

STATION MONITOR **SM-220**



STATION MONITOR..... A HIGH-PERFORMA

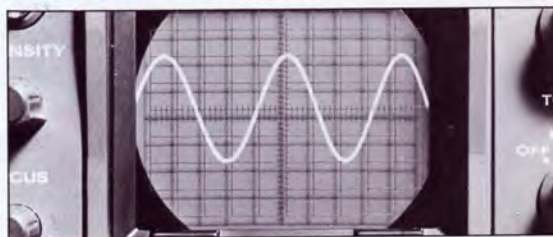
Based on a wide-frequency-range oscilloscope (up to 10 MHz), the Model SM-220 station monitor features, in combination with a built-in two-tone generator, a wide variety of waveform-observing capabilities. An optional feature is a unique pan-display capability. The SM-220 provides efficient station operation as it monitors transmitted waveforms, and it also serves as a high-sensitivity, wide-frequency-range oscilloscope for various adjustments and experiments.

Flexible monitoring and measuring capabilities are built-in features.

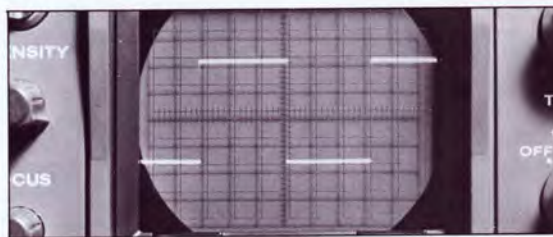
- The SM-220 monitors SSB signal waveforms. To achieve transmission with a minimum of distortion, it helps you establish correct microphone amplifier gain setting and proper compression level setting of the speech processor. Now it is simple to tune the final-amplifier stage accurately (plate and load) as well as check carrier suppression.
- The SM-220 offers various waveform observations in transmitter adjustments and experiments, as a high-sensitivity, wide-frequency-range oscilloscope.
- Key clicks, if any, are distinctively shown as the SM-220 monitors the CW signal being transmitted.
- The SM-220 checks waveforms of received signals (SSB and CW), as it monitors the incoming signal waveforms at your receiver's IF stage (TS-820 series).
- The SM-220 tests the linearity of linear amplifiers (in trapezoidal waveform observation).
- Tuning points in RTTY reception can be located quickly (in cross-pattern observation).
- By adding the optional pan-display unit, the SM-220 provides a visual look at the frequencies and amplitude of on-the-air stations within the band.

A 2-Hz to 10-MHz wide bandwidth, high-performance oscilloscope is the basic unit.

The vertical amplifier has a high sensitivity of 20 mV/division, with a broad frequency range of from 2 Hz to 10 MHz. With these specifications, comparable to laboratory oscilloscopes, it is a useful tool for widely varying waveform-observation applications including transceiver adjustments and experiments with other equipment.



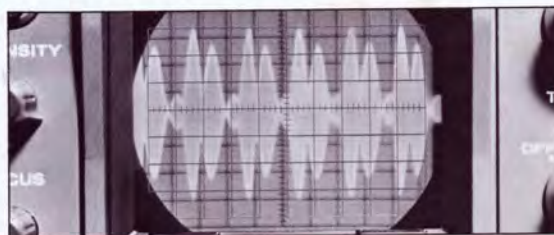
Sine wave



Square wave

The monitor scope ensures quality signal transmissions

The instrument is capable of observing modulated signal waveforms transmitted over a range of 1.8 to 150 MHz. By constantly monitoring the transmitted signal waveforms of your transceiver, a glance at the CRT screen allows quick and accurate SSB microphone gain setting, speech-processor compression level setting, key-click elimination, and other adjustments for maintaining quality signal transmission with minimum distortion. The circuit design is conservatively rated; maximum allowable power capability delivered to the antenna is 1 kW over 1.8 to 54-MHz, and 50 W (rated output) on the 144-MHz band.



Speech pattern

ANCE OSCILLOSCOPE FOR COMMUNICATIONS

The SM-220 is capable of monitoring various incoming signal waveforms.

Making full use of the scope's wideband performance, it can monitor the IF output waveforms of incoming signals being received by Kenwood TS-820 or TS-520 series transceivers.

Now you can give accurate information to stations you are working about their signal qualities. The SM-220 connects directly to the IF OUT terminals on the Model TS-820; a minor change is required on the Model TS-520.

For RTTY reception, accurate tuning can be achieved by coupling an RTTY demodulator and observing the cross pattern.

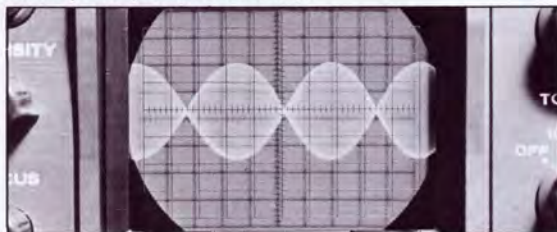


RTTY cross pattern

A 1000-Hz and 1575-Hz two-tone generator is built-in.

The SM-220 contains a two-tone generator which consists of 1000-Hz and 1575-Hz Wien bridge audio frequency oscillators. With its output applied to your transceiver's microphone terminal as simulated speech, you can monitor the waveform of the signal being transmitted.

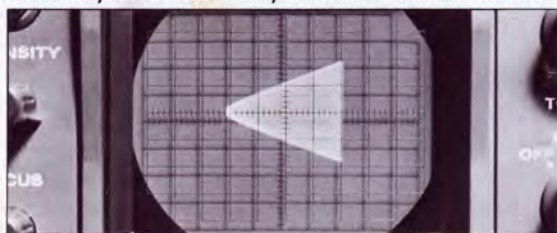
In SSB transmission, proper microphone amplifier gain setting, correct compression level setting for the speech processor (to eliminate the possibility of distortion), optimum final amplifier stage tuning (to safeguard against clipping), and other adjustments can be made quickly and accurately.



Two-tone oscillator waveform

If you use a linear amplifier, its linearity can be examined by monitoring a trapezoidal display on the CRT screen in combination with the two-tone generator, for a quick look at the amplifier's dynamic operating characteristics.

Besides the two-tone signal output, individual single tones can be obtained independently for such applications as making carrier suppression checks in the SSB transmission mode. This built-in signal availability will have many other uses around the hamshack.



Trapezoid waveform



Pan display option BS-5, BS-8

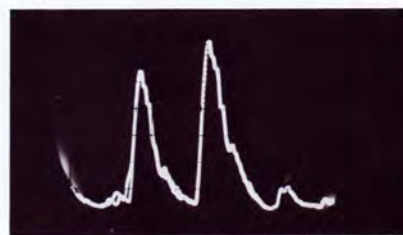
An extra feature is the pan display capability.

The instrument is expandable to pan-display capability by fitting optional units (Model BS-8 for the TS-820 series or BS-5 for the TS-520 series) within the SM-220.

The pan display capability is a convenient feature which enables the operator to look at on-the-air conditions within the band; frequencies and amplitude of stations operating in the band are shown on the CRT screen. The optional pan display units have a switchable bandwidth of ± 100 kHz and ± 20 kHz, with respect to the center frequency of reception. Combined with a built-in center frequency marker and the transceiver's 25-kHz calibrator, relative frequency positions of on-the-air stations are easily determined. The SM-220's logarithmic amplifier makes possible observation of stations widely varying in signal strength — from weak to overpowering — simultaneously on the CRT screen.

In addition, narrow-bandwidth filtering isolates adjacent signals during crowded conditions or during CW reception for careful signal observation.

(For pan display capability, a minor modification in your transceiver is required.)



Pan display waveform

An easy-to-see blue-green cathode ray tube is featured in the SM-220.

For satisfactory luminance and contrast, a P31 CRT with blue-green phosphor is used. The trace-to-the-graticule alignment of the CRT may be adjusted from the rear panel without detaching its enclosure.

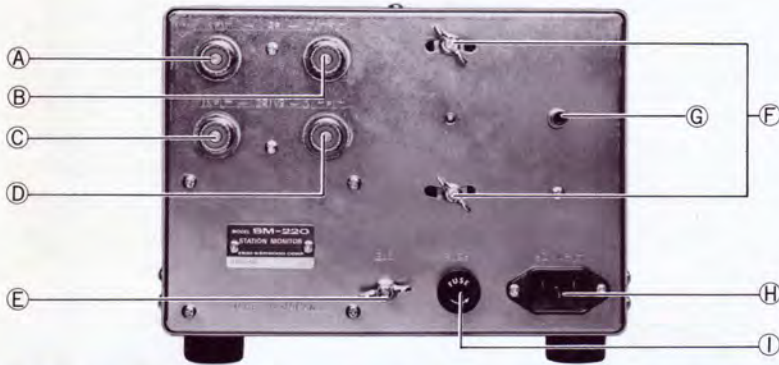
Human-engineered layout of front-panel controls provides easy operation. The SM-220 is styled to match companion TS-820 series and TS-520 series transceivers.

SM-220 FRONT PANEL VIEW



- ① Power indicator
- ② Power switch
- ③ CRT & scale
- ④ Intensity control
- ⑤ Focusing
- ⑥ Vertical ATT fine control
- ⑦ Vertical ATT
- ⑧ Vertical input
- ⑨ Function selector
- ⑩ RF ATT
- ⑪ Output for the tone AG
- ⑫ Tone function selector
- ⑬ Scan width
- ⑭ Marker/sync INT-EXT horizontal
- ⑮ Sweep freq. fine adjustment & EXT horizontal gain control
- ⑯ Sweep freq. selector
- ⑰ Horizontal/EXT SYNC terminal
- ⑱ Vertical position
- ⑲ Horizontal position

SM-220 REAR PANEL VIEW



- A RF input
- B RF output
- C Drive input
- D Drive output
- E Ground
- F Horizontal trace tilt adjustment
- G IF input
- H Power cable connector
- I Fuse holder

SM-220 SPECIFICATIONS

CRT 76ARB31

Transmit Signal Monitor Terminal

Frequency range	1.8 ~ 150 MHz
Maximum power	2 kW (1.8 ~ 54 MHz) 100 W (150 MHz)
SWR	1.2 : 1 or less
Deflection sensitivity	More than 1 div. at 2W input
Attenuator	6 steps

Trapezoid Waveform Observation

Frequency range	1.8 ~ 30 MHz
Maximum power at DRIVE terminal	2 ~ 100 W
SWR	1.2 : 1 or less

Two-Tone Generator

Oscillator frequency	1,000 Hz and 1,575 Hz
Output voltage	10 mV/50 k-ohm (at TWO TONE)

Pan Display Unit

Adaptor name	BS-5 (TS-520 series) BS-8 (TS-820 series)
Input center frequency	3.395 MHz (BS-5) 8.830 MHz (BS-8)
IF frequency	455 kHz
IF bandwidth	More than 1 kHz (-6 dB)
Input sensitivity	More than 20 dBm/div.
Scan width	± 20 kHz, ± 100 kHz, switchable gain

Horizontal Amplifier

Deflection sensitivity	More than 300 mV/div.
Frequency response	DC-250 kHz or over (EXT GAIN at MAX) DC-40 kHz (EXT GAIN at 1/2)

Input resistance/capacitance	1 M-ohm (± 20%)/40 pF or less (SYNC switch at INT)
Attenuator	Fully variable to 0
Max. input voltage	100 Vp-p

Sweep Circuit

Sweep frequency	10 Hz ~ 100 kHz (4 ranges, with fine adjustment)
Sweep linearity	Better than 5%
Sync system	Synchronized sweep, internal negative sync and external sync
Sync amplitude	Internal: More than 1 div. on CRT External: More than 2 Vp-p

Vertical Amplifier

Deflection sensitivity	More than 20 mV/div.
Frequency response	2 Hz ~ 10 MHz (-3 dB)
Input resistance/capacitance	1 M-ohm/40 pF
Overshoot	Less than 5%
Attenuator	1, 1/10, 1/100 and GND/MONITOR (Error between steps: 5% max.)
Max. input voltage	300 V (DC + AC peak) or 600 Vp-p

Power Supply

Power Supply	100V, 120V, 220V, 240V AC ± 10%, 50/60 Hz 20W (Power supply may change according to destination)
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Dimensions

Dimensions	215 (8-1/2)W x 153 (6-1/4)H x 335 (13-3/16)D mm (inch)
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Weight

Weight	5 kg (1.1 lbs.)
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