

## **VHF & UHF RECEIVER COMBINERS**

FROM THE INDUSTRY'S PACE SETTER

### **FEATURES**

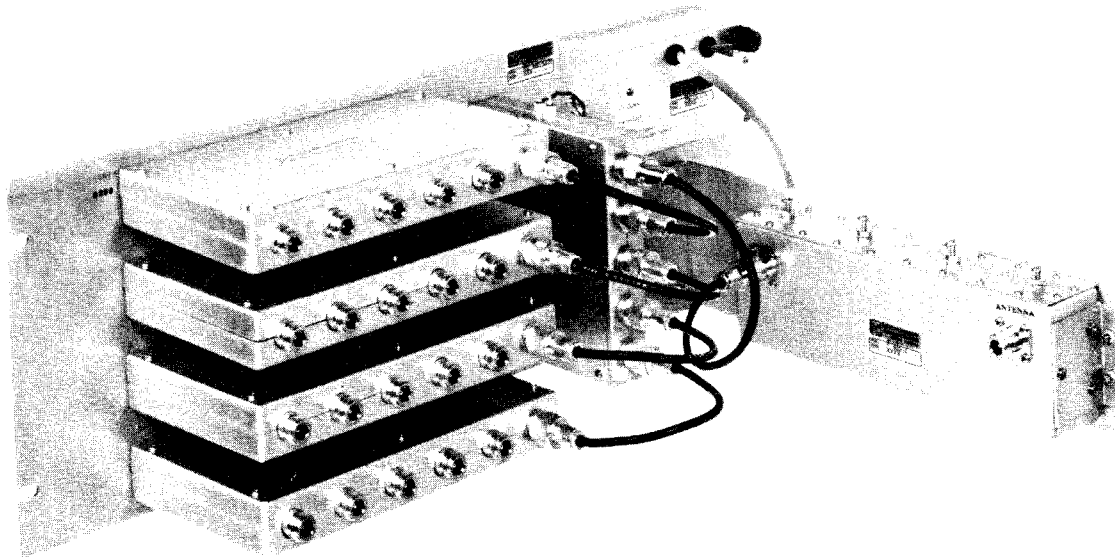
- **High Power Protection**
- **Broad Band Performance**
- **No Scheduled Field Service Requirements**
- **Pre-Tested For Assured Reliability**
- **Superior Specifications**



# RECEIVER COMBINERS

LB — VHF-UHF 25-512 MHz

UHF — 806-960 MHz



*RC-800 20 x 20 with optional power supply P515-115  
and preselector F-800-4-15*

M/A-COM LMC receiver combiners give you reliable, trouble-free performance with no scheduled field service required. We offer a complete selection of options and accessories. To assure optimum performance from our space-age design combiners, a preselector is recommended for your system in high-density areas; give us a call today regarding needs for your application.

M/A-COM LMC offers the latest advance in state-of-the-art receiver combiners. The series of models RC-40 (25-50 MHz), RC-150 (146-174 MHz), and RC-450 (406-512 MHz) give you the optimum in electrical performance, stability, reliability and compactness. The combiners feature hermetically-sealed amplifiers and divider modules, diode limiters for high power protection, 48-hour factory burn-in test to insure continued stable operation in the most severe environment, and a MTBF of well over one million hours. Standard units have 2 to 12 channel capacity; 12 to 144 modular field-expandable units are also available.

The 800 MHz receiver combiners give you high performance and reliability in the 806-960 MHz range. Use this new generation receiver combiner and other M/A-COM LMC components to get the greatest potential from your 800 MHz communications system. Standard units are available with 4 and 8 ports; field expandable units from 8 to 64 and 5 to 20 are also available for high density sites.

## SPECIFICATIONS 25-512 MHz

Frequency Range: LB-VHF-UHF(25-512MHz)  
 Number Receiver Channels: 4 through 12  
 Power: 15 VDC\*  
 Isolation: Rx-Rx 25 dB Min.  
 Noise figure: 5.5 dB Typ.  
 Impedance: 50 Ohms

VSWR: Input 2:1 Output 1.5:1  
 1dB Compression Point: + 10 dBm  
 Intercept Point: + 38 dB Typ.  
 Temperature: - 30° to + 70°C  
 Connectors: BNC female  
 Size: 19 inch rack mount, 3.5 x 19 x 4.25 inches

*\*Operable at 12 VDC (at slightly reduced specifications) and is ideal for use where 12 VDC is available or in systems that use 12 VDC as standby power.*

## INTERMODULATION, GAIN & ATTENUATION CHART

NUMBER OF CHANNELS	IM LEVELS BELOW TWO INCOMING SIGNALS AT - dbm INPUTS				FIXED GAIN ± 1dB	CURRENT ma	LOW BAND MODEL NO.	VHF MODEL NO.	UHF MODEL NO.
	- 40	- 35	- 25	- 18					
4	- 135	- 127	- 107	- 92	3	108	RC40-4	RC150-4	RC450-4
6	- 135	- 127	- 107	- 92	0	108	RC40-6	RC150-6	RC450-6
6G	- 118	- 107	- 86	- 73	3	196	RC40-6G	RC150-6G	RC450-6G
8	- 135	- 127	- 107	- 92	0	108	RC40-8	RC150-8	RC450-8
8G	- 118	- 107	- 86	- 73	3	196	RC40-8G	RC150-8G	RC450-8G
10	- 118	- 107	- 86	- 73	3	196	RC40-10	RC150-10	RC450-10
12	- 118	- 107	- 86	- 73	3	196	RC40-12	RC150-12	RC450-12

## SPECIFICATIONS 806-960 MHz

Frequency Range: 806-960 MHz  
 Number Receiver Channels: 2 - 4 - 8  
 Power: 15 VDC\*  
 Isolation: Rx-Rx 25 dB Min.  
 Noise figure: 3.5 dB Typ., 4.0 Max.  
 Impedance: 50 Ohms

VSWR: Input 2:1 Output 1.5:1  
 1 dB Compression Point: + 19 dBm  
 Intercept Point: + 32 dB Typ.  
 Temperature: - 30° to + 70°C  
 Connectors: N female  
 Size: 19 inch rack mount, 3.5 x 19 x 5.5 inches

*\*Operable at 12 VDC (at slightly reduced specifications) and is ideal for use where 12 VDC is available or in systems that use 12 VDC as standby power.*

## INTERMODULATION, GAIN & ATTENUATION CHART

NUMBER OF CHANNELS	IM LEVELS BELOW TWO INCOMING SIGNALS AT - dBm LEVELS				FIXED GAIN ± 1 dB	CURRENT ma	UHF 806-960 MHz MODEL NUMBER
	- 40	- 35	- 25	- 18			
4	- 114	- 105	- 84	- 70	3 dB	144	RC800-4
8	- 114	- 105	- 84	- 70	3 dB	144	RC800-8

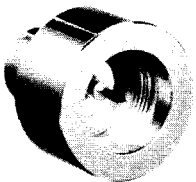
## OPTIONS

### TERMINATIONS:



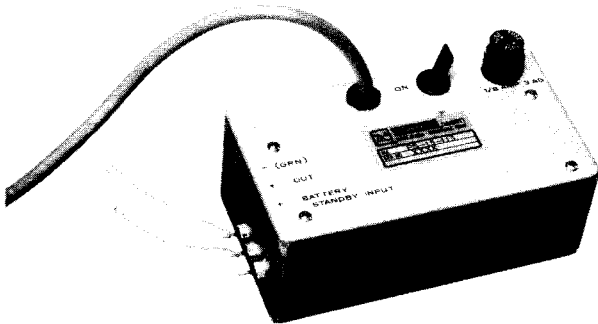
50 ohm terminations are required on all unused ports. Units mate directly to female connector on combiner.

Model: 44007-LB VHF & UHF



Model: 44009 UHF 806-960 MHz

### POWER SUPPLIES:



15 volt DC, 115, 230 VAC primary source 50/60 cycle with automatic switch over to your standby system.

Model: PS 15 - 115 - 15 volt DC 115 VAC

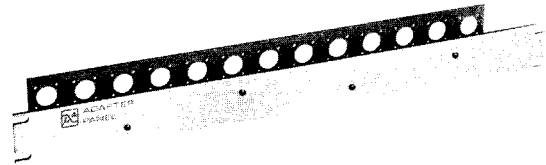
Model: PS 15 - 230 - 15 volt DC 230 VAC

### TERMS:

Prices are F.O.B. Merrimack. Invoices are due net 30 days and standard delivery is 30 days A.R.O. unless otherwise stated.

### ADAPTOR PANELS, CONNECTORS AND CABLES:

Ideal for strain relief.



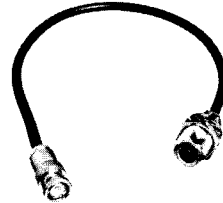
Model: AP-1

Adaptor Panel: 1 3/4 inch, 19 inch rack mounting panel accommodates Antenna Connector and up to 12 Receiver Connectors.



Connector: BNC to N Adaptor Cable for use with AP-1 or AP-3 panel.

Model: ACN



Connector: BNC to UHF Adaptor Cable for use with AP-1 or AP-3 panel

Model: ACU

### PRESELECTORS:

Performance in congested areas may require additional protection. Please refer to the M/A-COM LMC brochure entitled *Preselectors and Duplexers*.

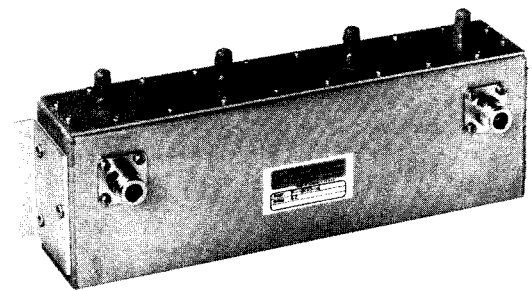
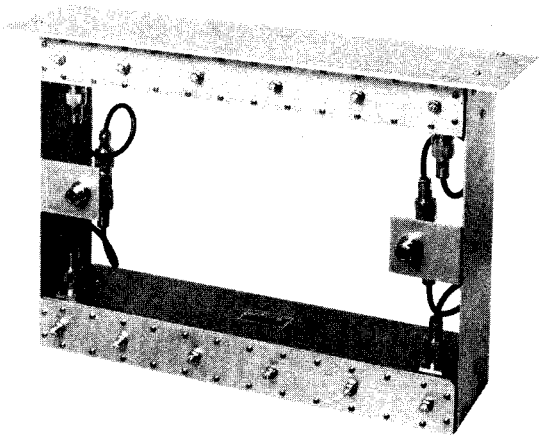
### WARRANTY:

M/A-COM LMC warrants all items against defective material and/or workmanship for a period of one year.

## PRESELECTORS

406-512-MHz

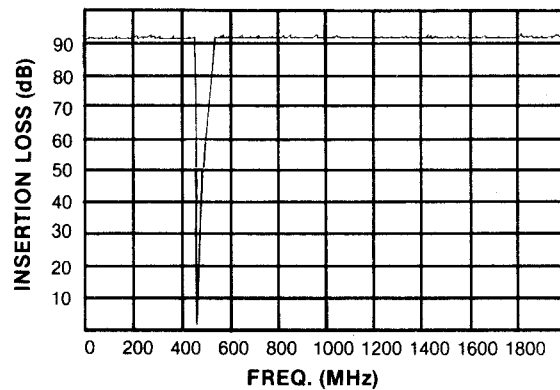
806-960-MHz



### FEATURES

- Receiver System Protection
- Nonharmonic
- Low Loss
- Small in Size, Low in Cost
- Panel Mounts (Optional)

TYPICAL NONHARMONIC RESPONSE CURVE



These unique preselectors, featuring a nonharmonic response above and below the passband, provide protection for your receiver systems from out-of-band RF power sources regardless of frequency.



## SPECIFICATIONS:

**406-512 MHz  
SINGLE BAND**

MODEL	Mid-band Insertion Loss	1 dB Bandwidth	REJECTION			Size In Inches Approx.
			±3 MHz	±5 MHz	±10 MHz	
F450-3-4	1.3 dB	4 MHz	10 dB	20 dB	36 dB	9¼ x 2 x 5
F450-5-2	2.7 dB	2.5 MHz	29 dB	60 dB	80 dB	17 x 2¼ x 5
F450-6-4	2.8 dB	4 MHz	22 dB	50 dB	80 dB	17 x 2 x 5

**806-960 MHz  
SINGLE BAND**

MODEL	Mid-band Insertion Loss	1 dB Bandwidth	REJECTION			Size In Inches Approx.
			±30 MHz	±45 MHz	±60 MHz	
F800-3-11	.5 dB	11 MHz	35 dB	50 dB	60 dB	7½ x 2¼ x 4
F800-4-11	.7 dB	11 MHz	55 dB	70 dB	80 dB	10½ x 2¼ x 4
F800-4-15	.8 dB	15 MHz	47 dB	65 dB	75 dB	10½ x 2¼ x 4
F800-6-11	1.2 dB	11 MHz	70 dB	85 dB	95 dB	7½ x 4¼ x 4

Dual and triple window units for high density master antenna systems are shown below.

**406-512 MHz  
DUAL SUB-BANDS**

MODEL	Mid-band Insertion Loss	1 dB Bandwidth	REJECTION			Size In Inches Approx.
			±3 MHz	±5 MHz	±10 MHz	
F2-450-55-22	2.9 dB	2.5 MHz	29 dB	60 dB	80 dB	17 x 12 x 5
F2-450-66-44	3.0 dB	4.0 MHz	22 dB	50 dB	80 dB	17 x 12 x 5

**TRIPLE SUB-BANDS**

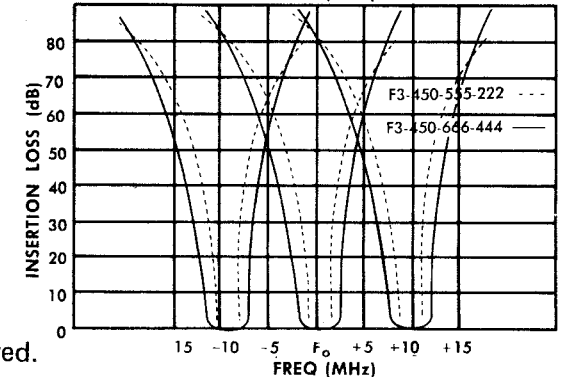
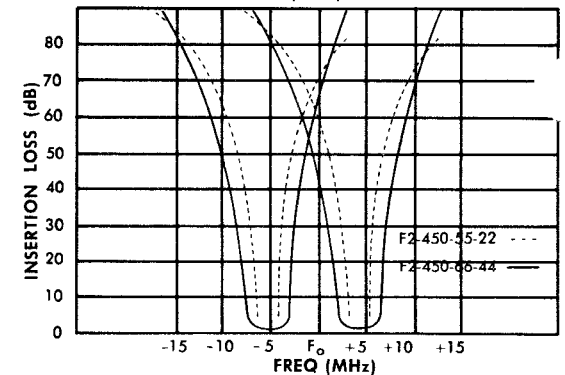
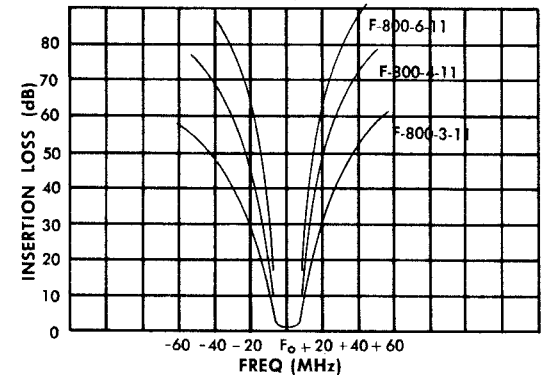
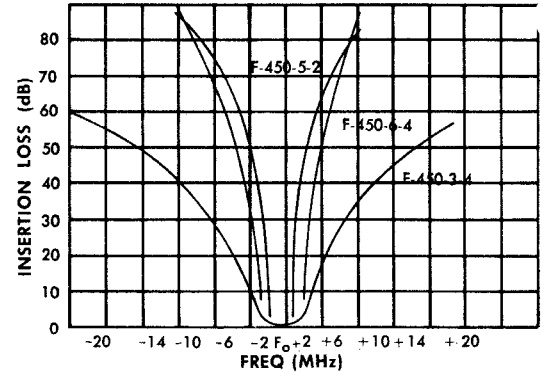
MODEL	Mid-band Insertion Loss	1 dB Bandwidth	REJECTION			Size In Inches Approx.
			±3 MHz	±5 MHz	±10 MHz	
F3-450-555-222	3.0 dB	2.5 MHz	29 dB	60 dB	80 dB	17 x 15 x 5
F3-450-666-444	3.1 dB	4.0 MHz	22 dB	50 dB	80 dB	17 x 15 x 5

### ORDERING INFORMATION:

Select and order by model number giving center frequencies desired. Please consult with factory for configurations other than shown. N female connectors are standard; panels are optional.

### OPTIONS:

**Panels:** Standard 5.25 inches high, 19 inch rack mount panel for easy equipment room installation. Add suffix "P" to any model number.



# TOWER TOP RECEIVER COMBINER SYSTEM

## INTRODUCTION & APPLICATION NOTES

UHF: 450 MHz & 800 MHz  
PRELIMINARY

Microwave Associates' new RCT series field-expandable receiver combiner, which offer signal preamplification at the top of your tower represent the latest advance in improving receiver system sensitivity. System sensitivity improvement, using a RCT combiner in place of a standard receiver combiner, will be at least equal to the loss of the cable between the antenna and the equipment room. (New sites or new installations can also achieve a significant cost and weight savings by not having to install larger diameter cable on the tower.) As with any preamplifier, receiver sensitivity will also be improved if the preamplifier's noise figure is lower than that of the receiver. Microwave Associates' RCT low 4 dB noise figure should allow the average receiver system to realize an additional sensitivity improvement of from 2 to 10 dB over a receiver using no receiver combiner or preamplifier.

Microwave Associates' RCT series receiver combiners consist of two modules per system. The tower top pre-amplifier is housed in a weatherproof box which also has room for multi-window and/or multi-band preselectors as well as crossband couplers. The equipment room unit consists of the receiver combiner decks, a bias injector/splitter and the optional power supply, all mounted on a panel which is predrilled for mounting all decks required to expand the combiner to its full capacity. The DC voltage required to operate the tower top preamplifier is coupled onto the center conductor of the antenna line in the equipment room through the bias injector and decoupled from the antenna line into the preamplifier inside the preamplifier case so that no power or wiring are required at the top of the tower. The DC is isolated at both ends of the cables by circuitry within the RCT combiner. The gain at which the preamplifier is set should be 9 dB plus the loss of the antenna cable in dB.

The use of the RCT series receiver combiner instead of a standard "bottom of the tower" receiver combiner will improve

receiver sensitivity on most sites. Receivers on sites with very high RF noise, however, will not benefit from this type of combiner and should use only standard-type receiver combiners. Consult Microwave Associates factory personnel for details on a test you can make to determine usability of this unit in your system.

If the overall system noise figure of a given receiver system can be reduced, then an improvement in receiver sensitivity will be realized. System figure improvement is accomplished by the following:

$$F_t = F_1 + \frac{F_2 - 1}{G}$$

WHERE:  $F_t$  = Total improved system noise factor  
 $F_1$  = Noise factor of 1st amplifier stag  
 $F_2$  = Noise factor of receiver  
 $G$  = Gain of 1st amplifier state

### System Noise Figure Improvement Example

Given:  $F_t = F_1 + \frac{F_2 - 1}{G}$

Given Following Data: Amplifier Noise Figure 4.0 dB  
 Amplifier Gain 10 dB  
 Receiver Noise Figure 12.0 dB

$$F_1 = 2.5 \quad F_2 = 15.84$$

$$F_t = 2.5 + \frac{15.84 - 1}{10}$$

$$F_t = 3.98 = 6.0 \text{ dB Noise Figure}$$

- Convert noise figure to noise factor  
 $\text{Anti } \log_{10} \frac{\text{N.F. dB}}{10} = \text{Noise Factor}$
- Solve for  $F_t$  and convert resultant to noise figure  
 $10 \log_{10} \text{ Noise Factor} = \text{Noise Figure}$

## SPECIFICATIONS:

**MODEL:** RCT9-4-3 F266-8-3F4

**FREQUENCY RANGE:** 406-512 MHz  
 806-960 MHz

**NO. CHANNELS:** 12 expand to 48 - 450 MHz  
 8 expand to 32 - 800 MHz

**POWER:** 15V DC

**CURRENT:** Basic 680 ma  
 Fully expanded 1.76 amps

**ISOLATION:** Rx-Rx 25 dB minimum  
 4 dB maximum - 450 MHz-800 MHz

**NOISE FIGURE:** 3.0 dB typical - 450 MHz  
 3.5 dB typical - 800 MHz

**IMPEDANCE:** 50 OHMS

**VSWR:** Input 2:1  
 Output 11.5:1

**1 DB COMP. POINT:** +19 dBm

**INTERCEPT POINT:** +32 dBm - 800 MHz  
 +38 dBm - 450 MHz

**TEMPERATURE:** -40° - +70° C

**CONNECTORS:** 450 MHz - BNC Female  
 800 MHz - N Female

**SIZE:** TOP 24x20x6 Weatherproof Box Top  
 BOTTOM 19" Panel Mounted  
 12.25 at 800 MHz  
 26.25 at 450 MHz  
 5.25 Crossband Coupler Panel

**SYSTEM GAIN:** 2 dB + gain specified in equipment room

## MODEL NUMBER IDENTIFICATION:

RCT	9	4	3	F266	8	3	F4
Tower Mount	Tower Top Gain. Range is 9-16 db	Frequency Range (450 MHz)	Equipment Room Gain. Range is 0-6 db 3 db Recommend	Preselector F2-450-86-44 is included	Frequency Range (800 MHz)	Equipment Room Gain. Range is 0-4 db 3 db Recommend	Preselector F-800-4-5 is included

## OPTIONS:

Same As Offered With - RCT800 G16 F4 and RCT450 G12 F266

PLEASE NOTE: Two Power Supplies Required to Satisfy Current Requirements.

450 / 800 MHz RECEIVER SYSTEM

