# Instruction Book For

Catalog Number: 5042-1

Frequency: 138-174 MHz

# Document Part Number: 607100224500

# Word File: 607100224.DOC

- Dist: Production Supervisor, Phoenix, Corvallis QC Supervisor, Marlboro Marketing Distribution Manager, Marlboro
- Note: Production Supervisor is responsible for maintaining document control for sub distribution to test stations.
- Note: Distribution Manager is responsible for updating distributor and Glendale warehouse locations with latest revisions.
- Note: Only the most current revision level of this document should be retained. The second page contains the revision level history. Discard documents without revision level identification.



#### Description

This duplexer consists of six cavities, normally arranged with three cavities tuned for each of the two (2) frequencies being used. The unit is tunable from 138 to 174 MHz with a band split at 150 MHz requiring different loop assemblies. Normal operating frequency separations of 0.5 to 5.0 MHz are available.

The individual cavities are shortened coaxial resonators with a pass dual notch coupling circuit mounted on a rotatable loop plate. Frequency tuning is accomplished by a push/pull rod assembly and is secured by an oval point set screw to prevent burring of the tuning rod during locking.

### Specifications

| Electrical | 0.5 MHz F | 5.0 MHz F |
|------------|-----------|-----------|
|            |           |           |

| Frequency Range*             | 138-174 MHz    |              |
|------------------------------|----------------|--------------|
| Frequency Separation         | 0.5 to 5.      | .0 MHz       |
| Max Power Input              | 100W           | 350W         |
| Ins. Loss Tx to Ant          | 1.8 dB max     | 1.0 dB max   |
| Ins. Loxx Ant to Rx          | 1.8 dB max     | 1.0 dB max   |
| Bandwidth                    | Single Freq.   | +/- 200 KHz  |
| Rx Isolation at Tx freq.     | 60 dB          | 90 dB        |
| Tx Noise Supp. at Rx freq.   | 60 dB          | 90 dB        |
| Mid Band Isolation           | NA             | 80 dB        |
| Max VSWR all ports**         | 1.5:1          | 1.35:1       |
| Connectors                   | Type "N'       | ' Fem.       |
| Temperature Range, Operating | -30°C to +60°C |              |
| Mechanical                   |                |              |
| Mounting                     | 19 <b>"</b> ra | ack or wall  |
| ino an e ing                 | (optional      | al brackets) |
| Height, Rack                 | 5-             | -1/4"        |
| Wall                         | 4 -            | -3/4"        |
| Depth. Total                 | 2.2            | 2-1/2" max.  |
| Rack) Front                  | 9-             | -1/2"        |
| Mounting) Rear               |                | 13"          |
| Weight                       |                | 22 lbs.      |
|                              |                |              |

\*Band split is necessary depending on frequency & separation. \*\*Other ports terminated in 50 ohms.

#### INSTALLATION

The unit is supplied with brackets for horizontal mounting in a 19" rack, or with optional brackets for wall or vertical mounting.

For horizontal rack mounting a clearance of 13" is required behind the mounting rails and 9-1/2" in front.

Connectors are all type "N" female facing to the rear of the rack. Tx, Rx and Ant. are identified by labels. (See Fig. 1).

#### Testing of Installation

#### Tx VSWR

After installing duplexer, transmitter to duplexer return loss should be measured for compliance with electrical specifications with ant port terminated in 50 ohms.

#### Rx Isolation

Key transmitter while observing Rx meter. There should be minimal to no change over the ambient noise level reading.

#### Tuning Requirement

If either test of installation indicate an out of spec condition or if tuning to another frequency is desired procede to tuning and alignment section.

#### TUNING AND ALIGNMENT

#### Equipment Required

HP 8505 or equivalent 50 ohms termination Johanson Tuning Tool #8774 or equivalent Medium slot screwdriver 3/32" Allen (Hex) wrench

#### Procedure

The units are normally supplied factory tuned to the desired frequency and Tx to Rx spacing and no readjustment should be required unless there has been a change in frequency.

The reject frequency will maintain its spacing from the pass frequency if the cavity is tuned over a limited range (approx. +/- 3 MHz). It is therefore recommended that the pass adjustments be made first.

#### Preliminary Steps

Place duplexer on bench with the loops on top. (See Fig. 1). Remove the cable harness from the duplexer.

Each cavity is to be tuned individually. See Fig. 2 for connectors.

Check Graph 1 to insure the correct lowpass loop assembly and padding capacitor are installed in the duplexer for the frequency band and Tx to Rx separation desired. Hipass loop assemblies require no additional capacitance across the trimmer capacitor.

#### Tuning

With each cavity connected as shown in Fig. 2 the following adjustments should be made.

#### Pass/Notch Cavity Tuning

Loosen the three loop locking screws and rotate the loop to the maximum coupling position as shown in Fig. 4 then tighten one screw.

With the cavity still connected as shown in Fig. 2, loosen the pass locking set screw and adjust the pass response. Use the return loss presentation on the 8505 to tune the desired frequency.

After the pass frequency has been set, observe the notch frequency on the 8505 and adjust the loop trimmer to position the notch at the desired frequency. If the notch cannot be adjusted close enough to the pass with the trimmer alone then loosen the one loop screw and rotate the loop towards the minimum coupling position as shown in Fig. 4. This adjustment should be made with the trimmer capacitor left in the position that was nearest to the desired notch frequency.

After the notch frequency is set, recheck the pass frequency setting and readjust both as required to obtain the following approx. results:

| Desired Tx to Rx | Ins. Loss/dB | Rej./dB |
|------------------|--------------|---------|
|                  |              |         |
| 0.5 MHz          | . 4          | 20      |
| 1.0 MHz          | .3           | 25      |
| 3.0 MHz          | .25          | 30      |

Lock all mechanisms on the cavity and repeat procedure on the other 5 cavities for their respective pass and notch frequencies.

#### TUNING DUPLEXER

After tuning all six (6) cavities as described above, reinstall cable assembly.

Connect duplexer as shown in Fig. 5. Check insertion loss, return loss and notch attenuation for compliance with specifications in electrical bands.

Attached are typical curves for frequency spacings as follows:

## Tx to Rx Spacing P.D. Drawing Number

| 600 | KHz | S-37396 |
|-----|-----|---------|
| 1.0 | MHz | S-37358 |
| 2.0 | MHz | S-37343 |
| 5.0 | MHz | S-37359 |

Some minor adjustments may have to be made to optimize the duplexer response, usually VSWR. This can generally be best accomplished by the middle resonator of the three (3) on each side of the antenna. A poor VSWR response can usually be corrected by decreasing the coupling slightly of the middle cavity.

After the desired response is obtained lock all mechanisms and the duplexer is ready to put into service.



FIG 1



.

.

(A) CAVITY SET UP FIG 2

.



LOOP PLATE LAYOUT

FIG 3





(B) DUPLEXER SET UP FIG 5

۰.

,



DIETZGEN CORPORATION MADE IN U.S.A.

(

H PAPER

NG. 341-10 DIETZGEN GRAPH PAPER 10 X 10 PER INCH

(\* · ·