used; terminals* GD *and* GE *are not used.*

2.06 Now install the jumpers to connect the 9291 modules to the interrupted ringing generator as follows (continue to refer to figure 4 and/or the system wiring diagram [section 7]):

☐ A. Determine the ringing frequency for each line.

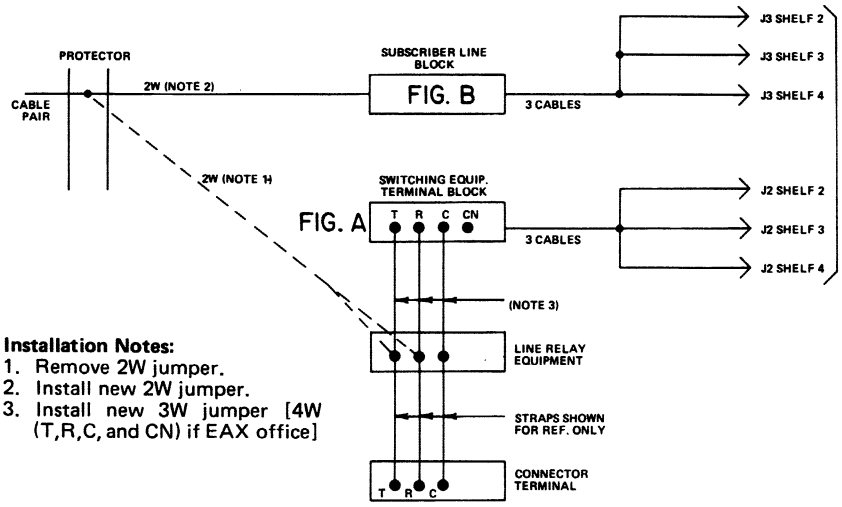
☐ B. Connect a jumper from each line terminal on *TB2* of the station shelves to any pin on one of the two horizontal rows on *TB3* representing the ringing frequency of the line being connected. Take particular care to balance the number of lines of a given ringing frequency evenly between the two horizontal rows on *TB3* for that particular frequency. (More than one jumper can be connected to a single pin, if necessary.).

Note: *Three option switches,* S1 *and* S3 *on the 9003A Ringing Interrupter Control Module and* S1 *on each 9291 2Wire ARD Conference Terminate Line Circuit Module, are also related to the ringing function of the 292R System.*

2.07 Install the wiring between the shelves and the CO distributing frame(s) as follows (the specific terminals to be used on the distributing frame(s) will vary, depending upon local wiring schemes):

☐ A. Run a connectorized cable (not provided with the System) from connector *J2* on each line equipment shelf to the connector distributing frame (CDF) or main distributing frame (MDF). Use a cable with connectors on both ends if a Tellabs 80-0066 8x25 switching-equipment terminal block is used; otherwise, use a cable with a connector on one end. Terminate these cables on the switching equipment terminal block as indicated in figure 5 or 6, as appropriate. See table 1 for lead assignments on connector *J2* on each line equipment shelf and paragraph 2.08 for wiring information.

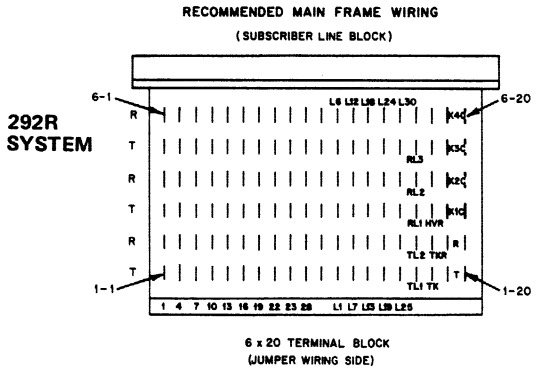
☐ B. Run a connectorized cable (not provided with the System) from connector *J4* on the common equipment shelf to the CDF in a two-frame office or to the MDF in a single-frame office. Use a cable with connectors on both ends if a Tellabs 80-0066 8x25 switching-equipment terminal block is used; otherwise, use a cable with a connector on one end. Terminate this cable on the CDF or MDF in accordance with figure 5 or 6, as appropriate. See table 2 for lead assignments on connector



Installation Notes:
1. Remove 2W jumper.
2. Install new 2W jumper.
3. Install new 3W jumper [4W (T,R,C, and CN) if EAX office]

figure 5. Typical station wiring for use in SxS, X-Bar, EAX, and other offices that supply a sleeve or control lead (the above wiring scheme must be repeated for shelves 5, 6, and 7, if provided)

FIGURE B



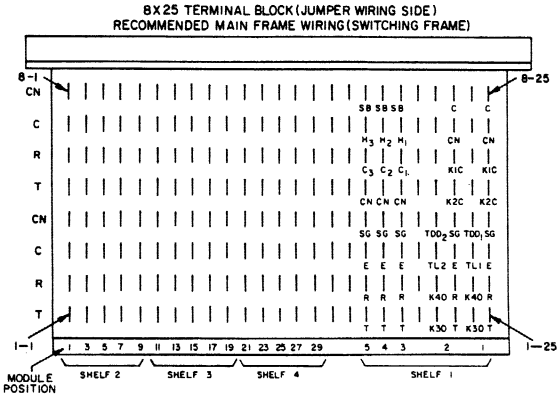
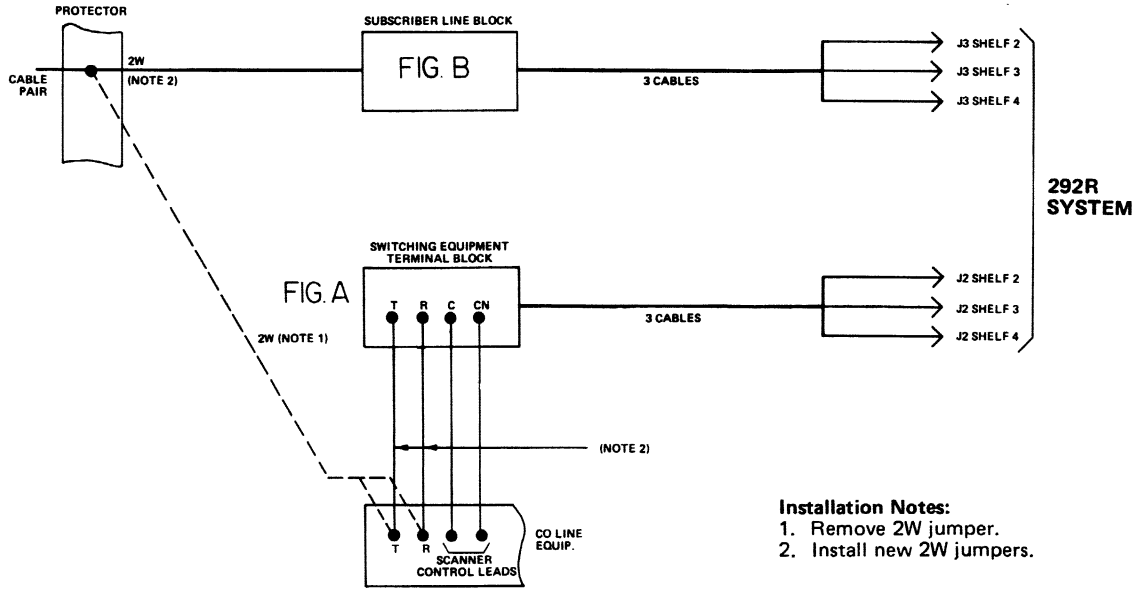


FIGURE A



Installation Notes:
1. Remove 2W jumper.
2. Install new 2W jumpers.

figure 6. Typical station wiring for use in ESS and other electronic offices that do not supply sleeve leads (the above scheme must be repeated for shelves 5, 6, and 7, if provided)

station eqpt. shelf connector J2 pin no.	color	lead desig-nation	appearance on shelf at position no.	module with which lead is associated
26	W-BL	T	1	9291 in position 1
1	BL-W	R	1	of line equipment
27	W-OR	CN	1	shelves 1 through 6
2	OR-W	C	1	
28	W-GRN	T	2	9291 in position 2
3	GRN-W	R	2	of line equipment
29	W-BRN	CN	2	shelves 1 through 6
4	BRN-W	C	2	
30	W-SL	T	3	9291 in position 3
5	SL-W	R	3	of line equipment
31	R-BL	CN	3	shelves 1 through 6
6	BL-R	C	3	
32	R-OR	T	4	9291 in position 4
7	OR-R	R	4	of line equipment
33	R-GRN	CN	4	shelves 1 through 6
8	GRN-R	C	4	
34	R-BRN	T	5	9291 in position 5
9	BRN-R	R	5	of line equipment
35	R-SL	CN	5	shelves 1 through 6
10	SL-R	C	5	
36	BLK-BL	T	6	9291 in position 6
11	BL-BLK	R	6	of line equipment
37	BLK-OR	CN	6	shelves 1 through 6
12	OR-BLK	C	6	
38	BLK-GRN	T	7	9291 in position 7
13	GRN-BLK	R	7	of line equipment
39	BLK-BRN	CN	7	shelves 1 through 6
14	BRN-BLK	C	7	
40	BLK-SL	T	8	9291 in position 8
15	SL-BLK	R	8	of line equipment
41	Y-BL	CN	8	shelves 1 through 6
16	BL-Y	C	8	
42	Y-OR	T	9	9291 in position 9
17	OR-Y	R	9	of line equipment
43	Y-GRN	CN	9	shelves 1 through 6
18	GRN-Y	C	9	
44	Y-BRN	T	10	9291 in position 10
19	BRN-Y	R	10	of line equipment
45	Y-SL	CN	10	shelves 1 through 6
20	SL-Y	C	10	

table 1. Typical connections from switching equipment to cable connector J2 on line equipment shelves

J4 on the common equipment shelf. In this Practice, the CDF or MDF 8 x 25 terminal block on which this cable is terminated will be called the switching-equipment terminal block.

☐ C. Run a connectorized cable (not provided with the System) from connector *J3* on each line equipment shelf to the line distributing frame (LDF) in a two-frame office or to the MDF in a single-frame office. Use a cable with connectors on both ends if a Tellabs 80-0065 subscriber line block is used; otherwise, use a cable with a connector on one end. Terminate this cable on the LDF or MDF in accordance with figure 5 or 6, as appropriate. See table 3 for lead assignments on connector *J3* on each line equipment shelf. In this Practice, the LDF or MDF 6 x 20 terminal block on which this cable is terminated will be called the subscriber line block.

2.08 Install the wiring between the distributing frame(s) and the CO switching system as directed below. The specific terminals to be used on the office distributing frame(s) will vary, depending upon local wiring schemes:

☐ A. Remove the jumper between each emergency crew member's cable pair and the associated line relay equipment (see figure 5 or 6, as appropriate).

☐ B. Install a jumper between each emergency crew member's cable pair and the subscriber line block on the LDF or MDF (see figure 5 or 6, as appropriate).

☐ C. Install a jumper between each emergency crew member's line relay equipment and the switching equipment terminal block on the CDF or MDF (see figure 5 or 6, as appropriate).

☐ D. If automatic conferencing is to be provided in offices that can supply sleeve or control leads, cross-connect a connector terminal, with the line relay equipment removed, to the appropriate terminals on the switching equipment terminal block (see figure 7).

☐ E. If automatic conferencing is to be provided in offices that cannot supply sleeve or control leads, cross-connect the line circuit terminal block to the appropriate terminals on the switching equipment terminal block (see figure 8).

☐ F. If automatic conferencing is to be provided in a Northern Telecom DMS-10 office or with any Type II E&M signaling interface, install jumpers in accordance with figure 9.

common eqpt. shelf connector J4 pin no.	color	lead desig-nation	appearance on shelf at position no.	module with which lead is associated
26	W-BL	T	1	9293 or 9296
1	BL-W	R	1	module in shelf
27	W-O	E	1	position 1.
2	O-W	SG	1	
28	W-G	K2C	1	
3	G-W	K1C	1	
29	W-BR	CN	1	
4	BR-W	C	1	
30	W-S	K30	1	
5	S-W	K40	1	
48	V-G	TDD_1	1	
31	R-BL	T	2	9293 or 9296
6	BL-R	R	2	module in shelf
32	R-O	E	2	position 2.
7	O-R	SG	2	
33	R-G	K2C	2	
8	G-R	K1C	2	
34	R-BR	CN	2	
9	BR-R	C	2	
35	R-S	K30	2	
10	S-R	K40	2	
23	G-V	TDD_2	2	
36	BK-BL	T	3	9296 module
11	BL-BK	R	3	in shelf
37	BK-O	E	3	position 3.
12	O-BK	SG	3	
43	Y-G	CN	3	
21	BL-V	C_1	3	
45	Y-S	H_1	3	
49	V-BR	SB	3	
38	BK-G	T	4	9296 module
13	G-BK	R	4	in shelf
39	BK-BR	E	4	position 4.
14	BR-BK	SG	4	
18	G-Y	CN	4	
47	V-O	C_2	4	
20	S-Y	H_2	4	
24	BR-V	SB	4	
40	BK-S	T	5	9296 module
15	S-BK	R	5	in shelf
41	Y-BL	E	5	position 5.
16	BL-Y	SG	5	
44	Y-BR	CN	5	
22	O-V	C_3	5	
46	V-BL	H_3	5	
50	V-S	SB	5	

table 2. Connections from distributing frame to cable connector 4 on common equipment shelf

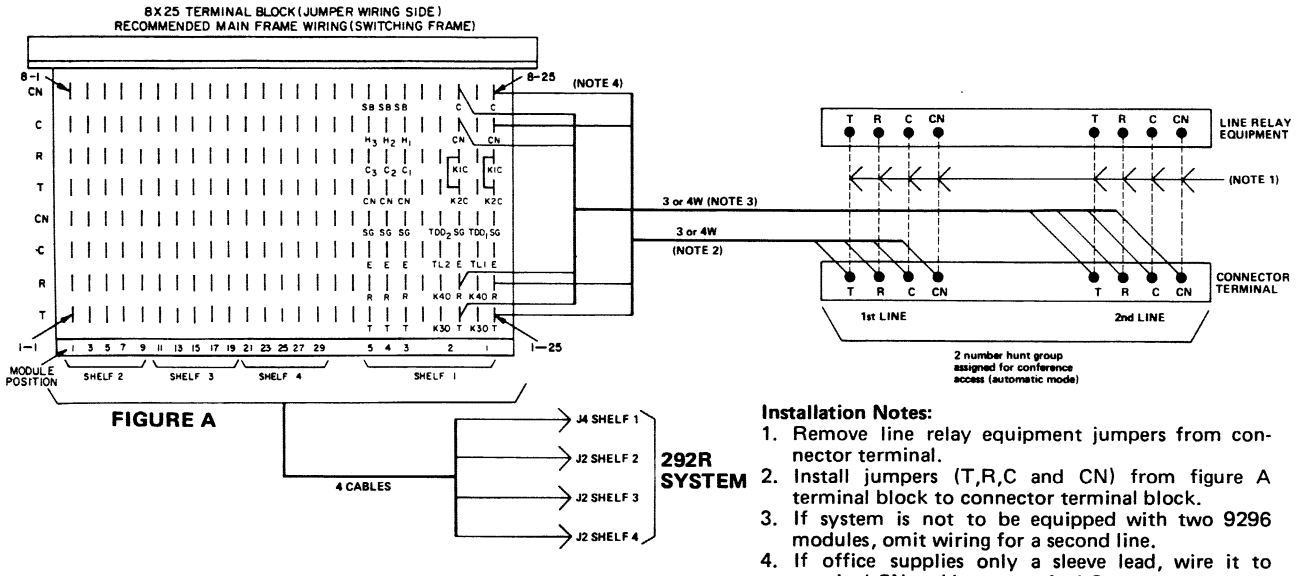


FIGURE A

Installation Notes:

1. Remove line relay equipment jumpers from connector terminal.
2. Install jumpers (T,R,C and CN) from figure A terminal block to connector terminal block.
3. If system is not to be equipped with two 9296 modules, omit wiring for a second line.
4. If office supplies only a sleeve lead, wire it to terminal CN and leave terminal C vacant.
5. Install jumper between K1C and K2C.

figure 7. Typical wiring for one- or two-line automatic conferencing System installed in SxS, X-Bar, EAS, or other office that supplies a sleeve or control lead (9296 access port)

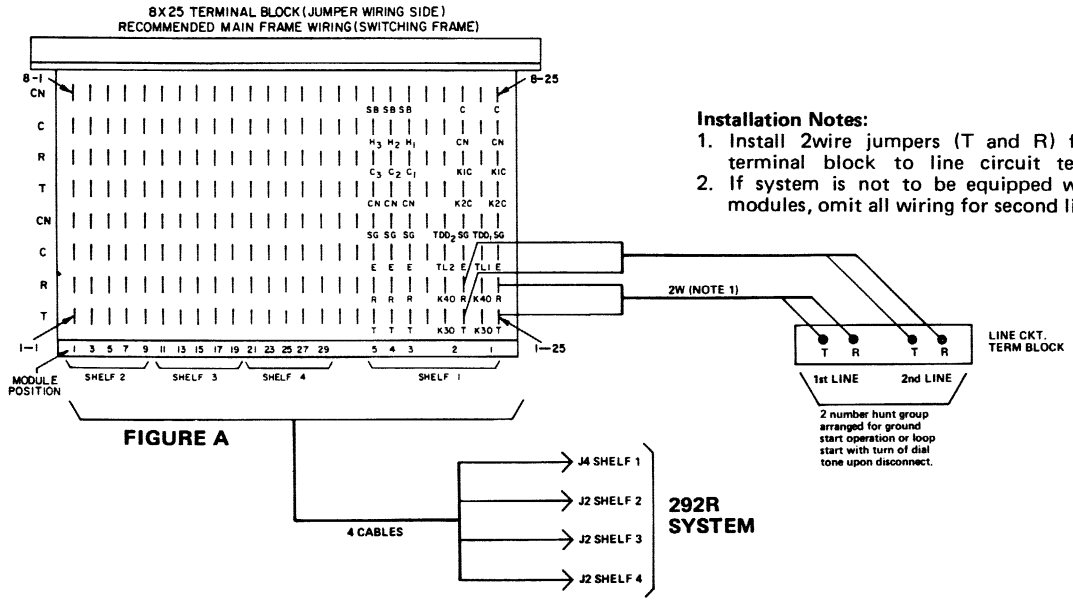


FIGURE A

Installation Notes:

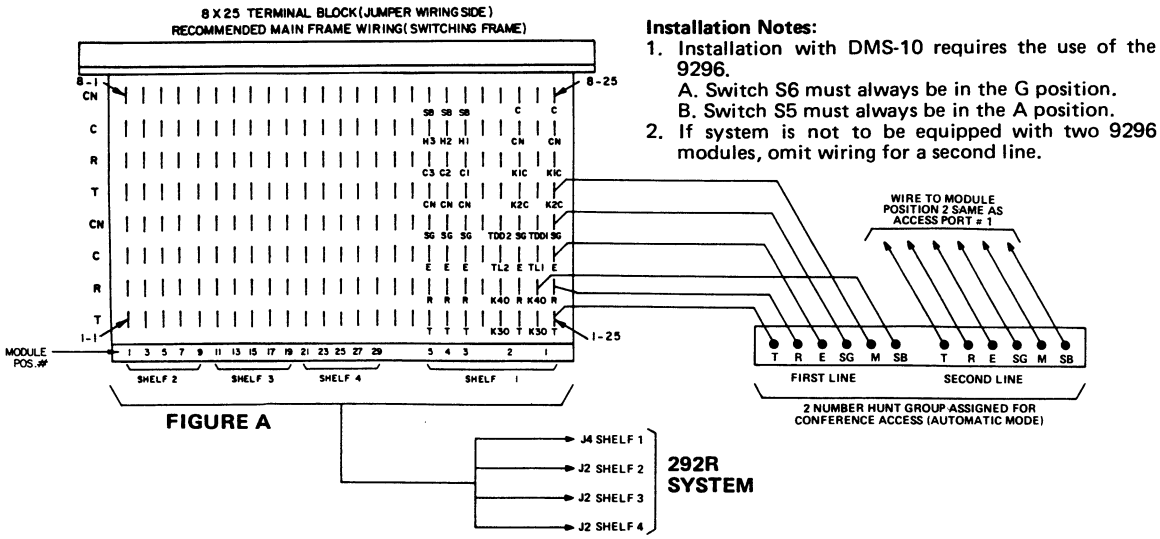
1. Install 2wire jumpers (T and R) from figure A terminal block to line circuit terminal block.
2. If system is not to be equipped with two 9296 modules, omit all wiring for second line.

figure 8. Typical wiring for one- or two-line automatic conferencing System installed in ESS or other electronic office that does not supply a sleeve lead (9296 access port)

☐ G. If remote access (i.e., conference access by calling in via an unlisted number) is desired, run similar jumpers from the connectors corresponding to the chosen unlisted numbers (those that the emergency crew members call to enter the conference) to the switching equipment terminal block (see figure 10, 11, or 12, as appropriate). Provision is made for up to three unlisted numbers, and these should be arranged as a hunting group.

☐ H. If manual conferencing (dedicated telephone access) is to be provided, or to provide for manual-mode operation in combined automatic and manual conferencing arrangements, jumper the master station cable pair (or multiple key-station cable pairs, if used in manual conferencing) to the appropriate terminals on the subscriber line block of the LDF or MDF (see figure 13).

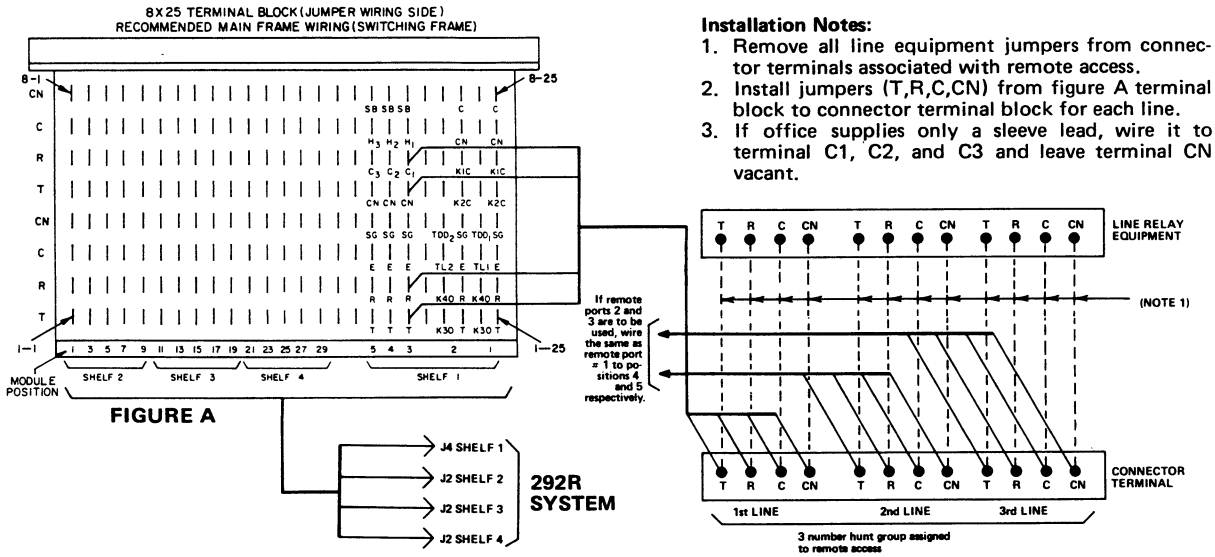
☐ I. In automatic conferencing arrangements where two 9296 2Wire ARD Trunk Access Circuit Modules are used in loop-start or sleeve-lead-access arrangements, cross-connect to the subscriber's line block in accordance with figure 14. With a Type II E&M signaling interface or ground-start access, please contact Tellabs' Application Engineering Group at your Tellabs Regional Office or our U.S. or Canadian Headquarters. Telephone numbers are listed in paragraph 4.03.



Installation Notes:

1. Installation with DMS-10 requires the use of the 9296.
   A. Switch S6 must always be in the G position.
   B. Switch S5 must always be in the A position.
2. If system is not to be equipped with two 9296 modules, omit wiring for a second line.

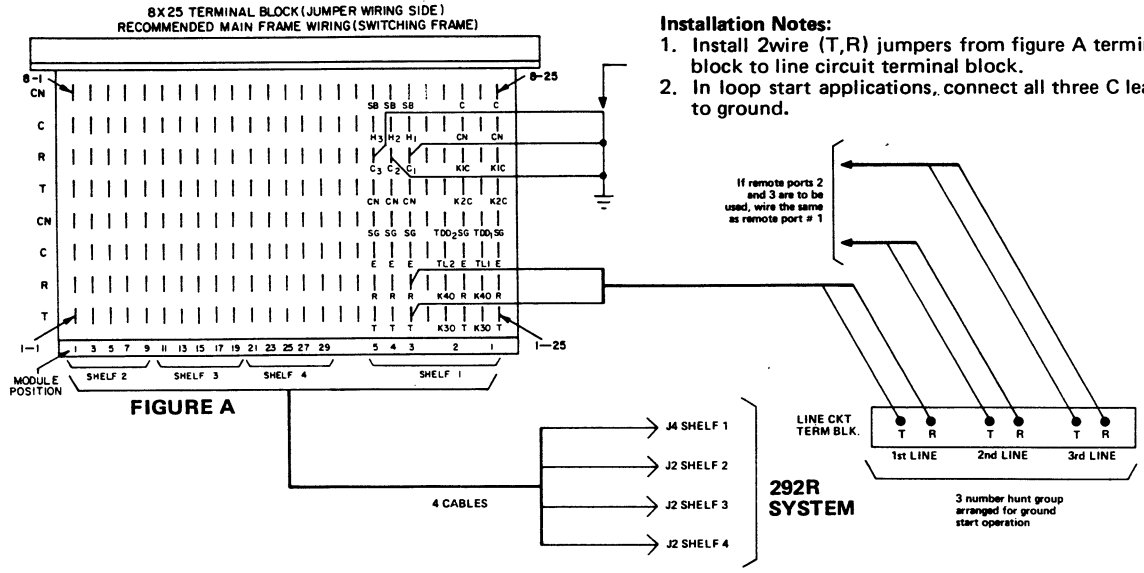
figure 9. Typical wiring for one- or two-line automatic conferencing System installed in a Northern Telecom DMS-10 office using Type II E&M Signaling (9296 access port)



Installation Notes:

1. Remove all line equipment jumpers from connector terminals associated with remote access.
2. Install jumpers (T,R,C,CN) from figure A terminal block to connector terminal block for each line.
3. If office supplies only a sleeve lead, wire it to terminal C1, C2, and C3 and leave terminal CN vacant.

figure 10. Typical wiring for remote access capability in SxS, X-Bar, EAX, and other offices that supply a sleeve or control lead (9296 remote access port)



Installation Notes:

1. Install 2wire (T,R) jumpers from figure A terminal block to line circuit terminal block.
2. In loop start applications, connect all three C leads to ground.

figure 11. Typical wiring for remote access capability in ESS and other electronic offices that do not supply a sleeve lead (9296 remote access port)

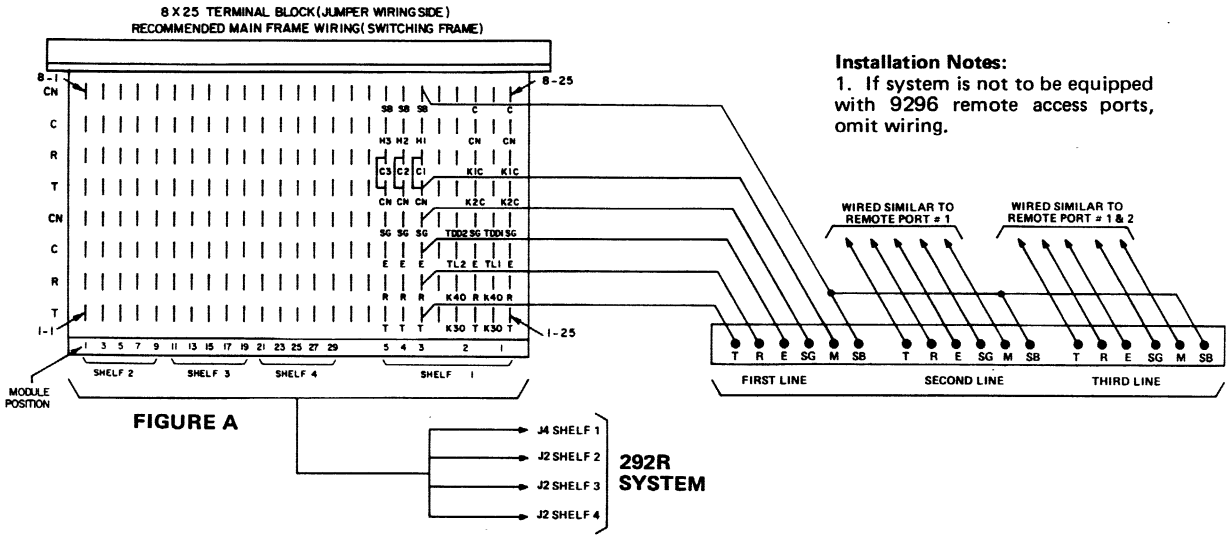


FIGURE A

figure 12. Typical wiring for one to three automatic remote-access ports when installed in a Northern Telecom DMS-10 office with Type II E&M Signaling (9296 remote access port)

Installation Notes:
1. When using a transfer key between manual (9293) and automatic access (9296), K1C and K2C leads on the MDF term block (switch block) must not be strapped together.

2. 9296 must be placed in position 1 of the common shelf, the 9293 must be placed in position 2.

3. Refer to module practices for more information.

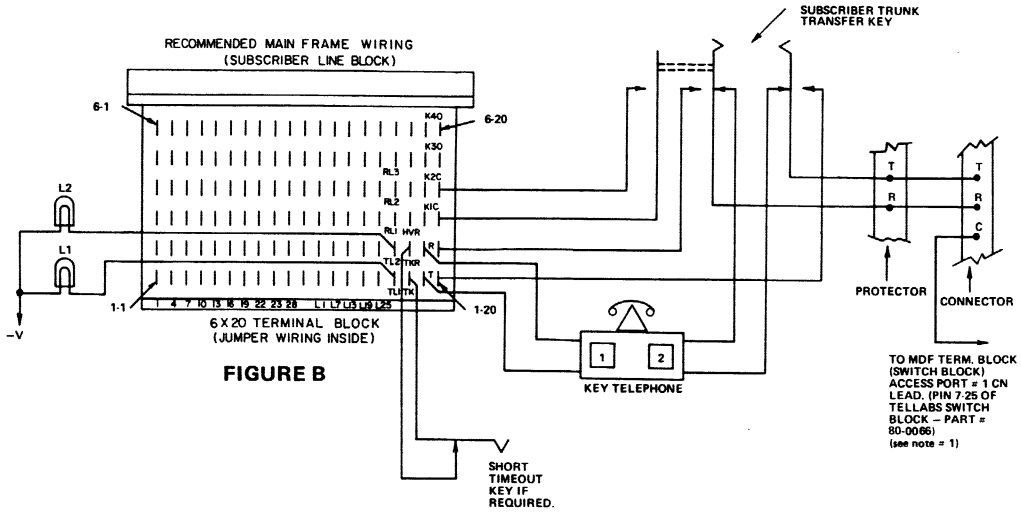


FIGURE B

figure 13. Typical master station (or key station) wiring showing transfer switch (or key) and dedicated telephone connections (for applications arranged for both automatic and manual conference origination) (9296 automatic access port and 9293 manual access port)

Installation Notes:
1. Do not strap K1C and K2C leads on the MDF term block (switch block) of both access ports.

2. Strap CN and C leads on MDF term block (switch block).

3. A 9296 must be used in positions 1 and 2 of the 292R common shelf.

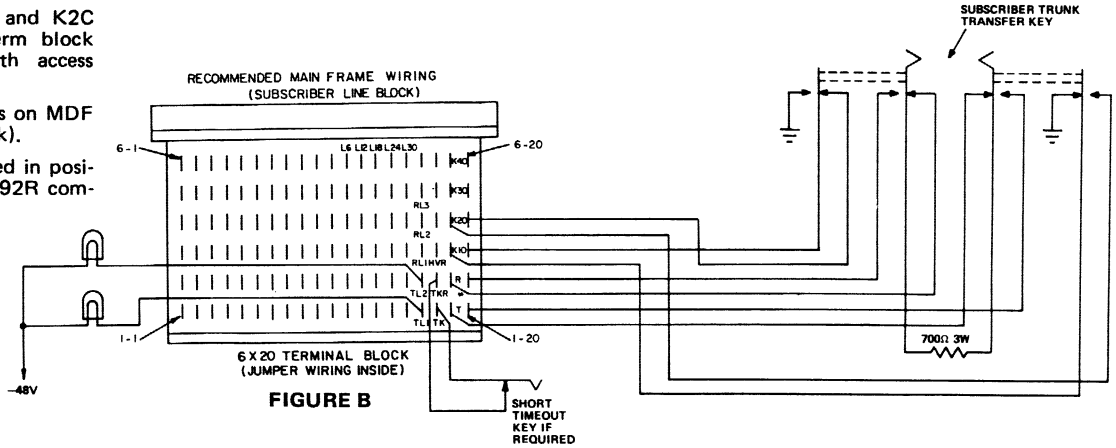


FIGURE B

figure 14. Transfer switch between two automatic access lines (two 9296 modules)

station eqpt. shelf connector J3 pin no.	color	lead designation	appearance on shelf at position no.	module with which lead is associated*
26 1	W-BL BL-W	T1 R1	1 1	9291 in position 1 of line equipment shelves 1 through 6
27 2	W-OR OR-W	T1 R1	2 2	9291 in position 2 of line equipment shelves 1 through 6
28 3	W-GRN GRN-W	T1 R1	3 3	9291 in position 3 of line equipment shelves 1 through 6
29 4	W-BRN BRN-W	T1 R1	4 4	9291 in position 4 of line equipment shelves 1 through 6
30 5	W-SL SL-W	T1 R1	5 5	9291 in position 5 of line equipment shelves 1 through 6
31 6	R-BL BL-R	T1 R1	6 6	9291 in position 6 of line equipment shelves 1 through 6
32 7	R-OR OR-R	T1 R1	7 7	9291 in position 7 of line equipment shelves 1 through 6
33 8	R-GRN GRN-R	T1 R1	8 8	9291 in position 8 of line equipment shelves 1 through 6
34 9	R-BRN BRN-R	T1 R1	9 9	9291 in position 9 of line equipment shelves 1 through 6
35 10	R-SL SL-R	T1 R1	10 10	9291 in position 10 of line equipment shelves 1 through 6
36	BLK-BL	L1*	1	9291 in position 1 of l.e. shelves 1 through 6
11	BL-BLK	L2*	2	9291 in position 2 of l.e. shelves 1 through 6
37	BLK-OR	L3*	3	9291 in position 3 of l.e. shelves 1 through 6
12	OR-BLK	L4*	4	9291 in position 4 of l.e. shelves 1 through 6
38	BLK-GRN	L5*	5	9291 in position 5 of l.e. shelves 1 through 6
13	GRN-BLK	L6*	6	9291 in position 6 of l.e. shelves 1 through 6
39	BLK-BRN	L7*	7	9291 in position 7 of l.e. shelves 1 through 6
14	BRN-BLK	L8*	8	9291 in position 8 of l.e. shelves 1 through 6
40	BLK-SL	L9*	9	9291 in position 9 of l.e. shelves 1 through 6
15	SL-BLK	L10*	10	9291 in position 10 of l.e. shelves 1 through 6
41	Y-BL	TL1*†	12	9293/9296 in pos. 1 of common equipment shelf
16	BL-Y	TL2*†	12	9293/9296 in pos. 2 of common equipment shelf
42	Y-OR	RL1*†	12	9293/9296 in pos. 3 of common equipment shelf
17	OR-Y	RL2*†	12	9296 in position 4 of common equipment shelf
43	Y-GRN	RL3*†	12	9296 in position 5 of common equipment shelf
18 44	GRN-Y Y-BRN	TK† TKR†	12 12	short timeout key (optional)
19	BRN-Y	HVR†	12	ground output from 9133 in pos. 10 of common eqpt. shelf for siren control
45 20 46 21 47 22	Y-SL SL-Y V-BL BL-V V-OR OR-V	T† R† K1C† K2C† K30† K40†	12 12 12 12 12 12	9293/9296 in pos. 1 of common equipment shelf
48 23 49 24 50 25	V-GRN GRN-V V-BRN BRN-V V-SL SL-V	T† R† K1C† K2C† K30† K40†	12 12 12 12 12 12	9293/9296 in pos. 2 of common equipment shelf

*Optional busy indicator lamp leads.
†These leads appear on line equipment shelf 1 only and are spares on line equipment shelves 2 and 3 (if supplied).

table 3. Typical connections from station equipment to cable connector J3 on line equipment shelves

☐ J. Connect indicator lamps, transfer switches, short timeout key, and supervisory lamp panel (if provided) to the appropriate terminals on the subscriber line block (see figure 13).

☐ K. If a siren is required, strap the HVR (high-voltage relay) lead from the subscriber line block to one of the two siren control leads going to the siren location. The other siren control lead should be connected to −48Vdc. The HVR lead provides a ground signal to activate the siren when the siren pushbutton is depressed.

PBX-equipment-room installation procedures

2.09 The most common 292R System arrangement (for a PBX equipment room) is shown in figure 15. The uppermost shelf is the 80-5033 Common Equipment Shelf, followed immediately below by one to six (depending upon the number of conference stations required) 80-5034 Line Equipment Shelves. If a power supply and ringing generator(s) are supplied, they should be located below the last 80-5034 Line Equipment Shelf. Install the 292R System in accordance with the checklist below: (For Systems larger than 30 stations, refer to paragraph 2.35 and figure 19.)

☐ Mount the 80-5033 Common Equipment Shelf with the hardware provided (a pair of 14-9009 Relay Rack Adapters are required for 23-inch relay-rack mounting).

☐ Mount one to six 80-5034 line equipment shelves with the hardware provided. (A pair of 14-9009 Relay Rack Adapters are required for each shelf when mounted in a 23-inch rack.)

☐ Connect the 50-5302 interconnect cable between connector *J1* of the first line equipment shelf (80-5034) and connector *J1A* on the common equipment shelf (80-5033).

☐ If a second line equipment shelf (80-5034) is supplied, connect the second 50-5302 interconnect cable between connector *J1* on the second line equipment shelf and connector *J1B* on the common equipment shelf (80-5033).

☐ If a third line equipment shelf (80-5034) is supplied, connect the third 50-5302 interconnect cable between connector *J1* on the third line equipment shelf and connector *J1C* on the common equipment shelf (80-5033).

☐ If a fourth line equipment shelf (80-5034) is supplied, remove the cable that is already in place in the *J1* connector of the first line equipment shelf. Then connect the 50-4027 interconnect cable between *J1* of the first line equipment shelf and *J1* of the fourth line equipment shelf. Then connect the end of the previously removed cable to the 50-4027 interconnect cable, which is in place.

☐ If a fifth line equipment shelf (80-5034) is supplied, remove the cable that is already in place in the *J1* connector of the second

line equipment shelf. Then connect the 50-4027 interconnect cable between *J1* of the second line equipment shelf and *J1* of the fifth line equipment shelf. Then connect the end of the previously removed cable to the 50-4027 interconnect cable, which is in place.

- ☐ If a sixth line equipment shelf (80-5034) is supplied, remove the cable that is already in place in the *J1* connector of the third line equipment shelf. Then connect the 50-4027 interconnect cable between *J1* of the third line equipment shelf and *J1* of the sixth line equipment shelf. Then connect the end of the previously removed cable to the 50-4027 interconnect cable, which is in place.
- ☐ Connect the 50-4011 Cable Adapter (end labeled *J4 MDF*) to connector *J4* (*Main Distributing Frame*) on the common equipment shelf (80-5033).
- ☐ Connect the 2-to-1 50-4010 Cable Adapter (end labeled *J2 SWG EQ*) to connector *J2* (*Switching Equipment*) on the first line equipment shelf (80-5034). Connect the second end of the double-ended connector labeled *J3 SUB LINES* to connector *J3* (*SUBSCRIBER LINES*) on the same shelf.
- ☐ If second through sixth line equipment shelves are supplied, connect the remaining 2-to-1 50-4010 Cable Adapters to these shelves as described in the previous step.
- ☐ Secure all cable connectors to the shelves with the brackets provided on the rear of each shelf.
- ☐ If the optional ringing generator(s) (one to three, depending upon System requirements) are supplied, mount these generators on the appropriate mounting bars (14-9002 for 19-inch racks, 14-9003 for 23-inch racks) with the hardware provided.
- ☐ Mount this ringing generator assembly on the relay rack with the hardware provided.
- ☐ Mount the optional power supply (if provided) on the relay rack directly below the ringing generators. (A pair of 14-9009 Relay Rack Adapters are required for 23-inch relay-rack mounting.)

installer connections

power

2.10 Before beginning the power wiring procedure below, ensure that input power is **not** applied to the power supply and/or ringing generators. Power must be applied only after all wiring is completed and all modules are properly optioned. Reference to figure 16 will aid in completing this wiring procedure.

- ☐ Remove and store the protective clear glass shields from the rear of the following units: the power supply, the 8108 20Hz Ringing Generator(s), the 80-5033 Common Equipment Shelf and the 80-5034 Line Equipment Shelves.
- ☐ Connect a 14AWG stranded red wire equipped with spade lug connectors (Tellabs 60-0048, or Panduit P18-8F-C) from the *negative (–)* terminal of the power supply to the *negative (–)* terminal of terminal block *TB1* on the 80-5033 Common Equipment Shelf.
- ☐ Connect a second 14AWG stranded red wire equipped with spade lug connectors from the same *negative (–)* terminal of *TB1* on the 80-5033 Shelf to the *negative (–)* terminal of *TB1* on the first 80-5034 Line Equipment Shelf.
- ☐ In a similar fashion, connect a 14AWG stranded red wire equipped with spade lug connectors from the *negative (–)* terminal of *TB1* on the first 80-5034 Shelf, to the *negative (–)* terminal of *TB1* on the second 80-5034 Shelf, and from the *negative (–)* terminal of *TB1* on the second 80-5034 Shelf to the *negative (–)* terminal of *TB1* on the third 80-5034 Shelf. Repeat power connections to the fourth, fifth, and sixth shelves, if provided.
- ☐ Connect a 14AWG stranded black wire equipped with spade lug connectors from the *positive (+)* terminal of the power supply to the *positive (+)* terminal of *TB1* on the 80-5033 Shelf.
- ☐ Connect a second 14AWG stranded black wire equipped with spade lug connectors from the same *positive (+)* terminal of *TB1* on the 80-5033 Shelf to the *positive (+)* terminal of *TB1* on the first 80-5034 Line Equipment Shelf.
- ☐ In a similar fashion, connect a 14AWG stranded black wire equipped with spade lug connectors from the *positive (+)* terminal of *TB1* on the first 80-5034 Shelf to the *positive (+)* terminal of *TB1* on the second 80-5034 Shelf, and from the *positive (+)* terminal of *TB1* on the second 80-5034 Shelf to the *positive (+)* terminal of *TB1* on the third 80-5034 Shelf. Repeat power connections to the fourth, fifth, and sixth shelves, if provided.

2.11 If Tellabs 8108 20Hz Ringing Generators are supplied, make the following input connections from the power supply to the 8108 units:

- ☐ Connect a 20AWG solid red wire equipped with spade lug connectors from the *negative (–)* terminal on the power supply to the *Negative Battery* terminal (terminal *2*) of terminal block *TB402* on the first 8108 20Hz Ringing Generator.
- ☐ Connect a strap (20AWG solid red wire equipped with spade lug connectors) from the *Negative Battery* terminal (terminal *2*) of *TB402* on the first 8108 to the *Negative Battery* terminal (terminal *2*) of *TB402* on the second 8108.
- ☐ Connect a strap (20AWG solid red wire equipped with spade lug connectors) from

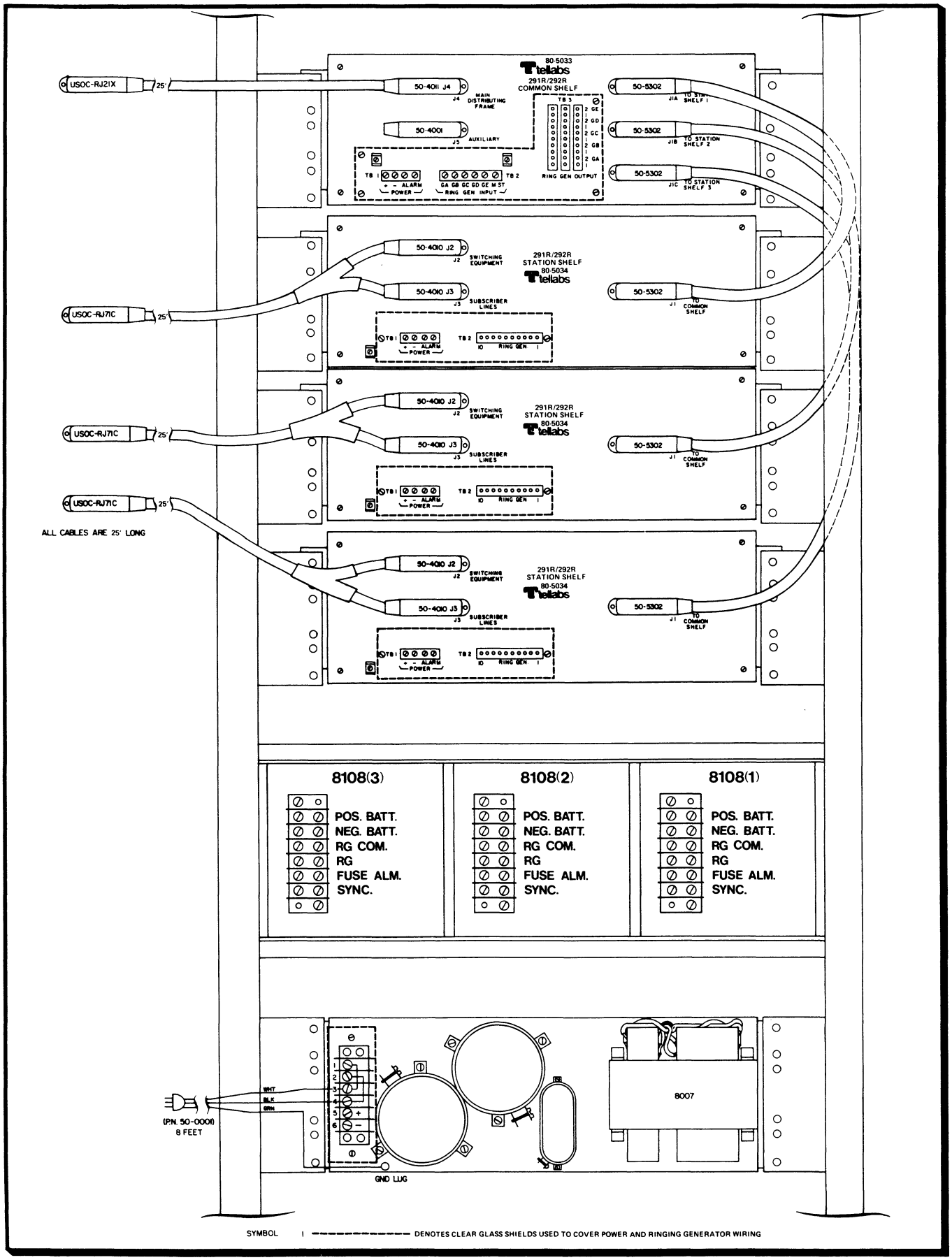


figure 15. 292R System, rear view, showing equipment arrangement for a 30-line System

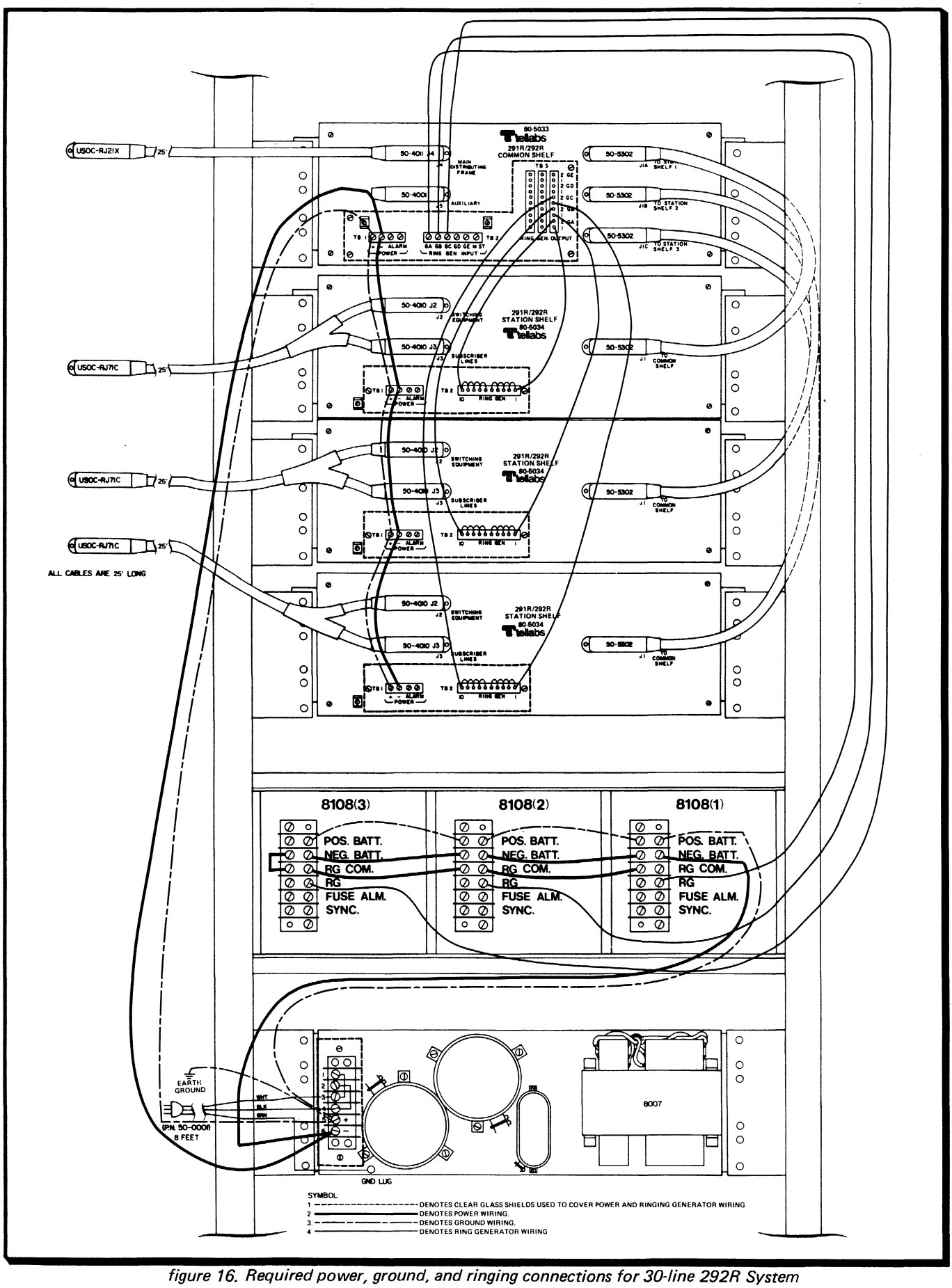


figure 16. Required power, ground, and ringing connections for 30-line 292R System

the *Negative Battery* terminal (terminal *2*) of *TB402* on the second 8108 to the *Negative Battery* terminal (terminal *2*) of *TB402* on the third 8108.

- ☐ Connect a 20AWG solid black wire equipped with spade lug connectors from the *positive (+)* terminal of the power supply to the *Positive Battery* terminal (terminal *1*) of *TB402* on the first 8108 20Hz Ringing Generator.
- ☐ Connect a strap (20AWG solid black wire equipped with spade lug connectors) from the *Positive Battery* terminal (terminal *1*) of *TB402* on the first 8108 to the *Positive Battery* terminal (terminal *1*) of *TB402* on the second 8108.
- ☐ Connect a strap (20AWG solid black wire equipped with spade lug connectors) from the *Positive Battery* terminal (terminal *1*) of *TB402* on the second 8108 to the *Positive Battery* terminal (terminal *1*) of *TB402* on the third 8108.
- ☐ Connect a strap (20AWG solid red wire equipped with spade lug connectors) from the *RG COMM.* terminal (terminal *3*) of *TB402* on the first 8108 to the *RG COMM.* terminal (terminal *3*) of *TB402* on the second 8108.
- ☐ Connect a strap (20AWG solid red wire equipped with spade lug connectors) from the *RG COMM.* terminal (terminal *3*) of *TB402* on the second 8108 to the *RG COMM.* terminal (terminal *3*) of *TB402* on the third 8108.
- ☐ On the last 8108, connect a 20AWG solid red wire equipped with spade lug connectors between the *Negative Battery* terminal (terminal *2*) of *TB402* and the *RG COMM.* terminal (terminal *3*) of *TB402.* This strap and the three straps installed in the previous step provide each 8108 with the required –48Vdc ring-trip bias voltage.

ringing

2.12 Make the following connections between the 8108 20Hz Ringing Generators and the 80-5033 Common Equipment Shelf (reference to figure 16 will aid in completing this wiring procedure):

- ☐ Connect a 20AWG solid white wire equipped with spade lug connectors from the *RG* terminal (terminal *4*) of *TB402* on the first 8108 to terminal *GA* of *TB2* on the 80-5033 Common Equipment Shelf.
- ☐ Connect a second 20AWG solid white wire equipped with spade lug connectors from the *RG* terminal (terminal *4*) of *TB402* on the second 8108 to terminal *GB* of *TB2* on the 80-5033 Shelf.
- ☐ Connect a third 20AWG solid white wire equipped with spade lug connectors from the *RG* terminal (terminal *4*) of *TB402* on the third 8108 to terminal *GC* of *TB2* on the 80-5033 Shelf.

Note: *Terminals* GD, GE, *and* M. ST. *of* TB2 *on the 80-5033 Shelf are not used in PBX applications.*

2.13 Terminal block *TB2* is factory-wired to the input of the 9003A module, which provides the 1-second-on, 1-second-off ringing format. The output of the 9003A is factory-wired to terminal block *TB3.* The 9003A provides alternate ringing between the pairs of rows on *TB3*, i.e., while terminals *GA1* through *GC1* are ringing, terminals *GA2* through *GC2* are silent (and vice versa). Make the following connections between terminal block *TB3* and each of the line equipment shelves (80-5034) to provide the conference stations with ringing voltage:

- ☐ Connect (via wire wrapping) a 22AWG tinned, solid-white wire from terminal *GA1* of terminal block *TB3* on the 80-5033 Shelf to terminal *1* of terminal block *TB2* on the first 80-5034 Shelf.
- ☐ Connect a 22AWG tinned, solid white wire strap between the first 5 terminals of terminal block *TB2* on the 80-5034 Shelf.
- ☐ Connect a 22AWG tinned, solid white wire from terminal *GA2* of terminal block *TB3* to terminal *6* of terminal block *TB2* on the first 80-5034 Shelf.
- ☐ Connect a 22AWG tinned, solid white wire strap between terminals *6, 7, 8, 9,* and *10* of terminal block *TB2* on the 80-5034 Shelf.
- ☐ In a similar fashion, connect 22AWG tinned, solid white wires from terminals *GB1* and *GB2* of terminal block *TB3* to terminals *1* through *5* and *6* through *10* respectively, of terminal block *TB2* on the second 80-5034 Shelf.
- ☐ If a third 80-5034 Shelf is supplied, connect 22AWG tinned, solid white wires from terminals *GC1* and *GC2* of terminal block *TB3* to terminals *1* through *5* and *6* through *10*, respectively, of terminal block *TB2* on the third 80-5034 Shelf.
- ☐ If a fourth 80-5034 Shelf is supplied, connect 22AWG tinned, solid white wires from terminals *GA1* and *GA2* of terminal block *TB3* to terminals *1* through *5* and *6* through *10*, respectively, of terminal block *TB2* on the fourth 80-5034 Shelf.
- ☐ If a fifth 80-5034 Shelf is supplied, connect 22AWG tinned, solid white wires from terminals *GB1* and *GB2* of terminal block *TB3* to terminals *1* through *5* and *6* through *10*, respectively, of terminal block *TB2* on the fifth 80-5034 Shelf.
- ☐ If a sixth 80-5034 Shelf is supplied, connect 22AWG tinned, solid white wires from terminals *GC1* and *GC2* of terminal block *TB3* to terminals *1* through *5* and *6* through *10*, respectively, of terminal block *TB2* on the sixth 80-5034 Shelf.
- ☐ Bind all wiring together using tie wraps and replace all of the clear glass shields.

- ☐ Connect 20AWG solid white wires equipped with spade lug connectors from the *alarm* terminals of *TB1* on each shelf to the PBX-room alarm-monitoring system.

cabling

2.14 The PBX access interface modules, located in the 80-5033 Common Equipment Shelf, are terminated into the 50-4011 Cable Adapter in accordance with USOC RJ21X. The conference station interface modules, located in each of the one to six 80-5034 Line Equipment Shelves, are terminated into the 50-4010 Cable Adapter in accordance with USOC RJ71C. Make the connections at the MDF in accordance with figure 17 and the following checklist:

- ☐ Locate the common equipment shelf connector labeled *RJ21X* and make the required installer connections in accordance with table 4.
- ☐ Locate the first line equipment shelf connector labeled *RJ71C* and make the required installer connections in accordance with table 5.
  Note: *Disconnect all cross-connections between the PBX station numbers prior to connecting the* RJ71C *cable.*
- ☐ In a similar fashion, locate the second through sixth line equipment shelf connectors labeled *RJ71C* and make the required installer connections in accordance with table 5.

RJ21X connector pin no.	color	lead designation	80-5033 position no.	module
26	W-BL	T	1	9296 Automatic Access or
1	BL-W	R		9293 Manual Access
27	W-O	T	2	9296 Automatic Access or
2	O-W	R		9293 Manual Access
28 3	W-GR GR-W	T R	3	9296 Remote Access
29 4	W-BR BR-W	T R	4	9296 Remote Access
30 5	W-SL SL-W	T R	5	9296 Remote Access

table 4. Connections from 80-5033 Common Equipment Shelf's connector (RJ21X) to MDF

option switch selection

2.15 Nearly all optioning of the modules in the 292R System is accomplished via switches on the printed circuit board or front panel of each module. All option switches and their functions are listed in table 6. Locations of these switches on the modules' printed circuit boards and front panels are shown in figure 18. Paragraphs 2.16 through 2.32 contain instructions on optioning each of the modules in the System. This information also appears in greater detail in the separate Tellabs Practice on each module. When all the modules are optioned and installed, the System must be aligned as described in paragraph 2.34.

9003A options

2.16 On the 9003A Ringing Interrupter Control Module, set the six positions of DIP switch *S1* to *OFF* to enable the six (if all six ringing generator outputs are used) ringing-generator alarm detectors or to *ON* to disable the detectors. Set switch *S2* to the *B* position if the CO or PBX uses battery-biased ringing generator or to the *G* position if the CO or PBX uses ground-connected ringing generator. Finally, set switch *S3* to the *A* position for the normal 1-second-on, 1-second-off ringing to both groups of stations, or to the *B* position if continuous ringing is desired on all outputs.

9121 options

2.17 On the 9121 Tone Supply module, set switch *S1* to the *AT* (alerting tone) position when used in a 292R System. (The *BT* [busy tone] position is used for applications other than the 292R System.)

9132 options

2.18 On the 9132 Ringing Timer module, adjust potentiometer *R2* as required to provide a normal (1.5 to 5 minute) ringing timeout interval. If a lever-key switch is provided at the master station for an optional short (0 to 2 minute) ringing timeout interval, adjust potentiometer *R1* as required to provide the desired timeout. Set switch *S1* to the *B* position if the conference is to be forced idle 1.5 to 5 minutes (preset) after the first conference station answers or to the *A* position if the conference is to be held busy until the last conference station goes on-hook.

9133 options

2.19 On the 9133 Long Interval Timer module, the siren timing interval of 1 second to 26 minutes is set by means of switches *S1* and *S2* (which are both miniature 10-position rotary switches) and potentiometer *R2*. Set *S1* and *S2* as indicated in table 7 to obtain the timing interval range within which the specific desired timing interval falls. Then adjust potentiometer *R2* (if necessary) to achieve the precise timing interval desired.

2.20 Switch *S3* on the 9133 permits manual override of the timer for early siren cutoff. When *S3* is set to the *ON* position, an emergency crewman at any station equipped with a siren-activation pushbutton can start the siren (and activate the timer) by depressing the pushbutton, and can stop the siren, if desired, before the preset timing interval expires by depressing the pushbutton a second time. When *S3* is set to the *OFF* position, however, once the siren is activated, it will operate until its preset timing interval expires, even if the pushbutton is redepressed.

2.21 Switch *S4* on the 9133 permits total manual control of the siren. When *S4* is set to the *B* position, both the timer (switches *S1* and *S2*

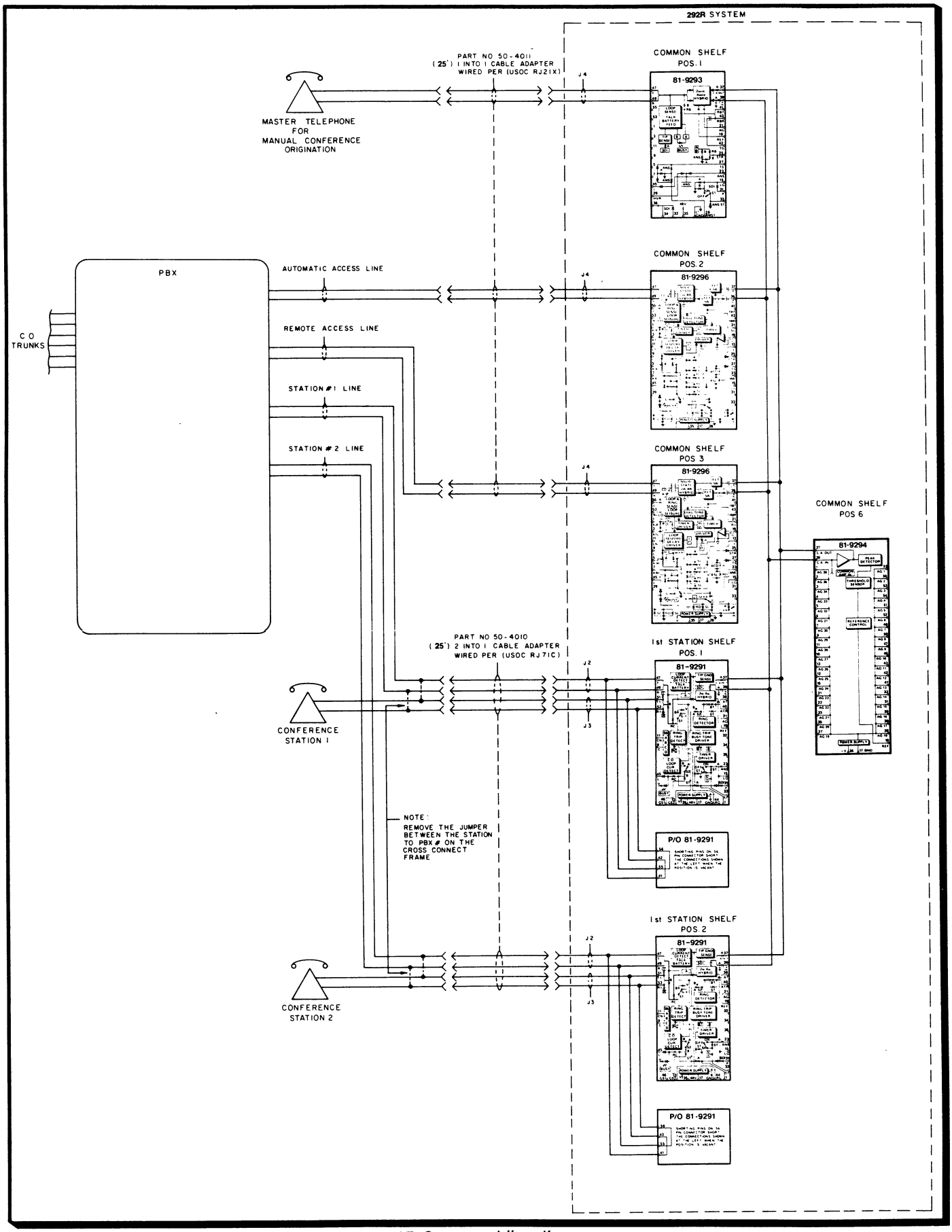
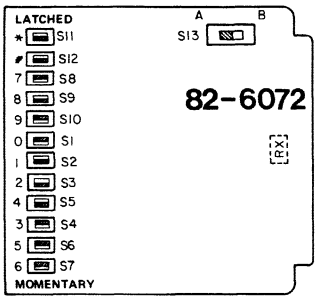
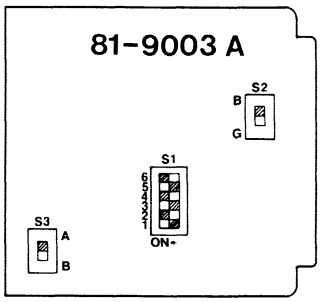
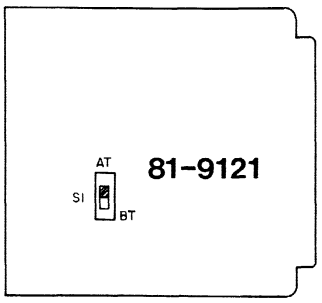
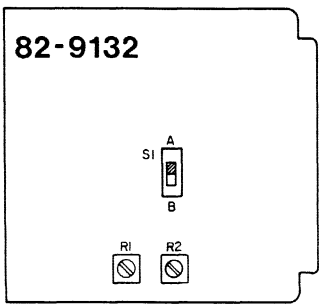


figure 17. System cabling diagram





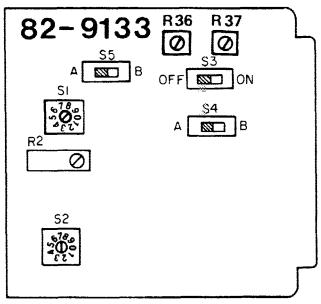


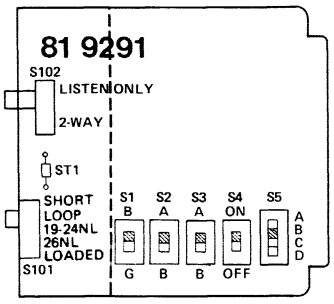


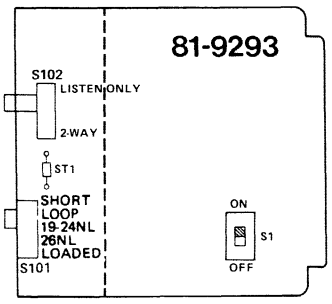
line	RJ71C connector pin no.	color	lead designation	80-5034 sta shelf position no.	module
1 in	26	W-BL	T PBX	1	9291 in pos. 1
	27	W-O	R PBX		of sta. shelf 1, 2, 3,
1 out	1	BL-W	T STA.	1	4, 5, or 6
	2	O-W	R STA.		
2 in	28	W-GR	T PBX	2	9291 in pos. 2
	29	W-BR	R PBX		of sta. shelf 1, 2, 3,
2 out	3	GR-W	T STA.	2	4, 5, or 6
	4	BR-W	R STA.		
3 in	30	W-SL	T PBX	3	9291 in pos. 3
	31	R-BL	R PBX		of sta. shelf 1, 2, 3,
3 out	5	SL-W	T STA.	3	4, 5, or 6
	6	BL-R	R STA.		
4 in	32	R-O	T PBX	4	9291 in pos. 4
	33	R-GR	R PBX		of sta. shelf 1, 2, 3,
4 out	7	O-R	T STA.	4	4, 5, or 6
	8	GR-R	R STA.		
5 in	34	R-BR	T PBX	5	9291 in pos. 5
	35	R-SL	R PBX		of sta. shelf 1, 2, 3,
5 out	9	BR-R	T STA.	5	4, 5, or 6
	10	SL-R	R STA.		
6 in	36	BK-BL	T PBX	6	9291 in pos. 6
	37	BK-O	R PBX		of sta. shelf 1, 2, 3,
6 out	11	BL-BK	T STA.	6	4, 5, or 6
	12	O-BK	R STA.		
7 in	38	BK-GR	T PBX	7	9291 in pos. 7
	39	BK-BR	R PBX		of sta. shelf 1, 2, 3,
7 out	13	GR-BK	T STA.	7	4, 5, or 6
	14	BR-BK	R STA.		
8 in	40	BK-SL	T PBX	8	9291 in pos. 8
	41	Y-BL	R PBX		of sta. shelf 1, 2, 3,
8 out	15	SL-BK	T STA.	8	4, 5, or 6
	16	BL-Y	R STA.		
9 in	42	Y-O	T PBX	9	9291 in pos. 9
	43	Y-GR	R PBX		of sta. shelf 1, 2, 3,
9 out	17	O-Y	T STA.	9	4, 5, or 6
	18	GR-Y	R STA.		
10 in	44	Y-BR	T PBX	10	9291 in pos. 10
	45	Y-SL	R PBX		of sta. shelf 1, 2, 3,
10 out	19	BR-Y	T STA.	10	4, 5, or 6
	20	SL-Y	R STA.		

Note: *Existing frame cross-connects between the PBX numbers and the stations must be removed prior to interface into the RJ71C connector.*

table 5. Connections from each 80-5034 Line Equipment Shelf's connector (RJ71C) to MDF







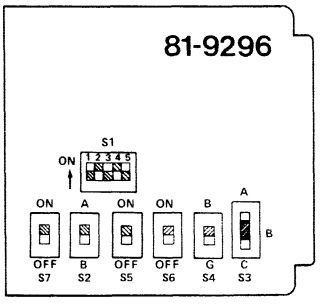


figure 18. Option switch and control locations

module	function	switch	selection
9003A	ringing generator alarm detectors	S1-1 through S1-6	set to *OFF* to activate ringing alarm detectors; set to *ON* to deactivate ringing alarm detectors
	ringing generator bias	S2	set to *B* position for battery bias; set to *G* position for ground bias
	ringing mode	S3	set to *A* position for continuous 1-second-on/ 1-second-off ringing; set to *B* position for continuous ringing on all outputs
9021		none	
9121	tone choice	AT/BT	set to *AT* position for alerting tone; position BT not used in 292R System applications (BT position selects busy tone)
9132	long ringing timeout adjustment	pot. R2	1.5 to 5 minutes, continuously adjustable
	short ringing timeout adjustment	pot. R1	0 to 2 minutes, continuously adjustable
	method of conference termination	S1	set to *B* position to force conference idle, 1.5 to 5 minutes after first station answers; set to *A* position to hold conference busy until last station returns to on-hook condition
9133	siren timing interval, selection of range in which desired timing interval falls	S1 and S2	Both switches set in combination to provide any of 100 timing interval ranges (minimum 1 to 1.5 seconds, maximum 17 to 26 minutes; please refer to table 7)
	siren timing interval selection of precise timing interval desired	pot. R2	continuously adjustable within range selected via *S1* and *S2*
	siren control: timer override for early cutoff of siren (before timing interval expires)	S3	set to *ON* position when early cutoff allowed; set to *OFF* position when early cutoff not allowed; enabled only when *S4* is set to *A* position
	siren control: manual operation of siren	S4	set to *A* position when siren is under timer control, with or without early cutoff, depending upon *S3* setting; set to *B* position when siren is under manual control, with *S3* and timer defeated
	siren mode	S5	set to *B* position to enable siren interrupter; set to *A* position to enable continuous siren
	siren interrupter timing: controls "on" time	pot. R36	"on" time continuously adjustable between 1 and 10 seconds
	siren interrupter timing: controls "off" time	pot. R37	"off" time continuously adjustable between 1 and 10 seconds
9291	biasing of loop for compatibility with CO ringing generator	S1	set to *G* position for battery-biased ringing generator (when ground is connected to tip side of line during ringing); set to *B* position for ground-connected ringing generator (when battery is connected to tip side of line during ringing)
	automatic ring trip disable	S2	set to *A* position when calls to the station involved in a conference are automatically answered and busy tone is applied; set to *B* position when the call is to be ignored
	conference entry supervision control	S3	set to *A* position to inhibit line transfer by C, CN, or sleeve lead; set to *B* position to inhibit line transfer by loop current

module	function	switch	selection
9291	disconnect control	S4	set to *ON* position when conference station remains connected to conference until entire conference is terminated; set to *OFF* position to enable conference station to disconnect from conference in progress via hook-switch flash
	conditions module so that associated station is marked busy to switching equipment while a conference is in progress	S5	set to *A* position for use with SxS or EAX offices; set to *B* position for use with Cross-bar-type offices; set to *C* position for use with ESS-type offices; set to *D* position for use with certain electronic PBX's (please refer to paragraph 2.27)
	conditions module for correct interface to different types of 2wire loops (if cable characteristics are unknown, use System alignment procedure)	short loop/ 19-24nl/ 26nl/ loaded (front panel; labeled S101 on baby board)	• set to *short loop* for: 0 to 7.5 kft of 19 AWG or 0 to 4.5 kft of 22 AWG or 0 to 3 kft of 24 or 26 AWG • set to *19-24nl* for: 7.5 kft to 12 kft of 19 AWG or 4.5 kft to 20 kft of 22 AWG or greater than 3 kft of 24 AWG • set to *26nl* for: greater than 3 kft of 26 AWG • set to *loaded* for: 19H88* 22H88 24H88 26H88 — loaded loops *Remove strap *ST1* (see figure 18) for 19 AWG loaded loop.
	options module for one-way alerting or two-way conference applications	listen only/ 2-way (front panel; labeled S102 on baby board)	set to *listen only* position* for one-way alerting applications set to *2-way* position for normal two-way conference applications *set to *listen only* position also during initial 292R System alignment
9293	maintenance of conference by any station or by master station only	S1	*ON* (conference held up by any station's remaining off-hook) or *OFF* (conference held up by master station only)
	conditions module for correct interface to different types of 2wire loops (if cable characteristics are unknown, use System alignment procedure)	short loop/ 19-24nl/ 26nl/ loaded (front panel; labeled S101 on baby board)	• set to *short loop* for: 0 to 7.5 kft of 19 AWG or 0 to 4.5 kft of 22 AWG or 0 to 3 kft of 24 or 26 AWG • set to *19-24nl* for: 7.5 kft to 12 kft of 19 AWG or 4.5 kft to 20 kft of 22 AWG or greater than 3 kft of 24 AWG • set to *26nl* for: greater than 3 kft of 26 AWG • set to *loaded* for: 19H88* 22H88 24H88 26H88 — loaded loops *Remove strap *ST1* (see figure 18) for 19 AWG loaded loop.
	options module for System alignment or two-way conference applications	listen only/ 2-way (front panel; labeled S102 on baby board)	set to *listen only* position during initial 292R System alignment only set to *2-way* position for normal two-way conference applications
9294		none	(see paragraph 2.34 for alignment procedure)

module	function	switch	selection
9296 (in positions 1 through 5 of common equipment shelf)	options module for sleeve-lead seizure and release	S1-1 and S1-3	Both set to *ON* position for offices that provide sleeve-lead control; both set to *OFF* position for other applications
	options module for disconnect upon opening of the loop	S1-4	Set to *ON* position if far end signals disconnect by opening the loop (used in ground-start electronic offices); set to *OFF* position for other applications
	options module for proper disconnect sequence in offices that do not provide sleeve-lead control	S1-2	Set to *ON* position for ESS or other electronic offices that do not provide sleeve-lead control; set to *OFF* position for other applications
	options module for disconnect upon dial tone	S1-5	Set to *ON* position for ESS or other electronic offices that return dial tone to signal disconnect (loop-start offices only); set to *OFF* positions for other applications
	conditions module to function as either originating or remote-access trunk circuit	S2	Set to *A* when used in shelf positions 1 or 2; set to *B* when used in positions 3, 4, or 5 (as remote answer trunk)
	options module for proper sleeve-lead resistance	S3	Set to *A* for 0-ohm sleeve-lead resistance; set to *B* for 830-ohm sleeve-lead resistance; set to *C* for 1200-ohm sleeve-lead resistance. **Note:** *Switch position does not matter when module is used in shelf positions 3, 4, or 5.*
	options module for proper sleeve-lead bias	S4	Set to *B* for battery-biased sleeve lead; set to *G* for ground-biased sleeve lead. **Note:** *Switch position does not matter when module is used in shelf positions 3, 4, or 5.*
	selects proper CN-lead resistance and function	S5	Set according to paragraph 2.31
	selects CN-lead resistance-battery range	S6	Switch is operational only when *S5* is *ON*; set according to paragraph 2.31
	options modules for maintenance of conference by either any station or by master station only	S7	Set to *ON* for conference held up by any station(s) remaining off-hook; set to *OFF* for conference held up by master station only
6072 (optional)	selective signaling	S1 thru S10 and S12	Please consult Tellabs' Application Engineering Group at one of the telephone numbers in paragraph 4.03
	DTMF siren activation	S11	Must be set to *momentary* position
	rotary or DTMF input	S13	Must be set to *B* (DTMF) position

table 6. Switch and other user-selectable options

and potentiometer *R2*) and switch *S3* are defeated, and the siren operates only while the siren-activation pushbutton is held depressed. When *S4* is set to the *A* position, the siren is under the control of the timer and operates until manually stopped or until the timer times out, depending upon the setting of *S3*.

Note: *When using a nonlocking pushbutton to activate the siren, the pushbutton must be depressed for 1 second and then released. When overriding the siren timer, the pushbutton must also be depressed for 1 second and then released.*

2.22 Switch *S5* on the 9133 is used to enable or disable the siren interrupter circuitry. Set switch *S5* to the *A* position when the siren is to operate continuously during either the fixed-time-interval or fixed-time-interval-with-override mode. Set switch *S5* to the *B* position if interrupted siren operation during the preset timing interval is desired. With switch *S5* set to the *B* position, adjust potentiometer *R36* for the desired on-time interval and potentiometer *R37* for the desired off-time interval. Both timing intervals are continuously adjustable over a 1-to-10-second range.

9291 options

2.23 Set switch *S1* to the *G* position if the associated switching equipment uses battery-biased ringing generator or to the *B* position if the switching equipment uses ground-connected ringing generator.

Note: *This instruction may seem incorrect. It is* **not** *incorrect. On this module,* B *is ground-connected and* G *is battery-biased ringing generator.*

2.24 Switch *S2* is used in PBX and CO applications where no provision is made for marking individual line appearances busy while a conference call is in progress. Set switch *S2* to the *A* position to condition the 9291 to automatically trip incoming ringing and to return interrupted alerting tone as a busy indication. Set switch *S2* to the *B* position to condition the 9291 to ignore an incoming call. (With *S2* set to *B*, the 9291 does **not** trip ringing; thus, the caller will not be billed for any toll charges incurred.)

2.25 Switch *S3* determines the manner in which the station, if busy with a normal call at the time a conference is originated, will enter the conference. Set *S3* to the *B* position to condition the 9291 to apply alerting tone to the call in progress (after which the station user may enter the conference via a hookswitch flash), or to the *A* position to condition the 9291 to cut off the call in progress and force the busy station into the conference.

2.26 Switch *S4* selects the manner in which the station disconnects from a conference. In 292R System applications, set *S4* to the *OFF* position to allow the station to disconnect from a conference in progress via hookswitch flash. The *ON* position of *S4*, which is not normally used in the 292R System, restricts the station from leaving a conference in progress by preventing disconnection from the System after hanging up.

2.27 Switch *S5* conditions the module (through appropriate control-lead functions) so that the station is marked busy to the switching equipment while a conference is in progress. Set *S5* to the *A* position for use with SxS or EAX systems, to the *B* position for use with Crossbar-type systems, to the *C* position for use with ESS-type systems (i.e., systems that require only a closure between the make-busy leads to make a line circuit busy), or to the *D* position for use with electronic PBX's that will accept a 750-ohm tip-ring short as a make-busy indication (e.g., Dimension 2000 ™ PBX's). If the switching equipment is not one of the types listed above, provision is made within the module to automatically trip incoming ringing voltage (regardless of the setting of *S5*) on an incoming call made to the station while a conference is in progress and to return interrupted alerting tone as a busy indication.

2.28 The front-panel *short loop/19-24nl/26nl/loaded* switch is used to interface the module with different types of 2wire loops. Set this switch to the *short loop* position for 0 to 7.5kft of 19AWG cable, 0 to 4.5kft of 22AWG cable, or 0 to 3kft of 24 or 26AWG cable. Set this switch to the *19-24nl* position for 7.5 to 12kft of 19AWG, 4.5 to 20kft of 22AWG, or greater than 3kft of 24AWG cable. Set this switch to the *26nl* position for greater than 3kft of 26AWG cable. Set this switch to the *loaded* position for 19H88, 22H88, 24H88, or 26H88 loaded cable. **Please note that 19AWG loops greater than 12kft and 22AWG loops greater than 20kft are not recommended.** When using 19H88 loaded cable, strap *ST1* must be removed (in addition to the above settings). If cable characteristics are unknown, align the System according to the System alignment procedure.

2.29 The front-panel *listen only/2-way* switch conditions the module for one-way alerting or two-way conference applications. Set this switch to the *2-way* position for normal two-way conference applications (this is the position normally selected). Set this switch to the *listen only* position for special applications requiring one-way alerting and also during initial 292R System alignment.

9293 options

2.30 The 9293 2Wire ARD Conference Originate Line Circuit Module contains one printed-circuit-board option switch *(S1)* and two front-panel

		switch 1 positions																			
		0		1		2		3		4		5		6		7		8		9	
		max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
switch 2 positions	9	3.05	2.03	2.88	1.92	2.71	1.81	2.54	1.70	2.37	1.56	2.20	1.47	2.03	1.36	1.87	1.24	1.70	1.13	1.53	1.02
	8	6.10	4.06	5.76	3.84	5.42	3.62	5.08	3.40	4.74	3.12	4.40	2.94	4.06	2.72	3.74	2.48	3.40	2.26	3.06	2.03
	7	12.21	8.12	11.52	7.68	10.84	7.24	10.16	6.80	9.48	6.24	8.80	5.88	8.12	5.44	7.48	4.96	6.80	4.52	6.12	4.07
	6	24.42	16.24	23.04	15.36	21.68	14.48	20.32	13.60	18.96	12.48	17.60	11.76	16.24	10.88	14.96	9.92	13.60	9.04	12.24	8.14
	5	48.84	32.48	46.08	30.72	43.36	28.96	40.64	27.20	37.92	24.96	35.20	23.52	32.48	21.76	29.92	19.84	27.20	18.08	24.48	16.28
	4	1:38	1:05	1:32	1:01	1:27	57.92	1:21	54.40	1:16	49.92	1:10	47.04	1:05	43.52	59.84	39.68	54.40	36.16	48.96	32.56
	3	3:15	2:10	3:04	2:03	2:53	1:56	2:42	1:49	2:32	1:40	2:21	1:34	2:10	1:27	2:00	1:19	1:49	1:12	1:38	1:05
	2	6:31	4:20	6:09	4:06	5:47	3:52	5:25	3:38	5:03	3:20	4:42	3:08	4:20	2:54	3:59	2:38	3:38	2:25	3:16	2:10
	1	13:01	8:40	12:17	8:12	11:34	7:43	10:50	7:15	10:06	6:39	9:23	6:16	8:40	5:48	7:59	5:17	7:15	4:49	6:32	4:20
	0	26:02	17:20	24:35	16:23	23:08	15:27	21:41	14:30	20:13	13:14	18:46	12:33	17:19	11:36	15:57	10:35	14:30	9:39	13:03	8:41

Note 1: Adjustment of R2 allows selection of time interval within the ranges indicated for each switch combination.
Note 2: Timing intervals shorter than 1 minute are given in seconds and hundredths of a second (e.g., 14.96). Intervals longer than 1 minute are given in minutes and seconds (e.g., 23:08).

table 7. Switch settings for siren timing interval, 9133 Long Interval Timer module

option switches. Set *S1* to the *ON* position if it is desired that a conference be held up by any station's remaining off-hook (instead of the master station [or a key station, if two or more key stations are used] only). Set *S1* to the *OFF* position if it is desired that the conference drop when the master station or a key station goes on-hook. The front-panel *short loop/19-24nl/26nl/loaded* switch is used to correctly interface the module to the associated 2wire loop. If the associated loop characteristics are known, set this switch according to table 6. However, if the loop characteristics are unknown, the correct switch position is determined by following the System alignment procedure. The front-panel *listen only/2-way* switch conditions the module for one-way alerting or two-way conference applications. Set this switch to the *2-way* position for normal two-way conference applications (this is the position normally selected). Set this switch to the *listen only* position during initial 292R System alignment.

type of switching equipment	9296 switch positions (module in shelf position 1 or 2)										
	S1-1	S1-2	S1-3	S1-4	S1-5	S2	S3	S4	S5	S6	S7
SxS	ON	OFF	ON	OFF	OFF	A	A or B**	B	ON	ON	see table 6
No. 1 EAX	ON	OFF	ON	OFF	OFF	A	C	G	OFF	ON	
No. 2 EAX	ON	OFF	ON	OFF	OFF	A	C	G	ON	ON	
X-Bar or similar	ON	OFF	ON	OFF	OFF	A	C	G	OFF	ON	
DMS-10	ON	OFF	ON	OFF	OFF	A	A	G	OFF	ON	
DMS-100	ON	OFF	ON	OFF	OFF	A	X*	X*	OFF	ON	
ESS or similar (ground start)	OFF	ON	OFF	ON	OFF	A	X*	X*	OFF	ON	
ESS or similar (loop start)	OFF	ON	OFF	OFF†	ON†	A	X*	X*	OFF	ON	

*The letter X indicates a "DON'T CARE CONDITION."

**Note 1: *Set switch* S3 *to the* B *position for normal use and to the* A *position in AECo offices with 600 + 230Ω in the line-equipment tie lead.*

†Note 2: *In this case, the disconnect must be indicated by return of dial tone.*

table 8. 9296 optioning when in shelf position 1 or 2

type of switching equipment	9296 switch positions (module in shelf position 3, 4, or 5)										
	S1-1	S1-2	S1-3	S1-4	S1-5	S2	S3	S4	S5	S6	S7
SxS	ON	OFF	ON	OFF	OFF	B	X*	X*	ON	OFF**	X*
No. 1 EAX, No. 2 EAX, X-Bar, DMS-10, DMS-100 or similar	ON	OFF	ON	OFF	OFF	B	X*	X*	ON	OFF	X*
ESS or similar (ground start)	OFF	ON	OFF	ON†	OFF†	B	X*	X*	OFF	OFF	X*
ESS or similar (loop start)	OFF	ON	OFF	OFF†	ON†	B	X*	X*	OFF	OFF	X*

*The letter X indicates a "DON'T CARE CONDITION."

**Note 1: *Set switch* S6 *to the* ON *position only when the CO requires resistance battery of less than 1200Ω (provides 850Ω when* S6 *in* ON*).*

†Note 2: *Set switch* S1-4 *to* ON *and set switch* S1-5 *to* OFF *when the electronic office is a ground-start office that indicates disconnect via momentary interruption of loop current. Set switch* S1-4 *to* OFF *and set switch* S1-5 *to* ON *when the electronic office is a loop-start office that indicates disconnect by returning a dial tone.*

table 9. 9296 optioning when in shelf position 3, 4, or 5

9296 options

2.31 The 9296 2Wire ARD Trunk Access Module can be used as either an originating or a remote-access trunk circuit. When the module is used in position 1 or 2 of the common equipment shelf, set the 9296's option switches according to table 8. When the module is used in shelf position 3, 4, or 5 (as a remote-access trunk circuit), set the 9296's switch options according to table 9.

6072 options

2.32 On the 6072 Single-Digit DTMF/Dial Decoder module, switches *S1* through *S10* and switch *S12* program each of the 11 station groups to respond to one of the remaining 11 corresponding DTMF pushbuttons (the * pushbutton is used for siren activation). Because an additional interface circuit and external wiring are required, these switches cannot be set at this time. If this selective-signaling feature is provided, contact Tellabs' Applications Engineering Group at one of the telephone numbers in paragraph 4.03 for further assistance. Switches *S11* and *S13* provide the means for any conference station that is equipped with a DTMF telephone to start the community siren by pressing the * pushbutton. Switch S11 must be set to the *momentary* position, and switch *S13* must be set to the *B* position (DTMF input) for proper siren operation.

module installation

2.33 Install the modules in a standard 292R System in their shelf positions

exactly as shown in figure 3a. If the characteristics of all 2wire loops are known and the associated option switches are set accordingly, no System alignment is required. However, if the characteristics of the 2wire station loops are not known, the System alignment procedure must be completed. If remote access, siren control, and/or (in automatic conferencing only) a second 9296 2Wire ARD Trunk Access Module are not required in a particular application, the appropriate module position(s) can simply be left blank.

Note 1: *For manual conferencing, insert the 9293 2Wire ARD Conference Originate Line Circuit Module in position 1 of the common equipment shelf.*

Note 2: *For combined automatic and manual conferencing, insert the 9296 2Wire ARD Trunk Access Module in position 1 and the 9293 2Wire ARD Conference Originate Line Circuit Module in position 2 of the common equipment shelf.*

System alignment procedure

2.34 Alignment of the 292R System is required only if the 2wire loop characteristics are not known (in which case the front-panel *short loop/19-24nl/26nl/loaded* switches cannot be set). To perform this alignment procedure, proceed as directed in the System alignment flowchart on page 33.

System expansion beyond 30 lines

2.35 When a 292R System is expanded beyond 30 stations, one Y cable (Tellabs part number 50-4027) is provided for each 10-station increment. The Y cable has a male plug at one end and a dual connector (plug and receptacle back to back) on the other end. Figure 19 shows a typical 60-line System. In this application, Y cables are connected from *J1* of station shelves 1, 2, and 3 to *J1* of station shelves 4, 5, and 6, respectively. Also, 50-5302 cables are connected from *J1* of station shelves 1, 2, and 3 to *J1A, J1B,* and *J1C,* respectively, on the common equipment shelf.

3. system specifications

system capacity
60 conference stations; 3 remote answer access lines; 2 access lines for either automatic, manual, or combined automatic and manual access

ringing frequencies
3 frequencies to accommodate harmonic ringing

functional ringing arrangement
2 ringing subgroups per frequency (6 subgroups total), arranged as 3 ringing groups of 2 subgroups each (alternate ringing is provided within the 3 ringing groups)

ringing interruption rate
1 second on, 1 second off, or continuous ringing (switch-selectable)

ringing generator bias
grounded or battery-biased (switch-selectable)

ringing capability
up to 5 ringers can operate simultaneously from each 2wire station loop

2wire loops
2wire loop limit: 2000 ohms or office loop limit, whichever is less
longitudinal balance: 60dB minimum, 200 to 4000Hz

power
input voltage: –42 to –56Vdc, filtered, positive-ground-referenced
input current: 3 amperes maximum (nominal) when idle; 13 amperes maximum (nominal) when busy

operating environment
32° to 122°F (0° to 50°C), humidity to 95% (no condensation)

dimensions
(for 60-station System with 7 shelves, power supply, and ringing generators)
42.75 inches (108.59cm) high
19 or 23 inches (48.26 or 58.42cm) wide
9.94 inches (25.25cm) deep

weight
each fully loaded common shelf: approximately 20 pounds (9.1kg)
each fully loaded station shelf: approximately 19 pounds (8.6kg)

4. testing and troubleshooting

4.01 The Testing Guide Checklist in this section may be used to assist in the installation, testing, or troubleshooting of the 292R Conference/Alerting System. The Checklist identifies the most common types of general trouble conditions with suggestions as to the probable cause. For specific difficulties associated with a particular module and not covered in the Checklist, consult the separate Tellabs Practice on that module, where detailed testing information is provided. In general, the most expeditious method of isolating trouble is the substitution of a known good module for suspected defective modules while referencing that module's Testing Guide Checklist. If the substitute module operates correctly, the original module should be considered defective and returned to Tellabs for repair or replacement. We strongly recommend that no internal (component-level) testing or repairs be attempted on the modules or mounting shelves in the 292R System. Unauthorized testing or repairs may void the module's or shelf's warranty.

4.02 Tellabs warrants the 292R System's modules and mounting shelves to be free of defective components, workmanship, and design for a period of two years from the date of manufacture, when applied as outlined in our Practices, subject to handling and installation commensurate with industry standards for solid-state electronic equipment. If a module or shelf does not prove to be free of defective components, workmanship, and design under these criteria, Tellabs will replace or repair it free of charge.

Note: *Warranty service does not include removal of permanent customer markings on the front panels of Tellabs modules, although an attempt will be made to do so. If a module must be marked* **defective**, *we recommend that it be done on a piece of tape or on a removable stick-on label.*

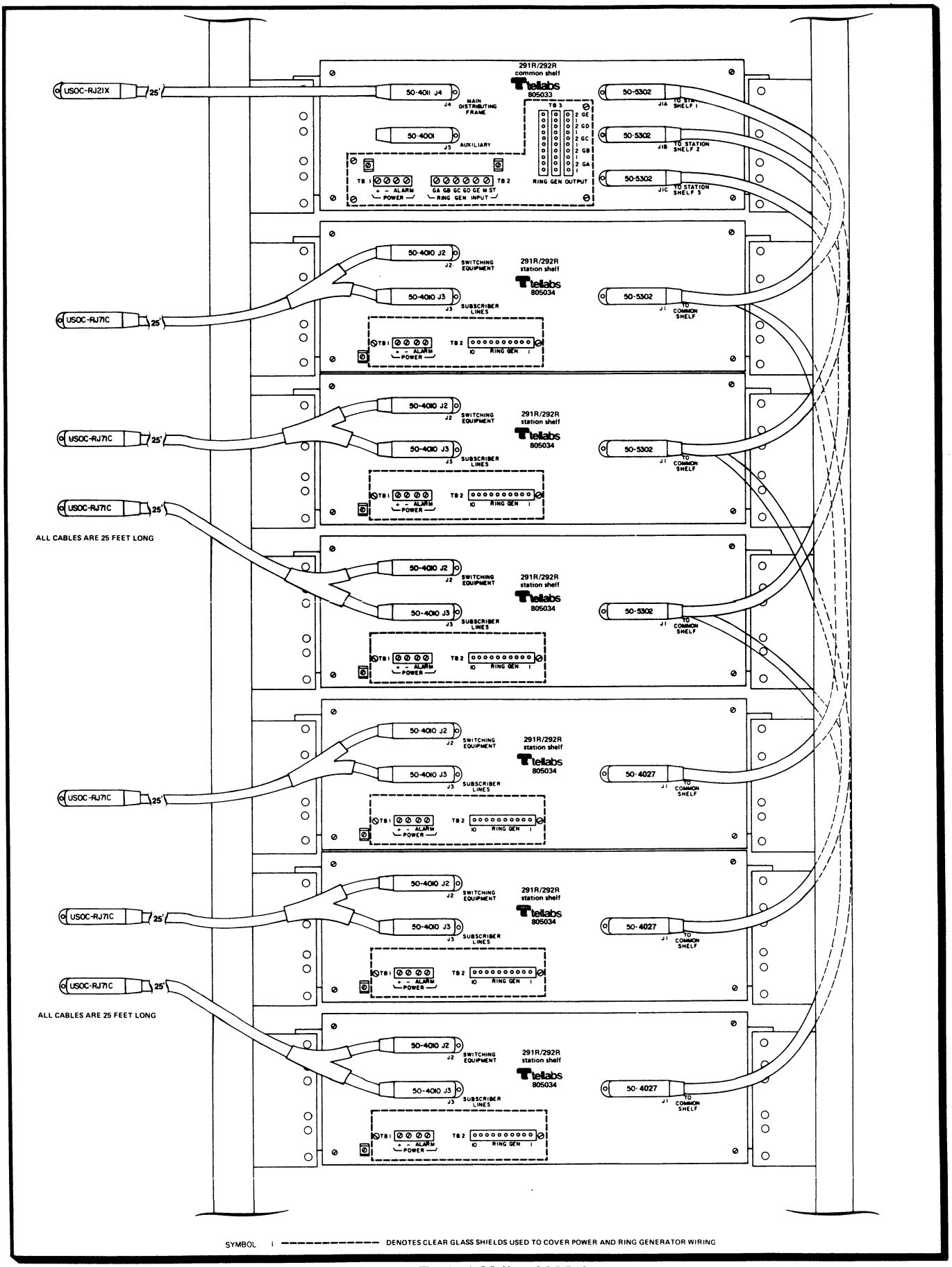


figure 19. Typical 60-line 292R System

4.03 If a situation arises that is not covered in the Checklist, contact Tellabs Customer Service at your Tellabs Regional Office or at our Lisle, Illinois, or Mississauga, Ontario, Headquarters. Telephone numbers are as follows:

US central region: (312) 969-8800
US northeast region: (412) 787-7860
US southeast region: (305) 645-5888
US western region: (702) 827-3400
Lisle Headquarters: (312) 969-8800
Mississauga Headquarters: (416) 624-0052

4.04 If a 292R System module or mounting shelf is diagnosed as defective, the situation may be remedied by either *replacement* or *repair and return*. Because it is more expedient, the *replacement* procedure should be followed whenever time is a critical factor (e.g., service outages, etc.).

replacement

4.05 To obtain a replacement module or shelf, notify Tellabs via letter (see addresses below), telephone (see numbers above), or twx (910-695-3530 in the USA, 610-492-4387 in Canada). Be sure to provide all relevant information, including the 8XXXXX part number that indicates the issue of the device in question. Upon notification, we shall ship a replacement to you. If the device in question is in warranty, the replacement will be shipped at no charge. Pack the defective device in the replacement carton, sign the packing slip included with the replacement, and enclose it with the defective device (this is your return authorization). Affix the preaddressed label provided with the replacement equipment to the carton being returned, and ship the equipment prepaid to Tellabs.

repair and return

4.06 Return the defective equipment, shipment prepaid, to Tellabs (attn: repair and return).

in the USA: Tellabs Incorporated
4951 Indiana Avenue
Lisle, Illinois 60532

in Canada: Tellabs Communications Canada, Ltd.
1200 Aerowood Drive, Unit 39
Mississauga, Ontario, Canada L4W 2S7

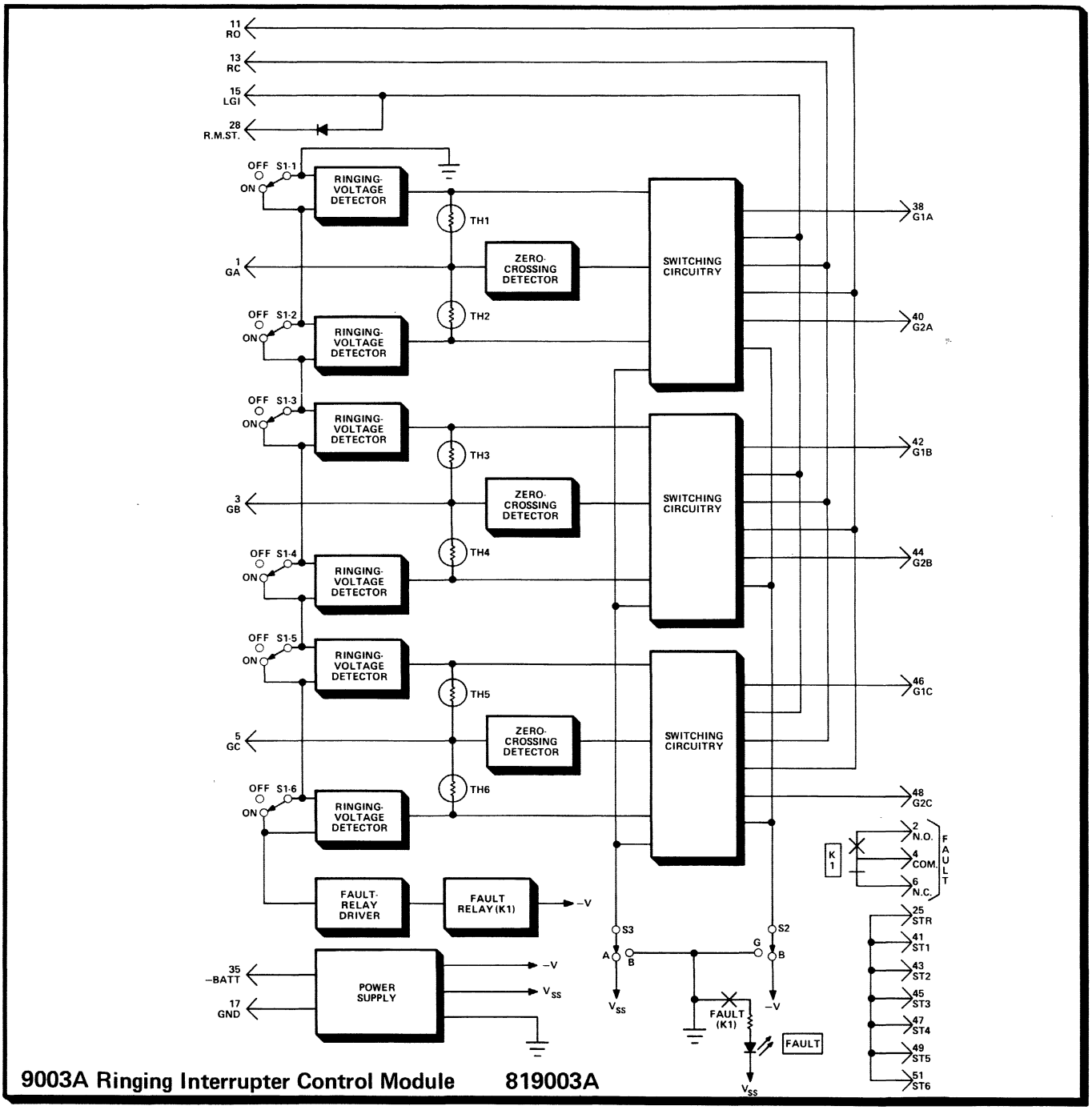
Enclose an explanation of the malfunction. Follow your company's standard procedure with regard to administrative paperwork. Tellabs will repair the equipment and ship it back to you. If the equipment is in warranty, no invoice will be issued.

testing guide checklist

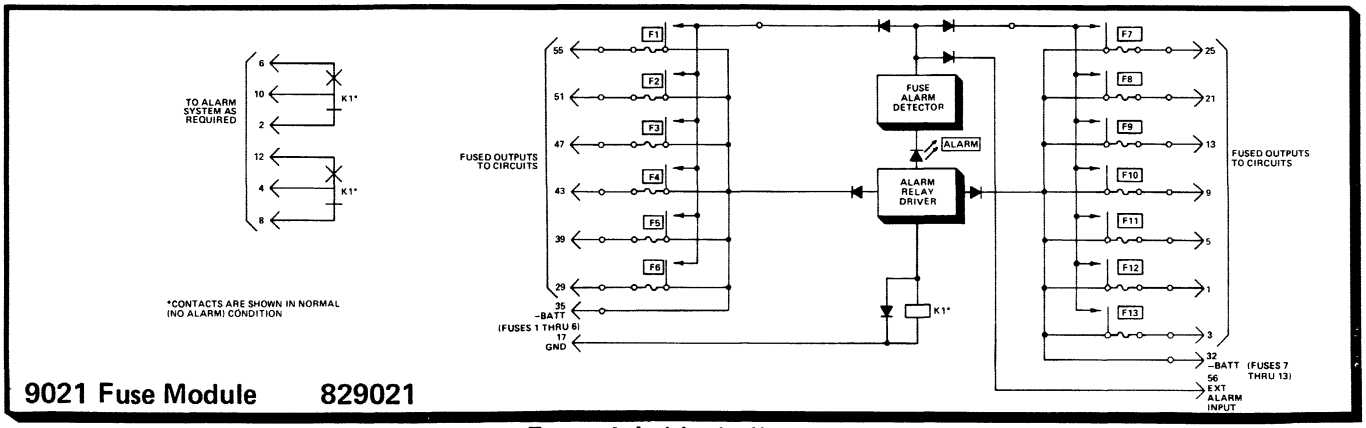
Note: *If a fault is isolated to a particular module in the 292R System but cannot be corrected with the information provided in this checklist, refer to the separate Tellabs Practice on that module for detailed testing information.*

trouble condition	possible cause (in order of likelihood)
In automatic mode, System cannot be accessed. Originating party continues to receive ringback tone.	1) 9296 module in shelf position 1 or 2 incorrectly optioned ☐. 2) Fuse blown in common equipment shelf ☐. 3) Originating line connected incorrectly to 292R System; line relay equipment not removed ☐. 4) 9296 module in wrong shelf position ☐. 5) Strap missing between K1C and K2C on subscriber line block ☐, or manual/automatic switch miswired ☐. 6) Power connections to 292R System open or improperly connected ☐. 7) 9296 module defective ☐.
In automatic mode, System access is incomplete. Ringback tone is removed from originating line, but conference telephones do not ring.	1) 9296 module incorrectly optioned ☐. 2) 9291 module incorrectly optioned ☐. 3) Ringing generator(s) incorrectly connected to System ☐. 4) Ringing option straps on rear of common equipment shelf improperly installed ☐. 5) Power not connected to line equipment shelves ☐. 6) Strap missing between K1C and K2C on subscriber line block ☐, or manual/automatic switch miswired ☐. 7) Fuse associated with 9296 module blown ☐. 8) Line relay equipment not removed (SxS office only) ☐. 9) Defective 9296 module ☐. 10) Defective 9003A module ☐.
When accessed, not all conference telephones ring.	1) 9291 associated with non-ringing phones incorrectly optioned ☐. 2) Ringing option straps on rear of common equipment shelf improperly installed ☐. 3) Required ringing frequency not wired to System ☐. 4) Non-ringing telephone lines incorrectly wired to System ☐. 5) Blown fuses in line equipment shelves ☐.

trouble condition	possible cause (in order of likelihood)
Alerting tone not received by conference telephones off-hook on routine call when conference is activated.	1) 9291 optioned incorrectly ☐. 2) Fuse associated with 9121 module blown ☐. 3) If condition is limited to one specific telephone, defective 9291 ☐. 4) If condition is always associated with same telephones (others work normally), check for incorrect wiring between switching equipment and 292R System on lines with problem ☐. 5) Defective 9121 module ☐.
Conference telephones can answer only during ringing cycle.	1) 9003A optioned incorrectly (check switch *S1*) ☐. 2) Switch *S1* on 9291 modules incorrectly set ☐. 3) Defective 9003A module ☐.
When a conference station with party-line service receives conference call, wrong party rings.	1) Ringing generator option straps installed incorrectly on rear of common equipment shelf ☐. 2) If party to be rung requires that ringing be applied to tip lead, reverse associated tip and ring leads at both switching equipment and line interface frame ☐. **Note:** *The 9291 applies ringing to the lead designated* ring *only.*
Ringing period either too long or too short.	1) Timeout period of 9132 module requires adjustment ☐. 2) Defective 9132 module ☐. 3) If too short, possible short circuit across TK and TKR leads ☐.
Not all conference telephones ring. Those that do so ring without interruption.	1) Defective 9132 module ☐.
When System operated in manual mode, ringback tone not received by originating station.	1) Station off-hook ☐. 2) Ringback-tone level adjustment set too low on 9121 module ☐. 3) Defective 9121 module ☐. 4) Defective 9293 module ☐.
Remote-access lines inoperative.	1) 9296 module(s) in shelf positions 3, 4, and 5 incorrectly optioned ☐. 2) CN leads miswired ☐. 3) 9133 not operated or defective ☐. 4) Line relay equipment not removed (SxS office only) ☐. 5) Blown fuse associated with 9296 or 9133 ☐. 6) Defective 9296 module ☐.
Remote-access lines do not release from switching equipment at end of call.	1) Access lines are loop start rather than ground start ☐. 2) Defective 9296 module ☐.
One particular fuse blows repeatedly.	1) Module associated with blown fuse is defective ☐.
When System is accessed, howling occurs on all conference telephones.	1) System improperly aligned ☐. 2) Defective 9294 module ☐.
Conference activation causes immediate termination of routine calls in progress at conference telephones.	1) C leads from switching equipment associated with conference lines either not connected or incorrectly connected ☐. 2) 9291 modules incorrectly optioned ☐.
Siren control inoperative.	1) Inadequate ground on siren-activation pushbutton ☐. 2) Fuse associated with 9133 module blown ☐. 3) Defective 9291 modules associated with siren control station ☐. 4) 9133 module defective ☐.
Siren timer output operates only when pushbutton is depressed.	1) 9133 module incorrectly optioned ☐.
Siren timing period too long or too short.	1) 9133 module requires timing adjustment per table 7 ☐.

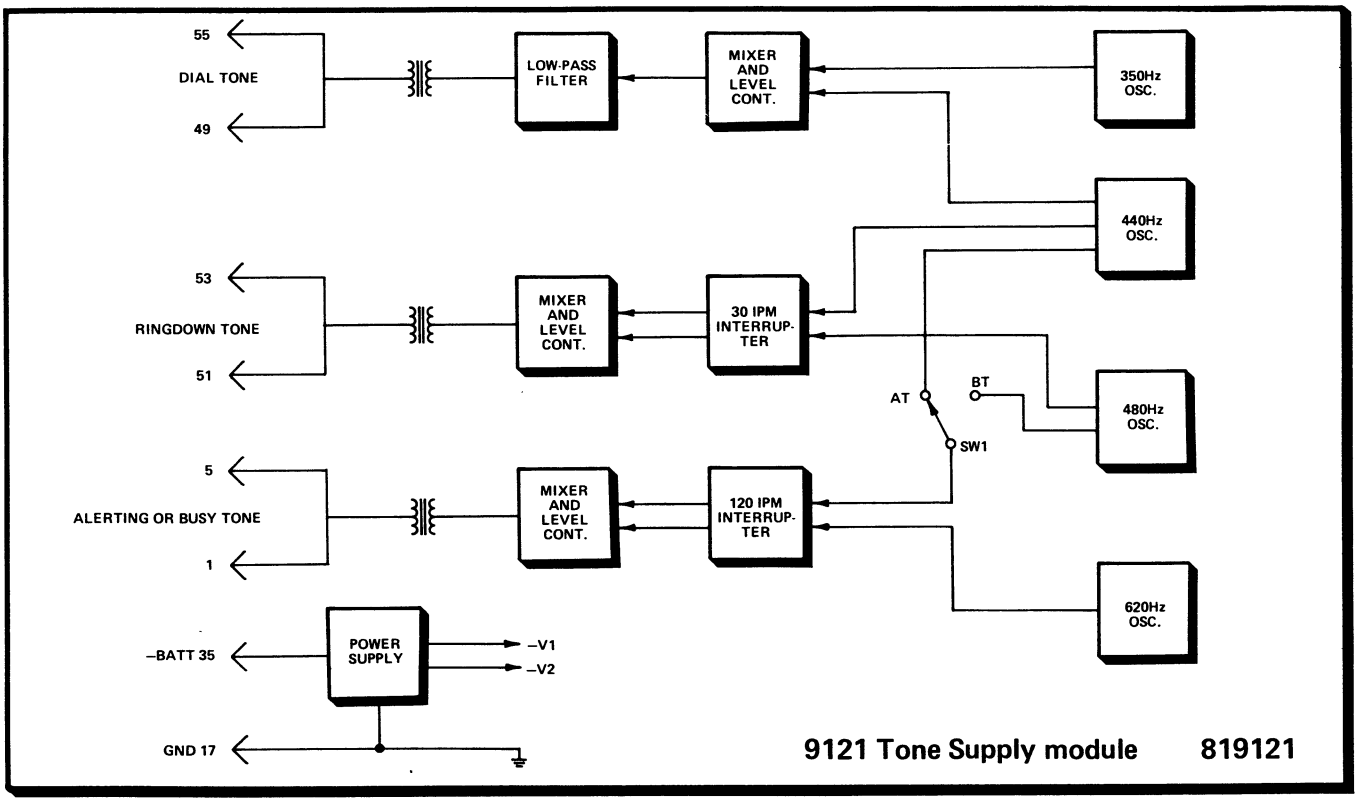


9003A Ringing Interrupter Control Module 819003A

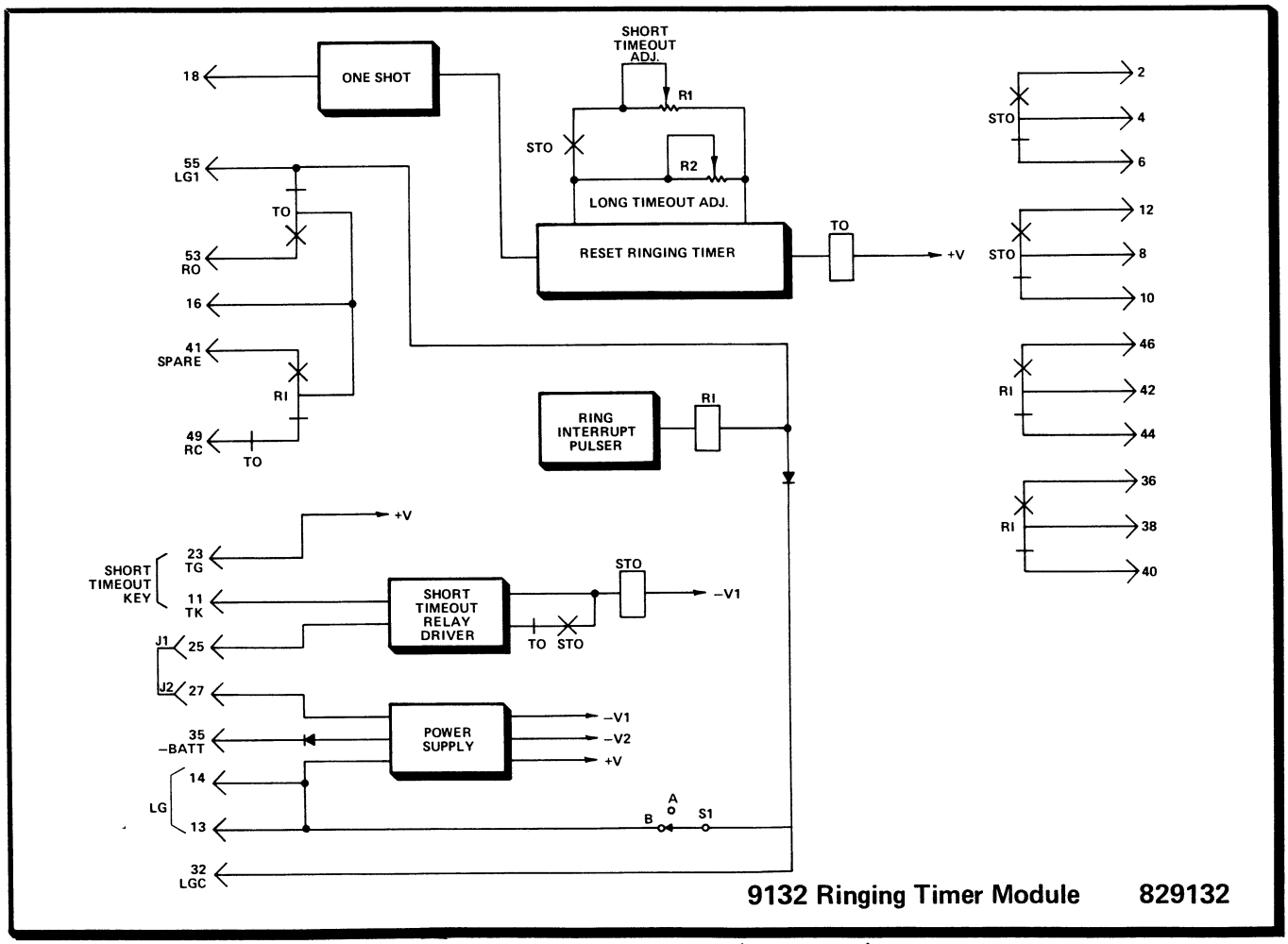


9021 Fuse Module 829021

5. module block diagrams

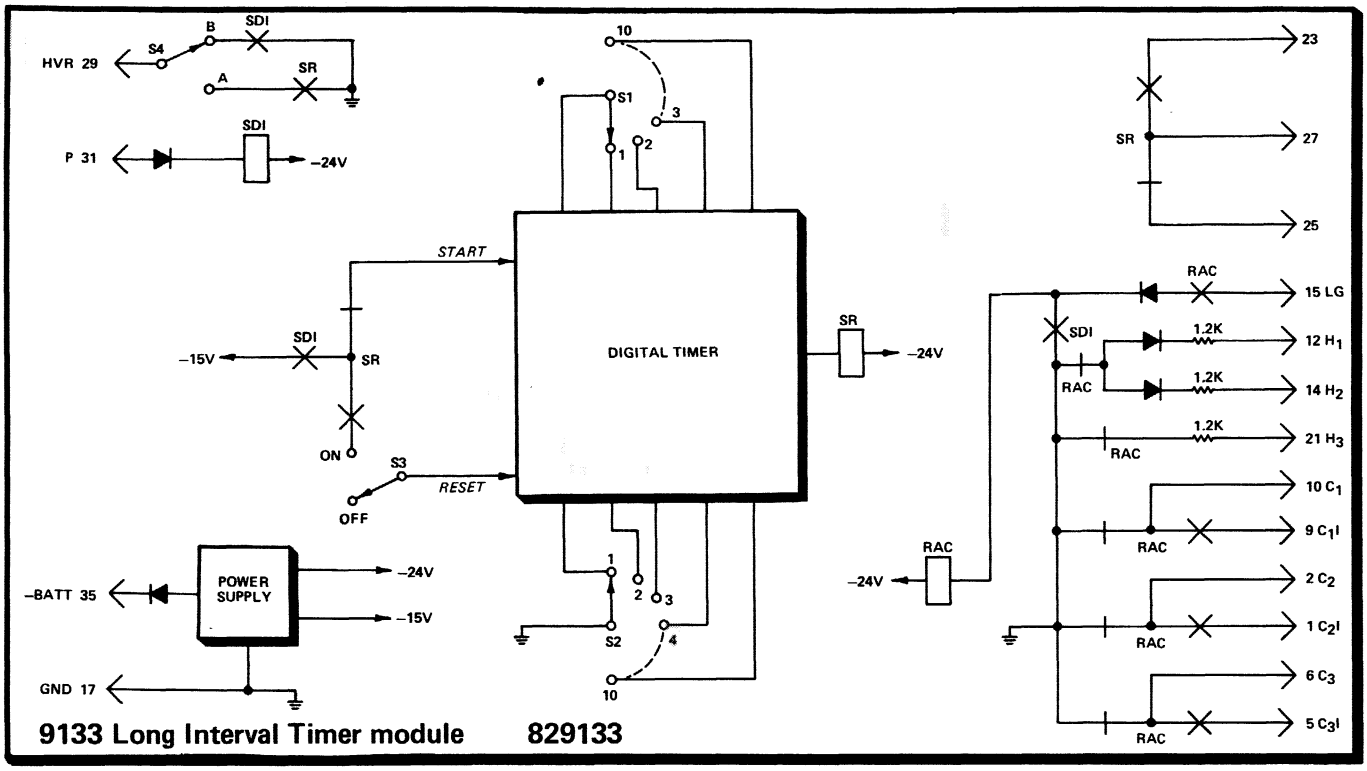


9121 Tone Supply module **819121**

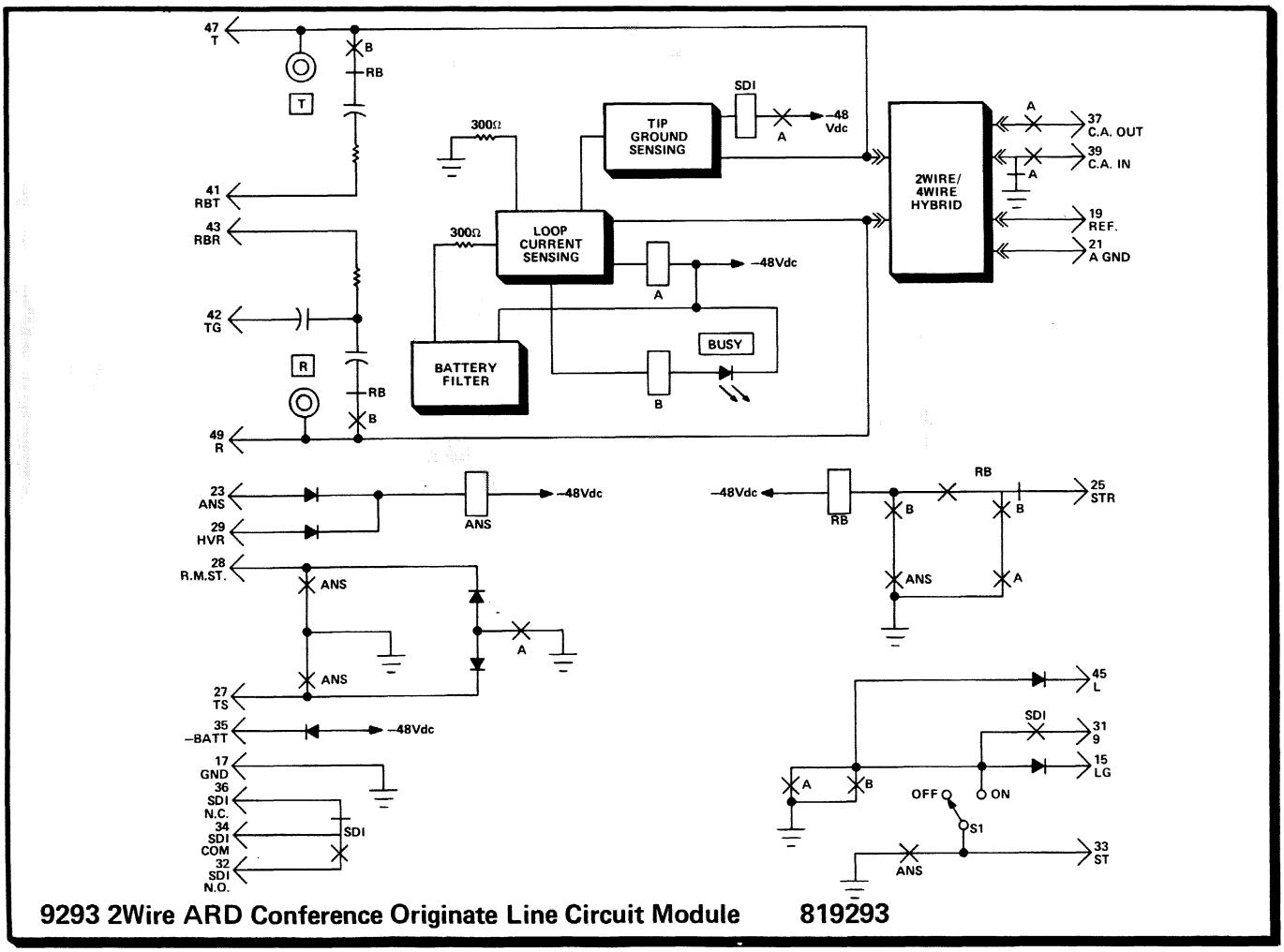


9132 Ringing Timer Module **829132**

5. module block diagrams (continued)

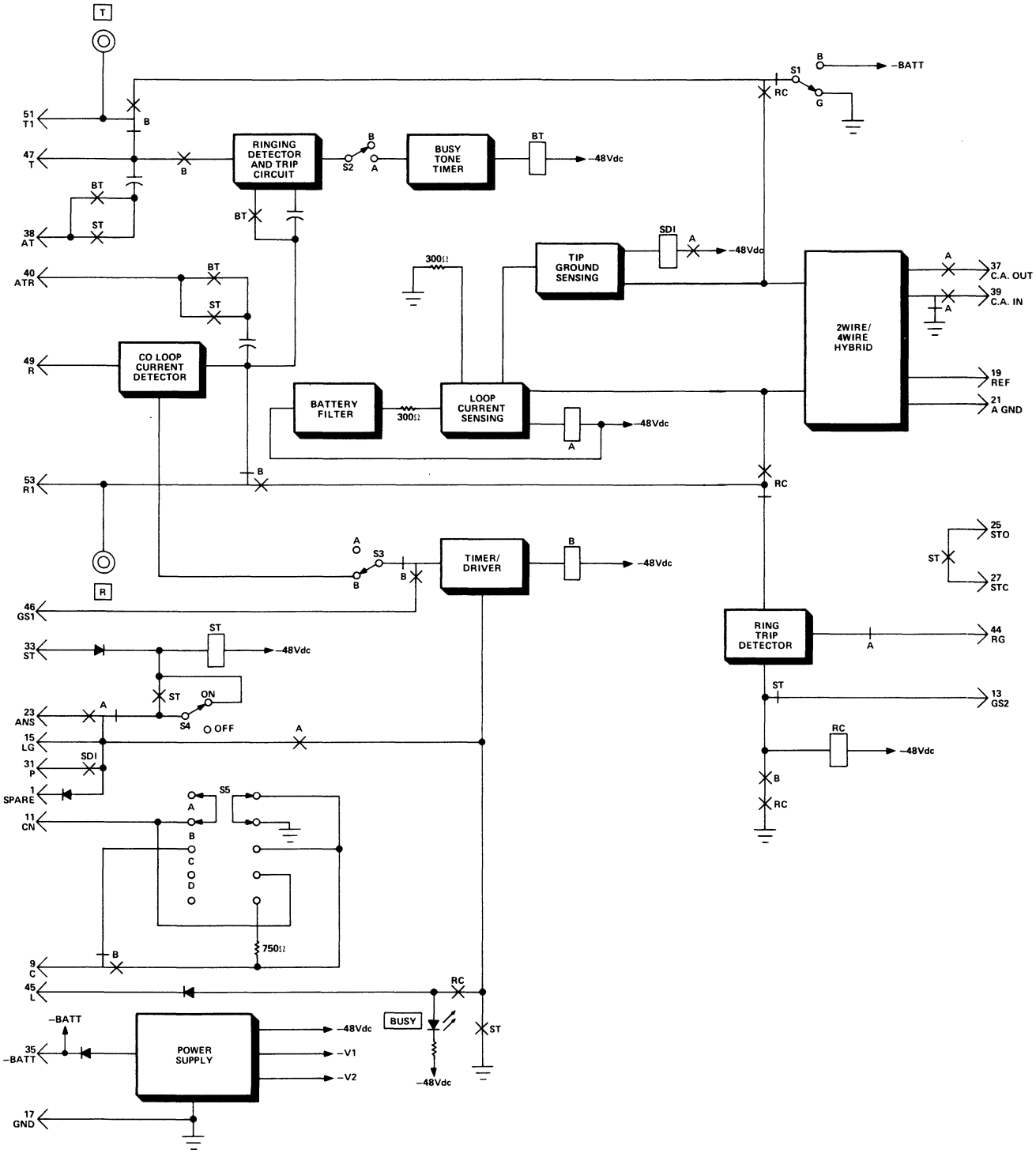


9133 Long Interval Timer module 829133



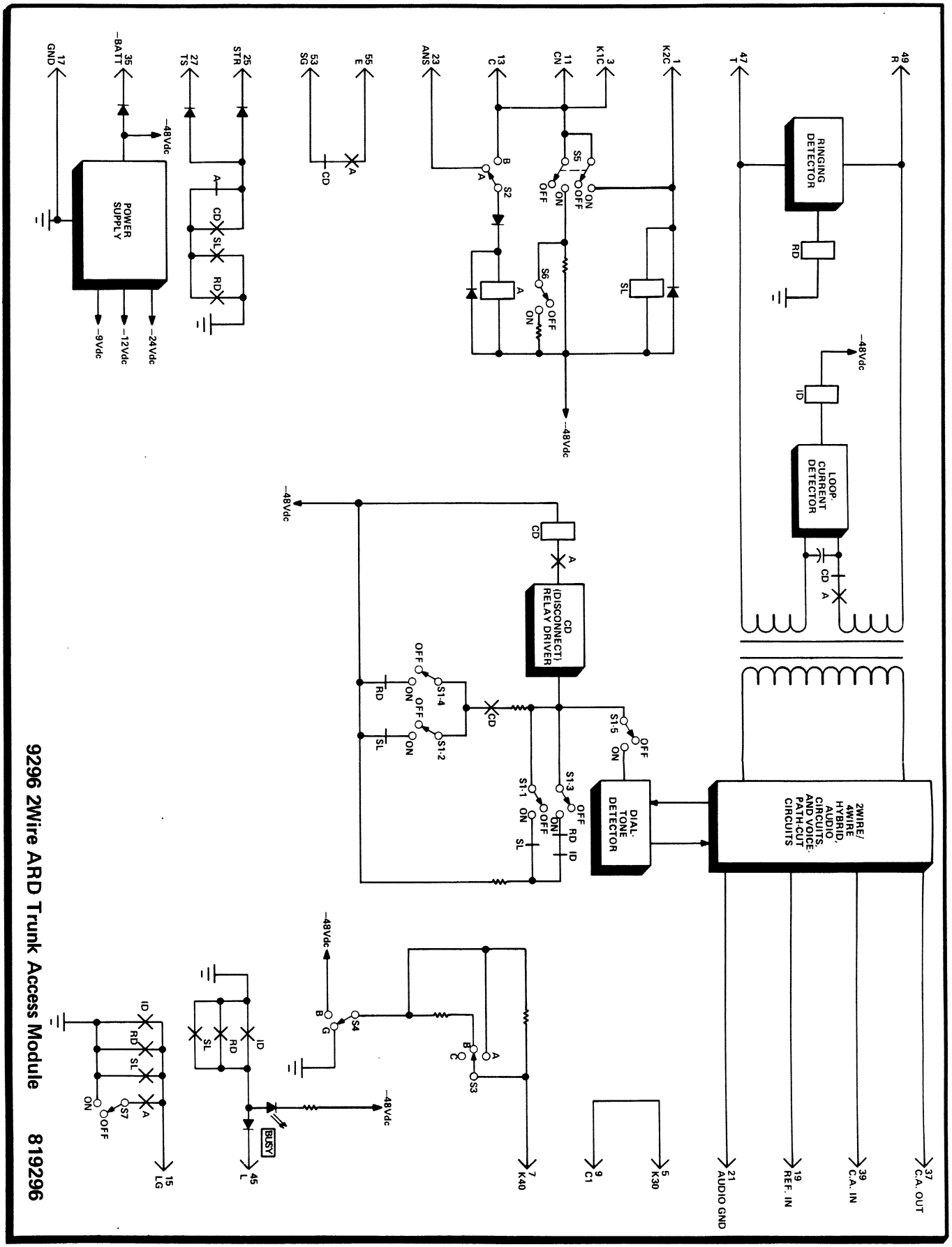
9293 2Wire ARD Conference Originate Line Circuit Module 819293

5. module block diagrams (continued)



9291 2Wire ARD Conference Terminate Line Circuit Module 819291

5. module block diagrams (continued)



5. module block diagrams (continued)

292R system port no. _____

test frequency (Hz)	measured levels at each 9291 loop-interface switch setting			
	short loop	19-24nl	26nl	loaded
200				
300				
400				
500				
600				
700				
800				
900				
1000				
1100				
1200				
1300				
1400				
1500				
1600				
1700				
1800				
1900				
2000				
2100				
2200				
2300				
2400				
2500				
2600				
2700				
2800				
2900				
3000				
3100				
3200				
3300				
3400				
3500				
3600				
3700				
3800				
3900				
4000				

Practice section 81292R-2

1 September 1982

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Please take a minute to help us by completing this reader comment sheet. All comments will be appreciated and considered. After writing your comments, detach this page, fold as indicated, staple once, and mail. Thank you.

Walter F. Madura
Director, corporate communications

How did you use this Practice?

☐ Installation ☐ Training

☐ Product information ☐ Other: _____

☐ Testing or maintenance Was this Practice suited to your purposes? yes ☐ no ☐

General comments: (Any errors in this Practice? If so, please specify.)

_____

_____

_____

_____

_____

_____

optional:

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____ Telephone _____

Would you like a reply? yes ☐ no ☐

Would you like a representative to call? yes ☐ no ☐

Would you like more product information? yes ☐ no ☐

Please specify: _____

_____

292R system port no. _____

test frequency (Hz)	measured levels at each 9291 loop-interface switch setting			
	short loop	19-24nl	26nl	loaded
200				
300				
400				
500				
600				
700				
800				
900				
1000				
1100				
1200				
1300				
1400				
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