

HIGH-PERFORMANCE VIDEO/AUDIO MODULATOR

MODEL VM-100R
1 RU HEIGHT, 70 AND 140 MHz



The VM-100R video modulator is designed for applications that require high signal-to-noise ratios and minimum distortions of the transmitted information. The applications include multiloop terrestrial and satellite links where cumulative distortions render conventional modulator performance unacceptable. These modulators are designed to meet or exceed RS-250C short-haul and IESS-306 standards, and are compatible with NTSC, PAL and SECAM video formats. A wide selection of optional features make the modulators compatible with B-MAC, D2-MAC, SIS, IRDETO and encrypted NTSC, PAL/SECAM video formats. All operating parameters are fully programmable from the front panel or optional remote interface port without the need for additional test equipment or manual adjustments.

FEATURES

- Fully programmable front panel or optional remote interface
- Save/recall multiple user-defined complete transponder setups of video, audio, dispersal and IF variables
- Adaptable to a wide variety of video formats
- DC-coupled circuitry
- Multiple pre-emphasis selection for video and audio
- Baseband mute enable/disable select
- Averaging AFC with enable/disable select
- Front panel audio, video and IF monitor ports
- Individual and summary alarm contact closure outputs
- One IF filter and one video filter of customer's choice
- Direct programming of video, dispersal and audio deviations, subcarrier level and frequency and IF level programming resolution;
 - 0.1 MHz p-p for video and dispersal deviation
 - 10 kHz audio subcarrier frequency
 - 1 kHz p-p for audio deviation
 - 0.1 dBc for audio subcarrier level
 - 0.5 dBm for audio limiting
 - 0.1 dBm for IF level
- Fine adjustment of video/audio deviations and subcarrier level for exacting requirement

OPTIONS

- Up to four internal and two external audio subcarrier modulators programmable from 5 to 8.2 MHz in 10 kHz steps supporting 50/75 μ s and J17 audio pre-emphasis and flat response
- Support full 1:N redundant multiformat configurations, with remote options
- External wideband subcarrier input
- Programming interface for ASM-100 audio expansion subsystem
- Up to four switchable IF filters
- Two switchable video filters
- Gated/averaging AFC for NTSC, PAL/SECAM, with external synchronization for B-MAC or D2-MAC video formats
- Front panel programmable automatic external ED synchronization for IRDETO or encrypted PAL/SECAM and NTSC formats
- SIS (Sound in Sync) operation
- Programmable video polarity
- Front panel programmable ATIS (Automatic Transmitter Identification System)
- RS232, RS485 and RS422 remote interface
- IF loop interface
- +10 dBm IF output
- Offset IF carrier operation for two half-transponder operation in one full transponder bandwidth

ELECTRICAL SPECIFICATIONS

IF OUTPUT

Center frequency	70 MHz
Frequency stability	< ± 10 kHz
Peak-to-peak deviation	9 to 36 MHz (0.1 MHz p-p programming resolution)
Impedance	75 ohms
Return Loss	20 dB minimum
Output Level	-25 to +2 dBm (0.1 dBm programming resolution) (higher output level optional)
Linearity	< ± 1.5 %, ± 18 MHz (< ± 1 % optional)
Group delay (± 18 MHz)	
Linear	0.05 ns/MHz maximum
Parabolic	0.0025 ns/MHz ² maximum

AFC SYNTHESIZED REFERENCE SOURCE (APPLIES TO GATED AFC OPTION)

Frequency range.....	55 to 85 MHz (10 kHz steps)
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VIDEO INPUT

Level	1 V p-p
Impedance	75 ohms
Return loss.....	30 dB minimum

VIDEO CHARACTERISTICS (BACK-TO-BACK WITH WIDEBAND REFERENCE DEMODULATOR)

Frequency response	10 Hz to 6 MHz, ± 0.3 dB maximum, 10 Hz to 10 MHz, ± 0.35 dB maximum (video filter out)
Insertion gain stability	< 0.15 dB/hour
Line-time distortion	< ± 0.5 IRE
Short-time distortion.....	< ± 1 %
Long-time distortion	< ± 1 IRE
Luminance nonlinearity.....	< ± 1 IRE
Chrominance/luminance gain error	< ± 1.5 IRE
Chrominance/luminance delay error.....	< ± 4.5 ns nominal without video filter, < ± 20 ns with optional video filter
Differential gain.....	< ± 1 %
Differential phase.....	< $\pm 0.5^\circ$
Chrominance/luminance intermodulation	< ± 1 IRE
Chrominance nonlinear gain.....	< 1 IRE
Chrominance nonlinear phase.....	< 1°
S/N luminance (weighted)	70 dB minimum

ENERGY DISPERSAL WAVEFORM

Frequency	25/30 Hz, phase locked to video frame rate
Stability	± 1 Hz
Deviation	0 to 8 MHz p-p (0.1 MHz p-p programming resolution)

AUDIO

Input level	+18 dBm maximum
Audio limiting	12 to 20 dBm (0.5 dBm programming resolution)
Input impedance	600 ohms balanced (others available)
Input return loss	30 dB minimum
Frequency response.....	100 Hz to 12 kHz, 0.6 dB p-p, 40 Hz to 15 kHz, < 1 dB p-p
Harmonic distortion.....	< 0.5%, 150 kHz p-p deviation, < 1%, 840 kHz p-p deviation
Pre-emphasis.....	50/75 μ s, J17 and flat response, programmable
Signal/noise (weighted)	> 62 dB, 300 kHz p-p deviation

SUBCARRIER MODULATOR

Subcarrier deviation	Programmable 50 to 840 kHz p-p (1 kHz p-p programming resolution)
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ELECTRICAL SPECIFICATIONS (CONT.)

70 MHz IF carrier deviation by subcarrier	Programmable from 5% to 20% of deviation by video (0.1 dBc programming resolution)
Subcarrier IF frequency	Programmable from 5 to 8.2 MHz (10 kHz steps)

PRIMARY POWER REQUIREMENTS

Voltage	100/120/220/240 VAC, $\pm 10\%$, rear panel selectable
Frequency	47 to 63 Hz
Power consumption	70 W typical, can vary with number of subcarriers and options

MECHANICAL SPECIFICATIONS

PHYSICAL

Dimensions	19" x 24" x 1.75" nominal
Weight	24 pounds nominal

CONNECTORS (FRONT PANEL)

Video monitor	BNC female
Dispersal monitor	BNC female
IF monitor	BNC female
Audio monitor	Audio jack
Audio subcarrier monitor	BNC female

ADJUSTMENTS (FRONT PANEL)

IF frequency

CONTROLS (FRONT PANEL)

AC power control	Rocker switch
Local programming	Keypad with LCD display

CONNECTORS (REAR PANEL)

AC power	IEC receptacle
Audio input	Audio DIN connector
External wideband subcarrier input	BNC female
External AFC sync input	BNC female
External ED sync input	BNC female
Video Input	BNC female
IF output	BNC female
IF auxiliary output	BNC female
IF loop (output and input)	BNC female
Alarm contact closure output	DB-25P
Redundancy alarm output	DB-25P
Remote interface connectors	DE-9P for RS485 and RS422, DB-25P for RS232

ADJUSTMENTS (REAR PANEL)

ATIS level adjust	Multiturn screw adjust trimpot (factory set to -26 dBc)
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ENVIRONMENTAL

Operating

Ambient temperature	0 to 50°C
Relative humidity	Up to 95% at 40°C
Atmospheric pressure	Up to 10,000 feet

Nonoperating

Temperature	-40 to +60°C
Relative humidity	Up to 95% at 40°C
Atmospheric pressure	Up to 40,000 feet
Shock and vibration	Normal handling by commercial carriers

OPTIONS

- M1** 525 NTSC video filter (4.2 MHz flat, 4.5 MHz -3 dB) (included in NTSC systems).
- M2*** 625 B-PAL video filter (5.1 MHz flat, 5.5 MHz -40 dB).
- M3*** 625 D-PAL video filter (6 MHz flat, 6.5 MHz -40 dB).
- M4*** 625 I-PAL or wideband B-PAL video filter (5.5 MHz flat, 6 MHz -40 dB).
- M5** Video filter switching of any two options of M1, M2, M3 or M4.
- M6** Additional IF filter.
- M62S** Switching for two IF filters.
- M64S** Switching for four IF filters.
- MA16** Fully programmable modulation parameters to support any full/half transponder operation and all video/audio formats, including the storage of multiple parameter sets (included in all systems).
- M8** Switchable gated/averaging AFC.
- M9** Switchable gated, either B-MAC or D2-MAC and averaging AFC.
- A.** External AFC synchronization for B-MAC.
- B.** External AFC synchronization for D2-MAC.
- M10** Automatic external ED synchronization for:
- A.** Encrypted PAL/SECAM, NTSC video formats (rear panel composite video sync or normal video input).
- B.** IRDETO video format (rear panel composite video sync input only).
- C.** M10A and M10B combined (rear panel composite video sync input only).
- M12** SIS (Sound in Sync) operation.
- M13** ATIS (Automatic Transmitter Identification System).
- M14** External wideband subcarrier input (rear panel BNC).
- M15** Baseband mute (included in all systems).
- M16** 70 MHz auxiliary output (rear panel BNC).
- M17** Keypad IF level programming (0.1 dBm resolution), from -25 to +2 dBm or -15 to +12 dBm with Option M21 (included in all systems).
- M18** IF loop interface.
- M19** Video polarity select.
- M21** High level IF output (+10 dBm).
- M22** Programming interface for ASM-100 audio expansion subsystem, for two additional subcarrier modulators.
- M23** Offset IF frequency operation at 61 and 79 MHz, supporting two half transponder carriers in one full transponder bandwidth (Options M8 and M6 must be selected).
- M24** Offset IF frequency operation at 60 and 80 MHz, supporting two half transponder carriers in one full transponder bandwidth (Options M8 and M6 must be selected).
- M25** Linearity $\leq 1\%$ p-p, ± 18 MHz.
- M26** 70 and 140 MHz operation selectable.
- M27** De-emphasized video monitor output (rear panel BNC).
- * Either M2, M3 or M4 included in PAL/SECAM systems.

REMOTE OPTION PACKAGE

MRVA Video/audio remote options (R1, R3, R4, R5, R6, R8, R9, R10, R11, R13, R14, R16 and R17).

REMOTE OPTION EXPLANATIONS

- R1** NTSC, PAL/SECAM, MAC pre-emphasis and flat response select.
- R3** Switching of up to four IF filters.
- R4** Video filter switching of any two combinations of M1, M2, M3 or M4.
- R5** Subcarrier mute.
- R6** Dispersal off/auto/variable select.
- R8** Audio J17, 50 and 75 μ s pre-emphasis and flat response select.
- R9** Internal sync (gated AFC for standard NTSC, PAL/SECAM video formats) and external sync (gated AFC for B-MAC or D2-MAC video format with external sync) synchronization select. Requires local Option M9.
- R10** Remote programming subcarrier frequencies.
- R11** Remote interface bus programming through RS232, RS485 and RS422 bus. Customer must specify bus operation on order.
- R13** User-programmable subcarrier IF deviations by audio for J17, 50 and 75 μ s pre-emphasis and flat response.
- R14** Preset independent phase/frequency setting for NTSC, PAL/SECAM video formats.
- R15** Baseband mute.
- R16** User-programmable video deviation setting. This supports half/full transponder operation for three video formats and flat response for up to four IF filters.
- R17** Remote IF level programming (0.1 dBm resolution).
- R18** Programming interface for ASM-100 audio expansion subsystem. Requires local Option M22.
- R19** Offset IF frequency operation.