OPERATIONAL DESCRIPTION

1.0 INTRODUCTION

This report contains the required information and test data for Type Acceptance Approval for the **ACR/PLB-300** 406 MHz Personal Locator Beacon (PLB). The **ACR/PLB-300** meets all of the current FCC requirements for a 406 MHz PLB.

The **ACR/PLB-300** contains 2 battery packs, each consisting of three 2/3 A size cells of Lithium Manganese Dioxide chemistry. The battery packs will have a 5-year replacement cycle. The enclosure is made of high impact, corrosion resistant, ultra violet resistant plastic.

The **ACR/PLB-300** has an active internal GPS receiver. The **ACR/PLB-300** is a class 2 beacon that operates from -20°C to +55°C. Throughout this document, the **ACR/PLB-300** may be referred to as the Beacon or PLB.

2.0 GENERAL INFORMATION REQUIRED FOR TYPE ACCEPTANCE
(Per 47 CFR Ch I, 2.1033(c). (For a Part 95, Subpart K 95.1402 PLB))

1)   Name of Applicant: ACR Electronics, Inc. (manufacturer)
                                                5757 Ravenswood Road
                                                Fort Lauderdale, FL 33312

2)   Identification of Equipment: 406 MHz PLB

        FCC ID: B66ACR-PLB-300   Model: PLB-300 Class 2
        The PLB-300 meets Category 1 floatation requirement with the optional pouch.

3)   Installation and operating instructions: Users Manual Exhibit

4)   Type of Emission: 406 MHz - 16K0G1D
                                                121.5 MHz – 3K20A3X
                                                121.5 MHz – 2K00A2A

5)   Frequency Range: 406.028 MHz (+ 0.002 MHz and
                                                         - 0.005MHz)
                                                121.5 MHz ± .006 MHz

6)   Range of Output Power: 406 MHz - 5W ± 2dB
                                                121.5 MHz - 50 mW ± 3 dB

7)   Maximum Output Power: 406 MHz - 7.9 W
        (into 50 ohm)   121.5 MHz - 100 mW

8)   DC Voltages and Currents: 406 MHz – 6.2 V, 2.0 A @ IC301

121.5 MHz – 6.2 V, 30 mA @ Q200, Q201

9)   Tune-up Procedures:

There is no tuning required for the 406 MHz 5 watt signal. There is no tuning required for the 121.5 MHz 0.050 watt signal. The antenna-matching network is tuned at 406 MHz by adjusting C311 and measuring the return loss into the antenna coupler network. The antenna matching network is tuned at 121.5 MHz by adjusting C329 and measuring the return loss into the antenna coupler network.

10)   Schematic Diagram: Schematic Exhibit

Description of Circuitry [Refer to Schematic ACR Y1-01-0690 (Schematic Exhibit)]:

Circuitry for Determining and Stabilizing Frequency:

The Beacon generates a phase modulated 406 MHz signal for transmission of the distress message. The 406 MHz carrier is frequency synthesized by a PLL; IC300, IC400, IC401, and IC300 with an on-board VCO. It is locked to a TCXO (IC402) to provide the high frequency stability required for the COSPAS-SARSAT system. The carrier is phase modulated by the phase lock loop filter of the PLL, R405,C408, L401, and R406, C405, R414, C410, R408, C406, and R407. Q301 and power amplifier IC301 amplify the phase-modulated signal to provide 5W output at the antenna.

The Beacon also has a 121.5 MHz radio homer output. The 121.5 MHz is generated by a crystal (Y200) controlled oscillator (Q203) for frequency stability of better than ± 50 PPM over the full operating temperature range. Q200 and Q201 amplify the carrier to provide a nominal power output at the antenna of 50 mW. This signal is AM modulated by switching the 121.5 MHz drive signal on and off using Q200 and Q201.

Circuitry for Suppression of Spurious Radiation:

Spurious radiation is suppressed by means of power supply decoupling (numerous capacitors and inductors), low phase noise oscillators, and limited bandwidth features (C205, C207, L204, C206, C208, C209, L205, L206, and C210) and filtering by the antenna matching (L304, C308, L306, L305, C310, C329, C311, L308, and C309) networks.

Circuitry for Limiting Modulation:

Limitations to the modulation of the 406 MHz signal consists of a current source provided by resistors (R409, R410, R412, and R413). These resistors limit the current into the phase lock loop detector circuit (IC401) and the currents set the level of modulation. The 121.5 MHz modulation is limited by microprocessor control of IC101, Q200 and Q201 that digitally turn on or off the output power.

Circuitry for Limiting Power:

A regulated control voltage limits the maximum power output of the 406 MHz amplifier (IC301). Under best battery voltage, maximum power is limited to 7.9W.

Power limiting for the 121.5 MHz output is obtained by operating the P.A. (Q201) saturated.

Other circuitry:

The modulation and other controls for the Beacon are generated by a microprocessor (IC101). This processor provides digital signals for both the 406 MHz and the 121.5 MHz modulations as well as for LED's, a buzzer and other functions.

The **ACR/PLB-300** has an internal GPS receiver that operates while the beacon is turned on. This GPS receiver sends GPS navigation data to microprocessor IC101 for incorporation into the 406 beacon message.

Description of Devices:

TABLE 1: FUNCTION OF ACTIVE ELEMENTS

DESIGNATOR	FUNCTION
IC400	D Flip Flop, TC7WH74
IC401	Logic X OR, NC7SZ86
IC101	Microprocessor, PIC18F4520
IC300	RF Transmiter, ADF7017
IC2	Switching Controller, LM3485
IC1	Switching Regulator, LM2736Y
IC402	TCXO, TCXO-50 (E3499)
IC100	Gps Receiver, GPS-ZX4150P-4
IC301	RF POWER AMP, RA07M4047M
Q103	Dual NPN Transistors, MBT3904DW
Q100	Mosfet N, IRLML2502PBF
Q105	Mosfet N, BSS138
Q104	Mosfet P, IRLML6401
Q102	NPN Transistor, UMT3904T
Q106	NPN Transistor, MMBT3904
Q200 Q203	NPN Transistor, PBR941
Q201 Q202 Q300 Q301	NPN Transistor, NE85633
Q1 Q101	Power Mosfet P, FDC658P
CR300	Diode, HSMS2800
D1	Diode, 20BQ030
D2 D100 D101	Diode, MBRS130T3G
D3 D102 D104	Schottky Diode, BAT54HT1G

11) Label drawings: ID Label Exhibit

12) Photographs: External Photos Exhibit & Internal Photos
                                       Exhibit

13) Digital Modulation:

The modulation for the 406 MHz signal passes through a one pole RC filter provided
by R409, R410 and C407. The purpose for this filter is to provide the rise and fall
times (150 μs nominal) for the modulating data. This provides the necessary filtering
of the 400 baud data to ensure that spectral mask requirements are met.

The 121.5 MHz is digitally modulated by the microprocessor (IC101) that controls
transistor (Q202) and switch (Q200) to apply or remove the carrier from the P.A.
(Q201) stage.

14) Required Test Data: Test Report Exhibit