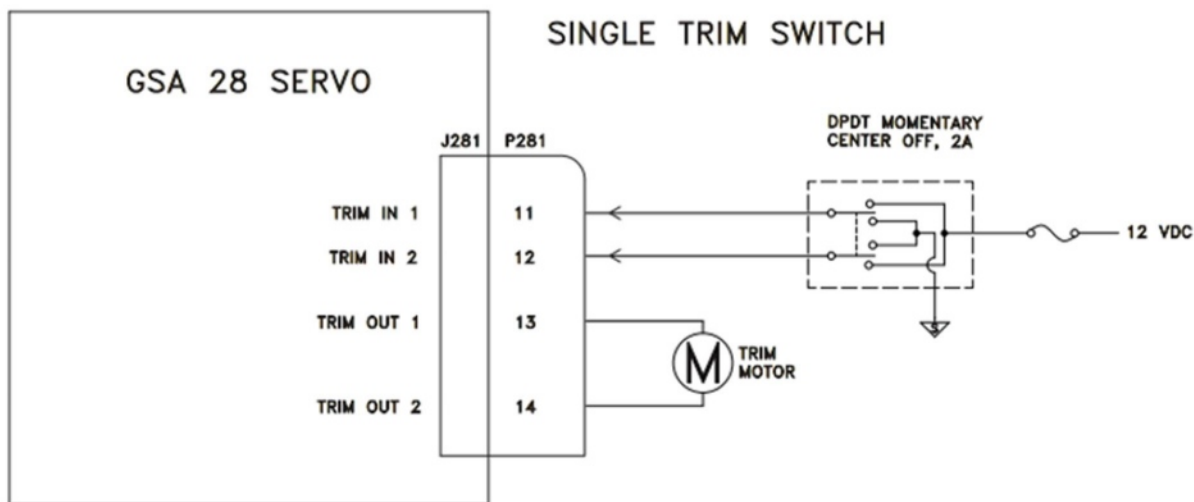


GSA 28 3rd party Trim Motor Control in a G3X Touch System

Basic System Architecture

The GSA 28 provides an interface between the pilot's electric trim switch and a 3rd party 14 VDC trim motor. The stick switch is connected to Trim In 1 and Trim In 2 on the GSA 28. When the switch is active in one direction or the other, one input is connected to 12 volts, and the other to ground and vice versa, allowing for operation of the trim motor in either direction. When the GSA 28 autopilot servo is powered, the output to the trim motor is generated by the GSA 28 itself using PWM (Pulse Width Modulation) with optional speed scheduling to run the trim slower as airspeed increases, for finer control of the trim tab. If the GSA 28 loses power for any reason, the GSA 28 trim inputs are tied directly to the GSA 28 trim outputs through a normally closed bypass relay, and the pilot's switch controls the trim motor directly.



This is a description of the 3 trim control states of the GSA 28 autopilot servo: Backup Trim Mode, Speed Scheduled Manual Trim and Auto-Trim.

- Speed Scheduled Manual Trim: GSA 28 Autopilot Servo Powered, Autopilot Disengaged

This is the normal mode of operation when the GSA 28 is powered, but the autopilot is not engaged. With the GSA 28 servo powered on, the normally closed bypass relay opens and the GSA 28 Autopilot servo will use a PWM signal to drive the trim motor in response to pilot input. The trim control inputs on pins 11,12 of the servo are read by the servo microprocessor, and the output to the trim motor is generated by the GSA 28. This allows the GSA 28 to react to pilot input, and automatically reduce the speed of the trim motor at higher airspeeds, in order to provide finer control of trim tab position, based on a pre-determined configuration.

- Auto Trim: GSA 28 Servo Powered, Autopilot Engaged

When the autopilot is engaged in the air, it automatically drives the connected trim motor as required to relieve control forces for associated primary control surface. This helps ensure the aircraft will be properly trimmed when the autopilot is later disengaged. It is very similar to the previous mode except that the servo ignores the Trim Switch inputs (except to disengage the autopilot) and drives the trim motor based on out-of-trim torque sensing that it does on its own. If the servo is powered with the autopilot engaged and auto trim feature is enabled, the servo has full control of the trim outputs. Both the CWS/AP Disconnect and Manual Trim switch will disengage the autopilot, and prevent the GSA 28 from commanding any trim movement absent of pilot input.

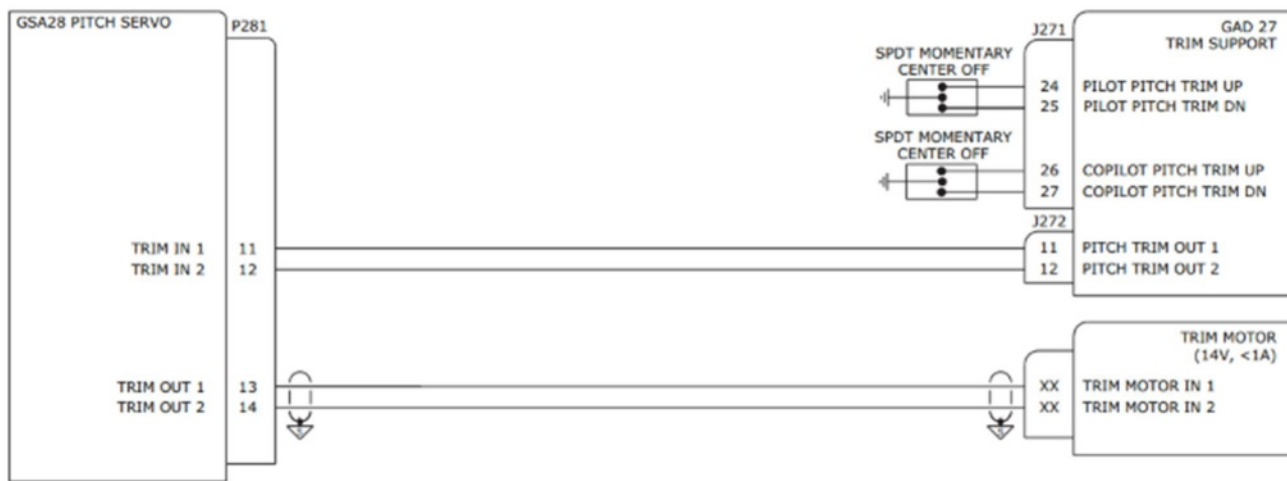
- Backup Trim Mode: GSA 28 Servos Powered Down

In the event that power is removed or lost to the GSA 28, a fail-safe system allows for the trim switch to power the trim motor directly and at full speed. The normally closed bypass relay behaves such that when power is removed to the servo, it closes and passes the trim through without connecting it to the internals of the autopilot. The wires connected to input pins 11,12 at the servo are directly connected to output pins 13,14 to provide direct control input to the trim motor.

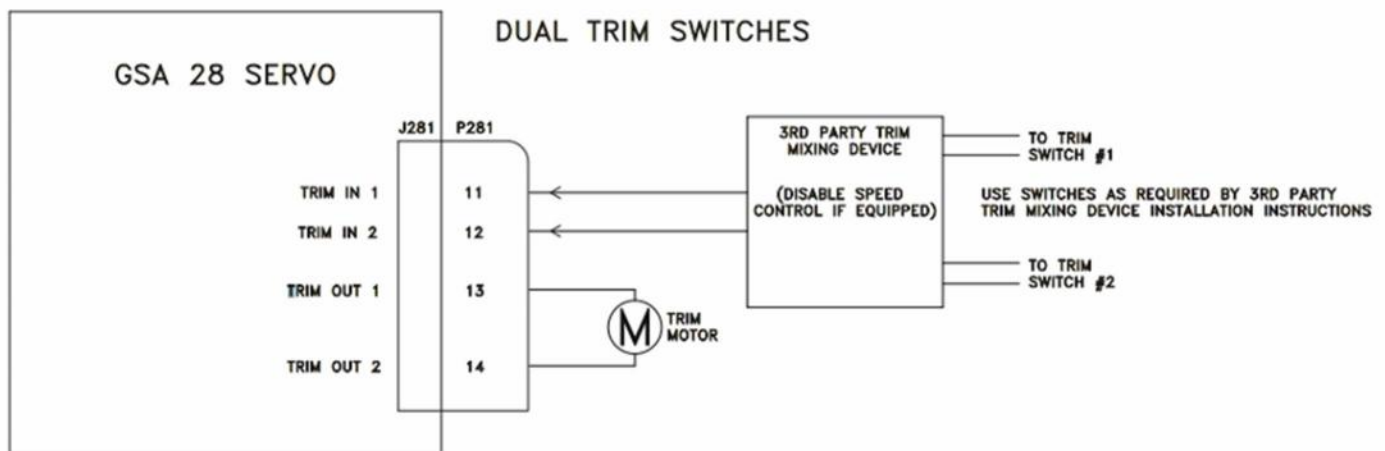
Pilot and Co-Pilot Trim Control

The GSA 28 supports a single trim switch input only. For use with multiple trim switches (e.g. pilot and co-pilot), a GAD 27 or other third-party device capable of mixing multiple trim switches into one output is required.

- The GAD 27 can be used to facilitate two trim inputs (24,25 and 26,27) into one trim output signal (11,12) to the GSA 28. Trim power is brought into the GAD 27 apart from all other power inputs on pins 1 and 2. Based on the state of the switches, a trim command can be generated, sourcing power from GAD 27 pins 1 and 2, to the GSA 28 Trim inputs out of the GAD 27 (11 and



- 3rd Party Trim mixing devices can accomplish the same thing. The VP-X is an example, when using a mixing device such as the VP-X it is important to disable speed control on the mixing device if present.



3rd Party Trim Motor Compatibility

- The GSA 28 trim outputs are capable of sourcing a maximum of 1A of current to drive a DC trim motor at 12V, or a maximum of 500 mA of current to drive a DC trim motor at 24V.
- Do not connect a trim motor that requires higher current, this may damage the trim outputs of the GSA 28. For higher current trim motors, a third party interface may be used.
- The DC trim motor connected to the GSA 28 should be rated for the full power supply voltage being used to power the GSA 28. If the GSA 28 is connected by a 24-28V power input, the trim motor must also be rated for 28V.
- The GSA 28 does not provide a voltage step-up service. To drive a 24V trim motor, the GSA 28 must be to be supplied with 24V or higher

