GODDARD DESIGN COMPANY

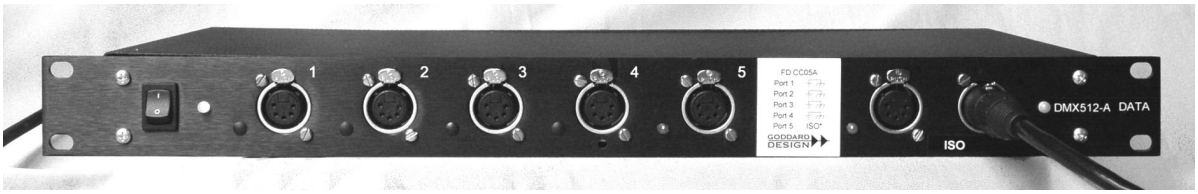
HUB5

An E1.11/E1.20 HUB / SPLITTER

Part FD HUB5

Hardware R1

Software V1.0.0



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1 Welcome

Goddard Design's Hub5 is **the** splitter for today's DMX512. It is designed to provide flexible, reliable signal distribution for systems using E1.11 (DMX512-A) and E1.20 (RDM). It is a truism that RDM systems that use splitters must use splitters designed for that Standard. But many RDM splitters will have very little to offer for a system that runs only plain DMX512. The Hub5 provides a feature set unmatched by any other DMX or DMX/RDM splitter - meaning you can stock just the one splitter for both uses.

RDM was designed to be compatible with Standard compliant legacy DMX512 equipment; however there is a lot of legacy equipment whose Standard compliance is incomplete. The Hub5 is designed to allow for mixed systems even when some of the equipment may not be fully DMX512 compliant.

A Hub5 can also solve thorny problems found in pure DMX512 systems. Hopefully you won't need all the Hub5's features every day but it is great insurance!

2 Quick start guide

We know that most splitters have manuals that fit on one sheet of paper. This manual runs 16 pages. So what do you really need to know to use the Hub5 in most DMX or DMX with RDM systems?

2.1 Connect the console or DMX source to the input connector (Port0). Connect other splitters or DMX terminator to the Loop Thru output connector.

2.2 Connect the cables needed to drive your DMX/ RDM receivers.

2.3 Plug the Hub5 into the AC mains and turn it on.

2.4 If you need to do anything special, **READ THE MANUAL!** It never hurts. We would suggest reading at least all of section 4. It explains the default setup.

3 Hub5 Features

3.1 Hub5 hardware details:

The **Hub5** has five RDM-ready outputs, and one input with a passive loop-thru. It is packaged in a 19" 1U rackmount chassis. It supports the new preferred topology of isolated inputs and grounded DMX512A outputs. The five output ports support the RDM termination requirements. This termination may be selectively removed using on board programing jumpers.

It is powered by a universal switching power supply for 100-250 VAC 50-60Hz.

High speed programmable logic handles all RDM switching for minimal, predictable delays.

3.2 RDM features:

The Hub5 meets the requirements for a 'transparent in-line device' (section 4 of E1.20) The factory defaults will handle most standard systems, whether plain DMX or RDM. Just plug and play.

The Hub echos all RDM response messages on all ports. Under the Standard, sending the responses to all branches is optional. GDC feels that including this optional feature is important for systems that wish to achieve the full power of RDM.

3.2.1 Anti-Jabber

The Hub5 includes sophisticated jabber detection. If an RDM device on one port attempts to hijack the system, the Hub5 will quickly quarantine that port, limiting how many responders are affected. Even when a port is quarantined, the Hub5 will attempt to send standard DMX data to that port. Quarantined ports are automatically retested. RDM communication is reenabled when the problem is cleared. Users may manually quarantine any port. (See section 6 Mode 3 for more on port blocking.) The Hub5 marks the port on which a jabber condition has been detected with a special blinking pattern. This pattern repeats about every 2 seconds.

Jabber detected

If a port is jabber free for eight seconds the Hub5 returns it to normal operation.

3.2.2 The Hub5 is Discoverable

The Hub5 is fully discoverable. It can be monitored via RDM. Configuration is done directly from the back panel. The configuration data can be read out via E1.11(DMX512-A) text packets.

If your system contains older legacy equipment that does not tolerate the use of alternate start codes, any port on the Hub5 can be configured to send only Null START Code packets. We call this type of port a 'Clean Port'.

The Hub5 supports a unique 'Full Hub' mode in which any port may serve as the controller port (input port)

3.3 Features useful in both DMX and RDM systems

In the event of DMX failure the Hub5 can automatically continue sending the last packet received to all ports set as 'Clean Ports'.

If your system contains equipment that is a bit fussy about the flavor of DMX that it will respond to, the HUB5 can re-time the DMX to either of two relaxed flavors. To be re-timed the port must be set to be a 'Clean Port'.

3.4 Special Feature for DMX only systems

Splitters are often used in large DMX systems with long cable runs. They are placed at the end of these runs. In this use, they allow star topologies, they eliminate ground loops, and they restore the signal level. However, they cannot restore the signal timing. Cascading conventional splitters will provide less and less benefit.

3.4.1 The Hub5 can be a DMX Re-timing Repeater

A Hub5 is not a conventional splitter. Any port can be set to re-time DMX512 signals, restoring all timing back to correct DMX values. As long as the runs between Hub5 units are kept to some reasonable length (say 1200') the Hub5 will allow DMX systems of any length to be constructed. (RDM signals are not re-timed and RDM systems should be limited to a total of about 1200 -1500 feet from the controller to the furthest receiver.)

3.5 Topology - Isolation

The Hub5 meets the electrical requirements of both E1.11(DMX512-A and E1.20 (RDM). USITT DMX512 - 1990 had very few electrical requirements. The Hub5 does not violate any of the 512-1990's requirements. However, its topology may be different from what might be expected from equipment built to that version of the Standard. That said, it should be electrically compatible with any compliant legacy system.

3.5.1 Port 0 - the input

On the right-hand end of the front panel are both a male and female XLR5 connector. The two connectors are wired together to form a passive loop thru of all five connector pins. In most applications the male connector will serve as the input port to the hub. In RDM speak this would be known as a 'responder port' because it is a port which outputs responses from an RDM receiving device. The female connector may be looped thru to other hubs or splitters. Technically it can be used as 6th output of the hub driving RDM or DMX512 devices. However, this is not a recommended practice. The signals on this line are not buffered and failure, particularly a shorted cable, may disable the whole system.

3.5.1.1 **Loop Thru Must Be Terminated!**

If the thru connector is not used, a 120 ohm DMX terminator must be plugged into the unused

connector. Failure to terminate the loop thru may cause erratic operation. An XLR style male connector with a 120 Ω terminator installed may be purchased from Goddard Design Company.

3.5.1.2 Port 0 - electrical

Port 0 is an isolated port. It is isolated for voltages of at least 60 VAC. The impedance between connector pins 1, 2, or 3 and case ground will be 22mΩ +/-5%. This port has both RFI bypassing and a predictable discharge path for ESD pluses. This port does not have any termination components for either DMX512 or RDM.

3.5.2 Ports 1, 2, 3, 4

Ports 1 thru 4 are the same. Port 1 is on the extreme right of the front panel. In the default setup these are output ports. They are, in RDM speak, 'command' ports. These ports are buffered and grounded following the requirements of E1.11 section 5.4 and other relevant sections. They also have the RDM Line Bias Networks following the requirements of E1.20 sections 2.4 and 2.5.

If these outputs are going to be used to drive only legacy DMX512 equipment which needs the highest signal level, the termination and line bias networks may be removed by moving two jumper blocks.

These ports are ideally suited for driving DMX or RDM responders that are isolated or floating. Most RDM responders should be isolated. If they are driving ground reference ports the driven devices should be reasonably close to the Hub, and should run from the same power distribution.

Goddard Design does not recommend the use of **grounded receivers** as described in section A3 of E1.11. If equipment built to the topology of A3 must be used, it should be connected to a fully isolated port. Port 5 on the Hub5 is fully isolated.

3.5.3 Port 5

In the default setup this is an output port, or in RDM speak 'command' port. This port is buffered and fully isolated following the requirements of E1.11 section A1 and other relevant sections. It also has the RDM Line Bias Networks following the requirements of E1.20 sections 2.4 and 2.5.

In some special setups this port might be used as a dedicated input (responder) port, or it might be used to drive legacy DMX512 equipment of types which need the highest signal levels, in which case the termination and line bias networks may be removed by moving two jumper blocks.

3.5.3.1 Port 5- isolation

Port five is an isolated port. It is isolated for voltages of at least 60 VAC. The impedance between connector pins 1, 2, or 3 and case ground will be 22mΩ +/-5%. This port has both RFI bypassing and a predictable discharge path for ESD pluses.

3.5.3.2 Grounding Port 5

Port5 can be converted to a grounded port by installing an on board jumper block.

4 General Operation - Plug and Play

The Unit is shipped set to mode 1. For most general usage you may use the unit as shipped. This is the 'plug and play mode'.

4.1 Default settings

The Ports 1 thru 5 are set as output ports and port 5 is a galvanically isolated port. Physically the rotary mode switch visible thru the back panel should be pointed toward the number 1. All the levers on the bank of six DIP switches should be pressed down toward the bottom of the case.

4.2 Display in Default Mode

When either DMX or RDM is being received the front panel green LED on the right end of the panel should be on. It may flicker. The red LED next to the loop thru DMX input will also be on, showing that data is being received by port0.

During DMX-only service the red and green LED will monitor the same data. During DMX-only service the red LEDs to the left of each output port will be off.

4.2.1 Port Displays During RDM Operation

The output port displays becomes active when an RDM controller is connected to the Hub5 port0 and at least one RDM responder is connected to one of the output ports. Now any output port receiving an RDM response will flicker. The duty cycle of the port LED will approximate the percentage of time that the port is acting as input port for RDM messages. Generally the LED on port 0 will be 'On' and the other ports will only wink. However, in some modes of operation some output ports may be functioning as input a reasonable amount of the time. If you only see flickering on some ports and not others, the ports that are not flickering do not have RDM responders that are currently being polled.

4.3 Clean Ports

RDM has been carefully designed to be comparable with equipment that complies with the DMX512 Standard. However, some equipment doesn't even check for alternate START Codes. Not all such equipment is of old manufacture. If you have equipment that acts up when RDM communication is on, Clean Ports are your way to a well-mannered system. You will need to connect all the offending equipment on DMX segments(cables)that contain no RDM equipment. If you need to share the wire with RDM capable equipment that is possible, but remember any equipment on the clean segment will not respond to RDM.

Once you have all the offending equipment on one or more cables plug them into the Hub5 and note the port number. On the back panel raise the switches which match the ports to which you only want to send Null START Code data.

4.3.1 Clean Port LED Blink Pattern

The ports that have been switched into Clean Port mode will be marked by the port LED starting to blink in a special pattern. The graphic below should help visualize this pattern. Black ink represents the LED being on and the white paper represents the LED being off. The LED will be on 7/8 or the time and off 1/8 of the time. The pattern repeats about once per second.

Clean Port LED blink pattern

4.3.2 Disabling a Clean Port.

Pressing down the dip switch for a port converts that port back to a normal RDM port. (Wow that was fairly obvious.) However, what happens next might not be. The LED for that port will start to flash rapidly. The pattern will be the same pattern used when a port has detected jabber. (See section 3.xx above) For software reasons the Hub5 switches out of a Clean Port mode by going through the jabber blocking mode, So assuming all is well, the LED will go out in about eight seconds after the switch is changed.

4.3.3 Clean Port Technical Details

The Hub5, like any splitter, receives and sends all DMX packets from its input to its outputs. Null START Code, Non Null and RDM packets are all forwarded unchanged. Unlike a normal splitter RDM and NSC packets are received and stored in buffers. The Hub5 can resend data from the DMX buffer. This data is sent at one of two user-selectable flavors. These flavors are conservative and reasonably jitter free. They are designed to drive even a finicky receiver. Information about the Clean Port flavors is in section 8.

5 Configuration

The configuration of the Hub5 is normally simple. Yes, we know you never used to configure splitters at all! All you had to do was plug them into the AC mains. Well, the Hub5 is an intelligent device. To automatically route the RDM protocol efficiently requires considerable intelligence. Further E1.11 and E1.20 have various optional physical structures. It is hard to build completely static hardware that will answer the wide ranges of choice available. You can design an RDM hub to automatically handle most RDM systems, but to truly cover the different data distribution needs requires some options.

The above said, most users can use the Hub5 as it comes out of the box. You can still 'plug and play'.

5.1 Hardware Configuration

5.1.1 Termination Configuration

The five output ports ship configured with RDM Line Bias and DMX termination networks. For normal RDM systems these networks are essential. These networks are normally harmless when used with DMX only system. However, there are systems which could benefit from these networks being disabled. Do not disable these networks unless you are well versed in DMX and RDM networks or have been instructed to do so by the factory. If you need to disable these networks, you do so by removing two programing jumpers for each port to be disabled. The location of these jumpers is shown in figure 3 in Section 9.

5.1.2 Port 5 Grounding Configuration

The default hardware configuration for Port5 is an isolated port. Installing a programing jumper block on J12 converts Port5 to a grounded transmitter.

5.2 Software configuration

The Hub5 software is configured by setting the mode switch on the rear panel and by the six-way DIP switch. Custom configurations may be burned into the flash memory. Future versions of the software will permit the configuration over the RDM system.

5.2.1 Default Software Configuration

Hub5s are normally shipped set for what Goddard Design refers to as a Level-1 RDM hub. This mode is selected by setting the mode switch to Mode 1. In this configuration it behaves like a normal DMX splitter except that it also handles RDM. Port 0 - the one with the loop thru connector is the input from the console or from other splitters. RDM commands are sent to all five output ports.

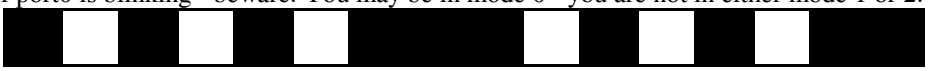
6 **Operational Modes Settings**

The rear panel mode switches control most of the operation mode options. Their uses are summarized below. Section 6.0 explains mode 0 and so on. In most cases the position of the rear panel mode switch is only read at power up or reset. If a new mode is set, it will become effective the next time the power is cycled.

6.0 - DMX Splitter with Clean Ports (Mode 0)

This converts the Hub5 into an intelligent DMX512 splitter. In this mode RDM is not supported. The dip switches for ports 1 thru 5 will switch those ports to 'Clean Port' mode. The flavor used for Clean Ports and whether a Clean Port holds its last frame is controlled by the configuration bits set in mode 8, below.

Since DMX only mode is a special mode that does not support RDM it is a somewhat dangerous mode. So we mark this mode by having unique LED indication. In DMX mode the input port LED will blink in the pattern shown below. All other ports will be dark if normal and blink with the Clean Port pattern so set. So if port0 is blinking - beware. You may be in mode 0 - you are not in either mode 1 or 2.



DMX input port

6.1 - Level 1 Hub with Clean Ports - Factory Default (Mode 1)

This is the factory default setting. For most systems you can use this setting for all your splitter needs. The Hub5 will configure itself for either RDM or DMX512 automatically. If your system uses DMX512 equipment that behaves erratically when driven by an RDM controller, place all of those units together on one port of the hub. Raise the dip switch for that port. If you need to have 'hold last' or if you wish to select the clean 'flavor', see the setting of the configuration bits by Mode 8, below.

Responses are routed to all ports other than the port receiving the response. Discovery is limited to Port 0.

6.2 - Level 1 Hub with response block (Mode 2)

In this mode we can set a port to block RDM responses coming from that port. This is what the anti-jabber routine does automatically. A blocked port is unidirectional all controller packets are sent to that port.

This setting would be used for trouble shooting an RDM system while allowing alternate start code messages to get thru. You will use mode 1 much more often.

If a port is blocking responses, it is marked with a special LED blink pattern. The graphic below should help visualize this pattern. Black ink represents the LED being on and the white paper represents the LED being off. The LED will be on 3/4 of the cycle. There will be two off blinks, each taking 1/8 of the cycle. The pattern repeats about once per second.

RDM Responses Blocked

6.3 - Full Hub with Clean Ports (Mode 3)

A 'full hub' is a different animal. From a software point it considers every port to be the same. At signal start-up the first port to see a valid DMX or RDM packet will become the controller port. and all function will continue as if that port were the input port. However, the hardware of the input port and the output ports are different. First the connector's sex isdifferent. A sex reverser handles that problem. What is more complicated is the RDM termination and Line Biasing system. An RDM segment must be terminated at both ends. One of those terminations must contain an RDM Line Biasing network to hold the line in a

known state when all the transmitters are high impendence. For simplicity this marking network is installed on all port that are nominally controller ports. The outputs of consoles and the outputs of splitters are controller ports.

In the future, various testers and back-up controllers may well be set up with a port designed to drive what is electrically a controller port (output) as if it is a logical responder port (input). If an RDM controller port is directly connected to a Hub5 controller port, it should drive it even though the network topology is not correct**. However, we would not expect this to work on a heavily loaded long line with many responders. We wouldn't risk our show to such a set up.**

At this time full hub mode shows some of the new flexibility RDM provides. If you have questions about how and why to use this mode please feel free to contact Goddard Design. If you are not sure which mode to use - use mode 1 or 2.

This mode also supports Clean Ports.

6.3.1 -Warning Port 0 can be switched to Clean Port

One odd detail is that in mode 3 you can switch Port 0 to Clean Port. Why? Because in Mode 3 Port 0 may not be the input to the Hub5. However, never switch Port 0 to Clean Port if it could be used as an input!

6.4 - Full Hub with Response Block (Mode 4)

This mode is the same as mode 3 but support port blocking instead of Clean Ports.

6.4.1 -Warning Port 0 can be switched to Blocking

One odd detail is that in mode 4 you can switch Port 0 to Blocking. Why? Because in Mode 4, Port 0 may not be the input to the Hub5. However, never switch Port 0 to blocking if it could be used as an input!

6.5 - Custom Mode 1 (Mode 5)

If you need a custom mode, we can program it into this position for you. Perhaps you want a level 1 hub with one clean port and one response blocked port - we can do that.

6.6 - Custom Mode 2 RDM (Mode 6)

A second custom mode. - In the future this mode will store the mode set by RDM commands

6.7 - Send text info packets (Mode 7)

This mode sends several text packets to all the output ports (1-5). They are sent using the DMX512-A text packet format. Once this mode is entered, the function of the mode switch changes. Rotating the switch will cycle through messages below. The displays listed below are two line displays showing what the message would look like on the *Lil'*DMXter2 running V2.30 software. The Text portion of the message is shown on the second line.

MSG0 -Unique Identifier

```
|MS#   1 L-512 C-  3 |
|4744:8765 4321=UID  |
```

The UID shown will be the unique number for your Hub5. It is shown in hexadecimal notation. The first two digits will always be 47, 44 the ASCII for the characters 'G' and 'D'. That marks this equipment as a product of Goddard Design.

MSG1 - Software Checksum

```
|MS#    2 L-512 C- 3 |
|257B = Checksum     |
```

MSG2 - RDM Start Codes Accepted

```
|MS#    3 L-512 C- 3 |
|F0 & CC=RDM Startcod|
```

Hexadecimal 0xCC is the START Code for RDM. 0xF0 was the development START Code used to develop RDM. At this time the software still recognizes the developmental start code to allow testing with certain developmental hardware.

MSG3 - Copyright notice one

```
|MS#    4 L-512 C- 3 |
|(c)2005-2006 Goddard Design|
```

MSG4 -Copyright notice two

```
|MS#    5 L-512 C- 3 |
|All Rights Reserved |
```

MSG5 - Configuration bits

```
|MS#    6 L-512 C- 3 |
|cfg bits 00000000   |
```

MSG6 Errors

```
|MS#    7 L-512 C- 3 |
|WD0000 CE0000 D00415|
```

This display is mostly used for factory testing and monitoring. 'WD' is the number of Watch Dog timer resets, 'CE' is the number or Critical Errors. Both ideally stay at zero. If CE is non-zero WD will be non-zero. WD should be equal or greater than CE since every CE will generate a WD hit. DO is the value of the mock DMX slot which the Hub reports to the 'get slot' PID.

These counters are reset when new code is burned and maybe reset by a setting bit 7 in the configuration byte. See mode 8, below.

MSG7 - Software Version Number

```
|MS#    8 L-512 C- 3 |
|1.0.0a Software Ver |
```

MSG8 - Port Jabber counters one

```
|MS#    9 L-512 C- 3 |
|J0:00000 00000 00000|
```

If an RDM responder speaks at any time other than when it is spoken to it can disrupt RDM communication. The Hub5 tries to sense these disruptions and isolate the offending data link so the whole system is not compromised. As a trouble shooting tool the Hub5 counts the number of jabber events. The right-hand counter is for port 0, hence the label J0. The next counter is for port 1, followed by port 2. These counters are reset when the code is updated or by setting bit 7 in the configuration byte.

MSG9 - Port Jabber counters two

```
|MS#   10 L-512 C- 3 |
|J3:00000 00000 00000|
```

This message shows the jabber counters for ports 3, 4, and 5.

6.8 - Configure bits (Mode 8)

This mode is used to set up additional behaviors for the other modes. The data is written into nonvolatile EEPROM. The data is entered by setting (raising) the mode bits you want on DIP Switches 2-6. The write is triggered by toggling switch one twice. On the first toggle, the green light will turn on briefly. Then toggle it again to lock in the new values (the green light will stay on for a longer period). Using a toggle, rather than an absolute state on switch, one prevents accidentally changing the configuration if the user goes into mode 8 when the "write" switch happens to be up.

The current setting is shown on the port LEDs when this mode is entered. After a write the new values will be shown.

Bit usage	
1	1 = All Clean Ports use the slow flavor
2	1 = All Clean Ports hold last frame
3-6	These bits are reserved for future use.
7	If bit 7 is set at the time of an EEPROM write the following error counters are reset.
	WD WatchDog timers
	CE Critical Error
	J0-J7 Jabber counters

6.9 - Reserved (Mode 9) - (same a zero)

7 RDM functions - The Hub5 as a responder

The Hub5 is itself an RDM device. Not only does it route RDM messages, it can respond to them. In the terminology of RDM it is 'discoverable', and you won't need a flashlight.

Discovery is the method by which an RDM controller searches a system and finds all the RDM responders that it can talk too. The controller keeps a list of the unique identification numbers. Each discoverable RDM device is required to have a unique 48 bit serial number.

An RDM splitter is not required to be discoverable. It can do its job of routing RDM and DMX messages without revealing it existence to the world. However, if you want to manage and troubleshoot an RDM system, having a discoverable splitter or hub is very useful.

7.1 Hub5 identify mode

Knowing that a system has four splitters and forty color changers is all well and good, but until the operator knows which is which, a list of 48 bit binary numbers doesn't help much. A discoverable RDM device is required to have a method to show that a controller has found it. The RDM command is referred to as the Identify Command.

The Hub5 will identify itself by flashing all of its front panel LED at once with a flash pattern as shown below.

RDM Identify

7.2 RDM support vs. software version number

RDM is a brand-new protocol. This is one of the very first products to support V1 RDM.

Since very few products can do more than discover that a Hub5 is on the network, there is as yet not much use for extensive configuration commands . What RDM commands the Hub5 responds to is likely to change reasonably quickly until the RDM world becomes stable. So check which software version you have and be sure this manual matches that. If this manual is older than your software version, an updated manual should be posted on our web site.

7.3 This manual is for software V1.0.0

7.4 Supported PIDs as of this time

PID stands for Parameter ID or parameter identifier, it is RDM short hand for a request or response command. In the list below the parameter is followed by its value in hexadecimal and then by the clause number describing it in E1.20. The characters 'G' or 'S' show whether this command is a 'get' - console read, or a 'set' - console write command.

7.4.1 Discovery PID - required

These three commands are required to allow a device to be discovered by a controller. If you need to know about how RDM works, understanding these commands is mandatory: if you're just using the equipment, you don't need to know more.

```
DISC_UNIQUE_BRANCH          0x0001
DISC_MUTE                   0x0002
DISC_UN_MUTE                0X0003
```

7.4.2 RDM Information

```
SUPPORTED_PARAMETERS        0x0050 G (10.4.1)
```

Returns a list of the PIDs beyond those required. The Hub5 currently reports:

0x0080, 0x0081, 0x0082, 0x00F0

7.4.3 Product information

PID_DEVINFO 0x0060 G (10.5.1)

Returns the following product information about the Hub5. Only the numeric data is sent.

0x01,0x00 RDM Version identifier - here version 1

0x40,0x10 A number that uniquely identifies this product within GDC

0X08,0X01 RDM product category- PRODUCT_CATEGORY_DATA_DISTRIBUTION - to distribute DMX universes.

0x00,0x00,0x00,0x01 Software Version numeric index

0x00,0x01 DMX Foot print

DEVICE_MODEL_DESCRIPTION 0x0080 G (10.5.3)

Returns a text description of the product:
5 PORT RDM HUB WITH CLEAN PORTS

MANUFACTURER_LABEL 0X0081 G (10.5.4)

Gets the Hub5's part number as text:
FD HUB5 (REV 0)

DEVICE_LABEL 0x0082 G/S (10.5.5)

Gets or sets a user-defined text device label - shipped with the label set to:
Hub 1

SOFTWARE_VERSION_LABEL 0x00C0 G (10.5.9)

Gets a human readable version of the software version - currently:
V1.0.0A

7.4.4 DMX512 Setup

DMX_START_ADDRESS 0x00f0 G/S (10.6.3)

While the Hub5 does not use slot data, it can report that it does (yes, it lies!) - with some test equipment this makes it easier to identify the Hub5.

7.4.5 Control

IDENTIFY_DEVICE 0X1000 G/S (10.11.1)

Turns on or off the identify mode - All LEDs flashing

8 Technical Details & Specifications

8.1 What Standards Is Hub5 Built to?

The HUB5 is built to conform to two Standards issued by ESTA. Goddard Design believes that it conforms to all relevant clauses of these Standards. We have attempted to meet the disclosure and marking requirements of these standards.

8.1.1 E1.11 DMX512-A EF1.0

DMX512-A is major rewriting and formalizing of the DMX512 protocol that has been in use since 1986. Issued in 2004 DMX512-A covers many detail that were not covered in the earlier informal versions of the standard. It can be said that earlier versions were an oral tradition with some written notes.

8.1.1.1 EF1.0

The inclusion of EF1.0 at the end the DMX512-A name means that this equipment has what DMX512-A refers to as Enhanced Functionality. EF1 equipment can send signals in both direction on the primary data link (pins two and three). The number after the decimal point defined what protocol the equipment runs. In this case EF1.0 is equipment that runs the RDM protocol.

8.1.2 E1.20 RDM

For the last several years ESTA has had under development a protocol that will allow management and status commands to pass bidirectionally over a DMX512 link. As a draft standard it has been known as BSR E1.20 - RDM Remote Device Management over DMX512 Networks. It was approved by ESTA to be submitted to American National Standards Institute on January 21, 2006. When released by ANSI it will be known as E1.20.

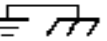
8.2 E1.11 Disclosures

8.2.1 Packet processing latency (clause 10.5.4)

An inline device must declare any delay or latency inserted between receiving and re-sending a packet. For all ports except for ports configured as Clean Ports the data delay is approximately.2µS. RDM allows this number to be anything less than 88µS. When a port is configured as a Clean Port the data will be delayed by the time required for one packet to be sent at the selected flavor. This will amount to a maximum of about 35mS for the faster flavor and 67mS at the slower flavor.

8.2.2 DMX512-A Port Topology Requirements and Disclosure

Outputs marked with the text '**ISO***' are shipped as isolated. They conform to E1.11, clause A1. However, they may be reconfigured to the grounded topology in which case they conform to E1.11, clause 5.4.

Outputs marked with the  symbol conform to E1.11 clause 5.4

8.3 RDM Port Topology requirements

Port 1 through port 5, the ports with the single female connector, all meet the requirements of E1.20 section 2.4 and 2.5.

All ports were designed to pass the requirements of the tests required of that type of port in E1.20 Appendix F.

8.4 RDM Disclosures

Section 4.2.4 BREAK timing - allows an RDM inline device to shorten the break of a packet. This allows for the time required by a device to turn around. The Standard set the allowed shortening at 22µS. The Hub5 waits 1 to 1.5µS after the start of the break to turn around. This delay decreases the chance of a false trigger due to electronic noise. This filtering is not used on discovery replies to conform to the requirements of 7.5 Discovery. Shortening

of DISC_UNIQUE_BRANCH response packets is less than 30nS.

8.5 Other Specifications

8.5.1 Mechanical Specifications

Rack mount case 19" W - 1.75"H - 8"D
Table top case 17"W - 1.75"H - 8"D

Weight 6.5lb

8.5.2 AC Power Requirements

The Hub5 is powered by a universal switching power supply for 100-250 VAC 50-60Hz. It consumes less than 500mA.

8.5.3 Operating Environment Limits

Humidity	0%to-95%	Non-condensing
Altitude	0 to 1900 meters	
Temperature	0 to 40 Degrees Celsius	Avoid prolonged operation in direct sunlight.

8.5.4 Clean Port DMX 'Flavors'

Flavor	Break	MAB	Inter-slot	Updates / S	Config Bit 1
Default	200µs	69µS	22µS	29	0
Slow	400	139µS	44µS	15	1

The values have some jitter; these are average values.

8.5.5 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.

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

This device is professional theatrical control 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.

9 Component and Jumper Locator

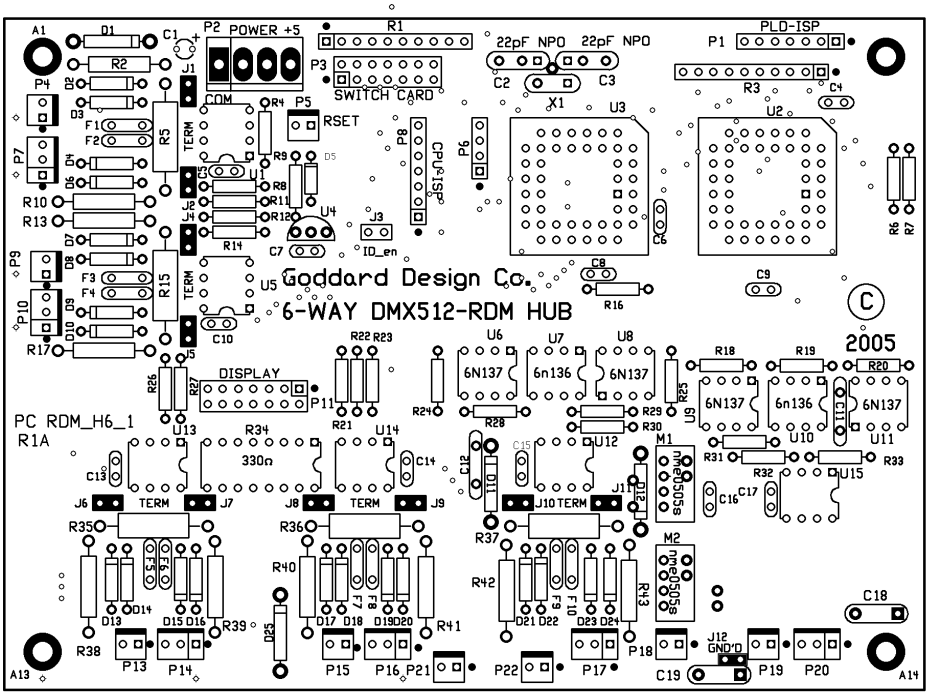


Figure 3 PCB component locator.

9.1 Disabling Termination on Ports 1- 5

If you have a reason to not want RDM termination and line bias on a port of the Hub5 it can be disabled. In general you should not do this unless you are very familiar with the electrical requirements of both DMX and RDM. If you are unsure please consult the factory.

Each port has two black jumper blocks that cover two gold plate pins. Removing these two blocks on a port removes the termination and bias network for that port. The blocks are highlighted in the above drawing by being filled in black. Port 1 :J1-J2–Port 2 J4-J5 – Port3: J6-J7 – Port4: J8-J9 – Port5 J10-J11. When shipped these jumpers will normally all be installed.

9.2 Changing Port5 from an Isolated Port to a Grounded Port

Port5 is normally shipped as an Isolated transmitter Port. As shipped it conforms to E1.11 Clause A1. If the jumper block provided is placed over the two gold pins of J12, the port is then grounded conforming to clause 5.4 of E1.11.

If you are driving legacy equipment with grounded inputs, the Isolated port is often a better choice. If you are driving a line that has only isolated receivers on it, the grounded transmitter is a better choice - often either will do just as well.

10 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.