INSTALLATION MANUAL

FOR

GEAR ALERT SYSTEM

FOR

AMPHIBIAN AIRCRAFT

P/N 2042-1

SPECIFICATION IP-2

REV. 1

05-10-05

Approved

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TABLE OF REVISIONS			
Rev No.	**Date**	**Description of Revision and pages changed**	**Approval**
1	5-10-05	Revised Pg. 4 for compatibility with AML	

I. INTRODUCTION

This manual provides information for installing the P/N 2042 Gear Alert Landing Gear Warning System on a general aviation amphibian aircraft. All installation work is to be performed in accordance with this manual and applicable sections of AC 43.13 - 1B.

II. BASIC OPERATIONS

The Gear Alert System is an electronic device which provides the pilot of the aircraft with an easily recognizable audible voice warning if he attempts to make a landing with the landing gear in the wrong position for either a water landing, or a runway landing. The system consists of three subassemblies, an electronic module which is mounted inside the aircraft, and two switches which mount on the instrument panel. The unit is interconnected to the existing landing gear position indicating lights and the existing pitot system. The system functions as follows: During takeoff, when the aircraft exceeds a preset speed, the system becomes active. As the aircraft slows to the landing approach speed, the system will provide a voice message in the pilot's headset. The pilot must then push one of the panel mounted switches marked "W" for a water landing, or "L" for a runway landing. The system then checks to determine if the landing gear is in the proper position for the type of landing being made. If the landing gear is set correctly, a voice message will confirm it, if the landing gear is in the incorrect position for the type of landing, the pilot will hear a second message in his headset alerting him of the unsafe condition.

Momentarily pushing either switch initiates a self-test sequence. If the system is O.K, a voice message will be heard. Pushing and holding either switch for 2 sec. disengages the system. The amber lights then flash, indicating the system is disengaged.

WARNING: THE GEAR ALERT IS AN ADVISORY SYSTEM ONLY. IT SHOULD NOT BE UTILIZED AS THE PRIMARY MEANS OF DETERMINING LANDING GEAR POSITION THE PILOT SHOULD CONTINUE TO UTILIZE THE NORMAL OPERATING PROCEDURES, CHECKLISTS, LIGHTS, INDICATORS, ETC. AS DEFINED IN THE AIRCRAFT FLIGHT MANUAL AS THE PRIMARY INDICATION OF LANDING GEAR POSITION

III APPLICABILITY

Refer to Specification 2042-AML for a listing of the aircraft make and models for which installation of this system is approved.

IV. INSTALLATION INFORMATION

The P/N 2042 Gear Alert System has been designed for installation in aircraft with different wiring configurations. The aircraft wiring configuration may require the use of different cable assemblies Information on the cable configuration and other installation information is provided in the following section.

V. CABLE ASSEMBLY MODIFICATION

1. Review the wiring schematic for the particular aircraft that the system is being installed in. Determine which of the following configurations applies.

a) If the aircraft is wired so that one side of the gear down light or lights is grounded, and the gear down limit switch provides power turning the light or lights on whenever the gear is down, no changes to the cable are required. Install the system in this aircraft as shown on FIG A.

b) If the aircraft is wired so that one side of the gear down light or lights always has power applied, and the down limit switch supplies a ground, turning the light or lights on when the gear is down, then it will be necessary to modify the cable as follows

1. Remove the gray plastic cover from the end of the cable assembly. Locate PIN 1 on the connecter (red wire). PIN 2 will be empty, followed by PIN 3 with a black wire in it. Leave the black wire connected to PIN 3, and solder a jumper wire from PIN 2 to PIN 3

2. Inspect the modification to insure there are no solder shorts between the pins, and that the connections are good.

3. Reassemble the plastic cover to the end of the cable.

4. Install this system in the aircraft as shown on FIG B.

VI. COMPONENT INSTALLATION

1. Locate a place to mount the electronic module in the cockpit. The unit can be mounted to the front bulkhead, or other aircraft structure. Choose a location such that the 3/16 inch dia. tubing on the unit will reach to the pitot pressure line which attaches to the airspeed indicator. Drill 4 mounting holes using the template, FIG1, and attach the unit to the aircraft with the hardware provided as shown on FIG 2.

2. The Gear Alert system "T's" into the aircraft Pitot pressure line that goes to the airspeed indicator. Locate the tubing that runs to the pressure side of the airspeed indicator. Cut the line, and install a "T" fitting as shown on FIG 3. Attach the 3/16 tubing to the side connection of the "T". Note: Minimum bend radius in the tubing should be 1 inch to prevent flattening the tube. Verify that mounting does not flatten the tube

3. Locate a position on the instrument panel where the 2 switches can be installed. Ideally, the switches should be close to the gear switch. They can be arranged either horizontally, or vertically. Refer to FIG 4 for installation information and proper spacing.

4 install the labels and the switches. Note the switches have different colored wiring.

This completes the installation of the mechanical equipment.

VII. ELECTRICAL HOOKUP

The Gear Alert System can operate in either 12V or 24V aircraft systems. Select the proper wiring schematic FIG A, or FIG B for the installation as defined in section V.

1. The Gear Alert System should be installed on its own separate 1 amp circuit breaker or fuse. Attach the red wire to the 12v or 24v aircraft power buss.

2. Attach the BLACK wire to a good aircraft ground point.

3. Wire the two switches as shown on the schematics, the color codes on the pre-wired switch match the colors of the main cable assembly. The 2 orange wires are interchangeable.

4. A 600 ohm audio output is provided (white wire). The audio output must be hooked into the aircraft audio system in a way that the pilot cannot accidentally turn it off. If the aircraft has an audio panel that has an un-switched audio input, the Gear Alert audio output can be hooked to this point. This will provide a voice warning directly into the pilot's headset and through the cabin speaker. If the aircraft does not have an audio panel with an un-switched input, then the white wire can be hooked directly to the pilot's headset jack.

5. The system interconnects to the gear up and to the gear down indicating lights. Select the correct schematic (FIG A or FIG B) to match the way the gear indicating lights are wired in the aircraft. The wires must be attached to the correct point in the wiring as shown on FIG A or FIG B. One side of the light will have power or ground continuously, while on the other side of the light the voltage will change as the gear goes up and down (light goes on and off). Attach the correct colored wire to the side of the light that changes voltage as the wheels go up and down.

6. The P/N 2042 Gear Alert system incorporates an airspeed activated switch closure that can be used to activate equipment such as a Hobbs meter, transponder, or other device that requires a ground signal to activate. Pin 13 on the connecter (TAN wire) is the switch activation. Whenever the aircraft speed is above 45 mph, this lead will be grounded. NOTE: It will be necessary to externally limit the current through this input to 60 ma maximum to prevent damage to it.

7. Attach the gray DB-15 connecter to the electronic module and secure it with its mounting screws.

8. Bundle and secure all wiring.

VIII. SYSTEM ADJUSTMENTS

An adjustments have been provided to optimize operation of the Gear Alert system to each aircraft.

1. The speed at which the system will activate when landing can be adjusted up or down by turning the speed adjusting screw through the hole on the front panel of the black box. The speed is settable between 40 mph and 90 mph. The installer should first determine the airspeed at which at the aircraft will be flying during the approach, and set the activation to this speed initially. This adjustment is accomplished as follows: There is a short VIOLET wire attached to pin 14 in the cable assembly. Attach a digital volt meter between this VIOLET wire and aircraft ground. Refer to Fig 5 which is a plot of voltage at pin 14 vs the activation airspeed. There are 2 adjusting screws on the front of the electronic module.

The opening closest to the connecter is the volume adjustment, the opening the furthest away is the speed adjustment. With power applied to the system, insert a small screwdriver through the hole in the panel, and turn the speed control until you read the voltage on the meter that corresponds to the desired activation speed. Once this adjustment has been made, insulate the end if the VIOLET wire and secure it in place. Note: There is a 15 sec. delay between the time the system recognizes the activation speed and when it actually starts the warning sequence. This delay was incorporated to minimize false triggering

2. The headset volume can be adjusted by turning the volume pot through a hole in the front panel of the black box. Turning the pot clockwise increases the volume to the headset only.

IX. SYSTEM CHECKOUT AND OPERATION

A .Ground Test

1. Power up the system. The voice must not sound. The amber lights must not illuminate. Individually turn on the various electrical devices in the aircraft. Use the table attached to this procedure as a guide for performing this test. The acceptance criteria given below must be met, as each electrical device is activated and then turned off.

The following criteria must be fully met for each part of this test.
a) Any false trigger of the Gear Alert at any time constitutes failure of this test.
c) If any electronic device in the aircraft does not operate correctly, turn off the Gear Alert and determine if it is the cause. If the Gear Alert affects the operation of any electronic device in the aircraft, or if any electronic device in the aircraft affects the operation of the Gear Alert that constitutes failure.

2. Push either test switch and release it. The voice message "TEST OK" must be heard in the pilot's headset, and through the built in speaker if the system is working. If the test message fails to function or the volume is inadequate, this constitutes failure of the test. Repeat this test by pushing the other switch. The headset volume can be adjusted by turning the volume pot in the electronic module.

4. Push either switch and hold it for about 2 sec. then release it. The test message "TEST OK' should be heard, and when your finger is released, the amber lights in both switches will flash alternately indicating that the system is disengaged. Pushing either switch again will turn the lights off and re-engage the system. If the test voice does not function, or the amber lights fail to blink, or the system does not re-engage, the test has failed.

B. Flight Test

1. Perform a normal takeoff

2. Fly the aircraft at different cruise speeds from maximum cruise speed to just above approach speed. Tests should include flight with power changes, climbs, steep turns, etc. Any false triggering of the Gear Alert at any time constitutes failure of the test.

3. With the aircraft flying above the activation speed, push either switch and release it. The voice message "TEST OK" should be heard at an adequate volume level in the pilot's headset, and through the built in speaker. Repeat by pushing the other switch. Failure of the voice to sound at an adequate level constitutes failure of the test.

4. With the landing gear retracted, slow the aircraft to normal approach speed. The voice message "SELECT LANDING ....." will be heard continuously in the pilots headset and through the built in speaker. Push the switch marked W (water), and the voice message must stop. Accelerate the aircraft above approach speed, and repeat this test, except this time push the switch marked L (land). The voice message "CHECK LANDING GEAR, CHECK LANDING GEAR" will be heard in the pilot's headset and through the built in speaker after the land switch has been pushed. The voice will continue until either the gear is extended, or the speed is increased above the approach speed. Failure to function as described constitutes failure of the test.

5. With the landing gear extended, slow the aircraft to normal approach speed. The voice message "SELECT LANDING," will be heard continuously in the pilot's headset and through the built in speaker. Push the switch marked L (land), and the voice message must stop. Accelerate the aircraft above approach speed, and repeat this test, except this time push the switch marked W (water). The voice message "CHECK LANDING GEAR, CHECK LANDING GEAR" will be heard in the pilot's headset and through the built in speaker after the W switch has been pushed. The voice will continue until either the gear is retracted, or the speed is increased above the approach speed. Failure to function as described constitutes failure of the test.

6. Individually turn on the various electrical devices in the aircraft. Use the attached table as a guide. As each device is activated, verify that its operation is not affected by the Gear Alert, and that the Gear Alert does not false trigger as the various electrical devices are turned on. Any false trigger of the Gear Alert at any time constitutes failure of this test.

X. DOCUMENTATION

1. The installer is responsible for making all logbook entries, revising weight and balance, and other documentation as required.

2. Place the aircraft flight manual supplement (AFMS) in the aircraft.

XI. MATERIALS

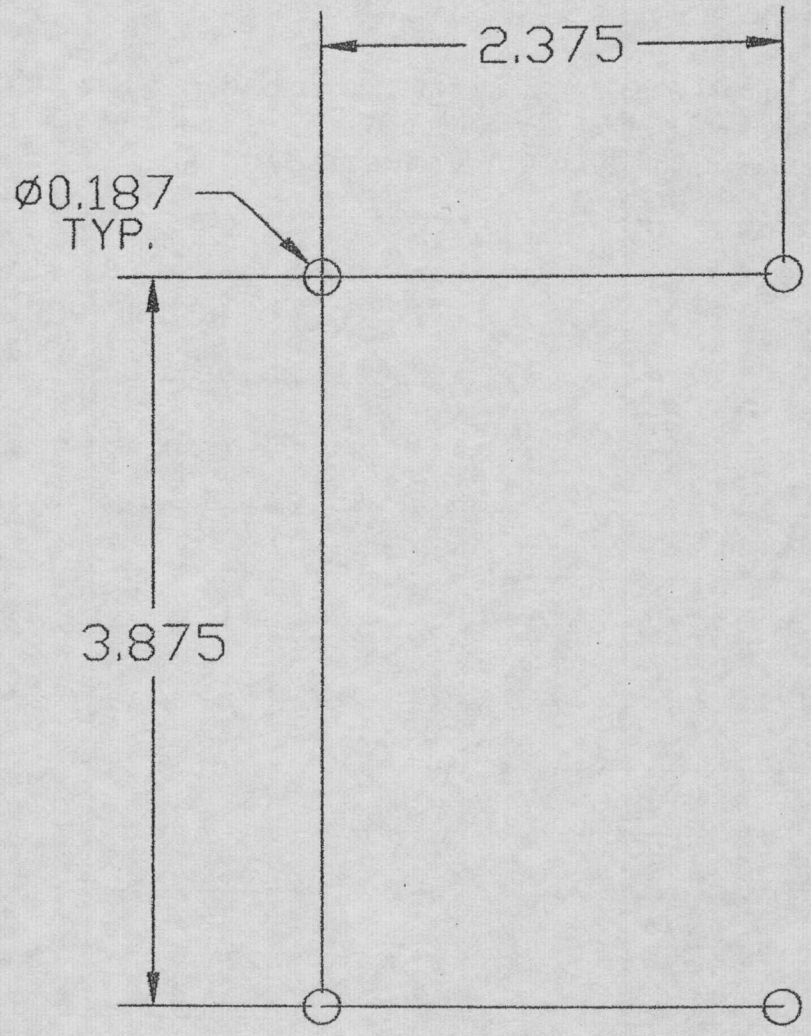
The following materials are included in the P/N Gear Alert assembly. Check all parts before beginning the installation.

1. (1) electronic module assembly P/N 2042-2-1
2. (1) cable assembly P/N 2042-3
3. (1) aircraft flight manual supplement
4. (1) instructions for continued airworthiness
5. (1) installation manual
6. (1) installation kit P/N 2042-10

Interference Test Checklist

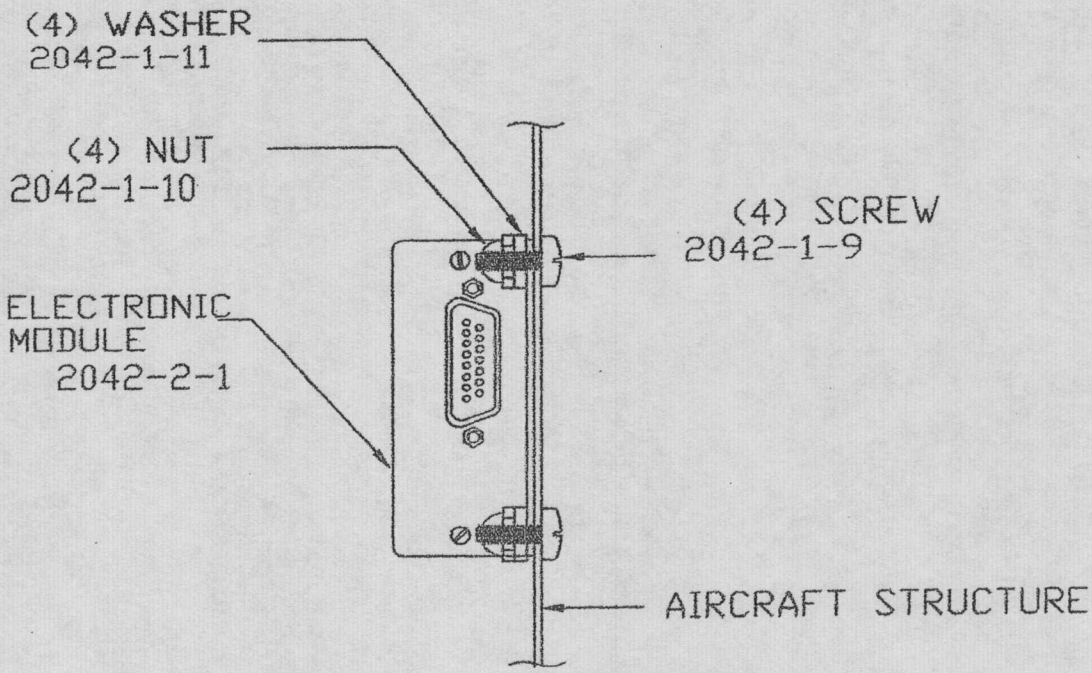
The following is a checklist to be used when checking for interference between the Gear Alert system and other electrical equipment installed in the aircraft. This is a suggested listing only. Testing should include all electrical equipment actually installed in the aircraft.

ITEM	GROUND TEST	FLIGHT TEST
1. Master Switch		
2. Avionics Master Switch		
3. Electronic Aircraft Instrumentation		
4. Audio System		
5. Boost Pump		
6.Flaps		
7.Landing Gear Actuators		
8.Trim Motors		
9. Accessory Motors		
10. Communication Radios		
11. GPS		
12. VOR receivers		
13. ADF receiver		
14. DME		
15. Transponder		
16. Marker beacon receiver		
17. TCAS system		
18. Strobe lights		
19. Rotating Beacon		
20. Electric Timers		

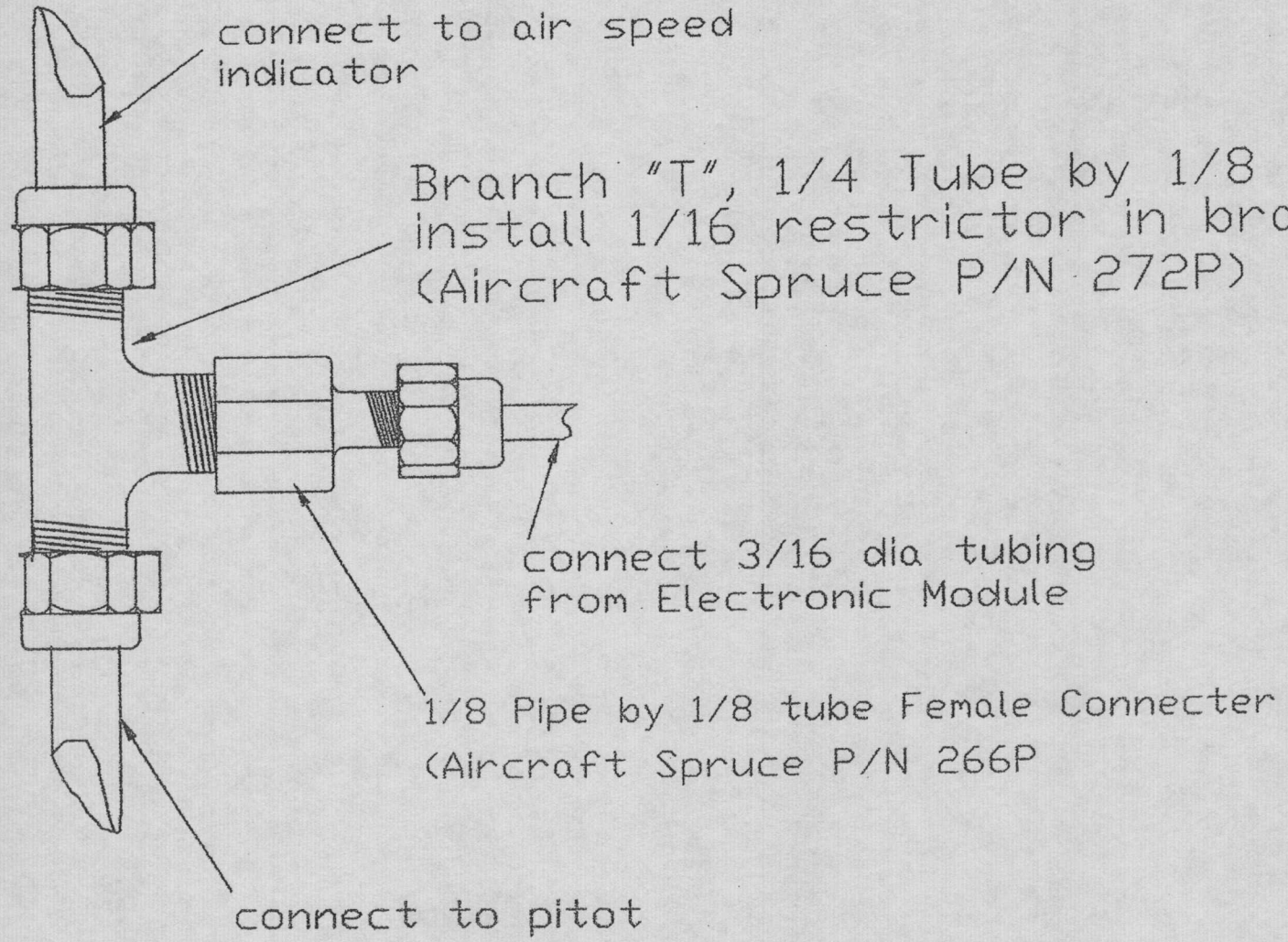


ELECTRONIC MODULE TEMPLATE

FIG 1

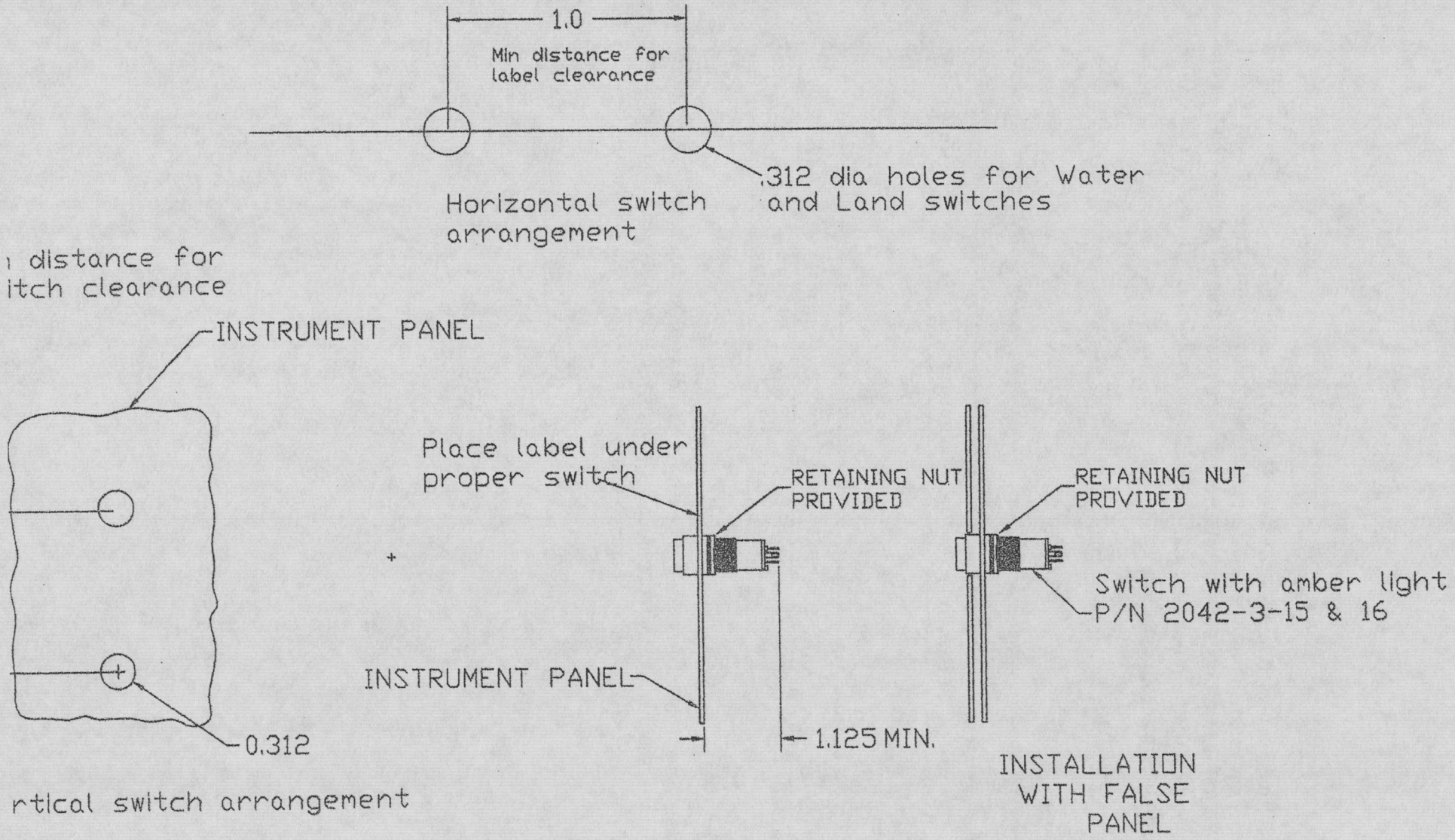


ELECTRONIC MODULE INSTALLATION
FIG 2



Cut existing pitot tube, and install fitting as shown. Side connection should contain a restrictor to prevent airspeed loss in the event of air leak.

FIG 3



INSTALLATION OF SWITCHES

FIGURE 4

ACTIVATION SPEED SETTING

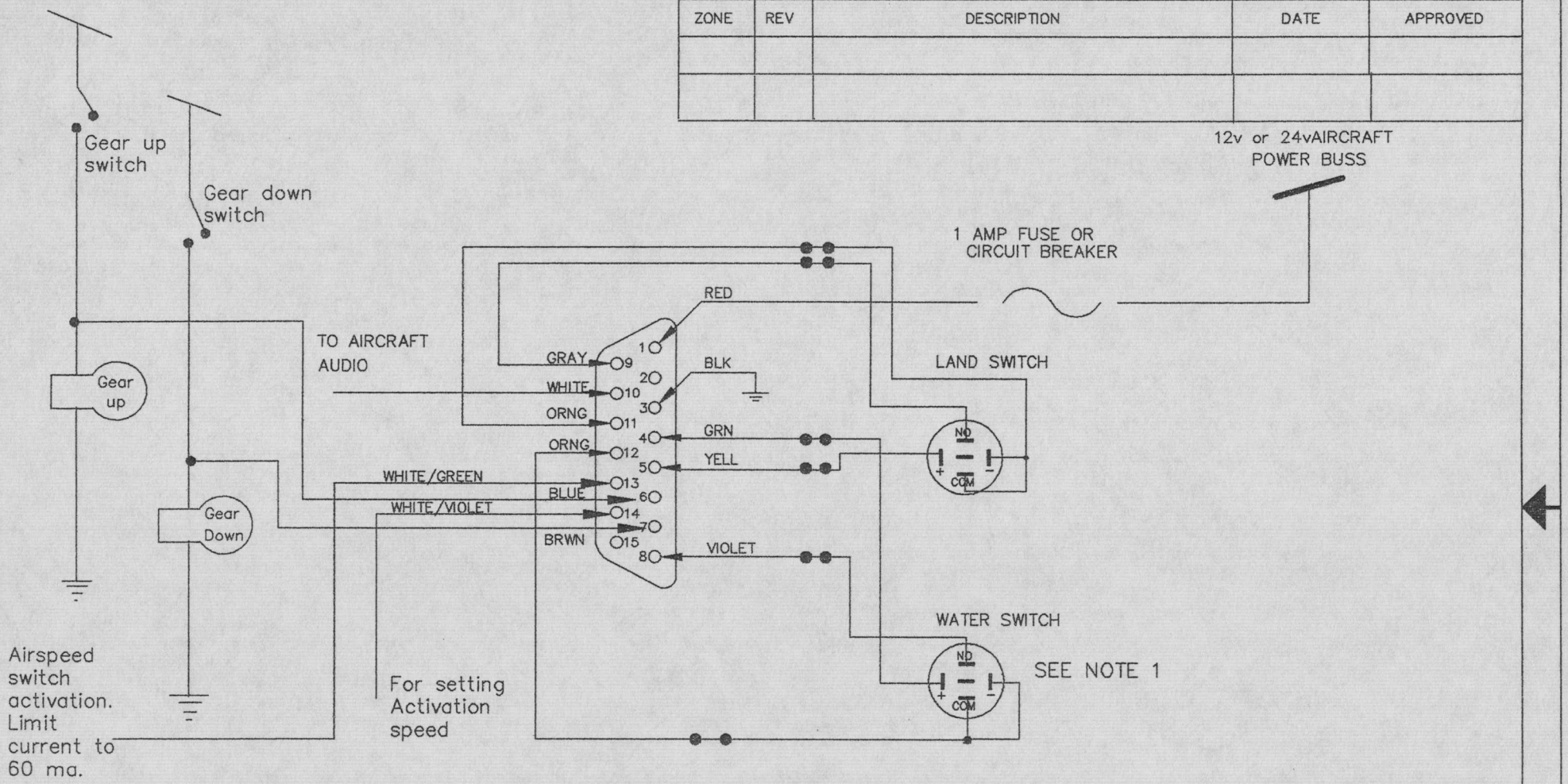
Listed below is information on setting the activation speed for the gear alert. The following table supplies voltage readings vs activation speed. Use a digital multi meter to measure the voltage present between the short VIOLET wire in the cable, and ground. Then using a small screwdriver turn the speed adjusting pot through the hole in the top of the Electronic Module (black box) to set the voltage corresponding to the desired activation speed .

Volts	Miles/hr	Knots/hr	Inch H2O
.92	45	39	.99
1.64	60	52	1.77
2.55	75	65	2.76
3.70	90	78	4.0

NOTE: The voltages given above are average values. The actual voltage setting for your unit may be different due to variations in electronic components. Use the values given above for the initial trial, and then adjust the voltage as required to obtain your desired setting.

Fig 5 Activation Speed Setting

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

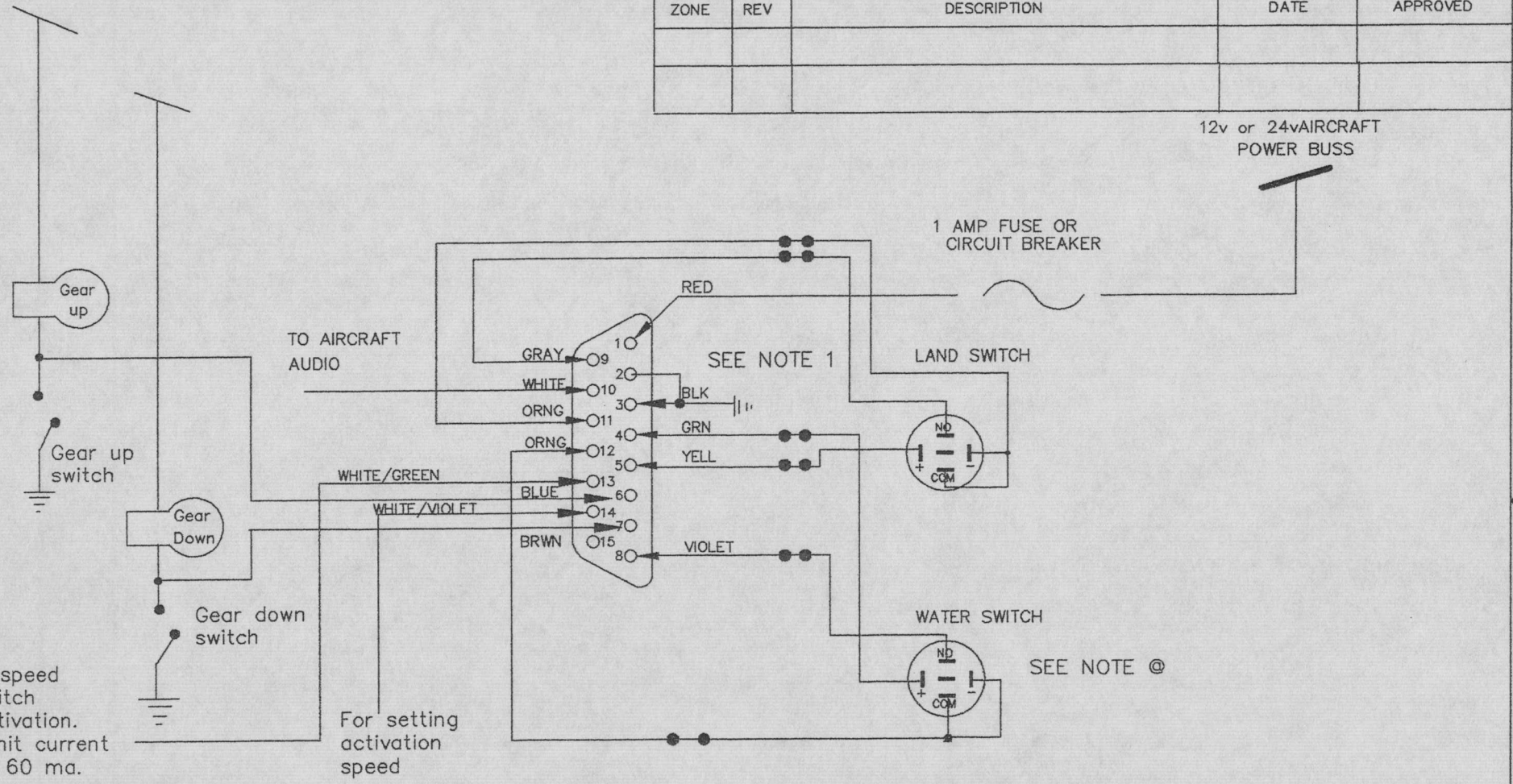


NOTES:

1. Wire switches by attaching same wire colors. Orange wires are interchangable

AIRCRAFT COMPONENTS INC.				
Gear Alert Electrical Installation Schematic				
APPROVED JDG	SIZE A	FSCM NO.	DWG NO. FIG A	REV 0
DATE 8/30/03	SCALE NONE	DRAWN BY J.D.G.	SHEET 1 OF 1	

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



NOTES

1. Solder jumper from pin2 to pin3

2. Wire switches by attaching same wire colors. Orange wires are interchangable.

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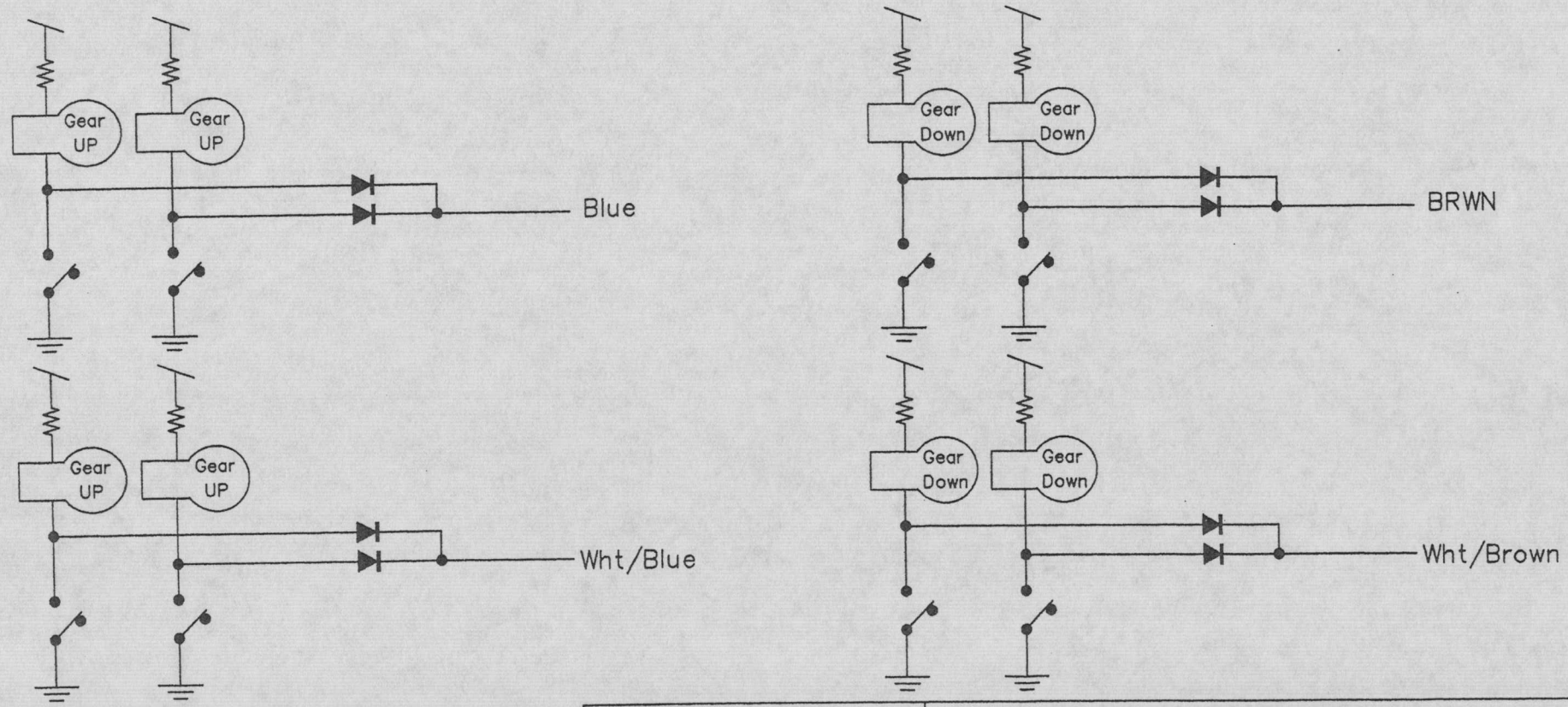
Gear Alert Electrical Installation Schematic

APPROVED JDG	SIZE A	FSCM NO.	DWG NO. FIG B	REV 0
DATE 8/30/03	SCALE NONE	DRAWN BY J.D.G.	SHEET 1 OF 1	

Notes:
1. Use 1N4007 Diodes.
2. If using a light instead of an LED, a resistor may be need across the light. The value will depend on the light.
3. Value of Resistors on LED depend on LED (1k Typical).
   Use 1/4 watt on a 12 volt system.
   Use 1/2 watt on a 24 volt system.
4. Ground pins 15, 2 and 3 on cable assembly.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1	Added 1N4007 for Imultiple configuration.	5/15/12	



Diode
Resistor
Aircraft Power
Aircraft Ground
Connection

AIRCRAFT COMPONENTS INC.

2042 Electrical Schematic
For Multiple Lights Ground Activation

APPROVED MDG	SIZE A	FSCM NO.	DWG NO. FIG C	REV 1
DATE 4/28/10	SCALE NONE	DRAWN BY J.D.G.	SHEET Page 9	

Notes:

1. Use 1N4007 Diodes.
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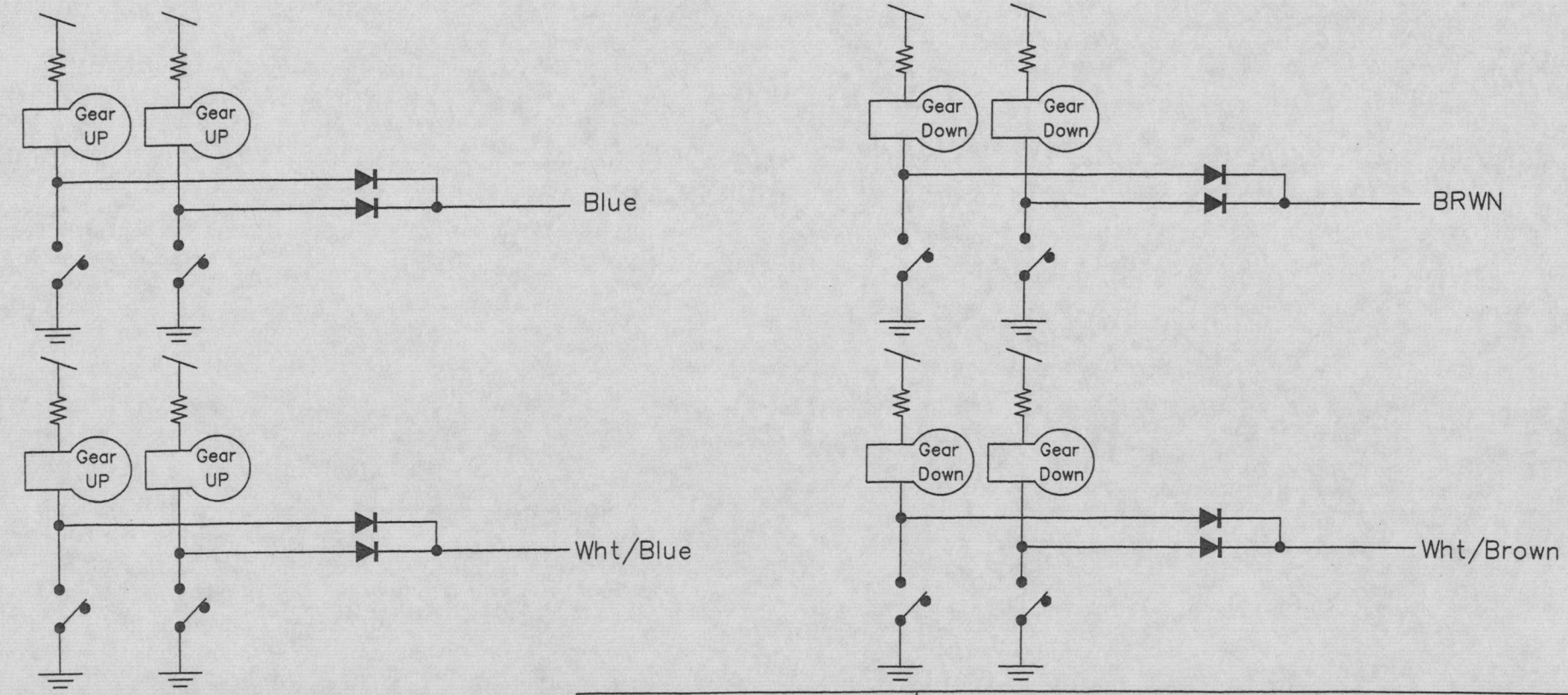

Diode
Resistor
Aircraft Power
Aircraft Ground
Connection

AIRCRAFT COMPONENTS INC.

2042 Electrical Schematic
For Multiple Lights Ground Activation

APPROVED MDG	SIZE A	FSCM NO.	DWG NO. FIG C	REV 1
DATE 4/28/10	SCALE NONE	DRAWN BY J.D.G.	SHEET Page 9	

Notes:

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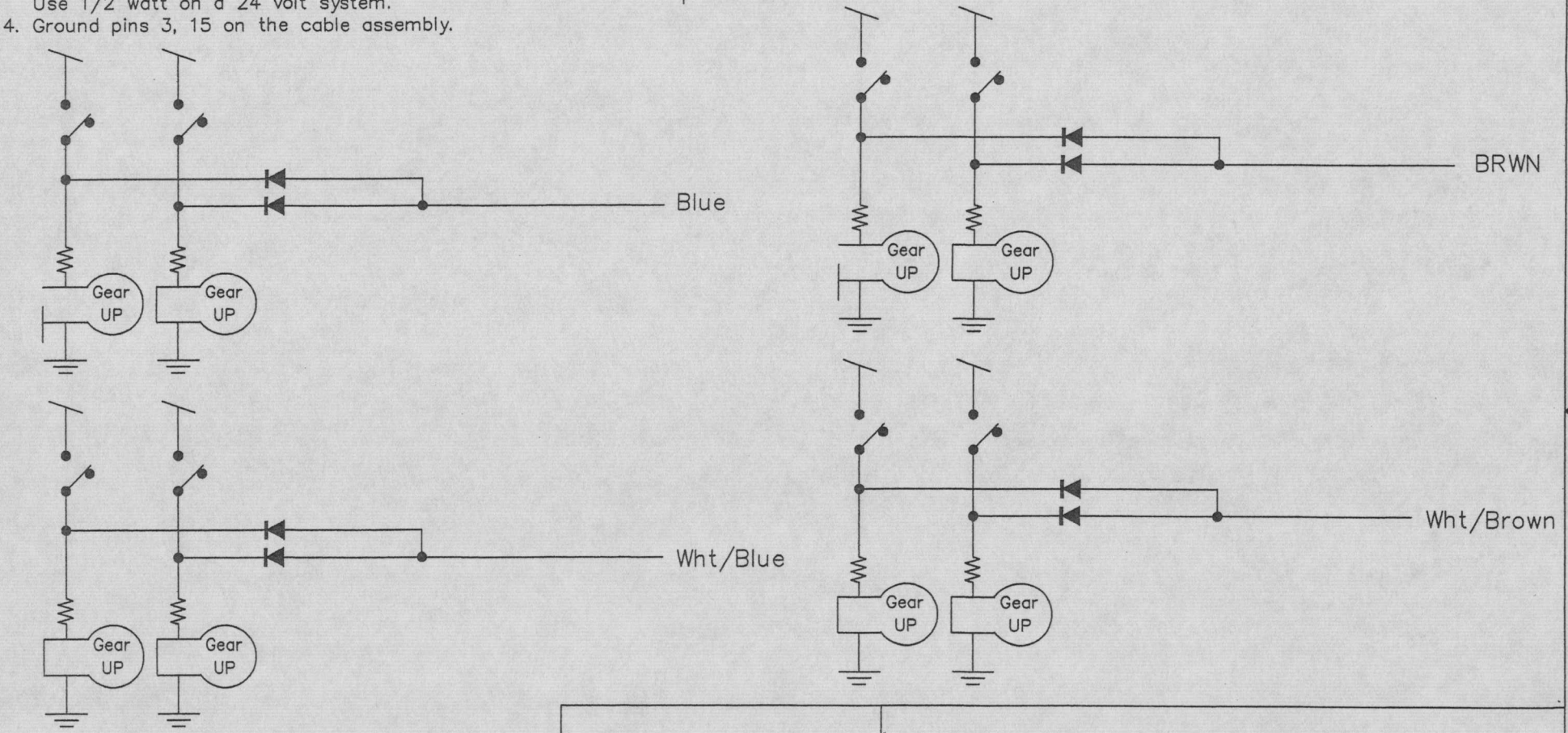
   Use 1/4 watt on a 12 volt system.
   Use 1/2 watt on a 24 volt system.
4. Ground pins 3, 15 on the cable assembly.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



Diode
Resistor
Aircraft Power
Aircraft Ground
Connection

AIRCRAFT COMPONENTS INC.

2042 Electrical Schematic
For Multiple Lights Power Activated

APPROVED	MDG	SIZE	FSCM NO.	DWG NO.	REV
DATE	5/15/12	A		FIG D	0
		SCALE NONE	DRAWN BY J.D.G.	SHEET Page 10	