DOCUMENT No. 2500650001

PLB7 EPIRB
COMPLETE UNIT
FUNCTIONAL DESCRIPTION

1.General Arrangement and Operation.

The PLB7 consists of a moulded waterproof casing, carrying a switch for arming the unit, a push-button for testing or manually activating the unit, a water detector automatically activating the unit, and the antenna, which doubles as the strap. The case contains a radio transmitter board, a control board, and a battery.
The radio transmitter is crystal controlled, and radiates at 121.5 MHz. It is amplitude modulated by the control circuit.
The control board uses CMOS logic and an oscillator I.C. to generate a repeated falling tone.
The control board switches on the unit in either a test mode or the operational mode, depending on the position of the Arm switch. When the Arm switch is in the non-armed position, depressing the push-button causes the the unit to run in a low-power test mode, whilst the button is held down. A R.F. monitor detects that the transmitter circuit is operating, and lights an indicator lamp. When the Arm switch is in the Arm position, depressing the push-button causes the unit to operate at full power, and to continue to operate when the button is released. The water detector performs the same function as the push button when the unit is armed. The unit continues to operate until the Arm switch is returned to the Non-armed position, or until the battery is exhausted.

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PLB7 EPIRB
TRANSMITTER CIRCUIT
FUNCTIONAL DESCRIPTION

1. Transmitter Circuit.

The transmitter circuit consists of Q101,Q102,Q103,Q106 and Q107. The oscillator section uses a 3rd overtone crystal, operating at 40.5 MHz, which is tripled to produce 121.5 MHz.

The oscillator/tripler is Q101 and Q102. The output of Q102 is transformer coupled to the output stage, Q103.

The low-power facility is provided by Q106 and Q107, which de-tune the transformer and by- pass the signal when they are switched on by Q5 or Q105.

The output stage is coupled to the antenna by a band-pass circuit L103 and C112, and a low- pass filter L104, C114 and C115. The low-pass filter is required to reduce harmonics introduced by the R.F. detector circuit.

2.3 R.F. Detector Circuit.

The R.F. detector is D105, which peak-rectifies the output of the transmitter, so that the audio modulation of the transmitter output appears across R117. The audio signal is amplified by U6a, and fed to a level detector, U6b. The output of U6b drives the indicator LED, D101.

The gain of U6a is high enough to produce a useable output when the transmitter is operating in low-power mode, its output is restricted by D110 and D111 when the transmitter operates in its normal mode. The low-power circuitry of the transmitter is operated in conjunction with the modulator to ensure that the oscillator leakage during the OFF periods of the modulation does not give a false indication.

PLB7 EPIRB
CONTROL BOARD
FUNCTIONAL DESCRIPTION

1.General Description.

The control broard consists of a double-sided PCB with surface mounted components on both sides.

2.Circuit Description.

2.1 Control circuit.

The control circuit consists of U4a, Q104 and Q105. U4a is used as a S-R flip-flop. It is reset at power-on by C5 , and is set by the push-button or the water detector. Power is applied to the circuit via the Reed switch SW2. The water detector operates when current passing between the W1 and W2 contacts raises the voltage on the SET input of U4a to its threshold. The push-button operates by pulling the SET input of Q4a high.
When the Q\ output of U4a goes low, it turns on Q3 which supplies power to the crystal oscillator of the radio transmitter, the R.F. detector and to the tone generator.
Operation of the push-button when the Arm contacts are open causes Q104 and Q105 to be turned on. Q104 supplies the power to the circuit, Q105 drives the low-power control of the transmitter.
When the button is released, Q104 turns off, returning the unit to its quiescent state.

2.2 Tone Generator.

The tone generator consists of U1, U2, U4b, and U5, with Q4 and Q5.
The cadence of the falling tone is controlled by U1 and U2.
U1 is an oscillator/counter, U2 is a shift register. The output of U1 at 2.4 Hz is used to increment the shift register U2. The 9th stage of U2 is connected to the reset input, to give a sequence of 9 steps.
The first 3 steps produce the OFF period of the cadence, the remaining 6 steps give the ON period, ensuring that the cadence has an exact 2:1 mark-space ratio.
The audio tone is generated by U5, a universal timer I.C. connected to self-oscillate. The frequency of oscillation is set by R111, R12 and C6, but is modified by the voltage across C4.
C4 is discharged by Q3 every cycle of the 2.4 Hz signal from U1.
As C4 recharges via R13 and R14 the output frequency of U5 falls.
The component values are chosen to give a starting frequency of 2.8 kHz and a finishing frequency of 800 Hz.
The output of U5 is fed to U4b, which divides it by 2, giving the required tone to modulate the transmitter. The Q\ output of U4b drives Q5, which switches the output stage of the transmitter, producing a 100% square-wave modulation of the R.F. output.
The Q output of U4b is used to drive Q5, which drives the low-power control of the transmitter, ensuring correct operation of the R.F. detector, when the unit is transmitting normally.