

The most important thing we build is trust.

MR Series Receivers



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Revision History

Version	Date	Main Changes from Previous version	Created by
X1	04/25/05	Initial Release	TM
X2	02/24/10	Change doc format	RM

1. Introduction

1.1 About the Manual

The MR Series Receivers are capable of receiving analog FM Microwave signals with one video channel and two audio sub-carriers. They incorporate an integral Low-Noise Amplifier at the RF input. They are signal conversion receivers with dual Surface Acoustic Wave (SAW) filters at the IF stage for excellent adjacent channel interference rejection. These receivers have an integral video low-pass filter in the video output and feature NTSC video as standard with PAL and SECAM as factory options. Frequency, video level, and audio levels are microprocessor controlled with front panel push buttons. A one line liquid crystal display (LCD) provides visual readouts of lock status, frequency, signal strength, video gain and audio gain. As an additional feature an RS-232 interface is provided for remote control of all receiver functions. Connections to the receiver are made through four standard connectors; a ten-pin PTO, two BNC, and one SMA. GMS recommends a DC cable no longer than one meter (approx. three feet).

2. Functional Description

2.1 Power

Power requirements are +11 to +15 VDC at 350-450 mA. Connection to the receiver is made through the ten-pin PTO connector (see Section 4). GMS recommends a DC cable no longer than one meter (approx. three feet).

2.2 RF

The MR Series Receivers have a nominal sensitivity of -78 dBm for a 36 dB S/N (weighted) with a dynamic range of 75 dB and a 5dB overall noise figure. The RF signal is supplied to the receiver through the SMA connector (J4). GMS recommends an RF cable no longer than one meter (approx. three feet).

2.3 Audio

The MR Series Receivers have two audio channels. Each channel provides a balanced audio level of +9 dBm (maximum) into 600 ohms. Both audio channels are output through the ten-pin PTO connector (see Section 4). Audio gain of each output is independently adjustable via front panel controls.

2.4 Video

MR Series Receivers have one video channel. The video has two buffered outputs. Each output is 1 V peak to peak into 75 ohms. Video level of both outputs is simultaneously adjustable via the front panel controls. Video is accessible through a BNC or the ten-pin PTO connector (see Section 4.)

2.5 RS-232

An RS-232 interface is provided on all MR Series Receivers. All receiver functions are controllable via this interface with the optional GMS Remote Control System. Access to this interface is provided through the ten-pin PTO connector (see Section 4).

2.6 Front Panel

The front panel consists of an LCD with four push buttons; UP ↑, DOWN ↓, CTRL, and ENTER. The front panel controls the receiver frequency, video level and audio levels. The LCD displays audio gain set, video gain set and signal strength in bar graph and digital format.

3. Front Panel Operation

3.1 Power-up

On power-up the unit will display a pre-coded customer name and serial number, then set the channel to the one in use at last power-down. The display will look like this:

RX	CH A	#
----	------	---

Where:

- RX = receiver locked
- CH A = receiver channel or frequency
- # = receiver signal strength on a scale of 0-99

3.2 Front Panel Controls and Displays

The CTRL key selects the applicable receiver control mode. For example, for each press of the CTRL key, the receiver control functions are selected as shown:

RX	CH A	#
----	------	---

 CHANNEL DISPLAY

CTRL pressed

SS		#
----	--	---

 SIGNAL STRENGTH

CTRL pressed

VI		#
----	--	---

 VIDEO GAIN SET

CTRL pressed

A1		#
----	--	---

 AUDIO 1 GAIN SET

CTRL pressed

A2		#
----	--	---

 AUDIO 2 GAIN SET

CTRL pressed

RX	CH A	#
----	------	---

 CHANNEL DISPLAY

3.3 Channel Display

In this mode, when the UP ↑ or DOWN ↓ key is pressed, the receiver will step through the channels. On key release the display will blink for ten seconds. If ENTER is pressed before the ten seconds, the receiver frequency will be changed and stored in nonvolatile memory. If ENTER is not pressed before ten seconds, the display will stop blinking and the receiver will reset to the previous frequency. The channel display and control functions are shown below:

RX CH A #

UP ↑	Increment channel
DOWN ↓	Decrement channel
ENTER	Save channel
CTRL	Change to SIGNAL STRENGTH mode

3.4 Signal Strength Display

The signal strength mode presents a bar graph and digital display of the RELATIVE receiver signal level TO AID IN PATH ALIGNMENT

SS ||||| #

UP ↑	No Operation
DOWN ↓	No Operation
ENTER	Return to DISPLAY CHANNEL mode
CTRL	Change to VIDEO LEVEL ADJUST mode

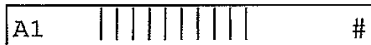
3.5 Video Gain Set

The video gain can be adjusted from the front panel with the UP ↑ and DOWN ↓ keys. This control adjusts all three inputs simultaneously. When adjusting the level, the V1 on the left of the display will blink indicating that a change in gain is in progress. If ENTER is pressed the new gain setting will be stored. If CTRL is pressed before ENTER, the video will be reset to the previous level. The video level is factory set for 1 V peak to peak into 75 ohms with the digital display indicating 80, therefore allowing the operator to easily reset the receiver to the industry standard video level. The video gain and control functions are shown below:

VI ||||| #

UP ↑	Increase video gain
DOWN ↓	Decrease video gain
ENTER	Save video gain
CTRL	Change to AUDIO 2 GAIN SET mode and cancel audio level changes if A1 is flashing

3.6 Audio Gain Set



- UP ↑ Toggle audio 1 level
- DOWN ↓ Toggle audio 1 level
- ENTER Save audio 1 level
- CTRL Change to CHANNEL DISPLAY mode and cancel audio level changes if A1 is

flashing



- UP ↑ Toggle audio 2 levels
- DOWN ↓ Toggle audio 2 levels
- ENTER Save audio 2 levels
- CTRL Change to CHANNEL DISPLAY mode and cancel audio level changes if A2 is flashing

3.7 On Screen Display (optional)

The On Screen Display is a unique feature of GMS that provides the receiver operator with a visual indication of receiver status on a video overlay. The LCD is simultaneously displayed over the video signal to aid in tracking airborne transmission systems. When the signal strength function is selected on the front panel and the overlay is activated, a tri-color bar graph of signal strength is displayed to assist in antenna orientation and tracking of mobile transmitters.

The video overlay is activated by selecting the OVERLAY ON or OVERLAY OFF function from the receiver front panel. Use the CTRL button to select the OVERLAY function and the UP ↑ or DOWN ↓ keys to activate or deactivate the overlay feature. The overlay display will track the receiver front panel LCD display. The display information can be changed by cycling the CTRL button to the desired function.

The video overlay is output through video output connector J2 when activated. The signal from J1 is normally sent to the GMS LR-Series integrated monitor while the video output connector J2 can be connected to any monitor. The video signal on J3 is always a “clean feed” whether or not the video overlay is activated. The signal is normally connected to a video tape machine or production center. With the overlay off, both J2 and J3 output a “clean feed” from the receiver.

4. Specifications for MR Series Receivers

4.1	RF	
	Frequency Range	1.7 – 6.0 GHz standard (consult factory for additional frequencies)
	Frequency Stability	0.005%
	Noise Figure	5 dB typical: L, S: 7 dB Typical
	Dynamic Range	75 dB
	Sensitivity	-83 dBm@43dB-S/N,L/S&40dB-S/N,C(weighted)
	Input Impedance	50 ohm
4.2	Power	
	Voltage	11-15 VDC
	Current	450 mA Typical
4.3	Video	
	Output Impedance	75 ohm
	Output Level	1 Volt (peak to peak)
	De-emphasis	Per CCIR 525/625 line
	Frequency Response	10 Hz – 5.5 MHz 10 Hz – 10 MHz composite
	Signal to Noise	57 dB p-p/rms weighted
	Signal to Low Frequency Noise	55 dB, meets or exceeds EIA/TIA 250-C end to end performance specifications
4.4	Audio	
	Sub-carriers available: MHz	4.83, 5.8, 6.0, 6.2, 6.5, 6.8, 7.02, 7.5, 8.3, 8.5, 8.59 (any two)
	Output Impedance	600 ohm balanced
	Output Level	+9 dB, meets or exceeds EIA/TIA 250-C end to end performance specifications
4.5	Environmental	
	Temperature Range	-20° C to +70° C
	Humidity	0 to 100% non-condensing
4.6	Mechanical	
	Size	3.25" X 4.25" X 1.50"
	Weight	14 oz (397gms)
	RF input (J4)	Female SMA
	Video (J2, J3)	Female BNC
	Power/RS232/Audio (J1)	PTO2H-12-10P

The following details the pin-out of the ten-pin PTO connector, J1:

PIN #	DESCRIPTION
A	+11 to +15 VDC
B	Ground
C	Audio 1 Out (high)
D	Audio 2 Out (High)
E	Audio 1 Out (Low)
F	Audio 2 Out (Low)
G	RS-232 Transmit
H	RS-232 Receive
J	Video Out
K	Composite Out

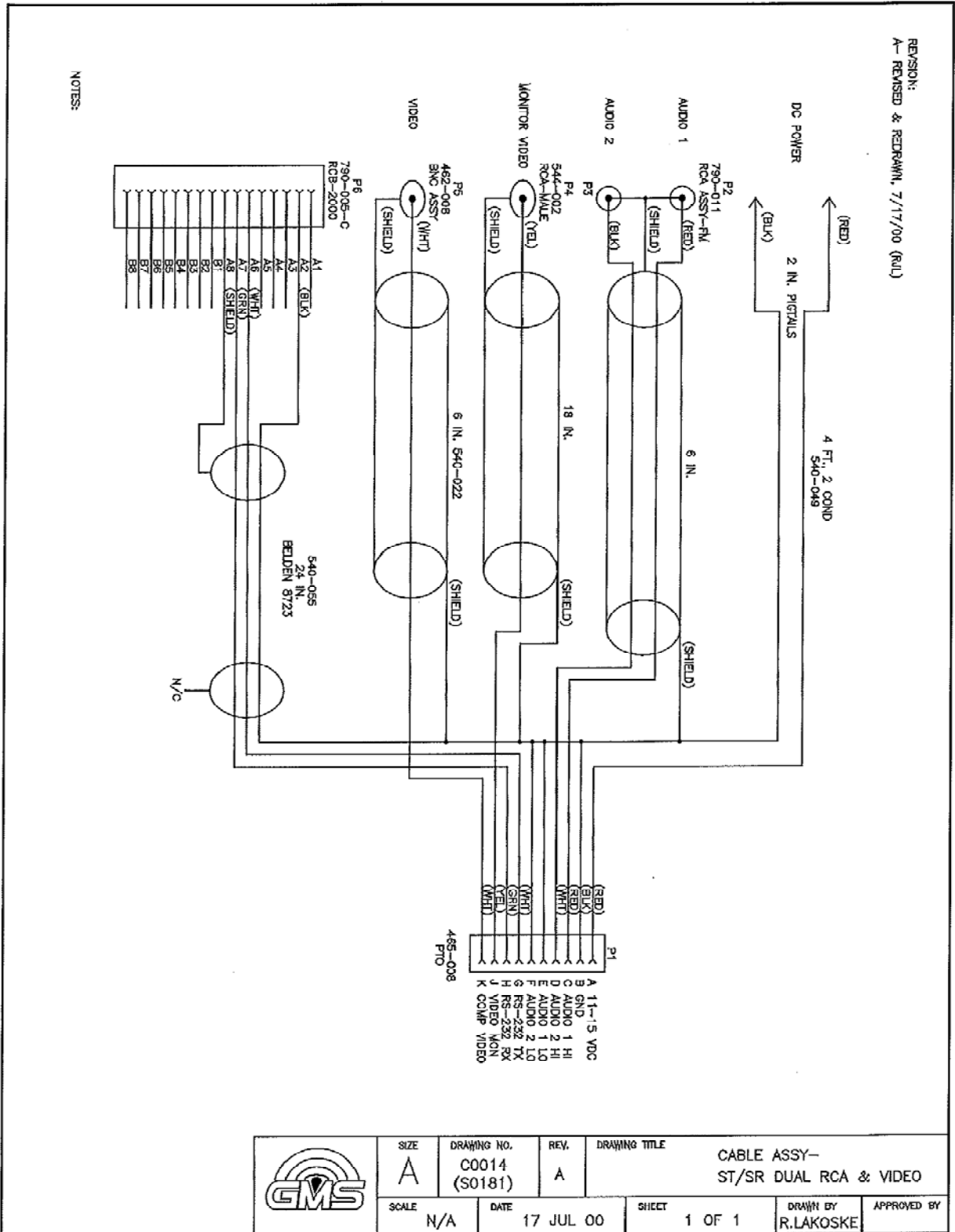
Table 1: Ten Pin PTO Connector

The following is pin-out information for RS-232 connections, J1:

PIN #	DESCRIPTION	DB-25F (computer)	DB-9F (computer)	COLOR
B	Ground	7	5	Black
G	RS232-TX	3	2	Green
H	RS232-RX	2	3	White
		4 - Request to send 5 - Clear to send	7 - Request to send 8 - Clear to send	Jump
		6 - Data set ready 8 - RX signal detector 20 - Data term ready	6 - Data set ready 1 - RX signal detector 4 - Data term ready	Jump

Table 2: RS-232 Pin-Out Information

Appendix A – Cable Assembly ST/SR Dual RCA & Video



Appendix B – Cable Assembly SR Receiver, 10 Pin PTO

