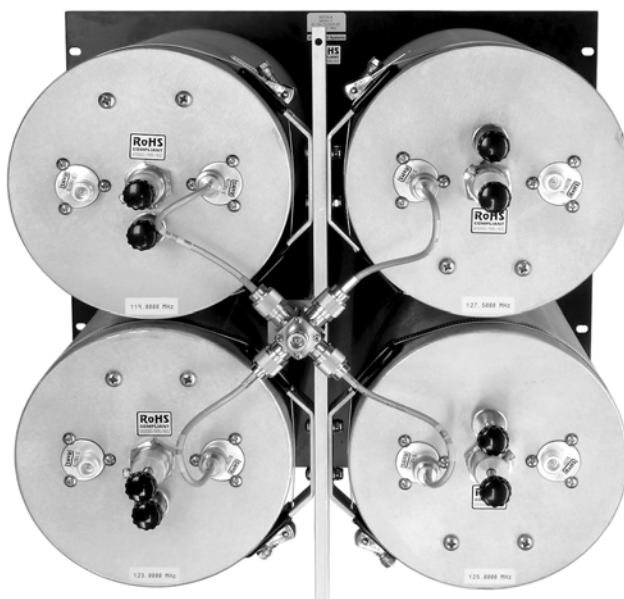




Instruction Manual for Receiver Multicoupler Model Number 42-35A-02094-X

Manual Part Number

7-9308-2



Warranty

This warranty applies for one year from shipping date.

TX RX Systems Inc. warrants its products to be free from defect in material and workmanship at the time of shipment. Our obligation under warranty is limited to replacement or repair, at our option, of any such products that shall have been defective at the time of manufacture. **TX RX Systems Inc.** reserves the right to replace with merchandise of equal performance although not identical in every way to that originally sold. **TX RX Systems Inc.** is not liable for damage caused by lightning or other natural disasters. No product will be accepted for repair or replacement without our prior written approval. The purchaser must prepay all shipping charges on returned products. **TX RX Systems Inc.** shall in no event be liable for consequential damages, installation costs or expense of any nature resulting from the purchase or use of products, whether or not they are used in accordance with instructions. This warranty is in lieu of all other warranties, either expressed or implied, including any implied warranty or merchantability of fitness. No representative is authorized to assume for **TX RX Systems Inc.** any other liability or warranty than set forth above in connection with our products or services.

TERMS AND CONDITIONS OF SALE

PRICES AND TERMS:

Prices are FOB seller's plant in Angola, NY domestic packaging only, and are subject to change without notice. Federal, State and local sales or excise taxes are not included in prices. When Net 30 terms are applicable, payment is due within 30 days of invoice date. All orders are subject to a \$100.00 net minimum.

QUOTATIONS:

Only written quotations are valid.

ACCEPTANCE OF ORDERS:

Acceptance of orders is valid only when so acknowledged in writing by the seller.

SHIPPING:

Unless otherwise agreed at the time the order is placed, seller reserves the right to make partial shipments for which payment shall be made in accordance with seller's stated terms. Shipments are made with transportation charges collect unless otherwise specified by the buyer. Seller's best judgement will be used in routing, except that buyer's routing is used where practicable. The seller is not responsible for selection of most economical or timeliest routing.

CLAIMS:

All claims for damage or loss in transit must be made promptly by the buyer against the carrier. All claims for shortages must be made within 30 days after date of shipment of material from the seller's plant.

SPECIFICATION CHANGES OR MODIFICATIONS:

All designs and specifications of seller's products are subject to change without notice provided the changes or modifications do not affect performance.

RETURN MATERIAL:

Product or material may be returned for credit only after written authorization from the seller, as to which seller shall have sole discretion. In the event of such authorization, credit given shall not exceed 80 percent of the original purchase. In no case will Seller authorize return of material more than 90 days after shipment from Seller's plant. Credit for returned material is issued by the Seller only to the original purchaser.

ORDER CANCELLATION OR ALTERATION:

Cancellation or alteration of acknowledged orders by the buyer will be accepted only on terms that protect the seller against loss.

NON WARRANTY REPAIRS AND RETURN WORK:

Consult seller's plant for pricing. Buyer must prepay all transportation charges to seller's plant. Standard shipping policy set forth above shall apply with respect to return shipment from TX RX Systems Inc. to buyer.

DISCLAIMER

Product part numbering in photographs and drawings is accurate at time of printing. Part number labels on TX RX products supersede part numbers given within this manual. Information is subject to change without notice.

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Version Number	Version Date
1	04/05/02
2	07/27/06

Symbols Commonly Used



WARNING



ESD Electrostatic Discharge



CAUTION or ATTENTION



Hot Surface



High Voltage



Electrical Shock Hazard



Use Safety Glasses



Important Information

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Table 1: System specifications 1

GENERAL DESCRIPTION

The model 42-35A-02094-X Receiver Multicouplers are multichannel systems which use band-pass filters to distribute the received signals to individual station receivers while simultaneously rejecting nearby transmit frequencies. The final "X" in the model number represents the number of channels the system is designed to accommodate. Models are available from 1 through 12 channels. Specifications for the model 42-35A-02094-X family of receiver multicouplers are listed in **Table 1**. A system diagram is included with each shipment that shows the layout of the system in schematic form as well as the factory tuned frequencies of each channel.

Specification	Quantity
Cavity Tuning Range (MHz)	118 - 137
Min. Channel-Channel Separation	150 KHz
Cavity Insertion Loss	0.9 dB
Max. Channel Insertion Loss	2.0 dB
Table 1: System Specifications.	

UNPACKING

Care should be used when removing the system components from their shipping containers to avoid unnecessary damage. It is important to visually inspect the multicoupler system for any shipping damage as soon as possible after taking delivery. It is the customers responsibility to file any necessary damage claims with the carrier. Receiver multicouplers are rugged devices but may become detuned if severely jostled or dented during shipping. The most easily damaged parts of the system are the tuning rods of the cavity filters.

INSTALLATION

The system is shipped from the factory as separate 19" rack mount assemblies. These sections must be securely installed in a standard EIA 19" rack and then interconnected as shown in the system layout drawing shipped with the equipment. **Figure 1** shows the block diagram of a four channel system. Additional channels can be added or subtracted from this design using tee-connectors. **Figure 2** is a photograph of a four channel system showing the correct location for connecting your receivers and antenna.

All RF connections should be made with double-shielded, 50-ohm coaxial cable. Flexibility in the cables will help prevent damage to the connectors.

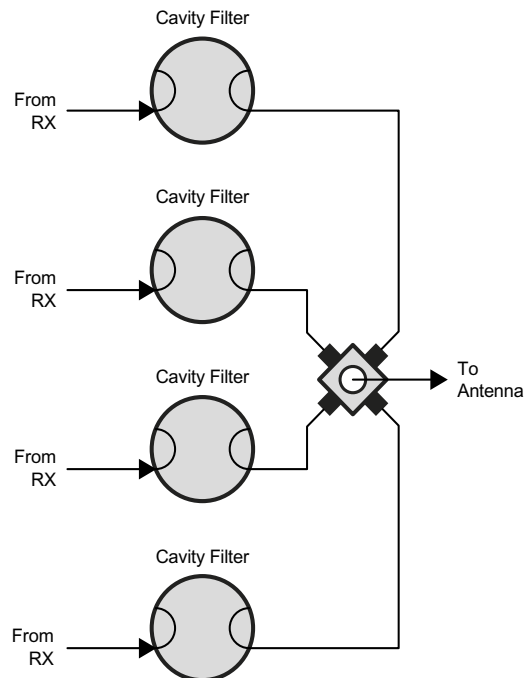


Figure 1: Block diagram of a four channel system.

We recommend the use of high quality connectors with gold plated center pins. Cable assemblies using these type of connectors are available from TX RX Systems.

The receiver multicoupler should be securely installed in a dry, vibration-free environment. Avoid areas of high heat or direct sunlight which can cause differential heating and drift. Attachment of the mounting rack to a common earth ground is recommended to maximize lightning protection.

MAINTENANCE

No special maintenance is required. The receiver multicoupler is a passive device of rugged electrical and mechanical design. The system is tuned at the factory for the customers original specified receive frequencies and requires no further adjustment or maintenance. The multicoupler will stay properly tuned unless it is physically damaged or is tampered with. Check for loose or corroded connectors on the interconnect cables whenever an inspection is performed on other station equipment.

Because the system is composed of passive devices field repairs are rarely required. Field repair is limited to the replacement or repair of damaged cables. When damage occurs to the cav-

ities it is usually due to catastrophic failure from lightning. If cavity problems are suspected, the subassembly should be returned to the factory for repair. Due to the critical alignment of parts within the cavities field repair is not recommended.

TUNING & RETUNING

The filters are factory tuned to the customers specified receive frequencies. Changes in system frequency may require retuning of the cavities.

Tuning of the cavity filters is always required when changing channel frequencies. One other frequency restriction is that there is a minimum frequency separation between combiner channels. This means that there can not be two channels on the same frequency assignment and that no two channels may be closer together than 150 kHz.

Cavity Tuning

The pass frequency is the only recommended field adjustable parameter in the cavity filters. Adjustment of the tuning rods will allow the passband to be centered at the desired frequency. The insertion loss of each cavity is determined by the position of its loop plates and is not field adjustable. The loop plates on the cavities used in the receiver multicoupler system should never be loosened or moved from their factory preset positions. The systems



Figure 2: Interconnecting the four channel system.

interconnect cables are critical in length and must not be changed.

Due to the sensitivity of the adjustments, it is recommended that the proper equipment be used when tuning the individual filters and the work be performed by a qualified technician familiar with the system. Otherwise the filters should be sent to the factory or a factory authorized representative for retuning. Cavities can be field tuned if a network analyzer or spectrum analyzer with a tracking generator is available.

- 1) Connect the equipment as in **Figure 3**. Set the center frequency of the analyzer to the desired pass frequency.
- 2) Set the fine tuning knob at it's mid-point. Adjust the pass frequency by setting the peak (minimum loss value) of the response curve to the desired frequency. The resonant frequency is adjusted by using the coarse tuning rod, which is a sliding adjustment (invar rod) that rapidly tunes the filter's response curve. The resonant frequency is increased by pulling the rod out of the cavity and is decreased by pushing the rod into the cavity. Additionally, the fine tuning rod, also a sliding adjustment (silver-plated-brass rod), allows a more precise setting of the response curve after the coarse adjustment is

made. The resonant frequency is increased by pushing the fine tuning rod in and is decreased by pulling it out, the exact opposite of the coarse tuning rod.

- 3) Once the desired response is obtained using the coarse and fine tuning rods, they are locked in place. The coarse rod is secured by tightening the 10-32 cap screw and the fine tuning rod is held in place by tightening the knurled thumb nut. **Failure to lock the tuning rods** will cause a loss of temperature compensation and detuning of the cavity.

Cavity Tuning Tip

When tuning a cavity that has been in service for some time it is not unusual to find the main tuning rod hard to move in or out. This occurs because because TX RX Systems Inc. uses construction techniques borrowed from microwave technology that provide large area contact surfaces on our tuning probes. These silver plated surfaces actually form a pressure weld that maintains excellent conductivity. The pressure weld develops over time and must be broken in order for the main tuning rod to move. This is easily accomplished by gently tapping the tuning rod with a plastic screwdriver handle or small hammer so it moves into the cavity. The pressure weld will be broken with no damage to the cavity.

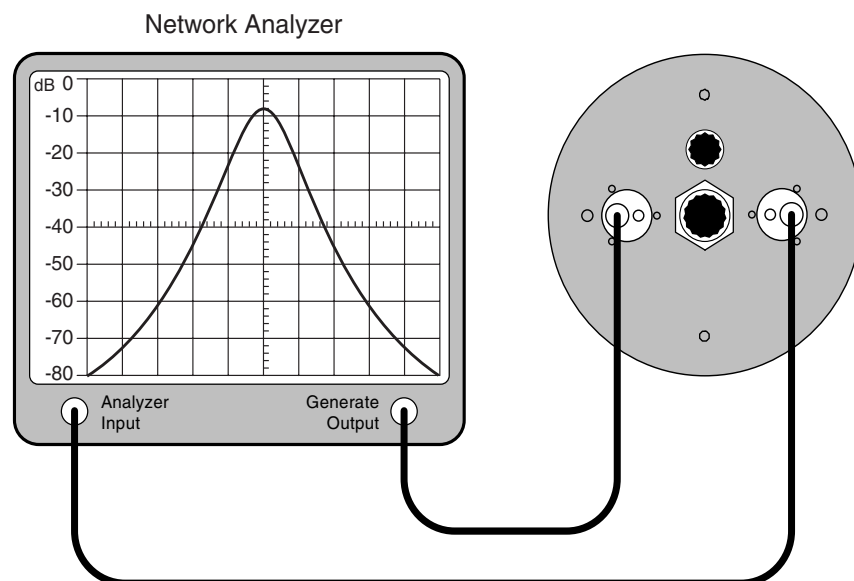


Figure 3: Tuning the pass frequency.

NOTES

Return Loss vs. VSWR

Return Loss	VSWR
30	1.06
25	1.11
20	1.20
19	1.25
18	1.28
17	1.33
16	1.37
15	1.43
14	1.50
13	1.57
12	1.67
11	1.78
10	1.92
9	2.10

Watts to dBm

Watts	dBm
300	54.8
250	54.0
200	53.0
150	51.8
100	50.0
75	48.8
50	47.0
25	44.0
20	43.0
15	41.8
10	40.0
5	37.0
4	36.0
3	34.8
2	33.0
1	30.0

dBm = 10log P/1mW
Where P = power (Watt)

Insertion Loss

Input Power (Watts)

	50	75	100	125	150	200	250	300	
Insertion Loss	3	25	38	50	63	75	100	125	150
	2.5	28	42	56	70	84	112	141	169
	2	32	47	63	79	95	126	158	189
	1.5	35	53	71	88	106	142	177	212
	1	40	60	79	99	119	159	199	238
	.5	45	67	89	111	134	178	223	267

Output Power (Watts)

Free Space Loss

Distance (miles)

	.25	.50	.75	1	2	5	10	15
Frequency (MHz)	150	68	74	78	80	86	94	104
	220	71	77	81	83	89	97	107
	460	78	84	87	90	96	104	113
	860	83	89	93	95	101	109	119
	940	84	90	94	96	102	110	120
	1920	90	96	100	102	108	116	126

Free Space Loss (dB)

Free space loss = 36.6 + 20log D + 20log F
Where D = distance in miles and F = frequency in MHz

