Model 8211 Modulation Meter

Boonton's Model 8211 is a microprocessor-based, high-performance meter for measuring AM and FM modulation. Economical and accurate, the Model 8211 automatically measures AM and FM of carriers from 2.0 MHz to 1500 MHz. The Model 8211 provides automatic tuning and leveling, low residual modulation, true peak detection, a digital display, and is self-calibrating.

- Features:
- Carrier frequency range from 2.0 MHz to 1.5 GHz
- Self calibrating
- Automatic tuning and leveling
- Low residual modulation
- AM/FM modulation bandwidth AM modulation depth 0 to 100%
- FM deviation 150 kHz peak
- True peak-responding detectors
- Digital display
- IEEE-488 interface

Model 8210 Modulation Meter

The Model 8210 offers the same functionality and value as the Model 8211 without a GPIB interface. **For More Information,** Contact Boonton NOW!

BOONTON 8210

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- Digital display

SECTION I

GENERAL INFORMATION

1-1. SAFETY NOTICE

The Model 8210 is furnished with a three-conductor power cable and three-prong plug so that, when the plug is inserted in a properly polarized a.c. power receptacle, the instrument is grounded. The instrument depends upon such connection to ground for equipment and operator safety.

***** WARNING *****

To avoid the possibility of electrical shock, before anything is connected to this instrument, and before you use this instrument, make certain that its power cable is plugged into a mating a.c. receptacle that has a grounded ("earthed") contact.

Never defeat the instrument's protective grounding. For example: Do not use an extension power cable if it is not equipped with a ground conductor; do not plug the instrument into an a.c. receptacle that does not provide a high-quality earth ground. If only a two-terminal a.c. power receptacle is available, use a three-prong-to-two-prong adapter and connect the ground wire of the adapter to the power-receptacle ground. Do not use such an adapter if the ground wire cannot be grounded.

1-2. DESCRIPTION

The Model 8210 Modulation Meter, manufactured by Boonton Electronics Corp., is a versatile, solid-state instrument that measures and displays the deviation of frequency-modulated signals or the percentage modulation of amplitude-modulated signals over a carrier range of 2 MHz to 1.5 GHz. Both the a.m. and f.m. detectors of the 8210 are true peak-responding at all levels. Thus they conform to the basic definition of modulation depth or deviation. In addition, because the detectors are true peak-responding, the effect of any system noise will be accurately included in the measured value. Among the features of the Model 8210 are:

a. Fully Automatic Tuning and Leveling. The Model 8210 will automatically acquire the largest signal present at the input connector and adjust its local oscillator, and the gain of its measurement channel, to provide a fully calibrated display of amplitude modulation or frequency modulation.

b. Internal Calibration. Each time it is turned on, the 8210 calibrates both its a.m. and its f.m. detector.

c. Digital Display. The 8210 presents recovered modulation on a 3-1/2 digit display, providing exceptional resolution and accuracy for modulation measurements.

d. Pushbutton Operation. Selection of all operational parameters is made by means of pushbuttons, thus allowing fast measurement setup.

e. Low Residual Modulation. The 8210's exceptionally low residual modulation permits accurate measurements of low-noise sources. Direct residual measurements are possible if an external r.m.s. detector is used.

The Model 8210 is intended for both laboratory and field application. It will also be especially useful in the design of, and for production-line and field-testing of, f.m. and a.m. transmitters and signal generators.

1-3. ITEMS FURNISHED

The instrument is supplied complete with power cord. For making measurements the connection of various cables will be called for, depending upon the operating mode of the 8210. Required cable connections are discussed in paragraph 2.1d.

1-4. OPTIONS AND ACCESSORIES

Option -01: With this option, the 15 kHz low-pass filter is replaced by a 30 kHz low-pass filter. See Specifications, below, for details.

Accessory 950027: This is a rack-mounting kit (not supplied as standard), for mounting a single 8210 to left or right of center.

1-5. ENVIRONMENTAL DATA, OPERATING AND STORAGE

Temperature: Operating, 0 to +55°C
Storage, -55°C to +75°C

1-6. SPECIFICATIONS

R.F. INPUT:

Carrier-Frequency Range	2 MHz to 1.5 GHz
Tuning	Automatic
Sensitivity	10 mV, r.m.s., 2 MHz to 520 MHz 30 mV, r.m.s., 520 MHz to 1.5 GHz
Level Set	Automatic for levels up to 1 V
Maximum Safe Input	7 V, r.m.s.
Input Impedance	50 ohms, nominal

FREQUENCY MODULATION:

Maximum Deviation	150 kHz, peak
Deviation Ranges	10 and 100 kHz, full scale
Deviation Accuracy	1% of reading for modulation frequencies between 50 Hz and 5 kHz. 2% of reading, 5 kHz to 7.5 kHz. NOTE: Peak residuals must be accounted for to obtain the above accuracies.
Modulation Bandwidth	<30 Hz to 15 kHz
Residual F.M. (R.F. Level >100 mV)	With 3 kHz low-pass filter: <150 Hz, r.m.s., at 1.5 GHz, decreasing linearly to a floor of <5 Hz, r.m.s. With 15 kHz low-pass filter: <200 Hz, r.m.s., at 1.5 GHz, decreasing linearly to a floor of <15 Hz, r.m.s.
A.M. Rejection	<100 Hz deviation at 50% a.m. (modulation frequency < 1 kHz) 3 kHz low-pass filter.

§1-6, Continued.

AMPLITUDE MODULATION

Modulation-Depth Ranges: 10% and 100%, full scale

Depth Accuracy

Modulation Frequency	Accuracy	
	10% to 90% A.M.	<10% & >90% A.M.
50 Hz to 5 kHz	1% of reading	3% of reading
5 kHz to 7.5 kHz	2% of reading	6% of reading

NOTE: Peak residuals must be accounted for to obtain the above accuracies. Carrier frequency <520 MHz; r.f. level between -10 and +10 dBm.

Modulation Bandwidth: <30 Hz to 15 kHz.

Residual A.M.: With 3 kHz low-pass filter: Less than 0.15% a.m., r.m.s., for input levels above 100 mV, r.m.s.

With 15 kHz low-pass filter: Less than 0.25% a.m., r.m.s., for input levels above 100 mV, r.m.s.

NOTE: Carrier frequency <520 MHz; above 520 MHz residuals increase linearly with frequency.

F.M. Rejection: Less than 1.0% a.m.,peak, at 100 kHz peak modulation.

AUDIO-FREQUENCY RESPONSE

Filters: 3 kHz low-pass, 15 kHz low-pass, & 750 µs de-emphasis; corner accuracy is ± 4%. Jumper selects de-emphasis either before or after the display.

Audio Distortion: Less than 0.25% t.h.d., for 75 kHz peak deviation. <0.5% t.h.d., for 90% a.m.

Output Level: F.M.: 1 V, r.m.s., approx., into 600 ohms at 1000 counts on the display.

A.M.: 1 V to 1.2 V, r.m.s.

DISPLAY

Modulation: LED display; 1000 counts plus 50% over-range; true peak, positive peak, negative peak, or peak-average indications.

Annunciators: Display of settings of mode switch and of filter. Digital display indicates level-high, level-low and unlocked conditions.

I.F. OUTPUT

Frequency: 400 kHz, nominal.

Level: 300 to 360 mV, approx., into 600 ohm load

POWER REQUIREMENTS: 100, 120, 220, or 240 volts, a.c., 50 to 400 Hz; 24 VA.

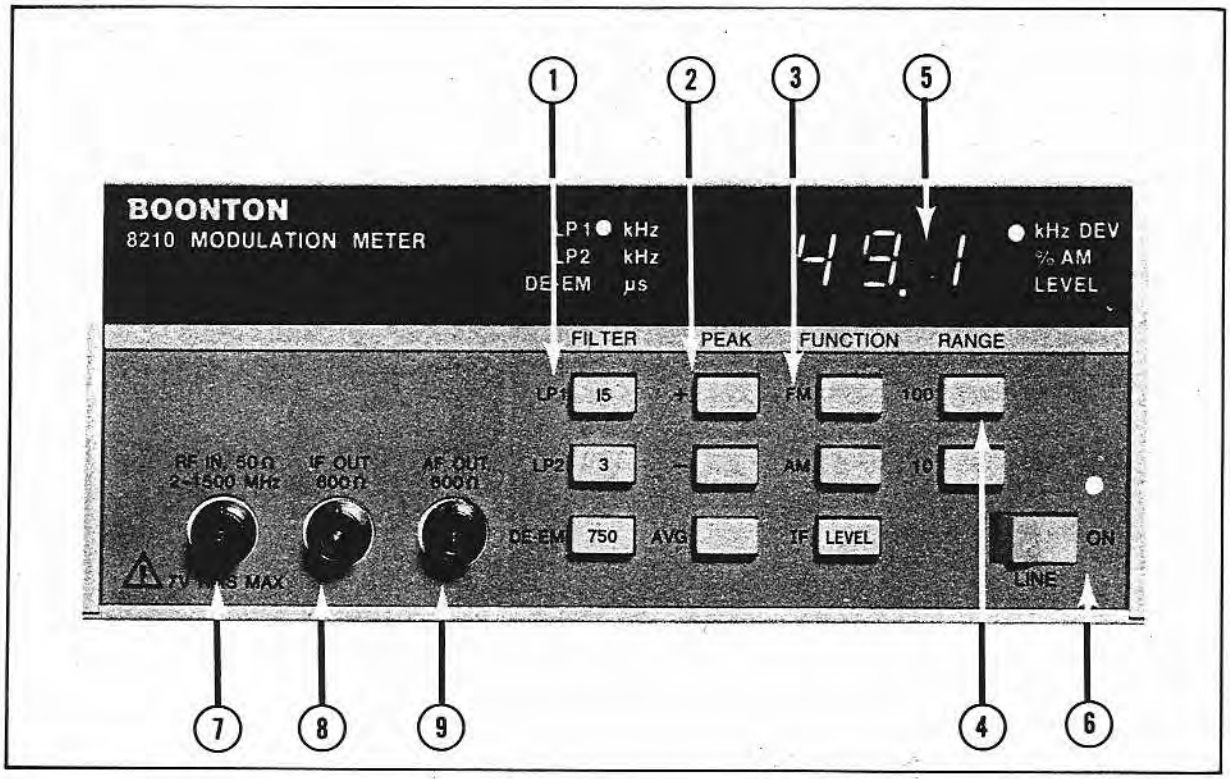

Figure 2-1. Model 8210, Front View

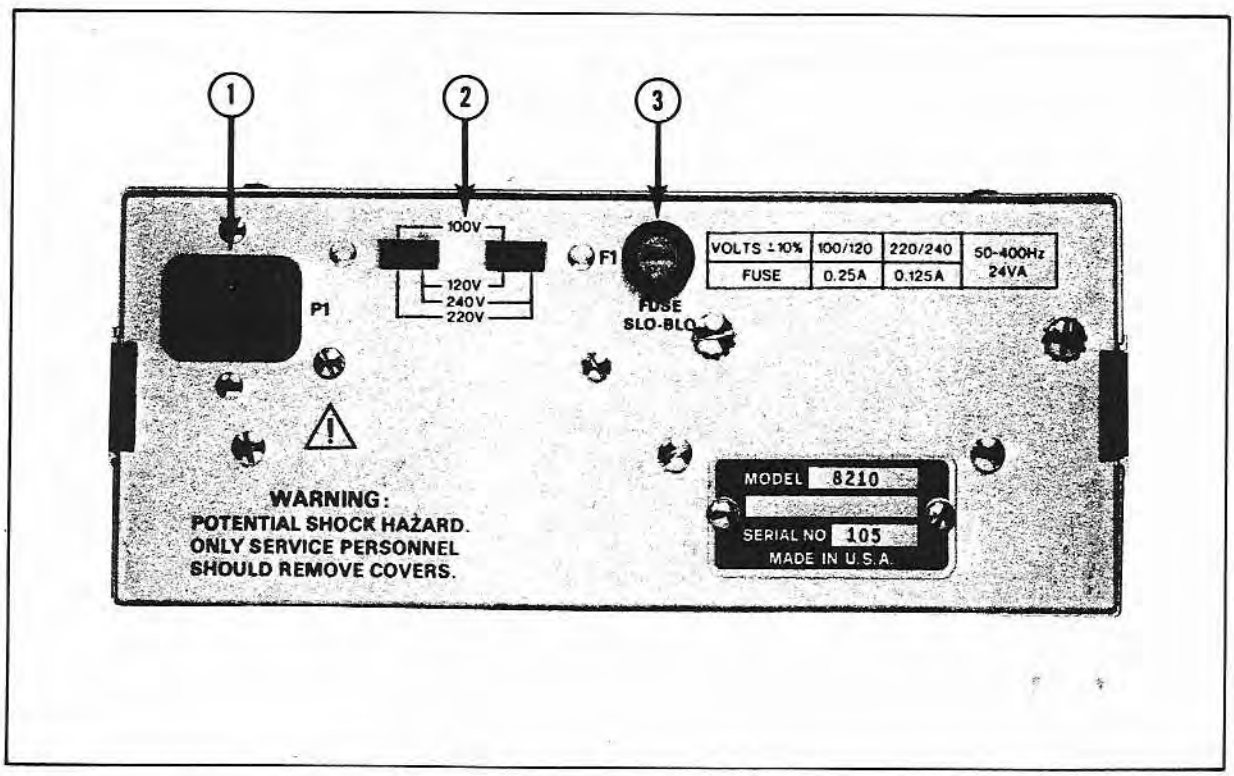

Figure 2-2. Model 8210, Rear View