TELLABS 9196 2W ARD
LOOP START ACCESS TRUNK

1. GENERAL

1.01 This Section describes the 9196 2Wire Automatic Ring Down Loop Start Access Trunk manufactured by TELLABS Inc. Which is approved for installation by Southwestern Bell Telephone Co.

1.02 This Section is issued to provide guidelines for the installation and maintenance of the TELLABS 9196 2Wire ARD Loop Start Access Trunk.

2. DESCRIPTION AND APPLICATION

2.01 The TELLABS 9196 2Wire ARD Loop Start Access Trunk Circuit module is designed specifically for use in the TELLABS 291 Conference/Alerting System, where it may be used in place of the TELLABS 9192 2Wire ARD Conderence Access Trunk Circuit and/or the 9195 2Wire ARD Remote Answer Trunk Circuit to provide automatic conference origination and/or remote conference access in applications where the System interfaces a CO or PBX that cannot provide ground-start or sleeve-lead control of line circuits. The 291 Conference/Alerting System is a 2Wire multistation ringdown conference system designed for emergency reporting and business conference applications. The System provides simultaneous conference access to up to 30 local stations from either a dedicated master telephone or any local telephone via a listed directory number.

2.02 Unlike the 9192 and 9195 which are designed for ground-start operation only, the 9196 is designed for loop-start as well as ground-start operation. The 9196 seizes the conference circuit in response to incoming ringing and disconnects upon a momentary opening of the loop when the distant end goes on-hook (ground-start operation) or upon return of dial tone when the distant end goes on-hook (loop-start operation). The CO or PBX must return dial tone to the terminating station or momentarily open the loop when the originating station goes on-hook for the 9196 to operate properly in the loop-start mode. The 9196 functions with ground-start circuits, regardless of whether dial tone is returned or not.

2.03 When used to replace the 9192 module, the interface between the 291 System and any switching system arranged for loop-start operation or for operation with a mixture of loop-start and ground-start lines. The 9196 is used to initiate a conference call automatically by generating a start pulse to signal all conference stations in response to either incoming ringing from an emergency-reporting connector number or a ground-start circuit in an ESS office.

2.04 When used to replace the 9195 module, the 9196 provides an interface between the 291 System and various types of CO line circuits to allow remote access to an established conference from any local telephone via a listed directory number.

2.05 In this mode, the 9196 can only be accessed while a conference is in progress and the optional community siren has been activated. (A 9133 Long Interval Timer module is required for siren control in all remote-access applications of the 9196.) If the 291 System is equipped with two or three 9196 modules, the associated connector terminals should be arranged in a PBX trunk hunting group. This arrangement permits an incoming call to be routed to the second or third 9196 module if the first and second 9196's are busy.

2.06 Option switches condition the 9196 to function as an originating trunk circuit (to replace the 9192) or as a remote-access trunk circuit (to replace the 9195). A busy LED on the 9196's front panel lights to indicate the active state of the module.

2.07 An integral voltage regulator allows the 9196 to operate from a filtered -42.75 to -56Vdc input. Maximum current requirement is 120mA.

2.08 A Type 10 module, the 9196 mounts in positions 1 and 2 of the 291 System's common equipment shelf when replacing the 9192 module, or in positions 3, 4, and 5 of the common equipment shelf when replacing the 9195 module. The common equipment shelf is factory-wired and equipped with a connectorized backplane. For additional information on the 291 System, refer to the TELLABS 291 Conference/Alerting System Practice (Section 310-530-900SW).

3. INSTALLATION

A INSPECTION

3.01 The 9196 2Wire ARD Loop Start Access Trunk Circuit module should be visually inspected upon arrival in order to find possible damage incurred during shipment. If damage is noted, a claim should immediately be filed with the carrier. If stored, the module should be visually inspected again prior to installation.

B MOUNTING

3.02 The 9196 module mounts either in positions 1 and 2 of the 291 System's common equipment shelf when replacing the 9192 module, or in positions 3, 4, and 5 of the common equipment shelf when replacing the 9195 module. The module plugs physically and electrically into a 56-pin connector at the rear of the shelf.

3.03 Before making any connections to the mounting shelf, make sure 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.

3.04 When the 9196 module is supplied as part of the 291 System, all intermodule wiring is factory-wired and external wiring is simplified through the use of connectorized cables. Refer to Section 310-530-900SW for detailed information regarding wiring procedures, power connections and distributing frame terminations of the connectorized cables. Figure 1 lists the external connections to the 9196 module for reference purposes only.

CONNECT:	TO PINS:
R (ring lead)	47
T (tip lead)	49
STR (start lead)	25
C (control lead from 9133)	13
SL (lamp lead)	45
L1 (common audio bus No. 1)	37
L2 (common audio bus No. 2)	39
G1 (gain control lead No. 1)	21
G2 (gain control lead No. 2)	19
ANS (answer bus)	23
LG (locking ground)	15
-BATT (-42.75 to -56Vdc input)	35
GND (ground)	17

FIGURE 1

C OPTION SELECTION

3.05 As shown in Figure 2, the 9196 contains two option switches. After these switches are set, no further optioning or alignment of the module is required. Switch S2 determines whether the 9196 is to be used in place of a 9192 to originate a conference (position A) or in place of a 9195 for remote access (position B). When the 9196 replaces a 9192, switch S1 determines whether a conference will be held up by any station remaining off-hook (ON position) or will be terminated when the 9196 disconnects (OFF position). See paragraphs 2.06 and 2.07 for details.

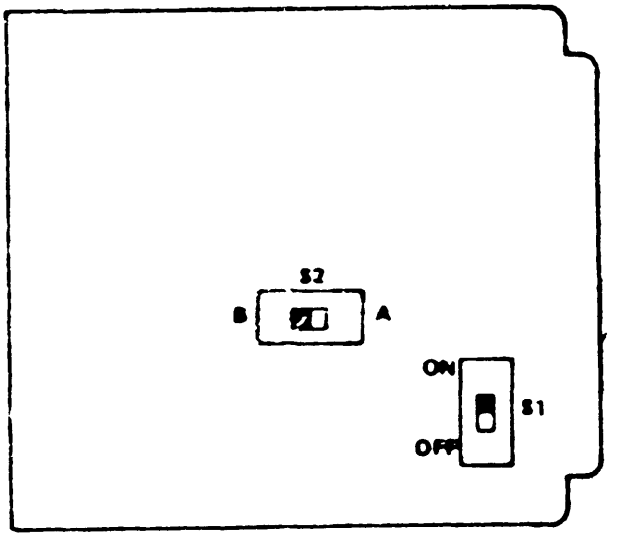

FIGURE 2

3.06 When the 9196 issued in place of a 9192 for automatic conference origination in normal emergency-reporting applications where it is desired that the entire conference be terminated when the 9196 disconnects, set S2 to A and S1 to OFF.

3.07 When the 9196 is used in place of a 9195 for remote access, set S2 to the B position. The setting of switch S1 is irrelevant since switch S1 is nonfunctional in this application.

4. CIRCUIT DESCRIPTION

4.01 This circuit description is intended to familiarize you with the 9196 2Wire ARD Loop Start Access Trunk Circuit for engineering and application purposes only. Attempts to troubleshoot the 9196 internally are not recommended. Procedures for recommended testing in the field are limited to those prescribed in Part 6 of this Section. Reference to the block diagram, (Exhibit 1), will aid in following this description.

4.02 The 9196 is designed to replace the 9192 2Wire ARD Conference Access Trunk Circuit and/or the 9195 2Wire ARD Conference Remote Access Trunk Circuit in applications where TELLABS' 291 Conference/Alerting System interfaces loop-start lines or a mixture of loop-start and ground-start lines.

4.03 When the 9196 is used in place of the 9192 as an originating trunk circuit, switch S2 must be in the A position and S1 is normally set to ON. Incoming ringing causes relay SR to operate. During the silent interval between incoming ringing relay SR is held in the activated state until the next ringing cycle. The time constant is approximately 5 seconds, which is long enough to carry over the 2-second-on, 4-second-off ringing cycle.

4.04 Once operated, relay SR applies a ground to operate the relay SL. In addition, relay SR applies ground to the STR lead (pin 25) to originate the conference and to prepare a partial operate path for relay R. Operation of relay SL applies a ground to the LG (locking ground) lead (pin 15), lights the front-panel busy LED and applies ground to the SL (lamp) lead (pin 45) for an external indication.

4.05 When the first conference station answers, a ground received on the ANS lead (pin 23) operates relay ANS to complete the operate path for relay R, which operates on the next ringing cycle. The R relay contact bridges the SR and ANS contacts. Operation of relay R provides a 250-ohm loop closure to trip ringing and hold up the incoming line. Relay R locks operated through its contacts and remains operated as long as the loop current detector is activated. Operation of relay R allows relay SR to release (after its release delay). Relay SL is held in the operated state by relay R.

4.06 When the distant end goes on-hook, dial tone is connected to the loop-start line circuit. This dial-tone input is amplified by the operational amplifier (op amp) and impressed on the phase-locked loop. This loop detects the 440Hz dial-tone component and causes relay DT to operate. One contact of relay DT immediately cuts the audio path to the conference to prevent dial tone from interrupting the conference. To prevent talkoff caused by possible erroneous detection of 440Hz, actual disconnect is accomplished in two steps. First, relay DT operates. If relay DT remains operated (as a result of actual dial tone and not a transient), the DDT relay operates. Relay DDT is slow to operate, but once operated, it locks to an operated contact of relay SL. Relay DDT also opens the operate path of relay R, causing relay R to release. This restores the 9196 to its idle condition.

4.07 If the phase-locked loop erroneously detects a 440Hz component, relay DT operates momentarily and relay DDT does not operate at all. The resultant momentary interruption in the audio path does not cause a complete disconnect.

4.08 When the 9196 is used in place of the 9195 as a remote-access trunk, switch S2 is set to B. External wiring is arranged so that relay ANS will not operate unless the RAC relay of the 9133 Long Interval Timer used in the 291 System operates. In this application, no connection is made to either the LG lead or the STR lead, and operation of relay SR in response to inadvertent calls has no effect. If the RAC relay were operated, the ANS relay would operate and subsequent operation of relay SR would cause relay R to operate. Disconnect is accomplished in precisely the same manner as the originating-trunk mode.

4.09 The 9196 contains an internal voltage regulator that provides all required voltages from any supply voltage between -42.75 and -56Vdc. The module also provides a polarity protection diode.

5. SPECIFICATIONS

- DIAL TONE FREQUENCY
  350 + 440Hz (other frequencies may be supplied upon request)

- TRANSFORMER IMPEDANCE RATIO
  1:1

- INSERTION LOSS
  1.0dB at 1000Hz

- FREQUENCY RESPONSE
  ±0.5dB, 300 to 3500Hz, re 1000Hz

- LONGITUDINAL BALANCE
  60dB minimum, 200 to 4000Hz

- POWER REQUIREMENTS
  input voltage: -42.75 to -56Vdc with positive ground
  input current: 120mA maximum

- OPERATING ENVIRONMENT
  (-20° to +130°F -7° to +54°C), humidity to 95%, (no condensation)

- DIMENSIONS
  5.58 inches (14.17cm) high
  1.42 inches (3.61cm) wide
  5.96 inches (15.14cm) deep

- WEIGHT
  20 ounces (567 grams)

- MOUNTING
  position 1 through 5 of 291 System's common equipment shelf or relay rack or apparatus case via one position of TELLABS Type 10 Mounting Shelf

6. TESTING AND TROUBLESHOOTING

6.01 The Troubleshooting Guide (Exhibit 2) may be used to assist in the installation, testing or troubleshooting of the 9196 2Wire ARD Loop Start Access Trunk Circuit module. The Troubleshooting Guide is intended as an aid in the localization of trouble to a specific module. If a module is suspected of being defective, a new module should be substituted and the test conducted again. If the substitute module operates correctly, the original module should be considered defective and returned to TELLABS for repair or replacement. It is strongly recommended that no internal (component level) testing or repairs be attempted on the 9196 module. Unauthorized testing or repairs may void the 9196 warranty.

6.02 If a 9196 is diagnosed as defective, the situation may be remedied by either replacement or repair and return. Becuase it is the more expedient method, the replacement procedure should be followed whenever time is a critical factor (e.g. service outages, etc.).

A. REPLACEMENT

6.03 If a defective module is encountered on central office installed equipment, Network Maintenance will arrange for a replacement by notifying TELLABS via telephone (312) 969-8800, letter (see below), or TWX (910-695-3530). Notification should include all relevant information, including the 8X9196 part number (from which TELLABS can determine the issue of the module in question). Upon notification, TELLABS will ship a

replacement module to the installation site or other designated location. If the warranty period of the defective module has not elapsed, the replacement module will be shipped at no charge. Package the defective 9196 in the replacement module's carton; sign the packing list included with the replacement module (this is your return authorization; affix the pre-addressed label provided with the replacement module to the carton being returned; and ship the equipment prepaid to TELLABS.

6.04 For defective customer premise installed units, Business I/M will return the defective module to their Supplies Attendent or Material Management coordinate for Repair and Return handling as covered in paragraph 6.05.

B. REPAIR AND RETURN

6.05 Return the defective 9196 module, shipment prepaid, to:

TELLABS Incorporated
4951 Indiana Avenue
Lisle, Illinois 60532
Attn: Repair and Return Dept.

6.06 Enclose an explanation of module's malfunction. TELLABS will repair the module and ship it back to you. If the module is in warranty, no invoice will be issued.

EXHIBIT 1

9196 2W ARD BLOCK DIAGRAM

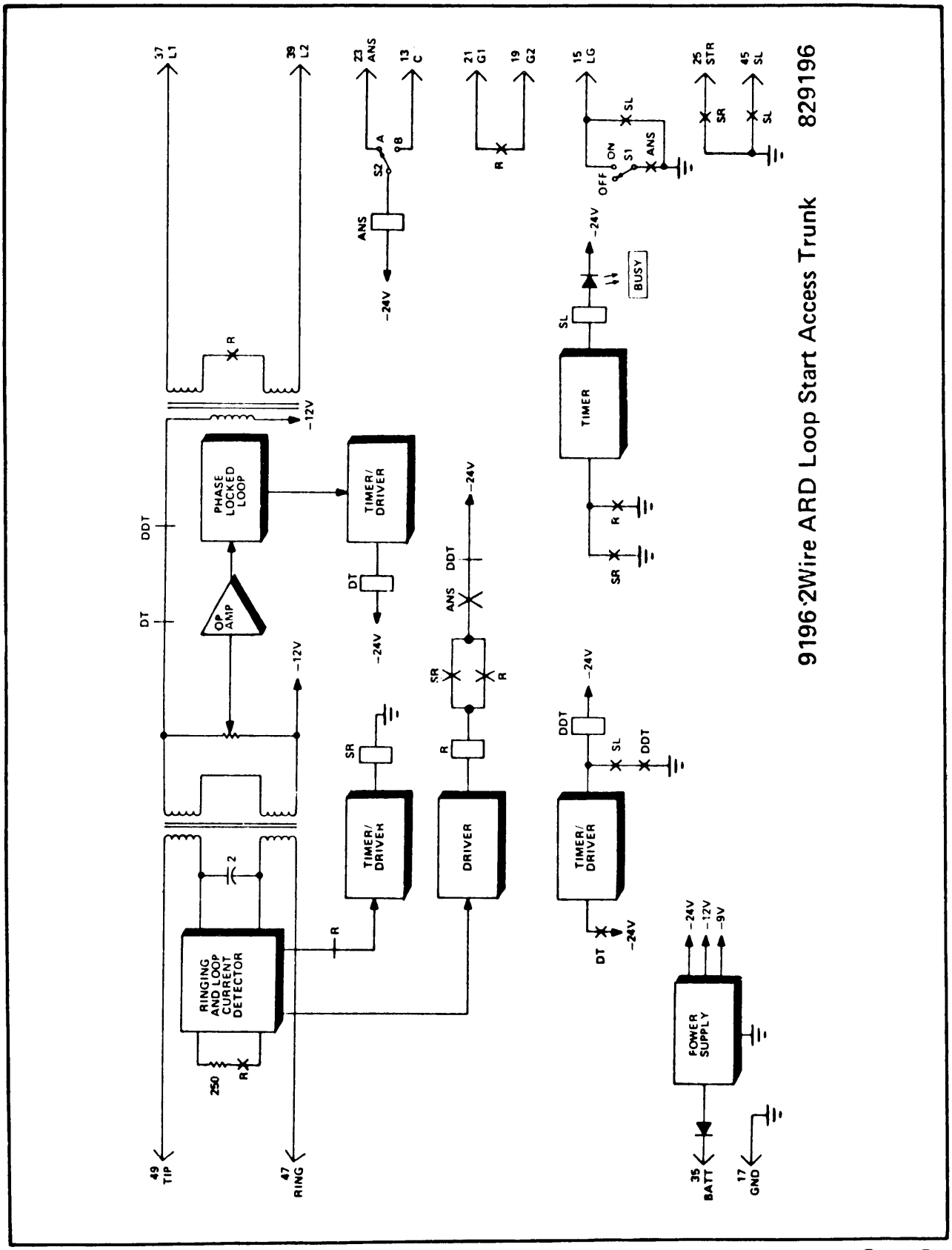

EXHIBIT 2

9196 2W ARD TROUBLESHOOTING GUIDE

TROUBLE CONDITION	POSSIBLE CAUSE (IN ORDER OF LIKELIHOOD)
incoming call does not trip ringing and conference stations do not ring	1) Incorrect wiring from switching machine to switching equipment terminal block. 2) Fuse associated with 9196 blown. 3) Defective 9196, replace and retest.
incoming call does not trip ringing when conference station is answered	1) Option switch S2 set incorrectly. 2) Defective 9196, replace and retest.
incoming call does not drop when distant end goes on-hook	1) Dial tone not returned to 9196 at termination of call. 2) Dial tone is not precise dial tone (350 + 440Hz). 3) Defective 9196, replace and retest.
when 9196 used in place of 9195, incoming call does not trip ringing	1) Subscriber's terminal block incorrectly wired. Ground not being applied to C lead. 2) 9133 module used in 291 System not activated. 3) Option switch S2 not set to B position. 4) Replace 9196 and retest.