Model 8100

Circuit Checker

Instruction Manual

We would like to express our appreciation for your purchase of Model 8100. It was designed using the latest in technology to ensure high reliability. To get the most out of the 8100, we highly recommend that you read and follow carefully the instructions included in this document.

Specialists in Testing and Measuring Instrumentation

SOAR corporation®

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Precautions

Read this manual carefully before attempting to use the 8100. After check that the AC line voltage is proper, connect the line plug and switch on the power.

To prevent shocks, always connect a ground to the checker, and never work with wet hands, as this is extremely dangerous.

If a fuse blows, pull the power plug from its outlet and investigate the cause of the fuse blowing before replacing with one of the proper rating.

1. INTRODUCTION

The 8100 Circuit Checker is an intelligent continuity tester designed to test interconnections on printed circuit boards and cables at high speeds. It was designed around an 8-bit microprocessor and uses LSI technology to provide the utmost in reliability and simplicity of operation.

It is a valuable tool in enhancing the efficiency of incoming inspections on printed circuit boards, cables and similar items.

2. FEATURES

- The Model 8100 automatically learns the interconnectivity of printed circuit boards and cables from a known good sample at high speeds and the interconnectivity can be changed simply by using an editing function.

- Learned interconnectivity can be backed up in EEPROM (electrically erasable programmable read-only memory), eliminating the necessity to erase the contents of memory using ultraviolet radiation each time contents must be changed.

- The unit's conditions and test results are indicated on a high-intensity, 8-digit LED display and on status indicating LEDs. Interconnectivity data and test results (go/nogo) can be output to a printer as well.

- Automatic or manual testing can be selected, as appropriate to the particular test tasks.

- In addition to test connectors, the rear panel features a remote control connector, extension bus connectors and a search terminal.

  The remote control connector is used to remotely start and stop tests and is convenient for use when applying a test fixture.

  The extension bus connector is used to extend the maximum capability of 400 lines (standard 80) by using expansion units connected to the bus, enabling expansion of up to 400 lines.

  The search terminal is a special output terminal which can be connected to any input terminal for use in displaying the number of the input terminal on the LED display.

- A test mode is provided to enable self-diagnostic checking of the 8100.

3. SPECIFICATIONS

Model	8100 Circuit Checker
Tested items	Opens and shorts 500Ω or above: open 100Ω or below: short
Test voltage	5V
Maximum number of test modules	5/mainframe, 15/(mainframe + expansion unit)
Number of test points	80(input)/module, 80(output)/module
Test time	0.4s max./80pins, 4 - 20S max./400 pins (not including printout time)
Programming method	Self-programming (automatic from a known good board) Numerical key input programming (edit mode)
Programming time	15ms/line (including ROM writing time)
Maximum capacitance between lines	0.01μF
Test modes	ALL CHECK FAIL END FAIL STOP FAIL END RETRY
Operating switches	Start Continue
Remote connector	Input start, output ready, nogo or PASS, OPEN or SHORT
Printer output data	Wiring list, bad wiring positioning, good unit count Paper : 38 x 66 mm
Other functions	Short start, search, slow display
Power requirements	90～130V AC, (50 or 60Hz) or 180～260V AC, (50 or 60Hz)
Power consumption	5W
Fuse	90～130V AC (2A/250V FAST 5φ×20mm) 180～260V AC (1A/250V FAST 5φ×20mm)
Rom Writer	EEPROM

Operating temperature range	5 to 35°C
Outer dimensions	350(W) × 220(H) × 200(D)mm

4. CONFIGURATION

4.1 Standard Accessories

Mainframe
Module board (provided within mainframe)
Remote control connector
EEPROM
Search lead
Connector-terminated flat cables for fixture (4)
Instruction manual
Spare fuse

4.2 System Configuration

The figure below shows the overall system configuration of 8100 Circuit Checker.

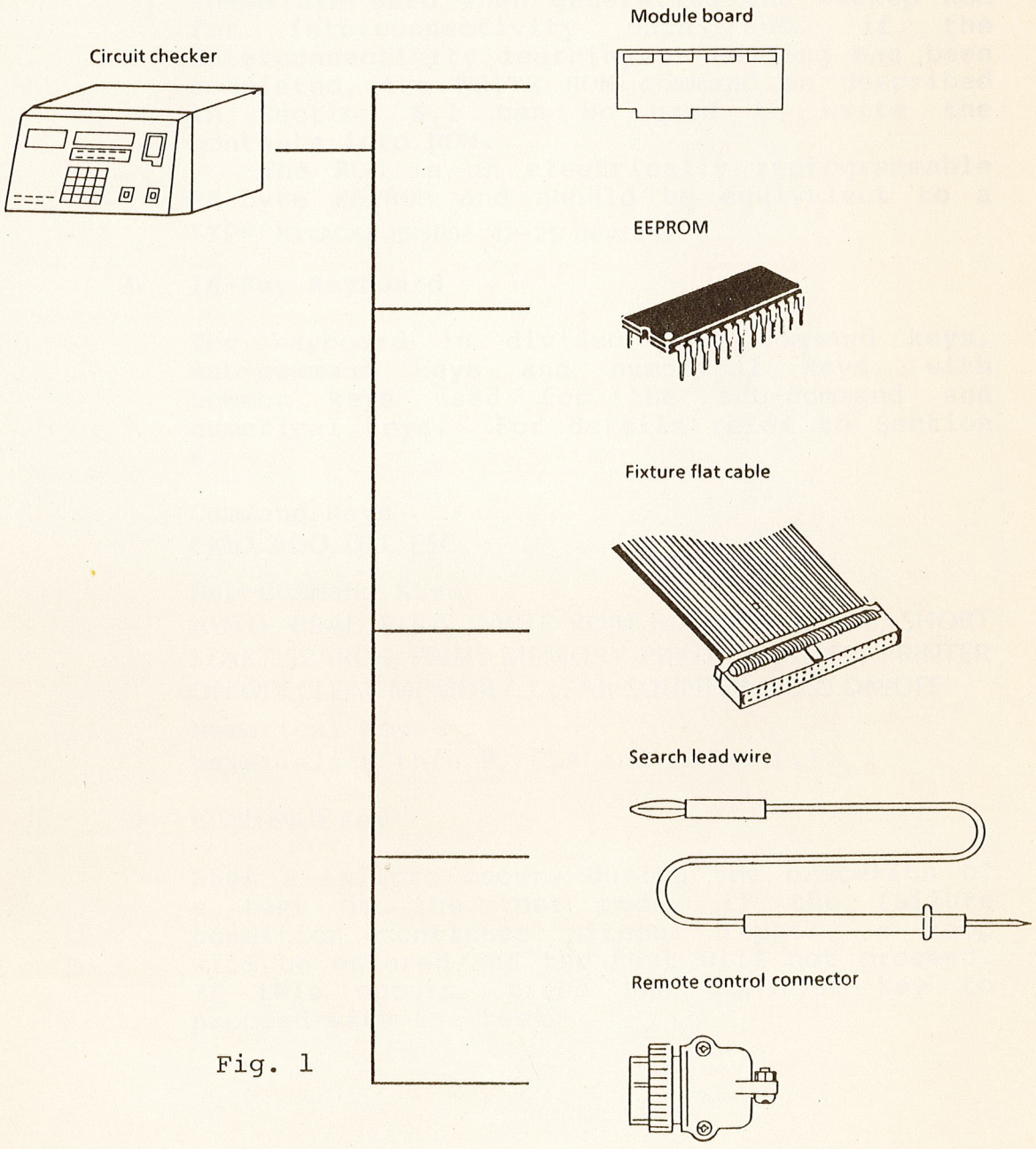


Fig. 1

4.3 Modules

By adding test module boards to the 8100 mainframe, it is possible to expand the number of test lines. Each module board accommodates 80 input lines and 80 output lines and up to five such boards may be installed in the mainframe for a total of 400 input and output lines each, enabling a test to be made on 400 lines.

5. PANEL DESCRIPTIONS

5.1 Front Panel

Fig. 2 shows the front panel layout.

① 7-Segment, 8-Digit LED

This display indicates interconnectivity data and indicates results during command execution and when performing tests.

② Status LEDs

SHORT START, SEARCH, PRINTER, SLOW BUSY, SHORT, OPEN, RUNNING MODE, CMD, GO, NG

③ ROM WRITER

These are used when generating the backup ROM for interconnectivity data and, if the interconnectivity learning or editing has been completed, the WRITE ROM command as described in Section 6.1 can be used to write the contents into ROM.

The ROM is an electrically reprogrammable 8K-byte EEPROM and should be equivalent to a type HITACHI HN5806 4P-25 device.

④ 16-Key Keyboard

The keyboard is divided into command keys, sub-command keys and numerical keys, with common keys used for the sub-command and numerical keys. For details refer to Section 6.

Command Keys
CMD, ADD, DEL, ESC

Sub-Command Keys
AUTO, READ ROM, WRITE ROM, RUNNING MODE, SHORT START, SEARCH, PRINT MEMORY PRINT COUNTER, PRINTER ON/OFF CLEAR MEMORY, CLEAR COUNTER SLOW ON/OFF

Numerical Keys
Numerials 0 thru 9, CLR and comma (,).

⑤ CONTINUE Key

When a failure occurs during the execution of a test in the test mode, if the failure condition continues without repair, a loop will be entered and the test will not proceed. If this occurs, press the CONTINUE key to proceed with the test.

⑥ START Key

This key is used to start the actual test.

⑦ Printer

The printer is used to provide a printout of test results, interconnectivity data and the number of tests and failures.

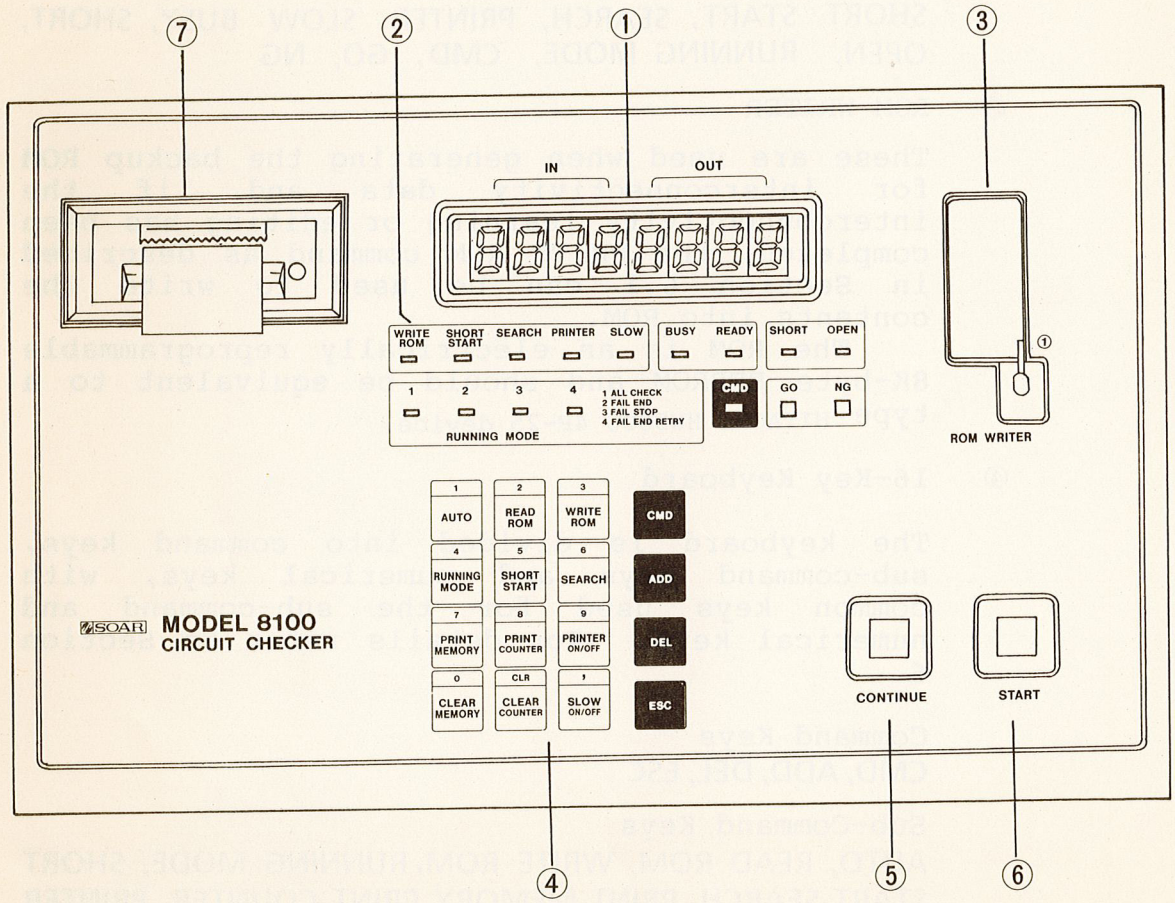


Fig. 2

5.2 Rear Panel

Fig. 3 shows the rear panel layout.

① Test output connectors (blank covered when not used)

② Test input connectors (blank covered when not used)

③ Remote control connector

④ Search terminal

⑤ Protect switch

⑥ AC cable connector

⑦ Fuse holder

⑧ Power switch

⑨ Expansion bus cable outlet

⑩ Ground terminal

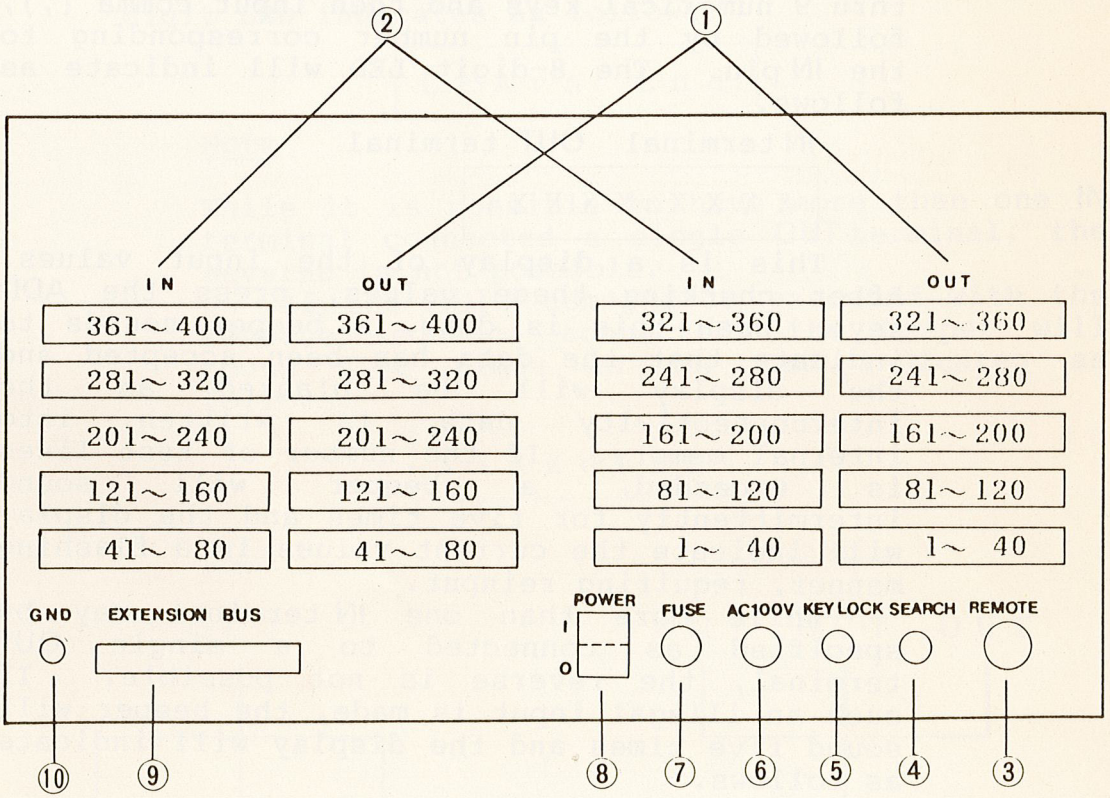


Fig. 3

6. OPERATION

6.1 Command Key Descriptions

Commands include single functions such as CMD, ADD, DEL and ESC and double functions made up of numerical keys and command keys.

6.1.1 Single Function Keys

(1) CMD

While the 0 thru 9, CLR and comma keys (16 keys) are normally in the numerical mode, if the CMD key is pressed, these keys will have the function marked on the bottom of the key for approximately two seconds. During this period the CMD LED lights.

(2) ADD, DEL

These two keys are used to change interconnectivity data which has already been written into internal memory or to create such data using the numerical keys.

To add interconnectivity data (lines), input the test connector pin number corresponding to the OUT terminal using the 0 thru 9 numerical keys and then input comma (,), followed by the pin number corresponding to the IN pin. The 8-digit LED will indicate as follows.

IN terminal OUT terminal

X X X X . X X X X .

This is a display of the input values. After checking these values, press the ADD key. When this is done, a beeper sounds to indicate that the data has been accepted and the display will be blanked as the interconnectivity data is written into internal memory. If the number of test lines is exceeded, a beeper will sound intermittently for five times and the display will indicate the current values in a flashing manner, requiring reinput.

While more than one IN terminal may be specified as connected to a single OUT terminal, the reverse is not possible. If such an illegal input is made, the beeper will sound five times and the display will indicate as follows.

IN terminal

X X X X d u b L

If this occurs, reinput the data in the correct sequence. To delete already input interconnectivity data, input the data in the same manner, but press the DEL key.

(3) ESC Key

During a test, if it is impossible to escape from the BUSY condition, pressing this key will return the unit to the READY condition.

6.1.2 Double Function Keys

To use a double function key, always press the CMD key first and press the second key of the sequence within approximately two seconds.

(1) AUTO

By sequentially scanning and testing the interconnectivity of the unit-under-test (cable, printed circuit board, etc.) connected to the test connector(s), and comparing this interconnectivity with data stored in internal memory, a comparison interconnectivity data table is written into internal RAM. When this data capture and compare sequence is completed, a beeper sounds and the 8-digit LED indicates as follows.

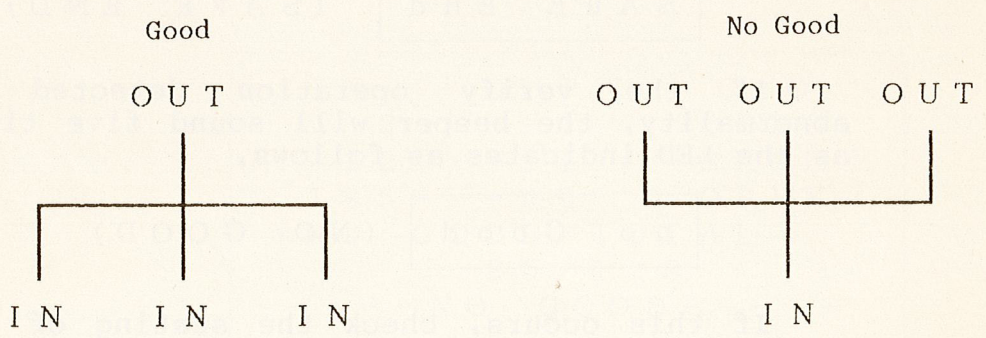
L E A r n E n d

Note

While it is possible to have more than one IN terminal connected a single OUT terminal, the reverse is not possible.

If the AUTO command is executed with the reverse sequence connected, the beeper will sound five times as the LED indicates as follows.

X X X X d u b L



(2) READ ROM

Interconnectivity data backed up in the EEPROM can be copied into the internal memory from ROM writer. When the copying is completed, verify is automatically performed and, if no abnormality is detected, a beeper will sound once as the 8-digit LED indicates as follows.

C o P y E n d

If the verify operation detected an abnormality, the beeper will sound five times as the LED indicates as follows.

n o G o o d	(N O G O O D)

n o r o m	(N O R O M)

If this occurs, check the seating of the ROM in its socket, check for other abnormalities and repreform the test.

(3) WRITE ROM

Before executing this command, it is necessary to use AUTO or ADD and DEL to generate the interconnectivity data table in the internal memory. When performing a WRITE, the EEPROM must be in the ROM writer. When this key is pressed, the interconnectivity data table in internal memory is written into the EEPROM by the ROM writer. When the writing operation is completed, an automatic verity is performed and, if no abnormality is detected, a beeper will sound one time as the 8-digit LED indicates as follows.

S A u E E n d	(S A V E E N D)

If the verify operation detected an abnormality, the beeper will sound five times as the LED indicates as follows.

n o G o o d	(N O G O O D)

If this occurs, check the seating of the ROM in its socket and check for other abnormalities and repreform the test.

(4) RUNNING Mode

The RUNNING mode is used to select the actual method of processing to be employed in the test itself. There are four running modes, as follows.

1. ALL CHECK
2. FAIL END
3. FAIL STOP
4. FAIL END RETRY

Press the CMD key and then press the RUNNING mode key to switch through the 1→2→3→4→1 sequence, with the LED indicating the number of the mode currently selected.

When a single test is completed, the results are displayed on the status LEDs, the 8-digit LED display and printed out on the printer, if the printer is operating. The status indicating LEDs indicate the PASS or NG (nogo) condition and, if the test was nogo, whether it was a OPEN or SHORT failure.

The 8-digit LED indicates the test result memory contents and PASS. If the result was nogo (NG), the display indicates the IN terminal number on the first four digits and the OUT terminal number on the second four digits, in the following format.

```
--------PASS--------
```

IN terminal OUT terminal

```
XXXX.XXXX.
```

The printing format is as shown as below.

```
  IN      OUT      S/O
    3-----1      OPEN
   22---11       SHORT
  185---99       OPEN
*NO  GOOD/TOTAL
       25/123
------NO  GOOD------
```

ALL CHECK

At the point at which the interconnectivity data table in memory differs from the interconnectivity of the unit-under-test, the NG lamp will light along with the OPEN or SHORT lamp and, the 8-digit display will indicate the input and output connector pin numbers for the offending position. If the printer is operating, the printer will also print out this information. The test is continued from this point. After this point, the same processing continues and, when completed, the unit goes into the wait for the start signal once again.

If all of the contents of the memory were the same as the actual interconnectivity, the PASS lamp lights and the unit waits for the start signal. The test counter reading is incremented by 1 each time a test is completed.

If during a test, you wish to escape from the current mode, press the ESC key.

In this mode, if there are two or more differences between the unit under test and memory contents, it is possible to display all of the positions and print these outs.

FAIL END

At the point at which the interconnectivity data table in memory differs from the actual interconnectivity of the unit-under-test, the test is terminated and a wait is made for the start signal. If this occurs, the NG lamp and OPEN or SHORT lamp will light and the 8-digit LED display will indicate the input and output pin numbers of the offending position. If the printer is operating, the printer will print out this information.

If all contents were the same, the PASS lamp will light and then unit will go into the wait-for-start condition. The test counter value will be incremented by 1 each time a test is completed.

In this mode, even if there were a number of differences between internal interconnectivity data and actual interconnectivity, the first difference will cause the test to be terminated (in the sequence of increasing IN terminal numbers).

FAIL STOP

At the point at which the internal interconnectivity data table in memory differs from the actual interconnectivity of the unit under-test, the NG and OPEN or SHORT lamp will light and the 8-digit LED display will indicate the input and output connector pin numbers of the offending location. If the printer is operating, the printer will also print out this information. Also, the unit will go into a loop at this point. If the erroneous interconnectivity condition in the unit under test is corrected at this point, escape will be made from the loop and the test will proceed. To skip over this portion of the test, simply press the CONTINUE key.

When the test is completed, the unit wait for the start signal and, if repair is made and the inspection is completed the PASS LED lights.

If all interconnectivity agreed with memory contents the PASS lamp lights and the unit waits for the start signal once again. The test counter value is incremented by 1 each time test is completed.

In this mode, it is possible to perform repair as the test proceeds.

FAIL END RETRY

At the point of which the interconnectivity data table in memory is different than the actual interconnectivity of the unit-under-test, return is made to the beginning at which point the test is retried. If this occurs, the NG lamp and OPEN or SHORT lamp will light and the 8-digit LED display will indicate the input and output connector pin numbers of the offending location. If the printer is operating, it will print out the same information.

If all contents agreed, the PASS lamp will light and the unit will wait for the next start signal. In this mode, the CONTINUE key is not operative, and the test counter does not operate as well.

To escape from this test mode, press the ESC key.

This mode is used manually and enables repair of cables and other units under test during the test sequence.

(5) SHORT START (ALL CHECK MODE ONLY)

This command is used to set or cancel the SHORT START condition and, if the condition is set, the SHORT START lamp lights. In this condition, shorting the IN-1 pin and OUT-1 pin of the test connectors have the same effect as the START key.

To escape from this mode, press the ESC key.

By connecting IN-1 and OUT-1 pins to pins you know are connected in the unit under test, it is necessary only to connect the unit under test to enable this mode and start the test.

(6) SEARCH

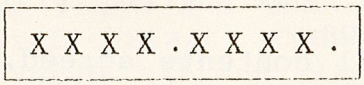
This command is used to set and cancel the SEARCH condition. When the SEARCH condition is set, the SEARCH lamp lights and the SEARCH terminal on the rear panel can be connected to any one of the IN pins to display the connector pin number of the IN pin on the 8-digit LED display.

To escape from this mode, press the ESC key.

(7) PRINT MEMORY

This is used to sequentially indicate on the 8-digit LED display the interconnectivity data memory contents. If the printer is operating, this will be printed out as well. The format on the LED display is as follows.

IN terminal OUT terminal



As shown above, the first four digits are used for the input and the second four for the output. The only data indicated is data for connections.

If the data is too fast, use the SLOW ON/OFF command to slow it down.

The printer format is as follows.

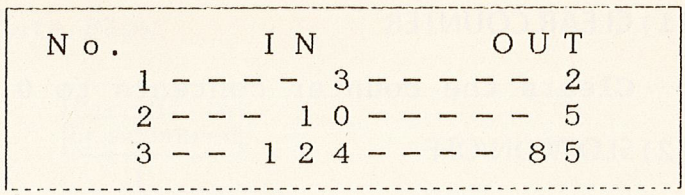
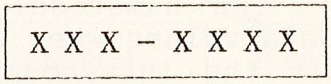


Fig. 4

(8) PRINT COUNTER

This counter indicates the total number of test and number of failures. The LED display format is as follows.



In the above, the first three digits indicates the number of failures and the last four digits the overall number of tests. Each counter is a four-digit counter, with the lower LED digits display.

If the printer is operating, it will print out the same information. All digits, however, are printed out and the format is as shown in Fig. 5.

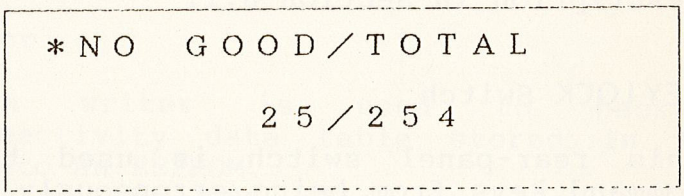


Fig. 5

(9) PRINTER ON/OFF

This is used to set the printer on and off. It toggles between these two conditions and, if the printer is ON, the printer on lamp will light.

(10) CLEAR MEMORY

Used to clear all of the interconnectivity data table in memory. While the ADD command can be used to generate such a table, this command can be used to clear all previous data and then, making it necessary to execute this command before the ADD command.

(11) CLEAR COUNTER

Clears the counter contents to 0.

(12) SLOW ON/OFF

Used to increase the data hold time on the display (8-digit LED). It toggles between the ON and OFF conditions and, when the ON condition SLOW lamp lights and the display time is increased.

6.2 Numerical Keys

The numerical keys include the numeral 0 thru 9, comma and CLR. The numerical keys 0 thru 9 are used to input data values when using the ADD or DEL commands to edit the interconnectivity data table in memory. The comma is used as a data delimiter and CLR is used to cancel data erroneously entered. Refer also to the descriptions of ADD and DEL.

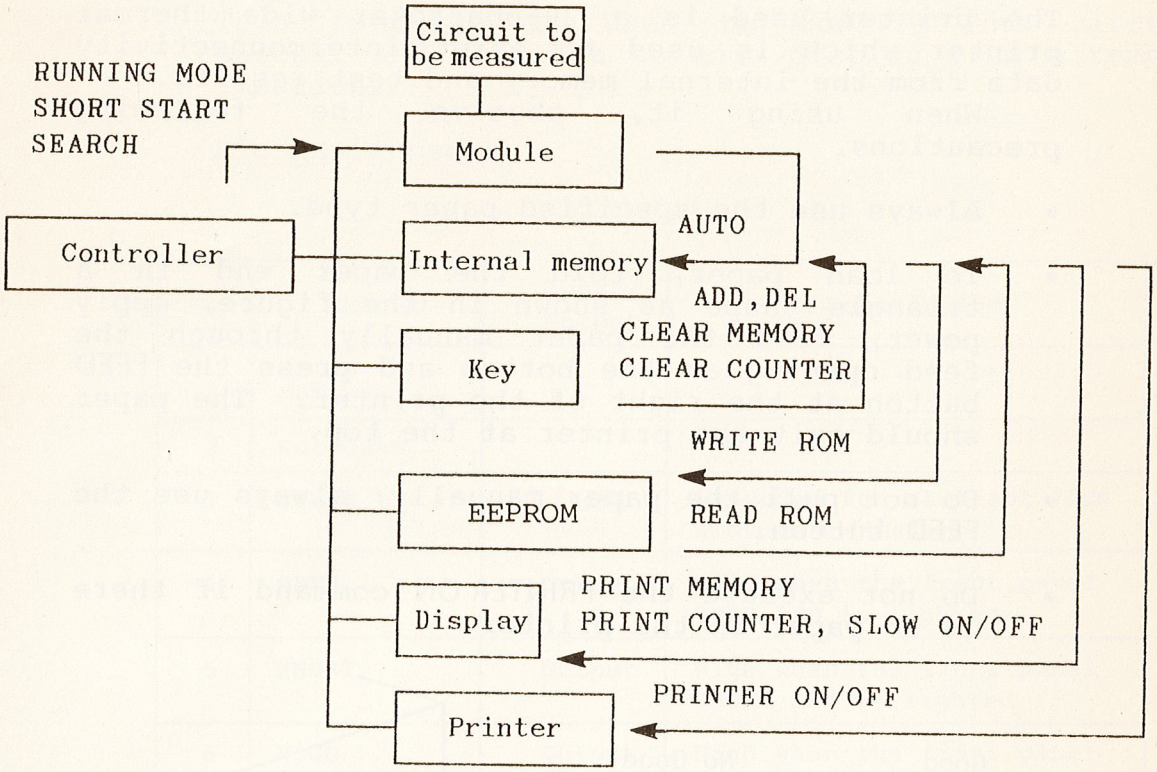
6.3 START and CONTINUE Operating Keys

The START key is pressed to start the test. The CONTINUE key is operate in the FAIL STOP submode (3) and is used to continue the test when a stop is made. For details, refer to RUNNING MODE description in Section 6.1.

6.4 KEY LOCK Switch

This rear-panel switch is used to prevent the command keys from being erroneously pressed on the test line, as this type of error can cause problems.

6.5 Command & Data Flow



7. ROM Writer

The ROM writer is used to backup the interconnectivity data table stored in internal memory into an EEPROM.

Power to the ROM writer is automatically cut off until the WRITE ROM is executed. When using the writer, observe the following precautions.

- Do not mount of unload an EEPROM while the BUSY LED is lighted.

- EEPROMs are mounted by first lifting the lever at the right bottom of the socket towards the front, then seating the EEPROM securely in its sockets with pin 1 agreeing with ① mark and then lowering the lever once again. Removal of the device is performed in the reverse sequence.

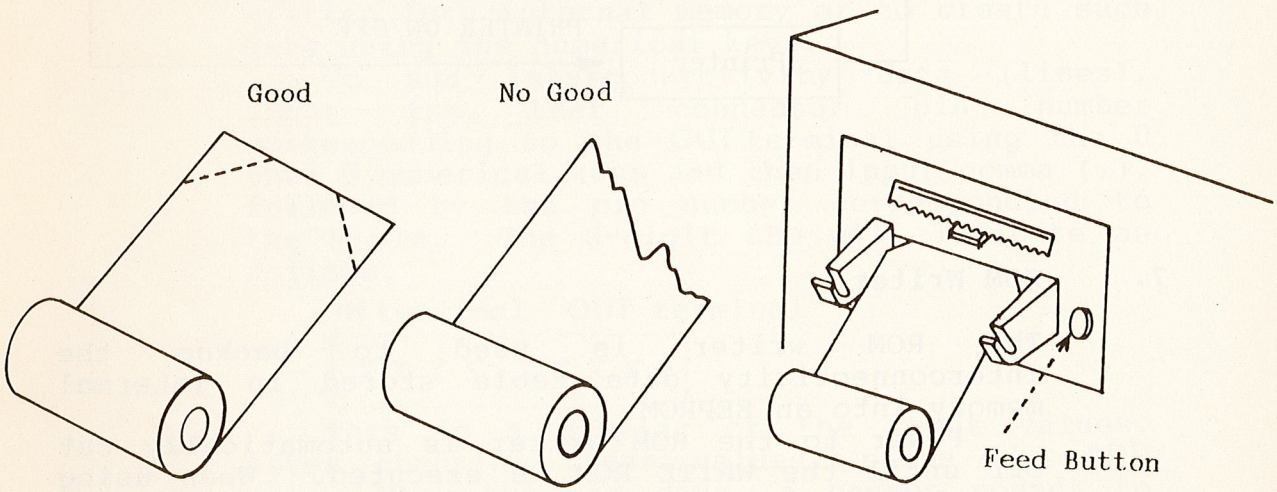
  Remember that reverse insertion of the EEPROM can result in damage in both the EEPROM and Model 8100.

8. PRINTER

The printer used is a 20-character wide thermal printer which is used to print interconnectivity data from the internal memory and test results.

When using it, observe the following precautions.

- Always use the specified paper type.
- To load paper, fold the paper end in a triangle shape as shown in the figure, apply power, feed the paper manually through the feed opening at the bottom and press the FEED button at the right of the printer. The paper should exit the printer at the top.
- Do not pull the paper manually; always use the FEED button.
- Do not execute the PRINTER ON command if there is no paper in the printer.



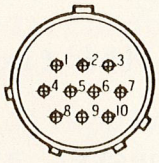
9. REMOTE CONTROL

This function is used to control the circuit checker and obtain a go/nogo display from a remote location.

Pin Assignments

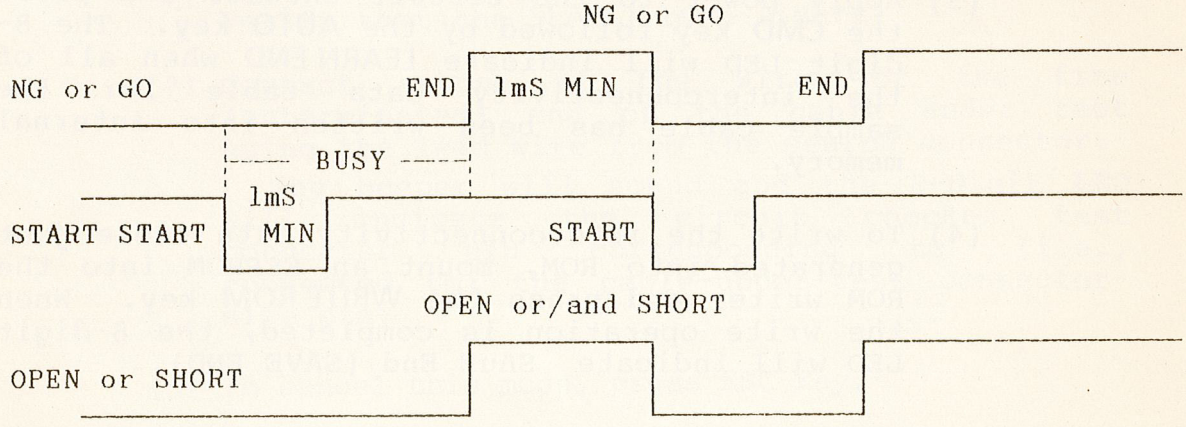
Pin	Signal	Input/ Output	Description
1	Not used		
2	Not used		
3	START	Input	Grounded for at least 10μs at the start of the test.
4	OPEN	Output	High when the front panel OPEN LED is lighted
5	SHORT	Output	High when the front panel SHORT LED is lighted
6	NOGO	Output	High when the front panel NG LED is lighted
7	GO	Output	High when the front panel GO LED is lighted
8	Spare		
9	Ground		
10	Ground		

JMSP 21 10 M(DDK)



The figure at the left shows the male remote control connector as seen from the feed side.

Timing is shown below.



10. TEST MODE

This mode is provided to check the normal operation of the various parts of the circuit checker.

Test Procedure

(1) While holding the CMD key down, set the rear-panel power switch to ON.

(2) Nest, press the START switch. The four RUNNING MODE lamps and SHORT START, SEARCH, SLOW and PRINT lamps (total of eight) will flash in sequence. The printer will print out as follows.

"CIRCUIT CHEKER"

(3) Next, press the CONTINUE switch. The 8 LEDs BUSY, READY, OPEN, SHORT, NG, GO, WIRE, CMD will flash in sequence.

(4) Next, press several of the keys in the keypad near the center of the panel. Each time the key is pressed, the hexadecimal code (0 thru 9 and A thru F) corresponding to the key will be indicated on the 8-digit LED and shift to the left after each key is pressed.

(5) Finally, press the ESC key eight times continuously to escape from this test mode.

11. OPERATING EXAMPLE

11.1 Cable Test Method Using AUTO

(1) Fabricate a fixture which connects the cable-under-test to the test input and output connectors.

(2) Connect the circuit checker to the fixture and connect the known good cable.

(3) Apply power to the circuit checker and press the CMD key followed by the AUTO key. The 8-digit LED will indicate LEARN END when all of the interconnectivity data table for the sample cable has been written into internal memory.

(4) To write the interconnectivity data table just generated into ROM, mount an EEPROM into the ROM writer and press the WRITE ROM key. When the write operation is completed, the 8-digit LED will indicate SAuE End (SAVE END).

(5) Press the CMD key and then the RUNNING MODE key to select the desire mode. Refer to Section 6.1 on the various mode available.

(6) Press the CMD and the PRINTER ON/OFF key to establish whether or not the printer is to be on for the test.

(7) Connect the cable-under-test. Press the START switch to begin testing.

11.2 Test Method Using the Backup ROM

(1) Mount the backup ROM in the ROM writer and apply power.

(2) Apply power to the circuit checker and press the CMD key followed by the READ ROM key. When the ROM contents have been copied into the circuit checker, the 8-digit LED will indicate 'CoPy End".

(3) Proceed from the step (5) described in Section 9.1.

11.3 Using Search

When one end of a wire harness or cable has been terminated with the connector (i.e., can be connected to the circuit checker) but the other end is left unterminated, this function is used to determine which connector pin is connected to each of the leads on the unterminated end.

(1) Use a cable fixture to connect the input side of the circuit checker to the connector end of the cable.

(2) Connect a banana-tip lead to the rear-panel SEARCH terminal.

(3) Apply power to the circuit checker and press the CMD key followed by the SEARCH key. Verify that the SEARCH lamp lights.

(4) Contact anyone of the wires of the free (unterminated) end of the cable under test using the lead wire from the search connector.

The beeper will sound and the 8-digit LED will indicate the circuit checker test connecter pin corresponding to (i.e., connected to) the cable-under-test connector-side pin.

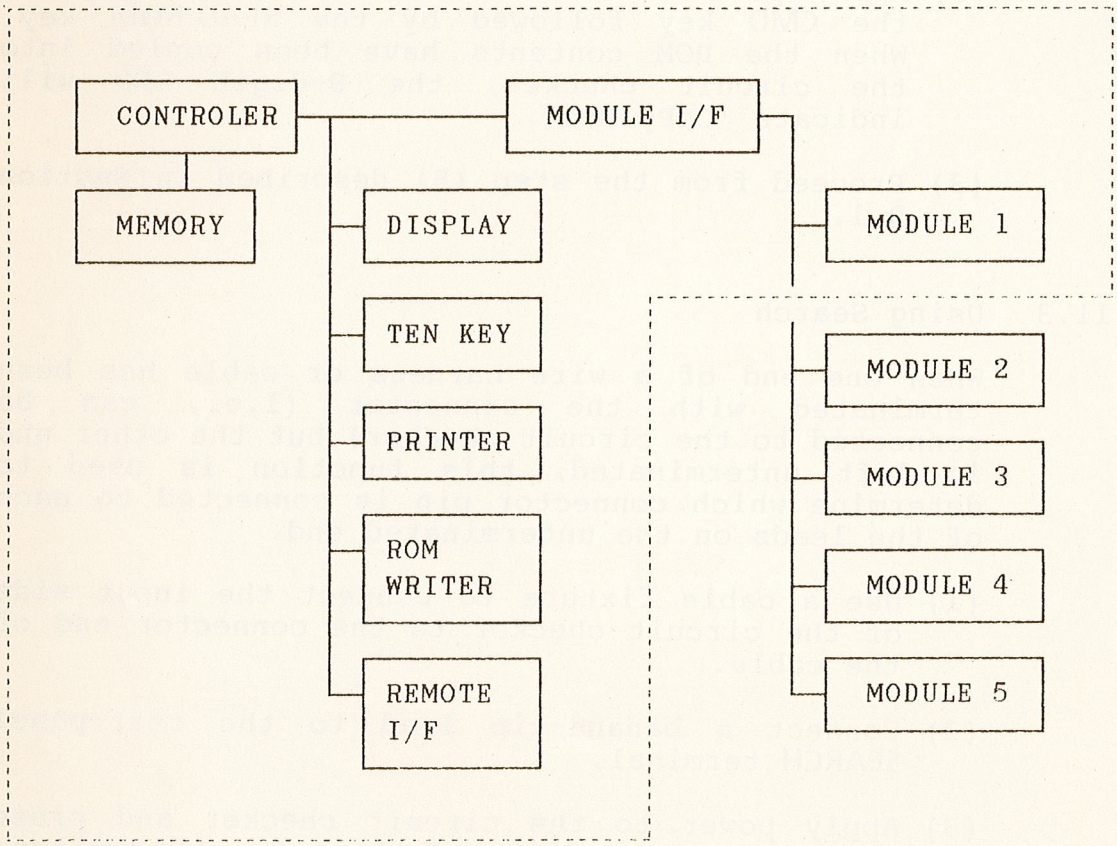
(5) To cancel this mode, press ESC Key.

12. OPERATIONAL DESCRIPTION

Block Diagram

Fig. 6 shows a block diagram of the circuit checker.

The control section uses an 8-bit microprocessor to control the various blocks shown in this diagram. The test section is bus controlled via module interfaces, enabling a high-speed test to be performed with a low number of actual signal lines.



Items shown inside dotted lines are standard, with other items being optional.

Fig. 6

12.2 Test Section (Module) Operation

As shown in Fig. 7, each of the OUT terminals is connected to a current source through a resistance and the terminal side is connected to a comparator. On the IN side, each of the terminals can be grounded.

When the unit under test is connected to the OUT and IN terminals and the test is begun, each of the IN side terminals are sequentially grounded and a check is made of the level at the OUT side using a comparator, comparing the result to the interconnectivity data table in internal memory.

If, for example, OUT pin 1 and IN pin 1 of the unit-under-test were connected, with the IN pin 1 grounded, the OUT pin 1 comparator will be at ground potential. If the OUT and IN terminals were not connected, the comparator will be at the supply voltage. This is performed for all pins, and if the comparison indicates a match between actual interconnectivity and the interconnectivity table data, the PASS condition is displayed. If the match fails, the NG (nogo, open or short) is displayed.

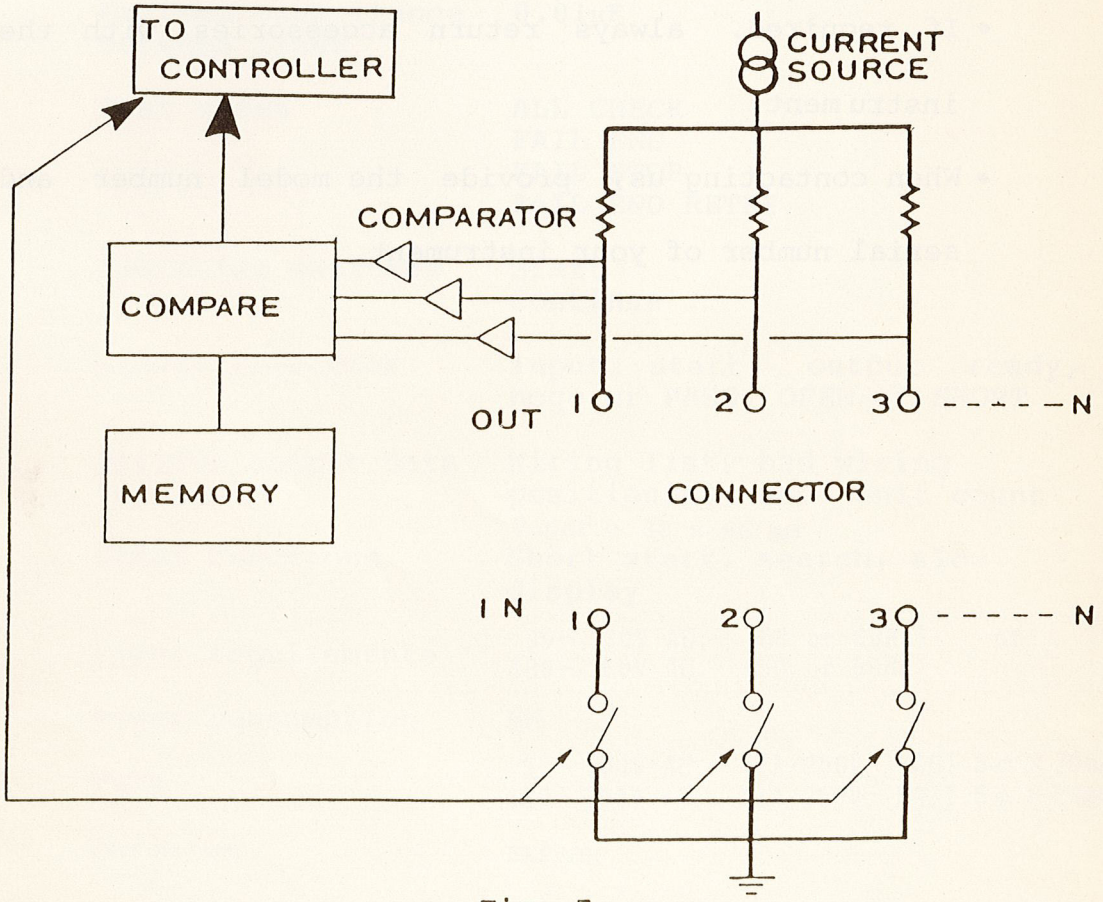


Fig. 7

13. MAINTENANCE

When making requests for repair service, please bring the instrument directly to the dealer. If this is impossible, however, send the instrument directly to our sales office.

When mailing this instrument, always pack it in its original or requivalent packing material and pack to together with name, address, telephone number and the warranty documentation.

- To ensure speedy and reliable repair, always include information as to the type of failure and cause.
- If required, always return accessories with the instru ment.
- When contacting us, provide the model number and serial number of your instrument.