

# TRANSMITTER COMBINERS

*Click on a model number, or use bookmarks on left.*

<b>M101-150-8TRM</b>	8 Channel VHF combiner - 24" welded rack
<b>M101-150-8TRM19</b>	8 Channel VHF combiner - 19" rack mount
<b>M101-350-8TRM</b>	8 Channel UHF combiner - 24" welded rack
<b>M101-450-8TRM</b>	8 Channel UHF combiner - 24" welded rack
<b>M101-860-10TRM</b>	10 Channel 800 MHz combiner - 19" rack mount
<b>M101-900-10TRM</b>	10 Channel 900 MHz hybrid combiner- 19" rack mount
<b>M104-150-4TCP</b>	4 Channel VHF compact combiner - 19" rack mount
<b>M106-860-5TP,10TP</b>	5-10 Channel 800 MHz combiner panel - 19" rack mount
<b>M107-130-5TP</b>	5 Channel Airband compact combiner panel - 19" rack mount
<b>M107-150-5TP</b>	5 Channel VHF compact combiner - 19" rack mount
<b>M107-250,350,450,760-14TR</b>	14 Channel 250-760 MHz combiner - 19" rack mount
<b>M107-250,350,450,760-8TP</b>	4-8 Channel 250-760 MHz combiner panel - 19" rack mount
<b>M107-450-5TP</b>	5 Channel UHF compact combiner panel- 19" rack mount
<b>M107-860-5TRM</b>	5-10 Channel 800 MHz combiner - 19" rack mount
<b>M107-860-5TRM-HP,10TRM-HP</b>	5-10 Channel high power 800 MHz combiner - 19" rack mount
<b>M108-150-4TP</b>	4 Channel compact VHF combiner panel - 19" rack mount
<b>M108-220-5TRDS</b>	5 Channel 220 MHz trunking combiner system - 19" rack mount
<b>PASS/NOTCH</b>	1 Channel Pass/Notch combiner 66-512 MHz - 19" rack mount
<b>TATC-8645-1E,1HP</b>	5 Channel 800 MHz autotuning combiner - 19" rack mount
<b>TATC-8646/8648-3R</b>	6 / 8 Channel 800 MHz autotuning combiner - 19" rack mount
<b>TATC-8648-1E</b>	8 Channel 800 MHz autotuning combiner - 19" rack mount
<b>TC804</b>	4-8 Channel 800 MHz ceramic combiner - 19" rack mount
<b>TC860</b>	4-8 Channel 800 MHz ceramic combiner - 19" rack mount
<b>TC9042</b>	4 Channel 900 MHz ceramic combiner - 19" rack mount
<b>THRP-4548</b>	High performance UHF repeater panel - 19" rack mount
<b>TS-1546,1580,4680</b>	Crossband couplers VHF, UHF, 800
<b>TW150,220,450,900</b>	2-4 Channel 150-900 MHz hybrid combiners - 19" rack mount
<b>TW860-2HRB1H, TW860-4HRB1H</b>	2-4 Channel 800 MHz hybrid combiners - 19" rack mount
<b>TW860-2HRB1N, TW860-4HRB1N</b>	2-4 Channel 800 MHz hybrid combiners - 19" rack mount

# TELEWAVE, INC. - TERMS & CONDITIONS - Effective August 2003

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- TERMS:** All prices are F.O.B. Seller's plant, San Jose, CA. Domestic packing is included. Export packing or other special requirements will be provided for an extra charge.
- PRICES:** Prices quoted do not include Federal, State, Local or Excise Taxes. Applicable taxes in effect at the time of shipment will be added unless the buyer has submitted a Certificate of Exemption to the seller. Prices are subject to change without notice. Written price quotations will remain valid for 60 days. The minimum invoice is \$50.00.
- ACCEPTANCE:** Orders will be valid only when accepted in writing at Seller's office, 660 Giguere Court, San Jose, California. The contract arising therefrom shall be deemed to have been entered into in the State of California, and its interpretation, construction, and the remedies for its enforcement shall be governed in accordance with California Law.
- CREDIT:** Orders are subject to approval by the seller's credit department. Orders that are not on open account will be shipped prepaid or C.O.D. A confirmed irrevocable letter of credit will be accepted on international orders.
- DELIVERY:** Delivery times quoted are based on date the order is accepted by the seller. The Seller is not liable for delays or inability to fulfill contractual obligations when the causes thereof are beyond the reasonable control of the seller.
- SHIPPING:** All shipments will be collect unless otherwise specified by the buyer and approved by the seller. The buyer's choice of shipper and routing will be used when it is practical. Shipments are routed according to the best judgment of the seller. The seller is not responsible for selecting the least expensive or the fastest routing. Quoted shipping costs are estimates only and not binding on the seller.
- CLAIMS:** Claims for shortages must be made to the seller within 30 calendar days after date of shipment from the seller's plant.
- All goods become the property of the buyer upon delivery to the carrier. Claims for goods lost in transit or damage must be made immediately against carrier by the Buyer.
- Any request for a change order from the Buyers shall be in writing and no change shall be made pursuant to this clause unless agreed to in writing and signed by Seller and Buyer. If a change causes an increase or decrease in the cost or the time required in the performance of any part of the work, an equitable adjustment shall be made in the contract price and schedule. Seller shall have no obligation to commence any extra or changed work without written agreement as to adjustments to contract price and delivery schedules effective thereby.
- Written authorization from Telewave, Inc. must be obtained before returning material. A credit, not greater than 80% of the purchase price of the goods, excluding taxes and shipping, will be allowed. The equipment must be unused and received prepaid in new condition. Any refurbishing of the equipment that is required to return it to an acceptable condition will be charged against the requested credit at our current repair rate. Credit for the returned material will be issued to the original buyer. Cancellation of acknowledged orders by the Buyer will be accepted only upon terms which protect Seller against loss and which are accepted by Seller.
- SPECS:** All specifications of the seller's products are subject to change without notice. We reserve the right to discontinue the manufacture of any product. We reserve the right to modify any product without the consideration of compatibility of previously manufactured products.

## TELEWAVE, INC. - PRODUCT WARRANTY

Products sold by Telewave, Inc. and covered by this Warranty are warranted to be free from defects in material and workmanship at the time of and for a period of one (1) year after delivery to the Buyer. Seller's entire warranty obligation is limited to making adjustments by repair, replacement, or refunding the purchase price of any product which is returned to the Seller as provided below within one (1) year from the date of shipment by the Seller. In no event shall Seller be liable for direct, special, or consequential damages for breach of warranty.

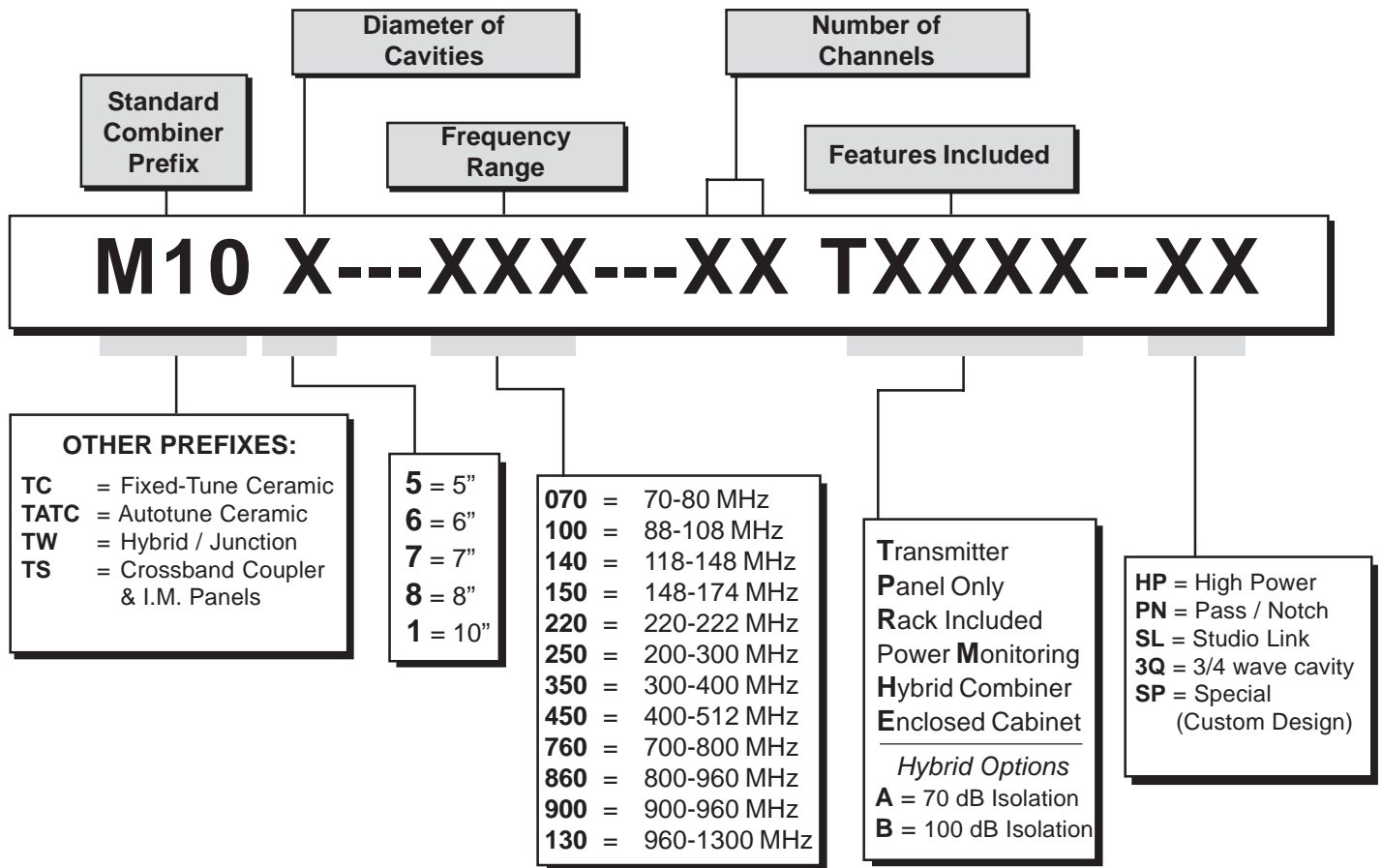
Adjustment will not be allowed for products which have been damaged by lightning, subjected to abuse, improper application or installation, alteration or accident, or negligence in use, storage, transportation or handling. Alteration or removal of the serial number or identification markings voids the Warranty. Seller shall have the right of final determination as to the existence and cause of a defect, whether adjustment will be allowed, and if allowed, whether adjustment will be by repair, replacement, or refund. Where adjustment is not allowed, a charge of 5% of the original purchase price will be made to the Buyer to cover the Seller's cost of inspection and handling.

Shipping and packaging instructions must be obtained from the Seller before products are returned for adjustment. The Buyer will pay for packing, transportation, and transit insurance costs for returned products. The Seller reserves the right to discontinue models at any time or change specifications, design, or price without notice and without incurring any obligation. Products will be returned to the Buyer with transportation cost collect.

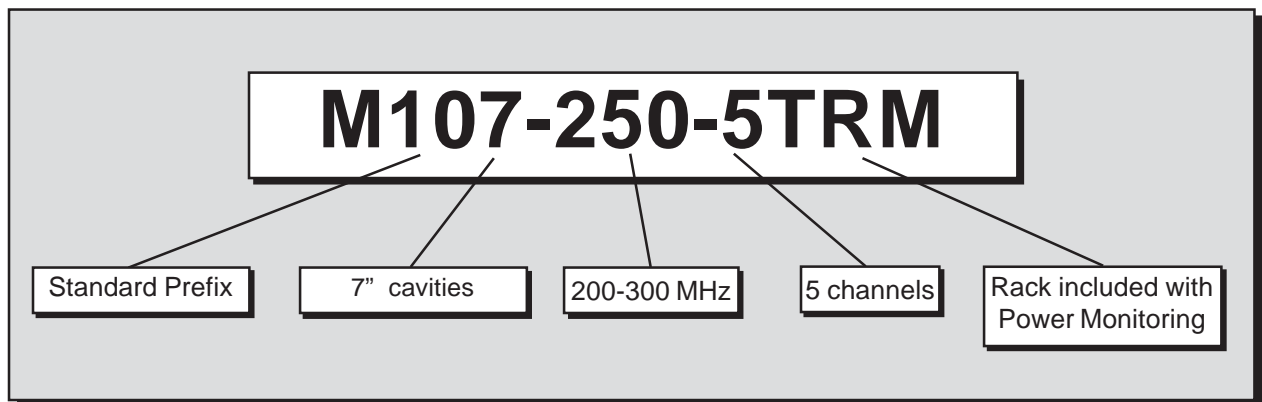
Subject to the provisions of its "Patent Indemnity" clause, the Seller also warrants that it has the right to sell its products, that the Buyer shall have and enjoy quiet possession thereof as against any lawful claims existing at the time of the sale by the Seller, and that said products are free from any charge of encumbrance in favor of third persons existing at the time of sale by the Seller.

The foregoing constitutes the Seller's entire warranty, express, implied or statutory with respect to its products and states the full extent of its liability for breach of Warranty and for damages, whether direct, special or consequential resulting from any such breach. No change whatsoever thereto shall be binding upon the seller unless made in writing and signed by a duly authorized representative of the Seller.

# COMBINER MODEL NUMBER NOMENCLATURE



## EXAMPLE:



## NOTES:

150, 350, and 450 MHz Standard Combiners ship in 24" Welded Rack.  
 860 MHz Standard Combiners ship in standard 19" EIA Rack.  
 Consult factory for special applications.

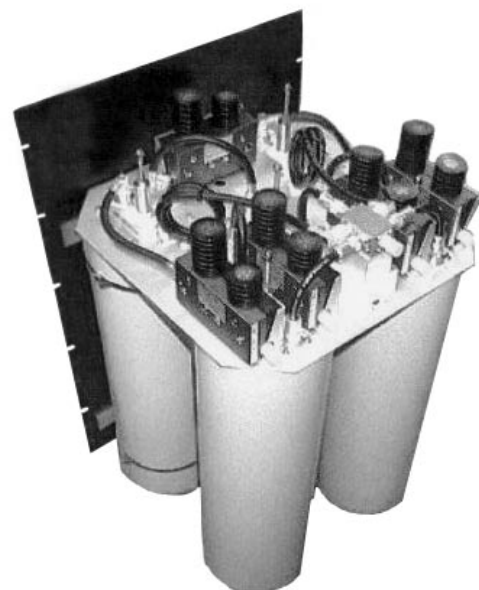
## **M107-130-5TP**

### **VHF AIRBAND TRANSMITTER COMBINER**

The TELEWAVE M107-130-5TP Low Loss Combiner allows up to 5 transmitters in the 118-136 MHz VHF Airband to be connected to a single antenna.

All components in these field-expandable combiners are completely passive. This design allows direct access for tuning, simplifies installation and maintenance, and allows for addition of channels without any disruption of service.

High -"Q" cavities and dual isolators are integrated into each channel for maximum interference prevention, and transmitter protection. These combiners are shipped without racks, for mounting in existing installations.



#### **Major Options :**

Heavy duty 19" (48 cm) racks  
Power Monitoring  
Wattmeter Panel  
Receiver Multicoupler

#### **SPECIFICATIONS**

Frequency Range	118-136 MHz
System Impedance	50 Ohms
VSWR (typ.)	1.25:1
Channels	5 channels into one antenna
Input Power	150 W max per channel
Insertion Loss at 150 KHz (typ.)	3.3 dB
TX-to-TX Isolation	85 dB or greater
2nd Harmonic Suppression	90 dB or greater
Operating Temp	-30° C to +60° C
Connectors	N-Female
Panel Dimensions in. (cm) (HWD)	36.75" x 19" x 20"
Panel Dimensions cm. (HWD)	93" x 48" x 51"
Weight lb (kg)	80 (36.4)

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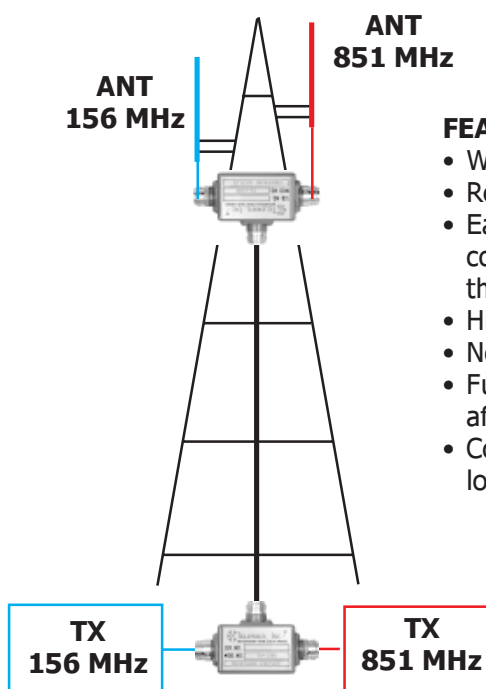
## TS-1546, TS-1580, TS-4680 CROSSBAND COUPLERS

**DESCRIPTION:**

Telewave Cross-Band Couplers allow transmitters, receivers, and antennas in 150/850 MHz, 150/450 MHz, and 450/850 MHz bands to share a common feedline. Two couplers are required for each installation. The ability to share a feedline between systems on different bands simplifies installation, and allows use of higher quality cable, as only one is required.

**TS-1580**

132-174 MHz  
806-960 MHz


**FEATURES:**

- Wide Pass Band - >100 MHz min.
- Reduces tower weight and wind loading
- Easy installation - TX and RX connect through one coupler to the feedline, and antennas connect through a second coupler on the tower
- High power input - 400 watts each port
- No tuning required
- Fully sealed construction - No maintenance needed after connectors are sealed
- Cost savings enable upgrade of primary feedline for lower loss

**TS-4680-DIN**

406-512 MHz  
806-960 MHz


**SPECIFICATIONS**

Low input:  
High input:  
Insertion loss:  
Input power:  
Temperature:  
Weight:  
Dimensions:  
Connector types:

**TS-1546**

132-174 MHz  
440-520 MHz  
0.1 dB per pair  
150 watts per port  
-30°C to +60°C  
0.5 lb per unit  
3.75" W x 2.25" W x 1" H  
N-F or N-M, 7-16 DIN opt.

**TS-1580**

132-174 MHz  
806-960 MHz  
0.15 dB per pair  
150 watts per port  
-30°C to +60°C  
0.5 lb per unit  
3.75" W x 2.25" W x 1" H  
N-F or N-M, 7-16 DIN opt.

**TS-4680**

406-512 MHz  
806-960 MHz  
0.15 dB per pair  
150 watts per port  
-30°C to +60°C  
1 lb per unit  
6.5" L x 1.5" W x 1" D  
N-F or N-M, 7-16 DIN opt.

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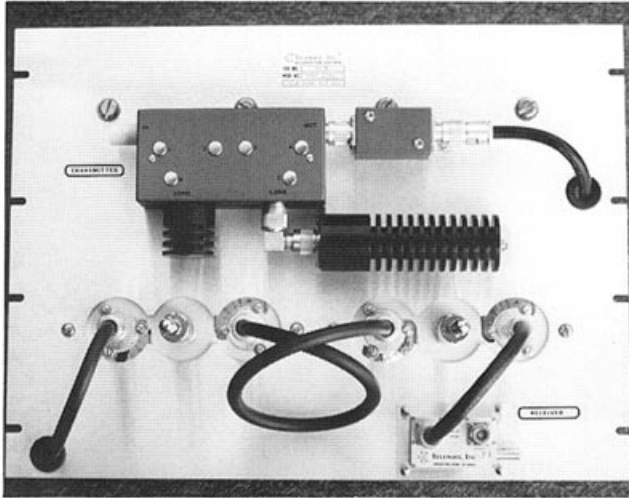
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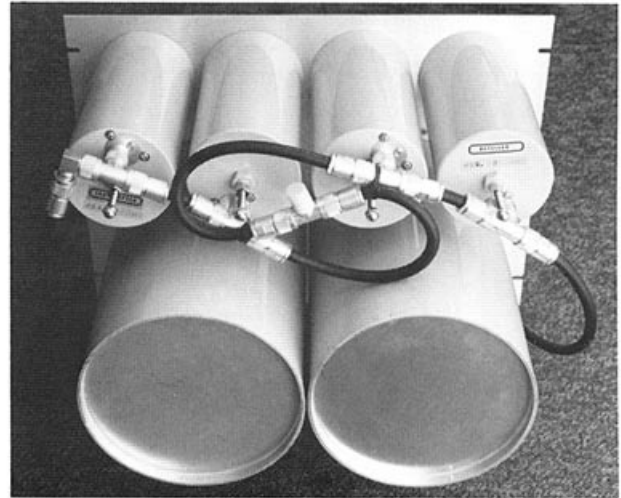


## **THRP-4548**

### **HIGH PERFORMANCE REPEATER PANEL**



**FRONT**



**BACK**

The Telewave THRP-4548 High Performance Repeater Panel is ideal for applications where maximum intermodulation protection is required for the repeater transmitter and receiver. This panel also greatly improves the effective sensitivity and selectivity of the receiver front-end for extended mobile and portable coverage.

The panel uses a T-4560 Dual Isolator with a 50 watt termination on the second stage output, and a low pass filter for transmitter IM protection. This combination provides over 60 dB of IM protection over a  $\pm 5$  MHz bandwidth, and TX 2nd harmonic attenuation of over 50 dB.

The duplexer is a Telewave TPRD-4544, with four 4" cavities in a pass/reject configuration. This duplexer has only 1 dB insertion loss, and provides over 110 dB isolation. The receiver side of the duplexer is interconnected to two 8" high-Q bandpass cavities, to form a narrow pass-band preselector.

The output of the preselector is coupled to one of two types of low-noise preamplifiers. The TLA450-12 is a variable-gain, low-noise bipolar preamp. The output is factory adjustable from +6 to +28 dB, with a noise figure of 2.5 dB or better, and 3rd order intercept of +35 dBm or better. This preamp is recommended for areas that are prone to lightning damage or high static discharge.

The second preamp option is the TGA450-12, which uses a GaAsFET transistor for high sensitivity with a noise figure of 0.7 dB or better. Typical gain is +17 dB, with 3rd order intercept of +24 dBm or better. This preamp is recommended for sites with a relatively low existing ambient noise level.

The Telewave THRP-4548 High Performance Repeater Panel puts all this equipment on one 14" H x 19" W panel, tuned tested, and ready to install. The total price is less than if the equipment were purchased a piece at a time, and requires less rack space. The simple installation consists of mounting the panel, connecting +12 VDC to the preamp, and connecting the transmitter, receiver, and antenna to the proper input/output ports.

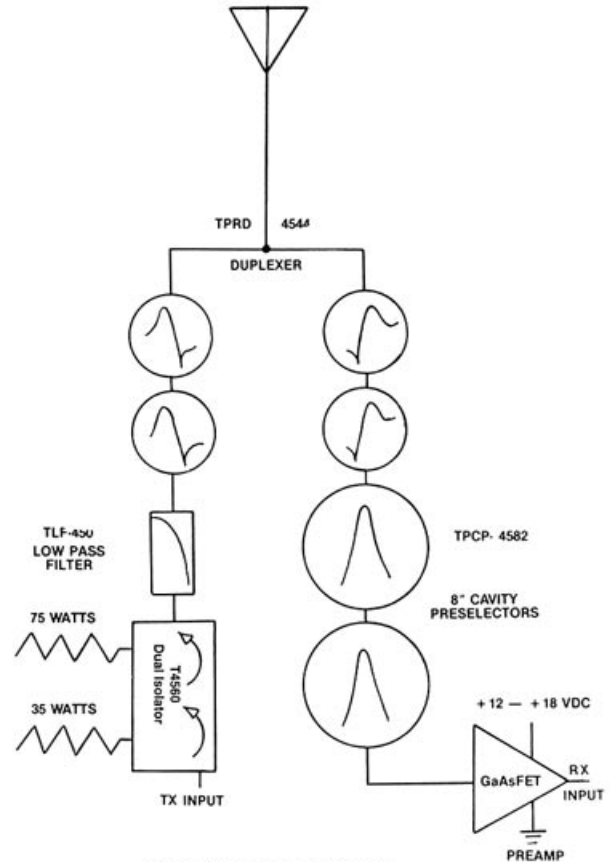
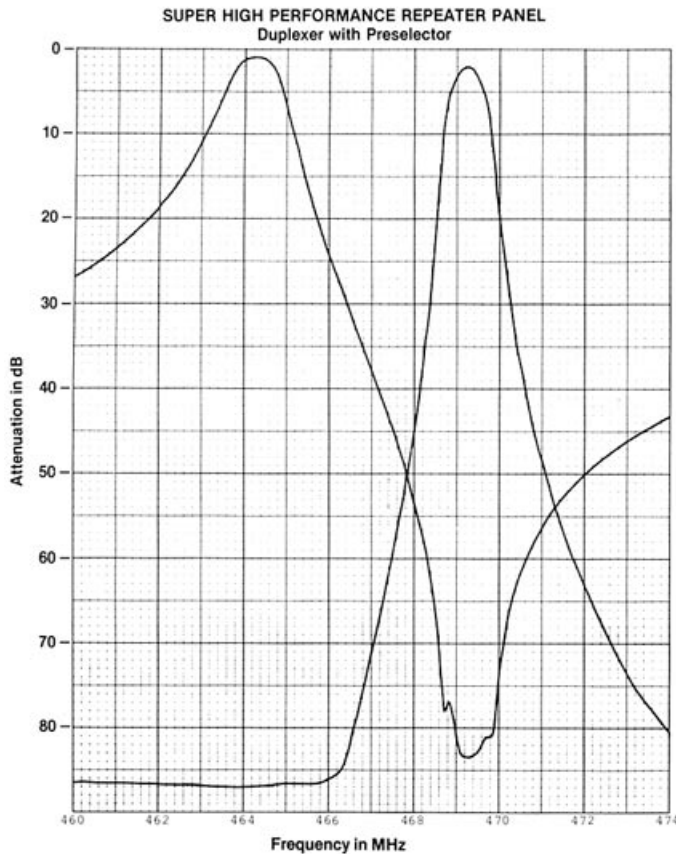
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# THRP-4548



SYSTEM BLOCK DIAGRAM

## SYSTEM ELECTRICAL SPECIFICATIONS

Frequency Range . . . . . 400-512 MHz  
 Frequency Separation . . . . . 5 MHz or more  
 Transmitter Power Input (continuous) . . . . 125 watts  
 Maximum VSWR . . . . . 1.22 to 1  
 Transmitter to Receiver Isolation . . . . . 110 dB  
 Transmitter to Antenna Insertion Loss . . . . 1.8 dB  
 Transmitter 2nd harmonic attn . . . . . 50 dB  
 Antenna to Transmitter Isolation . . 75 dB + 5 MHzs  
 Antenna to Receiver Gain (GaAsFET) . . . . +17 dB  
 (Bipolar) . . +8 to +28 dB  
 Receiver to Transmitter Isolation . . . . . 120 dB  
 Preamp noise figure (GaAsFET) . . . . . 0.7 dB  
 (Bipolar) . . . . . 2.5 dB  
 Preamp 3rd order I.O. (GaAsFET) . . . . . +24 dBm  
 (Bipolar) . . . . . +35 dBm  
 Preamp input power (GaAsFET) . . +12 to +18 VDC  
 Preamp current (GaAsFET) . . . . . 18 mA  
 (Bipolar) . . . . . 170 mA

## MECHANICAL SPECIFICATIONS

Dimensions . . . . . 19"W x 14"H x 12"D  
 Net Weight . . . . . 17 lbs.  
 Shipping Weight . . . . . 22 lbs.  
 Temperature Range . . . . . -30 to +40 deg. C  
 Connector Type . . . . . N-female  
 Finish . . . . . Grained Alum.  
 Preselector . . . . . 2-8" bandpass cavities  
 Duplexer . . . . . 4-4" pass/reject cavities

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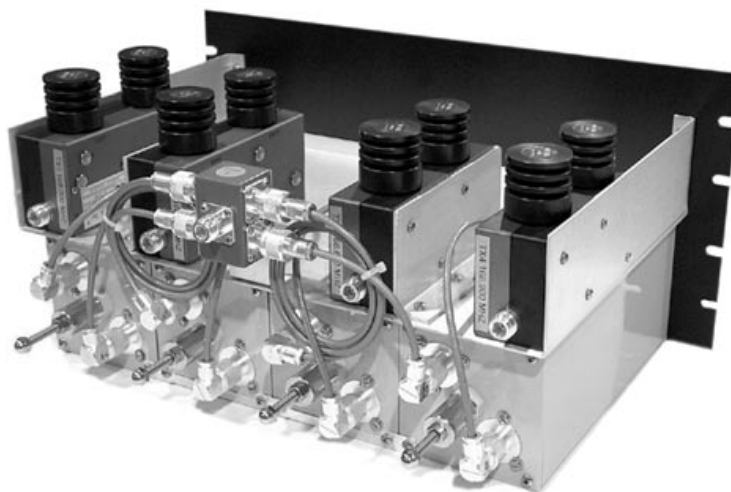
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## **M104-150-4TCP**

### **4 CHANNEL LOW LOSS COMBINER**



The M104-450-4TCP Low Loss VHF Combiner offers the same high performance as our standard low loss combiners, in a much smaller package. This state of the art technology allows us to create one of the world's smallest Low Loss Combiners.

The M104-450-4TCP combines up to 4 channels per unit, with 300 KHz separation, in only 8.75" of standard rack space. The modular combining units can be grouped for up to 16 channels to accommodate system expansion.

The optional receiver system utilizes the TPMC-1534 Preselector / Multicoupler for enhanced receiver performance, and distribution to 4 receivers.

#### **Specifications**

#### **M104-150-4TCP**

Frequency Range		148-170 MHz
Frequency Spacing (min)		300 KHz
Temperature		-30°C to +60°C
System Impedance		50 ohms
TX to TX Isolation (min)		75 dB
Ant to TX Isolation (min)		70 dB
Insertion loss at 300 KHz (typ)	4 channels	3.4 dB
Power Input Per Channel		100 watts
Transmitter Input VSWR (max)		1.25:1
Mounting		19" (48 cm) rack
Dimensions (H x W x D)	4 channels	8.5" x 19" x 12.5"
		21.6 x 48 x 31.75 cm
Input/Output Connectors		N-Female
Net Weight		32 lb / 14.5 Kg

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## **M108-150-4TP**

### **VHF TRANSMITTER COMBINER**

The TELEWAVE M108-150-4TP Low Loss Combiner allows up to 4 transmitters in the 148-174 MHz VHF band to be connected to a single antenna.

All components in these field-expandable combiners are completely passive. This design allows direct access for tuning, simplifies installation and maintenance, and allows for addition of channels without any disruption of service.

High -"Q" cavities and dual isolators are integrated into each channel for maximum interference prevention, and transmitter protection. These combiners are shipped without racks, for mounting in existing installations.



#### **Major Options :**

Heavy duty 19" (48 cm) racks  
Power Monitoring  
Wattmeter Panel  
Receiver Multicoupler

#### **SPECIFICATIONS**

Frequency Range	148-174 MHz
System Impedance	50 Ohms
VSWR (typ.)	1.25:1
Channels	5 channels into one antenna
Input Power	150 W max per channel
Insertion Loss at 150 KHz (typ.)	3.3 dB
TX-to-TX Isolation	85 dB or greater
2nd Harmonic Suppression	90 dB or greater
Operating Temp	-30° C to +60° C
Connectors	N-Female
Panel Dimensions in. (cm) (HWD)	29.75" x 19" x 20"
Panel Dimensions cm. (HWD)	76" x 48" x 51"
Weight lb (kg)	60 (27.2)

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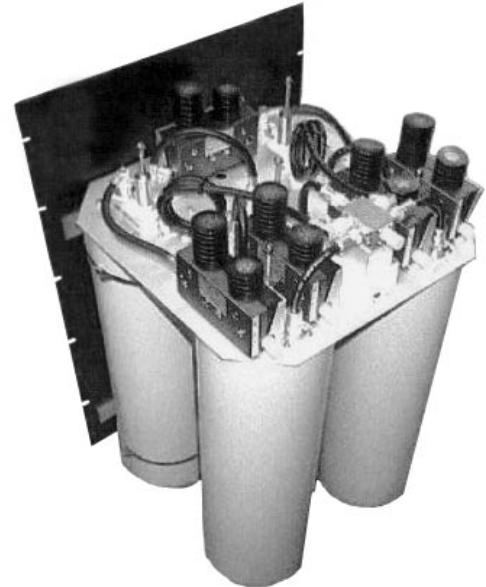
## **M107-150-5TP**

### **VHF TRANSMITTER COMBINER**

The TELEWAVE M107-150-5TP Low Loss Combiner allows up to 5 transmitters in the VHF band to be connected to a single antenna.

All components in these field-expandable combiners are completely passive. This design allows direct access for tuning, simplifies installation and maintenance, and allows for addition of channels without any disruption of service.

High -"Q" cavities and dual isolators are integrated into each channel for maximum interference prevention, and transmitter protection. These combiners are shipped without racks, for mounting in existing installations.



#### **Major Options :**

Heavy duty 19" (48 cm) racks  
Power Monitoring  
Wattmeter Panel  
Receiver Multicoupler

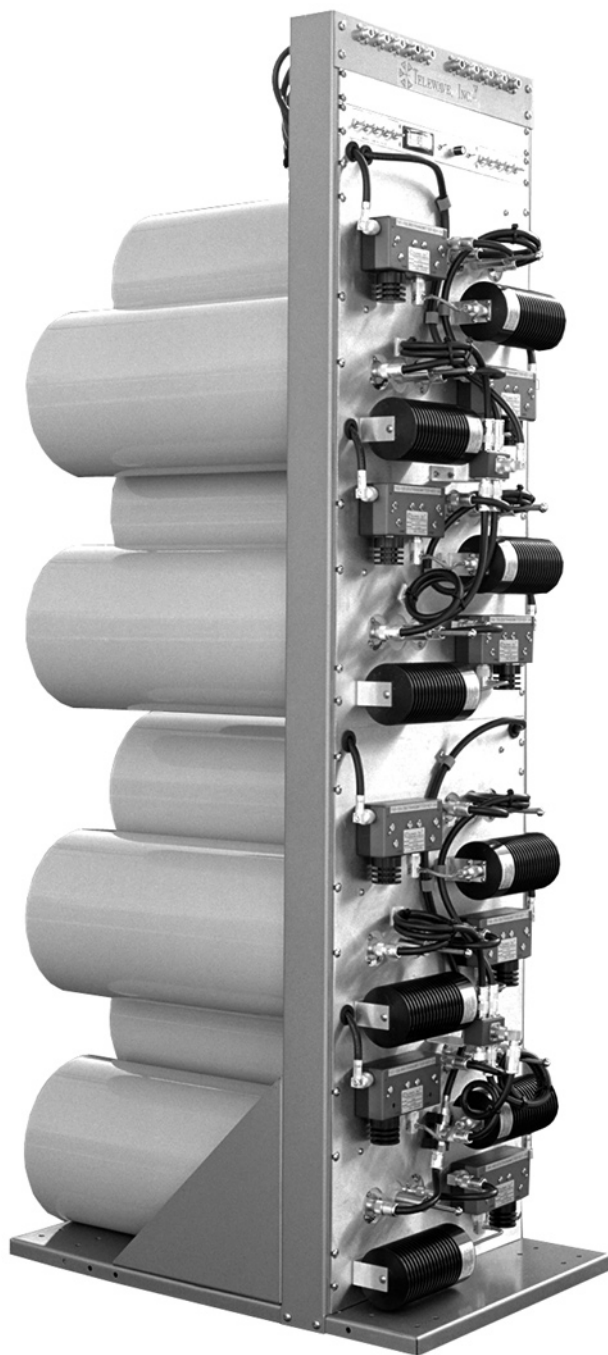
#### **SPECIFICATIONS**

Frequency Range	148-174 MHz
System Impedance	50 Ohms
VSWR (typ.)	1.25:1
Channels	5 channels into one antenna
Input Power	150 W max per channel
Insertion Loss at 150 KHz (typ.)	3.3 dB
TX-to-TX Isolation	85 dB or greater
2nd Harmonic Suppression	90 dB or greater
Operating Temp	-30° C to +60° C
Connectors	N-Female
Panel Dimensions in. (cm) (HWD)	29.75" x 19" x 20"
Panel Dimensions cm. (HWD)	71" x 48" x 51"
Weight lb (kg)	74 (33.6)

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## **M101-150-8TRM19**

### **LOW LOSS VHF COMBINER FOR CLOSE SPACING**



OPTIONAL 100 WATT LOADS SHOWN

Telewave introduces the latest innovation in high-power, high capacity VHF combining systems. The **M101-150-8TRM19** uses up to eight 10", high "Q" low-loss cavities mounted on a standard EIA 19" x 72" rack. This new design provides as much as 75 dB isolation for each transmitter, with spacing as close as 105 KHz. Each channel has a separate isolator with 60 watt load (standard), and all tuning is accessible from the front panel.

Optional power monitoring for each channel is available, as well as remote keying for each transmitter. The PM10C2S1C metering panel uses only 1.75" of vertical rack space.

The optional receiver system is built around the new Compact Preselector Series. Depending on the application, the TPCP-1544C, -1546C, or -1548C preselector may be integrated directly into the upper portion of the M101-150 84" rack. The receiver multicoupler also mounts straight into the rack, preserving valuable site floor space.

As frequency "re-farming" begins to take shape, and new 12.5 KHz and 6.25 KHz assignments become more common, channel spacing will be a critical issue. The M101-150-8TRM19 allows operators of high-density VHF systems to take advantage of new technology, while preserving and enhancing the performance of existing equipment.

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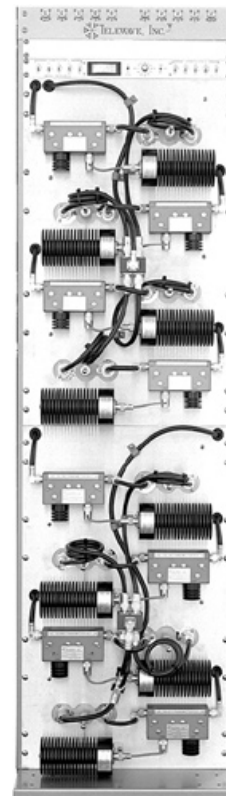
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# M101-150-8TRM19

## SPECIFICATIONS

### **TRANSMITTER COMBINER**

CONFIGURATION	8 TX - 1 ANT or 4 TX - 2 ANT
FREQUENCY RANGE	148 MHz TO 174 MHz
CAVITY SIZE	1/4 WAVE 10 INCH DIAMETER
NUMBER OF CHANNELS	8
Tx TO Tx ISOLATION	75 dB
ANTENNA TO Tx ISOLATION	55 dB
Tx TO Tx CHANNEL SEPARATION	105 KHz MIN
INSERTION LOSS	3.8 dB TYP
INPUT POWER	125 WATTS
2nd STAGE ISOLATOR TERMINATION	60 WATTS (optional 100 watt loads shown)
2nd HARMONIC SUPPRESSION	90 dB MIN
INPUT VSWR	1.25:1
REMOTE TRANSMITTER KEYING	YES
RF POWER MONITORING	COMBINER INPUT AND OUTPUT
CONNECTORS INPUT/OUTPUT	(8) N FEMALE ON FRONT
MOUNTING	EIA 19" RACK 72" HIGH (84" rack required with receiver system)
TUNING	FROM FRONT
INTER CONNECT CABLES	RG214
TEMPERATURE RANGE	-30°C to +60°C
WEIGHT	200 LB.

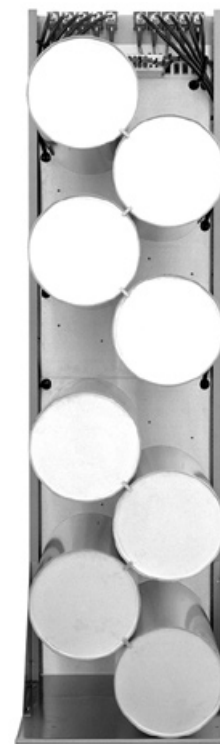


### **POWER MONITORING - PM10C2S1C (OPTION)**

FREQUENCY RANGE	132 TO 174 MHz
BANDWIDTH	40 MHz
INPUTS	10 TRANSMITTERS, 2 ANTENNAS
REMOTE KEYING	10 TRANSMITTERS
DIMENSIONS	1.75" X 19"

### **RECEIVER MULTICOUPLER - TW8-150-1R (OPTION)**

FREQUENCY RANGE	132 TO 174 MHz
BANDWIDTH	40 MHz
VSWR	1.5:1 MAX
NOISE FIGURE	2.5 dB (4 dB INCLUDING PRESELECTOR)
3rd ORDER INTERCEPT	+38 dB
1 dB COMPRESSION POINT	+18 dB MIN
SYSTEM GAIN	2 dB MIN
Rx TO Rx ISOLATION	30 dB
INTERMOD SUPPRESSION	-130 dBm WITH TWO -35 dBm INPUT SIGNALS
TEMPERATURE RANGE	-30° C to +60° C
CONNECTORS INPUT/OUTPUT	(8) N FEMALE ON REAR
DIMENSIONS (H x W x D)	1.75" x 19"



### **RECEIVER PRESELECTOR - TPCP-1546C (OPTION)**

TUNING RANGE	148-174 MHz
BANDWIDTH	2 MHz
ISOLATION @ +/- 5Mhz	70 dB
INSERTION LOSS:	2.0 dB
VSWR REF. TO 50Ω (max)	1.5:1
TEMPERATURE RANGE	-30° C to +70° C
NUMBER OF CAVITIES	6
MOUNTING	19" Rack Mount
DIMENSIONS (HxWxD)	8.75" x 19" x 15"
CONNECTORS	N or UHF Female
NET WEIGHT	36.5 lb

**TELEWAVE, INC.** 660 Giguere Court San Jose, CA 95133  
Toll Free: 1-800-331-3396 Direct: 408-929-4400 Fax: 408-929-4080  
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## **M101-150-8TRM**

### **LOW LOSS VHF COMBINER**

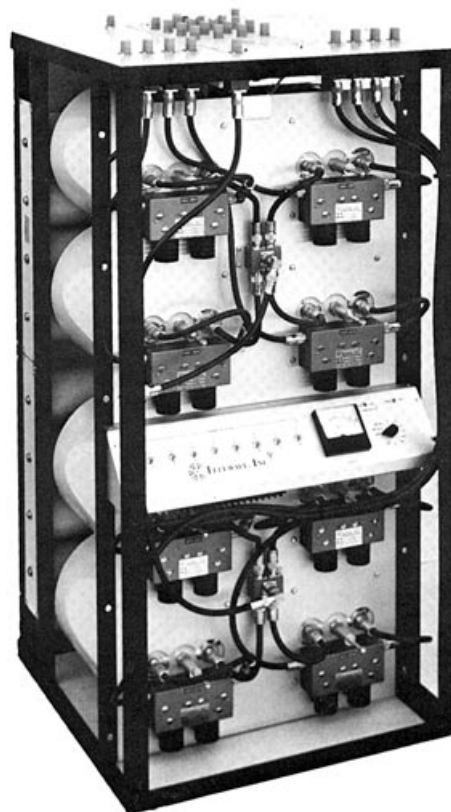
The TELEWAVE M101-150 series of Low Loss Combiners are designed with the technician in mind.

All components in these field expandable combiners are completely passive with the exception of the optimal solid-state receiver distribution amplifier. The compact design is enclosed in a rugged steel frame.

Once installed, this unique combiner allows for maintenance or addition of channels without disruption of co-channel users.

All components are standard and easy to obtain. Buy only the channels presently needed; add-on in the future. This design is ideal for installation in close quarters.

NOW is the time to clean up an existing site or start a new system!



**M101-150-8TRM**

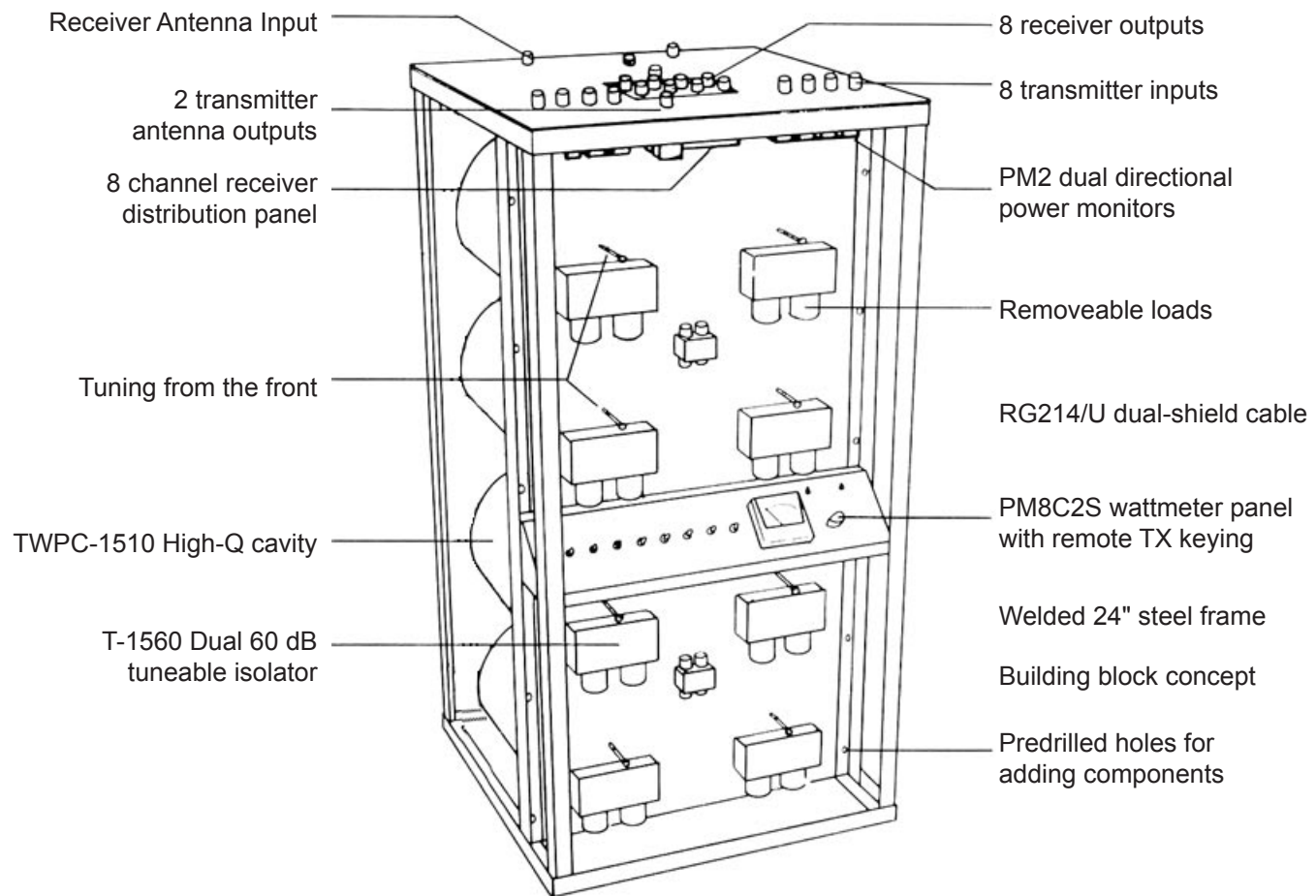
#### **FEATURES**

- ALL TUNING FROM FRONT
- 8 TRANSMITTERS INTO ONE ANTENNA
- UP TO 64 RECEIVERS FROM ONE ANTENNA
- COMPLETELY SELF-CONTAINED, BUILDING BLOCK CONCEPT
- ONLY 2.8 dB INSERTION LOSS TO EACH TRANSMITTER WITH PROPER FREQUENCY SELECTION
- ALL CONNECTORS AT TOP OF RACK
- 75 dB TRANSMITTER TO TRANSMITTER PROTECTION
- 130 dB RECEIVER INTERMODULATION PROTECTION
- NO DUPLEXERS REQUIRED
- RF POWER MONITORING FOR ALL CHANNELS, INCLUDING ANTENNA
- REMOTE TRANSMITTER KEYING
- LOWER COST PER CHANNEL
- FIELD TUNABLE.
- RECEIVER DISTRIBUTION PANELS
- OPTIONAL RF PRESELECTOR FILTERS THE COMPLETE RX BAND

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# M101-150-8TRM



## GENERAL SPECIFICATIONS

Model	M101-150-8TRM	Power Metering	PM-8C2S
Impedance	50 Ohms	Temperature	-30 C to +60 C
Frequency	148-174 MHz	Weight	175 lbs
		Dimensions (HWD)	24" x 31" x 48"

## TRANSMITTER COMBINER

Insertion Loss	determined by freq spacing (3.0 dB typ. at 120 KHz)
Tx-to-Tx Isolation	75 dB or greater
2nd Harmonic Supr.	90 dB or greater
Transmitter Power	150 Watts
Channels	8 channels into one transmitter antenna

## RECEIVER SYSTEM

Power Reverting	optional
3rd Order Intercept	+36 dBm (typ)
System Gain	+4 to +6 (typ)
Rx-to-Rx Isolation	25 dB (typ)
Noise figure	2.5 dB (typ)
Power Supply	15 or 24 VDC 115/230 VDC
Average Battery Drain	170 mA @ 15 VDC

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**BANDPASS/NOTCH COMBINERS****1 NOTCH, 1-3 PASS CAVITIES**

**M101-150-1T-3PN  
WITH T1560CM ISOLATOR**



**M101-450-1T-3PN  
WITH T4560CM ISOLATOR**

The growing demand for combining of simplex base stations has resulted in the development of a series of expandable bandpass / notch combiners. These combiners feature the same high quality and rugged design found in all other Telewave products. They offer excellent performance, and numerous advantages over conventional cavity/ferrite combiners. There are no critical cable lengths between combining elements, and additional frequencies can be added without retuning the entire system. Installation is simplified and off-air time is minimized. Splitting of transmitter and receiver systems is not necessary.

Each combiner consists of a notch cavity, and one to three pass cavities. A cavity-mounted isolator is usually added to suppress intermodulation. The notch cavity performs the function of a steering device to maintain proper energy flow in the combining network. The pass cavities form a highly selective filter which effectively isolates each node. The nodes are arranged in ascending order, with the highest frequency nearest the antenna.

Contact Telewave for complete engineering assistance with your system.

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# BANDPASS/NOTCH COMBINERS

## SPECIFICATIONS

Model	<u><b>M101-70-1T-1PN</b></u>	<u><b>M101-70-1T-2PN</b></u>	<u><b>M101-70-1T-3PN</b></u>
Frequency Range	66-88 MHz	66-88 MHz	66-88 MHz
Insertion Loss	Adjustable	Adjustable	Adjustable
Impedance	50	50	50
VSWR (max)	1.5:1	1.5:1	1.5:1
Input Power (max)			
1.7 dB ins. loss	350 Watts	350 Watts	350 Watts
3.0 dB ins. loss	150 Watts	150 Watts	150 Watts
Cavity Size (typ)	8"	8"	8"
Temperature	-30 C to +60 C	-30 C to +60 C	-30 C to +60 C
Size (HWD)	53" x 8.5" x 19"	53" x 8.5" x 19"	53" x 8.5" x 19"
Weight	24 lbs	35 lbs	46 lbs

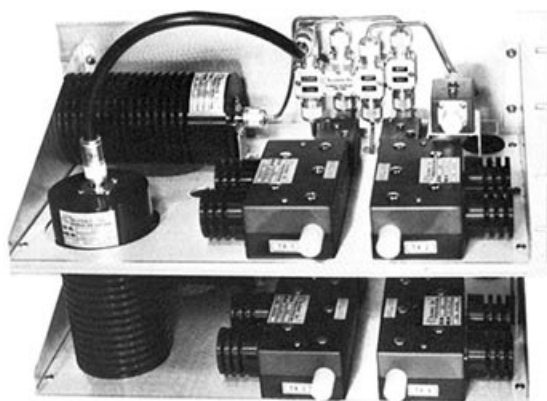
Model	<u><b>M101-150-1T-1PN</b></u>	<u><b>M101-150-1T-2PN</b></u>	<u><b>M101-150-1T-3PN</b></u>
Frequency Range	136-174 MHz	136-174 MHz	136-174 MHz
Insertion Loss	Adjustable	Adjustable	Adjustable
Impedance	50 ohms	50 ohms	50 ohms
VSWR (max)	1.5:1	1.5:1	1.5:1
Input Power (max)			
1.7 dB ins. loss	350 Watts	350 Watts	350 Watts
3.0 dB ins. loss	150 Watts	150 Watts	150 Watts
Cavity Size (typ)	8"	8"	8"
Temperature	-30 C to +60 C	-30 C to +60 C	-30 C to +60 C
Size (HWD)	22" x 8.5" x 19"	22" x 8.5" x 19"	22" x 8.5" x 19"
Weight	17 lbs	25 lbs	33 lbs

Model	<u><b>M101-450-1T-1PN</b></u>	<u><b>M101-450-1T-2PN</b></u>	<u><b>M101-450-1T-3PN</b></u>
Frequency Range	406-512 MHz	406-512 MHz	406-512 MHz
Insertion Loss	Adjustable	Adjustable	Adjustable
Impedance	50 ohms	50 ohms	50 ohms
VSWR (max)	1.5:1	1.5:1	1.5:1
Input Power (max)			
1.7 dB ins. loss	350 Watts	350 Watts	350 Watts
3.0 dB ins. loss	150 Watts	150 Watts	150 Watts
Cavity Size (typ)	8"	8"	8"
Temperature	-30 C to +60 C	-30 C to +60 C	-30 C to +60 C
Size (HWD)	26" x 8.5" x 19"	26" x 8.5" x 19"	26" x 8.5" x 19"
Weight	12 lbs	17 lbs	20 lbs

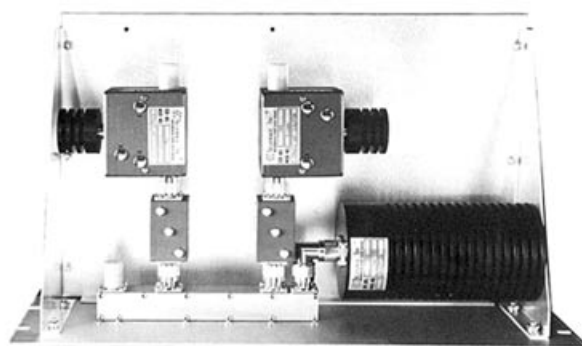
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## **HYBRID COMBINERS**

### **2 OR 4 CHANNELS**



**TW900-4HRB1**



**TW450-2HRA1**

The Telewave hybrid combiner allows you to combine transmitters at frequency spacings that are too close to be practical for cavity/ferrite combiners. Combining as close as four adjacent channels is possible. These combiners are configured in sets of two or four while maintaining reasonable insertion losses.

The Telewave hybrid combiners use a minimal amount of 19" rack space. Two channel units require 5.25" rack space, and 10.5" for the four channel. The hybrid is a broad band device and comes tuned to your specified frequency. There is no tuning required during installation. Each channel is equipped with a harmonic filter to maintain spurious products below the FCC minimum.

The basic hybrid design can be integrated into the standard Telewave cavity/ferrite combiner systems to give you outstanding flexibility in the selection of your frequencies. High power is available in all frequency bands. Contact our systems engineering for custom integration and high power applications.

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# HYBRID COMBINERS

## GENERAL SPECIFICATIONS (COMMON TO ALL MODELS)

Input power (Watts)	150
Input VSWR @ 50	1.25:1
Temperature Range	-30 C to +60 C
Connector	Type N female
Weight	Varies with options selected - contact factory

## TWO CHANNEL HYBRID WITH SINGLE STAGE ISOLATORS

Model Number	TW150-2HRA1	TW220-2HRA1	TW450-2HRA1	TW900-2HRA1
Frequency Range (MHz)	118-174	216-250	406-512	806-960
Isolation Tx-Tx (dB)	70	70	70	70
Ant-Tx	33	33	33	33
Insertion Loss (dB)	3.8	3.8	3.7	3.6
Attenuation, Harmonic (dB)	65	65	65	65
Panel Size in. (HW)	5.25 x 19	5.25 x 19	5.25 x 19	5.25 x 19

## TWO CHANNEL HYBRID WITH DUAL STAGE ISOLATORS

Model Number	TW150-2HRB1	TW220-2HRB1	TW450-2HRB1	TW900-2HRB1
Frequency Range (MHz)	118-174	216-250	406-512	806-960
Isolation Tx-Tx (dB)	100	100	100	100
Ant-Tx	65	65	65	65
Insertion Loss (dB)	4.0	4.0	3.9	3.8
Attenuation, Harmonic (dB)	65	65	65	65
Panel Size in. (HW)	5.25 x 19	5.25 x 19	5.25 x 19	5.25 x 19

## FOUR CHANNEL HYBRID WITH SINGLE STAGE ISOLATORS

Model Number	TW150-4HRA1	TW220-4HRA1	TW450-4HRA1	TW900-4HRA1
Frequency Range (MHz)	118-174	216-250	406-512	806-960
Isolation Tx-Tx (dB)	70	70	70	70
Ant-Tx	33	33	33	33
Insertion Loss (dB)	6.8	6.8	6.8	6.7
Attenuation, Harmonic (dB)	65	65	65	65
Panel Size in. (HW)	10.5 x 19	10.5 x 19	10.5 x 19	10.5 x 19

## FOUR CHANNEL HYBRID WITH DUAL STAGE ISOLATORS

Model Number	TW150-4HRB1	TW220-4HRB1	TW450-4HRB1	TW900-4HRB1
Frequency Range (MHz)	118-174	216-250	406-512	806-960
Isolation Tx-Tx (dB)	100	100	100	100
Ant-Tx	65	65	65	65
Insertion Loss (dB)	7.2	7.2	7.1	7.0
Attenuation, Harmonic (dB)	65	65	65	65
Panel Size in. (HW)	10.5 x 19	10.5 x 19	10.5 x 19	10.5 x 19

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## **M108-220-5TRDS**

### **LOW LOSS COMBINING SYSTEM**



The Model M108-220-5TRDS is a self-contained, field tunable, 5-channel transmitter and receiver combiner for use in the 220 MHz trunking frequency band. A Pass/Reject Duplexer, 4-pole Pass Cavity Preselector, and expandable Receiver Distribution Panel are integral parts of the system. The TPRD-22612 duplexer incorporates 12, 6-inch, high-Q cavities to provide better than 80 dB TX-TX isolation

Mounted on a 19" EIA rack, and utilizing highly reliable components, the M108-220-5TRDS combiner is designed to provide continuous, trouble free service. All components are completely passive, with the exception of the solid state receiver distribution amplifier, and are easily accessible from the top or front of the rack.

A unique capacity for channel expansion allows the operator to start with as few as two channels, and add additional frequencies without disruption of existing users. The Model M108-220-1T expansion kit provides factory-tuned components, cabling, and hardware necessary for each additional channel.

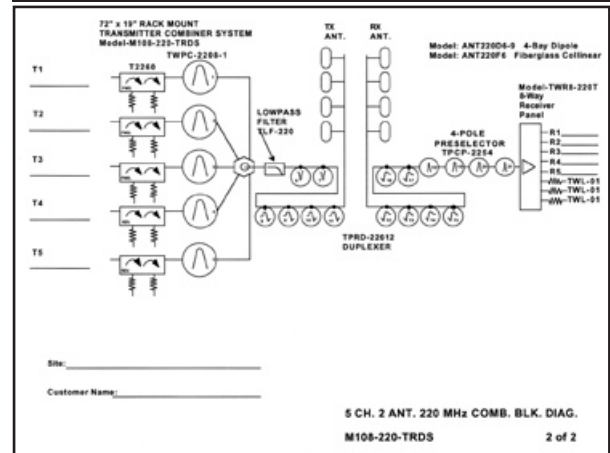
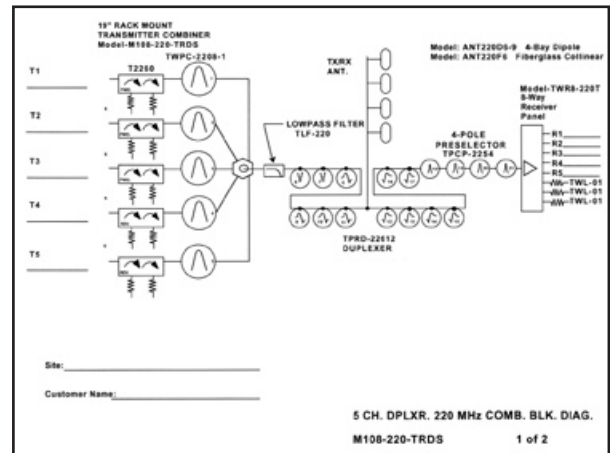
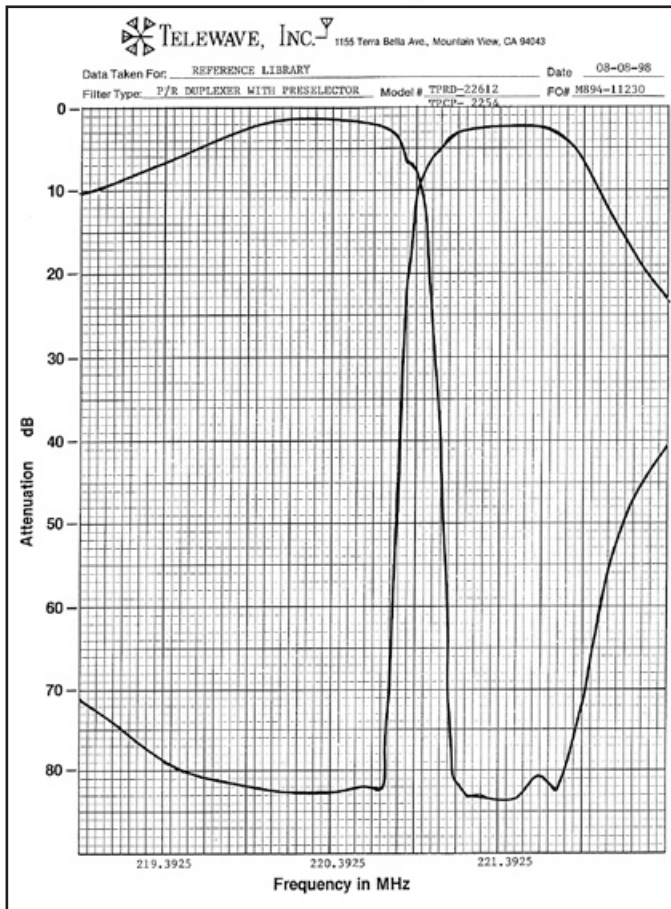
The M108-220-5TRDS and the M108-220-1T are pre-tuned at the factory, and should not require adjustment in normal use. However, adjustments or frequency changes can be made from the front panel with proper test equipment and knowledge. The optional PM10C2S-1C Power Monitoring System provides a calibrated display of performance for each channel, and the system as a whole. Remote transmitter keying is also included with the PM10C2S-1C.

#### **FEATURES**

- 5 channels into one antenna
- Integrated duplexer and receiver preselector
- High 80 dB isolation for close channel spacing
- TV Channel 13 filtering
- 125 watts per channel
- Simplified maintenance
- Optional integrated power monitoring

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# M108-220-5TRDS



## SYSTEM SPECIFICATIONS

### TRANSMITTER COMBINER

Channels	5 channels into (1) TX antenna
Impedance	50 Ohms
Frequency Range	220-222 MHz
Temperature	-30°C to +60°C
Insertion Loss	3.0 dB typ @ 150 KHz (determined by freq. spacing)
Tx-to-Tx Isolation	85 dB or greater
2nd Harmonic Suppression	90 dB or greater
Transmitter Power	125 Watts per channel standard
Rack Dimensions (EIA 19")	20" W x 22" D x 72" H 51cm W x 56cm D x 183cm H
Weight	200 lb

### M108-220-5TRDS

### RECEIVER SYSTEM

System gain	+4 to +6 dB overall
3rd Order Intercept	+36 dBm
Noise figure	2.5dB typ.
Power Supply	15 VDC or 115/230 VAC
Average Battery Drain	175 ma
Power Reverting	DC standard

### TWR8-220T

### DUPLEXER PRESELECTION

Power Input	350 W
Bandwidth	2 MHz
RX to TX isolation	80 dB
TX to RX isolation	80 dB
Insertion Loss	2.0 dB typ. 3.0 dB typ.
Cavities	(2) 5" (12) 6" (5) 8"
Mounting	Fully integrated in 19" EIA rack

### TPRD-22612 TPCP-2254

### OPTIONAL METERING

Dual Directional Coupler	PM10C2S-1C
-40 dB sampling ports BNC-F	TWDC-2540
Dual Directional Detector	Antenna monitoring using spectrum analyzer
Wattmeter Panel	PM2A-220
(Monitors 10 transmitters and 2 antenna power monitors)	PM10C2S-1C

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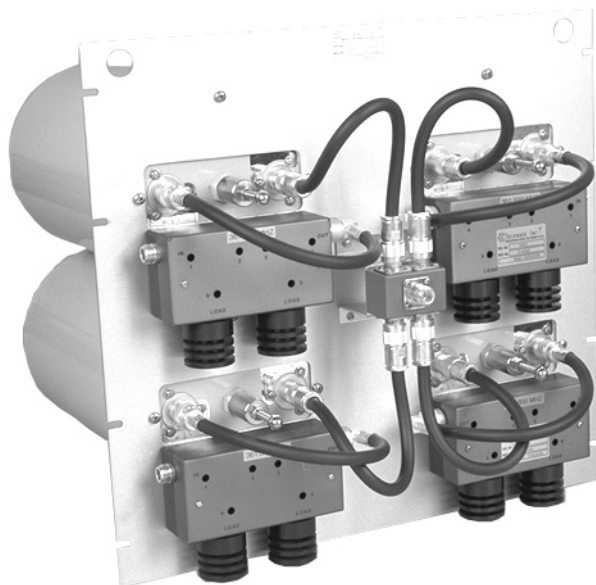
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## **M107-250/350/450/760-8TP**

### **LOW LOSS TRANSMITTER COMBINER PANELS**



The TELEWAVE M107-250, -350, -450, and -760 series of Low Loss Combiner Panels are designed for new, narrow-band technologies.

All components in these field-expandable combiners are completely passive. This design allows front panel tuning, simplifies installation and maintenance, and allows for addition of channels without any disruption of service.

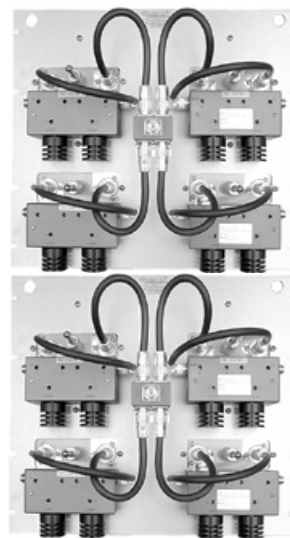
These combiners are shipped without racks, for mounting in existing installations.

#### **Major Options :**

Heavy duty 19" racks  
Power Monitoring  
Wattmeter Panel  
Receiver Multicoupler  
Expansion Kits to 14 channels-  
(M107-250-1T) (M107-350-1T)  
(M107-450-1T) (M107-760-1T)

#### **FEATURES:**

- ALL TUNING FROM THE FRONT
- 4 TRANSMITTERS INTO ONE ANTENNA
- LESS THAN 3dB INSERTION LOSS
- MODULAR PANELS SIMPLIFY EXPANSION
- COMPLETELY SELF CONTAINED
- LOW COST PER CHANNEL
- FULLY FIELD TUNABLE
- 85dB TX to TX PROTECTION



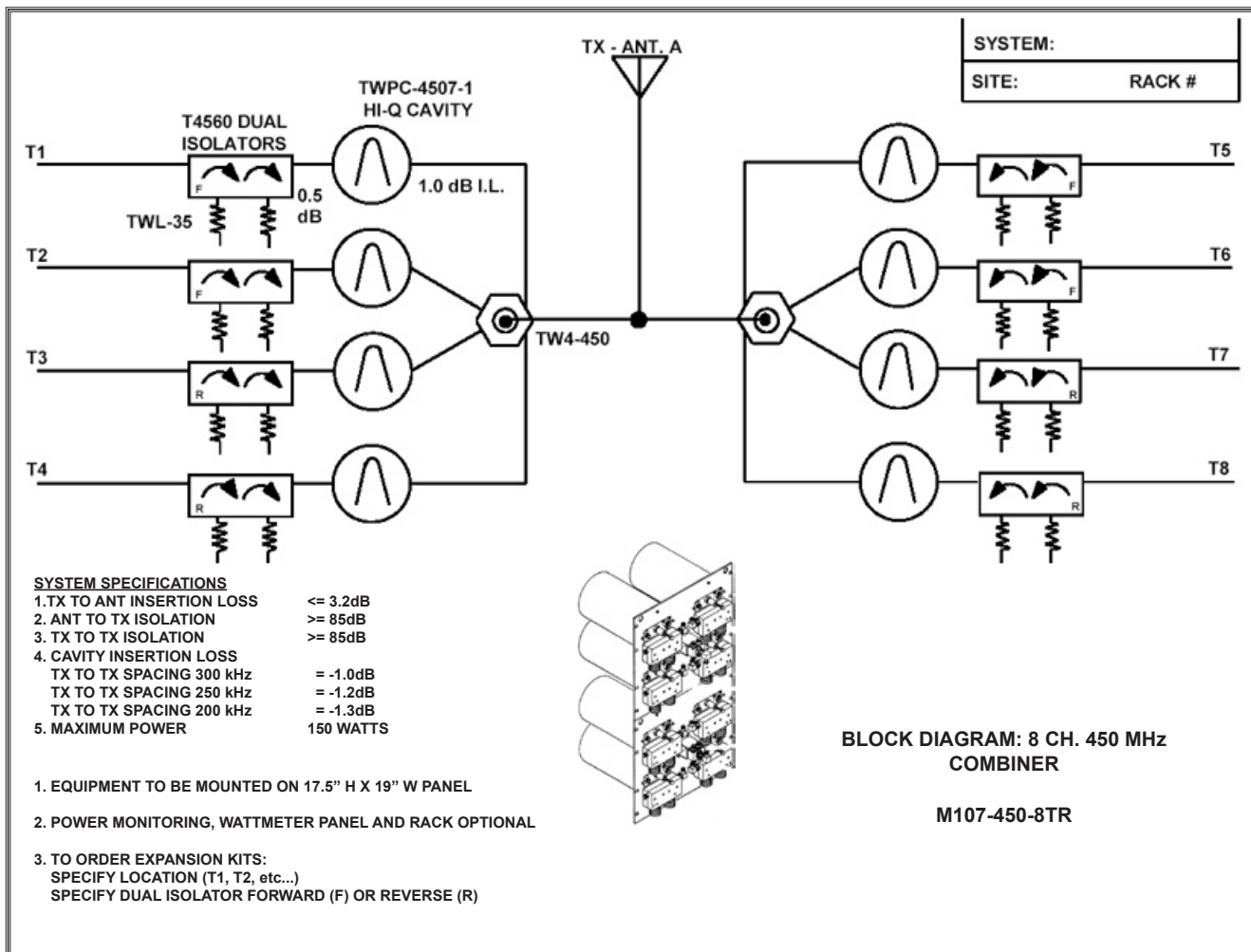
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# M107-250/350/450/760-8TP



## SYSTEM SPECIFICATIONS

### Frequency Range

M107-250-8TP

200-300 MHz

M107-350-8TP

300-400 MHz

M107-450-8TP

400-512 MHz

M107-760-8TP

700-800 MHz

### System Impedance

50 Ohms

### Channels

8 channels into one antenna

### Input Power

150 W max per channel

### Insertion Loss (determined by freq. spacing)

3.0dB typ. @ 275 KHz

### TX-to-TX Isolation

85dB or greater

### 2nd Harmonic Suppr.

90dB or greater

### Operating Temp

-30° C to +60° C

### Panel Dimensions

19" W x 17" D x 17.5" H

(250 MHz panel is 19.5" H)

48.3 cm W x 43.2 cm D x 44.5 cm H

### Weight

80 Lb. / 36.4 Kg

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**M107-250-14TR / M107-350-14TR**  
**M107-450-14TR / M107-760-14TR**  
**EXPANDABLE 14 CHANNEL TRUNKING COMBINERS**

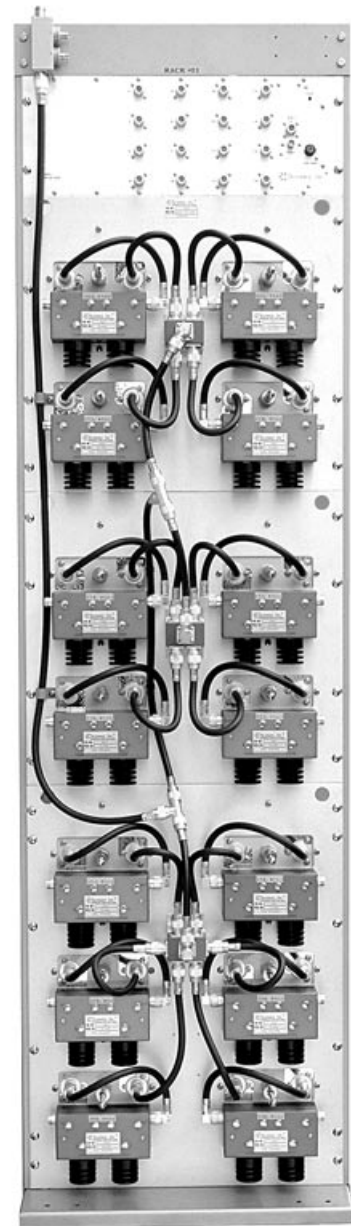
TELEWAVE M107-250, -350, -450, & -760 Low Loss Combiners are designed for new, narrow-band technologies.

All components in these field-expandable combiners are completely passive, with the exception of the optional solid-state receiver distribution amplifier. The compact layout is enclosed in a rugged steel frame.

To meet international requirements, special configurations and expansion kits are available. A Pass/Reject duplexer, and Pass-Cavity preselector are also available.

**FEATURES:**

- ALL TUNING FROM THE FRONT
- Up TO 14 TRANSMITTERS INTO ONE ANTENNA
- LESS THAN 3dB INSERTION LOSS
- ALL CONNECTIONS AT TOP OF RACK
- COMPLETELY SELF CONTAINED
- LOW COST PER CHANNEL
- FULLY FIELD TUNABLE
- 75dB TX to TX PROTECTION

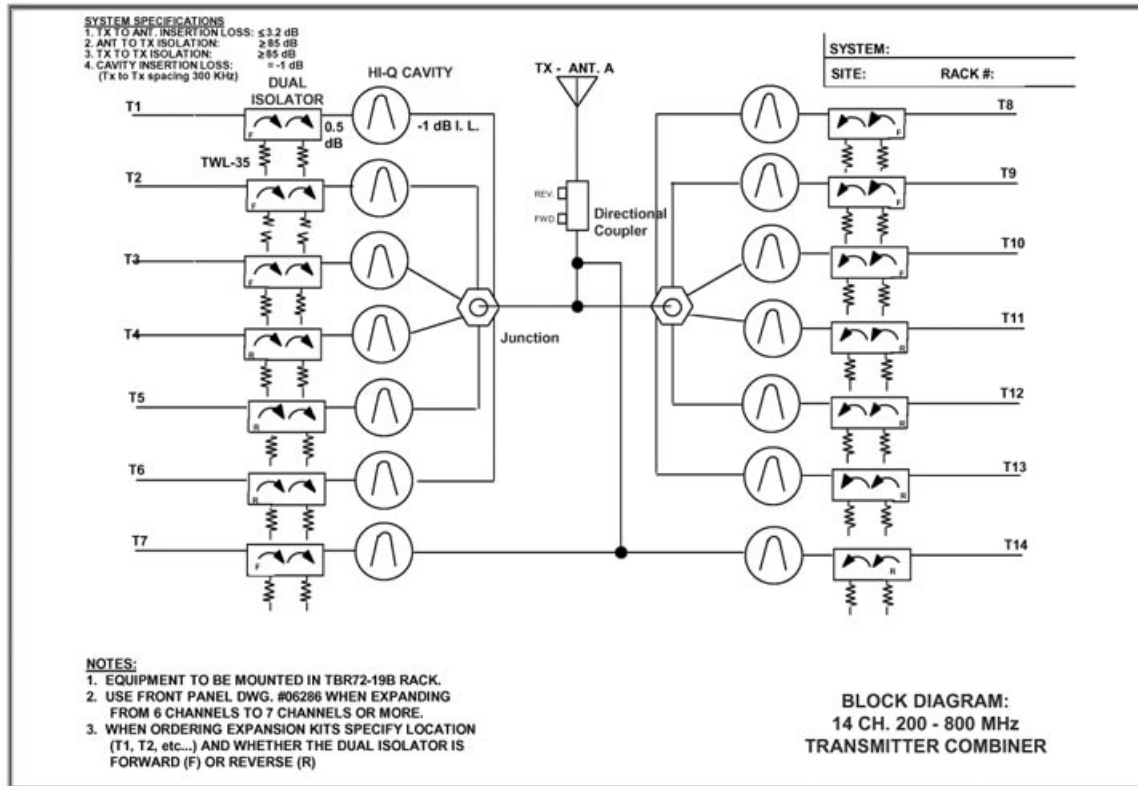


Shown with Optional Receiver Distribution Panel

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# M107-250/350/450/760-14TR



## SYSTEM SPECIFICATIONS

Model	Frequency Range	Operating Temp.	-30° C to +60° C
M107-250-14TR	200-300 MHz		
M107-350-14TR	300-400 MHz	Shipping Weight	175 lbs / 79.5 Kg
M107-450-14TR	400-512 MHz		
M107-760-14TR	700-800 MHz	Rack Dimensions (HWD)	72" x 20" x 22" 51 cm x 56 cm x 183 cm
System Impedance	50 Ohms		

## RECEIVER SECTION (optional)

TRANSMITTER SECTION			
Channels	14 channels into one antenna	Power Reverting	standard
Input Power	150 W max per channel	3rd Order Intercept Point	+36dBm
Insertion Loss	(determined by freq. spacing) < 3.0dB typ. @ 275 KHz	System Gain	+6 to +8 dB
TX-to-TX Isolation	75dB or greater	RX-to-RX Isolation	25dB typical
2nd Harmonic Suppr.	90dB or greater	Noise Figure	2.4dB typ., 3.0dB max
		Power Supply	+12/+24 VDC or 115/230 VAC
		Average Battery Drain	120 mA

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## **M101-350-8TRM**

### **LOW LOSS UHF COMBINER**

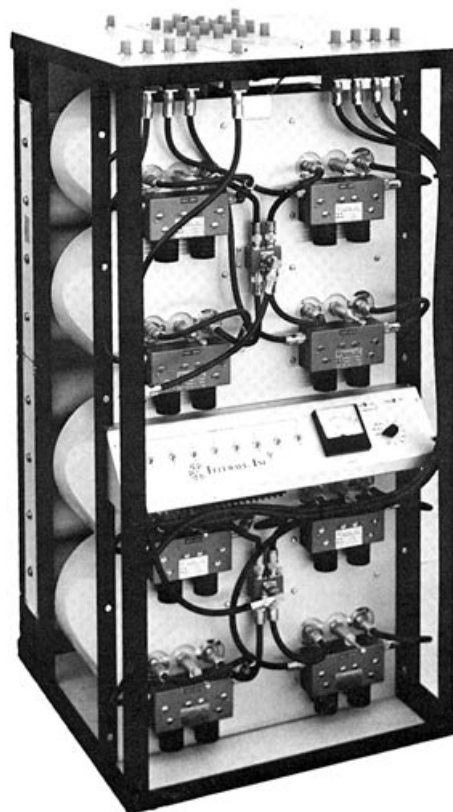
The TELEWAVE M101-350 series of Low Loss Combiners are designed with the technician in mind.

All components in these field expandable combiners are completely passive with the exception of the optimal solid-state receiver distribution amplifier. The compact design is enclosed in a rugged steel frame.

Once installed, this unique combiner allows for maintenance or addition of channels without disruption of co-channel users.

All components are standard and easy to obtain. Buy only the channels presently needed; add-on in the future. This design is ideal for installation in close quarters.

NOW is the time to clean up an existing site or start a new system!



**M101-350-8TRM-8R**

#### **FEATURES**

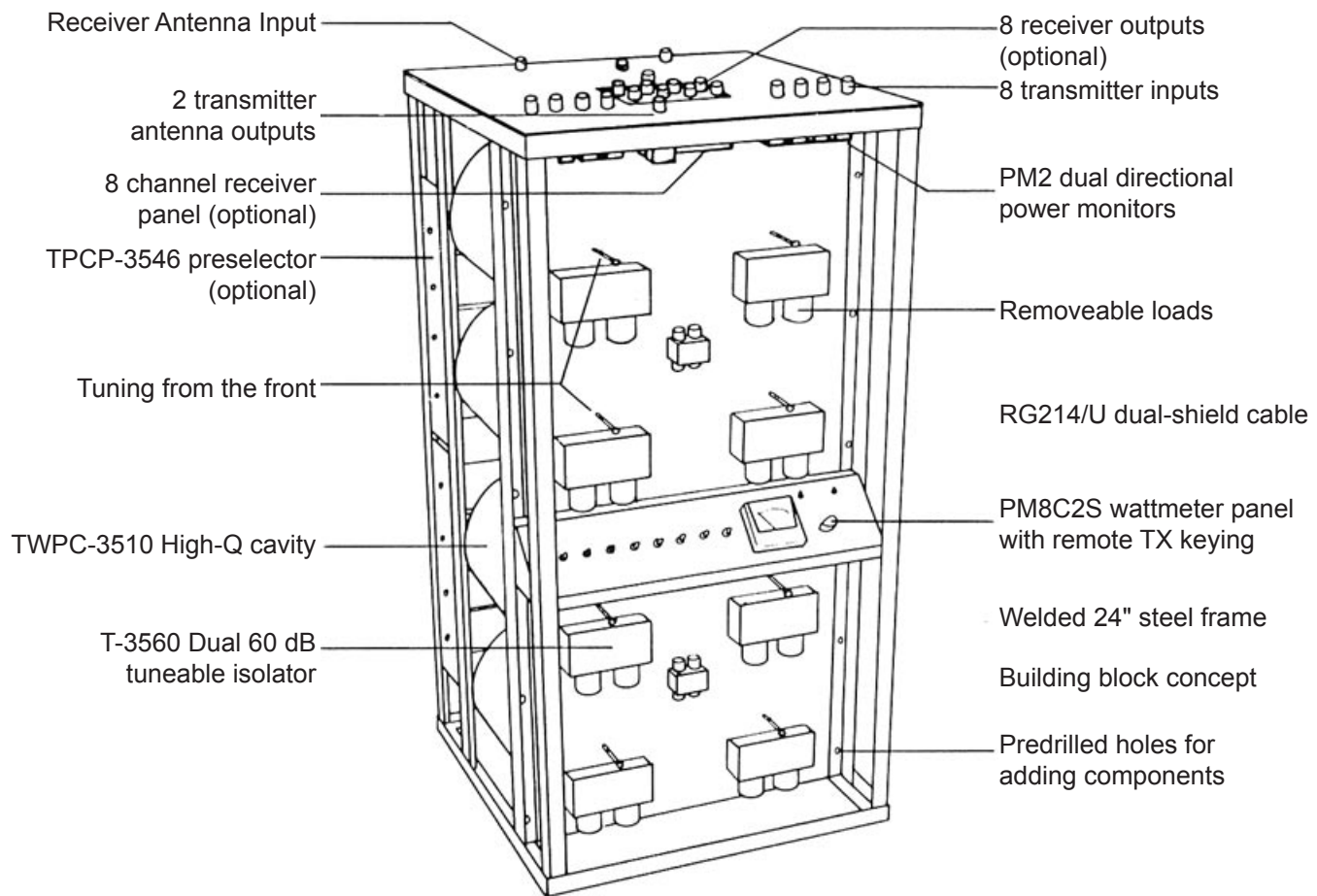
- ALL TUNING FROM FRONT
- 8 TRANSMITTERS INTO ONE ANTENNA
- COMPLETELY SELF-CONTAINED, BUILDING BLOCK CONCEPT
- ONLY 2.8 dB INSERTION LOSS TO EACH TRANSMITTER WITH PROPER FREQUENCY SELECTION
- ALL CONNECTORS AT TOP OF RACK.
- 75 dB TRANSMITTER TO TRANSMITTER PROTECTION
- 130 dB RECEIVER INTER-MODULATION PROTECTION
- NO DUPLEXERS REQUIRED.
- RF POWER MONITORING FOR ALL CHANNELS, INCLUDING ANTENNA
- REMOTE TRANSMITTER KEYING.
- LOWER COST PER CHANNEL.
- FIELD TUNABLE.

#### **OPTIONAL**

- RECEIVER DISTRIBUTION PANELS
- RX PRESELECTOR

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# M101-350-8TRM



## GENERAL SPECIFICATIONS

Model	M101-350-8TRM	Power Metering	PM-8C2S
Impedance	50 Ohms	Temperature	-30 C to +60 C
Frequency	300-400 MHz	Weight	150 lbs
		Dimensions (HWD)	24" x 24" x 48"

## TRANSMITTER COMBINER

Insertion Loss	determined by freq spacing (2.8 dB typ. at 275 KHz)
Tx-to-Tx Isolation	75 dB or greater
2nd Harmonic Supr.	90 dB or greater
Transmitter Power	150 Watts
Channels	8 channels into one transmitter antenna

## RECEIVER SYSTEM

Power Reverting	optional
3rd Order Intercept	+36 dBm (typ)
System Gain	+4 to +6 dB (typ)
Rx-to-Rx Isolation	25 dB (typ)
Noise figure	2.5 dB (typ)
Power Supply	15 or 24 VDC 115/230 VAC
Average Battery Drain	170 mA @ 15 VDC

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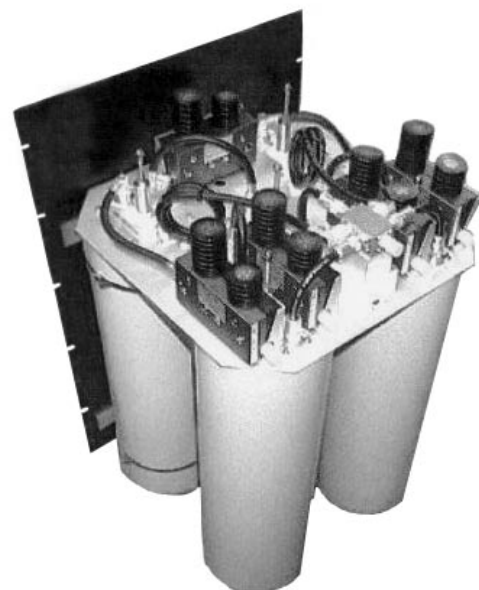
## **M107-450-5TP**

### **UHF TRANSMITTER COMBINER**

The TELEWAVE M107-450-5TP Low Loss Combiner allows up to 5 transmitters in the UHF band to be connected to a single antenna.

All components in these field-expandable combiners are completely passive. This design allows direct access for tuning, simplifies installation and maintenance, and allows for addition of channels without any disruption of service.

High -"Q" cavities and dual isolators are integrated into each channel for maximum interference prevention, and transmitter protection. These combiners are shipped without racks, for mounting in existing installations.



#### **Major Options :**

Heavy duty 19" (48 cm) racks  
Power Monitoring  
Wattmeter Panel  
Receiver Multicoupler

#### **SPECIFICATIONS**

Frequency Range	400-512 MHz
System Impedance	50 Ohms
VSWR (typ.)	1.25:1
Channels	5 channels into one antenna
Input Power	150 W max per channel
Insertion Loss at 250 KHz (typ.)	3.0 dB
TX-to-TX Isolation	85 dB or greater
2nd Harmonic Suppression	90 dB or greater
Operating Temp	-30° C to +60° C
Connectors	N-Female
Panel Dimensions in. (cm) (HWD)	29.75" x 19" x 20"
Panel Dimensions cm. (HWD)	46" x 48" x 51"
Weight lb (kg)	54 (24.5)

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## **M101-450-8TRM**

### **LOW LOSS UHF COMBINER**

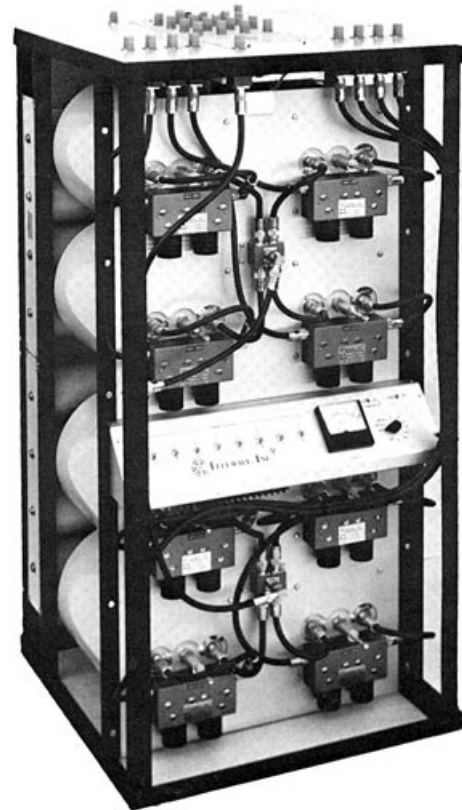
The TELEWAVE M101-450 series of Low Loss Combiners are designed with the technician in mind.

All components in these field expandable combiners are completely passive with the exception of the optimal solid-state receiver distribution amplifier. The compact design is enclosed in a rugged steel frame.

Once installed, this unique combiner allows for maintenance or addition of channels without disruption of co-channel users.

All components are standard and easy to obtain. Buy only the channels presently needed; add-on in the future. This design is ideal for installation in close quarters.

NOW is the time to clean up an existing site or start a new system!



**M101-450-8TRM-8R**

#### **FEATURES**

- ALL TUNING FROM FRONT
- 8 TRANSMITTERS INTO ONE ANTENNA
- COMPLETELY SELF-CONTAINED, BUILDING BLOCK CONCEPT
- ONLY 2.8 dB INSERTION LOSS TO EACH TRANSMITTER WITH PROPER FREQUENCY SELECTION
- ALL CONNECTORS AT TOP OF RACK.
- 75 dB TRANSMITTER TO TRANSMITTER PROTECTION
- 130 dB RECEIVER INTER-MODULATION PROTECTION
- NO DUPLEXERS REQUIRED.
- RF POWER MONITORING FOR ALL CHANNELS, INCLUDING ANTENNA
- REMOTE TRANSMITTER KEYING.
- LOWER COST PER CHANNEL.
- FIELD TUNABLE.

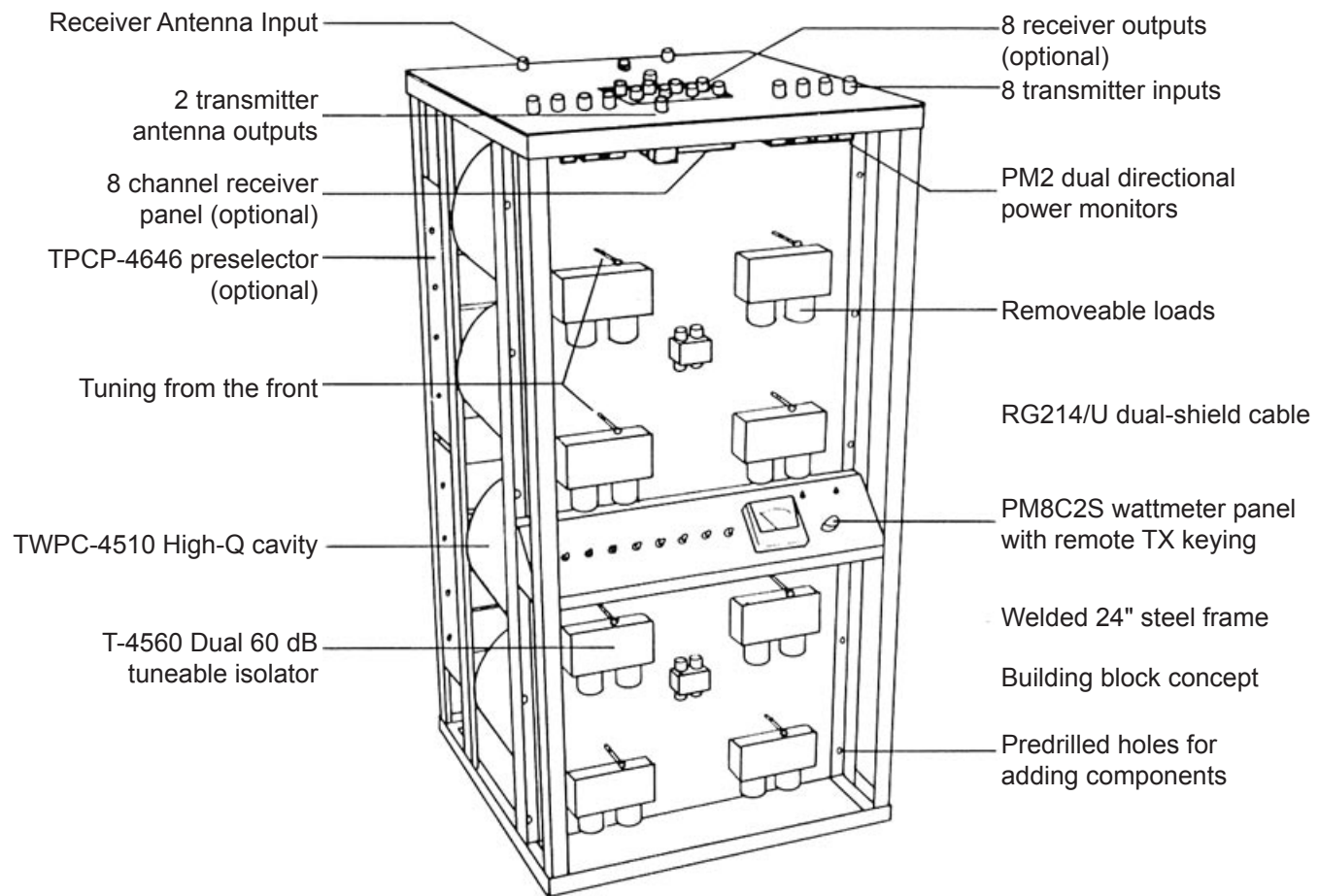
#### **OPTIONAL**

- RECEIVER DISTRIBUTION PANELS
- RX PRESELECTOR

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# M101-450-8TRM



## GENERAL SPECIFICATIONS

Model	M101-450-8TRM	Power Metering	PM-8C2S
Impedance	50 Ohms	Temperature	-30 C to +60 C
Frequency	406-512 MHz	Weight	150 lbs
		Dimensions (HWD)	24" x 24" x 48"H

## TRANSMITTER COMBINER

Insertion Loss	determined by freq spacing (2.8 dB typ. at 275 KHz)
Tx-to-Tx Isolation	75 dB or greater
2nd Harmonic Supr.	90 dB or greater
Transmitter Power	150 Watts
Channels	8 channels into one transmitter antenna

## RECEIVER SYSTEM

Power Reverting	optional
3rd Order Intercept	+36 dBm (typ)
System Gain	+4 to +6 dB (typ)
Rx-to-Rx Isolation	25 dB (typ)
Noise figure	2.5 dB (typ)
Power Supply	15 or 24 VDC 115/230 VAC
Average Battery Drain	170 mA @ 15 VDC

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## **M106-860-5TP / 10TP**

### **COMPACT EXPANDABLE TRUNKING COMBINER PANELS**

The TELEWAVE M106-860 Compact Trunking Combiner is the industry leader for excellence in low-loss combiner technology.

The completely passive combining technique with front panel tuning simplifies installation and maintenance, and allows for the addition of new channels without any disruption of service.

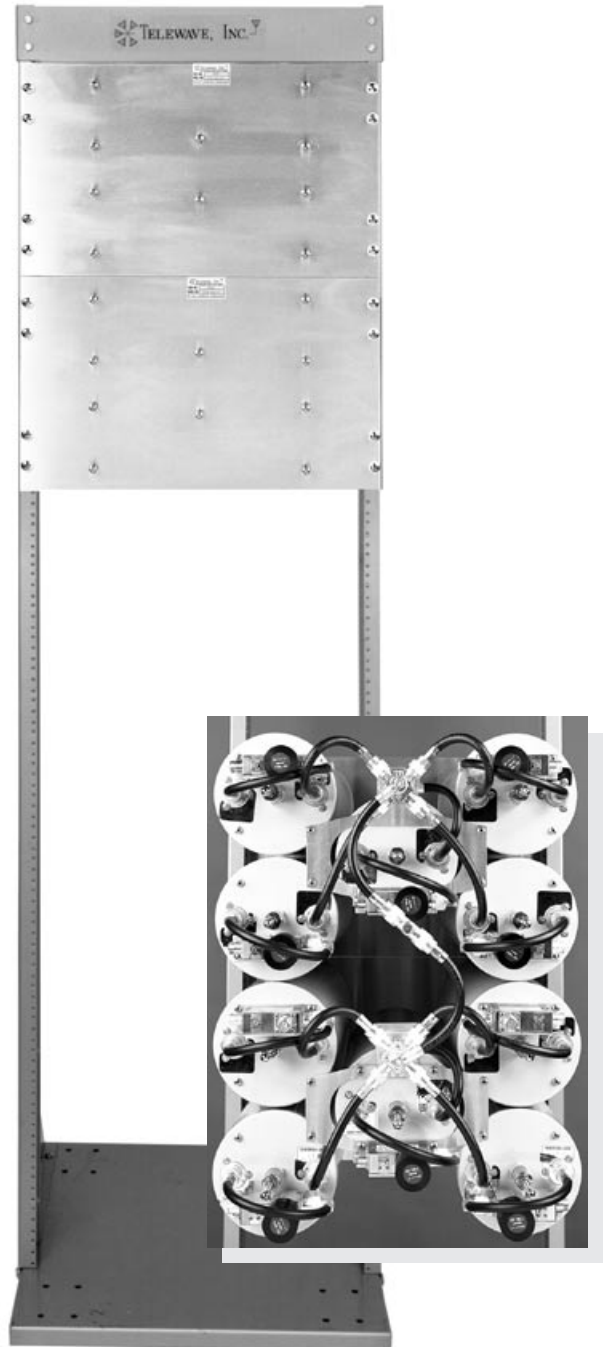
All rack-mount 5-channel combiners are field expandable to 10 channels. Expansions are accomplished by the addition of pre-tuned combiner panels. Valuable site space is conserved when using efficient TELEWAVE combiners.

Modular building-block construction means no specialized test equipment is required. The advanced mechanical design of the TELEWAVE high-Q cavities assures maximum long-term system performance.

Heavy duty 19" racks, duplexers, and receiver multicoupler systems are available as upgrades.

#### **OPTIONS:**

- HEAVY DUTY 19" RACK
- DUPLEXERS
- RECEIVER MULTICOUPLERS
- POWER MONITORING
- TOWER TOP PREAMPLIFIERS

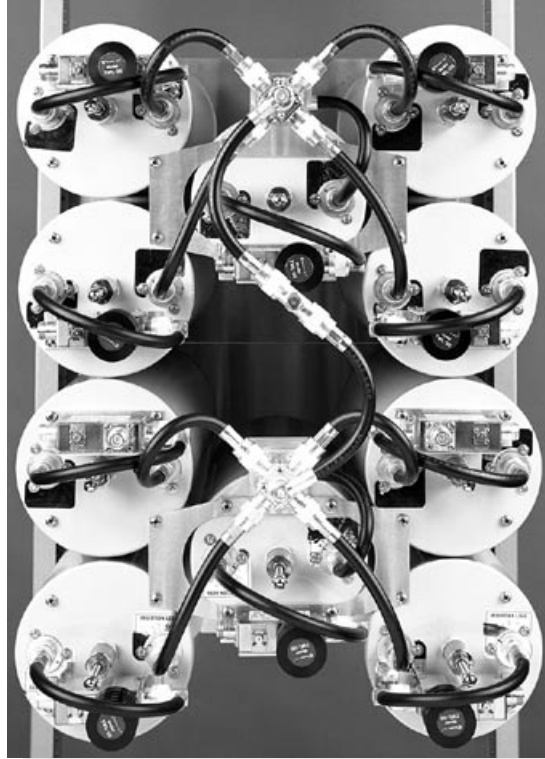


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# M106-860-5TP / 10TP



**CLOSE-UP OF REAR PANEL**

## RACK OPTION

5 CH. - M106-860-5TR  
10 CH. - M106-860-10TR

## RACK WITH POWER MONITORING

5 CH. - M106-860-5TRM  
10 CH. - M106-860-10TRM

## *System Specifications*

### Transmitter Combiner

Frequency Range	806-960 MHz
Frequency Spacing	250 KHz
Temperature	-30°C to +60°C
Tx to Tx Isolation (min)	80 dB
Ant to Tx Isolation (min)	75 dB
Insertion Loss	(typical)
5 ch. at 1 MHz spacing	2.0 dB
10 ch at 500 KHz spacing	3.2 dB
Power Input per Channel	100 Watts
Transmitter Input VSWR	1.15:1
Mounting	19-inch panels
Connectors	Type N-Female

### Receiver Distribution System (Option)

Frequency	806-960 MHz
Receiver Channels	8, 16 or 24
Temperature	-30°C to +60°C
Rx to Rx Isolation	25 dB
Power Input	115 VAC
Backup Power	+12 VDC
3rd Order IM Intercept Point	+36dB
Noise Figure	2.5dB
Gain Through System	+3 to +6 dB
Connectors	Type N-Female

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**M107-860-5TRM**  
**M107-860-10TRM****COMPACT EXPANDABLE TRUNKING COMBINER 150 WATTS**

**TELEWAVE** Compact Low Loss Trunking Combiners are designed for trunking applications up to 150 watts per channel.

All Trunking Combiners are shipped complete with 72" x 19" EIA Rack, power monitoring, wattmeter panel with remote keying, T8660 dual isolators, and Type N-F connectors all mounted on a 17.5"x 19" panel.

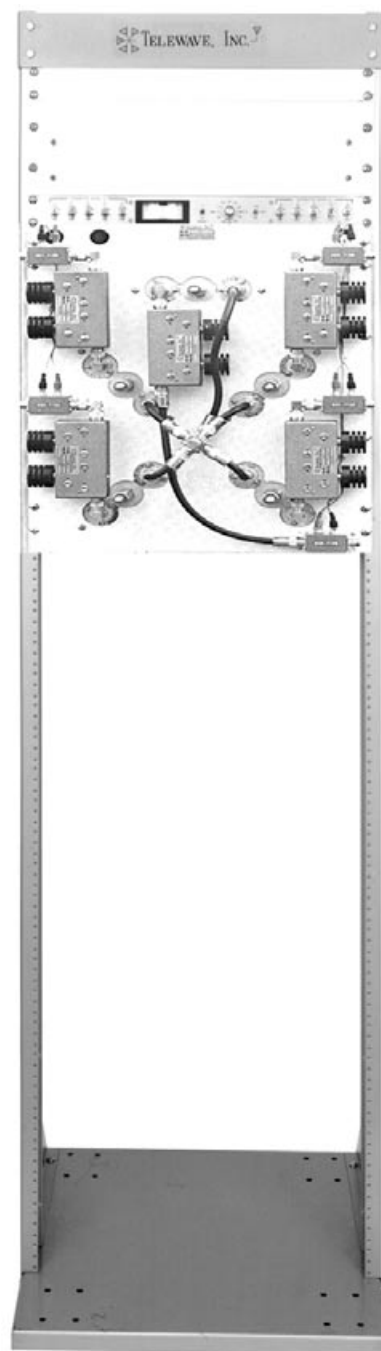
Channel expansion and maintenance are accomplished without disruption of the system. RF power metering is switchable for forward and reverse directions for each transmitter and antenna. Convenient remote transmitter keying is included on the RF wattmeter panel.

**FEATURES**

- Field tunable with up front access.
- 10 Transmitters into one Antenna
- Power Monitoring for all channels and antenna
- Wattmeter with remote TX keying
- Low cost Channel Expansion Kits.

**OPTIONS**

- Receiver Distribution System
- Tower Top Preamplifier / Preselector
- 350 Watt Duplexer with 15 MHz passband
- RG-214 phasing harness for joining two 5 channel panels

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# M107-860-5TRM

## OPTIONAL EQUIPMENT



**TTPA-8626 Tower Top  
Preamplifier / Preselector**



**TWR8-860-1RTT Receiver  
Distribution Panel**

## SYSTEM SPECIFICATIONS

### Transmitter Combiner

#### M107-860-5TRM - 5 CH

#### M107-860-10TRM - 10 CH

Frequency range	851-869 MHz
Frequency Spacing	250 KHz
Metering:	All Transmitters & Antenna
Temperature	-30° C to +60° C
Tx to Tx Isolation	85 dB (min)
Ant to Tx Isolation	80 dB
Insertion Loss (typical)	
5 ch. at 1 MHz spacing	2.2 dB
5 ch. at 250 KHz spacing	3.6 dB
10 ch. at 500 KHz spacing	3.2 dB
Power Input per Channel (max)	150 Watts
Transmitter Input VSWR	1.25:1
TX Panel height	17.5"
Connectors:	
TX input	N-F
Combiner output	N-F

### Receiver Distribution System (Option)

#### TWR8-860-1RTT - 8 CH

#### TWR16-860-1RTT - 16 CH

Frequency range	806-824 MHz
Rx to Rx Isolation	25 dB
Power Input	115 VAC
(Backup Power +12 VDC)	
3rd Order IM Intercept Point	+36 dB
Noise Figure	2.5 dB
Gain Through System	3 to 6 dB
Temperature	-30°C to + 60°C
Rx Input connectors	Type N-Female
Receiver Channels:	8 or 16
Mounting	19-inch panels
Height	1 rack-unit (1.75")

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**M107-860-5TRM-HP  
M107-860-10TRM-HP**
**COMPACT EXPANDABLE TRUNKING COMBINER 175 WATTS**

**TELEWAVE** Compact Low Loss High Power Combiners are designed for trunking applications up to 175 watts per channel.

All Trunking Combiners are shipped complete with 72" x 19" EIA Rack, power monitoring, wattmeter panel with remote keying, 175 watt Isolator, -50 dB sampler on 2nd stage isolator load port (125 Watt Load), and Type N-F or DIN-F (option) connectors all mounted on a 17.5"x 19" panel. Standard cabling is High Temp RG-393.

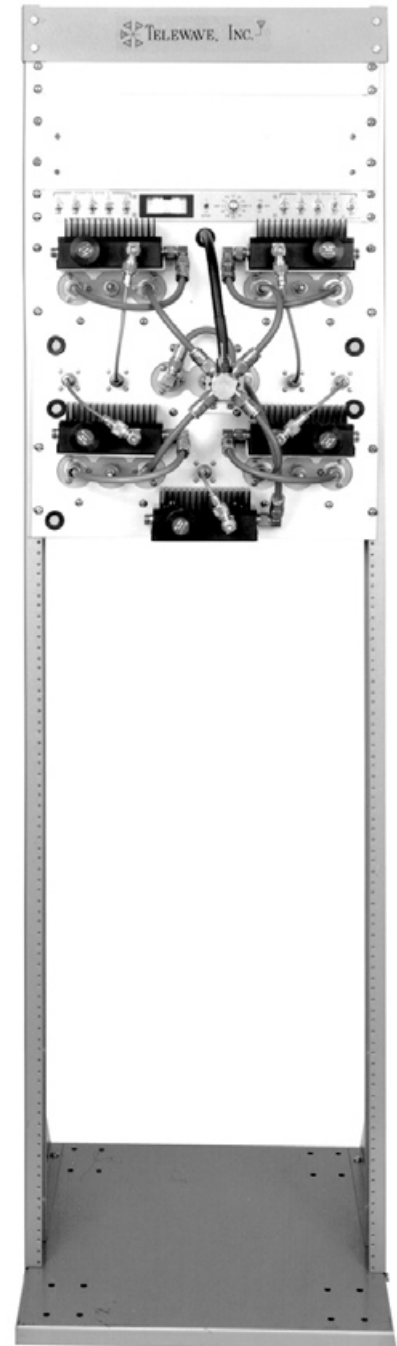
Channel expansion and maintenance are accomplished without disruption of the system. RF power metering is switchable for forward and reverse directions for each transmitter and antenna. Convenient remote transmitter keying is included on the RF wattmeter panel.

**FEATURES**

- Field tunable with up front access.
- 10 Transmitters into one Antenna
- Power Monitoring for all channels and antenna
- Wattmeter with remote TX keying
- -50 dB RF output power sampler to monitor antenna match (each specific channel)
- Low cost Channel Expansion Kits.

**OPTIONS**

- Receiver Distribution System
- Tower Top Preamplifier / Preselector
- 500 Watt Duplexer with 15 MHz passband and 7-16 DIN connectors
- ½" Helix with 7-16 DIN interconnect cable for High Power Duplexer and Combiner
- RG-393 phasing harness with 7-16 DIN connectors for two 5 channel panels
- High Power 5-Way 7-16 DIN Junction



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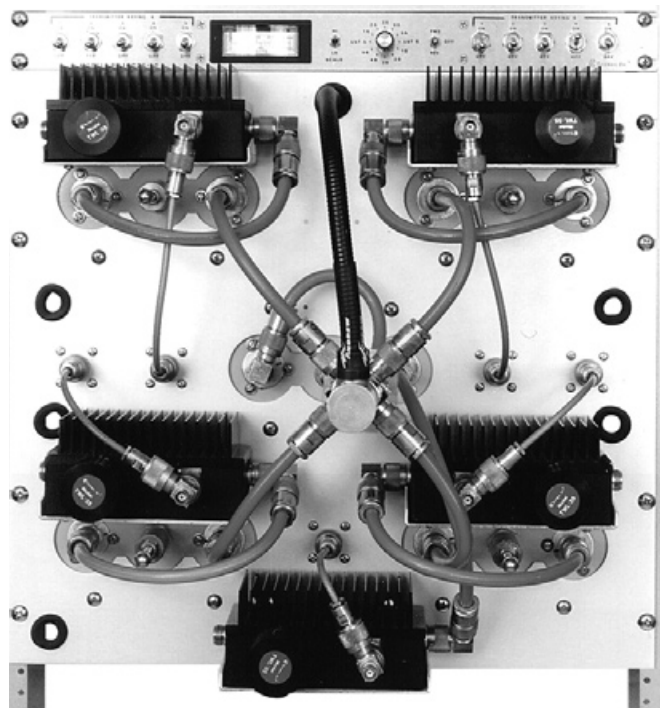
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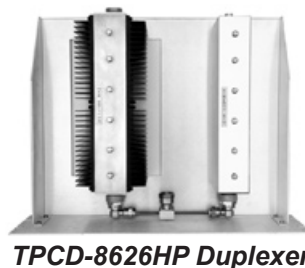
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# M107-860-5TRM-HP

## OPTIONAL EQUIPMENT



*Closeup of front panel*



*TPCD-8626HP Duplexer*



*TTPA-8626 Tower Top  
Preamplifier / Preselector*



*TPSF-8626HP Sideband Filter*



*TWR8-860-1RTT Receiver  
Distribution Panel*

## SYSTEM SPECIFICATIONS

### Transmitter Combiner

#### M107-860-5TRM-HP

#### M107-860-10TRM-HP

Frequency range	851-869 MHz
Frequency Spacing	250KHz
Metering:	All Transmitters & Antenna
Temperature	-30° C to +60° C
Tx to Tx Isolation	85 dB (min)
Ant to Tx Isolation	80 dB
Insertion Loss (typical)	
5 ch. at 1 MHz spacing	2.2 dB
5 ch. at 250 KHz spacing	3.6 dB
10 ch. at 500 KHz spacing	3.2 dB
Power Input per Channel (max)	175 Watts
Transmitter Input VSWR	1.25:1
TX Panel height	17.5"
Connectors:	
TX input	N-F
Combiner output	7-16 DIN F

### Receiver Distribution System (Option)

#### TWR8-860-1RTT

#### TWR16-860-1RTT

Frequency range	806-824 MHz
Rx to Rx Isolation	25 dB
Power Input	115 VAC
(Backup Power +12 VDC)	
3rd Order IM Intercept Point	+36 dB
Noise Figure	2.5dB
Gain Through System	3 to 6 dB
Temperature	-30°C to + 60°C
Rx Input connectors	Type N-Female
Receiver Channels:	8 or 16
Mounting	19-inch panels
RF Sampling	-50 dB
(Isolator Load Port)	

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## **M101-860-10TRM**

### **LOW LOSS 800 MHZ COMBINER**

The Telewave M101-860 trunking combiner is the industry leader for excellence in low-loss combiner technology. Ease of installation and maintenance is accomplished by front panel tuning.

All Telewave trunking combiners are priced complete, including 19 inch rack or heavy duty steel cabinet with front and rear locking doors, complete combining package, receiver distribution system, preselector, and power monitoring package.

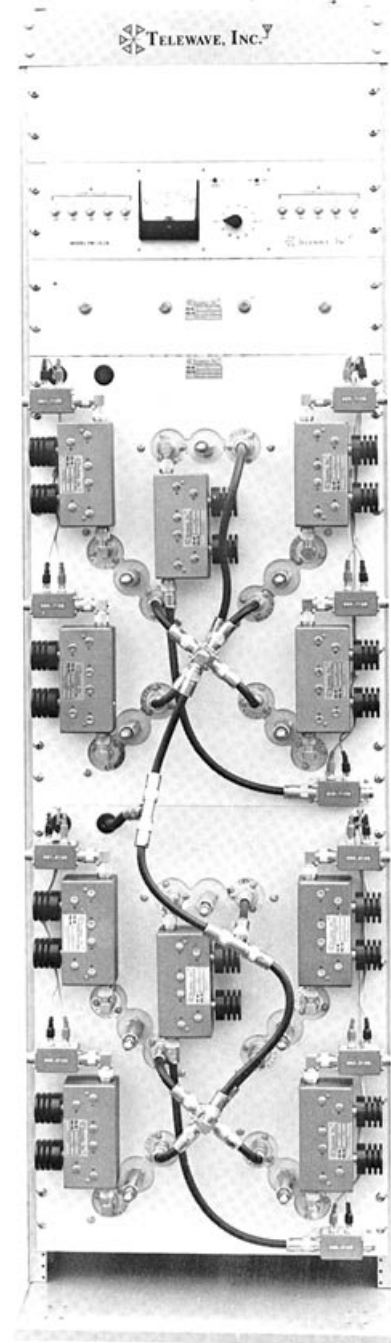
The completely passive combining technique allows for maintenance and addition of channels without disruption of the system.

Your valuable site space is conserved when using efficient Telewave designed combiners,

RF power metering is a standard feature. All forward and reverse power measurements are switchable for each transmitter and antenna. Convenient remote transmitter keying is included on the RF wattmeter panel.

All rack-mount 5 channel combiners are field expandable to 10 channels by the addition of pre-tuned combiner panels. The modular building-block construction means no specialized test equipment is required.

The advanced mechanical design of the Telewave 8-inch high-Q cavities assures maximum long-term system performance. All cables are easily accessible from the front panel. There are NO hidden cables.



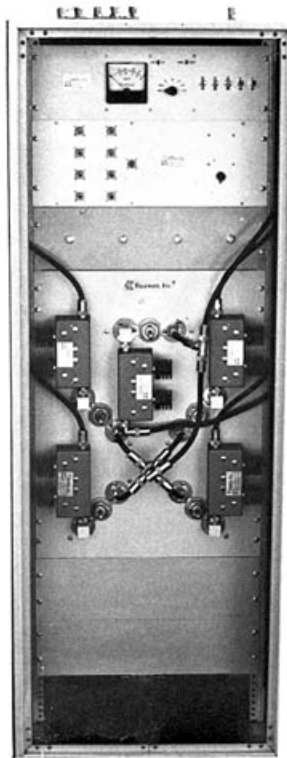
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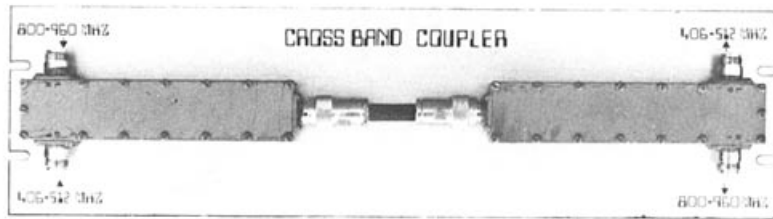
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# M101-860-10TRM

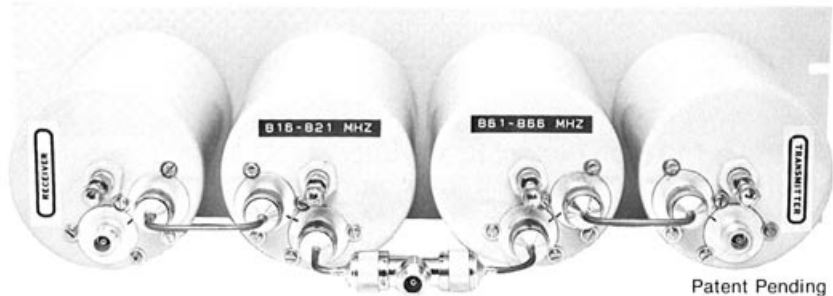


M101-860-5TCM

- EXPANDABLE
- LOW-LOSS



TS4680



TTPD-8644 Duplexer

A special coupling technique provides a true band-pass response while rejecting a specified frequency band with 5 or 15 MHz TX/RX passbands.

## RACK-MOUNT

5 CH: M101-860-5TRM

10 CH: M101-860-10TRM

## MODELS

## CABINET MOUNT

M101-860-5TCM

M101-860-10TCM

### Transmitter Combiner

Frequency	806-960
Frequency Spacing(min)	250 KHz
Metering	All TX and Ant
Temperature	-30 C to +60 C
Tx to Tx Isolation	85 dB(min)
Ant to Tx Isolation	80 dB
Insertion Loss (typical)	
5 ch. at 1 MHz	2.2 dB
10 ch. at 500 KHz	3.2 dB
Power input Per Channel	150 Watts
TX Input VSWR(max)	1.25:1

### Receiver Distribution System

Frequency	806-960 MHz
RX to RX Isolation	25 dB (typ)
Power Input	115 VAC / +15 VDC
3rd Order Intercept	+36 dB (typ)
Noise Figure	2.5 dB (typ)
System gain	+4 to +6 dB (typ)
Temperature	-40 C to +60 C
Connectors	Type N-Female
Receiver Channels	8, 16 or 24
Mounting	19-inch panels
Test Port	-20 dB

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## **TATC-8645-1E, -1HP**

### **5 CHANNEL AUTOTUNE TRUNKING COMBINERS**



TATC-8645-1E



TATC-8645-1HP

The TELEWAVE Auto Tune Trunking Combiner is a unique integration of advanced ceramic resonator technology, and high-resolution microprocessor controlled positioning. At 10.5" high, and only 13" deep, the TATC-8645-1E and -1HP are the smallest full power rack-mounted combiners available today for the SMR / ESMR trunking bands. Each cavity immediately tunes to the frequency of an applied RF signal, or by remote commands via an RS-232/485 data link. Each resonator is individually tuned by its own microprocessor, and the loss of control electronics on one channel does not affect other channels.

In the event of an input power supply failure, all channels remain tuned to current frequencies with full power output, and auto-tuning resumes as soon as power is restored. The integrated PMU2C1S antenna VSWR / output power monitor provides a front-panel LED display for on-site testing, and fully programmable alarm indicators provide immediate notification of failure, or out-of-range conditions. PC-based application software allows remote, dial-up measurement, display, and recording of all parameters, as well as control, history, and status monitoring for each cavity

## **FEATURES**

- **UP TO 150 WATTS PER CHANNEL**
- **MANUAL TUNING FROM FRONT PANEL**
- **FRONT PANEL LED INDICATORS:**  
Power • Error • Home • Tune • Link
- **FULLY INTEGRATED POWER/VSWR MONITORING FOR EACH CHANNEL**
- **FULLY PROGRAMMABLE ALARMS FOR LOW POWER / HIGH VSWR**
- **SMALLEST FULL POWER 5 CHANNEL UNITS**
- **COVERS 851-869 MHz TRUNKING BAND**
- **RS-232 /485 REMOTE CONTROL & STATUS**
- **MANUAL PARKING SWITCH - EACH CAVITY**
- **PC-BASED APPLICATIONS SOFTWARE**
- **FULL HISTORY DATABASE**

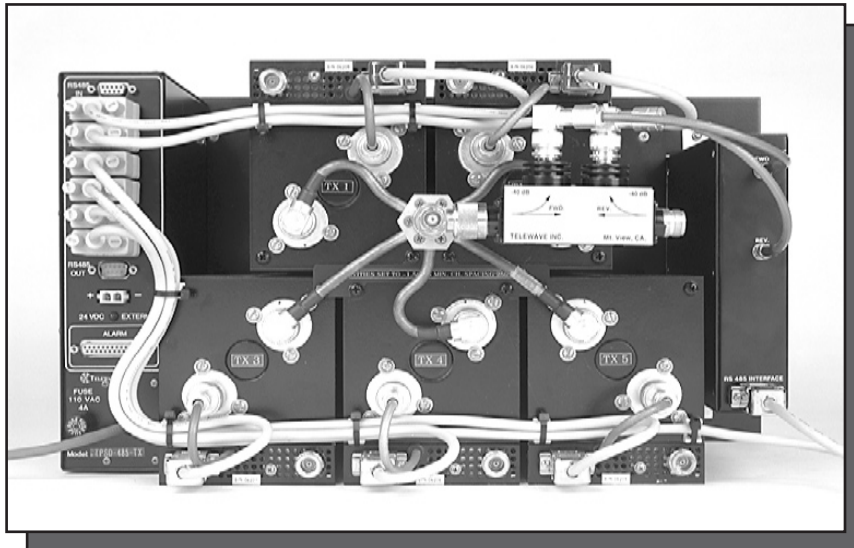
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# TATC-8645-1E, 1-HP



## **ELECTRICAL SPECIFICATIONS**

Frequency Range	851-869 MHz	
Bandwidth	18 MHz	
Minimum Channel Separation	200 KHz	
Maximum Input Power	100 W / Channel 150 W / Channel	TATC-8645-1E TATC-8645-1HP
Minimum Tuning Power	4 W	
Maximum Tuning Time	< 2 seconds	
TX to TX Isolation (min)	70 dB	
Antenna to TX Isolation (min)	60 dB	
Insertion Loss	1.5 dB 2.2 dB	5 channels - 1 MHz spacing 10 channels - 500 KHz spacing
Input VSWR (max)	1.25:1	
Temperature Range	-20°C to +50°C	
AC Supply Voltage	110 VAC or 220 VAC	
DC Supply Voltage	+24 VDC or -54 VDC	

## **MECHANICAL SPECIFICATIONS**

Dimensions		10.5" H x 19" W x 13" D (26 cm x 33 cm x 48.3 cm)	
Mounting		19" Panel	
Connectors	TX Inputs	N-Female	
	Antenna Output	N-Female	7-16 DIN optional
Net Weight		46 lbs. (20.7 kg)	
Shipping Weight		56 lbs. (25.2 kg)	

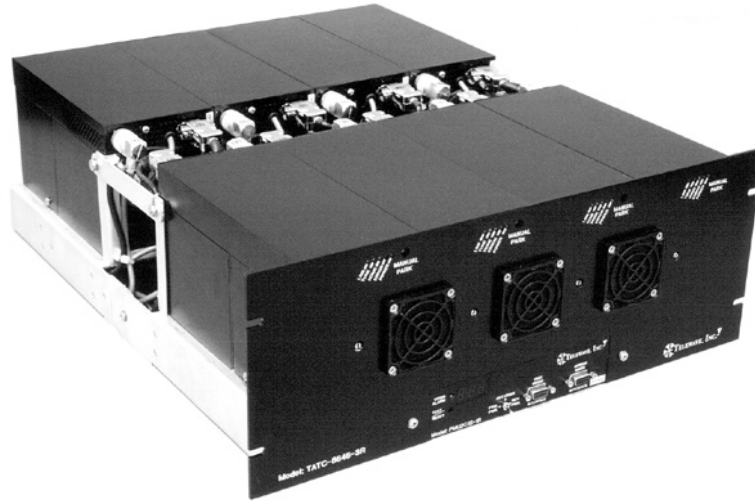
### OPTIONS AVAILABLE :

1. PMU2C1S - Antenna Power Monitor. Includes RS-232 to RS-485 Converter
2. Multi-Combiner Harness for up to 10 channels into one antenna.

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## **TATC-8646-3R, TATC-8648-3R**

### **6 and 8 CHANNEL AUTOTUNE TRUNKING COMBINERS**



The TELEWAVE AutoTune Trunking Combiner is a unique integration of advanced ceramic resonator technology, and high-resolution microprocessor controlled positioning. Only 7" high, and 22" deep, the 6 or 8 channel TATC-8646 and 8648-3R are the smallest full power rack-mounted combiners available today for the SMR and ESMR trunking bands. Each cavity immediately tunes to the frequency of an applied RF input signal, or by remote commands via any RS-232 / 485 data link. Each resonator is individually tuned by its own microprocessor, and loss of control electronics on one channel does not affect other channels.

In the event of an AC or DC input supply failure, all channels remain tuned to current frequencies with full power output, and a relay opens to provide alarm activation. The combiner will return to "home" when power is restored, and auto-tuning then resumes immediately. The optional antenna VSWR/output power monitor (PMU2C1S-1R) provides a front-panel LED display for on-site testing, and fully programmable alarm indicators for immediate notification of failure or out-of-range conditions. PC application software allows remote dial-up for display and recording of all parameters, with history, and status monitoring for each channel.

## **FEATURES**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• <b>TUNING AND POWER FAILURE ALARM</b></li> <li>• <b>MANUAL TUNING FROM FRONT PANEL</b></li> <li>• <b>FRONT PANEL LED INDICATORS:</b><br/>Power • Error • Home • Tune • Link</li> <li>• <b>OPTIONAL INTEGRATED POWER/VSWR MONITORING FOR EACH CHANNEL</b></li> <li>• <b>OPTIONAL PROGRAMMABLE ALARMS FOR LOW POWER / HIGH VSWR</b></li> <li>• <b>FULL HISTORY DATABASE</b></li> </ul> | <ul style="list-style-type: none"> <li>• <b>OPERATE AS 6, 8, OR 2 X 4 CHANNEL</b></li> <li>• <b>COVERS 851-869 MHz TRUNKING BAND</b></li> <li>• <b>RS-232 / 485 REMOTE CONTROL &amp; STATUS</b></li> <li>• <b>MANUAL PARKING SWITCH - EACH CAVITY</b></li> <li>• <b>PC-BASED APPLICATIONS SOFTWARE</b></li> <li>• <b>COMPATIBLE WITH SCHROFF® RACKS</b></li> <li>• <b>-48 VDC INPUT for iDen® SPEC.</b></li> <li>• <b>ACCEPTS iDen® 16QAM MODULATION</b></li> </ul> |
|---|---|

**TELEWAVE, INC.** 660 Giguere Court San Jose, CA 95133  
Toll Free: **1-800-331-3396** Direct: 408-929-4400 Fax: 408-929-4080

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Email: [sales@telewave.com](mailto:sales@telewave.com)

# TATC-8646-3R, TATC-8648-3R



## **ELECTRICAL SPECIFICATIONS**

Frequency Range	851-869 MHz
Bandwidth	18 MHz
Minimum Channel Separation	150 KHz
Modulation Schemes	iDen® 16QAM, TDMA, FM, AM, CW
Standard Input Power (Continuous)	100 W / Channel
Minimum Tuning Power	2 Watts
Maximum Tuning Time	< 2 seconds      2 target Power Ramps

Insertion Loss (8 ch.)	1 MHz	2.2 dB
	500 KHz	2.6 dB
	250 KHz	3.5 dB

TX to TX Isolation (min)	-70 dB
Antenna to TX Isolation (min)	-60 dB
Input VSWR (typ)	1.25:1
Temperature Range	-20°C to +50°C
Input Voltage	-36 to -72 VDC

## **MECHANICAL SPECIFICATIONS**

Dimensions	7" H x 19" W x 22" D
Mounting	19" Panel      Compatible with Schroff® Racks
	Slide Rails

Connectors	TX Inputs	N-Female
	Antenna Output	N-Female or 7-16 DIN

Net Weight	59 lbs.
Shipping Weight	69 lbs.

## **OPTIONS AVAILABLE :**

1. PMU2C1S-1R - Antenna Power Monitor. Includes RS-232 to RS-485 Converter
2. 110 / 220 VAC to +24 VDC converter
3. Combiner Harness for up to 16 channels
4. Site modem (internal to PMU)
5. RS-232 to RS-485 Converter (If no PMU)

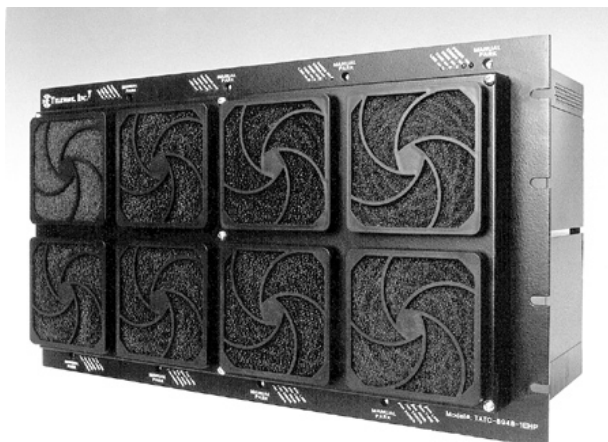
**TELEWAVE, INC.** 660 Giguere Court San Jose, CA 95133  
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## **TATC-8648-1E**

### **8 CHANNEL AUTOTUNE TRUNKING COMBINER**



The TELEWAVE AutoTune Trunking Combiner is a unique integration of advanced ceramic resonator technology, and high-resolution microprocessor controlled positioning. At 10.5" high, and only 14" deep, the 8 channel TATC-8648-1E is the smallest full power rack-mounted combiner available today for the SMR and ESMR trunking bands. Each cavity immediately tunes to the frequency of an applied RF input signal, or by remote commands via any RS-232 / 485 data link. Each resonator is always individually tuned by its own microprocessor, and loss of control electronics on one channel does not affect other channels.

In the event of an AC or DC power supply failure, all channels remain tuned to current frequencies with full power output, and auto-tuning resumes as soon as power is restored. The optional PMU2C1S antenna VSWR / output power monitor provides a front-panel LED display for on-site testing, and fully programmable alarm indicators provide immediate notification of failure, or out-of-range conditions. PC-based application software allows remote, dial-up measurement, display, and recording of all parameters, as well as control, history, and status monitoring for each channel.

## **FEATURES**

- **ACCEPTS Iden® 16QAM MODULATION**
- **MANUAL TUNING FROM FRONT PANEL**
- **FRONT PANEL LED INDICATORS:**  
Power • Error • Home • Tune • Link
- **FULLY INTEGRATED POWER/VSWR MONITORING FOR EACH CHANNEL**
- **FULLY PROGRAMMABLE ALARMS FOR LOW POWER / HIGH VSWR**
- **FULL HISTORY DATABASE**
- **OPERATE AS 8 CHANNEL OR 2 X 4 CHANNEL**
- **COVERS 851-869 MHz TRUNKING BAND**
- **RS-232 / 485 REMOTE CONTROL & STATUS**
- **MANUAL PARKING SWITCH - EACH CAVITY**
- **PC-BASED APPLICATIONS SOFTWARE**
- **COMPATIBLE WITH SCHROFF® RACKS**
- **-54VDC INPUT FOR iDen® SPEC.**

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# TATC-8648-1E




*Rear view TATC-8648-1E*



*Installation in iDen® Base Station*

## **ELECTRICAL SPECIFICATIONS**

Frequency Range	851-869 MHz		
Bandwidth	18 MHz		
Minimum Channel Separation	200 KHz		
Modulation Schemes	iDen 16QAM, TDMA, FM, AM, CW		
Standard Input Power	100 W / Channel		
Minimum Tuning Power	4 Watt		
Maximum Tuning Time	< 2 seconds		2 target Power Ramps
Insertion Loss (8 ch.)	1 MHz	1.75 dB	
	500 KHz	2.2 dB	
	200 KHz	3.5 dB	
TX to TX Isolation (min)	-70 dB		
Antenna to TX Isolation (min)	-60 dB		
Input VSWR (max)	1.25:1		
Temperature Range	-20°C to +50°C		
Supply Voltage	+24 VDC or -54 VDC		

## **MECHANICAL SPECIFICATIONS**

Dimensions	10.5" H x 19" W x 14" D		
Mounting	19" Panel	Compatible with Schroff Racks	
Connectors	TX Inputs	N-Female	
	Antenna Output	N-Female	7-16 DIN optional
Net Weight	64 lbs.		
Shipping Weight	74 lbs.		

### OPTIONS AVAILABLE :

1. PMU2C1S - Antenna Power Monitor. Includes RS-232 to RS-485 Converter
2. 110 / 220 VAC to +24 VDC converter
3. Combiner Harness for up to 16 channels
4. Site modem and connecting cable

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## ***TW860-2/4HRB1N***

### ***COMPACT HYBRID COMBINERS***



**TW860-2HRB1N**



**TW860-4HRB1N**

Telewave Compact Hybrid Combiners allow system operators to combine transmitters at adjacent channel frequency spacing, which is not practical with cavity/ferrite combiners. The TW860-2HRB1N and TW860-4HRB1N will handle 2 or 4 channels respectively, with reasonable insertion loss.

These Compact combiners provide high performance in a very small space. Both combiners occupy only 2 rack units each (3.5") of vertical space on a 19" rack. Each combiner is a broad-band device, and is pretuned for 800/900 MHz SMR, Trunking, or Cellular. No additional tuning is required during installation. A harmonic filter on each channel maintains spurious products below FCC minimum standards.

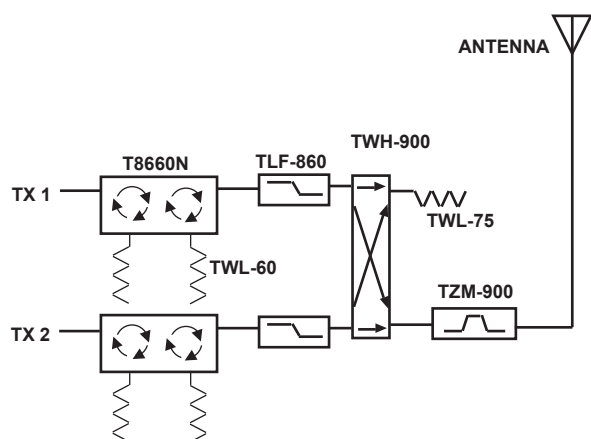
The TW860-2HRB1N and TW860-4HRB1N can be integrated into any standard Telewave cavity/ferrite system to provide maximum flexibility in frequency assignment. Contact our System Engineering Department for custom integration, and high power applications.

### **FEATURES**

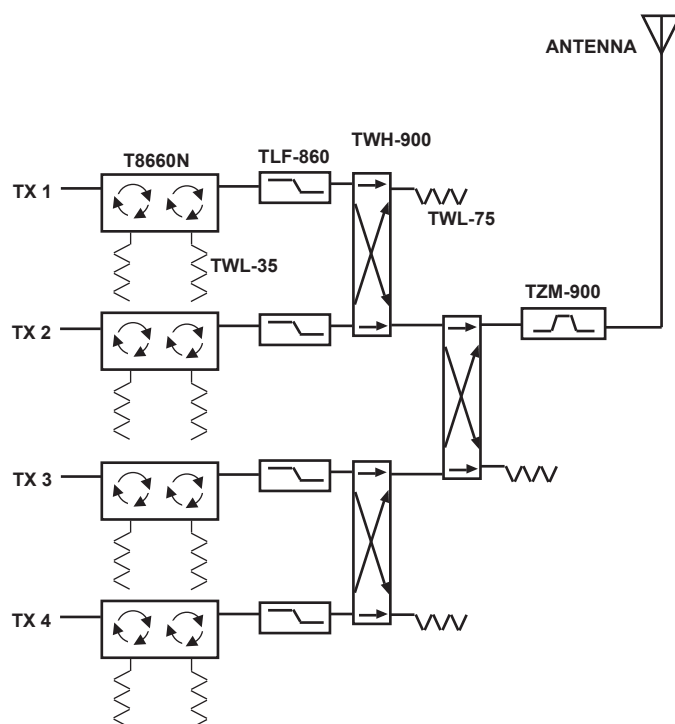
- 2 OR 4 CHANNELS ONLY 3.5" HIGH
- ADJACENT CHANNEL COMBINING
- UP TO 75 WATTS PER CHANNEL
- 800 / 900 MHz SMR, TRUNKING, CELLULAR

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# TW860-2/4HRB1N



**BLOCK DIAGRAM  
TW860-2HRB1N TWO CHANNEL HYBRID**



**BLOCK DIAGRAM  
TW860-4HRB1N FOUR CHANNEL HYBRID**

## SPECIFICATIONS

Frequency range	851-960 MHz
Bandwidth	10-30 MHz
TX to TX Isolation	90 dB
Antenna to TX Isolation	65 dB
2nd Harmonic Attn.	65 dB
Insertion Loss	3.8 dB 2 Channels 7.0 dB 4 Channels
Input Power (max)	75 W per channel
Input VSWR	<1.5:1
Impedance	50Ω
Temperature range	-30° to +60°C

Enclosure	Alodined Aluminum
Hardware	Stainless steel
Connectors	N-Female

Dimensions:	
TW860-2HRB1N	3.5" H x 19" W x 11.25" D
TW860-4HRB1N	3.5" H x 19" W x 16.75" D

Net Weight:	
TW860-2HRB1N	13 lbs.
TW860-4HRB1N	27 lbs.

Ship Weight:	
TW860-2HRB1N	17 lbs.
TW860-4HRB1N	36 lbs.

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## ***TW860-2/4HRB1H***

### ***COMPACT HIGH POWER HYBRID COMBINERS***



**TW860-2HRB1H**



**TW860-4HRB1H**

Telewave Compact Hybrid Combiners allow system operators to combine transmitters at adjacent channel frequency spacing, which is not practical with cavity/ferrite combiners. The TW860-2HRB1H and TW860-4HRB1H will handle 2 or 4 channels respectively, with reasonable insertion loss.

These Compact combiners provide high performance in a very small space. Both combiners occupy only 2 rack units each (3.5") of vertical space on a 19" rack. Each combiner is a broad-band device, and is pretuned for 800/900 MHz SMR, Trunking, or Cellular. No additional tuning is required during installation. A harmonic filter on each channel maintains spurious products below FCC minimum standards.

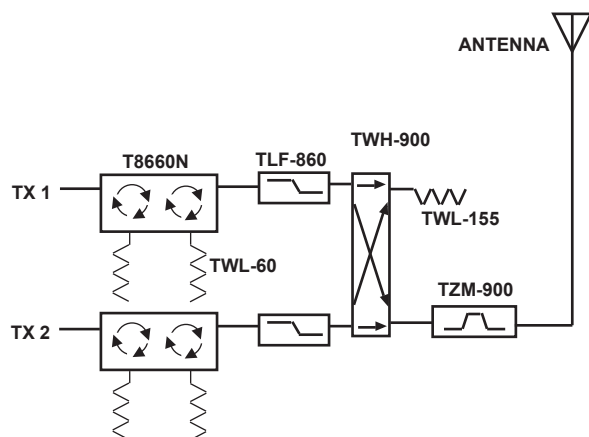
The TW860-2HRB1H and TW860-4HRB1H can be integrated into any standard Telewave cavity/ferrite system to provide maximum flexibility in frequency assignment. Contact our System Engineering Department for custom integration, and high power applications.

### **FEATURES**

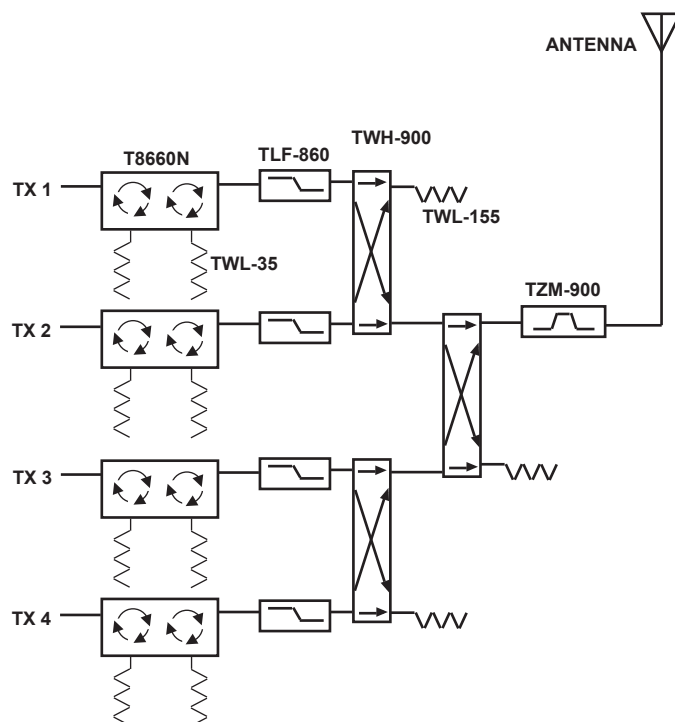
- 2 OR 4 CHANNELS ONLY 3.5" HIGH
- ADJACENT CHANNEL COMBINING
- UP TO 150 WATTS PER CHANNEL
- 800 / 900 MHz SMR, TRUNKING, CELLULAR

**TELEWAVE, INC.** 660 Giguere Court San Jose, CA 95133  
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# TW860-2/4HRB1H



**BLOCK DIAGRAM  
TW860-2HRB1H TWO CHANNEL HYBRID**



**BLOCK DIAGRAM  
TW860-4HRB1H FOUR CHANNEL HYBRID**

## SPECIFICATIONS

Frequency range	851-960 MHz
Bandwidth	10-30 MHz
TX to TX Isolation	90 dB
Antenna to TX Isolation	65 dB
2nd Harmonic Attn.	65 dB
Insertion Loss	3.8 dB 2 Channels 7.0 dB 4 Channels
Input Power (max)	150 W per channel
Input VSWR	<1.5:1
Impedance	50Ω
Temperature range	-30° to +60°C

Enclosure	Alodined Aluminum
Hardware	Stainless steel
Connectors	N-Female

Dimensions:	
TW860-2HRB1H	3.5" H x 19" W x 11.25" D
TW860-4HRB1H	3.5" H x 19" W x 16.75" D

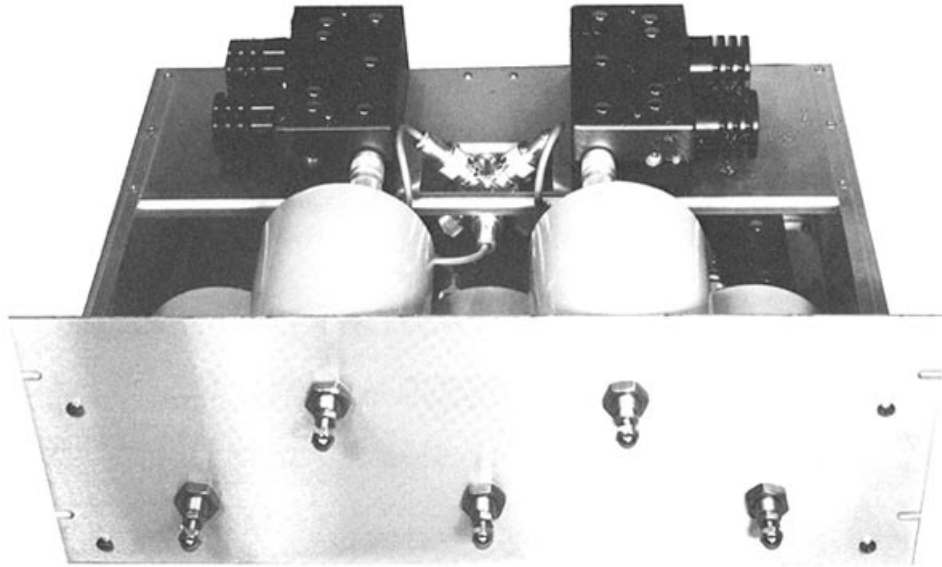
Net Weight:	
TW860-2HRB1H	15 lbs.
TW860-4HRB1H	30 lbs.

Ship Weight:	
TW860-2HRB1H	20 lbs.
TW860-4HRB1H	40 lbs.

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## **TC860**

### **CERAMIC ENHANCED TRUNKING COMBINER**



The Telewave CELLCO 860 MHz trunking combiner brings advanced ceramic technology to the SMR operator. The TC860 combiner occupies only 20% of the volume of its predecessor, and requires only 7 inches of rack space. The CELLCO ceramic cavities provide performance equivalent to conventional 8-inch 3/4 wavelength cavities. The Telewave CELLCO combiner is your best choice when site space is at a premium.

Fully temperature compensated components give you frequency stability throughout the entire temperature range. The unique design allows the cavity to be tuned under the full 80 watts of input power.

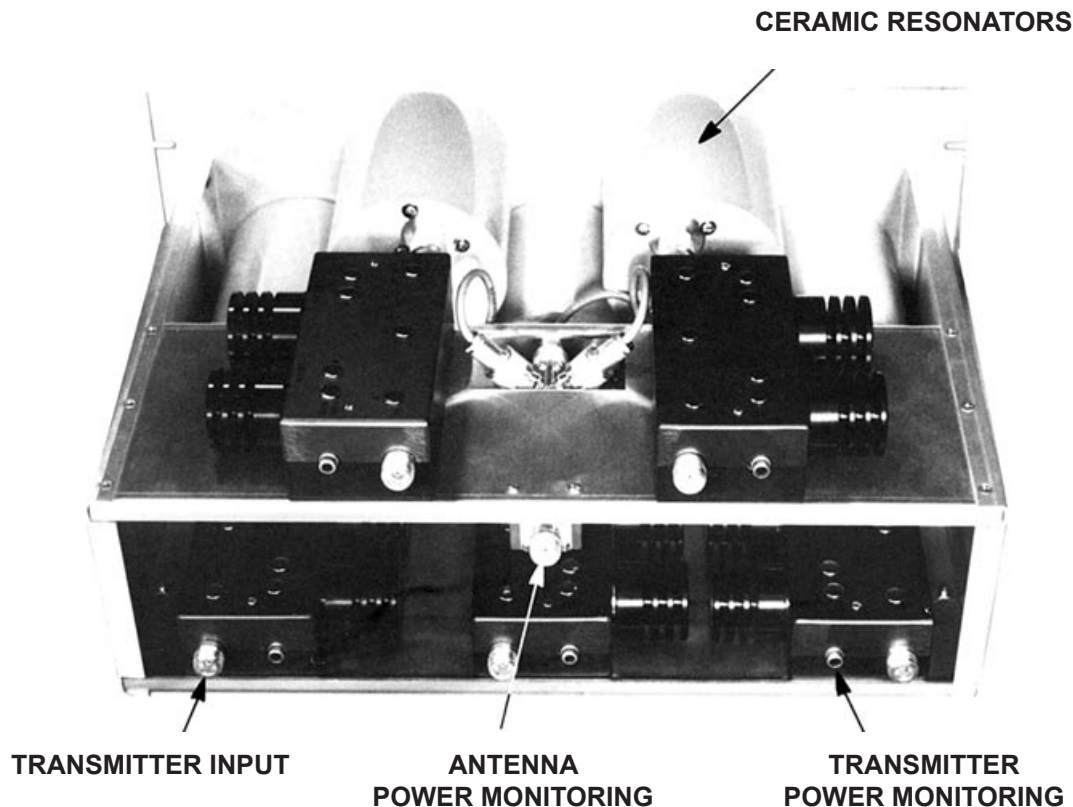
Ceramic Enhanced Resonators allows combining of channels as close as 250 KHz with reasonable insertion loss. The T8660D isolators are equipped with built-in power monitoring as a standard feature. To fully complement this compact combiner, the PM10C2SC wattmeter panel requires only 1 rack unit of panel space. The wattmeter panel is a standard feature with the CELLCO combiner. It gives the technician instant access to the transmitter keying and the monitoring of the combiner performance.

The CELLCO combiner is field expandable to 10 channels with pretuned expansion kits. This building block concept lets allows installation of new channels without the need for specialized test equipment.

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# TC860



## GENERAL SPECIFICATIONS

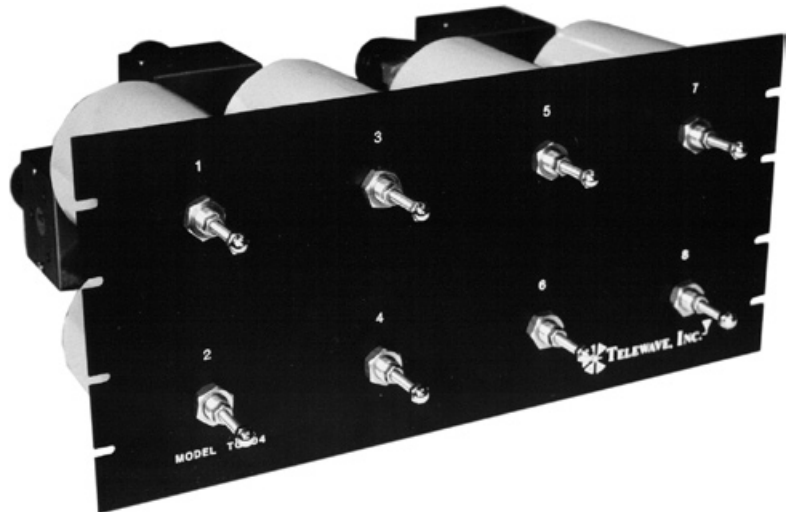
Frequency	869-896 MHz
Frequency Spacing (min)	210 KHz
Metering (optional)	All Transmitters and Antenna
Temperature	0°C to +50°C
TX to TX Isolation	70 dB at 630KHz
Antenna to TX Isolation	60 dB (min)
Insertion loss ( typical )	
4 Channel at 630 KHz	2.0 dB
4 Channel at 360 KHz	2.5 dB
16 Channels at 630 KHz	2.5 dB
16 Channels at 360 KHz	3.2 dB
Power Input Per Channel	50 Watts (Continuous)
Transmitter Input VSWR (max)	1.25 : 1
Dimensions (maximum outside)	8.75" x 19" x 10"
Depth from mounting rack face	10 inches nominal
Weight	45 pounds

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## **TC804 SERIES**

### **EXPANDABLE CERAMIC CELLULAR COMBINERS**

CERAMIC  
ENHANCED  
LOW  
LOSS  
COMBINING



Ceramic Low Loss Combining is another first from Telewave, pioneers of Low Loss Combining.

Our CELLCO product line provides a complete selection of ceramic cavity filters and combiners, for cellular and SMR site management.

Telewave's ceramic resonators offer the same high performance as our standard Low Loss cavities, in a much smaller package. This state-of-the-art advancement allows us to create one of the world's smallest Low Loss Combiners.

The TC804 Cellular Ceramic Enhanced Low Loss Combiner exceeds all previous specifications, combining up to 8 channels in only 8.75" of standard 19" rack space.

Ceramic enhanced resonators allow combining of transmitters at frequency spacing as close as 360 KHz. Lower insertion loss per channel is another result of the sharper selectivity of the resonators. This unique design also permits tuning under full power at 80 watts per channel, without damage to the resonators.

Remember, CELLCO is more than just a word. It's another first from the company that gave the world the first Low Loss Combiner.

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# **TC804 SERIES**

<b><u>TRANSMITTERS</u></b>	<b><u>MODELS</u></b>
<b>4 Ch / sector</b>	<b>TC804-4</b>
<b>16 Ch / sector</b>	<b>TC804-16</b>
<b>24 Ch / sector</b>	<b>TC804-24</b>

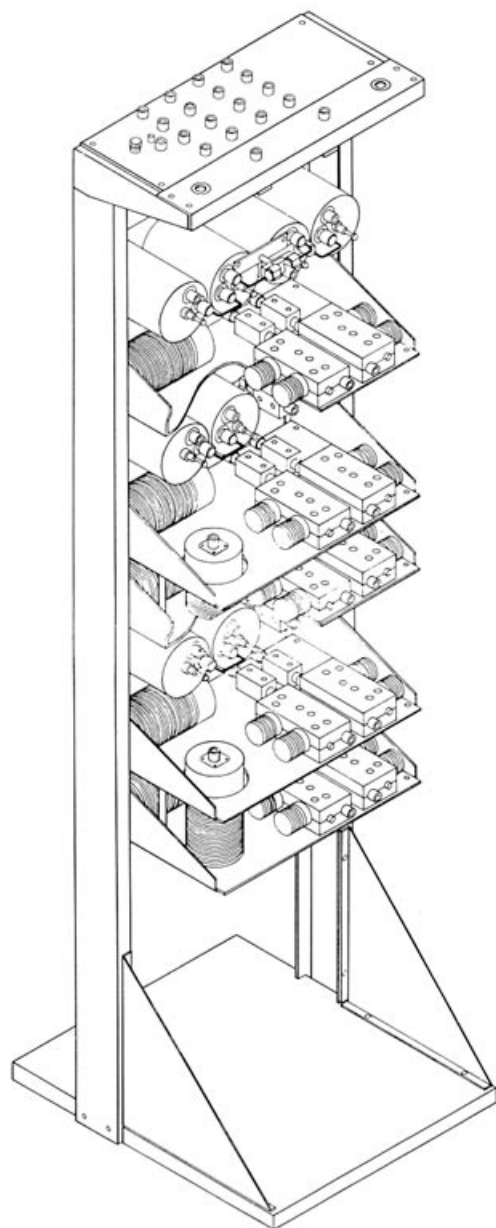
## **GENERAL SPECIFICATIONS**

Frequency Range	869-960 MHz
Frequency Spacing (min)	360 KHz
Temperature	0 to +50 C
TX to TX Isolation (min)	65 dB
Ant to TX Isolation (min)	60 dB
Insertion loss (typical)	
4 Ch. at 630 KHz	1.8 dB
16 Ch. at 630 KHz	2.5 dB
24 Ch. at 630 KHz	3.8 dB
Power Input Per Channel	80 W
Transmitter Input VSWR (max)	1.25:1
Antenna Test Port (option)	-50 dB

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## **M101-900-10TRM**

### **LOW LOSS 900 MHZ COMBINER**



The TELEWAVE 900 MHz SMR Trunking Combiner is the industry leader for excellence in hybrid combiner technology. Ease of installation and maintenance is accomplished by convenient access to all components.

All Trunking Combiner systems are priced complete including an EIA 19-inch rack, complete transmitter combining package, receiver distribution system with preselector, sideband filters if needed, and power monitoring.

This completely passive combining technique, as utilized, allows for low maintenance and easy reconfiguration of the antennas for the appropriate combination to meet your system coverage requirements.

Your Valuable site space is conserved when using efficient TELEWAVE - designed combiners.

RF power metering is a standard feature. All forward and reverse power measurements are switchable for each transmitter. Up to five antennas can be monitored for VSWR

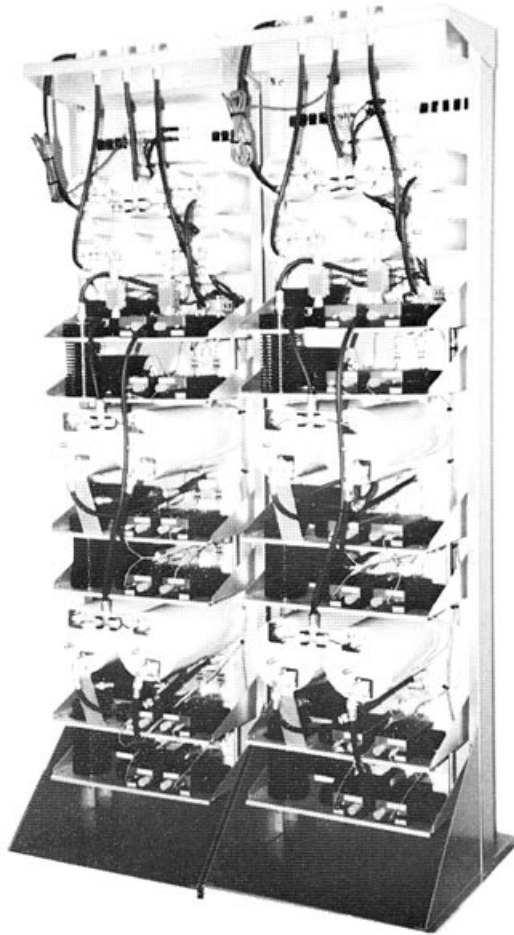
Convenient remote transmitter keying is included on the RF wattmeter panel.

All rack-mount 10 channel combiners are field expandable to 20 channels. Expansions are accomplished by the addition of the pre-tuned duplexer cavity panels. Modular building block construction means no specialized test equipment is required.

The advanced mechanical design of the TELEWAVE hybrid combiner assures maximum long-term system performance. Special high power (250 watts) combiners are available upon request. All cables are easily accessible from the back of the rack; THERE ARE NO HIDDEN CABLES!

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# M101-900-10TRM

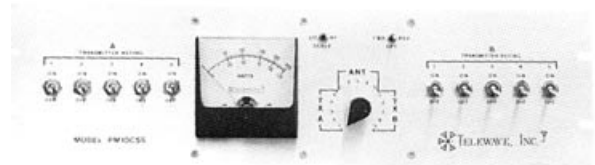


## M101-900-20TRMH

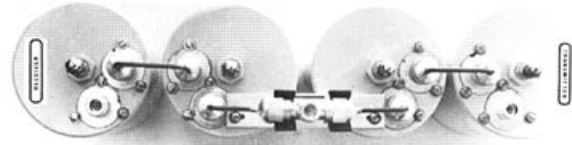
### Transmitter Combiner

Frequency Range	896-841
Frequency Spacing (min)	12.5 KHz
Metering	All TX and Ant.
Temperature	-30 C to +60 C
Tx to Tx Isolation	100 dB(min)
Ant to Tx Isolation	80 dB
Insertion Loss (typical)	
5 Ant system (4 Tx & 1 Rx)	
2 Ch. to ea. Tx	3.1 dB
2 Ch. duplexed to Rx Ant	3.1 dB
3 Ant system (2 Tx & 1 Rx Ant)	
4 Ch. ea. Tx	6.3 dB
2 Ch. duplexed to Rx Ant	3.1 dB
2 Ant system (1 Tx & 1 Rx)	
8 Ch. to Tx. Ant	9.3 dB

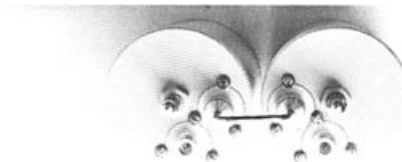
Note: Add 0.4 dB for each isolator.  
 Add 0.4 dB if duplexer is used.  
 Add 0.4 dB if sideband filter is used



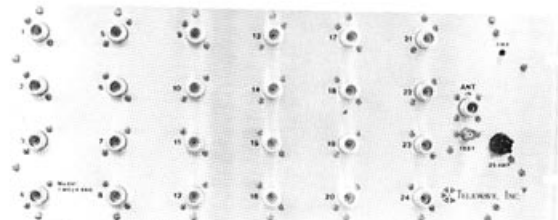
**PM10C5S**  
Wattmeter Panel



**TTPD-9044**  
Duplexer 5 MHz Bandwidth



**TPRF-9042**  
Sideband Filter 5 MHz Bandwidth



**TWR24-860**  
Receiver Distribution Panel

### Receiver Distribution System

Frequency Range	896-941 MHz
RX to RX Isolation	25 dB (typ)
Power Input	115 VAC / +15 VDC
3rd Order IM Intercept point	+36 dB (typ)
Noise Figure	2.5 dB (typ)
Gain Through System	+4 to +6 dB (typ)
Temperature	-40 C to +60 C
Connectors	Type N-Female
Receiver Channels	16 or 24
Mounting	19-inch panels
Test Port	-20 dB

**TELEWAVE, INC.** 660 Giguere Court San Jose, CA 95133

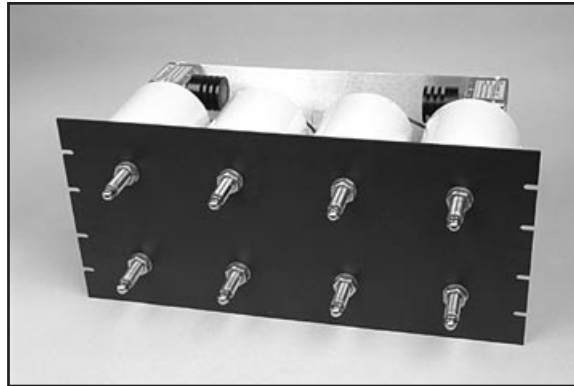
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Email: [sales@telewave.com](mailto:sales@telewave.com)



**TC9042 SERIES**  
**GSM CERAMIC LOW LOSS COMBINERS**  
**4 to 16 CHANNELS**



**TC9042-4      4 Channel GSM Combiner**

The TC9042 series of GSM Ceramic Low Loss Combiners offer the same high performance as our standard low loss cavities, in a much smaller package. This state of the art technology allows us to create one of the world's smallest Low Loss GSM Combiners.

The TC9042 series combines up to 4 channels per unit, with 200 KHz passband, in only 8.75" of standard rack space. The modular combining units can be grouped for up to 16 channels to accommodate system expansion.

Ceramic enhanced resonators allow combining of transmitters at frequency spacing as close as 800 KHz. The sharper selectivity of the resonators provides lower insertion loss per channel. Another benefit of ceramic technology is very high frequency stability, eliminating the need for external control devices. Our unique design allows tuning under full power without damage to the resonators.

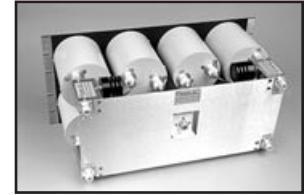
The optional receiver system utilizes the TPCP-9028-2A Dual Combine Preselector for very sharp receiver selectivity, and the TWR16-900-2A2R Dual Receiver Multicoupler for receiver distribution up to 24 channels.

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# TC9042 SERIES

## Model Numbers

<b>TC9042-4</b>	<b>4 channels</b>
<b>TC9042-8</b>	<b>8 channels</b>
<b>TC9042-12</b>	<b>12 channels</b>
<b>TC9042-16</b>	<b>16 channels</b>



## Specifications

## Transmitter Combiner

Frequency Range		935-960 MHz
Passband Width		200 KHz
Frequency Spacing (min)		800 KHz
Temperature		0°C to +50°C
System Impedance		50 ohms
TX to TX Isolation (min)		85 dB
Ant to TX Isolation (min)		65 dB
Insertion loss at 800 KHz (typ)	4 channels	≤ 1.8 dB
	8 channels	≤ 2.2 dB
	16 channels	≤ 2.8 dB
Power Input Per Channel		80 watts
Transmitter Input VSWR (max)		1.25:1
Mounting		19" (48 cm) rack
Dimensions (H x W x D)	4 channels	8.5" x 19" x 12.5"
		21.6 x 48 x 31.75 cm
Input/Output Connectors		N-Female
Net Weight		52 lb / 23.6 kg

## Optional Equipment

## Receiver System



### TWR16-900-2A2R

### Dual Receiver Multicoupler

Frequency Range		890-915 MHz
Bandwidth		25 MHz
Isolation RX to RX	Min	25 dB
	Max	30 dB
System Impedance		50W
3rd order intercept		+36 dBm
Noise figure		2.5 dB typ.
System gain (1 dB step adjustable)		+8 to +18 dB
Power requirements (1 ch.)		+19 to +29 VDC @ 360 mA
Temperature Range		0°C to +50°C
Current Metering		Analog
Current Alarm Circuit		LED and form "C" contacts
Mounting		19" Rack Mount
Dimensions (HxWxD)		3.5" x 19" x 9"
		9cm x 48cm x 23cm
Connectors	Input	N Female
	Output	BNC Female, SMA Female
Net Weight		7.7 lb
		3.5 kg

### TPCP-9028-2A

### Dual Combine Preselector

Frequency Range		890-915 MHz
Bandwidth		25 MHz
Insertion Loss		< 0.5 dB
Isolation RX to RX	Min	75 dB
	Max	80 dB
System Impedance		50 ohms
Temperature Range		0°C to +50°C
Mounting		19" (48 cm) Rack Mount
Dimensions (HxWxD)		3.5" x 19" x 9"
		9cm x 48cm x 23cm
Connectors		N Female
Net Weight		10 lb
		4.5 kg

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