## Revisions

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<tr>
<th>REV NO.</th>
<th>PAGE</th>
<th>DESCRIPTION</th>
<th>DATE</th>
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<td>1</td>
<td>5 &amp; 9</td>
<td>Delete note on mounting location. Change weight typing error.</td>
<td>5/16/89</td>
<td>CGL</td>
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<tr>
<td>2</td>
<td>APP. B</td>
<td>Remove mount bracket from dwg #PL-32478</td>
<td>9/18/89</td>
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<td></td>
<td>6</td>
<td>Eliminate wire spec. Mil-W-5086</td>
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<td>3</td>
<td>APP. A</td>
<td>Add updated AML dated 3/26/90</td>
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<td>Redraw &amp; Renumber DWG# PL-32478 to 000P043M 8/29/90</td>
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<td>9</td>
<td>Made minor corrections changed physical DWG# 00P053M to reflect new heatsink design</td>
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<td>8</td>
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<td></td>
<td>APP. A</td>
<td>Remove STC &amp; AFM Supplement, Move drawing data to Appendix A, Include packing list</td>
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<td>Change model number</td>
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<td>4,5,6</td>
<td>Change installation instructions</td>
<td>5/12/93</td>
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<td>APP. A</td>
<td>Corrected DWG# 000P023M to show correct diode placement</td>
<td>5/09/94</td>
<td>RPB</td>
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<td>8/27/96</td>
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<td>ALL</td>
<td>Added List of Active Pages, Revised Page Numbers. Added Text, Added Continued Airworthiness</td>
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<td>Added Stc# for Robinson R22 &amp; R44, Added Robinson R22 &amp; R44 Pack list</td>
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<td>3-2</td>
<td>7</td>
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<td>3-3</td>
<td>7</td>
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</tr>
<tr>
<td>3-4</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>3-5</td>
<td>7</td>
<td></td>
</tr>
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<td>3-6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>4-1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>4-2</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>5-1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>6-1</td>
<td>7</td>
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GENERAL INFORMATION

1.1. INTRODUCTION

This manual contains information regarding the physical, mechanical, and electrical characteristics, as well as installation information pertaining to the Precise Flight Pulselite Model 1210 / 2405-2A Control Unit. For maintenance and repair information, contact Precise Flight Inc.

1.2. PRODUCT DESCRIPTION

The Pulselite Model 1210 / 2405-2A Control Unit is a compact set of electrical components that will apply regulated pulsing power to the landing lights, instead of the normal steady on. The Pulselite connects easily to an aircraft's external lighting system, and may be installed on a wide variety of aircraft with differing light sequence combinations.

The control circuit of the Pulselite requires 12 or 24 VDC. The two controlled power circuits pulse DC Power to the aircraft lamps with loads no greater than 125 Watts per channel (or approx. 10 Amps @ 12 VDC or approx. 5 Amps @ 24 VDC).

Pulsing the landing lights enhances the aircraft flight path recognition quality and may be utilized any time the pilot desires. By flashing the landing, taxi, and recognition lights approx. 46 times per minute in a variety of patterns, the Pulselite creates an illusion of exaggerated motion that other pilots can immediately recognize and avoid.

Precise Flight recommends that the landing lights be turned on steady (full time) when the aircraft is within 200' AGL at night. Due to possible disorientation the Pulselite should not be operated at night in clouds or on the ground. The landing lights may be turned on steady, by simply switching the original landing/taxi/ recognition lights on.
1.3. **TECHNICAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>10 ounces 0.28 kilograms</td>
</tr>
<tr>
<td>Cooling</td>
<td>Radiation and Convection</td>
</tr>
<tr>
<td>Dimensions</td>
<td>4.75 in. W, 3.0 in. D, 1.25 in. H</td>
</tr>
<tr>
<td></td>
<td>12.06 cm W, 7.62 cm D, 3.18 cm H</td>
</tr>
<tr>
<td>Operating Voltages</td>
<td>12 VDC to 28 VDC (11 - 29 VDC)</td>
</tr>
<tr>
<td>Operating Current</td>
<td>0.020 amps</td>
</tr>
<tr>
<td>Maximum Load per Switching Circuit</td>
<td>125 Watt (10 Amps @ 12 VDC)</td>
</tr>
<tr>
<td></td>
<td>(5 Amps @ 24 VDC)</td>
</tr>
<tr>
<td>Number of circuits</td>
<td>2</td>
</tr>
<tr>
<td>Usage limitations</td>
<td>Less than 200 ft AGL at Night &amp; IMC Conditions</td>
</tr>
<tr>
<td>Ambient operating range</td>
<td>+5°F to +158°F</td>
</tr>
<tr>
<td></td>
<td>-15°C to +70°C</td>
</tr>
</tbody>
</table>

1.4. **FACTORY SETTINGS**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse rate</td>
<td>43 - 48 Pulses per minute - Low Rate</td>
</tr>
<tr>
<td></td>
<td>86 - 96 Pulses per minute - High Rate</td>
</tr>
<tr>
<td>Sequence normal</td>
<td>2 lights - Alternating or</td>
</tr>
<tr>
<td></td>
<td>2 lights - Simultaneously</td>
</tr>
<tr>
<td>Lamp brightness</td>
<td><strong>Full power during Pulse</strong></td>
</tr>
<tr>
<td></td>
<td>(Slight resistance through Pulselite Control Unit)</td>
</tr>
</tbody>
</table>
1.5. **UNITS AND ACCESSORIES SUPPLIED**

Pulselite Model 1210 / 2405-2A Kit including:

- a) Pulselite Control Unit
- b) Copy of the Supplemental Type Certificate
- c) Switch
- d) Fuse
- e) Fuse Holder
- f) Diode Set
- g) Placard
- h) Butt Splices
- i) Installation Manual
- j) Warranty Card
- k) Screws and washers
- l) Bundle Tye

See Appendix for Packing List

1.6. **INSTALLATION APPROVAL BASIS**

The person who performs or supervises the installation of the Pulselite Model 1210 / 2405-2A, may be required to prepare FAA form 337. See Fig. 1-1 for a Sample Description of Work Accomplished. Data that can be used as a basis for approval for return to service are:

A. AC 43.13-1A; Acceptable Methods, Techniques and Practices, Aircraft Inspection and Repair.

B. AC 43.13-2A; Acceptable Methods, Techniques and Practices, Aircraft Alterations

C. FAA approved Manufacturer's Installation Instructions.

Equipment installation procedures do not differ significantly among various aircraft. The installation and operation of the Pulselite Model 1210 / 2405-2A does not affect the aircraft operation or performance.
The Sample Description of Work Accomplished (Figure 1-7) is suggested language provided as a convenience to the installing agency. The information and wording should be modified to correctly describe the particular installation.

Precise Flight Inc. can assume no responsibility for the alteration of the airframe or electrical system.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

A. The following components were installed:

PULSELITE UNIT, MODEL 1210 / 2405-2A, P/N (Pulselite P/N & S/N)
SWITCH - (Switch P/N)
DIODE - (Optional Diode Set)
FUSE or CIRCUIT BREAKER - (Fuse or Circuit Breaker P/N)

B. The Unit was installed in (position in the aircraft) according to instructions in the PRECISE FLIGHT INSTALLATION MANUAL MODEL 1210 / 2405-2A, P/N PPRI-3000 dated (insert current revision date of manual), and guidance in FAA Advisory Circulars 43.13-1A, chapter 11, and 43.13-2A, Chapter 1 & 2.

B. (Robinson) The unit was installed per Precise Flight, Inc. Drawings 590P0001 & 590P0002

C. An electrical load analysis was performed and the revised continuous load of the alternator (generator or other supply) does not exceed 80% of capacity.

D. A complete operational test was performed according to PULSELITE 1210 / 2405-2A Installation Manual P/N PPRI-3000 date ____ . The equipment performed satisfactorily and did not adversely affect existing components or systems in the aircraft, as required by FAR 23.1301, FAR 23.1431 (or FAR 25.1301, FAR 25.1431 as applicable). (FAR 27.1301, FAR 27.1431 for the Robinson Helicopters)

E. The aircraft equipment list was revised to reflect these changes; weight and balance data was revised and placed in the aircraft records.

1.7. FIGURE - SAMPLE 337
1.8. AIRCRAFT CERTIFICATION

Unless otherwise provided the Pulselite 1210 / 2405-2A Model is approved by the following STC.

1. Type of Certification: Supplemental Type Certificate
2. Certification Number: SA4005NM, SA00701SE
3. Certification Basis: Approved Model Listing
4. Certification Date: August 19, 1987, May 19, 1999
1.9. GENERAL

The Pulselite Model 1210 / 2405-2A should be installed according to this manual and AC 43.13-1A and -2A. Cable harnesses and mechanical supports must be fabricated by the installing agency to these requirements or supplied by Precise Flight for specific aircraft installations. This section contains interconnect diagrams, mounting dimensions, and other information pertaining to a Pulselite installation.

1.10. UNPACKING AND INSPECTION

Exercise care when unpacking the equipment. Make a visual inspection of the unit for evidence of damage incurred during shipment. Check contents against the Packing List 4070 found in the Appendix of this manual. If a claim for damage is to be made, save the shipping container to substantiate the claim. The claim should be filed with the transportation company. Retain the container and packaging material after the equipment has been removed, should equipment storage or reshipment become necessary.

1.11. COOLING

Allow approx. 1/2 of space around the control unit for adequate convective cooling. This is required so the heat sink fins may dissipate heat at the proper rate. Make every effort to locate control unit away from heat sources, as elevated operating temperatures reduce reliability.
1.12. MECHANICAL INSTALLATION

Listed below are considerations to be examined before installing the Pulselite Model 1210 / 2405-2A. Close attention to these suggestions will assure optimum performance when completed.

1.12.1. Mechanical installation - Pulselite Control Unit.

A. Select a location for the Pulselite Control Unit which is suitably ventilated for avionics. **CAUTION:** The Pulselite Model 1210 / 2405-2A is not approved for use in a potentially explosive environment (refer to AC 43.13-2A, Chapter 2 - Radio Installation) Locate Pulselite away from fire hazard zones, highly explosive or corrosive areas, potentially hazardous fluid areas; e.g. water, fuel, hydraulic fluid, or oxygen units, etc.

B. The Pulselite Control Unit must be installed in a structurally substantiated location. A typical wiring diagram and physical installation is provided in Appendix A. Allow adequate space for installation of cables and connectors.

C. The Pulselite Control Unit can be installed in any axis. If the Pulselite Control Unit is mounted on a vertical surface, install the unit with the wire harness exiting the bottom of the unit. Use the 4 8-32 pan head screws and washers (supplied with kit). Burnish one fastener location to insure proper ground.
1.12.2. Mechanical installation - Switches

A. A switch is required for activation of the Pulselite Control Unit. The switch should be rated for 3 amps at 12 or 28 VDC.

B. The switch(s) should be located near the existing aircraft landing light switches.

C. Install placard (supplied with kit) next to switch. You may have your instrument panel engraved to provide switch identification.

1.13. FIGURE - PHYSICAL DIMENSIONS
1.14. ELECTRICAL INSTALLATION

All wiring should be secured to prevent chafing and faulty connections. Refer to Advisory Circular 43.13-2A. NOTE: Precise Flight recommends that Mil-W-22759 wiring be utilized in the Pulselite installation.

DO NOT USE ALUMINUM WIRE !!!

NOTE: Wiring precautions.
A. Observe proper cable routing, i.e. avoid tie-wrap joining power lines to antenna leads.
B. Be sure that all connections are sound, i.e. avoid frayed or split conduit ends.
C. Avoid sharp bends or undue strain on cables

1.14.1. Electrical Installation

A. After the Pulselite Control Unit has been properly mounted, determine the lighting pulse mode. Find the total wattage of the lamp(s) connected to the Pulselite Control Unit. Divide the highest total wattage by the voltage. The result will be the highest amperage rating on the Pulselite Control Unit. Amperages should not exceed 10 amps per channel @ 12 VDC or 5 amps per channel @ 24 VDC or 125 Watts per channel. See Example below.

\[
50\text{ Watts} / 12\text{ Vdc} = 4.16\text{ Amps}
\]
Determine the amperage on individual channels. Proper wire and circuit protection should be observed.

Approved wire specification is MIL-W-22759/16 or equivalent. Fuse specification is MIL-F-15160 or equivalent. Circuit breaker specification is MIL-C-5809 or equivalent.

A) To protect the Pulselite control unit and insure proper installation, it is important to check that the ground wire (black wire) is properly grounded to the aircraft frame. Chassis of unit should be mounted to airframe and interfaces burnished to ensure a good ground.

Power input for the Pulselite Control Unit is through the white wire. One 3 Amp circuit breaker or inline fuse (included in the kit) is required between the aircraft bus and this wire. Use at least 22 gauge wire for this circuit.

B) Making a connection between the two brown wires will change the rate of pulse from approx. 45 pulses per minute to approx. 90 pulses per minute.

C) Making a connection between the gray wire and the violet wire will pulse the two connected lights alternately. Making a connection between the gray wire and the orange wire will pulse the lights simultaneously.

D) The red wire is attached to either an existing external light circuit breaker, a new circuit breaker of the same value as the existing external light circuit breakers, or a fuse holder (included in the kit) with a fuse of the same value as the existing external light circuit breakers. See drawing 015P017W in the appendix.

E) The yellow wire is attached to an aircraft external light. See drawing 015P017W in the appendix.

F) The blue wire is attached to an aircraft external light. See drawing 015P017W in the appendix.

G) Terminate all wires not utilized in the installation.

H) Route wires neatly and tye wrap to complete electrical installation.

SEE FIGURE 2.7
### PULSELITE WIRE TABLE

<table>
<thead>
<tr>
<th>COLOR</th>
<th>GAUGE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED</td>
<td>12</td>
<td>INPUT POWER</td>
</tr>
<tr>
<td>YELLOW</td>
<td>16</td>
<td>OUTPUT CHNL.</td>
</tr>
<tr>
<td>BLUE</td>
<td>16</td>
<td>OUTPUT CHNL.</td>
</tr>
<tr>
<td>WHITE</td>
<td>22</td>
<td>CONTROL</td>
</tr>
<tr>
<td>BROWN</td>
<td>22</td>
<td>RATE SELECT</td>
</tr>
<tr>
<td>BROWN</td>
<td>22</td>
<td>RATE SELECT</td>
</tr>
<tr>
<td>BLACK</td>
<td>22</td>
<td>GROUND</td>
</tr>
<tr>
<td>ORANGE</td>
<td>22</td>
<td>MODE SYNC.</td>
</tr>
<tr>
<td>GRAY</td>
<td>22</td>
<td>MODE</td>
</tr>
<tr>
<td>VIOLET</td>
<td>22</td>
<td>MODE ALT.</td>
</tr>
</tbody>
</table>

1.15. **FIGURE - WIRE TABLE**
1.16. INSTALLATION TESTING

The following test procedure will evaluate the installation in the aircraft:

1. Check connections and wiring before applying power
2. Insure the grey wire is attached to either the violet or orange wire.
3. Turn aircraft power ON.
4. Switch the Pulselite Unit to ON and verify that the appropriate Landing / Taxi / Recognition Lights are flashing on the aircraft.
5. Switch the appropriate Landing/ Taxi / Recognition Lights ON utilizing the existing switch and verify that the lights remain on without flashing.
6. Switch the Pulselite Control Unit and the existing Landing/ Taxi / Recognition Light switches OFF and verify that the Landing/ Taxi/ Recognition Lights are OFF
1.17. EMI / RFI TESTING

The following is an outline for determining that no detrimental Electro Magnetic Interference (EMI) or Radio Frequency Interference is caused by the installation of a Precise Flight Pulselite product per FAR 23.1431, 25.1431, 27.1431 or 29.1431.

These procedures are not necessarily all encompassing in that they may not include all of the equipment installed in the airplane. If electronic and navigation equipment is installed which is not included in this document, consult the equipment manufacturer, an FAA approved repair station rated in the equipment involved, or an FAA Avionics Inspector for applicable test procedures.

The evaluation will be with a series of equipment checks, on the ground, to determine that no detrimental EMI/RFI effects are introduced into the aircraft by the Pulselite system.

The electrical systems installed in the aircraft will be referred to as the Pulselite system in this procedure.

The following tests should performed by personnel familiar with both aircraft systems and proper operation as well as the Pulselite equipment and its proper operation.

Any and all discrepancies shall be noted. Any discrepancies noted during these procedures must be reported to Precise Flight, Inc. and evaluated for cause, extent and as to what corrective action should be taken to correct the problem. The aircraft may not be flown after discrepancies are found unless the Pulselite system is disconnected at the aircraft bus until such time as the problems have been corrected and the aircraft has successfully passed the ground portion of this test. Only then may the aircraft be flown to complete this test.
A record of this test shall be recorded in the aircraft logbook. The entry should include date, aircraft time, and results including any discrepancies note. The ground test results shall be recorded in the permanent aircraft records by the installing mechanic or a mechanic with the proper ratings.

1.17.1. Procedures

During the following tests, the aircraft shall be supplied with adequate aircraft power at or above the minimum bus voltage for the aircraft. The airplane should be located for proper radio reception and radar operation, usually outside.

1.17.2. Communications

A. Select Comm. 1 to a local frequency in the lower end of the COMM frequency band. Check for clarity of reception and background noise with all Pulselite equipment operating. Repeat for all Comm radios.

   Remarks:

B. Select Comm. 1 to a local frequency in the upper end of the COMM frequency band. Check for clarity of reception and background noise with all Pulselite equipment operating. Repeat for all Comm radios.

   Remarks:

C. Verify that the intercom is free from noise and interference caused by the Pulselite installation.

   Remarks:
1.17.3. Ground Navigation Systems

A. VOR/DME

1. Select VOR 1 receiver to a local frequency, center CDI needle of HSI with "TO" indication. Listen for background noise.
2. Switch Pulselite equipment on and off, check for interference and needle deviation.
3. Repeat for all other VHF NAV radios.
4. Tune VOR Nav 1 to a local VORTAC station with Pulselite equipment off. Note distance on DME and listen for noise. Turn Pulselite equipment on and compare distance readings and background noise.

Repeat for all other VHF NAV radios.

Remarks:

B. Loran C

1. Observe Loran self test responses and signal to noise ratios. Turn Pulselite equipment on and recycle Loran and compare results.

Remarks:
C. RNAV

1. VOR MODE - Set to VHF on a local frequency, center CDI and pilots HSI, turn on Pulselite equipment and check for interference.

Remarks:

2. DME MODE - With Pulselite equipment off, set to local VHF frequency and note DME reading. Turn on Pulselite equipment and compare DME reading. Verify reading with known distance.

Remarks:

3. RNAV MODE - With Pulselite equipment off, set local VHF frequency, set waypoint bearing to 180 and waypoint distance to 25 miles. Center CDI and note RNAV readings. Turn Pulselite equipment on and note any changes in RNAV readings.

Remarks:

C. Magnetic Compass

With Pulselite equipment OFF, note compass heading. Turn Pulselite equipment ON and compare compass heading.

**THIS TEST MUST BE REPEATED WITH THE AIRCRAFT HEADED IN FOUR DIRECTIONS APPROXIMATELY 90 DEGREES APART.**

<table>
<thead>
<tr>
<th>Compass Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heading</td>
</tr>
<tr>
<td>Pulselite ON</td>
</tr>
<tr>
<td>Pulselite OFF</td>
</tr>
</tbody>
</table>
1.17.4. Weather Radar

**CAUTION!**
USE CAUTION WHEN OPERATING RADAR! FOLLOW RADAR MANUFACTURERS RECOMMENDATIONS FOR SAFETY.

A. Select "WxRadar ON". After proper warm up time, select "TEST" mode and confirm proper operation. Select "MAP" mode and note display. Turn on Pulselite equipment and note any changes.

Remarks:

1.17.5. Autopilot and Flight Director

Turn on autopilot and perform ground check per the autopilot manufacturers instructions in the flight manual. Turn on the Pulselite equipment and again perform check. Note any discrepancies.

Remarks:

1.17.6. Conclusion

<table>
<thead>
<tr>
<th>EMI Test Data Record</th>
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<tbody>
<tr>
<td>Date:</td>
</tr>
<tr>
<td>Make:</td>
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Comments:
1.18. NORMAL OPERATION

Pulsing the landing lights tend to enhance the aircraft flight path recognition quality and may be utilized any time the pilot desires. By flashing the landing, taxi, and recognition lights approx. 46 or 92 times per minute in a variety of patterns, Pulselite creates an illusion of exaggerated motion that other pilots can immediately recognize and avoid.

While the Pulselite has been tested throughout the entire landing phase of flight, Precise Flight recommends that the landing lights be turned on steady rate (full time) when the aircraft is within 200' AGL at night. The Pulselite system should not be operated in clouds at night, or in the close proximity of other aircraft on the ground, due to possible disorientation. The landing lights may be turned on steady, at any time by simply switching the original landing/taxi/recognition lights on. The Pulselite automatically stops pulsing until the original light switch is turned off. The Pulselite will remain active until the Pulselite switch is turned off.
1.19. CONTINUED AIRWORTHINESS

ANNUALLY

1. Check the Pulselite Control Unit for its security to the aircraft structure.

2. Check Pulselite Control Unit for corrosion, paying particular attention to where the unit is bonded to the aircraft.

3. Check the wire harness for loose wire connections, chaffing, and frayed or broken wires.

4. Electrically test unit per Section 3.1 “Installation Testing” of this manual.
1.20. DOCUMENTATION

To ensure technical updates and notifications, **fill out and return the Warranty document** and a copy of the 337, if appropriate.

1.21. RETURN AUTHORIZATION

In order to expedite repair of units, call the factory for a return authorization number before returning equipment for service.

1.22. WARRANTY SERVICE

Precise Flight warrants products in accordance with the warranty statement in effect at the time of equipment registration. All repairs are performed at the factory. Contact Precise Flight Inc. for a warranty/return authorization. All requests for warranty payment must be submitted on a standard warranty claim form, accompanied by the dealer invoice. Authorized warranty work performed by the dealer will be limited to removal and re-installation of units on an exchange basis. Precise Flight Inc. will bear the cost of warranty returns both ways via UPS surface delivery only. Precise Flight reserves the right to use reconditioned parts in repairing the product or to use reconditioned units as warranty replacements.

For technical information and service, call 1-800-547-2558.
APPENDIX A

1.23. PARTS LIST

1.24. P-12007 DIODE SET POWER FLOW

1.25. INSTALLATION INSTRUCTION DRAWING