

The most important thing we build is trust.

## Configurable Messenger Transmitter High-Power Rack-Mount Kit (CMT-R)



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## 1.0 Acronyms

This section lists and describes the various acronyms used in this document.

<b>Name</b>	<b>Meaning</b>
16 QAM	16-state Quadrature Amplitude Modulation
64 QAM	64-state Quadrature Amplitude Modulation
A/V	Audio/Video
AES	Advanced Encryption System (32 bit)
ASI	Asynchronous Serial Interface
BDC	Block down converter
COFDM	Coded Orthogonal Frequency Division Multiplexing
CVBS/Y	Composite video/Luminance with S-video
C	Chroma video
CML	Configurable Messenger Link
CMT	Configurable Messenger Transmitter
D/C	Down-Converter
DRL	Data Return Link
DVB-T	Digital Video Broadcasting-Terrestrial
FEC	Forward Error Correction
ENG	Electronic News Gathering
GUI	Graphical User Interface
HD	High Definition
HPA	High Power Amplifier
I/O	Input/ Output
Kbaud	Kilobaud per second
Kbps	Kilobits per second
Mbps	Megabits per second
MER	Modulation Error Rate
MPEG	Moving Picture Experts Group
MSR	Messenger Smart Receiver
NTSC	National Television System Committee
PAL	Phase Alternation Line
QPSK	Quadrature Phase Shift Keying
RCU	Remote Control Unit
RF	Radio Frequency
RX	Receiver
SDI	Serial Digital Interface
S/N	Signal-to-Noise Ratio
THD	Total Harmonic Distortion
TX	Transmitter
UAV	Unmanned Aerial Vehicle
UGV	Unmanned Ground Vehicle
VDC	Volts (Direct Current)

## 2.0 Introduction

The CMT-R is a rack-mount kit that converts the GMS's wireless camera Configurable Messenger Transmitter (CMT) into a high-power rack-mounted COFDM transmitter. Both the CMT-R's front and top panels are hinged for easy installation and removal of the CMT. This allows the CMT to be used both as an on-camera transmitter as well as a high-power rack-mounted transmitter. The CMT-R allows the CMT to be powered with +28 VDC, +12 VDC or 85-256 VAC @ 47 to 63 Hz (Model dependant). The CMT's local control panel can be accessed through the CMT-R's front panel allowing local control of the transmitter. Additionally, remote control is available via a USB port, a RS-232 port, an RCU (remote control unit) or optional wireless command link.

The CMT-R adds support for either internally or externally mounted High Power Amplifier (HPA). Remotely mounting the HPA at the antenna location minimizes RF losses and provides maximum power to the Antenna. DC power for the external PA can be supplied through the coax cable by the CMT-R. This kit includes two Bias-Ts, one for each end of the coax supplying RF and power to the remote HPA. A separate power control switch is provided to enable the HPA. The CMT provides a signal that keeps the HPA off until the CMT's output signal is enabled and stable.

Principal applications include Electronic News Gathering (ENG), sports, helicopter links, UAV/UGV applications and mobile and portable AV applications.

### 2.1 Key System Features

- CMT Quick Release Mount
- Internal or External (Mast Mount) High-Power Amplifiers
- AC & DC Operation
- Rack-Mountable W/Slides

## 3.0 Theory of Operation

The CMT (transmitter) documentation is in manual 100-M0071 which is on-line at GMS web site, [WWW.GMSINC.COM](http://WWW.GMSINC.COM). The manual documents in detail the operation of the transmitter, the use of the PC control application software and the connectors. It contains valuable information which will help in getting the most use out of the CMT-R.

### 3.1 Rack Mount Operation

The CMT-R rack consists of two switches (with built in LED indicators) on the front panel along with the interface connectors located on the rear panel. The 'TX PWR' switch enables the voltage to the CMT transmitter and the internal fans. The 'HPA PWR' switch enables the voltage to the HPA. The CMT transmitter needs to be fully initialized and PLL locked (this takes approximately 30 seconds) before it sends an active high TTL signal to the HPA turning it on (with the 'HPA PWR' switch enabled).

DC voltage is provided on the same RF output coax cable on units with remotely located HPA. This configuration requires a DC extractor on the HPA end. The coax cable must be capable of handling the large current drive (approximately 8 to 10 amps) required by the

HPA and have minimum DC losses. Careful attention must be paid to properly heat sink the remotely located HPA.

Monitoring and control of the CMT-R can be done through the front panel keypad and LCD display. Some controls such as setting user attenuation, turning on user data or encryption, changing video group parameters and others require the use of a PC with GMS's Windows control software interfaced through the rear RS-232 or USB connectors (see section 4.1).

### 3.2 Stand Alone Wireless Camera Transmitter

The CMT transmitter can be easily removed from the rack to use as a wireless camera transmitter. Before taking the transmitter out of the rack it is necessary to reduce the 'User Attenuation' value in order to bring the transmitter up to full power. Establish communication with the transmitter using the PC software application control using a serial cable (or USB cable) connected to the appropriate rear connector (see section 4.0 for connector locations). Once communication is established go to the 'Others' screen which is under the 'Special Setup' menu under the 'Configuration' menu in the main window. Note the current value in the 'Set User Attenuation Step Upper Limit' text box. You will need to set it back to this value before re-installing the transmitter. Change this value to '0' for no attenuation. Save the settings and exit the program. Turn off both CMT-R switches (Tx Pwr and HPA Pwr).

Pull the CMT-R all the way forward out the rack (see Figure 1). Undo the quick release screws on the top cover and swing it up and out of the way. Unscrew the two thumbscrews on the front panel and let it roll forward giving you easily access to the transmitter. Ensure to disconnect all cables before releasing it from the battery mount plate (Anton Bauer or IDX) located on the bottom of the rack. The CMT can now be used as a stand-alone wireless HD/SD camera transmitter (see Figure 2).

The installation is the reverse of the removal process. Just be sure to set the 'User Attenuation' back to the factory setting value otherwise the HPA may be overdriven causing the C-OFDM signal to go into compression causing poor performance. In addition the three-position CMT power switch should be left in the 'ON' (external power) setting.

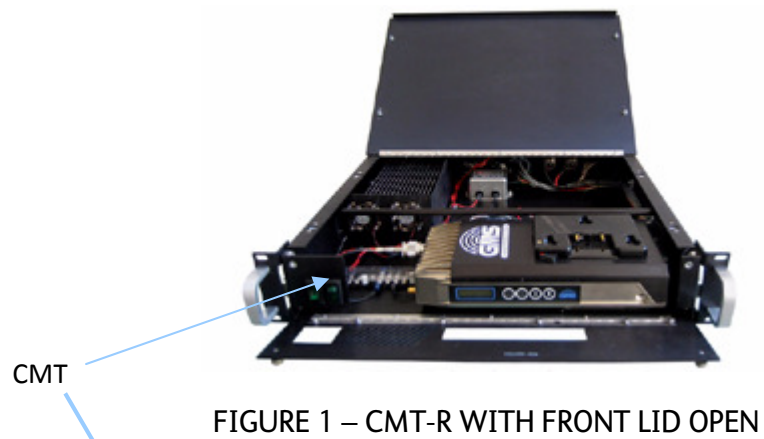


FIGURE 2- CMT WIRELESS CAMERA TRANSMITTER

## 4.0 Hardware Overview

The connectors and switches of the CMT-R are detailed below and shown in Figure 3 and Figure 4.

### 4.1 Rear Panel Connectors

#### 4.1.1 RF Output (J9)

The CMT-R uses a female 'N' type bulkhead connector for its 'RF Output' port.

**Note: This port should be properly terminated (with an antenna or attenuator) before enabling the power to the HPA. Damage to the unit could occur without the proper termination.**

#### 4.1.2 AC Input (J11)

A three-prong module connector is provided for AC power. This is a universal AC power supply which can handle the voltage range from 85 to 256 VAC at 47 to 63 Hz.

#### 4.1.3 DC Power (J10)

A standard 4 pin PTO connector (PTO2E-12-4P) is provided for DC voltage input. Pins A&B are used for +Vcc and pins C&D are used for ground.

#### 4.1.4 RS-232 (J7)

A 9-pin female dB connector is provided for interfacing the CMT-R to the PC using GMS's PC Windows application control software. A standard 9 pin serial cable can be used between the PC and the CMT-R.

#### 4.1.5 USB (J8)

A USB (1.0) type B jack is provided and serves the same purpose as the RS-232 connector above since most new computers only contain USB ports. Special USB drivers are shipped with GMS's PC control software that need to be loaded before using this port. The transmitter should be fully booted and initialized before plugging in the USB cable between the PC and the CMT-R. This port is not active until the transmitter is fully booted and initialized.

#### 4.1.6 User Data (J6)

A 9-pin female dB connector is provided for user data. If the transmitter is equipped (and setup) to handle user data the serial data can be injected into this port.

#### 4.1.7 Audio Connectors (J4 & J5)

Two 3 pin XLR –F connectors are provided to handle the balanced audio 1 and audio 2 input channels. The audio signal can be set for line or mic levels.

#### 4.1.8 HD/SD SDI IN (J2)

A female BNC connector is provided for SD-SDI or HD-SDI video input streams (75 ohm impedance). The input bit rate is 270 Mbps for SD and 1.485 Gbps for HD.

#### 4.1.9 ASI Out (J1)

A female BNC connector is provided for DVB-ASI transport stream output (75 ohm impedance). The output bit rate is 270 Mbps. This transport stream does not include the SI tables, User-Data or AES encryption which is added later in the processing chain. This port is also useful for troubleshooting. The ASI stream output from this port can be taken directly into the ASI input of a decoder showing the status of the encoder bypassing any RF processing.

#### 4.1.10 Comp Video (J3)

A female BNC connector is provided for composite video input (75 ohm impedance). In order for the transmitter to recognize composite video it must be set for SD (standard definition) mode by selecting the correct Video Group from the front panel of the CMT-R or using the PC control software through the RS-232 or USB ports.



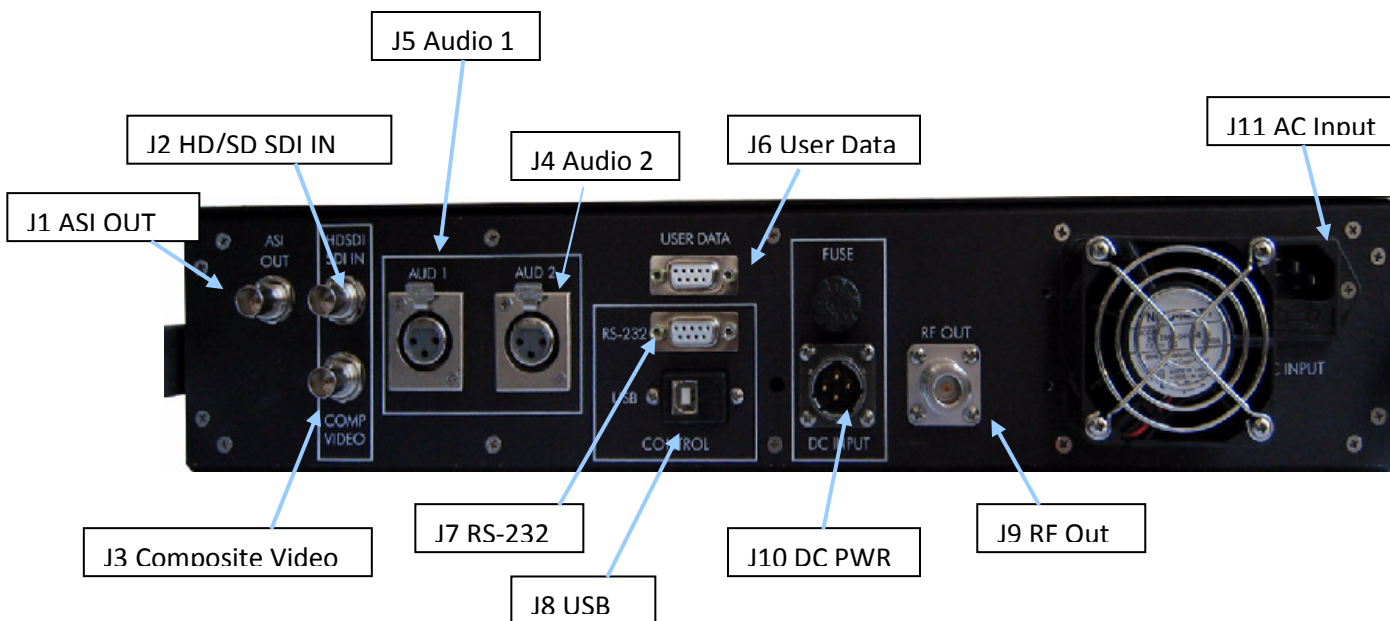


FIGURE 3 – CMT-R REAR PANEL

## 4.2 Front Panel Switches, CMT Front Panel Keypad & LCD Display

### 4.2.1 TX PWR Switch

This switch controls the main power to the CMT-R, providing power to the internal fans and the transmitter.

### 4.2.2 HPA PWR Switch

This switch enables the power to the HPA. The HPA will not turn on until it receives the lock signal from the transmitter regardless if the HPA PWR switch is enabled.

### 4.2.3 Front Panel Keypad & LCD

Most control and monitoring of the CMT-R can be done with the 4 button keypad and the LCD. Full operation is detailed in the CMT manual 100-M0071 as stated above.



FIGURE 4 – CMT-R FRONT PANEL

## 5.0 Specifications

### 5.1 Connectors

- RF Output: N-F
- Video Composite: BNC-F
- Video SDI/HD-SDI: BNC-F
- ASI Out: BNC-F
- Audio: 3 Pin XLR-F (2 audio connectors)
- RS-232 – DB-9 F
  - Pin 2 – Tx
  - Pin 3 – Rx
  - Pin 5 – GND
- User Data – DB-9 F
  - Pin 2 – Tx
  - Pin 3 – Rx
  - Pin 5 – GND
  - Pin 6 – Fwd Pwr Det
  - Pin 7 – Rev Pwr Det
- USB – Type B Jack
- DC Power: PTO 4P M Jack (PTO2E-12-4P)
  - Pin A&B: +Vcc
  - Pin C& D: GND
- AC Power: 3 Prong module (10 Amp fused)
  - 85-256 VAC (47-63 Hz)

- 5.2 Control
  - RS-232 3-wire interface (Tx,Rx,Gnd)
  - USB 1.0
  - RCU A remote portable control unit
  - Optional Wireless command link available
  - A MS Windows based control application running on XP or Windows 2000 operating systems is used to control the transmitter.
- 5.3 C-OFDM RF Output
  - Output Frequency: 1 to 7 GHz (In-Bands)
  - RF Output Power: Up to 15 W (Model Dependant)
- 5.4 AC Power
  - 120 VAC @ < 1 amp
- 5.5 DC Power
  - DC Voltage +12VDC: 9-15 V range ( @ 9 – 11 amps, model and video input dependant)
  - DC Voltage +28VDC:
- 5.6 Physical
  - Dimensions:
    - 16" (W) x 16.94" (D) x 3.5" (H)
    - 40.64 cm (W) x 43.03 cm (D) x 8.89 cm (H)
    - Width with handles 18.658" / 47.391 cm
    - Weight: 15.4 lbs (6.99 kgs)
    - (without CMT transmitter)
- 5.7 Environmental
  - Operational Temperature: -10 to +70 °C
  - Humidity: Up to 100% (non-condensing)

APPENDIX A – AI, CABLE, EXTERNAL BREAKOUT

NOTES:

1.1. REFERENCE BOM 780-AI0056 FOR PART REFERENCE DESIGNATORS

1.2. LABEL THE CABLE ASSEMBLY WITH "780-AI0056X1" USING BEST COMMERCIAL METHOD APPROXIMATELY WHERE SHOWN AND COVER WITH CLEAR SHRINK WRAP.

1.3. REFERENCE SHEET 1 FIGURE 1 FOR CABLE WIRING DIAGRAM.

1.4. REFERENCE SHEET 2 FOR CABLE ASSEMBLY INSTRUCTIONS.

REVISIONS				
ECO	REV	DESCRIPTION	DATE	APPROVED
E0676	X1	INITIAL RELEASE	12/14/06	APPROVED

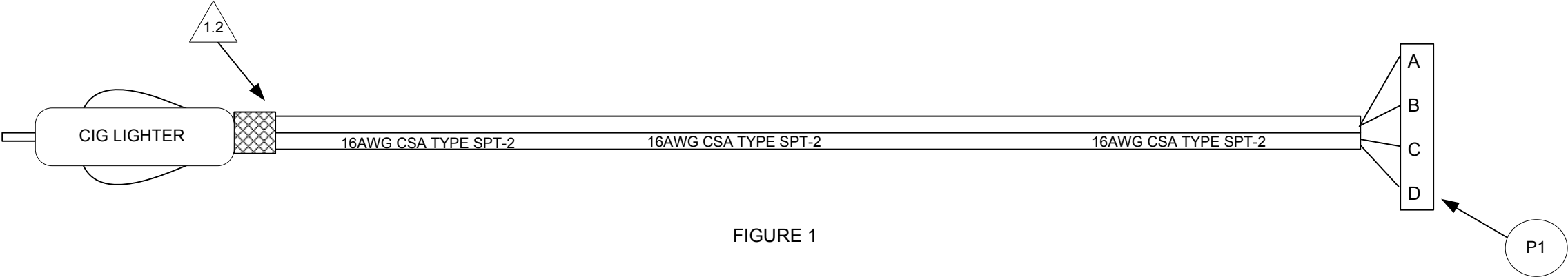



FIGURE 1

ENG/TECH	T GIOTTA		 GMS Products		DWG TITLE		
DRAWN	T GIOTTA				AI,CABLE, CMT-R, +12VDC, PWR EXTERNAL WITH CIG LIGHTER END		
ENG			SIZE	DATE 12/14/06	DWG NO		REV X1
PROD					780-AI0056X1		
QC			SCALE	NONE		SHEET	1 OF 3