REMOTE EXCHANGE TESTER

MODEL MC-8044 Series 2E

SERIAL/ITEM 533/388

OPERATING AND INSTALLATION MANUAL

ISSUE 5, OCTOBER 1998

PATENTS PENDING

DESIGNED AND MANUFACTURED IN AUSTRALIA

ESIGN 2000
ELECTRONICS

DESIGN TWO THOUSAND PTY LTD

TELEPHONE (+ 61 3) 9758 5933   FACSIMILE (+ 61 3) 9758 5560
E-MAIL gen@design2000.com.au   HOME PAGE www.design2000.com.au

DESIGN TWO THOUSAND IS CERTIFIED TO ISO9001

MADE IN AUSTRALIA

_____

REMOTE EXCHANGE TESTER - MC-8044 SERIES 2E

Operating and Installation Instructions

PATENTS PENDING

DESIGN TWO THOUSAND PTY LTD

© COPYRIGHT 1998

_____

_____

_____

SERVICE INFORMATION

If problems are experienced with the installation or operation of the Remote Exchange Tester, please call the Help Desk Number listed below before returning units to the factory for repair.

In most cases, problems can be diagnosed and rectified over the phone, avoiding unnecessary transportation and service costs.

HELP DESK NUMBER:

+61 3 9758 5933 (All hours)

_____

GENERAL DESCRIPTION

The MC-8044 Remote Exchange Tester (R.E.T.) is used to test the integrity of telephone exchanges at remote locations from a central location. Staff at the Technology Maintenance Groups are able to verify correct exchange line operation, to verify newly uploaded software, and check customer complaints without the need for unnecessary site visits.

The system provides Network Operations staff with a flexible test call facility, and allows test calls to be generated from any telephone line into any attended or unattended PSTN exchange, independent of the location of the Operations & Maintenance Centre.

Installed at the remote exchange, the R.E.T. is connected to an 'Access' line, up to ten different 'Test' lines, and usually. powered from the nominal 50V exchange supply.

Logging on to the R.E.T. is performed by calling the Access line and waiting for the R.E.T. to answer with its Link & Route Detail (LRD) code or identity. The LRD code is used to confirm the Node (and RSS/RSU where applicable) to which the R.E.T. is connected.

Standard DTMF is used to access and control the R.E.T..

A four digit personal identification number (PIN) and two digit Test line number prevents unauthorised access.

Line tests are then able to be performed as per the Operating Instructions to follow.

PRINCIPLE OF OPERATION

The R.E.T. is connected to the Exchange MDF. The Test line(s) are connected directly to appropriate pair(s) on the terminals marked 'TEST LINES' and the Access Line is connected to the terminal marked 'ACCESS'.

Remote access is gained by dialling the Access number and responding to the voice prompts by entering the four digit PIN and two digit Test line number in DTMF. The R.E.T. validates the PIN and if correct checks for loop current on the Test line to be accessed. The line is looped and dial tone is heard from the Test line. DTMF digits and commands can now be entered.

The test session is automatically ended if one of the following conditions occur:

- # * # is entered by the testing officer.
- No DTMF is received within 90 seconds (programmable 10 → 255 secs).
- Busy tone on the Access line is detected.
- Line reversal on the Access line is detected.
- Loop current loss on the Access line is detected.

There is no 'master' timer placing any restrictions on testing.

An unlimited number of commands can be entered in the one session by use of the 'Line re-loop' facility. This function opens and re-loops the test line (or other test lines), thus reapplying dial tone for the next command.

The R.E.T. may also be set up to allow the connection of an incoming call on the Test line to the Access line in order to test that incoming calls can be answered successfully.

_____

USAGE AND BENEFITS

The main use for Remote Exchange Testers is as follows:

1. Testing outbound and inbound calls remotely.
2. Testing products remotely. eg. Call Diversion.
3. Testing data changes remotely. eg. Re-routing a code.
4. Confirming customer faults remotely. eg. A customer with a particular category having trouble accessing a product or code.

The main benefits of using the Remote Exchange Testers are:

1. Cost saving by not providing dedicated lines from remote sites to the central maintenance office.
2. Cost saving by not providing dedicated lines from remote sites to other areas that also require access to test lines.
3. Multiple telephones/telephone sockets/patch panels are not required at each maintenance office/office desk.
4. Relocating the central maintenance office at any time does not require all test lines to be relocated.
5. The testing officer does not have to be at the remote exchange or central maintenance office to perform the required tests. This reduces travelling time and allows for staff mobility.
6. More efficient use of resources.

SYSTEM DESCRIPTION

The Remote Exchange Tester contains ten separate 'Test' line circuits which are served by the one common 'Access' line.

The unit is suitable for mounting in a 19" rack, including the type 84 and the type 72.

The R.E.T. has the following 'Klippon' screw/clamp terminal connections:

- 24 $\rightarrow$ 48V power input:　nominal operating voltage, polarity insensitive
- Access line:　　　　　　　to which the Access line is connected
- Test lines (01 $\rightarrow$ 10):　　to which the Test lines are connected
- Alarm output:　　　　　　three terminal changeover contact set

The Remote Exchange Tester is connected to the exchange MDF. The Access line and Test lines are connected to the designated exchange number appearances (LIs).

The R.E.T. has the following controls and indicators:

- Keypad controller, 4 x 3 silicone membrane push buttons
- Seven segment LED monitor
- POWER LED
- IN USE LED
- 10 x Test line ACCESSED LEDs

The keypad controller is used to load the PIN, the LRD code, and for maintenance programming functions.

The POWER LED indicates that 50V (nom.) power is connected and the internal fuse is intact.

The Seven segment LED monitor is used to confirm the PIN number and the LRD code when it is initially stored. When the R.E.T. is in use, the monitor will briefly display the Test line being accessed (01 $\rightarrow$ 10) then the digits as they are entered by the test person.

_____

_____

INSTALLATION PROCEDURES

There are only a few set up procedures to be carried out before the system is ready for use. (Refer also to the Installation diagram on page 19).

1.   Fasten mounting brackets

The mounting brackets can be screwed to the front or rear position depending on the rack type where the R.E.T. will be mounted.

2.   Connect power

Screw terminals for the 50 V (nom.) power input is found on the right hand side of the unit. The power input is polarity insensitive. The maximum operating current drain is 135 mA. When power is first applied, the R.E.T. will display MC8044.

3.   Line connections

The R.E.T. requires a maximum of eleven pairs, one pair for each of the ten Test line circuits plus one pair for the Access line. These can be cabled from the rack to a suitable IDS block on the MDF to enable jumpering.

Connections are made using the 'Klippon' screw/clamp terminals on the left hand side of the unit. Terminations are clearly marked as 'TEST LINES (01 → 10)' to which the Test line(s) are connected.

The Access line is a dedicated exchange line for remote access. It is connected to the terminal marked 'ACCESS' line on the left hand side of the unit.

4.   Alarm connection

The 'ALARM' output should be wired to the exchange alarm scheme as required. The Alarm relay is a changeover contact set marked COM, NC, and NO. For schematic reasons, this refers to the relays in the un-powered state. Therefore when the unit is powered up, the NO and COM contacts will provide a normally closed contact and the NC and COM will provide a normally open contact.

STORING THE PIN

The Personal Identification Number (PIN) prevents unauthorised access to the R.E.T.

Using the keypad on the front panel of the MC-8044:
Press * # nnnn #, where nnnn is the required PIN.

The display will confirm the PIN entry both by displaying the digits as they are entered and by reading it back when the closing # is pressed.

_____

_____

STORING THE LINK & ROUTE DETAIL (LRD) CODE (UNIT IDENTITY)

Each telephone exchange has a unique identity in the form of a Link and Route Detail (LRD) code. When accessed, the R.E.T. announces the LRD code (also referred to as unit Identity) to verify that you have reached the required exchange.

The LRD Code or Unit Identity can be any combination of alphanumeric characters.

When installing the R.E.T., it must be programmed with the LRD Code corresponding to the NODE (and RSS/RSU where applicable) at which it is installed. More than one LRD code may be entered by separating them with a dot (.) - see below.

Entering the Alphanumeric LRD Code

The LRD Code is loaded using the inbuilt keypad on the front of the R.E.T. or by Remote Master Programming.

To set the R.E.T. ready to accept the LRD code:
Press * 8044 #. The unit will display a blinking cursor '_' on the 'MONITOR' LED, waiting for you to begin entering characters.

Selecting Alphanumeric Characters

Standard telephone key number/letter assignments are employed and (Q), (.), and (Z) are assigned to the number 1 key.

Alphanumeric Key assignments:

Key	Character	Key	Character	Key	Character
1	Q ,(.), Z , 1	**2**	A, B, C, 2	**3**	D, E, F, 3
4	G, H, I, 4	**5**	J, K, L, 5	**6**	M, N, O, 6
7	P, Q, R, S, 7	**8**	T, U, V, 8	**9**	W, X, Y, Z, 9
*	(Clear) clears last character entered.	**0**	(Zero)	**#**	(Enter) stores last character entered.

A desired letter is entered through the telephone keypad by pressing the associated numerical key the required number of times (indicated by the position of the letter or number on the key). As letters and numerals are entered, they are repeated.

Examples:

KEY   CHARACTER

| ABC |
| **2** |

2=A, 22=B, 222=C
2222=2

| TUV |
| **8** |

8=T, 88=U, 888=V
8888=8

After the first character is entered and displayed on the 'MONITOR', press # (normally referred to as 'Hash' but in this case (enter)). The R.E.T. will display the blinking cursor '_' on the 'MONITOR', waiting for the next character. Continue until complete, then press another closing # to store and end programming.

Example:
To program F T G Y as the LRD code you would enter * 8044 # 333# 8# 4# 999# #.

To check the LRD code, press * 8044 # #.

Note: depending on the letter (eg. K, M, V, W, X, and Z), not all alpha characters can be displayed as they are written. In these instances, a symbol representing to actual letter will appear.

_____

MAINTENANCE FEATURES

NON-VOLATILE MEMORY

All data such as PIN number, LRD Code and Log On counter are stored in non-volatile memory (EEPROM). Should a unit fail, the EEPROM may be unplugged and refitted into a replacement unit transferring all programmed data.

ALARM OUTPUT

A change over relay contact set will signal power failure, processor failure or RAM failure.

If an alarm occurs and the fault which produced it is then cleared, the R.E.T. alarm state is automatically reset.

The Alarm Output may be wired to the urgent or non-urgent Exchange alarm. Since an R.E.T. failure will not necessarily disable the normal telephone service, a non-urgent alarm may be appropriate but this is subject to local policy.

Note: For a normally closed loop to the exchange alarm input, connect the wires to the NO and COM terminals.

ALARM CONDITIONS

An alarm will be raised (a change over on the 'ALARM' output will take place) if one of the following events occur:

- Power to the system fails or if the internal fuse blows.
- The Processor fails to operate.
- RAM failure is detected.
- A 'hacker' enters more than five invalid PINs consecutively.

ALARM TESTS

Alarm Simulation Test

The alarm circuit may be tested by simulating an Alarm. Press * 42 # for Alarm Simulation Test. The R.E.T. will display 'F A I L'. A change over on the 'ALARM' output will occur. Reset the alarm by pressing * 50 #. This may also be performed by 'Remote Master Programming'- see next page, to test that Exchange Alarm reporting is in order.

RAM Test

A RAM test (both EEPROM and static RAM) can be manually initiated by pressing * 44 #. If no failure is detected, the R.E.T. will sequentially display 'P A S S' twice. If a failure is detected, the R.E.T. will sequentially display 'F A I L'. A change over on the 'ALARM' output will occur. Reset the alarm by pressing * 50 #.

LINE TEST

A test to establish which Test line positions are connected.
Press * 46 # and the R.E.T. will sequentially display the connected Test line numbers eg. 01 02… etc..

SOFTWARE VERSION NUMBER

The software version number can be displayed by pressing * 48 #. The monitor will display nnnn… as the EPROM version number.

RELIABILITY

Units of similar design and hardware complexity to the R.E.T. have a 'mean time between failure' figure (MTBF) of in excess of 33 years.
The relays employed are NEC MR62-12SR with a switching current of 2A. The mechanical life expectancy is 10 000 000 operations.

LOG ON COUNTER

Each time the R.E.T. accepts a valid PIN, it is counted as a successful Log on.

To read the Log On counter:
Press * 36 #.
The display reads eg. 0030 to indicate a Log on total of 30.

To reset the Log On counter:
Press * 30 #.
The display reads 0000.

MASTER RESET

All data in memory can be reset.
Press * 67 7096 00 #. Care must be taken not to unintentionally enter this command.
The PIN number, LRD Code and Log on counter is reset.

REMOTE MASTER PROGRAMMING

The Master Password enables you to perform all R.E.T. programming operations from a remote location as you would from the R.E.T. Keypad.

This feature allows the PIN number and LRD code to be re-programmed by authorised staff from the Operations and Maintenance Centre. Further functions such as checking the Log On Counter, Line Test, Alarm Simulation Test, and checking the Software version are also possible.

The procedure involves ringing the Access line and entering a special Master Password. You then have special access to load a new PIN number and/or LRD code etc..

TO LOAD THE MASTER PIN AT THE R.E.T.

To load the Master PIN:

Press * * * # nnnnnnnn #, where nnnnnnnn is to be the eight digit Master PIN.

PROGRAMMING FROM THE REMOTE LOCATION

1. Dial the R.E.T. Access number and listen for the message to enter PIN.
2. Enter * * nnnnnnnn #, where nnnnnnnn is the Master PIN. listen for "*Thank you*". (If the Password is incorrect, the R.E.T. responds "*Error, invalid PIN...*". Only five attempts are allowed before the 'Hacker' alarm is raised).
3. Listen for "*Please enter command*". You are now able to load a new PIN number and /or a new LRD code.

To load a new PIN

1. Enter * #. Listen for "*Please enter PIN followed by hash*". Enter nnnn #, where nnnn is to be the new PIN. Listen for "*Please enter PIN followed by hash*". Enter nnnn #. The R.E.T. repeats the PIN followed by "*Please enter command*".
•   In summary: Enter * # nnnn # nnnn #.
2. To end, press # * #. Listen for "*Thank you*" and hang up.

To load a new LRD code

1. Enter * 8044 #. Listen for "*Enter characters*".
2. Enter the required letters and numerals as you would from the keypad (see 'LRD CODE' on page 7). The R.E.T. repeats the LRD characters.
3. To end, press # * #. Listen for "*Thank you*" and hang up.

TEST FEATURES

The MC-8044 Remote Exchange Tester (R.E.T.) is used to test the integrity of telephone exchanges at remote locations from a central location. The system includes the following features:

Link & Route Detail (LRD) Code (Unit Identity)

Each telephone exchange has a unique identity in the form of an LRD code. When accessed, the R.E.T. announces the LRD code to verify that you have reached the required exchange.

PIN Security

Unauthorised access to the system is prevented by an 'Access' line number, a four digit PIN and a two digit 'Test' line number.

Outgoing Calls

Having accessed a 'Test' line, you are able to make outgoing calls.

Incoming Call Answer

Test that an incoming call to a 'Test' line can be successfully answered via the 'Access' line.

Camp-on/Answer

Via the 'Access' line, the ability to 'camp on' to a 'Test' line and answer an incoming call.

Line Re-loop facility

Ability to re-loop (hang up and pick up) a 'Test' line allowing for any number of tests or programming operations to be performed in the same test session.

Test Line Select

Ability to access other 'Test' lines in the same test session without the need to hang up, call back and log on again.

"EASYCALL", "CENTEL", "CENTREX", "SMART-PHONE" etc… (Special Calling Services)

Program, activate, deactivate and test special calling services such as "EASYCALL" and "CENTEL".

Hook Flash

100 ms Timed Loop Break facility used for special calling services such as 'Call Waiting', 'Third Party Enquiry/Conference call', and 'Malicious or Un-welcome Call Trace'.

DTMF to Decadic Conversion

Allows use in Decadic exchanges or to test the decadic function of an exchange.

Extended 'No DTMF' Time Supervision Mode

After selecting a test line, the operator can command the R.E.T to keep the test line looped for up to four minutes, without DTMF. ie. the time supervision for no DTMF is set to four minutes.

24 Hour Test Mode

After selecting a test line, the operator can command the R.E.T. to keep the test line looped for up to 24 hours, without DTMF. ie. the time supervision for no DTMF is set to 24 hours. This mode is used when uninterrupted testing is required. eg. testing for a faulty junction, VoIP testing or testing with a Call Charge Analysis System (CCAS).

Note:
>   The standard software will not allow 24 hour calls to long distance numbers. If this is required, consult the system administrator.

Remote Alarm Test

After accessing the R.E.T., the operator can generate an alarm for 90 seconds, on the 'ALARM' output of the R.E.T.. This enables the operator to then check the external alarm drivers. The R.E.T. reports "*A L A R M*" while the alarm is activated.

Ring Cadence Test

After selecting a test line, this facility allows the operator to 'camp on' to that line and test the distinctive ring (DR) cadence of an incoming call that is then placed to the test line.

Disconnect Warning

A warning announcement ("*Disconnect warning, no DTMF*") sent to the 'Access' line that time-out is pending. Any DTMF digit will reset the timer.

Forced Disconnect or Automatic Disconnect

Testing officer can end the test session by pressing # * #, or the R.E.T. will automatically time-out after 90 seconds (programmable from 10 → 255 secs) of no DTMF detect. The R.E.T. will also hang up if busy tone, line reversal or loop current loss is detected on the 'Access' line.

_____

REMOTE EXCHANGE TESTER

OPERATOR GUIDE

1.   Dial Access number.

2.   Listen for "*Remote Exchange Tester, LRD Code ABCD...*", where *ABCD...* is the LRD Code.

3.   Listen for "*Please enter PIN*". Enter the four digit PIN. If the PIN is invalid, the R.E.T. responds "*Error, invalid PIN, please re-enter PIN*". A maximum of five attempts is allowed before the 'Hacker' Alarm is raised.

4.   Listen for "*Enter test line number*". Enter the number of the R.E.T. Test line (01 → 10) to be tested.

5.   If the Test line is not physically connected, the R.E.T. responds "*Error, no line connected*". If the Test line is connected, listen for "*Line nn accessed*".

6.   You are now able to perform any of the following tests (see 'Test Procedures and Commands', next two pages):

•   Make an outgoing call and follow-on calls.
•   Camp on the Test line and answer an incoming call.
•   Camp on the Test line, listen to the distinctive ring and answer the call.
•   Answer an incoming call to the Test line.
•   Activate or de-activate "EASYCALL" or "CENTEL" etc. type special calling facilities.
•   Hang up the Test line and re-loop the same line or select another Test line.
•   Perform a Hook Flash during an established call.
•   Set the unit to Decadic mode.
•   Extend the 'No DTMF Time-out' period.
•   Set off the alarm.
•   Test ring cadence.
•   Establish 24 hr test mode.

7.   Press # * # to end the test session. Listen for "*Thank you*".

8.   Hang up telephone.

Note:

   Releasing from a TCARS:

   Difficulty in entering DTMF commands may be encountered after a connection has been made to a 'TCARS'. The 820 Hz test tone from the 'TCARS' tends to mask the DTMF to the R.E.T. because the connection is only 'two wire' duplex. The # and * commands should be entered during successive silent periods to ensure reliable detection.

_____

_____

TEST PROCEDURES AND COMMANDS

Outgoing calls

When the Test line dial tone is heard, simply dial the required number. 'Follow-on' calls can be made using the 'Line Re-loop' facility.

Command: nn nnnn nnnn...

Incoming Call Answer

Dial the actual telephone number of a Test line and listen for ring tone. From another telephone, Log on to the R.E.T. and select the R.E.T. Test line number that is ringing. The two calls should be connected together.

Command: nn nnnn nnnn... (Test line number)
              nn nnnn nnnn... (Access line)
              pppp (PIN)
              nn (R.E.T. Test line number)
              Verify connection.

Camp on/Answer

To camp a call on to a Test line, select a Test line and press # * 22. Listen for "*Camped on line nn*". The R.E.T. is then ready to answer and connect an incoming call to the Test line.

Command: # * 22

Line Re-loop and Test Line Select

Pressing # * nn, where nn is the Test line number (01 → 10), will re-loop the line or loop the Test line selected. The R.E.T. responds "*Line nn accessed*" for confirmation before dial tone is heard.

Command: # * nn, where nn = 01 → 10

"EASYCALL" ,"CENTEL", "CENTREX" … Special Calling Services

Simply enter the appropriate command to program, activate or de-activate a special calling facility.

Command: * 21 03 9758 5933 #, listen for facility tone. (Example to activate 'Telstra' Call Diversion)

Hook Flash

Either before or after dialling a telephone number on the test line, the operator can command the R.E.T. to perform a Hook Flash (100 ms timed loop break) on the test line. The Hook Flash is used for customer facilities such as 'Malicious or Unwelcome Call Trace', 'Call Waiting', 'Call Transfer' and 'Third Party Enquiry/Conference call'.

Command: 0 *

_____

_____

DTMF to Decadic Conversion

To test the Decadic function of the telephone exchange, select a Test line and enter # * 62. Listen for "*Decadic mode, line nn, enter number followed by hash*". When the number is received and the closing # is entered, the R.E.T. re-loops the Test line and dials the number in decadic. If no hash is entered, after 20 seconds, the R.E.T. dials the number entered.

Command: # * 62
                 nn nnnn nnnn... #.

Extended 'No DTMF' Time Supervision Mode

After selecting a test line, the operator can enter # * 74 which extends the 'no DTMF' Time-out period or time supervision to four minutes. So if it is known that a test call is to be made to a customer for example, the operator is able to extend in advance the available connect time (without DTMF) for that call. This means that the operator does not need to send DTMF every 1 to 90 seconds for that call to remain connected.

Command: # * 74

24 Hour Test Mode

After selecting a test line, the operator can enter # * 75 which allows the test line to remain looped for up to 24 hours, without DTMF. ie. the time supervision for no DTMF is set to 24 hours. This mode is used when uninterrupted testing is required. eg. testing for a faulty junction, VoIP testing or testing with a Call Charge Analysis System (CCAS).

Command: To Activate: # * 75
             To Cancel: Press # * #, if the connection to Access line is still up, or:
             ◊   Log on to the R.E.T. and press # * #, or:
             ◊   Press # * # at R.E.T. Keypad, or:
             ◊   Automatic reset after 24 hours.

Note:
    To prevent misuse of this facility, digit analysis prevents the operator from dialling 'long distance', and a Call Trace can be set up on the Access line. Refer to your system administrator.

Remote Alarm Test

After accessing the R.E.T., the operator can generate an alarm for 90 seconds, on the 'ALARM' output of the R.E.T.. This enables the operator to then check the exchange external alarm drivers. The R.E.T. reports "*A L A R M*" while the alarm is activated.

Command: Generate Alarm # * 42
             Reset Alarm   0, or:
             ◊   # * nn, where nn may be a test line number or command, or:
             ◊   # * # to end the session, or:
             ◊   Automatic reset after 90 seconds.

_____

Ring Cadence Test

After selecting a test line, this facility allows the operator to 'camp on' to that line and test the distinctive ring (DR) cadence of an incoming call that is then placed to the test line.

The R.E.T. analyses the ring cadence of an incoming call on the test line and stores the on/off times detected.

If the operator then presses *, the R.E.T. reports the ring on/off times in milliseconds. See 'Australian Distinctive Ring Cadence patterns' below. A typical example for some European countries would be "*ON 1000 milliseconds, OFF 4000 milliseconds...*". If the readings do not make any sense at all, this may indicate that the R.E.T. is not detecting sufficient ring voltage. Alternatively, field tests have revealed possible problems with mechanical ring generators used in some exchanges. In addition to the ringer running fast, slow, or at a varying rate, contact and/or earthing problems etc. may give rise to short 'glitches'. These glitches may be detected and reported by the R.E.T.. Glitches may even be reported as lasting "0" (zero) milliseconds due to 'rounding off' of the detected time.

The operator may then press * again to review the ring cadence, press 0 to answer the call, press # *... to continue testing, or press # * # to end the session.

Command: Camp on/Listen to distinctive ring # * 23
          Check distinctive ring   *
          Answer call   0

In <u>Australia</u> the following ring cadences are reported:

Australian Distinctive Ring Cadence patterns

1 Ring Cycle   1 Ring Cycle

Seconds
200 Milliseconds

DR0 Normal ring

DR1 Forwarded Calls

DR2 Selective Ring 2,
Operator, Recall

DR3 Multiple Number 1

DR4 Selective Ring 1,
Centel Plus (Centrex)

DR5 Selective Ring 3

DR6 Multiple number 2

DR7 Data ('Duet')

_____
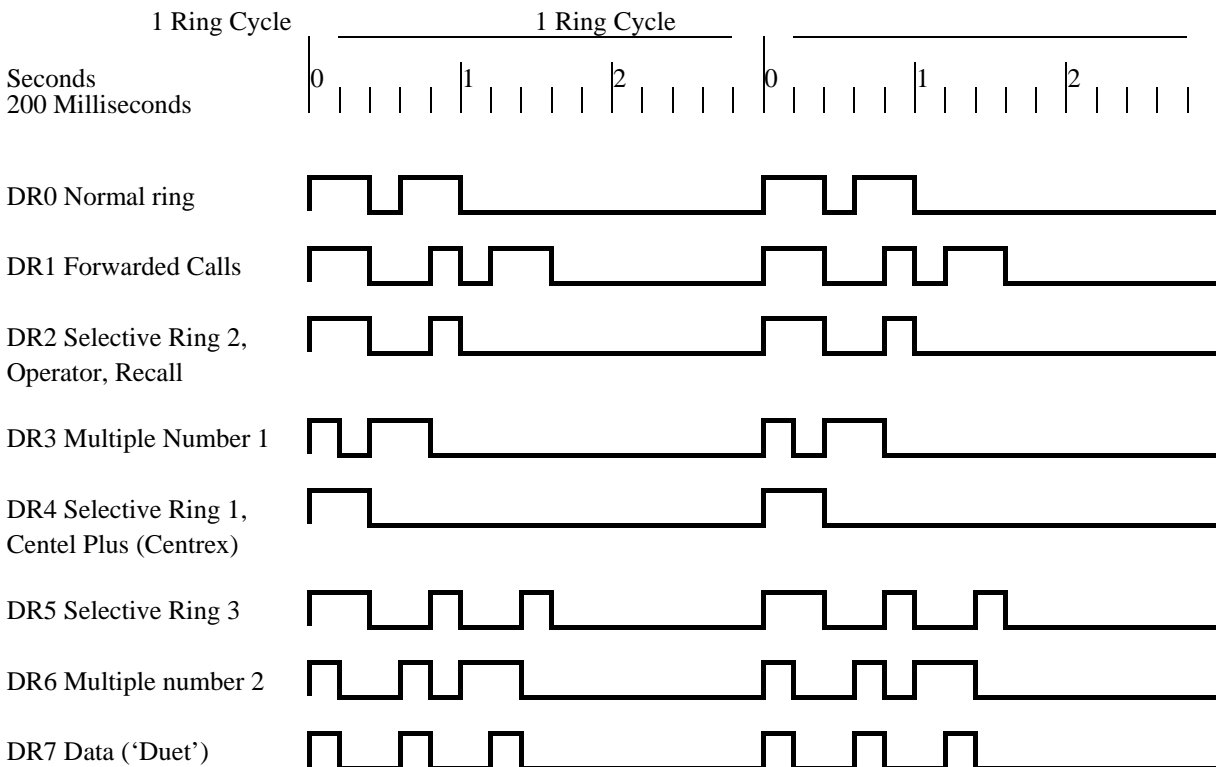
Accessing Normal Test Mode from Master Programming Mode

This facility allows the operator to enter Master Programming mode with the password * * xxxxxxxx # and then access normal Test mode without the need to log off and call in again.

Command: Master Programming mode: * * xxxxxxxx # then,
                 Normal Test mode: # * nn, where nn may be a test line number.

Forced Disconnect

To end the test session, you may press # * # which commands the R.E.T. to hang up the Access line and Test line. The R.E.T. will also time-out automatically if no DTMF is detected within a 90 second period, and hang up if busy tone, line reversal or loop current loss is detected on the Access line.

_____

_____

REMOTE EXCHANGE TESTER

COMMAND SUMMARY

FUNCTION   **COMMAND**

AT R.E.T. KEYPAD:

Load Master PIN   * * * # nnnnnnnn #
Load PIN   * # nnnn #
Load LRD Code   * 8044 # A # B # C #...#
Check LRD Code   * 8044 # #
Log on Counter   * 36 #
Reset Log on Counter   * 30 #
Alarm Simulation Test   * 42 #
RAM Test   * 44 #
Line Test   * 46 #
Software Version   * 48 #
Alarm Reset   * 50 #
Master Reset   * 67 7096 00 # (CAUTION !)

DTMF REMOTE CONTROL:

Call the Access line, verify LRD code, enter PIN and select 'Test' line Outgoing Call nn nnnn nnnn...
Line Re-loop   # * nn
Camp On/Answer   # * 22
Ring Cadence Test   # * 23
Hook Flash   0 *
Remote Alarm Test   # * 42
Alarm Test Reset   0 or automatic after 90 seconds.
Decadic mode   # * 62
Extended Time-out   # * 74 (255 secs with no DTMF)
24 Hour Test Mode   # * 75 (24 hrs with no DTMF)
Disconnect   # * #
Master Password   * * nnnnnnnn # (allowing all above keypad functions by remote control)

ACA SUPPLIER'S CODE: N 468

_____

REMOTE EXCHANGE TESTER   MODEL MC-8044 SERIES 2E

SPECIFICATIONS

Control logic:	Motorola 6809 microprocessor, 64K bytes EPROM, 2K static RAM, 1K bit EEPROM.
Line Interfaces:	Two wire ring in/loop out.
Operator programming:	DTMF.
Admin. programming:	DTMF and/or via inbuilt keypad.
DTMF detect:	≥ 40 ms nominal.
Ring detect:	≥ 30V RMS @ 25 Hz nominal.
DC Loop detect:	≥ 5 mA.
Indicators:	Power on LED, In use LED, 10 x Accessed LED, 7 segment display.
Connectors:	'Klippon' screw/clamp terminals (supplied).
Capacity:	10 x Test lines, 1 x Access line (10 Test lines/system).
Relays:	11 x MR62-12SR, 1 x MR62-5SR.
Answer delay:	3 secs. (Software programmable).
Insertion loss:	< 3 dBm with isolation transformer type PI 720.
Line re-loop:	2 secs on hook.
Decadic Dialling:	10 pps, 34/66 m/s ratio.
Hook Flash:	100 ms preset (software programmable).
Alarm output:	1 x three terminal change over relay contact set - power fail, processor or RAM fail.

Recorded voice announcements

Recording method:	32K bit/sec ADPCM.
Storage medium:	256K bytes EPROM.
Output level:	-6dBm, potentiometer adjustable.

Power requirement:	24 →50 V dc nom. (polarity insensitive).
Power consumption:	85 mA quiescent, 135 mA operating (max.).
Internal fuse:	1A 250V 20 mm size 00.
Dimensions:	19" rack mount, W 483 mm x D 251 mm x H 44 mm.
Packed weight:	3.5 kg.

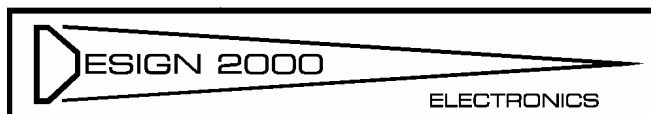**WARRANTY**

The equipment has a warranty against defects in material and workmanship for a period of 24 months from date of delivery into the customer's store. Within this period repairs, if necessary, are without charge for parts and labour.

Transport costs to the factory will be to the customer's account, and Design Two Thousand Pty Ltd will cover the return transport costs for warranty repairs. If units are sent to the factory and discovered to be 'No Fault Found', a service charge may apply and the return transport costs may be to the customer's account.

See 'SERVICE INFORMATION' on page 1 of this document. In the explicit event of a malfunction, please send the unit, (along with an accurate fault report, contact name and number, and a return address) for repair to:

<div align="center">

DESIGN TWO THOUSAND PTY LTD
11 ROSE STREET
UPPER FERNTREE GULLY
MELBOURNE AUSTRALIA 3156
TELEPHONE + 613 9758 5933

</div>

INSTALLATION DIAGRAM

_____

BLOCK DIAGRAM


```
                          ACCESS
                         CONTROL
                           LINE                                                    BUS

                            ╳        RING          ▦         ⊙——⊙
                                    DETECT                   ⊙
                                                             ⊙

                                              ▽
                                             DTMF


                                                        01 TEST LINE        02 TEST LINE


                           EXCHANGE                        ⊙——⊙              ⊙——⊙          UP TO
                            TESTER                         ⊙                 ⊙              TEN
                          CONTROLLER
                                          SPEECH
                                                        RING/LOOP          RING/LOOP
                                                        DETECTOR           DETECTOR


                                                            ╳                  ╳



                                    MC-8044
                          REMOTE EXCHANGE TESTER
                                   SERIES II
```
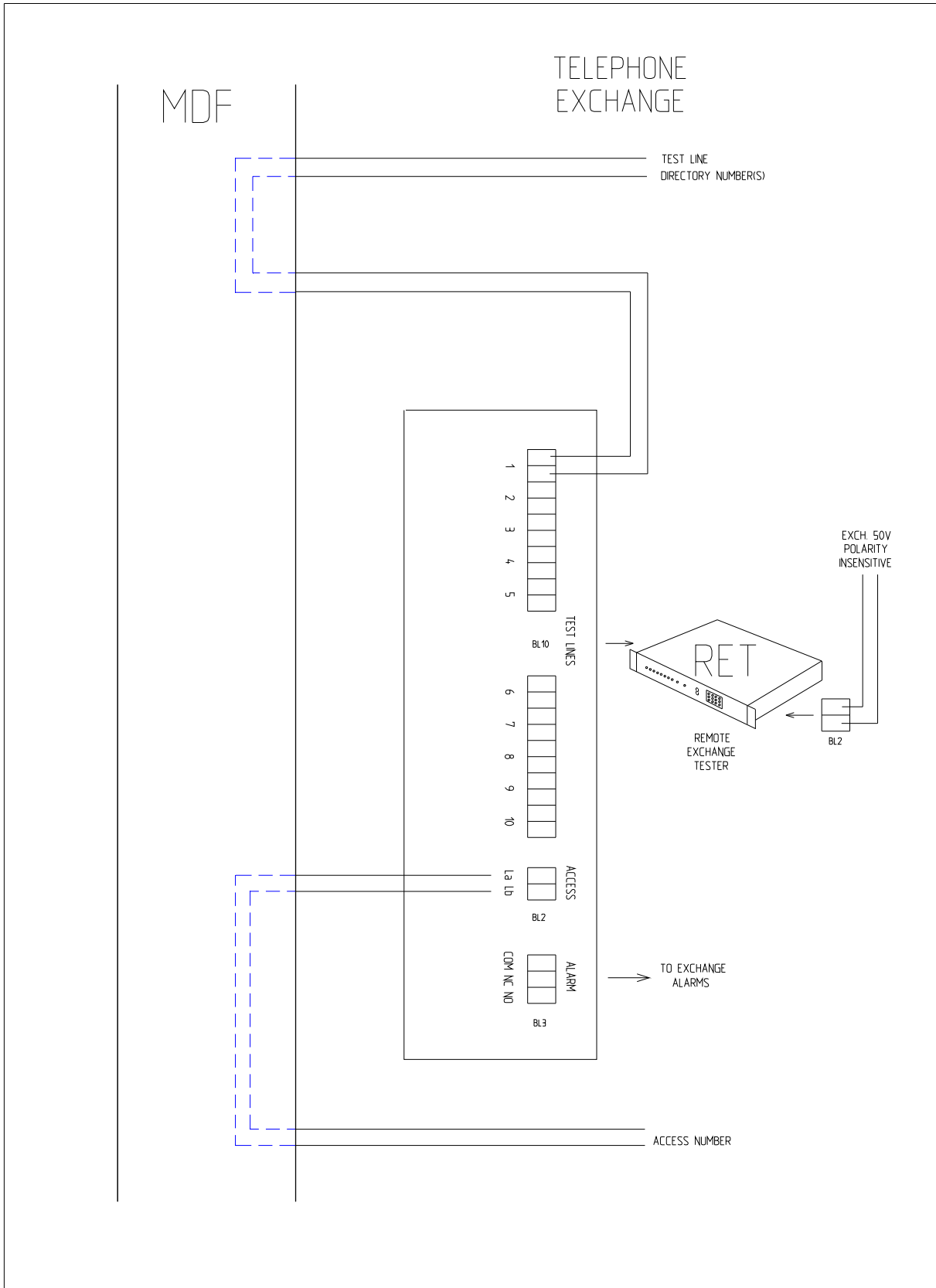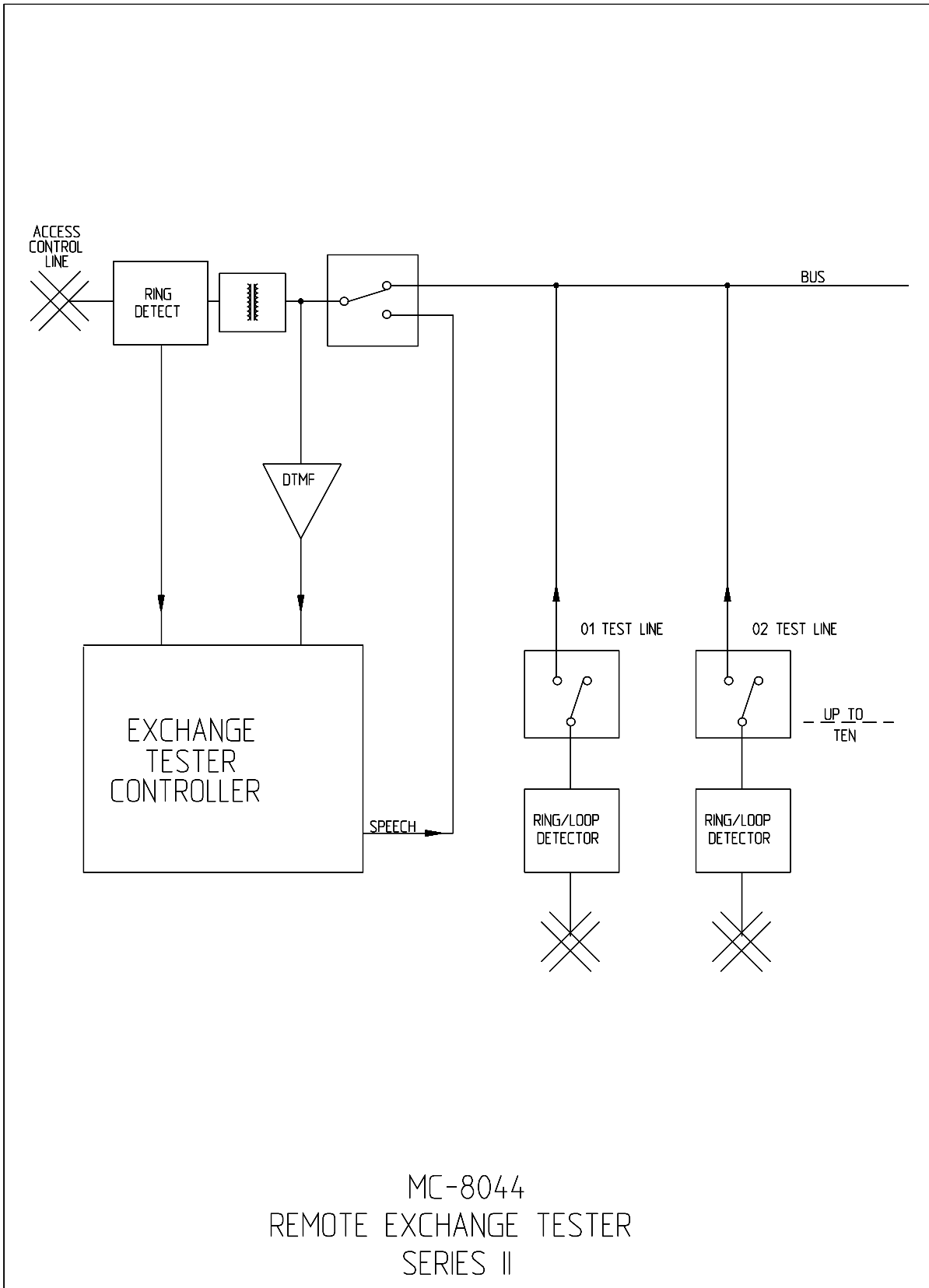
463015.DWG ISSUE 1 OCT. 1995

_____

_____

ADDITIONAL FEATURES

AUTOMATIC DISCONNECT

If, during a test session, the test person fails to enter the # * # command before hanging up, the R.E.T. will release the Access line after the 'No DTMF Time-out' period.

The test officer may forget to enter this command before hanging up, in which case it may be desirable for the R.E.T. to automatically clear more quickly. The R.E.T. may be programmed to detect 'Calling party disconnect' (and therefore clear all lines) in one or more of the following ways.

Busy Tone Detect

If busy tone is detected on the Access line, the line may be automatically released. (Similarly, if test call is established and busy tone is detected on the test line, the R.E.T. can hang up the test line, but keep the connection to the Access line, and ask you for the next command).

Either by Remote Master Programming or from the R.E.T. Keypad:

Enable Busy Tone Detector
Press * 81 1 #.

Disable Busy Tone Detector
Press * 81 0 #.

To check state:
Press * 81 #. The R.E.T. responds with "*On*" if the busy tone detector is enabled, or "*Off*" if it is disabled.

Default = Enabled.

Line Reversal and Loop Current Loss Detect

If a line reversal or loop current loss is detected on the Access line, the line may be immediately released.

Either by Remote Master Programming or from the R.E.T. Keypad:

Enable Line Reversal/Loop Current Loss Detector
Press * 79 1 #.

Disable Line Reversal/Loop Current Loss Detector
Press * 79 0 #.

To check state:
Press * 79 #. The R.E.T. responds with "*On*" if the line reversal/loop current loss detector is enabled, or "*Off*" if it is disabled.

Default = Enabled.

'HACKER' ALARM

If a caller, in an unauthorised attempt to gain access to the R.E.T., enters an invalid PIN more than five times consecutively, a 'Hacker' alarm (alarm relay changeovers) is raised for a minimum of three hours. During this time, the alarm relay is pulsed (cadenced rather than continuous) 540 times (10 seconds on, 10 seconds off, repeated) and normal access to the R.E.T. is denied. Callers attempting to log on will restart the 'Hacker' alarm timer and then hear "... *'HACKER ALERT', alarm activated,...access denied*". At this stage, only the Master Password will be accepted.

When the 'Hacker' alarm is reset by the alarm reset procedure (* 50 #), normal operation is restored.

_____

_____

PROGRAMMABLE OPTIONS

CALLING LINE IDENTIFICATION

Identification of all 'A' numbers from which the R.E.T. was accessed can be used to trace any suspected abuse of the facility. Firstly, the Access line to the R.E.T. must be programmed for the 'Unwelcome/Malicious Call Trace (MCT)' facility. Secondly, the R.E.T. is to be programmed to perform a hook flash on the Access line after a valid PIN is entered. Both facilities must be programmed, otherwise the system will fail to operate.

Either by Remote Master Programming or from the R.E.T. Keypad:

No hook flash on access line
Press * 41 0 #.

Hook flash on access line (After valid PIN or master PIN) (For MCT)
Press * 41 1 #.

To check if hook flash is programmed:
Press * 41 #. The R.E.T. responds with "*On*" if the hook flash is turned on, or "*Off*" if the hook flash is turned off.

PROGRAMMABLE TIMEOUT

The R.E.T. keeps the connection for a nominal 90 seconds if no DTMF is detected. Each time DTMF is detected, the timer is reset. This is referred to as 'No DTMF Time-out'. This time-out period may be altered as required. Please note that if this time is made too long and the correct clear down procedure is not followed (# * #), the R.E.T. will stay busy for that time.

Either by Remote Master Programming or from the R.E.T. Keypad:

No DTMF Time-out
Press * 64 nnn #, where nnn = 000 $\rightarrow$ 255 secs (Default = 090, ie. 90 seconds).

To check the time-out:
Press * 64 #. The R.E.T. responds with "*nnn*", where nnn is the number of seconds.

850 Hz TEST TONE MODE ON TEST LINE

The R.E.T. test line(s) may be programmed to answer (ring trip) and provide an 850 Hz test tone. The test tone is generated for ten seconds. If the operator presses * within thirty seconds after the test tone has stopped, the test tone sounds again. This tests for both-way transmission. The test line automatically clears shortly after the operator hangs up.

Either by Remote Master Programming or from the R.E.T. Keypad:

No Answer and 850 Hz test tone on test line.
Press * 57 0 #. Listen for "*Test mode is off*".

Answer and 850 Hz test tone on test line.
Press * 57 nn nn... #, where nn nn... are the test lines (01 $\rightarrow$ 10) that will answer with the 850 Hz test tone. Listen for "*Test mode is on line nn, line nn...*"
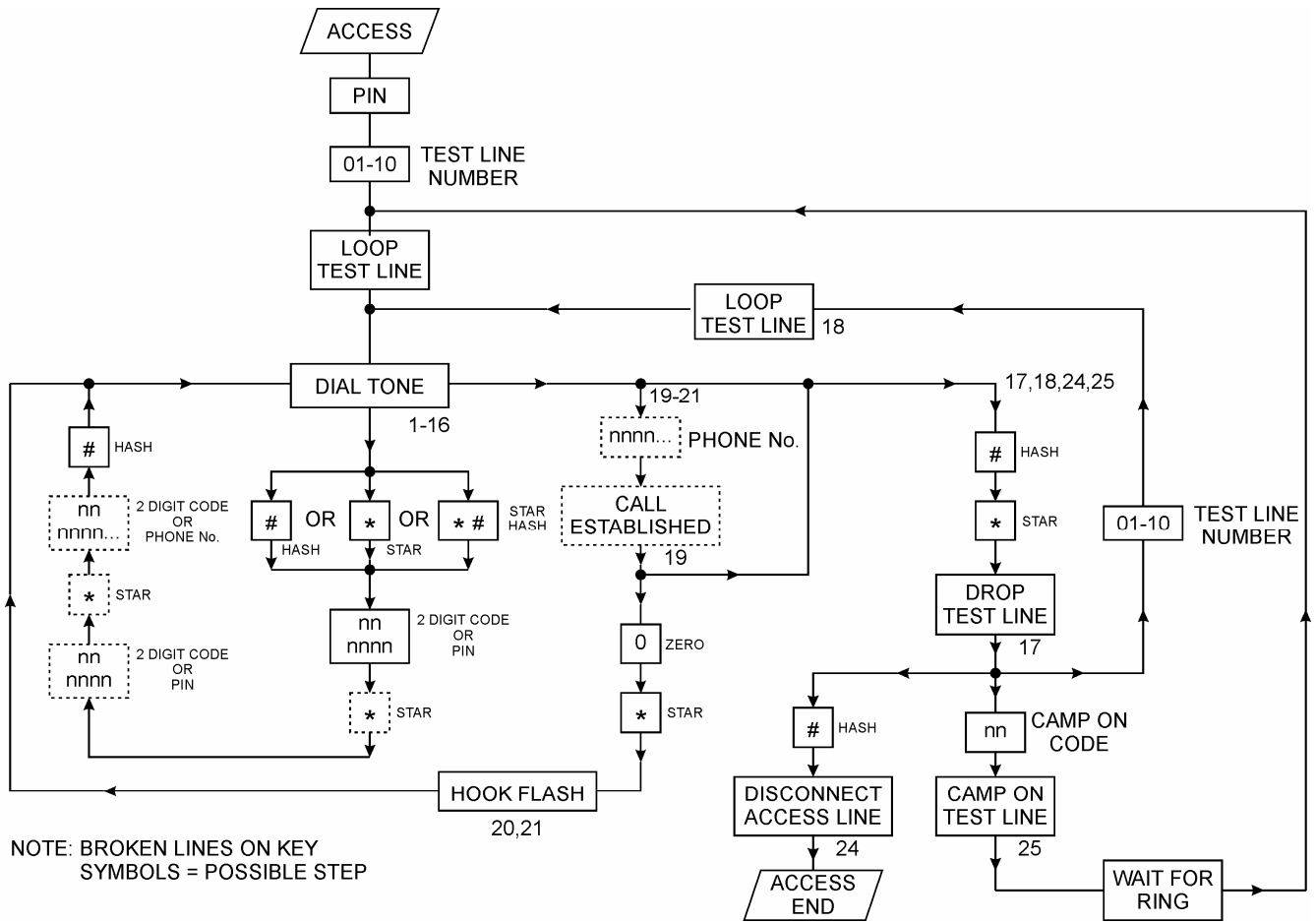
To check if Answer and 850 Hz test tone on test line(s) is programmed:
Press * 57 #. The R.E.T. responds with "*Test mode is on line nn, line nn...*", where nn, nn...
are the test lines programmed for Answer and 850 Hz test tone.

Note:
    Whenever the ACCESS line is in use, the 850 Hz test tone mode cannot run.

_____

COMMAND PATH DIAGRAM

NOTE: REFER TO COMMAND STRUCTURE (NEXT PAGE)

COMMAND STRUCTURE

Command Number	Command String/Sequence						
1	*	nn				#	
2	*	nn	*		nnnn...	#	
3	*	nn	*	nn	*	nnnn...	#
4	*	nn	*	nnnn		#	
5	*	nn	*	nnnn	*	nn	#
6	*	nnnn	*	nn	*	nnnn...	#
7	#	nn				#	
8	#	nn	*	nn		#	
9	#	nn	*	nnnn		#	
10	*#	nn				#	
11	*#	nn	*	nn		#	
12	*#	nn	*	nnnn		#	
13	*#	nn	*		nnnn...	#	
14	*#	nn	*	nn	*	nnnn...	#
15	*	nn			nnnn...	#	
16	#	nn				#	
17	#*					DROP TEST LINE	
18	#*	01 → 10				LOOP TEST LINE	
19	nnnn...					DIAL NUMBER	
20	**					HOOK FLASH	
21	nnnn...	**				HOOK FLASH	
22	nn	*				NO HOOK FLASH	
23	nnnn	*				NO HOOK FLASH	
24	#	*	#			DISCONNECT	
25	#	*	nn			CAMP ON TEST LINE	

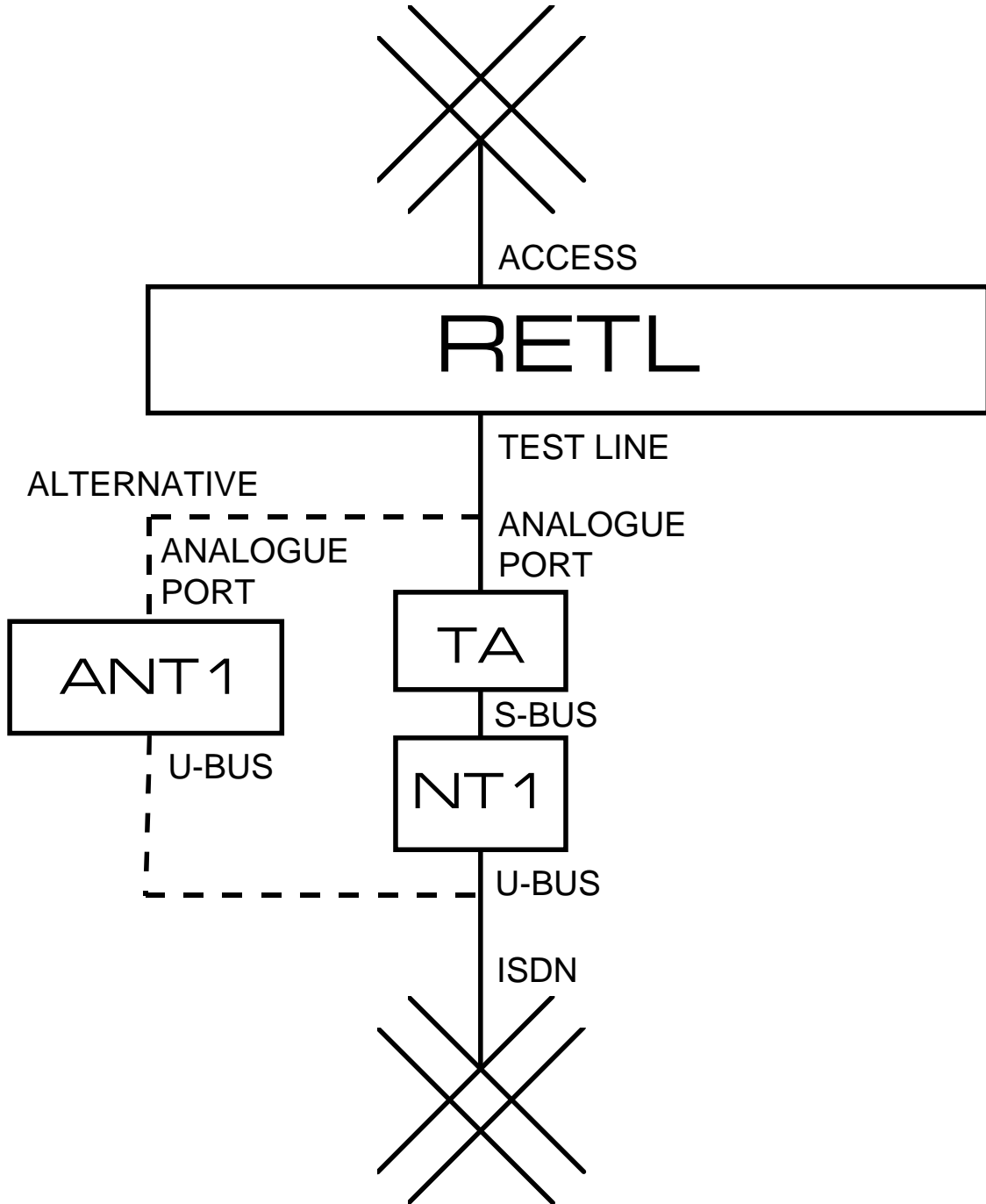|		
01 → 10	=	TEST LINE NUMBER
*	=	STAR
#	=	HASH
nn	=	2 DIGIT CODE
nnnn	=	PIN No. OR HRS/MIN (HH:MM)
nnnn...	=	PHONE NUMBER

NOTE: REFER TO COMMAND PATH DIAGRAM (PREVIOUS PAGE)

_____

REMOTE EXCHANGE TESTER

ISDN BASIC RATE TESTING

The diagram below shows one possible method of testing the ability to originate and receive calls on an ISDN Basic Rate service.

ACCESS

RETL

TEST LINE

ALTERNATIVE

ANALOGUE
PORT

ANALOGUE
PORT

ANT1

TA

U-BUS

S-BUS

NT1

U-BUS

ISDN

AUTHOR: PETER ZEUG

- END OF DOCUMENT G/96087 -

_____

REMOTE EXCHANGE TESTER

MODEL MC-8044 Series 2E

SERIAL/ITEM 533/388

OPERATING AND INSTALLATION MANUAL

ISSUE 5, OCTOBER 1998

PATENTS PENDING

DESIGNED AND MANUFACTURED IN AUSTRALIA

DESIGN TWO THOUSAND PTY LTD

TELEPHONE (+ 61 3) 9758 5933   FACSIMILE (+ 61 3) 9758 5560
E-MAIL gen@design2000.com.au   HOME PAGE www.design2000.com.au

---

DESIGN TWO THOUSAND IS CERTIFIED TO ISO9001

MADE IN AUSTRALIA