INSTALLATION MANUAL

FOR

The

Landing Gear Position Warning System
For
Land Aircraft

# For Experimental Category Aircraft Only
# Not FAA Approved

P/N 2050-1

SPECIFICATION IM-2050

REV. 1

07/22/2011

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Approved

Aircraft Components Inc.
www.flyingsafer.com

## TABLE OF REVISIONS

| Rev No. | Date | Description of Revision and pages changed | Approval |
|---|---|---|---|
| 1 | 7/22/11 | Added multiple light configurations for figs A,B,C,D (which is done through pins 2 and 14) | JDG |
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## I. INTRODUCTION

This manual provides information for installing the P/N 2050 Landing Gear Warning System on an experimental category retractable gear aircraft. All installation work is to be performed in accordance with this manual.

## II. SYSTEM OPERATION

The Landing Gear Warning System is an electronic device which provides the pilot of a retractable gear experimental category aircraft with information on the position of the landing gear prior to a runway landing. The system consists of a small electronic module and a panel mounted switch, and it connects to the aircraft landing gear DOWN position indicating light. 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 active. A delay of 15 sec. is built into the unit to allow for airspeed transients. As the aircraft slows for landing, the system enters the warning mode. The electronics check the gear down position light to determine if the landing gear is down for a runway landing. If the gear is down, the pilot will then hear the message "GEAR OK" in his headset, and through the built in speaker. If the gear is not in the correct position, he/she will hear the message "CHECK LANDING GEAR, CHECK LANDING GEAR" repeatedly until the gear is placed in the proper position, or the airspeed is increased above the activation speed.

The system incorporates a test function, and the ability to temporarily disengage operation 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.

The system also has optional inputs that allow the installer to hook up a switch on the flaps and a switch on the throttle. When these options are used, closing the throttle or lowering the flaps with the gear up will produce the warning message.

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 THE PRIMARY INDICATION OF GEAR POSITION.

## III APPLICABILITY

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

1. 12v or 24v DC power
2. A minimum of 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 2050 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 dia hole in the instrument panel in a location in front of and in easy reach of the pilot, and install the P/N 2050-4 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, and 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 gear position indicating lights wired so that power is always applied to the lights, and the switches then supply a ground to turn the lights on. Fig B is the wiring configuration for an aircraft that has gear position indicating lights that are wired so that the switches supply power to the lights to turn them on. Fig C is for an aircraft with multiple gear lights that light when ground is applied. Fig D is for an aircraft with multiple gear lights that light when power is applied. The system can also be used with aircrafts that do not have indicating lights, but do have up and down limit switches on the gear position. Contact the factory for information on this installation. If you have individual indicator lights, and wish to hook all of them up, this can also be done. Contact the factory for information on this configuration.

2. Hook the RED wire to the aircraft power 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 Figures A, C and D require that a jumper be installed in the cable connecter. Remove the gray plastic cover from the cable connecter and solder a jumper from pin 2 to pin 3 in the connecter. Attach the correct color wire to the 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.

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 airspeeds above 40 mph, and opens (turns off) at speeds below 40 mph. NOTE: The switch current must be externally limited to 40 ma.

8. The system can also be attached to a switch on the throttle that provides a ground when the throttle is closed. This switch closure will provide an additional means of activation when landing. This input can be left unused if desired.

9. 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" must 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 must 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 between the short VIOLET wire attached to pin 9 of the connecter and 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 with the landing gear retracted. The voice message "CHECK LANDING GEAR, CHECK LANDING GEAR" must be heard in the pilot's headset and through the built in speaker. Lower the landing gear and the voice message "GEAR OK" must be heard, and the amber light must turn off.

4. If the flap switch or the throttle switch options have been hooked up, their operation should be verified by testing as above.

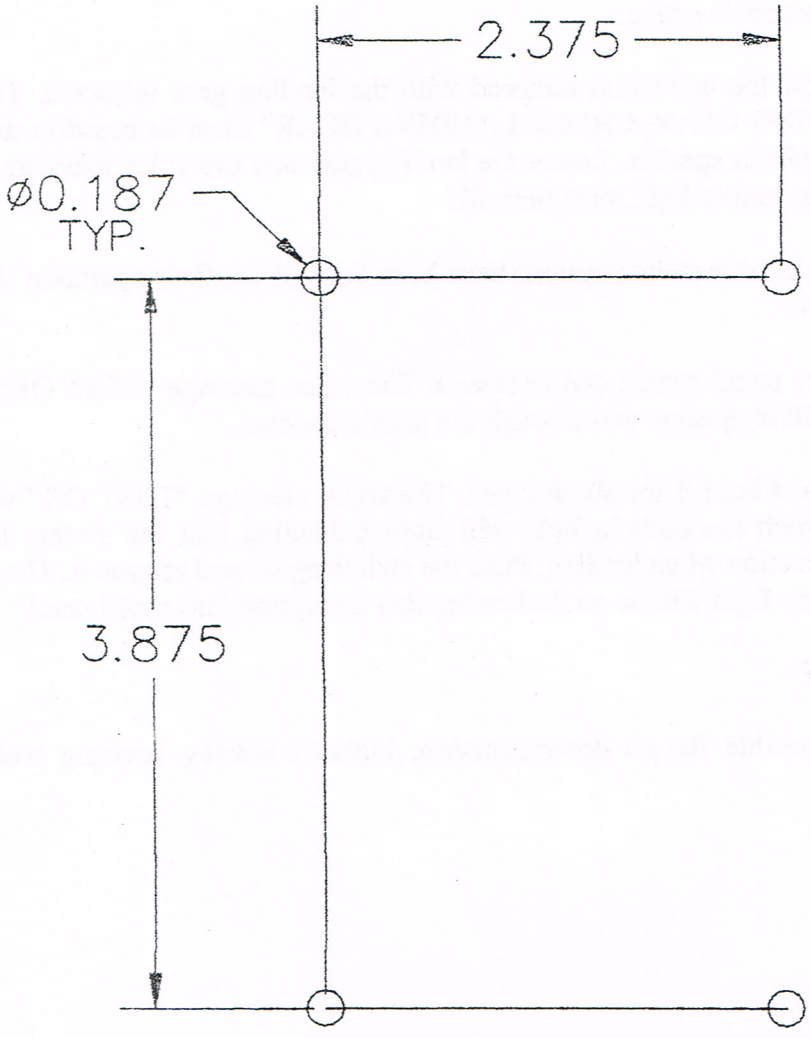
5. When in flight, push the panel switch and release it. The voice message "TEST OK" will be heard once through the built in speaker and through the pilot's headset.

6. 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**

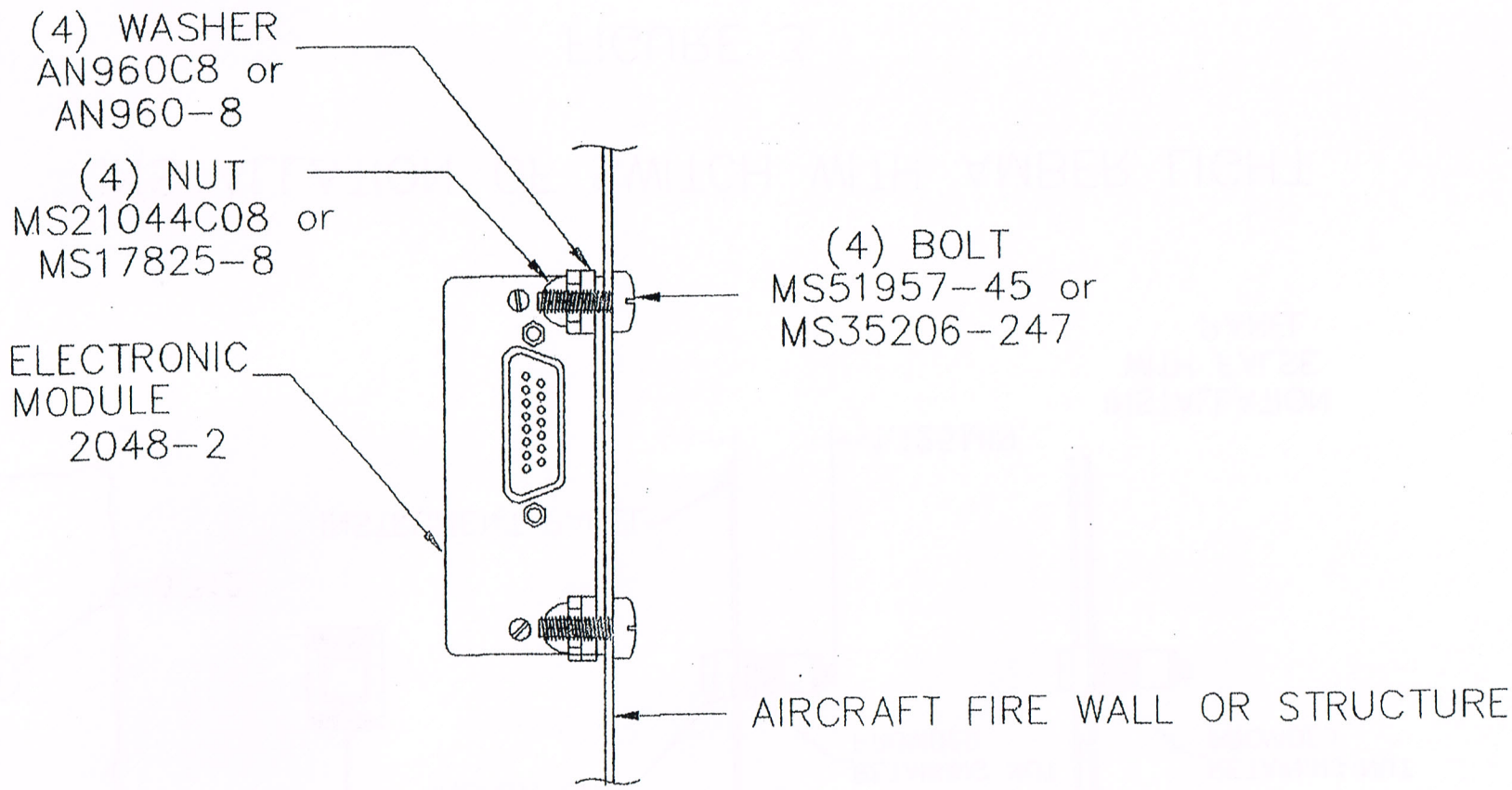
1. The installer is responsible for all documentation, logbook entries, revising weight and balance, etc.

2. System weight is 0.7 lb.



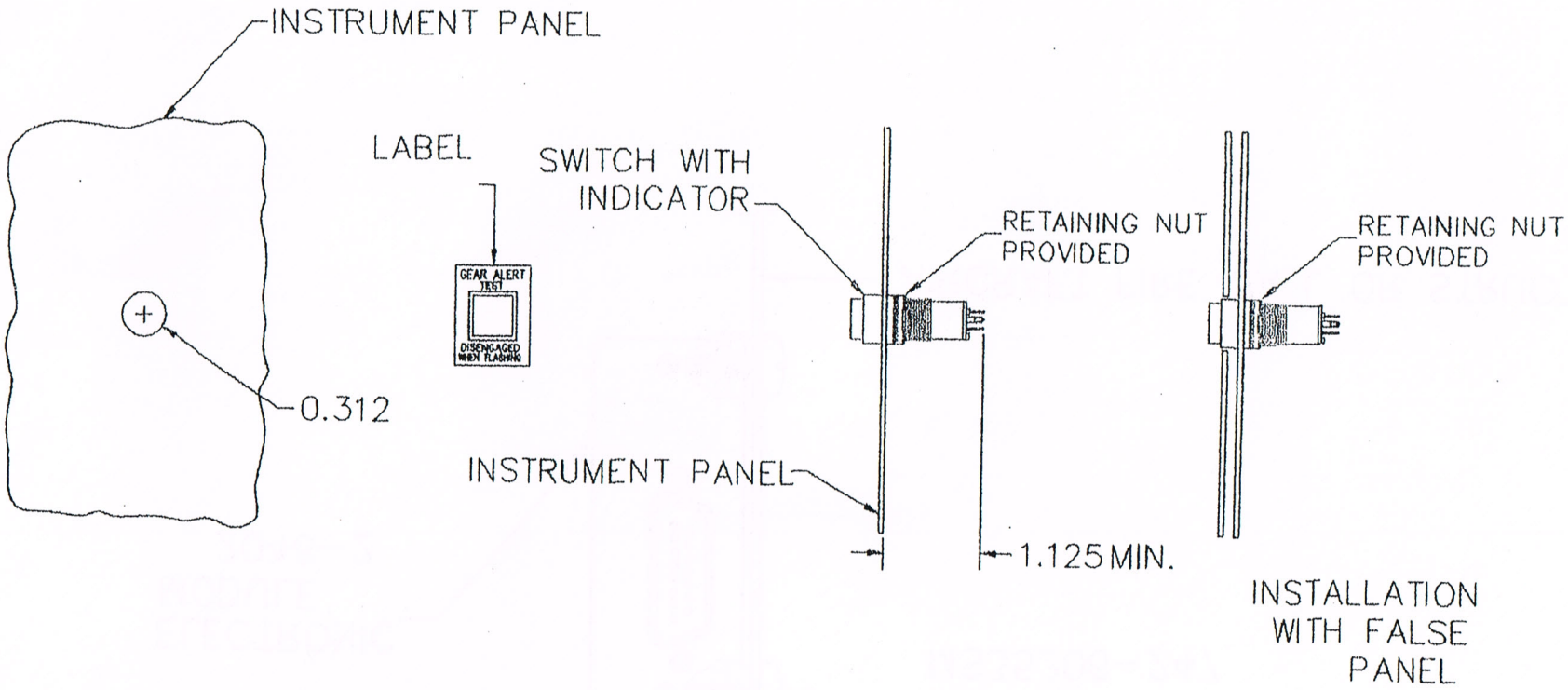

ELECTRONIC MODULE TEMPLATE

FIG 1




ELECTRONIC MODULE INSTALLATION

FIG. 2



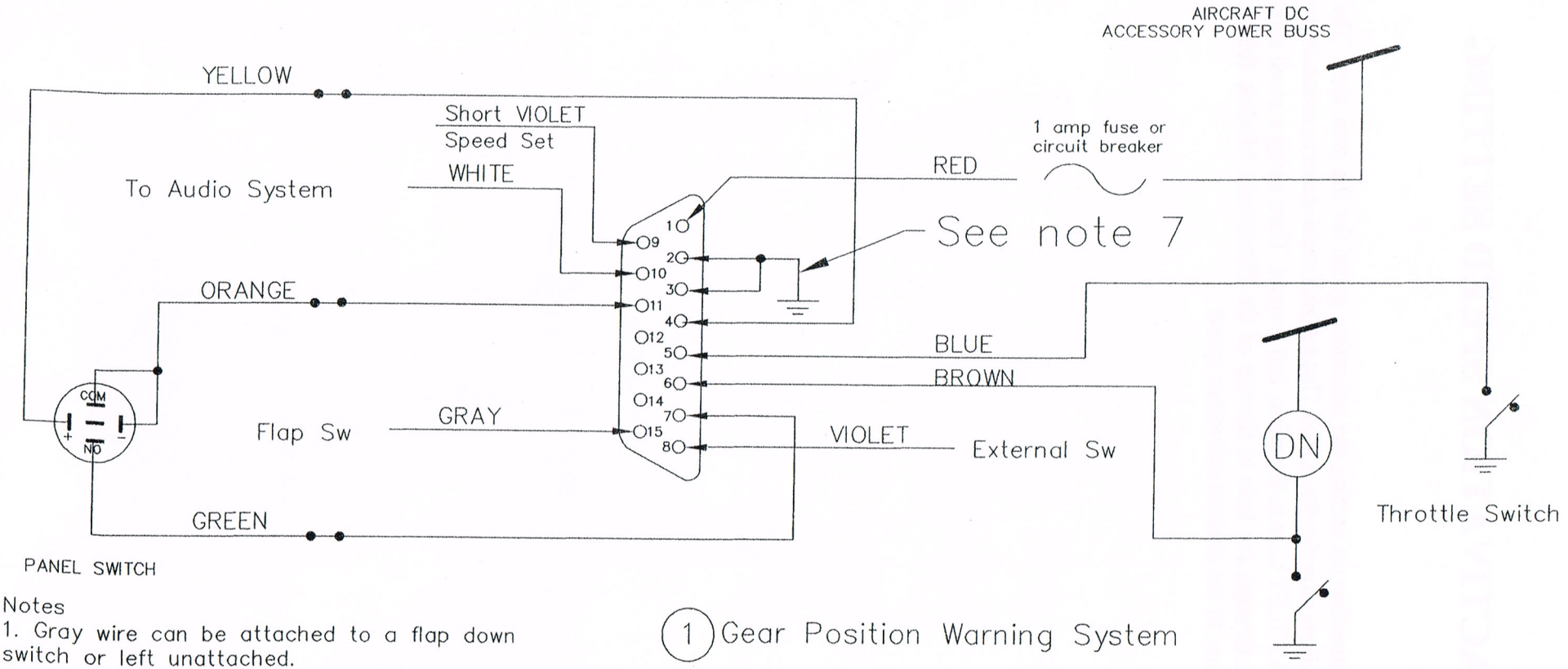

INSTALLATION OF SWITCH WITH AMBER LIGHT

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 .

| REVISIONS | | | | |
|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | DATE | APPROVED |
| | 2 | Redesign for multiple configurations | 7/22/11 | MDG |




Notes
1. Gray wire can be attached to a flap down switch or left unattached.
2. Violet wire supplies an internal ground when active. 0.040 amps max.
3. Hook white wire to un-switched audio input or pilots headset jack.
4. Input +12v or +24v DC
5. Brown wire attaches to gear down position light.
6. Blue wire can be attached to a switch that provides a ground when the throttle is closed.

7. Cable set for grounding pin 3 only, installer must add ground for pin 2.

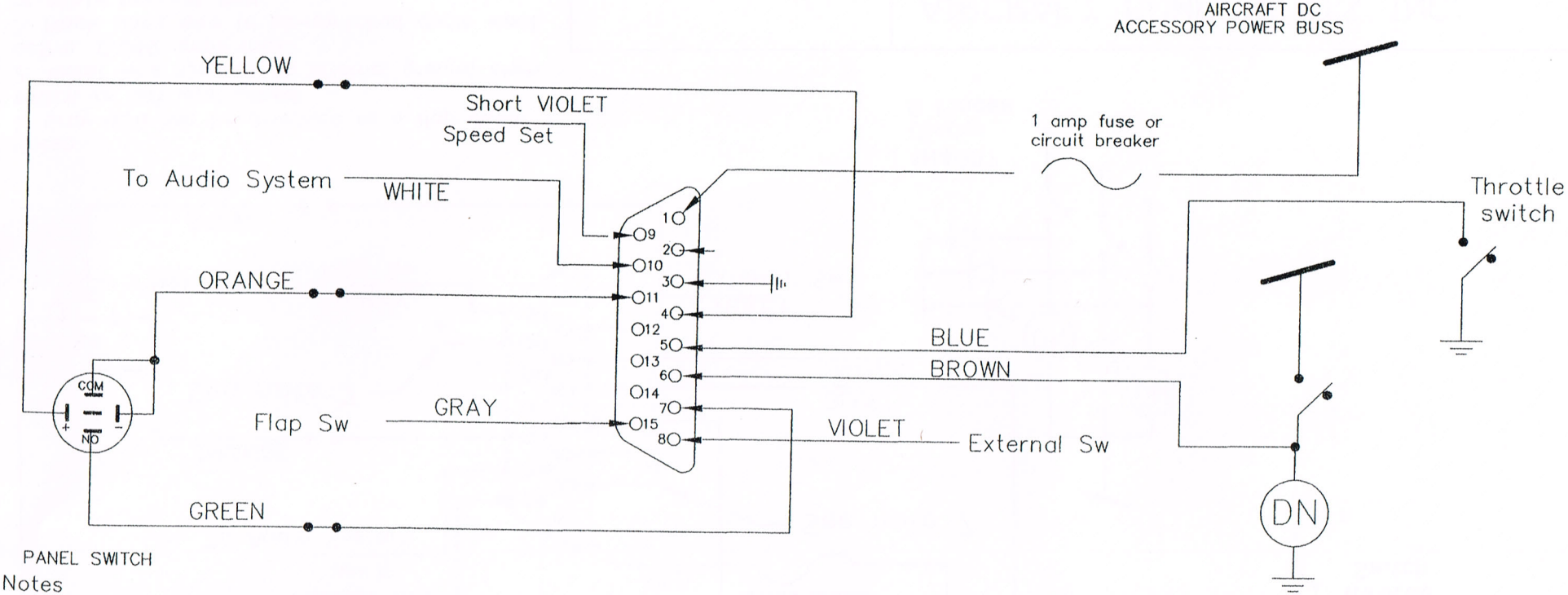
(1) Gear Position Warning System

AIRCRAFT COMPONENTS INC.

Gear Position Warning System
for Experimental Land Aircraft
(Single light, ground turns on light)

| APPROVED MDG | SIZE A | FSCM NO. | DWG NO. 2050 FIG A | REV 2 |
|---|---|---|---|---|
| DATE 3-9-07 | SCALE NONE | DRAWN BY J.D.G. | SHEET 1 OF 1 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | DATE | APPROVED |
| | 2 | Redesign for multiple configurations | 7/22/11 | JDG |




PANEL SWITCH

Notes

1. Gray wire can be attached to the flap down switch or left unconnected.
2. Violet wire supplies an internal ground when system is active. Limit current to 0.040 amps max.
3. Hook white wire to un-switched audio input or pilots headset jack.
4. Input +12v or +24v DC
5. Blue wire attaches to gear Down position light.
6. Brown wire can be attached to a switch that provides a ground whenever the throttle is closed.
7. Cable set for grounding pin 3 only.

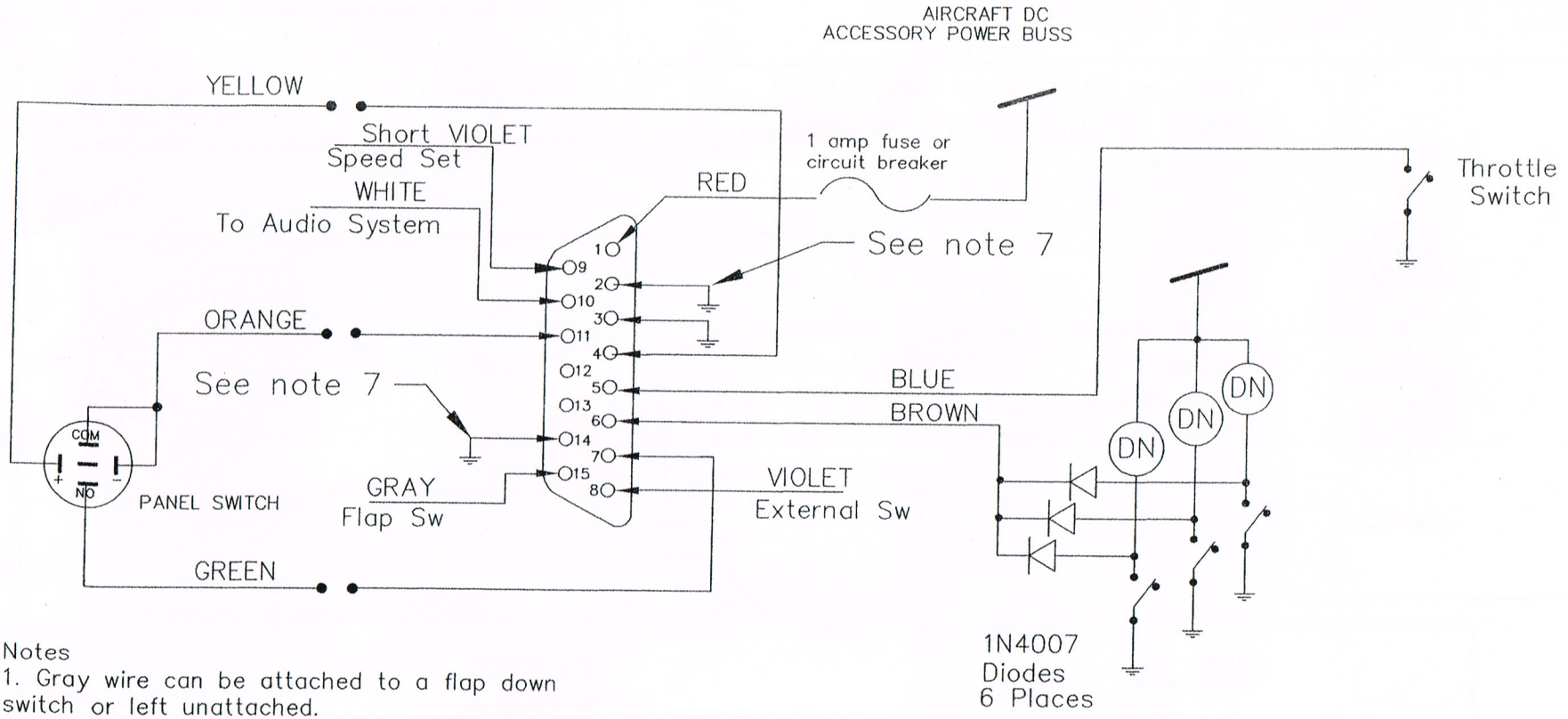
(1) Gear Position Warning System
(Single light, power turns on light)

AIRCRAFT COMPONENTS INC.

Gear Position Warning System
for Experimental Land Aircraft
(Single light, power turns on light)

| APPROVED MDG | SIZE A | FSCM NO. | DWG NO. 2050 FIG B | REV 2 |
|---|---|---|---|---|
| DATE 3-9-07 | SCALE NONE | DRAWN BY J.D.G. | SHEET 1 OF 1 | |

| REVISIONS | | | | |
|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | DATE | APPROVED |
| | 2 | Redesign for multiple configurations | 7/22/11 | JDG |



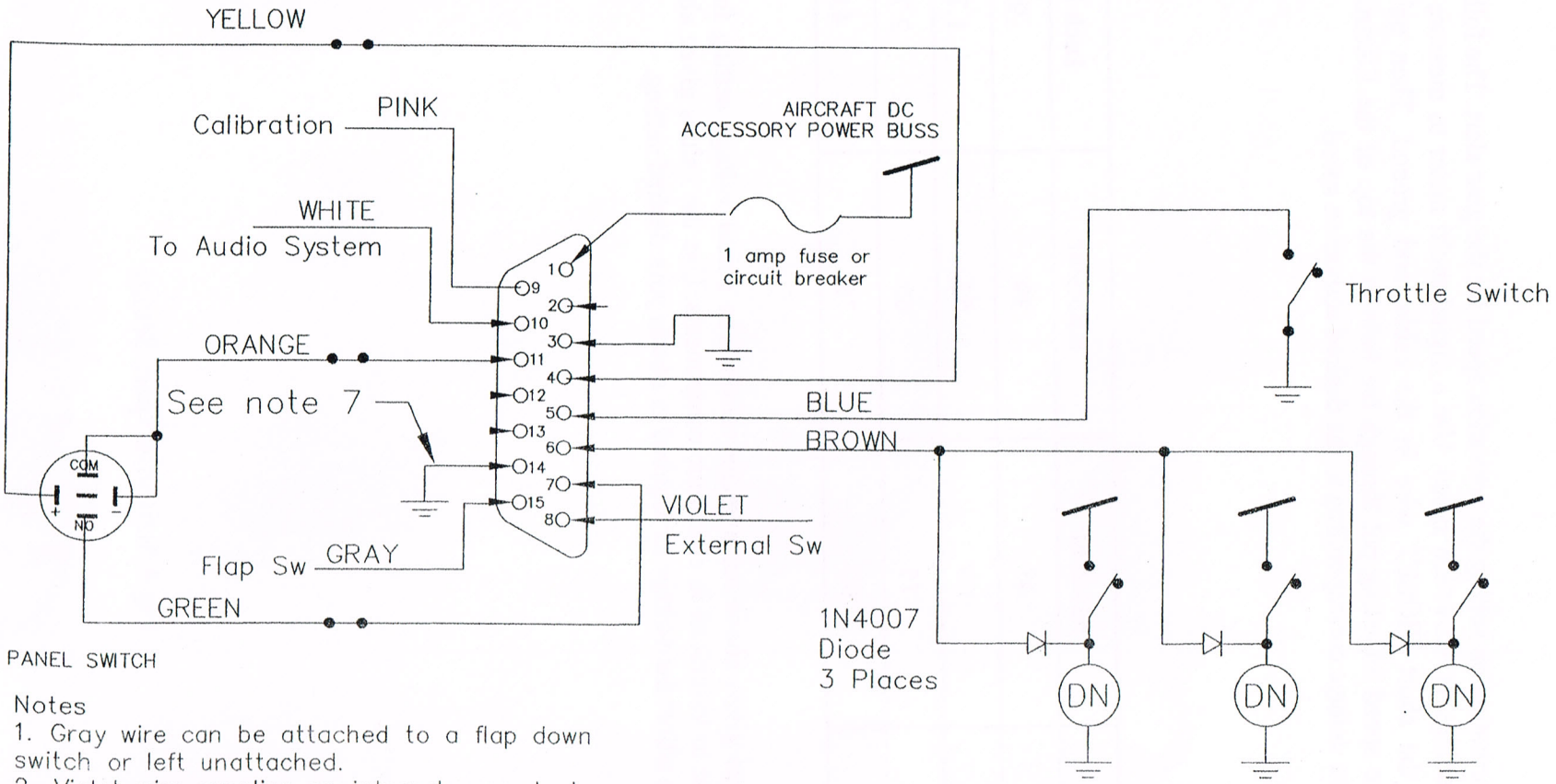

Notes
1. Gray wire can be attached to a flap down switch or left unattached.
2. Violet wire supplies an internal ground when active. 0.040 amps max.
3. Hook white wire to un-switched audio input or pilots headset jack.
4. Input +12v or +24v DC
5. Brown wire attaches to gear down position light.
6. Blue wire can be attached to a switch that provides a ground when the throttle is closed.
7. Cable set for grounding pin 3 only, installer must add ground for pins 2, 14.

AIRCRAFT COMPONENTS INC.

Gear Position Warning System
for Home Built Experimental Aircraft
(Multiple lights, ground turns on lights)

| | | | |
|---|---|---|---|
| APPROVED JDG | SIZE A | FSCM NO. | DWG NO. 2050 FIG C REV 2 |
| DATE 08-12-09 | SCALE NONE | DRAWN BY J.D.G. | SHEET 1 OF 1 |

| REVISIONS | | | | |
|---|---|---|---|---|
| ZONE | REV | DESCRIPTION | DATE | APPROVED |
| | 2 | Redesign for multiple configurations | 7/22/11 | JDG |




Notes
1. Gray wire can be attached to a flap down switch or left unattached.
2. Violet wire supplies an internal ground when active. 0.040 amps max.
3. Hook white wire to un-switched audio input or pilots headset jack.
4. Input +12v or +24v DC
5. Brown wire attaches to gear down position light.
6. Blue wire can be attached to a switch that provides a ground when the throttle is closed.
7. Cable set for grounding pin 3 only, installer must add ground for pin 14.

AIRCRAFT COMPONENTS INC.

Gear Position Warning System
for Home Built Experimental Aircraft
(Multiple lights, Power turns on lights)

| APPROVED | JDG | SIZE A | FSCM NO. | DWG NO. 2050 FIG D | REV 2 |
|---|---|---|---|---|---|
| DATE | 08-12-09 | SCALE NONE | DRAWN BY J.D.G. | SHEET 1 OF 1 | |

# 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 4 Activation Speed Setting