

## BELAR PEAK LIMITER

### DESCRIPTION

The PL-1 Peak Limiter is an all new, solid state limiting device utilizing state of the art concepts in signal control. This device will limit all complex waveforms to the degree preset by the controls. The PL-1 features an extremely fast attack time and variable switch selected release time. Pre-emphasis for the control circuit is also included and is switch selectable from front panel.

The degree of limiting and output level is determined by input and output attenuators. The fast attack time of one microsecond is accomplished by using an extremely short time constant in the rectifier circuits which yield virtually distortionless limiting action. The high output capabilities and gain characteristics of this unit further enhance its value for the engineer.

The PL-1 Peak Limiter is a compact unit that weighs only 14 pounds and fits in a standard mounting rack or cabinet. It is designed to accurately limit program peaks over a long period of time with virtually no maintenance required.

### SPECIFICATIONS

Input Level .....	-27 to +23 dbm
Input Impedance .....	600 ohms
	balanced or unbalanced
Output Impedance .....	600 ohms
	balanced or unbalanced
Maximum output level .....	+30 dbm @ 1 kHz with
	limiting disabled
Meter Selection .....	Output level,
	degree of limiting
Meter Accuracy .....	Better than 5% over
	entire scale
Signal-to-Noise Ratio .....	-75 db
Gain .....	50 db (adjustable)
Frequency Response .....	0.5 db 30-20,000 Hz
Distortion .....	0.5% 30-20,000 Hz
Attack Time .....	1 microsecond
Release Time .....	Dependent upon program
	content (selectable speed)
Degree of Limiting .....	-30 db
Compression ratio .....	Better than 30:1
Remote Metering .....	meter may be remotely metered
Size .....	5¼" H 19" W x 10½" D
Weight .....	14 lbs.

### ORDERING INFORMATION

PL-1 Peak Limiter

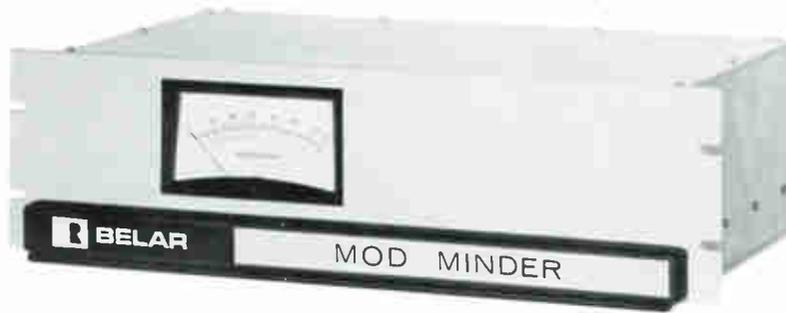
MP-7 Remote Meter Panel for PL-1  
(Accessory for the PL-1)



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## BELAR MOD MINDER

### DESCRIPTION

The MML-1 "Mod Minder" is a totally new concept in automatic broadcast control. Complete automatic control of the modulation level of your present transmitter is obtained when the MML-1 is installed in the system. The number of overmodulation peaks per unit of time is preset by the engineer and the "Mod Minder" takes over from there. It automatically controls the level of peak modulation at the preset level.

The fast attack time of one microsecond is accomplished by using an extremely short time constant in the rectifier circuits which yield virtually distortionless limiting action. There are no thumps, bumps or wheezes.

The MML-1 utilizes the Belar peak indicating metering system; allowing the engineer to read true waveform peaks. Also included is a front panel disable switch that removes the "Mod Minder" from the system for proof-of-performance measurements.

### SPECIFICATIONS

Input Level .....	-40 to +20 dbm
Input Impedance ...	600 ohms balanced or unbalanced
Output Impedance ..	600 ohms balanced or unbalanced
Maximum Output Level .....	+30 dbm @ 1 kHz
Meter Selection .....	Input, output, degree of limiting
Meter accuracy .....	Better than 5% over entire scale
Signal-to-Noise Ratio .....	.75 db
Gain .....	50 db adjustable
Frequency Response .....	0.5 db 30-20,000 Hz
Distortion .....	0.5% 30-20,000 Hz
Attack Time .....	1 microsecond
Release Time .....	Dependent upon program content (selectable speed)
Degree of Limiting .....	.30 db
Compression Ratio .....	Better than 30:1
Remote Metering .....	Meter may be remotely metered
Size .....	5¼" H 19" W 10½" D
Weight .....	14 lbs.

### ORDERING INFORMATION

MML-1 "Mod Minder"

MP-6 Remote Meter Panel for MML-1  
(Accessory for MML-1)



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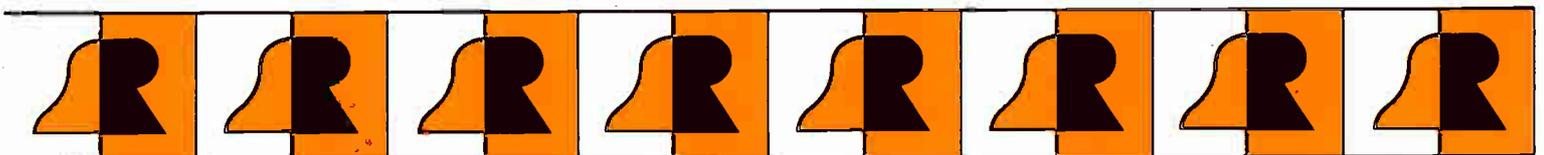
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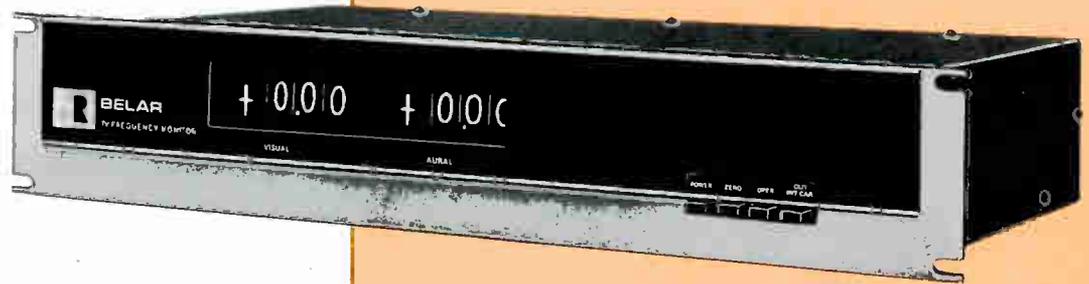
# TV MONITORS



WHERE ACCURACY COUNTS...COUNT ON BELAR



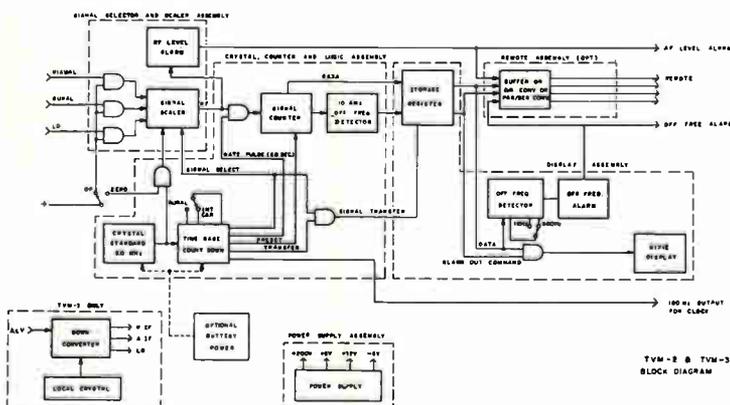




## BELAR TV FREQUENCY MONITORS

### FEATURES

- Measures visual and aural carrier frequencies independently — no need to have one on to measure the other
- Push-button selection to measure aural carrier or aural intercarrier frequency
- True frequency counter circuits — instead of period comparators — give mathematically correct frequency readings
- Inhibited off-frequency alarm drivers to prevent false off-frequency alarms
- Stand-by power supply provision
- 1 MHz and 100 Hertz outputs
- Interface with RFA-3 for off-air monitoring
- Parallel BCD or analog outputs for automatic logging with optional interface cards.



The Belar TVM-2 and the TVM-3 are digital TV frequency monitors designed expressly to measure TV visual carrier and aural carrier or aural intercarrier deviations. Since the TVM-2 and TVM-3 incorporate true frequency counter circuits that are multiplexed between aural and visual carriers, the aural and visual carrier frequencies may be measured independently. When one carrier is off, the monitor will display the remaining carrier frequency correctly while giving both a carrier-off and an off-frequency alarm for the missing carrier. The monitor contains two digital displays — one for aural and one for visual with  $\pm$  indicators to indicate deviations from correct channel frequency. The monitor also incorporates off-frequency alarm drivers that are inhibited so that three successive errors are required to signal an alarm to prevent false off-frequency alarms.

Buffered parallel BCD or analog outputs are available as an option. A 1 MHz output is provided for frequency comparison and a 100 Hertz output is provided to drive a digital clock for recording long-term frequency deviations for self-frequency calibration.

The TVM-2 and TVM-3 will interface with the RFA-3 for off-air monitoring and remote control applications.

### SPECIFICATIONS

TVM-2	Channels 2-13	
TVM-3	Channels 14-83	
Time Base	$\pm 1 \times 10^{-7}$	0 to 30°C
	$\pm 1 \times 10^{-6}$	0 to 55°C
	$\pm 1 \times 10^{-6}$	per year

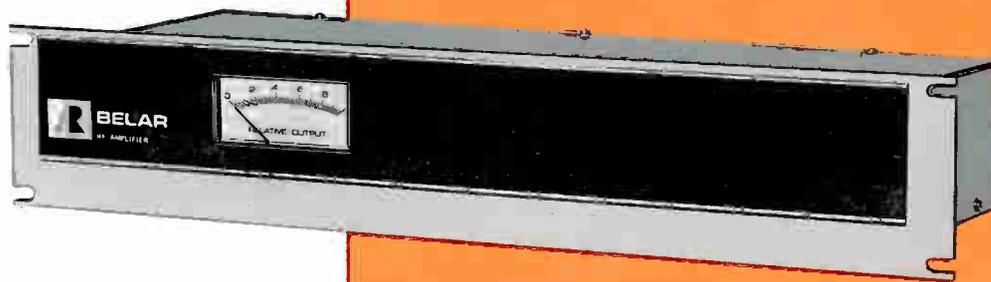
Digital Readout: Separate readout for visual and aural carrier or aural intercarrier deviations.

Pre-Set for  $\pm 10$  kHz off-sets, automatically adjusts for 0 off-set on intercarrier.

Off-Frequency Alarms: Either  $\pm 500$  Hz or  $\pm 1$  kHz switch settable, inhibited for three successive errors.

#### Carrier-Off Alarm

Gate Time:	2 seconds
Size:	19" x 3 1/2" Rack Panel
Weight:	12 pounds



## BELAR RFA-3 TV RF AMPLIFIER

The Belar RFA-3 TV RF Amplifier is a sensitive, high-gain, all-silicon, solid-state amplifier designed to meet the requirements of the broadcaster for off-air monitoring of both aural and visual TV transmitters in the VHF and UHF band.

The RFA-3 utilizes separate IF's for the aural and visual channels to reduce cross-talk, improve selectivity, and reduce selective fading of either the aural or visual signals. It provides off-air monitoring for those who wish to monitor at the studio and for remote control applications.

### SPECIFICATIONS

RF Input Sensitivity	100 $\mu$ V
RF Input Impedance	50-75 ohms
RF Frequency Range	Ch.2-Ch. 83 (specify)
Adjacent Channel Rejection (6 MHz removed)	70 dB
Dynamic Range	100 $\mu$ V to 0.5 V (70 dB)
IF Rejection	greater than 90 dB
L.O. Radiation	meets applicable FCC specifications
Power Consumption	5 W
Dimensions	3½ x 19 x 7 inches overall
Weight	5 pounds

### ORDERING INFORMATION

TVM-1 Television Aural Modulation Monitor  
 TVM-2 VHF Digital Frequency Monitor  
 TVM-3 UHF Digital Frequency Monitor  
 MP-4 Remote Meter and Flasher Panel for TVM-1  
 BOC-1 Buffered Parallel BCD Output Card  
 DAC-1 Analog Output Card  
 RFA-3 RF Amplifier  
 SCM-1 SCA Subcarrier Frequency and Modulation Monitor  
 Specify frequency and offset when ordering

1500  
1500  
1750

535



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## DESCRIPTION

The Belar Model FMS-2 Stereo Modulation Monitor is an all solid state precision stereo monitor designed to operate in conjunction with the Belar model FMM-2 baseband modulation monitor. The FMS-2 is also used for test functions in conjunction with the model FMM-2 to ensure the proper performance of FM stereo transmitters. The test and measurement capability of the FMS-2 is further enhanced by the integration of two independent auto-ranging voltmeters allowing automatic measurement of channel separation and crosstalk, along with sub-carrier suppression and noise. For example, depressing the left and right channel buttons automatically registers the wanted and unwanted channel for instant separation measurements. A front panel hold button can be used to lock the autorange to the displayed range.

## FEATURES

- Two independent semi-peak modulation meters for simultaneous monitoring of left and right channels
- Front panel switchable de-emphasis for noise measurements
- Pilot alarm with front panel indicator
- Outputs for audio proof-of-performance measurements
- Two auto-ranging voltmeters with LED displays for 0 to -80 dB range measurements
- Stereo separation measurement capability of over 70 dB at 15 kHz
- High visibility rear-illuminated meters

## SPECIFICATIONS

Input Level . . . 4.2 V P-P (3.5 V P-P Opt) composite  
 Input Impedance . . . . . 220k ohms, unbalanced,  
 BNC connector

### Metering:

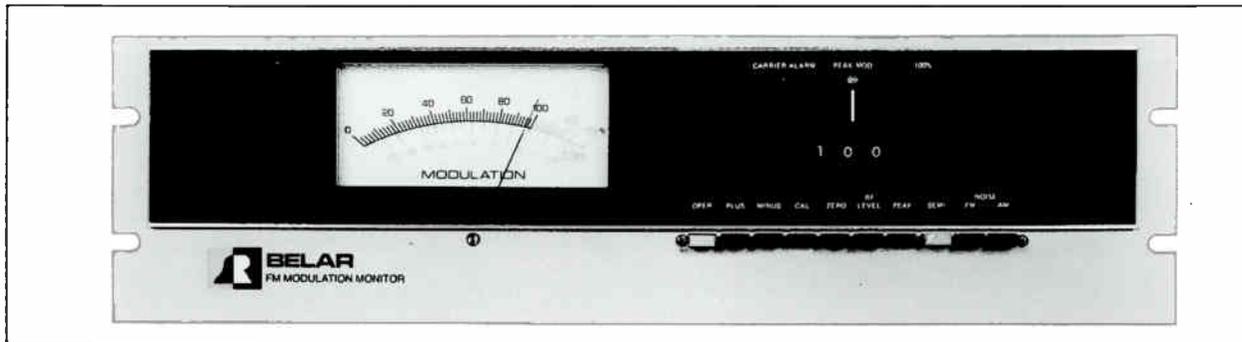
Left Meter . . . . . Selectable: total modulation, L + R,  
 pilot or left channel modulation

Right Meter . . . . . Selectable: pilot phase, L - R, 38  
 kHz suppression or right channel modulation  
 Auto Range Attenuator . . . . . 0-60 dB in 10 dB steps,  
 calibrated full range readings:  
 +3 to -80 dB  
 Modulation Meter Range . . . . . 0 to 133%  
 Modulation Meter Accuracy . . . . . Better than 2%  
 over entire range  
 Pilot Meter Accuracy . . . . . 0.5% (6% to 13%  
 pilot modulation)  
 Separation:  
 Left to Right . . . . . 70 dB, 10 Hz to 15 kHz  
 Right to Left . . . . . 70 dB, 10 Hz to 15 kHz  
 Crosstalk:  
 L + R to L - R . . . . . 85 dB min  
 L - R to L + R . . . . . 85 dB min  
 SCA to L + R . . . . . Greater than 90 dB  
 SCA to L - R . . . . . Greater than 90 dB  
 SCA Interference . . . . . Greater than 90 dB  
 Outputs:  
 Left and Right Channel Program Audio . . . . . +10  
 dBm, 600 ohms, balanced  
 Left and Right Channel Program Test . . . . . 5 vrms,  
 10k ohms, unbalanced  
 Pilot . . . . . 3 V P-P, 27k ohm source  
 Composite (less Pilot) . . . . . 4 V P-P, 2k ohm source  
 Audio Output Specifications:  
 Frequency Response, Left and Right . . . . .  $\pm 0.25$  dB,  
 50-15,000 Hz  
 Signal to Noise Ratio, Left and Right . . . . . 90 dB min  
 Harmonic Distortion . . . . . 0.01% max, 50-15,000 Hz  
 Intermodulation Distortion . . . . . 0.01% max (SMPTE)  
 Remote Outputs:  
 Left Meter, Right Meter, Pilot Indicator . . . . . For inter-  
 face to Model MP-8 remote meter panel (opt)  
 Dimensions . . . . . 5¼" H x 10½" D x 19" W  
 (EIA Rack Mount)  
 Power Consumption . . . . . 15 watts, 117 VAC, 234 VAC  
 opt, 50/60 Hz  
 Shipping Weight . . . . . 17 lbs



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## DESCRIPTION

The Belar Model FMM-2 FM Modulation Monitor is a precision wideband, all solid state FM monitor, designed to measure the total modulation characteristics of monaural as well as multiplexed FM transmitters. The Model FMM-2 is also used as a low distortion and low noise FM demodulator to drive the companion stereo and SCA monitors, as well as providing audio outputs for aural monitoring and proof of performance measurements.

The Model FMM-2 has set new standards in totally accurate measurement techniques. Utilizing such advanced design features as an ultra-linear digital discriminator, an almost distortionless and absolutely flat baseband signal is produced to ensure precise stereo and SCA decoding.

In addition to the normal FCC defined semi-peak metering, the FMM-2 incorporates a sample-hold peak modulation meter circuit, independent of modulation polarity, to allow the meter to respond accurately to program peaks.

## FEATURES

- Ultra-linear digital discriminator
- Digitally selectable peak indicator, adjustable in 1% increments from 1 to 199%, independent of modulation polarity
- Built-in voltmeter for AM and FM noise measurements
- Carrier alarm with front panel indicator
- Two wide-band outputs
- True peak or semi-peak metering
- Separate fixed 100% modulation indicator
- High visibility rear-illuminated meter

## SPECIFICATIONS

Frequency Range . . . . . 88 to 108 mHz std.  
 RF Input . . . . . 1 to 10 volts rms, 50 ohms,  
 BNC connector

### Modulation Metering:

Deviation Indication . . . . . 100% @  $\pm 75$  kHz,  
 0 to 133% range  
 Accuracy . . . . .  $\pm 2\%$  @ all modulation levels  
 Characteristics . . . . . selectable: peak (sample-hold)  
 or semi-peak

### Noise Measurement:

FM Noise Range . . . . . -50 dB to -70 dB  
 AM Noise Range . . . . . -50 dB to -70 dB

### Test Function:

Calibrate . . . . . Provides internal std.  
 deviation reference  
 Zero . . . . . Provides zero deviation for s/n  
 RF Level . . . . . Calibrates AM noise function and  
 carrier alarm reference level  
 Carrier Alarm . . . . . Indicator adjusted for 90%  
 carrier level

### Outputs:

Stereo Monitor . . . . . Wideband, 1.5v rms @ 1k  
 ohm unbalanced  
 SCA Monitor . . . . . Wideband, 1.5 v rms @ 1k  
 ohm unbalanced  
 Audio, (Program) . . . +10 dBm, 600 ohms, balanced  
 Audio, (Test) . . . . . 5v rms, 10k ohms, unbalanced

### Audio Output Specifications

Frequency Response . . . . .  $\pm 0.01$  dB  
 Harmonic Distortion . . . . . 0.01% max  
 Intermodulation Distortion . . 0.01% max (SMPTE)  
 Signal-to-Noise Ratio . . . . . 90 dB, min

### Remote Outputs

Carrier Level Alarm . . . Provides "open collector"  
 output, capable of sinking 20 ma @ 15 vdc  
 Meter, 100% Peak Indicator,  
 Adj. Peak Indicator . . . . . For interface to Model  
 MP-8 Remote Meter Panel (opt)

Dimensions . . . . . 5.25"H x 10.5"D x 19"W  
 (EIA Rack Mount)

Power Consumption . . . . . 10 watts, 117 VAC std.  
 (234 VAC opt) 50/60 Hz

Shipping Weight . . . . . 12 lbs



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**DESCRIPTION**

The Belar SCM-1 SCA Frequency and Modulation Monitor, when added to the FMM-1 Frequency and Modulation Monitor, or FMM-2 Modulation Monitor provides complete monitoring and test functions for SCA storecasting, data transmission and remote telemetering applications. Up to four crystal switch positions allow four channels to be operated and tested.

Features include three deviation ranges for optimum operation of a particular subcarrier. Narrow deviation (2 kHz deviation) is for remote telemetering applications and selective call systems. Normal operation (6 kHz deviation) is for storecasting and other background programming applications; 4 kHz deviation is for simultaneous stereo operation. The discriminator is wideband for minimum distortion. Maximum versatility is thus provided for future applications as well as present needs.

The SCM-1 features unlimited SCA frequency selection by incorporating interchangeable crystals into its unique design. Select the one to four frequencies best suited to your application. Plug in the appropriate crystals. Monitor four channels by means of push-button selection. To test other frequencies or to change frequencies, merely plug in new crystals. The separate SCA peak flasher is independent of SCA modulation polarity. The front panel push button modulation calibrator allows the calibration accuracy to be checked at any time.

**SPECIFICATIONS**

Modulation Meter Range	.....133% to -70 dB
SCA Modulation Sensitivities	.....100% = 6 kHz, 4 kHz, 2 kHz deviation, switched
Maximum Modulation Frequency	.....5 kHz at 6 kHz deviation
SCA Modulation Calibrator	.....2 kHz
SCA Subcarrier	.....24 kHz to 100 kHz, 4 switched crystal positions. SCA subcarrier and deviation maintained in the FCC allowable total frequency deviation
SCA Injection Level	.....133% to 5%
SCA Peak Indicator	.....100% = 6 kHz 4 kHz, 2 kHz deviation, switched, independent of modulation polarity
SCA Frequency Meter Accuracy	..... $\pm 2$ kHz
Internal Crosstalk	
Sub to Main	..... -66 dB
Main to Sub	.....Better than 50 dB
Stereo to Sub	.....Better than 50 dB
Remote Metering	.....Both frequency meter and modulation meter may be remotely metered, 5000 ohms external loop resistance
Weight	.....14 lbs



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## BELAR FM RF AMPLIFIER

**RFA-1**

### DESCRIPTION

The Belar Model RFA-1 FM RF Amplifier is a sensitive, high gain, all solid state preamplifier designed for off-air monitoring of both monaural and multiplexed FM transmitters.

The Model RFA-1 amplifies the signal to a level suitable for the input requirements of Belar FM Modulation Monitors. The RFA-1 utilizes an IF bandwidth of 400 kHz to assure low distortion of a multi-plexed signal, while IF selectivity is such that an adjacent channel, 800 kHz removed, is attenuated 50 dB. The dynamic range of the amplifier is such that no adjustments are necessary over an input range of 100 uv to 0.5 v.

### SPECIFICATIONS

RF Input Sensitivity . . . . . 100 uv for full output  
RF Input Impedance . . 50-75 ohms, BNC connector  
RF Frequency Range . . . . . 88-108 mHz  
Adjacent Channel Rejection  
(800 kHz removed) . . . . . 50 dB  
Phase Linear Bandwidth . . . . . 600 kHz  
Dynamic Range . . . . . 100 uv to 0.5 v (70 dB)  
Image Rejection . . . . . more than 60 dB  
IF Rejection . . . . . more than 90 dB  
L.O. Radiation . . . . . less than -80 dBm  
RF Power Output . . . . . 0.2 to 1 watt  
RF Output Impedance . . . . . 50 ohms  
Signal to Noise Ratio . . . . . 100 uv input: 75-80 dB  
1 mv input: 85-90 dB  
Dimensions . . . . . 3½" H x 19" W x 11⅞" D  
(EIA Rack Mount)  
Power Consumption . . . 5 watts, 117 VAC (234 VAC  
opt) 50/60 Hz  
Shipping Weight . . . . . 12 lbs

## BELAR YAGI ANTENNA

**MJ-10**

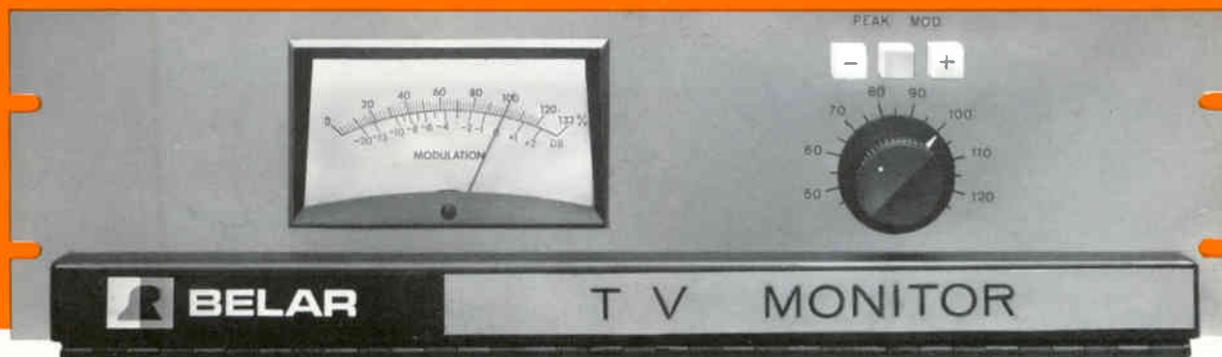
The Model MJ-10 (MJ-10L for operation @ 88-98.1 mHz, MJ-10H for operation @ 97.9-108 mHz) antennas are 10 element gamma matched receiving antennas intended for use with Belar FM RF Amplifiers. The MJ-10 antenna gain is 9.5 dB, with a 17 dB front to back ratio. The antenna is collapsable and provided with a built-in 75 ohm connector and matching F-59 connector with weather boot.



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# BELAR TVM-1 TELEVISION AURAL MODULATION MONITOR



The TVM-1 Television Aural Modulation Monitor is a wideband, all solid-state TV aural monitor designed to provide accurate modulation monitoring for the TV Broadcaster, UHF or VHF. The state-of-the-art TVM-1 measures both positive and negative peaks simultaneously and automatically selects and registers the higher of the two on both the true peak meter and peak flasher. Exclusive polarity lamps indicate the instantaneous polarity of the peaks registered on the peak meter and peak flasher. Calibration accuracy may be checked at any time with the front panel push-button modulation calibrator.

The TVM-1 is immediately available. It has the same guaranteed performance as Belar's AM and FM Monitors and Belar's other precision broadcast products.

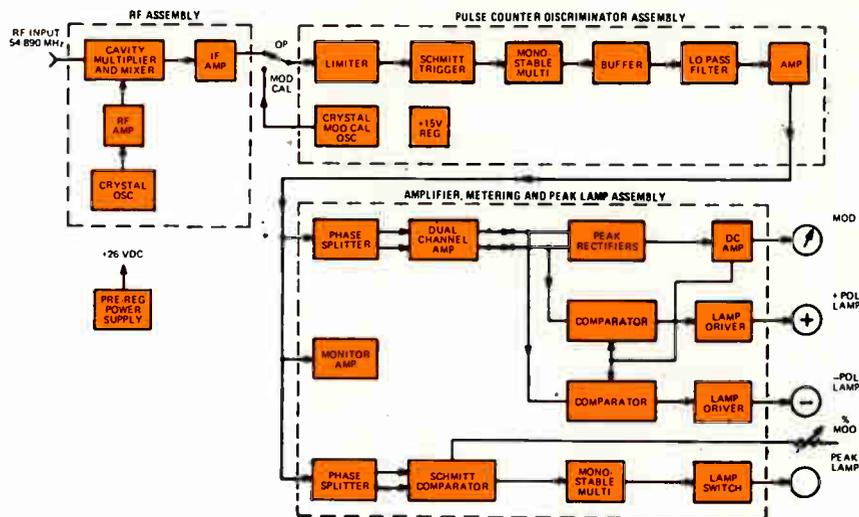
## features:

- True peak reading—both modulation meter and peak flasher respond accurately to the shortest duration program peaks encountered in today's programming.
- Modulation meter independent of modulation polarity.
- Peak flasher independent of modulation polarity.
- Polarity lamps to indicate the instantaneous polarity of the peaks the monitor is displaying.
- Built-in FM deviation type modulation calibrator.
- May be expanded to SCA by plugging in Belar's SCM-1 SCA Frequency and Modulation Monitor.
- May be remotely operated by the addition of the RFA-3 RF Amplifier or MP-4 Remote Meter Panel.
- Solid-state design.



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# BELAR TVM-1 TELEVISION AURAL MODULATION MONITOR

## SPECIFICATIONS

RF Input Sensitivity	1 to 10 volts RMS
RF Input Impedance	50 ohms
RF Frequency Range	54-890 MHz
Modulation Meter Range	133% (100% at 25 kHz)
Modulation Meter Accuracy	Better than 5% over entire scale
Peak Modulation Indicator	50% to 120%
Frequency Response	0.5 db 50-75,000 Hz
Distortion	0.1% max. 50-15,000 Hz
Signal-to-Noise Ratio	70 db with 75 $\mu$ sec. de-emphasis
Outputs	Wideband isolated output to drive an SCM-1 SCA Frequency and Modulation Monitor and aural monitoring output
Remote Metering	Modulation meter may be remotely metered, 5000 ohms external loop resistance
Size	5 1/4" H x 19" W x 10 1/2" D
Weight	14 lbs.

## ORDERING INFORMATION

TVM-1 Television Aural Modulation Monitor  
 MP-4 Remote Meter and Flasher Panel for TVM-1  
 (Accessory for TVM-1)  
 RFA-3 RF Amplifier  
 SCM-1 SCA Frequency and Modulation Monitor  
 (Optional Unit)



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## BELAR STEREO FREQUENCY & MODULATION MONITOR

### DESCRIPTION

The Belar FM monitors were designed as a totally integrated, solid state system to enable the broadcaster to fulfill his monitoring equipment requirements as the need arises. The Belar FMS-1 Stereo Frequency and Modulation Monitor, when added to the FMM-1 FM Frequency and Modulation Monitor, provides complete monitoring and test functions to meet the daily requirements for stereo monitoring and provides additional facilities for making the proper tests for weekly and monthly maintenance checks to insure maximum performance from stereo transmitters.

FM noise, AM noise, and incidental AM are all read on the front panel meters as well as pilot frequency, separation, crosstalk, pilot amplitude, and subcarrier suppression. A unique filter system allows the FMS-1 to be used as an intermodulation analyzer for measuring stereo distortion directly in the frequency range of 5 to 15 kHz, previously unmeasurable with conventional techniques available to the broadcaster.

The pilot phase regeneration system utilizes a phase discriminator so that a null reading is obtained with the correct phase, allowing the phase to be regenerated within  $\frac{1}{4}$  degree. The FMS-1 is type approved for remote metering.

### SPECIFICATIONS

Pilot Frequency Meter Range	..... $\pm 3$ Hz
Pilot Frequency Meter Accuracy	..... $\pm 0.2$ Hz (0.001%)
Modulation Meter Range	..... 133% to -70 db
Modulation Meter Accuracy	..... Better than 5% over entire scale
Frequency Response (L and R)	..... $\pm 0.5$ db (50-15,000 Hz)
Separation	..... 45 db (50-15,000 Hz) (Meter Range-70 db)
Crosstalk	..... 60 db (L+R) to (L-R) 60 db (L-R) to (L+R) 66 db SCA to (L+R), (L-R)
<b>Outputs</b>	
Left & Right Channel Monitoring	..... 600 ohms, Unbalanced
Left & Right Channel Test	..... 10 K, Unbalanced
Distortion (Either Channel)	..... 0.2%
Signal-to-Noise Ratio (Either Channel)	..... 70 db with 75 usec de-emphasis
<b>Monitoring Modes (Modulation Meter Switched 133% to -70 db).....</b>	
	Left Channel Audio,
	Right Channel Audio, L+R, L-R, 38 kHz (May be measured with modulating frequencies greater than 5 KC),
	19 KC Pilot Injection, (12% full scale), Total Modulation, FM Noise, AM Noise, Inc. AM.
Remote Metering	..... Both pilot frequency and modulation meters may be remotely metered, 5000 ohms external loop resistance
Size	..... 5 $\frac{1}{4}$ " H x 19" W x 10 $\frac{1}{2}$ " D
Weight	..... 12 lbs.

### ORDERING INFORMATION

- FMM-1 FM Frequency and Modulation Monitor
- FMS-1 Stereo Frequency and Modulation Monitor
- SCM-1 SCA Frequency and Modulation Monitor
- MP-2 Remote Meter and Flasher Panel for FMS-1



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## AS-1 AUDIO SENTRY

The Belar AS-1 Audio Sentry is an alarm which aurally and visually alerts station personnel of the absence of modulation or carrier. The AS-1 will react immediately upon loss of carrier. In the case of loss of modulation, the Audio Sentry can be programmed to sound off anywhere between 3 and 60 seconds.

In addition to use in AM, FM or TV facilities, it may also be installed in locations with storecasting and public address systems as well as in recording and duplicating studios.

### Typical Specifications

Input Sensitivity .....	Adjustable from 140 microvolts to 20 volts
Input Impedance .....	1000 ohms
Frequency Range .....	30 Hz to 15,000 Hz
Time Delay .....	Adjustable from 3 to 60 seconds
Aural Alarm Frequency .....	2900 Hz
Aural Alarm Level .....	+70 dB
Remote Alarm .....	External alarms may be connected to Audio Sentry. Total drive current not to exceed 50 MA.
Carrier-Off Alarm .....	External contact required
Size .....	3½" H x 19" W x 4¾" D
Gross Weight .....	6 lbs.
Power Requirements .....	115/230 volts, 50/60 Hz



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## BELAR TV FREQUENCY MONITORS      MODELS TVM-2A/3A

### FEATURES

- Measures visual and aural carrier frequencies independently — no need to have one on to measure the other
- Push-button selection to measure aural carrier or aural inter-carrier frequency
  - True frequency counter circuits — instead of period comparators—give mathematically correct frequency readings
- Inhibited off-frequency alarm drivers to prevent false off-frequency alarms
  - 1 MHz output
- Interface with RFA-3 for off-air monitoring

### DESCRIPTION

The Belar TVM-2A and the TVM-3A are digital TV frequency monitors designed expressly to measure TV visual carrier and aural carrier or aural intercarrier deviations. These units employ pulsed high-intensity red seven segment LED displays for easy reading under high ambient light conditions. Since the TVM-2A and TVM-3A incorporate true frequency counter circuits that are multiplexed between aural and visual carriers, the aural and visual carrier frequencies may be measured independently. When one carrier is off, the monitor will display the remaining carrier frequency correctly while giving both a carrier-off and an off-frequency alarm for the missing carrier. The monitor contains two digital displays — one for aural and one for visual with  $\pm$  indicators to indicate deviations from correct channel frequency. The monitor also incorporates off-frequency alarm drivers that are inhibited so that three successive errors are required to signal an alarm to prevent false off-frequency alarms.

A 1 MHz output is provided for frequency comparison. The TVM-2A and TVM-3A will interface with the RFA-3 for off-air monitoring and remote control applications.

### SPECIFICATIONS

TVM-2A	Channels 2-13	
TVM-3A	Channels 14-83	
Time Base	$\pm 1 \times 10^{-7}$	0 to 30°C
	$\pm 1 \times 10^{-6}$	0 to 55°C
	$\pm 1 \times 10^{-6}$	per year

Digital Readout: Separate readout for visual and aural carrier or aural intercarrier deviations.

Pre-set for  $\pm 10$  KHz off-sets, automatically adjusts for 0 off-set on intercarrier.

Off-Frequency Alarms: Either  $\pm 500$  Hz or  $\pm 1$  KHz switch settable, inhibited for three successive errors.

Carrier-Off Alarm

Gate Time:	2 seconds
Size:	19" x 3½" Rack Panel
Weight:	12 pounds

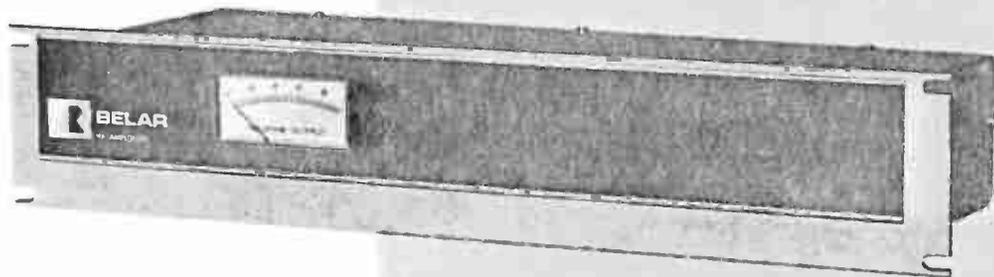


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## **BELAR RFA-3 TV RF AMPLIFIER**

The Belar RFA-3 TV RF Amplifier is a sensitive, high-gain, all-silicon, solid-state amplifier designed to meet the requirements of the broadcaster for off-air monitoring of both aural and visual TV transmitters in the VHF and UHF band.

The RFA-3 utilizes separate IF's for the aural and visual channels to reduce cross-talk, improve selectivity, and reduce selective fading of either the aural or visual signals. It provides off-air monitoring for those who wish to monitor at the studio and for remote control applications.

### **SPECIFICATIONS**

RF Input Sensitivity	100 $\mu$ V
RF Input Impedance	50-75 ohms
RF Frequency Range	Ch. 2-13, 83 (specify)
Adjacent Channel Rejection (6 MHz removed)	70 dB
Dynamic Range	100 $\mu$ V to 0.5 V (70 dB)
IF Rejection	greater than 90 dB
L.O. Radiation	meets applicable FCC specifications
Power Consumption	5 W
Dimensions	3 1/2 x 19 x 7 inches overall
Weight	5 pounds

### **ORDERING INFORMATION**

TVM-1 Television Aural Modulation Monitor  
TVM-2 VHF Digital Frequency Monitor  
TVM-3 UHF Digital Frequency Monitor  
MP-4 Remote Meter and Flasher Panel for TVM-1  
BOC-1 Buffered Parallel BCD Output Card  
DAC-1 Analog Output Card  
RFA-3 RF Amplifier  
SCM-1 SCA Subcarrier Frequency and Modulation Monitor  
Specify frequency and offset when ordering



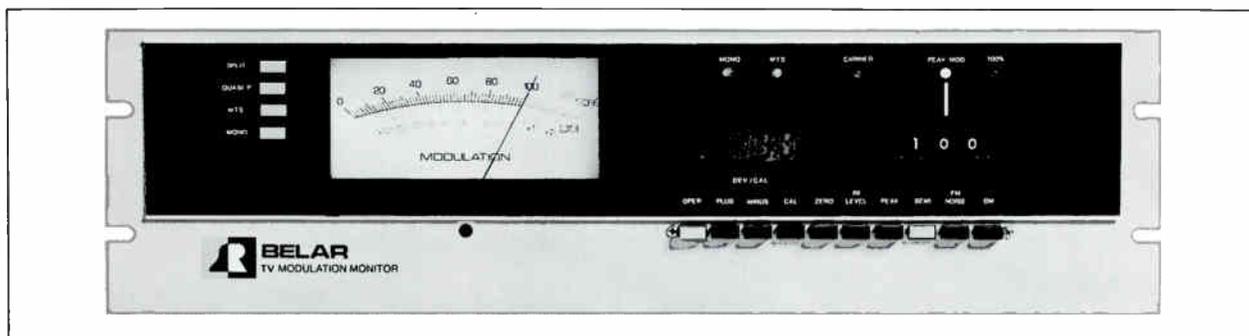
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## DESCRIPTION

The Belar Model TVM-100 Precision Aural Monitor is a wide band TV aural modulation monitor designed to measure the total modulation characteristics of mono as well as multi-channel television transmitters.

The TVM-100 is also used as a low distortion, low noise main channel demodulator for driving audio monitor amplifiers and audio distortion analyzers. Wide band composite outputs are provided for Stereo SAP, PRO and SCA monitors.

Designed to conform with the latest EIA/BTSC recommendations, the TVM-100 features a highly accurate automatic modulation calibrator for mono and stereo modes, along with a digital frequency deviation display. Built-in noise measurement capability allows direct measurement of signal-to-noise ratio as well as noise due to transmitter ICPM.

## FEATURES

- Split sound and quasi-parallel detection modes
- Built-in high-accuracy automatic deviation calibrators for mono and multi-channel modes, with a digital display, to indicate actual deviation in kHz, with 100 Hz resolution
- Digitally selectable peak indicator, adjustable in 1% increments from 1% to 199% modulation, independent of modulation polarity
- Semi-peak and SAMPLE/HOLD peak metering characteristics
- Measurement of SAP & PRO injection levels directly in kHz deviation

## SPECIFICATIONS

Frequency Range ....TVM-100L: 54 to 216 mHz, TVM-100H: 470 to 806 mHz  
 RF Input .....100 mv to 5 vrms (composite)  
 Detected Measurement Bandwidth.....30 Hz to 150 kHz  
 Frequency Response.....± .01 dB, 30 Hz to 50 kHz

Linear Phase Deviation .....Less than ± .05°  
 Modulation Metering  
 Deviation Indication .....100% @ 73 kHz and 100% @ 25 kHz, 0-133% range  
 Accuracy.....± 2%  
 Characteristics .....Selectable: semi-peak or sample-and-hold peak

Peak Modulation Indicators  
 Adjustable Indicator..1% to 199% range in 1% increments  
 Fixed Indicator.....Set to indicate @ 100%  
 Accuracy.....± 1%

Noise Measurement  
 Range.....- 50 dB to - 70 dB

Test Functions  
 Calibrate.....Provides internal standard modulation references @ 25 kHz and 73 kHz  
 Deviations: Accuracy: ± 100 Hz

Calibrator Accuracy.....± 0.1%  
 Deviation Meter..Indicates modulation deviation of calibrator or test signal. Resolution: 100 Hz  
 Zero.....Provides zero deviation for signal-to-noise measurement tests

RF Level.....Sets proper operating input level  
 Carrier Alarm .....Indicator adjusted for 90% carrier level

Outputs  
 Wideband Composite....Five, @ 1.5 vrms for stereo, SAP, PRO and SCA Monitors  
 Main channel Audio (Program).....+ 10 dBm, 600 ohms, balanced  
 Main channel Audio (Test).....5 vrms, 10k ohms, unbalanced

Audio Output Specifications  
 Frequency Response...± 0.01 dB, 30 Hz to 50 kHz, ± 0.1 dB 30 Hz to 120 kHz

Harmonic Distortion .....0.01%, max  
 Intermodulation Distortion.....0.01%, max (SMPTE)  
 Signal to Noise Ratio .....80 dB, min  
 Dimensions.....5.25" H × 10.25" D × 19" W (EIA Rack Mount)

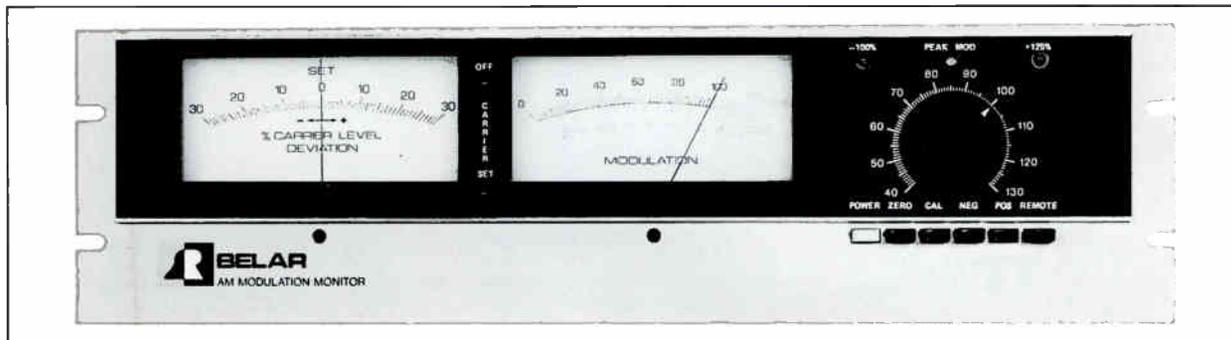


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# BELAR AM MODULATION MONITOR

**AMM-2B**



## DESCRIPTION

The Belar AMM-2B Modulation Monitor is an all solid state AM demodulator designed to measure the total modulation characteristics of AM Broadcast Transmitters. Since the input circuitry is non-frequency-discriminating, the AMM-2B is suitable for measuring shortwave and VHF transmitter modulation. The AMM-2B utilizes a unique modulation cancellation scheme to recover unmodulated carrier which provides a reference to modulation peaks. Thus the instantaneous program peaks are referenced to the instantaneous carrier without the need of time-constants, as with AGC devices.

## FEATURES

- Separate 100% negative peak modulation indicator
- Separate 125% positive peak modulation indicator
- Adjustable peak modulation indicator, adjustable from 40% to 130%
- All peak indicators independent of carrier level
- True peak-reading modulation meter responds accurately to the shortest duration program peaks
- Built-in carrier-off alarm
- Built-in modulation calibrator
- Phase Linear Filter permits true negative modulation indication without overshoot

## SPECIFICATIONS

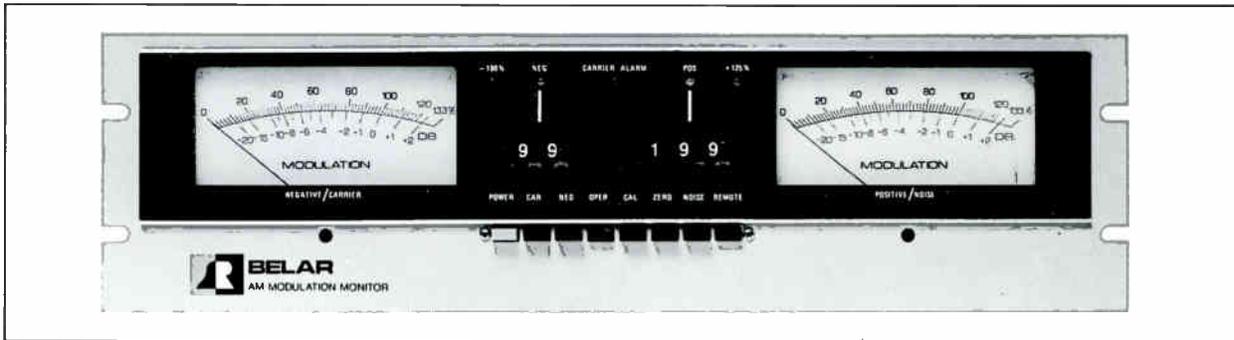
RF Frequency Range ..... 200 KHz to 160 MHz  
RF Sensitivity ..... 5 to 10 V RMS  
RF Input Impedance .... 1,000 ohms std, 50 ohms opt.  
Modulation Meter  
Range ..... 0 to 133% (switchable to either positive or negative peaks)

Accuracy ..... 2% @100% Modulation  
Frequency Response ....  $\pm 0.5$  dB, 20 Hz to 25 KHz  
Pulse response (overshoot) ..... less than 1%  
Carrier Level Meter  
Range .....  $\pm 30\%$   
Peak Modulation Indicators  
Peak Indicator .... 40 to 130% (switchable to either positive or negative peaks)  
125% Positive Indicator ..... Set to flash when modulation exceeds +125%  
100% Negative Indicator ..... Set to flash when modulation exceeds -99%  
Accuracy .....  $\pm 2\%$   
Pulse Response (overshoot) ..... Less than 1%  
Frequency Response ....  $\pm 0.5$  dB, 20 Hz to 25 KHz  
Audio Outputs  
Audio Monitor ..... +10dBm, 600 ohms, unbalanced  
Audio Test ..... 5 Vrms, unbalanced  
Frequency Response .....  $\pm 0.5$  dB, 20 Hz to 25,000 Hz  
Distortion ..... 0.25% max @99% modulation  
Signal-to-noise Ratio ..... better than 75 dB  
Carrier-off Alarm ..... adjusted to indicate at a 30% drop in carrier level  
Remote Outputs ..... adjustable, +125%, -100% peak modulation indicators: aux detector, carrier reference, remote modulation meter, remote carrier level meter & carrier-off alarm  
Operating Temperature Range ..... 0 to +50° C  
Power Requirements ..... 115/230 vac, 50/60 Hz, 10W  
Size ..... 5 1/4" H x 6" D x 19" W (EIA rack mount)  
Weight ..... 8 lbs.



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## DESCRIPTION

The Belar AMM-3 Modulation Monitor is a precision, all solid state AM demodulator designed to measure AM transmitter modulation characteristics over a frequency range of 200 KHz to 160 MHz. Utilizing true ratio-type peak indicators and unique modulation cancellation circuitry, modulation peaks are referenced to unmodulated carrier for extremely accurate program peak indication. Two meters are provided for simultaneous positive and negative modulation measurement, along with individual thumbwheel programmable peak indicators. Fixed 125% positive peak and 100% negative peak modulation indicators are also provided. Metering of carrier level and AM noise is also incorporated, as well as a built-in modulation calibrator and remote outputs for all indicators.

## FEATURES

- Two modulation meters for simultaneous measurement of positive and negative modulation
- Separate 100% negative and 125% positive peak indicators
- Two adjustable peak modulation indicators, thumbwheel programmable from 1-199% positive and 1-99% negative
- All peak indicators independent of carrier level
- True peak reading modulation meters respond to the shortest duration program peaks.
- Built-in carrier limit alarm
- Built-in modulation calibrator
- Phase linear filters, with no overshoot, permit true negative modulation indications

## SPECIFICATIONS

RF Frequency Range ..... 200 KHz to 160 MHz  
 RF Sensitivity ..... 5 to 10 volts rms

RF Input Impedance ... 1000 ohms std. (50 ohms opt.)  
 Modulation Meters

Positive modulation meter range ..... 0 to 133%  
 Negative modulation meter range ..... 0 to 100%  
 Accuracy ..... 2% @100% modulation  
 Frequency response..... ±0.5 dB, 20 Hz to 25 KHz  
 Pulse response (overshoot) ..... Less than 1%

Carrier Level Meter

Range ..... 0 to 133%

Peak Modulation Indicators

Positive peak range ... 1 to 199% in 1% increments  
 Negative peak range ... 1 to 99% in 1% increments  
 100% negative (fixed) ... int. adjustable 85 to 100%  
 125% positive (fixed) ... int. adjustable 100 to 130%  
 Accuracy ..... 2%  
 Frequency response..... ±0.5 dB, 20 HZ to 25 KHz  
 Pulse response (overshoot) ..... Less than 1%

AM Noise Measurement Range .... -40 dB to -70 dB

Audio Outputs

Audio monitor .... +10 dBm, 600 ohms, unbalanced  
 Audio test ..... 2.5 Vrms  
 Frequency response..... ±0.5 dB, 20 Hz to 25,000 Hz

Distortion..... 0.25% max @ 99% modulation  
 Signal to noise ratio ..... 75 dB

Carrier Alarm ..... Adjustable to alarm with a -10% to +5% change in carrier level

Remote Outputs..... Adjustable positive peak, adjustable negative peak, +125% & -100% modulation indicators; carrier limit alarms, positive modulation meter, negative modulation and carrier level meter

Power Requirements .. 115/230 vac, 50 to 400 Hz, 15 watts

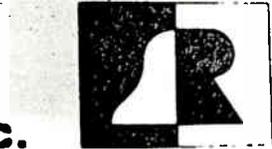
Dimension ..... 5¼" H, 8½" D, 19" W (EIA rack mount)

Weight..... 8 pounds



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# BELAR ELECTRONICS LABORATORY, INC.

## DOMESTIC PRICE LIST

Effective 9/15/85

### FM Equipment

FMM-2	FM Modulation Monitor	\$1350.00
FMS-2	FM Stereo Modulation Monitor	\$1550.00
FMM-1	FM Frequency & Modulation Monitor	\$1925.00
FMS-1	FM Stereo Frequency & Modulation Monitor	\$1825.00
SCM-1	SCA Frequency & Modulation Monitor	\$1650.00
SCM-2	SCA Modulation Monitor (Available Late 1985)	\$1550.00
RFA-1	FM RF Amplifier	\$ 575.00

### Accessories

MP-1	Remote Meter Panel for FMM-1	\$ 250.00
MP-2	Remote Meter Panel for FMS-1	\$ 250.00
MP-3	Remote Meter Panel for SCM-1	\$ 250.00
MP-8	Combined Remote Meter Panel for FMM-2 & FMS-2	\$ 350.00
MJ-10	Yagi Antenna, 10 Element, Used with RFA-1	\$ 95.00

### TV Equipment

TVM-1	TV Aural Modulation Monitor, Mono	\$2195.00
** TVM-100	TV Aural Modulation Monitor, Mono/Stereo Compatible	\$2695.00
TVM-200	TV Stereo Modulation Monitor, BTSC System	\$4295.00
TVM-2A	TV Frequency Monitor (VHF)	\$2395.00
TVM-3A	TV Frequency Monitor (UHF)	\$2595.00
RFA-3	TV RF Amplifier	\$ 750.00

### Accessories

MP-4	Remote Meter Panel for TVM-1	\$ 175.00
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### AM Equipment

AMM-2B	AM Modulation Monitor	\$1095.00
AMM-3	AM Modulation Monitor	\$1400.00
AMM-4	AM Frequency Monitor	\$1095.00
Option 01	Alarm Relay Card for AMM-4	\$ 195.00
RFA-2	AM RF Amplifier	\$ 595.00

### Accessories

MP-5	Remote Meter Panel for AMM-1	\$ 350.00
MP-6	Remote Meter Panel for AMM-2	\$ 250.00
MP-6A	Remote Meter Panel for AMM-2A & AMM-2B	\$ 250.00
MP-7	Remote Meter Panel for AMM-3	\$ 275.00
LP-1	Shielded Loop Antenna	\$ 250.00
LP-1A	Shielded Loop Antenna with Built-in Preamplifier	\$ 315.00
Option 01	External Power Supply for LP-1A	\$ 65.00

### Miscellaneous Equipment

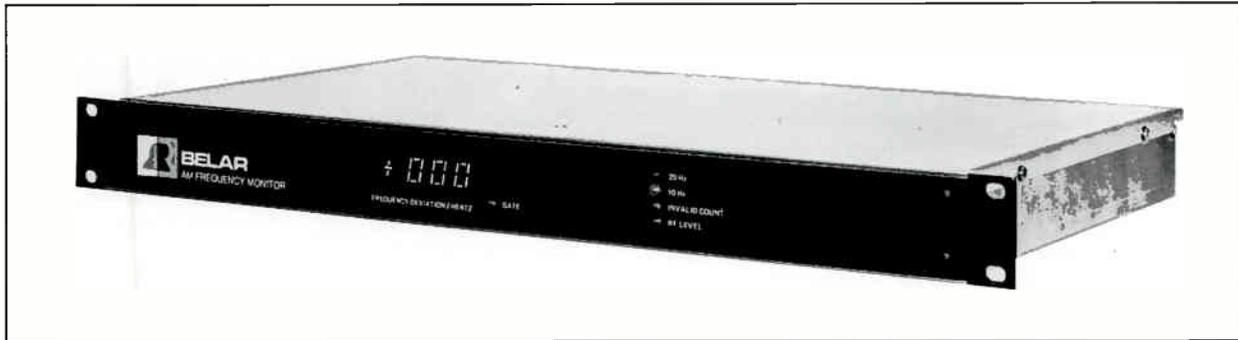
AS-1	Audio Sentry	\$ 250.00
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Prices subject to change without prior notice.

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\*\*TVM-200 System Components Available Separately: TVM-210 \$3395.00  
 TVM-220 \$1095.00





## DESCRIPTION

The Belar AMM-4 is a digital AM frequency monitor designed especially for automatic broadcast transmitter monitoring. The counter will accurately monitor any frequency from 10 kHz to 50 MHz. A large 3½ digit LED readout provides a display range of  $\pm 1999$  Hz deviation from the assigned channel. A front panel LED indicator warns of low RF level or loss of carrier; an optional relay contact can be provided. The monitor also provides two off-frequency alarms which are inhibited so that three successive errors are required to signal an alarm. This prevents false off-frequency conditions. For example, if the carrier frequency exceeds  $\pm 10$  Hz, a front panel LED indicator is immediately activated into a flashing state. This warns of an impending off-frequency condition. After three successive counts in this condition, the monitor will activate an optional relay contact for remote alarms. It also changes the front panel indicator to a continuous ON state. If the frequency exceeds  $\pm 20$  Hz for three successive counts, then the second front panel indicator is activated as well as an optional relay contact.

Another feature of the AMM-4 is the invalid count alarm. If this condition arises due to low RF level or a malfunction in the counter, the frequency alarms are held in their OFF condition; however, a front panel LED indicator and optional relay contact are provided to warn of an invalid count.

If the counter is driven by a modulated source, a count inhibit input is provided. This input is controlled by the 100% negative output of a modulation monitor; thus if the modulation level exceeds 99% negative, then the display and alarms would be held at the state they were in prior to the overmodulation fault.

Relay contact outputs (described above) are available as options. A switchable 1 MHz input/output connector is provided for frequency comparison.

## FEATURES

- Inhibited off-frequency alarms
- 10 Hz off-frequency alarm

- 20 Hz off-frequency alarm
- RF level alarm
- Invalid count alarm
- Count inhibit input
- External timebase input
- 1 MHz output
- 3½ digit LED display
- Low profile design
- Designed for ATS operation

## SPECIFICATIONS

Frequency Range	10 kHz to 50 MHz
Display	Large 3½ digit LED
Display Range	$\pm 1999$ Hz
Sensitivity	100 MV, Unmodulated 2 V RMS, 99% modulation
Gate Time	2 seconds
Resolution	0.5 Hz
Time Base (Internal)	3 MHz
Stability	$\pm 1 \times 10^{-6}$ per year
Time Base (External)	.1 MHz, TTL compatible level
10 Hz alarm	Front panel LED warns of potential frequency fault, inhibited for three successive errors
20 Hz alarm	Front panel LED, inhibited for three successive errors
RF alarm	Front panel LED, warns of low RF level or carrier fail condition
Invalid Count Alarm	Prevents false counts due to low RF level or problem in counter
Count Inhibit Input	External contact required capable of sinking 2mA
Dimensions	1.75"H x 19"W (EIA Rack Mount)
Power Requirements	110/220 VAC, 50/60 Hz

## OPTIONS

- Relay card for frequency alarms, RF level alarm



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## DESCRIPTION

The state-of-the-art design of the BELAR RFA-2 AM RF Amplifier — a selective, high gain, all solid state unit with automatic gain control (AGC) and companion to the BELAR AM Frequency and Modulation Monitors makes it possible to monitor off-the-air AM signals accurately and conveniently without the problems associated with changes in transmitter power level, antenna patterns, and signal fading. The RFA-2 allows monitoring of both carrier frequency deviation and modulation characteristics from a point remote from the transmitters in the 530-1610 kHz band.

The RFA-2 uses both crystal controlled superheterodyne and heterodyne repeater principles to provide a virtually distortionless, spurious free output for modulation monitoring and a frequency restored output for frequency monitoring.

The intermediate frequency (IF) of the RFA-2 is 260 kHz whereby a precision 30 kHz wide band-pass filter is used to remove the unwanted adjacent channels and still retain the full frequency response and linearity for accurate monitoring of 10 kHz modulating frequencies. The IF is amplified by a linear, feedback amplifier whose output then drives the modulation measuring portion of the AM monitor. There is a 6 dB margin in the output capability to permit the high positive peaks of supermodulated carriers to be accurately monitored.

A portion of the 260 kHz is fed to a limiter to remove modulation and is mixed with the local oscillator frequency to restore the original station frequency. The

output is filtered to remove unwanted signals and is amplified to provide a frequency measuring output.

The outstanding feature of the RFA-2 is the AGC range — the total range is more than 30 dB. Sufficient feedback is employed to hold the output level constant to better than 2% for an input level change of 12 dB. This eliminates the problems encountered by station's having to change power levels or antenna patterns. The AGC also holds the level constant in remote locations where signal fading is a problem.

## SPECIFICATIONS

RF Sensitivity	100 uv. across 50 ohms
Antenna Required	Whip or Loop
Bandwidth	0.2 dB ± 10 kHz -3 dB ± 16 kHz Greater than -40 dB ± 40 kHz
I.F.	260 kHz
IMAGE REJ	Greater than 50 dB
IF REJ	Greater than 50 dB
RF OUTPUTS	260 kHz for MODULATION measurements, 5 volts RMS min.
STATION FREQ for FREQ measurements	
AGC Range	Less than 2% change in carrier level for 12 dB change in input level
Size	3½" H x 19" W x 11½" D
Net Weight	8 lbs.
Shipping Weight	11 lbs.

# BELAR SHIELDED LOOP ANTENNAS

# LP-1, LP-1A

BELAR Shielded Loop Antennas are recommended when excessive electrical interference exists, or in the presence of an interfering station.

The basic design of a loop receiving antenna reduces electrostatic noise, and by using the natural directional receiving pattern, off-axis interference from other stations can be minimized by rotating the antenna.

## SPECIFICATIONS

### Model LP-1 Shielded Loop Antenna

Frequency Range . 530 kHz to 1610 kHz in 3 bands  
Diameter . . . . . 36" (914 mm)

Mounting	½" NPT
Connector	BNC
Attenuation	30 dB
Permissible Wind Load	150 mph 100 mph with ¾" ice

### Model LP-1A Shielded Loop Antenna (Amplified)

Specifications as above, except that internal amplifier provides 30 dB gain for unity output. + 12 to + 15 vdc required. (Belar RFA-2 RF Amplifiers can be simply modified to provide the voltage source)

OPTION 01: External 12 vdc Power Supply

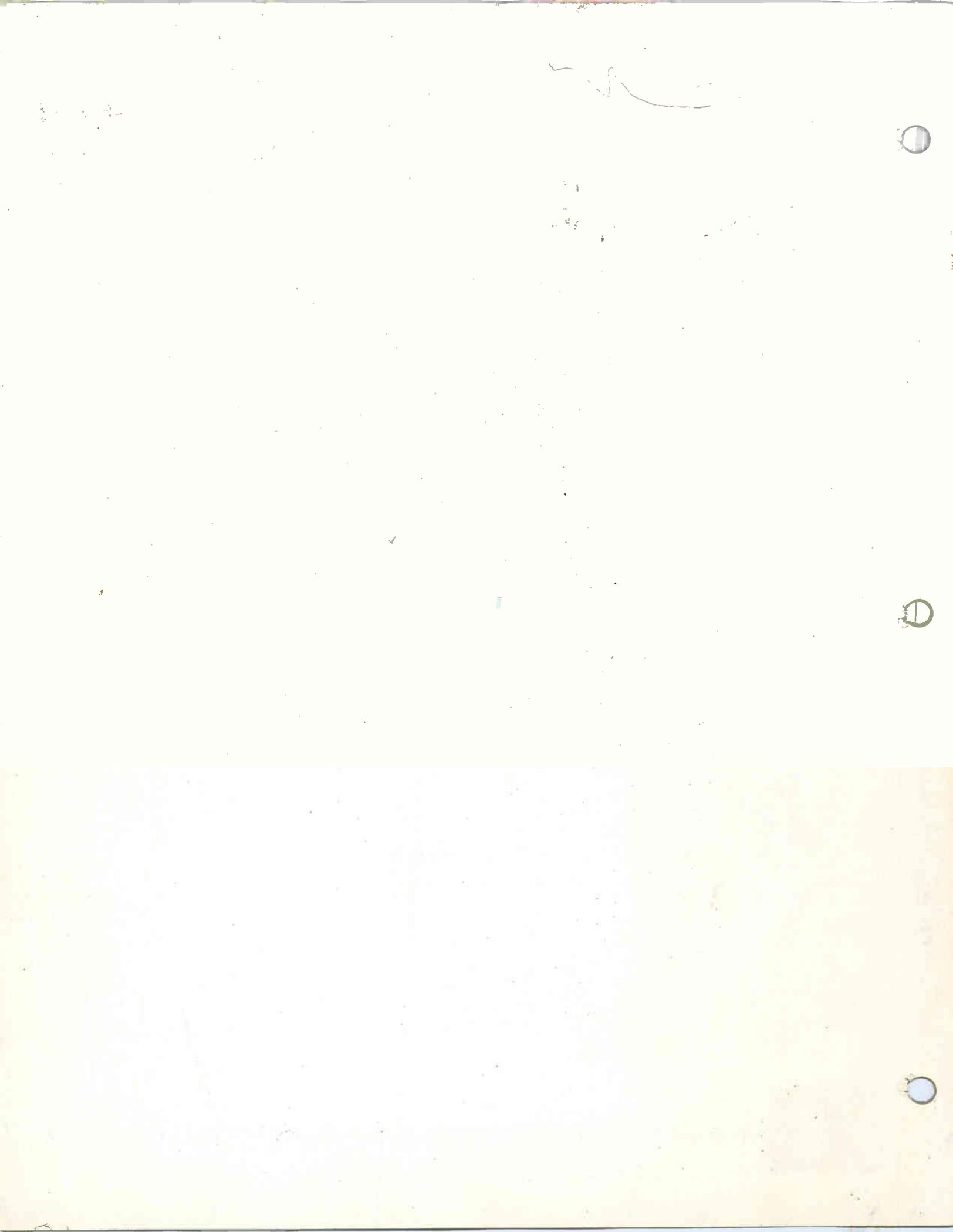


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## BELAR FM FREQUENCY & MODULATION MONITOR

### DESCRIPTION

The Belar FM monitors were designed as a totally integrated, solid state system to enable the broadcaster to fulfill his monitoring equipment requirements as the need arises. The Belar FMM-1 Frequency and Modulation Monitor is a wideband, all solid state FM monitor designed expressly to fulfill all the new requirements for monaural monitoring as well as to provide a virtually pure, distortionless demodulated signal to drive the companion FMS-1 Stereo Frequency and Modulation Monitor and the SCM-1 SCA Frequency and Modulation Monitor for multiplex monitoring.

An outstanding feature of the FMM-1 is the state of the art monitoring circuitry which gives you a true peak reading modulation meter that responds accurately to the shortest duration program peaks encountered in today's programming. The built-in type approved modulation calibrator combined with the true peak reading meter assures accurate modulation monitoring and helps prevent overmodulation problems. The FMM-1 is type approved for remote metering.

The FMM-1 peak flasher is completely independent of modulation polarity in that it samples both positive and negative peaks simultaneously and automatically selects and registers the greater amplitude if the preset level is exceeded. The front panel push-button modulation calibrator allows the calibration accuracy to be checked at any time.

### SPECIFICATIONS

RF Input Sensitivity	.....0.2 to 10 volts RMS
RF Input Impedance	..... 50 ohms
RF Frequency Range	.....88-108 MHz
Deviation Meter Range	..... $\pm 3$ kHz
Modulation Meter Range	..... 133% (100% at 75 kHz)
Modulation Meter Accuracy	..... Better than 5% over entire scale
Peak Modulation Indicator	..... 50 to 120%
Frequency Response	..... $\pm 0.1$ db, 50-75,000 Hz 3 db down at 180 kHz
Distortion	..... 0.1% max. 50-75,000 Hz
Signal-to-Noise Ratio	..... 75 db with 75 usec de-emphasis
Outputs	..... 4 wide band isolated outputs to drive the FMS-1, and one or more SCM-1, distortion meter output, and monitoring output
Remote Metering	..... Both carrier deviation and modulation meters may be remotely metered, 5,000 ohms external loop resistance
Size	..... 5¼" H x 19" W x 10½" D
Weight	..... 14 lbs.

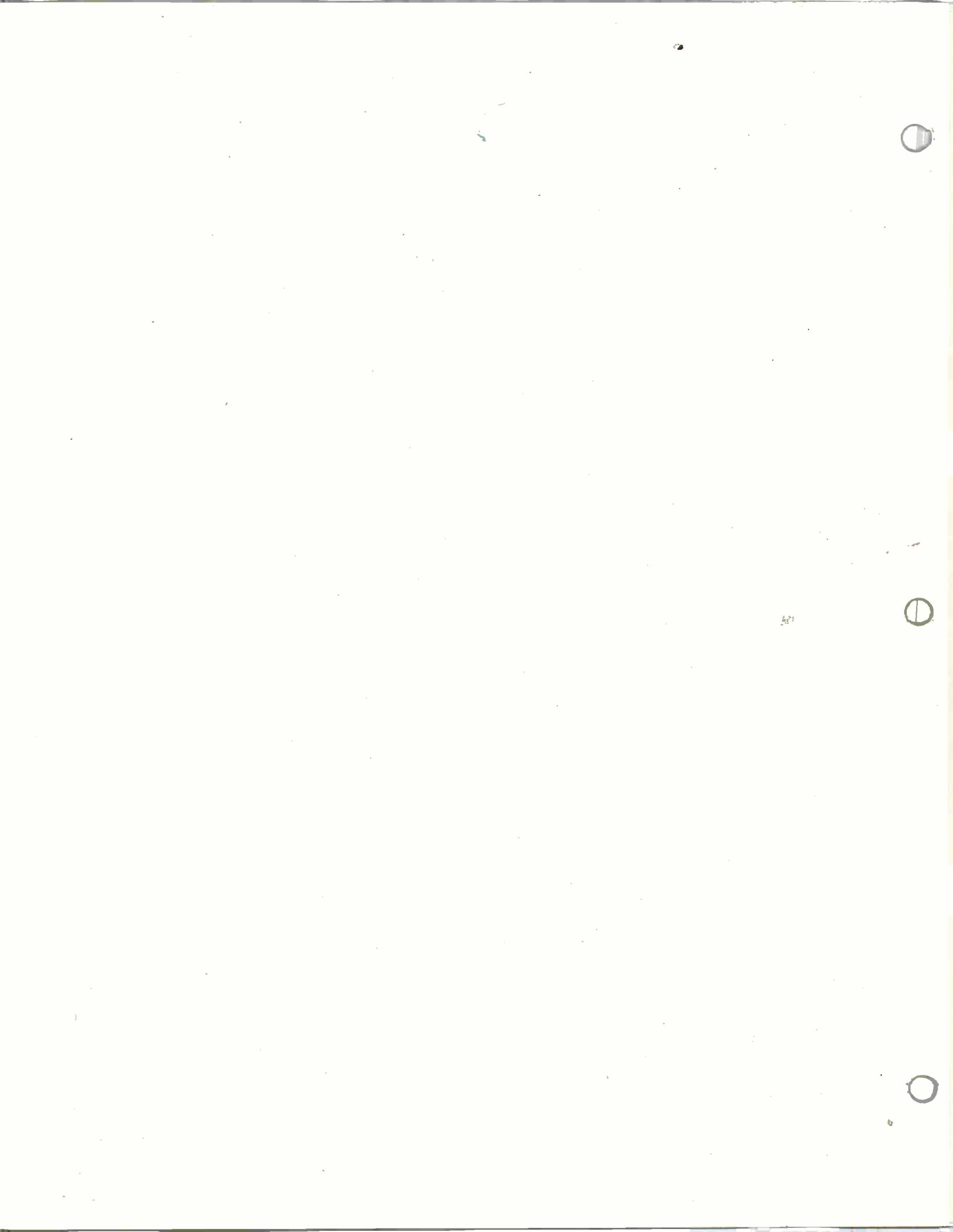
### ORDERING INFORMATION

- FMM-1 FM Frequency and Modulation Monitor
- FMS-1 Stereo Frequency and Modulation Monitor
- SCM-1 SCA Frequency and Modulation Monitor
- RFA-1 Solid State RF Amplifier
- MP-1 Remote Meter and Flasher Panel for FMM-1



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# BELAR TVM-1 TELEVISION AURAL MODULATION MONITOR



The TVM-1 Television Aural Modulation Monitor is a wideband, all solid-state TV aural monitor designed to provide accurate modulation monitoring for the TV Broadcaster, UHF or VHF. The state-of-the-art TVM-1 measures both positive and negative peaks simultaneously and automatically selects and registers the higher of the two on both the true peak meter and peak flasher. Exclusive polarity lamps indicate the instantaneous polarity of the peaks registered on the peak meter and peak flasher. Calibration accuracy may be checked at any time with the front panel push-button modulation calibrator.

The TVM-1 is immediately available. It has the same guaranteed performance as Belar's AM and FM Monitors and Belar's other precision broadcast products.

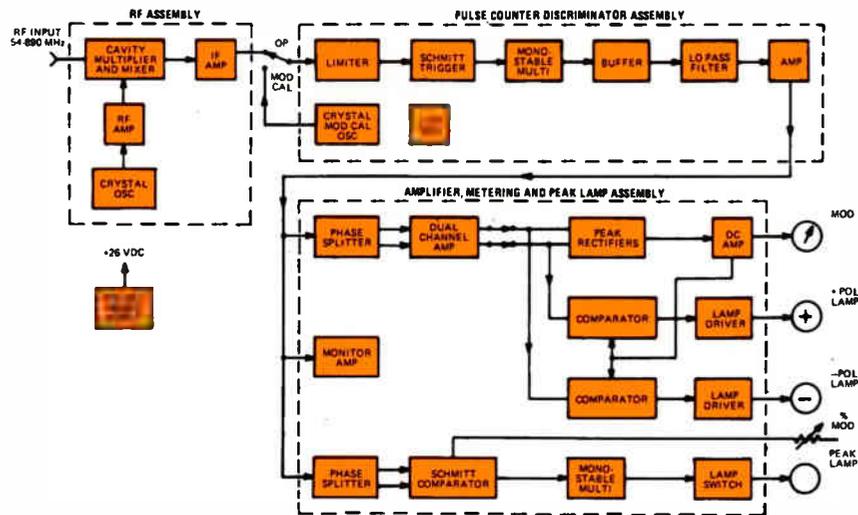
## features:

- True peak reading—both modulation meter and peak flasher respond accurately to the shortest duration program peaks encountered in today's programming.
- Modulation meter independent of modulation polarity.
- Peak flasher independent of modulation polarity.
- Polarity lamps to indicate the instantaneous polarity of the peaks the monitor is displaying.
- Built-in FM deviation type modulation calibrator.
- May be expanded to SCA by plugging in Belar's SCM-1 SCA Frequency and Modulation Monitor.
- May be remotely operated by the addition of the RFA-3 RF Amplifier or MP-4 Remote Meter Panel.
- Solid-state design.



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# BELAR TVM-1 TELEVISION AURAL MODULATION MONITOR

## SPECIFICATIONS

RF Input Sensitivity	.....1 to 10 volts RMS
RF Input Impedance	.....50 ohms
RF Frequency Range	.....54-890 MHz
Modulation Meter Range	.....133% (100% at 25 kHz)
Modulation Meter Accuracy	.....Better than 5% over entire scale
Peak Modulation Indicator	.....50% to 120%
Frequency Response	.....0.5 dB 50-75,000 Hz
Distortion	.....0.1% max. 50-15,000 Hz
Signal-to-Noise Ratio	.....70 dB with 75 $\mu$ sec. de-emphasis
Aural Monitoring Output	.....+ 10 dBm 600 ohms
Outputs	.....Wideband isolated output to drive an SCM-1 SCA Frequency and Modulation Monitor and aural monitoring output
Remote Metering	.....Modulation meter may be remotely metered, 5000 ohms external loop resistance
Size	.....5 $\frac{1}{4}$ " H x 19" W x 10 $\frac{1}{2}$ " D
Weight	.....14 lbs.

FCC TYPE APPROVAL #3-181

## ORDERING INFORMATION

- 6 1500 TVM-1 Television Aural Modulation Monitor
- TVM-2 VHF Digital Frequency Monitor
- TVM-3 UHF Digital Frequency Monitor
- MP-4 Remote Meter and Flasher Panel for TVM-1  
(Accessory for TVM-1)
- 450 RFA-3 RF Amplifier
- SCM-1 SCA Frequency and Modulation Monitor (Optional Unit)



**BELAR ELECTRONICS LABORATORY, INC.**

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## BELAR SCA FREQUENCY & MODULATION MONITOR

### DESCRIPTION

The Belar FM monitors were designed as a totally integrated, solid state system to enable the broadcaster to fulfill his monitoring equipment requirements as the need arises. The Belar SCM-1 SCA Frequency and Modulation Monitor, when added to the FMM-1 Frequency and Modulation Monitor, provides complete monitoring and test functions for SCA storecasting and remote telemetering applications. Up to four crystal switch positions allow four channels to be operated and tested.

Features include three deviation ranges for optimum operation for a particular subcarrier. Narrow deviation (2 kHz deviation) is for remote telemetering applications and selective call systems. Normal operation (6 kHz deviation) is for storecasting and other background programming applications; 4 kHz deviation is for simultaneous stereo operation. The discriminator is wideband for minimum distortion. Maximum versatility is thus provided for future applications as well as present needs.

The SCM-1 features unlimited SCA frequency selection by incorporating interchangeable crystals into its unique design. Select the one to four frequencies best suited to your application. Plug in the appropriate crystals. Monitor four channels by means of push-button selection. To test other frequencies or to change frequencies, merely plug in new crystals. The separate SCA peak flasher is independent of SCA modulation polarity. The front panel push button modulation calibrator allows the calibration accuracy to be checked at any time.

### SPECIFICATIONS

Modulation Meter Range .....	133% to -70 db
SCA Modulation Sensitivities .....	100% = 6 kHz, 4 kHz, 2 kHz deviation, switched
Maximum Modulation Frequency .....	5 kHz at 6 kHz Deviation
SCA Modulation Calibrator .....	2 kHz
SCA Subcarrier .....	24 kHz to 74 kHz, 4 switched crystal positions. SCA subcarrier and deviation maintained in the FCC allowable total frequency deviation
SCA Injection Level .....	133% to 5%
SCA Peak Indicator .....	100% = 6 kHz, 4 kHz, 2 kHz deviation, switched, independent of modulation polarity
SCA Frequency Meter .....	$\pm 2$ kHz
Internal Crosstalk	
Sub to Main .....	-66db
Main to Sub .....	Better than 50 db
Stereo to Sub .....	Better than 50 db
Remote Metering .....	Both frequency meter and modulation meter may be remotely metered, 5000 ohms external loop resistance
Weight .....	14 lbs.

### ORDERING INFORMATION

- FMM-1 FM Frequency and Modulation Monitor
- FMS-1 Stereo Frequency and Modulation Monitor
- SCM-1 SCA Frequency and Modulation Monitor
- MP-3 Remote Meter and Flasher Panel for SCM-1



**BELAR ELECTRONICS LABORATORY, INC.**

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Where Accuracy Counts . . . Count on Belar

