OVER-THE-HORIZON RADIO SYSTEMS

ITTL 12A-1 OVER-THE-HORIZON RADIO SYSTEM

NUS 3298 RECEIVER

ALIGNMENT TESTS AND ADJUSTMENTS

Each branch of the diversity receiver contains several TD-2 Microwave Radio System receiver components which are operated in a manner which differs from the usual application. This section is designed to correlate the standard radio system methods with the variations of those methods applied to the over-the-horizon system receivers.

The receiver bay general test considerations summarized in Section 410-400-500 are broadly relevant to the diversity receiver. The characteristics of the received signals preclude the use of manual gain control while the receiver is in service. In general, receiver test require the system receivers to be operated in dual diversity with the receiver under test released from service as described in Section 403-413-301.

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CHART 1

RECEIVER CONTROL UNIT TESTS

Each dual diversity receiver is equipped with two receiver control units. Only one of the two AGC amplifiers within the control units is used at a time as selected by manual operation of the AGC AMPLIFIER SELECTOR switches on the receiver diversity switching panel. The unit control functions differ from those in the usual application in some respects in order to accommodate two or four receiver branches having some independent and some interconnected circuitry. Table A lists the functions of the controls on each control unit.

TABLE A

RECEIVER CONTROL UNIT FUNCTIONS

CONTROL	FUNCTIONS	
	UPPER CONTROL	LOWER CONTROL UNIT
CONVR (meter switch)	Meter left branch mixer crystal currents	Meter right branch mixer crystal currents
130V (meter switch)	Meter +130 volt supply to left branch components	Meter +130 volt supply to right branch components
AVC TST (meter switch)	Upper receiver control unit tests	Lower receiver control unit tests
SLOPE ADJ (potentiometer)	Modification of standard control unit to provide independent adjustment of left receiver branch gain control voltage	Modification of standard control unit to provide independent adjustment of right receiver branch gain control voltage
FIL (circuit breaker) FIL ADJ (potentiometer) FIL ACT (switches) FIL ACT (meter switch)	On-off and test operations of filament circuits to left receiver branch IF preamplifier, IF main amplifier, and upper receiver control unit	On-off and test operations of filament circuits to right receiver branch IF preamplifier, IF main amplifier, and lower receiver control unit
CONT (switch) AUTO (potentiometer) MAN (potentiometer) GC BIAS (meter switch) RCVR OUTPUT (meter switch)	Adjustment and metering of gain control circuits operation of both receiver branches when upper receiver control unit is selected by means of the AGC amplifier selector switches	Adjustment and metering of gain control circuits operation of both receiver branches when lower receiver control unit is selected by means of the AGC amplifier selector switches
+BIAS (potentiometer) +BIAS (meter switch)	Adjustment and metering of stabilizing bias to fixed gain stages in left receiver branch	Adjustment and metering of stabilizing bias to fixed gain stages in right receiver branch

CHART 1 (Cont)

STEP	PROCEDURE

Electron Tube Tests

1 There is no provision for a direct test of the receiver control unit tubes in the working circuit. The tubes should be removed and tested in a tube tester. The tubes in one control unit can be removed with the receiver in dual diversity service by operating the AGC AMPLIFIER SELECTOR switches on the diversity switching panel to select the other control unit for use during the test.

Automatic Gain Control Bias Test

2 The range of the automatic gain control of one receiver control unit can be checked with the receiver in service by operating the AGC AMPLIFIER SELECTOR switch to select the other control unit for use during the test.

3 Operate the control unit controls as follows:

CONTROL	POSITION
CONT switch	MAN
Meter switch	AUTO
AUTO potentiometer	Fully counterclockwise

4 Slowly operate the AUTO control in a clockwise direction while observing the control unit meter.

Requirement: The meter indicator should move smoothly from an off-scale positive deflection to an off-scale negative deflection.

Note: If the requirement is not met, perform Step 5. If the requirement is met, proceed to Step 7.

5 If the requirement in Step 4 is not met, replace tubes V1 and V2 in the control unit.

6 Slowly operate the AUTO control in a clockwise direction while observing the control unit meter.

Requirement: The meter indicator should move smoothly from an off-scale positive deflection to an off-scale negative deflection.

Note: Failure to meet the requirement is an indication of automatic gain control amplifier circuit trouble, the most likely cause being defective −12 volt bias circuit components.

CHART 1 (Cont)

STEP	PROCEDURE

+Bias Supply Tests and Adjustment

7 This test requires the dual diversity receiver to be released from service as described in Section 403-413-301.

8 On the receiver control unit selected for use, make the following control adjustments:

CONTROL	POSITION
CONT switch	MAN
Meter switch	+BIAS

9 Adjust the MAIN gain control to obtain a meter indication of 2.5 volts (full scale = 5V)

Requirement: The meter indication should be 7.2 to 7.8 volts.

Note: If this requirement is not met, adjust the +BIAS potentiometer to obtain a meter indication of 7.5 volts.

10 Operate the CONT switch alternately to AUTO and MAN while observing the control unit meter. Disregard the momentary meter deflections which occur when the switch is operated. Note the meter indication obtained with each switch position.

Requirement: The +BIAS meter indication should be the same value with the CONT switch in either AUTO or MAN position.

Note: A change in the +BIAS value under the test conditions is an indication of defective tubes in the fixed gain stages of the IF preamplifier or IF main amplifier in the branch of the receiver associated with the control unit under test.

11 Operate the AGC AMPLIFIER SELECT switch to select the second receiver control unit. Perform Steps 1 through 10 of this test using the controls of the second receiver control unit.

CHART 2

RECEIVER ALIGNMENT TESTS AND ADJUSTMENTS

The standard microwave system test instructions are used to the extent possible in the alignment of the NUS 3298 receiver. Figure 1 prescribes the order in which the tests should be made and the sections which are applicable. The figure includes a sketch of the receiver component arrangement for each of the series of tests. These configurations should be used with the test arrangements described in the applicable sections.

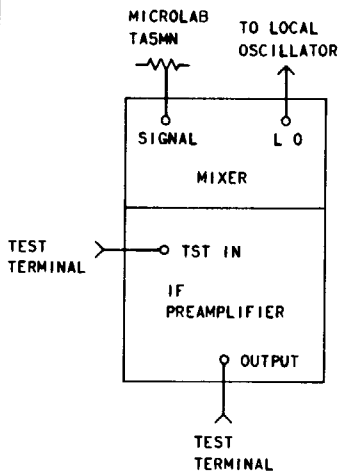
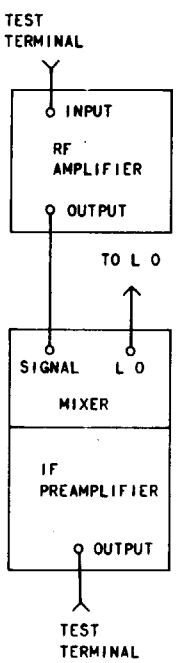
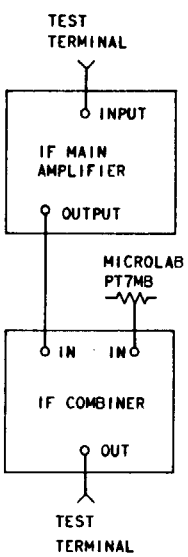
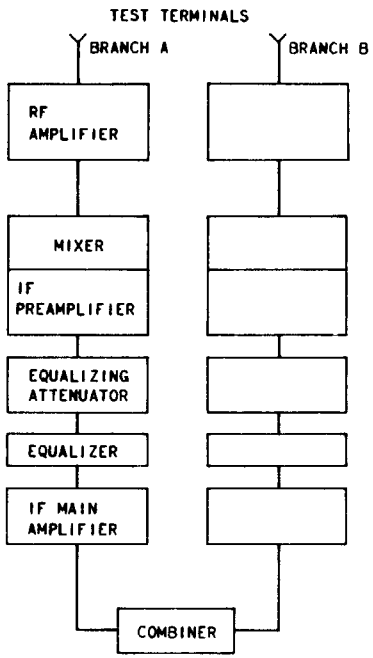
ORDER OF PERFORMANCE:	1	2	3	4	5	6
TEST	LOCAL OSCILLATOR	IF PREAMPLIFIER	RF AMPLIFIER	DUAL IF COMBINER	IF MAIN AMPLIFIER	ADJUSTMENTS FOR DUAL DIVERSITY OPERATION
BSP SECTION REFERENCE:	403-413-502	410-722-500	403-413-503	403-413-507	410-724-500	403-413-509
NOTES, EXCEPTIONS AND TEST CONFIGURATIONS USED WITH REFERENCE SECTION TEST ARRANGEMENT		 PERFORM THE FILAMENT ACTIVITY TEST DESCRIBED IN PLANT SERIES SECTION 410-720-500. IN MAKING OUTPUT IMPEDANCE MEASUREMENTS, THE IF MAIN AMPLIFIER IN THE RECEIVER BRANCH NOT UNDER TEST CAN BE USED AS THE TEST ARRANGEMENT IF TEST AMPLIFIER.			 OPERATE BOTH RECEIVER SLOPE POTENTIOMETERS FULLY CLOCKWISE. THE RECTIFIED OUTPUT TEST AND INTERSTAGE ALIGNMENT PROCEDURES IN THE REFERENCE SECTION ARE NOT APPLICABLE. IN MAKING INPUT AND OUTPUT IMPEDANCE MEASUREMENTS, THE IF MAIN AMPLIFIER IN THE RECEIVER BRANCH NOT UDER TEST CAN BE USED AS THE TEST ARRANGEMENT IF TEST AMPLIFIER.	 OPERATE BOTH RECEIVER CONTROL UNIT SLOPE POTENTIOMETERS FULLY COUNTER-CLOCKWISE.

Fig. 1—Receiver Alignment Tests