



## **Specification for Modular Track Receiver with Optional Analog FM Demodulation LS-27-M Series**

This document provides the configuration of the LS-27-M Series Tracking Receiver, with optional FM demodulation capability manufactured by Lumistar Inc. The modular track receiver is used with a typical auto-tracking antenna system. The input signal will typically be an RF signal from a CW beacon or a modulated carrier with Doppler, provided by the auto tracking system itself. The track receiver provides programmable AM & AGC signals to the antenna control system to facilitate the auto-tracking function.

The LS-27-M series track receiver is available with the characteristics listed below:



### **The LS-27-M Series Modular Track Receiver**



Specific configurations and performance specifications of the LS-27-M Series Track Receiver / FM Demodulator are identified herein. Custom configurations are available, please consult Lumistar Sales.

Channel Options:	Single and Dual Channel Versions available
Standard RF Bands:	215-320, 400-1150, 1435-1535, 1710-1850, 2200-2395, 2185-2485, 4400-4950, 5091-5150, 5091-5250 MHz Custom up to 6 GHz
RF Bands per Channel:	up to 5 plus 70 MHz
2 <sup>nd</sup> IF Bandwidths:	8 software selectable bandwidths using SAW IF Filters Standard: 120 KHz, 250 KHz, 500 KHz, 1 MHz, 1.5 MHz, 2.5 MHz, 5 MHz 8 MHz ( <i>typical for auto-track applications</i> ) 250 KHz, 500 KHz, 1 MHz, 2 MHz, 5 MHz, 10 MHz, 20 MHz, 40 MHz ( <i>typical for FM demod applications</i> )
FM Video Filters:	16 Video Filter, 8 fixed, 8 programmable
Tuner Resolution:	50 KHz, Dual channel configurations independently tunable
Frequency Accuracy:	0.002% (max); 0.001% (typical)
Noise Figure:	5 dB typical, 8 dB maximum
Input Power	+10 dBm to -95 dBm minimum
RF Input Level	+17 dBm (non-damage)
Receiver Input P1dB:	Greater than +10 dBm
Demodulation Types:	AM and Analog Single Symbol FM ( <i>De-emphasis optional</i> )
De-emphasis:	NTSC and PAL ( <i>both available in same unit</i> )
FM Output Level:	up to +/- 5 V in to 75 ohms, software adjustable
AM Output Level:	Software programmable 4 Vp-p in to a 10K ohm load at 50% AM index 2.5 Vp-p in to a 75-ohm load at 50% AM index
AM Frequency Response:	32 Software Selectable Lowpass Filters 50 Hz to 50 KHz total range 50, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1K, 1.1K, 1.2K, 1.3K, 1.4K, 1.5K, 1.6K, 1.7K, 1.8K, 1.9K, 2K, 3K, 4K, 5K, 6K, 7K, 8K, 9K, 10K, 15K, 20K, 50K Hz
AGC Output:	-5V to +5VDC, Software programmable slope and endpoints
AGC Time Constants:	5 Software Programmable Time Constants 0.1, 1.0, 10, 100, 1000 milliseconds
AGC Linearity:	+/- 1 dB into best straight fit line (+10 dBm to -90 dBm)
Phase Noise:	70MHz Phase Noise @ 1kHz <= -84.2dBc (typical) 70MHz Phase Noise @ 10kHz <= -97.8dBc (typical) 70MHz Phase Noise @ 100kHz <= -105.5dBc (typical) 70MHz Phase Noise @ 1MHz <= -124.5dBc (typical)
Control Interface:	Ethernet, USB and RS-232
Bus Outputs:	Signal Strength (AGC), AM Modulation Depth, AM Frequency

January 2023

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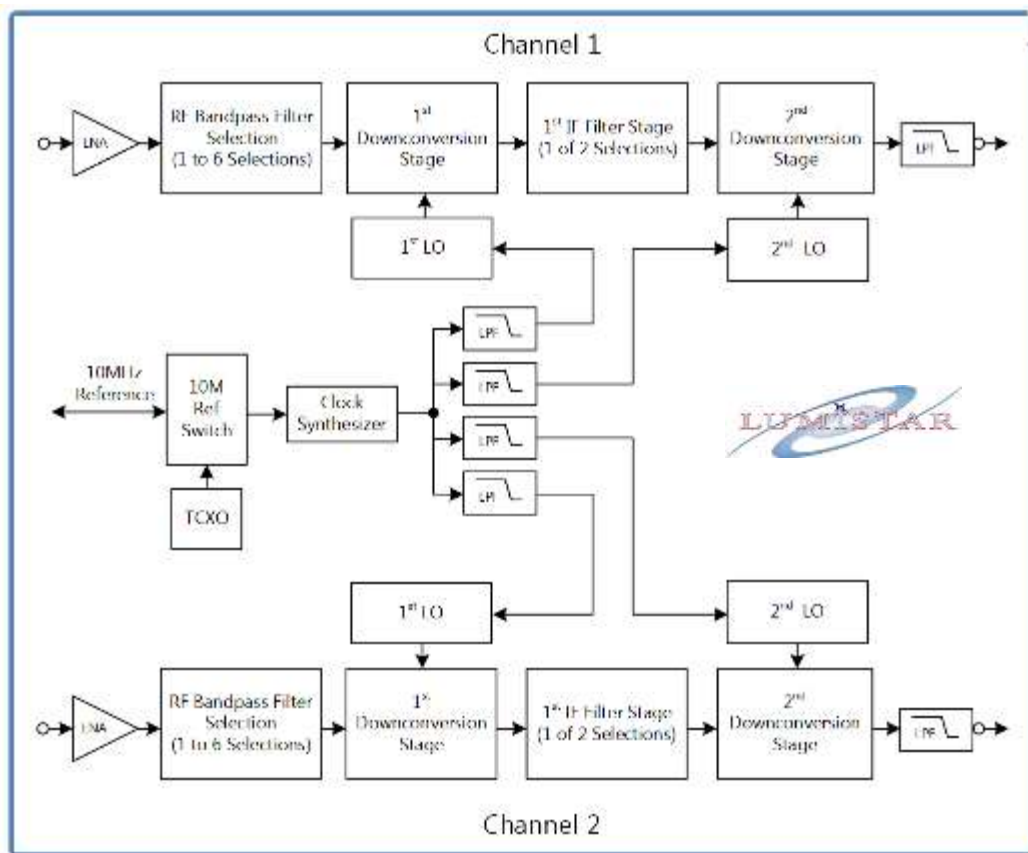
**Carlsbad, CA 92010**

**FAX: 760-431-2665**

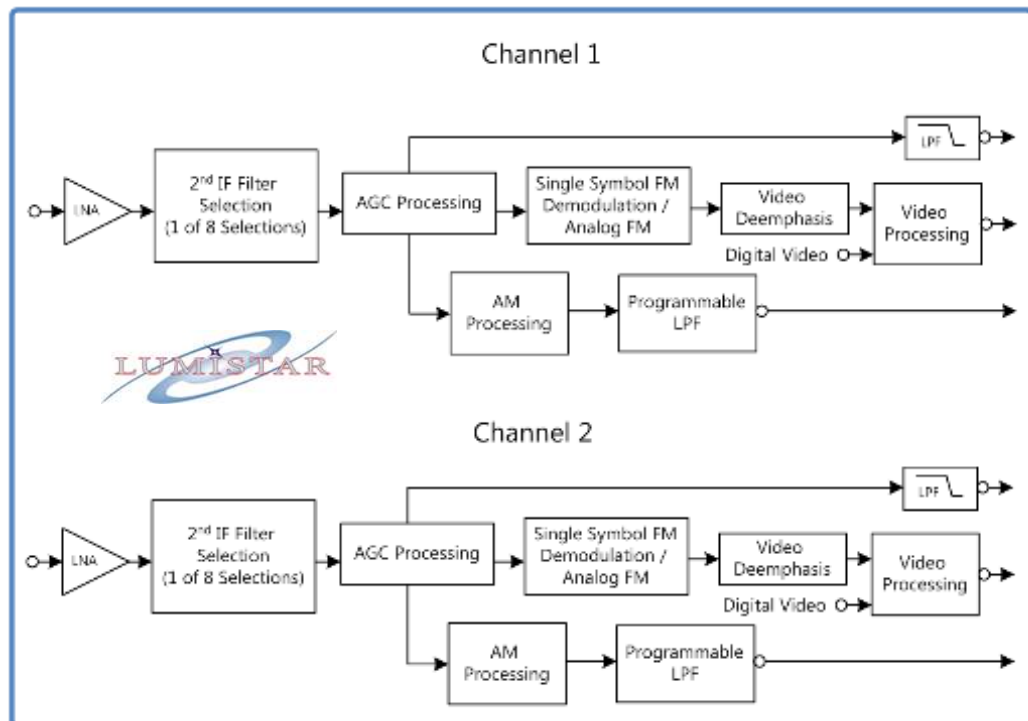
Form Factor:	6.00" x 4.00 x 1.67" Modular Brick (see Figures 2 and 3)
Weight:	Less than 2 pounds, (not including Desktop Fixture)
RF Inputs:	SMA Female, 50 ohms (1 or 2)
Additional IO:	See Figure 3 (All mating cables provided with unit, see Figures 5-8)
Power:	+9 to +42 VDC, 30 Watts, typ. (Configuration Dependent)
Temperature:	-40C to +85C (Operational) -40C to +85C (Non-Operational/Storage)
Humidity:	0 to 95% (non-Condensing) Protect from moisture and contamination during storage
MTBF:	35,000 hours minimum MIL-HDBK-217, Notice 2 Ground Benign, Controlled Temperature at +25C
Block Diagram:	See Figure 1
Application:	Provided by Lumistar, WIN 7/10/11 compatible
Desktop Fixture:	See Figure 4 (Optional): provides sufficient required cooling to the unit. Customer must otherwise mount to provide cooling (30 CFM)
Rack Mount Option:	See Figure 9

For additional details, please refer to the User Manual for the LS-27-M Series Track Receivers.





**Notional Block Diagram (RF Input to 70 MHz Section / Slice 1)**



**Notional Block Diagram (2nd IF and Analog Signal Processing Section / Slice 2)**

**LS-27-M Block Diagram  
Figure 1**

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## Various Configurations of the LS-27-M Series Track Receiver:

Lumistar Model Number	Description
LS-27-MS	Single Channel, 2200-2400 MHz
LS-27-MMS	Dual Channel, 2200-2400 MHz
LS-27-MK	Single Channel, 720 MHz
LS-27-MMK	Dual Channel, 720 MHz
LS-27-ME	Single Channel, 2185-2485 MHz
LS-27-MME	Dual Channel, 2185-2485 MHz
LS-27-MS+2	Single Channel, 1650-3150
LS-27-MMS+2	Dual Channel, 1650-3150 MHz
LS-27-MEJ	Single Channel, 950-1450 & 2185-2485 MHz
LS-27-MMEJ	Dual Channel, 950-1450 & 2185-2485 MHz
LS-27-MS+1	Single Channel, 2700 MHz
LS-27-MMLS+2	Dual Channel; CH1: 2700 MHz, CH 2:950-1450 MHz
LS-27-MS+3	Single Channel, 3200 MHz
LS-27-MM+4	Dual Channel; CH1:2185-2485 MHz CH2: 3250 MHz +/- 20 MHz
LS-27-MMLS+3	CH 2: 950-1450 MHz
<i>The list above is representative of product line capability</i>	<i>Custom configurations available, please consult Lumistar Sales for more information</i>

**Table 1-1**

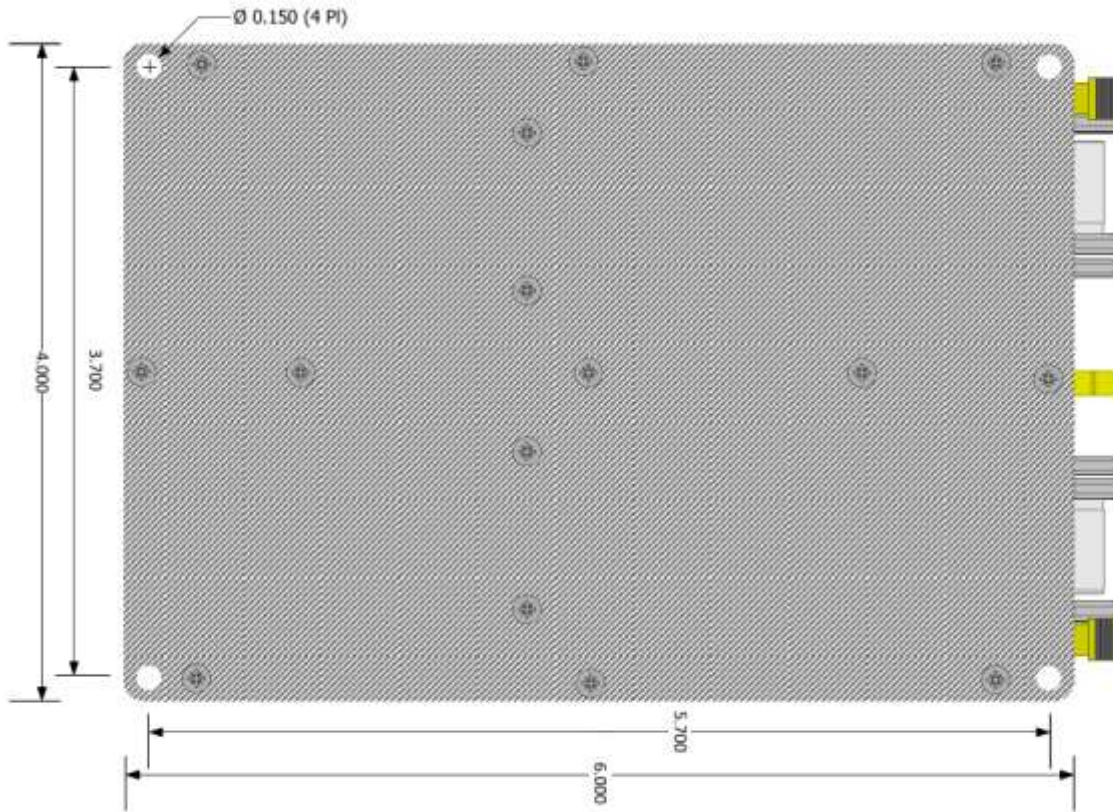


## Various Configurations of the LS-27-M Series FM/Track Receiver:

Lumistar Model Number	Description
LS-27F-MS	Single Channel, 2200-2400 MHz, with FM demod
LS-27F-MMS	Dual Channel, 2200-2400 MHz, with FM demod
LS-27F-MK	Single Channel, 720 MHz, with FM demod
LS-27F-MMK	Dual Channel, 720 MHz, with FM demod
LS-27F-ME	Single Channel, 2185-2485 MHz, with FM demod
LS-27F-MME	Dual Channel, 2185-2485 MHz, with FM demod
LS-27F-MS+2	Single Channel, 1650-3150, with FM demod
LS-27F-MMS+2	Dual Channel, 1650-3150 MHz, with FM demod
LS-27F-MEJ	Single Channel, 950-1450 & 2185-2485 MHz, with FM demod
LS-27F-MMEJ	Dual Channel, 950-1450 & 2185-2485 MHz, with FM demod
LS-27F-MS+1	Single Channel, 2700 MHz, with FM demod
LS-27F-MMLS+2	Dual Channel; CH1: 2700 MHz, CH 2:950-1450 MHz,
LS-27F-MS+3	Single Channel, 3200 MHz, with FM demod
LS-27F-MM+4	Dual Channel; CH1:2185-2485 MHz CH2: 3250 MHz +/- 20 MHz, with FM demod
LS-27F-MMLS+3	CH 2: 950-1450 MHz, with FM demod
<i>The list above is representative of product line capability</i>	<i>Custom configurations available, please consult Lumistar Sales for more information</i>

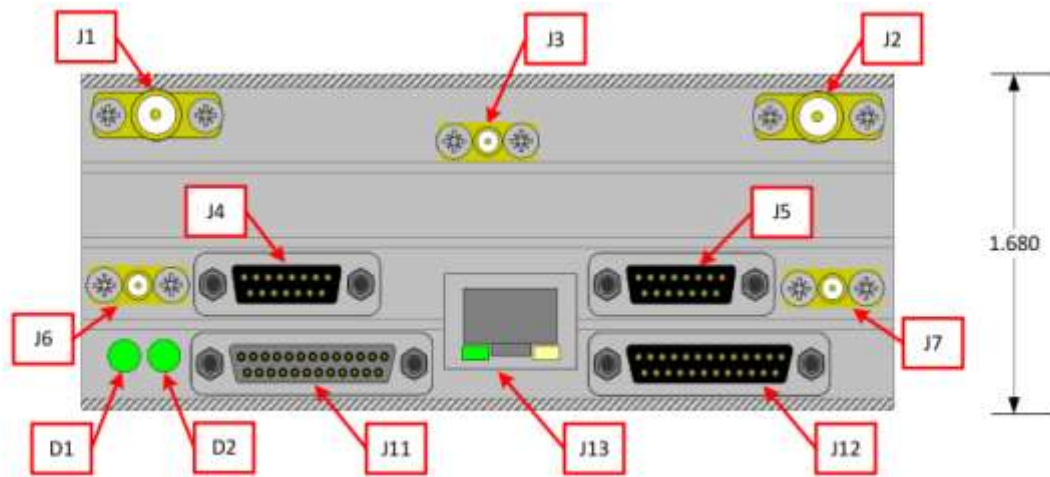
**Table 1-2**





**Outline and Dimensions  
Top View  
Figure 2**



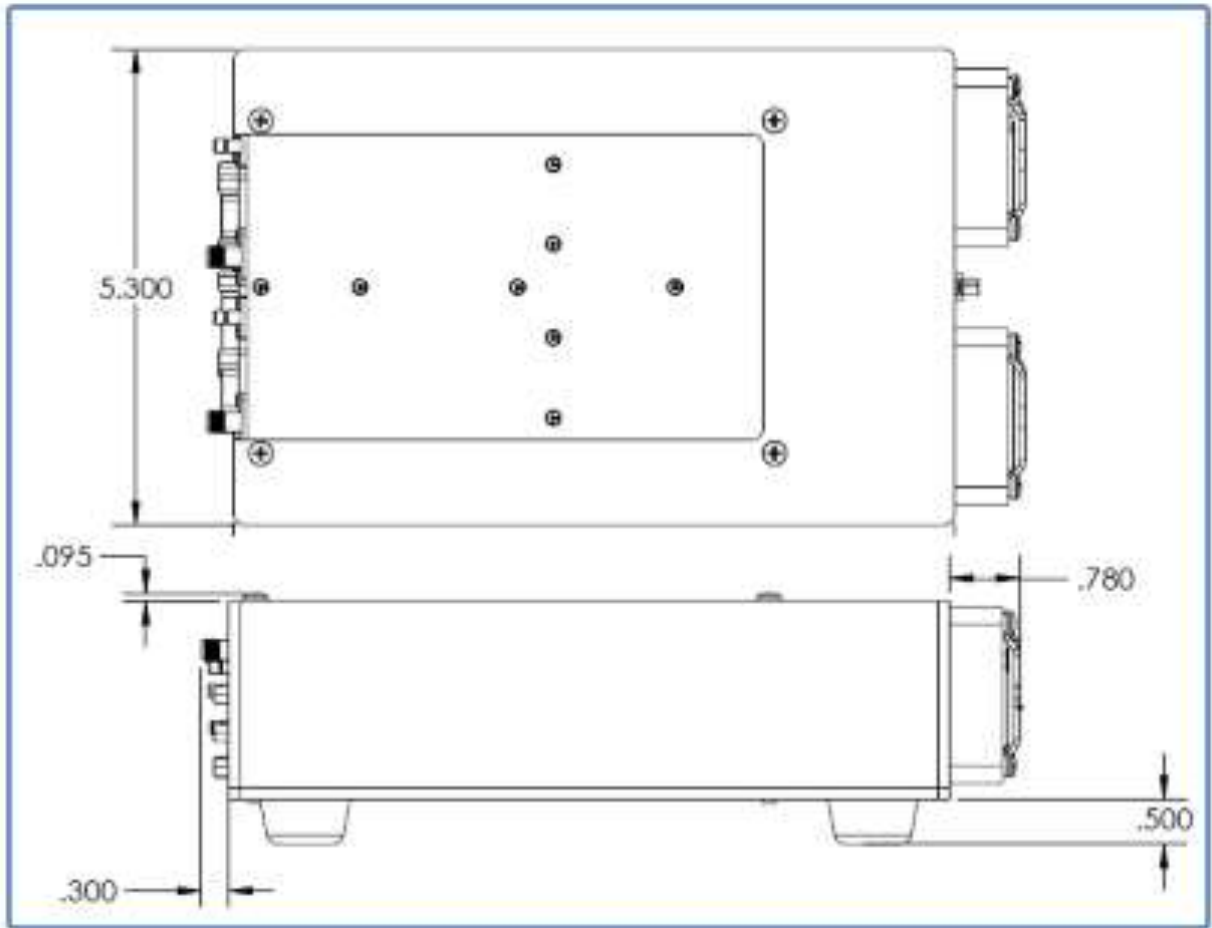


Designator	Style	Signal Description
J1	SMA-F	Channel 1 RF/IF Input
J2	SMA-F	Channel 2 RF/IF Input
J3	SMB-M	10MHz Reference Input/Output
J4	uDSUB15	Channel 1 Analog I/O (AM, AGC, Video (opt.))
J5	uDSUB15	Channel 2 Analog I/O (AM, AGC, Video (opt.))
J6	SMB-M	Channel 1 70MHz IF Out Linear/DAGC
J7	SMB-M	Channel 2 70MHz IF Out Linear/DAGC
J11	uDSUB25	Digital I/O / Power
J12	uDSUB25	Digital I/O / Communications
J13	RJ45	Ethernet Control/Status/Data Interface
D1	Multi Color LED	Channel 1 Status LED
D2	Multi Color LED	Channel 2 Status LED

**Outline and Dimensions  
Front View & Connector I/O  
Figure 3**

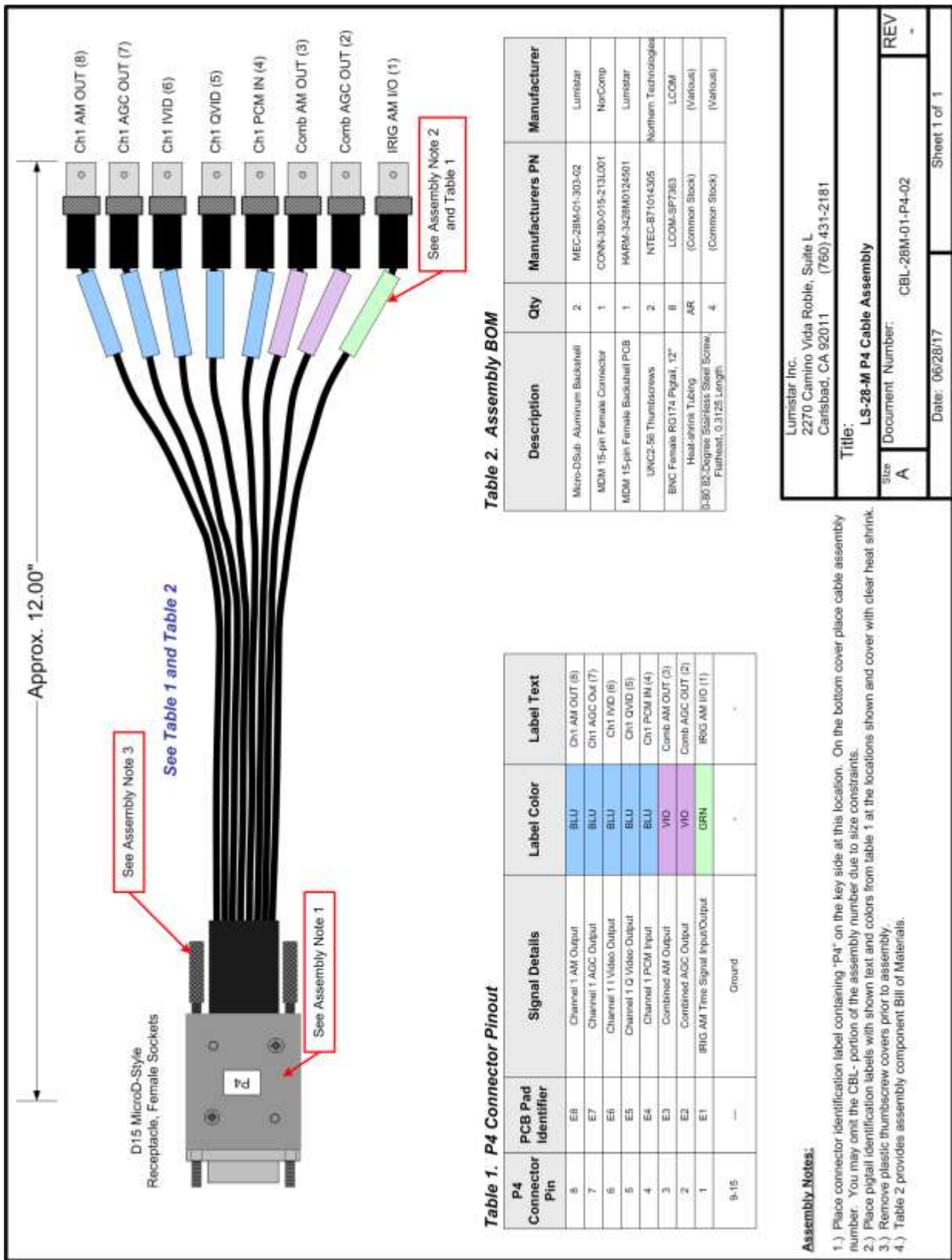






**Figure 4**  
**LS-27-M Mounted in Optional**  
**Desktop Fixture**





Approx. 12.00"

See Assembly Note 3

See Table 1 and Table 2

See Assembly Note 1

See Assembly Note 2 and Table 1

Table 1. P4 Connector Pinout

P4 Connector Pin	PCB Pad Identifier	Signal Details	Label Color	Label Text
6	E8	Channel 1 AM Output	BLU	Ch1 AM OUT (8)
7	E7	Channel 1 AGC Output	BLU	Ch1 AGC OUT (7)
8	E6	Channel 1 I Video Output	BLU	Ch1 IVID (6)
5	E5	Channel 1 O Video Output	BLU	Ch1 OVID (5)
4	E4	Channel 1 PCM Input	BLU	Ch1 PCM IN (4)
3	E3	Combined AM Output	VID	Comb AM OUT (3)
2	E2	Combined AGC Output	VID	Comb AGC OUT (2)
1	E1	IRIG AM Time Signal Input/Output	GRN	IRIG AM I/O (1)
9-15	—	Ground		

Table 2. Assembly BOM

Description	Qty	Manufacturers PN	Manufacturer
Micro-D Sub Aluminum Backshell	2	MEC-28M-01-303-02	Lumistar
MDM 15-pin Female Connector	1	CONN-180-015-213L001	NorComp
MDM 15-pin Female Backshell PCB	1	HARM-3428M0124501	Lumistar
UNCC-56 Thumbscrews	2	NTEC-BT1014305	Northern Technologies
BNC Female RG174 Pigtail, 12"	8	LOOM-SPT383	LOOM
Heat-shrink Tubing	AR	(Common Stock)	(Various)
0-80° 82-Degree Stainless Steel Screw, Flathead, 0.3125 Length	4	(Common Stock)	(Various)

**Assembly Notes:**

- 1.) Place connector identification label containing "P4" on the key side at this location. On the bottom cover place cable assembly number. You may omit the CBL- portion of the assembly number due to size constraints.
- 2.) Place pigtail identification labels with shown text and colors from table 1 at the locations shown and cover with clear heat shrink.
- 3.) Remove plastic thumbscrew covers prior to assembly.
- 4.) Table 2 provides assembly component Bill of Materials.

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Title:  
**LS-28-M P4 Cable Assembly**

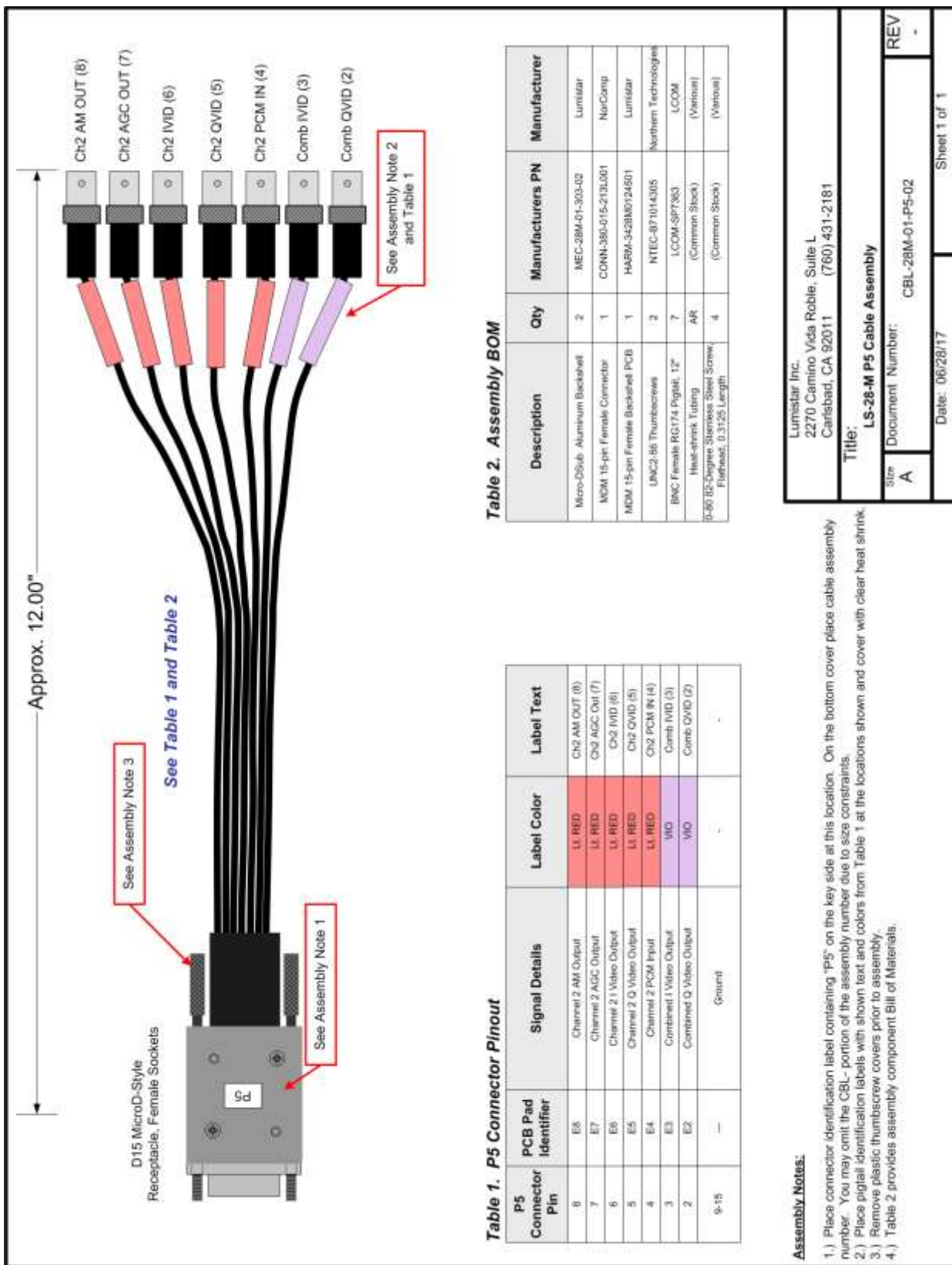
Document Number:  
CBL-28M-01-P4-02

REV  
A

Date: 06/28/17

Sheet 1 of 1

Figure 5  
Cable Assembly for J4



Approx. 12.00"

See Assembly Note 3

See Table 1 and Table 2

See Assembly Note 1

See Assembly Note 2 and Table 1

Table 1. P5 Connector Pinout

P5 Connector Pin	PCB Pad Identifier	Signal Details	Label Color	Label Text
8	E8	Channel 2 AM Output	L1 RED	Ch2 AM OUT (8)
7	E7	Channel 2 AGC Output	L1 RED	Ch2 AGC OUT (7)
6	E6	Channel 2 I Video Output	L1 RED	Ch2 IVID (6)
5	E5	Channel 2 Q Video Output	L1 RED	Ch2 QVID (5)
4	E4	Channel 2 PCM Input	L1 RED	Ch2 PCM IN (4)
3	E3	Combined I Video Output	VID	Comb IVID (3)
2	E2	Combined Q Video Output	VID	Comb QVID (2)
9-15	—	Ground	-	-

Table 2. Assembly BOM

Description	Qty	Manufacturers PN	Manufacturer
Micro-D Sub Aluminum Backshell	2	MEC-28M-01-303-02	Lumistar
MDM 15-pin Female Connector	1	CONN-350-D15-213L001	NorComp
MDM 15-pin Female Backshell PCB	1	HABM-3428M0124501	Lumistar
UNC2-56 ThumbScrews	2	NTEC-871014305	Northern Technologies
BNC Female RG174 Pigtail, 12"	7	LCOM-SP7363	LCOM
Heat-shrink Tubing	AR	(Common Stock)	(Various)
#40 82-Degree Stainless Steel Screw, Flathead, 0.3125 Length	4	(Common Stock)	(Various)

**Assembly Notes:**

- 1.) Place connector identification label containing "P5" on the key side at this location. On the bottom cover place cable assembly number. You may omit the CBL- portion of the assembly number due to size constraints.
- 2.) Place pigtail identification labels with shown text and colors from Table 1 at the locations shown and cover with clear heat shrink.
- 3.) Remove plastic thumbscrew covers prior to assembly.
- 4.) Table 2 provides assembly component Bill of Materials.

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Title:  
**LS-28-M P5 Cable Assembly**

Size	REV
A	-

Document Number:  
CBL-28M-01-P5-02

Date: 06/28/17

Sheet 1 of 1

Figure 6  
Cable Assembly for J5

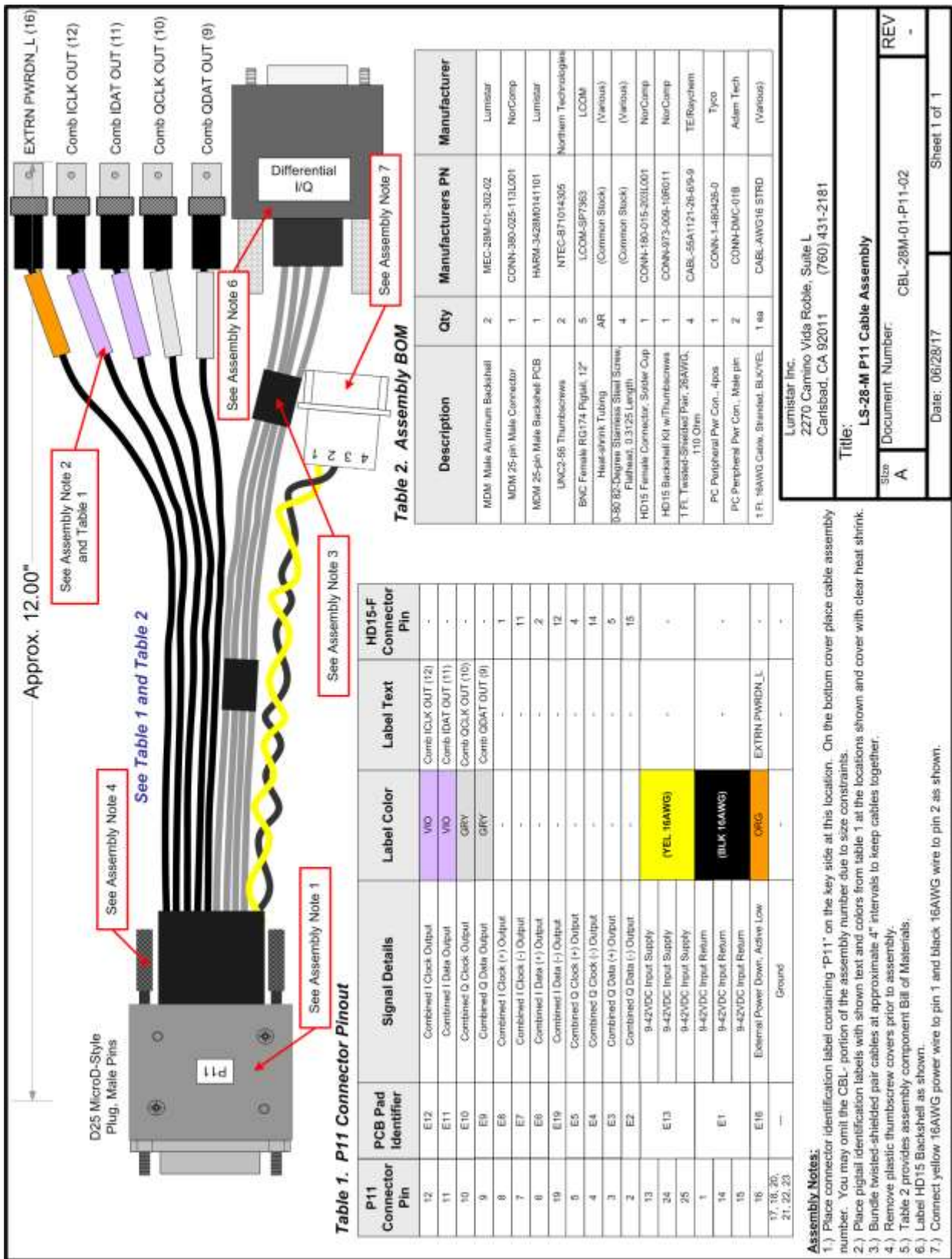
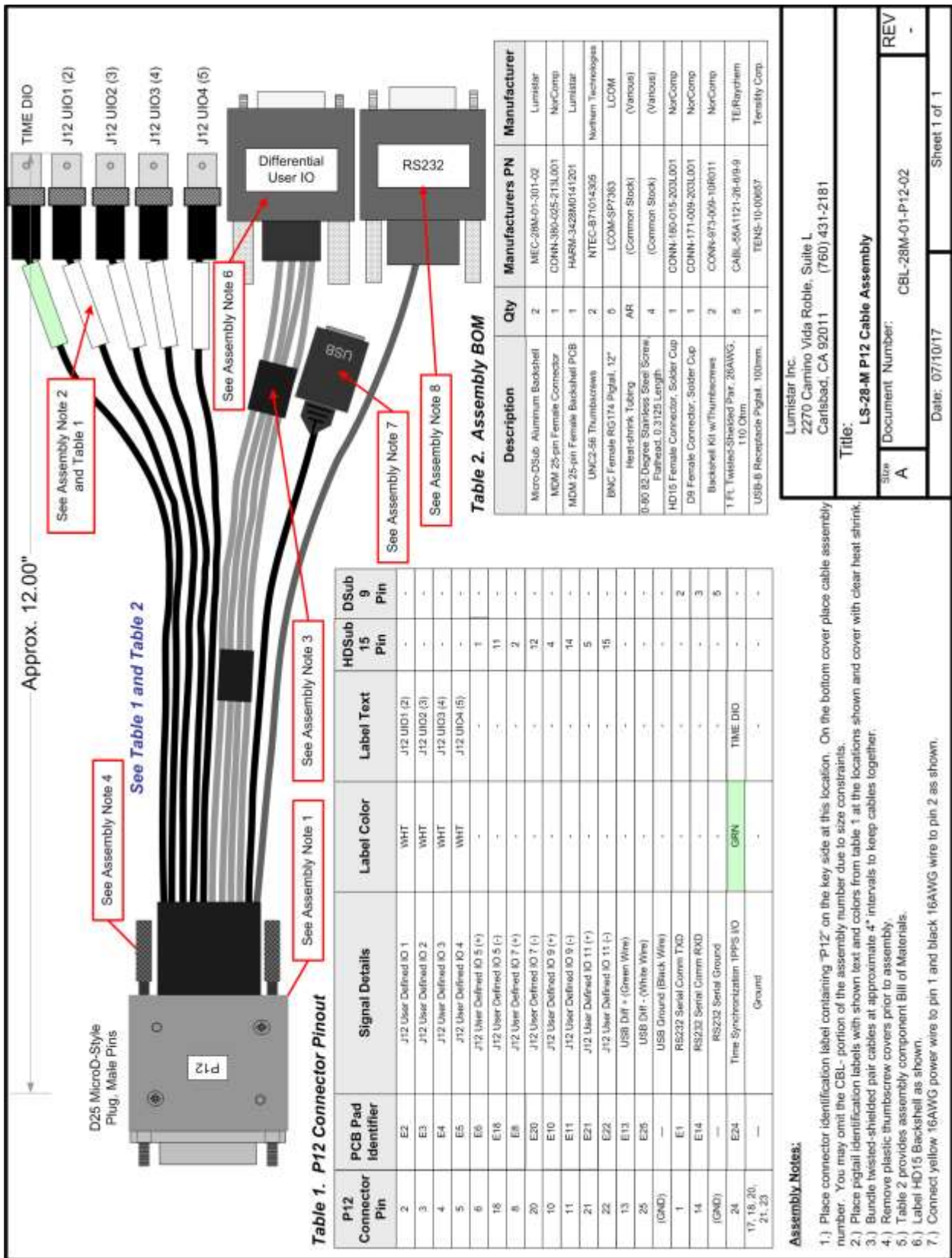


Figure 7  
Cable Assembly for J11



**Figure 8**  
**Cable Assembly for J12**

January 2023

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**Assembly Notes:**

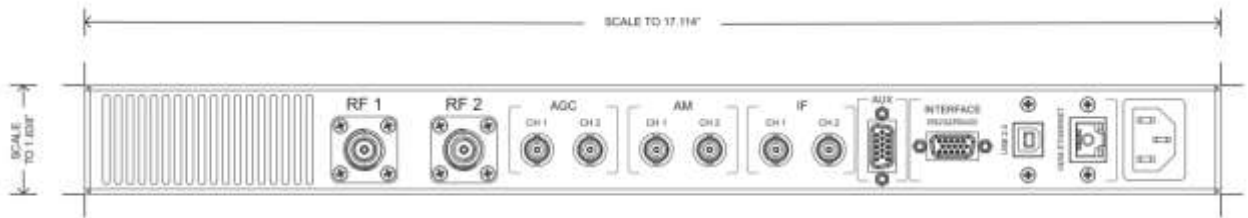
- 1.) Place connector identification label containing "P12" on the key side at this location. On the bottom cover place cable assembly number. You may omit the CBL- portion of the assembly number due to size constraints.
- 2.) Place pigtail identification labels with show text and colors from table 1 at the locations shown and cover with clear heat shrink.
- 3.) Bundle twisted-shielded pair cables at approximate 4" intervals to keep cables together.
- 4.) Remove plastic thumbcrew covers prior to assembly.
- 5.) Table 2 provides assembly component Bill of Materials.
- 6.) Label HD15 Backshell as shown.
- 7.) Connect yellow 16AWG power wire to pin 1 and black 16AWG wire to pin 2 as shown.

# 1U Rack Mount Version Figure 9



## LS-27-M-R1 Series Rack Mount Front View

1U Height / 19-inch width / 12-inch depth / 14 pounds



## LS-27-M-R1 Series Rack Mount Rear I/O Panel View

*Consult Lumistar Sales for additional information on the LS-27-R1 Rack Mount version*

*End of Document*