

9103 Subscriber Transfer Circuit module

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1. general description

1.01 The 9103 Subscriber Transfer Circuit module (figure 1) allows calls to a 2wire business telephone to be transferred to a 2wire residence telephone when the business telephone is unattended. The business subscriber selects either this transfer function or normal business telephone service via a transfer key installed at the business location.

1.02 The 9103 provides a path for the business telephone to ring even though the line has been transferred. This feature ensures that the business telephone will always be restored to normal business service upon the first call after the business location is once again staffed, because the ringing will serve as a reminder to reset the transfer key if this has not already been done.

1.03 The 9103 is equipped with two front-panel LED's. One lights to indicate a busy condition; the other lights when the line is in the transferred mode.

1.04 The 9103 operates on -44 to -56 Vdc input. Current requirements are 50mA for holding current and 90mA maximum.

1.05 As a Type 10 module, the 9103 mounts in one position of a Tellabs Type 10 Mounting Shelf, versions of which are available for relay rack and KTU apparatus case installation. 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 utilized.

2. application

2.01 The 9103 Subscriber Transfer Circuit module provides the necessary switching capability so that calls to a business telephone can be transferred to a residence telephone when the business telephone is unattended. Designed for central office installation, the 9103 may be used only in offices that provide C-lead or sleeve-lead control, such as SxS, Crossbar, and X-Y offices.

2.02 Operation of a transfer key associated with the business telephone grounds the ring or negative side of the line to activate the transfer function. When the transfer key is in the normal or unoperated position, both the business telephone and residence telephone can originate or receive calls with no interaction.

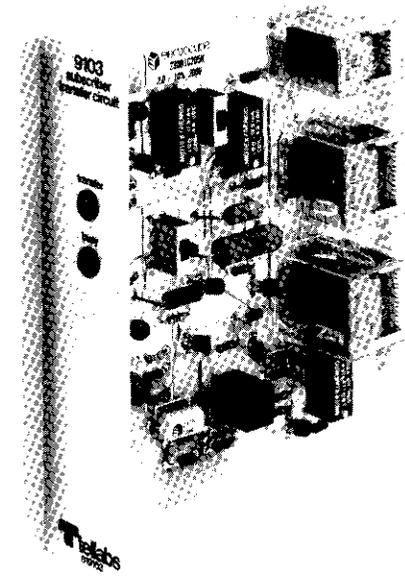


figure 1. 9103 Subscriber Transfer Circuit module

2.03 When the transfer key is operated, however, all incoming business calls are routed to the residence telephone. The business telephone rings along with the residence telephone, but the call cannot be answered by the business telephone unless the transfer switch is returned to normal.

Note: For proper operation, the business telephone's ringer must be connected from tip to ground.

2.04 When the 9103 is in the transferred mode, the residence telephone may originate or receive calls on the residence line. If a call is made to the business line while the residence telephone is busy on the residence line, the business line will be marked busy. When the residence telephone is answering the business line, the residence line is marked busy to any incoming calls.

2.05 If a business call is in progress to the residence telephone when the transfer key is reset to normal, the two lines will not be disconnected until the call is terminated in the normal manner. If, during such a call, a caller goes off-hook with the business telephone after the transfer key has been reset, that caller will enter the conversation to create a three-way conversation.

2.06 Restoring the transfer key while a call is in progress to or from the residence line will immediately terminate the transfer feature. The residence call, however, will not be disturbed.

2.07 An outgoing call cannot be made on the business line unless the transfer key is in the normal or unoperated position.

2.08 When the 9103 is used to transfer the first line of a multiline hunt group serving the business, the module's three make-busy sleeve leads (GT1 through GT3) are used to busy up to three additional lines in the hunt group. More than three additional lines may be busied if an external diode matrix is provided.

3. installation inspection

3.01 The 9103 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.

mounting

3.02 The 9103 mounts in one position of a Tellabs Type 10 Mounting Shelf. Each module plugs physically and electrically into a 56-pin connector at the rear of the shelf. All connections are made to wire-wrap pins on the 56-pin connector.

installer connections

3.03 Before making any connections to the Mounting Shelf, make sure that the power is off and modules are removed. The module should be put into place only after properly optioned and after wiring has been completed. Table 1 lists connections to the 9103. Pin numbers are found on the card connector at the rear of the Type 10 Shelf.

connect:	to pin:
+L1 (business line relay ckt. tip)	55
-L1 (business line relay ckt. ring)	43
CN1 (business line relay ckt. sleeve)	15
+N (business line connector ckt. tip)	29
-N (business line connector ckt. ring)	19
CN3 (business line connector ckt. sleeve)	21
+L (business telephone tip)	39
-L (business telephone ring)	45
+L2 (residence line ckt. tip)	53
-L2 (residence line ckt. ring)	41
CN2 (residence line ckt. sleeve)	37
GT1 thru GT3 (make-busy leads for lines 2, 3 and 4)	47, 49 and 51
-BATT (-48Vdc input)	35
GND (ground)	17

table 1. External connections to 9103

options

3.04 The 9103 contains only two option switches. Their locations are shown in figure 2. Switch S1, when set to the ON position, connects resistance battery to the sleeve leads for use in central offices (such as Leich) where this is required. The OFF position is selected for all other central office types. Switch S2 adapts the 9103 for use with ring generator on either the tip (+) or ring (-) side of the business line. Position A options the module for ring-connected generator; position B options the module for tip-connected generator.

3.05 If the 9103 is used to transfer the first line of a multiline hunt group, connect leads GT1 through GT3 to each of the sleeve leads of the remaining lines to busy out these lines when the first line is transferred.

4. circuit description

This circuit description is intended to familiarize you with the 9103 Subscriber Transfer Circuit module for engineering and application purposes only. Attempts to troubleshoot the 9103 internally are not recommended. Please refer to the associated Functional Schematic (section 5) as an aid in understanding this circuit description.

idle condition

4.01 In the idle condition, all relays are released and there is no interconnection between the business and residence lines. The business telephone line is disconnected from its line relay or connector circuit.

originating a call from business telephone

4.02 When the business telephone goes off-hook, it draws loop current supplied through resistors R10 and R12 via the normally closed contacts of the B and D relays. The voltage drop across R12 due to this loop current is insufficient to turn on transistor Q5. Relay A therefore does not operate. Transistor Q4, however, is biased so that the resultant voltage drop across R10 is sufficient to turn on Q4 and operate relay C.

4.03 Relay C, when operated, connects a 500 ohm resistor, R11, across the business line-relay circuit, thereby seizing the central office. The central office responds by returning ground on the sleeve or CN1 lead and supplying dial tone. The sleeve ground turns on transistor Q1 and operates relay B. Relay B, when operated, disconnects the business telephone from R10 and R12 and connects it to the central office line circuit for the duration of the call.

terminating an incoming call on business telephone

4.04 When the central office rings into the business line connector circuit, it also applies ground to the CN3 lead. This ground operates relay B, which connects the business telephone across the line connector. Ringing voltage then causes the telephone to ring normally. When the call is answered, ring trip occurs in the normal manner. Relay B restores at the end of the call.

terminating a business call on residence telephone when 9103 is in transfer mode

4.05 When the transfer switch associated with the business telephone is operated, a ground is placed on the ring (-L) side of the line connected to pin 45 of the 9103. This ground causes a current to flow through resistor R12, and the resultant voltage drop turns on transistor Q5 and operates relay A.

4.06 Relay A, through the unoperated contact of relay C, turns on transistor Q3 and thereby operates relay D. Relay D disconnects the business line-connector circuit and connects the residence line circuit to the business line-connector circuit. Incoming business calls therefore cause the resi-

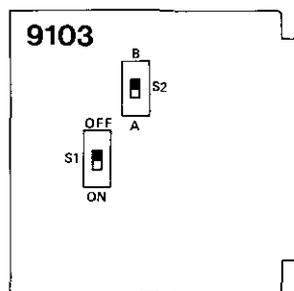


figure 2. Switch locations

dence telephone to ring. A ground on the *CN3* lead causes relay B to operate. Operation of relay B routes ground from the nonoperated E2 contact through the operated A relay and the operated D relay to the *CN2* lead of the residence line circuit. This buses out the residence line for the duration of the business call.

4.07 If a call is in progress on the residence line while the 9103 is in the transferred mode, a ground is routed via lead *CN2* from the residence line circuit through the operated D relay, the operated A relay, and the unoperated B relay contacts to the base of transistor Q2, causing Q2 to turn on and operate relay E. Relay E, when operated, places a ground on lead *CN3*, marking the business line busy to any incoming calls.

4.08 Whenever ringing voltage appears across the business line-connector circuit, optoisolator U1 detects it, turns on transistor Q6, and causes relay F to operate. Relay F, through capacitor C2, operated relay A, and operated relay D, conducts this ringing voltage from either the -N or +N lead (depending on the position of S2) to the +L lead and, therefore, to the business telephone, causing the ringer in the business telephone to operate. (The ringer should be connected from the tip or +L side to ground at the transfer key.)

4.09 Restoring the transfer key will disconnect the two lines if a call is in progress to or from the residence line.

4.10 Restoring the transfer key will not disconnect the two lines if a call is in progress on the business line because the D relay locks up through the operated B relay until the call is completed. The business phone can, however, join the conversation.

4.11 When the 9103 is in the transferred mode, ground is routed through the operated A relay and unoperated C relay to diodes CR1, CR2, and CR3 and thus to pins 47, 49, and 51. If the business line is the first of a multiline hunt group, these pins should be connected to the *CN* leads of each of the remaining lines in the group to busy them out.

6. specifications

maximum loop resistance

2000 ohms or signaling range of office, whichever is less

insertion loss

none (nominally 0dB)

ringing voltage

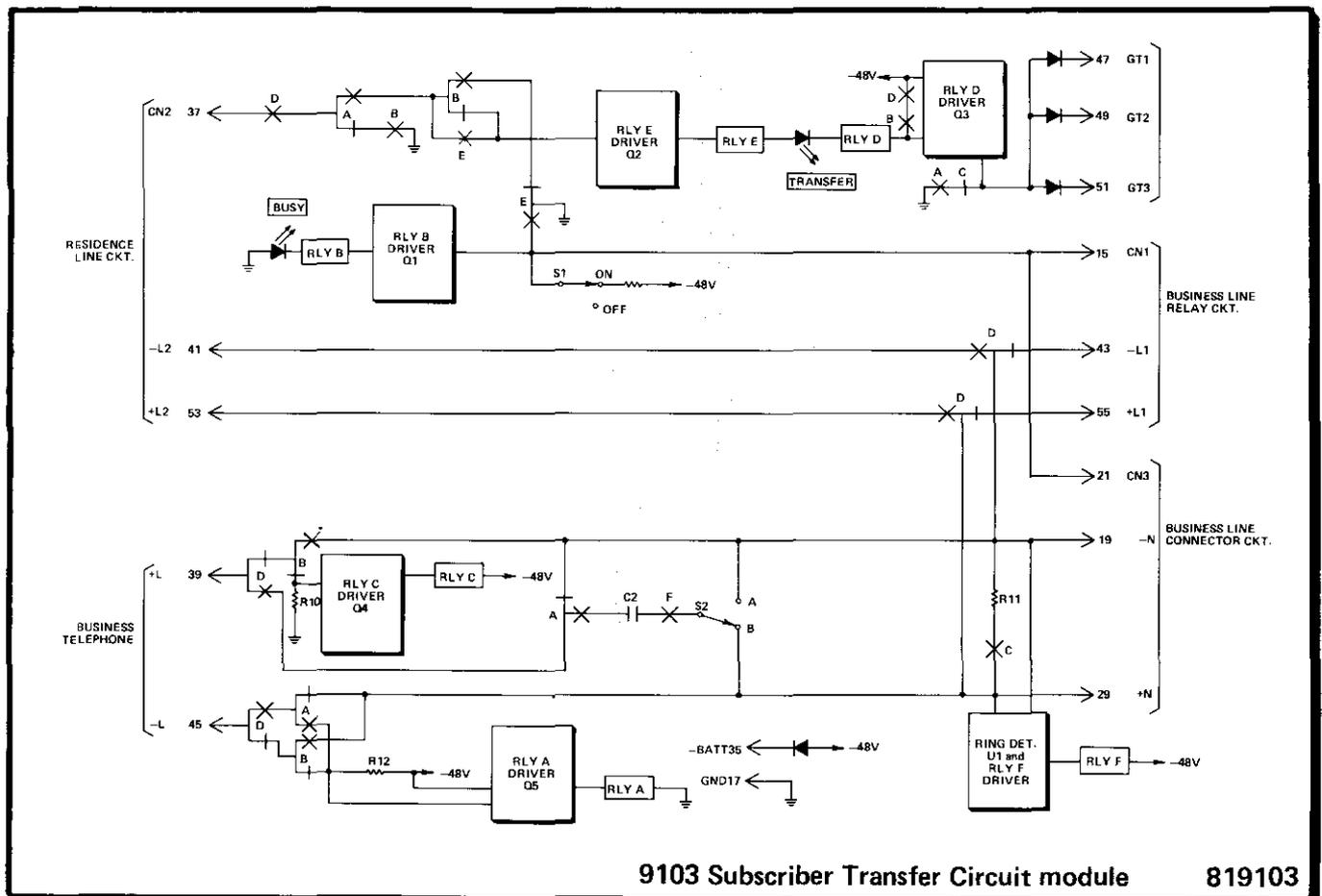
minimum 65Vac, 20 to 60Hz

relay contact rating

1 ampere, maximum

input voltage

-44 to -56Vdc, ground referenced



5. functional schematic

input current

50mA holding current,
90mA 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

10 ounces (283.5 grams)

mounting

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

7. testing and troubleshooting

7.01 The Testing Guide Checklist may be used to assist in the installation, testing or troubleshooting of the 9103 Subscriber Transfer Circuit 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 9103 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 9103 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.).

replacement

7.04 If a defective 9103 is encountered, notify Tellabs via telephone [(312) 969-8800], letter [see below], or twx, [910-695-3530]. Notification should include all relevant information, including the 8X9103 part number (from which we can determine the issue of the 9103 module in question.) Upon notification, we shall ship a replacement module to you. 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 pre-addressed label provided with the replacement module to the carton being returned; and ship the equipment prepaid to Tellabs.

repair and return

7.05 Return the defective 9103 module, shipment prepaid, to: Tellabs Inc.

4951 Indiana Avenue
Lisle, Illinois 60532

Attn: repair and return dept.

Enclose an explanation of the module's malfunction. Follow your company's standard procedure with respect 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.

troubleshooting guide

trouble condition	possible cause (in order of likelihood)
business telephone inoperative	1) Faulty battery and ground connections on pins 35 and 17, respectively <input type="checkbox"/> 2) External wiring incorrect <input type="checkbox"/> .
business telephone unable to draw dial tone	1) Incorrect polarity of business line-relay circuit <input type="checkbox"/> 2) Transfer switch in transfer position <input type="checkbox"/> 3) Permanent ground on business line connected to pin 45 <input type="checkbox"/> .
business telephone does not ring in transfer mode	1) Switch S2 in incorrect position for office ringing scheme <input type="checkbox"/> 2) Business telephone ringer not connected between tip and ground <input type="checkbox"/> .
residence line not made busy when business call is in progress to residence telephone	1) Pin 37 not connected to residence line-circuit C-lead <input type="checkbox"/> .
business line not made busy when call is in progress from residence telephone	1) Pin 37 not connected to residence line-circuit C-lead <input type="checkbox"/> .