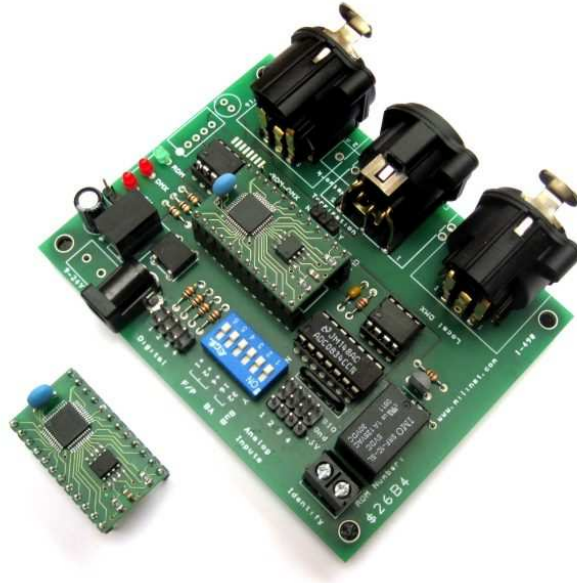# MILFORD INSTRUMENTS Limited

Add RDM functionality with the RDMchip

RDMchip (left, #1-499) and shown mounted on optional Evaluation Board (#1-490)
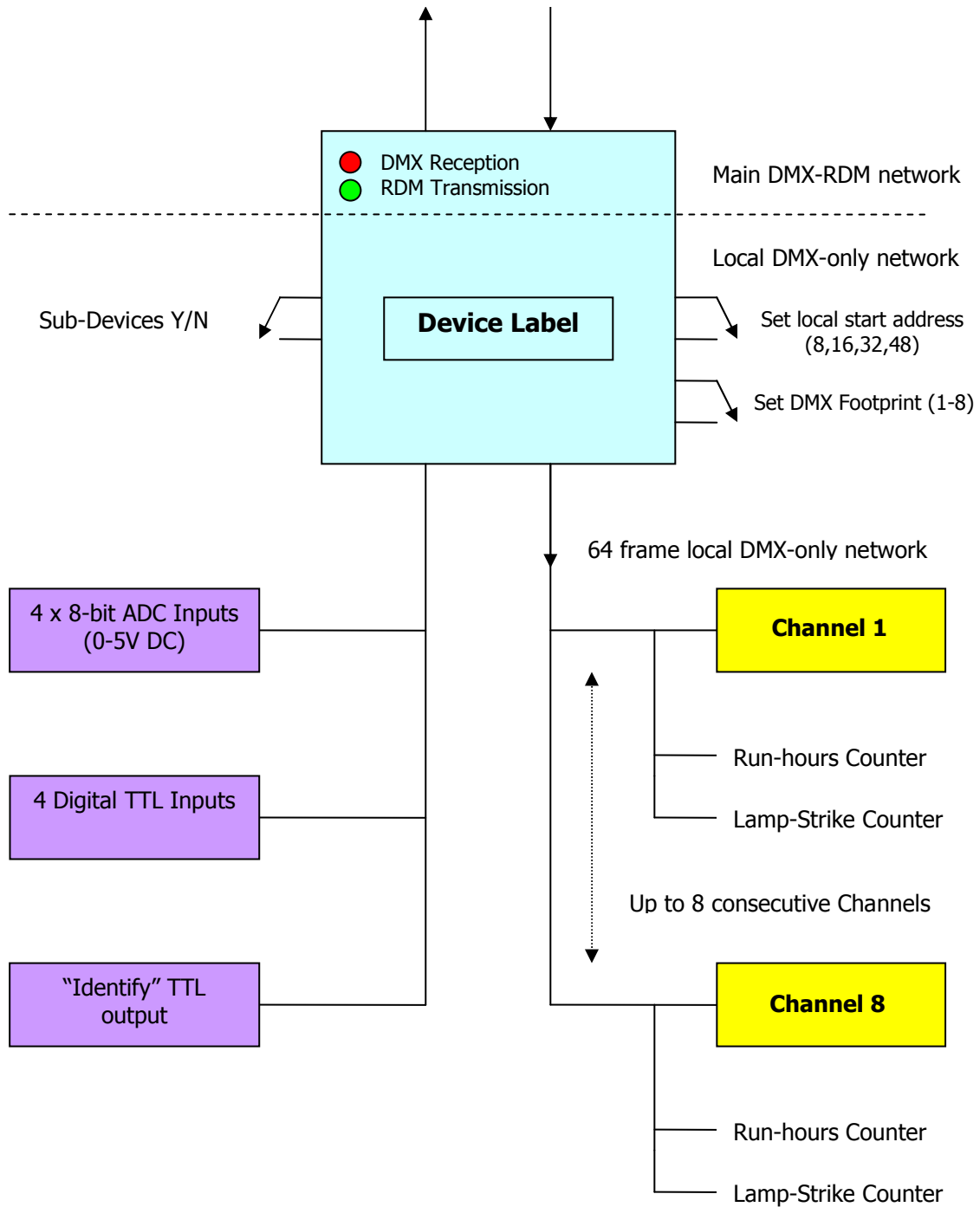
➢ Retrofit to existing DMX equipment

➢ Dynamic Addressing

➢ Run-hour and Cycle counters

➢ Support for 4x Digital and 4x 8-bit ADC sensor inputs

➢ Single footprint fixture, Group of fixtures or Multi-footprint fixture

➢ ANSI E1.20-2010 compliant

RDMchip extracts DMX data bytes from the main public DMX-RDM network and re-transmits them on a short, private DMX-only data stream to control the local fixture(s).
The local DMX address of the fixture remains static but its public DMX-RDM network address is dynamically set using standard RDM commands.

The following information/features relate to the RDMchip when used in conjunction with the 1-490 Evaluation Board. Please refer to the following block diagram.

RDMchip / Evaluation Board- Block Schematic

DMX Reception
RDM Transmission

Main DMX-RDM network

Local DMX-only network

Device Label

Sub-Devices Y/N

Set local start address (8,16,32,48)

Set DMX Footprint (1-8)

64 frame local DMX-only network

4 x 8-bit ADC Inputs (0-5V DC)

Channel 1

Run-hours Counter

Lamp-Strike Counter

4 Digital TTL Inputs

Up to 8 consecutive Channels

"Identify" TTL output

Channel 8

Run-hours Counter

Lamp-Strike Counter

Operation Overview

The RDMchip continuously services the main public DMX-RDM network and generates a short, private DMX data stream to control the local fixture. The RDMchip extracts a number of data bytes from the main DMX-RDM network starting at its (RDM) designated DMX address and then re-transmits these on the local network. The number of data bytes extracted is set to match the 'foot-print' of the local fixture up to a maximum of 8. The DMX base address of the local fixture is set to be either 8,16,32 or 48 and thereafter remains unchanged- the fixture's address on the public DMX-RDM network is handled by the RDMchip and is set and changed by RDM commands.

Specifics

Main DMX-RDM Network Address

Once 'discovered' by the RDM controller, the DMX start address of the RDMchip can be assigned by RDM controller- no need to physically visit the connected fixture.
This address is stored in eeprom and retained until changed again by the controller.

DMX Indicator

On whilst receiving valid DMX data.
Flashes when no valid DMX data is being received.

RDM Indicator

Flashes during RDM communications, otherwise off.

Local DMX Network

The RDMchip generates a local 64-frame long DMX network. All the frame data within this local DMX network is 0 except for those mapped from the main DMX-RDM network e.g. if the Interface Board's DMX-RDM start address has been assigned as 223 (by the RDM controller), the DMX footprint is set at 8 (using the DIP switches on the Interface carrier board) and the Local start address set at 48 (using the DIP switches on the Interface carrier board), then the Interface extracts data corresponding to frames 223-230 from the DMX-RDM network and pushes this out onto the local DMX network. Data from channel 223 on the main network is mapped to channel 48 on the local DMX only network, 224 to 49 etc.

You would of course ensure that the start address for channel 1 of the fixture you are controlling on the local network (ie your 8-channel dimmer pack or 4-channel fog generator) is set to match the local start address selection – in this example 48.

Once set up, the local address settings may then be left unchanged whilst the DMX-RDM controller assigns the RDMchip's DMX base address to whatever it wishes via the main network.

Local Base Address selection

Set the local start address using the 2 dip switches- address options: 8, 16, 32, 48.

BA16	BA32	Local Start Address
Off	Off	8
On	Off	16
Off	On	32
On	On	48

DMX Footprint

Set the DIP switches to the required number of DMX channels- ie the required DMX footprint. This may be between 1 and 8.

FP+1	FP+2	FP+4	DMX Footprint
Off	Off	Off	1
On	Off	Off	2
Off	On	Off	3
On	On	Off	4
Off	Off	On	5
On	Off	On	6
Off	On	On	7
On	On	On	8

Channels 1-8

Ensure the DMX start address for the equipment chosen to be Channel 1 on the local DMX network corresponds to the value selected under the 'Local Start Address Selection' section. Channel 2 will then correspond to the local start address value+1 and similarly for the other channels.

Each channel is equipped with its own 16-bit 'running hour' and 'lamp-strike' counters that may be read, cleared and set by the RDM controller. The minimum ON time registered by the hour-counters is 30 seconds.

*Note: If Sub-Devices is selected then the 'Root' counters point to the channel 1 counters

Sub-Devices Y/N

This tells the RDMchip if you are using Sub-Devices: eg if you have a rack of 8 identical dimmers, then these would be treated as sub-devices of the whole rack- so you'd set the switch to Yes.
If you are controlling your 'fog generator' and this needs 5 consecutive DMX channels to operate, then these consecutive channels would not be considered as sub-devices and you'd set the switch to NO.

Device Label

You can assign (via the RDM network) a 16-character text label for your interface board (and the individual sub-devices if present) so it's easy to identify on the RDM software. You can change this as often as you wish.

Sensors

The Interface board incorporates 4 x 8-bit ADC inputs and 4 TTL level digital inputs so that for example temperatures, liquid levels and contact status within a fixture may be monitored by the controller without having to physically visit it.

The sensors are addressed individually by the RDM network. Sensors are updated whenever they are read.

Identify Output

Zero volt relay contacts (1A @ 30V DC) output provides for identifying the fixture (by strobing a light, pulsing a buzzer etc). Action and status controlled by the RDM network.

RDM Commands

The following is a list of the standard PIDs (Parameter Descriptions) supported by the Interface Board as defined by ANSI E1.20-2010.
[Please contact us for custom versions / additional PIDs]

Get	Set	RDM Parameter ID	Value	
		DISC_UNIQUE_BRANCH	$0001	
		DISC_MUTE	$0002	
		DISC_UN_MUTE	$0003	
Y		SUPPORTED_PARAMETERS	$0050	
Y		DEVICE_INFO	$0060	
Y		DEVICE_MODEL_DESCRIPTION	$0080	
Y		MANUFACTURER_LABEL	$0081	
Y	Y	DEVICE_LABEL	$0082	
Y		SOFTWARE_VERSION_LABEL	$00C0	
Y	Y	DMX_START_ADDRESS	$00F0	
Y		SENSOR_DEFINITION	$0200	
Y		SENSOR_VALUE	$0201	
Y	Y	DEVICE HOURS	$0400	note 1
Y	Y	LAMP_HOURS	$0401	note 2
Y	Y	LAMP_STRIKES	$0402	note 2
Y	Y	DEVICE CYCLES	$0405	note 1
Y	Y	IDENTIFY_DEVICE	$1000	

Note 1: When no sub-devices selected
Note 2: When sub-devices selected

ESTA Manufacturer ID

All our standard boards carry our unique manufacturer's ID of $26B4.
For custom boards, we can use an OEM's own UID if required.

Firmware Testing/Compatibility

The RDMchip has been tested using the RDM-TRI from 'JESE' and the RDM transponder software test schedule provided by the Open Lighting Project.

Results summary:

```
------------------- Warnings --------------------
------------------ Advisories -------------------
------------------ By Category ------------------
                Control:   20 / 20     100%
            Sub Devices:    2 /  2     100%
          Configuration:    9 /  9     100%
        Dimmer Settings:    1 /  1     100%
    Product Information:   19 / 19     100%
    Network Management:     2 /  2     100%
      Core Functionality:   2 /  2     100%
        Error Conditions:  109 / 109   100%
        Display Settings:    4 /  4     100%
            DMX512 Setup:   12 / 12     100%
    Power / Lamp Settings:  15 / 15     100%
                 Sensors:    8 /  8     100%
        Status Collection:   3 /  3     100%
      -----------------------------------------------
      206 / 209 tests run, 206 passed, 0 failed, 0 broken
```

Mechanical

RDMchip (1-499): 24-pin DIP format
Evaluation Board (1-490): 97x74mm with 4mm fixing holes at 88.5x63.5mm centres

Quick Set-up

Single fixture- eg a single luminaire or piece of equipment.

1) Set the Sub-Devices dip switch (SuB) on the interface board to Off.

2) Set the required DMX footprint for the fixture on the interface board using the F/P dip switches (eg for a single luminaire, set the F/P to 1 by setting the dip switches to the Off position or if your fixture requires 3 DMX channels, then set '+2' to On, +1 and +4 to Off).

3) Set the fixture DMX start address to either 8,16,32 or 48 using the address setting facilities on the fixture.

4) Set this same number on the interface board using the 'BA' dip switches.

5) Connect the fixture to the 'Local DMX' female output socket.

6) Connect the main DMX-RDM network the RDM-DMX male and female sockets.

7) Apply 8-24V DC to the interface board.

8) The red power led should light and if there is a valid incoming DMX signal, the red DMX led should also be lit- if the red led is flashing, the interface board is not receiving a valid DMX signal.

9) Use the RDM facilities on your controller to 'Discover' the interface board.
   (You should see a brief flash on the green led during RDM traffic)

The DMX start address for the interface board may now be changed if required (the shipping default value is 1). The fixture will now respond to data sent on the assigned DMX start address.

Multiple fixtures- eg a group of luminaires

1) Set the Sub-Devices dip switch (SuB) on the interface board to On.

2) Set the required DMX footprint corresponding to the number of individual fixtures (1-8) on the interface board using the F/P dip switches.

3) Set the first fixture's DMX start address to either 8,16,32 or 48 using the address setting facilities on the fixture.
Set this same number on the interface board using the 'BA' dip switches.

4) Set the remaining fixture DMX start addresses to the first fixture's address+1, +2 etc

Continue as per #5 above.

RDMchip (1-499) Connections
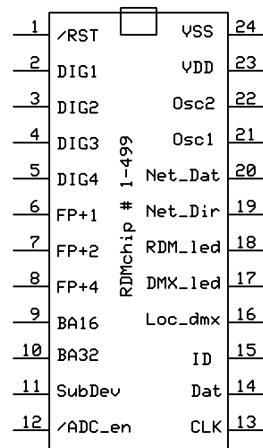
Pin	Legend	Description
1	/RST	Chip reset- active low (pulled high internally)
2	DIG1	Digital 1 input, TTL, (pulled high internally)
3	DIG2	Digital 2 input, TTL, (pulled high internally)
4	DIG3	Digital 3 input, TTL, (pulled high internally)
5	DIG4	Digital 4 input, TTL, (pulled high internally)
6	/FP+1	DMX Footprint +1 input, active low (pulled high internally).
7	/FP+2	DMX Footprint +2 input, active low (pulled high internally
8	/FP+4	DMX Footprint +4 input, active low (pulled high internally)
9	/BA16	Local DMX start address 16, active low (pulled high internally)
10	/BA32	Local DMX start address 32, active low (pulled high internally)
11	/SDv	Sub-Devices present (low), absent (high), (pulled high internally)
12	/ADC_en	SPI enable line for attached ADC interface chip
13	CLK	SPI clock line
14	DAT	SPI data line (by-directional)
15	ID	Identify_Device pin- active high TTL – max 10mA
16	Loc_dmx	Local DMX RS485 output data line- max 10mA
17	DMX_led	Active when DMX being received- max 10mA
18	RDM_led	Active during RDM communications- max 10mA
19	Net_Dir	Network DMX-RDM RS485 control line- high transmit, low receive
20	Net_Dat	Network DMX-RDM RS485 data line- bi-directional
21	OSC2	No contact
22	OSC1	No contact
23	+5v	+5V input at 50mA. **Note: NOT polarity protected**
24	Gnd	Ground

Connections on 0.1" pitch
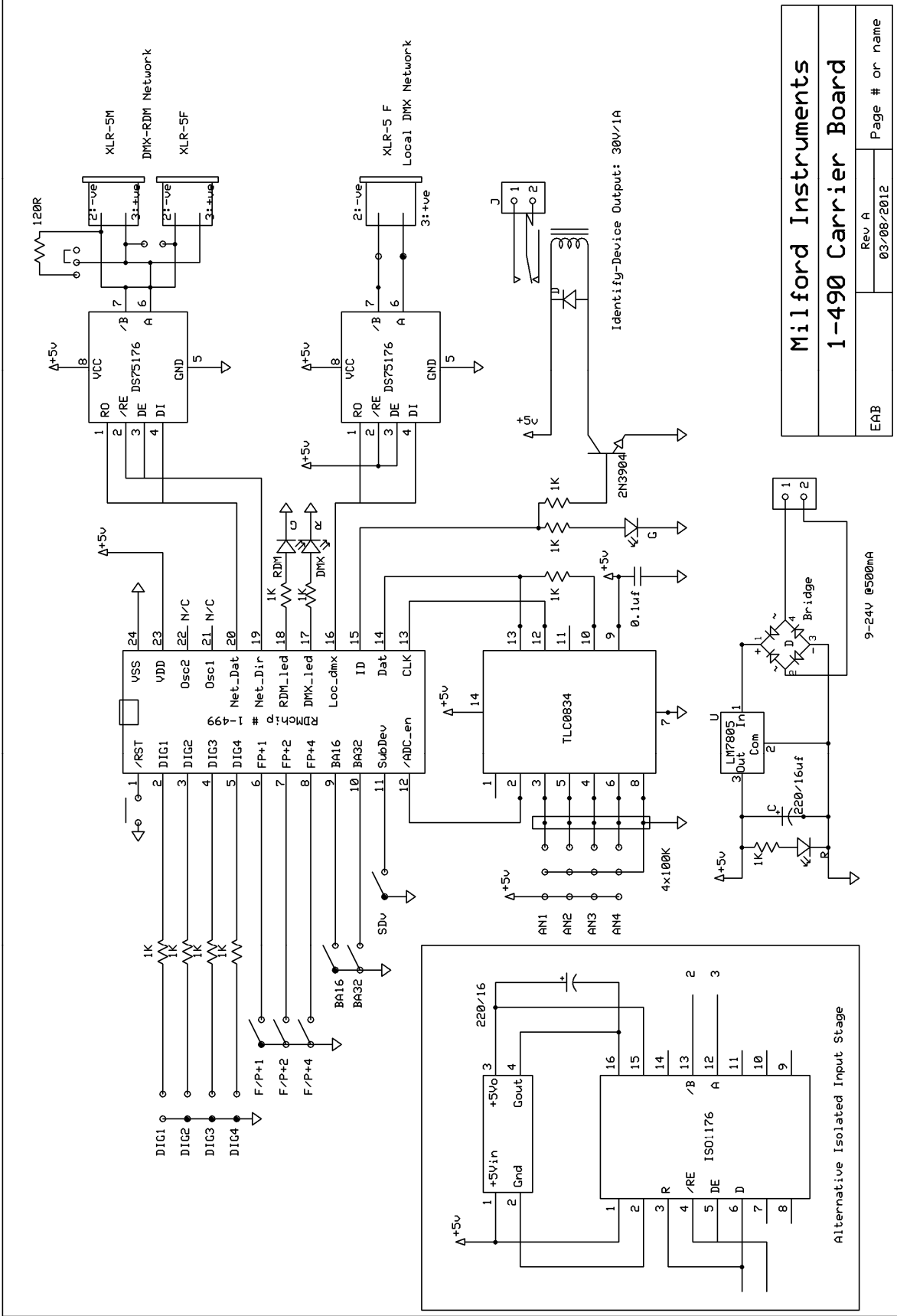
Milford Instruments

1-490 Carrier Board

Rev A

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