

MICRO-TEL & REACTION INSTRUMENTS



SMR-3520 Series Receiver shown with the CP-3501 Receiver Controller

FEATURES

- 0.5 to 20 GHz, Extendable to 40 GHz
- Compact and Lightweight
- Fixed, Mobile and Airborne Applications
- Local and Remote Control
- Plug-In IF Demodulator Modules
- Field-Replaceable Control Interface Modules
- Low Noise Figure
- Ultra-Low Phase Noise
- High Dynamic Range
- High NPR - 40 dB Typical
- Low Power Consumption
- Analog Sweep
- Totally Programmable
- Built-In Test Functions

DESCRIPTION

The SMR-3520 Series Receivers, part of the SMR-3500 family of high-performance synthesized microwave receivers, provide complete coverage from 0.5 to 20 GHz with optional frequency extension to 40 GHz. The SMR-3521 (Narrowband) and the SMR-3522 (Wideband) Receiver are currently available in the SMR-3520 Series. Both provide two broadband 70 MHz (or, optionally, two 160 MHz) IF outputs at the rear panel. The SMR-3522 wideband version provides an additional 500 MHz wide IF output centered at 1 GHz. Highly versatile operational control features and IF demodulation flexibility are provided in a compact, light-weight package. Each receiver measures only 3.5 inches high by 8.5 inches wide and is specifically designed for side-by-side rack mounting.

Each SMR-3520 Series Receiver consists of a mainframe with a microwave tuner, IF section, and a power supply. Integral plug-in IF Demodulator Modules and field-replaceable Control Interface Modules are available as options. Control of the receiver and its IF Demodulator Module is accomplished either remotely through an RS-422, RS-232, or IEEE-488 Control Interface Module (optional), or locally through the optional CP-3501 Receiver Controller which attaches directly to the receiver front panel.

Outstanding key electrical parameters include low noise figure, high intercept level, and high dynamic range. Excellent LO phase noise performance (less than 1° rms) over the entire frequency range ensures clean down-conversion and low distortion signal demodulation characteristics. The SMR-3520 Series Receivers can be linearly swept across their full band or any portion of the band in both forward and reverse directions. For local, manual or remote control tuning, the frequency resolution is 100 Hz.

To maximize the flexibility of the SMR-3520 Receivers, numerous IF demodulator bandwidths are available ranging from 250 kHz to 45 MHz. A maximum of four bandwidths is provided in a single IF Demodulator Module. Outputs from the IF Demodulator Module include simultaneous AM/FM Video, and switch selectable AM or FM Audio. Video outputs can be adjusted over a 10 to 100% range in 5% steps. The IF Demodulator Module can be plugged in through the receiver rear panel in a matter of seconds allowing the user to quickly substitute one group of bandwidths for another to meet changing requirements.

Built-In-Test (BIT) status of receiver phase lock, power supply voltages, and operating temperature limits is provided by color-coded LED indicators.

Optionally, the entire tuner assembly can be supplied separate from the mainframe and be remotely located at the antenna. Environmental protection through proper packaging of the tuner assembly would be required in such an application.

Local Control of the SMR-3520 Series Receivers is accomplished with the CP-3501 Receiver Controller which attaches directly to the front panel of the receiver. Operational features of the CP-3501 include soft-key driven menus combined with standard keyboard and rotary tuning knob operation, and a comprehensive alphanumeric LCD display. The user need only select the area of interest, such as "FREQ," and press the appropriate soft key. A second menu appears and prompts the user to quickly and easily select a new frequency or operate an encoder for frequency selection. Other menu routines include IF bandwidth selection, video output levels, demodulation, mode, BIT, and I/O communication information.

When combined with the DRD-3572 Digitally Refreshed Display, the SMR-3520 Series Receiver forms the basis of a complete receiving system. The DRD-3572 has a 5-inch electro-luminescent (EL) display screen and offers high horizontal and vertical resolution (320 x 256 pixels). In the scan mode, the display presents a single refreshed RF trace. When in the SDU mode, sweep width is adjustable from 0 to 40 MHz (50 MHz if optional 160 MHz input is installed). The half-rack display can be mounted side by side with the receiver.

SURFACE-MOUNT/MMIC TECHNOLOGIES

The SMR-3520 Series Receivers use Surface Mount Technology (SMT) and Monolithic Microwave Integrated Circuit (MMIC) devices. This design approach greatly reduces size and weight, while increasing performance and reliability. An additional benefit of using SMT is increased shock and vibration performance due to the reduced mass of the components.

RECEIVER SPECIFICATIONS (All Models)

Frequency Coverage	0.5 to 20 GHz 0.5 to 40 GHz with separate FE-3520 Frequency Extender	Spurious-free Dynamic Range	> 60 dB, typical, to 40 GHz
Frequency Resolution	100 Hz	LC Spurious	-55 dBc, minimum, to 40 GHz
Frequency Stability (Internal Reference)	0.3 parts per million after 10 minute warm-up	RF Outputs	BNC Connectors
External Reference Input Input Frequency	5 MHz, standard; 10 MHz available, consult factory for details	SMR-3521 and SMR-3522	Two 70 MHz outputs (Standard)
Input Level	-10 to +3 dBm		1) AGC/Fixed with bandwidth of 40 MHz, -20 dBm output with 60 dB range in AGC, 30 dB RF/IF gain in fixed mode
Waveform	TTL or sine wave		2) Fixed gain, auxiliary for connection to ancillary equipment, 40 MHz bandwidth.
	The external reference switches automatically to the internal reference when the input signal is removed		Option 7: Two 160 MHz outputs (BNC) in place of 70 MHz outputs; gain identical to the standard version with a bandwidth of 50 MHz. (Not available with Option 9)
Frequency Aging Rate RF Input	1 part per million/year		Option 9: Additional 140 MHz output (SMA). Fixed gain, 50 MHz bandwidth. (Not available with Option 7)
SMR-3520 Series (0.5 - 20 GHz)	SMA connector, 50 ohms nominal,	SMR-3522 only	Additional 1 GHz output (SMA) with a bandwidth of 500 MHz, standard
FE-3520* (18-40 GHz)	Waveguide	IF Passband Group Delay	20 ns, maximum, over 80% of the bandwidth of the IF output
Noise Figure		Built-In-Test (BIT)	Power supply voltages, temperature, phase lock status
SMR-3520 Series (0.5 - 20 GHz)	13 dB, maximum, over 90% of the band; remain- ing 10% 15 dB, maximum;	EMI Shielding	Per MIL-STD-461B, CE03, and RE02
FE-3520* (18-40 GHz)	17 dB, maximum, over 90% of the band; remain- ing 10% 19 dB, maximum	Temperature Range - Operating	0° to +50°C
Phase Noise		Power	115/230 Vac \pm 10%, 47-420 Hz, 100 W, maximum, receiver only 40 W, maximum, frequency extender
SMR-3520 Series (0.5-20 GHz)	Offset from carrier:	Size	
	100 Hz -74 dBc/Hz	SMR-3521	3.5 x 2.5 x 19 inches
	1 kHz -79 dBc/Hz	SMR-3521 and CP-3501 Controller	3.5 x 8.5 x 22 inches
	10 kHz -89 dBc/Hz	SMR-3522	3.5 x 8.5 x 21 inches
	100 kHz -100 dBc/Hz	SMR-3522 and CP-3501 Controller	3.5 x 8.5 x 24 inches
	1 MHz -120 dBc/Hz	FE-3520 Frequency Extender only	3.5 x 8.5 x 18 inches
	or	Weight	
	< 1° rms (typically 0.8°)	Receiver only	21 lbs
FE-3520* (18-40 GHz)	1.5° rms, maximum	Controller	3 lbs
Input VSWR	2.5:1, maximum	Frequency Extender only	10 lbs
LO Radiation			
SMR-3520 Series (0.5 -20 GHz)	-95 dBm		
FE-3520* (18 - 40 GHz)	-65 dBm, maximum		
Image Rejection			
SMR-3520 Series (0.5 - 20 GHz)	> 70 dB		
FE-3520* (18 - 40 GHz)	> 65 dB		
Third Order Input Intercept Point			
SMR-3520 Series (0.5 - 20 GHz)	0 dBm, minimum, over 90% of the band; remaining 10% -3 dBm		
FE-3520* (18 - 40 GHz)	-10 dBm, minimum, over 90% of the band; remaining 10% -13 dBm		

*When the receivers are used with the FE-3520, the specification indicated for the FE-3520 applies from 18 to 40 GHz

IF DEMODULATOR MODULE SPECIFICATIONS (DM-3501/DM-3502 Plug-In)

IF Gain Control	0 to 60 dB	Audio Output	Selectable AM or FM, 15 kHz bandwidth, 1/8 inch phone jack, 600 ohms level, adjustable from 0.1 to 1.0 Vrms
IF Bandwidths		NPR	40 dB, typical, depending on bandwidth and channel loading desired
DM-3501	0.25 to 10 MHz; ratio of highest to lowest bandwidth not to exceed 10:1	Internal Signal Spurious	None above noise floor in a 2 MHz bandwidth
DM-3502	4 to 45 MHz; ratio of highest to lowest bandwidth not to exceed 6:1 (5, 10, 20 and 32 MHz are standard unless otherwise specified)	Size	1.1 x 3.7 x 5.45 inches — plug-in to receiver chassis
AM Video Output	1 Vp-p into 50 ohms	Weight	1 lb
FM Video Output	1 Vp-p into 50 ohms		
AM and FM Video Level Control	10% to 100% in 5% steps, both AM and FM		

CONTROL INTERFACE MODULE SPECIFICATIONS

See Ordering Information

RECEIVER CONTROLLER SPECIFICATIONS

(CP-3501) Attached or remote from receiver

Display	Liquid crystal, alphanumeric, 4 lines with 20 characters each	Size	3.5 x 8.5 x 3 inches
Controls	Keyboard, optical encoder, and soft keys	Weight	3 lbs.

Specifications subject to change without notice.

ORDERING INFORMATION

A standard SMR-3520 Series Microwave Receiver consists of a mainframe with a 0.5 to 20 GHz Tuner, an IF section with two 70 MHz IF Outputs, and a power supply. Available options include integral plug-in IF Demodulator Modules, field-replaceable Control Interface Modules, 160 and 140 MHz IF Outputs, remoted tuner section, and different frequency ranges. Receiver options shown apply to either the SMR-3521 or the SMR-3522. The CP-3501 Receiver Controller, FE-3520 Frequency Extender and DRD-3572 Digitally Refreshed Display are available separately. When ordering, please specify from the following list:

SMR-3521 or SMR-3522	Synthesized Microwave Receiver	Option 10	160 MHz IF Output in addition to the standard 70 MHz outputs. Not available with Option 7, 9 or Option 12
Option 3	8-20 GHz Frequency Range	Option 11	0.5-18 GHz Frequency Range
Option 7	160 MHz IF Outputs, in place of the standard 70 MHz outputs. Not available with Option 9, 10 or Option 12	Option 12	Log IF - Not available with Option 7, 9 or 10
Option 8	Remote Tuner		
Option 9	140 MHz IF Output in addition to the standard 70 MHz outputs. Not available with Option 7, 10 or Option 12		

IF DEMODULATOR MODULES

DM-3501	IF Demodulator Module	Up to four user-specified IF bandwidths from 0.25 to 10 MHz. Ratio of highest to lowest bandwidth not to exceed 10:1.
DM-3502	IF Demodulator Module	Up to four user-specified IF bandwidths from 4 to 45 MHz. Ratio of highest to lowest bandwidth not to exceed 6:1. Unless otherwise specified, bandwidths supplied will be 5, 10, 20 and 32 MHz.

CONTROL INTERFACE MODULES

IM-3501	RS-422 Interface Module
IM-3502	RS-232 Interface Module
IM-3503	IEEE-488 Interface Module

CP-3501	Optional
Receiver Controller	

FE-3520		
Frequency Extender	Option 1	18-26.5 GHz
	Option 2	26.5-40 GHz
	Option 3	12-40 GHz

ADDITIONAL EQUIPMENT AVAILABLE IN THE SMR-3500 FAMILY

In addition to the SMR-3520 Series Receivers, the following equipment is available in the SMR-3500 Family. Separate data sheets are available upon request.

SMR-3530	Synthesized Microwave Receiver Frequency Range: 1-12 GHz
SMR-3540	Synthesized Microwave Receiver Frequency Range: 12-18 GHz
SMR-3550	Synthesized Microwave Receiver Frequency Range: 18-26.5 GHz

SMR-3560

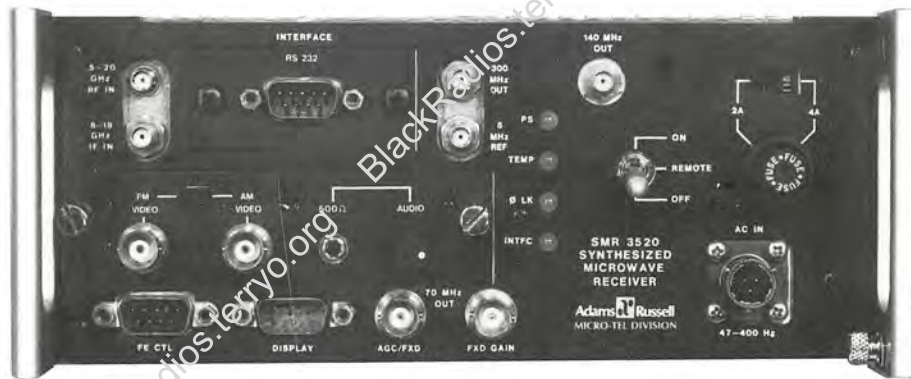
Synthesized Microwave Receiver
Frequency Range: 26.5-40 GHz

DRD-3572

Digitally Refreshed Display
Input IF: 70 MHz standard,
160 MHz (Option 1)

WARRANTY

All M/A-COM Government Products equipment is warranted for one year, except for damage caused by accident or misuse, provided the equipment is returned for repair to the plant in Hunt Valley, Maryland.



Rear Panel with optional Demodulator and Control Interface Modules



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