Line BACKER

Owner's Information

Introduction

Linebacker is primarily a 60 memory, 512 channel universal backup system for use with small to medium size DMX512 Lighting Control Desks.

It may also be used as a stand alone Lighting Desk, a Sequencer, a Channel Tester, a DMX Tester and a Cable Tester.

About this Handbook

This handbook describes the operation of the Linebacker using easy to follow diagrams. The controller is easy to use, particularly once you have understood a few basic concepts. *These are:*

Press the up (▲) or down (▼) buttons to select from menus.

Press GO to execute a function.

Press ESC to exit.
In general, repeatedly pressing ESC will return you to the main display.

Press + or - or use the keypad to change numeric values

If a memory is unprogrammed, it will have a dot (.) in front of its number.

A quick guide to the main uses of the Linebacker follows on page 2 including some simplified diagrams. Remember the basic concepts above, take a few minutes to explore the menus and you'll soon feel at home.

Issue 2 - September 1996

Manual Stock No. 73-615-00

Software Version: 1.8

For use with Lighting Desks fitted with DMX 512 outputs only.

This equipment is designed for professional stage lighting control, and is unsuitable for any other purpose. It should be used by, or under the supervision of an appropriately qualified or trained person only.

Zero 88 Lighting Ltd. reserves the right to make changes to the equipment described in this manual without prior notice. E & OE.

Zero 88 Lighting Ltd.

Tel	+44	(0)1633 838088★
Fax	+44	(0)1633 867880

★ : 24Hr Answer Phone

Overview

Connecting the Power Supply.

Plug the power connector into the back of the Linebacker. The base has been designed in such a way as to allow the power supply cable to be hooked around the flange and slot on the rear of the unit. This prevents accidental power cable removal. Plug the power supply into the mains supply.
Plug the incoming DMX signal into the fixed male XLR5 and the outgoing DMX signal into the fixed female XLR5.

IMPORTANT

The fundamental principle of Linebacker operation is that it will continue outputting DMX data from the same source until that source is changed by operator action.

A Universal Backup System

When first powered up, the Linebacker is in Backup mode. It receives DMX and retransmits the data without change or significant delay. The transmission parameters are set to the standard USITT specification rather than simply copying the signal received. These parameters may be adjusted as required.

If DMX is later lost, the output is held at the levels last received. *The operator may press GO to fade the DMX output to the next memory, otherwise the previous output is held indefinitely.*

If there is no DMX IN on entering backup, DMX OUT will default to the first available programmed memory. If there are no programmed memories available, 'DMX OUT = NONE' will be displayed.

The simplified diagram opposite shows how to use it - See **Hints & Tips** (p 11) for further transmission information.

A Stand Alone Lighting Desk

The simple way to set up the Linebacker as a stand alone lighting desk is to switch it on without a DMX input signal connected as shown opposite, press GO once and sequence through the memories.
If an input signal is present, press GO three times and then sequence through the memories.

Programming may be from another DMX desk or manually as shown. The THRU function provides a quick way to set a group of channels to the same level.

If programming is by grabbing a scene from a DMX controller connected to the Linebacker DMX input, the Linebacker will continue retransmitting the input DMX until Program / Edit or Program / Test DMX are selected.

A Sequencer

Simply select SEQUENCE on the main menu, press GO, set up the required START MEMory, LAST MEMory, DWELL TIME (the time that the memory stays on) and press the GO button.
Any crossfade times programmed into memories will be used to determine the *fade in* time for that memory and the *fade out* time for the previous memory. Crossfade and Dwell times can be varied using the Override control. A timing diagram is shown on Page 11.

If power is lost during a sequence, the Linebacker will restart the sequence at the beginning.
Setting SEQUENCER to CONT in Super User will make the sequence restart at the point where power was lost.

A Channel Tester

Select TEST DMX on the main menu, press GO, press GO again to select TEST CHANNELS, press the + or - buttons to select a DMX channel, ▲ or ▼ to select the level, + or - buttons to change the level, then *EITHER* ▲ or ▼ to return to selecting the next channel level, *OR* press GO to advance to setting the level for the next channel. THIS DOES NOT AFFECT ANY OF THE MEMORY SETTINGS.

A DMX Tester

Incoming DMX data can be comprehensively analysed by the Linebacker.

A Cable Tester

Any DMX cable terminated in an XLR5 plug and socket may be tested for a comprehensive variety of faults. All the faults that may be analysed are listed on Page 10.

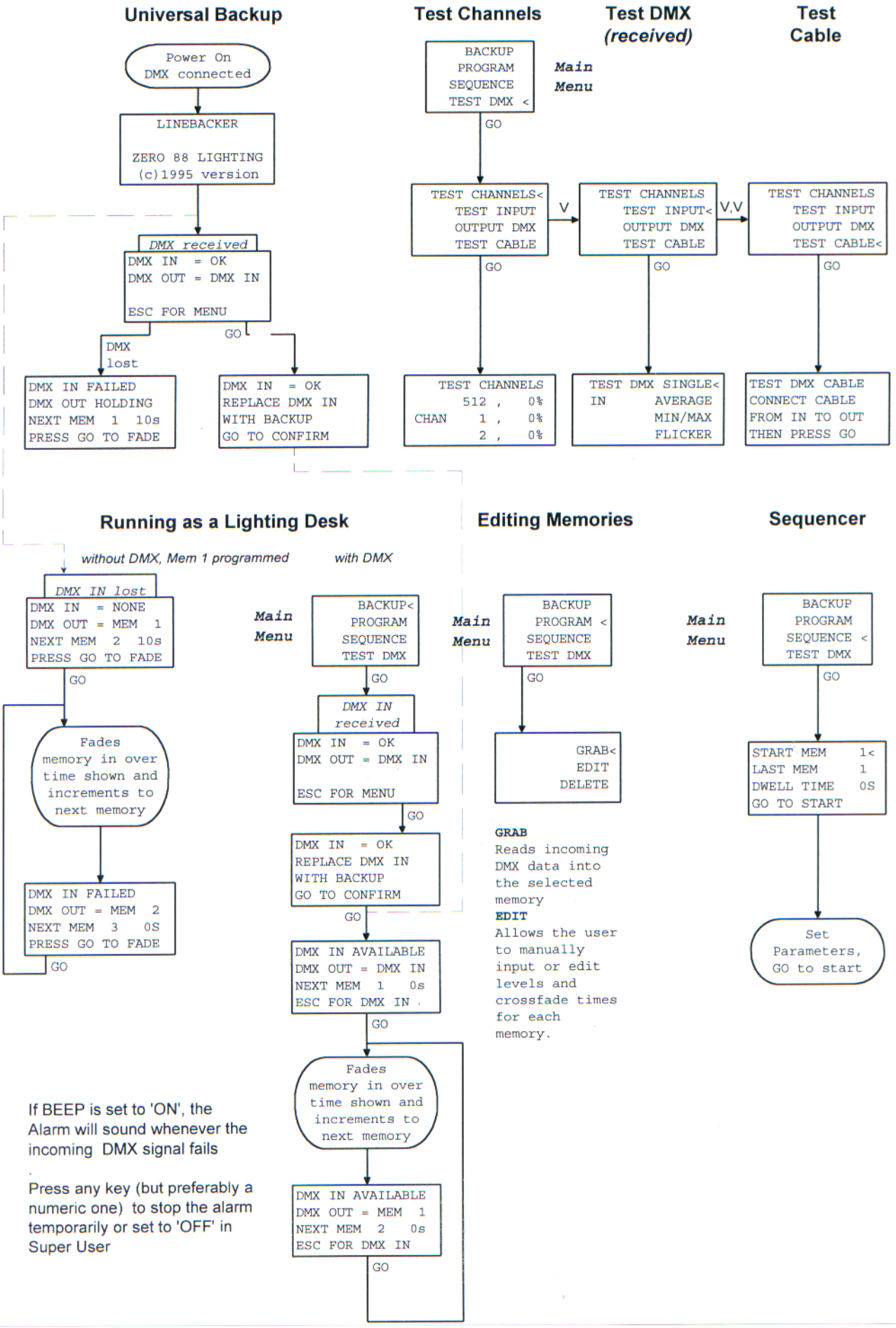
To return to Backup Mode

Press ESC repeatedly until the main menu is selected. Press GO. After the 'Waiting for DMX' message, DMX data out will become a repeat of the DMX In data.

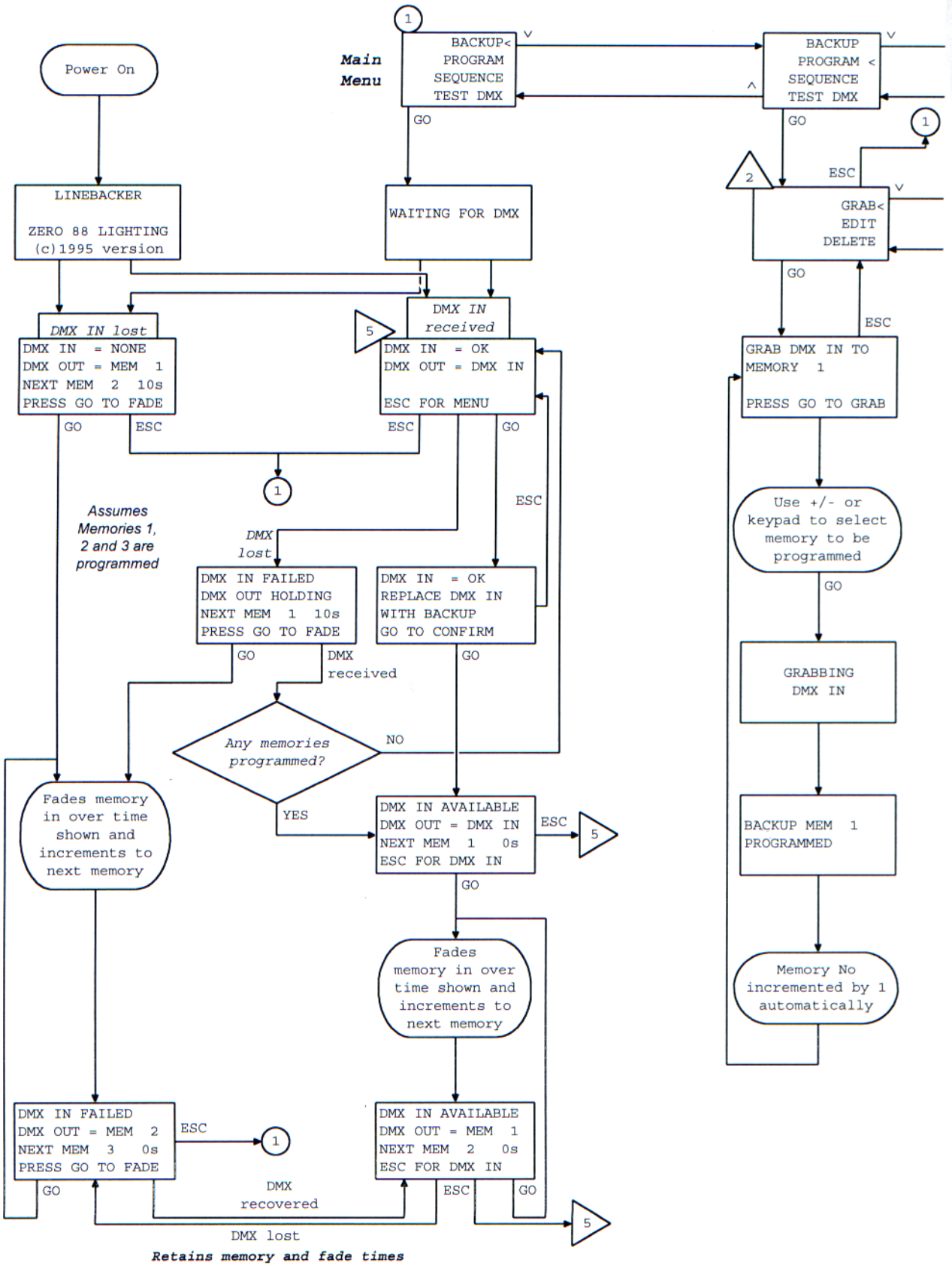
Note on Power Loss

After any loss of power in, if in Backup mode, the Linebacker will recover to the state that it was in when the loss occurred.
For example if a Memory 1 was being output when the power failed, it will restore to Memory 1 being output as soon as power is restored.
In any other mode of operation, the Linebacker will return to the Main Menu when power is restored

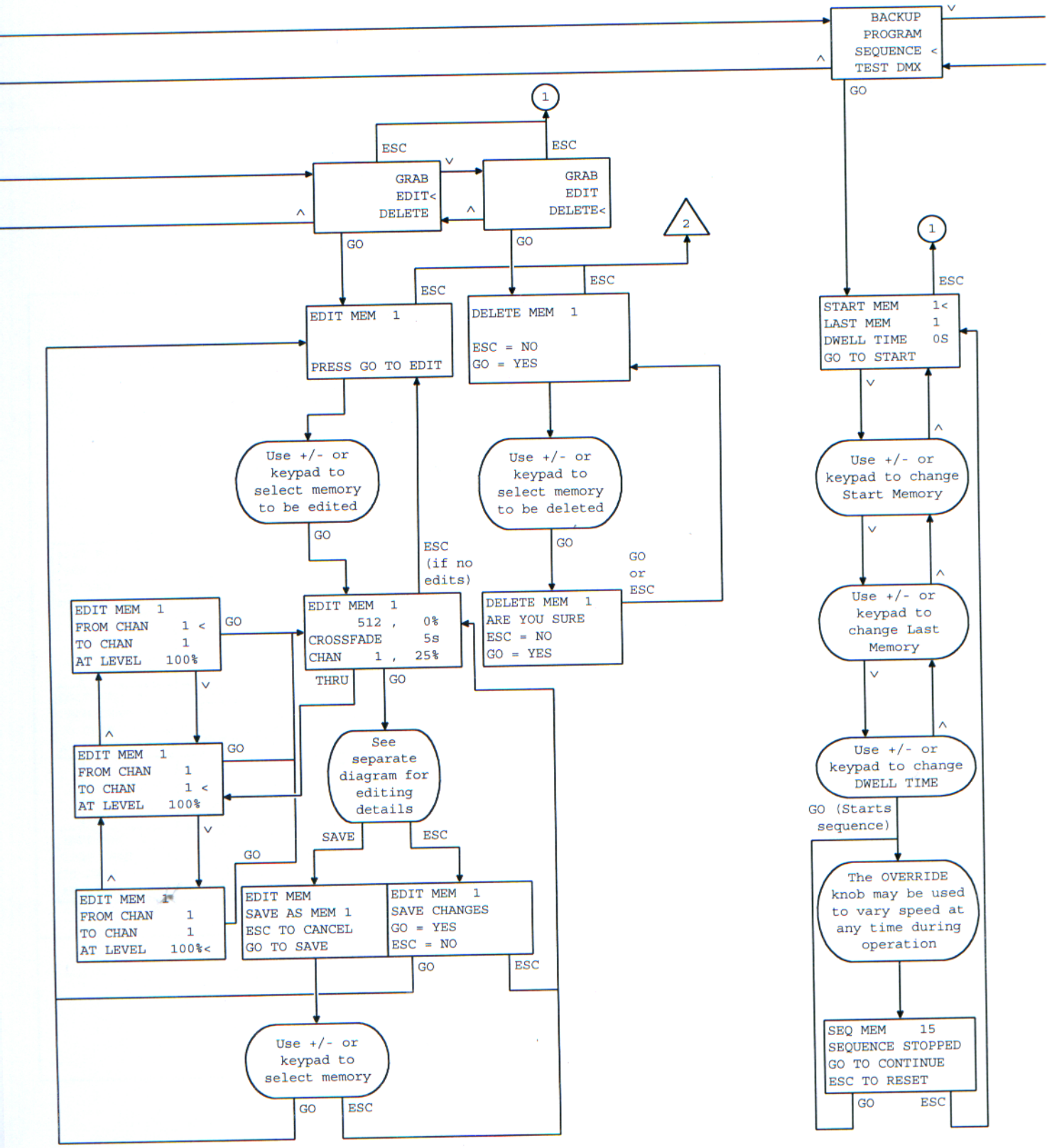
Overview


Universal Backup
Power On
DMX connected
LINEBACKER
ZERO 88 LIGHTING
(c)1995 version
DMX received
DMX IN = OK
DMX OUT = DMX IN
ESC FOR MENU
GO
DMX lost
DMX IN FAILED
DMX OUT HOLDING
NEXT MEM 1 10s
PRESS GO TO FADE
DMX IN = OK
REPLACE DMX IN
WITH BACKUP
GO TO CONFIRM
Test Channels
Test DMX (received)
Test Cable
BACKUP
PROGRAM
SEQUENCE
TEST DMX <
Main Menu
GO
TEST CHANNELS<
TEST INPUT
OUTPUT DMX
TEST CABLE
V
TEST CHANNELS
TEST INPUT<
OUTPUT DMX
TEST CABLE
V,V
TEST CHANNELS
TEST INPUT
OUTPUT DMX
TEST CABLE<
GO
TEST CHANNELS
512 , 0%
CHAN 1 , 0%
2 , 0%
TEST DMX SINGLE<
IN AVERAGE
MIN/MAX
FLICKER
TEST DMX CABLE
CONNECT CABLE
FROM IN TO OUT
THEN PRESS GO
Running as a Lighting Desk
without DMX, Mem 1 programmed
with DMX
DMX IN lost
DMX IN = NONE
DMX OUT = MEM 1
NEXT MEM 2 10s
PRESS GO TO FADE
GO
Fades memory in over time shown and increments to next memory
DMX IN FAILED
DMX OUT = MEM 2
NEXT MEM 3 0S
PRESS GO TO FADE
GO
Main Menu
BACKUP<
PROGRAM
SEQUENCE
TEST DMX
GO
DMX IN received
DMX IN = OK
DMX OUT = DMX IN
ESC FOR MENU
GO
DMX IN = OK
REPLACE DMX IN
WITH BACKUP
GO TO CONFIRM
GO
DMX IN AVAILABLE
DMX OUT = DMX IN
NEXT MEM 1 0s
ESC FOR DMX IN
GO
Fades memory in over time shown and increments to next memory
DMX IN AVAILABLE
DMX OUT = MEM 1
NEXT MEM 2 0s
ESC FOR DMX IN
GO
Editing Memories
Main Menu
BACKUP
PROGRAM <
SEQUENCE
TEST DMX
GO
GRAB<
EDIT
DELETE
GRAB
Reads incoming DMX data into the selected memory
EDIT
Allows the user to manually input or edit levels and crossfade times for each memory.
Sequencer
Main Menu
BACKUP
PROGRAM
SEQUENCE <
TEST DMX
GO
START MEM 1<
LAST MEM 1
DWELL TIME 0S
GO TO START
Set Parameters, GO to start
If BEEP is set to 'ON', the Alarm will sound whenever the incoming DMX signal fails
Press any key (but preferably a numeric one) to stop the alarm temporarily or set to 'OFF' in Super User

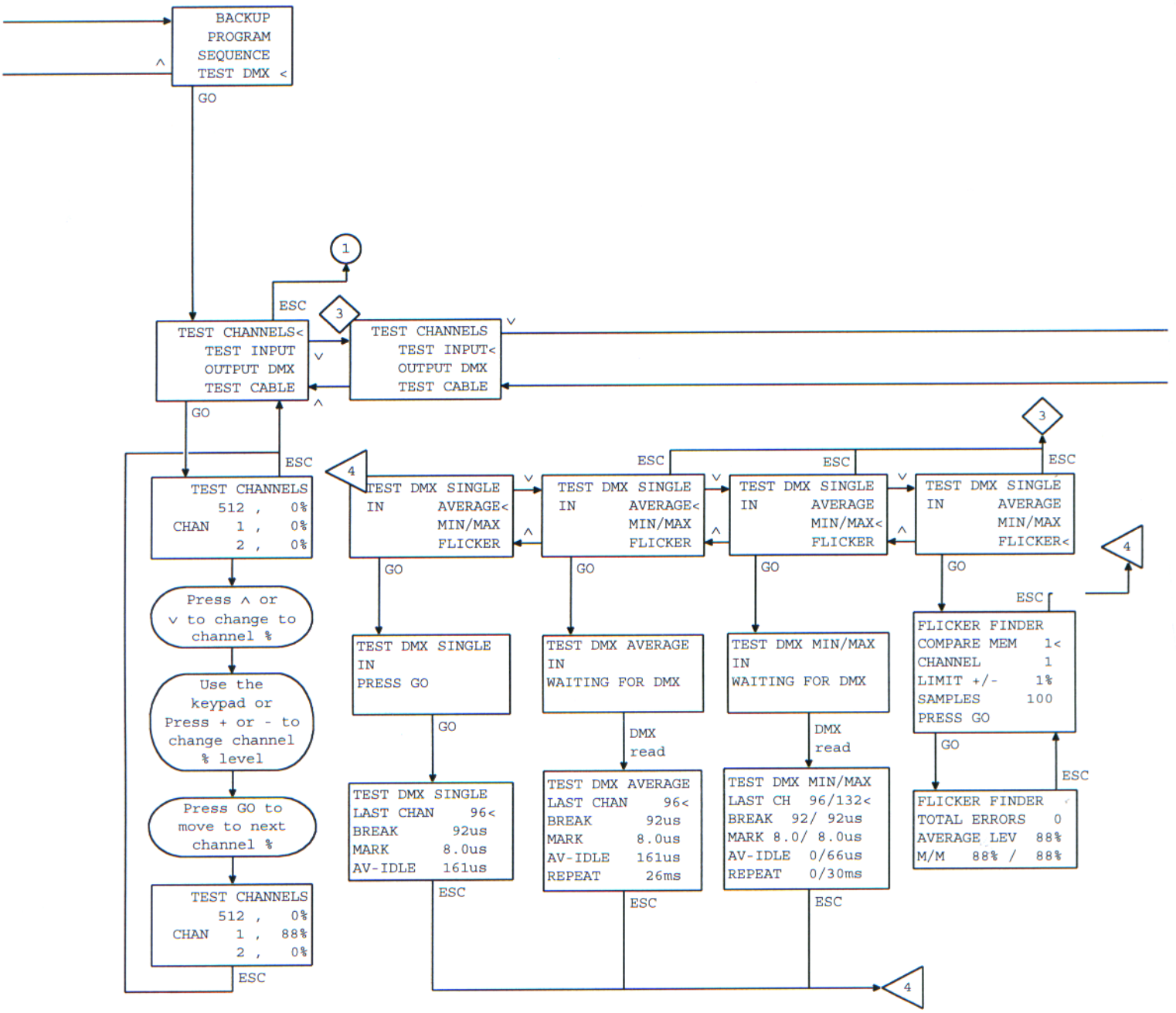
Backup and Program Operation



Sequence Operation



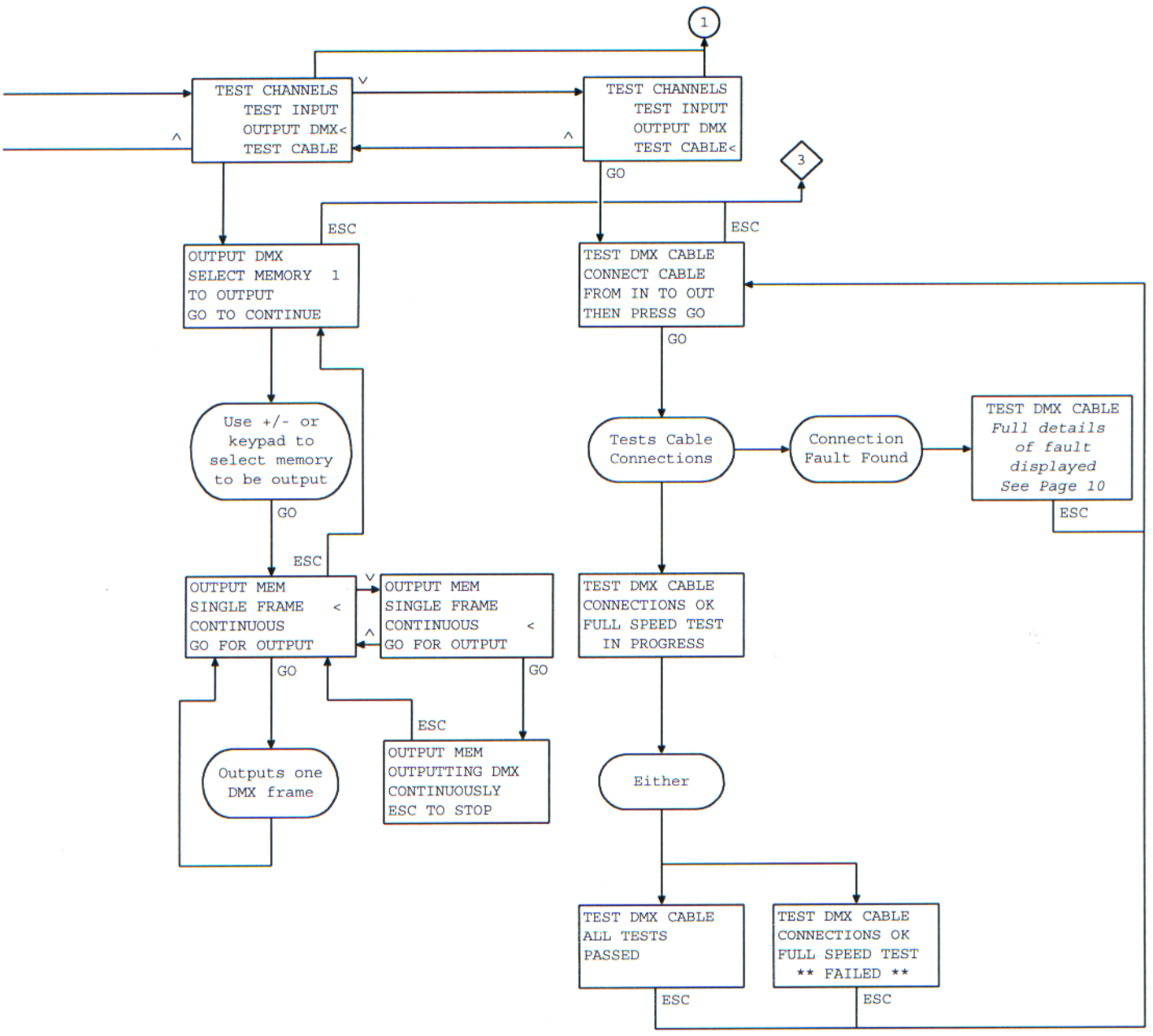
Test Facilities - Test Input



Alternatively Edit as shown in "Editing Memories" on Page 9

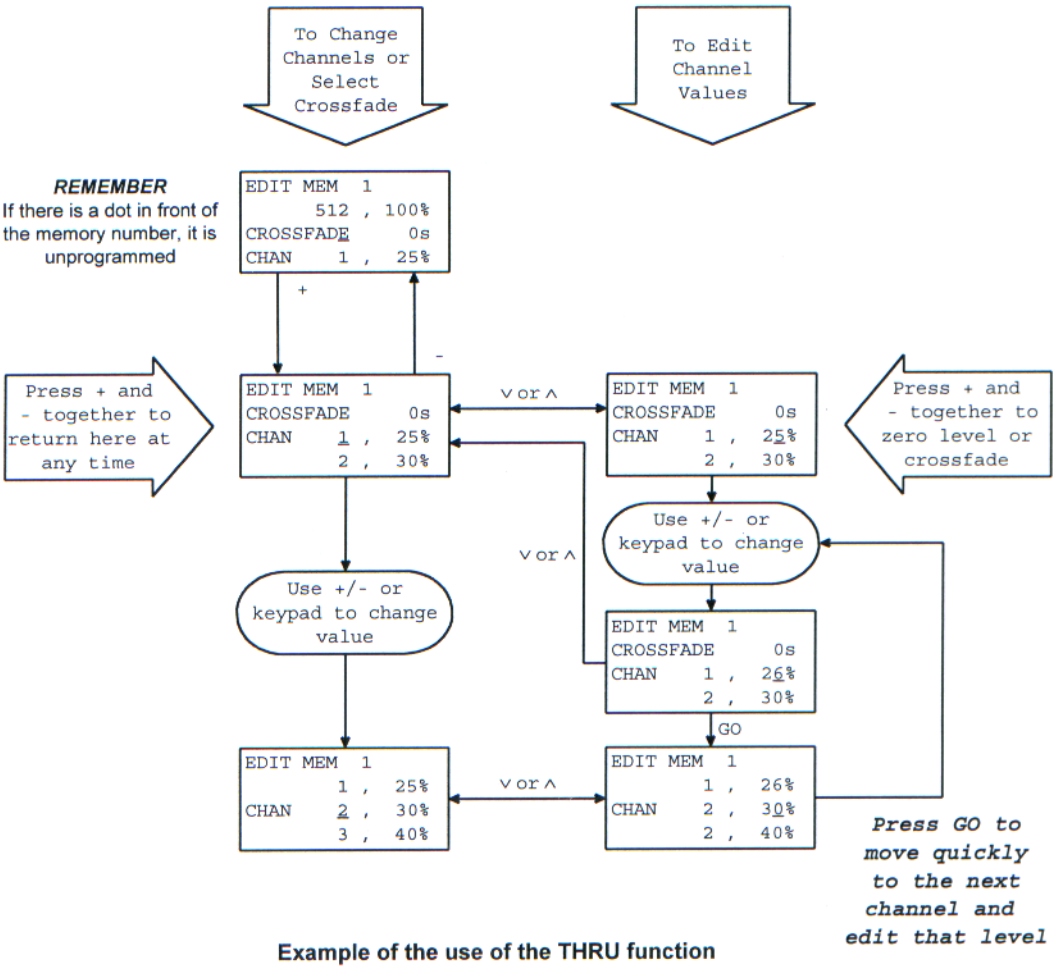
NOTE:
The symbols ^^^ show that the value measured is outside the range of measurement

Test Facilities - Output DMX and Test Cable

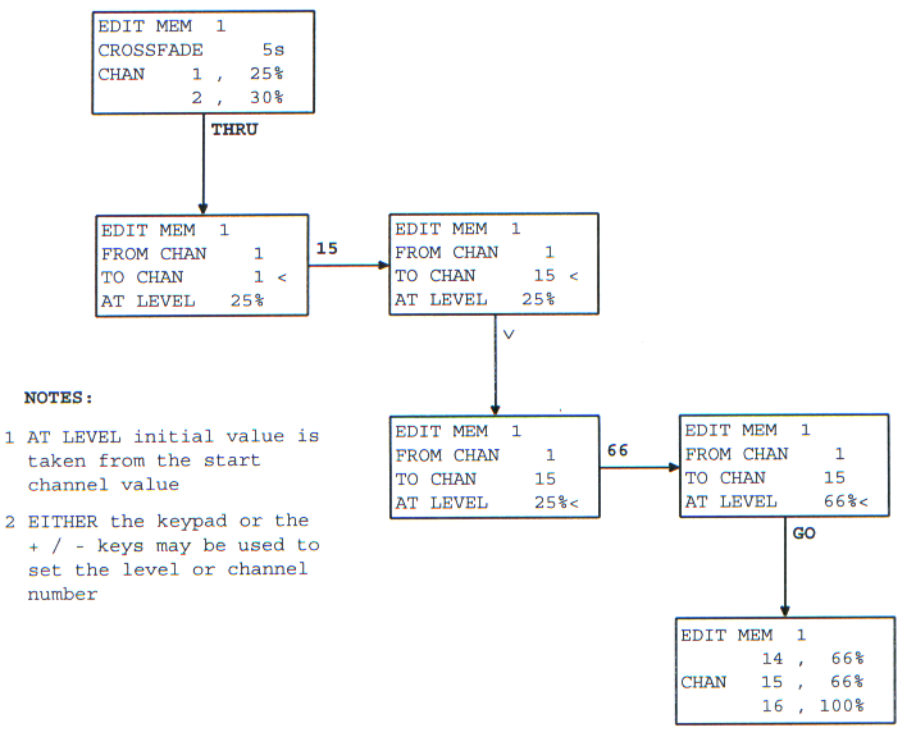


Editing Memories & THRU Operation

Editing Memories



Example of the use of the THRU function



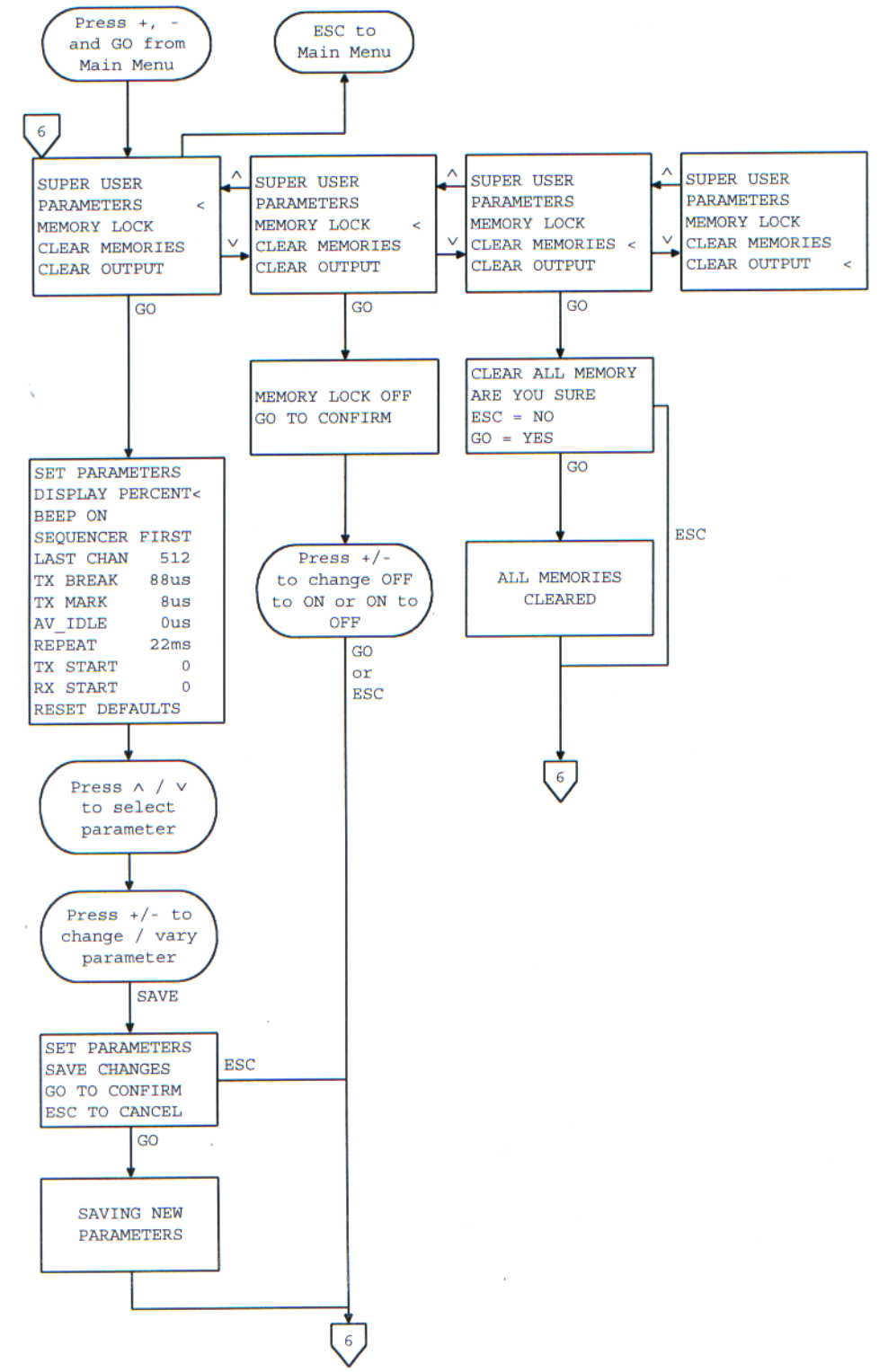
NOTES:

1 AT LEVEL initial value is taken from the start channel value

2 EITHER the keypad or the + / - keys may be used to set the level or channel number

SUPER USER Functions

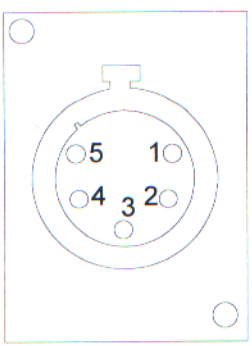
SUPER USER Functions



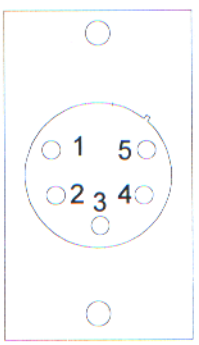
NOTE: Select SET DEFAULTS to return all the parameters to factory defaults (shown above)

Cable Test Error Messages

Group 1 - User Errors	TEST DMX CABLE NO CABLE FROM IN TO OUT
Group 2 - Open Circuits	TEST DMX CABLE OPEN CIRCUIT PIN 1
	TEST DMX CABLE OPEN CIRCUIT PIN 2
	TEST DMX CABLE OPEN CIRCUIT PIN 3
	TEST DMX CABLE OPEN CIRCUIT PIN 2 PIN 3
Group 3 - Short Circuits	TEST DMX CABLE SHORT CIRCUIT PIN 1 TO PIN 2
	TEST DMX CABLE SHORT CIRCUIT PIN 1 TO PIN 3
	TEST DMX CABLE SHORT CIRCUIT PIN 3 TO PIN 2
Group 4 - Miswires	TEST DMX CABLE MISWIRE PIN 1 TO PIN 3 PIN 3 TO PIN 1
	TEST DMX CABLE MISWIRE PIN 1 TO PIN 2 PIN 2 TO PIN 1
	TEST DMX CABLE MISWIRE PIN 3 TO PIN 2 PIN 2 TO PIN 3
	TEST DMX CABLE MISWIRE PIN 1 TO PIN 3 PIN 3 TO PIN 2 PIN 2 TO PIN 1
	TEST DMX CABLE MISWIRE PIN 1 TO PIN 2 PIN 2 TO PIN 3 PIN 3 TO PIN 1
Group 5 - Multiple Faults Cable with two or more faults. Replace the cable.	TEST DMX CABLE MULTIPLE CABLE FAULTS



DMX Out



DMX In

For both connectors, Pin 1 is 0v, Pin 2 is - Data, Pin 3 is + Data, Pins 4 & 5 are not connected

Power Connector

Tip	+12 V
Ring	0 V
Sleeve	Chassis (Earth)

NOTE

The Linebacker requires +12Vdc with NOT GREATER THAN 500mV peak to peak ripple at 500mA

Calculator power supplies have more ripple than this and can cause the Linebacker to misfunction.

Hints, Tips and Memory Timing

Hints & Tips

Synchronising the Outputs

As set up by the factory or after the SET DEFAULTS operation has been performed, the Linebacker retransmits all 512 channels of DMX data. If the main desk is transmitting less than 512 channels, onwards transmission from the Linebacker may be optimised by setting the number of channels transmitted to the same number.

To achieve this:

Measure the number of channels being received from the desk by connecting the DMX signal and selecting: TEST DMX / GO, TEST INPUT / GO, TEST DMX SINGLE / GO, GO. The LAST CHAN figure shows the number of channels being received. ESC, ESC to return to the main menu.

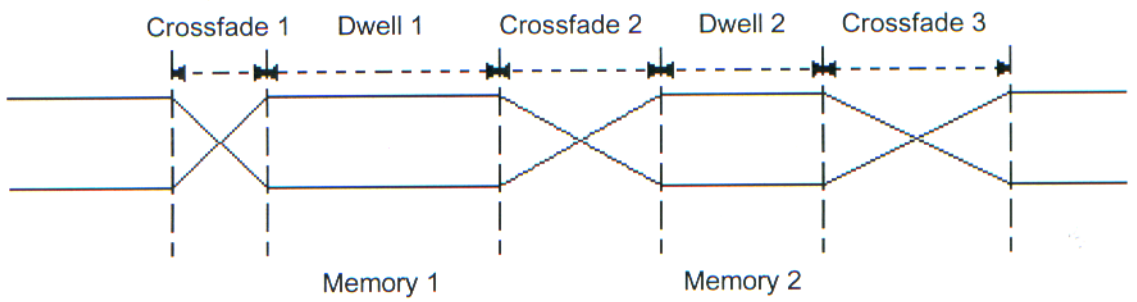
Set the number of channels being transmitted by selecting:
SUPER USER, PARAMETERS / GO, ▼, ▼, input last channel number using the keypad or + / - buttons, SAVE, GO, ESC to return to the main menu.

Changing the Start Codes

The Linebacker may be programmed to receive only DMX data with a specific start code.
Select:
SUPER USER, PARAMETERS / GO, ▼, ▼, ▼, ▼, ▼, ▼, ▼, ▼, change RX START using the keypad or + / - buttons, SAVE, GO, ESC to return to the main menu.

The Linbacker will transmit DMX data with any user specified start code.
Select:
SUPER USER, PARAMETERS / GO, ▼, ▼, ▼, ▼, ▼, ▼, ▼, change TX START using the keypad or + / - buttons, SAVE, GO, ESC to return to the main menu.

Memory Timing Diagram



The CROSSFADE time that is programmed with each memory controls the time taken for that memory to fade in to full and the time for the previous memory to completely fade out.

This is illustrated above. Crossfade 2 controls the rate at which the previous memory (1) fades out and the rate at which Memory 2 fades in.

The DWELL time is the time that the memory remains at full when used in Sequence mode of operation.

In Backup mode, the pre programmed Crossfade time may be adjusted manually by turning the OVERRIDE control. In Sequence mode, only the Crossfade time is affected.

Technical Specification

Inputs and Outputs

Accepts 1 to 512 channels of DMX data that is within the specification of the USITT DMX512 standard. Recognises any user specified Start Code.

Outputs up to 512 channels of DMX data with user variable parameters. When No of channels received = No of channels transmitted, nominal one cycle delay.

Memories

60 memories each of up to 512 channels. One stored crossfade time per memory of up to 999 seconds.

Memories programmable from incoming DMX data or manually from the keyboard. 'Live' editing from the keyboard (does not affect memory data until saved).

Thru function for bulk programming / editing.

Lock facility to write protect memories.

One sequence from any memory to any memory; skips empty memories. Uses a single user programmable 'dwell' time between crossfades

DMX Failure Actions

Input DMX failed indicated by LED plus sound warning which the user may disable. Action - holds last good DMX input until GO button pressed. When GO pressed system crossfades to any user selected memory.

DMX Variable Output Parameters

Retransmits DMX with control of the following parameters:

Up to 512 Channels	
Break	70 - 210 µs
Mark after Break	4 or 8 µs
Break to Break	0.4 to 87ms nominal
Interbyte Gap	8 to 99 µs
Start Code	

Single packet or continuous transmission.

DMX Input Testing

Measures all the above parameters plus a Flicker Finder which indicates an error if DMX data on the selected channel received is out of a user selected range.

Cable Test

Tests +, -, and 0V lines for crossed, open, shorted or high impedance faults plus a full speed data test.

Operating Temperature

5 to 40 °C non condensing

Power Supply

Separate calculator type Mains Power Supply operating on 180V to 250V (50 or 60 Hz) power supplies.

UK 13 Amp (00-720-11) and European (00-720-21) versions available.

Physical Dimensions

Length 265mm, Width 125mm, Depth 66mm: Weight 1.75kg

DMX512 Protocol and Recommended Practice

For those who need more technical information on the use of DMX protocol itself, Zero 88 recommends the PLASA/USITT Recommended Practice for DMX512 'A guide for users and installers'.

This is available at a small charge from PLASA Ltd, Highlight House, St Leonards Road, Eastbourne, Sussex, BN21 3UH, UK. Tel +44 (0) 1323 410335; Fax +44 (0) 1323 646905; E-mail info@plasa.org.uk; Internet http://www.plasa.org.uk/plasa.

PLASA are also able to supply copies of the full USITT DMX512 Protocol Specification.