

9005 Loop Current Detector

contents

section 1 description and application	page 1
section 2 installation	page 1
section 3 circuit description	page 3
section 4 block diagram	page 4
section 5 specifications	page 3
section 6 testing and troubleshooting	page 3

1. description and application

1.01 The Tellabs 9005 Loop Current Detector module (figure 1) detects loop current in up to five separate 2wire loops and provides relay-contact closures as indications of loop current flow. The 9005's five current detectors can be individually switch-optioned to detect current flow in one or both directions. Also, the five relays associated with the current detectors can be independently switch-optioned to detect or ignore dial pulses. When optioned to detect dial pulses, the circuits on the 9005 introduce negligible dial-pulse distortion. An additional switch option conditions all five circuits on the module to provide ground outputs upon contact closure, if desired.

1.02 This practice section is reissued to cover the Issue 2 9005 module (Tellabs part number **829005**), which is identical to its Issue 1 counterpart (Tellabs part number 819005) with the exception that the Issue 2 module is immune to current generated in the loop by nominal (30ms) ringing voltage.

1.03 Each current detector on the 9005 can detect a minimum loop current of 20mA and has a maximum loop-current rating of 100mA. The 9005 inserts a maximum resistance of 250 ohms into each 2wire loop.

1.04 The 9005 operates from filtered, ground-referenced -22 to -56Vdc input and draws a maximum current of 35mA. Reverse-battery protection and transient-limiting circuitry are provided for the module's internal power-supply circuitry.

1.05 A Type 10 module, the 9005 mounts in one position of a Tellabs Type 10 Mounting Shelf, versions of which are available for relay-rack or apparatus-case installation. In relay-rack applications, up to 12 modules can be mounted across a 19-inch rack, while up to 14 modules can be mounted across a 23-inch rack. In either case, 6 inches of vertical rack space is used.

2. installation

inspection

2.01 The 9005 Loop Current Detector module should be visually inspected upon arrival in order to find possible damage incurred during shipment. If

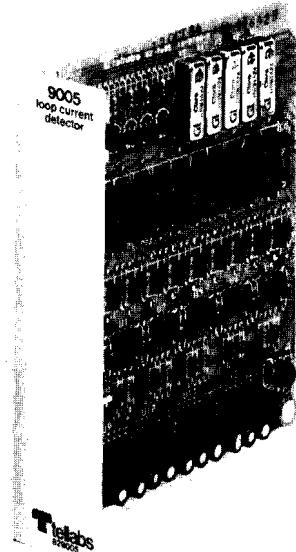


figure 1. 9005 Loop Current Detector module

damage is noted, a claim should immediately be filed with the carrier. If stored, the module should be visually inspected again prior to installation.

mounting

2.02 The 9005 mounts in one position of a Tellabs Type 10 Mounting Shelf, which is available in configurations for both relay-rack and apparatus-case installation. The module plugs both physically and electrically into a 56-pin connector at the rear of its shelf position.

Note: The 9005 module contains mercury-wetted relays. To ensure that the mercury within the relays is properly positioned, hold the module in an upright position and tap it gently on a hard surface. Then keep the module upright until installation and install it in a vertical position.

installer connections

2.03 Before making any connections to the mounting shelf, make sure that power is **off** and modules are **removed**. The 9005 module should be put into place **only after** it is properly optioned and **after** wiring is completed.

2.04 Table 1 lists external connections to the 9005. All connections are made via wire-wrapping to the 56-pin connector at the rear of the module's mounting shelf position. Pin numbers are found on the body of the connector.

switch options

2.05 While the 9005 requires no alignment, two option switches on the module must be set before it is placed into service. One of these is a 10-position DIP switch, and the other is a 2-position

connect:	to pin:
CO T (1).....	45
CO R (1).....	43
LINE T (1).....	46
LINE R (1).....	44
RELAY CONTACTS (1).....	56 and 55
CO T (2).....	41
CO R (2).....	39
LINE T (2).....	42
LINE R (2).....	40
RELAY CONTACTS (2).....	54 and 53
CO T (3).....	37
CO R (3).....	35
LINE T (3).....	38
LINE R (3).....	36
RELAY CONTACTS (3).....	52 and 51
CO T (4).....	33
CO R (4).....	31
LINE T (4).....	34
LINE R (4).....	32
RELAY CONTACTS (4).....	50 and 49
CO T (5).....	29
CO R (5).....	27
LINE T (5).....	30
LINE R (5).....	28
RELAY CONTACTS (5).....	48 and 47
-BATT (-22 to -56Vdc, filtered, ground referenced).....	10
GND (ground).....	17

Note: In applications requiring reverse-battery detection, tip and ring connections on both the CO and line sides must be reversed (i.e., connect the tip lead to the ring lead, and vice versa). See paragraph 2.06.

table 1. External connections to 9005

slide switch. Locations of these switches on the module's printed circuit board are shown in figure 2, and instructions for setting the switches are provided below. Table 2 summarizes all option-switch settings on the 9005.

Note: Paragraph 2.09 contains special instructions on optioning the 9005 in applications requiring detection of loop-current reversals.

2.06 Normal or Slow Relay Release. Positions 1, 3, 5, 7, and 9 of 10-position DIP switch S1 option the relays associated with each current detector for either normal or slow release. The slow-release

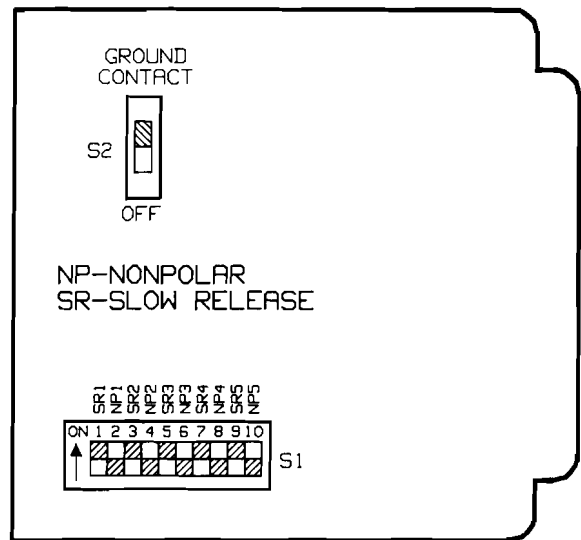


figure 2. 9005 option switch locations

setting prevents dial-pulse detection. Set each of these switch-S1 positions to the OFF position for normal release (dial-pulse detection) or to the ON position for slow release (no dial-pulse detection) as required.

2.07 Polar or Nonpolar Current Detection. Positions 2, 4, 6, 8, and 10 of 10-position DIP switch S1 option the five current detectors for either polar (unidirectional) or nonpolar (bidirectional) current detection. Set each of these switch S1 positions to OFF for unidirectional current detection or to ON for bidirectional current detection.

2.08 Ground Outputs upon Current Detection. Switch S2 conditions all five circuits of the 9005 to provide either a ground output or no ground output upon relay-contact closure. For ground outputs when loop current is detected, set S2 to the CONTACT GROUND position. For no ground outputs when loop current is detected, set S2 to OFF.

2.09 Optioning for Detection of Loop-Current Reversals. In applications requiring detection of loop-current reversals (e.g., reverse-battery answer

function	detector 1		detector 2		detector 3		detector 4		detector 5	
	switch	setting	switch	setting	switch	setting	switch	setting	switch	setting
polar (unidirectional) current detection	S1-2	OFF	S1-4	OFF	S1-6	OFF	S1-8	OFF	S1-10	OFF
nonpolar (bidirectional) current detection	S1-2	ON	S1-4	ON	S1-6	ON	S1-8	ON	S1-10	ON
relay slow-to-release (no dial-pulse detection)	S1-1	ON	S1-3	ON	S1-5	ON	S1-7	ON	S1-9	ON
relay normal release (dial-pulse detection)	S1-1	OFF	S1-3	OFF	S1-5	OFF	S1-7	OFF	S1-9	OFF
ground output upon relay closure	for all detectors, set S2 to CONTACT GROUND									
no ground output upon relay closure	for all detectors, set S2 to OFF									

table 2. 9005 option switch settings

supervision), the 9005 must be optioned for polar current detection and the tip and ring connections to both the CO and line sides must be reversed. For example, to condition current detector 1 to detect reverse battery, set position 2 of option switch *S1* to the *OFF* (polar) position, connect the CO tip lead to pin 43 and the CO ring lead to pin 45, and connect the line tip lead to pin 44 and the line ring lead to pin 46.

3. circuit description

3.01 This circuit description is intended to familiarize you with the 9005 Loop Current Detector module for engineering and application purposes only. Attempts to troubleshoot the 9005 internally are not recommended. Troubleshooting procedures should be limited to those prescribed in section 6 of this practice. Please refer to the 9005 block diagram, in section 4 of this practice, as an aid in following the circuit description.

3.02 The 9005 has five independent *current detectors*, each of which detects loop-current flow in one 2wire loop. Each *current detector* uses two opto-couplers, one in each lead of the 2wire loop, to detect loop current. The opto-coupler outputs feed a timing circuit that introduces a 100ms delay after the initial detection of loop current, making the 9005 immune to current generated by nominal (30mA) ringing voltage. After 100ms of continuous current flow, the circuit is enabled and activates its relay. If no loop current is detected for an additional 200ms, the active circuit returns to the idle state. As a result, the timing circuit allows the 9005 to detect dial-pulses with breaks of less than 200ms. Additionally, a 10 μ F capacitor connected across each *current detector* minimizes attenuation of ac signals in the loop.

3.03 Each *current detector* can be individually optioned to detect either polar (unidirectional) or nonpolar (bidirectional) loop-current flow. Each relay can also be independently optioned to detect or ignore dial pulses, as desired. Another option switch places a ground on one side of each relay contact of all five circuits on the module. As a result, the 9005's relays can, if desired, provide ground outputs upon loop-current detection.

3.04 The 9005's *power supply* is a simple zener shunt power supply. A series diode in the negative input lead protects the circuit against reversed input power connections, and a high-voltage zener diode between input battery and ground limits high-level supply transients to a safe level.

5. specifications

number of loop-current detector circuits
five (independent)

operating current (for each of the five loops)
20 to 100mA

contact rating
500mA, 350V, 50VA (contacts are unprotected)

voltage requirements
–22 to –56Vdc, filtered, ground-referenced

current requirements

35mA maximum

operating environment

20 to 130°F (–7 to 54°C) humidity to 95% (no condensation)

dimensions

5.58 inches (14.7cm) high

1.42 inches (3.61cm) wide

5.96 inches (15.14cm) deep

weight

6 ounces (170 grams)

mounting

relay rack or apparatus case via one position of a Tellabs Type 10 Mounting Shelf

6. testing and troubleshooting

6.01 The *testing guide checklist* in this section may be used to assist in the installation, testing, or troubleshooting of the 9005 Loop Current Detector module. The 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 one should be substituted and the test conducted again. If the substitute 9005 operates correctly, the original should be considered defective and returned to Tellabs for repair or replacement as directed below. We strongly recommend that no internal (component-level) testing or repairs be attempted on the module. Unauthorized testing or repairs may void the 9005's warranty. Also, if the module is part of a registered system, unauthorized repairs will result in noncompliance with Part 68 of the FCC Rules and Regulations.

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.*

6.02 If a situation arises that is not covered in the checklist, contact Tellabs Customer Service as follows (telephone numbers are given below):

USA customers: Contact Tellabs Customer Service at your Tellabs Regional Office.

Canadian customers: Contact Tellabs Customer Service at our Canadian headquarters in Mississauga, Ontario.

International customers: Contact your Tellabs distributor.

US Atlantic region: (203) 798-0506

US capital region: (412) 787-7860

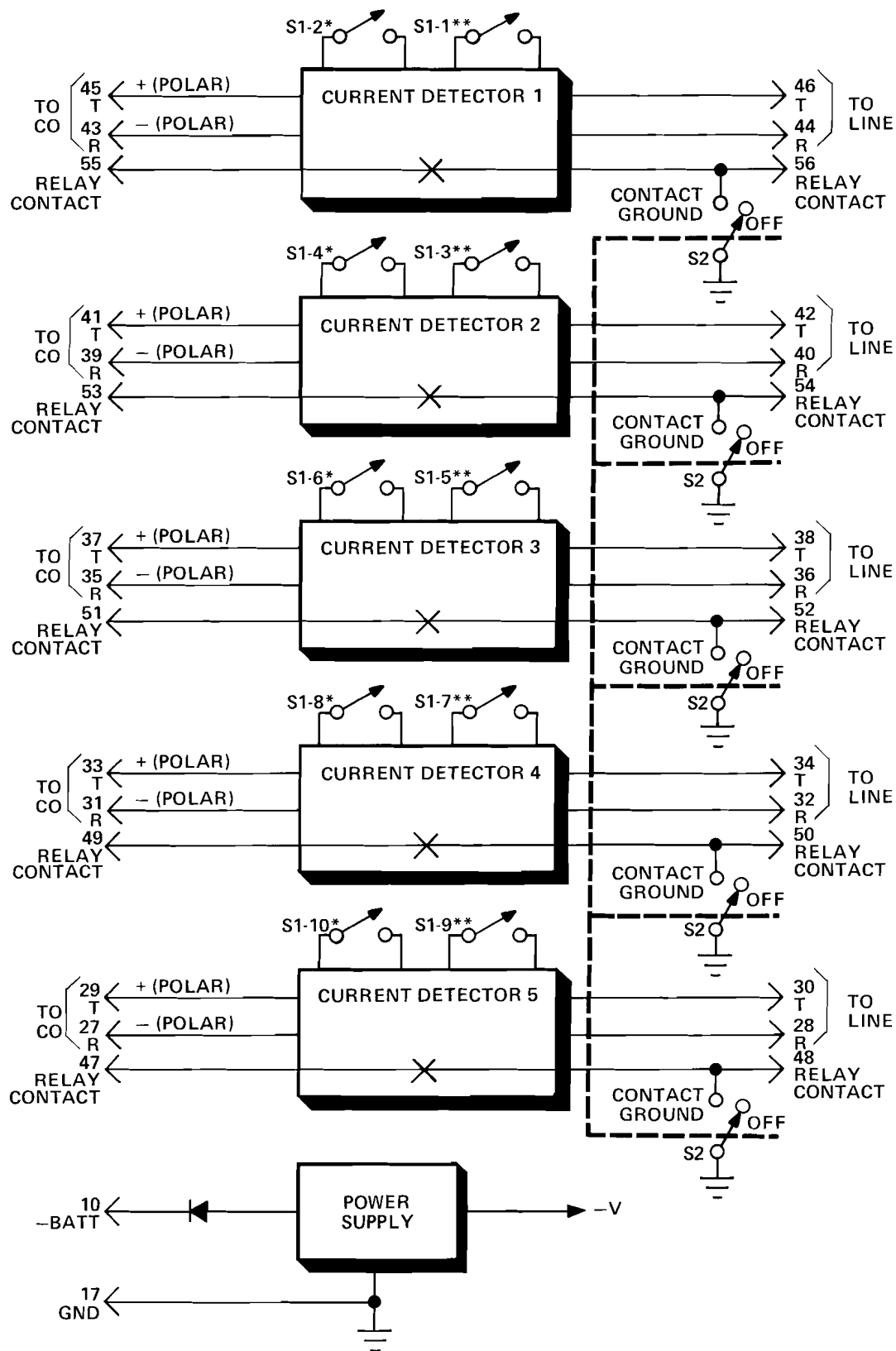
US central region: (312) 357-7400

US southeast region: (305) 645-5888

US western region: (702) 827-3400

Canada: (416) 624-0052

6.03 If a 9005 is diagnosed as defective, follow the *replacement* procedure in paragraph 6.04 when a critical service outage exists (e.g., when a system or a critical circuit is down and no spares are available). If the situation is not critical, follow the *repair and return* procedure in paragraph 6.05.



*Polar current detection = off (open), nonpolar current detection = on (closed)
 **Normal relay release = off (open), slow relay release = on (closed)

9005 Loop Current Detector

829005

4. block diagram

replacement

6.04 To obtain a replacement 9005 module, notify Tellabs via letter or telephone (see addresses and numbers below) or via TWX (910-695-3530 in the USA, 610-492-4387 in Canada). Be sure to provide all relevant information, including the 8X9005 part number that indicates the issue of the module in question. Upon notification, we shall ship a replacement module to you. If the module in question is in warranty, the replacement will be shipped at no charge. Pack the defective module in the replacement module's carton, sign the packing slip included with the replacement, 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 module prepaid to Tellabs.

repair and return

6.05 Return the defective module, shipment prepaid, to Tellabs (attn: repair and return).
in the USA: Tellabs, Inc.

4951 Indiana Avenue
Lisle, Illinois 60532
telephone (312) 969-8800

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

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

testing guide checklist

test	test procedure	normal result	if normal conditions are not met, verify:
current detectors	Set switch of detector under test for nonpolar current detection. Short T and R leads on line side of detector. Apply 20mA dc to T and R leads on CO side of detector for a few seconds.	Relay contacts of detector under test close when dc is applied <input type="checkbox"/> , then open when dc is removed <input type="checkbox"/> .	Input power <input type="checkbox"/> . Wiring <input type="checkbox"/> . Polar/nonpolar switch of detector under test set for nonpolar current detection <input type="checkbox"/> .
	With T and R leads on line side of detector still shorted, reverse dc connections on CO side.	Same as above <input type="checkbox"/> .	Same as above <input type="checkbox"/> .