
OPERATING MANUAL FOR
THE LIL'DMXter
SOFTWARE VERSION 1.63C
&
SHOW SAVER VERSION 1.10
FOR **CE** & NON-**CE** HARDWARE

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INTRODUCTION

The Lil'DMXter 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.

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.

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.

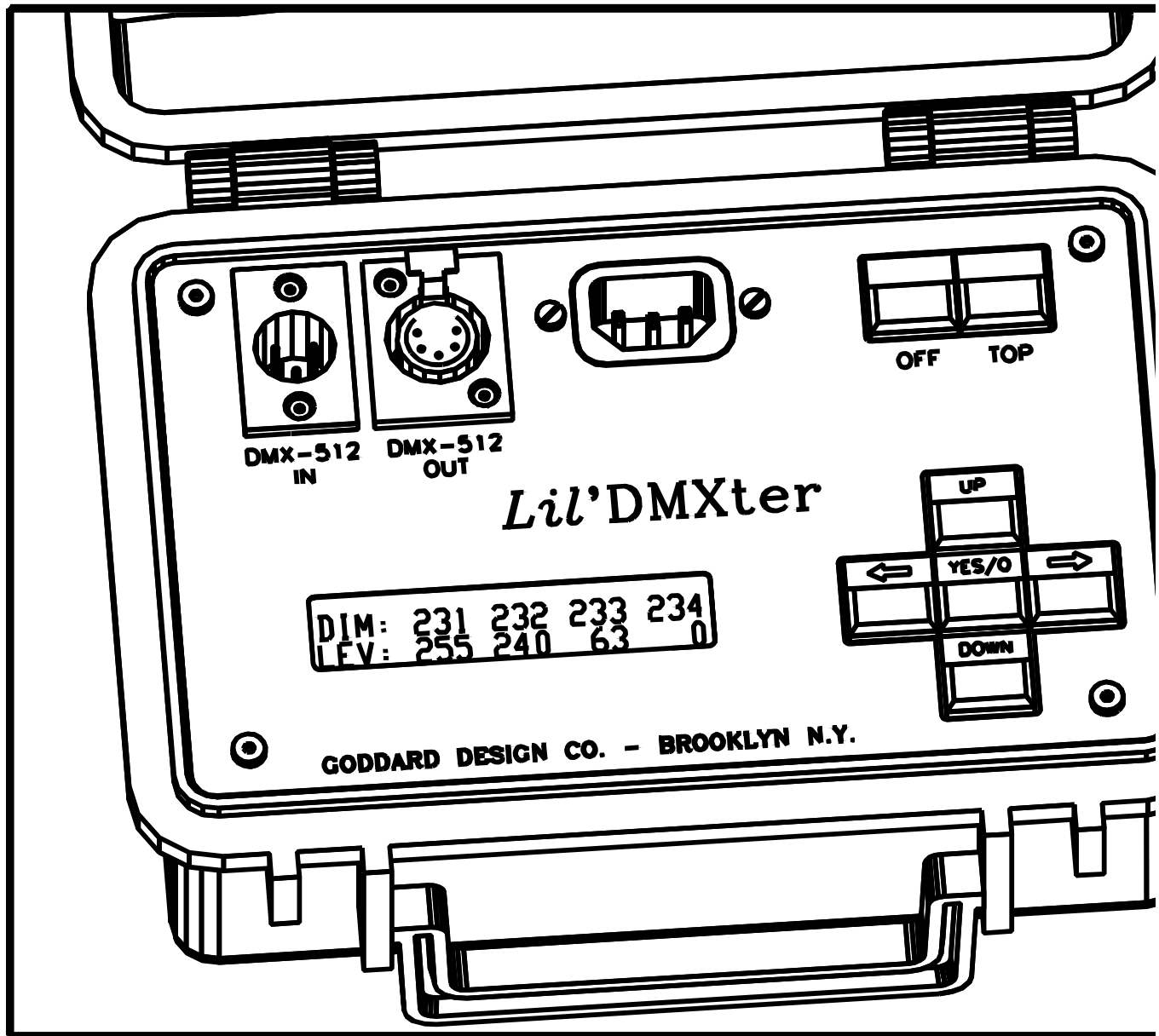
0.1(2) IF ESD IS PRESENT GROUND THE CASE

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.

<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.

<UP>, <DOWN>

<UP> and <DOWN> are used to step thru items of the menus. When setting dimmer levels or changing the value of a FLAVOR 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.

<LEFT>, <RIGHT>

The right and left arrows are used in stepping thru dimmer numbers. While they are marked with arrows, for the remainder of this manual they will be referred to as <LEFT> and <RIGHT>.

There are three sets of commands that use the <RIGHT> and <LEFT> keys for a use other than stepping thru dimmer numbers. See the section on **EDIT FLAVOR**, the section on **VIEW START CODE**, and the section on **SHOW SAVER** for details.

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) 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 12.1.

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 1 line or 2 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. 127. 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 12.5

The Lil'DMXter can display numbers in three formats; decimal, percent, or hexadecimal. Decimal, percent, or hexadecimal notation are available for dimmer levels. 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. The current status may be changed by queries in the **USER SETUP OPTIONS** menu (see section 8.3).

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

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

```
Lil'DMXter V1.60  
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 V1.60. It is applicable for any software version that is V1.6x.

Next the copyright notice will scroll across the display. If you purchased the **SHOW SAVER** option the second line of this display will read SHOW 1.10. 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.

If you purchased the **RECEIVE SCOPE TRIGGER** option the second line of this display will read SCOPE 1.00. This is the **SCOPE TRIGGER** software version which is important if you need to contact the factory with any questions. This manual is written for software Version V1.0. It is applicable for any software version that is V1.0x. If you have purchased both options the second line of the display will read

```
SHOW 1.10 SCOPE 1.00.
```

When the unit is on, pressing the <TOP> key clears any pending operation and returns you to the top of the main menu, skipping the power off timer and backlite queries.

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!!!**

2.1 IF THE UNIT WILL NOT TURN ON...

If the unit will not turn on, but instead displays

```
Lil'DMXter V1.60  
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 internal battery shutdown. You may run it on AC if you need it immediately; otherwise, allow it to charge.

2.1(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 11.3.

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 6 hours. As soon as the battery has at least some charge (30 minutes) the Lil'DMXter may be used while charging.

2.2 BYPASSING THE INITIALIZATION MESSAGE

We're proud to tell you all the information about software version and copyright, but we also know you're going to get mighty tired of having to look at it every time you initialize the unit, so...

Hold down the <OFF> key while pressing the <TOP> key, release the <TOP> key while still holding down the <OFF> key. This will bypass the initialization routine and the message you see is

```
OK , OK , OK !  
I ' M  AWAKE
```

Or if you purchased the **SHOW SAVER** option the display will look as below.

```
OK ,  OK ,  I ' AM  AWAKE !  
SHOW  1 . 1 0
```

2.21 RESETTING TO FACTORY DEFAULTS - *NEW FEATURE V1.62*

The Lil'DMXter's software has a number of setable 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 setable 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 parameter are now reset to the factory default values.

2.3 OWNER IDENTIFICATION (OPTIONAL)

We offer an optional internal identification message that briefly displays the message

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

or any 2 lines of 20 alphanumeric characters. If you have ordered this option, the message will last 2-3 seconds. If your unit is not fitted with this option, this message will not be seen. The message will appear after the copyright scroll or after the "ok, ok" message.

2.4 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. The first question the Lil'DMXter asks is

```
DISABLE THE AUTO
```

POWER OFF TIMER?

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

2.5 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. 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 1 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.

2.6 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.

2.6(1) QUICK ACCESS TO BACKLITE AND TIMER

The AUTO POWER OFF TIMER and the DISPLAY BACKLITE functions may be quickly accessed by the following sequence:

<TOP> <UP> <YES/Q> If your unit is equipped with **SHOW SAVER** or **RECEIVE SCOPE TRIGGER**, the sequence will be <TOP> <UP> <UP> <YES/Q>

If it is equipped with both... well you get the idea.

You should now be sitting at the auto power off query in the user options menu. See the SETUP USER OPTIONS menu (section 8 below) for more about access to these functions.

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
RECV SCOPE TRIGGER?	Section 13 (optional)
SHOW SAVER?	Section 9 (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. 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 8uS mark after break. With this setting the Lil'DMXter uses an 88uS break, an 8uS 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 88uS break, 8uS 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 11.6.

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
```

Change the dimmer number by using the <RIGHT> and <LEFT> keys; with the default "flavor" setting you may choose dimmers from 1 to 512. Use the <UP> and <DOWN> keys to set the level from 0 to 255.

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".

4.2 QUICK STEPPING THRU DIMMER AND LEVEL

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.

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: Hold the <YES/Q> button down while you press the <UP> key to jump to 255 (full). Hold the <YES/Q> button down while you press the <DOWN> key to jump to 0.

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 more 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
- 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 - In **RECEIVE SCOPE TRIGGER** using **DIMMER BYTE TRIGGER**

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".

Press the **<RIGHT>** or **<LEFT>** keys to increment or decrement the dimmer numbers by one.

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.

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: Hold the **<YES/Q>** button down while you press the **<UP>** key to jump to 255 (full). Hold the **<YES/Q>** button down while you press the **<DOWN>** key to jump to 0.

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 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	IBT	IPT	UPDATES/SEC
DMX512/1990 8uS MAB	88uS	8uS	512	0	0	40
24 DIMMERS 8uS MAB	88uS	8uS	24	0	0	769
DMX512/1990 4uS MAB	88uS	4uS	512	0	0	40
24 DIMMERS 4us MAB	88uS	4uS	24	0	0	771
70uS BK 4uS MAB 20 D	70uS	4uS	20	0	0	921
USER A (default values)	160uS	20us	128	1	1542	23
USER B (default values)	160uS	20uS	512	1	40	29
USER C (default values)	160uS	20us	512	2	742	16

BREAK = BREAK TIME

MAB = MARK AFTER BREAK

DIMMERS = NUMBER OF DIMMERS

IBT = INTERBYTE TIME (in units, each unit = 22uS)

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

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 display next reads

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

which is displayed only briefly.

4.8(2) CHANGE BREAK LENGTH

The top line of the next display reads

```
BREAK LENGTH IN Us
```

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 a 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 88uS and allows for breaks as long as 1 second. The Lil'DMXter can transmit breaks as short as 50uS and as long as 49,144uS if the mark after break is set at 8uS. The total of the mark after break and the break can equal no more than 49,152uS, 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 4uS. DMX512/1990 defined the MAB as no shorter than 8uS and less than 1 second. The Lil'DMXter can transmit a mark after break as short as 3uS and as long as 49,064uS if the break is set at 88uS. The total of the break and the mark after break can equal no more than 49,152uS 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 interbyte time or the interpacket time (see below).

4.8(5) INTERBYTE 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. The bytes 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 bytes. Many DMX512 transmitters do insert a small pause between bytes. The Lil'DMXter does insert a very small pause between bytes. This pause is approximately 4uS long. The Lil'DMXter takes 48uS to transmit a byte when the minimum possible time would be 44uS.

To help simulate consoles that insert pauses and to allow testing of some early dimmer designs that may require pauses between dimmer bytes, the Lil'DMXter allows you to insert an additional pause between each dimmer byte. The inter-byte interval may be adjusted between 0 and 15 units. Each unit represents an additional pause of 22uS (equal to 1/2 a byte time) added to the 4uS 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 22uS pause. DMX512/1990 requires that a dimmer function properly with no pause between packets.

The Lil'DMXter inserts a very short pause of about 4uS 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 1196uS. 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. Your choices are 0 to 255. 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. 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 4uS. 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 8uS with a non-0 start code, the minimum value will be 8uS; the maximum value will be about 12uS. Most of the time, the average value will be close to 12uS. Very few packets with a mark after break as short as 8uS will be sent.

4.11 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 2uS before the falling edge of transmitted break and remains high until approximately 3.2uS 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 >= 4
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 4 decimal. 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 and press <RIGHT> or <LEFT> keys to search for next higher (<RIGHT>) or lower (<LEFT>) dimmer with a level greater or equal to the search minimum.

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 88uS)

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

DMX512/1986 called for a 4uS mark. DMX512/1990 requires a mark of 8uS or longer. We flag marks of less than 8uS 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 there is an error in any portion of this test, the unit will indicate so. An error is indicated by * shown on the display under its code. If there is no problem, the bottom line will read

NO ERRORS DETECTED

Technical Note: We report a **PARITY ERROR** for any 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 87.5uS or less. A mark after break must be measured as 7.5uS 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 uS (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 65uS. If it receives a minimum break time of less than 65uS, 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 uS (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 3uS, 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 4 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 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".

5.2(4) # OF BYTES PER PACKET

This screen reads out the minimum and maximum values. We call this **BYTES PER PACKET**; we mean number of dimmer levels bytes per packet. The start code is not included in this count.

Warning: while the Standard does not require that the number of bytes be fixed for all transmissions, if the minimum and maximum number of bytes are different, you should suspect a problem. Also you should never receive more than 512 bytes. This test is start code sensitive; this test reports the byte 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 900uS or longer. If it receives a break-to-break time of less than 900uS, all three values will be removed from the display and be replaced by the words `TIME LESS THAN 900uS`. 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 +/- 8uS 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 8uS shorter than the average while the maximum will settle to a value 8uS 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 8uS less than the true minimum while the maximum value will be 8uS 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 +/- 8uS 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 1 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 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 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. Your choices are 0 to 255. 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. Then it reinitializes the start code to 0. See **MEAL PENALTY**, Section 11.2(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".

5.5 SETTING THE MINIMUM LEVEL FOR SEARCHES

SEARCH MIN IS 4
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 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".

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.

INTERBYTE TIME - Current software does not check Interbyte 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 either at 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**.

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 current 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, 1 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**.

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?

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 signalling. 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 5 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 1 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 that 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 that 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 that 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 2 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
  DISABLE TIMER?
or
POWER TIMER ENABLED
  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, percent, or hexadecimal. 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.

The first display you will see depends on the current setting of this option. It will be one of the three displays on the top row of the table below (A). Units are shipped switched to decimal. The display format is stored in RAM and will retain a setting until reset by the user, the battery is totally discharged or the battery is switched off.

(A)

DATA IS IN DECIMAL DISPLAY IN PERCENT?	DATA IS IN PERCENT DISPLAY IN DECIMAL?	DATA IS IN HEX DISPLAY IN DECIMAL?
---	---	---------------------------------------

(B)

DATA IS IN DECIMAL DISPLAY IN HEX?	DATA IS IN PERCENT DISPLAY IN HEX	DATA IS IN HEX DISPLAY IN PERCENT?
---------------------------------------	--------------------------------------	---------------------------------------

(A) If you press <YES/Q> you will select a new number format. The display will step to the next menu item which is the **OPEN LINE DETECTOR OPTION**.

(0-A) Pressing <UP> steps you back to the previous menu item.

(A) Pressing <DOWN> preserves the current number format and offers you the other available format. The display will be one of the ones in the second row of the table (B).

(B) If you press <YES/Q> you will select a new number format. The display will step to the next menu item which is the **OPEN LINE DETECTOR OPTION**.

(B) Pressing <DOWN> preserves the current number format. The display will step to the next menu item which is the **OPEN LINE DETECTOR OPTION**.

(B) Pressing <UP> steps you back to the first row of the table (A).

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.

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 SHOW SAVER

This section is written for SHOW SAVER Software version V1.10 it is applicable to any software version that is V1.1x.

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.

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** 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 8 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 8 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 may 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 8 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.

9.0(1) SHOW SAVER, CONVENTIONS AND STRUCTURE

SHOW SAVER has two major sub-sections. 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 9.31 thru 9.34.

9.0(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?

9.1 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 9.4 to learn how to enter scenes.

9.2 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 indicates 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.

9.2(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 1 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 in to **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:  °_k °_k °_k 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

9.3 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.

9.3(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 1.

```
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 under way 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
```

9.3(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

9.3(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>.

9.3(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%.

9.3(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.
- 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
```

9.3(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
```

9.3(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 BYTE TIME	INTER PACKET TIME	UPDATE RATE
160uS	20uS	512	44uSEC	16324uSEC	16 HZ

9.4 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.

9.5 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 9.7 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?
```

9.5(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 8 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.

9.5(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.

9.5(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 16 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>.

9.5(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 3 seconds. The default maybe changed; see Section 9.6 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>.

9.6 CLEARING OLD RECORDED SCENES

```
SHOW SAVER
CLEAR SCENE?
```

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

```
CLEAR SCENE?
▶1◀ 2 3 4 5 6 7 8
```

The conventions for manipulating this display are the same as for recording scenes. Place the brackets around the scene you wish to clear and press <YES/Q>. You will see

CLEAR SCENE X ? followed on the second line by the scene name

If you mean it, press <YES/Q> one more time.

9.7 EDITING RECORDED SCENES

```
SHOW SAVER
EDIT SCENE?
```

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

```
EDIT SCENE?
▶1◀ 2 3 4 5 6 7 8
```

The conventions for manipulating this display are the same as for recording scenes. Place the brackets around the scene you wish to edit and press <YES/Q>. You will see

```
LIVE MODE           or           BLIND MODE
EDIT SCENE BLIND?   EDIT SCENE LIVE?
```

If the DMXter is at the end of the line this question is irrelevant. If you are connected to dimmers then you have the choice of seeing the scene as you are editing it or leaving the DMXter in the pass thru mode and editing blind. If the present mode is correct press <DOWN>. If you wish to change the edit mode press <YES?/Q>. Each time you press <YES/Q> the edit mode and display will toggle to the other state.

When you press <DOWN> you will enter the edit dimmer screen. This display is exactly the same as the **SEND/EDIT SNAPSHOT** display, see section 4.6 if you are not familiar with it. When you have adjusted all the dimmers you wish to change press <YES/Q> to exit. Next you will be given a chance to edit the scene name, followed by a chance to edit the fade time. The methods used are the same as those used by **RECORDING SCENES**, above.

9.8 CHANGING THE DEFAULT FADE TIME

```
FADE TIME IS    x
CHANGE DEFAULT TIME?
```

The default fade time is used as the fade time for the permanent blackout scene and for all scenes that do not have individual fade times recorded. The default fade time is shipped set to 3 seconds. It may be set from 0 to 30 seconds using the <UP> and <DOWN> keys. Once set it will retain its new value until reset or the DMXter's battery is discharged or turned off. Press <YES/Q> when you have the default fade time you want. Exiting the fade time editor puts you back to the <RECORD SCENE?> menu.

9.9 RETURNING TO THE FUNCTION MENU

```
SHOW SAVER
TO FUNCTION MENU?
```

TO FUNCTION MENU? entries appear in all DMXter menus. But they are often ignored by users who habitually use the <TOP> key as the fastest way out of a menu. There are reasons to use **TO FUNCTION MENU?** to exit **SHOW SAVER**, as leaving by this method will clear the line termination, if it was set. Exiting by <TOP> will leave it set.

9.10 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.

9.11 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.

10.0 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".



10.1 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.

10.2 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.

10.3 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.

10.4 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.

10.5 CE Declaration of Confrornity

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.

11.0 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.

11.1 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 6 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.

11.2 THE BATTERY TALKS/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 every 30 seconds

```
LOW BATTERY WARNING!  
PLEASE FEED ME!
```

This message lasts for about 5 seconds. Note that while this message is displayed, the Lil'DMXter discontinues other operation. 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.

11.2(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 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 V1.60  
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.

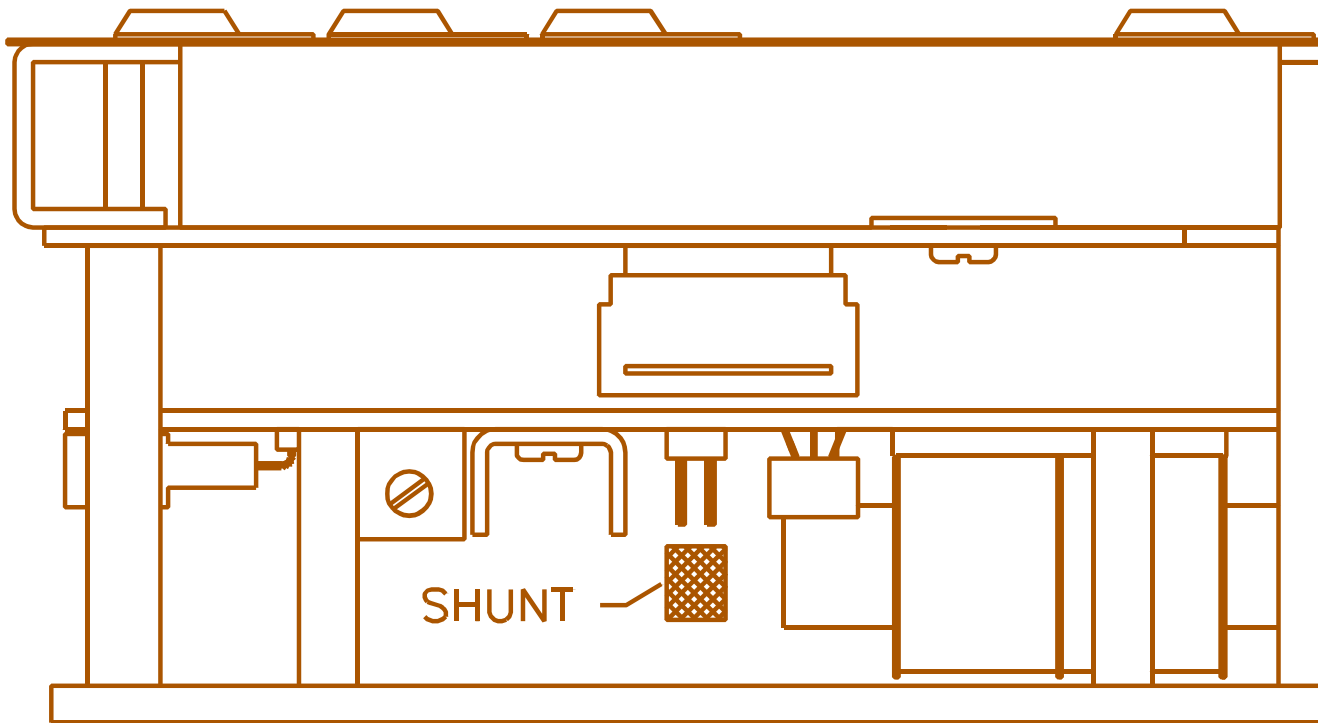
11.3 TURNING OFF THE BATTERY

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 switch towards the spacer; the "off" position is 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.



11.3 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 towards 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; installing the shunt will prolong battery life where the battery is cycled regularly.

11.4 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 have to always charge a DMXter fully. But do not let it sit with a dead battery for extended periods of time.

11.5 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.

11.6 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.

12.0 LIL'DMXTER TECHNICAL DISCUSSION

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

12.1 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, transmit functions 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**

12.2 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.

12.3 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 2.666666 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 4 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 locate 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 2.666666 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.

12.4 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.

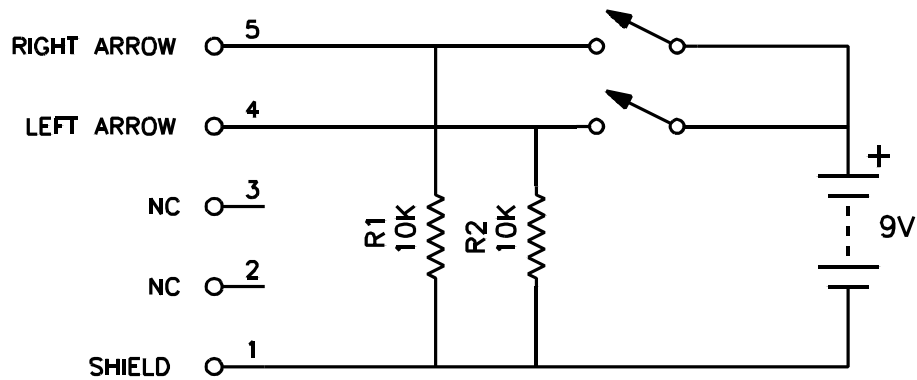
The RAM dimmer table always stores dimmer levels in 8 bit binary. Conversion is done when a number is displayed. Hence snapshot is re-transmitted exactly as it was received. While 7Fh and 81h are both displayed as 50% they will be stored and re-transmitted as different levels. **BUT** when the Lil'DMXter 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.

12.5 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			

12.6 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.

12.7 SPECIFICATION TABLES

TRANSMITTED DMX512 PARAMETERS

FUNCTION	DEFAULT	MINIMUM	MAXIMUM	RESOLUTION
BREAK LENGTH	88us	50us	49144us(1)	1uS
MARK AFTER BREAK	8us	3us	49064us(2)	1uS
INTERBYTE MARK TIME	4uS	4uS	330us	22uS
INTERPACKET MARK TIME	4uS	4uS	1.442SEC	22uS
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 8uS

(2) Maximum with break set to 88uS

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

(3) 512 dimmers, 49,144us break, 8uS mark, 334uS 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	65uS	-	
MAB LENGTH	3uS	-	
NUMBER OF DIMMERS	1	512	OVFL reported for over 512 dimmers
BREAK-BREAK TIME	170uS	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	+/- 4uS	NON-ZERO START CODE or BREAK + MAB time greater than 16,380MS
DIMMER BYTE JITTER	+/- 2uS	
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	+/-8uS	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.

12.7 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.

13.0 THE RECEIVE SCOPE TRIGGER OPTION

The receive scope trigger software is designed for detailed trouble shooting of DMX512 systems and for debugging of new designs. 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.

13.0(1) RECEIVE SCOPE TRIGGER HARDWARE

The STC1A card provides needed additional hardware to implement Scope trigger.

Its features include:

- * A TTL level trigger signal on a BNC connector.
- * A TTL level DMX512 data signal on a BNC connector.
- * RS485 DMX512 repeater with ability to optionally invert the data. This driver may be disabled to conserve battery life.
- * A self contained, low drain, battery power supply with low battery warning LED.

Functionally the card converts the RS485 DMX512 signal to a TTL signal, this signal is passed to one input of an "exclusive or gate" where it is buffered or inverted depending on the state of a control line from the DMXter. The control line from the DMXter is connected to the other input of the EXOR gate. The output of EXOR is connected to the clock input of a D latch. The D input of this latch is held high. The DMXter provides an "Arm" signal which is connected to the reset line of the D latch. The DMXter sets the control line to the EXOR gate depending on whether the next trigger is to be on a rising or falling edge of the DMX line. The latch is held in reset until just before a triggering event is expected. It is then released; the next transition of the proper polarity on the DMX line will cause the trigger. After the DMXter software knows the trigger event has passed it resets the D latch. The Arm signal from the DMXter is sometimes also a useful scope trigger.

As well as the general resources of the micro-processor and its UART the scope trigger uses certain hardware counters and timers available in this processor to produce highly accurate programmable delays.

13.0(2) RECEIVE SCOPE TRIGGER SOFTWARE

The behavior of RECEIVE SCOPE TRIGGER is totally controlled by special software. Units with scope trigger require a special EPROM containing this software as well as all the other DMXter software. Such an EPROM will be fitted in any unit ordered with RECEIVE SCOPE TRIGGER or a replacement EPROM will be provided for customers who order this option to retrofit existing units. DMXters with SHOW SAVER may also optionally be fitted with RECEIVE SCOPE TRIGGER.

The scope trigger user interface has fewer user warnings and error traps than the general DMXter code. This is because of both the nature of the code and the type of user we expect to use this code. Specifically there is no **NO DIGITAL INPUT OR INPUT NOT DMX512** message in scope trigger. Also if DMX data stops while the scope trigger is waiting for some important event to take place the software will patiently wait there until the event happens. Depending where in the code you are this may cause the user interface to freeze. To regain user interface control, restart the DMX data or exit by way of **<TOP>**.

13.1 TRIGGER ON THE START OF THE BREAK

OVERVIEW

This routine allows you to trigger a scope on the start of DMX512 break. You will only get a stable trigger on DMX512 transmitters that send packets containing a consistent number of bytes. This routine should work on the vast majority of current production transmitters.

The DMXter arms the trigger card during the stop bits of the last dimmer byte of the previous packet. The scope trigger card produces a rising trigger when it detects the next falling edge. In a properly formatted DMX data stream that edge will be the beginning of the break. The trigger should be taken from the gated output of the card, the BNC connector on STC1A cards (R1). This routine is equally useful with either analog or digital storage scopes.

INTERFACE

The entry point is | START OF BREAK? |. On entering you will see the following display

```
START OF BREAK
UNSTABLE DIM:
```

If no DMX512 is being received this display will be steady. If you are receiving DMX512 the number of dimmers in the packet will appear in the DIM field, and if the number of dimmers in each packet is stable the UNSTABLE field changes to STABLE. Trigger generation starts after the DMXter determines that the number of dimmers is stable. A stable display of a console sending 504 dimmers is

```
START OF BREAK
STABLE DIM: 504
```

If the transmitter should switch to a different packet size the STABLE field will momentarily change to **UNSTABLE**, the number in the DIM field will change and the display will change back to **STABLE**. The **UNSTABLE-STABLE** field is one shot so even a single packet with a different byte count should be observable. If the transmitter is intermingling packets of different lengths the field will stay showing **UNSTABLE**. The algorithm used for this trigger mode does not work with changing packet lengths.

Note: If you totally lose DMX512 the display will not change, it just acts as if the packet was being sent very slowly. But you should be able to figure it out, you do have a scope connected to the line, don't you?

ALGORITHM

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13.2 TRIGGER ON THE END OF THE BREAK

OVERVIEW

This routine is designed to trigger a scope at the end of a break that lasted at least as long as a minimum time set by the user. When the DMXter detects a frame with a framing error that it believes to be a break, it times from the leading edge of that frame: if when the amount of time set by the user has passed we are still in break the trigger card is armed. The next rising edge of the DMX line will produce a rising trigger on the BNC connector. On analog scopes this is useful for observing the Mark After Break. Additionally on DSO's you may use this routine to observe breaks that cannot be reliably viewed with the routine of 12.1 above.

Our break detection and qualification algorithm is given below. While the user is urged to fully understand the algorithm, this routine should be reasonably well behaved on most transmitters with either type of scope.

INTERFACE

The entry point is |END BREAK/START MAB?|. On entering you will see the following display

```
END BREAK/START MAB
TRIG ARM AT 65 uS
```

Note the cursor under the 6; you may move it using the <RIGHT> and <LEFT> keys. Whichever number or space the cursor is under may be edited using the <UP> and <DOWN> keys. If the cursor is under the "ones" place the <UP> key will increment the number by one with carry to the tens place if needed. If the cursor is under the tens place the <UP> key will increment the number by ten with carry to the hundreds place if needed. Pressing the <DOWN> key will decrement the proper place, if an underflow occurs the number will be set to 65 microseconds. The default value for the arm delay is 65 microseconds, any value up to 16383 microseconds may be selected. Once you have selected a value it will be saved as long as battery power is maintained. All trigger

modes other than TRIGGER ON THE START OF THE BREAK use the arm delay and share the same value for it.

ALGORITHM

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13.3 TRIGGER ON THE BEGINNING OF THE START CODE

OVERVIEW

This routine is designed to trigger a scope at the beginning of the start code if the break has lasted at least as long as a minimum set by the user. When the DMXter detects a break it times from the leading edge of that break, when the amount of time set by the user has passed the trigger card is armed. The next falling edge of the DMX line will produce a rising trigger on the BNC connector. This is useful for observing the start code and as a general trigger at the beginning of a packet.

INTERFACE

The entry point is |BEGIN OF START CODE?. On entering you will see the following display

```
BEGIN OF START CODE
TRIG ARM AT 65 uS
```

The interface behavior is identical to that for **END BREAK/START MAB**.

ALGORITHM

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13.4 DIMMER BYTE TRIGGER

OVERVIEW

The DIMMER BYTE TRIGGER routine is actually a number of powerful trigger routines selectable from a bar menu. The main thrust of these routines is to allow you to trigger on any byte in a DMX512 packet. The trigger is generated when the "AND" of 3 conditionals is true. An important thing to keep in mind is that the trigger is generated only AFTER a byte in the DMX packet has satisfied all of the conditions.

The qualifiers for the start code are: equal(=), not equal(≠), or don't care(----).

For dimmer number they are: equal (=), or don't care, (----).

For dimmer level they are: equal (=), greater than (>), less than (<), not equal(≠), or don't care (----).

Getting these routines to do what you want will require careful understanding of what they do. Unlike the other trigger routines all of these routines cause the receiver to read the DMX data and store it in the dimmer table. All of these routines will run in either a continuous mode or a single shot mode. In the continuous mode a trigger is generated every time the condition is met; in the single shot mode only one trigger is generated. In the continuous mode all packets are written to the dimmer table; in the single shot mode reception stops at the end of the first packet that satisfies the conditional trigger.

INTERFACE

The entry point is |DIMMER BYTE TRIGGER?|. On entering you will see the following display

```
MIN BREAK IS 65uS
CHANGE IT?
```

This allows you to set the shortest break that may be received for a packet to be further analyzed. After you have changed the break or bypassed doing so you will enter the main bar menu.

```
STCD DIM LEV CAPT
----- = 1 ----- CONT
```

13.4(1) TRIGGERING AFTER A DIMMER

These are the default settings and this is the most common mode of operation. These settings cause a trigger to be generated on every packet, regardless of start code, after dimmer 1. On an analog scope or DSO set to view post trigger you will see the start bit of dimmer 2.

The dimmer number may be set from 0 to 512. To set the dimmer number move the underline cursor with the <RIGHT> and <LEFT> keys. Place the cursor under the digit you wish to change. If the cursor is under the "ones" place the <UP> key will increment the number by one with carry to the tens place if needed. If the cursor is under the tens place the <UP> key will increment the number by ten with carry to the hundreds place if needed. Pressing the <DOWN> key will decrement the proper place; if an underflow occurs the number will roll over to the highest allowed number, in the case of dimmers 512.

If you want to view dimmer 1 set the number to 0. Setting the number equal to the number of dimmers sent will cause a trigger on the start of the break of the next packet. The reason we display the dimmer that causes the trigger and not the dimmer that will be viewed is so that we may have consistency with the rest of the dimmer byte trigger modes. If one is looking at the next dimmer byte the trigger will almost always be taken from the gated trigger signal from the BNC connector. If you are using a DSO to look backward in time at the dimmer byte that caused the trigger you may find that the arm signal gives less jitter. The difference between these two signals is explained in detail below. In general the Arm signal is precisely delayed from the start bit of the arming byte, while the gated trigger is synchronous with an edge in the next byte. How to get each signal will be explained below.

ALGORITHM

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13.4(2) TRIGGER ON PACKETS WITH START CODE "X"

STCD stands for start code. Setting the cursor under any one of the STCD spaces and pressing <UP> will cause the start code to come out of "don't care". On entry the start code will be set to the DMXter present start code setting, generally

```
STCD  DIM  LEV  CAPT
=  0  =  1  ----  CONT
```

Now the trigger will be generated only for packets that have a zero start code. Any dimmer number may be selected, but there are timing limitations on triggering on dimmer zero in this mode that mean that for general viewing it is better to start with dimmer 1. See the algorithm discussion below.

The allowed qualifiers for a start code are equal and not equal. The latter may well be used with the single shot mode (**ARM**) to capture suspect corruptions of the start code.

Try placing the **DIM** field into the "don't care" state. Do this by placing the cursor under the = sign and pressing either <UP> or <DOWN> keys. You will note that **LEV** field comes out of "don't care". Only one of the DIM or LEV fields may be in "don't care" at the same time.

ALGORITHM

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13.4(3) TRIGGERING IF ANY DIMMER IS AT LEVEL "X"

Leave the **DIM** field in the "don't care" state, select the start code value you want, including "don't care". The setting of the start code will determine which packets will be checked for levels. This mode is novel in that multiple triggers may be generated by a single DMX packet. Each dimmer byte is evaluated and a trigger is generated whenever the qualified level is matched. The qualifiers for levels are: equal (=), not equal (≠), level greater than (>), and level less than (<).

This is a mode where the fact that a trigger occurred may be all you wish to know so consider using the single shot mode. If multiple triggers occurred you may be more interested in where they were than what the data was. You might consider viewing the trigger signals directly. Which trigger signal you use depends on several things. You should consult the algorithm below.

ALGORITHM

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13.4(4) TRIGGERING DIMMER "X" IS AT LEVEL "Y"

If you enable both the **DIM** and the **LEV** fields at once the trigger will be generated after the indicated dimmer if it meets the level restrictions. Consult the algorithm below for timing restrictions.

ALGORITHM

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13.4(5) USING THE ONE SHOT MODE

The single shot mode is controlled by the last field. Placing the cursor under any one of the bottom line spaces beneath **CAPT** and pressing either <UP> or <DOWN> will change the **CONT** flag to **ARM**. This flag will stay showing **ARM** until the trigger conditions are met then it changes to **TRIP**. At that time a single trigger is generated and the packet containing the trigger is preserved in the dimmer table. At this point you may wish to temporarily leave the **DIMMER BYTE TRIGGER** to view the captured levels. You may do this by pressing <YES/Q> <DOWN> <YES/Q>. You may return to the **DIMMER BYTE TRIGGER** without losing your setup with the one exception that is the **TRIP** flag will be replaced by the **CONT** flag.

13.4(6) USING HEX NUMBERS IN RECEIVE SCOPE TRIGGER

If the DMXter is set to display in hexadecimal the start code and dimmer levels will be displayed as a two digit hex number followed by a lower case "h".

13.5 VIEW CAPTURED LEVELS

OVERVIEW

This routine allows you to view data stored in memory by the DIMMER BYTE TRIGGER software above. The data that will be displayed is the last packet received. If you have not run DIMMER BYTE TRIGGER since you entered the RECEIVE SCOPE TRIGGER menu the data in the dimmer table will be whatever was left from the last time transmit or receive functions of the DMXter were used. The only scope trigger routine that writes dimmer level to the dimmer table is DIMMER BYTE TRIGGER.

INTERFACE

The entry point is |VIEW CAPTURED LEVEL?|. The interface for this routine is the same as VIEW LEVELS.

13.6 FRAMING ERROR TRIGGER

OVERVIEW

INTERFACE

The entry point is |FRAME ERROR TRIGGER?|. On entering you will see the following display

```
FRAME ERROR TRIGGER
ERROR < 65 uS
```

The **FRAMING ERROR TRIGGER** has a dual nature. If either or both of the two stop bits are missing from a frame and the data byte is not zero, a trigger is generated. No further time qualification is required. If both of

the stop bits are missing, the data byte is zero, and the line goes high (marking) before the time set by the user, a trigger is generated. The trigger pulse is generated when the time delay expires. In many ways this is the inverse of the minimum break qualification routines (above) that require that a break lasts at least as long as the time set by the user for a trigger to be generated.

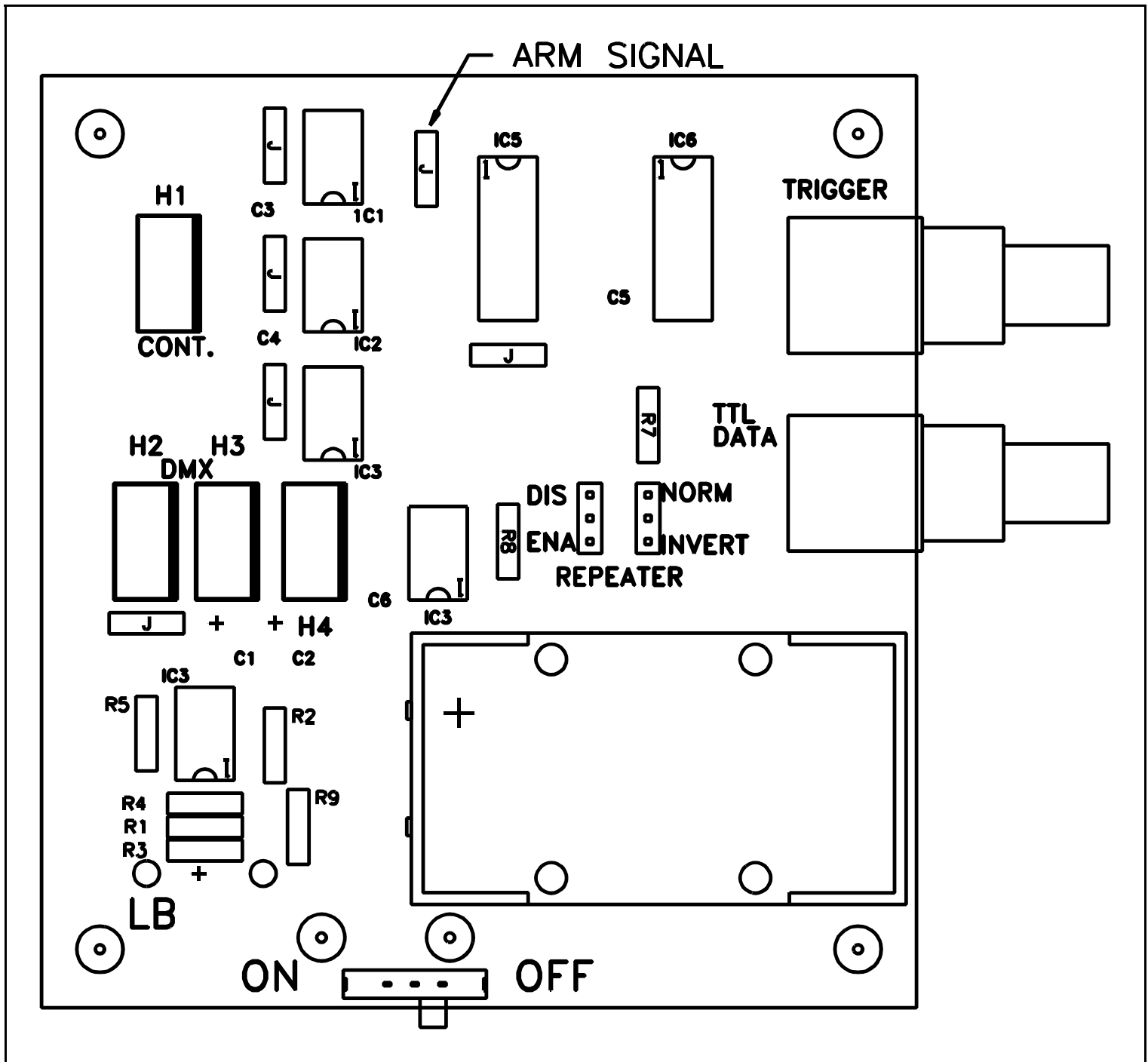
This routine has a number of uses tracking down glitches on a DMX512 line. Another use is to generate a trigger signal a precise time after the start of a DMX packet.

For normal use the gated trigger output produces a pulse with the needed accuracy. Using the arm line may produce slightly more predicable timing. See the algorithm section for timing details.

ALGORITHM

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13.7 FURTHER HARDWARE DETAILS



Header Connections:

H1, Control: This header carries the scope trigger control signals from the Lil'DMXter to the STC1A card. It should be wired to an A5M connector plugged in to the **DMX-512 OUT** connector on the scope trigger Lil'DMXter. All header to 5 pin cables should be wired one for one.

- 1 Shield
- 2 - Arm
- 3 + Arm
- 4 - Phase

5 + Phase

H2 - H3, DMX512 Data: Headers H2 and H3 are wired in parallel. H2 should be wired to the DMX source under test. H3 should be wired to an A5F connector plugged in to the **DMX-512 IN** connector on the scope trigger Lil'DMXter.

- 1 Shield
- 2 - DMX
- 3 + DMX
- 4 - Aux.
- 5 + Aux.

H4 This connector is the output of the DMX repeater. In scope trigger mode the DMXter always terminates the DMX512 line. Hence if you need to simultaneously drive a DMX line with a signal under test and cannot tolerate either double line termination or no line termination you will need to use the built in repeater. The repeater is controlled by two sets of programming jumpers. The DISable - ENAable jumper block controls whether the repeater is enabled or tri-stated. The NORMal - INVERTed jumper block controls whether the data is passed normally or inverted. This repeater is shipped disabled since its use shortens battery life. The scope card draws only about 3 to 4 MA. Driving a terminated DMX line draws about 25 MA additional.

- 1 Shield
- 2 Repeater out -
- 3 Repeater out +
- 4 Aux. - (jumped to H3-4)
- 5 Aux. + (jumped to H3-5)

Getting The ARM Signal:

On the current version of the scope trigger card (STC1A R1) the Arm signal is not available on the BNC connector. It can be gotten by hooking a scope probe to the zero jumper as marked on the above drawing.

14.0 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 retrofittable to all existing DMXters. But we will require that all units be returned to the factory to be retrofitted with additional hardware.

14.1 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.

14.2 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.

14.3 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.

14.3 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.

14.4 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
```

14.4(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!

14.4(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.

14.5 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.

14.5(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.

14.6 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	214.8uS	213-215uS	131-132uS
MAB	19.53us	19.5uS	12uS
Break to Break	40316uS	40307-40324uS (1)	24765 - 24778uS (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.

14.7 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.

14.8 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.

14.9 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.

14.10 CMX SCOPE TRIGGER

If you encounter any problem with CMX receive scope trigger please inform the factory.

15.0 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.

15.1 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.

16.0 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.

17.0 LOOK UP REFERENCE

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

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