
OPERATING MANUAL FOR
THE *Lil'*DMXter™
SOFTWARE VERSION 1.70C
&
SHOW SAVER™ VERSION 1.10
FOR **CE** & NON-**CE** HARDWARE

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INTRODUCTION

The *Lil'DMXter*^{TM 1} is a portable test set for checking DMX512 transmission and reception. It is also a cable tester for DMX512 cables, testing both continuity and data transmission.

The unit is built into a water-resistant case. It's pretty rugged - but the display is glass so please use reasonable common sense care.

The *Lil'DMXter* is battery operated using rechargeable batteries. We ship it with a good charge, but you may want to plug it in overnight to top it off. Use the line cord provided to connect to a 120VAC outlet. Your *Lil'DMXter* will run while plugged in as well. Units may be ordered strapped for 230VAC operation.

Your *Lil'DMXter* is a software based machine that uses a menu structure allowing you to step thru its features to get to the test you need to perform. Much of its operation is obvious. The purpose of this manual is to help you run it quickly, and to find the section you want easily.

SOFTWARE RELEASE NOTES

The release notes for this software version are in **Section 13.7 on page71**. If you got this manual with a software update we would suggest that you start by reading the release notes.

0.0 SAFETY WARNING

Due to failure of either the dimmers or the console, or due to a short between the DMX512 line and power cables, it is possible that a DMX512 control cable may be connected to the AC mains. If connected to the AC mains, a DMX512 cable would be carrying hazardous voltages. If any conductor of a DMX512 cable is connected to the AC mains it is possible that the metal case of the connector is also connected to the AC line. Care should always be taken when testing an installed DMX512 cable that no hazardous potentials are present.

The user should note the following:

Testing of DMX512 lines that are shorted to the AC line is hazardous and should not be attempted.

The *Lil'DMXter* does NOT indicate the presence of hazardous voltages on the DMX512 lines.

The metal frame and metal front panel parts of the *Lil'DMXter* are grounded only when the *Lil'DMXter* is being used with its 3-wire line cord plugged into a properly grounded outlet. The DMX512 lines entering the *Lil'DMXter* are isolated from the metal frame. The frame should not become 'hot' if there is AC leakage on the DMX512 lines. But do not rely on this for your safety - check that YOUR DMX512 lines are not 'hot'.

IT IS POSSIBLE THAT THE SHELL OF THE DMX512 CONNECTOR MAY BE HOT. IF THE SHELL OF THE CONNECTOR IS HOT, THEN THE METAL FRONT PANEL PARTS OF THE DMXter WILL BE HOT UNLESS THE DMXter IS GROUNDED.

If there is ANY likelihood that ANY of the DMX512 lines are 'hot' to the AC line, the case of the *Lil'DMXter* should be grounded at all times.

If your DMXter has an IEC AC cord simply plugging the unit into AC will achieve this end. During battery operation this can be accomplished by using the AC cord and connecting a ground wire from the ground pin of the AC cord to a water pipe ground.

¹ *Lil'DMXter* and **DMXter** are trademarks of Goddard Design Co.

If your DMXter is a **CE** unit that uses an external power supply, you will have to ground the unit to a suitable ground by connecting a grounded wire to the provided thumbscrew grounding lug on the front panel.

0.1 PRECAUTIONS THAT WILL ASSURE THE BEST OPERATION OF YOUR *Lil'*DMXter

The *Lil'*DMXter is a sensitive piece of test equipment designed to receive and decode low power digital signals even when those signals are in an electrically noisy environment. It is also a piece of theatrical field service equipment. We know that field conditions in a theatre or studio are often as close to a war zone as most of us wish to get. The *Lil'*DMXter is designed to work in this hostile environment.

One environmental threat that is always present particularly for a portable piece of equipment is static electricity or ESD. On a dry winter day a person walking across a wool carpet may easily become charged to **8 to 10 thousand volts**. Touch a piece of conductive material and a large pulse of current will flow.

The *Lil'*DMXter has been designed to deal with this fact. It's unlikely that normal ESD will damage the unit and if sensible precautions are taken ESD should not normally prevent it from operating normally.

0.1(1) USE A BLANKING PLUG IN UNUSED DMX CONNECTORS

When the unit is operating always have a plug in both the DMX OUT and the DMX IN connectors. Since the DMXter is often used with only one cable connection, the other connector should be capped with an un-wired XLR style plug. This plug must be of the metal body type and should be totally un-wired. The purpose of this plug is to prevent ESD discharge to the open connector pins. Such discharge is unlikely to harm the DMXter but it may cause mis-operation, possibly requiring power cycling to reset the unit.

0.1(2) IF ESD IS PRESENT GROUND THE CASE

When operating in an environment where ESD discharges are likely and nonstop operation of the *Lil'*DMXter is required it is advised that the case of the *Lil'*DMXter be grounded (earthed). If your DMXter has an IEC AC cord simply plugging the unit into AC will achieve this end. If yours is a **CE** unit that uses an external power supply, you will have to ground the unit to a suitable ground by connecting a grounded wire to the provided thumbscrew grounding lug on the front panel.

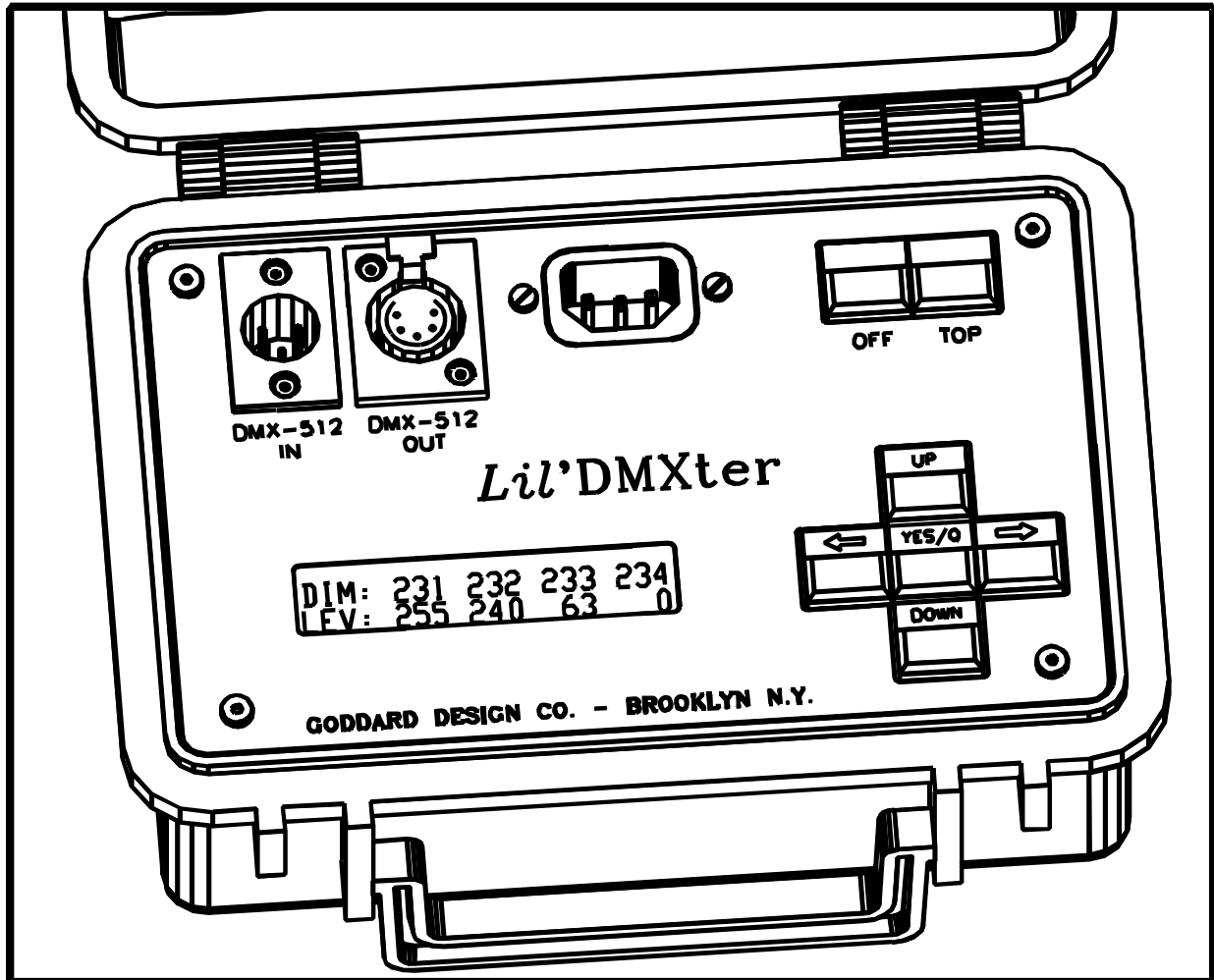
0.2 GETTING STARTED - QUICKLY

So you want to play **NOW**? First read the **SAFETY WARNING** above. Then go right ahead. We feel that the operation of the *Lil'*DMXter is fairly straightforward. But we would suggest that you read the following sections before you start taking our name in vain:

- 1.0 - 1.3 CONVENTIONS (all of it)
- 2.0 TURNING ON
- 3.0 FUNCTION MENU
- 4.0 TRANSMIT DMX - The most commonly used functions in **TRANSMIT** are:
 - 4.1 ADJUSTING ONE DIMMER
 - 4.5 SEND/EDIT SNAPSHOT
- 5.0 RECEIVE DMX
- 5.1 VIEW LEVELS

1.0 CONVENTIONS

As with any software-based device, we have set up some conventions.



1.1 KEY CONVENTIONS

The block of five keys on the right-hand side of the unit is used for most of the operation of the unit.

1.1(1) ACTION ON KEY UP

As a rule the *Lil'DMXter* software takes action on key release not on key press. The exceptions to this rule include auto repeat functions. For brevity this manual will refer to 'press < xx > key' even when action will take place after the key is depressed and released. When we feel it is important or where confusion is possible we will lay out the key strokes in detail.

1.1(2) < YES/Q >

The blue < **YES/Q** > key is the '**YES**' answer to queries and initiates the action that you have chosen in most cases. When the *Lil'DMXter* is performing functions where a yes/no answer would be inappropriate, there will no longer be a '?' in the display. At this point the < **YES/Q** > key will '**Quit**' the work you have been doing and generally

put you back to the point in the menu at which you entered. There are some exceptions to this rule; quitting some functions will return you to different points in the menu. These will be pointed out later in the manual.

1.1(3) < UP> , < DOWN>

< UP> and < DOWN> are used to step thru items of the menus. When setting dimmer levels or changing the value of a numeric parameter the *Lil'DMXter* uses the < UP> and < DOWN> keys to raise and lower the numeric values.

They also function as the 'no' to answer the queries of the menu. Pressing < DOWN> tells the *Lil'DMXter* 'no' to the current query, and advances you to the next choice. Pressing < UP> tells the *Lil'DMXter* 'no' to the current query, and backs you up to the previous choice.

1.1(3).1 **Bumping a Numeric Value to Minimum or Maximum :**

Hold the < YES/Q> button down while you press the < UP> key to jump a numeric value to maximum. Hold the < YES/Q> button down while you press the < DOWN> key to bump a numeric value to its minimum value.

1.1(3).2 **Bumping a Numeric Value to Half:**

Press both the < DOWN> and < UP> then release both keys. A numeric value will be taken to its half value. This will work with most but not all numeric values that are set by the < UP> and < DOWN> keys.

1.1(3).3 **Auto-incrementing a Numeric Value:**

Many numeric values set with the < UP> and < DOWN> keys may be auto-incremented by holding down the < UP> key.. If you hold down the < DOWN> key, the values will auto-decrement towards its minimum.

1.1(4) < LEFT> , < RIGHT>

The most frequent use of the right and left arrows is changing the current dimmer numbers. In displays that have an underline cursor they are used to move the cursor. While they are marked with arrows, for the remainder of this manual they will be referred to as < LEFT> and < RIGHT> .

1.1(4).1 **Changing a Dimmer Number by One:**

To increase a dimmer number by one press the < RIGHT > key. To decrease a dimmer number press the < LEFT> key.

1.1(4).2 **Auto-increment The Dimmer Number:**

Hold down the < RIGHT> or < LEFT> keys to auto-increment or auto-decrement the dimmer numbers by one.

1.1(4).3 **Jumping the Dimmer Number by 10:**

Hold down the < YES/Q> key and press and release the < RIGHT> or < LEFT> key to increment or decrement the dimmer number by 10.

1.1(4).5 **Auto-increment the Dimmer Number by 10:**

Hold down < YES/Q> and then press and hold the < RIGHT> or < LEFT> keys to auto-increment or auto-decrement by 10.

1.1(4).6 **Forcing the Dimmer Number to Zero:** (new)

In routines that reference a dimmer number pressing both the < LEFT> and < RIGHT> simultaneously will reset the dimmer number to one. This key combination is also used to see cue details in ShowSaver.

1.1(5) < YES/Q > As a Shift Key

There are several places in this software that use < YES/Q > as a shift key to allow one of the other four keys to access a second function or status display. When accessing a second function the < YES/Q > is pressed and held while the second key is pressed and released.

1.1(6) QUITTING < TOP > vs. < YES/Q >

When you are finished using a function and want to do something else there are two basic ways to 'Quit'. You can use either the < YES/Q > or the < TOP > keys, but the result will be somewhat different. < YES/Q >, as mentioned above, generally puts you back to the point in the menu at which you entered. If you want to use another function within the same main menu group use < YES/Q >. Example: If you are in **VIEW LEVELS** and you next want to **VIEW PARAMETERS** press < YES/Q >, < DOWN >, < YES/Q >. But if you next want to **ADJUST ONE DIMMER**, first you will have to use < YES/Q > to quit and then move to the **TO FUNCTION MENU?** entry and then < YES \Q > to return to the **FUNCTION SELECT MENU**. The key strokes are < YES/Q >, < DOWN >, < DOWN >, < YES/Q >, < UP >, < YES/Q >, < YES/Q >. It would seem to be a lot easier to hit the < TOP > and roll down the **FUNCTION SELECT MENU**. There is a reason why this is not always the best practice. Hitting < TOP > does not clear the termination relay in the same way as < YES/Q >. A detailed description of termination relay setting can be found in section 13.1.

While using < TOP > alone is seldom a problem we suggest that you get into the habit of using the following key strokes to return quickly to the **FUNCTION SELECT MENU**: < YES/Q >, < TOP > .

1.2 DISPLAY CONVENTIONS

There are two different purposes of the display. One is to allow you to move around the menu structure to the area you need for the test you want to perform. Here the top line of the display will generally tell you where you are in the menu, and the second line will usually ask you a question or give you a choice of actions. These displays are always in the form of a question and will contain a '?'.

The other purpose of the display is to give you information about the DMX512 system you are testing. This will be done either in one line or two line messages.

1.3 NUMBER CONVENTIONS

DMX512 uses an 8 bit binary byte to transmit dimmer levels, and the start code. This allows 256 different dimmer levels and start codes from 0 to 255. Most lighting consoles display these levels as 0 to 100. This means that a console with a dimmer set to 50 does not transmit the number 50 on the DMX512 line, but a number that is 50% of 255, i.e., 128. The normal lighting console 0 to 100 representation of dimmer levels is really a percent scale and will be referred to as 'percent' throughout this manual. Details of the percent conversion used by the DMXter can be found in section 13.5

The *Lil'*DMXter can display numbers in three formats; decimal, percent, or hexadecimal. Decimal, percent, or hexadecimal notations are available for dimmer levels. Decimal or hexadecimal notations are available for the start code, and for the **FLICKER FINDER** compare limit. When the DMXter is set to percent mode, the start code and the **FLICKER FINDER** compare limit will be displayed in decimal. Dimmer numbers and timing information are available in decimal notation only. The status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3).

1.3(1) DEFAULT DISPLAY FORMAT

The default format is percent for any value that is displayable in percent. Before V1.70 the default was decimal. Any readout displayed in hex will be two hex digits ending with a lower-case 'h'. Any readout displayed in percent will contain a % sign in the display.

2.0 TURNING ON THE Lil'DMXter

2.1 WARNING: BATTERY SWITCH MUST BE ON!

IMPORTANT OPERATIONAL NOTE:

The Lil'DMXter will not operate correctly if the battery is totally discharged or if the internal battery switch is off. When the unit is plugged into the AC line the unit may **appear** to operate, it may display the 'is sleeping' message but **it will not run accurately or reliably!** It will cease to operate the moment you remove the AC line.

A good indication of this problem is that the display backlite pulses, and attempts to run DOUBLE ENDED CABLE TEST will crash the DMXter, usually writing garbage to the display. You may leave the unit plugged into the AC line for 10 minutes and then try again. If the unit fails to operate the moment the AC line is removed, you can assume that you must open the unit and turn on the internal battery switch. See Section 12.3.

2.2 THE < TOP > KEY TURNS THE UNIT ON

Open the case by pressing on the front edge while undoing the latches. The display will be blank. When the unit is off, < **TOP** > functions as an 'ON' key. Press the < **TOP** > button and you will see the opening message

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Lil' DMXter V1.70  
GODDARD DESIGN CO.
```

This message also includes the software version, which is important if you need to contact the factory with any questions. This manual is written for software Version V1.70. It is applicable for any software version that is V1.7x. This message will last for about three seconds or until any one of the keys in the cross is pressed and released. If you purchased the **SHOW SAVER** option, the next display will be as shown on the left, if not it will be as shown on the right.

```
Lil' DMXter V1.70  
SHOW 1.11
```

```
Lil' DMXter V1.70
```

This is the **SHOW SAVER** software version which is important if you need to contact the factory with any questions. This manual is written for software Version V1.10. It is applicable for any software version that is V1.1x. This message also lasts for about three seconds or until any one of the keys in the cross is pressed and released.

2.3 IF THE UNIT WILL NOT TURN ON . . .

If the unit will not turn on, but instead displays

```
Lil' DMXter V1.70  
MEAL PENALTY
```

Then the battery has discharged to the point that it is not capable of supporting normal operation. Plug the unit into AC so you can work and recharge at the same time; then leave the unit plugged in to complete the recharge.

If when you try to turn the unit on instead of the **MEAL PENALTY** message the display remains blank there are three possibilities:

The battery is discharged to a point that the internal battery shutdown circuit has disabled the power supply.

The internal battery switch is turned off

The battery is totally discharged.

Plug the unit into AC. If the display comes on reading *Lil' DMXter is sleeping...* then it is likely that the unit was in low battery shutdown. You may run it on AC if you need it immediately; otherwise, allow it to charge.

If after plugging the unit into the AC line the display remains blank, the user should press < **TOP** > . If the display remains blank, the battery was probably totally discharged. After allowing the unit to charge for 10 to 30 minutes, try turning the unit on again. If the unit now operates correctly on AC, the battery was totally discharged and should be allowed to charge immediately for at least six hours. As soon as the battery has at least some charge (30 minutes) the *Lil' DMXter* may be used while charging.

2.4 BYPASSING THE INITIALIZATION MESSAGE

This is a vestigial feature. Earlier versions of this software had a scrolling copyright message. The following key presses were required to bypass the message. Since many people, myself included, use these key presses as second nature we have preserved them. The overall effect is the same as if you pressed any key in the cross of buttons or waited three seconds.

Hold down the < **OFF** > key while pressing the < **TOP** > key, release the < **TOP** > key while still holding down the < **OFF** > key. During the time that you are holding the < **OFF** > key but have released the < **TOP** > key the following message will be displayed. When you release both keys, you will drop to the owner identification message or if it is not present to the power timer display.

```
OK, OK, I'M AWAKE  
SHOW 1.11
```

2.5 RESETTING TO FACTORY DEFAULTS

The *Lil'DMXter's* software has a number of settable parameters or variables. The Transmit routine in particular is 'table driven'. These tables are stored in RAM memory. It is possible to set some user settable parameters to rather unusual settings. It is also possible that certain RAM parameters may be corrupted. If the internal battery switch is cycled OFF and then back ON all parameters will be reloaded from ROM. Of course all other data stored in RAM, such as **SHOW SAVER** cues will be lost. On Version **V1.62C** and up we provide a soft way to reset factory default values. This method does not erase **SHOW SAVER** cues.

To reset RAM parameters:

Press and **hold** both the < **OFF**> and the < **YES/Q**> keys. While holding the two keys press and **release** the < **TOP**> key. All internal parameters are now reset to the factory default values.

2.6 OWNER IDENTIFICATION MESSAGE (OPTIONAL)

We offer an optional internal identification message that briefly displays a message.

```
PROPERTY OF  
LITES'R'US
```

Or any two lines of 20 alphanumeric characters. If you have ordered this option, the message will last three seconds. This message may be keyed through in the same way that the version numbers can be keyed through. If your unit is not fitted with this option, this message will not be seen.

2.7 DISABLING THE AUTO POWER OFF TIMER

The unit will turn off if it hasn't registered a keystroke after 10 minutes or so. This is intended to conserve battery life. We strongly suggest that you make a habit of leaving the **POWER OFF** timer on. But if you are using the *Lil'DMXter* in a situation where you have to frequently walk away from the unit, you may find it best to disable this timer.

```
DISABLE THE AUTO  
POWER OFF TIMER?
```

Answer yes by pressing < **YES/Q**> or no by pressing < **UP**> or < **DOWN**> .

2.8 TURNING OFF THE DISPLAY BACKLITE

While we think you will usually want to use the display backlite, we can see some cases when ambient light conditions would make it better if it were off. You will also marginally lengthen battery life if you turn it off. The next choice the unit gives you is

```
DO YOU WANT THE  
BACKLITE OFF?
```

Answer yes by pressing < **YES/Q**> or no by pressing < **UP**> or < **DOWN**> .

The backlite has a timeout that will turn it off if no keystroke has been registered in about one minute. To turn it back on, press any key. Using the < **LEFT**> and < **RIGHT**> keys is appropriate here, as they will perform very few other functions but will turn the backlite on.

2.9 PRESSING < **TOP**> WHEN THE DMXter IS RUNNING

The **AUTO POWER OFF TIMER** and the **DISPLAY BACKLITE** queries are only displayed the first time that < **TOP**> is pressed after the DMXter has been off (sleeping). When the unit is running pressing < **TOP**> returns the DMXter to the top of the FUNCTION SELECT MENU to the TRANSMIT DMX512? query.

2.10 THE < **OFF**> KEY

The black < **OFF**> key is used to put the unit in 'sleep' mode. *Lil'DMXter* is, however, never truly 'off' because this switch doesn't interrupt power to the processor. (See the section on **BATTERY OPERATION** in Section 10 for details on battery operation and 'Turning Off the Battery'.) To turn off the battery, you must open the case. **IF YOU REALLY INSIST ON TRYING TO DO THIS BEFORE YOU READ THE SECTION, PUT DOWN THE ALLEN KEY. FIRST UNPLUG THE LIL'DMXTER FROM THE AC LINE!!!! NEVER OPERATE THE UNIT FROM THE AC LINE WHEN IT IS OUTSIDE ITS CASE.** NOW, YOU WANT TO REMOVE THE SINGLE SCREW ON THE BOTTOM OF THE CASE - NOT THE FOUR SCREWS ON THE TOP OF THE FACE!!!

3.0 FUNCTION SELECT MENU

The *Lil'*DMXter works on a function menu. All tests and functions of the *Lil'*DMXter are accessed by way of six FUNCTION SELECT MENUs. You can step thru the choices by pressing the < **UP**> or < **DOWN**> keys until you come to the function you wish to use. To select that function, press < **YES/Q**> . The functions you may choose from are:

TRANSMIT DMX512?	Section 4
RECEIVE DMX512?	Section 5
FLICKER FINDER?	Section 6
CABLE TESTER?	Section 7
SETUP USER OPTIONS?	Section 8
MULTI CHANNEL MODE?	Section 9
SHOW SAVER?	Section 10 (optional)

4.0 TRANSMIT DMX

TRANSMIT DMX is one of the primary diagnostic tools offered by the *Lil'*DMXter. The unit can transmit a DMX512 signal to allow you to check that the receive end of your transmission link is correctly receiving the signal.

DMX512 is a standard primarily intended to communicate level information to dimmers. It has provisions for non-level or non-dimmer communications by means of a 'start code'. For dimmer communication the start code has a value of 0, sometimes referred to as the 'null start code'. The default start code setting in the *Lil'*DMXter is therefore 0.

4.0(1) IF A NON-ZERO START CODE IS SET

If you previously changed the start code to a non-0 value, you will now be informed of this fact and given the chance to change the start code if you wish. If you do not wish to change the start code, press < **DOWN**> . Pressing < **UP**> will return you to the FUNCTION SELECT menu. The method is identical to that explained in Section 4.10.

4.0(2) IF A NON-STANDARD 'FLAVOR' IS SET

The *Lil'*DMXter provides considerable control of the parameters of the transmitted DMX signal. This is required because DMX512 allows many parameters to vary over wide ranges. Our method of allowing you to select groups of preset parameters we call selecting the 'flavor'. See the discussion of flavors in Section 4.8 below. The *Lil'*DMXter's default 'flavor' setting is DMX512/1990 8 μ S mark after break. With this setting the *Lil'*DMXter uses an 88 μ S break, an 8 μ S mark after break, transmits a level for all 512 dimmers, and refreshes the dimmers at approximately 40 times per second.

If you previously changed the 'flavor' to one other than DMX512/1990 88 μ S break, 8 μ S MAB you will now be informed of this fact and given the chance to change the 'flavor' if you wish. The method is identical to that explained in Section 4.8.

4.0(3) SUPPORT FOR EXTERNAL SWITCHES

In **ADJUST ONE DIMMER**, **AUTOFADE ONE DIMMER** and **ADJUST ALL DIMMERS** the software supports two user provided external switches. In **ADJUST ONE DIMMER**, and **AUTOFADE ONE DIMMER** the switches when present and enabled duplicate the unshifted functions of the < **RIGHT**> and < **LEFT**> keys. In **ADJUST ALL DIMMERS** the switches when present and enabled duplicate the unshifted functions of the < **UP**> and < **DOWN**> keys. A small pendant control or a foot switch can be used to activate these functions. This has been found to be useful by a number of customers.

To use this feature you must re-enable it by an item in the **USER SETUP OPTIONS** every time you are going to use it. (see section 8.5) It is disabled any time the < **TOP**> key is pressed. So after enabling this function you must leave the **USER SETUP OPTIONS** menu by way of **TO FUNCTION MENU?** menu item. The external switches will also be disabled whenever you leave the **TRANSMIT DMX512** menu.

At present Goddard Design does not sell these switches. Technical details needed to build your own will be found in section 13.6.

4.1 ADJUSTING ONE DIMMER

If you want to look at the output of one dimmer, or if you want to use the *Lil'*DMXter as a focusing remote, you want to use the first choice in the **TRANSMIT DMX512** menu.

```
TRANSMIT DMX512
ADJUST ONE DIMMER?
```

If you choose < **YES/Q**> , you will get a new display reading

```
SENDING DIMMER    1
TO LEVEL          0%
```

The level may be displayed in decimal, percent or hex. This status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). If percent is used, the level is followed by a % sign. If hex is used, the display will show two hex digits followed by a lower-case 'h'. Change the dimmer number by using the < **RIGHT**> and < **LEFT**> keys; with the default 'flavor' setting you may choose dimmers from 1 to 512. The dimmer number may be changed by any of the methods described in section 1.1(4) and summarized in the side bar on this page.

Use the < **UP**> and < **DOWN**> keys to change the level. You may use any of the key presses listed in section 1.1(3) or the side bar on this page to quickly get to the desired level.

4.2 REENTERING ADJUST ONE

If you press < **YES/Q**> to exit this routine and then press it again to reenter you will return pointing to the last dimmer that you were editing. If you exit to the main **FUNCTION SELECT** menu you will reset the dimmer number to dimmer one. Taking or erasing the snapshot will also reset the dimmer number to one. This behavior is uniform for all routines that use a dimmer number. This is a new feature in version 1.70.

QUICK STEPPING THRU DIMMERS AND LEVELS

DIMMER - AUTO-INCREMENT: Hold down the < **RIGHT**> or < **LEFT**> keys to auto-increment or auto-decrement the dimmer numbers by one.

DIMMER - JUMP BY 10: Hold down the < **YES/Q**> key and press the < **RIGHT**> or < **LEFT**> key to increment or decrement the dimmer number by 10.

DIMMER - AUTO-INCREMENT BY 10: Hold down < **YES/Q**> and then press and hold the < **RIGHT**> or < **LEFT**> keys to auto-increment or auto-decrement by 10.

RETURN TO DIMMER ONE: Press both the < **RIGHT**> and < **LEFT**> keys to return the dimmer number to one.

LEVEL - AUTO-INCREMENT: If you hold down the < **UP**> key, the dimmer levels will auto-increment towards full. If you hold down the < **DOWN**> key, the dimmer levels will auto-decrement towards zero.

LEVEL - BUMP TO FULL: Hold the < **YES/Q**> button down while you press the < **UP**> key to jump to full.

LEVEL - BUMP TO 0: Hold the < **YES/Q**> button down while you press the < **DOWN**> key to jump to 0.

LEVEL - BUMP TO HALF: Press both the < **DOWN**> and < **UP**> then release both keys the level will to jump to 50%. (new V1.70)

4.3 AUTOFADING ONE DIMMER

```
TRANSMIT DMX512
AUTOFADE ONE DIMMER?
```

This menu item is a test that allows you to cycle dimmers up and down automatically. It has two modes; one cycles one dimmer continuously, the other cycles a dimmer once and then steps to the next dimmer. You may choose whether a dimmer cycles from off to full and back to off (fade UP) or cycles from full to off and returns to full (fade DOWN).

```
AUTOFADE ONE DIMMER
ENABLE AUTOSTEP?
```

If you answer < **YES/Q** > to this question you will cause the DMXter to cycle a dimmer once and then step to the next dimmer. If you answer < **DOWN** > to this question the DMXter will cycle the same dimmer up and down continually. After pressing either < **YES/Q** > or < **DOWN** > the display will change to read:

```
AUTOFADE DIMMER    1
                   TO LEVEL  0%
```

The display will be static. The DMXter will have started to transmit. The level sent will be an unchanging zero. To start the autofade press either < **UP** > or < **DOWN** > . Pressing < **UP** > causes the DMXter to start fading from zero up to full and then back to zero. Pressing < **DOWN** > causes the DMXter to start fading with the dimmer set to full, fade the dimmer to zero and then back up to full. If you **ENABLE AUTOSTEP** and select < **UP** > , dimmer 1 will fade to full and then back to zero. When it reaches zero the dimmer number will increment to dimmer 2 and the level will start fading from zero to full. If you **ENABLE AUTOSTEP** and select < **DOWN** > dimmer 1 will bump to full, fade to zero and then back to full. When it reaches full it will bump to zero, the dimmer number will increment to dimmer 2, dimmer 2 will bump to full and start fading from full to zero. In either case the DMXter will cycle through all the dimmers.

The < **LEFT** > and < **RIGHT** > keys operate in the same way as in **ADJUSTING ONE DIMMER** above and may be used to change which dimmers are autofaded. If you did not **ENABLE AUTOSTEP** you must use the < **LEFT** > or < **RIGHT** > key to select the dimmer to autofade. Pressing < **LEFT** > or < **RIGHT** > zeros the old dimmer and sets the new dimmer to the beginning of its fade, either full or zero depending on whether we are fading < **UP** > or < **DOWN** > .

You may temporarily stop the fade by pressing < **YES/Q** > and either < **UP** > or < **DOWN** > . Pressing < **UP** > forces the dimmer to full; pressing < **DOWN** > forces the dimmer to zero. With the fade stopped, pressing either < **UP** > or < **DOWN** > will restart the fade.

The level may be displayed in decimal, percent or hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). If percent is used the level is followed by a % sign. If hex is used, the display will show two hex digits followed by a lower-case 'h'.

4.4 CLEARING SNAPSHOT

The *Lil'*DMXter can 'take a snapshot' of dimmer level information transmitted down the line, assuming you have plugged the input of the *Lil'*DMXter into the line coming from a working console. This is a useful function that we will discuss later. You may also build a snapshot dimmer by dimmer, using the *Lil'*DMXter's keys. Before doing this you may wish to clear the old snapshot.

The *Lil'*DMXter will ask you

```
TRANSMIT DMX512
CLEAR SNAPSHOT?
```

you should press < **YES/Q** > to answer yes. The unit will next ask

CLEAR SNAPSHOT?
ARE YOU SURE?

This gives you a second chance if you didn't really mean to clear it. If you did, press < **YES/Q** > again and the unit will momentarily read

ZZAAPP!!
SNAPSHOT IS HISTORY!

The *Lil'*DMXter will then drop thru to:

TRANSMIT DMX512
SEND/EDIT SNAPSHOT?

skipping the TAKE NEW SNAPSHOT menu item.

4.5 TAKING NEW SNAPSHOT

The *Lil'*DMXter can take the information it receives from the digital line and hold it in memory for later use. Taking a snapshot overwrites any old snapshot.

When you press < **YES/Q** > the top line of the display will briefly read TAKING SNAPSHOT. Assuming that there is data to be recorded, the bottom line will read briefly SNAPSHOT RECORDED. After a brief pause, the *Lil'*DMXter will drop thru to the next menu entry and the display will read

TRANSMIT DMX512
SEND/EDIT SNAPSHOT?

The snapshot function is start code sensitive. If your DMXter is still reading TAKING SNAPSHOT for more than three seconds, and the bottom line remains blank, this means that your DMXter is receiving data with a different start code than the one it is currently set to receive.

After 3 seconds, if no digital input is received, or if the input is not a digital form that the *Lil'*DMXter can recognize, you will see

NO DIGITAL INPUT
OR INPUT NOT DMX512

When you see this message on the display, first check to see that you have a cable plugged into the *Lil'*DMXter input connector and into the output connector of a working console.

Neither executing < **TOP** > nor < **OFF** > erases a snapshot. Many menu items erase a snapshot.

4.5(1) ACTIONS THAT OVERWRITE OR ERASE A SNAPSHOT

The following events will overwrite a snapshot with a new snapshot:

- 1 - Taking a new snapshot, including the snapshots in **MULTI CHANNEL MODE**
- 2 - In cable test mode, using **SINGLE ENDED** cable test
- 3 - Using the **FLICKER FINDER**
- 4 - Using **VIEW LEVELS**. Whatever levels are in the table at the time one exits **VIEW LEVELS** will be preserved and may be used as a snapshot.
- 5 - **SHOW SAVER: RECORD SCENE, EDIT SCENE, and PLAYBACK SCENE**
- 6 - Using any transmit function in **MULTI CHANNEL MODE**

The following events will erase a snapshot and leave the table clear:

- 1 - **ADJUST ONE DIMMER**
- 2 - **ADJUST ALL DIMMERS**

- 3 - Using **CLEAR SNAPSHOT**
- 4 - Shutting down due to low battery (showing you **MEAL PENALTY**)
- 5 - If the battery is turned off by the internal battery switch

4.6 SEND/EDIT SNAPSHOT

Pressing the < **YES/Q** > key will start sending the entire snapshot to the dimmers and display levels of four dimmers at a time. You can edit this as you need: use the < **RIGHT** > and < **LEFT** > keys for changing the dimmer numbers. Use the < **UP** > and < **DOWN** > keys for changing the level of the dimmer displayed in the left-most position on the display.

The levels may be displayed in decimal, percent or hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). If percent is used **LEV:** is changed to read **LEV%**. If hex is used, the display will show two hex digits followed by a lower-case 'h'.

Dimmer number and dimmer level may be set using the key presses listed in sections 1.1(3) and 1.1(4) and summarized in the side bar on page 11.

4.6(1) SEARCHING FOR THE NEXT DIMMER WITH LEVEL (new)

SEARCHING FOR THE NEXT DIMMER AT LEVEL: Press and hold the < **DOWN** > key while pressing and releasing < **RIGHT** > or < **LEFT** > keys to search for next higher (< **RIGHT** >) or lower (< **LEFT** >) dimmer with a level. The next dimmer with a level greater or equal to the search minimum will be displayed in the leftmost position of the display (New V1.70)

4.6(2) RE-ENTERING SEND/EDIT SNAPSHOT (new)

On exiting **SEND/EDIT SNAPSHOT** the transmitter is turned off, but the current dimmer number is NOT reset. Therefore you may simply press < **YES/Q** > again and restart exactly where you left off. This means that a finger stutter on the keys is not a disaster. You may also pause during a focus session and return to where you were. This is a new feature in V1.70 software. Previously the dimmer number was reset to 1 every time **SEND/EDIT** was entered.

If you exit to the main **FUNCTION SELECT** menu you will reset the dimmer number to dimmer one. Taking or erasing the snapshot will also reset the dimmer number to one. This behavior is uniform for all routines that use a dimmer number.

Entering any other DMX test routine in **TRANSMIT**, **RECEIVE** or **CABLE TEST** will clear all dimmer levels set in **ADJUST SOME**.

4.6(3) CLEARING SEND/EDIT (new)

You can set all dimmer levels to zero from within **SEND/EDIT SNAPSHOT**. Hold the < **YES/Q** > and < **DOWN** > keys. After about 3 seconds the display will change to read:

```
DIM:  25  26  27  28
      CLEAR ALL DIMS?
```

The top line of the display will not change; only the bottom line is rewritten. Release both keys. Now pressing < **YES/Q** > will clear all the dimmers, pressing < **UP** > or < **DOWN** > will return you to **SEND/EDIT SNAPSHOT**.

4.7 ADJUST ALL DIMMERS

This function allows you to set all the dimmers to the same level at once. Use the < **UP**> and < **DOWN**> keys. If you hold down the < **UP**> key, the dimmer levels will auto-increment towards full. If you hold down the < **DOWN**> key, the dimmer levels will auto-decrement towards zero.

The level may be displayed in decimal, percent or hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). If percent is used the level is followed by a % sign. If hex is used, the display will show two hex digits followed by a lower-case 'h'.

Note that the *Lil'DMXter* will not allow you to bring all the dimmers to half or full at once. Many installations lack the power service to handle everything at full at once, and we don't own a piece of any fuse or circuit breaker manufacturer.

4.8 SEND FLAVOR

Although they are 'standards', there are many parameters of DMX512/1986 and DMX512/1990 that are permitted to vary over a wide range. These parameters may vary from product to product or even from moment to moment at the output of the same product. The Standard defines the acceptable range within which a number of parameters of the transmitted signal are permitted to vary. The *Lil'DMXter* allows you to vary 5 important parameters of the DMX512 signal. Three of these parameters may be adjusted to values that fall outside those permitted by the Standards. We provide these out-of-Standard test signals to allow sophisticated testing of DMX receivers. It should be understood that one piece of equipment's ability to operate outside the Standard does not make it inherently a 'better' piece of gear than one that does not!

While these parameters are individually variable, to simplify matters, we have provided for presets of those parameters and we have taken to referring to those presets as 'flavors'. Therefore to choose a flavor refers to choosing a preset of parameters for the transmitted signal. The concept of flavors applies only to a transmitted signal generated by the *Lil'DMXter* and not to reception.

There are 8 possible choices of 'flavor':

NAME	BREAK	MAB	DIMMERS	IFT	IPT	Updates/Sec
DMX512/1990 8 μ S MAB	88 μ S	8 μ S	512	0	0	40
24 DIMMERS 8 μ S MAB	88 μ S	8 μ S	24	0	0	769
DMX512/1990 4 μ S MAB	88 μ S	4 μ S	512	0	0	40
24 DIMMERS 4 μ S MAB	88 μ S	4 μ S	24	0	0	771
70 μ S BK 4 μ S MAB 20 D	70 μ S	4 μ S	20	0	0	921
USER A (default values)	160 μ S	20 μ S	128	1	1542	23
USER B (default values)	160 μ S	20 μ S	512	1	40	29
USER C (default values)	160 μ S	20 μ S	512	2	742	16

BREAK = BREAK TIME

MAB = MARK AFTER BREAK

DIMMERS = NUMBER OF DIMMERS

IFT = INTERFRAME TIME² (in units, each unit = 22 μ S)

IPT = INTERPACKET TIME (in units, each unit = 22 μ S)

Getting into the **SEND FLAVOR** submenu will put you at the last flavor that was set. You may step thru the choices from there. Use the < **YES/Q** > key to select your flavor and return to the **TRANSMIT** submenu. You will find yourself at the **ADJUST ONE DIMMER** choice. This is an exception to the general rule that < **YES/Q** > returns you the point from which you entered the menu.

4.8(1) CHANGING THE USER FLAVORS

The *Lil'DMXter* gives you three choices of 'send flavor' for you to define using your own parameters. When the display reads

```
SEND FLAVOR?
EDIT USER FLAVORS?
```

and you press < **YES/Q** > , the next display briefly reads

```
USER FLAVOR EDITOR
USER A USER B USER C
```

² Before the V1.70 manual GDC called this parameter 'INTERBYTE time' we have changed the name to more closely match the DMX512 standard's wording.

4.8(2) CHANGE BREAK LENGTH

The entry routines for the next 5 parameters are a sub-menu loop. When you are done editing these parameters, you will need to go to the 6th item which reads **RETURN TO FLAVOR SELECT MENU?** This is a change in behavior from earlier versions of our software. The top line of the next display reads

BREAK LENGTH IN μ S

On the second line there will be three numeric entries representing the user A, B, and C break lengths. If you wish to change values for break lengths, press the < **RIGHT** > or < **LEFT** > keys. You will see an underline cursor entering from the right or left side of the display. The arrow keys move the cursor along this line; when you are at the location where you wish to change the entry, use the < **UP** > and < **DOWN** > keys to count up or down. When you are done making changes, pressing the < **YES/Q** > key enters the numbers and clears the cursor. You may now use the < **UP** > and < **DOWN** > keys to step thru the next parameter submenu. If you do not wish to change break lengths, press the < **UP** > or < **DOWN** > keys to step thru the parameter submenu.

The DMX512 Standard requires that breaks be at least 88μ S and allows for breaks as long as 1 second. The *Lil'*DMXter can transmit breaks as short as 50μ S and as long as $49,144\mu$ S if the mark after break is set at 8μ S. The total of the mark after break and the break can equal no more than $49,152\mu$ S, and the *Lil'*DMXter will not allow you to exceed this total.

4.8(3) CHANGE MARK AFTER BREAK LENGTH

The next user adjustable parameter is mark after break length (MAB). Just as above for break length, use the < **RIGHT** > and < **LEFT** > keys to move the cursor across the display, and the < **UP** > and < **DOWN** > keys to increment and decrement the information. When you are done making changes, pressing the < **YES/Q** > key enters the numbers and clears the cursor.

DMX512/1986 defined the MAB as 4μ S. DMX512/1990 defined the MAB as no shorter than 8μ S and less than 1 second. The *Lil'*DMXter can transmit a mark after break as short as 3μ S and as long as $49,064\mu$ S if the break is set at 88μ S. The total of the break and the mark after break can equal no more than $49,152\mu$ S and the *Lil'*DMXter will not allow you to exceed this total.

4.8(4) NUMBER OF DIMMERS

The next user adjustable parameter is number of dimmers. As before, use the < **RIGHT** > and < **LEFT** > keys to move the cursor across the display and the < **UP** > and < **DOWN** > keys to increment and decrement dimmer number. Press the < **YES/Q** > key to enter the information. Press the < **DOWN** > key to go on.

The *Lil'*DMXter may be set to transmit any number of dimmers from 1 to 999.

DMX512 sets a maximum number of dimmers at 512. No dimmer system should be expected to work correctly when receiving more than 512 dimmers. We provide the ability to transmit more than 512 dimmers as a test feature. While DMX512 does not set a minimum number of dimmers, setting the *Lil'*DMXter to transmit fewer than 22 dimmers will violate the minimum break to break spacing requirements of DMX512/1990 unless you properly set the interframe time or the interpacket time (see below).

4.8(5) INTERFRAME TIME

DMX512 transmits dimmers grouped in 'packets'. A packet starts with a break and mark after break sequence. Next the start code is sent, followed by the dimmers. Each dimmer is transmitted as a byte. A start bit and two stop bits are added to the raw byte. Technically when the start bit and stop bits are present the byte is referred to as a 'frame'. The frames are sent sequentially. The packet is considered to continue until the start of the next break. The Standard does not require there to be any time between frames. Many DMX512 transmitters do insert a small pause between frames. The *Lil'*DMXter does insert a very small pause between

frames. This pause is approximately $4\mu\text{S}$ long. The *Lil'DMXter* takes $48\mu\text{S}$ to transmit a frame when the minimum possible time would be $44\mu\text{S}$.

While the term 'frame' is technically correct it is common usage to refer to DMX512 as sending bytes. In fact all versions of this manual prior to V1.70 used the term INTERBYTE time to refer to the above parameter. So if INTERFRAME time sounds new that's because it is - At least in this manual.

To help simulate consoles that insert pauses and to allow testing of some early dimmer designs that may require pauses between dimmer frames, the *Lil'DMXter* allows you to insert an additional pause between each dimmer frame. The inter-frame interval may be adjusted between 0 and 15 units. Each unit represents an additional pause of $22\mu\text{S}$ (equal to $\frac{1}{2}$ a frame time) added to the $4\mu\text{S}$ noted above.

4.8(6) INTERPACKET TIME

The next user adjustable parameter is interpacket time or interpacket pause. Some early dimmers may require such a pause. The *Lil'DMXter* allows the user to insert up to an additional 65,535 units of interpacket time, each unit equal to a $22\mu\text{S}$ pause. DMX512/1990 requires that a dimmer function properly with no pause between packets.

The *Lil'DMXter* inserts a very short pause of about $4\mu\text{S}$ at the end of each packet. We will consider this to be a zero unit interpacket time.

One use of the interpacket time is to allow the *Lil'DMXter* to send DMX packets with fewer than 22 dimmers without violating the Standard. DMX512/1990 requires the break-to-break time not be less than $1196\mu\text{S}$. With packets of fewer than 22 dimmers this requirement will not be met by the *Lil'DMXter* unless interpacket time is added to maintain the minimum break-to-break time requirement. Should you wish to send packets of less than 22 dimmers that conform to the Standard, you should add at least 2 interpacket units for each dimmer less than 24 that you have selected. (Yes, we mean 24. When figuring out how many units of interpacket time to use, calculate with 24 instead of 22 dimmers.)

4.9 RETURN TO FUNCTION MENU

This does exactly what you might think it does!

4.10 CHANGING THE START CODE

DMX512 is a standard primarily intended to communicate level information to dimmers. It has provisions for non-level or non-dimmer communications by means of a 'start code'. For dimmer communication the start code has a value of 0, sometimes referred to as the 'null start code'. The default start code setting in the *Lil'DMXter* is therefore 0. Some of this equipment uses non-0 start codes. The *Lil'DMXter* provides you with the ability to set the start code you need for the type of equipment you are testing.

The display will read

```
START CODE IS 0
CHANGE IT?
```

If you press < **YES/Q** > the display will read

```
START CODE IS 0
CHANGE START CODE
```

Press the < **UP** > and < **DOWN** > keys to change the start code to your desired setting. Pressing < **UP** > and < **DOWN** > together will cause the start code to bump to 128. Pressing < **YES/Q** > and < **DOWN** > together will return the start code to zero. When the desired value is displayed, press the < **YES/Q** > key to save this value. The DMXter will use this value as its start code for both **TRANSMIT** and **RECEIVE** until it is changed

again by the user. The only exceptions are when a DMXter has had its battery turned off or when the power supply safety circuit has shut down the power supply or when the factory defaults have been restored. For details, see Section 2.5. Then it reinitializes the start code to 0. See **MEAL PENALTY**, Section 9.2(1).

The start code may be displayed in hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). Start codes may only be displayed in decimal or hex. If percent is selected for levels via **USER SETUP OPTIONS** start codes will be displayed in decimal. If hex is used, the display will show two hex digits followed by a lower-case 'h'.

Exiting **CHANGE START CODE** jumps you to **ADJUST ONE DIMMER**.

This is an exception to the general rule that **< YES/Q >** returns you the point from which you entered the menu.

4.10(1) MAB ACCURACY VS. START CODE

If the start code is set to 0 and the break length is less than 16mS, the mark after break should be essentially jitter-free. When you set a non-0 start code or when the break time is longer than 16mS, regardless of start code, we change the method of generating the mark after break. This alternate method has a maximum jitter of about 4 μ S. To guarantee that the generated mark after break is never less than that set by the current flavor, we offset the average value. The result is that if you set the mark after break to 8 μ S with a non-0 start code, the minimum value will be 8 μ S ; the maximum value will be about 12 μ S . Most of the time, the average value will be close to 12 μ S . Very few packets with a mark after break as short as 8 μ S will be sent.

4.11 SETTING THE MINIMUM LEVEL FOR SEARCHES

```
SEARCH MIN IS    1%
CHANGE IT ?
```

In **SEND /EDIT** pressing and holding down the **< DOWN >** key and then pressing either **< LEFT >** or **< RIGHT >** will cause it to search the dimmer table for next higher or lower dimmer with a level greater or equal to the search minimum.

4.12 TRANSMIT SCOPE TRIGGER

The *Lil'*DMXter can provide an oscilloscope triggering signal synchronized to the break in the transmitted DMX512 data stream. Most users will not have any interest in this function - feel free to skip the rest of this section. For this reason, the default for this function is off.

The scope trigger menu display reads

```
SCOPE TRIGGER IS OFF
ENABLE TRIGGER?
```

Use the **< YES/Q >** key to enable it. The scope trigger will turn on and the display will read

```
SCOPE TRIGGER IS ON
DISABLE TRIGGER?
```

Each time you press the **< YES/Q >** key the display will toggle. Leave this function by using the **< UP >** or **< DOWN >** keys.

Technical details: the scope trigger is output on Pins 4 and 5 of the female connector. The signal is balanced RS485. Pin 5 goes high approximately 2 μ S before the falling edge of transmitted break and remains high until approximately 3.2 μ S after the falling edge of mark after break. If you need to trigger an oscilloscope on DMX512 sent by another transmitter, see section 13.

5.0 RECEIVE DMX512

Answering < **YES/Q**> to the RECEIVE DMX512? query puts you in the **RECEIVE** menu, the first question the user needs to answer is

```
RECEIVE DMX512
AT END OF LINE?
```

DMX512 systems may be wired as a 'daisy chain' with multiple receivers (dimmer racks) connected in series by a cable going from the console to receiver 1, another cable going from receiver 1 to receiver 2, and then on from there until all the receivers are connected in a chain. The last receiver in the chain is required to terminate the line. For more information on termination, please see Section 12.1.

The *Lil'*DMXter may be inserted at any point in the daisy chain. If it is inserted at the end of the daisy chain, it must terminate the DMX line. If it is inserted in the middle of the daisy chain it should be transparent passing signals from its input connector to its output connector. Your answer to the END OF LINE? question will control whether the DMXter terminates the line or not. Answering < **YES/Q**> will terminate the line.

5.0(1) IF A NON-ZERO START CODE IS SET

If you previously changed the start code to a non-0 value, you will be informed of this fact and given the chance to change the start code if you wish. The method is identical to that explained in Section 5.4.

5.1 VIEW LEVELS

Pressing the < **YES/Q**> key will display 4 dimmer numbers on the top line and their levels below. If within 3 seconds the *Lil'*DMXter does not receive DMX512 data, the display will change to

```
NO DIGITAL INPUT
OR INPUT NOT DMX512
```

This is a latched display. After correcting the problem you may clear the NO DIGITAL INPUT display by restarting the **VIEW LEVELS** section. This is done either by using the < **UP**> or < **DOWN**> keys, or by exiting **VIEW LEVELS** (press < **YES/Q**>) and re-entering (press < **YES/Q**> again).

The unit allows you to step thru the levels for all of the dimmers displaying 4 at one time.

Regardless of how many dimmers are being transmitted, there will always be 512 entries in the dimmer table. The level value for dimmers that are not being transmitted will be displayed as 0. If you wish to know how many dimmers are being transmitted, see **5.1(2) RECEIVED DIMMER SUMMARY DISPLAY** below.

The levels may be displayed in decimal, percent or hex. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). If percent is used LEV: is changed to read LEV%. If hex is used, the display will show two hex digits followed by a lower-case 'h'.

5.1(1) RECEIVED DIMMER SUMMARY DISPLAY

Hold down the < **YES/Q**> key and press < **DOWN**> . You will see the following display

```
23 OF 256 L >= 1%
DIM: 2 TO DIM: 100
```

The top line of this display tells you the total number of dimmers received, in the case above, 256, and the number of dimmers having a level greater or equal to the search minimum. In this case, 23 dimmers have a level greater than or equal to 1 percent.. The bottom line lists the lowest dimmer and the highest dimmer to

have a level greater than or equal to the search minimum. The search minimum can be set from 0 to 255; it is set by its own menu item (see Section 5.5)

5.1(2) < **RIGHT**> AND < **LEFT**> IN VIEW LEVELS

AUTO-INCREMENT: Hold down the < **RIGHT**> or < **LEFT**> keys to auto-increment or auto-decrement the dimmer numbers by one.

JUMP BY 10: Hold down the < **YES/Q**> key and press the < **RIGHT**> or < **LEFT**> key to increment or decrement the dimmer number by 10.

AUTO-INCREMENT BY 10: Hold down < **YES/Q**> and then press and hold the < **RIGHT**> or < **LEFT**> keys to auto-increment or auto-decrement by 10.

SEARCH FOR NEXT DIMMER AT LEVEL: Hold down the < **DOWN**> key while pressing < **RIGHT**> or < **LEFT**> to search for next the higher (< **RIGHT**>) or lower (< **LEFT**>) dimmer with a level greater or equal to the search minimum

RETURN TO DIMMER ONE: Press both the < **RIGHT**> and < **LEFT**> keys together to return the dimmer number to one.

5.1(3) DATA ERROR WHILE VIEWING LEVELS

If a significant data transmission error is detected, the first three characters of the second line of the display will read ERR instead of LEV. You may view the error and clear the ERR flag by pressing and holding < **YES/Q**> and then pressing < **UP**>. The display will be the same as the first display in **VIEW PARAMETERS**.

5.2 VIEW PARAMETERS

Whenever the *Lil'*DMXter is receiving DMX512 it checks for the following problems:

PE = PARITY ERROR

FE = FRAMING ERROR

BK = BREAK TOO SHORT (less than 88 μ S)

MK = MARK AFTER BREAK TOO SHORT (less than 8 μ S)

DMX512/1986 called for a 4 μ S mark. DMX512/1990 requires a mark of 8 μ S or longer. We flag marks of less than 8 μ S as a warning of possible compatibility problems.

OVFL = OVERFLOW (meaning that you have attempted to receive more than 512 dimmers)

BNW = BROKEN WIRE (The probable cause is Pin 2 or 3 of your cable is open. If this reads as B?W it means that this feature is disabled. Turn it on again thru the **USER SETUP OPTION**.)

If any portion of this test returns an error the unit will show it. An error is shown by an * on the display under the error's code. The display on the left shows two errors, a short break and packet containing more than 512 dimmers. The display on the right is the 'no error display'.

```
| PE FE BK MK OVFL BNW |
|           *      *   |
```

```
| PE FE BK MK OVFL BNW |
| NO ERRORS DETECTED |
```

Technical Note: We report a **PARITY ERROR** for any frame (byte) that does not have its first stop bit. DMX512 is a no-parity system and the 9th bit should always be high. To prevent false trips on the **BREAK TOO SHORT** and **MARK AFTER BREAK TOO SHORT** measurements, the trip point for these measurements is set as follows: a break must be measured as 87.5 μ S or less. A mark after break must be measured as 7.5 μ S or less.

The *Lil'*DMXter allows the user to look at certain parameters of the received signal in detail. Pressing the < **UP**> and < **DOWN**> keys will scroll the user thru the choices. Pressing < **DOWN**> will bring you to:

5.2(1) BREAK LENGTH

BREAK LENGTH reads out a minimum value, a maximum value and an average of the last 32 packets, all expressed in μS (or if appropriate, in milliseconds). The average value will take a few seconds to appear on the display. The *Lil'*DMXter can measure the minimum, maximum and average break length for breaks longer than $65\mu\text{S}$. If it receives a minimum break time of less than $65\mu\text{S}$, the minimum and maximum values will be replaced with the words `TOO SHORT`. This is to warn you that you have exceeded the measurement capability of the DMXter. The average value will still be shown but its validity should not be counted on. Break length is not start code sensitive; the break length of all packets is measured regardless of the start code that the packet is transmitted with.

5.2(2) MARK AFTER BREAK LENGTH

MARK AFTER BREAK LENGTH reads out a minimum value, a maximum value and an average value for Mark After Break length expressed in μS (or if appropriate, in milliseconds). The average value will take a few seconds to appear on the display. If it receives a minimum mark time of less than $3\mu\text{S}$, the minimum and maximum values will be replaced with the words `TOO SHORT`. This is to warn you that you have exceeded the measurement capability of the DMXter. The average value will still be shown but its validity should not be counted on. MAB length is not start code sensitive; the MAB length of all packets is measured regardless of the start code that the packet is transmitted with.

5.2(3) LIST RECEIVED START CODES

The *Lil'*DMXter shows you which start codes are being sent. It also reminds you which start code it is currently set to receive levels from. The top line of the display will read

START CODES SET= X (where X= the current start code)

The bottom line will read out the start codes that have been received since the test was started. They will be sorted in numerical order with the lowest number to the left. If more than four start codes are being received, you will see

< 0 4 58 200 > (or something similar)

The brackets indicate that you may scroll < **RIGHT** > or < **LEFT** > thru all the start codes being received.

The start code may be displayed in hex. The status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). Start codes may only be displayed in decimal or hex. If percent is selected for levels via **USER SETUP OPTIONS** start codes will be displayed in decimal. If hex is used, the display will show two hex digits followed by a lower-case 'h'.

5.2(4) # OF FRAMES PER PACKET

This screen reads out the minimum and maximum values. We call this **FRAMES PER PACKET**; we mean number of dimmer levels or bytes per packet. Prior to V1.70 this parameter was called **BYTE PER PACKET**. The start code is not included in this count.

Warning: while the Standard does not require that the number of frames be fixed for all transmissions, if the minimum and maximum number of frames are different, you should suspect a problem. Also you should never receive more than 512 frames. This test is start code sensitive; this test reports the frame count of only those packets transmitted with the currently selected start code.

5.2(5) BREAK-TO-BREAK TIME

This screen reads out the minimum value, the maximum value and an average value. The *Lil'*DMXter can measure the minimum, maximum and average break-to-break length of a DMX512 signal where this time is

900 μ S or longer. If it receives a break-to-break time of less than 900 μ S, all three values will be removed from the display and be replaced by the words TIME LESS THAN 900 μ S. Break-to-break time is not start code sensitive; the break-to-break time of all packets is measured regardless of the start code that the packet is transmitted with.

The method of measuring break-to-break length on the *Lil'*DMXter causes there to be a statistical uncertainty of $\pm 8\mu$ S on any measured value. If the DMXter is receiving a DMX512 signal from a console whose break-to-break lengths do not vary, eventually the minimum value will settle to a value 8μ S shorter than the average while the maximum will settle to a value 8μ S greater than the average. For consoles whose break-to-break length varies but does so in a repeatable manner, the minimum value is likely to be 8μ S less than the true minimum while the maximum value will be 8μ S greater than the true maximum value. For consoles that erratically produce variable break-to-break lengths it is impossible to say exactly what the results will be other than the minimum and maximum values will be within $\pm 8\mu$ S of the ideal value. Added to this uncertainty is any inaccuracy caused by the finite accuracy of the *Lil'*DMXter's time base. The time base should be accurate to ± 75 parts per million for units with serial numbers of 908 or higher. Prior to that it should be accurate to ± 150 PPM.

5.2(6) UPDATES PER SECOND

This screen reads out the minimum, maximum and average number of DMX512 packets per second. The minimum and the maximum values are refreshed once per second. Thirty-five seconds is required for the average to appear initially. Following that, it is refreshed once per second. To leave this display, press either **< UP >** or **< DOWN >** or **< YES/Q >** and hold them for approximately one second. You will know that you have held the key long enough when the numbers on the bottom line of the display have been erased. This test is not start code sensitive.

5.3 RETURN TO FUNCTION MENU

While many users will find that using the **< TOP >** key to be the easiest way to get back to the function menu, using this menu item provides an advantage: if you answered **< YES/Q >** to the **< END OF LINE? >** query, the DMXter is now in a terminated mode and will not pass data. Using **< RETURN TO FUNCTION MENU? >** unterminates the DMXter; using **< TOP >** does not.

5.4 CHANGING THE START CODE

DMX512 is a standard primarily intended to send level information to dimmers. It has provisions for non-level or non-dimmer communications by means of a 'start code'. For dimmer communication the start code has a value of 0, sometimes referred to as the 'null start code'. The default start code setting in the *Lil'*DMXter is therefore 0. Some equipment uses non-0 start codes. The *Lil'*DMXter provides you with the ability to set the start code you need for the type of equipment you are testing.

The display will read

```
START CODE IS  0
CHANGE IT?
```

If you press **< YES/Q >** the display will read

```
START CODE IS  0
CHANGE START CODE
```

Press the **< UP >** and **< DOWN >** keys to change the start code to your desired setting. Pressing **< UP >** and **< DOWN >** together will cause the start code to bump to 128. Pressing **< YES/Q >** and **< DOWN >** together will return the start code to zero. When the desired value is displayed, press the **< YES/Q >** key to save this value. The DMXter will use this value as its start code for both transmit and receive until it is changed again by the user. The only exceptions are when a DMXter has had its battery turned off or when the power supply

safety circuit has shut down the power supply or when the factory default values have been restored. See Section 2.5. Then it reinitializes the start code to 0. See **MEAL PENALTY**, Section 11.2(1).

The start code may be displayed in hex. The status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). Start codes may only be displayed in decimal or hex. If percent is selected for levels via **USER SETUP OPTIONS** start codes will be displayed in decimal. If hex is used, the display will show two hex digits followed by a lower-case 'h'.

5.5 SETTING THE MINIMUM LEVEL FOR SEARCHES

```
SEARCH MIN IS      1%  
CHANGE IT ?
```

The search minimum is used by **VIEW LEVELS**. In **VIEW LEVELS** pressing and holding down the < **DOWN**> key and then pressing either < **LEFT**> or < **RIGHT**> will cause **VIEW LEVELS** to search the received dimmer table for next higher or lower dimmer with a level greater or equal to the search minimum. The number of dimmers with a level greater or equal to the search minimum is reported in the **RECEIVED DIMMER SUMMARY DISPLAY**.

This menu item is used to set the search minimum. The range for the search minimum is 0 to 255. The search minimum may be displayed in decimal, percent or hex. The status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). If percent is used the level is followed by a % sign. If hex is used, the display will show two hex digits followed by a lower-case 'h'.

The mechanics of changing the search minimum are the same as for changing the start codes as described in section 5.4 above.

5.6 DMX512 PARAMETERS NOT CHECKED

BAUD RATE - The *Lil'DMXter* does not measure the baud rate of the received signal. Neither does it measure bit jitter. If the baud rate of the console is within the allowed range, the *Lil'DMXter* should properly receive the signal, but no measurements are made or reported.

SIGNAL VOLTAGE LEVELS - The *Lil'DMXter* does not measure the voltages provided on the RS485 line, specifically neither differential nor common mode voltages are evaluated to see if they fall within the RS485 specification. If the *Lil'DMXter* is reliably receiving data, it is probable that the differential signal level is adequate. Testing of common mode signals is beyond the scope of the *Lil'DMXter* and this manual. Both common mode and differential mode signals can be tested by a qualified technician using standard laboratory equipment.

INTERFRAME TIME - Current software does not check Interframe time.

INTERPACKET TIME - Current software does not check Interpacket time.

6.0 FLICKER FINDER

The *Lil'*DMXter will let you look at changing DMX512 levels in your lighting system. Running a cue causes DMX512 levels to change, of course. When your console is sitting there not running cues, the levels should be constant. Sometimes they aren't and that's not an easy problem to diagnose and troubleshoot - until now. Most of the time the flickering lamp is not caused by the console; it's the lamp, or the socket, or the dimmers. Once in a while it is the console or the DMX512 transmission line. Since all of us automatically suspect the piece of equipment, we understand the least, the *Lil'*DMXter allows you to do a quick diagnosis of your console and the transmission line - and lets you get out the ladder with a heavy heart, but a clear conscience.

To use **FLICKER FINDER** you will use the DMXter to take a **SNAPSHOT** of the console's output and compare it to what the console is outputting a short time later. You can do this at the console end only, checking the console only. Or, if you have any reason to suspect the DMX512 cable, you can do it at either the console first, moving down to the dimmer end, or you can do the whole test at the dimmer end on the principle that a funky cable will not give you repeatable results. If you suspect a bad cable, we advise that you run **SINGLE ENDED CABLE TEST** first, as this will test certain cable parameters that **FLICKER FINDER** is not designed to test.

Be certain that the *Lil'*DMXter is connected to the console's output, either at the console or at the dimmer end of the control cable. Set the console to output a stable cue (important-not a chase!) Set a real cue with real levels, not every channel at 00. If you suspect one mode is 'flickering' set the console in that mode.

Upon entering the **FLICKER FINDER** submenu, the first message is

```
TAKE SNAPSHOT OF
CONSOLE 'S OUTPUT?
```

Pressing < **YES/Q** > causes it to record the snapshot.

A technical note: During the taking of the snapshot the DMX512 line is momentarily terminated. So there is a very brief moment when data is not passed thru to the DMX512 OUT connector. If the DMXter did not see a digital input, it will tell you so.

```
NO DIGITAL INPUT
OR INPUT NOT DMX512
```

After correcting the problem, press the < **DOWN** > key to try again. After the snapshot is recorded, the next display will

```
COMPARE LIMIT IS    4
CHANGE IT?
```

The compare limit is the number of steps of change either plus or minus that are allowed before the DMXter considers that a channel is changing or flickering. Note that one step is one part in 256; not one part in 100. The default compare limit is 4, but the user may set it from 0 to 64. The *Lil'*DMXter will remember the last limit you set and only returns to the default upon hard power up, i.e., battery switch on/off or **MEAL PENALTY**. **Note** that the compare limit menu item **does not** support any of the multi key bump functions.

The compare limit may be displayed in decimal or hex. If percent is selected for levels, the compare limit will be displayed in decimal. The status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3). If hex is used, the display will show two hex digits followed by a lower-case 'h'.

If the previously set compare limit is satisfactory, you may bypass changing it by pressing the < **DOWN** > key. Pressing < **YES/Q** > allows you to change the compare limit in a manner similar to changing start code. When you have set the compare limit (or bypassed setting it) you will see the following message

FLICKER FINDER
AT END OF LINE?

Is the DMXter the last DMX512 device in line or do you have a loop thru to other receivers? Answering this question starts the data comparison. The display will read

COMPARING INCOMING
DATA TO REFERENCE

As long as no errors are detected and the battery has sufficient charge, you will continue to see this message.

When an error is detected, the message will change to

ERRORS DETECTED
PRESS YES/Q TO VIEW

The test continues to operate with no further indication of other errors, if any. So let the test continue to run for whatever period of time you want; 15 minutes, one hour etc. Pressing < **YES/Q** > will show you a summary screen of the errors found.

3 DIMMERS W/ERRORS
FIRST: 2 LAST: 216

It will show you the number of dimmers with errors (1-512). On the second line of the display you will see **FIRST** and a number representing the lowest dimmer number with errors and **LAST** and a number representing the highest dimmer number with errors. To see details of the dimmers, press < **DOWN** > . You will now see a display

DIM: XXX ERRS: XXXXX
L: XXX H: XXX R: XXX

This screen means: the number following **DIM** is the lowest dimmer number with errors. The number following **ERRS** is how many errors accumulated for this dimmer; it may range from 1-65,535. The number following **L** is the lowest level outside the reference window that the dimmer went to. The number following **H** will equal the highest level outside the reference window. The number following **R** equals the reference value for this dimmer recorded when the snapshot was taken. It is possible for the **L** value to be higher than the **R** value if all the incoming levels are higher than the **R** value. Similarly it is possible for the **H** value to be lower than the **R** value if all the incoming levels are lower than the **R** value.

At this point pressing the < **RIGHT** > key will take you to an identical screen for the next dimmer with errors. Using the < **LEFT** > key will take you to the previous dimmer with errors. (If you are at the first dimmer with errors, the < **LEFT** > key will take you to the highest dimmer with errors.) Both the < **LEFT** > and < **RIGHT** > keys have auto-repeat functions. Holding the < **YES/Q** > key while pressing either the < **RIGHT** > or < **LEFT** > key will jump you to the last dimmer with errors or the first dimmer with errors, respectively. At any time while viewing the detailed error screens, holding the < **YES/Q** > and < **UP** > will temporarily redisplay the error summary screen.

When viewing either the summary or detailed error screens you may quit by pressing < **YES/Q** > . This will return you to

FLICKER FINDER
TO FUNCTION MENU?

6.1 RE-ENTERING FLICKER FINDER

If you hit < **YES/Q** > accidentally, do not despair! You may reenter **FLICKER FINDER** at three separate points. Pressing the < **DOWN** > key will offer you the chance to take a new snapshot. Pressing the

< **DOWN**> key again offers you the chance to reuse the existing snapshot. Pressing the < **DOWN**> key a third time offers you the chance to view previous errors. Isn't that reassuring?

```
NO ERRORS RECORDED
```

You will see this display if:

the last time **FLICKER FINDER** was run, no errors were detected,
or if **FLICKER FINDER** has not been run since the battery switch was turned on,
or if **FLICKER FINDER** has not been run since the unit went into a **MEAL PENALTY**,
or if you have run the **SHOW SAVER PLAYBACK**,
or if you have run the **MULTI CHANNEL MODE** send routines.

If during the data comparison section of the test you press < **YES/Q**> before any errors are detected you will get the following message

```
TEST SUSPENDED  
TO FUNCTION MENU?
```

If you wish to continue the test, press < **DOWN**> or < **UP**> . Pressing < **YES/Q**> will return you to the function menu. Once errors are detected, the data comparison section of the test cannot be re-entered. Once stopped, restarting the comparison clears the error tables.

6.2 TECHNICAL NOTES ON FLICKER FINDER

Flicker finder disables the power off timer while it is comparing incoming data regardless of the user setup. The backlite is turned off and left off as well; terminating the test by using < **YES/Q**> turns it back on. During the comparison test, the only keys on the DMXter that are operational are < **YES/Q**> and < **TOP**> . The < **OFF**> key will not turn the unit off while the test is running.

If during the data comparison section of the test any dimmer records 65,535 errors the test will be suspended. The display will read.

```
| TEST STOPPED, ERROR |  
| OVERFLOW. VIEW?   |
```

6.2(1) LOW BATTERY WARNINGS DURING FLICKER FINDER

Low battery warnings are displayed in a slightly different way during the data compare test of **FLICKER FINDER**. **FLICKER FINDER** is a very processor intense task that cannot tolerate any interruption so a special battery warning was required. When the battery discharges to the point that the *Lil'* DMXter would normally display the standard warning the display changes from the one on the left to the one on the right. This display will be latched and will not change back to the normal display even if the *Lil'* DMXter is plugged into AC power.

```
| COMPARING INCOMING |           | FLICKER FINDER |  
| DATA TO REFERENCE |           | LOW BATTERY WARNING! |
```

Once the low battery warning is displayed, it will only change if errors are detected. If the errors are detected and you have a low battery warning the display will look as shown below.

```
| ERRORS DETECTED |  
| LOW BATTERY WARNING! |
```

If you are an experienced DMXter user and don't remember this description from earlier manuals, you are right. But it is not a new feature, we just never documented it before.

7.0 CABLE TESTER

The *Lil'*DMXter includes a cable test feature. While DMX512 cables may be tested by a conventional cable tester for continuity, testing them for ability to pass high speed digital data is a little more complicated. DC cable testers may pass as 'good' cables that will provide unreliable operation of DMX512.

We provide two modes of cable testing - double ended and single ended. Double ended is used when you have both ends of the cable at hand; what you are doing with a standard cable tester. Single ended mode is used when you are testing an installed cable, where you don't have access to both ends at one time. This mode works by allowing you to take and store a sample of the signal at the console end of the cable you wish to test. It allows you to move the *Lil'*DMXter to the dimmer end of the cable and take a new sample. If the samples are the same, the cable is assumed to be good.

7.1 DOUBLE ENDED CABLE TEST

Upon entering the cable test menu, your first choice is whether you wish to do a double ended cable test

```
CABLE TESTER
DOUBLE ENDED?
```

Selecting < **YES/Q** > will bring you to the next question

```
CABLE TESTER
TEST PINS 4 AND 5?
```

Yes, we know, DMX512 doesn't use pins 4 and 5 - except that some manufacturers use them for non-DMX signaling. This is how some manufacturers signal over temperature on the dimmer racks. So we give you the option of testing these pins. Our tests of pins 4 and 5 are for continuity only, and do not attempt to send digital data on these pins.

Answering < **YES/Q** > will cause the test to start in a mode that tests all five wires. Pressing the < **DOWN** > key will cause the test to start testing only pins 1,2 and 3.

Once you begin the cable test, and assuming that your cable is good, the unit will step thru its procedure. After the DMXter has completed one test sequence the top line of the display will change to read CABLE GOOD! Each time the asterisk moves, the unit has completed one complete cable test and the cable has passed. A cable test consists first of checking for ground continuity, then checking for continuity and lack of shorts on Pins 2 and 3, then optionally continuity on Pins 4 and 5. Then a packet of DMX512-like data is transmitted and checked that it is received intact. If all of the above tests are successful, we consider the cable good. We move the asterisk one place in the display and start doing the test all over again.

Testing multiple cables: If you intend to test more than one cable at a time, after testing the first cable simply unplug it from the DMXter without pressing any keys on the DMXter. One of the error messages will appear, telling you that the 'cable' has failed. Plug the next cable to be tested into the DMXter and restart the test by pressing either the < **UP** > or < **DOWN** > keys.

In this manner you may rapidly test multiple cables.

So it failed . . . If a cable fails the continuity test, the top line of the display will read

```
CABLE TEST FAILED
```

The text on the second line will tell you which pin(s) should be checked.

P1: * means that Pin 1 (shield) is open. If Pin 1 fails, the test terminates so you will have no way of knowing if there are problems with other pins of that cable. We suggest that in repairing the cable, you check all the pins for problems. After repairing the cable test it again.

SOME DMX512 USERS DO NOT WIRE PIN 1 ON BOTH ENDS OF THE CABLE. THIS CABLE TESTER WILL NOT TEST CABLES THAT DO NOT HAVE PIN 1 CONNECTED ON BOTH ENDS.

P2:* means Pin 2 open or that Pin 2 is shorted to Pin 1.

P3:* means Pin 3 is open or that Pin 3 is shorted to Pin 1.

PINS 2&3 REVERSED! Obvious, huh?

P2:*P3:* means that either Pins 2 and 3 are both open or they are shorted to each other.

If either Pin 2 or Pin 3 is open or shorted to ground or the other pin, the test will stop before testing Pins 4 and 5.

P4:* means Pin 4 is open or that Pin 4 is shorted to Pin 1.

P5:* means Pin 5 is open or that Pin 5 is shorted to Pin 1.

PINS 4&5 REVERSED! Obvious, huh?

Px:*Px:* means that either both Pins are open or the pins are shorted together.

P2:* P3:* P4:* P5:* means that either the pairs Pin 2/Pin 3 and Pin 4/Pin 5 are reversed or Pin 2 is shorted to either Pin 4 or Pin 5, and that Pin 3 is shorted to Pin 4 or Pin 5. Pin 2 is not shorted to Pin 3 or the test would have stopped already.

If the data test part of the test fails, the display will read

```
CABLE TEST FAILED
WON'T PASS DATA
```

This means that you have a fatal problem with your cable. It may pass DC but massive errors were encountered when high speed digital data was sent. This error stops the test. If you wish to try again, press the < **UP** > or the < **DOWN** > keys. If, on the other hand, occasional data errors are found which might be caused by an intermittent solder joint or a cable that is borderline for transmitting data, the top line of the display will read

```
DATA ERROR
```

Once you've found a data error, the top line will continue to read DATA ERROR. The test will continue to run and the bottom line of the display will flash a black bar for about a second each time you encounter a data error.

7.1(1) ENDING CABLE TEST

To end cable test, press and hold the < **YES/Q** > key for about one second. You will know that cable test has ended when you no longer hear the clicking noise. Release the key and you will see the following message

```
TEST SUSPENDED
```

You may now use the < **UP** > or < **DOWN** > keys to restart the test. Pressing < **YES/Q** > will return you to

```
CABLE TESTER
DOUBLE ENDED?
```

As in many places in the *Lil'*DMXter, the quickest way to terminate a test is by pressing < **YES/Q**> < **TOP**>

. . .

7.2 SINGLE ENDED CABLE TEST

When you are trying to test installed DMX512 cables, you will usually be able to get to one end of the cable at a time. This is the time for SINGLE ENDED CABLE TEST.

First, go to the console end, unplug the DMX512 cable to be tested, and use a short jumper to connect between the DMX512-IN connector on the DMXter's front panel and the DMX512-OUT connector on the console. You will now use the *Lil'*DMXter to take a sample of the console's output. NOTE: The Console must be set to output a stable cue, no fades running, no chases etc. Plug the DMX512 cable under test back in and take the DMXter to the other end of the cable, where you will take another sample and the DMXter will compare the two samples. If they are the same, then your cable is regarded as good.

The first message is:

```
TAKE SNAPSHOT OF  
CONSOLE'S OUTPUT?
```

Answer < **YES/Q**> and the next message reads:

```
TAKING SNAPSHOT
```

If there is digital data available, you will see almost immediately

```
SNAPSHOT RECORDED
```

After a pause of about two seconds, you will see

```
UNPLUG DMXter, PLUG  
CABLE IN CONSOLE
```

Do as it says and unplug the jumper cable. Replug the cable under test into the console. After a short time, the message will change to

```
INSERT OTHER END OF  
CABLE UNDER TEST
```

Take the DMXter to the other end of the cable under test and plug it into the other end of the cable under test, using the DMX512-IN connector on the unit. Hopefully you see the message

```
CABLE GOOD!  
THE TEST CONTINUES. . .
```

If not, well, that's why we have test equipment . . . But do not despair - all the pins may not have connected at the same time. Pressing either the < UP> or the < DOWN> key will cause the unit to retest the cable. If the cable fails for any reason you can always retest using this method.

If you attempt to retest and instead of getting a 'good' or 'bad' message you get

```
RETESTING CABLE  
LOOKING FOR DATA
```

this means that the DMXter has seen no signal, good or bad. Either you have totally open cable, or no cable at all.

7.2(1) RESTARTING THE TEST USING AN OLD SNAPSHOT

If you press < **YES/Q**> during a cable test you will exit back to the **SINGLE ENDED** menu item. To restart the test without taking a new snapshot do the following. Press the < **YES/Q**> key again, the display will now read:

```
TAKE SNAPSHOT OF  
CONSOLE 'S OUTPUT?
```

Answer < **DOWN**> and the next message reads:

```
USE EXISTING  
SNAPSHOT?
```

Answering < **YES/Q**> will restart the test at the point where the

```
RETESTING CABLE  
LOOKING FOR DATA
```

message is displayed.

7.2(2) ERROR MESSAGES IN SINGLE ENDED CABLE TEST

Error messages:

```
CABLE BAD OR MISSING  
PRESS <DOWN> TO TEST
```

This message will be seen only if you press < **YES/Q**> key before plugging in the second end of the cable under test. Plug in the cable under test and press < **DOWN**> . Pressing the < **YES/Q**> key a second time will cause the DMXter to return to the **SINGLE ENDED** menu entry.

```
CABLE TEST FAILED  
DATA ERRORS
```

See item 1) below

```
DATA ERRORS  
PINS 2/3 REVERSED
```

See item 2) below

```
DATA ERRORS  
PINS 2/3 MAY BE OPEN
```

See item 3) below

What errors cause **SINGLE ENDED CABLE TEST** to fail?

1) A gross data format error such that the DMXter can't receive the DMX512 packet will cause the test to fail. If the received level of any channel changes more than + 4/-3 points from the value in the snapshot the test will fail.

2) We attempt to identify reversal of pins 2 and 3, but this error message should be taken as an advisory.

3) If we detect that either pin 2 or 3 is open the test fails. Why do we separately worry about an open pin when it would seem that an open pin would cause a data comparison failure? RS485, which is the electrical standard on which DMX512 is built, has an 'interesting feature'. Under certain unpredictable circumstances it will receive data with only shield and one of the two data lines connected. This makes checking cables harder. The cable test software uses special circuitry to specifically check to see if one of the two data lines is open.

IF YOU HAVE DISABLED THE 'OPEN LINE DETECTOR' IN THE **USER SETUP MENU**, YOU WILL NOT SEE THIS MESSAGE.

7.3 RETURN TO FUNCTION MENU

This does exactly what you might think . . . !

8.0 SETUP USER OPTIONS

The *Lil'*DMXter is intended to be versatile so we provide the option of allowing the user to set certain options that make life a little easier. These options affect more than one function or menu. The **AUTO POWER OFF TIMER** and the **DISPLAY BACKLITE** queries are only displayed the first time that **< TOP >** is pressed after the DMXter has been off (sleeping). So we have included both of these queries in the **SETUP USER OPTIONS** menu. When the unit is running pressing **< TOP >** returns the DMXter to the top of the **FUNCTION SELECT MENU**, TRANSMIT DMX512? query.

The entry point on the main menu is

```
FUNCTION SELECT MENU
SETUP USER OPTIONS?
```

8.1 POWER TIMER OPTION

If enabled, the **AUTO POWER OFF TIMER** turns the unit off after about 10 minutes. Depending on the current state of the timer you will see one of two displays.

```
POWER TIMER DISABLED          POWER TIMER ENABLED
  DISABLE TIMER?                ENABLE TIMER?
```

Pressing **< YES/Q >** reverses the state of the timer and displays the appropriate message. Pressing **< YES/Q >** will not step you to the next menu entry; it just reverses the timer state. To step to the next menu item you will have to press **< DOWN >**. This will preserve the current state of the timer.

8.2 BACKLITE OFF OPTION

The next menu item is

```
DO YOU WANT THE
  BACKLITE OFF?
```

Answer either **< YES/Q >** or **< UP >** / **< DOWN >** as you choose. Leaving this menu item by way of the **< UP >** / **< DOWN >** keys will turn the backlite on. The display will step you to the next (or in the case of **< UP >** the previous) menu item.

8.3 NUMBER FORMAT OPTION

The next menu item is the **NUMBER FORMAT OPTION**. Certain numbers may be displayed in any one of three formats: decimal (DEC), percent (%%), or hexadecimal (HEX). Dimmer levels may be displayed in all three formats. Decimal or hexadecimal notation are available for the start code and for the **FLICKER FINDER** compare limit. When the DMXter is set to percent mode the start code and the **FLICKER FINDER** compare limit will be displayed in decimal. Dimmer numbers and timing information are available in decimal notation only.

```
DISPLAY DATA IN
DEC  %%  HEX
```

The current display format is the one pointed to by the filled arrows. To set the display format use **< LEFT >** or **< RIGHT >** keys to move the filled arrows so they point to the desired selection. The format will be set to whichever format is marked when you exit by pressing either **< UP >**, **< DOWN >** or **< YES/Q >**. The display format setting is stored in battery backup memory and is preserved when the unit is turned off. The default for this option is percent.

8.4 OPEN LINE DETECTOR OPTION

The next menu item is either:

OPEN LINE ENABLED OR OPEN LINE DISABLED
DISABLE DETECTOR? ENABLE DETECTOR?

The choice will depend on the current setting of this option. The unit is factory set to **OPEN LINE ENABLED**. Most users will want to leave this function enabled.

What is an Open Line Detector? The **OPEN LINE DETECTOR OPTION** is a proprietary Goddard Design Co. circuit to overcome a potential problem with the parent standard of DMX512, RS485. In RS485 it is possible to intermittently receive data from a cable that does not have connection of all of its pins. This can throw you off when trying to track down problems. Since the chance of passing data intermittently on a cable exists the *Lil'*DMXter incorporates the **OPEN LINE DETECTOR OPTION**. This circuitry flags seemingly good data when all the pins are not connected.

There are some manufacturers and suppliers in the theatrical lighting field that have DMX512 cables that deliberately do not have pin 1 connected at both ends. Following upon majority interpretation of the DMX512 Standard this is a practice that Goddard Design Co. does not endorse. If the *Lil'*DMXter is used on these cables the **OPEN LINE DETECTOR OPTION** will provide spurious 'bad cable' readings and so we provide the option to disable it.

The following functions use the **OPEN LINE DETECTOR OPTION**:

VIEW LEVELS - it is the feature we call 'BNW' for broken wire

VIEW PARAMETERS - error summary screen where it is also called 'BNW'

SINGLE ENDED CABLE TEST - the following message indicates that the error was caused by the open line detector

```
DATA ERRORS  
PINS 2/3 MAYBE OPEN
```

DOUBLE ENDED CABLE TEST - it is inherent to this test and cannot be turned off. This test will not test cables where Pin 1 is not connected at both ends.

8.5 ENABLE EXTERNAL SWITCHES

In **ADJUST ONE DIMMER**, **AUTOFADE ONE DIMMER** and **ADJUST ALL DIMMERS** the software supports two user provided external switches. In **ADJUST ONE DIMMER**, and **AUTOFADE ONE DIMMER** the switches when present and enabled duplicate the unshifted functions of the < **RIGHT**> and < **LEFT**> keys. In **ADJUST ALL DIMMERS** the switches when present and enabled duplicate the unshifted functions of the < **UP**> and < **DOWN**> keys.

To use this feature you must re-enable it every time you are going to enter the **TRANSMIT DMX512** menu. It is disabled any time the < **TOP**> key is pressed. So after enabling this function you must leave the **USER SETUP OPTIONS** menu by way of **TO FUNCTION MENU?** menu item, conveniently pressing < **YES/Q**> will step you to the **TO FUNCTION MENU?** item. The external switches will also be disabled whenever you leave the **TRANSMIT DMX512** menu.

8.6 COPYRIGHT NOTICE

Yes, we still have a copyright notice. I just doesn't scroll anymore.

The last menu item is

SETUP USER OPTIONS
TO FUNCTION MENU?

Pressing < **YES/Q** > takes you back to the function menu. Pressing < **UP** > takes you back to the previous item in the user options menu. Pressing < **DOWN** > takes you to the beginning of the user options menu.

9.0 MULTI CHANNEL MODE - MOVING LIGHT TEST SOFTWARE

The *Lil'DMXter* **MULTI CHANNEL MODE** SOFTWARE is designed to ease the testing of multi-channel DMX512 devices. Originally DMX512 was used to drive dimmers. A lighting system was made up of several dimmer racks. Each dimmer rack usually contained many dimmers, but each dimmer had the same function as any other dimmer. Today many DMX512 devices (particularly moving lights) use more than one DMX dimmer channel. Each dimmer channel of a device controls a different parameter. Keeping track of the mapping of these different parameters has made testing multi channel devices a pain - until now. You could use a large specialized moving light console or you could use reams of cheat sheets while proving how good you are at mental arithmetic.

The **MULTI CHANNEL MODE** software is a specialized transmit routine. It is different from the rest of the *Lil'DMXter* and it has its own rules.

9.1 DMX DIMMERS, DMX CHANNELS, AND FIXTURE CHANNELS

You will notice one style change in this section of the manual. When we are referring to a specific DMX512 dimmer number, we will call it a DMX channel. The reason for this is that most of the data being sent by the DMX dimmer channels will not be dimmer levels at all. Also we treat channels that carry dimmer level values in special ways.

So we will use the term **dimmer** to refer to something that controls a specific dimmer level.

DMX channels will refer to a particular frame (byte) in the DMX512 packet.

The terms **fixture channel** or **channel** will refer to a relative control channel of a particular type of multi channel fixture.

9.2 SUMMARY OF THE FIXTURE PROFILING FEATURES

- You may define a fixture type using 2 to 99 fixture channels. Actually the software will let you define a fixture using only one channel, but this setting is so useless that we will not talk about it further.
- You may define the number of similar fixtures in a contiguous block. A block may contain from 1 to 99 fixtures.
- Many multi channel fixtures have an internal dimmer but some do not. For fixture types that use an external dimmer, the software allows patching of the intensity control channel to any dimmer.
- If the external dimmers are in contiguous blocks, a simple auto patch routine will set up the patch with the absolute minimum of key strokes.
- Some multi channel fixtures use discharge or arc style lamps. Many of these lamps may not be turned on and off at will. To make it easier to deal with these fixtures the software can define one channel as the arc lamp control channel. This channel's level will never be changed except by an explicit instruction.

9.3 USING THE FIXTURE CONFIGURATION SUBMENU

The configuration submenu is the first item that you will see upon entry to the MULTI CHANNEL MODE.

```
| MULTI CHANNEL MODE |  
| CONFIGURE FIXTURE? |
```

Pressing the < **YES/Q** > key will drop you into the configuration display. The first time you enter this routine the display will be as shown below.

```

|## SZ BGN CRT |
|-- -- --- -- -- |

```

If you have used this routine before, at least the first four fields will be filled in and it may look like the one shown below.

```

|## SZ BGN CRT |
|10 12 136 01 -- |

```

In either case these displays are rather cryptic. Before you start taking our name in vain please press the < **RIGHT** > key once. An underline cursor will appear under the left most character of the display. The top line of the display will change so that it now reads:

```

| NUMBER OF FIXTURES |
|_10 12 136 01 -- |

```

Are things getting a little clearer? This is a new feature of the V1.70 user interface. We call it dynamic labeling. What menu label text is displayed is dependent on which field the cursor is in and on the content of that field.

9.3(1) THE < **UP** > AND < **DOWN** > KEY USE IN CONFIGURE FIXTURE

The < **UP** > and < **DOWN** > keys may be used to increment or decrement the place the cursor is under, in this case the tens place. When incrementing a parameter, overflows carry into the next higher place. When the cursor is under the most significant place displayed for a parameter, decrementing will stop when that place reaches zero. If the cursor is under a field that is not the most significant place displayed for the parameter, underflows will cause a borrow from the more significant place. A special case needs to be pointed out. If the cursor is under the most significant place and all other places are 0, decrementing of the most significant place will stop at 1, not 0.

If you press and hold either the < **UP** > or the < **DOWN** > key the value will be auto-incremented. The < **LEFT** > and < **RIGHT** > keys are used to change the place within a parameter or to move to a new parameter field. Holding the < **LEFT** > or the < **RIGHT** > keys will cause the cursor to auto step across the display.

9.3(2) [##] SETTING THE NUMBER OF FIXTURES IN THE BLOCK

The leftmost two places on the display are used to set the number of fixtures in a contiguous block. That is what '##' is shorthand for. The allowed range for this parameter is 1 to 99.

9.3(3) [SiZe] SETTING THE NUMBER OF CHANNELS PER FIXTURE

Now move the cursor to the '**SZ**' or size field. The top line will change to read: CHANNELS PER FIXTURE. The software will allow you to enter a fixture having from 1 to 99 channels.

9.3(4) [BGN] SETTING THE STARTING DMX CHANNEL NUMBER

Moving the cursor into the '**BGN**' or 'Beginning field' changes the top line to read: STARTING CHANNEL #. The block of fixtures will start at the DMX channel number entered in this field. Any valid DMX512 channel number may be used if the block of fixtures will fit without extending past channel 512. We doubt that you will ever need to enter DMX channel 512.

9.3(5) RANGE CHECKING

The values entered into the first three fields are range checked as entered. The Lil'DMXter does not allow you to set up a system with ninety-nine fixtures, each requiring ninety-nine channels, starting at dimmer 200. Range

checking is done as you enter. The rule is the number of fixtures times the number channels per fixture plus the starting DMX channel number minus one must be 512 or less.

9.3(6) OUT OF RANGE BEHAVIOR

If you are increasing either the 'number' or 'SiZe' fields and the 'BeGiNning' field resets to 1 you have attempted to create an impossible system. Once you have entered the first two fields you may increase the beginning channel number to the maximum that will work. Likewise if all the fields freeze, you have tried to build an impossible system.

9.3(7) [CRT] SETTING THE CURRENT FIXTURE

The next field is labeled '**CRT**' in shorthand and dynamically labeled CURRENT FIXTURE IS. The number entered in this field selects one fixture as the current fixture. The current fixture is the one that you can edit with SEND/EDIT routines. This field is limited to a number that is less than or equal to the number of fixtures in the block.

Why do I care what the current fixture is now? Will you let me change the current fixture in the edit routine? Yes you will get to change this value elsewhere, and much of the time you will not bother to enter a value here. Sometimes it will be handy set up the first fixture to be tested here. There are two common uses for setting the current fixture by way of this field. One is to set the fixture whose dimmer you wish to patch. The other is to set the DMX channels from which the a default fixture look is recorded. More details of this use can be found in section 9.8.

9.3(8) SELECTING THE DIMMER MODE

We hope you understand the first four fields. As practice at this point would you please enter the values shown below. We will be using these settings to explain the next sections.

```
|## SZ BGN CRT |
|15 6 93 13 -- |
```

Move the cursor under the first dash. The display changes to:

```
| SELECT DIMMER MODE |
|15 6 93 13 _- |
```

Press the < **UP**> key. Again the display changes.

```
|ARC LAMP ON CHANNEL |
|15 6 93 13 A |
```

The 'ARC' mode is selected. We will explain the details below. Now press the < **UP**> key again. Now the display reads.

```
|LAMP ON DIMMER NUMBR |
|15 6 93 13 D --- |
```

The manual or patch review mode has been selected. Again the details are below. If you press < **UP**> again you'll find yourself in the AUTOPATCH Mode. The display will read

```
|AUTOPATCH START @ DM |
|15 6 93 1 DA --- |
```

Pressing < **UP**> again will put you back to the 'SELECT DIMMER MODE' display.

9.3(8).1 Setting the Arc Mode

Press the < **UP**> key until an '**A**' is displayed.

```
| ARC LAMP ON CHANNEL |  
| 15 6 93 13  A |
```

Move the cursor all the way to the rightmost place on the display. Press the < **UP**> key. You will be allowed to enter any number up to the number of channels you have defined for the fixture, here 6. If the fixture you are defining uses a light source that cannot be switched on and off at will, having that light source's control channel protected from changes made by the restore features of this software is desirable. See section 9.6 for details of these functions. The fixture channel defined by the setting of this field will be handled in a special manner on all fixtures. If the ARC lamp is controlled by channel 10 of our fixture, your display would now look like this:

```
| ARC LAMP ON CHANNEL |  
| 15 6 93 13 A  10 |
```

9.3(8).2 Setting or Viewing a Patch

Let us go back and set the current fixture to 1 and then move to the '**A**' field. Press the < **UP**> key twice and the display will now read:

```
| AUTOPATCH START @ DM |  
| 15 6 93 1 DA --- |
```

We are now in AUTOPATCH mode. Many 'fixtures' are made up of a DMX dimmer (a dimmer) and some sort of automated fixture. It can be as simple as a PAR can and a color scroller. It can be a two-axis mirror module that mounts to the front of a standard theatrical instrument, or it can be a complete robotic lighting fixture that controls every parameter of the lamp except it requires an external dimmer. Consider a fixture with pan, tilt, color wheel one, color wheel two, and beam spread channels. This five-channel fixture will require a sixth channel to handle intensity. We are going to continue with the imaginary fixture we have already entered.

9.3(8).3 Entering an Autopatch

```
| AUTOPATCH START @ DM |  
| 15 6 93 1 DA  200 |
```

You can enter any valid DMX channel number in the fields under '**DM**'. I have chosen 200 because the fixture we entered takes all the channels from 93 to 182. Whatever number you enter will be the first channel of a contiguous block of DMX channels used to dim the fixtures. So if you leave the display as shown above you will have defined channels 200 - 214 as the dimmer for our 15 fixtures. To check this move the cursor back to the '**CRT**' field. Change the current fixture. Note that the dimmer number displayed in last field changes. The display below shows the patch for fixture 13.

```
| CURRENT FIXTURE IS |  
| 15 6 93  13 DA 212 |
```

Let us assume that the dimmer pack we are using ends at 211 and the next dimmer pack can only be addressed by tens. So we wish fixture 13 to be patched to dimmer 220. To do this move the cursor back to the '**DM**' fields and enter 220. Go back to the '**CRT**' fields and check the results.

9.3(8).4 Rules for Autopatching

You must change something to cause a patch to be entered. Simply moving the cursor into the field changes nothing.

Patches are calculated as the numbers are entered. If you enter 300 and then move the cursor to the ones place incrementing from 0 to 5, a patch will be calculated starting 300, then 301, then 302, . . .

. and finally for 305. The effective patch is the one left when you move the cursor out of '**DM**' fields. Patches take effect the next time you use SEND/EDIT FIXTURE.

If you try to patch dimmers to channels greater than 512 you will be given a warning message:

```
|  AUTOPATCH STOPPED  |  
|  MORE THAN 512 DMRS  |
```

Fixtures that would have been patched to nonexistent channels will be left with their old value. If you have been incrementing the dimmer number, the 'old value' will be the last valid patch. It is therefore easy to end with several dimmers patched to DMX channel 512.

Other than checking that the patch does not extend beyond DMX channel 512 patches are not bounds checked. You may patch a fixture's dimmer to a DMX channel used by another fixture for a different parameter.

If you wish to autopatch several blocks, patch the one for the lowest fixture number first. Do the autopatch before any manual patching.

9.8(3).5 Manual Patching of External Dimmers

If you want to have absolute control of the patch, you may enter it channel by channel. The rule is autopatch the straightforward channels first and then go back and change the channels with odd patch assignments.

When the top line of the display reads, LAMP ON DIMMER NUMBER you may enter a patch for that fixture. Two points to remember are:

An autopatch will overwrite a manual patch on any fixture equal to or greater than the starting fixture of the autopatch.

Patches are not bounds checked. If you enter a stupid patch you will get one.

Well, six pages later we are done with the entries that go on one 20-character display. So let move on. Press and release the < **YES/Q** > key and then press the < **DOWN** > key.

9.4 SELECTING THE INITIAL FIXTURE STATE

```
| INITIALIZE FXTRS TO |  
| SNPSHT DFAULT ZERO |
```

Whenever the **SEND/EDIT FIXTURE** routine turns on the DMX512 transmitter, the block of DMX channels used by the configured fixtures is initialized. By this we mean that all these DMX channels have a predetermined value written to them. Note that we said that the fixtures will be initialized when the transmitter is turned on. Unlike other *Lil'*DMXter transmit routines the actual DMX512 transmitter is not simply turned off when the edit display is exited. We will explain this in detail below in section 9.10.S. The *Lil'*DMXter gives you three options on what values will be written to these channels.

SNPSHT stands for SNAPSHOT. This is the same snapshot sent by the standard Transmit DMX512 routine. If you have a moving light console that has a standard test cue you may start with all the fixtures set to this look by taking a snapshot of that look and configuring the software for **SNPSHT**.

DFAULT stands for DEFAULT. We allow the recording of a standard look or a default fixture look. This look may be the fixture pointing straight down, in white, the iris fully open, no effect enabled. If this option is selected, all fixtures will be set to values stored for this default fixture. Recording the default is explained in section 9.13. Editing the default is explained in section 9.8.

ZERO means that all DMX channels that are used by the configured fixtures will be set to 00.

If the above settings are changed, the fixtures will be initialized to the new settings the next time the SEND/EDIT FIXTURES routine is entered.

9.5 SETTING WHAT VALUES A FIXTURE WILL BE RETURNED TO

```
| RETURN FIXTURE TO |  
| RESTORE DFLT ASIS |
```

In MULTI CHANNEL MODE only one fixture is edited at once. That fixture is the current fixture. When you are done editing one fixture, you may move on to the next higher or lower numbered fixture. When you do, the current fixture is deselected, becoming the previous fixture. This menu controls what happens to the values that are being sent to the current fixture when it is deselected.

RESTORE When a fixture is selected as the current fixture the values of the DMX channels are saved. If RETURN is set to RESTORE these values are written back to the DMX channels when the fixture is deselected. If you wish to return the fixtures to the SNAPSHOT you must use this setting. This is the only setting that will preserve the SNAPSHOT for future use.

DFLT When the current fixture is deselected the stored default fixture is copied to the DMX channels for that fixture.

ASIS When the current fixture is deselected the edited values are left in the DMX channels for that fixture.

9.6 MOVE DATA TO NEXT FIXTURE?

```
| MOVE DATA > NXT FXTR |  
| YES NO |
```

This should be obvious. Do you wish to copy the edited look to the next fixture or not?

Well, you have now configured your fixture. The next menu item will get out of the configure submenu so you can go enter a default fixture. **Isn't this fun? Ok Now press <YES/Q>.**

```
| CONFIGURE FIXTURE |  
| BACK TO MULTI MENU? |
```

9.8 SENT/EDIT THE DEFAULT FIXTURE

The default fixture is a way of setting up a neutral or standard position for every fixture. Its values are usually chosen to be a good jumping off point for testing the functioning of the fixture. A common default is to point the fixture straight down, in white. You may enter the default either by recording it from another console or by entering it from the keyboard. This section describes how to enter it. You may enter the number blind if you choose, or you may edit the default by viewing it connected to one fixture. The way you select which fixture the default drives is by setting the current fixture. The current fixture may be selected in two places. It may be selected in the configuration

9.8.S Actions That Turn on and off the DMX512 Transmitter

Actions That turn ON the DMX512 transmitter

- 1) Entering the SEND/EDIT FIXTURE routine.
 - 2) Entering SEND/EDIT DEFAULT routine
- ***

Actions that turn OFF the transmitter

- 1) Pressing the < **TOP** > key.
- 2) Pressing < **YES/Q** > to the following menu item

```
| MULTI CHANNEL MODE |  
| TURN OFF DMX XMTR? |
```

- 3) Using the **TO FUNCTION MENU?** menu item. This is the preferred way to exit Multi Channel Mode.

display as described in section 9.3 or it may be selected in the SEND/EDIT FIXTURE routine. See section 9.9. The current fixture **cannot** be set in this routine.

Press the < **Down** > key twice

```
| MULTI CHANNEL MODE |
| SEND/EDIT DEFAULT? |

| FX C  1  2  3  4 |
| df L  0  0  0  0 |
```

You will note that you are now in what looks like a normal *Lil'*DMXter SEND/EDIT window. 'FX' stands for **FiXture**. The '**df**' stands for default. As you move around using the < **LEFT** > and < **RIGHT** > keys, you will notice that the top row of numbers only goes up to 6. That's because we are working with a fixture defined as having six channels. Also notice that fixture channel 6 is marked D 6. That's because this channel is patched to an external dimmer. Let us enter a few values. The values we will enter will not be real values but ones that are good for seeing the effect of this feature later in this section. Set channel 1 to 2, set channel 2 to 4, set channel 3 to 6, set channel 4 to 8, set channel 5 to 10, and set channel D 6 to 200.

9.8.1 EDITING AIDS

The < **UP** > and < **DOWN** > keys function as they do in other SEND/EDIT windows. A new SEND/EDIT feature in V1.70 software is ability to jump to 50%. To jump to 50% press and release both the < **UP** > and the < **DOWN** > keys **at the same time**.

Pressing and holding the < **YES/Q** > while pressing and releasing the < **LEFT** > or < **RIGHT** > keys will cause the channel display to jump by ten channels. This function is also found in our normal SEND/EDIT window, but these key presses are used for a different function in SEND/EDIT FIXTURE window described in section 9.9.

When you are done editing, the display should look like the ones shown below.

```
| FX C D 6  1  2  3 |
| df L 200  2  4  6 |
```

Press < **YES/Q** > . Which display you see next will depend on what setting was chosen for the INITIALIZE FXTRS TO menu item. If Default was chosen then you will be given the option of sending the default to the fixtures now. That display is shown below. If either of the other settings was chosen, you will return to the menu item that lets you SEND/EDIT a fixture.

```
| INITIALIZE FXTRS TO |
| NEW DEFAULT?       |
```

If you want to initialize all the fixtures to the default that you just edited, press < **YES/Q** > now. You have just left a transmit routine, but unlike other *Lil'*DMXter transmit routines the DMX transmitter is still on. Nothing on stage should have changed unless you answered < **YES/Q** > to the above question. If you enter the SEND/EDIT FIXTURE routine, nothing will change. Initialization only takes place when the transmitter is turned on and it is already on.

Initialization Rules - When will the Fixtures Initialize?

When the SEND/EDIT menu is entered the fixtures are initialized to the values set in the configuration menu if any of the following are true.

- 1) The DMX transmitter is OFF.
- 2) The Initialization mode has been changed since the last time SEND/EDIT has been run.
- 3) If a snapshot has been taken since the last time SEND/EDIT has been run.

If the initialization mode is set to **DEFAULT** and you have just edited the default fixture you will be asked if you wish to send the new default to the fixtures. Answering < **YES/Q** > will cause the fixtures to be immediately initialized.

9.9 TESTING THE FIXTURES - SEND/EDIT FIXTURE

```
| MULTI CHANNEL MODE |  
| SENT/EDIT FIXTURE? |
```

Finally it is time to test some fixtures. What happens when you press the < **YES/Q** > key is dependent on how you have configured the fixture and what you were doing before. See the sidebar on the previous page for details.

```
| FX C  1  2  3  4 |  
| 1 L  2  4  6  8 |
```

This is the edit fixture display. '**FX**' stands for fixture, the number below it the number of the fixture currently under test, now fixture 1. The values shown for channels are the ones entered for the default in section 9.8. As you move around using the < **LEFT** > and < **RIGHT** > keys, you will notice that the top row of numbers only goes up to 6. That's because we are working with a fixture defined as having six channels. Also notice that fixture channel 6 is marked D 6. That's because this channel is patched to an external dimmer. Using the < **LEFT** > and < **RIGHT** > keys you are confined to editing one fixture. The < **UP** > and < **DOWN** > keys function as they do in other SEND/EDIT windows. A new SEND/EDIT feature in V1.70 software is the ability to jump to 50%. To jump to 50% press and release both the < **UP** > and the < **DOWN** > keys **at the same time**.

1) **RESTORE** When a fixture is selected as the current fixture the values of the DMX channels are saved. If RETURN is set to RESTORE these values are written back to the DMX channels when the fixture is deselected. If you wish to return the fixtures to the SNAPSHOT you must use this setting. This is the only setting that will preserve the SNAPSHOT for future use.

2) **DFLT** When the current fixture is deselected the stored default fixture look is copied to the DMX channel for that fixture.

3) **ASIS** When the current fixture is deselected the edit values are left in the DMX channels for that fixture.

9.9(1) CHANGING FIXTURE NUMBER IN SEND/EDIT USING < **YES/Q** > < **LEFT** > OR < **YES/Q** > < **RIGHT** >

When you wish to test or edit another fixture press < **YES/Q** > < **RIGHT** > if you wish to move to the next higher number fixture. If you wish to move to the next lower number fixture press < **YES/Q** > < **LEFT** > . As with most two key press combinations in the *Lil'* DMXter you first press and hold the < **YES/Q** > key and then press and release the other key. Then you release the < **YES/Q** > key. As you do this the number under FX will change showing which fixture you are now editing. If you are editing fixture fifteen of a block of fifteen and you press < **YES/Q** > < **RIGHT** > you will be returned to editing fixture one.

9.9(2) WHAT VALUES ARE LEFT IN A DESELECTED FIXTURE?

What will happen to the value presently in the fixture you just deselected depends on which setting you selected in the RESTORE menu. Your options are repeated in the side bar on this page.

9.9(3) WHAT VALUES WILL BE IN THE CHANNELS OF THE NEWLY SELECTED FIXTURE?

If you selected MOVE DATA > NXT FXTR YES then the values that were in the old fixture will be copied to the new fixture. If you selected NO values that were in the fixture will be left there. These values may be the default fixture, or they may come from the snapshot, they can be left over from a previous edit, or they may even be all zeros.

9.9(4) DIFFERENCE IN THE SETTING OF VALUES TO ARC LIGHT CHANNELS

If you have configured one channel of a fixture as an ARC channel, it will have its own rules. It will set to an initial value just like any other fixture. It may be edited the same as any other fixture. But when you move from fixture to fixture Arc channels will be left at current value. No restore takes place. Further regardless of the setting in the MOVE DATA menu item data is never moved into an Arc lamp channel.

9.9(5) DISPLAYING ABSOLUTE DMX CHANNEL NUMBERS

It is very useful not to need to worry what DMX channel the iris of fixture 13 is on. Still it may be useful to know sometimes, if only to fix the patch on the console that seems to be the only thing that is wrong.

To display the DMX512 channel number press and hold both the < **LEFT** > and < **RIGHT** > keys. The fixture channel number will be replaced by the DMX channel numbers. If a dimmer channel (one marked with a D) displays NP in this mode, no patch was entered for this fixture's dimmer. While you may set a level for this channel, this level is NOT sent to the DMX line.

Most of the following menu items are self explanatory. Our explanations will be brief.

9.10 CLEARING THE SNAPSHOT

```
| MULTI CHANNEL MODE |  
| CLEAR SNAPSHOT?   |
```

What this function does is pretty self evident, but why you might wish to use it may not be. If you have the fixtures configured to initialize to the default fixture **only**, the DMX channels that are used by the configured fixtures will be set to known values. All other channels will be left with whatever happens to be in the DMX transmit table. If this is left over garbage from yesterday your stage may look 'interesting'.

9.11 CLEARING THE DEFAULT

```
| MULTI CHANNEL MODE |  
| CLEAR DEFAULT?    |
```

9.12 TAKING A NEW SNAPSHOT

```
| MULTI CHANNEL MODE |  
| TAKE NEW SNAPSHOT ?|
```

Taking a new snapshot does the same thing that it does in the normal transmit menu. The snapshot is simply left in the DMX table. Any routine that changes the values in the DMX table modifies the snapshot. The one exception to this rule is when the multi channel software is set to restore a fixture to its original look on exiting. Then the restore function repairs the snapshot.

The snapshot function is start code sensitive. If your DMXter is still reading TAKING SNAPSHOT for more than three seconds, and the bottom line remains blank, this means that your DMXter is receiving data with a different start code than the one it is currently set to receive. After 3 seconds, if no digital input is received, or if the input is not a digital form that the *Lil'* DMXter can recognize, you will see

```
NO DIGITAL INPUT  
OR INPUT NOT DMX512
```

9.12(1) DMX LINE MODE DURING A SNAPSHOT

Taking a snapshot momentarily switches on the DMX receiver. Switching on the receiver momentarily turns off the transmitter. If the transmitter was on before the snapshot was taken, it will be turned back on afterward.

The line termination does not change while the snapshot is taken. This switching is glitch-free and the result is that new snapshot will be sent to all DMX channels.

9.12(2) INITIALIZATION AFTER TAKING A SNAPSHOT

While taking a snapshot does not leave the transmitter off it sets a flag so that next time SEND/EDIT FIXTURES is entered the fixtures will be initialized.

9.13 TAKING A NEW DEFAULT

```
| MULTI CHANNEL MODE |  
| TAKE NEW DEFAULT? |
```

Taking a new default fixture look records the values being sent by another console to one fixture. These values are then moved to a special memory area. The fixture whose values are used is the current fixture. Taking a default also records a new snapshot. The transmitter switching and initialization behaviors of this function are the same as those of the snapshot function. See sections 9.12.1 and 9.12.2.

9.14 CLEARING THE PATCH TABLE

```
| MULTI CHANNEL MODE |  
| CLEAR PATCH TABLE? |
```

9.15 TURNING OFF THE DMX512 TRANSMITTER

```
| MULTI CHANNEL MODE |  
| TURN OFF DMX XMTR? |
```

One powerful feature of the Multi Channel Mode software is that the DMX512 transmitter can be left running. On the other hand leaving the transmitter on is a good way to drain the battery. This menu item lets you save the battery. It can also be used to reinitializing the fixtures. The fixtures are initialized when the transmitter is turned on. If the transmitter is **ON**, executing this item turns it **OFF**. The software then returns you to the SEND/EDIT FIXTURE? menu item. Pressing < **YES/Q** > again will activate the Send/Edit routine, turning on the transmitter and initializing the fixtures. If you are on the TURN OFF DMX XMTR? menu item, pressing < **YES/Q** > twice initializes the fixtures.

9.16 BACK TO THE FUNCTION MENU

```
| MULTI CHANNEL MODE |  
| TO FUNCTION MENU? |
```

This is the orderly way out of the Multi Channel Mode menu. Exiting by this route turns off the transmitter and sets the DMX line back to its pass through (unterminated) state. If you exit by pressing the < **TOP** > key the transmitter will be turned off but the DMX line will be left in its blocking or terminated mode.

9.17 MULTI CHANNEL MODE - TECHNICAL DETAILS

9.17(1) DMX512 LINE MODE AND MULTI CHANNEL MODE

Multi Channel mode is a transmit mode. There is no requirement that DMX512 transmitters be terminated with the characteristic line impedance - the last DMX512 receiver must be terminated with characteristic line impedance. The *Lil'* DMXter has two line termination modes; pass through and terminated. In the pass through mode the input connector is passively connected to the output connector. It is the default mode of the *Lil'* DMXter. In the terminated mode the input connector is terminated. The input connector is disconnected from the output connector. To assure that only the *Lil'* DMXter is driving the line all modes that transmit data switch into the terminated mode. We do this to break the pass through, not because of the line termination.

Entering the Multi Channel mode menu does not change the line termination. Normally you will be in the pass through mode. Turning on the transmitter by either SEND/EDIT routine will terminate the line and break the pass through mode. Leaving these routines does not turn the transmitter off and so does not unterminate the line. The following actions will switch the *Lil'DMXter* back to pass through mode.

- 1) Turning OFF DMX XMTR
- 2) Exiting by the TO FUNCTION MENU item

9.17(2) MULTI- CHANNEL MODE & NUMBER FORMAT

Channel levels are displayed in the current number format as set in **USER OPTIONS** All other numbers are displayed in decimal.

9.7(3) TRANSMIT FLAVOR FOR MULTI CHANNEL MODE

Multi Channel Mode uses the current transmit flavor setting with one modification. Entering either SEND/EDIT DEFAULT or SEND/EDIT FIXTURE sets the channel (dimmer) count to 512. You may select the other flavor setting in the normal manner but MULTI CHANNEL MODE always sends 512 channels

9.7(4) WHICH START CODE IS USED BY MULTI CHANNEL MODE?

What ever start code the *Lil'DMXter* is set on entry to MULTI CHANNEL MODE is the one that will be used for all transmit and receive functions. We doubt that you will ever wish to use this mode with a non zero START CODE but if you did you could. If you have set your *Lil'DMXter* to a non zero START CODE and try to use this function it is not likely to work as you expect.

10.0 SHOW SAVER™

THIS IS AN OPTIONAL FEATURE - YOUR DMXter MAY NOT BE EQUIPPED WITH IT. IF **SHOW SAVER** DOES NOT APPEAR IN THE FUNCTION MENU, YOU SHOULD SKIP THE REST OF THIS SECTION. This section is written for SHOW SAVER Software version V1.10 It is applicable to any software version that is V1.1x.

And now for something completely different . . . The *Lil'* DMXter is a piece of test equipment meant to help you troubleshoot your console and dimmers. The **SHOW SAVER**™³ feature is intended to help your show if your console develops an attitude at a bad time.

Uses of **SHOW SAVER**

There are many occasions in setting up and in testing a lighting system where it is useful to have several defined lighting looks available to switch between. Also, when testing or servicing certain DMX controlled apparatus, such as color changers, it is often useful to cycle thru a few different settings. **SHOW SAVER** adds to your *Lil'* DMXter the ability to record and save up to eight looks. These looks differ from the **SNAPSHOT** in that they are not overwritten when the DMXter is used to perform its usual diagnostic tasks. A number of functions overwrite the **SNAPSHOT**. A list of these functions can be found in section 4.5(1).

And should some forklift operator cut your DMX cable, having a source of lighting cues small enough to heft in one hand could be very useful (no, not to brain the klutz with!). Seriously though, while we do not wish you to view the DMXter as a lighting console, **SHOW SAVER** is intended to serve as a backup when disaster strikes. Remember that this capability is useful only if you learn to use it before you need it, and you make a practice of using it during show setup!

SHOW SAVER has the following features:

- Records eight looks or scenes.
- Provides a permanent blackout scene.
- Each scene may be given a recorded fade time of between 0 and 30 seconds.
- Each scene may be given an alphanumeric name of up to 16 characters long.
- **SHOW SAVER** allows you to edit the dimmer levels, the fade time and the alphanumeric name of the scenes.
- Scenes maybe edited blind or live onstage.
- **MONITOR MODE** 'monitors' the DMX transmission and holds the last transmission for fast stage restore.
- In playback **SHOW SAVER** allows you to sequence thru the eight scenes in any order using the prerecorded fade times.
- A bump-to-next-scene feature is also provided.
- A Grand Master level control is provided.

10.0(1) SHOW SAVER, CONVENTIONS AND STRUCTURE

SHOW SAVER has two major subsections. The first section records or edits the stored scenes. The second is the section that plays back scenes. The sections are separate, except that they share a common entry point. It is not expected that a user will switch back and forth between record and play back, so once you enter the **PLAYBACK SCENE** section the only exit takes you to the **FUNCTION SELECT MENU**.

SHOW SAVER has a convention that is peculiar to it. The < **LEFT** > and < **RIGHT** > keys are used to increment or decrement the current scene number. The routines that record or edit scenes share a common user interface. It is described in detail in sections 10.31 thru 10.34.

³ Show Saver, SHOW SAVER, and ShowSaver are trademarks of Goddard Design Co.

10.0(2) SELECTING PLAYBACK OR RECORD

The entry point for **SHOW SAVER** is

```
FUNCTION SELECT MENU
  SHOW SAVER?
```

The first choice we give you in the menu is to playback the previously stored scenes.

```
  SHOW SAVER
  PLAYBACK SCENE?
```

This may seem a little out of order, but think about it - your stage is in total darkness when it shouldn't be. How many menu items would you want to go thru to get light on the stage?

10.1 PLAYBACK

PLAYBACK SCENE is the only method to sequence thru the recorded scenes. Its operation is designed to be simple and we hope obvious, since you may not be at your calmest when using it. The behavior of **PLAYBACK** depends on whether you are connected to a transmitting source of DMX512 when you press the < **YES/Q**> key. If you are connected to a transmitting source of DMX512, you will enter **MONITOR** mode. If the DMXter does not see valid DMX512 within 1/4 second, it enters **PLAYBACK**. **MONITOR** is a useful mode of operation, but probably you should learn about **PLAYBACK** first. We'll tell you about **MONITOR** now, but you might consider skipping over it for now.

To enter **PLAYBACK** in any form, you must have scenes recorded. Otherwise, when you press < **YES/Q**> you will be told

```
  SHOW SAVER
  NO SCENES RECORDED
```

This message is displayed briefly. If you see it, you will have to skip to section 10.4 to learn how to enter scenes.

10.2 DMX MONITOR MODE

The purpose of **MONITOR** mode is to attempt to preserve the last valid DMX transmission in case of disaster. The concept is that this will help you to make a smooth transition to the scenes stored in the DMXter. Remember that unless you have stored some scenes in the DMXter, this is useless to you.

The DMXter must be daisy-chained between the console and the first dimmer rack. The console must be turned on and transmitting valid DMX512 to the dimmers. Select the **SHOW SAVER** menu and select **PLAYBACK SCENES?**. If the DMXter detects valid data, you will see the following display:

```
STAGE:  °k  GM: 100%
NEXT:  1   TIME:  3
```

In the field following **STAGE**: you will see a small 'ok' chasing rapidly. This shows valid DMX reception. At this point the DMXter is not affecting what you see onstage. While the DMXter is in monitor mode the < **RIGHT**> and < **LEFT**> keys are active and you may preset the scene you wish to go to following the 'OK' scene in the event of a failure.

10.2(1) WHEN THE MONITOR MODE DETECTS A FAILURE

If you have had the DMXter in monitor mode for more than a minute, the display backlight will have timed out. If the DMXter fails to detect valid DMX for one second, it holds the last valid transmission it received, turns on the display backlight and the display changes to

```
STAGE: FAIL GM: 100%
NEXT:  °_k   TIME:  0
```

This is meant to get your attention, assuming that what is happening to the lights on stage hasn't. The DMXter is not yet transmitting and we presume your console isn't either. If the console has stopped transmitting what you are seeing on stage now depends on your dimmers; **certain types will hold the last transmission for considerable time before fading to black, while others will dump immediately.** Your console is still connected to your dimmers via the DMX line, if you can still run cues the problem must have been transitory. On the other hand if your console is still transmitting, but erratically, you may get 'disco dimmers'. Now you have two choices (three really, if you count turning it all off and going out for coffee to call the shop . . .)

Choice 1 - Retest the DMX512 line: press the < **UP**> or < **DOWN**> keys, this will cause the DMXter to retest the incoming DMX line. If valid DMX512 has returned the unit will return to monitoring the line. If on testing the line the DMXter does not find valid DMX it will go into **SHOW SAVER** playback just as if you pressed < **YES/Q**> .

Choice 2 - Go to playback: press < **YES/Q**> this will transmit the last stored transmission to the stage. The display will read

```
STAGE:  °_°_°_ GM: 100%
NEXT:   1   TIME:  3
```

The stored scene will bump to the stage. If your dimmers were holding level, you may see little change. If they were black . . .

The scene in the **NEXT** field will be the lowest recorded scene unless you preset a scene while the DMXter was in monitor mode. You are now in **PLAYBACK** and the rules apply. See below. Once you fade to another scene, the 'emergency' scene is gone.

During the time between 'FAIL' appearing and pressing the < **YES/Q**> key to start transmission, the following apply:

- The console is still connected to the dimmers
- The DMXter is neither receiving nor transmitting
- < **OFF**> and < **TOP**> serve their normal functions

10.3 ABOUT PLAYBACK

The following are several things that you should keep in mind when using **PLAYBACK SCENE**.

This is a self-contained routine. Once you enter it the only exit is back to the **OK, OK I'M AWAKE** message that one sees if one bypasses the copyright message.

When you press < **YES/Q**> entering **PLAYBACK**, if the DMXter does not detect valid DMX within 1/4 second, the transmitter is turned on and the **BLACKOUT** scene is transmitted. Therefore, if any dimmers were on, they will be taken to black. To get lights up you must select a previously stored scene and press < **YES/Q**> . This will start a cross fade into that scene.

Entering **PLAYBACK** disables the auto power timer so that you do not have to worry about the DMXter turning itself off on you. But you must consider the fact that it could run out of battery charge. In **PLAYBACK** the transmitter is always on, hence the drain on the battery is high. A DMXter that is to be used as a back up must be kept well charged. If the battery discharges to the point where the safety circuit shuts down the power supply, all stored scenes will be lost. You will not lose scenes if only the low battery warning is displayed. But while this warning is displayed the transmission of dimmers to the stage stops. With most dimmers this will not cause a visible blink, but this is not guaranteed. Keep your DMXter well charged and if you are going to use it to drive dimmers for an extended period, plug it into AC.

The DMXter will seamlessly switch back and forth between battery and line operation, so you may plug it in while running. For more information on battery charging and battery operating times, see section 10.

If you are not in **MONITOR** mode, the **< OFF >** and the **< TOP >** keys have special uses in **PLAYBACK**. The **< OFF >** does not turn off the DMXter, and the **< TOP >** does not cause you to exit **SHOW SAVER**. Their special uses are explained below.

10.3(1) THE PLAYBACK DISPLAY

Below is the Playback display as it may look when you enter **PLAYBACK SCENE** for the first time. When you enter **PLAYBACK** the stage will be in blackout and the **NEXT:** scene will set to the lowest numbered scene that has been recorded, usually scene one.

```
STAGE: BLK  GM: 100%
NEXT: 1     TIME: 10
```

There are four fields in the display. They are:

STAGE: Shows which scene is being transmitted to the dimmers. Scenes are 1 thru 8 and BLK, which stands for BLACKOUT.

GM: Shows the current setting of the Grand Master. It may be set from 0% to 100 %.

NEXT: Shows the scene that will be faded to the next time the cross fade is started. The user may select the scene number in this field with the **< LEFT >** or **< RIGHT >** keys.

TIME: Shows the recorded fade time into the next scene.

While a cross-fade is underway the display will change. The **TIME:** field changes to read **XFADE:** and starts to count down the fade.

```
STAGE: BLK  GM: 100%
NEXT: 1     XFADE: 9
```

10.3(2) KEYS USED IN PLAYBACK

The seven keys all have functions in Playback. The following list is a quick summary of their playback uses.

< RIGHT >	Increments the scene number
< LEFT >	Decrements the scene number
< YES/Q >	1) Starts a cross fade into the next scene, 2) exits 'onstage' edit mode
< UP >	Raises grand master level
< DOWN >	Lowers grand master level
< YES/Q > < UP >	Bumps to next scene
< YES/Q > < DOWN >	Bumps to blackout scene
< LEFT > < RIGHT >	View summary screen (Press and hold)
< OFF >	Toggles the 'onstage' edit mode
< TOP >	Shows a warning message, but does NOT exit Playback
< OFF > < TOP >	Exits playback to OK, OK I'M AWAKE

10.3(3) THE CROSS FADER

The cross fader executes a dipless cross fade between the scene in the **STAGE:** field and the scene in the **NEXT:** field. The cross fade starts when the < **YES/Q**> key is pressed and released. During a fade holding down the < **YES/Q**> key will cause the fade to stop temporarily. The time remaining in a fade is shown in the **XFADE:** field. At any time pressing and holding the < **YES/Q**> key and pressing the < **UP**> key will cause a bump to the next scene.

During a cross fade pressing < **YES/Q**> < **DOWN**> does not cause a bump to black, unless the next scene is BLK (a blackout). The following keys are also locked out during a fade; < **LEFT**> , < **RIGHT**> , and < **OFF**> .

10.3(4) THE GRAND MASTER

The grand master is operated by the < **UP**> and < **DOWN**> keys. If one of these keys is held, it auto repeats. The value changes in 1% steps. The Grand Master is 'last in line' affecting stage value - if the Grand Master is set at 80%, a dimmer entered at 100% appears onstage at 80%.

10.3(5) THE ONSTAGE EDITOR

If you need to change the levels of a few dimmers while in **PLAYBACK SCENE** you can do so by using the onstage editor. Pressing < **OFF**> will change the display to the same display seen in **SEND/EDIT SNAPSHOT**. The present **STAGE:** scene will be loaded and dimmer levels may be changed in the same way they are in **SEND/EDIT SNAPSHOT**. You exit the editor by pressing either < **OFF**> or < **YES/Q**> .

- These changes take place on stage immediately as you enter them.
- The levels seen on stage will be the levels shown in the display as proportionally mastered by the Grand Master.
- The changes are made only to the **STAGE:** scene and are temporary. The next scene faded to will be unmodified and the changes will not be present when you return to the scene you modified.
- All the key combinations available in SEND/EDIT will work here. So you may use such functions as 'search for next channel with level' and 'bump to half'.
- Remember that the Grand Master value affects the actual dimmer level seen onstage.
- When you are running with a modified scene you are warned of this fact by the addition of a * to the **STAGE:** scene number. (example below)

```
STAGE: 2*   GM: 100%
NEXT: 3     TIME: 10
```

10.3(6) PLAYBACK SUMMARY DISPLAY

If you would like to see a summary screen of the **NEXT**: scene, hold down both the < **LEFT**> and < **RIGHT**> keys simultaneously. An example of a summary display is shown below. The top line starts with S:x, where 'x' is the current scene number. The rest of the top line displays the scene name, if any. The second line lists the number of dimmers with levels equal or greater than 1%, and the first and last such dimmer.

```
S:2 THIS SCENE NAME
  10 DIMS   3 TO 510
```

10.3(7) TECHNICAL INFORMATION ABOUT PLAYBACK

WARNING: entering PLAYBACK erases the **FLICKER FINDER** error tables.

PLAYBACK including **MONITOR** receives and transmits data only on start code 0. This is the normal 'dimmer' start code. Using **PLAYBACK** sets the start code to 0. This setting remains when you exit **SHOW SAVER**. **PLAYBACK** transmission characteristics are set by a special 'flavor'. If you need information on what we mean by a DMX 'flavor', see section 4.8. The flavor we use for playback is the same as the default setting of the **USER C** flavor. This flavor is permanent and will not change if you make changes to **USER C**.

PLAYBACK FLAVOR USED FOR **SHOW SAVER**

BREAK LENGTH	MAB	DIMMERS	INTER FRAME TIME	INTER PACKET TIME	UPDATE RATE
160 μ S	20 μ S	512	44 μ S EC	16324 μ S EC	16 HZ

10.4 SHOW SAVER START CODE & LINE TERMINATION

The receive and edit routines of **SHOW SAVER** temporarily change the start code to which the DMXter is set to the 'dimmer' start code of 0. Exiting **SHOW SAVER** by way of the **TO FUNCTION MENU?** menu item will restore the start code to the value you were using beforehand. Pressing < **TOP**> to exit **SHOW SAVER** will leave the start code set to 0. REMEMBER THAT PLAYBACK PERMANENTLY CHANGES THE START CODE TO 0. IF YOU WANT TO RETURN TO A NON-0 START CODE, YOU WILL HAVE TO RESET IT.

The subject of line termination is important but we'll try and spare you the gory details. DMX512 uses a balanced terminated transmission line. All DMX lines should have one and only one termination impedance at the dimmer end of the line. The DMXter can either terminate a line or bridge the line. When bridging the line the DMXter passes the data from its IN connector to its OUT connector. We refer to this mode as pass thru mode. If you have plugged in the DMXter after the last dimmer rack, it is important that you respond < **YES/Q**> to

```
SHOW SAVER
AT END OF LINE?
```

This response terminates the line. An unterminated DMX512 line may cause faulty reception by all devices connected to it. This is particularly true with cable runs of greater than 250 feet. Answering < **YES/Q**> will cause the DMXter to keep the DMX512 line terminated until you exit back to the **FUNCTION SELECT MENU**, using the **TO FUNCTION MENU?** query. Pressing < **TOP**> to exit **SHOW SAVER** will leave the line terminated until some other operation unterminates it.

Normally you will probably record new scenes with the DMXter physically near the console. You will also often wish to see the scenes you have recorded on stage. We believe the most common method of using the unit

will be daisy-chained (between the console output and the dimmers) - so most of the time you will want to answer 'No' to the termination question using the < **DOWN**> key.

If you do answer < **YES/Q**> to the termination query, you will see the message

```
ARE YOU SURE?  
STAGE WILL BLACKOUT!
```

This tells you that if your dimmers are plugged into the output of the DMXter, they will blackout. If the DMXter is the last thing in line, there will be no change.

10.5 RECORDING SCENES

SHOW SAVER's scenes can be recorded from the output of any DMX512 console in the same manner as **TAKING A SNAPSHOT**. They may also be entered dimmer by dimmer (painfully!). If you wish to do this, please see **EDITING SCENES** Section 10.7 below.

An important difference between the DMXter and most lighting consoles is that the DMXter deals in dimmers, not in channels. To translate a cue sheet to the DMXter will require some thought (and an accurate copy of any softpatch). This is another reason why it is usually easiest to record from the console.

So then, connect the DMXter to the output of your console. Normally you will do this by daisy-chaining with your dimmers so you can see on stage what you're recording. Set the console to output a look you want to save which need not be a cue.

The entrance message for recording a scene is, appropriately

```
SHOW SAVER  
RECORD SCENE?
```

10.5(1) THE SCENE SELECT DISPLAY

When you press the < **YES/Q**> key, you will see

```
RECORD SCENE?      RECORD SCENE?  
>1< 2 3 4 5 6 7 8   or   1 2 3 4 5 6 7 8
```

The numbers 1 thru 8 are the eight scenes that **SHOW SAVER** can store. A set of brackets point to the currently selected scene. Solid brackets enclose a recorded scene; open brackets enclose a cleared scene. To select the scene, use the < **LEFT**> < **RIGHT**> keys to move the brackets to enclose the desired scene. If you would like to see a summary screen for a particular scene, hold down both the < **LEFT**> and < **RIGHT**> keys simultaneously. An example of a summary display is shown below. The top line starts with S:x, where 'x' is the current scene number. The rest of the top line displays the scene name, if any. The second line lists the number of dimmers with levels equal or greater than 1%, the first and last such dimmer.

```
S:2 THIS SCENE NAME  
10 DIMS 3 TO 510
```

These conventions will be used any time you see a display of this type.

10.5(2) TAKING THE SNAPSHOT

Press < **YES/Q**> to record. If nothing was previously recorded in the scene, the screen message will display briefly **TAKING SNAPSHOT**.

If the scene had been previously recorded, you will see the warning `OVERWRITE SCENE 1 ?` with the second line displaying the alphanumeric name of the old scene. If you do wish to overwrite the scene, answer `< YES/Q >` here. If not, use `< DOWN >` to cancel the operation.

10.5(3) NAMING THE SCENE

After recording the scene, the screen will read

```
EDIT SCENE NAME?
```

The second line of the display provides space for a sixteen character alphanumeric name. If you have overwritten an old scene, the old scene name will be in the display. If you have recorded to a cleared scene this line will normally be blank until you enter the name. The exception is if the scene recorded had no dimmers with levels equal to or greater than 1% (4 hex) - the scene will automatically be named **BLACKOUT**.

To edit a scene name, first press `< YES/Q >`. The cursor will appear at the first space of the name on the second line. Each press of the `< UP >` key will step you thru first the numbers 0-9, then the alphabet. Pressing the `< DOWN >` key steps you thru the same sequence backwards. When you have the right character, use the `< RIGHT >` and `< LEFT >` arrow keys to move the cursor. When editing an old name, you may clear a space by pressing `< UP >` and `< DOWN >` simultaneously and releasing them. To clear from the cursor to the end of the line, press `< UP >`, `< DOWN >` and `< RIGHT >` simultaneously. (Look, it's the only three key press in the unit, ok?!) When you like the name, press `< YES/Q >`.

10.5(4) SETTING THE FADE TIME

The next screen message is

```
FADE TIME IS  3 D
CHANGE IT?
```

This display tells you the fade time in seconds. If 'D' appears, the time shown is the default fade time. The default fade time is shipped set to three seconds. The default maybe changed; see Section 10.6 below. If you wish to set a different fade time, press `< YES/Q >` and the display will change to

```
FADE TIME IS  3
CHANGING FADE TIME
```

Fade time may be set from 0 to 30 seconds using the `< UP >` and `< DOWN >` keys. It is important to note that setting a fade time of 3 is different from having a default time of 3. A scene for which you have set a fade time of 3 will always have a fade time of 3 (until you edit that time in that scene) while a scene with a default time of 3 will change when the value for the default time is changed. Pressing `< YES/Q >` removes the default and substitutes a recorded value. To return to the default value, press `< YES/Q >` and `< DOWN >`. Exiting the fade time editor puts you back to the

```
RECORD SCENE?
1  2 3 4 5 6 7 8  display.
```

To reach the next menu item, press `< DOWN >`.

10.6 CLEARING OLD RECORDED SCENES

```
SHOW SAVER
CLEAR SCENE?
```

Pressing `< YES/Q >` will get you to this display

```
CLEAR SCENE?
```


10.10 PLAYBACK SCENE?

This is where you will be given another chance to playback scenes if you did not choose to do so upon entry. If you scroll thru the **SHOW SAVER** menu more than once this is where you will find the playback query.

10.11 GETTING A SUMMARY OF THE SCENES

```
SHOW SAVER
SCENE SUMMARY?
```

This last menu in **SHOW SAVER** is another way to get a scene summary. If you enter this routine you will see the following display

```
SCENE SUMMARY
1 2 3 4 5 6 7 8
```

Now you could get a summary display by pressing both the < **LEFT**> and the < **RIGHT**> keys, but that display is only shown as long as you hold both keys. If instead you press < **YES/Q**> you will get a latched summary display, as per the example below

```
S:2 THIS SCENE NAME
10 DIMS 1 TO 512
```

If you wish to view a summary for another scene you may increment or decrement the scene number using either the < **UP**> and < **DOWN**> keys or the < **LEFT**> and < **RIGHT**> keys. NOTE: When incrementing or decrementing cleared scenes are skipped.

11.0 *Lil'*DMXter THAT CONFORMS TO THE EEC EMC DIRECTIVE 89/336/EEC

The European Economic Community A.K.A. European Union has established certain requirements that most electronic equipment must conform to if they are used within the EEC. It has established testing methods to determine that a unit does conform. Units that do conform may carry the '**CE** mark'.



11.1 CE MARKED *Lil'*DMXters

The *Lil'*DMXter is now available **CE** marked. As of this time **CE** marked units are a separate product. While operationally they are nearly identical to our standard product there are several minor differences that need to be pointed out.

11.2 IDENTIFYING CE CONFORMING *Lil'*DMXters

You may easily identify if your *Lil'*DMXter is a **CE** unit.

- 1) Only **CE** units carry the **CE** mark.
- 2) Model number is FD DMX-1CE
- 3) Our standard *Lil'*DMXters have a 3-pin IEC power inlet connector at the center of the top edge of the front panel. In the same location **CE** *Lil'*DMXters have 2.5 mm low voltage DC power connector and a thumbscrew grounding post.

11.3 OPERATIONAL DIFFERENCES OF CE *Lil'*DMXters

The most important difference is that **CE** *Lil'*DMXters use an external power supply. The external power supply both charges the internal battery and allows operation directly from the AC mains. Since the power supply is external the DMXter is no longer set for either 120 or 230 volt operation. That choice is made by selection of the proper external power supply.

There are two operational differences that result from the change to a CE power supply.

- 1) The **CE** *Lil'*DMXter may be operated from the AC mains with the internal battery switch OFF. This may well be an advantage in those places where only AC operation is needed. Turning off the internal battery switch when battery operation is not needed will increase the life of the battery. With our standard product it is necessary for the internal battery switch to be ON and for a working battery to be present for correct operation of the unit even from the AC mains.
- 2) The use of a double insulated external power supply removes the ground terminal provided by the AC cord. So the metal frame of the *Lil'*DMXter is no longer grounded during AC operation. Normally this is fine. But in those place where grounding is desired for either shielding or electrical reasons the user must connect a properly grounded cable to the *Lil'*DMXter. A thumbscrew grounding post is provided for this purpose.

11.4 BACKLIGHT INVERTOR PRECAUTIONS.

While **CE** units do not have any AC mains voltage within the case, all units have an invertor to power the LCD backlight. This invertor produces 100 VAC at very low current. No *Lil'*DMXter should be operated out of it case and should only be serviced by a trained technician.

11.5 CE Declaration of Conformity

Goddard Design Company does declare that the following equipment meets the requirements of the EMC Directive 89/336/EEC:



The *Lil'DMXter*- Model Number FD DMX-1CE

Note that only model number **FD DMX-1CE** is covered by this declaration. Model **FD DMX-1** is not.

This unit was certified for emissions under EN55022 as class B ITE device. This unit was certified for immunity under EN50082-1.

The certification was issued on the 31 of August 1996.

Robert M Goddard
Head of Electronic Design
Goddard Design Co.

12.0 CARE AND FEEDING OF THE BATTERY

The *Lil'*DMXter may be powered either from the AC line or from its own internal rechargeable battery. When the DMXter is plugged into an AC line, it will both draw its operating power from the AC line and recharge its internal battery.

We expect that many users are going to find battery operation to be most convenient when troubleshooting equipment in the theater, and will prefer line operation in the shop.

12.1 CHARGING

The *Lil'*DMXter is shipped charged. We recommend that you charge the unit for an additional 12 hours soon after receipt. Most of the charging occurs during the first few hours of being plugged in. For example, after about six hours, the unit is about 70% charged. Within about 12 hours the unit is 90% charged, but it will take in excess of 24 hours total to fully recharge the batteries. If you need to use a DMXter that is fully discharged, it is acceptable to give it 2-3 hours of charge, enough to make it usable. But make a general rule of charging the unit fully, at least for 12 hours. We also recommend that the unit be given a monthly 'equalizing charge' lasting 24 to 36 hours.

The problem with a lot of battery powered equipment is that to get good battery life one has to follow a complicated regimen, which usually has little to do with how you wish to use the equipment. We have tried to design the DMXter to be 'understanding' of your needs. You can short cycle the batteries in the DMXter when you need to; that is, run it partway down and charge it back up fully. You may leave it plugged into AC for several days at a time without injury; however, if you plan to use the unit in a shop or other setting where it would be more convenient to keep it plugged in, see below for the recommended modifications to facilitate this.

12.2 LOW BATTERY WARNINGS / POWER MANAGEMENT

Surprise! The *Lil'*DMXter (like most battery-powered equipment) has a low battery warning. When it needs a charge, but before it's truly critical, it will give you the following message.

LOW BATTERY WARNING!
PLEASE FEED ME!

This message is displayed about every thirty seconds and lasts for about five seconds. While this message is displayed, the user interface is disabled. Obviously you can't view received levels and function such as **CABLE TEST** and **AUTOFADE ONE DIMMER** pause momentarily. The actual transmit routines continue to run. The low battery warning does not cause any interruption of the data sent to the dimmers. A low battery warning should not cause the **VIEW PARAMETERS** routines to a glitch in the displayed values.⁴

The amount of time/charge left in the battery is dependent on the function you are performing. **CABLE TEST** and **TRANSMIT** consume the most power. While you can continue to operate off batteries for 10, 20, maybe 30 more minutes, you should start thinking about the nearest AC outlet. As soon as you have plugged the unit in, you can continue your work on AC operation. The unit will also start to charge.

12.2(1) MEAL PENALTY

If you have been seeing the **LOW BATTERY WARNING** message for some time, the unit will at some point shut down. When the battery voltage drops low enough, the power supply is disconnected from the computer. This function is necessary to protect the battery. The display will go blank. Usually after a pause the battery

⁴ Before V1.70 of the *Lil'*DMXter software a low battery warning caused all other functions to cease for the duration of this message.

voltage will recover enough that the power supply shut down circuit will turn the battery back on. The *Lil' DMXter* will display the message

```
Lil'DMXter V1.70  
MEAL PENALTY
```

This display will last for about 30 seconds. It means that the *Lil' DMXter* power supply had shut down and that while it is now on there is not enough charge to operate the *Lil' DMXter*. Attempts to turn the unit on using the < **TOP** > key will redisplay the **MEAL PENALTY** message. If they produce no results (display stays blank) the power supply shut down circuit is still engaged.

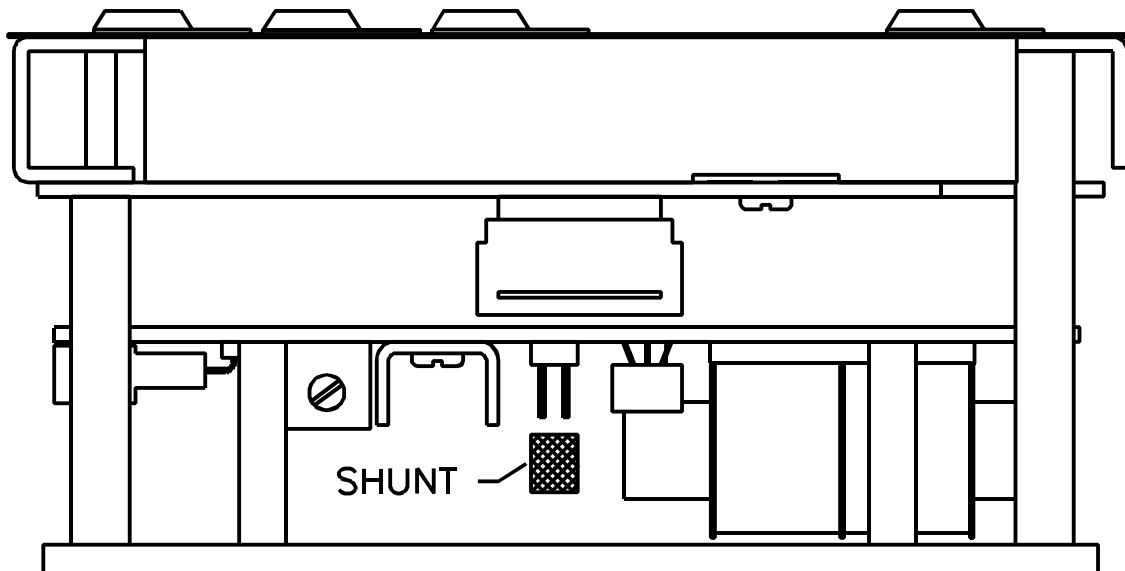
12.3 TURNING OFF THE BATTERY

If you plan to leave the *Lil' DMXter* unplugged for more than 20 days at a time, you will prolong battery life by turning off the battery. This will prevent the battery from going into deep discharge. Leaving a battery in deep discharge for any length of time greatly decreases battery life. To turn off the battery, you will need to access the battery switch inside the case.

**FIRST UNPLUG THE *Lil' DMXter* FROM THE AC LINE!!!!
NEVER OPERATE THE UNIT FROM THE AC LINE WHEN IT IS
OUTSIDE ITS CASE.**

To remove the unit from the case, DO NOT USE THE FOUR SCREWS ON THE FRONT PANEL. USE THE ONE SCREW ON THE BOTTOM OF THE CASE. The unit will drop out of the open case into your hand (or the floor if you're a klutz about this . . . remember that the display is glass!) Place the uncased unit on a table with the legends facing away from you. Look for a switch mounted to the base plate next to the right-hand spacer. The 'on' position is the switch toward the spacer; the 'off' position is the switch away from the spacer. Put the *Lil' DMXter* back into its case and put the bottom screw back in loosely. This will help remind you to check the battery switch before you next try to use the unit. We also recommend that you tag the unit as further reminder.

Note that when the unit is turned back on, if it has enough charge to operate, you will momentarily see the message *Lil' DMXter* is sleeping.



12.3 MODIFICATION FOR CONTINUOUS LINE OPERATION

If you plan to use the unit plugged into AC on a continuous basis, you may wish to make a simple modification to the unit to prolong battery life. As above, remove the unit from the case. Place the unit on a table with the Goddard Design Co. logo on the left. Approximately in the center of the open side of the end toward you, you will see a flat cable connector. Below it, on the other side of the PC board is the shunt. Pull this straight down, using your fingernail, to remove it. This removes the trickle charger; the unit will work just the same without it. Do hold onto the shunt you have removed in case you use the unit in a field situation in the future. The unit will certainly work on battery operation without the shunt.

Units shipped after April of 1997 (serial 1775 or greater) do not have the above-mentioned shunt. Experience has shown the trickle charge to be unnecessary and it was removed. This shunt will be found on DMX PS printed circuit boards through etch revision R3 and is missing on all later etch revisions.

12.3(1) WE RECOMMEND DISABLING THE TRICKLE CHARGER !NEW!

It is Goddard Design's feeling that the trickle charger provides little benefit to most users. We now recommend that most users will get better battery life with this feature disabled and will experience little increase in the amount of time needed to fully charge the battery. On the other hand we expect that the improvement in battery life will be minimal so we do not see this as important change for most users.

12.4 BATTERY OPERATING TIME

Approximate operating time on a fully charged battery:	
Shelf life between charges	20 days
Receiving	30 hours
Transmitting	12 hours
Running Cable test	6 hours

Units with serial numbers of 942 or higher should have a longer 'shelf life between charges'. The shelf life should be on the order of 30 days. But some caution is advisable. **The fast way to destroy your battery is to let the DMXter sit on the shelf discharged!** It is very difficult to damage the battery by over charging a DMXter. Nor do you always to have charge a DMXter fully. But do not let it sit with a dead battery for extended periods of time.

12.5 LINE VOLTAGE REQUIREMENTS (NON CE UNIT ONLY)

Units are shipped to operate from a 120 VAC line, 50 or 60 Hz. Units should operate on any voltage from 85 to 135 VAC. Units should be able to fully charge the battery at any voltage from 100 to 135 VAC. At line voltages below 110 volts charging time will increase markedly. At 100 volts charging time will be nearly double the 120 volt time. Units may be ordered strapped for 230 volt operation. Existing units may be restrapped in the field for 230 VAC operation. Consult the factory.

12.6 EXTERNAL POWER SUPPLY REQUIREMENTS (CE UNIT ONLY)

The external power supply provides the *Lil'*DMXter with the raw DC power. The internal circuitry regulates this power and acts as a battery charger. It is NOT necessary to use external power supplies that are designated as battery chargers. What is required is a supply that delivers 11 VDC to 14 VDC at least 500 MA. The polarity is not important since internal diodes will properly polarize the voltage. The supply must be a **CE** unit and must also present a high common mode impedance to ESD pulses. This last requirement can usually be met by placing a common mode choke in conductors from the supply. The choke is made by:

The twin lead wire carrying the low voltage DC current from the power supply to the DMXter is wound around a ferrite core. The core is a **Fair-Rite Products Corp.** part number # **2643802702**. Twelve (12) turns of the twin lead are wound on the core. The winding should be a neat single layer. The start and finish leads should be tied to the core by separate nylon wire ties or equivalent. There should be as much distance as possible between the start and finish leads. At a minimum this should be 15 millimeters (.590 inches).

But we can only guarantee **CE** compliance if the external supply is provided by GDC.

13.0 Lil'DMXter TECHNICAL DISCUSSION

Following are discussions of a few items of interest that we couldn't find a better place to put . . .

13.1 LINE TERMINATION AND CONNECTOR WIRING

PIN #	DMX512 IN	DMX512 OUT	NOTES
1	Shield & Common	Shield & common	connect common on both ends
2	DATA -	DATA -	DMX512 data pair
3	DATA +	DATA +	
4	Spare -	spare + , Scope trigger -	
5	Spare +	Spare -, Scope trigger +	

Pins 2 and 3 of the DMX IN connector are always wired to a differential line receiver. This line receiver consists of a standard RS485 receiver chip protected by a transient and overvoltage protection network. Pins 2 and 3 of the DMX OUT connector are always wired to a DMX512 line driver. The line driver consists of an RS485 transmitter and a protection network. If the DMXter is in a terminated mode, Pins 2 and 3 of the DMX IN connector are loaded by a 100 ohm half-watt termination resistor and there is no connection between Pins 2 and 3 of the INPUT connector and Pins 2 and 3 of the OUTPUT connector. If the DMXter is in unterminated mode, the termination resistor is removed and Pins 2 and 3 of the INPUT connector are connected to Pins 2 and 3 of the OUTPUT connector. In the unterminated mode the DMXter can passively transfer a DMX signal from its IN connector to its OUT connector so that the *Lil'DMXter* may be put in line between a console and the dimmers transparently. The switching from terminated to unterminated mode is done by a magnetically latched relay. The advantage of using a latched relay is that the DMXter maintains its state even when off. If you place the DMXter on a cable after the last dimmer rack, you will wish to terminate the line by answering < **YES/Q** > to the '**AT END OF LINE?**' question in **RECEIVE DMX512**. If the *Lil'DMXter* turns off while sitting at the end of the line, it would be embarrassing if it removed the line termination - but it won't. Similarly, if the *Lil'DMXter* is placed between the console and the dimmers, it will stay in the Pass-Thru mode when turned off.

The following list of functions causes the DMXter to terminate the line:

- 1- In **RECEIVE DMX512** and in **FLICKER FINDER** answering < **YES/Q** > to the **AT END OF LINE?** question.
- 2- Any function that transmits data - if exited in a normal fashion, unterminates the line on exit, but note that exiting a function via < **TOP** > is not a normal exit and will leave the line terminated
- 3- **SINGLE ENDED CABLE TEST** terminates the line - the condition on exit is the same as in **TRANSMIT**

4- **DOUBLE ENDED CABLE TEST** terminates the line - the condition on exit is the same as in **TRANSMIT**

13.2 STANDARDS - DMX512, RS422 AND RS485

Detailed discussion of DMX512 is beyond the scope of this manual. We would recommend that persons wishing to know more consult a good book discussing asynchronous serial communications in computers.

The electrical standards on which DMX512 is based are both RS422 and RS485. Many textbooks and catalogs discuss the features of these standards. Copies of these standards may be obtained from the Electronic Industries Association, 1722 Eye Street N.W., Washington D.C. 20006

A copy of the DMX512 standard may be obtained from the US Institute for Theater Technology (**USITT**), 6443 Riding Road, Syracuse NY 13206-1111. Phone: 315 463-6463.

13.3 VERIFYING SYSTEM TIMEBASE ACCURACY

The *Lil'*DMXter has a highly accurate crystal timebase, but it is not traceable to a certified calibration standard. For normal DMX512 testing and evaluation, the stock accuracy of the crystal should be more than adequate. If you have any need or desire to know the absolute accuracy of your particular DMXter, continue reading. If not, skip the rest of this section as it will only serve to confuse matters!

To verify the actual accuracy of the system timebase, it is necessary to measure the operating frequency of the microprocessor. To do this will require a frequency counter capable of measuring 2.6666666 Mhz with an accuracy of better than 20 PPM.

**FIRST UNPLUG THE *Lil'*DMXter FROM THE AC LINE!!!!
NEVER OPERATE THE UNIT FROM THE AC LINE WHEN IT IS
OUTSIDE ITS CASE.**

OK, so now take the unit apart. Start by removing the single screw in the back of the case (careful as the unit will drop on the floor if you are clumsy). Remove from case. Next remove the four screws in the corners of the front panel. The unit will separate into two pieces connected by a ribbon cable and a twisted pair.

Turn the DMXter on, it must be on battery power only, not connected to AC. Leave the unit in either of the first two menu items:

DO YOU WANT THE
BACKLITE OFF?

or

DISABLE THE AUTO
POWER OFF TIMER?

Your MUST enter either of these menu items by turning on the DMXter. Entering them by way of the **SETUP USER OPTIONS?** menu is not the same as far as this test is concerned!

Next find the 40 pin microprocessor. The signal that needs to be examined is on pin 30. This signal is called ALE. The frequency of the crystal is the frequency of this pin multiplied by six. The nominal crystal frequency is 16 Mhz. Therefore the frequency appearing on this pin should be 2.6666666 Mhz. The deviation from the nominal crystal frequency can be used to calculate the correction factor that would have to be applied to all time measurements and settings for this particular DMXter.

A side note: Do not try to measure the frequency of the crystal directly with any normal probe system as the additional capacitance of the probe and counter will detune the crystal oscillator and result in extremely inaccurate readings.

13.4 THE PERCENT SCALE

We have included a percent display mode in the *Lil'DMXter* for the convenience of having a display that approximates the display seen on your lighting console. The percent display mode should not be expected to exactly match any particular console, and should not be used if it is important to know the actual level that you are receiving. It should not be assumed that a *Lil'DMXter* transmitting 45% percent will transmit the same code as your light console set to '45'.

DMX512 uses an 8 bit binary byte to represent a dimmer level, this is 256 possible levels, 0 to 255. Theatrical lighting has long used a 10 point scale, which with advent of the digital control consoles became a 101 point scale, 0 to 100. There is no integer factor to convert 101 to 256. Therefore an integer conversion between these scales will be approximate. There is no universal agreement on exactly how the rounding should be done. The discrepancies manufacturer to manufacturer are seldom of great import in theatrical lighting although they are of some import when DMX512 is used to drive other devices, such as color scrollers.

Technical note: The conversions from percent to decimal and decimal to percent in the *Lil'DMXter* are all table driven. When the *Lil'DMXter* is set to the percent mode more than one received code will be displayed as the same percent value. For example 7Fh, 80h, and 81h are all displayed as 50%. The full receive conversion table is listed below.

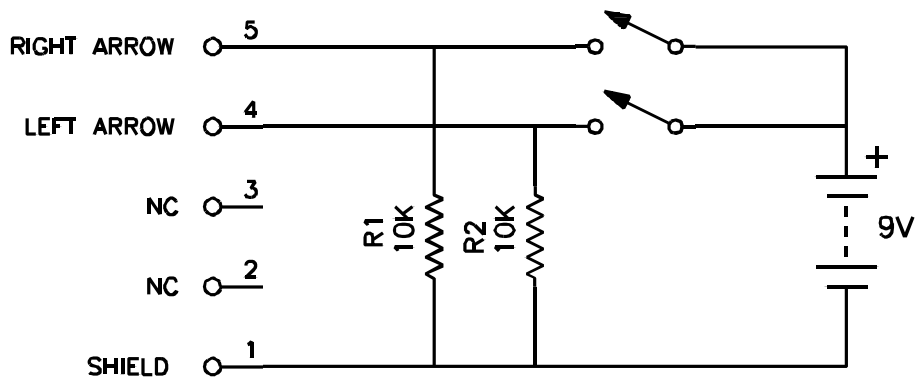
The RAM dimmer table always stores dimmer levels in 8 bit binary. Conversion is done when a number is displayed. Hence snapshot is re-transmitted exactly as it was received. While 7Fh and 81h are both displayed as 50% they will be stored and re-transmitted as different levels. **BUT** when the *Lil'DMXter* is in percent mode you can only enter one value for each percent step. To find the exact values see the transmit conversion table listed below.

There is an exception to the rule that changing display mode does not change data. The display resolution of hex and decimal is finer than that of percent. This means that there are two or three values of hex and decimal that are nominally displayed as 50%. If the DMXter has been set to hex and you have been searching for dimmers set to 80h (nominally 50%) and you switch the unit to percent, you would expect to find all dimmers displayed with a value of 50% or greater. Hence we change the search value from 80h to 7Fh so that all dimmers displayed as 50% are included. On changing from hex or decimal to percent, all search values are corrected so that all dimmers displayed as set to the same percent will be found.

13.5 PERCENT TABLES

%	REC'D	XMIT	%	REC'D	XMIT	%	REC'D	XMIT
0	00-02	00	34	57-58	58	68	AD-AF	AF
1	03-05	05	35	59-5B	5B	69	B0-B1	B1
2	06-07	07	36	5C-5D	5D	70	B2-B4	B4
3	08-0A	0A	37	5E-60	60	71	B5-B6	B6
4	0B-0C	0C	38	61-62	62	72	B7-B9	B9
5	0D-0F	0F	39	63-65	65	73	BA-BB	BB
6	10-11	11	40	66-68	68	74	BC-BE	BE
7	12-14	14	41	69-6A	6A	75	BF-C0	C0
8	15-16	16	42	6B-6D	6D	76	C1-C3	C3
9	17-19	19	43	6E-6F	6F	77	C4-C5	C5
10	1A-1B	1B	44	70-72	72	78	C6-C8	C8
11	1C-1E	1E	45	73-74	74	79	C9-CB	CB
12	1F-20	20	46	75-77	77	80	CC-CD	CD
13	21-23	23	47	78-79	79	81	CE-DO	DO
14	24-26	26	48	7A-7C	7C	82	D1-D2	D2
15	27-28	28	49	7D-7E	7E	83	D3-D5	D5
16	29-2B	2B	50	7F-81	81	84	D6-D7	D7
17	2C-2D	2D	51	82-83	83	85	D8-DA	DA
18	2E-30	30	52	84-86	86	86	DB-DC	DC
19	31-32	32	53	87-89	89	87	DD-DF	DF
20	33-35	35	54	8A-8B	8B	88	E0-E1	E1
21	36-37	37	55	8C-8E	8E	89	E2-E4	E4
22	38-3A	3A	56	8F-90	90	90	E5-E6	E6
23	3B-3C	3C	57	91-93	93	91	E7-E9	E9
24	3D-3F	3F	58	94-95	95	92	EA-EC	EC
25	40-41	41	59	96-98	98	93	ED-EE	EE
26	42-44	44	60	99-9A	9A	94	EF-F1	F1
27	45-47	47	61	9B-9D	9D	95	F2-F3	F3
28	48-49	49	62	9E-9F	9F	96	F4-F6	F6
29	4A-4C	4C	63	A0-A2	A2	97	F7-F8	F8
30	4D-4E	4E	64	A3-A4	A4	98	F9-FB	FB
31	4F-51	51	65	A5-A7	A7	99	FC-FD	FD
32	52-53	53	66	A8-AA	AA	100	FE-FF	FF
33	54-56	56	67	AB-AC	AC			

13.6 BUILDING AN EXTERNAL SWITCH ADAPTOR



In **ADJUST ONE DIMMER**, **AUTOFADE ONE DIMMER** and **ADJUST ALL DIMMERS** the software supports two user provided external switches. A small pendant control or a foot switch can be used to activate these functions. At present Goddard Design does not sell these switches. But you can build your own.

Any two mechanically suitable normally open momentary switches may be used. They should be wired to a female 5 pin DMX connector (Switchcraft A5F) as shown in the above schematic. A power source of 5 volt DC to 10 volts DC is required. The two 10 K resistors constitute the bulk of the power drain on the power source. A 9 volt radio battery should last as long as its shelf life.

13.7 SPECIFICATION TABLES

TRANSMITTED DMX512 PARAMETERS

FUNCTION	DEFAULT	MINIMUM	MAXIMUM	RESOLUTION
BREAK LENGTH	88 μ S	50 μ S	49144 μ S (1)	1 μ S
MARK AFTER BREAK	8 μ S	3 μ S	49064 μ S (2)	1 μ S
INTERFRAME MARK TIME	4 μ S	4 μ S	330 μ S	22 μ S
INTERPACKET MARK TIME	4 μ S	4 μ S	1.442SEC	22 μ S
DIMMERS TRANSMITTED	512	1	999	1
UPDATE RATE	40	.594(3)	5200(4)	NA
START CODES SENT	0	ANY	START	CODE

(1) Maximum with MAB set to 8 μ S

(2) Maximum with break set to 88 μ S

(1 or 2) The Total of break and MAB cannot exceed 49152 μ S .

(3) 512 dimmers, 49,144us break, 8 μ S mark, 334 μ S IBT(15 units), 1.454 second IPT (65535 units)

(4) 1 dimmer, 88us break, 8us MAB

RECEIVED DMX512 PARAMETERS

FUNCTION	MINIMUM	MAXIMUM	NOTES
BREAK LENGTH	65 μ S	-	
MAB LENGTH	3 μ S	-	
NUMBER OF DIMMERS	1	512	OVFL reported for over 512 dimmers
BREAK-BREAK TIME	170 μ S	3 SEC.	

RECEIVED & TRANSMITTED BAUD RATE	250,000	as per DMX512
----------------------------------	---------	---------------

ACCURACY

PARAMETER	ACCURACY	NOTES
TIMEBASE & BAUD RATE ACCURACY	+/- 75 PPM (1)	0 - 70 Degrees C, by design, not tested in production
TRANSMITTED BREAK JITTER	NEGLIGIBLE	Timebase jitter is the major source of break jitter
TRANSMITTED MAB JITTER	NEGLIGIBLE	START CODE = 0 BREAK + MAB less than 16.380 MSEC
TRANSMITTED MAB JITTER	+/- 4 μ S	NON-ZERO START CODE or BREAK + MAB time greater than 16,380MS
DIMMER FRAME JITTER	+/- 2 μ S	
SCOPE TRIGGER TO BREAK JITTER	NEGLIGIBLE	Timebase jitter is the major source of jitter
RERC'D BRK,MAB ACCURACY	+/- 250nS +/- 75PPM (1)	Sum of both errors, rounded as needed for display
REC'D BREAK TO BREAK	+/-8 μ S	See section 5.2(5)

(1) Prior to unit # 908 the accuracy was given a +/-150ppm.

VOLTAGE AND CURRENT LIMITS

	VOLTAGE OR CURRENT	NOTES
LINE VOLTAGE	85 - 135 VAC 100 - 135 VAC	- To operate - To charge fully (1)
DMX512-OUT PINS 2&3 MAX VOLTS MAX CURRENT	+ 20VDC, -12VDC(3) +/- 100 MA	Withstanding voltage & current
DMX512-IN PINS 2&3(2) MAX VOLTS MAX CURRENT	+ 50VDC, -30VDC +/-7 MA	Withstanding voltage & current
PIN 4&5 IN or OUT	+/-70 VDC	SCOPE TRIGGER - OFF DOUBLE ENDED CABLE TEST - OFF
PIN 4&5 OUT	+ 15 VDC, -5 VDC +/-100 MA	SCOPE TRIGGER - ON

(1) At line voltages below 110 volts charging time will increase markedly. At 100 volts charging time will be nearly double the 120 volt time. Units may be ordered strapped for 230 volt operation.

(2) In terminated modes, in unterminated modes DMX512-OUT limits apply.

(3) **NOTE:** Before serial number #681 this limit was + 20 VDC -5 VDC.

13.8 RELEASE NOTES & SOFTWARE, VERSION HISTORY

V0.90 - V0.95 Beta test versions

V1.01 is the first production software version.

V1.40 This software added the following features

- 1) A 0 to 100 percent scale option was added for dimmer levels.
- 2) The user options menu was reworked to accommodate switching between the three display formats, decimal, percent, and hex.
- 3) AUTOFADE ONE DIMMER was added to transmit.
- 4) The following were added to receive: search for next dimmer at level, a dimmer summary display, and a new menu item added to set the search minimum.
- 5) FLICKER FINDER may now run with the line either terminated or unterminated.

V1.40 Bugs Swatted:

The power off timer had a bug that caused it to be re-enabled every time < **TOP**> was pressed even though the user would have assumed this was not the case.

There was a bug in TAKE SNAPSHOT that caused multiple copies of the received dimmer data to be recorded in the dimmer table when a snapshot was taken of a console outputting fewer than 512 dimmer levels. SNAPSHOT continued to record dimmer levels until 512 levels where in the table.

Other minor code tweaking was done. The only one worth mentioning is; in VIEW PARAMETERS the displayed label 'MARK LENGTH' has been changed to 'MAB LENGTH'.

V1.50 This software was made compatible with **SHOW SAVER**. In the User Setup Menu, the **POWER TIMER DISABLE/ENABLE** query was clarified. Provision was made for optional owner identification within the turn on message display. In **RECEIVE DMX512, MEASURE PARAMETERS** the return points for the measurement routines have been changed to be consistent.

The USER C 'flavor' was changed to match that used by the **SHOW SAVER** software. Considerable internal housekeeping was performed.

V1.60 **RECEIVE SCOPE TRIGGER** was added as an option. Again most of the other changes are internal. Much of the menu code is now handled by a table driven 'menu engine'. Interrupt code may now be ram resident and reloaded at will. The only notable user interface changes are in **SHOW SAVER**'s monitor mode, plus the addition of the external switches to **TRANSMIT DMX512**.

Bugs Swatted: V1.01 **SHOW SAVER** did not change the status of the termination relay on entry to monitor mode. If the last use of the DMXter had been as a receiver at the end of DMX line, the termination relay would stay terminated. While the line would be monitored no DMX512 would pass through to the dimmers. Playback worked correctly. In V1.10 of **SHOW SAVER** when entering the monitor mode the line is always unterminated so that data is passed through to the dimmers.

V1.61C This was the first version to support the Colortran protocol. It was only released in CMX-DMX version.

V1.62C This version corrected a bug that occasionally caused some of the ram variables to be corrupted when switching from DMX to CMX or back. It also was only released for CMX-DMX units.

A feature to allow the user to reset all ram variables from the front panel was included.

V1.63 - V1.63C This version is available in both a Colortran and a non-Colortran version. An internal change was made to correct a problem that caused earlier Colortan code to be CPU lot code sensitive. No lot sensitivity has been seen in non-Colortran units. The change was made to all code.

V1.73 -V1.73C **RELEASE NOTES FOR THIS VERSION**

A) The major new feature of this version is the **MULTI CHANNEL MODE**. This feature is designed to ease the testing of multi channel fixtures. We suggest that users old and new read all of section 9.

B) The scrolling copyright message has been removed. The static version and personal identification fields can be keyed through.

C) Other significant changes that the user will notice are in the **TRANSMIT DMX512** menu.

1) Bumping a dimmer level to 50% is now possible. This is done by pressing and releasing both the **< UP >** and the **< DOWN >** keys. In general this key combination will set most values to their mid scale value.

The following changes cause the *Lil'*DMXter software to more nearly match the software written for the MiniDMXter.

2) In **SEND/EDIT** it is now possible to skip to the next dimmer set to a level greater than the search value. This function mirrors a feature that has long been part of the **RECEIVE** routine.

3) Another 'Mini' like change is that exiting **SEND/EDIT** by pressing **< YES/Q >** does not reset the dimmer number to 1. Hence if you are viewing dimmer 321 and your finger stutters on the **< YES/Q >** key pressing it again will put you back at dimmer 321, not back at dimmer 1 as happened with prior versions of the software. This feature is also available in all routines that use a dimmer number.

4) A means to reset the dimmer number to one at any time has been added to all routines that use a dimmer number. The key press to do this is **< RIGHT >** and **< LEFT >** together.

5) A method of clearing the transmit table without leaving **SEND/EDIT** has also been included.

D) The menu item in **USER OPTIONS** for selection of the number format now is the same as the one used in the MiniDMXter. The default display type is now percent. We have made one DMX512 terminology change. **INTERBYTE** time is now called **INTERFRAME** time. This change reflects the usage in the Standard.

E) The low battery warning code has been changed. The new code allows background tasks, such as DMX512 transmit, to continue to run during the warning message. User interface related tasks still pause during the message.

- F) One optional routine has been removed. As of this writing the **RECEIVE SCOPE TRIGGER** is not order-able as part of V1.70. This routine is still order-able but it will be supplied with the rest of V1.63 or V1.63C which is still supported. The **TRANSMIT SCOPE TRIGGER** is still provided standard on all units.

As usual many internal modifications to the code have been made. Hopefully the user will never need to know anything about them.

14.0 THE RECEIVE SCOPE TRIGGER OPTION

The **RECEIVE SCOPE TRIGGER** software is not included in V1.70. If you require this option it is available as part of V1.63 which is still a production part. The same hardware may run either V1.70 or V1.63. But an EPROM swap will be required.

The **RECEIVE SCOPE TRIGGER** software is designed for detailed troubleshooting of DMX512 systems and for debugging. It is not generally needed by show electricians. With scope trigger it is possible to trigger an oscilloscope from certain important points within the DMX data stream. Proper use of this feature requires a detailed knowledge of DMX512 and the use of an oscilloscope. While executing scope trigger function the DMXter can not otherwise receive or analyze DMX512.

This feature consists of two parts, an optional software module and an additional external printed circuit card. (type number STC1A) Neither is of any use without the other. The scope trigger option includes both parts.

15.0 COLORTRAN PROTOCOL OPTION

You may now order any *Lil'*DMXter with an option that allows it to send and receive Colortran's proprietary digital protocol. This protocol is usually referred to as CMX. It is the parent protocol on which DMX512 was based. The primary difference between CMX and DMX512 is that CMX uses a baud rate of 153.6K while DMX512 uses a baud rate of 250K. A side note: the baud rate of CMX has often erroneously been listed as 156K.

This option should be of great use to anyone servicing Colortran systems that use this protocol. All of the *Lil'*DMXter's features now support CMX, but certain differences must be taken into account.

This option should be retrofitable to all existing DMXters. But we will require that all units be returned to the factory to be retrofitted with additional hardware.

15.1 HOW TO IDENTIFY CMX EQUIPPED DMXTERS

A *Lil'*DMXter fitted with this option is identified by a 'C' after the software version number. The first version of the software to support CMX is version V1.61C.

15.2 *Lil'*DMXter's NAMING CONVENTIONS FOR THE CMX PROTOCOL

The *Lil'*DMXter's software uses either 'COLORTRAN' or 'CTN' in its display messages to identify the CMX protocol. The reason for this is that at a quick glance CMX and DMX are easily confused in the block letter character set of the LCD display. This naming change is done only for clarity.

15.3 SELECTING THE CMX PROTOCOL

The primary standard of units fitted with this option is still DMX512. Units so fitted must be switched via software to Colortran mode. Once switched they will stay that way until switched back or until the power-up defaults are restored.

There are two methods of changing the unit to Colortran mode. One is by way of a new switch in the **USER SETUP OPTIONS** menu. This is a bidirectional switch which will offer the user whichever standard the unit is not currently set for. If the unit is set for DMX512 the display will read:

```
DATA IS DMX
SET FOR COLORTRAN?
```

The other method is a new 'flavor' in the **TRANSMIT DMX512, SEND FLAVOR** submenu.

```
SEND FLAVOR?
COLORTRAN CMX 153.6k
```

The following should be noted: While DMX512 flavors only effect transmitted DMX, the **COLORTRAN CMX 153.6k** flavor sets the DMXter to transmit and receive CMX. Also there is only one transmit flavor available for CMX. The values for this flavor are listed below.

15.3 HOW TO TELL IF A DMXter IS SET TO CMX PROTOCOL

If you have pressed < **TOP**> the DMXter is sitting on the Transmit menu; the display will be changed if the unit is set to CMX.

```
FUNCTION SELECT MENU
TRANSMIT COLORTRAN?
```

The Receive menu item also changes to:

```
FUNCTION SELECT MENU
RECEIVE COLORTRAN?
```

The displays for other **FUNCTION SELECT MENU** items do not change when the protocol is switched. But all of these functions will now support Colortran protocol.

15.4 CHANGES TO TRANSMIT MENU ITEMS

Any Transmit menu item that has a first line that normally reads TRANSMIT DMX512 will change to read TRANSMIT COLORTRAN.

The SEND/EDIT SNAPSHOT routine display matrix is changed. The first example below is a possible display of a *Lil'*DMXter without the CMX option.

```
DIM:  1  2  3  4
LEV:  98 FF 50  0
```

The following examples are for units fitted with the CMX option. When the protocol is set to DMX512 the display will be as shown below. The field that used to read LEV is changed to read DMX to indicate the current protocol setting.

```
DIM:  1  2  3  4
DMX  98 FF 50  0
```

When the protocol is set to CMX the display will be as shown below. The field that used to read LEV is changed to read CTN to indicate the current protocol setting.

```
DIM:  1  2  3  4
CTN:  98 FF 50  0
```

15.4(1) THE CHANGE SEND FLAVOR SUBMENU & CMX

```
TRANSMIT COLORTRAN
CHANGE SEND FLAVOR?
```

This menu item has only one useful function while a DMXter is set to CMX protocol. It allows you to return the DMXter to DMX512 protocol. Pressing < **YES/Q**> will display the following:

```
SEND FLAVOR?
COLORTRAN CMX 153.6k
```

Using the < **UP**> or < **DOWN**> keys to move to another flavor and accepting that flavor by pressing the < **YES/Q**> will cause the start code to be set to 0 and that **DMX** flavor to become the current flavor. The flavor editor may be used while the unit is in CMX mode but you are editing **DMX** flavors!

15.4(2) CHANGING THE START CODE WHILE IN CMX MODE

The submenu item that allows the DMXter to set the start code to non null values is available when the unit is in CMX mode. It is left active to keep the unit's behavior as similar as possible in both protocol modes. We know of no valid CMX uses where the byte used as the Start Code in DMX is anything but a null. Therefore we doubt that you will ever need this feature in CMX.

Note that whenever the protocol is changed either from DMX to CMX or CMX to DMX, the Start Code is reset to a null (zero) value.

15.5 CHANGES TO RECEIVE MENU ITEMS

Any Transmit menu item that has a first line that normally reads RECEIVE DMX512 will change to read RECEIVE COLORTRAN.

The VIEW LEVELS routine display matrix has been changed in the same way as the SEND/EDIT SNAPSHOT display. The LEV characters have been replaced by CTN.

15.5(1) **WARNING:** VIEW PARAMETERS WORKS DIFFERENTLY IN CMX

The following parameter measurement routines require a correction factor to give a valid reading when your Lil'DMXter is set to Colotran CMX mode;

BREAK LENGTH IN uS , MAB LENGTH IN uS , BREAK TO BREAK IN uS, and any of the above when calibrated in milliseconds.

All of the parameter measurements that are currently supported in DMX are also supported for CMX. But the current software does not provide a reading directly in engineering units for the routines listed above. A correct reading can be obtained by multiplying the displayed reading by a conversion factor. The factor (to 4 places) is 1.6276. It is derived by dividing 250K by 153.6K.

The following routines work the same way in either DMX or CMX;

The error summary display, START CODES, BYTES PER PACKETS, and UPDATES PER SECOND.

15.6 COLORTRAN CMX TIMINGS, AND GDC'S CMX FLAVOR

The following section gives in tabular form some of the important timing information for CMX.

CMX Baud Rate	153.6 Kilo Baud
CMX Bit Time	6.5104 Micro Seconds
CMX Frame Time	71.615 Micro Seconds
Correction Factor For View Parameters	Multiply Reading By 1.6276

The following table has two uses. One it lists the values that Goddard Design uses when sending CMX protocol. These values are found in the column labeled 'DMXter CMX'. The second use is to demonstrate the use of the correction factor when measuring other CMX transmitters. The example assumes you have two CMX equipped DMXters and that you use one to measure the other. The raw parameter measured is shown in the column labelled 'Raw Value Measured'. After applying the correction factor you should get the value listed in the column labeled 'Corrected Reading'.

Parameter	DMXter CMX	Corrected Reading	Raw Value Measured
BREAK	214.8 μ S	213-215 μ S	131-132 μ S
MAB	19.53 μ S	19.5 μ S	12 μ S
Break to Break	40316 μ S	40307-40324 μ S (1)	24765 - 24778 μ S (1)
Bytes Per Packet	512	512 (2)	512
Update Rate	25	24-25 (2)	24-24

Notes:

- 1) These values are typical of minimum and maximum values, raw and corrected. A typical raw rolling average value will be approximately 24770.
- 2) These values require NO correction.

15.7 CMX FLICKER FINDER

The CMX version has the same display and is operationally identical to the DMX version. The test is run at the CMX baud rate.

15.8 CMX CABLE TESTER

The CMX version is operationally and display identical to the DMX version. The test is run at the CMX baud rate. This means that some cables may pass the CMX data test that would fail the DMX data test. This is appropriate since CMX makes lower demands of its cable.

15.9 CMX SHOW SAVER

The operation of CMX Show Saver is identical to the DMX version. The only display difference is that when editing levels the LEV characters are changed to CTN as they are in SEND EDIT.

Since changing protocols does not change any recorded Show Saver looks it is possible to record looks from a console set to one protocol, say DMX512, and then switch protocol to the other to play them back. This could get you out of a very tight spot someday.

If the DMXter is set to enter DMX (CMX) Monitor mode and receives data sent on the protocol that it is not set for, it will act just as if it saw no data at all. No additional indication of a problem is given.

16.0 FCC PART 15 STATEMENT

This device complies with Part 15 of FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

16.1 WARNING: YOU MUST CORRECT ANY HARMFUL INTERFERENCE CAUSED BY THIS DEVICE.

This device is professional test equipment and as such it is not intended for residential use.

If this device causes harmful interference it is the responsibility of the user to take action to eliminate this harmful interference. And if necessary discontinue use of this device in the environment where the interference occurred.

17.0 WARRANTY

The GODDARD DESIGN CO. warrants each unit it manufactures to be free from defects in material and workmanship under normal use and service for the period of 1 year from date of purchase. This warranty extends only to the original purchaser. This warranty shall not apply to fuses, disposable batteries (rechargeable type batteries are warranted for 90-days), or any product or parts which have been subject to misuse, neglect, accident or abnormal conditions of operations.

In the event of failure of a product covered by this warranty, GODDARD DESIGN CO. will repair a unit returned to us within 1 year of the original purchase provided the warrantor's examination discloses to its satisfaction that the product was defective. The warrantor may, at its option, replace the product in lieu of repair. With regard to any unit returned within 1 year of the original purchase said repairs or replacement will be made without charge. If the failure has been caused by misuse, neglect, accident or abnormal conditions of operation, repairs will be billed at a nominal cost. In such case, an estimate will be submitted before work is started, if requested.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS OR ADEQUACY FOR ANY PARTICULAR PURPOSE OR USE. GODDARD DESIGN CO. SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHETHER IN CONTRACT, TORT OR OTHERWISE.

If any failure occurs, the following steps should be taken:

- 1 Notify the GODDARD DESIGN CO. giving full details of the difficulty, and include the serial number. On receipt of this information service data or shipping instructions will be forwarded to you.

- 2 On receipt of the shipping instructions, forward the unit, shipping prepaid. Repairs will be made at the GODDARD DESIGN CO. and the unit returned, shipping prepaid.

All shipments to GODDARD DESIGN CO. should be made via United Parcel Service or similar 'best way' carrier prepaid. The unit should be properly packed either in its original container, or if in a substitute container, in one that is rigid and of adequate size to allow for suitable packing padding to protect the unit from shock.

The unit should be thoroughly inspected immediately upon original delivery to purchaser. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the unit is damaged in any way, a claim should be filed with the carrier immediately. Final claim and negotiations with the carrier must be completed by the customer.

18.0 LOOK UP REFERENCE

Not really an index, this is an aid to help the user look up items of interest.

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