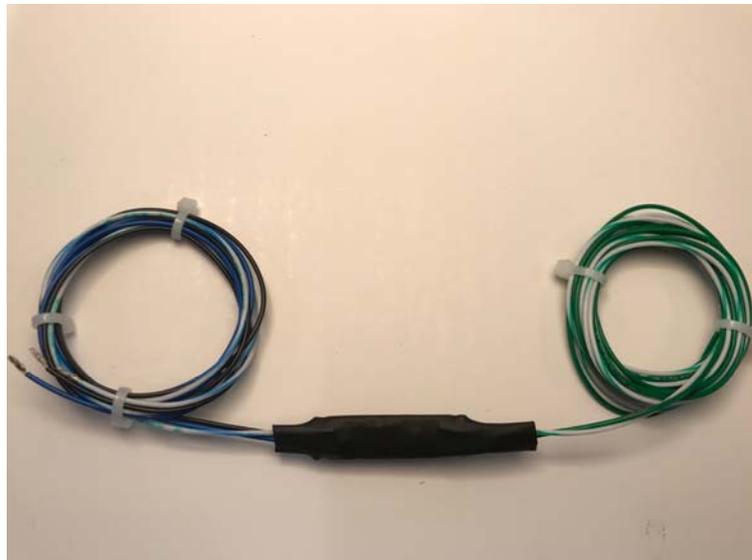


Safety-Trim™

Auto-pilot Interface

Model: ST-API



The Safety-Trim Autopilot interface allows the Garmin G3x Auto-pilot to be coupled to a Safety-Trim Controller. Contact TCW for other autopilot compatibility.

The Safety-Trim system provides run-away trim prevention and two speed trim operation. Additionally, the Safety-Trim system may be coupled to multiple trim switches including panel mounted and control stick mounted switches. Safety-trim is available in models for controlling standard Ray-Allen type DC motor servos as well as larger DC servo motors up to 10 amps.

The ST-API is a very small module that accepts the trim outputs from the Garmin G3x auto-pilot system and allows them to be coupled into any of the Safety-Trim controllers.

The Garmin G3x autopilot trim system is limited to only one set of trim input switches and a maximum of 1 amp servo motors. When the ST-API is coupled to a G3X autopilot system any number of trim switches may be utilized. When the ST-API is coupled to a Safety-Trim HD unit trim servo motors up to 10 amps may be controlled.

Safety-Trim and its accessories must be installed using the current aircraft standards and practices. Refer to AC 43.13-2A/1B. The installer/builder is solely responsible for determining the suitability of the installation and use of this product.

Installation instructions:

1) Install the Autopilot system as detailed in the installation instructions for the Garmin G3x system. (or per equivalent system if using a different brand system).

DO NOT WIRE THE TRIM SWITCHES TO THE GARMIN AUTOPILOT.
Wire the trim switches to the Safety-Trim system only.

2) Install the TCW Safety-Trim per its specific installation instructions, including wiring of all trim switches to the Safety-Trim controller.

3) Wire the Safety-Trim Auto-Pilot interface per the following wiring diagram.

The ST-API receives the trim signals from the Autopilot and converts them into to signals compatible with the Safety-Ttrim controller. The ST-API output wires are simply wired in parallel with the manual trim switches that are connected to the Safety-Trim Controller.

4) Set up the Garmin Autopilot to provide single speed trim control with NO speed adjustment with airspeed. Adjustable trim speed is done in the Safety-Trim controller via the adjustments found on the side of the Safety-Trim controller. Utilize an ASW-1 airspeed switch or flap torque tube switch to activate the two speed operation.

PRODUCT OPERATION

NORMAL Operation:

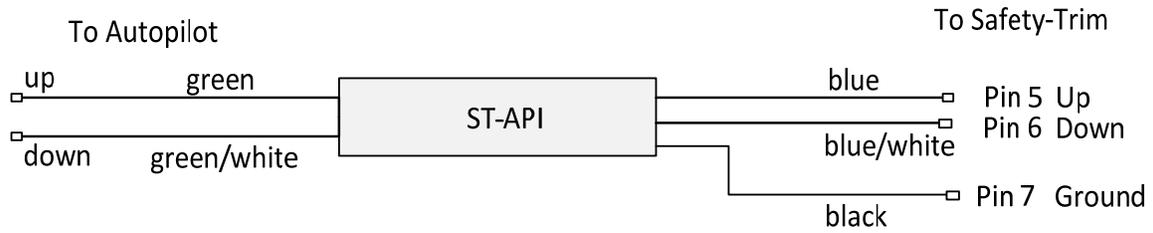
- 1) Place the power switch in the “ON” position.
- 2) Use the trim input switches to drive the respective trim servo in the desired direction.
- 3) If you hold a trim switch closed for more than 3 seconds, the trim servo will stop moving the control surface. If you want more trim authority than commanded in 3 seconds, release the trim switch and press again. This will provide an additional 3 seconds of trim motion.
- 4) Any time you let go of a trim switch, the servo will stop moving.

Autopilot trim operation.

When the autopilot is engaged any trimming requirements are sent to the Safety-Trim controller which in turn drives the trim servo. No pilot action is required.

TCW Technologies, LLC.
2955 Main Road East
Emmaus, PA 18049

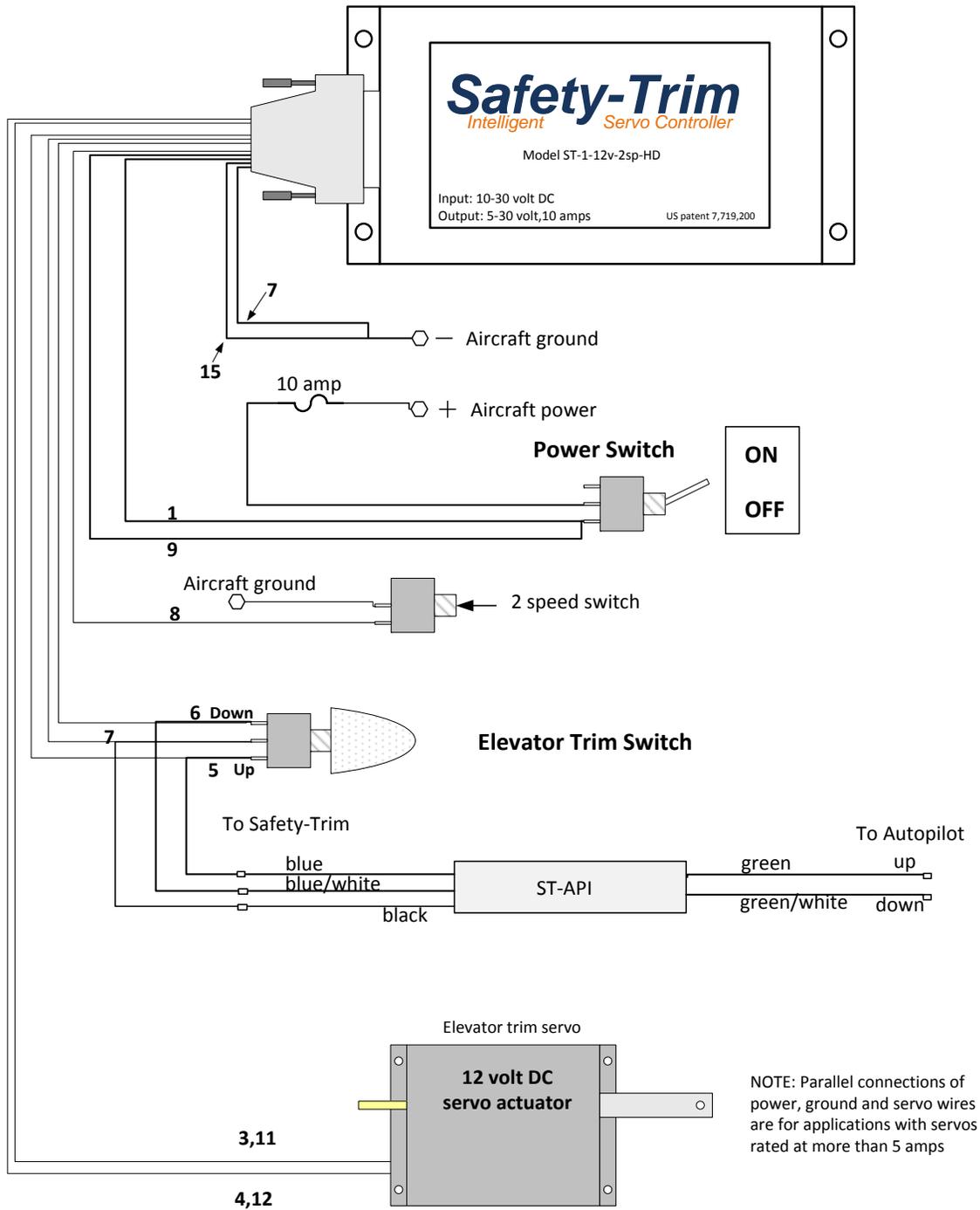
610-928-3420
www.tcwtech.com
support@tcwtech.com



Wire additional trim switches in parallel to the pin5/pin 6 connections that are connected to the Safety-Trim controller.

Product dimensions: 0.375" x 1.5" with mil-spec 22awg wire

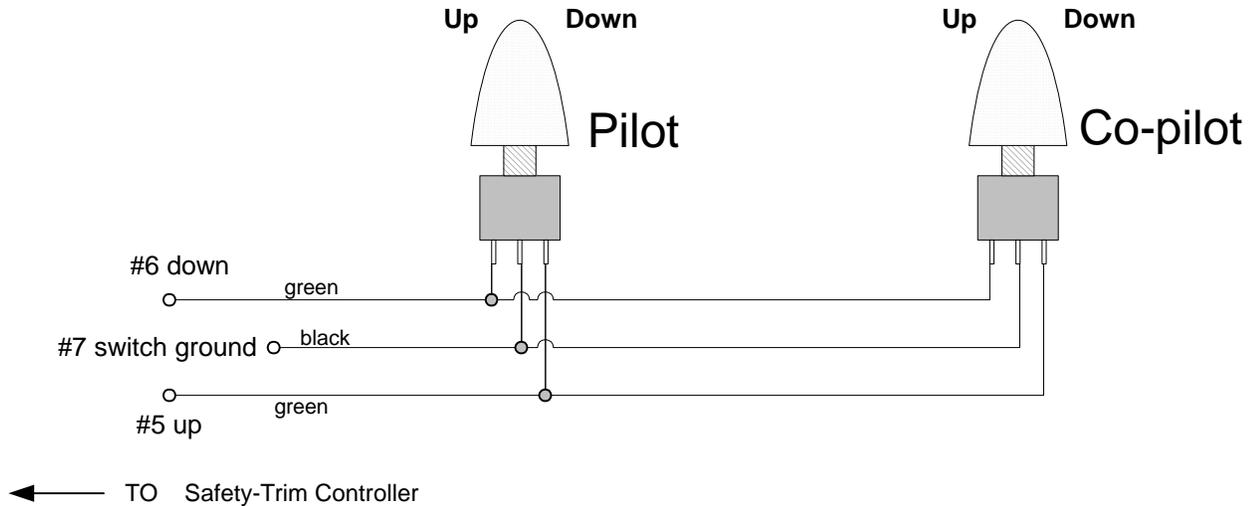
Wiring Diagram Model ST-1-12v-2sp-hd with ST-API



Application Note #1

Multiple Switch Wiring Details

TYPICAL "hat switch" wiring, each switch is a momentary type



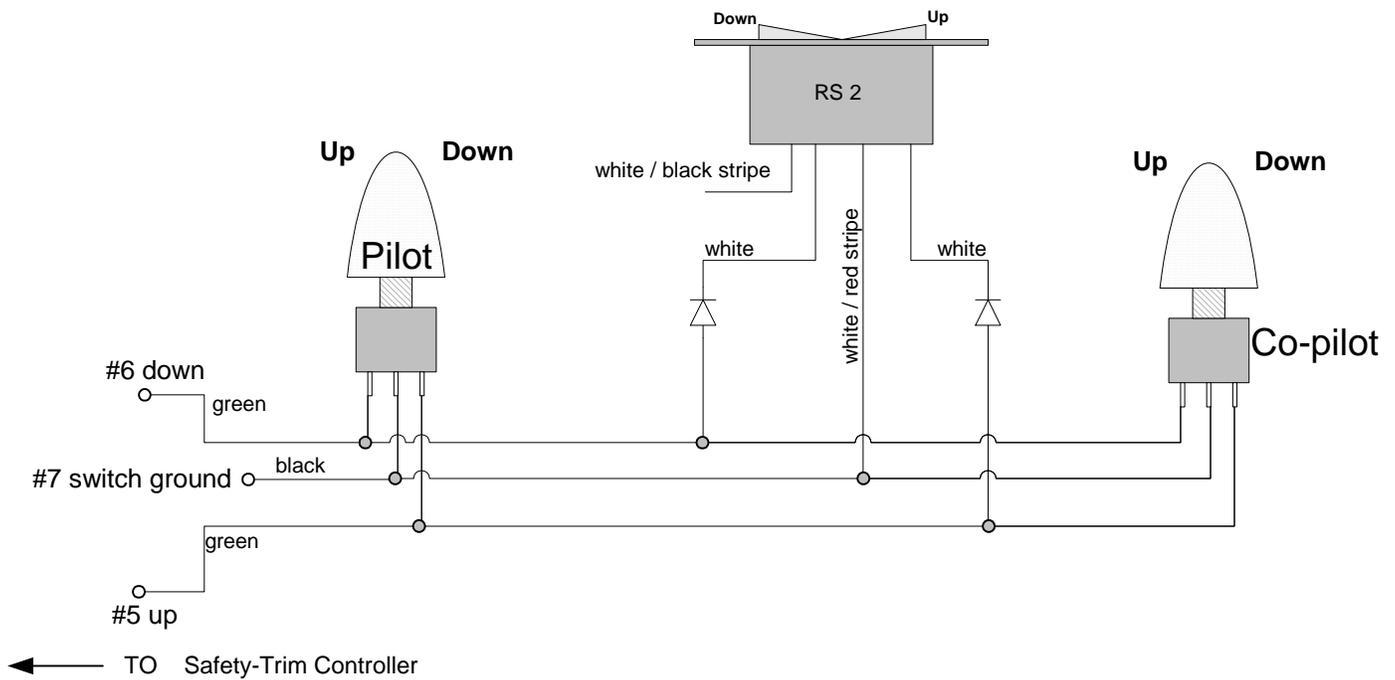
Note: Aileron or Rudder trim switches may be wired in the same manner.

Note: Additional STANDARD SPST and SPDT switches may be wired in parallel

Note: See Application Note #2 and #3 for details on RAY ALLEN Rocker Switch RS2

Application Note #2

Using Ray Allen RS 2 Rocker switch with additional "hat switches"



Note: Diodes may be any general purpose diode such as 1N914 or 1N4004

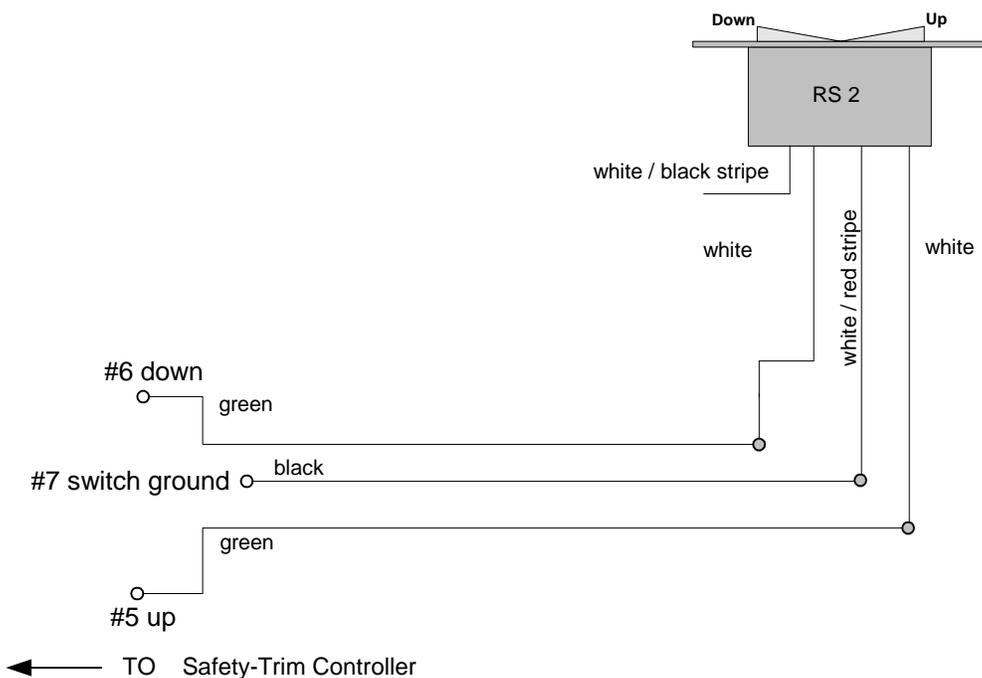
Note: RAY ALLEN Rocker Switch RS2 is of a custom design, in the neutral position the white wires are shorted together

Note: Aileron or Rudder trim switches may be wired in the same manner.

Rev 1, Nov 3, 2007
Safety-Trim switch wiring

Application Note #3

Using Ray Allen RS 2 Rocker switch with no other switches



Note: RAY ALLEN Rocker Switch RS2 is of a custom design, in the neutral position the white wires are shorted together

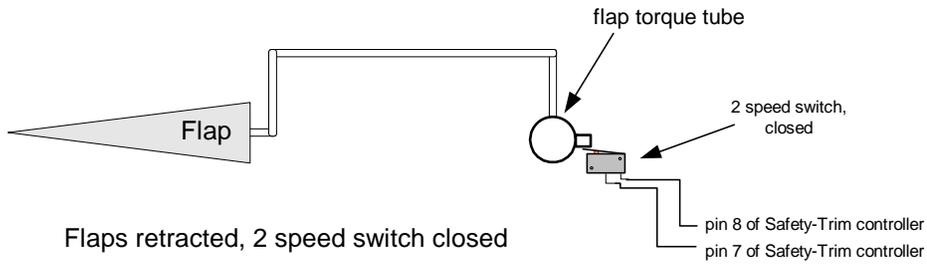
Note: Aileron or Rudder trim switches may be wired in the same manner.

Rev 1, Nov 3, 2007
Safety-Trim switch wiring

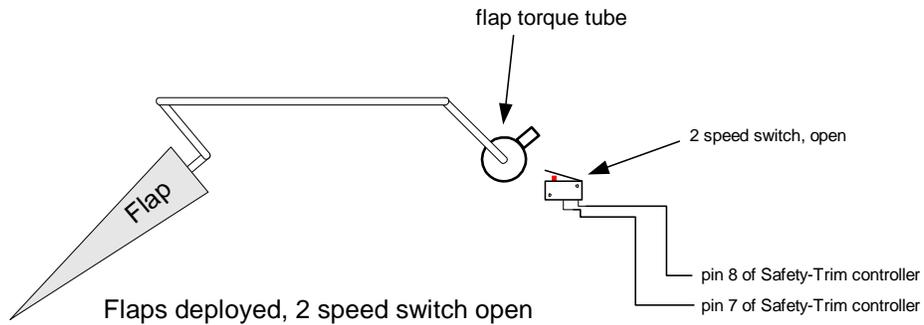
Application Note #4

2 speed switch detail

Mount a micro-switch near the flap torque tube. Attach a small bracket to the torque tube that activates the 2 speed switch when the flaps are retracted



"Speed 2 selected"

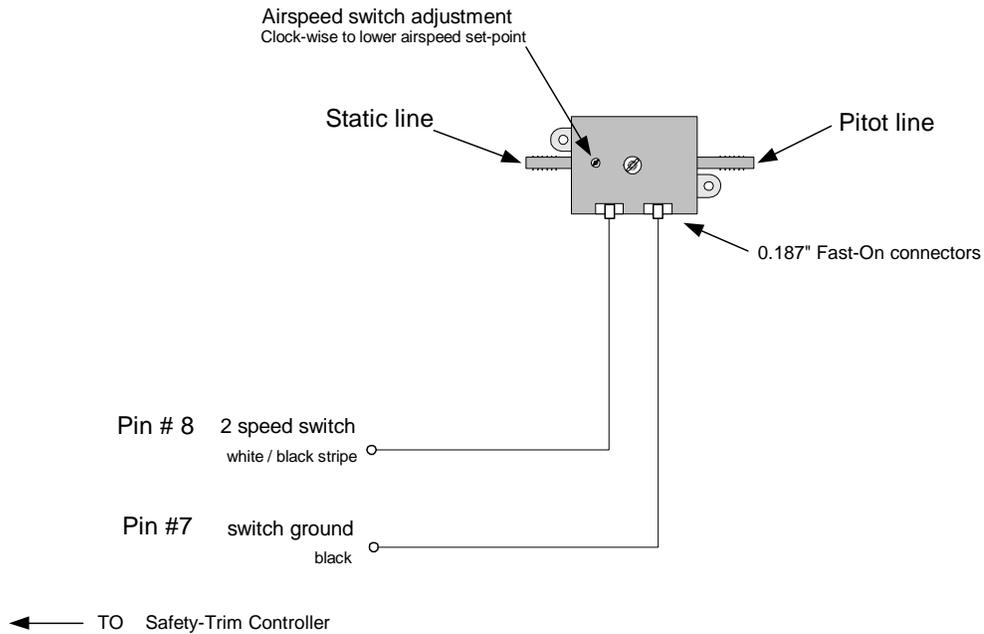


"Speed 1 selected"

Application Note #5

ASW-1

Airspeed Switch for 2 speed selection of Safety-Trim



Note: Pin #7 is a common switch ground for all trim switches and the airspeed switch. An airframe ground may be used as an alternative

Note: Adjustment ranges is about from 55 knots to 140 knots. Factory calibrated to 100 knots.

Rev 1, Dec 22, 2007
Safety-Trim
Airspeed Switch wiring detail

TCW Technologies, LLC.

During the first 24 months from the date of purchase and subject to the conditions hereinafter set forth, TCW Technologies, LLC. (TCW) will repair or replace to the original user or consumer any portion of your new Safety-Trim product which proves defective due to defective materials or workmanship of TCW. Contact TCW Technologies for warranty service. TCW shall have and possess the sole right and option to determine whether to repair or replace defective equipment, parts or components. Damage due to equipment, environment or conditions beyond the control of TCW Technologies are NOT COVERED BY THIS WARRANTY.

LABOR, COSTS: TCW shall IN NO EVENT be responsible or liable for the cost of field labor or other charges incurred by any customer in removing and/or reaffixing any TCW product, part or component thereof.

THIS WARRANTY WILL NOT APPLY: (a) to defects or malfunctions resulting from failure to properly install, operate or maintain the unit in accordance with printed instructions provided; (b) to failures resulting from abuse, accident, or negligence; (c) to normal maintenance services and the parts used in connection with such service; (d) to units which are not installed in accordance good trade practices; or (e) to unit used for purposes other than for what it was designed and manufactured.

RETURN OR REPLACED COMPONENTS: any item to be replaced under this Warranty must be returned to TCW Technologies in Emmaus, PA, or such place as TCW may designate, freight prepaid.

PRODUCT IMPROVEMENTS: TCW reserves the right to change or improve its products or any portions thereof without being obligated to provide such a change or improvement for units sold and /or shipped prior to such change or improvement.

WARRANTY EXCLUSIONS: as to any specific TCW product, after the expiration of the time period of the warranty applicable thereto as set forth above. THERE WILL BE NO WARRANTIES, INCLUDING ANY IMPLIED WARRANTIES OR MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. No warranties or representations at any time made by any representative of TCW shall vary or expand the provisions hereof.

LIABILITY LIMITATION: IN NO EVENT SHALL TCW OR ITS AFFILIATES BE LIABLE OR RESPONSIBLE FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES RESULTING FROM OR RELATED IN ANY MANNER TO ANY TCW PRODUCT OR PARTS THEREOF. THE SUITABILITY OF USE OF THE SAFETY-TRIM PRODUCT IS TO BE DETERMINED BY THE AIRCRAFT HOMEBUILDER.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state. In the absence of other suitable proof of this installation date, the effective date of this Warranty will be based upon the date of manufacture plus one year. Direct All Notices To: Warranty and Product Service Department, TCW Technologies, 2955 Main Rd. E., Emmaus, PA 18049