



 **COMMUNICATIONS, INC.**

SERVICE MANUAL

DUPLEXER

MODEL DPLX U250

INSTRUCTION SHEET

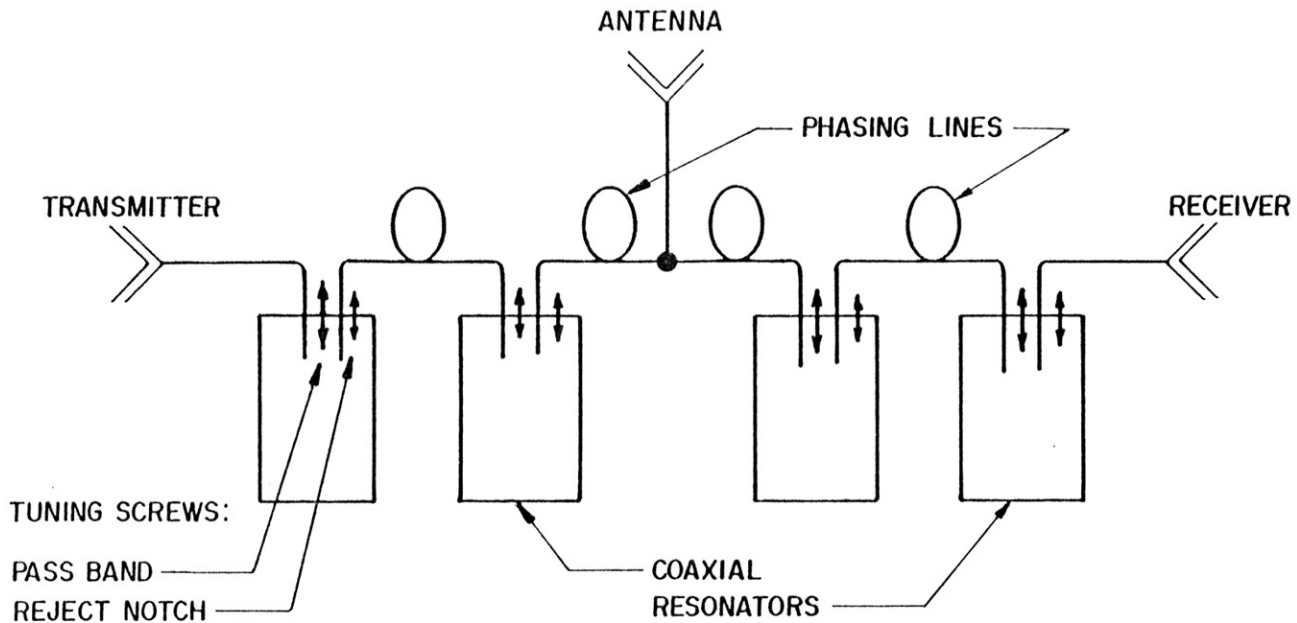
DUPLEXER DPLXU250

This 250-watt duplexer assembly is configured for 5½" x 19" rack space mounting and is recommended for use with the Regency ACU45 or ACU100 power amplifiers. The unit employs 4 high-Q bandpass/reject cavities which provide additional selectivity over that obtainable with band-reject resonators. Maximum isolation between the transmitter and receiver is obtained simultaneously with minimum insertion losses for the transmit and receive functions. The circuit block diagram is shown in Figure 1 and typical Tx and Tx channel response curves are shown in Figure 2. Electrical and mechanical specifications are tabulated in specification drawing 104-250.

These duplexers are factory tuned with a network analyzer to customer's specific transmitter and receiver frequencies and should require no further adjustment during station installation. If duplexer realignment becomes necessary, it is important that the reflections at the transmitter port be viewed simultaneously as the isolation notches are optimized so that transmitter-to-receiver isolation is not obtained at the expense of excessive VSWR's at the transmitter port.

!WARNING!

DUPLEXERS SHOULD NEVER BE TUNED WITH TRANSMITTER POWER APPLIED!




DPLX U250 CIRCUIT BLOCK DIAGRAM

FIG 1

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
R-201		9/25/79	[Signature]

PART NO.	2703-5428-001
FREQ RANGE - MHz	406-470
FREQ SEPARATION - MHz	5 OR MORE
MAX. POWER INPUT - WATTS	250
INSERTION LOSS TX-ANT - dB	0.8
INSERTION LOSS Rx-ANT - dB	0.8
Tx NOISE SUPPRESSION AT Rx FREQ - dB	85
Rx ISOLATION AT Tx FREQ - dB	1 85
MAX VSWR	1.3:1
FREQ. STABILITY	0.5PPM/°F
TEMPERATURE RANGE	-40°C to +70°C
RACK MOUNTING SCREWS	10-32 x .5
MAX. DIMENSIONS (W-D-H)	19" x 12" x 5 1/4"
WEIGHT	17 LBS
CONNECTORS	ANT 'N' FEMALE TX UHF FEMALE Rx UHF FEMALE

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		FRACT.	DEC.	ANG.	DRAWN CMCC CHECKED DFTG. SUPV.		
		±	.xx± .xxx±	±	ENGR. <i>KW</i>	9/79	SPECIFICATIONS DUPLEXER U250
		MATERIAL		FINISH	<i>cm</i>	9/24/79	
NEXT ASSY	USED ON	U250					
APPLICATION		DO NOT SCALE DRWG		SCALE	~	SIZE A	PART NUMBER 104-250 SHEET OF

REV	APPLICATION		REVISIONS			
	NEXT ASSY	USED ON	REV	DESCRIPTION	DATE	APPROVED
			A	R-211	11/1/79	REW

TEST PROCEDURE

DUPLEXER ALIGNMENT FOR DPLXU45, DPLXU250
AND OTHER DUPLEXERS USED WITH REGENCY REPEATERS

I. Test Set-Up

A. Equipment

1. Network Analyzer H.P. 8754A with H.P. 8502 Transmission/Reflection Test Set or equivalent.
2. 50 ohm coaxial termination with VSWR = 1.05 or less in the 450-512 MHz frequency range.


B. Alignment Criteria and Precautions

When aligning a duplexer, the technician must keep in mind the following operational objectives:

1. Suppression of the transmitter carrier into the receiver port.
2. Suppression of the transmitter noise at the receiver frequency into the receiver port.
3. Minimum insertion loss between the transmitter and antenna at the transmitter frequency.
4. Minimum insertion loss between the antenna and receiver at the receiver frequency.

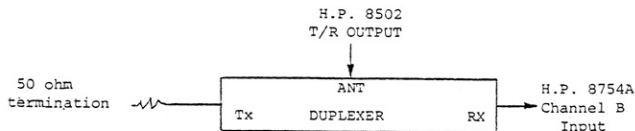
Duplexers must be tuned to achieve all of these objectives simultaneously. The following test interconnection diagrams allow simultaneous observations of the transmission and reflection losses at the duplexer input and output ports. Tuning adjustments can then be made with the transmission and reflection coefficients displayed on the network analyzer over the entire frequency range of operation. Optimization of the isolation notches can then be achieved within the limits of acceptable transmitter and receiver mismatch losses as viewed on the network analyzer display.

The usual procedure is to tune for widest and deepest isolation notches while restricting the antenna-to-transmitter and antenna-to-receiver reflection losses to an acceptable value, for example 14dB corresponding to a duplexer/antenna VSWR of 1.5 maximum.

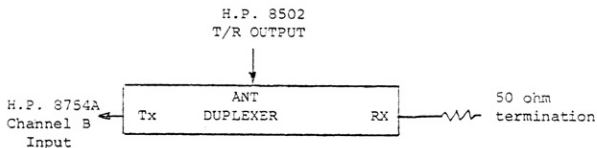
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE	APPROVALS	DATE	 COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937		
	DRAWN <i>R. Adams</i>	11/1/79			
FRACT. DEC ± .XX± ± .XXX±	ANG. ±	CHECKED	TEST PROCEDURE DUPLEXER ALIGNMENT FOR DPLXU45, DPLXU250 AND OTHER DUPLEXERS USED WITH REGENCY REPEATERS		
		GFTG. SUPV.			
MATERIAL	ENGR.	<i>REW</i>	SIZE A PART NUMBER TP14-267 REV. A		
		11/1/79			
FINISH			SCALE SHEET 1 OF 4		
DO NOT SCALE DRWG.					

II. Test Interconnection Diagram

Connection #1:



Connection #2:



III. Measurement Procedure

- A. Connect the H.P. 8502 Transmission/Reflection test set to the H.P. 8754A Network Analyzer and turn the power switch on for a 4-hour warm-up period.
- B. Channel A will show the reflection loss at the T/R test set output port, and Channel B will show the transmission through the duplexer port under test.
- C. With the T/R output open-circuited, adjust Channel A gain to center screen which then becomes the reference line for zero VSWR return loss.
- D. Adjust the center frequency to the center of operational band with the help of the 50 MHz and 10 MHz markers. Set the sweep width to 100 MHz.
- E. Terminate the T/R output with the 50 ohm termination and verify the return loss to be greater than 32dB.
- F. Connect the T/R output to Channel B input and adjust Channel B gain to the top display line, which then becomes the reference line for zero transmission loss.
- G. Connect the duplexer to the Network Analyzer and T/R test set as shown in Test Interconnection Diagram #1.
- H. Tune the duplexer cavities in the Rx arm for minimum loss in the pass band with the pass adjustment. Then with the reject notch adjustment place the rejection notches approximately at the transmitter frequency.

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DO NOT SCALE DWG.		SCALE		SHEET 2

- I. Change the Channel B input to the Tx port as shown in Test Interconnection Diagram #2.
- J. Tune the duplexer cavities in the Tx arm for minimum loss in the pass band with the pass adjustment. Then with the reject notch adjustment place the rejection notches approximately at the receiver frequency.
- K. Reduce the sweep width to 20 MHz and repeat steps G through J while simultaneously observing the VSWR reflection losses on Channel A.
- L. The duplexer is now approximately tuned and ready for final adjustment of the notch frequencies, isolation and VSWR performances.
- M. Reduce the sweep width to 5 MHz and activate the 1 MHz markers.
- N. Refer to the table of test limits in Section IV and note the expected values and limits of the six parameters which characterize a properly tuned duplexer.
- O. Repeat steps G through J making precise adjustments of notch frequencies and simultaneously tuning for maximum isolations and maximum VSWR return losses and minimum insertion losses.

IV. Table of Test Limits

A. Definition of parameters:

RLTx = VSWR return loss of terminated transmitter port
 RLRx = VSWR return loss of terminated receiver port
 ILRxT = Isolation loss of receiver port at the transmitter carrier frequency
 ILTxR = Isolation loss of transmitter port at the receiver frequency
 ILRx = Insertion loss of receiver port at the receiver frequency
 ILTx = Insertion loss of transmitter port at the transmitter frequency

B. Parameter limits DPLXU45:

<u>PARAMETER</u>	<u>MIN.</u>	<u>TYP</u>	<u>MAX.</u>
RLTx	14dB	16dB	--
RLRx	14dB	16dB	--
ILRxT	75dB	77dB	--
ILRxR	75dB	80dB	--
ILRx	--	1.2dB	1.4dB
ILTx	--	1.0dB	1.4dB

C. Parameter limits DPLXU250:

<u>PARAMETER</u>	<u>MIN.</u>	<u>TYP</u>	<u>MAX.</u>
RLTx	14dB	16dB	--
RLRx	14dB	16dB	--
ILRxT	85dB	90dB	--
ILTxR	85dB	90dB	--
ILRx	--	0.8dB	1.0dB
ILTx	--	0.8dB	1.0dB

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V. Mechanical Specifications

Mechanical specifications are shown on Regency drawing 104-249 for DPLXU45 and on Regency drawing 104-250 for DPLXU250.

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