

# 220 MHz Trunking Multicoupler Systems



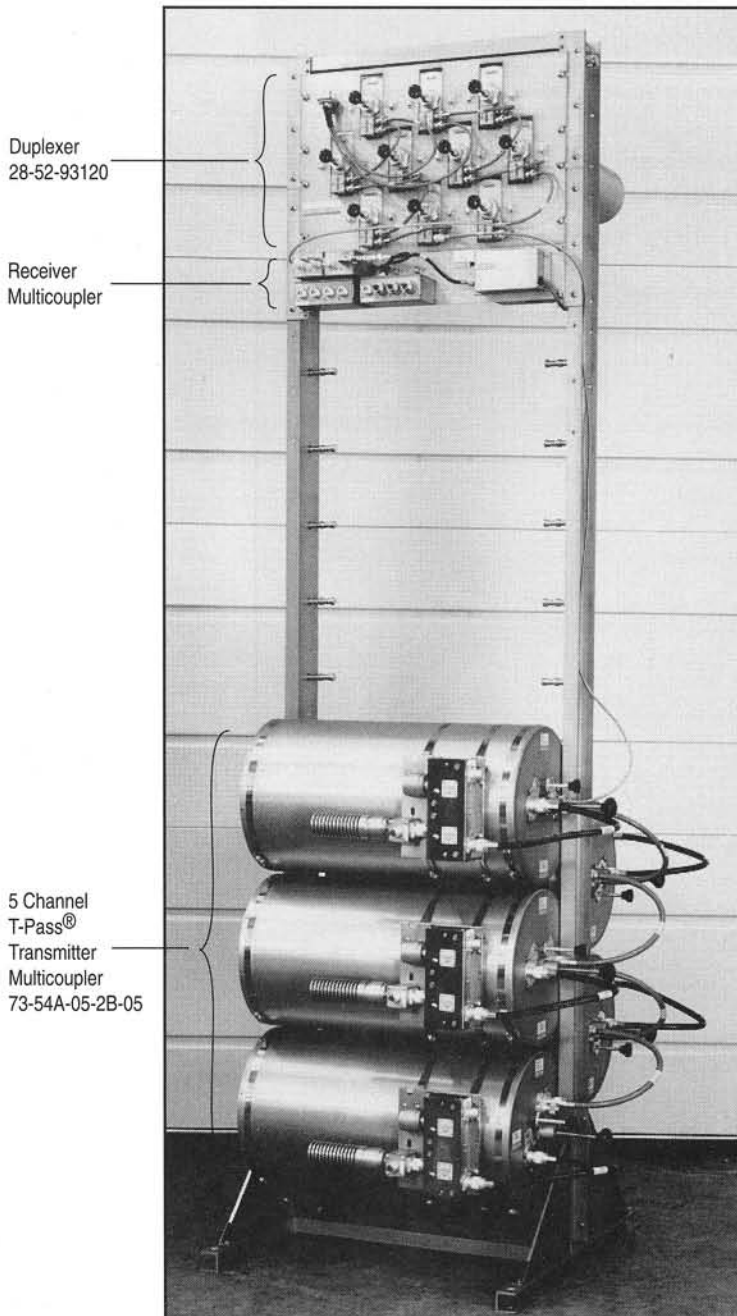
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*A Member of Bird Technologies Group*

# **220 MHz Trunking Multicoupler Systems**

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# Transmitter and Receiver Multicoupler Systems for 220 MHz

**Systems  
Brief**  
052494S



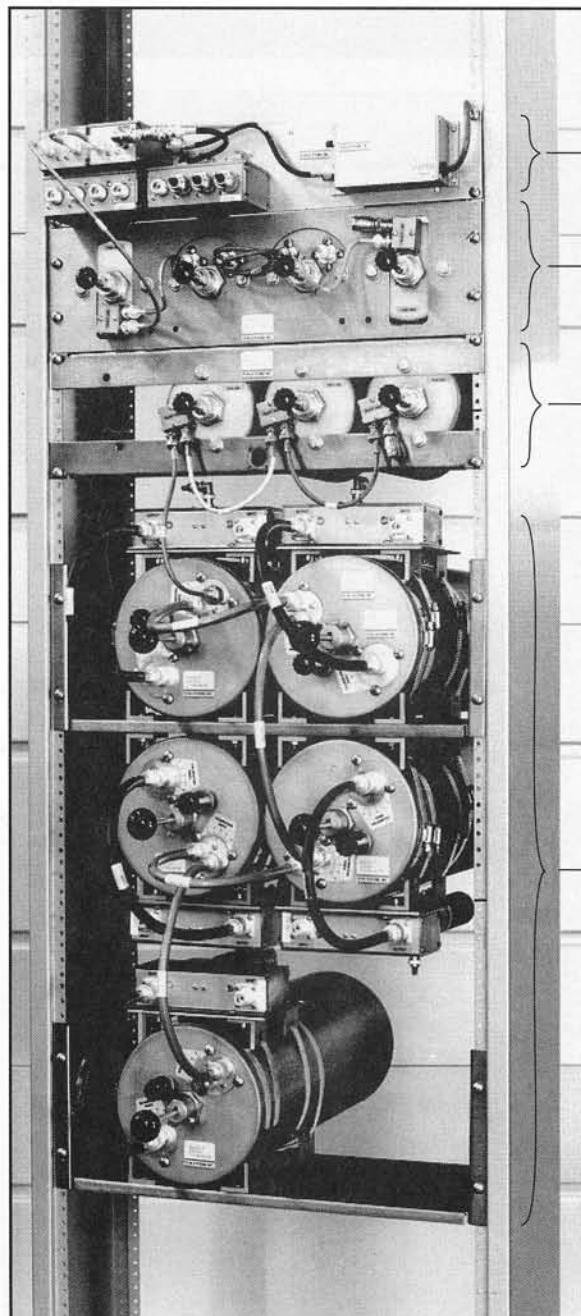
Duplexer  
28-52-93120

Receiver  
Multicoupler

5 Channel  
T-Pass®  
Transmitter  
Multicoupler  
73-54A-05-2B-05

**Complete 5 Channel System**  
*(Peg-Rack version, includes Peg-Rack)*  
**System Model 74-54A-05-2B-05**

*Single Antenna System.  
150 KHz Transmitter channel spacing.  
Transmitter loss 5.7dB maximum.  
Receiver gain 5.0 Minimum.*



Receiver  
Multicoupler

Receiver  
Preselector  
89-52-93120

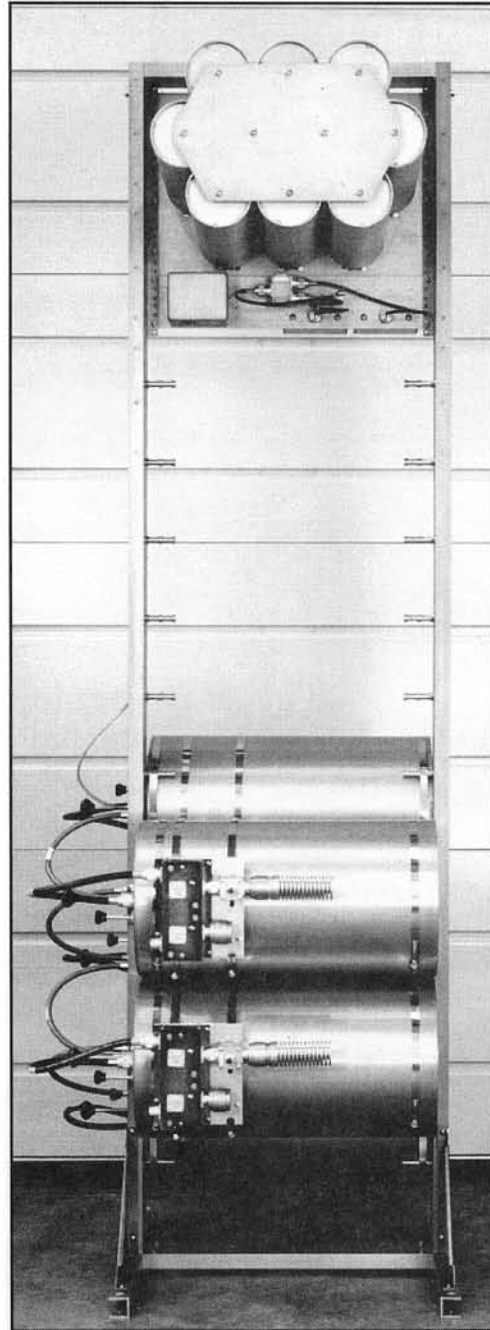
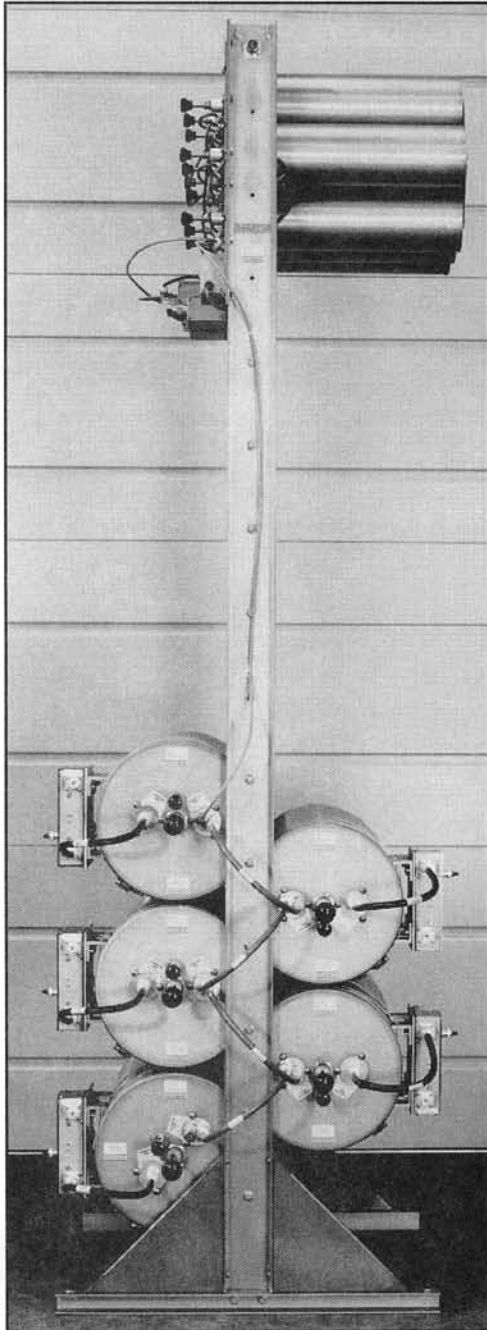
Transmitter  
Noise Filter  
15-52-93120

5 Channel  
T-Pass®  
Transmitter  
Multicoupler on  
19" Decks  
73-54A-01-2B-05-LR

**Complete 5 Channel System**  
*(19" Rack Mount version, includes Rack)*  
**System Model 74-54A-01-2B-05DR**

*Separate Tx and Rx Antennas.  
150 KHz Transmitter channel spacing.  
Transmitter loss 4.9 dB maximum.  
Receiver gain 5.0 Minimum.*

**Transmitter and Receiver Multicoupler  
System Model 74-54A-05-2B-05**  
(additional views)



# 220 MHz Multicoupling

## Topic #1: Antennas

Q: How many?

A: Though a single antenna multicoupler system is available, a dual antenna system is recommended whenever possible. Being that it takes 10 cavities in the duplexer to insure adequate carrier and noise suppression, a single antenna system has 1.2 dB greater insertion loss.

Inherent to a 5 channel system are a number of high order intermod "hits" which start at the 9th order and are .050 MHz from the receivers. Space isolation greatly reduces the risk of these intermod problems.

For sites with more than one trunk system, a master receive system should accommodate all the receivers. Depending on frequency separation and cavity size, (see below) multiple transmit antennas may be necessary.

Q: Distance between antennas?

A: Ten feet of tip to bottom separation should provide at least 40 dB between the RX and TX antennas. If multiple transmit antennas are used, ten feet should be maintained between the RX and all TX antennas. Distance between TX antennas is typically not critical as a proper combiner will have dual isolators which insure sufficient TX-TX isolation. Please note the topic here is antenna isolation not antenna pattern.

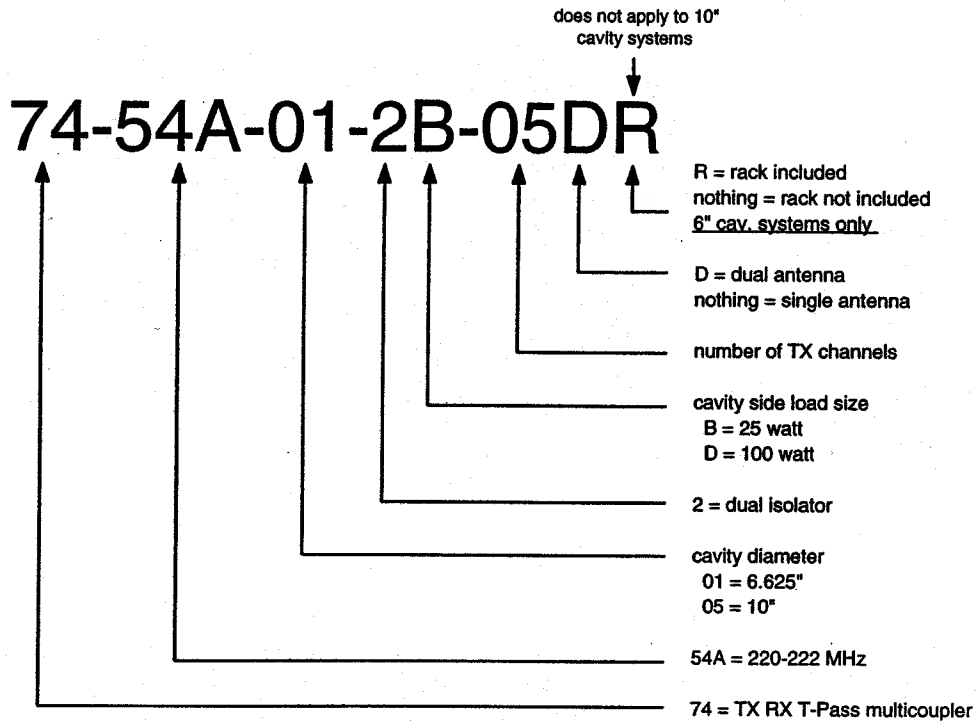
## Topic #2: Cavity Size

**6.625" diameter:** This cavity should be used when system size is a concern and no more than 5 transmitters will be combined to the same antenna. Insertion loss will be approximately .4 dB greater than a system using 10" diameter cavities. The standard system includes a 19" x 77" relay rack. This rack can be deleted by dropping the "R" trailer at the end of the model number. Required panel space is 43.75" (25 rack units) for the dual antenna system and 49.00" (28 rack units) for the single antenna system.

**10" diameter:** This cavity should be used when insertion loss is critical and/or the possibility of expansion exists. Spacings down to .060 MHz are possible with this cavity which means 10 channel combiners are achievable. Systems utilizing 10" cavities are fully assembled in our patented Peg Rack™.

With the above decisions being made, it is time to proceed to an explanation of our nomenclature.

# 220 MHz Multicoupling Nomenclature

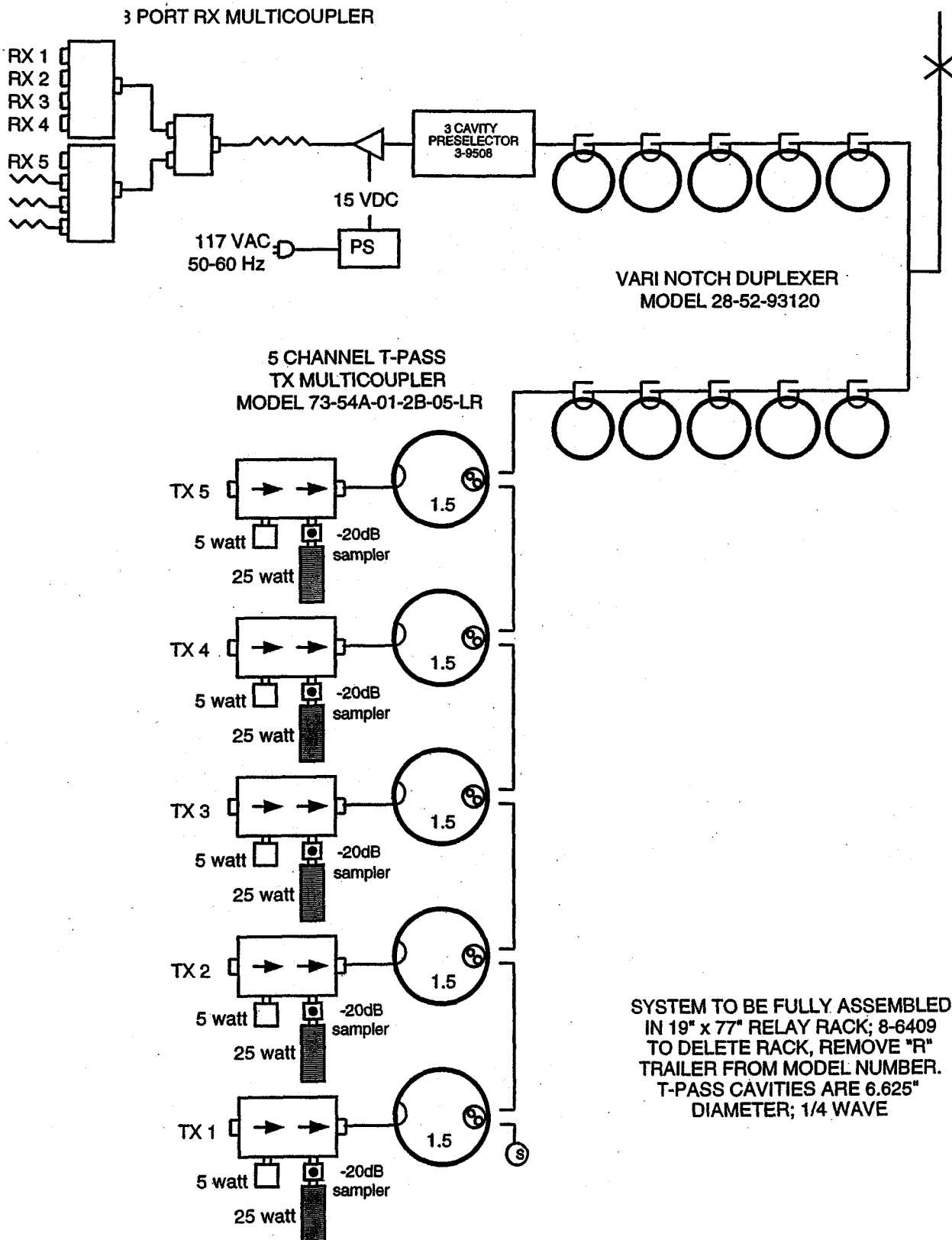


Listed below are the basic systems for discussion. Variations from these systems can be accomplished by contacting the factory.

Model Number	No. of Ant's	Cav dia.	Mechanical
74-54A-01-2B-05R	1	6.625"	assembled in relay rack
74-54A-05-2B-05	1	10"	assembled in Peg Rack
74-54A-01-2B-05DR	2	6.625"	assembled in relay rack
74-54A-05-2B-05D	2	10"	assembled in Peg Rack

The following pages are drawings, specification sheets, and plotted response curves for the above systems.

# 220 MHz TRUNKING MULTICOUPLER MODEL 74-54A-01-2B-05R



TRANSMITTER RECEIVER MULTICOUPLER

SYSTEM MODEL 74-54A-01-2B-05R

System Specifications & Mounting Description

ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE.....	220-222	MHz
CHANNEL LOSS (TRANSMIT @ .150 MHZ SEPARATION).....	6.1	dB max
CHANNEL GAIN (RECEIVE).....	+2 to +4	dB
SYSTEM NOISE FIGURE (at lowest RX frequency).....	8.2	dB typ.
PREAMP NOISE FIGURE.....	3.6	dB typ.
ISOLATION:		
TX to TX.....	75	dB min.
TX I.M. Suppression.....	80	dB min.
TX to RX (Noise Suppression 221-222 MHz).....	95	dB min.
RX to TX (Carrier Suppression 220-221 MHz)...	85	dB min.
RX to TX (Carrier Suppression 211 MHz).....	90	dB min.
RX to RX .....	20	dB min.
TX POWER/CHANNEL (limited by isolator load).....	50	watts max.
V.S.W.R.....	1.3:1	max.
TEMPERATURE RANGE.....	-30 C to +60 C	
CONNECTORS .....	'N'	TYPE FEM.

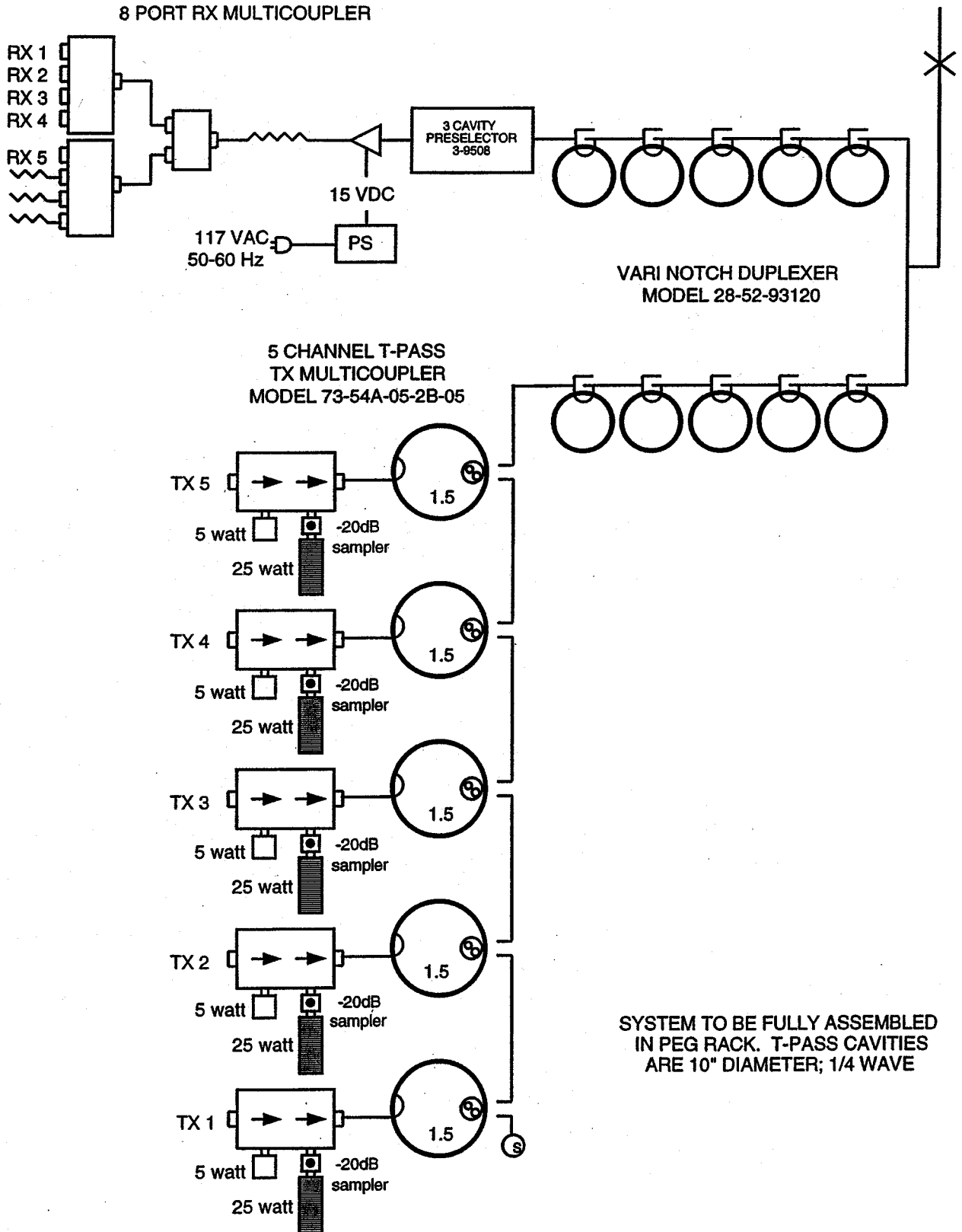
MECHANICAL SPECIFICATIONS

SYSTEM WEIGHT (with rack).....	200	lbs.
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MOUNTING DESCRIPTION

System to be fully assembled in 19" x 77" relay rack.

## 220 MHz TRUNKING MULTICOUPLER MODEL 74-54A-05-2B-05



TRANSMITTER RECEIVER MULTICOUPLER

SYSTEM MODEL 74-54A-05-2B-05

System Specifications & Mounting Description

ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE.....	220-222	MHz
CHANNEL LOSS (TRANSMIT @ .150 MHZ SEPARATION).....	5.7	dB max
CHANNEL GAIN (RECEIVE).....	+2 to +4	dB
SYSTEM NOISE FIGURE (at lowest RX frequency).....	6.7	dB typ.
PREAMP NOISE FIGURE .....	3.6	dB typ.
ISOLATION:		
TX to TX.....	76	dB min.
TX I.M. Suppression.....	82	dB min.
TX to RX (Noise Suppression 221-222 MHz).....	100	dB min.
RX to TX (Carrier Suppression 220-221 MHz)...	85	dB min.
RX to TX (Carrier Suppression 211 MHz).....	90	dB min.
RX to RX .....	20	dB min.
TX POWER/CHANNEL (limited by isolator load).....	50	watts max.
V.S.W.R.....	1.3:1	max.
TEMPERATURE RANGE.....	-30 C to +60 C	
CONNECTORS .....	'N'	TYPE FEM.

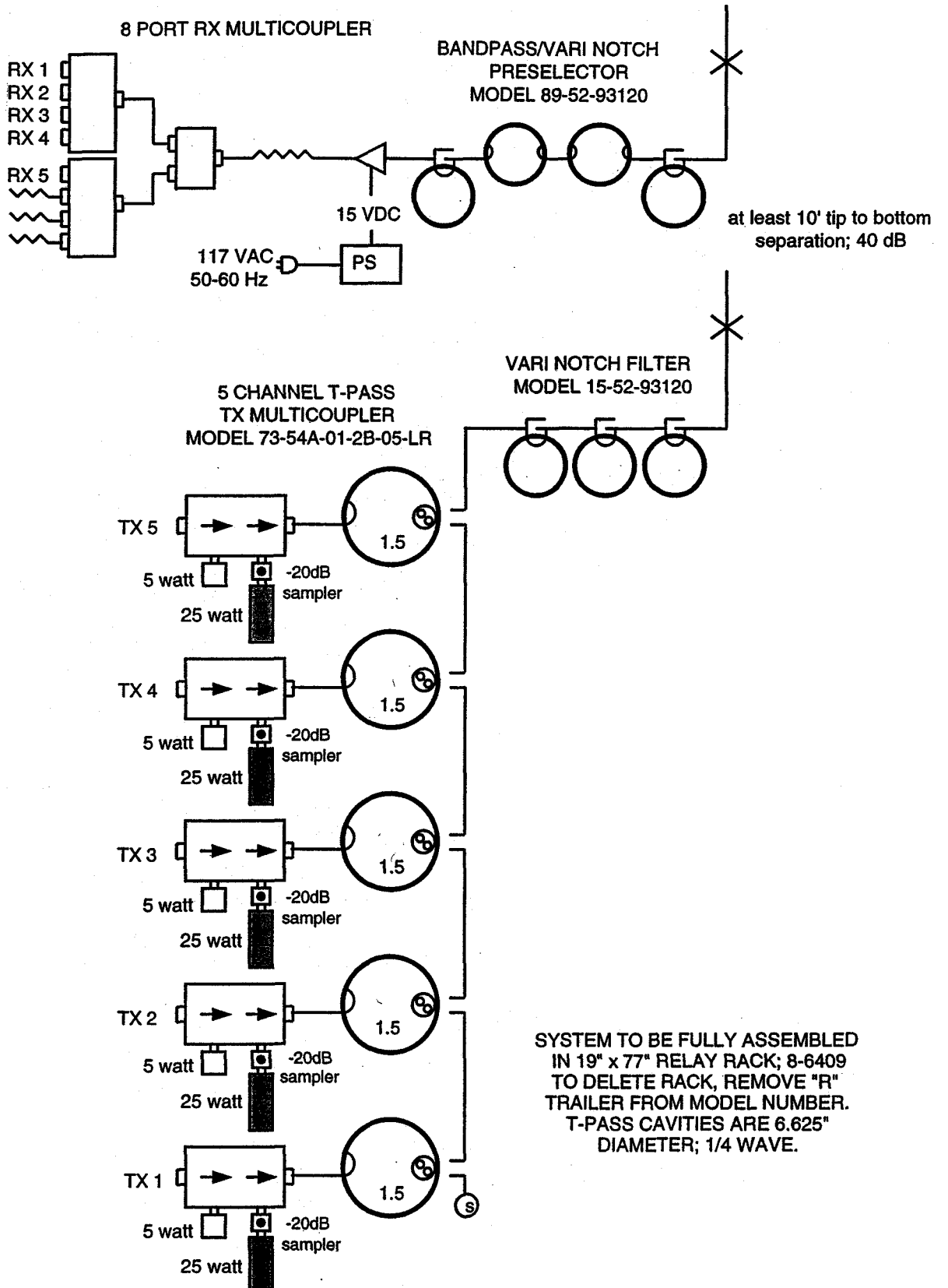
MECHANICAL SPECIFICATIONS

SYSTEM WEIGHT (with rack).....	210	lbs.
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MOUNTING DESCRIPTION

System to be fully assembled in Peg Rack.

# 220 MHz TRUNKING MULTICOUPLER MODEL 74-54A-01-2B-05DR



TRANSMITTER RECEIVER MULTICOUPLER

SYSTEM MODEL 74-54A-01-2B-05DR

System Specifications & Mounting Description

ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE.....	220-222	MHz
CHANNEL LOSS (TRANSMIT @ .150 MHZ SEPARATION).....	4.9	dB max
CHANNEL GAIN (RECEIVE).....	+2 to +4	dB
SYSTEM NOISE FIGURE (at lowest RX frequency).....	6.5	dB typ.
PREAMP NOISE FIGURE .....	3.6	dB typ.
ISOLATION: (INCLUDES 40 dB ANTENNA ISOLATION SPACE WHERE APPLICABLE)		
TX to TX.....	75	dB min.
TX I.M. Suppression.....	80	dB min.
TX to RX (Noise Suppression 221-222 MHz).....	96	dB min.
RX to TX (Carrier Suppression 220-221 MHz)...	86	dB min.
RX to TX (Carrier Suppression 211 MHz).....	40	dB min.
RX to RX .....	20	dB min.
TX POWER/CHANNEL (limited by isolator load).....	50	watts max.
V.S.W.R.....	1.3:1	max.
TEMPERATURE RANGE.....	-30 C to +60 C	
CONNECTORS .....	'N'	TYPE FEM.

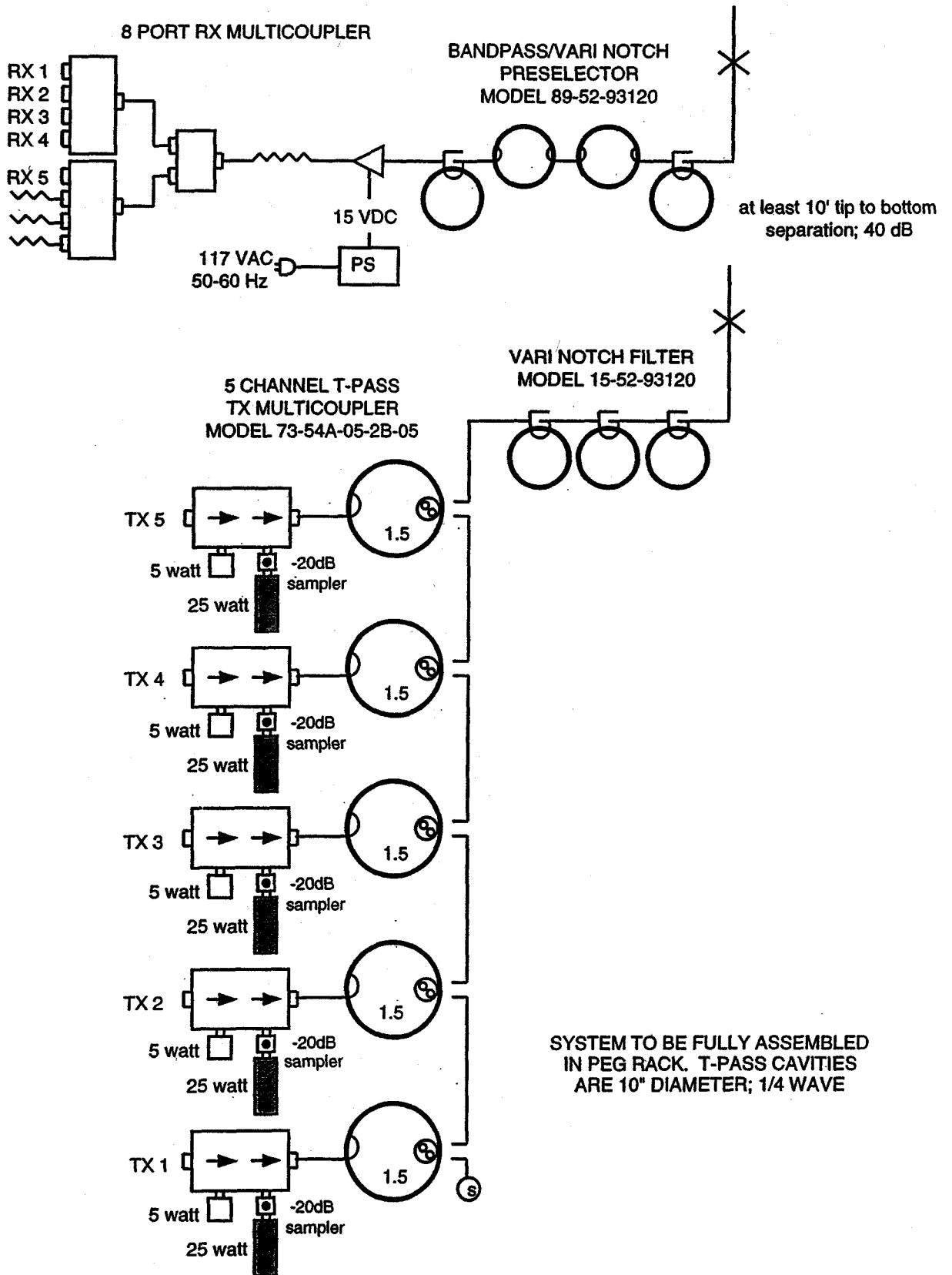
MECHANICAL SPECIFICATIONS

SYSTEM WEIGHT (with rack).....	195	lbs.
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MOUNTING DESCRIPTION

System to be fully assembled in 19" x 77" relay rack.

# 220 MHz TRUNKING MULTICOUPLER MODEL 74-54A-05-2B-05D



TRANSMITTER RECEIVER MULTICOUPLER

SYSTEM MODEL 74-54A-05-2B-05D

System Specifications & Mounting Description

ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE.....	220-222	MHz
CHANNEL LOSS (TRANSMIT @ .150 MHz SEPARATION).....	4.5	dB max
CHANNEL GAIN (RECEIVE).....	+2 to +4	dB
SYSTEM NOISE FIGURE (at lowest RX frequency).....	6.5	dB typ.
PREAMP NOISE FIGURE .....	3.6	dB typ.
ISOLATION: (INCLUDES 40 dB ANTENNA ISOLATION SPACE WHERE APPLICABLE)		
TX to TX.....	76	dB min.
TX I.M. Suppression.....	82	dB min.
TX to RX (Noise Suppression 221-222 MHz).....	98	dB min.
RX to TX (Carrier Suppression 220-221 MHz)...	86	dB min.
RX to TX (Carrier Suppression 211 MHz).....	40	dB min.
RX to RX .....	20	dB min.
TX POWER/CHANNEL (limited by isolator load).....	50	watts max.
V.S.W.R.....	1.3:1	max.
TEMPERATURE RANGE.....	-30 C to +60 C	
CONNECTORS .....	'N' TYPE FEM.	

MECHANICAL SPECIFICATIONS

SYSTEM WEIGHT (with rack).....	200	lbs.
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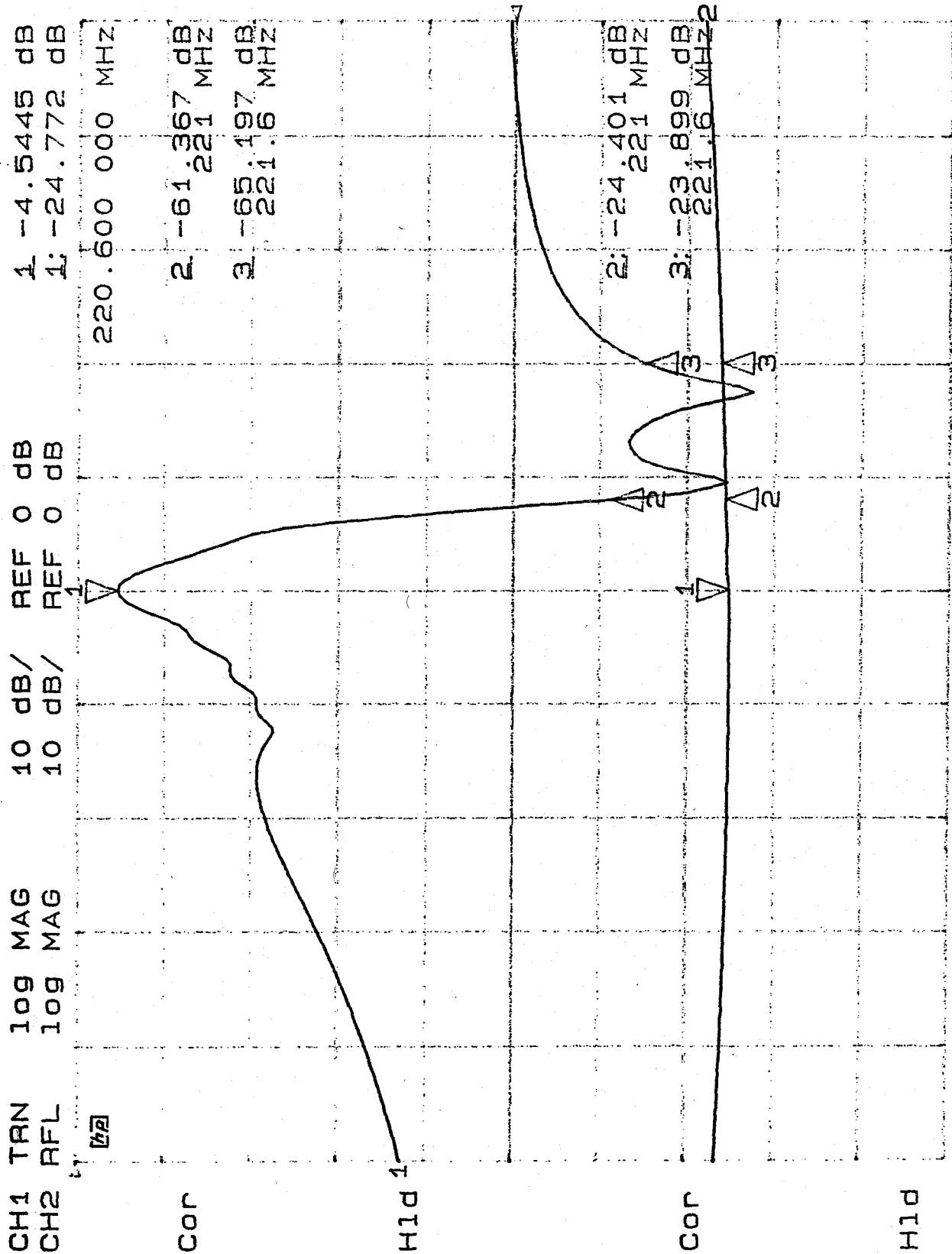
MOUNTING DESCRIPTION

System to be fully assembled in Peg Rack.

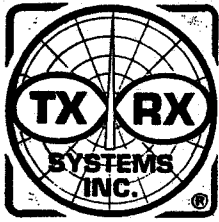


# Noise Suppression Response Curve System Model 74-54A-01-2B-05D

from isolator input to Vari Notch filter output  
 marker 2 = 221.000 MHz (atten. = 61 dB)  
 marker 3 = 221.600 MHz (atten. = 65 dB)



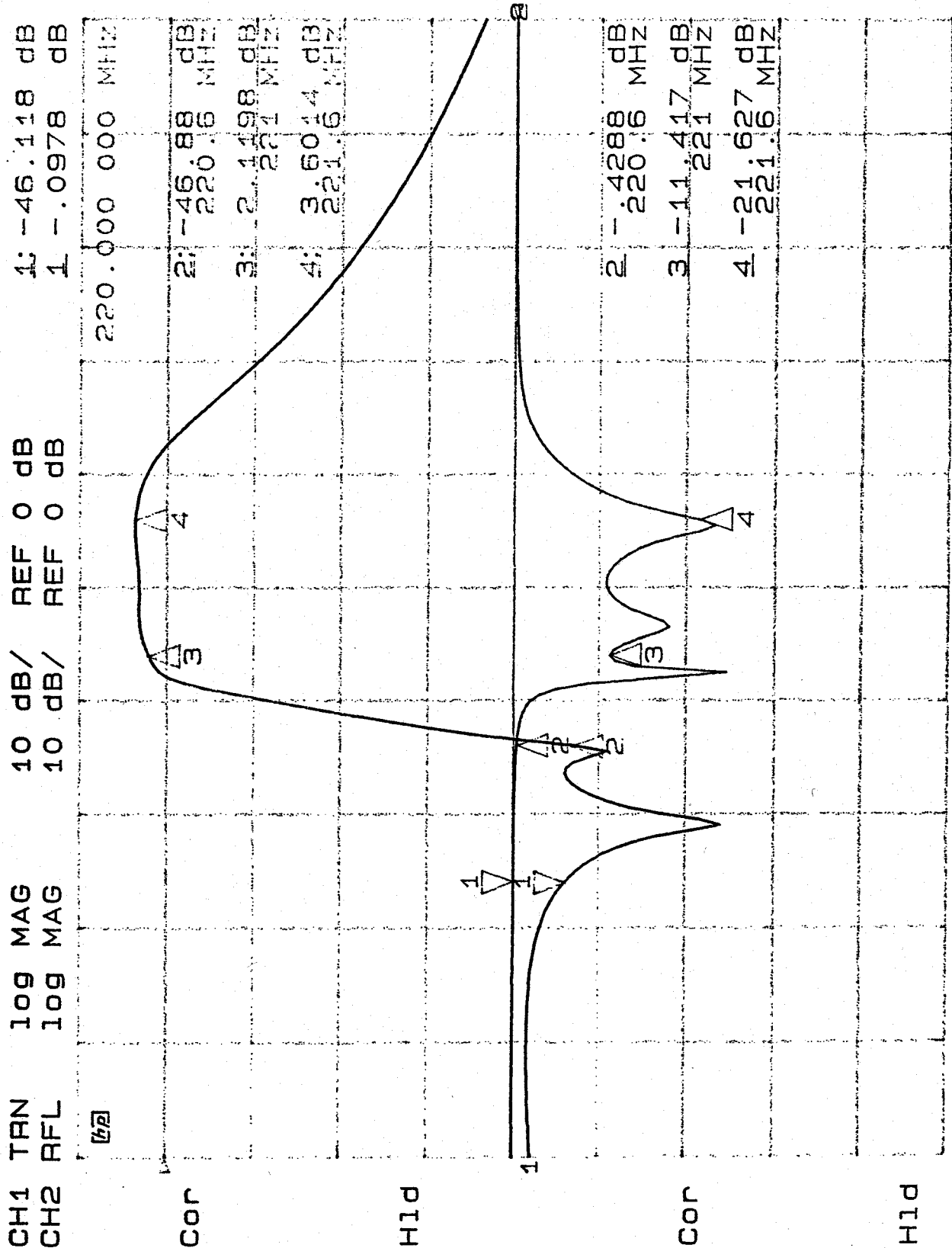
CENTER 220.600 000 MHZ      SPAN 5.000 000 MHZ



# Carrier Suppression Response Curve

## System Model 74-54A-01-2B-05D

from preselector antenna input to RX multicoupler output  
 marker 1 = 220.000 MHz (atten. = 46 dB)  
 marker 2 = 220.600 MHz (atten. = 46 dB)







# Carrier Suppression Response Curve

## System Model 74-54A-05-2B-05

from duplexer input to preselector output

marker 1 = 211.000 MHz (attn. = 91 dB)

marker 2 = 220.6825 MHz (attn. = 85 dB)

