STC SA02798SE

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TITLE: Installation manual

for PA-34 Gear Warning Upgrade

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REVISIONS

Revision Level	Revision Date	Reason
IR	11/11/2023	Initial Revision
1	2/16/2026	Updated figure 1-2. Removed reference of PN AN824-4D and replaced with PN AN834-4D.

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1.0 INTRODUCTION

This document provides the FAA-approved installation instructions for the installation of Absolute Solutions LLC Gear Warning Upgrade in accordance with STC SA02798SE on eligible aircraft models.

The Absolute Solutions Gear warning upgrade is a reliable alternative to the gear warning systems incorporating a throttle position switch system. The system requires removal of the throttle position switches and gear horn and replaces them with a solid state relay, two vacuum switches and a much more reliable gear horn.

The vacuum switches are tee'd into the existing manifold pressure indication lines, and rigidly mounted behind the engine firewall adjacent to the manifold pressure line. The switches are normally open, and are designed to close at approximately 14"HG as indicated on the manifold pressure gage. Power to the vacuum switches is routed through wires which are installed into the existing circuitry of the throttle position switches. The switch incorporates a jumper plug to allow for simple testing of the gear warning horn in conjunction with scheduled inspections. The switches are protected from residual fuel that makes its way into the manifold sense line via in-line filter.

The existing gear horn and flasher is replaced with long lasting, reliable gear horn. The gear horn emits loud beeps at a frequency of 180/min and does not require the use of a flasher when installed. The gear horn is mounted to the factory horn holder plate with some minor modification.

Utilizing the existing wiring from the removed throttle position switches, a solid state relay is installed. The relay then gets its trigger input signal when one or more vacuum switches close, making the relay power the gear horn when an unsafe condition exists.

By utilizing manifold pressure in lieu of throttle position, precision of the gear horn trigger signal is maintained. Mechanical slop, vibration or misalignment of the throttle controls have no bearing on the operation of the gear warning system.

Maintenance on throttle position switches requires a check flight to determine a reference point on where to set the throttle switch. In most cases, a subsequent check flight is required to verify the gear horn is going off when prescribed by the aircraft manufacturer maintenance manual. The Absolute Solutions LLC Gear Warning Upgrade can be installed, adjusted and tested on the ground, which eliminates the need for a check flight.

2.0 APPROVED CONFIGURATIONS

The Absolute Solutions LLC gear warning upgrade is eligible for install on Piper PA-34-220T Seneca 3 models SN 34-8133001 through 34-8633031 and 3433001 through 3333172 (14 volt bus).

3.0 GENERAL SPECIFICATIONS

Kit Contents

Main Components

Nomenclature	Part number	Quantity
Gear Horn and Bracket Assembly	AS-GHBA-1	1
Vacuum Switch Assembly	AS-MPSBA-1	2
Solid State Relay	DC60S3	1
In-line Filter	AS-IF-1	2
Gear Horn Test Plug	AS-GHTP-1	1

Hardware and Miscellaneous

Nomenclature	Part number	Quantity
Gear Horn Mount Hardware		
Nut	AN340-8	2
Washer	MS3533-38	2
Screw	MS27039-0807	2
Vacuum Switch Hardware		
Nut	MS21044N08 or AN365-832A	4
Washer	NAS1149FN832P or AN960-8	4
Screw	MS27039-0807	4
Supplemental Wiring Hardware		
Ring Terminal	36154	12
Spade Terminal	640917-1	4
Connector, Male MATE N LOK	1-480318	5
Connector, Male MATE N LOK	1-480349-0	1
Connector, Female MATE N LOK	1-480319	3
Connector, Female MATE N LOK	1-480350-0	1
Pin	60618-1	10
Socket	60617-1	15
Environmental Splice	D-436-37	4
Miscellaneous		
Hose	193-3 (18” section)	2
Heat Shrink	HIX-2 (2.5” section)	1
Clamp	6504	8
Tee	AN834-4D	2

AN Reducer	AN894D4-3	2
Nut	AN818-3D	2
Sleeve	AN819-3D or MS20819-3D	2
Tube	03-00012-1 (12” section)	2
Adel clamp	MS21919WDG7	6
Adel clamp	MS21919WDG14	2
Adel clamp bolt	AN3-3A	6
Adel clamp washer	NAS1149F0332P OR AN960-10L	6
Adel clamp nut	MS21044N3 OR AN365-1032A	6

4.0 INSTALLATION

It is the responsibility of the installer to ensure modifications made to accommodate this system do not alter the operation of any existing original or aftermarket systems.

Special tools:

Wire insulation Stripper

Pin/Socket crimper

Vacuum hand pump/bleeder

Environmental splice crimper (such as DMC GMT232)

Mini tubing cutter

37 degree tube flaring tool

Tube bender

4.1 AS-MPSBA-1 Vacuum Switch Installation

Begin by determining a suitable location to mount the switches. The switch must be mounted on the aft side of the engine firewall in the nacelle compartment. We recommend installing the switch approximately at the center top of the firewall for easy accessibility.

1.) Determine placement of AS-MPSBA-1 vacuum switch in reference to Figure 1-1.

Note:

Ensure enough space between AS-MPSBA-1 vacuum switch and engine frame to allow for wire connections at switch terminal lugs. Use care when drilling through the firewall not to damage anything that may be on the other side of the firewall.

2.) Match drill two #18 or #19 holes for the AS-MPSBA-1 vacuum switch mounting plate. Deburr holes after drilling.

3.) Install AS-MPSBA-1 vacuum switch with nipple pointing inboard, utilizing supplied hardware. Ensure one washer is installed under each nut.

4.) See figure 1-2. Replace factory manifold pressure -4an union with AN834-4D tee pointing toward engine firewall, then install AN894D4-3 reducer onto tee. Temporarily leave AN tee loose to allow for the determination of best routing of vacuum tube.

Note:

Some minor repositioning of the factory manifold pressure lines may be required to accommodate the extra length of the tee.

5.) See figure 1-3. **For all 03-00012-1 tubing modifications, use standard maintenance practices found in AC 43.13-1B section 9-30**. Flare one end of 03-00012-1 tube and inspect it. When the flare is satisfactory, slide AN819-3D sleeve and AN818-3D nut over tube and seat on the flare. Apply approximately 90 degree bend to tube in proper location to allow the tube to be routed from the AN894D4-3 reducer, upward along firewall near the adjacent lines.

6.) Trim 03-00012-1 tube length as required, then install 193-3 hose with 6504 hose clamp and route along firewall toward AS-MPSBA-1 vacuum switch.

7.) See Figure 1-1. Locate suitable point on 193-3 hose, 4-8” inboard of the AS-MPSBA-1 vacuum switch. Install AS-IF-1 in-line filter onto 193-3 hose with 6504 hose clamps.

Note:

Install AS-IF-1 filter with larger diameter toward AS-MPSBA-1 vacuum switch.

8.) Trim 193-3 hose to length and ensure it is a straight cut. Install hose to connect AS-IF-1 in-line filter to AS-MPSBA-1 vacuum switch and secure with 6504 clamps.

Note:

Use care when removing or installing hoses from AS-IF-1 in-line filter and AS-MPSBA-1 vacuum switch hose barbs. They can easily be broken if sideloaded, causing manifold pressure leaks and/or faulty operation.

9.) Secure 193-3 hose to engine frame and firewall with supplied adel clamps as required to ensure security and adequate clearance to firewall.

Note:

Install one washer under each adel clamp nut.

10.) Ensure all hose connections are secured with supplied 6504 hose clamps. Ensure all manifold pressure connections that were loose are now secure and leak free.

11.) Fabricate a plug-in vacuum switch harness in reference to Figures 1-4 and 3-1.

12.) See Figure 1-1 and 1-4. Connect 640917-1 vacuum switch harness spade terminals to AS-MPSBA-1 vacuum switch and ty-rap harness as required to facilitate future accessibility of the test connector.

13.) Disconnect manifold pressure line from engine in area where is most accessible. Pressurize manifold pressure system to maximum allowable manifold pressure as indicated on cockpit MP gage. Ensure all tee fitting, reducer, vacuum tube, and hose connections are leak free.
14.) Reconnect manifold pressure line.
15.) Repeat steps 1-14 for installing opposite side vacuum switch.

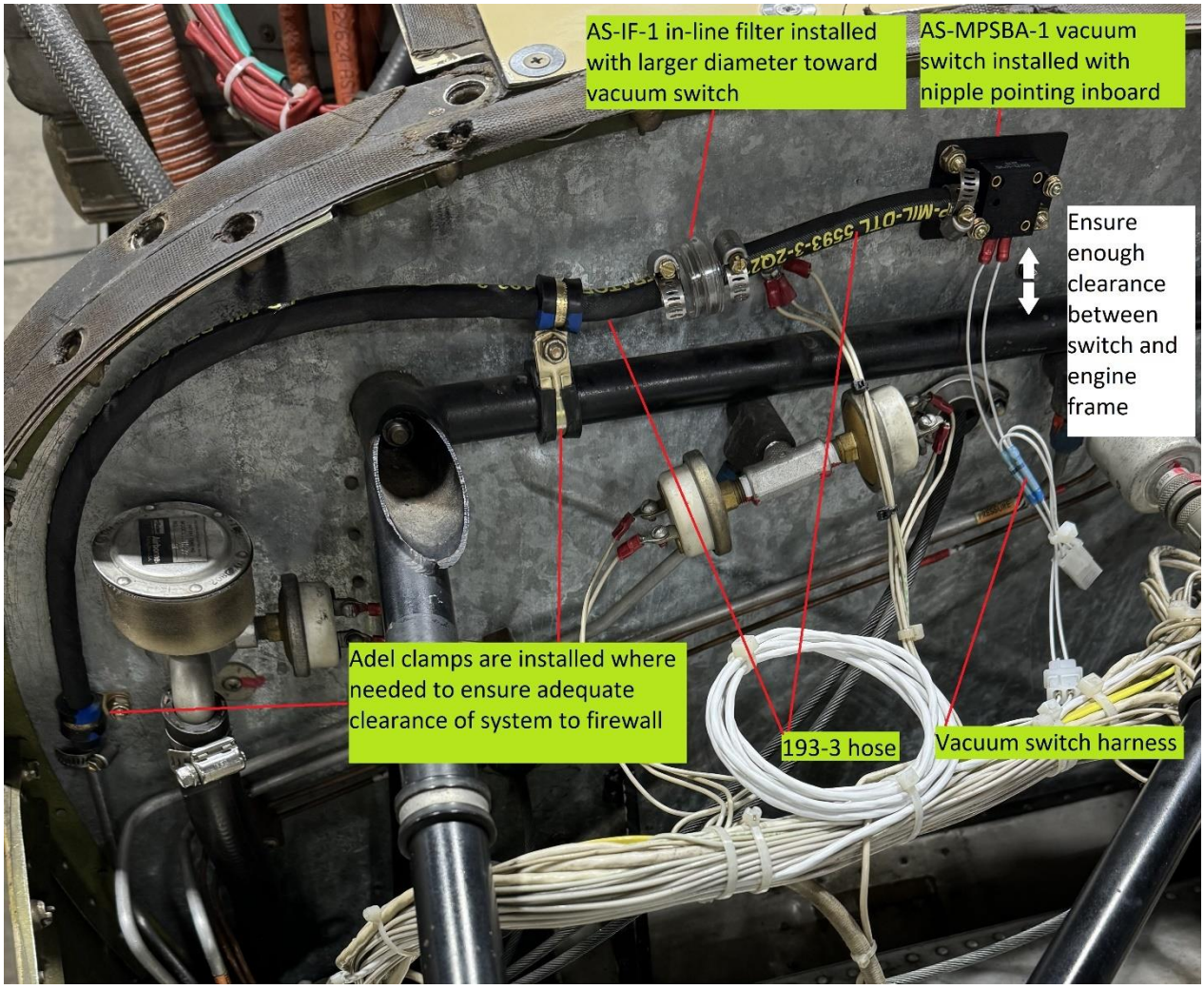

Figure 1-1. AS-MPSBA-1 Vacuum Switch Installation

Figure 1-2. Factory Manifold Pressure Union

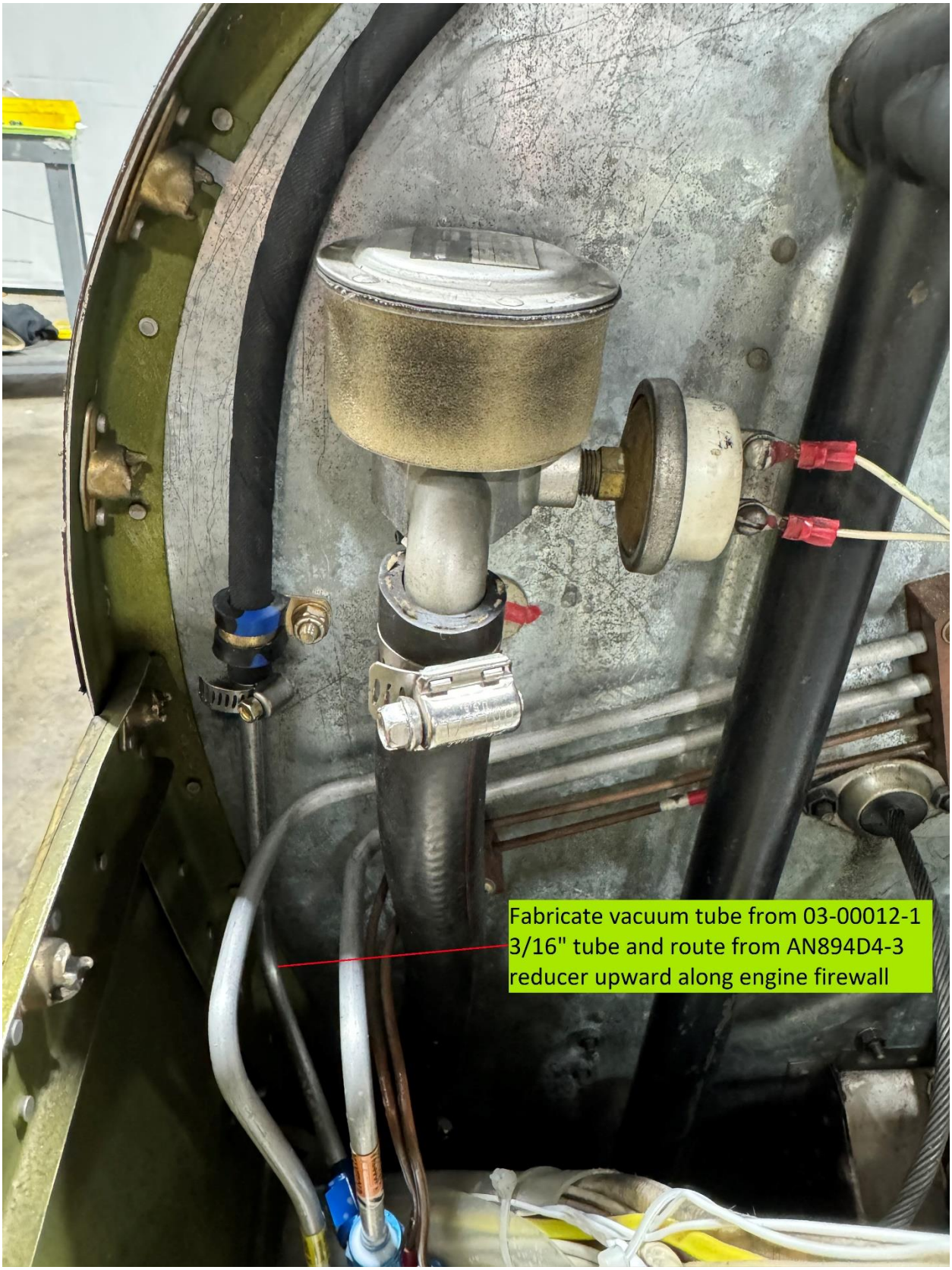

Figure 1-3. Vacuum Tube Routing

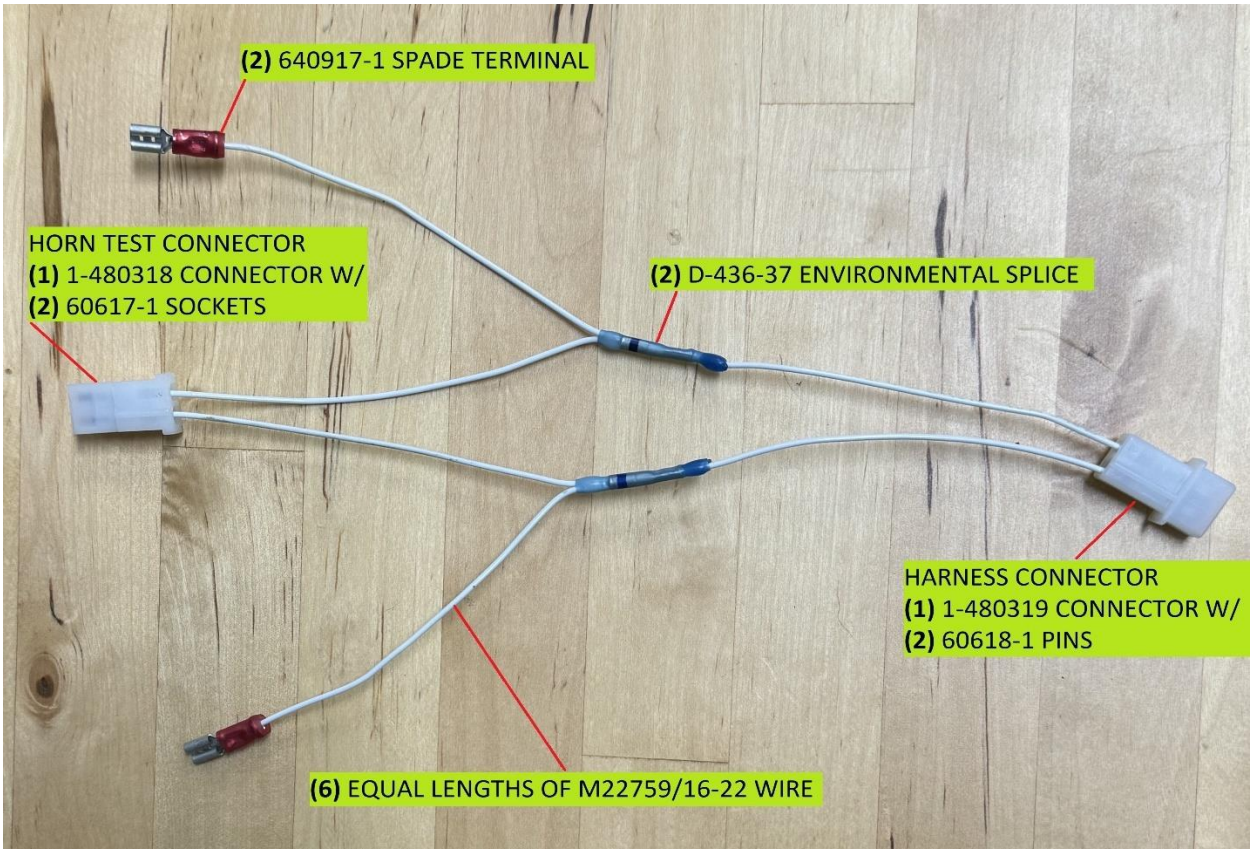

Figure 1-4. Vacuum Switch Harness

4.2 AS-GHBA-1 Gear Horn Installation

The Gear Horn and supplied bracket will be mounted utilizing supplied hardware.

1. See figure 2-1. Locate factory gear and stall warning horn holder under pilot side instrument panel. Remove factory flasher and gear horn.
2. See figure 2-2. Partially install AS-GHBA-1 gear horn into FWD wire block mount hole with existing wire block hardware.
3. Align the base of the AS-GHBA-1 gear horn mount plate approximately parallel with factory horn holder, then mark remaining mount hole location.
4. Remove AS-GHBA-1 horn, drill marked mounting hole location with a #18 or #19 bit, then reinstall horn with supplied hardware as shown in Figure 2-2. Ensure supplied lock washers are installed under each mount nut.
5. See Figure 2-2 and wiring diagram in Figure 3-1. **Make necessary wiring connections utilizing supplied hardware and standard maintenance practices found in AC 43.13-1B.**
6. Secure and ty wrap wiring as required.

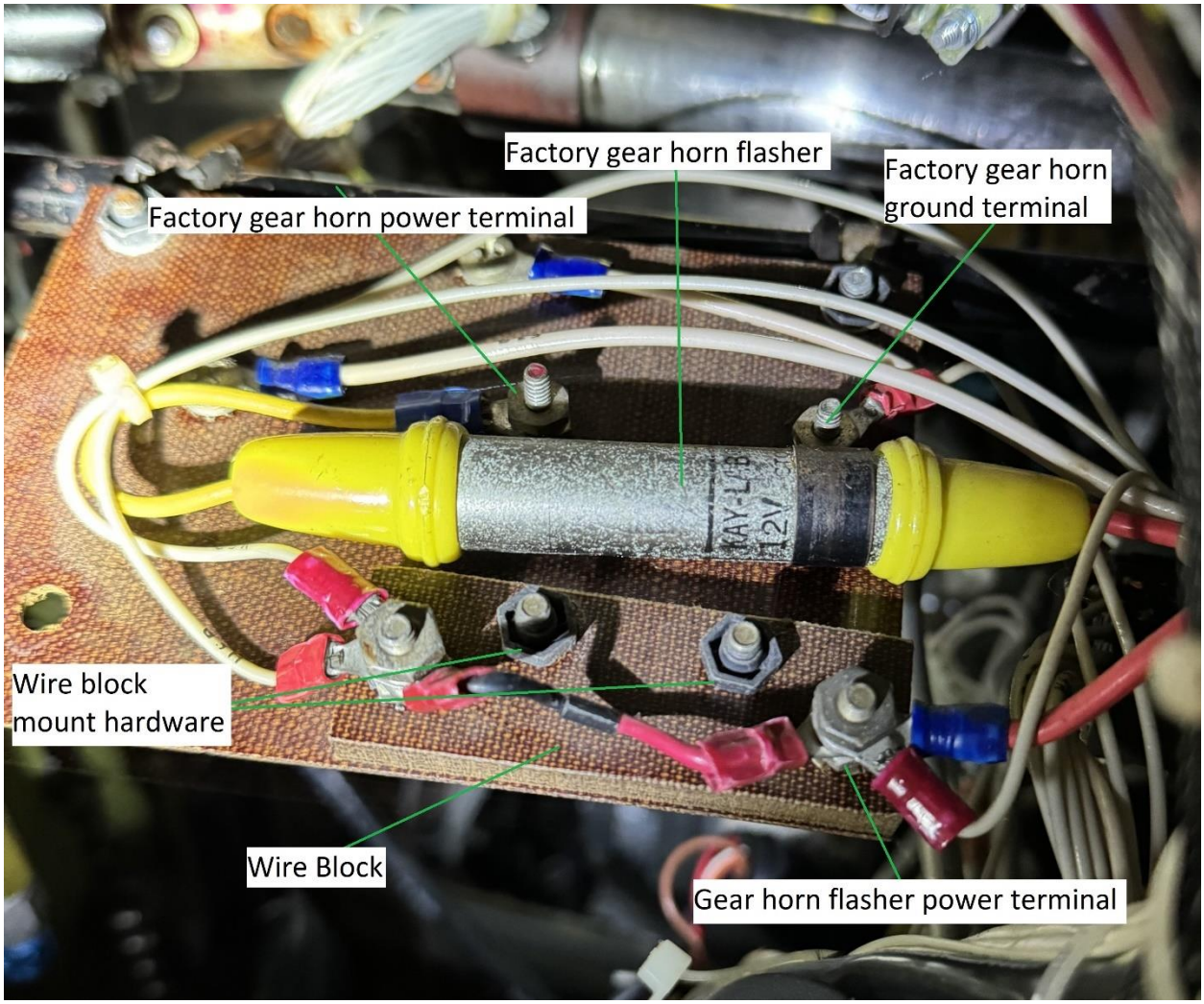

Figure 2-1. PA-34 Factory Gear Horn Installation and Wiring

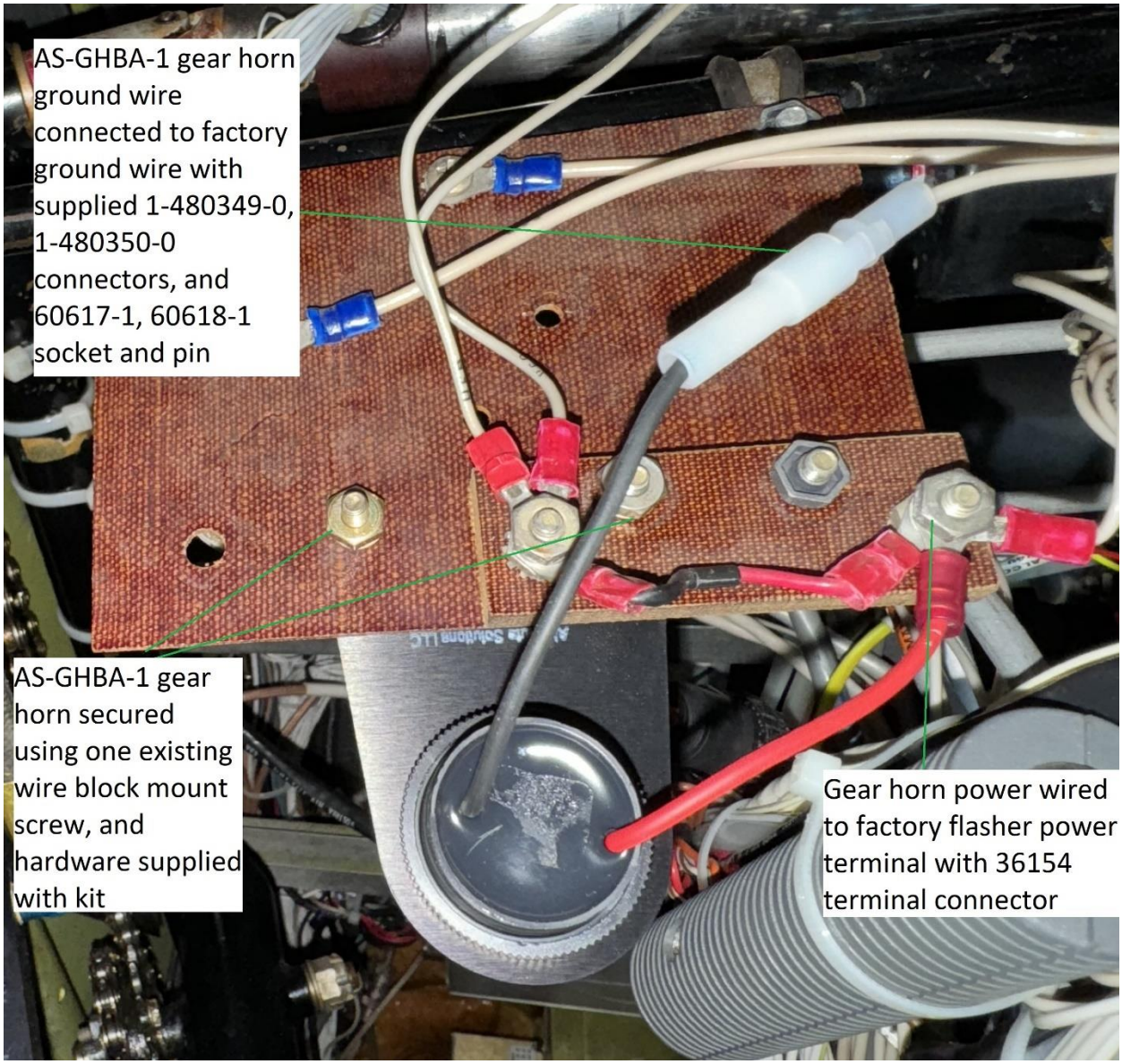

Figure 2-2. PA-34 AS-GHBA-1 Gear Horn Installed

4.3 DC60S3 Relay and Wire Harness Installation

Note:

The DC60S3 relay must be wrapped in heat shrink supplied with kit after installation to prevent arcing of contacts. It is acceptable to cut the heat shrink so that it may be wrapped around the DC60S3 relay then secured with ty raps to avoid removing wiring connections.

1.) Remove throttle position switches with associated brackets. Retain throttle position wires noted in Figure 3-1.
2.) Secure DC60S3 relay to existing wire bundles in a convenient area, provided the relay or associated wiring does not interfere with flight controls or any other systems.
3.) Fabricate a two-pin jumper harness from throttle switch wires G4A and G4B to the correct numbered relay terminals noted in Figure 3-1.
4.) See figure 3-1. Fabricate (2) two-pin wire harnesses to connect the vacuum switch harnesses noted in Figure 1-1, to the correct numbered terminals on the DC60S3 relay. Wiring between AS-MPSBA-1 switches and DC60S3 relay must be routed along existing wire bundles behind leading edge wing panels. Wire harness can be fabricated using M22759/16-22 wire. **Use standard installation practices referenced in AC 43.13-1B Ch. 11.**

WARNING

Ensure all installed wiring does not interfere with flight controls or any other systems.

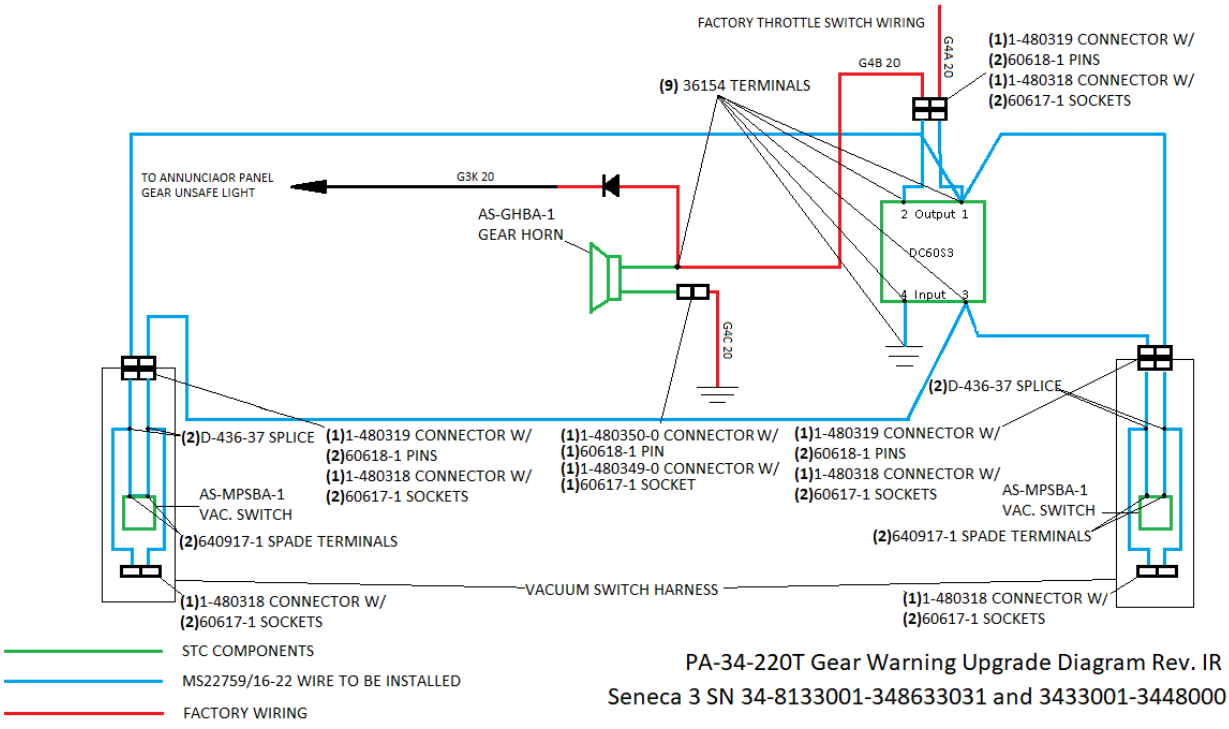

Figure 3-1. PA-34-220T Wiring Diagram

4.4 Removal Information

Follow sections 4.1-4.3 in reverse order as required to facilitate component removal.

CAUTION

Use care when removing or installing hoses from AS-IF-1 in-line filter and AS-MPSBA-1 vacuum switch hose barbs. They can easily be broken if sideloaded, causing manifold pressure leaks and/or faulty operation.

5.0 INSTALLATION CHECKS

5.1 System Testing

Use a generic automotive style vacuum bleeder hooked up to a manifold pressure source to apply simulated engine vacuum. Calibration of the AS-MPSBA-1 vacuum switch is preset and should not require adjustment. However, adjustments can be made to the AS-MPSBA-1 switch trigger point if necessary, see section 5.2.

Test

1. Place aircraft on jacks for system ops check using manufacturer maintenance manual procedures.
2. Disconnect Left and Right manifold pressure lines from engine.
3. Power on aircraft, and retract landing gear.
4. Connect vacuum bleeder to either Left or Right manifold pressure line.
5. With landing gear retracted, reduce manifold pressure to approximately 14”HG. Ensure gear horn operates. If gear horn does not come on at between 12-16”HG, proceed to Calibration section 5.2.
6. Repeat steps 5 and 6 for opposite engine.

Test 2

1. Extend landing gear.
2. With the bleed tester hooked to either right or left manifold pressure line, reduce manifold pressure to below 12”HG. Ensure Gear Horn *does not* operate.
3. Re secure each manifold pressure line to each respective engine.

5.2 Adjustment Procedure For AS-MPSBA Vacuum Switch.

See Figure 4-1. The vacuum switch trigger point may be adjusted via the small flat-head adjustment screw located on the face of the AS-MPSBA-1 vacuum switch. The adjustment screw is sensitive, therefore very small adjustments will yield desirable results.

Adjusting screw clockwise decreases the amount of vacuum required to close the switch.

Adjusting screw counter-clockwise increases the amount of vacuum required to close the switch.

Adjust screw in or out to achieve a trigger point of 14” HG as indicated on manifold pressure gage.

CAUTION

Ensure AC power is off when turning adjustment screw as it is electrically active.

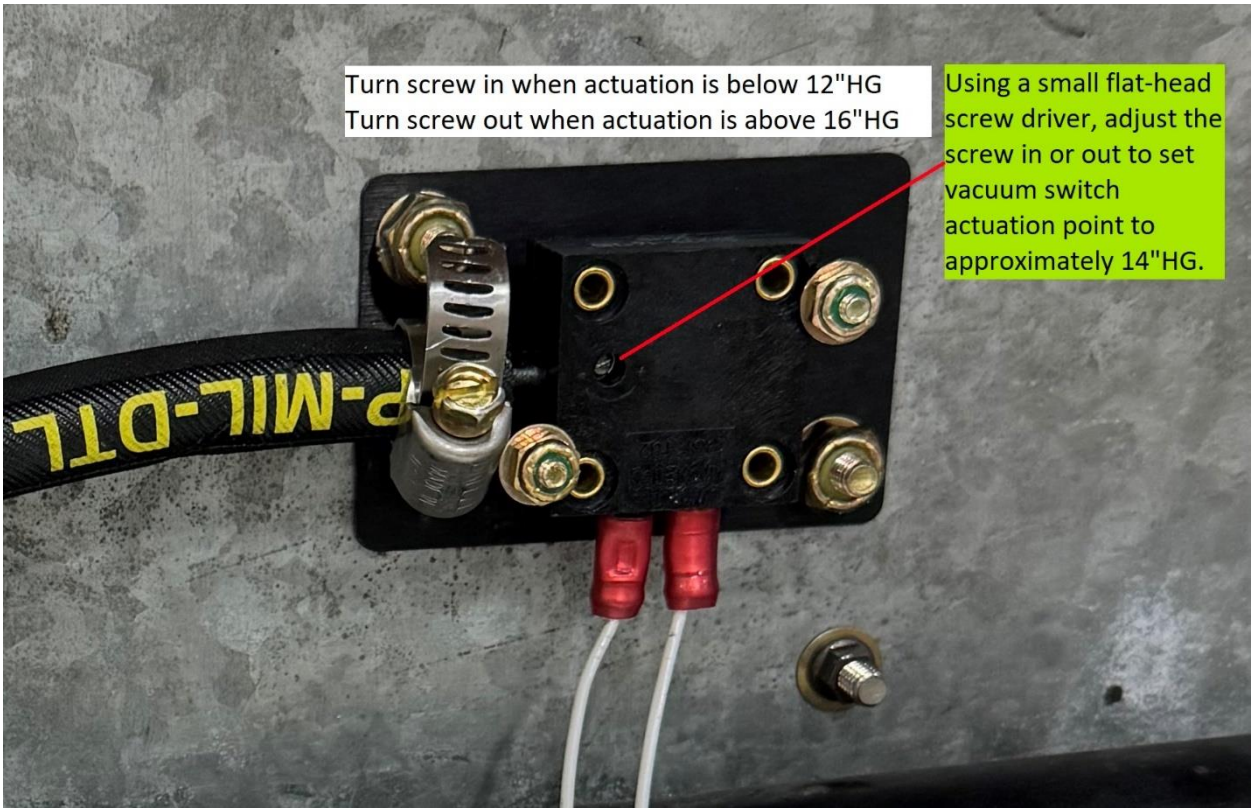

Figure 4-1. AS-MPSBA Adjustment