

TELLABS 9003  
RINGING INTERRUPTER RELAY MODULE

1. GENERAL

1.01 This Section describes the 9003 Ringing Interrupter Relay Module 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 9003 Ringing Interrupter Relay Module.

2. GENERAL DESCRIPTION

2.01 The TELLABS 9003 Ringing Interrupter Relay Module, in conjunction with an associated TELLABS 9132 Ringing Timer module, divides a ringing load into two groups of stations and alternately connects a ringing source to each group for 1 second, thus producing a distinctive 1-second-on, 1-second-off ringing signal. The 9003 (with its associated 9132) is used in applications requiring distinctive station ringing with adjustable ringing timeout (e.g., automatic ringdown applications such as in TELLABS' 291 Conference/Alerting System).

2.02 Five separate ring generator inputs on the 9003 allow the module to be used with harmonic or decimonic ringing arrangements. The 9003 module provides alarm detection circuitry to activate a front-panel alarm LED and an external central office alarm in the event any one of the five ring generator inputs drops below 45Vac. In

addition, each ring generator input is individually fused with a GMT-type fuse to protect the associated generator from a possible short circuit due to equipment failure.

2.03 The 9003 module can be switch optioned to accommodate either battery-biased or ground-connected ringing generators.

2.04 The 9003 module is designed to operate on a filtered -42.75 to -56Vdc positive ground input. Current requirement is 56mA maximum.

2.05 As a Type 10 module, the 9003 mounts in one position of a TELLABS Type 10 Mounting Shelf, versions of which are available for relay rack and KTU apparatus case installations. In relay rack applications, a maximum of 12 modules may be mounted across a 19-inch rack, and up to 14 modules may be mounted across a 23-inch rack. In either case, 6 inches of vertical rack space is used.

3. APPLICATION

3.01 The 9003 Ringing Interrupter Relay Module, which operates only in conjunction with an associated 9132 Ringing Timer module, is primarily used to activate station ringing in the TELLABS 291 Conference/Alerting System. The 291 System is a self-contained multi station ringdown conference system designed for emergency reporting and business conference applications. In the 291 System, the 9003 module activates ringing (or alerting tone) at each conference

station by repeating the start pulse supplied by the line or trunk circuit that originates the conference. The 9003 module also divides the ringing load of conference stations into two groups and alternately connects each group to a ringing source for 1 second, thus producing the 1-second-on, 1-second-off ringing signal that distinguishes conference calls from normal traffic.

3.02 Each of the 9003's five ring generator inputs terminates in two outputs. In response to 1-second control pulses generated by its associated 9132 Ringing Timer module, the 9003 connects the ringing source to one half of the outputs. Battery or ground (see paragraph 3.05) is connected to the other group of outputs to provide the bias required to trip ringing during the silent period. This configuration is reversed once every second.

3.03 The 9003 module can also be switch optioned to provide the normal 1-second-on, 1-second-off ringing signals to one group of stations, while providing continuous ringing to the second group of stations. When the 9003 module is optioned in this manner a larger ringing-generator source is required since the total number of stations ringing simultaneously has increased by 25%.

3.04 The ringer capacity of the 9003 is essentially dependent upon the limitations of the ringing source in use. Because the 9003 splits the ringing load into two groups, the ringing source can accommodate twice the rated number of ringers (see paragraph 3.03).

3.05 The 9003's five ring generator inputs can accommodate up to five separate ringing frequencies for compatibility with harmonic or decimonic ringing arrangements. An option switch on the module is set to connect either battery or ground to the ring generator outputs during the silent interval, depending on whether a battery-biased or ground-connected ringing supply is used.

3.06 Each of the five ring generator inputs to the 9003 is individually fused and alarmed. Five GMT-type fuses on the module's front-panel protect the five associated ring generators from possible short circuits. Once a fuse opens, the module's ringing detector will activate the alarm circuitry providing two types of alarm indication: a relay contact closure to activate an external audible or visible alarm, and a local visible alarm via a front panel ring gen alarm (red) LED. The alarm circuit is also activated when the ringing generator's input to the 9003 module drops below 45Vac level. When any one of the five ring generator inputs is not used the corresponding detector circuit must be disabled. This is easily accomplished by setting the appropriate switch positions of 5-position DIP switch S7 to the ON position.

3.07 Outside of the 291 System, the 9003 module can be used wherever distinctive station ringing with adjustable ringing timeout is required (e.g., in conjunction with automatic ringdown operation). In all applications, the 9003 module must be used with an associated 9132 Ringing Timer module.

3.08 In applications other than the 291 System, the 9003 mounts in one position of a TELLABS Type 10 Mounting Shelf. When used in the 291 System, the 9003 mounts in position 9 of the System's 12-position common equipment shelf. For specific information on use of the 9003 in the 291 System, refer to the TELLABS 291 Conference/Alerting System Practice (Section 310-530-900SW).

#### 4. INSTALLATION

##### A INSPECTION

4.01 The 9003 Ringing Interrupter Relay 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 inspection.

##### B MOUNTING

4.02 The 9003 module mounts in position 9 of the 291 System's common equipment shelf or in one position of a TELLABS Type 10 Shelf. The module plugs physically and electrically into a 56-pin connector at the rear of the shelf.

##### C INSTALLER CONNECTIONS

4.03 Before making any connections to the mounting shelf, make sure that power is off and modules are removed. The 9003 module should be put into place only after it has been properly optioned and after wiring has been completed.

4.04 When the 9003 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 and distributing frame terminations. Table A lists external connections to the 9003.

##### D OPTION SELECTION

4.05 The 9003 module requires no alignment. Optioning consists of enabling the ringing generator alarm detectors, selecting the ringing generator bias, and selecting either continuous or interrupted ringing. The location of these option switches in the module's printed circuit board is shown in Figure 1.

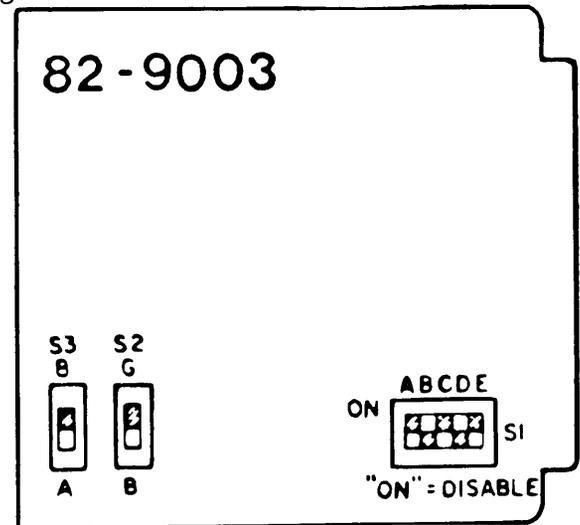


FIGURE 1

4.06 Option switch S1, a five-position DIP switch, is used to enable the five ring-generator alarm detectors. If all five ring-generator inputs are used, set switch positions S1A through S1E to the OFF (enable) position. If any of the ring-generator inputs are not used, refer to the Functional Schematic (Exhibit 1) for the S1 switch positions corresponding to those inputs, and set those switch positions to the ON (disable) position.

4.07 Ground referenced ringing generator or external battery-bias ringing generator is determined by slide switch S2. Set switch S2 to the B position if the associated ringing generators are battery biased or to the G position if the ringing generators are ground biased.

4.08 Option switch S3 options the 9003 to apply either continuous ringing to one group of stations and 1-second-on, 1-second-off (interrupted) ringing to the other group, or 1-second-on, 1-second-off ringing to both groups. Set switch S3 to the A position for the normal 1-second-on, 1-second-off ringing to both groups of stations. Set switch S3 to the B position if ringing outputs G2A, G2B, G2C, G2D, and G2E are to supply continuous ringing, while ringing outputs G1A, G1B, G1C, G1D, and G1E are to supply the normal 1-second-on, 1-second-off ringing.

## 5. CIRCUIT DESCRIPTION

5.01 This circuit description is intended to familiarize you with the 9003 Ringing Interrupter Relay Module for engineering and application purposes only. Attempts to troubleshoot the 9003 internally are not recommended. Trouble shooting procedures should be limited to those prescribed in Part 7 of this Section. Refer to the 9003 Functional Schematic (Exhibit 1) as an aid in following the circuit description.

5.02 The 9003 module provides ringing load splitting and ringing interruption when used with the 9132 Ringing Timer module. The 9003 module accepts up to five separate ring generator inputs (GA through GE) and provides two alternating outputs (G1A through G1E and G2A through G2E) for each input.

5.03 An LGI lead ground operates relay IS and provides a path for each of the five inputs to individual pairs of normally closed contacts on relays RO and RT. Contact 6 of relay IS provides an operating ground through the normally closed contact

1 of relay RO to operate relay RT. When relay RT operates, outputs G2A through G2E are disconnected from their respective ringing supplies and connected to either battery or ground, as determined by the setting of switch S1, to provide the correct bias for ring trip during the silent interval.

5.04 The 9132 module supplies 1-second ground pulses via lead RC that cause relay RO to alternately operate and release. When relay RO operates, outputs G1A through G1E are disconnected from their respective ringing supplies and connected to the silent-interval bias. The normally closed contact 1 of the operated RO relay opens the operate path of relay RT and allows relay RT to release. When relay RT releases, ringing is restored to outputs G2A through G2E. This sequence repeats every 2 seconds to provide the System's 1-second-on, 1-second-off distinctive ringing and the means for splitting the load applied to each ring generator input.

5.05 After the 9132 module times out, ground is removed from the LGI lead, relay IS releases, and ground is applied to the RO lead, which operates relays RO and RT. Operation of relays RO and RT connects the silent interval bias to each of the 10 outputs. This allows any station that answers after ringing has timed out to access the conference by activating its ring-trip circuitry.

5.06 Whenever relay IS operates, a ground is extended to the Ringing Machine start lead (pin 28) for use in offices that require a start lead.

5.07 The 9003 module also incorporates a start relay (STR) that is operated by a ground supplied by the line or trunk circuit

that originates the conference. The STR relay repeats this start pulse on 6 leads (ST1 through ST6), each of which is wired to up to 5 station line circuits, thus allowing activation, in the 291 System, of ringing or alerting tone at all (up to 30) System stations.

5.08 Each one of the five ring-generator inputs is individually fused to protect the associated ring generator from inadvertent short circuits. A factory supplied 0.25 ampere fuse ensures that a maximum of 25 telephone set ringers, per ring generator input, can be rung simultaneously. If more telephone set ringers are to be rung simultaneously, a larger GMT fuse can be substituted.

5.09 The alarm detector circuitry associated with each ring generator input is factory set to a 50Vac rms threshold level. If the ring generator voltage drops below this threshold for more than 500 milliseconds, the alarm relay operates, lighting the front panel ring gen alarm LED and providing a form C relay contact closure for external alarms. In the 291 System, these relay contacts are strapped together with other system alarms and are terminated into a barrier block for remote alarm indication.

## 6. SPECIFICATIONS

- INTERRUPTION FREQUENCY  
1 second on, 1 second off when pulsed by 9132 Ringing Timer module
- CAPACITY  
5 frequencies to accommodate harmonic or decimonic ringing

- FUNCTIONAL ARRANGEMENT  
2 ringing subgroups per frequency (10 subgroups total) arranged as 2 ringing groups of 5 subgroups each (alternate ringing is provided between the 2 ringing groups)
- RELAY CONTACT RATING  
0.5A (115Vac, 60Hz)
- ALARM THRESHOLD VOLTAGE  
50Vac rms
- POWER REQUIREMENTS  
input voltage: -44 to -56Vdc with positive ground  
input current: 80mA maximum
- OPERATING ENVIRONMENT  
-40° to +140°F (-40° to +60°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  
12 ounces (340 grams)
- MOUNTING  
position 9 of 291 System's common equipment shelf, or one position of TELLABS Type 10 Mounting Shelf

## 7. TESTING AND TROUBLESHOOTING

4.01 The Testing Guide Checklist (Exhibit 2) may be used to assist in the installation, testing or troubleshooting of the 9003 Ringing Interrupter Relay Module. The Testing Guide Checklist 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 9003 module. Unauthorized testing or repairs may void the module's warranty.

7.02 If a situation arises that is not covered in the Checklist, contact TELLABS Customer Service at 312-969-8800 for further assistance.

7.03 If a 9003 is diagnosed as defective, the situation may be remedied by either replacement or repair and return. Because it is the more expedient method, the replacement procedure should be followed whenever time is a critical factor (e.g., service outages, etc.).

A REPLACEMENT

7.04 If a defective 9003 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 8X9003 part number (from which TELLABS can determine the issue of the module in question). Upon notification, TELLABS will ship a replacement module to the site or other designated address. If the warranty period of the defective module has not elapsed, the replacement module will be shipped at no charge. Package the defective module in the replacement module's carton; sign the packing list included with the replacement module and enclose it with the defective module (this is your return authorization); affix the preaddressed label provided with the replacement module to the carton being returned; and ship the equipment prepaid to TELLABS.

7.05 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 7.06.

B. REPAIR AND RETURN

7.06 Return the defective 9003 module, shipment prepaid, to:

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

7.07 Enclose an explanation of the 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.

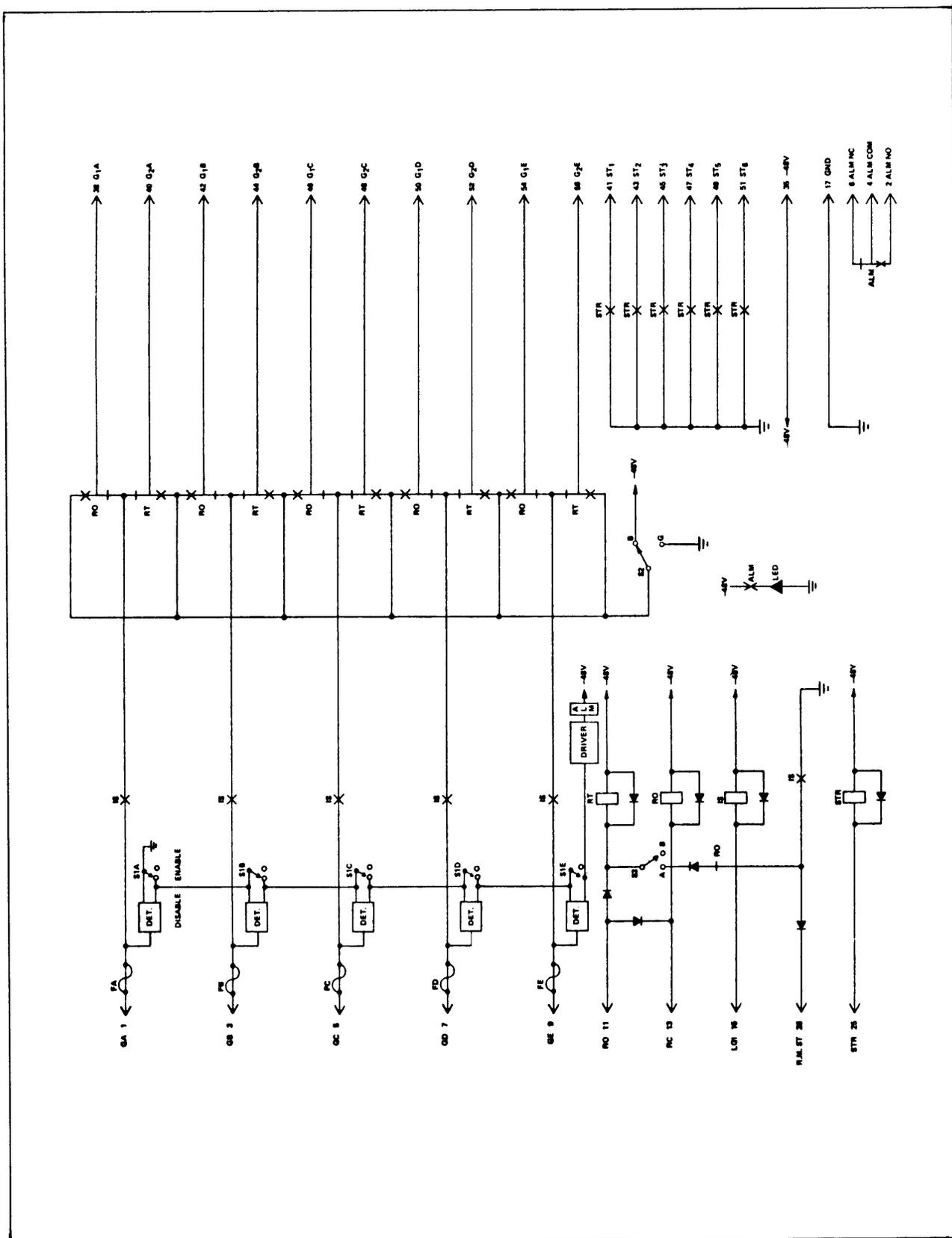
TABLE A

## 9003 EXTERNAL CONNECTIONS

CONNECT:	TO PIN:
GA (generator input A) . . . . .	1
GB (generator input B) . . . . .	3
GC (generator input C) . . . . .	5
GD (generator input D) . . . . .	7
GE (generator input E) . . . . .	9
RO (ringing over lead to associated 9132). . . . .	.11
RC (ringing continuing lead to associated 9132). . . . .	.13
LGI (locking ground lead to associated 9132) . . . . .	.15
R.M.ST (ringing machine start) . . . . .	.28
STR (start relay to 9003 start leads). . . . .	.25
G1A (generator A output phase 1) . . . . .	.38
G2A (generator A output phase 2) . . . . .	.40
G1B (generator B output phase 1) . . . . .	.42
G2B (generator B output phase 2) . . . . .	.44
G1C (generator C output phase 1) . . . . .	.45
G2C (generator C output phase 2) . . . . .	.48
G1D (generator D output phase 1) . . . . .	.50
G2D (generator D output phase 2) . . . . .	.52
G1E (generator E output phase 1) . . . . .	.54
G2E (generator E output phase 2) . . . . .	.56
ST1 (ringing start lead 1 to station line circuits). . . . .	.41
ST2 (ringing start lead 2 to station line circuits). . . . .	.43
ST3 (ringing start lead 3 to station line circuits). . . . .	.45
ST4 (ringing start lead 4 to station line circuits). . . . .	.47
ST5 (ringing start lead 5 to station line circuits). . . . .	.49
ST6 (ringing start lead 6 to station line circuits). . . . .	.51
ALM CM (alarm common). . . . .	4
ALM NC (alarm normally closed) . . . . .	6
ALM NO (alarm normally open) . . . . .	2
-48V (battery) . . . . .	.35
GND (ground) . . . . .	.17

EXHIBIT 1

9003 RINGING INTERRUPTER RELAY MODULE  
FUNCTIONAL SCHEMATIC



## EXHIBIT 2

## 9003 TESTING GUIDE CHECKLIST

TEST	TEST PROCEDURE	NORMAL RESULT	IF NORMAL CONDITIONS ARE NOT MET, VERIFY:
Operation of STR relay	Remove modules from positions 1 and 2 of common equipment shelf. Apply ground to STR lead (pin 25).	STR relay operates. Ground present on pins 41, 43, 45, 47, 49, and 51.	Battery (-48Vdc) on pin 35. Switch S1 set correctly (see 3.05). Check battery supply to (and for blown fuse in) common equipment shelf. Ground on pin 17. If not, check ground connection to common equipment shelf. Replace 9003 and retest.
Operation of IS relay	Apply ground to pin 13.	IS relay operates. RT relay operates. Ground present on pin 28.	Same as above.
Operation of RO and RT relays	With IS relay operated (see above), apply ground to pin 15.	RO relay operates. RT relay releases.	Same as above.
	Remove ground from pin 13.	RO relay releases. RT relay operates.	Same as above.
	Remove ground from pins 15 and 13. Apply ground to pin 11.	RO relay operates. RT relay operates. IS relay releases.	Same as above.
Operation of ALM relay	Remove five front-panel fuses. Set switch S1A through S1E to the ON (disable) position.	ALM relay is de-energized. Front panel ring gen alarm LED is off.	Same as above.
	Enable one of the ring generator alarm detectors by setting the appropriate S1 switch position to the OFF position.	ALM relay operates. Front-panel ring gen alarm LED lights.	Same as above.

## EXHIBIT 2 (Cont'd)

## 9003 TESTING GUIDE CHECKLIST

TEST	TEST PROCEDURE	NORMAL RESULT	IF NORMAL CONDITIONS ARE NOT MET, VERIFY:
Operation of ALM relay	<p>Repeat this procedure for the remaining four ring-generator inputs.</p> <p>Re-insert front-panel fuses. Set those S1 switch positions to OFF, which are connected to a ringing generator.</p>	<p>Same as above.</p> <p>ALM relay is de-energized. Front-panel ring gen alarm LED is off.</p>	<p>Same as above.</p> <p>Ringing generator input is 50Vac or greater. Same as above.</p>

NOTE 1: Because it is the most common application, the Testing Guide Checklist is written with reference to the 9003 as used in a 291 System. Testing in other applications may easily be derived from this checklist.

NOTE 2: When the 9003 is used in a 291 System, to prevent unnecessary ringing of subscriber telephones during testing, remove the 9021 Fuse modules from the System's line equipment shelves and leave the common equipment shelf Fuse module in place.

NOTE 3: Because the connectorized backplane of each 291 System equipment shelf prevents access to the connector pins at the rear of most module positions, use of a TELLABS 9801 Card Extender is necessary for testing of this module when used in that System.