

INSTALLATION MANUAL

For

The

Landing Gear Position Warning System

For

Amphibian Aircraft

**For Experimental Category Aircraft Only  
Not FAA Approved**

P/N 2048-1

SPECIFICATION IM-2048

REV. 1

07/22/2011

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Approved

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## **I. INTRODUCTION**

This manual provides information for installing the P/N 2048 Landing Gear Position Warning System on a home built amphibian aircraft. All installation work is to be performed in accordance with this manual.

## **II. SYSTEM OPERATION**

The Landing Gear Position Warning System is an electronic device which provides the pilot of an amphibian aircraft with information on the position of the landing gear prior to either a water landing, or a runway landing. The system consists of a small electronic module and a panel mounted switch. The system is activated by airspeed on takeoff. Once the airspeed has exceeded a preselected speed, a light in the panel switch will illuminate indicating that the system is activated. A delay of 15 sec. is built into the system to allow for airspeed transients. As the aircraft slows for landing, or deploys the flaps for landing, the warning system becomes active. The pilot will then hear one of 3 voice messages directly in his headset and through the built in speaker, either "WATER LANDING, WATER LANDING" in a male voice or "RUNWAY LANDING, RUNWAY LANDING" in a female voice depending on the present position of the landing gear, or "CHECK LANDING GEAR". If the pilot determines that the gear is set in the proper position for the type of landing being made, he/she then pushes the panel switch which cancels the voice message and turns the light off. If the gear is not correct for the type of landing being made, he/she can reposition it. When the gear position changes, the voice will change to the other message also. If he/she accelerates above the activation airspeed, the system resets, and the voice stops. Once he/she is satisfied that the gear is in the proper position for the type of landing being made, he/she can cancel the voice by pushing the panel switch. The system incorporates a test function, and the ability to temporarily disengage for slow flight. Pushing the panel switch in flight or on the ground will initiate a test sequence. If the electronics are functioning, the voice message "TEST O.K." will be heard. If the panel switch is held for 2 sec., the system will be deactivated. The light in the panel switch will then flash indicating that the system is deactivated. Pushing the switch again re-engages the system and turns the flashing light off. Should one of the aircraft position switches or lights fail or not activate properly, the system senses this and will provide a warning message "CHECK LANDING GEAR" to alert the pilot. This message will also sound while the gear is in transition between positions. The voice messages can be heard through the speaker built into the unit, and directly in the pilot's headset. If the aircraft has an audio panel with an un-switched input, the voice message will also play through the cabin speaker.

**NOTE:** THIS IS AN ADVISORY SYSTEM ONLY. IT SHOULD NOT BE UTILIZED AS THE PRIMARY MEANS OF DETERMINING 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 GEAR POSITION.

### **III APPLICABILITY**

This system is **not FAA approved**. It is intended for installation on an experimental category amphibian aircraft only. The aircraft must have the following minimum requirements for an installation:

1. 12v or 24v DC power
2. A minimum of one gear up and one gear down position indicating light, or an electrical switch which activates when the gear is up and when the gear is down.
3. An audio panel with an un-switched audio input or a headset jack for the pilot.

The system is designed to operate with a variety of light and limit switch wiring configurations. See the attached installation schematics, or contact the manufacturer for installation information with other wiring schemes.

## IV. INSTALLATION INFORMATION

### A. Mechanical Installation

1. Locate a place in the aircraft to mount the P/N 2048-2 electronic module. The unit can be mounted to the aircraft structure, side panels etc. Drill 4 mounting holes as shown on Fig 1, and mount the unit using the hardware provided.
2. Drill a 5/16 diameter hole in the instrument panel in a location in front of and in easy reach of the pilot, and install the P/N 2048-4 switch assembly. Place the panel label over the hole before inserting the switch.
3. Attach the 3/16 inch OD (1/8 inch ID) plastic tube on the electronic module to the pressure line from the Pitot tube. Do not use a bend radius less than 1 inch, and do not crush the tube when securing it.

### B. Electrical Installation

1. Refer to Fig A, Fig B, Fig C or Fig D for information on the electrical installation that fits the wiring configuration in your aircraft. Fig A is the wiring configuration for an aircraft that has a gear position indicating light wired so that power is always applied to the lights, and the switches then supply a ground to turn the light on. Fig B is the wiring configuration for an aircraft that has a gear position indicating light that is wired so that the switches supply power to the lights to turn them on. Fig C and Fig D show installations in an aircraft that has either 2 or 4 gear up and gear down lights. The system can also be used with an aircraft that does not have indicating lights, but does have up and down limit switches on the gear position. Contact the factory for information on this installation.
2. Hook the RED wire to the aircraft buss through a 1 amp fuse or circuit breaker. The system works with both 12v and 24v power.
3. Attach the BLACK wire to a good aircraft ground.
4. NOTE: Installations made using Fig A, C or D require that jumpers be installed in the cable connector. Remove the gray plastic cover from the cable connector and solder the appropriate jumpers on pins 2 and 14, depending on configuration needed per attached drawings. Attach the correct color wires to the gear up and gear down lights or switches as shown on the correct figure. Note: The short VIOLET wire is for speed calibration.
5. The system incorporates a standard audio output. 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 incorporates an un-switched audio input, the Gear Alert audio output should be hooked to this point. This will provide a voice warning directly into the pilot's headset and through the cabin speaker. Hook the WHITE wire to this un-switched audio input. 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.
6. The system can be attached to a switch on the flaps that provides a ground when the flaps are fully deflected. This switch closure will provide a second means of activation when landing. This input can be left unused if desired. This option should only be used on an aircraft that normally makes all landings with full flaps.

7. The system incorporates an airspeed activated switch which can be used to activate an external device like a transponder, a Hobbs meter, etc. The system provides a switch closure, (a ground) at an airspeeds above 40 mph, and opens (turns off) at speeds below 40 mph. NOTE: The switch current must be externally limited to 50 ma.

8. Cut any remaining wires and insulate the ends. Secure all wiring in place.

## V. SYSTEM CHECKOUT AND OPERATION

### A. Ground Testing

1. Turn on the master switch. The system must not operate. Push the panel switch and release it. The voice message "TEST OK" will be heard once through the built in speaker and through the pilot's headset. The voice message will also be heard through the cabin speaker and all headsets in the aircraft if the audio is attached to an un-switched input in the audio panel. The volume level of the audio through the cabin speaker and the headsets can be adjusted by turning a volume control pot in the electronic module. Locate the correct pot in the electronic module, and using a small screwdriver turn the pot to change the volume level.

2. Push the panel switch and hold it for about 2 sec. The voice message "TEST OK" will play. When you release the switch, the built in light will flash indicating that the system has been disengaged and will not function when landing. Push the switch again and release it. The flashing light will go off indicating that the system has reactivated.

### B. Setting the Activation Speed

1. The activation airspeed can be adjusted over a wide range (40 MPH to 90 MPH) by a pot in the electronic module. Locate the correct pot in the electronic module, and use a small screwdriver to adjust it.

2. Attach a digital voltmeter to the short VIOLET wire attached to pin 9 of the connector and to aircraft ground. Using the table of voltage vs activation speed, adjust the speed control pot to set the desired system activation speed. NOTE: The activation speed should be set lower than the normal climb speed to prevent system activation when climbing. Insulate and secure the short VIOLET wire when finished.

### C. Flight Testing

1. Make a normal takeoff. If the external switch is connected to an accessory, it should activate at about 40 mph.

2. Increase the airspeed until the yellow light illuminates indicating that the system is active. Adjust the activation speed if necessary. Note: The airspeed must be above the activation speed for about 15 sec before the system becomes active.

3. Decrease airspeed below the activation airspeed. The voice message "WATER LANDING, WATER LANDING" will be heard if the landing gear is up. Push the panel switch and release it. The voice message should stop, and the light should turn off. The voice message "RUNWAY LANDING, RUNWAY LANDING" will be heard if the gear is in the down position. Test the system with the gear in both positions. The system hooks to both the gear up and the gear down lights. It must sense that one set of lights is off, and the other set of lights is on. If this combination does not exist, (both off, both on for example), the voice message "CHECK LANDING GEAR" will be heard indicating a problem.

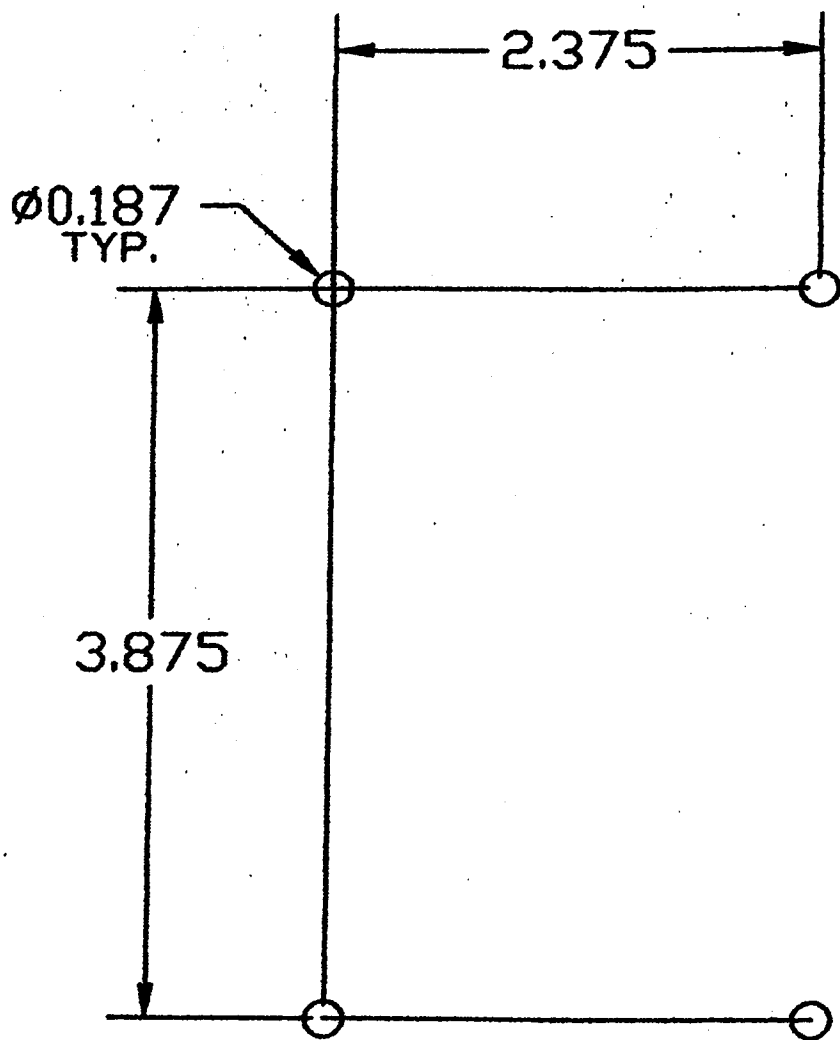
5. With the gear in either position or the voice playing, move the gear to the other position. The voice message "CHECK LANDING GEAR" will be heard while the gear is in transient, and the voice message will then change to correspond to the new gear position.

6. When in flight, push the panel switch and release it. The voice message "TEST OK" will be heard once through the built in speaker and through the pilot's headset.

7. Push the panel switch and hold it for about 2 sec. The voice message "TEST OK" will play. When you release the switch the built in light will flash indicating that the system has been disengaged and will not function when landing. Push the switch again and release it. The flashing light will go off and a steady light will be on, indicating that the system has reactivated.

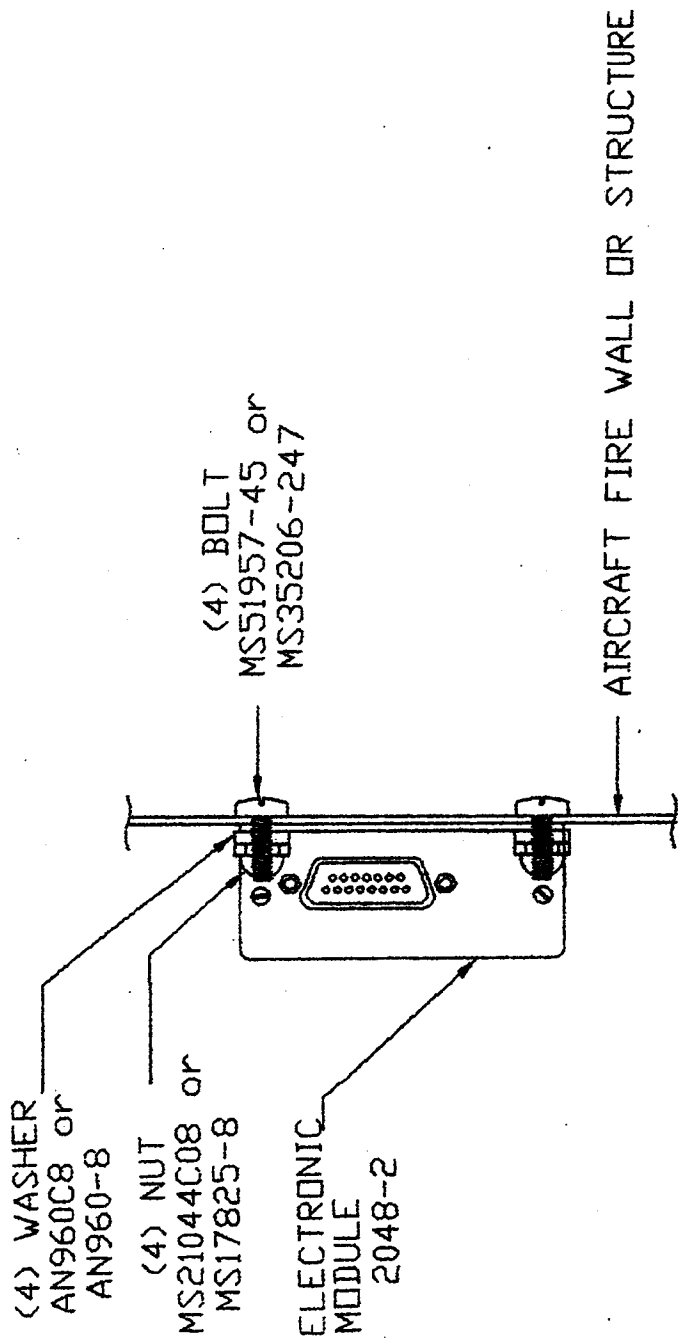
## **VI. DOCUMENTATION**

1. The installer is responsible for all documentation, logbook entries, revising weight and balance, etc.
2. System weight is 0.7 lb.

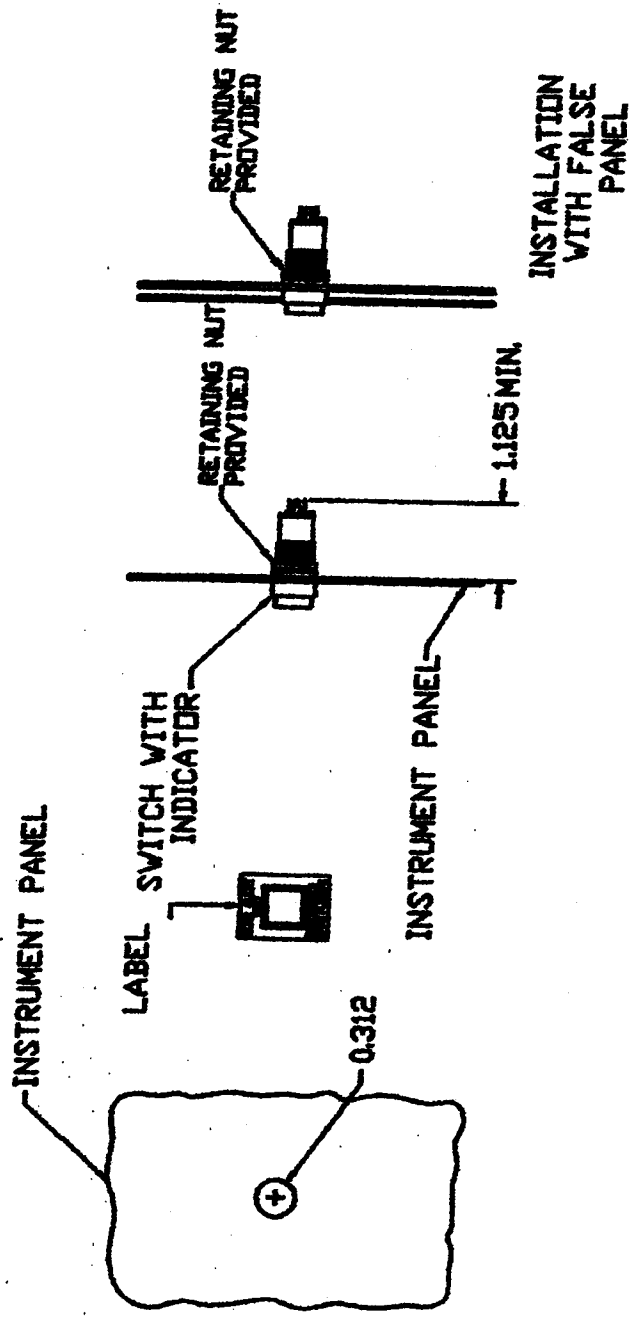


ELECTRONIC MODULE TEMPLATE  
FIG 1





ELECTRONIC MODULE INSTALLATION  
 FIG 2



INSTALLATION OF SWITCH WITH AMBER LIGHT

FIGURE 3

## ACTIVATION SPEED SETTING

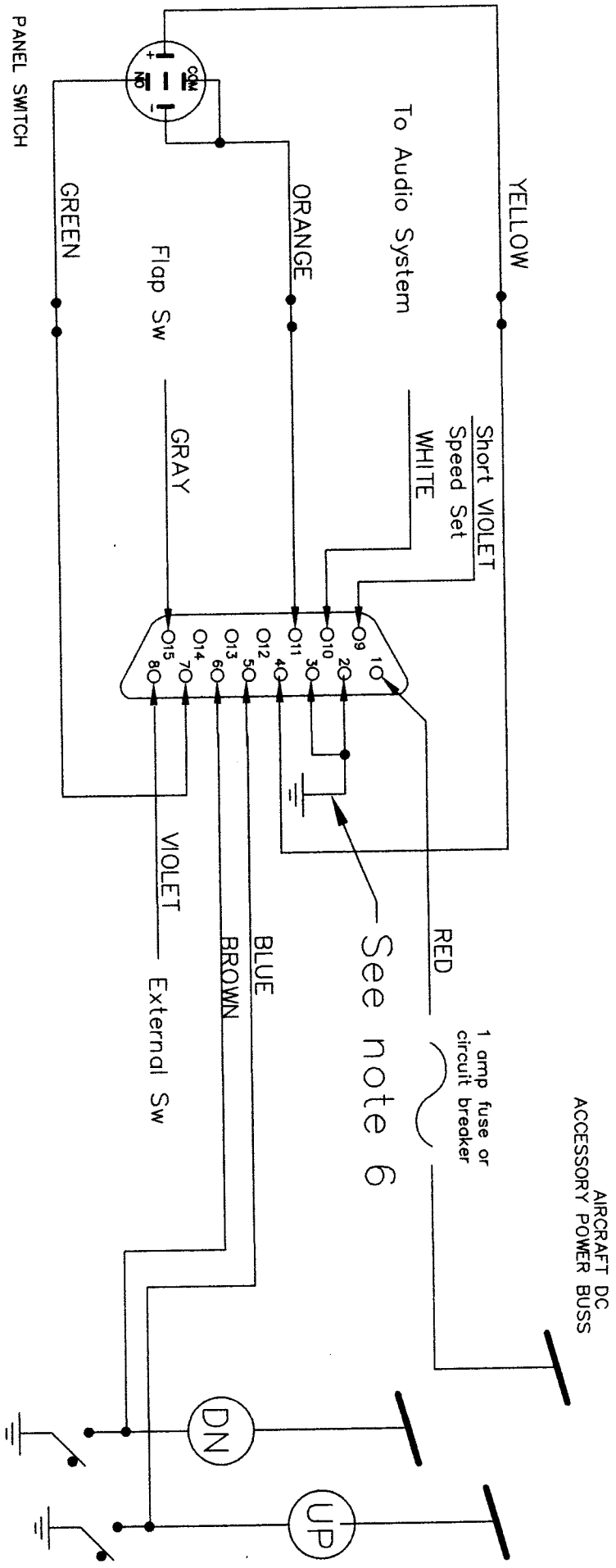
Listed below is information on setting the activation speed for the gear alert. The following table supplies voltage readings vs activation speed. Use a digital multi meter to measure the voltage present between the short VIOLET wire in the cable, and ground. Then using a small screwdriver turn the speed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

<b>Volts</b>	<b>Miles/hr</b>	<b>Knots/hr</b>	<b>Inch H2O</b>
.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
	1	Redesign for multiple configurations	7/22/11	JDG

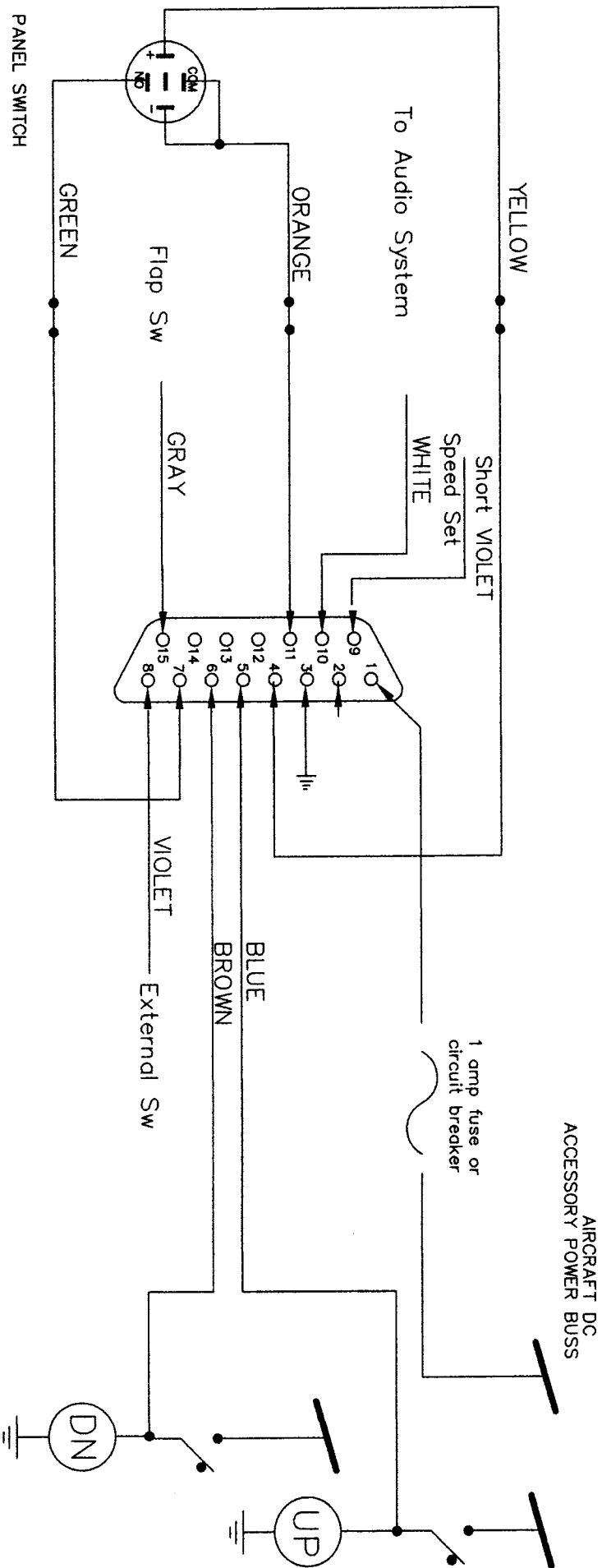


① Gear Position Warning System  
(Single light, ground turns on light)

- Notes
1. Gray wire can be attached to flap down switch or left unattached.
  2. Violet wire supplies a ground when active. 0.050 amps max.
  3. Hook white wire to un-switched audio input or pilots headset jack.
  4. Input +12v or +24v DC
  5. Blue & Brown wires attach to Up & Down gear position lights as described in the manual.
  6. Cable set for grounding pin 3 only, installer must add ground for pin 2.

APPROVED		JDG	
DATE	04-15-03	SCALE	NONE
AIRCRAFT COMPONENTS INC.		DRAWN BY	J.D.G.
Gear Position Warning System for Home Built Amphibian Aircraft (Single light, ground turns on light)		DWG. NO.	2048 FIG A
SIZE	FSCM. NO.	SHEET	1 OF 1
A		REV	1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1	Redesign for multiple configurations	7/22/11	JDG

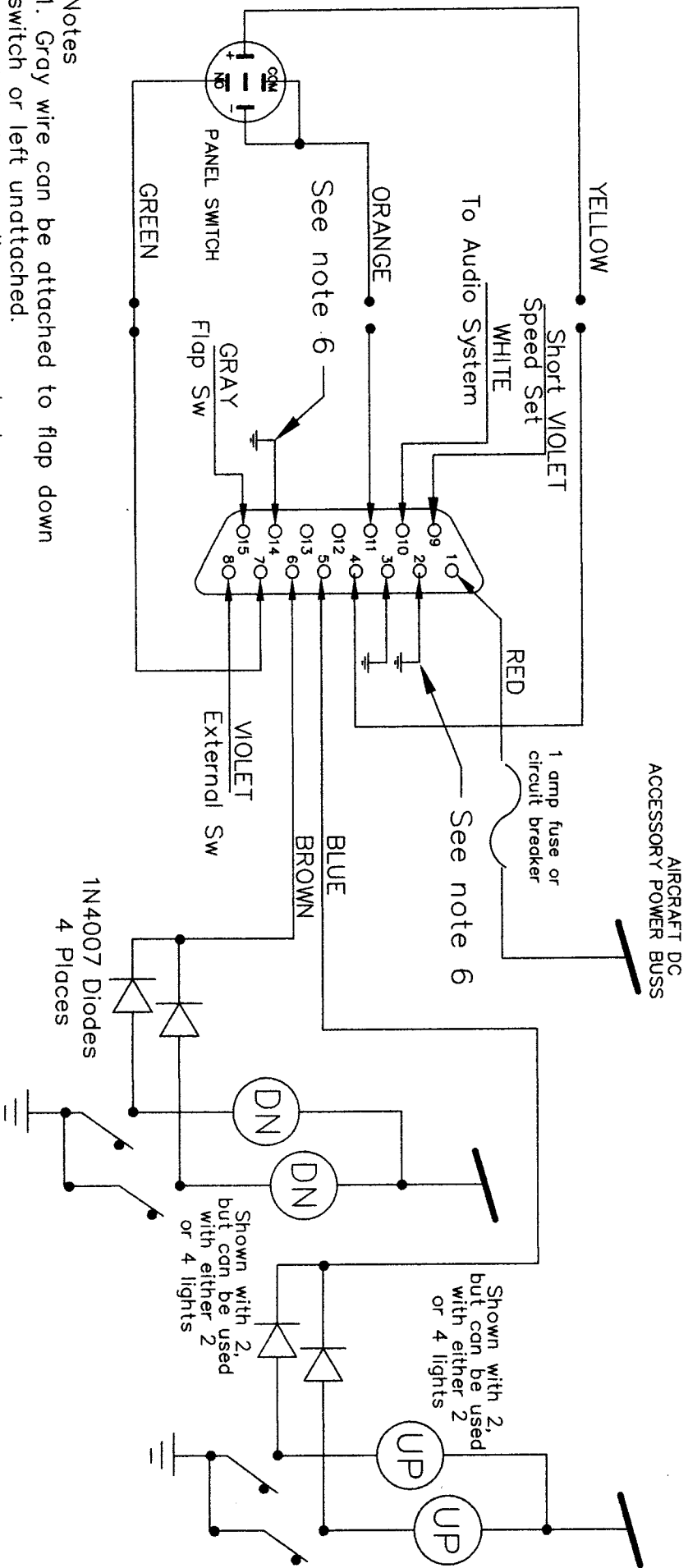


① Gear Position Warning System  
(Single light, power turns on light)

- Notes
1. Gray wire can be attached to flap down switch or left unattached.
  2. Violet wire supplies a ground when active. 0.050 amps max.
  3. Hook white wire to un-switched audio input or pilots headset jack.
  4. Input +12v or +24v DC
  5. Blue & Brown wires attach to Up & Down gear position lights as described in the manual.
  6. Cable set for grounding pin 3 only.

APPROVED		JDG		SCALE NONE		DRAWN BY J.D.G.		SHEET 1 OF 1	
DATE 04-15-03		SIZE A		FSCM NO.		DWG NO.		REV 1	
<b>AIRCRAFT COMPONENTS INC.</b> Gear Position Warning System for Home Built Amphibian Aircraft (Single light, power turns on light)									
<b>2048 FIG B</b>									

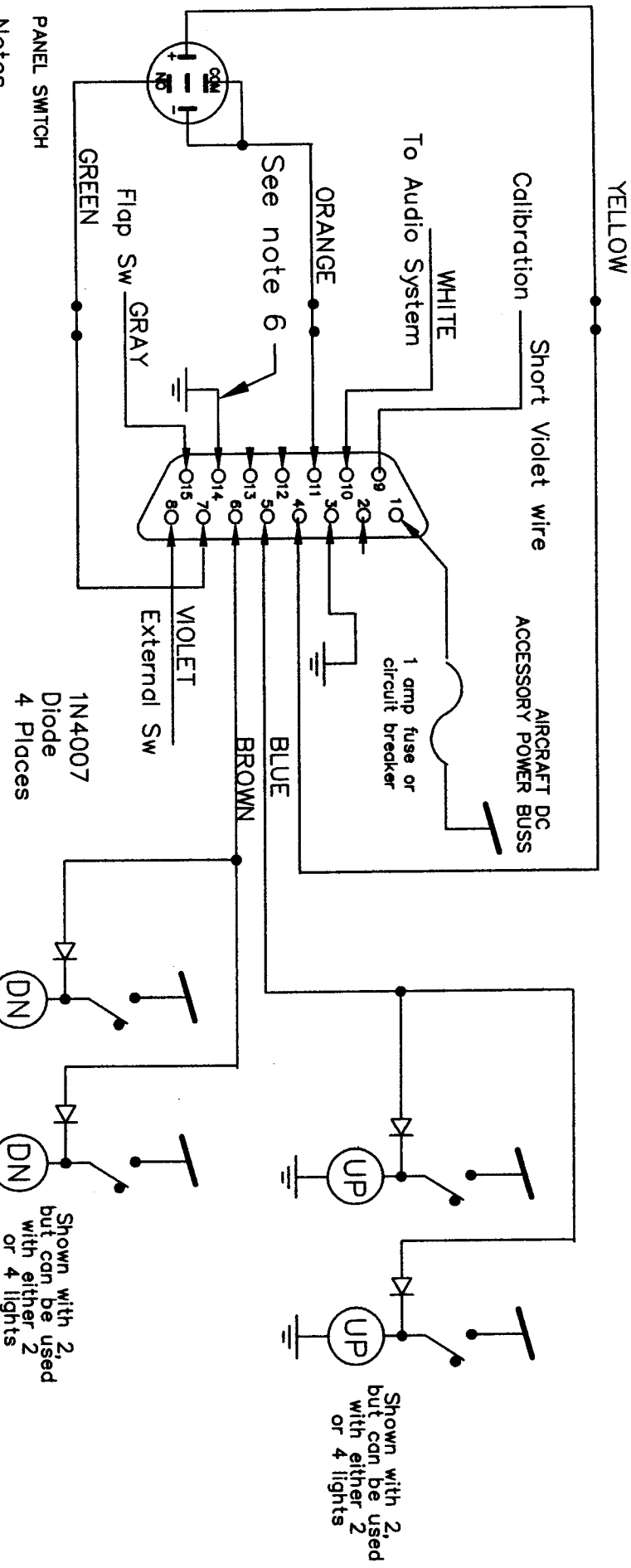
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1	Redesign for multiple configurations	7/22/11	JDG



- Notes
1. Gray wire can be attached to flap down switch or left unattached.
  2. Violet wire supplies a ground when active. 0.050 amps max.
  3. Hook white wire to un-switched audio input or pilots headset jack.
  4. Input +12v or +24v DC
  5. Blue & Brown wires attach to Up & Down gear position lights
  6. Cable set for grounding pin 3 only, installer must ground pins 2, 14.

APPROVED		DATE	
JDG		04-15-03	
<b>AIRCRAFT COMPONENTS INC.</b> Gear Position Warning System for Home Built Amphibian Aircraft (Multiple lights, ground turns on lights)			
SIZE	FSCM NO.	DWG NO.	REV
A		2048 FIG C	1
SCALE	NONE	DRAWN BY	J.D.G.
		SHEET	1 OF 1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1	Redesign for multiple configurations	7/22/11	JDG



**Notes**

1. Gray wire can be attached to flap down switch or left unattached.
2. Violet wire supplies a ground when active. 0.050 amps max.
3. Hook white wire to un-switched audio input or pilots headset jack.
4. Input +12v or +24v DC
5. Blue & Brown wires attach to Up & Down gear position lights
6. Cable set for grounding pin 3 only, installer must ground pin 14.

APPROVED		DATE		SCALE		DRAWN BY		SHEET		REV	
JDG		04-15-03		NONE		J.D.G.		1 OF 1		1	
<b>AIRCRAFT COMPONENTS INC.</b> <b>Gear Position Warning System for Home Built Amphibian Aircraft (Multiple lights, Power turns on lights)</b>											
SIZE		FSCM NO.		DVG NO.		2048 FIG D					
A											