

MODULE 10
AS-2481 ANTENNA COUPLER TEST

OBJECTIVE

Given TO 31S1-2TSC60-16WC-1 and authorized radio frequencies, test the operation and tuning range of the AS-2481 Antenna Couplers IAW cards 1-060 thru 1-063.

PREREQUISITES

1. AS-2481 antenna must be installed and operational.
2. Must have completed Modules 1 thru 4.

INFORMATION

The purpose of this routine is to test the AS-2481 Transmit Orthogonal Antenna Couplers to ensure that the antenna provides a maximum signal over the required frequency range and that the VSWR is within standards. Read cards 1-060 thru 1-063 then we'll discuss the procedure.

When performing this test, you first need to connect cables from the shelter to the antenna. Many units have a standard they follow when connecting these cables so that each technician will always know where each antenna is connected on the RF Patch Panel. Check with your trainer to see if your unit has such a standard. Otherwise, make the connections as outlined in the workcards.

There are actually two antennas contained in the AS-2481, Transmit Orthogonal (commonly called Ortho). Each

antenna requires two cables from the van, one for electronic control of the antenna and one for RF. You must keep the connections of these cables straight, or you could end up controlling one antenna and applying RF to the other.

Step 2 instructs you to make connections on the RF Patch Panel. These connections connect the Power Amplifier to the appropriate antenna connector and the Exciter to its Power Amplifier. If your unit uses a standard for connecting the antennas, you will have to make different connections in this step. Your trainer will advise you in this matter.

Steps 3 thru 8 guide you through turning on the equipment. Follow these steps closely.

Step 9 tells you to set the transmit frequency to 8MHz. You will be transmitting a signal through the antenna in order to test its operation and VSWR. Before doing this, you need to obtain permission to transmit on a frequency. In other words, just because the PMI tells you to transmit on 8MHz doesn't mean you are authorized to use that frequency. Have your trainer show you how to obtain authorized test frequencies at your location.

The remainder of the procedure tells you to apply a signal and make sure the antenna tunes properly. Then measure the forward and reflected power in order to calculate the VSWR.

WARNING

When measuring forward and reflected power using the Maintenance Display Multimeter, make sure the Wattmeter on the RF Patch Panel is turned OFF, or you will get false readings.

We gave you the warning to catch your attention. Let's see why there would be false readings.

The meter on the RF Patch Panel and the Maintenance Display Multimeter (in the FORWARD/REFLECTED POWER positions) are tied in parallel across the output of the RF power sensor in the Power Amplifier. These two meters are reading a voltage that represents the output power of the Power Amplifier. If both meters are set to read the voltage representing either the forward or reflected power at the same time, each will read half the voltage. Module 38 will discuss these two meters in a little more detail. When reading forward or reflected power, always remember to make sure one of the meters is turned off.

Once you have measured the forward and reflected power, you need to calculate the VSWR. Step 14 on card 1-062 tells you to refer to the formula in Figure 11-008, but it doesn't tell you where to find Figure 11-008. Turn to card 1-066. There it is. Now what do you do with it?

Depending on the calculator you have, you can either do the calculation in one step, or break it up into smaller, simpler steps. We'll show you the less complicated method. If you are capable of doing it the other way, you don't need our help anyway.

Let's assume that we read 0.987 for forward power and the reflected reading was 0.085. The first thing to calculate is the forward-to-reflected power ratio, 0.085 divided by 0.987, which is 0.086. Second, figure the square root of that ratio, which is 0.293. Write that number down. The formula uses this number twice. Third, you need to add 1 to the 0.293 and write down the sum (1.293) and subtract 0.293 from 1 and write down the difference (0.707). The last step is to divide the sum by the difference (1.293 divided

by $0.707 = 1.829$). Thus, in our example the VSWR is 1.829 to 1.

Look back at step 14 on card 1-062. Anything less than 2 to 1 is acceptable.

The remainder of the routine has you repeat the test for other frequencies and then for the other half of the Ortho. Don't forget, you need authorization to transmit on any frequency.

ADDITIONAL INSTRUCTIONS

Answer the following review questions and check your answers with the confirmation key. For each wrong answer, review the material in the module. Next, ask your trainer for the KEP questions. After your trainer checks your answers and reviews the questions you missed, go on to the performance procedures.

REVIEW QUESTIONS

1. How many cables are required for the Transmit Orthogonal Antenna, and what are they for?
2. When the local Radio Control Group Power switch is first turned on, what indications should you see on the front panel of the control group?
3. The first test frequency in the workcard is 8MHz. When would you not use that frequency? What frequency would you use?

4. What is the VSWR for a forward power reading of 0.975 and a reflected power reading of 0.023?

PERFORMANCE PROCEDURES

Have your trainer demonstrate performance of the antenna coupler test. Then practice performing this test under the supervision of your trainer until you feel confident. Your trainer will annotate your training records when he/she feels you are proficient.