

EQUIPMENT INSTALLATION MANUAL

for the

FreeFlight Systems

GPS/WAAS 1201 SENSOR

Revision E

FreeFlight Systems
3700 Interstate 35 S
Waco, TX 76706

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Table Of Contents

RECORD OF REVISIONS.....3
INTRODUCTION:4
DESCRIPTION:.....4
PART NUMBERS:4
REGULATORY COMPLIANCE:.....4
 Instructions for Continued Airworthiness, FAR 23.1529, FAR 25.1529, FAR 27.1529, FAR 29.1529...4
 Software5
 Hardware5
SUPPLIED EQUIPMENT6
NOT SUPPLIED6
SPECIFICATIONS, GPS/WAAS 1201 SENSOR:7
 Certification:7
 Physical:7
 Electrical:7
 Data Input / Output:7
SPECIFICATIONS, ANTENNA (P/N 81194):.....8
 Certification:8
 Physical:8
 Electrical:8
OPERATION:9
 RS232 Input9
 RS232 Output.....9
CONNECTOR PIN OUT:.....10
APPENDIX A11
A1 ENVIRONMENTAL, ANTENNA:.....12
A2 ENVIRONMENTAL, SENSOR:.....13
A3 TYPICAL INTERCONNECT14
A4 OUTLINE DRAWING15
A5 SLIDE LATCH ASSEMBLY16
LIMITED WARRANTY17
I. HARDWARE17
II. ITEMS NOT COVERED BY WARRANTY17
III. LIMITATIONS ON WARRANTY17
LIMITATION OF LIABILITY17

SYSTEM: GWSS

“Modification of an aircraft by this Supplemental Type Certificate obligates the aircraft operator to include the maintenance information provided by this document in the operator’s Aircraft Maintenance Manual and the operator’s Aircraft Scheduled Maintenance Program.”

- (1) Maintenance Manual information for the GWSS (system description, removal, Installation, testing, etc.) is contained in FreeFlight Systems Installation Manual, 84143-01.

- (2) Line Replaceable Unit (LRU) part numbers and other necessary part numbers contained in the installation data package should be placed into the aircraft operator’s appropriate airplane Illustrated Parts Catalog (IPC).

- (3) Wiring diagram information contained in this data package should be placed into the aircraft operator’s appropriate airplane Wiring Diagram Manuals.

- (4) Scheduled Maintenance Program tasks to be added to the aircraft operator’s appropriate airplane maintenance program are as follows:
 - a. Recommended Periodic Scheduled Servicing Tasks: None Required
 - b. Recommended Periodic Scheduled Preventative Maintenance Tests/Checks to Determine System Condition and/or Latent Failures: None Required
 - c. Recommended Periodic Inspections: None Required
 - d. Recommended Periodic Structural Inspections: None Required

- (5) **Unscheduled Maintenance**
Unscheduled maintenance may include upgrade of the program software contained in the GWSS unit.

Software

The software was developed in accordance with RTCA/DO-178B to criticality level C.

Hardware

The GPS/WAAS 1201 Sensor meets the categories of DO-160D indicated in Environmental Qualification Form found later in this document.

SUPPLIED EQUIPMENT

Each GPS/WAAS 1201 Sensor is shipped with the following items:

Part Number	Description	Qty
84100-01-XXXX	GWSS GPS/WAAS 1201 Sensor	1
84142-01	Installation Kit, GPS/WAAS 1201 Sensor	1
81194	Hi Speed GPS Antenna	1
84143-01	Equipment Installation Manual	1

Complete installation kits are available under kit part number 84142-01. Individual pieces are available under the part numbers shown. Contact FreeFlight Systems sales to place orders.

Part Number	Description	Qty
84142-01	Installation Kit, GPS/WAAS 1201 Sensor	
84140	Connector, Receptacle, 25 pin D-Sub	1
84141	Socket, Crimp Style, female	25
84150	Backshell Assy, 25-Pos., 90 deg exit, w/Latch Kit	1
82809	Connector, TNC, Right Angle for RG142	1
84104 (Alt. 84134)	Connector, TNC, Straight for RG142	1

NOT SUPPLIED

Coax, RG142 or equivalent.

Insertion loss: Less than 10dB at 1.575 GHz.
DC Resistance: Less than 1 ohm.

Mounting hardware.

SPECIFICATIONS, GPS/WAAS 1201 SENSOR:

Certification:

TSO Compliance.....TSO C145a (Beta 1)
Environmental.....DO-160D (See appendix)

Physical:

The GPS/WAAS 1201 Sensor attaches to the airframe via six 8-32 screws (not supplied). See the paragraph titled Outline Drawing for further details.

Height.....1.60”
Width4.13” (Includes mounting flange)
Depth.....6.50”
Weight.....1.2 lb.

Electrical:

Input Voltage14 or 28 VDC
Input Current.....0.25 Amp at 28V or 0.5 Amp at 14V

Data Input / Output:

Format.....RS232
Baud Rate.....19200 Baud, 8 data bits, 1 stop bit and odd parity

SPECIFICATIONS, ANTENNA (P/N 81194):

Certification:

TSO Compliance TSO C144
Environmental DO-160C (See appendix)

Physical:

Height 0.60"
Width 3.00"
Length 4.70"
Weight 0.375 lb.
Mounting External
Speed Rating 1300kts

Electrical:

Input Voltage +5 VDC (Supplied by sensor)
Input Current 40 mA

OPERATION:

RS232 Input

The sensor receives RS232 input data from the Navigation System on pins J1-21 and J1-22.

Refer to latest revision of the Interface Control Document for input message details.

RS232 Output

The sensor transmits RS232 output data on pins J1-8 and J1-9.

Refer to latest revision of the Interface Control Document for output message details.

CONNECTOR PIN OUT:

The Sensor has a 25-pin male connector per MIL-C-24308 available on the front of the unit. All connections except for the GPS antenna are through J1. The mating connector, P1, is described previously under the section “Equipment Supplied”.

Pin	Signal	Function
1		unused
2	1 PPS A	One Pulse Per Second RS422 A
3		unused
4		unused
5	Shield 1	Ground
6	A+	Primary Power Input 14/28 Vdc
7	TX2 232	RS232 Transmitter # 2
8	TX1 232	RS232 Transmitter # 1
9	TX1 Com	Ground for TX1 232
10	TX2 Com	Ground for TX2 232
11		unused
12		unused
13		unused
14		unused
15	1 PPS B	One Pulse Per Second RS422 B
16		unused
17		unused
18	Shield 2	Ground
19	Power Common	14/28 Vdc Return
20	RX2 232	RS232 Receiver #2
21	RX1 232	RS232 Receiver #1
22	RX1 Com	Ground for RX1 232
23	RX2 Com	Ground for RX2 232
24		unused
25		unused

APPENDIX A

A1 ENVIRONMENTAL, ANTENNA:

The 81194 GPS antenna meets the environmental test categories detailed below in accordance with RTCA/DO-160C, Environmental Conditions and Test Procedures for Airborne Equipment.

NOMENCLATURE: Hi Speed GPS Antenna
 PART NO: 81194
 MANUFACTURER: Aero Antenna
 ADDRESS: 20732 Lassen Street
 Chatsworth, CA. 91311
 USA

Section	Category	Remarks
4.0 Temperature and Altitude	F2	
5.0 Temperature Variation	A	
6.0 Humidity	B	
7.0 Operational Shock and Crash Safety		6 g's 11ms
8.0 Vibration	C and L	
9.0 Explosion Proofness	X	Not Tested
10.0 Waterproofness	S	
11.0 Fluids Susceptibility	F	
12.0 Sand and Dust	D	
13.0 Fungus Resistance	F	
14.0 Salt Spray	S	
15.0 Magnetic Effect	X	Not Tested
16.0 Power Input	X	Not Tested
17.0 Voltage Spike	X	Not Tested
18.0 AF Conducted Susceptibility – Power Inputs	X	Not Tested
19.0 Induced Signal Susceptibility	X	Not Tested
20.0 Radio Frequency Susceptibility (Radiated and Conducted)	X	Not Tested
21.0 Emission of Radio Frequency Energy	X	Not Tested
22.0 Lightning Induced Transient Susceptibility	X	Not Tested
23.0 Lightning Direct Effects	2A	
24.0 Icing	C	

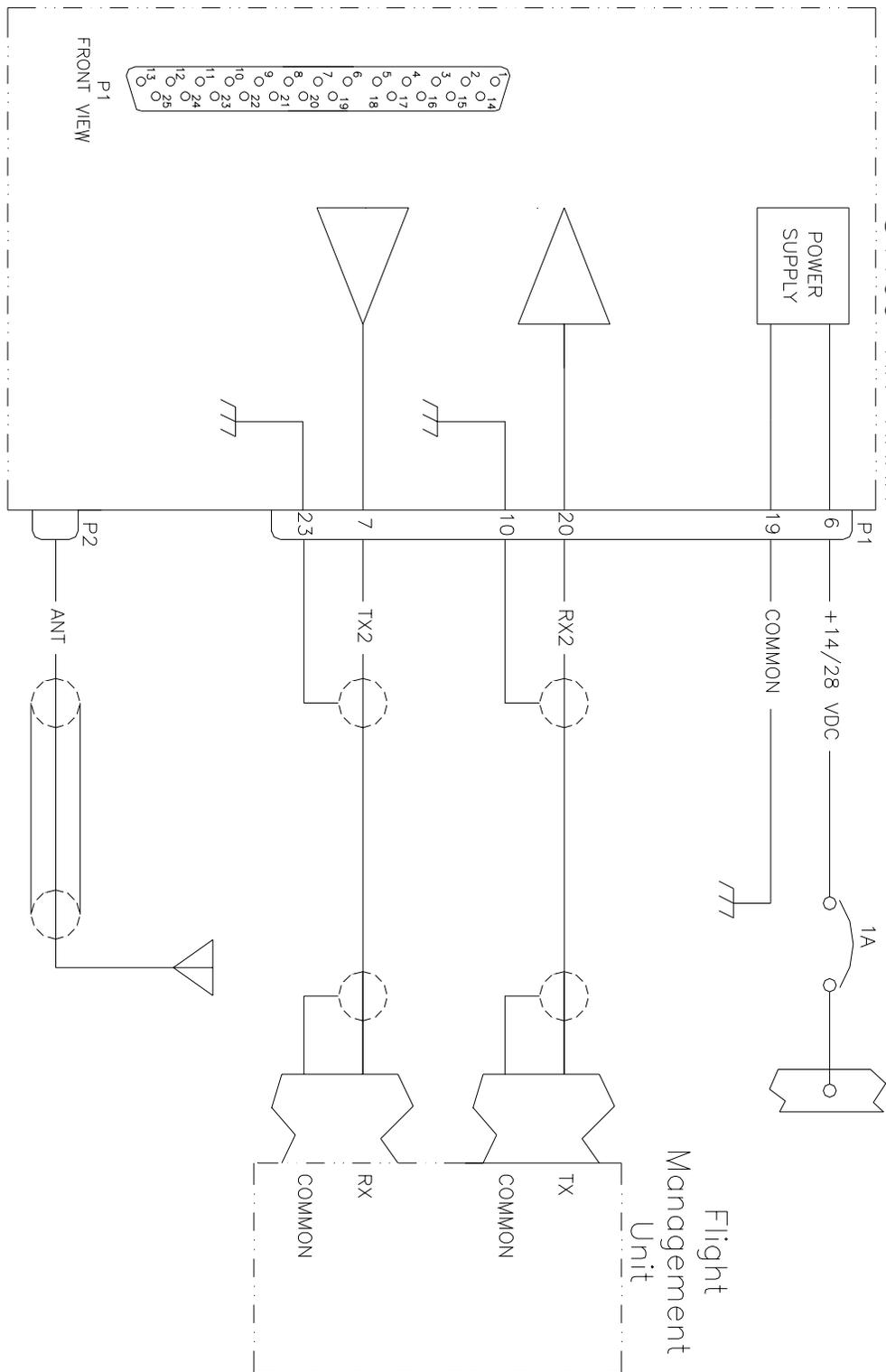
A2 ENVIRONMENTAL, SENSOR:

The Sensor meets the environmental test categories detailed below in accordance with RTCA/DO-160D, Environmental Conditions and Test Procedures for Airborne Equipment.

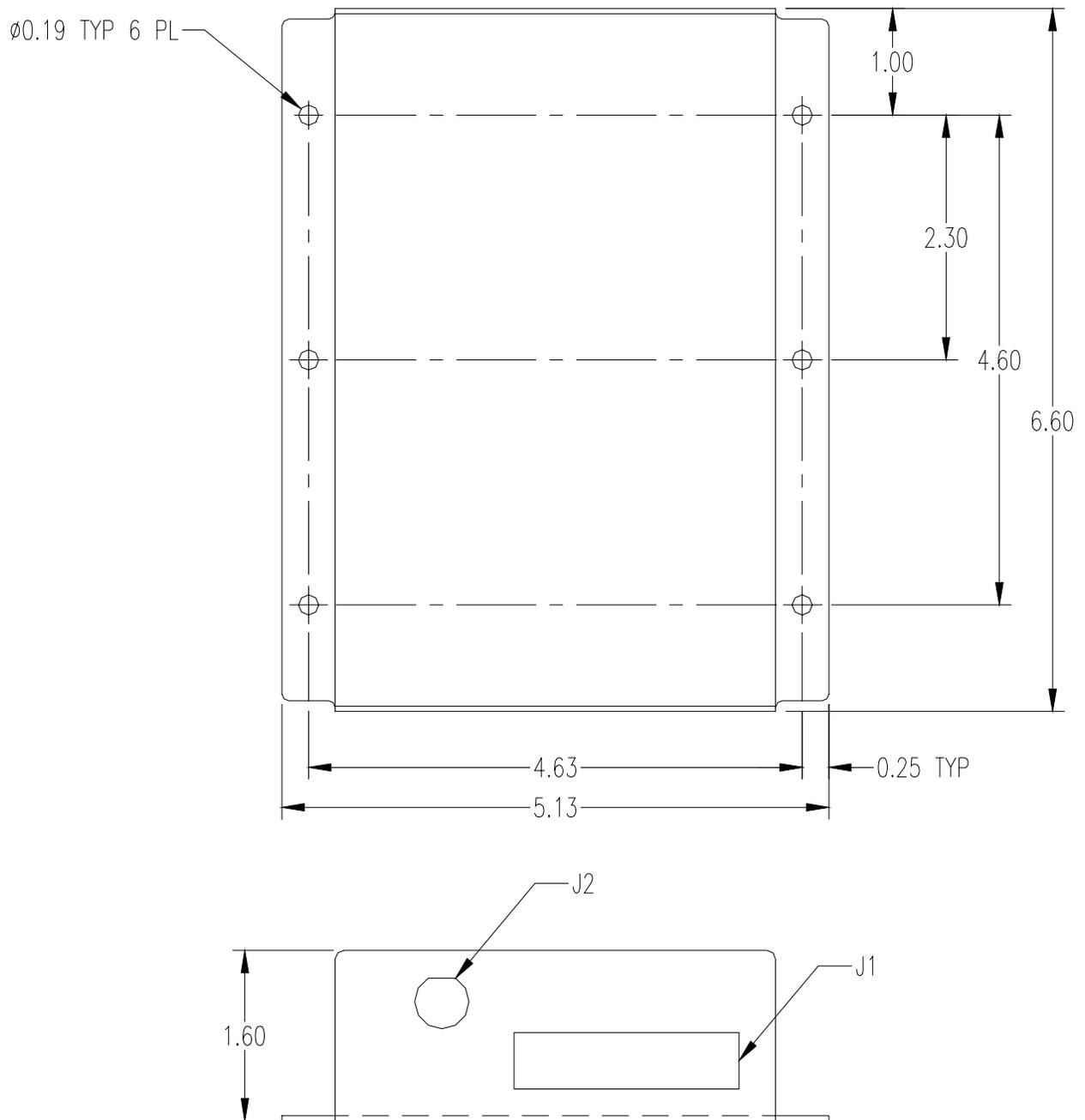
NOMENCLATURE: GPS/WAAS 1201 Sensor
 PART NO: 84100-01-XXXX
 MANUFACTURER: FreeFlight Systems, Inc.
 ADDRESS: 3700 Interstate 35, Waco, TX 76706
 USA

Section	Category	Remarks
4.0 Temperature and Altitude	D1	50,000 Ft Temperature controlled
5.0 Temperature Variation	B	Partially controlled temperature
6.0 Humidity	A	Standard Humidity
7.0 Operational Shock and Crash Safety	B	Fixed wing and helicopter
8.0 Vibration	S / U	Fixed wing and helicopter (unknown frequencies)
9.0 Explosion Proofness	X	Not Tested
10.0 Waterproofness	W	Falling water, condensation
11.0 Fluids Susceptibility	X	Not Tested
12.0 Sand and Dust	X	Not Tested
13.0 Fungus Resistance	X	Not Tested
14.0 Salt Spray	X	Not Tested
15.0 Magnetic Effect	A	0.3 meter to 1.0 meter
16.0 Power Input	B	Alternator/rectifier with battery
17.0 Voltage Spike	B	56 volts
18.0 AF Conducted Susceptibility – Power Inputs	B	Alternator/rectifier with battery
19.0 Induced Signal Susceptibility	A	Interference free operation desired
20.0 Radio Frequency Susceptibility (Radiated and Conducted)	V	50 volts/meter
21.0 Emission of Radio Frequency Energy	B	Interference controlled
22.0 Lightning Induced Transient Susceptibility	A3E3	600 Volt
23.0 Lightning Direct Effects	X	Not Tested
24.0 Icing	X	Not Tested
25.0 ESD	X	Not Tested

A3 TYPICAL INTERCONNECT



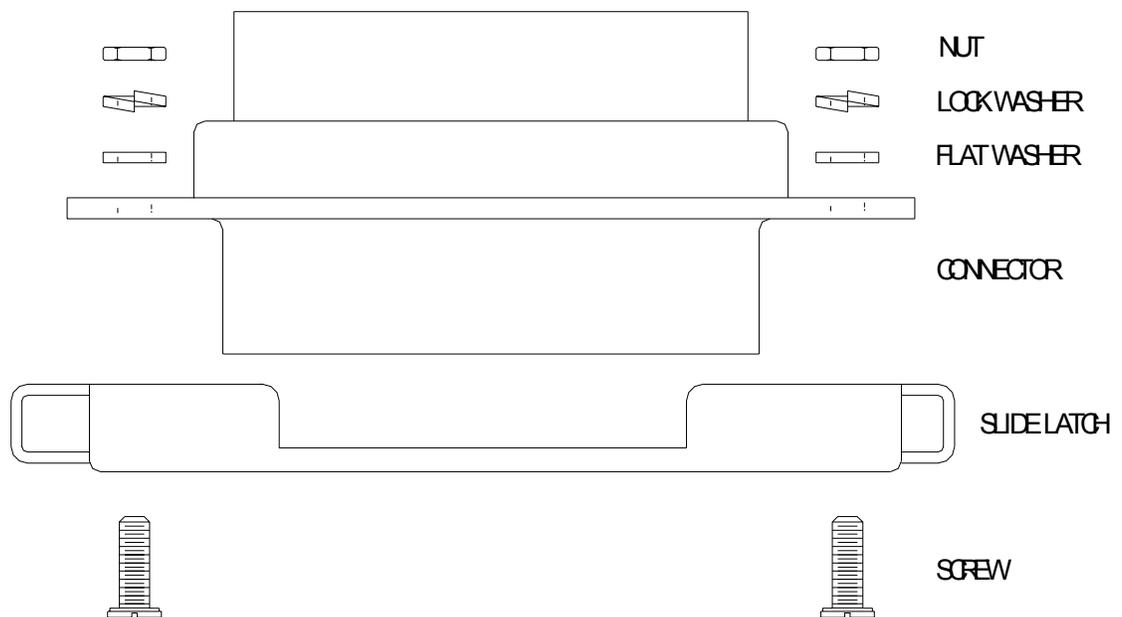
A4 OUTLINE DRAWING



Note: Dimensions are in inches.

A5 SLIDE LATCH ASSEMBLY

Assemble the slide latch mechanism, part number 84132, onto the mating connector as pictured using the hardware supplied with the slide latch.



LIMITED WARRANTY

I. HARDWARE

FREEFLIGHT SYSTEMS, LTD. ("FREEFLIGHT"), 3700 Interstate 35 S, Waco, TX 76706, hereby warrants to the first retail purchaser only, that hardware purchased hereunder will be free from defects in material and workmanship for a period of two (2) years from the date of installation, not to exceed thirty (30) months from the date of shipment from FREEFLIGHT's factory. Should defects be found, FREEFLIGHT at its option, will repair or replace the product in which physical defects in materials or workmanship occur. The foregoing states the sole liability and obligation of FREEFLIGHT arising out of this warranty, and such warranty is subject to the following CONDITIONS AND LIMITATIONS.

(A) The defect shall occur under normal use and service for which this product was intended. FREEFLIGHT shall not be obligated or liable under this Warranty for defects which FREEFLIGHT's examination discloses are due to: (1) tampering, (2) misuse, (3) abuse, (4) neglect, (5) improper storage or maintenance, (6) use in a manner beyond which such equipment is normally intended to be used, (7) improper repair or poor workmanship by those who are not authorized by FREEFLIGHT to repair the products or use of defective material by such unauthorized persons, and (8) any other cause except for defects in material or workmanship caused by FREEFLIGHT.

(B) The warranty card supplied with the product must be completed and returned to FREEFLIGHT within 15 days of installation of the product in order for this Warranty to become effective.

(C) The product is sold and installed by an authorized dealer. A list of all authorized FREEFLIGHT dealers may be obtained from FREEFLIGHT.

(D) The company must have received a copy of a completed FAA Form 337 covering installation of the product in the purchaser's aircraft, or equivalent documentation showing installation of the product by the authorized FREEFLIGHT dealer.

(E) The product shall be returned to FREEFLIGHT via the dealer with transportation charges prepaid. After correction of the defects, the products will be returned to the purchaser, transportation charges prepaid, except for returns to purchasers in foreign countries, which purchasers shall be responsible for payment of such charges from the American Port of exit to purchaser's place of business. The risk of loss or damage to all products in transit shall be assumed by the party initiating the transportation of such products.

II. ITEMS NOT COVERED BY WARRANTY

EXCEPT FOR THE EXPRESS WARRANTIES GRANTED IN SECTIONS I AND II ABOVE, FREEFLIGHT MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, WITH RESPECT TO ITS PRODUCT AND DISCLAIMS THE SAME. FREEFLIGHT MAKES NO EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE DESIGN, ADEQUACY, ACCURACY, RELIABILITY, SAFETY OR CONFORMANCE WITH GOVERNMENT STANDARDS OR REGULATION OF ANY FLIGHT PROCEDURE PRESCRIBED BY A GOVERNMENT AUTHORITY, INCLUDING, BUT NOT LIMITED TO, ANY EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. FURTHER, FREEFLIGHT MAKES NO WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO THE ADEQUACY, ACCURACY, RELIABILITY, SAFETY, OR CONFORMANCE WITH GOVERNMENT STANDARDS OR REGULATIONS, OF ANY INFORMATION CONTAINED IN THE PRODUCT WHICH IS PUBLISHED BY OTHERS OR WHICH FREEFLIGHT OBTAINED FROM OTHERS. FURTHER, FREEFLIGHT MAKES NO EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE COMPLETENESS OF ANY DATA, FLIGHT INFORMATION, OR FLIGHT PROCEDURE CONTAINED IN ITS PRODUCT. FREEFLIGHT DOES NOT INCLUDE ALL AVAILABLE DATA IN ITS PRODUCT.

III. LIMITATIONS ON WARRANTY

THIS WARRANTY IS LIMITED TO THE ORIGINAL RETAIL PURCHASER, EXCEPT WHERE THE PRODUCT IS USED OR PURCHASED PRIMARILY FOR THE PURCHASER'S PERSONAL OR FAMILY USE. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IF ANY, AND SAID IMPLIED WARRANTIES ARE HEREBY EXPRESSLY EXCLUDED AND DISCLAIMED. WHERE THE PRODUCT IS USED OR PURCHASED PRIMARILY FOR THE PURCHASER'S PERSONAL OR FAMILY USE, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IF ANY, ARE HEREBY EXPRESSLY LIMITED TO TWO (2) YEARS FROM THE DATE OF PURCHASE OF THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF AN IMPLIED WARRANTY, OR OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, THEREFORE, THE ABOVE LIMITATIONS CONCERNING THE EXCLUSION OF IMPLIED WARRANTIES AND LIMITATIONS OF DAMAGES MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

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To obtain service under this warranty contact: FreeFlight Systems at (254) 662-0000.