The Technicians Notebook

By Jerry Gordon

VIR-351

Revision 2 Feb.,1998

Weight 3.3 lbs including tray and connectors.
Voltage 13.75 volts. PWC-150 power converter used for 28 volt systems.
Aural sensitivity: 3 uv max. for 10 db s+n/n, Nav sensitivity 3 uv max. for VOR/LOC flag out of view.
AGC <2 db from 10 to 10,000 uv. Audio output: 50 mw into 600 ohms. Audio load impedance 500-600 ohms. OBS resolver ARINC 547; ORZ'd at 300 degrees. VOR accuracy 2 degrees. VOR/LOC deviation loads; 6 1000 ohm loads max.; dummy loads not required. Flag loads; 6 1000 ohm loads max.; dummy loads not required. TO/FROM flag loads; 2 200 ohm loads max.; dummy loads not required. Radial read-out sensitivity less than 3 uv with accuracy within 2 degrees. TO-FROM Flags 40 mv for fully in view. NAV Flags fully in view at 180 mv, fully out of view at 245 mv.

IND-350 Weight 1 lb. IND-351 Weight 1.3 lbs. IND-350A/IND-351A/IND-351C/IND-351D Weight 1.5 lbs.
IND-350:
P.N. 622-2082-001: 200 OHM NAV flag horiz at bottom of ind.
P.N. 622-2082-002: 1000 OHM NAV flag at angle of bottom ind.
P.N. 622-2082-003 Same as -002 but with RNAV annunciator.

IND-350A: P.N. 622-4477-001 Replaces IND-350.

IND-351: P.N. 622-2083-001: 200 OHM NAV & GS flag horiz on bottom and vertically on side of ind.
P.N. 622-2083-002: 1000 OHM NAV & GS flags at angle on bottom and side of ind.
P.N. 622-2083-003: Same as -002 but with RNAV annunciator.

IND-351A: P.N. 622-4478-001 Replaces IND-351.

IND-351C: P.N. 622-2425-001: 1000 OHM NAV & GS flags. P.N. 622-2425-002: Same as -001 but with RNAV annunciator.

IND-351D: P.N. 622-4479-001: Replaces IND-351C.

VIR-351 P.N.: 622-2080-001, 011 = Black face plate. 622-2080-002, 012 = Blue face plate.
622-2080-003, 013 = Green face plate. 622-2080-004, 014 = Red face plate.
622-2080-005, 015 = Brown face plate. 622-2080-006, 016 = Gray face plate.

PWC-150 Power converter: Weight 1.5 lbs. Input 27.5 VDC. Output 13.75 VDC, NAV 2 amps continuous, COM continuous 5 amps for 15 seconds, 1 amp for 45 seconds. COM intermittent 5 amps for 1 minute at 10 minute intervals.

SERVICE BULLETINS:

VIR-351 (-001 THRU -005)	SB-1	IMPROVE AGC DYNAMIC RANGE.
VIR-351 (-011 THRU -016)	SB-1	FM BROADCAST INTERFERENCE.
VIR-351 (-001 THRU -005)	SB-2	NOT ISSUED.
VIR-351 (-011 THRU -016)	SB-2R1	MINIMIZE ROTOR MODULATION IN AUDIO.
VIR-351 (-001 THRU -005)	SB-3	POWER SUPPLY INTERFERENCE TO ADF.
VIR-351 (-011 THRU -016)	SB-3	SCALLOPED VOR SIGNALS.
VIR-351 (-001 THRU -005)	B-4R1	FM BROADCAST INTERFERENCE.
VIR-351 (-011 THRU -016)	SB-4	IMPROVED OPERATION WITH DOPPLER VOR SIGNALS.
VIR-351 (-001 THRU -005)	SB-5	REDUCED EFFECT OF SCALLOPED VOR SIGNAL.

VIR-351 (-001 THRU -005)	SB-6	IMPROVED OPERATION WITH DOPPLER VOR SIGNALS.
VIR-351(-001 THRU -005)	SB-2-75	INCREASE AUDIO OUTPUT AT LOWER MODULATION LEVEL.
VIR-351 (-001 THRU -005)	SB-1-76	NEW SWITCH/POT ASSEMBLY.
VIR-351 (-001 THRU -005)	SB-2-76	ADJUSTMENT OF RF AGC DELAY CIRCUIT.
VIR-351 (-001 THRU -005)	SB-3-76R1	ROTARY SWITCH INSULATOR.
VIR-351 (-001 THRU -005)	SB-1-77 I	NTERFACE WITH 331A-3G COURSE INDICATOR.
VIR-351	SB-7	All that have revision C of the A6 P.C. Board Assembly, to meet

ICAO ANNEX 10. In some situations, ***FM broadcast stations may interfere with NAV receiver operation.*** Consists of adding some components and removing or replacing others. Estimated time to modify and test one receiver: two hours. Contact S-TEC for details.

IND-350	SB-2	VOR/ILS METER MOVEMENT REPLACEMENT.
IND-350/351	SB-1	IMPROVE INDICATOR ILLUMINATION.
IND-351	SB-2	VOR/ILS & GS METER MOVEMENT REPLACEMENT.
IND-351	SB-1-76	SPACER BLOCK MOUNTING SCREW LENGTH.
IND-351C	SB-1	VOR/ILS & GS METER MOVEMENT REPLACEMENT.
IND-351C	SB-1-76	CT SYNCRO B2 SHAFT EXTENSION ADHESIVE.
IND-350/351/351C	SB-1-77	NAV & GS FLAG REPLACEMENT.
IND-350/351/351C	SB-2-77R1	MOVEMENT STOP CLEANING PROCEDURE.
IND-350A/351A/351D	SB-1-79	KEYED MATING CONNECTOR.
IND-350/350A/351/351A/351C/351D	SB-1-80	MOUNTING SCREW LENGTH.

Alignment of VOR Board A4 (628-5010-001/002) only.

1. 110.2 mhz 1000 uv std. VOR test signal.
2. Scope to A4TP2 and adjust A4R22 Ref Level for neg pulse width of 70 us. +-4us.
3. Gen and OBS to 60 degrees. Adj A4R4 VOR zero to center needle.
4. Gen and OBS to 150 degrees. Adj A4R30 VOR track to center needle.
5. Repeat until error within 1 degree.
6. OBS to 0 and gen to 180 degrees. Adj A4R5 VOR BAL for 1/2 of the error.
7. Repeat 60 and 150 degree alignments and VOR BAL adjustments until all are within 2 degrees.
8. Gen and OBS to center needle exactly. Move gen off 10 degrees and adjust A4R20 VOR/LOC DEV for 150 uv or 5 dots. If A4R20 does not have enough range, sub A4R10 on VOR converter board. If you change A4R10, repeat VOR alignment.

Alignment of VOR (Board A4 (628-5010-003) only. Same as above until step 8. Deviation adjustment is A5R20.

Localizer adjustment, ALL.

1. Gen to LOC center.
2. Adjust A5R26 to center needle.
3. Gen to 4 db (15090) should = 90 mv or 3 dots.
4. Gen from 10uv to 10,000 uv (LOC Center) needle should not vary over 1 mv.
5. Gen to 3 uv, should have full NAV flag.
6. Gen to 1000uv 90hz only or 150 hz only. Should have flag showing.

Digital Bearing Indicator alignment.

1. If digital bearing indication is more then 1 degree in error, apply standard VOR signal at 240 degrees.
2. Adjust A5R7 Radial Zero, while rocking generator output, to center radial reading at 60 degrees.
3. Gen to uv, unit should show dashes. At 3 uv and higher, unit should show radial.

Common Part Numbers; Part Numbers Not In The Manual;

Displays: 262-1390-010 Lens, Polarized: 628-5321-001

Common Part Numbers That Have Changed;

Symbol	*Old P/N*	*S-TEC P/N*
A3L1	240-2741-020	240-0988-080
A3U7	351-1549-010	No longer avail.
A3CR101	353-3264-020	922-6131-020
A6Q2	352-5016-010	352-1045-030
A6CR1/3/5/7	353-3264-020	922-6131-020
A6L1/2/4/5	628-5448-002	278-0415-020

COMMON PROBLEMS AND FIXES COURTESY OF S-TEC CUSTOMER SERVICE

I. +5, -12VDC power supply common problems: No +5VDC or -12VDC. Usually can be repaired by replacing A2U1. No -12VDC only. Usually A2CR2.

II. Noisy audio common problems: Synthesizer VCO frequency drifting. If tuning voltage is correct, the problem usually lies with A3L1 (39mh coil).

III. Nervous VOR needle common problems: (A) Detector signal oscillating. Realign receiver for maximum AGC according to alignment procedures in manual. Then at 47 DBM, set R39 to 1.4VDC on the case of Q3. Set R29 detector for .5VRMS. Repeat AGC delay (R39) and detector level adjustment (R29) until results are met. Then connect oscilloscope to A6TP3 and observe detector signal. Adjust C23 until detector signal just stops oscillating. Go back and verify 4.5VDC AGC voltage at 97.5 DBM on gen.
(B) A.C. ripple on 10VDC line at junction of A6R108 and A6R113. While looking at junction with oscilloscope, verify AC ripple increases and decreases while adjusting volume knob. Fix: Usually A6C109 and/or A6R113 bad. (C) If not step (B) above, check A.C. ripple at A4VR1 and A4VR2 on VOR converter board. Ripple here usually means VR1 and VR2 have been changed and the impedance of the new zeners are causing this A.C. ripple.

IV. VOR needle will not adjust to center. Common problem: Needle shifts left or right of center and will not stay centered. Check 70 u sec. neg. going pulse width at TP2, ensure it does not self-oscillate when R22 is adjusted to both ends of its range. Fix: If 70 u sec. neg. going pulse width self-oscillates, replace A4U2. If 70 u sec. neg. going pulse width is good, replace chopper A4Q1.

V. NAV channeling. The VIR-351 switching unit utilizes BCD and 2x5 control logic. The 2x5 runs straight from the switches to the rear connector. The nav unit uses BCD information for itself. The BCD logic runs straight to the rear connector and from the rear connector to A5 LOC/PWR sup board, from the A5 board through A5-U4, then off the board to the front display (A1 board). Common problem: NAV1 channels TCR-451 and NAV2 channels some frequencies but not all. NAV1 seems to effect NAV2 2x5 channeling or vice-versa. Fix: Once you verify DME NAV select lines and aircraft wiring are correct, then you probably have a bad isolation diode in the NAV unit itself on the 2x5 switches. (Note: You cannot have a BCD external short problem without seeing it on the NAV display.)

NOTES: