479V-3 Universal Precision Track Selector

520-5928000-004111
4th Edition, 1 December 1966

1.1 PURPOSE OF EQUIPMENT.

Universal Precision Track Selector 479V-3, shown in figure 1, is used in testing and adjusting Collins Navigation Receivers 51R-2 and 51R-3, Collins Navigation and Communications Receiver 51R-4, and Collins Instrumentation Units 344A-1 and 344B-1.

The 479V-3 replaces the omnibearing selector on the test bench by providing an accurate, stable, and quick method of obtaining omnibearing selector settings.

1.2 FEATURES.

The following features are incorporated in Universal Precision Track Selector 479V-3.

a. HIGH STABILITY. Faulty equipment may cause an excessive d-c current to flow through the resolver and seriously impair the accuracy of an omnibearing selector. The design of the 479V-3 is such that the runout error will not change under adverse conditions.

b. INCREASED ACCURACY. The maximum runout error is ±0.05 degree.

c. VERSATILITY. The 479V-3 may be used with units using 30-cps or 400-cps resolver systems.

d. SMALL SIZE. The 479V-3 mounts in a standard 19-inch relay rack on a 3-1/2-inch panel. Depth of the chassis is approximately 5-1/2 inches.

e. SAVES TEST TIME. Equipments are ordinarily calibrated in 30-degree intervals. The 479V-3 also is calibrated in 30-degree steps that are selected by a switch; thus, selecting omnibearing selector (OBS) settings is fast and positive.

f. ALLOWS RECEIVERS TO BE ADJUSTED IN A MORE PRECISE MANNER. The 479V-3 simulates a design-center resolver as specified by Radio Technical Commission for Aeronautics (RTCA) Committee SC-61. The use of an OBS which meets this condition

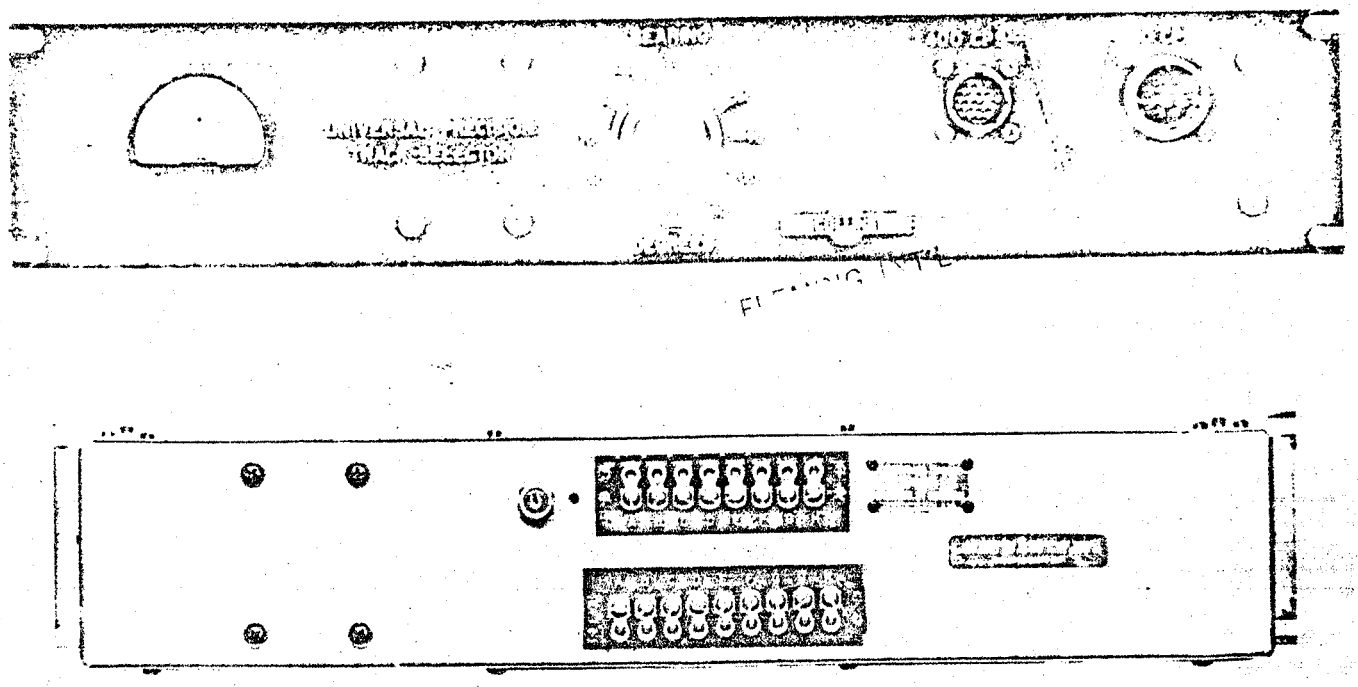

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Figure 1. Universal Precision Track Selector 479V-3

at all test stations results in uniform adjustment and operation of all equipments in the fleet, thereby tending to decrease the frequency of unscheduled removals. The TRACKING and VOR ZERO controls in navigation units can be adjusted accurately only when an accurate OBS is used with the equipment during adjustment. The VOR FLAG control for flag sensitivity can be adjusted accurately only when the OBS used during adjustment has an output level the same as a design-center OBS.

1.3 DESCRIPTION.

The 479V-3 uses a combination of precisely tapped transformers and switching arrangements to produce the required voltage ratios corresponding to a standard resolver output.

The 479V-3 is electrically identical to a standard aircraft OBS containing a resolver with design-center electrical characteristics.

The 479V-3 mounts in a standard 19-inch relay rack on a 3-1/2-inch panel. Connections to the 479V-3 are made to the terminal strips on the rear of the unit or through the AN connectors on the front panel. The connectors are identical to those on a standard aircraft OBS. The desired OBS setting is selected by a BEARING DEGREES switch on the front panel that is calibrated in 30-degree increments. A selector switch on the front panel selects either 30 CPS or 400 CPS operation. In addition, the front panel contains a to-from indicator calibrated in microamperes. A locking-type potentiometer is located at the rear of the unit to index the 479V-3 in accordance with RTCA standards.

2.1 INSTALLATION.

Unpack the equipment carefully, and inspect it for apparent damage during shipment. All claims for damage in shipment must be filed promptly with the transportation company. If a claim is to be filed, the original packing case and material should be preserved.

Universal Precision Track Selector 479V-3 may be mounted in a standard 19-inch relay rack at the test bench. Cabling may be attached to the terminal strips at the rear of the unit or to the AN connectors on the front panel. The connectors are identical to those on a standard aircraft OBS. The mating connectors required are Collins part no. 357-4012-00 for J1, and Collins part no. 371-8087-00 for J2.

Potentiometer R3 is the only adjustment on the 479V-3. This variable resistor is the ORZ setting for the 30-cps portion of the 479V-3. Procedure for setting R3 is given in paragraph 5.2.

3.1 OPERATION.

Connect the 479V-3 to the equipment to be tested. The instruction book covering the particular equipment will give the interconnecting wiring diagram. Select 400 CPS or 30 CPS on the function selector; setting depends on the equipment being tested. Use the 30 CPS setting when testing Navigation Receivers 51R-2 and 51R-3 or Instrumentation Unit 344A-1. Use the 400 CPS setting when testing Navigation and Communications Receiver 51R-4 or Instrumentation Unit 344B-1.

4.1 PRINCIPLES OF OPERATION.

A complete understanding of the fundamental principles and techniques used in navigation receivers and instruments is desirable for operators of this equipment. Refer to the instruction book on Navigation Receivers 51R-2 or 51R-3, Navigation and Communications Receiver 51R-4, or Instrumentation Units 344A-1 or 344B-1.

Universal Precision Track Selector 479V-3 is an omnibearing selector for use in testing equipments using either 30-cps or 400-cps resolver systems. The principles of operation for the two types of operation are discussed separately.

Electrically the 479V-3 represents a different concept in an omnibearing selector. In a standard resolver using rotor input, the selected angle is represented by two output voltages which appear at the stator windings. As the resolver rotor shaft is turned, the two output voltages will change, but for each setting of the omnibearing selector there will be two voltages which will represent that specific shaft position or omnibearing setting. The values of these two voltages can be readily calculated for any desired setting of the omnibearing selector.

A resolver is a transformer whose output voltages can be changed by turning a shaft which varies the coupling between the rotor and stator windings. A transformer therefore can be used to simulate a resolver, and its output voltages can be changed by selecting taps on the output windings. To simulate the resolver used in an aircraft OBS, the transformer must have two output windings, one to simulate each stator. The phase shift through the transformer must be the same as the resolver, and the impedance looking into the transformer must be the same as the resolver. The 479V-3 uses transformers with accurately located taps to ensure low runout error.

4.2 CIRCUIT DESCRIPTION, 30-CPS CIRCUITS.

A typical rotor input resolver circuit as used in the Collins Navigation Receivers 51R-2 and 51R-3 and Instrumentation Unit 344A-1 is shown in figure 2. The phase of the signal at points X and Y changes degree for degree with the angular position of the resolver shaft in a properly adjusted circuit. When R1 (tracking) is adjusted correctly, the sum of R1 and R2 is equal to the reactance of C1. If R1 is not adjusted accurately, the receiver will have a runout error. Note that the resolver is not a phase shifter. The resolver, in conjunction with R1 plus R2 and C1, forms a phase-shifting circuit. The resolver itself supplies two output voltages that change as the shaft is turned. The phase of the resolver output voltage remains constant, except for reversing 180 degrees.

The relationship between the electrical characteristics of an omnibearing selector and the dial indication has been established by RTCA Committee SC-61. The conditions shown in figure 3 exist for a design-center omnibearing selector with rotor input. The dial is set to 300 degrees. With θ = 0 degrees, the rotor winding is fully coupled to stator 1 and there is no coupling to

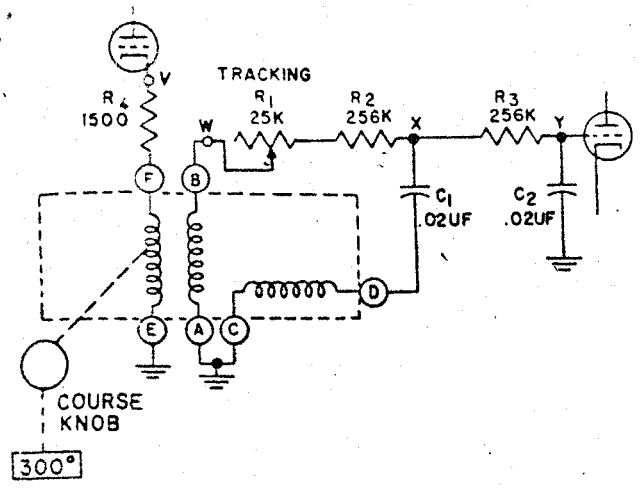

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Figure 2. Typical Rotor Input Resolver Circuit

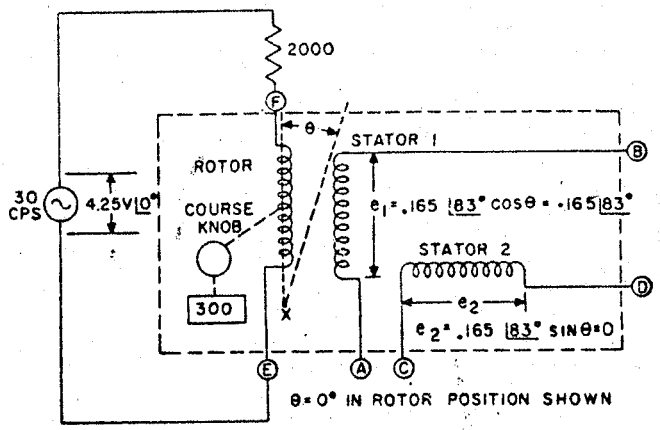

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Figure 3. Electrical Characteristics of a Design-Center OBS in a Rotor Input Circuit at a Dial Setting of 300 Degrees

stator 2. Consider the rotor as rotating about point X in the figure. When θ = 90 degrees, the omnibearing selector dial will read 210 degrees and the rotor will be fully coupled to stator 2. There will be no coupling between the rotor and stator 1. From the sine and cosine relationship, the omnibearing output voltages at terminals B and D can be readily calculated at any dial setting.

Figure 4 shows the 479V-3 with a BEARING DEGREES setting of 300 degrees in the same test circuit of figure 3. For simplicity, switching has been omitted. The phase shift through the transformer is adjusted to 83 degrees by varying the loading on the 3-to-4 winding of transformer T1. Note that the voltage and phase relationship between the 30-cps generator and the omnibearing selector output (B and D) is the same in both cases. The 479V-3 therefore simulates a design-center omnibearing selector in accordance with RTCA standards at a dial setting of 300 degrees. This is the point at which an omnibearing selector is indexed. To simulate other dial settings, it is necessary to change only the output voltages from the 479V-3 in a precise manner by selecting taps on the two output windings of transformer T1. The locations of the taps for 30-degree intervals are shown in figure 4 as percentages of the whole output winding.

The design of the transformer is such that the phase shift through the transformer is stable with variations in a-c level or d-c current through the primary. The impedance of the output windings is low with respect to the magnitude of the reactance of C1 and the resistance of R1 plus R2 of figure 2.

4.3 CIRCUIT DESCRIPTION, 400-CPS CIRCUITS.

The 400-cps resolver circuit illustrated in figure 5 is similar to the one used in the 51R-4 or 344B-1 and Course Indicator 331A-2CW. The 400-cps resolver is positioned by the bearing servo motor. The resolver consists of two rotor windings, one of which is shorted, and two stator windings. The two stator windings are connected to the stator windings of a resolver in the course indicator. The angular position of the rotor windings in the course indicator are set when the desired course is entered in the course indicator.

When the rotor position in the 51R-4 or 344B-1 corresponds with the rotor position in the course indicator, the voltage across rotor winding R_B is zero. Current will not flow in the deviation discriminator circuit, thus, giving an on course indication on the deviation indicator. If the two rotor positions do not agree, a voltage will be induced in rotor winding R_B causing the deviation discriminator to have an output voltage that will make the deviation indicator to deflect either left or right, depending on the direction and amount of rotor displacement. The voltage induced in rotor R_A will be maximum when the voltage across R_B is minimum. If

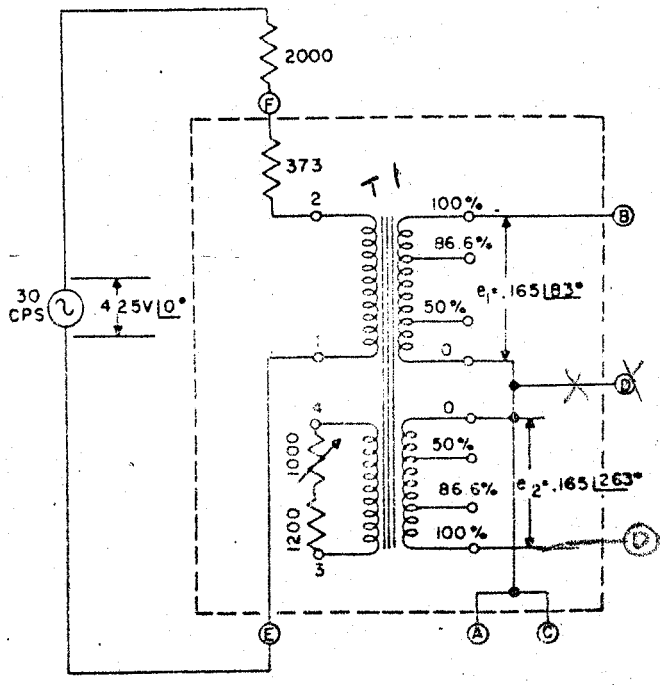

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Figure 4. Electrical Characteristics of the 479V-3 at a 300-Degree Dial Setting

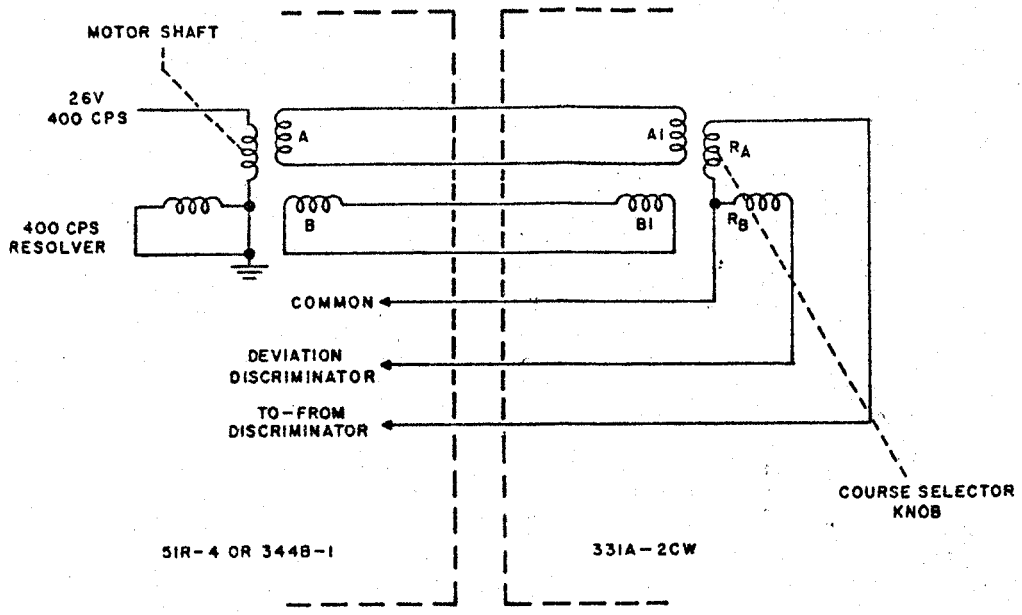

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Figure 5. Typical Resolver Circuits, Simplified Schematic Diagram

the voltage across R_A is in phase with the 400-cps excitation voltage, the to-from discriminator output voltage will cause the to-from indicator to show a "to" condition; an out-of-phase condition will cause the to-from indicator to show a "from" indication.

Figure 6 shows a simplified circuit of the 479V-3, with BEARING DEGREES setting of 300 degrees, in the same circuit as shown in figure 5. For simplicity, switching has again been omitted. By selecting different taps on transformers T1 and T2 in the 479V-3, the transformers can be made to simulate accurately the output voltages from a standard synchro resolver; the taps are located at 30-degree intervals. High-quality transformers allow precise voltage and phase-angle outputs under varying load conditions.

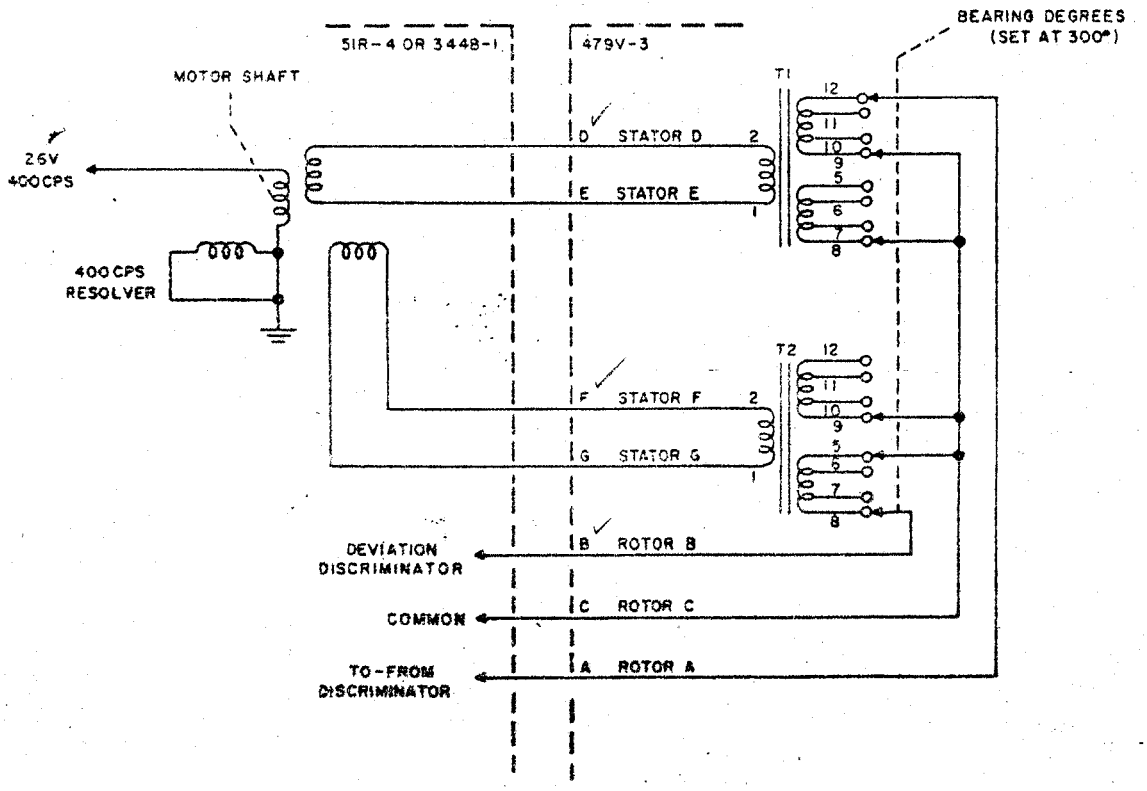

Figure 6. Universal Precision Track Selector 479V-3 in the 400 CPS Position, Simplified Schematic Diagram

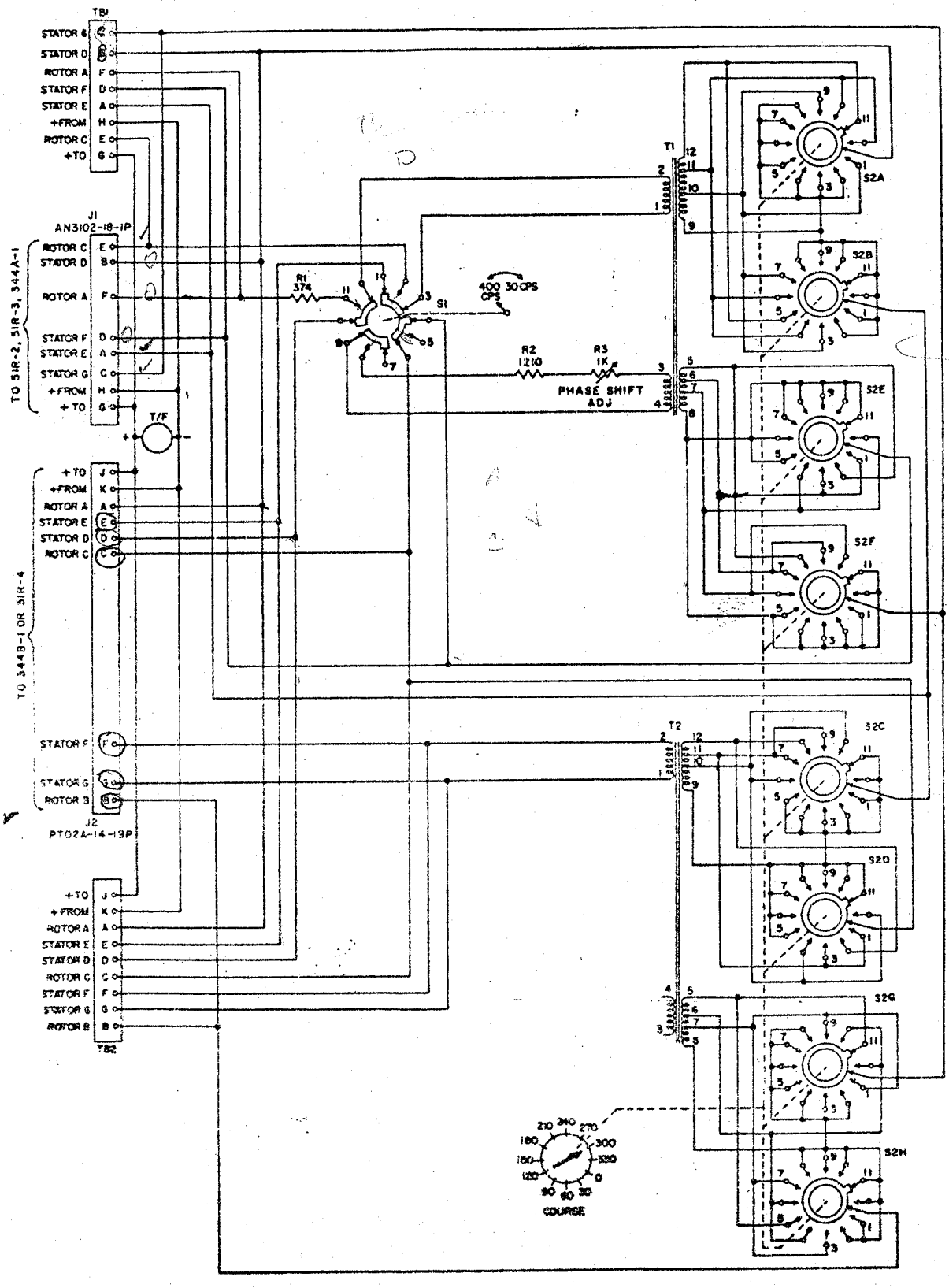

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Figure 7. Universal Precision Track Selector 479V-3, Schematic Diagram

BEFORE MODIFICATION

5.1 VISUAL INSPECTION.

Make a thorough visual inspection of the equipment. Look for loose wires or parts, discolored resistors, proper switch detent operation, and general over-all appearance. Check each terminal on the 479V-3 connector to determine that no terminal is grounded.

5.2 INDEXING THE 479V-3, 30-CPS MODE OF OPERATION.

The phase shift at the 300-degree setting of the 479V-3 index position (when in the 30 CPS mode of operation) is determined accurately and set at the factory. It can be reset accurately using the following procedure.

5.2.1 TEST EQUIPMENT REQUIRED.

a. Collins Audio Signal Generator 479S-3 or 30-cycle generator.

b. Ballantine 300 VTVM or equivalent.

c. Collins Resolver Zeroing Panel 479X-2.

d. DuMont 304 Oscilloscope or equivalent.

5.2.2 TEST PROCEDURE.

a. Connect the equipment as shown in figure 8. If a 30-cycle generator is used in place of the 479S-3, it must be capable of delivering 4.5 to 8.0 volts across a 2000-ohm load; frequency accuracy should be within 1 percent.

b. Select SET ORZ on the selector switch of the 479X-2.

c. Adjust the INPUT LEVEL control on the 479X-2 for a 4.25-volt indication at the VOLTMETER jack.

d. Remove the lead from the 479X-2 VOLTMETER jack and connect it to the 479X-2 OUTPUT jack.

e. Set the BEARING DEGREES switch on the 479V-3 to 300.

f. Alternately adjust the 479X-2 AMP BAL control and potentiometer R3 on the 479V-3 until the best obtainable null is indicated.

g. Lock potentiometer R3, and repeat the zeroing procedure.

5.3 ADJUSTMENTS, 400-CPS MODE OF OPERATION.

Transformers T1 and T2 have been balanced accurately at the factory by coupling inductance and/or resistance across the secondary windings; refer to figure 9. Inductor L1 or resistors R4 and R5 may be replaced without rebalancing T1 and T2. It is highly unlikely that T1 or T2 will ever have to be replaced; however, if

Notes: * HP 33120A - Func Gen
FLUKE 8842A - DMM
JcAir 79X-2
ESI 861A - Gen/Detector
HP 467A - Pwr Amp

225 PAV

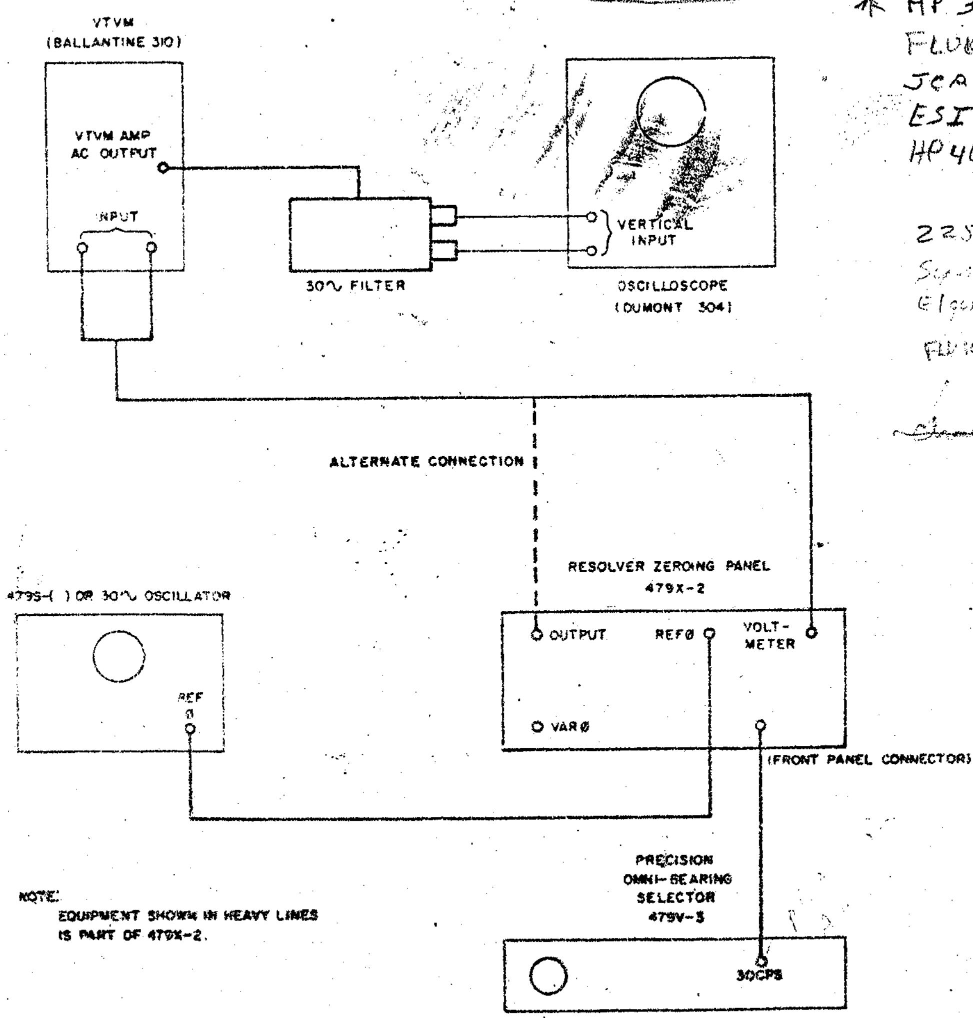

Figure 8. Test Bench Setup for Indexing Universal Precision Track Selector 479V-3

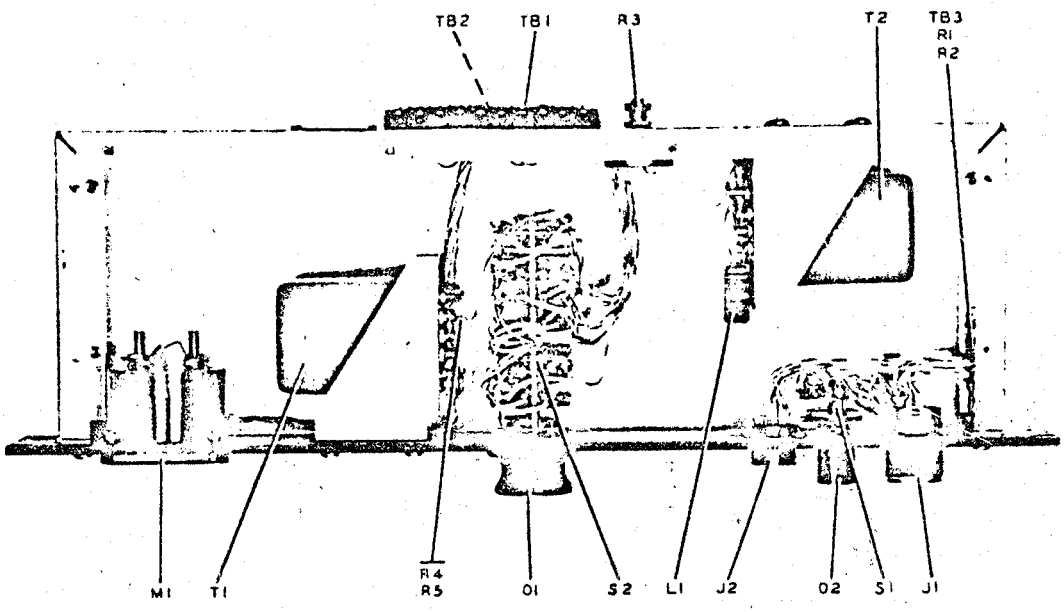

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Figure 9. Universal Precision Track Selector 479V-3, Top View

either T1 or T2 is replaced, the balance procedure in paragraph 5.3.2 must be used.

5.3.1 TEST EQUIPMENT REQUIRED.

a. Current meter, Weston 901, 150-0-150 ua, 1000-ohm.

b. Calibrated resolver with an accuracy of at least ±0.02 degree.

c. Test fixture (see figure 10).

d. Resistance decade box.

e. A-c power supply, 26-volt, 400-cps, single phase; ±10 percent.

f. Decade inductor box, Hycor Type 700 and 701.

5.3.2 ADJUSTMENT PROCEDURES.

a. Connect the 479V-3, Calibrated Resolver, and the 400-cps power supply to the test fixture.

b. Set S1 on the 479V-3 to the 400 CPS position. Set R7 crosspointer sensitivity control on the test fixture for maximum sensitivity. With zero input signal to the 479V-3, set the crosspointer and to-from indicators to a zero indication with R3 TO/FROM zero adjust and R8 crosspointer zero adjust on the test fixture.

c. Set S2 on the 479V-3 to a 300-degree bearing and set the Calibrated Resolver to a bearing that produces zero indication on the crosspointer indicator. The Calibrated Resolver should indicate 300 degrees; if not, the error is in the gear train and should be noted, and allowance should be made for this error on all subsequent readings.

d. Run a tracking curve on the 479V-3 in the following manner: Set the 479V-3 BEARING DEGREES switch to 0; center the crosspointer indicator by turning the Calibrated Resolver; record the setting of the Calibrated Resolver. Repeat this operation for each of the 12 settings of the BEARING DEGREES switch on the 479V-3.

e. If the tracking curve indicates a runout error exceeding 0.05 degree, refer to table 1 for assistance. Attach a resistance or inductance decade box across applicable terminals of transformer T1 and/or T2, and determine the amount of inductance or resistance required to balance the 479V-3. When the amount of inductance or resistance is determined, refer to the parts list and substitute the applicable component or components in place of the decade box.

TABLE 1. TRANSFORMER ERROR CORRECTION PROCEDURES

SYMPTOM	CORRECTIVE ACTION
POSITIVE ERROR AT 90 DEGREES	
Positive error at 60 degrees equal to error at 90 degrees.	**Add inductance in series with terminal 1 of T2**
Positive error at 60 degrees greater than error at 90 degrees.	**Add resistance between terminals 7 and 8 of T2 to reduce error at 60 degrees; then add resistance between terminals 6 and 7 of T2 to reduce error at 90 degrees.**

TABLE 1. TRANSFORMER ERROR CORRECTION PROCEDURES (Cont)

SYMPTOM	CORRECTIVE ACTION
POSITIVE ERROR AT 90 DEGREES (Cont)	
Positive error at 60 degrees less than error at 90 degrees.	Add resistance between terminals 6 and 7 of T2 to reduce error at 90 degrees; then add resistance between terminals 7 and 8 of T2 to reduce error at 60 degrees.
No or small negative error at 60 degrees.	Add resistance between terminals 6 and 7 of T2 to reduce error at 90 degrees; then add resistance between terminals 6 and 7 of T1 to reduce error at 60 degrees.
Negative error at 60 degrees greater than error at 90 degrees.	Add resistance between terminals 6 and 7 of T1 to reduce error at 60 degrees; then add resistance between terminals 6 and 7 of T2 to reduce error at 90 degrees.
NEGATIVE ERROR AT 90 DEGREES	
Negative error at 60 degrees equal to error at 90 degrees.	Add inductance in series with terminal 1 of T1.
Negative error at 60 degrees greater than error at 90 degrees.	Add resistance between terminals 6 and 7 of T1 to reduce error at 60 degrees; then add resistance between terminals 7 and 8 of T1 to reduce error at 90 degrees.
Negative error at 60 degrees less than error at 90 degrees.	Add resistance between terminals 7 and 8 of T1 to reduce error at 90 degrees; then add resistance between terminals 6 and 7 of T1 to reduce error at 60 degrees.
No or small positive error at 60 degrees.	Add resistance between terminals 7 and 8 of T1 to reduce error at 90 degrees; then add resistance between terminals 7 and 8 of T2 to reduce error at 60 degrees.
Positive error at 60 degrees greater than error at 90 degrees.	Add resistance between terminals 7 and 8 of T2 to reduce error at 60 degrees; then add resistance between terminals 7 and 8 of T1 to reduce error at 90 degrees.
NO ERROR AT 90 DEGREES	
Positive error at 60 degrees.	Add resistance between terminals 7 and 8 of T2 to reduce error at 60 degrees; then add resistance between terminals 7 and 8 of T1 to correct error induced at 90 degrees.
Negative error at 60 degrees.	Add resistance between terminals 6 and 7 of T2 to reduce error at 60 degrees; then add resistance between terminals 6 and 7 of T1 to correct error induced at 90 degrees.

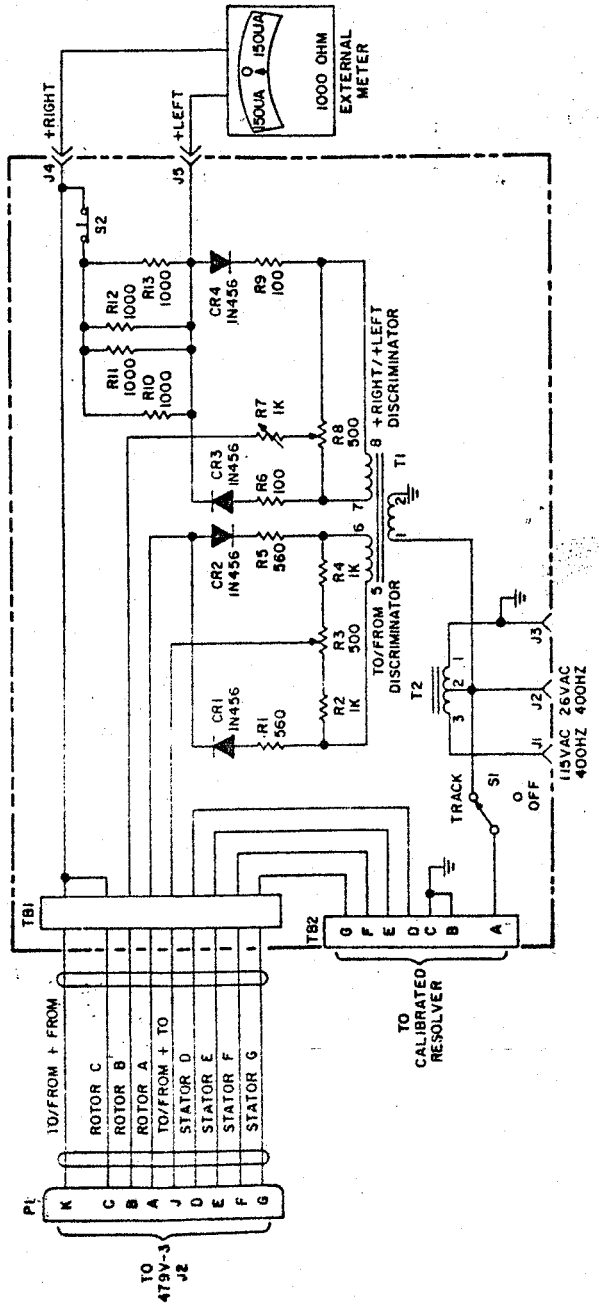

Figure 10. 479V-3 Test Fixture, Schematic Diagram

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3. MATERIAL INFORMATION

A. The following items are required to modify one 479V-3 Universal Precision Track Selector.

B. Modification kit 779-5390-001 consists of the following:

NEW COLLINS PART NUMBER	QTY	UNIT PRICE	DESCRIPTION	REPLACED COLLINS PART NUMBER	INSTRUCTIONS -DISPOSITION
259-2762-010	1		Switch, rotary, S1		
266-3005-000	1		Switch, toggle		
439-7038-000	2 ft		Wire, #22 AWG, white-black-red		
439-7041-000	2 ft		Wire, #22 AWG, white-black-blue		
439-7056-000	2 ft		Wire, #22 AWG, white-brown-red-green		
421-2220-000	1 ft		Wire, #22 AWG, bus		
152-2493-000	1 ft		Sleeve, #20 AWG, natural color		

The following item is not part of modification kit and must be ordered separately if required:

280-3778-010	1	$0.05	Information chart.

PARTS LIST

ITEM	DESCRIPTION	COLLINS PART NUMBER
	UNIVERSAL PRECISION TRACK SELECTOR 479V-3	522-1339-00
J1	CONNECTOR, RECEPTACLE, ELECTRICAL: 10 rd male contacts, 22 amps, 700 v dc, 500 v ac; straight	357-3006-00
J2	CONNECTOR, RECEPTACLE, ELECTRICAL: 19 male contacts, box mounting bayonet locking	371-2051-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 6.0 mh inductance, 162 ma current rating	240-0258-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 7.2 mh inductance, 148 ma current rating	240-0259-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 8.6 mh inductance, 136 ma current rating	240-0260-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 10 mh inductance, 126 ma current rating	240-0261-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 12 mh inductance, 114 ma current rating	240-0262-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 15 mh inductance, 101 ma current rating	240-0263-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 17.5 mh inductance, 95 ma current rating	240-0264-00
M1	AMMETER: panel type; microamperes; 500-0-500 ua meter range; phenolic; rectangular; black markings on white background	458-0286-00
O1	KNOB: black phenolic; set screw type; 1-3/4 in. dia. x 7/8 in. h; w/bakelite insert tapped 10-32 NF-2	503-2377-002
O2	KNOB: bar; black bakelite; for 0.256 in. dia. shaft; two no. 8-32 NF-2 tapped holes at 90° angle for shaft; 1 arrow marking, brass insert	508-1103-20
R1	RESISTOR, FIXED, FILM: 374 ohms ±1%; 1/2 w	705-7784-00
R2	RESISTOR, FIXED, FILM: 1210 ohms ±1%; 1/4 w	705-7100-00
R3	RESISTOR, VARIABLE: wirewound; 1000 ohms ±10%; 2w	760-8065-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 2700 ohms ±10%; 1/2 w	745-1370-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 3900 ohms ±10%; 1/2 w	745-1377-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%; 1/2 w	745-1380-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%; 1/2 w	745-1384-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 6800 ohms ±10%; 1/2 w	745-1387-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 8200 ohms ±10%; 1/2 w	745-1391-00
S1	SWITCH, ROTARY: 1 section, 4 pole, 2 positions; 4 moving contacts, 12 fixed contacts	259-1079-00
S2	SWITCH, ROTARY: 8 sections, 8 pole, 12 positions; 1 moving contact, 13 fixed contacts	259-0991-00
T1	SPECIAL TRANSFORMER: used to simulate a resolver; 30 cps; 12 turret head terminals; 2-3/8 in. by 2-3/4 in. by 4-1/4 in. overall dim.	674-0673-00
T2	SPECIAL TRANSFORMER: same as T1	674-0673-00
TB1	TERMINAL STRIP: phenolic; barrier type w/lug for back connection; 8 terminals, 3-3/8 in. lg approx. 13/32 in. h, 7/8 in. w overall	367-0016-00
TB2	TERMINAL STRIP: phenolic; barrier type w/lug for back connection; 9 terminals, 3-3/4 in. lg approx. 13/32 in. h, 7/8 in. w overall	367-0017-00
TB3	TERMINAL BOARD: plastic; 3/32 in. thk, 1-1/4 in. by 1-1/4 in.; 4 brass turret type terminals	544-9902-002

*NOTE: Location and size of coil L1 and resistors R4 and R5 are determined by final test. These components may or may not appear in the unit and their location may not be as shown in figure 9.

ITEM	DESCRIPTION	COLLINS PART NUMBER
	479V-3 TEST FIXTURE	
CR1	DIODE, SILICON: 1N457	353-0199-00
CR2	DIODE, SILICON: 1N457	353-0199-00
CR3	DIODE, SILICON: 1N457	353-0199-00
CR4	DIODE, SILICON: 1N457	353-0199-00
J1	BINDING POST: nylon insulated; red	372-1062-00
J2	BINDING POST: nylon insulated; red	372-1062-00
J3	BINDING POST: nylon insulated; black	372-1061-00
J4	BINDING POST: nylon insulated; black	372-1061-00
J5	BINDING POST: nylon insulated; red	372-1062-00
P1	CONNECTOR, PLUG, ELECTRICAL: bayonet locking; 19 female pin contacts; cable end mounting	371-2394-00
R1	RESISTOR, FIXED, COMPOSITION: 560 ohms ±10%; 1/2 watt	745-1342-00
R2	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R3	RESISTOR, VARIABLE, WIREWOUND: 500 ohms ±10%; 2 watt	381-1110-00
R4	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R5	RESISTOR, FIXED, COMPOSITION: 560 ohms ±10%; 1/2 watt	745-1352-00
R6	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%; 1/2 watt	745-1310-00
R7	RESISTOR, VARIABLE, WIREWOUND: 1000 ohms ±10%; 2 watt	381-1111-00
R8	RESISTOR, VARIABLE, WIREWOUND: 500 ohms ±10%; 2 watt	381-1110-00
R9	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%; 1/2 watt	745-1310-00
R10	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R11	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R12	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R13	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
S1	SWITCH, TOGGLE: single pole-single throw	266-3005-00
S2	SWITCH, PUSHBUTTON: momentary contact; snap action	260-1263-00
TB1	TERMINAL STRIP: phenolic; barrier type; 10 terminals	367-3100-00
TB2	TERMINAL STRIP: phenolic; barrier type lugs for back connections; 8 terminals	367-0016-00

PARTS LIST

ITEM	DESCRIPTION	COLLINS PART NUMBER
	UNIVERSAL PRECISION TRACK SELECTOR 479V-3	622-1339-00
J1	CONNECTOR, RECEPTACLE, ELECTRICAL: 10 rd male contacts, 22 amps, 700 v dc, 500 v ac; straight	357-3006-00
J2	CONNECTOR, RECEPTACLE, ELECTRICAL: 19 male contacts, box mounting bayonet locking	371-2051-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 6.0 mh inductance, 162 ma current rating	240-0258-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 7.2 mh inductance, 148 ma current rating	240-0259-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 8.6 mh inductance, 136 ma current rating	240-0260-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 10 mh inductance, 126 ma current rating	240-0261-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 12 mh inductance, 114 ma current rating	240-0262-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 15 mh inductance, 101 ma current rating	240-0263-00
*L1	COIL, RADIO FREQUENCY: toroidal wound; 17.5 mh inductance, 95 ma current rating	240-0264-00
M1	AMMETER: panel type; microamperes; 500-0-500 ua meter range; phenolic, rectangular; black markings on white background	458-0288-00
Q1	KNOB: black phenolic; set screw type; 1-3/4 in. dia. x 7/8 in. h; w/bakelite insert tapped 10-32 NF-2	503-2377-002
Q2	KNOB: bar; black bakelite; for 0.256 in. dia. shaft; two no. 8-32 NF-2 tapped holes at 90° angle for shaft; 1 arrow marking; brass insert	508-1103-20
R1	RESISTOR, FIXED, FILM: 374 ohms ±1%; 1/2 w	705-7784-00
R2	RESISTOR, FIXED, FILM: 1210 ohms ±1%; 1/4 w	705-7100-00
R3	RESISTOR, VARIABLE: wirewound; 1000 ohms ±10%, 2w	750-8065-00
R4	RESISTOR, FIXED, COMPOSITION: 2700 ohms ±10%; 1/2 w	745-1370-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 3900 ohms ±10%; 1/2 w	745-1377-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%; 1/2 w	745-1380-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%; 1/2 w	745-1384-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 6800 ohms ±10%; 1/2 w	745-1387-00
*R4 & R5	RESISTOR, FIXED, COMPOSITION: 8200 ohms ±10%; 1/2 w	745-1391-00
S1	SWITCH, ROTARY: 1 section, 4 pole, 2 positions; 4 moving contacts, 12 fixed contacts	259-1079-00
S2	SWITCH, ROTARY: 8 sections, 8 pole, 12 positions; 1 moving contact, 13 fixed contacts	259-0991-00
T1	SPECIAL TRANSFORMER: used to simulate a resolver; 30 cps; 12 turret head terminals; 2-3/8 in. by 2-3/4 in. by 4-1/4 in. overall dim.	674-0673-00
T1	SPECIAL TRANSFORMER: same as T1	674-0673-00
TB1	TERMINAL STRIP: phenolic; barrier type w/lug for back connection; 6 terminals, 3-3/8 in. lg approx. 13/32 in. h, 7/8 in. w overall	367-0016-00
TB2	TERMINAL STRIP: phenolic, barrier type w/lug for back connection, 9 terminals, 3-3/4 in. lg approx. 13/32 in. h, 7/8 in. w overall	367-0017-00
TB3	TERMINAL BOARD: plastic; 3/32 in. thk, 1-1/4 in. by 1-1/4 in.; 4 brass turret type terminals	544-9902-002

*NOTE: Location and size of coil L1 and resistors R4 and R5 are determined by final test. These components may or may not appear in the unit and their location may not be as shown in figure 9.

ITEM	DESCRIPTION	COLLINS PART NUMBER
	479V-3 TEST FIXTURE	
CR1	DIODE, SILICON: 1N457	353-0199-00
CR2	DIODE, SILICON: 1N457	353-0199-00
CR3	DIODE, SILICON: 1N457	353-0199-00
CR4	DIODE, SILICON: 1N457	354-0199-00
J1	BINDING POST: nylon insulated; red	372-1062-00
J2	BINDING POST: nylon insulated; red	372-1062-00
J3	BINDING POST: nylon insulated; black	372-1061-00
J4	BINDING POST: nylon insulated; black	372-1061-00
J5	BINDING POST: nylon insulated; red	372-1062-00
P1	CONNECTOR, PLUG, ELECTRICAL: bayonet locking; 19 female pin contacts; cable end mounting	371-2394-00
R1	RESISTOR, FIXED, COMPOSITION: 560 ohms ±10%; 1/2 watt	745-1342-00
R2	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R3	RESISTOR, VARIABLE, WIREWOUND: 500 ohms ±10%; 2 watt	381-1110-00
R4	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R5	RESISTOR, FIXED, COMPOSITION: 560 ohms ±10%; 1/2 watt	745-1352-00
R6	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%; 1/2 watt	745-1310-00
R7	RESISTOR, VARIABLE, WIREWOUND: 1000 ohms ±10%; 2 watt	381-1111-00
R8	RESISTOR, VARIABLE, WIREWOUND: 500 ohms ±10%; 2 watt	381-1110-00
R9	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%; 1/2 watt	745-1310-00
R10	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R11	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R12	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
R13	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%; 1/2 watt	745-1352-00
S1	SWITCH, TOGGLE: single pole-single throw	266-3005-00
S2	SWITCH, PUSHBUTTON: momentary contact; snap action	260-1263-00
TB1	TERMINAL STRIP: phenolic; barrier type; 10 terminals	367-3100-00
TB2	TERMINAL STRIP: phenolic; barrier type lugs for back connections; 8 terminals	367-0016-00

COLLINS | SERVICE BULLETIN

NAVIGATION

479V-3 UNIVERSAL PRECISION TRACK SELECTOR (522-1339-XXX)

SERVICE BULLETIN NO 1

TESTING 30- OR 400-Hz RESOLVER SYSTEMS USING 400-Hz CABLE

1. PLANNING INFORMATION

A. Effectivity

Applicable to all 479V-3 units, serial number 422 (MCN 510) and below, except those listed below. Production cut-in: serial number 423 (MCN 511) and above. The following units do have subject modification incorporated:

SERIAL NUMBER	MCN
408	431
411	434
412	435
413	436
414	437
415	438
416	439
417	440

B. Reason

The 479V-3 normally replaces the OBS on the test bench and provides accurate omnibearing selector settings in 30-degree increments. The subject modification allows testing either a 30- or 400-Hz system using only the 400-Hz cable and the selector switch.

C. Description

This modification consists of replacing one wafer switch, adding a toggle switch, and performing associated wiring changes.

D. Compliance

Recommended where greater flexibility in utilization of test equipment is desired.

E. Approval

None required.

F. Manpower

Estimated 8 man-hours.

G. Material - Cost and Availability

Modification kit 779-5390-001 will be available for shipment May 1, 1969 at a price of $11.74 from Collins Radio Company, Service Parts Department, Cedar Rapids, Iowa 52406. The indicated price is subject to change without notice. All orders should state modification kit 779-5390-001 and reference 479V-3 Service Bulletin No 1.

H. Tooling

None required.

I. Weight and Balance Change

None

J. References

None

K. Other Publications Affected

Edition 5 to the 479V-3 Universal Precision Track Selector Instruction Sheet, Collins part number 520-5928000, will include the changes covered in this bulletin.

2. MODIFICATION INSTRUCTIONS

A. Modification Procedure

NOTE: Refer to figure 3 for a schematic of the unit after modification.

(1) Remove unit dust cover.

(2) Remove cable ties from cabling going to terminal strips TB1 and TB2 to cable clamp.

(3) Remove cable ties from cabling going to switch S1.

(4) Remove cable ties from cabling going to connectors J1 and J2 back to cable clamp.

(5) Drill a 1/2-inch hole in chassis per figure 1 and install new toggle switch S3 (266-3005-000).

(6) For ease of removing and installing wires on connectors J1 and J2, remove connectors from chassis. Do not remove wires until instructed to do so.

(7) For ease of removing wires from switches S1 and S2, remove knobs and switches from chassis.

(8) Remove the following three white-black wires from TB1-B, and reconnect or discard as indicated:

(a) Remove and discard the jumper wire connected from TB1-B to TB2-A.

(b) Locate the wire connected from TB1-B to J2-A, remove from TB1-B, and reconnect to TB2-A.

(c) Locate the wire connected from TB1-B to switch S2-A wiper, remove from TB1-B, and reconnect to either terminal on new switch S3.

NOTE: When adding or rerouting wires in the following steps, reference is sometimes made to the new rotary switch S1A and S1B terminals. It should be understood that the new switch S1 has not been installed at this point; therefore, all wires to S1 should be routed to the general area of the switch and left unterminated with enough excess length to ensure connection to new switch S1 when installed. The switch terminals to which the wires connect are called out for reference only and should not be soldered until instructed to do so.

(9) Connect a new white-black-blue wire (439-7041-000) to the same terminal on new switch S3 as the white-black wire was connected to in step (8)(c). Route the opposite end through cable clamp to area of rotary switch S1 (S1B-3).

(10) Solder a new white-black-blue wire (439-7041-000) to the vacant terminal on new switch S3, and connect the opposite end to TB2-A.

(11) Remove the following two white-black wires from J1-B, and reconnect as follows:

(a) Remove and retain jumper wire connected from J1-B to J2-A.

(b) Locate the wire connected from J1-B to TB2-A, disconnect from J1-B, and reconnect to J2-A.

(c) Connect the jumper wire, retained in step (11)(a), to J1-B, and route opposite end to S1 (S1B-1).

(12) Remove and discard the white-brown wire connected from J2-C to S1-6.

(13) Locate the white-red wire connected from TB2-C to S2D wiper, remove from TB2-C, and route to area of S1 (S1A-5).

(14) Locate the white-red wire connected from TB2-C to S1-6, remove from S1-6, and reconnect to J2-C.

(15) Remove the following two white-green-blue wires from TB1-E, and reconnect as follows:

(a) Locate the wire connected from TB1-E to S1-2, remove from TB1-E, and reconnect to TB2-C.

(b) Locate the wire connected from TB1-E to J1-E, remove from TB1-E, and reroute to area of S1 (S1A-1).

(16) Remove the following two white-brown wires on TB1-A, and reconnect as follows:

(a) Locate the wire connected from TB1-A to J1-A, remove from TB1-A, and reconnect to TB2-A, A white-brown-red wire should be there already.

(b) Locate the wire connected from TB1-A to S2B wiper, remove from TB1-A, and route to area of S1 (S1A-9).

(17) Locate the white-black-red-orange wire connected from TB2-F to T2-2, remove from TB2-F, and route to area of S1 (S1B-5).

(18) Remove the following two white-orange wires from TB1-D, and reconnect as follows:

(a) Locate the wire connected from TB1-D to J1-D, remove from TB1-D, and reconnect to TB2-F.

(b) Locate the wire connected from TB1-D to S2E wiper, remove from TB1-D, and route to area of S1 (S1A-4).

(19) Remove the following two white-green wires from TB1-C, and reconnect as follows:

(a) Locate the wire connected from TB1-C to S2F wiper, remove from TB1-C, and route to area of S1 (S1B-9).

(b) Locate the wire connected from TB1-C to J1-C, remove from TB1-C, and reconnect to TB2-G.

(20) Connect a new white-black-red wire (439-7038-000) to TB2-G (do not solder yet), and route to area of S1 (S1B-7).

(21) Locate the white-black-red-green wire connected from TB2-G to T2-1, remove from TB2-G, and route to area of S1 (S1B-8). There now should be three wires soldered to TB2-G.

(22) Remove the following three white-red-orange-blue wires connected to TB1-G, and reconnect as follows:

(a) Remove and discard the wire connected from TB1-G to TB2-J.

(b) Remove the remaining two white-red-orange-blue wires connected to TB1-G, and reconnect both to TB2-J.

(23) Remove the following three white-red-orange-green wires from TB1-H, and reconnect as follows:

(a) Remove and discard the wire connected from TB1-H to TB2-K.

(b) Remove the remaining two white-red-orange-green wires on TB1-H, and reconnect to TB2-K.

(24) Solder a new white-brown-red-green wire (439-7056-000) from TB3-1 to J2-H.

(25) Remove the remaining wires connected to original switch S1. Discard original switch S1 after all wires have been removed.

(26) Solder new bus wire (421-2220-000) (with sleeve (152-2493-001) to the indicated terminals on new switch S1 (259-2762-010).

NOTE: Refer to rear of switch for numbering sequence.

TERMINAL FROM	TO
S1B-6	S1A-2
S1A-2	S1A-4
S1A-3	S1A-8

(27) Solder the following wires to the indicated terminals on new switch S1:

WIRE COLOR	CONNECT TO TERMINAL	OPPOSITE END CONNECTED TO
White-black-blue	S1B-3	S2A wiper and S3 terminal
White-black	S1B-2	TB3-4
White-black	S1B-2	T1-2
White-black	S1B-1	J1-B
White-red-green-blue	S1B-1	TB2-D
White-red-green-blue	S1B-1	J2-D
White-black-red or white-black-orange (depending on age of unit)	S1B-12	TB3-2
White-red-green	S1B-10	T1-4
White-green	S1B-9	S2F (wiper)
White-black-red-green	S1B-8	T2-1
White-black-red	S1B-7	TB2-G
White-black-red-orange	S1B-5	T2-2
White-orange	S1B-4	TB2-F and J2-F
White-orange	S1B-4	J1-D
White-orange-blue	S1A-3	T1-1
White-green-blue	S1A-1	TB2-C
White-green-blue	S1A-1	J1-E
White-brown	S1A-9	S2B (wiper)

WIRE COLOR	CONNECT TO TERMINAL	OPPOSITE END CONNECTED TO
White-brown-red	S1A-7	TB2-E
White-brown or white-brown-red (depending on age of unit)	S1A-7	J2-E and J1-A
White-red	S1A-5	S2D (wiper)
White-orange	S1A-4	S2E (wiper)

(28) Replace J1, J2, S2, and new switch S1 on chassis.

(29) Retie cable between TB2 and cable clamp.

(30) Retie cable from cable clamp to S1, J1, and J2.

(31) Label the open position of new switch S3 "51RV-1A," and the closed position "ALL OTHER RADIOS TESTED."

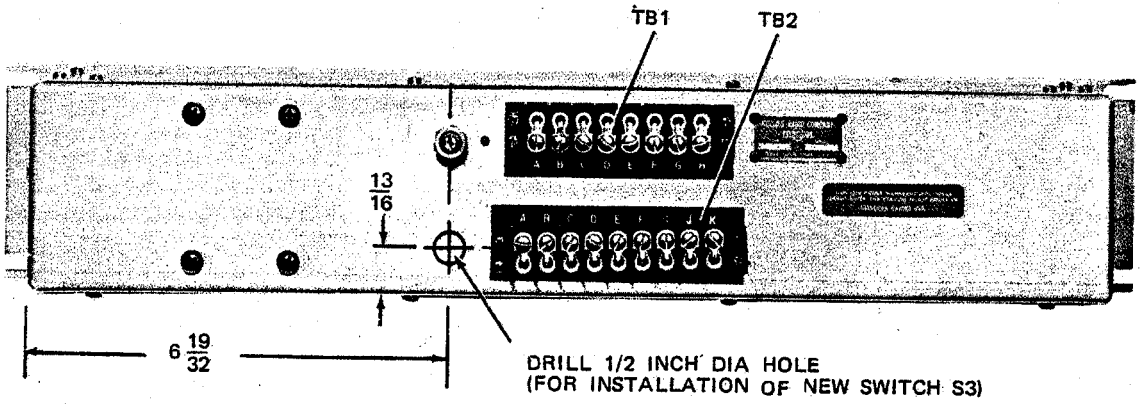
(32) Replace the unit dust cover.

B. Identification Procedure

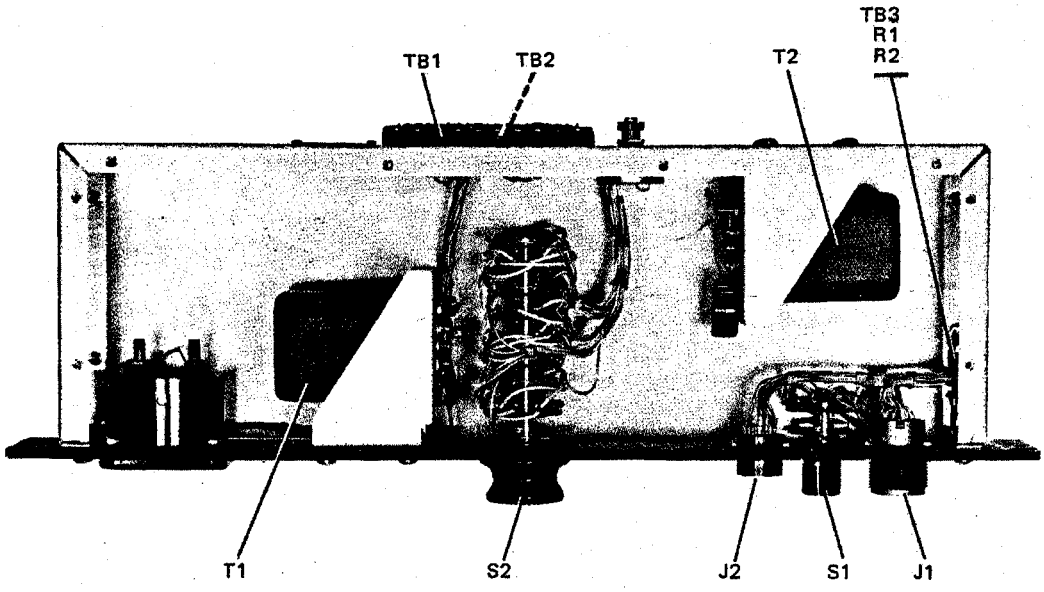
Enter SB 1 on unit information chart. An information chart (280-3778-010) should be ordered if not already present.

C. Testing Procedure

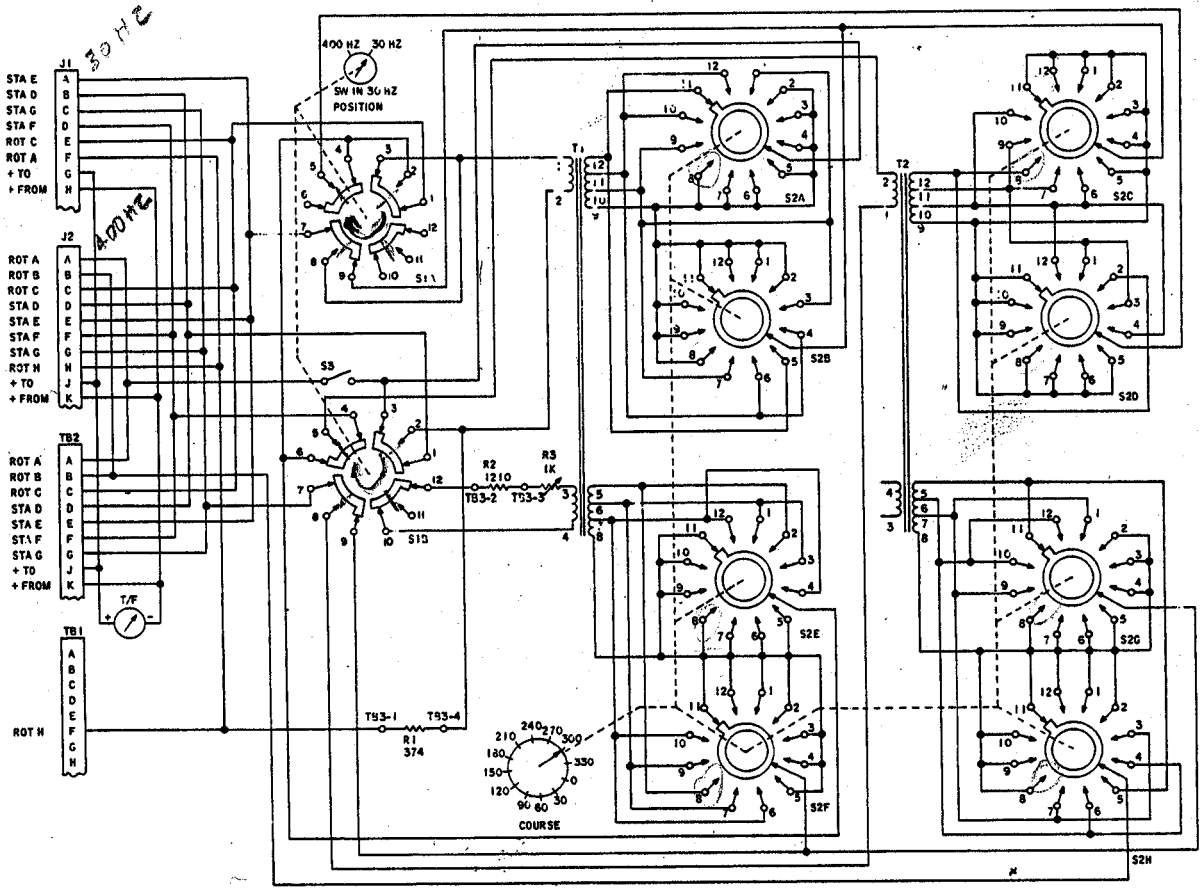
Installation of this modification does not require changes to the existing test procedures.



479V-3 Rear View Showing Hole Location
Figure 1



479V-3 Top View With Cover Removed
Figure 2



479V-3 Schematic After Modification
Figure 3