ISDN LOOP BACK TESTER

MODEL MC-9044

SERIAL/ITEM 533/nnn

OPERATING AND INSTALLATION MANUAL

Issue 10, 1999 AUTHOR: PETER ZEUG

PATENTS PENDING

DESIGNED AND MANUFACTURED IN AUSTRALIA

DESIGN TWO THOUSAND PTY LTD

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DESIGN TWO THOUSAND IS CERTIFIED TO ISO9001

MADE IN AUSTRALIA

ISDN LOOP BACK TESTER MODEL MC-9044

Operating and Installation Instructions

CONTENTS **PAGE**

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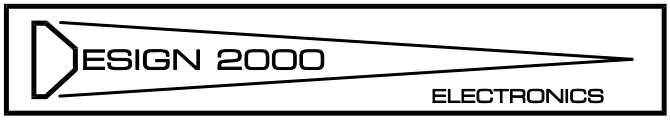


SERVICE INFORMATION

If problems are experienced with the installation or operation of the Loop Back 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.

DESIGN 2000
ELECTRONICS

HELP DESK NUMBER:

+61 3 9758 5933 (All hours)

GENERAL DESCRIPTION

The MC-9044 Loop Back Tester (LBT) is a remotely controlled ‘patch panel’ for up to eight cross-connected four wire circuits as described here.

The LBT is used to test the integrity of four wire ISDN circuits, that are interconnected (‘cross-connected’) at a remote ‘Point of Presence’ location, from either ‘end' of the ISDN service. Test officers at the local exchange are able to dial up the LBT at the remote location and use DTMF to instruct the LBT to either open circuit both sides of a transmit and receive circuit or provide loops via the transmit and receive wires back to the local exchanges. The test officer is then able to perform a bit error rate test around the loop without the need for site attendance at the remote location.

The LBT is also a very powerful Alarm Dialler as described later.

Installed at the remote exchange, the LBT is connected to a dial up analogue ‘ACCESS’ line, and up to eight different interconnected four-wire circuits, referred to as ***‘Cross-connects’***. The LBT can be powered from the 48V exchange supply, or a 12 → 48 V dc supply. An LBT failure will not affect normal service and provide a change over on the alarm output relay.

Logging on to the LBT is performed by calling the Access line and waiting for the LBT to answer with its LRD code. The LRD code is used to confirm the Node (and RSS/RSU where applicable) to which the LBT is connected.

Standard DTMF is used to access and control the LBT.

A personal identification number (PIN) of up to twelve digits and two digit *Cross-connect* number (01 → 08, or 51 → 58)) prevents unauthorised access.

Continuity tests can then be performed as per the Operating Instructions to follow.

PRINCIPLE OF OPERATION

The LBT is connected to the Exchange MDF. The Transmit (Tx) and Receive (Rx) wires for each *Cross-connect* circuit are connected to one of the eight pairs of RJ 45 connectors marked:

Tx/Rx 01 AB ab (Rx A, Tx A, Tx B, Rx B/Rx a, Tx a, Tx b, Rx b)
Tx/Rx 02 AB ab (Rx A, Tx A, Tx B, Rx B/Rx a, Tx a, Tx b, Rx b) etc. up to
Tx/Rx 08 AB ab (Rx A, Tx A, Tx B, Rx B/Rx a, Tx a, Tx b, Rx b),
and the Access Line (analogue two wire ring in/loop out) is connected to the BL-3 terminal marked ‘ACCESS’.

Remote access is gained by dialling the Access number and responding to the voice prompts. All operating and programming progress is voice prompted. A PIN is used to begin a test session. The LBT validates the PIN and, if correct, reports the current state of the cross-connects.

If a two digit *Cross-connect* number (eg.01) is entered, the LBT disconnects Tx 01 A-a, Tx 01 B-b, Rx 01 A-a, Rx 01 B-b and connects Tx 01 A to Rx 01 A, Tx 01 B to Rx 01 B, Tx 01 a to Rx 01 a, Tx 01 b to Rx 01 b. From this description, a loop now exists via Tx 01 and Rx 01 on both sides of the LBT. Continuity tests can now be performed.

If a two digit *Cross-connect* number (eg.51) is entered the LBT disconnects Tx 01 A-a, Tx 01 B-b, Rx 01 A-a, Rx 01 B-b. From this description, an open circuit now exists via Tx 01 and Rx 01 on both sides of the LBT. Appropriate tests can now be performed.

An unlimited number of commands can be entered in the one session by use of the ‘Circuit re-loop' or ‘Open circuit’ facilities. This function re-establishes all links to the normal interconnected (cross connected) position and then re-loops or open circuits the Tx and Rx pairs as selected by the test officer.

The ACCESS line is automatically released when one of the following conditions occur:

- No DTMF is received within 120 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.

The looped back condition or open circuit condition is cancelled and the normal cross connected state is restored when one of the following conditions occur:

- The test officer enters # * #, if the call to the ACCESS line is still up.
- The test officer calls the ACCESS line, logs on, and enters # * #.
- The one hour (or 24 hour) ‘master' timer expires.

USAGE AND BENEFITS

The main use for Loop Back Testers is as follows:

- Sectionalising faults remotely.
- Alarm reporting.
- Testing the exchange external alarm drivers.
- Opening doors at POP sites remotely.

The main benefits of using the Loop Back Testers are:

- Reduced costs associated with reduced travelling and site attendance. A test officer does not have to be at the MDF where ISDN services are cross-connected in order to open circuit jumpers and/or provide loops to either end.
- Cost saving by not providing dedicated test lines from remote sites to the test positions.
- Cost saving by not providing dedicated test lines from remote sites to other areas that also require access to the *Cross connect* jumpers.
- No separate alarm dialler is required.

SYSTEM DESCRIPTION

The Loop Back Tester contains eight pairs of four wire line circuits that are served by the one common ACCESS line.

The Loop Back Tester is connected to the Point Of Presence (Point Of Interconnect) MDF. The Tester is 1 unit high (44 mm) suitable for mounting in a standard 19" rack, including the type 84 and the type 72.

The LBT has the following ‘Klippon' screw/clamp terminal connections:

12 → 56V power input:	Polarity insensitive (rear or right hand side)
Access line:	To which the Access line is connected (rear or left-hand side)
Alarm output:	Three terminal changeover contacts set (rear or left-hand side)
Alarm Interface:	Up to six alarm inputs (voltage free N/O contacts) with a common return.

The LBT has sixteen RJ 45 connectors:

Cross-connect (01 - 08): to which the ISDN services are connected (front panel)

The LBT has the following indicators:

Tx/Rx LEDs (01-08):	Steady glow = normal, Slow flash = Tx looped back to Rx on both ‘sides’, Fast flash = Tx and Rx are open circuit on both ‘sides’.
POWER LED:	indicates that 50V power is connected and the internal fuse is intact.
IN USE LED:	indicates that remote operation is in progress.

Remote Programming:

The ACCESS line is used to load the PIN, the unit LRD code, and for maintenance programming functions, as well as testing functions.

The inbuilt voice synthesizer is used to confirm the PIN number and the LRD code. When the LBT is in use, the voice synthesizer will confirm the *Cross-connect* number accessed (01 - 08) and any commands as the test officer enters them.

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 13).

1. Fasten Mounting Brackets

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

2. Connect Power

Screw terminals for the 50 V power input is found at the back (or right hand side) of the unit. The power input is polarity insensitive. The maximum operating current drain is 135 mA.

When power is applied, the LBT Power LED and Tx/Rx LEDs illuminate.

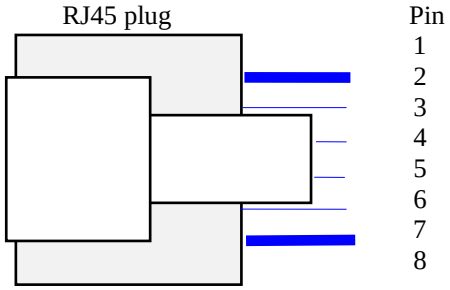
3. Line Connections

Each LBT requires a maximum of thirty three pairs, one pair for each Tx circuit, one pair for each Rx circuit 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 RJ 45 connectors at the front of the unit. Terminations are clearly marked as ‘Tx/Rx 01-08' to which the ISDN line(s) are connected.

Connection of the four physical wires for each Tx/Rx for both the AB and ab sides is:

1.	Not used	Pin 1 of RJ45 connector
2.	Not Used	Pin 2 of RJ45 connector
3.	Rx A or a	Pin 3 of RJ45 connector
4.	Tx A or a	Pin 4 of RJ45 connector
5.	Tx B or b	Pin 5 of RJ45 connector
6.	Rx B or b	Pin 6 of RJ45 connector
7.	Not used	Pin 7 of RJ45 connector
8.	Not Used	Pin 8 of RJ45 connector



The Access line is a dedicated dial up line for remote access. It is connected to the terminal marked ACCESS line at the back (or left hand side) of the unit. La and Lb are connected, one to the centre pin and the other to either of the outside pins of the BL-3 connector. The connection is polarity insensitive.

4. Alarm Connection

The ‘ALARM RLY' output at the back (or left hand side) should be wired to the exchange alarm scheme as required. The Alarm relay is a changeover contact set marked COM, NO, and NC. This refers to the relay in the powered state (normal operating condition).

5. Alarm Interface

The LBT has six analogue inputs with a common return marked ‘ALARM INTERFACE’. Voltage free contact closure(s) on any of these six input ports, either pulsed (for more than one second) or latched, are processed by the LBT and a dial out function is executed on the Access line as described later.

6. RS232 Port

This is a standard three wire serial COM port reserved for future applications. Eg. Operating the LBT from a PC. The communication format is 9600 baud, 8N1.

REMOTE MASTER PROGRAMMING

The LBT is configured from any DTMF dialling telephone. The Master Password enables you to perform all LBT programming operations by telephone from any location.

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, 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 PROGRAM THE MASTER PIN (UP TO TWENTY DIGITS PLUS ** AND #)

Call the ACCESS line of the LBT and wait for answer:

1. Press * * 90449044 #. (This is the default Master password).
2. Press * * * # mmmmmmmm… #, where mmmmmmmm… is to be the new Master PIN.
   The Master Password is now * * mmmmmmmm… #.

PROGRAMMING FROM THE REMOTE LOCATION

1. Dial the LBT Access number and listen for the message to enter PIN.
2. Enter * * mmmmmmmm…#, where mmmmmmmm… the Master PIN. listen for "*Thank you*". (If the Password is incorrect, the LBT responds "*Error, invalid PIN*". Only three attempts each time are allowed, after the third the LBT responds "*Access denied*" and hangs up).
3. Listen for "*Please enter command*". You are now able to load a new PIN number and /or a new LRD code.

TO PROGRAM THE USER PIN (UP TO TWELVE DIGITS)

The User PIN only allows the test officer to establish and remove loops (or open circuits) to either end of the *Cross connects*.

1. Enter * #. Listen for "*Please enter PIN followed by hash*".
2. Enter pppp… #, where pppp… is to be the new PIN. Listen for "*Please enter PIN followed by hash*".
3. Enter pppp… #. Listen for "*PIN is pppp…, thank you, please enter command*".
   In summary: Enter * # pppp… # pppp… #.
4. To end, press # * #. Listen for "*Thank you*" and hang up.

STORING THE LRD CODE (UP TO TWELVE CHARACTERS)

When accessed, the LBT announces its Link & Route Detail (LRD) code so that you can verify that you have reached the required LBT.

The LRD code can be any combination of alphanumeric characters.

When installing the LBT, the appropriate LRD code should be programmed.

Entering the Alphanumeric LRD Code

The LRD code is programmed by Remote Master Programming as described above.

To set the LBT ready to accept the LRD input:
Press * 9044 #. The LBT responds with "*Enter characters*...", waiting for you to begin entering characters.

Standard telephone key number/letter assignments are employed and (Q), (.), and (Z) are also 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 8=8888

After the first character is entered, press # (normally referred to as 'Hash' but in this case (enter)). The ***LBT*** is waiting for the next character. Continue until complete, then press another closing # to store and end programming.

Example:

To program LBT.ADL as the LRD code you would enter 555# 22# 8# 11# 2# 3# 555# #.

To check the LRD code, press * 9044 # #.

The voice synthesizer will confirm all entries by reading them back as they are entered and when the closing # is pressed.

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 that produced it is then cleared, the LBT alarm state is automatically reset.

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

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. (Please note that the cross-connects revert to the normal state).
- The Processor fails to operate.
- RAM failure is detected.

ALARM TESTS

The following tests and verifications may be performed in Master Programming mode.

Alarm Simulation Test
Simulating an Alarm may test the LBT alarm circuit. Press * 42 # for the Alarm Simulation Test. The LBT will report "*A L A R M* ". A change over on the 'ALARM' output will occur. Reset the alarm by pressing * 50 #. This feature is also used to test that the external Alarm drivers are in order.

RAM Test
A RAM test (both EEPROM and static RAM) can be manually initiated by pressing * 44 #. There will be a pause while the LBT performs a self-test. If no failure is detected, the LBT will sequentially announce "*P A S S* " twice. If a failure is detected, the LBT will sequentially announce "*F A I L*". A change over on the 'ALARM' output will occur. Reset the alarm by pressing * 50 #.

Alarm Interface Input Verification
The LBT Alarm Interface Inputs can be checked by pressing * 46 #. The LBT will report the current status, eg. "*Alarm 1 is off, Alarm 2 is off, Alarm 3 is off*"… etc.

SOFTWARE VERSION NUMBER

The software version number can be displayed by pressing * 48 #. The LBT will report 92nn as the EPROM version number.

RELIABILITY

Units of similar design and hardware complexity to the LBT have a mean time between failure figure (MTBF) of in excess of 33 years.
The relays employed are NEC EA2-12 with a switching current of 2A. The mechanical life expectancy is ten million operations.

LOG ON COUNTER

Each time the LBT accepts a valid PIN, it is counted as a successful Log on.
To read the Log On counter:
Press * 36 #.
The LBT reports eg. "*0030*" to indicate a Log on total of 30.
To reset the Log on counter:
Press * 30 #.
The LBT reports "*Reset 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 are reset.

KEYPAD OPERATION

Local programming and control of the LBT is possible via the inbuilt keypad. All programming operations are the same as over the phone, except that you are not required to enter a PIN in order to program the unit or to control the *Cross-connects*.

Some examples are:

To Program the Master Password:

1. Press * * * # mmmmmmmm #, so that * * mmmmmmmm # will be the new master password for remote master programming

To Program the User PIN:

1. Press * # pppp #, where pppp will be the new user PIN for remote access.

To Loop Back *Cross-connect* 01:

1. Press 01. The Tx/Rx 01 LED will flash.

To Open Circuit *Cross-connect* 01:

1. Press 51. The Tx/Rx 01 LED will flash rapidly.

To Reset All *Cross-connects* to their Normal Cross Connected State:

1. Press 00. All Tx/Rx LEDs will glow steadily.

ISDN LOOP BACK TESTER

OPERATOR GUIDE

1. Dial the ACCESS number.

2. Listen for "*Music Intro, LRD Code ABCD...*", where ABCD... is the LRD code.

3. Listen for "*Please enter PIN*".
   Enter the PIN. If the PIN is invalid, the LBT responds "*Error, invalid PIN, please re-enter PIN*". A maximum of three attempts is allowed before access is denied. If the correct PIN is entered then:

4. Listen for the current status message then "*Enter the code for a Cross-connect to be looped back or open circuit, or hang up*".
   Enter the number of the *Cross-connect* (01 → 08) to be looped (or enter 51 → 58 which signifies the Cross-connect to be open circuited) (or simply hang up to retain the current status).

5. Listen for *"Cross-connect 'nn' is looped back both ways*" (or .*"Cross-connect 'nn' is open circuit"*).

- (This message is repeated every twenty seconds for two minutes after which the access line is force released but the *Cross-connects* remain as they were set. Whenever the test officer hangs up, the access line is automatically released but the *Cross-connects* remain as they were set).

You are now able to perform the necessary continuity and Bit Error Rate tests.

Loops or opens on other *Cross-connects* are possible by simply entering nn, where 0n = the required *Cross-connect* number to be looped and 5n = the required *Cross-connect* to be open circuit. Any previous loops or open circuits are automatically restored to the normal cross-connected state.

6. All cross-connects revert to the normal state if:

I. The test officer enters 00, if the call to the ACCESS line is still up (and keep the ACCESS line connection).
II. The test officer enters # * #, if the call to the ACCESS line is still up (and force release the ACCESS line connection).
III. The test officer calls the ACCESS line, logs on, and enters 00 or # * #.
IV. The one hour (or 24 hour) 'master' timer expires (Note that the timer is reset every time the LBT is interrogated).

Notes:

- If the test officer logs on, and any *Cross-connects* are in the looped back or open circuit condition at that time, the LBT automatically reports *"Cross-connect 'nn' is looped back both ways*", or *"Cross-connect 'nn' is open circuit"* otherwise the LBT reports "*All cross-connects are normal*".
- If the test officer logs on, and inputs 78, *Cross-connect* 08 is looped back for twenty seconds. "*Access 8 is activated*" is reported. This is suitable for operating electric door strikes. See 'Door Opener Facility' on page 15.

ISDN LOOP BACK TESTER

COMMAND SUMMARY

FUNCTION	**COMMAND**
REMOTE MASTER PROGRAMMING:	
Access	* * 90449044 # (Default password)
Program Master PIN	* * * # mmmmmmmm… #
Program User PIN	* # pppp… # pppp… #
Store LRD Code	* 9044 # A # B # C #...#
Check LRD Code	* 9044 # #
Log on Counter	* 36 #
Reset Log on Counter	* 30 #
Alarm Simulation Test	* 42 #
RAM Test	* 44 #
Alarm Input Verification	* 46 #
Alarm Dial Number	* 21 nn… #
Software Version	* 48 #
Alarm Reset	* 50 #
Master Reset	*67709600# (CAUTION !)
DTMF REMOTE CONTROL:	
Call the Access line, verify LRD code, enter User PIN and select *Cross-connect* (Tx/Rx circuit) number	
Cross-Connect loop back	0n
All *Cross-Connects* looped back	99
Cross-Connect open circuit	5n
Cross-Connect loop back for 20 s	7n
Reset *Cross-Connects* to Normal	00 (Reset and Continue test session)
Reset *Cross-Connects* to Normal	# * # (Reset and End test session)
Master Password	* * mmmmmmmm… # (allowing all above ‘Master' functions by remote control)

ISDN LOOP BACK TESTER MODEL MC-9044

SPECIFICATIONS

Control logic:	Motorola microprocessor, 64K bytes EPROM, 2K static RAM, 1K bit EEPROM.
Access Line Interface:	Two-wire ring in/loop out.
Operator programming:	DTMF.
Admin. programming:	DTMF, inbuilt keypad, or via RS232 port.
DTMF detect:	> 40 ms nominal.
Ring Voltage detect:	> 20V RMS @ 25 Hz nominal.
Indicators:	Power on LED, 8 x Tx/Rx LEDs.
Connectors:	'Klippon' screw/clamp terminals (supplied). RJ 45 line connectors.
Capacity:	8 x Tx/Rx circuits, 1 x Access line (16 loops or open/system).
Relays:	33 x EA2-12.
Answer delay:	3 secs.
Insertion loss:	0 dBm.
Line re-loop:	2 secs (min.), loops for up to 1 or 24 hours.
Alarm output:	1 x three terminal change over relay contacts 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:	12→ 50 V dc nom. (polarity insensitive).
Power consumption:	135 mA relays idle, 160 mA relay operated @ 48 V
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.

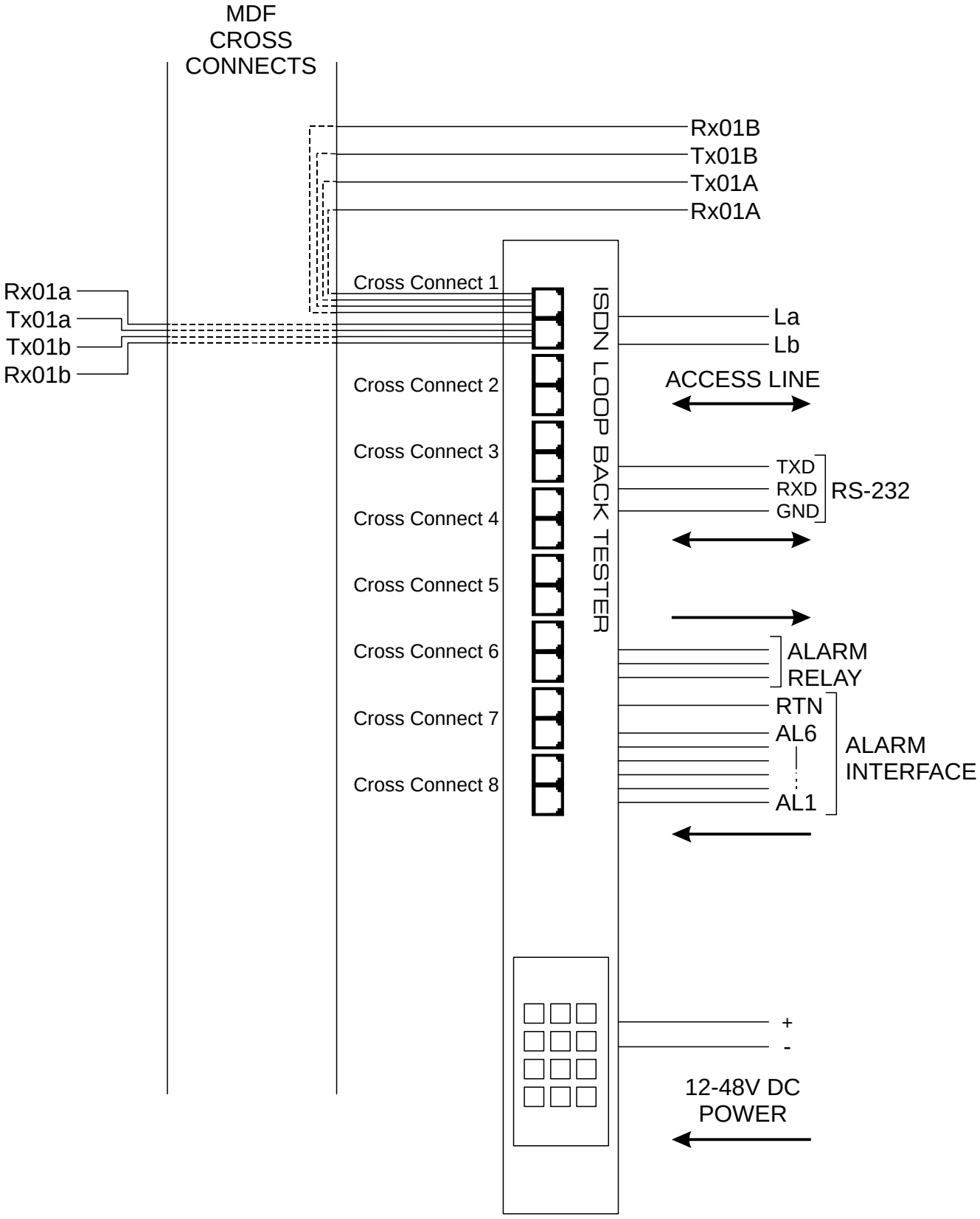
Transport costs to the factory will be to the customer's account, and Design Two Thousand Pty Ltd will cover the return transport costs for warranty repairs. If units are sent to the factory and discovered to be 'No Fault Found', a service charge may apply and the return transport costs may be to the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

See 'SERVICE INFORMATION' on page 1 of this document. In the unlikely event of a breakdown, units can be sent for repair to:

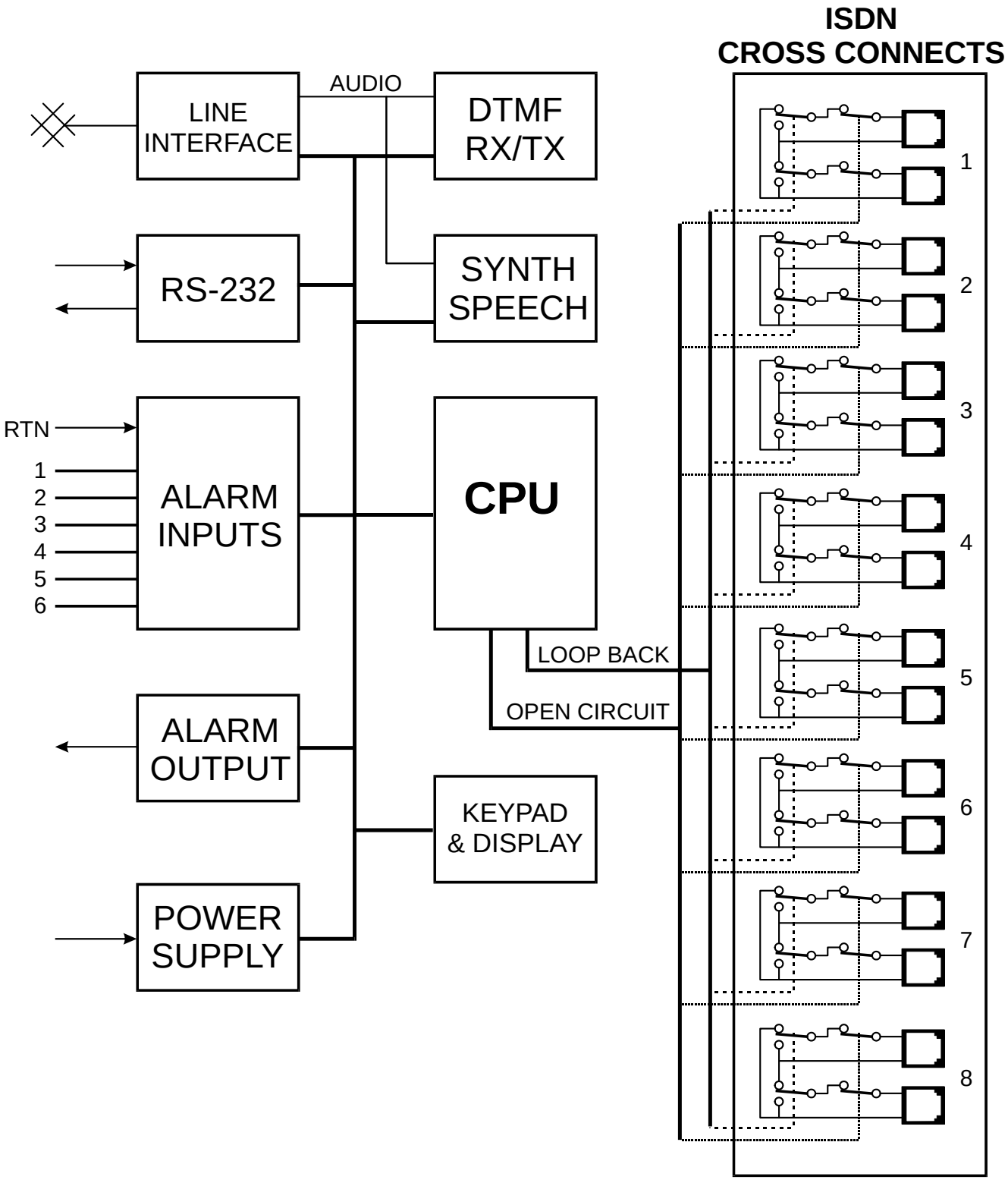
DESIGN TWO THOUSAND PTY LTD
11 ROSE STREET
UPPER FERNTREE GULLY
MELBOURNE AUSTRALIA 3156
TELEPHONE + 613 9758 5933

Please remember to include an accurate fault report, contact name and number, and a return address .

INSTALLATION DIAGRAM



BLOCK DIAGRAM



ADDITIONAL FEATURES

DOOR OPENER FACILITY

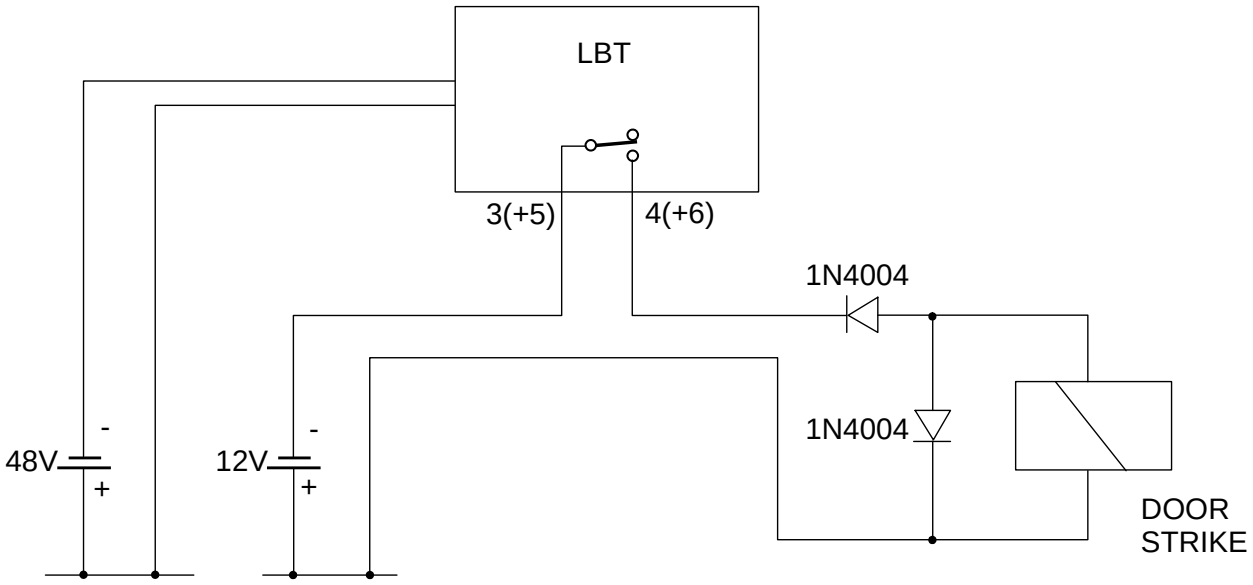
The LBT can be used to remotely open doors for attendees at POP sites.

Pins 3 and 4 of the RJ45 connector (see page 5), for a normally open loop, may be wired to an electric door strike. Using pins 3&5 in parallel, and pins 4&6 in parallel can obtain additional switching current of up to 2 Amps.

If the test person accesses the LBT and enters 7x, where x is cross-connect number, the LBT will operate relays x for twenty seconds. "*Access x is activated*" is reported.

Recommended Installation for an Electric Door Strike

1. Fit 1N4004 quenching diode in parallel with and close to the body of the solenoid, to absorb back EMF voltage spike.
2. If the solenoid supply volts could be reversed, it is preferable to fit a protection diode in series.
3. It is also good practice to ensure that solenoid current does not flow in any power lead supplying current to the LBT.



AUTOMATIC ACCESS LINE DISCONNECT

If, during a test session, the test person fails to enter the # * # command before hanging up, the LBT will release the Access line after the 'No DTMF Timeout' period.

The test person often forgets to enter this command before hanging up, in which case it may be desirable for the LBT to automatically release the ACCESS line more quickly. The LBT 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.

Either by Remote Master Programming or from the LBT Keypad:

Enable Busy Tone Detector
Press * 81 1 #.

Disable Busy Tone Detector
Press * 81 0 #.

To check state:
Press * 81 #. The LBT 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.

By Remote Master Programming:

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 LBT responds with "*On*" if the line reversal/loop current loss detector is enabled, or "*Off*" if it is disabled.

Default = Enabled.

PROGRAMMABLE OPTIONS

Calling Line Identification

Identification of all 'A' numbers from which the LBT was accessed can be used to trace any suspected abuse of the facility.

Firstly, the Access line to the LBT must be programmed for the 'Unwelcome Call Trace (MCT)' facility. (Telstra facility). Secondly, the LBT 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.

By Remote Master Programming:
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 LBT responds with "*On*" if the hook flash is turned on, or "*Off*" if the hook flash is turned off.

Programmable Time-out

The LBT keeps the ACCESS line connection for a nominal 120 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 (# * #), or if busy tone or line reversal/loop current loss does not occur, the LBT ACCESS line will stay busy for that time.

By Remote Master Programming:

No DTMF Time-out
Press * 64 nnn #, where nnn = 000 - 255 secs (Default = 120, ie. 120 seconds).

To Check the Time-out:
Press * 64 #. The LBT responds with "*nnn*", where nnn is the number of seconds.

24 Hour Test Mode

Normally when a *Cross-Connect* is "*looped back both ways*" or "*Open circuit*" a one hour 'master' timer is in force so that the *Cross-Connect* automatically resets and reverts to the normal state if the Test Officer 'forgets' to manually reset after a test.

Sometimes, a longer test session may be required, in which case the LBT 'master' timer may be programmed for twenty four hours (24 Hour Test Mode).

By Remote Master Programming:

24 Hour Test Mode:
Press * 65 n #, where n = 0 or 1. 0 = one hour master timer and 1 = twenty four hour master timer.

To Check the Test Mode Master Timer:
Press * 65 #. "*Deactivated*" = one hour master timer and "*Activated*" = twenty four hour master timer.

Please note that whenever a 24 hour test session is initiated, the master timer for subsequent tests will automatically revert to one hour.

Appendix 2

ALARM INTERFACE

Description

The LBT Alarm Interface performs the function of a comprehensive alarm reporting and management system. A host Call Information Interface (CII) Model CN-4750 and PC handle the alarm reports.

The LBT has six analogue inputs. Voltage free contact closure(s) on any of these six input ports, either pulsed (for more than one second) or latched, are detected by the LBT.

If an alarm is detected, the LBT will dial out the pre-programmed *Alarm Dial* Number (the number of the CII) and wait for a valid answer. If the number is busy or does not answer, the LBT will re-try up to four times.

After a successful answer from the CII, (a DTMF * is the valid answer signal), the LBT sends a DTMF alarm identifier. The Identifier typically consists of sixteen digits or more, the first eight (or more) being the LRD code of the LBT (in hexadecimal ASCII code), a delimiter of two digits (always 3a), and the last six digits being the alarm input number (01→ 06) and status (1 or 0) again in hexadecimal ASCII (30 31 31 → 30 36 31, or 30 31 30 → 30 36 30). See '*LBT LRD And Alarm Code Identification*' on the next page. In the event of multiple alarms these can be reported sequentially in the same call. When there are no more alarms to report, the LBT sends an identifier with a suffix of 000 in hexadecimal ASCII (30 30 30). The CII then responds with '#' to close the session.

The Calling Number Display (if used) and DTMF data (LRD code and alarm number/status) will always be unique to the location and type of alarm. This data (information) is detected by a host CII and converted to RS232 ASCII messages. The host PC has an application running which does the text conversions and alarm string processing.

The host PC application program then signals the CII to send an acknowledgment DTMF digit '5 *' back to the LBT. If the LBT does not receive an acknowledgment, up to four attempts at re-dialling and alarm processing will occur.

Please note that the CII answer tone (DTMF *) and acknowledgment tone (DTMF 5 *) are simply transmitted as single DTMF digits, NOT in hexadecimal ASCII format.

Advantages

The LBT Alarm Interface has many advantages over conventional alarm diallers. These include:

- Inexpensive
- Integrated
- Reliable
- Flexible
- Easy to test Integrity
- No separate AC power, DC power or plug pack required
- No dedicated PSTN line required
- Customised for reliable and accurate communicate with host end

Programming

The intelligence resides in the LBT.

The LBT must have Software Version 92.05 or later, or V4794 00 or later.

The LBT must have a unique LRD code programmed - see '*STORING THE LRD CODE*' on page 7.

Appendix 3

To Program the Alarm Dial Number

Either from the LBT Keypad or by Remote Master Programming:

1. Press * 21 nn… #, where nn… is the number of the host CII. The entered number is replayed.
- To check the number, you can press * 21 #.

LBT LRD and Alarm Code Identification

The LBT identifies itself using DTMF tones giving the hexadecimal ASCII code for each letter (or digit) in the LRD code followed by a delimiter of **:** (transmitted as 3a in hexadecimal ASCII) and then the alarm code, using the following tables:

ASCII Table

00	nul	01	soh	02	stx	03	etx	04	eot	05	enq	06	ack	07	bel
08	bs	09	ht	0a	nl	0b	vt	0c	np	0d	cr	0e	so	0f	si
10	dle	11	dc1	12	dc2	13	dc3	14	dc4	15	nak	16	syn	17	etb
18	can	19	em	1a	sub	1b	esc	1c	fs	1d	gs	1e	rs	1f	us
20	sp	21	!	22	"	23	#	24	$	25	%	26	&	27	'
28	(	29	)	2a	*	2b	+	2c	,	2d	-	2e	.	2f	/
30	0	31	1	32	2	33	3	34	4	35	5	36	6	37	7
38	8	39	9	3a	:	3b	;	3c	<	3d	=	3e	>	3f	?
40	@	41	A	42	B	43	C	44	D	45	E	46	F	47	G
48	H	49	I	4a	J	4b	K	4c	L	4d	M	4e	N	4f	O
50	P	51	Q	52	R	53	S	54	T	55	U	56	V	57	W
58	X	59	Y	5a	Z	5b	[	5c	\	5d	]	5e	^	5f	_
60	`	61	a	62	b	63	c	64	d	65	e	66	f	67	g
68	h	69	i	6a	j	6b	k	6c	l	6d	m	6e	n	6f	o
70	p	71	q	72	r	73	s	74	t	75	u	76	v	77	w
78	x	79	y	7a	z	7b	{	7c	|	7d	}	7e	~	7f	del

Note: Upper case letters should be selected for LRD code identification.

DTMF Tones

Hexadecimal character	DTMF Tone
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
a	a
b	b
c	c
d	d
e	*
f	#

Appendix 3 continued

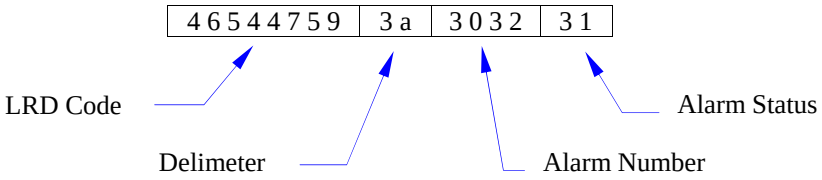
Example:

If the LRD Code is **F T G Y**, the DTMF tones to provide the hexadecimal ASCII code will be **46 54 47 59**.

If the Alarm Number is **0 2**, the DTMF tones to provide the ASCII code will be **30 32**.

An activated alarm is signified by **1.** The DTMF tones to provide the ASCII code will be **31.**

The complete DTMF alarm identifier string in this example is therefore:



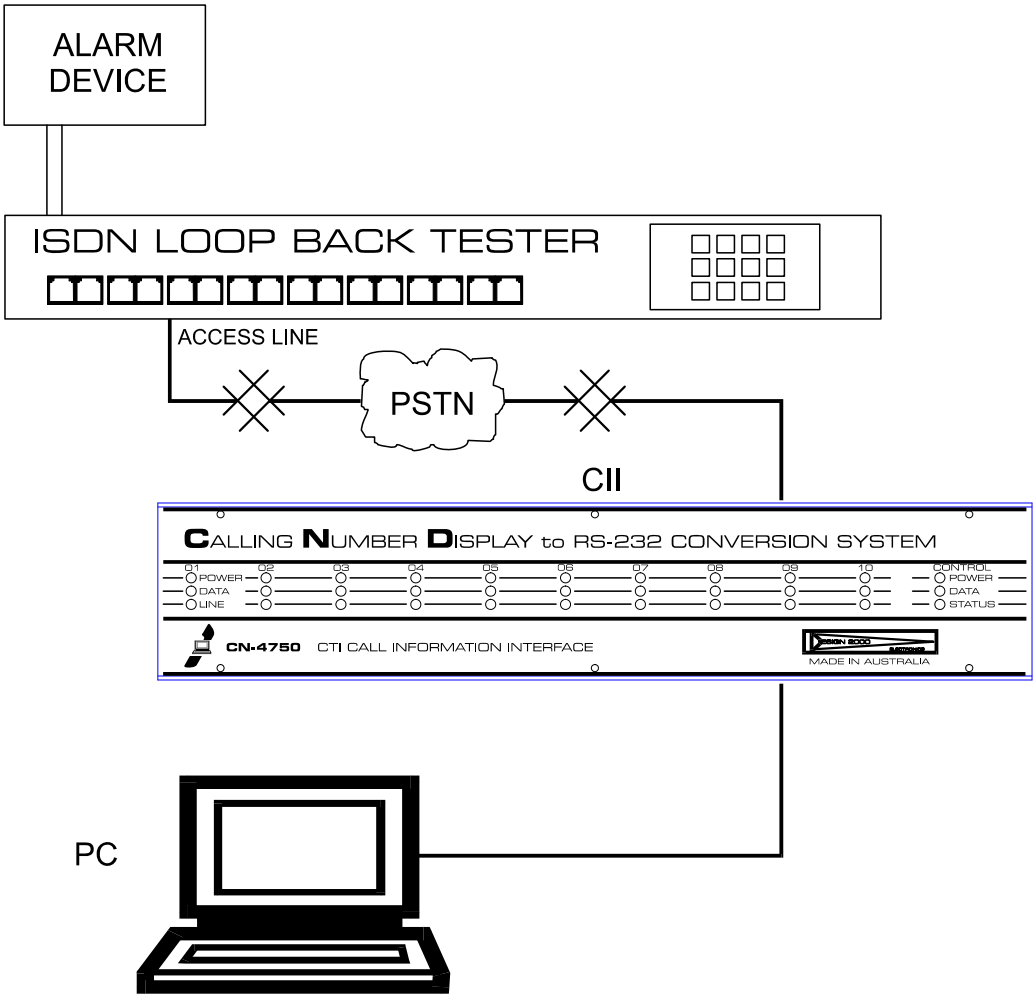
Note: Referring to the example above, a cleared alarm would be signified by **0** as the last character in the alarm identifier string**.** The DTMF tones to provide the ASCII code will be **30.**

Alarm Contacts

The alarm contact(s) are voltage free, normally open contacts, connected to the alarm input terminal(s).

Appendix 3 continued

Functional Diagram of the Alarm Interface

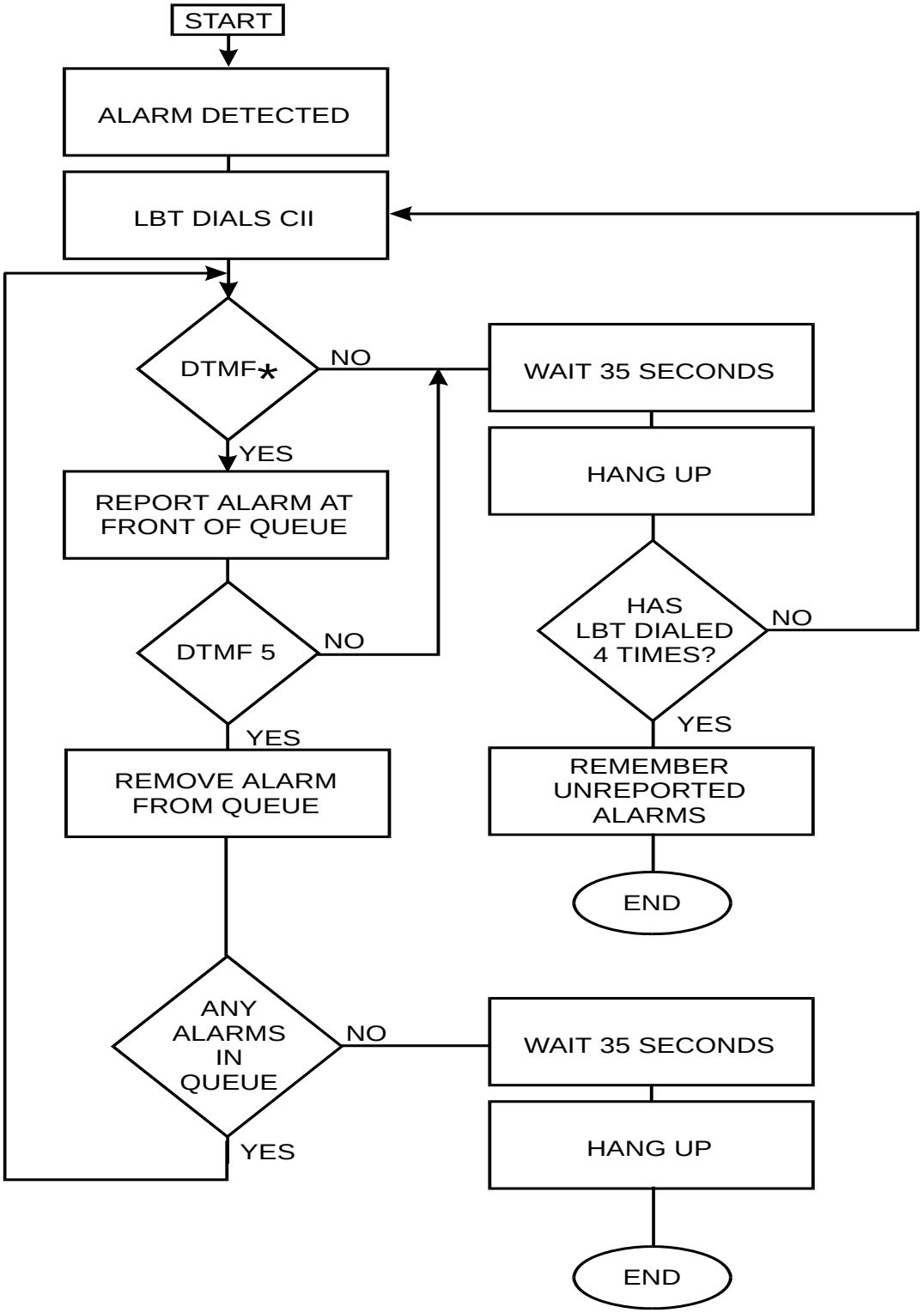


When an alarm is triggered, the LBT dials the CII. The CII sends a ‘ring’ message to the PC. The PC sends a ‘loop’ command to the CII followed by a ‘dial *’ command. The LBT then dials the Alarm Identifier String. The PC then sends a ‘dial 5’ command to acknowledge the alarm followed by a ‘dial * command to request any further Alarm Identifier String to the CII. If there were no more alarms to report, the LBT sends an identifier with suffix 000 in hexadecimal ASCII (30 30 30) and the PC sends a ‘dial #’ command followed by ‘hang up line’ command. The LBT releases its Access line and checks the alarm state indefinitely. If the alarm contact that was closed is now open (cleared), the LBT re-dials the CII and sends an Alarm Identifier String with an alarm code of 303x30. This indicates that the Alarm was either pulsed or has been reset.

A flow chart of events is shown on the next page.

Appendix 3 continued

Flow Chart of Alarm Reporting



Appendix 3 end

ISDN LOOP BACK TESTER

MODEL MC-9044

MADE IN AUSTRALIA

DESIGN 2000
ELECTRONICS

End of Document

ISDN LOOP BACK TESTER

PACKING LIST

2 x BL-3

1 x BL-2

1 x BL-10

4 x RJ 45

1 x Operator Manual G/97098

2 x Mounting Brackets

4 x Mounting Bracket Screws

1 x 12Vdc 1A Power Adaptor

ISDN LOOP BACK TESTER MODEL MC-9044

POWER

Power Requirement:	12-48 Vdc nominal, polarity and ground insensitive.
Power Consumption:	135 mA relays idle, 160 mA relay operated @ 48 V 270 mA relays idle, 315 mA relay operated @ 24 V 600 mA relays idle, 745 mA relay operated @ 12 V ie. 6.5 W $\rightarrow$ 7.7 W nominal @ 48V
Initial Start Up Current:	600 mA for 40 ms @ 48 V 1 A for 50 ms @ 24 V 1.5 A for 90 ms @ 12 V