
**OPERATION MANUAL FOR
μDMX
DIGITAL LIGHTING PROTOCOL
GENERATOR**

SOFTWARE VERSION
V1.10

GODDARD DESIGN CO.
51 NASSAU AVE.
Brooklyn, New York 11222
718 522-0170 718 599-0172 fax

Copyright by Goddard Design Co. April 2009 www.goddarddesign.com

Using your μ DMX

Congratulations! Our customers asked us to bring back the μ DMX, and here it is - a hand held battery powered digital multiplexed dimmer protocol generator. It supports USITT DMX512. It also supports Colortran "CMX" protocol and AVAB "Light Transmission Protocol". Its main use is to allow you to bring a dimmer to any level. The μ DMX was designed to be simple to use - you can probably figure out its operation yourself. But spending a few minutes stepping through this introduction should be useful. (This is an older product, dating from before the change of terms from "dimmer" to "slot". You'll cope.)

-The μ DMX unit can bring up any one dimmer, any combination of dimmers, or bring up all dimmers to the same level. Bringing all "dimmers" to the same level is very handy for checking that all your color scrollers are colored identically. (This is why the term was changed to "slot".....)

-The unit is designed so that most operations can be comfortably performed with one hand.

-It supports level displays in both percent and hexadecimal.

Caution

Under certain fault conditions, high voltages, including line voltage, can be present on the pins and/or the shell of a DMX512 (or other digital signal) connector.

Test for high voltages before connecting this or any other product to a signal cable that may be carrying them.

The μ DMX is simple and straightforward to operate. The best way to learn it is to use it. First, we'll discuss the conventions that are used to display and enter values. Then we provide a tutorial that walks you through the standard operation of μ DMX. Next will come an explanation of the unit's power management followed by instructions on how to select options. Finally you will get the technical details and the warranty.

READING THE DISPLAY

Whenever the left-most character of the μ DMX's display is the letter "L", it is displaying the current level. If the left-most character is blank or contains a number, the μ DMX is displaying a dimmer number.

When set to hexadecimal, a level is displayed as a two digit hex number. The character set is: 1 through 9, A, b, C, d, E, and F. Dimmer numbers are always displayed as 1 to 512 in decimal. When displaying dimmer numbers, leading zeros are suppressed.

BUTTON OPERATION

Each time you press the red DIMMER/LEVEL SELECTOR button, it alternates between showing the current level and the dimmer number to which that level is sent.

The operation of the top three buttons follows the display. If the display is showing a level, these button will modify the level. If the display is showing a dimmer number, they modify the dimmer number.

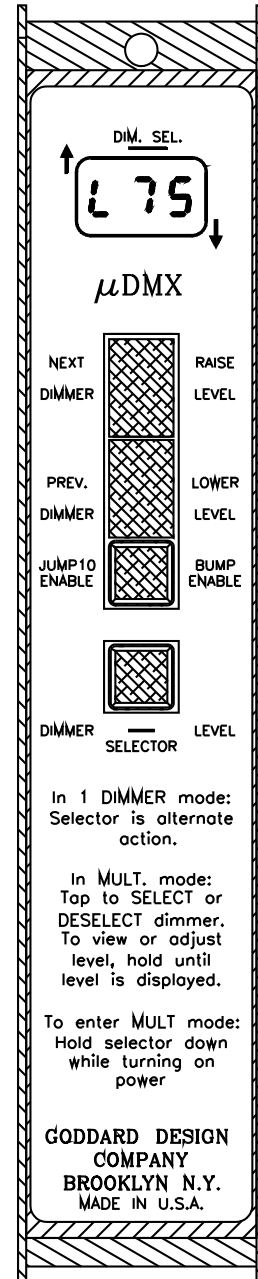
Unless specifically noted, button presses take effect on release of the button. Exceptions to this rule are the functions that auto-increment when you hold down the button.

LEVEL - DIMMER ROCKER SWITCHES

The two large black buttons form a rocker switch that raises or lowers the displayed value. Each time the button is pressed and released, the dimmer is changed by one, or the level is changed by 1%. They also auto-repeat in steps of this size if held down long enough.

ENABLE BUTTON

The blue ENABLE button allows changing the level or the dimmer number in larger steps.



Pressing and releasing this button enables a "bump" in level or a "jump10" in dimmer number. With a "bump" enabled, pressing and releasing the RAISE LEVEL button bumps the level to "full"; LOWER LEVEL bumps the level to "off". When adjusting dimmer numbers, the ENABLE button changes the size of the steps from a 1-dimmer step to a 10-dimmer step.

If either the NEXT DIMMER or PREV. DIMMER buttons are held down when "jump10" is enabled, the dimmer number will auto increment (or decrement) in 10 dimmer steps.

The "bump" or "jump10" stays enabled only until any one of the four buttons is pressed and released.

BUMPING TO 50% - RETURNING TO DIMMER 1 (New in V1.10)

We have added a way to quickly get a dimmer to a level of 50% (80h). You can also jump back to dimmer 1. Pressing and releasing both the the Dimmer Rocker switches will cause the unit to either bump the level to 50%, or to return to dimmer 1. Which depends on whether you are in the Level or Dimmer mode.

TUTORIAL

Use the slide switch on the top of the case to turn on your μ DMX. "L 0" will appear in the display.

(As we'll see later, holding down one of μ DMX's buttons *while* you turn it on accesses several special functions.)

The display is used to show the current level and the dimmer to which that level is being sent. The level is always identified by the letter "L" in the first space of the display. Therefore, the display is now showing you a "Level of 0" or "off".

The two large black buttons form a rocker switch used to increase or decrease the value in the display. Press and release the RAISE LEVEL button. On its release, the displayed level increases to "L 1" (or "Level of 1%").

Hold the RAISE LEVEL button down. After a short delay, the button "auto-repeats" until you release it. Try the LOWER LEVEL button.

Next, press and release the blue BUMP ENABLE button. Notice that a dot lights at the lower right corner of the first space of the display (the space showing the "L"). This tells you that you have enabled a "bump". Now press and release the RAISE LEVEL button. The displayed level bumps instantly to "LFF" (or "Level of Full") and the dot goes out. Use the LOWER LEVEL and RAISE LEVEL buttons to confirm that μ DMX has returned to normal 1% steps. Press and release the BUMP ENABLE button again and use the LOWER LEVEL button to bump to a level of "L 0" or "off". If you accidentally press Bump Enable, press it again to clear.

At some point the display may black out, except for a blinking dot. This is a power conservation feature described in the Battery Life section below. Press any button to restore the display. To restore the display without changing it, press the blue Enable button twice.

Set the level to 20% and then press and release the red DIMMER/LEVEL SELECTOR button. The display changes to " 1" for "Dimmer #1". You have switched into dimmer mode. The display shows the dimmer to which you're sending the level of 20%. The unit remains in dimmer mode; the labels down the left-hand side of the buttons now apply.

Use the NEXT DIMMER button to increase the dimmer number. The button also auto-repeats. Press and release the blue JUMP10 ENABLE button. A dot in the lower right corner of the second space of the display will light. Press and release the NEXT DIMMER button to advance the dimmer number by a 10-dimmer step. The dot will go out. Pressing the NEXT (or PREV.) DIMMER button again will confirm that μ DMX has returned to 1-dimmer steps. Now, press and release the JUMP10 ENABLE button again, and this time hold down the NEXT DIMMER button and notice that instead of auto-repeating by one dimmer, the dimmer number now auto-repeats by ten. Release the NEXT DIMMER button. Try using the JUMP10 ENABLE button with the PREV. DIMMER button to lower the dimmer number by tens. If you decrement past dimmer #1, μ DMX continues at dimmer #512. The μ DMX also rolls over from dimmer #512 to dimmer #1.

SENDING A LEVEL TO ALL DIMMERS

To enter the ALL mode, the level must be set to 0. Switch to dimmer mode using the red DIMMER/LEVEL SELECTOR button. Set the dimmer number to "1". Press and release the PREV. DIMMER button; instead of "rolling over" to dimmer #512, the display shows "ALL". Press the PREV. DIMMER button again and the display will show "512".

"ALL" means "send all dimmers" the same level. Use the NEXT DIMMER button to return to the "ALL" choice. Now use the red DIMMER/LEVEL SELECTOR button to set dimmer mode. Set the level you wish to send to all dimmers.

In "All" mode, you will find that the "bump full" feature is disabled. We hope the reason for this is obvious. The "bump off" feature using BUMP ENABLE and LOWER LEVEL is still available.

If you use the red DIMMER/LEVEL SELECTOR button to return to dimmer number adjustment while the current level is greater than "00", you will find that the NEXT DIMMER and PRE. DIMMER buttons have no effect. To exit "All Dimmers", you must first return the level to "00" ("L 0") or turn μ DMX off and on again.

SENDING A LEVEL TO MULTIPLE DIMMERS

μ DMX can send the selected level to any combination of dimmers. You must be in "Mult"(for "Multiple dimmer") mode. All dimmers not selected are sent a level of "00". Any number of dimmers from 0 to 512 can be selected.

To enter "Mult" mode, turn on your μ DMX *while* holding down the red DIMMER/LEVEL SELECTOR button. Three bars will appear in the display. Release the DIMMER/LEVEL SELECTOR button and the display will show the normal "L 0" starting level.

Set a level to send to all selected dimmers, say, 50%. Press and release the red DIMMER/LEVEL SELECTOR button to change to dimmer number adjustment. The display will now indicate a dimmer number and whether that dimmer is currently selected, and also whether any additional dimmers are selected.

Use the NEXT DIMMER button to advance to dimmer #5 and then press and release the red DIMMER/LEVEL SELECTOR button. Instead of changing back to level adjustment, the display still shows dimmer #5, but with the addition of two dots along the top center of the display (right under the bar labeled "Dim Sel." for "Dimmer Selected"). You have just "selected" dimmer #5 to receive the current level (50%).

Press and release the PREV. DIMMER button to get to dimmer #4. The two dots along the top edge of the display are now off (because dimmer #4 is not selected), but a dot lights at the top left corner of the display, next to an upward-pointing arrow. This indicates that one or more dimmers with a higher number are currently selected (in this case, dimmer #5).

Press and release the NEXT DIMMER button twice to get to dimmer #6. The two "Dim Sel." dots along the top edge of the display are off (because dimmer #6 is not selected), but a dot lights at the lower right corner of the display, next to a downward-pointing arrow. This indicates that one or more dimmers with a lower number are currently selected (our friend, dimmer #5).

Use the PREV. DIMMER button to get back to dimmer #5. Press and release the red DIMMER/LEVEL SELECTOR button. The two dots along the top edge of the display go out. Dimmer #5 is no longer selected, and is now being sent a level of "00" or "off". Because neither of the "arrow" dots is lit, you know that there are no selected dimmers either above or below dimmer #5.

Use the DIMMER/LEVEL SELECTOR and NEXT DIMMER buttons to select dimmers #5, #10, and #20. Use the JUMP10 ENABLE and PREV. DIMMER buttons to return to dimmer #1. The dot next to the up-arrow tells you that there is at least one selected dimmer above dimmer #1. You could find the selected dimmers by stepping through the dimmers one at a time with the NEXT DIMMER button until you reach the highest selected dimmer (the up-arrow dot goes out). But there's an easier way. Hold the blue ENABLE button depressed *while* pressing and releasing the NEXT DIMMER button. The display jumps to the next selected dimmer (dimmer #5) and then to each selected dimmer after that, returning to the lowest-number selected dimmer after reaching the highest-numbered. This "next selected" feature is available for both the NEXT and PREV. DIMMER buttons.

If we're using the red DIMMER/LEVEL SELECTOR button to select and de-select dimmers, how do we change levels? Hold the DIMMER/LEVEL SELECTOR button depressed until the level display appears. No change is made to the status of the displayed dimmer. To return to selecting dimmers, press and release the DIMMER/LEVEL SELECTOR button again.

To de-select all dimmers at once, take the level to "L 0"; press and release the blue ENABLE BUTTON; then hold down the LOWER LEVEL button until three bars appear side-by-side "---" in the display. This indicates that all dimmers have been de-selected.

To exit "Mult" mode, you must switch your μ DMX off using the slide switch.

To sum up, "Mult" allows sending the current level to any number of selected dimmers. Enter "Mult" mode by turning on your μ DMX *while* holding the red DIMMER/LEVEL SELECTOR button depressed. In "Mult" mode, the dimmer whose number is currently in the display is selected or de-selected by pressing and releasing the red DIMMER/LEVEL SELECTOR button. The display indicates whether the dimmer is selected, as well as whether selected dimmers are above and/or below it. To skip from one selected dimmer to the next, use the NEXT or PRE. DIMMER button *while* holding the blue ENABLE button down. To exit "Mult" mode you must turn your μ DMX off.

BATTERY LIFE

The μ DMX has been designed to get maximum use out of the four "AA" batteries it uses.

The μ DMX saves power by shutting off the display 30 seconds after the last key press. However, the unit continues to transmit the current level. This power saving mode is indicated by a flashing dot at the bottom of the display. To restore the display, press any button. To do so without changing the displayed value, press the blue ENABLE key twice.

To further save battery power, 16 minutes after the last key press μ DMX will stop transmitting and "go to sleep". To resume operation, you must turn the unit off, wait at least five seconds, and then turn it on again. If you wish to disable this last power conservation feature, you can do so with a jumper selection described in the **Options** section below. The jumper that control this feature is referred to as the POWER TIMER jumper.

There is a low battery warning: "**bAT**". When the batteries are approaching end life this warning will flash in the display every 30 seconds. After 16 minutes of these warnings the unit will shut down.

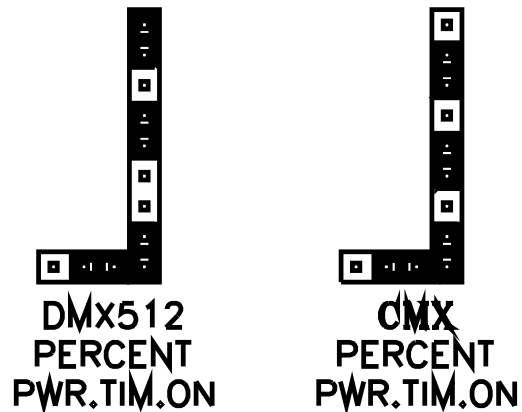
To change the batteries, remove the three screws on the bottom of μ DMX's case. Open the case and replace the batteries.

SELECTING OPTIONS

As you receive it from the factory, μ DMX is set up to send DMX512 with the level displayed in percent, and the POWER TIMER feature enabled. Each of these can be changed by moving jumpers inside μ DMX's case. To change jumpers, remove the three screws on the bottom; open μ DMX's case; and hold the chassis with the printed circuit card facing you and the 5-pin connector to your right. Look at the right-hand edge of the lower PCB, the one closest to the front panel. You will see a vertical column of gold pins extending from a rectangular header, and a short row of three such pins at the bottom of the column, forming a backwards "L". There will be four black plastic rectangular jumpers each one covering a pair of pins.

- Always turn off your μ DMX before changing jumpers. The changes will take effect when the μ DMX is turned back on.

- To remove a jumper, grasp it firmly between your thumb and forefinger and pull it away from the card. Replace it carefully.

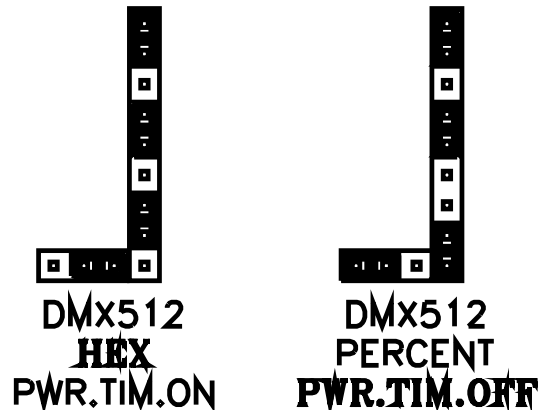


SELECTING COLORTRAN PROTOCOL

To change from DMX512 to Colortran or Avab protocol, you need to move the top **two** jumpers each down one pin. The top jumper should cover the second and third pins from the top, the second jumper, the fifth and sixth pins from the top. **Both jumpers must be moved to convert to Colortran or Avab protocols.**

SWITCHING TO AVAB PROTOCOL

When Colortran - Avab jumpers are installed, μ DMX will turn on with CMX protocol selected. To select the Avab protocol hold down the blue BUMP ENABLE while turning on the unit. The display will read **AAA**. This confirms that the unit is now in Avab protocol. This must be done every time that the μ DMX is turned on.



DISPLAYING LEVELS IN HEX

To change the level display from percent to hexadecimal, the third jumper must be moved up by one pin, so that it covers the seventh and eighth pins from the top.

Note that although μ DMX and consoles and other signal sources usually display levels in percent, they always send a level as one step from a 256-step range. Different manufacturers use slightly different conversions between some percentages and the 256-step value actually transmitted. The conversion used by μ DMX is listed in a table below. If you need to exactly match levels sent by some other DMX512 source, either contact the manufacturers for their conversion table or compare the products using a Lil'DMXter. If their conversion is different from the μ DMX, you will have to set μ DMX to hex.

DISABLING THE POWER OFF TIMER

To disable the POWER TIMER feature, move the jumper on the short leg of the backward "L" so that it covers the two pins furthest from the edge of the card as shown in the drawing.

HOW DO I KNOW HOW MY μ DMX IS JUMPERED?

To quickly determine whether a μ DMX has had a jumper changed, hold down the PREV. DIMMER button *while* turning it on.

If three dots appear across the top edge of the display, the jumpers are in their factory positions (DMX512, percent, power conservation features enabled)

If the letter "P" appears in the first space of the display, the 16-minute power conservation "sleep" feature has been disabled.

If the letter "h" appears in the second space of the display, hexadecimal level display has been selected.

If the letter "C" appears in the third space of the display, Colortran (or optional Avab) protocol may have been selected.

The μ DMX can't tell that *both* jumpers were properly moved, because the top jumper changes the clock speed and its position cannot be detected and displayed.

To determine the software version installed in a μ DMX, hold down the NEXT DIMMER button *while* turning it on. This manual is for version 1.10.

PROTOCOL DETAILS

When sending DMX512 the μ DMX is set to 250 kilo-baud. It sends 512 slots/dimmer bytes at an 8 Hz update rate, with a 120 μ s Break and a 14 μ s Mark-After-Break. The Inter-slot time is 32 μ s.

These values were chosen to be compatible with the largest possible number of receivers, including those not capable of keeping up with DMX512 if it is sent at the maximum speed permitted under the Standard.

When sending Colortran (CMX) the μ DMX is set to 153.6 kilo-baud. It sends 512 dimmer bytes at an 8 Hz update rate, with a 218 μ s Break and a 26 μ s Mark-After-Break.

When sending Avab protocol the μ DMX is set to 153.6 kilo-baud. It sends 256 dimmer bytes at an 10 Hz. update rate. Packets are framed by two leading sync bytes of "FF". Levels are restricted to values between 0 and FE hex.

PERCENT TABLE

%	XMIT	%	XMIT	%	XMIT
0	00	34	58	68	AF
1	05	35	5B	69	B1
2	07	36	5D	70	B4
3	0A	37	60	71	B6
4	0C	38	62	72	B9
5	0F	39	65	73	BB
6	11	40	68	74	BE
7	14	41	6A	75	C0
8	16	42	6D	76	C3
9	19	43	6F	77	C5
10	1B	44	72	78	C8
11	1E	45	74	79	CB
12	20	46	77	80	CD
13	23	47	79	81	DO
14	26	48	7C	82	D2
15	28	49	7E	83	D5
16	2B	50	81	84	D7
17	2D	51	83	85	DA
18	30	52	86	86	DC
19	32	53	89	87	DF
20	35	54	8B	88	E1
21	37	55	8E	89	E4
22	3A	56	90	90	E6
23	3C	57	93	91	E9
24	3F	58	95	92	EC
25	41	59	98	93	EE
26	44	60	9A	94	F1
27	47	61	9D	95	F3
28	49	62	9F	96	F6
29	4C	63	A2	97	F8
30	4E	64	A4	98	FB
31	51	65	A7	99	FD
32	53	66	AA	100	FF
33	56	67	AC		

Warranty

The Goddard Design Company 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, or to any product or parts that have been subjected to misuse, neglect, accident or abnormal conditions of operation.

In the event of a failure of a product covered by this warranty, Goddard Design Company will repair a product returned to it within one year of the original purchase, provided that Goddard Design Company's examination establishes to its satisfaction that the product was defective. Goddard Design Company may, at its option, replace the product in lieu of repair. Said repair or replacement of such a defective product returned within 1 year of purchase 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 cases, an estimate will be submitted before work is started, provided that such an estimate has been 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 COMPANY 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 Company, giving full details of the problem, and include the serial number. On receipt of this information, service or shipping instructions will be forwarded to you.
2. On receipt of shipping information, forward the unit, shipping prepaid. Repairs will be made at the Goddard Design Company and the unit returned, shipping prepaid.

All shipments to Goddard Design Company 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 protective padding to protect the unit from shock.

Thoroughly inspect your unit immediately after purchase. All material in the shipping container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing list unless notified immediately. Product is shipped F.O.B. the factory. 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.

**GODDARD DESIGN COMPANY
51 NASSAU AVENUE BROOKLYN, N.Y. 11222
(718) 599-0170 FAX (718) 599-0172**