# *Safety-Trim*™

## Single Axis Servo Booster

Models:
**ST-1-12v-10a-BSTR**
**ST-1-24v-10a-BSTR**

Safety-Trim Single Axis Servo Booster is an electronic speed controller designed specifically to operate DC electric servo motors up to 10 amps of rated current.

The Safety-Trim Booster can receive input commands from compatible autopilot systems such as the Garmin G3x GSA 28 or a traditional dpdt type rocker switch. The servo booster receives trim commands from the autopilot system to enable the auto-trim function and in turn drives servo trim motors requiring up to 10 amps of rated current. The servo booster may receive constant drive signals from a traditional trim switch or PWM signals up to 25 kHz to allow for variable rate trim functions

Safety-Trim is to be used with DC trim motors and linear actuators rated for operation at up to 10 amps. 14 and 28 volt models are to be used with 14 and 28 volt actuators respectively. No other uses are permitted. Safety-Trim is not TSO'd and must only be used in aircraft certified in the Experimental category.

Safety-Trim 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:

**NOTE: ST-1-12v-10a-BSTR for 14 volt applications**
**ST-1-24v-10a-BSTR for 28 volt applications**

1) Mount an on/off power switch or pull-able circuit breaker for the trim controller in a suitable place in the aircraft and in reach of the pilot.

2) Connect the two RED #20 gauge wires coming from the connector to the power switch to provide + Aircraft Power via a 10 amp fuse or circuit breaker.
Connect the two BLACK #20 gauge wires to – Aircraft ground. (as shown on the wiring diagram)

3) Connect the trim input wires (green) to the corresponding wires as shown in the wiring diagram. Connect these wires to the trim output terminals of the autopilot servo. DO NOT connect an additional manual switches to these inputs when utilizing an autopilot trim servo controller.

4) Pin #2 provides current limited power to a manual trim switch. This is an optional connection. Alternate sources of manual trim switch power may be provided through a separate CB or fuse.

5) Connect the trim motor to the Servo Booster outputs. Utilize one pair of wires if the motor current is 5 amps or less. Utilize the redundant wire pairs if the motor current is between 5-10 amps. It is highly recommended to connect the power wire, ground wire and input wires first, then temporarily connect the respective trim servo motor wires to verify the control surface moves in the correct direction. The polarity of the trim servo motor wires will vary in different aircraft and MUST be confirmed in your application.
YOU MUST ensure the trim surface moves in the proper direction as activated by the trim switches. You may need to swap the elevator trim motor wires A+, A- to get the elevator trim to go in the proper direction. ONLY after verification of correct motion should you make permanent connections to the trim servo motors.
DO NOT LET THE SERVO WIRES TOUCH EACH OTHER OR GROUND, this will damage the Servo Booster!

6) Mount the Safety-Trim Control box inside the aircraft using the mounting tabs on the enclosure.

7) ALL programing of the trim system is completed utilizing the instructions provided by the Autopilot manufacturer. The Safety-trim Servo Booster follows the commands issued by the autopilot auto-trim function, it does not have any internal adjustments.

## 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 or utilize the auto-trim function per the instructions provided by the autopilot manufacturer.

3) If any problem with the trim system is detected move the power switch to the ‘OFF” position.

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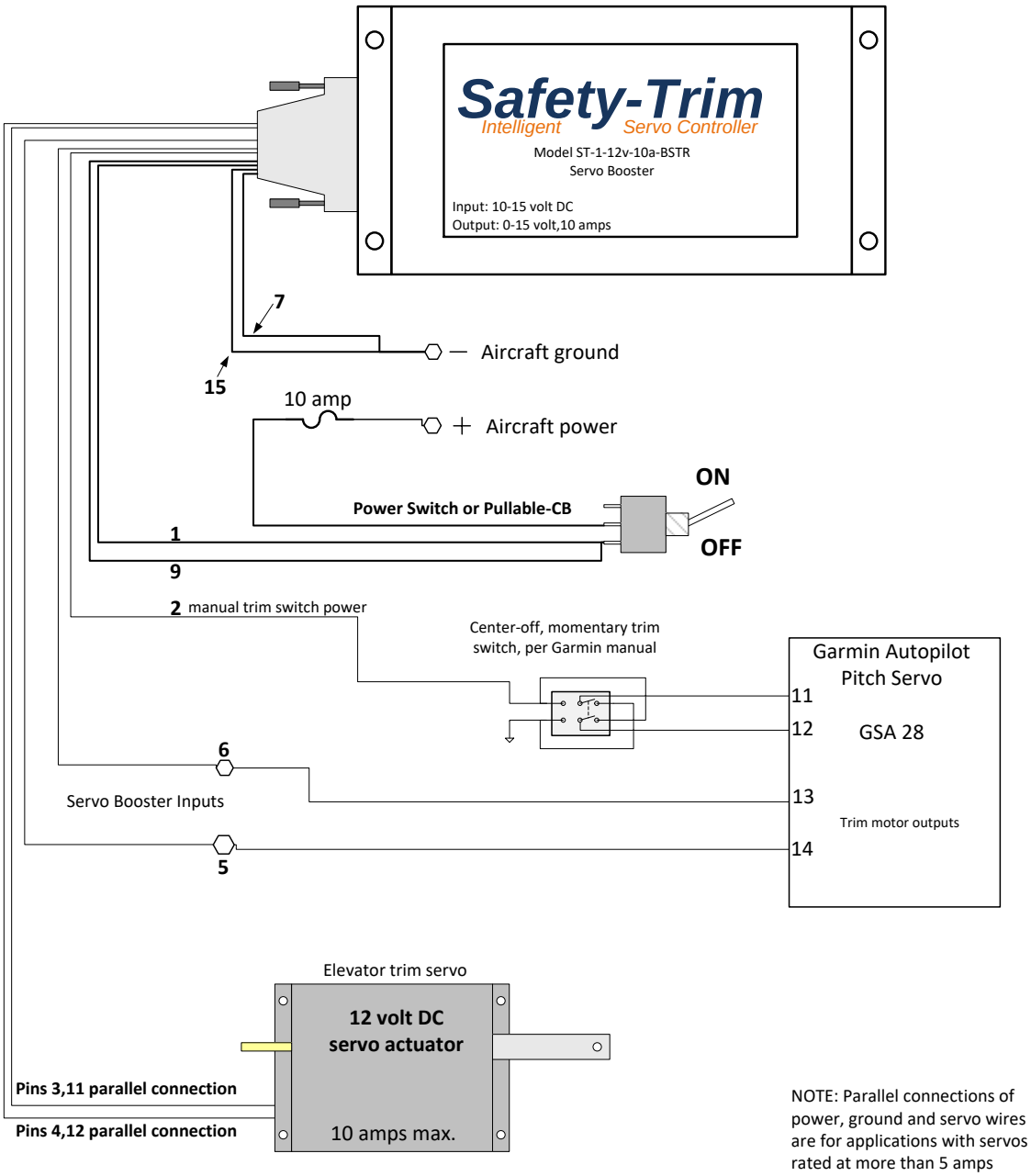
# Wiring Diagram Model ST-1-12v-10a-BSTR

Interconnection to Garmin G3x autopilot




NOTE: Parallel connections of power, ground and servo wires are for applications with servos rated at more than 5 amps

# Wiring Harness Connector Detail

## Safety-trim Booster

Dsub-15 Female on wiring harness, male on booster

| Pin # | Function | Wire color |
|---|---|---|
| 1 | Power + | WHITE |
| 2 | SWITCH POWER OUT<br>100mA limited | White/black |
| 3 | Trim motor + | RED/white |
| 4 | Trim motor - | GREEN |
| 5 | Input from A/P | BLUE |
| 6 | Input from A/P | BLUE |
| 7 | Ground | BLACK |
| 8 | | |
| 9 | Power + | WHITE |
| 10 | | |
| 11 | Trim motor + | RED/white |
| 12 | Trim motor - | GREEN |
| 13 | | |
| 14 | | |
| 15 | Ground | BLACK |

**NOTE:**

**USE redundant connections for the following pins when motor load is greater than 5 amps**

**Power, ground, trim motor + and motor -**

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.

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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 Road East. Emmaus, PA 18049