

3.2 MAIN UNIT

3.2.1 Position

- (1) Select a position (table, rack, etc.) for the main unit satisfying following conditions :
 - a. Convenient for operation, easy to maintain and with a good view of the display.
 - b. Avoid direct sunshine, water splash, high temperature and strong vibration.
 - c. Give a separation of 150mm or more for both sides and back of the main unit.
- (2) Follow the procedures shown below to install the main unit.
 - a. Loosen two knobs combining the unit and its support and separate them.
 - b. Fix the support to a table, rack or like, with 6 screws (attached).
 - c. Fasten the main unit to the support with two knobs.

3.2.2 Grounding and Speaker Jack

- (1) Grounding of the main unit should be made with a low impedance cable, as short as possible, to a grounding point of the vessel.
- (2) The speaker jack is on the rear side. The impedance of the speaker is 8Ω .

3.3 DESCRIPTION OF CIRCUIT

3.3.1 Antenna Circuit

The antenna is a H type Adcock antenna, and a sense signal is synthesized with signals from NS and EW elements by special matching circuit. NS and EW signal are modulated by 135.6Hz and the output signal is fed to the main unit through coaxial cable A. The 135.6Hz is supplied from PCA CPU (appendix 7) through coaxial cable A and B. The sense signal is applied through coaxial cable B.

3.3.2 Printed Circuit Assemblies

All Printed Circuit Assemblies (PCAs) are on the chassis except PCA AVR and PCA LED.

(1) PCA HF (appendix 4)

PCA HF involves super heterodyne circuits which are shown as following :

a. VHF Amp.

The antenna output are amplified by Q1 and Q2 and its both output are applied to Q3. Q1~Q6 and Q11~Q12 are VHF amplifiers and the gain is controlled automatically. The capacitor diodes in the tuning circuit are variable.

b. 1st Mixer

The 1st mixer, U1, generates a 1st VIF in 30~30.995MHz which is supplied from PCA VCO-1 (appendix 8).

c. 1st VIF

The 1st VIF 30~30.995MHz is amplified by Q7, Q8 and Q9.

d. 2nd Mixer

U2 is the 2nd mixer which generates a 2nd IF of 21.4MHz which is supplied from PCA VCO-2 (appendix 9).

(2) PCA IF/AF (appendix 5)

PCA IF/AF is in charge of IF and AF circuits which are explained as following :

a. 2nd IF Amplifier

The 2nd IF, 21.4MHz, is amplified by Q1 and Q2, and FL1 is a crystal filter of 21.4MHz.

b. 3rd Local Oscillator

Q4 is the 3rd local oscillator and generates 20.945MHz.

c. 3rd Mixer

Q3 is the 3rd mixer for 21.4MHz and 20.945MHz, the difference, 455kHz.

d. 3rd IF Amplifier

The 3rd IF, 455kHz, is amplified by Q5 ~ Q10, and the signal is detected by CR8 , and applied to ADDF amplifier circuit.

e. AGC, SQUELCH, AF Amplifier

Q11 and Q12 are AGC amplifiers, which supply the AGC voltages to Q4, Q6 and Q9 of PCA HF and Q2, Q7 and Q9 of PCA IF/AF. Q14, Q15 and Q16 are the other 455kHz amplifier and the amplified signal is detected by diodes CR9 and CR10 to detect FM signal. Q20 and Q21 are squelch control, and Q22, Q23, Q24 and Q25 are audio amplifiers. Noise is amplified by U1, Q26 and Q27. Its output voltage is applied to stop the the scanning and to control a squelch. Q17, Q18, Q19, Q30 and Q31 amplify the signal of 135.6Hz ADDF. L2 and C79 make band pass filter for 135.6Hz. Q13 is a level indicator amplifier and its gain is adjusted by RV1 and RV2. Q28 and Q29 control a voltage for dimmer.

(3) PCA NOISE LIMITER (appendix 6)

The PCA consists of a noise limiter circuit and Q1 is an audio amplifier.

(4) PCA VCO-1 (appendix 8)

It has the 1st local oscillator with frequency synthesizer circuit, which generates 80 ~ 140MHz. U3, U4 and U5 are the programmable counter of for MHz setting. U2 is a phase detector and Q1, Q2 and Q3 are low pass filter circuits.

Q4, CR1 ~ CR4 and T1 consists of a VCO circuit, its generated frequency is amplified by Q5, Q6 and Q7, and which is applied to the 1st mixer of PCA HF. U11 and U7 are frequency divider for the programmable counter. Q8 is a buffer amplifier for the variable capacitor diode of PCA HF.

(5) PCA VCO-2 (appendix 9)

It has the 2nd local oscillator with frequency synthesizer and generates 8.6 ~ 9.595MHz. U3, U4 and U5 are the programmable counter for kHz setting. U10 is the phase detector and Q1, Q2 and Q3 are low pass

filter circuits. Q4, CR1~CR4 and T1 make a VCO circuit, and the generated frequency is amplified by Q5, Q6 and Q7, and which is applied to the 2nd mixer of PCA HF.

(6) PCA CPU (appendix 7)

The ADDF signal is applied from PCA IF/AF and the outputs are transferred to PCA DISPLAY and LED to display bearing information, and all process is controlled by the CPU. The PCA includes a master counter for bearing display, a basic frequency generator of 5MHz, an encoder by key board switch, a scanning control, a back up circuit for memory, a balanced modulator signal generator, and the latch for the display. U12,U13,U14,U8,U17,U18 and U15 are CPU circuits. U20 is the master counter and 135Hz, 270Hz and 540Hz are generated from the master counter and are applied to PCA BM. Q1, Q2 and Q3 are the back-up battery over circuit.

(7) PCA BM (appendix 10)

The PCA supplies 4 phase balanced modulator signal.

(8) PCA LCD DISPLAY

The PCA consists of the key board switch, and LCD display circuits.

(9) PCA LED

The PCA consists of the bearing indicator with 10° step on the LED display.

(10) PCA CHOPPER (appendix 12)

The PCA is a voltage regulator.

Input voltage allows from 12V to 40V and output voltage is regulated to 9V by chopper control circuit.

(11) PCA AVR (appendix 11)

This PCA is on the rear side of chassis , and it consists of 3 voltage regulators, 5V, 5V and 7V for computers.

3.4 PERFORMANCE CHECK AND REPLACEMENT

3.4.1 Test Equipment

Performance check of the direction finder requires following test equipment.

(1) Antenna Simulator