S-TEC 3100 Digital Autopilot
Technical Specification

Revision 2, March 2018
## Revision History

<table>
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<th>Rev</th>
<th>Notes</th>
<th>Date</th>
<th>Author</th>
</tr>
</thead>
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<tr>
<td>1</td>
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1 Introduction

The S-TEC 3100 autopilot system must be installed in accordance with the applicable STC instructions which will supersede any information contained within this document. The following information can be used to aid in the planning and preparation for installing an S-TEC 3100 autopilot system.

This document is not controlled and is subject to change without notification.

1.1 S-TEC 3100 Description

The S-TEC 3100 is a panel mount, three-axis, attitude-based digital flight control system certified to FAA TSO-C198, Class A1 (Fixed Wing Autopilot), Class B (Yaw Damper) and Class C (Flight Director). The Autopilot can operate from a 14v or 28v nominal DC power supply and provides pitch, roll and yaw (optional) modes and control; along with separate Altitude Selector and Alerter modes. The S-TEC 3100 has automatic electric pitch trim as standard on all aircraft models.

The S-TEC 3100 introduces new technology and features over existing S-TEC autopilots such as envelope protection, straight and Level mode, integrated Yaw Damper and can drive up to 4 servos. Compatibility options have increased with 8 ARINC receive ports, bi-directional targets/modes and configurable software options.

The S-TEC 3100 has a flight guidance computer (FGC) and front panel interface combined into one unit and situated in the cockpit.

The pilot interface consists of buttons and knobs on the front panel to selected modes and set targets. Remote mounted switches are also used for supplementary inputs. A LCD display on the front panel indicates modes, settings and events along with an audio output to enunciate important events.

Integration to an EFIS or glass display is optional for annunciating modes and providing targets to the FGC

1.2 Regulatory

Compliance
TSO-C198 Automatic Flight Guidance and Control System Equipment (AFGCS); RTCA/DO-325
Class A1 – Fixed Wing Autopilot
Class B – Yaw Damper
Class C – Flight Director

Software
RTCA/DO-178B Level A; [Voice Annunciations Level C]

Hardware
Not Applicable, no complex hardware

Environmental
RTCA/DO-160G

Altitude
S-TEC 3100 certified to 50,000ft
Servos certified to 35,000ft

Humidity
S-TEC 3100 – 95% @65°C for 6 hours; 85% @38°C for 16 hours
Servos – 95% @50°C for 6 hours; 85% @38°C for 16 hours

Operating Temperature
-55°C to +70°C

Power Requirements
14 or 28 Volts DC; Typically 3 amps @ 28 Volts per FGC board
Systems with yaw capability will have dual board FGC’s
Systems without yaw will have single board FGC’s

Weight
S-TEC 3100 FGC 2.6 lbs
S-TEC 3100 mounting tray 0.5 lbs
Standard servo 2.9 lbs
2 Description of Operation

2.1 General Control Theory

The S-TEC 3100 is a three-axis attitude based autopilot which controls the roll, pitch, and yaw axes through selected modes of operation. The modes are selected via the front panel and the FGC utilizes attitude, air data and navigation information to drive the servo motors. The 3 primary servo motors are used to control the elevator (pitch), aileron (roll) and rudder (yaw) flight control surfaces and control the aircraft flight path and a secondary servo motor is used to adjust the pitch trim tab keeping the aircraft in trim. The selected modes and targets can be bi-directionally transferred between the FGC and a compatible EFIS.

2.2 Principal Modes of Operation

2.2.1 Roll Axis Control

Autopilot (AP) Mode Used to Engage Roll Servo
Flight Director (FD) Mode Used to Laterally Drive Steering Command Bars
Roll Attitude (ROLL) Mode Used to Hold Roll Attitude
Heading (HDG) Mode Used to Turn onto a Selected Heading and Hold it
Navigation (NAV) Mode Used to Intercept and Track a VOR Course
Approach (APR) Mode Used to Intercept and Track a LOC Front Course Inbound
GPS Lateral (GPSL) Mode Used to Intercept and Track a GPS Precision (WAAS) Course Inbound
Reverse (REV) Mode Used to Intercept and Track a LOC Back Course Inbound
Control Wheel Steering (CWS) Mode Used to Capture and Hold new Roll Attitude, Pitch Attitude, Indicated, Airspeed, Vertical Speed, or Altitude
Global Positioning System Steering (GPSS) Mode Used to Laterally Steer along a Course defined by GPS
Automatic Trim Mode Used to Automatically Trim about the Axis

2.2.2 Pitch Axis Control

Autopilot (AP) Mode Used to Engage Pitch Servo
Flight Director (FD) Mode Used to Vertically Drive Steering Command Bars
Pitch Attitude (PITCH) Mode Used to Hold Pitch Attitude
Indicated Airspeed (IAS) Mode Used to Hold Indicated Airspeed
Vertical Speed (VS) Mode Used to Hold Vertical Speed
Altitude Hold (ALT HOLD) Mode Used to Hold Altitude
Glideslope (GS) Mode Used to Intercept and Track Glideslope
GPS Vertical (GPSV) Mode Used to Intercept and Track a GPS Precision (WAAS) Glideslope
Automatic Trim Mode Used to Automatically Trim about the Axis

2.2.3 Yaw Axis Control (as applicable)

Yaw Damper (YD) Mode Used to Dampen Excessive Adverse Yaw and apply a coordinated turn
Automatic Trim Mode Used to Automatically Trim about the Axis
2.3 Envelope Protection

The S-TEC 3100 envelope protection constantly monitors the aircraft flight performance and greatly reduces the chance for inadvertent stalls or over-speeds.

If the aircraft approaches stall while the S-TEC 3100 autopilot is engaged, the autopilot will automatically reduce the pitch angle to maintain safe flight. An annunciator alert will notify the pilot. In situations involving over speed, similar corrections and warnings are implemented to mitigate potentially hazardous maneuvers.

2.4 Straight and Level

The Straight and Level button provides fast, simple recovery from an unusual attitude if the pilot should lose situational awareness or become disoriented. With a single button push, the Straight and Level function is engaged and overrides previous inputs to safely return the aircraft to a neutral attitude.

2.5 Flight Director

The S-TEC 3100 can operate as an autopilot, a flight director, or both. When operating as an autopilot, the S-TEC 3100 provides drive to the servo motors to control the aircraft. When operating as a flight director, the servo motors are disengaged and the FGC outputs roll and pitch flight director commands. The flight director data can be sent via ARINC or analog signals.

When operating as both an autopilot and flight director, the AP and FD behaviors are the same.

2.6 Altitude Preselect

Altitude preselect is built into the S-TEC 3100 autopilot computer but requires baro-corrected altitude information. Without baro-corrected altitude the autopilot is unable to climb or descend the aircraft to a specific altitude target. Altitude hold would still be available.

2.7 Yaw Damper

The S-TEC 3100 will be certified with yaw functionality for certain aircraft makes and models. Some aircraft may not require yaw control which will be decided during the STC development work. Yaw calculations and control are processed inside the flight guidance computer rather than a separate unit, therefore the 3100 will also include control for coordinated turns.

2.8 Automatic Electric Trim

All S-TEC 3100 systems include automatic electric pitch trim as standard. Roll and yaw trim control are not available with the 3100 autopilot.
3 System Components

3.1 Major Component List

The units shown below are typical for an S-TEC 3100 system. Each installation will have specific mounting provisions and control system interface connections unique to that aircraft model/group.

<table>
<thead>
<tr>
<th>Major LRU Component</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Board Flight Guidance Computer (no Yaw)</td>
<td>01326-04-02-000</td>
</tr>
<tr>
<td>Dual Board Flight guidance Computer (with Yaw)</td>
<td>01326-01-02-000</td>
</tr>
<tr>
<td>Roll, Yaw and Trim Standard Servo (14Vdc)</td>
<td>0105-XX-XX</td>
</tr>
<tr>
<td>Roll, Yaw and Trim Standard Servo (28Vdc)</td>
<td>0106-XX-XX</td>
</tr>
<tr>
<td>Pitch Servo with Trim Feedback Sensors (14Vdc)</td>
<td>0107-XX-XX</td>
</tr>
<tr>
<td>Pitch Servo with Trim Feedback Sensors (28Vdc)</td>
<td>0108-XX-XX</td>
</tr>
<tr>
<td>Sandia SAC 7-35 Air Data Computer (includes install kit)</td>
<td>705548-00</td>
</tr>
<tr>
<td>Hardware Kit</td>
<td>HK-xxx</td>
</tr>
<tr>
<td>Documentation Kit</td>
<td>DK-xxx</td>
</tr>
</tbody>
</table>

3.2 S-TEC 3100 Flight Guidance Computer (FGC)

3.2.1 General Description

The S-TEC 3100 FGC is the main processing unit for the autopilot system. It controls all of the input/output processing, control law calculation and provides analog drives for up to 4 servos (pitch, roll, yaw and pitch trim).

The FGC requires navigational and target data and uses this information to provide the correct servo drive signals. Mode selection can be controlled through the front panel.

3.2.2 Single/Dual Board Configurations

The S-TEC 3100 FGC can be configured with a single processing PCB board to drive pitch, roll and pitch trim servos. There is no yaw capability on a single board FGC, therefore the bezel will not have YD button or associated LED.

Dual board FGC’s are required to add the additional yaw drive and processing. These units will also have the additional YD button and LED on the front bezel.

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Single board FGC with no Yaw Damper capability

Dual board FGC with Yaw Damper capability
3.2.3 **Internal Attitude Source**

The S-TEC 3100 has an on board MEMS device that can calculate attitude angles and rates in the pitch, roll and yaw axis. This can be configured to act as the primary or single source of attitude on certain interface configurations. If there is an external AHRS or ADAHRS source available providing attitude information to the 3100, the internal attitude source will act as a secondary comparator in most cases.

3.2.4 **Software Configuration**

Each S-TEC 3100 is loaded with a single configuration file which contains aircraft and interface configuration data to match the installation. Please be aware that any future avionic upgrades on equipment that is interfaced to the autopilot may require a new 3100 configuration file to be uploaded.

**Aircraft Configuration**

The aircraft configuration contains the specific gains and servo drive values to match the aircraft flight characteristics. The gain values are specifically setup during STC flight testing and are calculated for the optimum flight performance of each aircraft model / type.

**Interface Configuration**

The S-TEC 3100 has been designed to interface to both modern digital EFIS systems and older analog navigation and heading systems. The interface configuration ensures that the 3100 maximizes performance by utilizing any available data from both digital and analog sources.

3.2.5 **Installation**

The FGC is mounted within the cockpit of the aircraft and secured within a mounting tray.

The FGC uses two 78 pin DB connectors for power, ground and interconnecting wires.

3.2.6 **Part Numbers**

There are two part numbers of FGC available for the S-TEC 3100 to denote single and dual board configurations.

<table>
<thead>
<tr>
<th>Part Number Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Board Flight Guidance Computer (no Yaw)</td>
<td>01326-04-02-000</td>
</tr>
<tr>
<td>Dual Board Flight guidance Computer (with Yaw)</td>
<td>01326-01-02-000</td>
</tr>
<tr>
<td>Configuration File</td>
<td>9394-xxx-xxx</td>
</tr>
</tbody>
</table>

The configuration file part number will be specific to the aircraft and interface setup. Each FGC will have an additional label indicating the current configuration. The configuration is also displayed on the initial splash page when the unit is powered on.

![Diagram](image-url)
3.2.7 *FGC Dimensions*

- Panel Cutout

Dimensions:
- Height: 1.47
- Width: 6.15
- Note: 4X R.020
3.3  Servo Assemblies

3.3.1  General Description
The S-TEC 3100 servos will be used to move the aircraft control surfaces. They are driven by the FGC using pulse width modulated (PWM) signal. The pulse width modulation allows the FGC greater control over the speed of servo during fluctuations in aircraft voltage.

The PWM signal removes high startup voltage problems common with older servo installations. The servo is always provided with full power and the speed controlled by the frequency of pulses, rather than a ramp up voltage system used on previous S-TEC autopilot systems.

3.3.2  Part Numbers
Different servo part numbers are available to suit the function and characteristics required. The base part number will indicate the type of the servo with the following dash numbers for the variation, function and gear ratio.

```
XXXX - X - XX
```

- Gear motor dash number
- Servo Function (P = Pitch; R = Roll; Y = Yaw; T = Trim)
- Capstan variation
- Base Part Number

The specific type and part number of the servos are controlled by the STC and will be provided depending on the STC kit ordered.

3.3.3  Standard Servo
Standard servos can provide up to 75 in-lbs of torque and have different capstan options to suit particular aircraft flight control surfaces. [For torque requirements greater than 75 in-lbs please refer to heavy duty servos]

The gear motor dash number will determine the rate of movement which can range from 0.3 to 33 nominal RPM. Different capstans are available to accommodate different flight control cable sizes or push/pull rods.
3.3.4 **Standard Servo Dimensions**

NOTE: Different variations in capstan design will alter the dimension specifications. The example below shows a typical bridle cable style capstan.

---

3.3.5 **Heavy Duty Servo**

Heavy duty servos are occasionally required for larger control surfaces and house additional gearing which can provide up to 200 in-lbs of torque and have different capstan options to suit particular aircraft flight control surfaces.

The gearing ratio will determine the rate of movement which can range from 0.3 to 16 nominal RPM.

Different capstans are available to accommodate different flight control cable sizes or push/pull rods.

3.3.6 **Heavy Duty Servo Dimensions**

NOTE: Different variations in capstan design will alter the dimension specifications. The example below shows a typical bridle cable style capstan.
3.3.7 **Installation**

Servos can be installed to drive the pitch, roll and yaw axis and pitch trim tabs. The mounting positions will vary between each airframe and may require special brackets to be manufactured for securing the servo in place. Typically the servo will attach to the existing control system using a bridle cable clamped onto the control cable. Brackets and bridle cables will be provided as part of the STC installation kit.

![Image of Servo Installation](image)

3.3.8 **Capstan Variations**

The capstan type and setting will be determined by the STC process.

Control rod capstans can be connected directly to the aircraft control rod, although some installations may require additional hardware.

Additional gearing and clutch adjustments can be adjusted to suit the torque and speed requirements of the installation.

This is a typical capstan which will use a bridle cable to attach to the existing control wires.

Additional gearing and clutch adjustments can be adjusted to suit the torque and speed requirements of the installation.

Capstan with sprockets are available on some servo part numbers.

Additional gearing and clutch adjustments can be adjusted to suit the torque and speed requirements of the installation.
3.3.9 **Clutch/Torque Adjustments**

The servo clutch is typically not set to a particular torque at the factory. Servo motor assemblies are delivered with the cotter pin uninstalled so the installation facility can set the clutch as needed for their particular installation. The gear ratio which, sets the capstan speed, will determine the maximum torque setting available for each particular part number of servo. The clutch can then be set anywhere below this maximum to meet the specific aircraft requirements.

3.4 **Sandia SAC 7-35 Air Data Computer**

3.4.1 **General Description**

The SAC7-35 is a solid state -1000 to 35,000 foot Air Data Computer and altitude encoder manufactured by Sandia Aerospace and supplied with the 3100 system for certain non-EFIS configurations. Specific details can be requested from Sandia or referenced in the installation manual (P/N 305586-00) which is supplied with the STC data package.

3.4.2 **Part Numbers**

Please refer to the Sandia 7-35 installation manual for specific part numbers of equipment.

3.4.3 **Autopilot System Integration**

The ADC is required for non-EFIS installations that do not have a digital source of air data. The ADC provides essential airspeed and altitude data required for the 3100 internal attitude source to calculate attitude angles and rates. The ADC is also used for altitude information to aid with altitude preselect and capture.

3.4.4 **SAC 7-35 Dimensions**

![SAC 7-35 Dimensions Diagram]
3.4.5  **Installation**

The SAC 7-35 is uses a mounting tray secured to the airframe and installed in accordance with the Sandia installation manual 305586-00. The ADC will require typical electrical connections as well connections to the pitot/static system and an OAT probe.

3.5  **Hardware kit**

3.5.1  **General Description**

Each STC will be provided with the relevant electrical and hardware components necessary to complete the installations. Wiring harnesses will not be provided but the hardware kit will contain the connectors/pins/sockets required to fabricate a harness.

3.5.2  **Typical Kit Contents**

<table>
<thead>
<tr>
<th>Electrical Hardware</th>
<th>Switches – Trim master, AP master, GA, disconnects, manual trim….</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Connectors – Dsubs, pins, sockets, backshells….</td>
</tr>
<tr>
<td></td>
<td><strong>Circuit Breakers</strong></td>
</tr>
<tr>
<td></td>
<td>Flap pot potentiometer and relays</td>
</tr>
<tr>
<td></td>
<td>Various solder sleeves, diodes, terminal rail, splices….</td>
</tr>
<tr>
<td>FGC Hardware</td>
<td><strong>Mounting tray and spacers</strong></td>
</tr>
<tr>
<td>Servo Hardware</td>
<td><strong>Brackets, cotter pin, bridle cable….</strong></td>
</tr>
<tr>
<td>General Hardware</td>
<td><strong>Placards, nuts, bolts, screws, washers….</strong></td>
</tr>
</tbody>
</table>

3.5.3  **Upgrade Kit Contents**

Upgrade kits will be supplied with the necessary components applicable with the type of upgrade. For example, servo hardware will not be supplied if there is no servo supplied with the upgrade.

55X upgrades will be supplied with components to fabricate an adaptor harness.

3.6  **Documentation Kit**

S-TEC installations will be provided an STC data package containing all the diagrams and an installation bulletin typical of S-TEC autopilot systems. The kit will also provide the ICA, AFMS and warranty application.

An STC approval letter will be provided with each STC documentation package giving the dealer authorization to install the S-TEC 3100 under that STC.
3.7 Trim System

3.7.1 General Description

The S-TEC 3100 trim system allows both automatic and manual electric trim in the pitch axis. An S-TEC servo will be installed into the aircraft pitch trim system and controlled with pulse width modulated signals from the 3100 FGC.

3.7.2 Manual Electric Trim

The Manual Trim Switch is intended for installation in all aircraft models and is provided in the STC installation kit. The manual electric trim switch is a double pole double throw momentary contact switch with a center off position and independent throw capability. The manual electric trim is designed to run the trim only when both sides of the switch are activated in the same direction.

3.7.3 Automatic Electric Trim

The primary pitch servo has a rotational spring system which allows the motor to rotate to either side of a center null within a limited distance. Trim Sensor Switches are mounted and positioned so that they close when a preset level of output torque is exceeded, thereby sensing the out-of-trim condition.

The trim sensor outputs are sent to the FGC as trim commands to drive the respective trim motor.

3.7.4 Flap Sensor

To avoid erratic behavior from the autopilot pitch trim system during the movement of the aircraft flaps, the S-TEC 3100 uses the Flap Position Sensor input to compensate for this movement.

NOTE: The Flap position pot input is used to calculate compensation for both the main pitch and pitch trim channels.
4 System Interfaces Descriptions

4.1 Garmin G500/G600

4.1.1 General Description
The Garmin G500/G600 have a fully digital interface allowing bi-directional transfer of vertical speed (VS) and altitude targets for altitude preselect functionality. Targets set on the S-TEC 3100 bezel will be synced onto the EFIS display and vice-versa. This EFIS does not have a setup option that allows flight director modes to be displayed when connected to an S-TEC 3100 autopilot therefore the 3100 FGC should be mounted within the pilot’s field of view. A remote annunciator panel is not required.

The GDU620 must be running software version 7.22 or higher and use the Garmin DFCS6 autopilot interface protocol.

4.1.2 G500 TXI and G600 TXi
The S-TEC 3100 should interface using the same DFCS6 protocol and ARINC connections as the G500/600 system but this interface has not been physically tested and is not yet listed on the STC drawing package. This may be updated when the TXi systems become available and the interface has been physically tested. Garmin have stated that the TXi screens are backwards compatible with existing G500/600 installations, which should also mean it retains the same compatibility with S-TEC autopilots.

4.1.3 Attitude and ADC Inputs
The S-TEC 3100 receives attitude and air data information from direct connections with the GDU620 and AHRS/ADC/ADAHRS associated with the EFIS system.

In a typical G500/600 setup there are direct ARINC connections between the GDU620, GRS77 and GDC74.

In this setup, the S-TEC internal attitude will be used as a comparator to monitor the primary attitude information coming from the EFIS system.

An electronic standby is not required and should not be connected.

4.1.4 GPS
GPS and navigational data will come from the GDU620, there is no direct connections to the GNS or GTN GPS Navigators. Selecting NAV/GPS NAV and GPSS is all achieved through the GDU620, no external switching is required. See manufacturers’ installation manual for further guidance on wiring and setup.

4.1.5 Altitude Preselect
VS and ALT targets can be set by adjusting the target bugs on the EFIS display or using the S-TEC 3100 bezel. The targets will be synced between both units.

Since the Garmin systems do not have an Indicated Airspeed target bug, all IAS targets will need to be input using the 3100 bezel.

The Garmin GAD43e is not required to interface to the S-TEC 3100 autopilot. All targets are sent digitally over an ARINC interface.

4.1.6 Flight Director
The 3100 can drive the flight director bars on the GDU620 display using a standard ARINC 429 interface. Please note that the GDU620 does not display autopilot modes. The 3100 front bezel will annunciate the active and armed modes.
### Example G500/G600 Block Diagram

**Garmin Navigator#1**
- G5430/530(W)
- GTN650/750

**Garmin Navigator#2**
- G5430/530(W)
- GTN650/750

**GDU620**
- DFCS 6
- EFIS/GPS
- AHRS
- ADC

**GRS77**
- Discrete Inputs
- Stall
- Lighting Bus
- Flap Compensator Pot

**GDC74**
- TRIM Master
- AP Power
- Trim Power

**S-TEC 3100**
- ARINC TX
- ARINC RX
- ARINC RX
- ARINC RX
- ARINC RX

**Audio Panel**
- Audio Output +

**PITCH Servo**
- Servo Drive (PWM)
- Clutch
- Trim Feedback

**ROLL Servo**
- Servo Drive (PWM)
- Clutch
- Trim Feedback

**PITCH Trim**
- Servo Drive (PWM)
- Clutch

**YAW Servo**
- Servo Drive (PWM)
- Clutch

**COMPARATOR**
- Internal Attitude Source

**AP Disconnect**
- AP Disconnect
- Trim Interrupt

**AP Master**
- 14V / 28Vdc

**TRIM Master**
- Second 5A breaker required for Dual board FGC’s (with Yaw)
- AP Master
- 5A

**OPTIONAL**
- Go Around
- Control Wheel Steering

**Second 5A breaker required for Dual board FGC’s (with Yaw)**

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4.2 Aspen EFD1000 (Software Version 2.9 or earlier)

4.2.1 General Description
Aspen EFD1000 units running version 2.9 software will have a digital/analog hybrid interface. The S-TEC 3100 will benefit from digital ADC, heading and navigational information although targets will not be bi-directional. Indicated airspeed (IAS), vertical speed (VS) and altitude targets should all be set on the 3100 bezel. The autopilot will not react to any target bug changes made on the EFD1000. The flight director modes are not displayed on the EFD1000.

Refer to section 4.3 for future updates introduced in EFD1000 software 2.9.1

4.2.2 Attitude
The EFD 1000 does not output attitude information on version 2.9 software and therefore the S-TEC 3100 cannot use this as a primary source of attitude.

If an electronic standby is installed it is recommended to also connect this to the autopilot. The attitude information used from the standby device will depend on whether the autopilot has yaw capability or not as some standby attitude indicators do not output the yaw information required. There are currently two electronic standby models approved within the STC documentation, the Mid Continent MD302 (SAM) unit or the L-3 ESI-500 (Genesis) unit.

The autopilot will use the available attitude data depending on the configuration:
- No Electronic Standby installed – The 3100 internal attitude source will be primary, there is no secondary source.
- With Electronic Standby installed – The primary/secondary source will change depending whether yaw is installed.
  - 3100 with Yaw Damper – 3100 internal attitude will be primary and the standby will be secondary
  - 3100 without Yaw Damper – Standby will be primary and the 3100 internal attitude will be secondary

4.2.3 Air Data
Limited air data information is sent by the EFD1000 over an ARINC interface. The 3100 uses information such as True Airspeed (TAS) to aid the attitude calculations and baro-corrected altitude for altitude preselect.

Indicated airspeed (IAS) data is not output from the EFD1000 therefore an additional source of air data is required to allow IAS modes within the autopilot. This can be achieved using an electronic standby as described above or a Sandia SAC 735 ADC computer. S-TEC will provide the Sandia ADC if no other source is available.

EFD1000 software version 2.9.1 allows all of the air data information required to be transferred over ARINC429 and therefore will not require additional ADC sources.

4.2.4 GPS
The S-TEC 3100 requires direct connection to the GPS Navigator(s) for ARINC GPS data. For dual GPS installations a GPS selector switch will be mounted in the panel to switch between GPS1 and GPS2.

4.2.5 Altitude Preselect
There is no interface available for the EFD1000 and S-TEC 3100 to share target information. VS, IAS and ALT targets must be adjusted using the 3100 bezel input.

EFD1000 software version 2.9.1 has an improved autopilot interface.

4.2.6 Flight Director
The Aspen EFD1000 does not accept digital flight director over ARINC and will use the analog FD output instead. This will need to go through an ST-670 (FD Interface) or existing ST-645 (Remote Annunciator) to convert it to the KI-256 format required by the Aspen ACU-2.
Directly connecting the 3100 to the ACU-2 will result in Mode Failure annunciations being displayed on the Aspen EFD as these are not provided by the 3100 analog FD output.
4.3 Aspen EFD1000 (Software Version 2.9.1 or later)

4.3.1 General Description
Aspen EFD1000 version 2.9.1 software introduces a fully digital interface allowing full bi-directional transfer of target bugs and also annunciates flight director modes on the EFIS display.

4.3.2 Attitude and ADC Inputs
This software version introduces a much more powerful ARINC interface allowing attitude and air data to be shared between both units. The S-TEC 3100 will be able to use the EFD1000 ADAHRS information as the primary source and its own internal attitude source as a comparator.

An electronic standby is not required and should not be connected.

4.3.3 GPS
GPS and navigational data will come from the EFD1000, there are no direct connections to the GPS Navigator. Selecting NAV/GPS NAV and GPSS is all achieved through the EFD1000, no external switching is required. See manufacturers’ installation manual for further guidance on wiring and setup.

4.3.4 Altitude Preselect
Software version 2.9.1 has an ARINC interface allowing both units to share target information. IAS and ALT targets can be set by adjusting the target bugs on the EFIS display or using the S-TEC 3100 bezel. The targets will be synced between both units.

Since the Aspen EFD does not have a Vertical Speed target bug, all VS targets will need to be input using the 3100 bezel.

4.3.5 Flight Director
Software version 2.9.1 has will allow flight director bars and autopilot modes to be displayed on the EFS1000 over an ARINC interface.
4.3.6 Example Aspen EFD Block Diagram (SW 2.9.1 or later)

GPS Navigator#1
Avidyne IFD540/550
Garmin GNS430/530(W)
Garmin GTN650/750

GPS Navigator#2
Avidyne IFD540/550
Garmin GNS430/530(W)
Garmin GTN650/750

Aspen EFD1000

S-TEC 3100

Audio Panel

S-TEC 3100

Audio Output +

Stall
Lighting Bus
Flap Compensator Pot

Discrete
Inputs

Go Around

Control Wheel

Steering

Servo Drive (PWM)

Clutch

Trim Feedback

AP Disconnect

Trim Interrupt

AP Power

Trim Power

AP Master

TRIM Master

14V / 28Vdc

AP Disconnect

Trim Interrupt

AP Power

Trim Power

PITCH Trim

Trimm Down

Trimm Up

PITCH Trim

5A

AP Master

TRIM Master

Second 5A breaker required for Dual board FGC's (with Yaw)
4.4 Analog (Non-EFIS)

4.4.1 General Description
The S-TEC 3100 can be installed without an integrating to an EFIS. In this instance the 3100 will utilize its own internal attitude source.

4.4.2 Attitude
In an analog setup, the 3100 will use its own internal attitude source as the primary unless an electronic standby is installed.

If an electronic standby is installed it is recommended to also connect this to the autopilot. The information used from the standby device will depend on whether the autopilot has yaw capability or not. This is because some standby attitude indicators do not output the yaw information required. There are currently two electronic standby models approved within the STC documentation, the Mid Continent MD302 (SAM) unit or the L-3 ESI-500 (Genesis) unit.

The autopilot will use the available attitude data depending on the configuration:

- No Electronic Standby installed – The 3100 will use its own internal attitude source as the only attitude source.
- With Electronic Standby installed – The primary/secondary source will change depending whether yaw is installed
  - 3100 with Yaw Damper – 3100 internal attitude will be primary and the standby will be secondary
  - 3100 without Yaw Damper – Standby will be primary and the 3100 internal attitude will be secondary

4.4.3 Air Data
S-TEC 3100 autopilots without an EFIS or electronic standby will be supplied with a Sandia SAC 7-35 ADC to provide the necessary air data and accurately calculate aircraft attitude.

4.4.4 Altitude Preselect

4.4.4.1 S-TEC ST-360 Altitude Selector / Alerter
The ST-360 can be used to set altitude (ALT) and vertical speed targets (VS) targets. The ST-360 works on analog signals and therefore cannot output the aircrafts barometric altitude causing the 3100 to display “------” as the altitude target.

Once the ST-360 detects the aircraft is at the correct altitude, it will switch the 3100 into Altitude Hold mode. All ALT targets must be set on the ST-360 whereas VS targets can be set on either the 3100 or ST-360 units.

IAS targets will be set on the 3100 bezel as the ST-360 does not have an IAS mode.

4.4.4.2 Encoding Altimeters
Aircraft with a compatible encoding altimeter can output the barometric correction signal to the Sandia ADC (provided on analog configurations). The ADC will add barometric correction to the current pressure altitude and output the resultant to the 3100 autopilot via a digital ARINC label.

All VS, IAS and ALT targets will be set on the 3100 bezel.

The encoding altimeters supplied with the S-TEC SA-200 (ST-1000) altitude preselect system can be used to directly connect to the Sandia SAC 7-35 ADC.

4.4.5 GPS
To enable GPSS modes, a GPS Navigator supplying ARINC Label 121 (GPSS) is required. GPS information is also used to aid in wind calculations for cross track errors.
The “GPS annunciate” and “APR Select” outputs from each GPS should be wired directly to the autopilot for switching between analog deviations from the HSI \([\text{NAV/APR}]\) and GPS Steering commands from the GPS \([\text{NAV}_{\text{GPS}}/\text{APR}_{\text{GPS}}]\).

### Dual GPS installations

When two GPS Navigators are connected, an additional switch is required to select the source in command between GPS1 and GPS2.

#### 4.4.6 Flight Director

For analog flight director displays, an S-TEC ST-670 Single Cue FD interface unit may also be required to provide the appropriate drive signals. An existing S-TEC ST-645 remote LCD annunciator may be utilized for the FD interface, although the mode annunciations will not operate correctly when interfaced to the 3100 and the LCD display should not be visible to the pilot.

#### 4.4.7 Analog DG and HSI’s

The Bendix/King KI-525A HSI which is part of the KCS55A system can be directly connected to the S-TEC 3100. The Garmin G5 HSI does not output heading and course information directly and is required to be converted into KI-525A format via the Garmin GAD29B interface unit.

The following DG/HSI’s will require a heading converter P/N 03976 – available from S-TEC.

- NARCO HSI-100/100S
- COLLINS HSI 331A-6P/6R
- COLLINS PN-101
- EDO NSD-360/360A/1000, DG 360
- EDO 52D54 or 52D154
- EDO 52D254
- CESSNA ARC IG 832A/IG-832C/IG-895A
- BENDIX HSD 880
- BENDIX IN 831A
- KING KPI 550/550A
- AERONOTICS MODEL 8000
- SIGMA TEC IU445-004-9
- SIGMA TEK IU262-014-11 or 13
- SIGMA TEK IU262-015-12 or 13
- SANDEL SN3308
- S-TEC HSI 6443 INDICATOR
- S-TEC DG 6406
- RC ALLEN DG 103-0010-01 MODEL RCA110-3

#### 4.4.7.1 03976 Heading Converters

To be compatible with the various different heading formats it may be required to install a heading converter (P/N 03976). Existing S-TEC customers may already have this unit installed as part of an ST-901 GPSS converter system. Since the 3100 can accept digital GPSS information directly, the converter can be wired to act as a heading converter.
4.4.8 Example Analog Block Diagram

**S-TEC 3100**

- ARINC RX
  - Analog FD
  - ARINC TX
  - ARINC TX

**Flight Director**

- Flight Director

**Audio Panel**

- Audio Panel

**GPS Navigator#1**
- Avionics IFD540/550
- Garmin GNS430/530/530(W)
- Garmin GTN650/750

**GPS Navigator#2**
- Avionics IFD540/550
- Garmin GNS430/530/530(W)
- Garmin GTN650/750

**Optional**

- GPS Select
- GPS Annunciate
- APR Select

**NAV 1/2 Switching**

- Left/Right Track
- Nav Flag
- LOC Enable
- Glide slope
- Up/Dn

**HSI**

- Stalls
  - Lighting Bus
  - Flap Compensator Pot

**AP Disconnect**

- AP Disconnect
- Trim Interrupt

**AP Power**

- AP Power
- Trim Power

**TRIM Master**

- TRIM Master

**Electronic Standby**

- Sandia SAC 7-35
  - Air Data Computer
  - **Not required if optional Electronic Standby is connected**

**OPTIONAL**

- ARINC RX
  - Air Data
  - AHRS/ADC

**OPTIONAL**

- Barometric Correction

**OPTIONAL**

- Sandia SAC 7-35
  - Air Data Computer
  - **Not required if optional Electronic Standby is connected**

**OPTIONAL**

- Electronic Standby
  - MD 302
  - ESI-500

**Second 5A breaker required for Dual board FGC's (with Yaw)**

- AP Master
  - TRIM Master
5  Discrete Inputs

Various discrete inputs to the computer are available such as Disconnect, Go Around and Trim. These may be located on the controls, panel, or other locations. The Disconnect switch must be mounted on the control yoke/stick. The STC drawing package provided with each installation will contain wiring schematics for more details.

5.1  Power and lighting

The nominal Main AP Power is 14Vdc or 28Vdc drawing no more than 5 Amps when under worst case operating conditions, exclusive of inrush current.

Dual board FGC’s will have different power wiring in order to provide aircraft power to both boards independently.

There is a lighting bus input designed to work with 5vdc, 14vdc and 28vdc standard aircraft lighting busses.

5.2  Autopilot Disconnect

This input commands a complete hardware reset which is unrelated to software. When asserted, the autopilot will disconnect all servo solenoids and place the autopilot into AP READY mode; audible disconnect tones followed by the vocal “Autopilot Disconnect” are annunciated.

The Disconnect Switch is a double pole normally closed push button switch mounted on the Control Yoke.

The warning tones will be discontinued if the Disconnect Switch Input remains active for 1.5 ± 0.5 seconds.

5.3  Go Around Button (GA)

The Go Around Button is designed to be located on the throttle.

When the Go Around button is pressed, the AP mode will be disengaged and the FD Mode will go into ROLL and PITCH hold modes. If FD was not previously engaged, pressing the Go Around will engage the FD mode.

The ROLL hold target will be set at 0 degrees (wings level) and a PITCH hold target which can be defined according to the aircraft. Refer to the AFMS for actual target values.

When Go Around is asserted, all armed modes, including the Target Altitude, are cancelled.

5.4  Take Off Go Around (TOGA)

TOGA is available when the aircraft is on the ground for setting flight director targets to aid during the take-off and climb out. When the Go Around button is pressed the FD Mode will go into ROLL and PITCH hold modes with a roll target of 0 degrees and a pitch target defined according to the aircraft. Refer to the AFMS for actual target values.

5.5  Control Wheel Steering (CWS) Enable

The CWS Switch is designed to be mounted on the Control Yoke that has two states: “NORMAL” (CWS switch not held down) and “ACTIVE” (CWS switch being held down).

When CWS is asserted and held down in ROLL and/or PITCH hold mode, the FGC will inhibit the Roll and Pitch servo solenoid and allow the pilot to maneuver the into the desired roll and pitch attitude. Releasing the CWS switch will then sync the ROLL and/or PITCH targets to the current attitude.

When CWS is asserted in ALT hold mode, again the FGC will inhibit the Roll and Pitch servo solenoid allowing the pilot to manually fly the aircraft to a different altitude. Releasing the CWS switch will then sync the Altitude target to the current altitude.

When CWS is asserted in a mode other than ROLL and/or PITCH and/or ALT hold mode, the FGC will still inhibit the Roll and Pitch servo solenoid and not change any targets for the axis not in one of those mode. Upon release, the AP will command to return to the previous target (i.e. NAV and GS).
5.6 Flap Sensor

The Flap position sensor input is used to prevent the aircraft from ballooning when changing the flap position. An increasing or decreasing 5Vdc voltage is fed from a potentiometer assembly connected to the flap system to indicate if the flaps are moving up or down.

Compensation is computed for both the main pitch channel and the pitch trim channel to maintain a smooth flight profile.

5.7 Maintenance Mode

The Maintenance Mode discrete is designed to start the S-TEC 3100 in a diagnostic mode for ground crew maintenance and setup.
6 System Outputs

6.1 Servo Solenoids
The servo solenoid output is a +14/28Vdc signal used to engage the clutch on the Roll, Pitch, Yaw, and Trim servos. When the servo solenoid output is 0Vdc or open, the clutch is disengaged then the servo will move freely and the connected flight surface will not move. For example, the clutch is disengaged when FD mode is on and AP mode is off.

Power to the solenoids are provided through pulse width modulation where the modulation range is 0Vdc to aircraft power, and the duty cycle is 0 to 95%.

6.2 Servo Motors
The S-TEC 3100 has up to 4 six servo motor outputs for Roll, Pitch, Yaw and Pitch Trim servos.

Power to the motors are provided through a -14/28Vdc to +14/28Vdc pulse width modulated signal where the modulation range is 0Vdc to aircraft power, and the duty cycle is 0 to 95%. The power is compensated in SW, so if voltage decreases, the duty cycle will increase to maintain a constant average voltage to the motor.

6.3 Audio Outputs

6.3.1 Disconnect Tones
Repeating beep tone that sounds for 2.5 seconds.

6.3.2 Altitude Alerter Tones

<table>
<thead>
<tr>
<th>Tone</th>
<th>Frequency (Hz)</th>
<th>Voltage (Vpp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000</td>
<td>8.48</td>
</tr>
<tr>
<td>2</td>
<td>840</td>
<td>8.48</td>
</tr>
</tbody>
</table>

6.3.3 Aural Alerts
Digitally sampled feminine human voice with no regional accent to annunciate the following important conditions:
<table>
<thead>
<tr>
<th>Aural Alert</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Trim in Motion”</td>
<td>AutoTrim on but a persistent Out-of-Trim condition exists</td>
</tr>
<tr>
<td>“Check Pitch Trim”</td>
<td>AutoTrim disabled and a persistent Out-of-Trim condition exists</td>
</tr>
<tr>
<td>“Altitude 1000 to go”</td>
<td>1000ft to go until the target altitude is reached</td>
</tr>
<tr>
<td>“Altitude 200 to go”</td>
<td>200ft to go until the target altitude is reached</td>
</tr>
<tr>
<td>“Altitude”</td>
<td>Following an altitude capture and an alerter tone</td>
</tr>
<tr>
<td>“Check Altitude”</td>
<td>After an altitude captured but altitude deviation occurred</td>
</tr>
<tr>
<td>“Airspeed, Airspeed”</td>
<td>IAS is below the configured minimum airspeed</td>
</tr>
<tr>
<td>“Overspeed, Overspeed”</td>
<td>IAS has exceeded the configured maximum airspeed</td>
</tr>
<tr>
<td>“Attitude, Attitude”</td>
<td>Roll attitude (bank angle) has exceeded the configured envelope limit</td>
</tr>
<tr>
<td>“Autopilot Disconnect”</td>
<td>Following a disconnect and repeating beep tone</td>
</tr>
<tr>
<td>“Autopilot Failure”</td>
<td>An internal AP failure has been detected</td>
</tr>
<tr>
<td>“Pitch Interrupt”</td>
<td>Pitch servo solenoid has disconnected</td>
</tr>
<tr>
<td>“Roll Interrupt”</td>
<td>Roll servo solenoid has disconnected</td>
</tr>
<tr>
<td>“Yaw Interrupt”</td>
<td>Yaw servo solenoid has disconnected</td>
</tr>
<tr>
<td>“Pitch Trim Interrupt”</td>
<td>Pitch trim servo solenoid has disconnected</td>
</tr>
<tr>
<td>“Level Mode, Engage Autopilot”</td>
<td>Emergency level mode has been engaged – pilot action required to engage an autopilot mode.</td>
</tr>
</tbody>
</table>
7 Installation Guidelines

The following information is intended to aid in planning and preparation of installing the S-TEC 3100 digital autopilot system and is not intended to be used during an actual installation. Please refer to the STC documentation package and wiring schematics for aircraft installation purposes.

7.1 Complete installation

If an aircraft has an existing S-TEC autopilot installed then they may be eligible for an upgrade as described in section 7.2.

For aircraft without an existing autopilot or a 3rd party autopilot installed will require a complete S-TEC 3100 installation.

7.1.1 Aircraft Survey

It is recommended to complete an aircraft survey and gather information about the current avionics, condition and existing modifications. This information will aid in ordering the correct autopilot configuration and advise the owner of any additional equipment or upgrades required.

7.1.1.1 Interface configuration

Please ensure the aircraft has the correct avionics equipment installed to drive the 3100 autopilot. Please be aware that certain DG or HSI units may require a heading converter (P/N 03976). Analog flight directors will require an ST-670 single cue FD interface.

The following interface options are available. This interface list may increase as we develop further interfaces for commonly installed avionics equipment.

1. Garmin G500/600 – fully digital interface
2. Aspen EFD 1000 (SW 2.9 or earlier) – digital/analog hybrid interface
3. Aspen EFD 1000 (SW 2.9 or earlier) with Electronic Standby* – digital/analog hybrid interface
4. Aspen EFD 100 (SW 2.9.1 or later) – full digital interface.
5. KCS55A (KI-525A) – analog interface
6. KCS55A (KI-525A) with Electronic Standby* – analog interface with AHRS comparator
7. 03976 (ST-901) heading converter – analog interface with older DG and HSI’s
8. 03976 (ST-901) heading converter with electronic standby* – analog interface with older DG and HSI’s with AHRS comparator

* Electronic standby options listed on the STC are the L-3 ESI-500 and Mid Continent MD302 (SAM)

7.1.1.2 STC Notes and Applicability

Please check any applicable STC notes to ensure the aircraft is compatible. The aircraft may have previous modifications that inhibit correct servo placement or have changed flight control rods.

7.1.2 Removing Existing Autopilot

The 3100 is unable to drive 3rd party servos or utilize other manufacturers’ autopilot equipment and should be removed before installing the S-TEC 3100 system. Please be aware that servo positions and mounting may change between 3rd party autopilots and an S-TEC system.

7.1.3 Installing STEC 3100 system

7.1.3.1 Fabricate Wiring Harness
The 3100 installation kit is supplied with all the necessary components to complete the installations. This does not include any wire and wiring harnesses must be fabricated by the installer. All pins, sockets and connectors required will be supplied.

### 7.1.3.2 Hardware installation

Installation of hardware will be very similar to a 55X installation with pitch trim.

- Install programmer computer
- Install Roll, Pitch and Pitch trim servos
- Install Yaw servo (if applicable)
- Install control yoke switches – AP disconnect, CWS, trim and GA switches
- Install panel switches and circuit breakers – AP Master, Trim Master, 1 x CB (2 x CB’s for dual board systems)
- Install CAN BUS interface – 2 x 9 pin Dsubs

### 7.1.3.3 Ground/Flight tests

Carry out all ground checks to test newly fabricated harnesses and the autopilot system functionality. Use navigation test sets to simulate VOR/ILS signals and ensure the autopilot reacts accordingly.

Flight tests will be required and are usually in accordance with the Pilots Guide. Any specific tests will be detailed in the STC instructions.

### 7.1.3.4 Maintenance Ports

It is required to install two 9 pin D-sub (supplied with install kit) for maintenance access. These can be connected to a PC computer using the Grid Connect GC-CAN-USB-COM shown here. [Grid Connect Website](#)

### 7.1.3.5 Attitude Levelling

The S-TEC 300 has an internal attitude source which is required to be levelled on initial installation. This is done by connecting a PC to the maintenance ports via a CAN-USB connector and running the software program that will be available through our website. This levelling process should take between 15 and 30 minutes.

### 7.2 Upgrading an Existing S-TEC Autopilot

Continuing S-TEC building block strategy, existing S-TEC customers will be able to upgrade their current S-TEC autopilot systems to the new 3100. This has the advantage of retaining the existing servos and mounting as well as utilize any existing hardware compatible with the 3100.

#### 7.2.1 S-TEC System 55X upgrades

S-TEC System 55X installations can be upgraded to the 3100 with minimal installation effort. An adaptor harness can be fabricated by the installer which plugs into the existing 55X connectors and adapts to the 3100 connectors. Many of the signals can be utilized although there may be some additional wiring required:

- Go Around (GA) – the 55X system did not have a GA switch. This will be additional wiring to the yoke.
- EFIS interface – the interface can now make more use of the digital information available from EFIS systems and some wiring changes may be required. In most cases this will reduce the number of wires.
- Analog DG/HSI – older DG/HSI’s may require an additional heading converter (P/N 03976) box installed.
- CAN BUS interface – 2 x 9 pin Dsubs
- GPS Select switch for dual GPS integration. (not applicable on G500/600 or EFD1000 with 2.9.1 software)
7.2.1.1 **Automatic Pitch Trim**
The S-TEC 3100 has automatic pitch trim as standard. If the 55X system already has an S-TEC trim system installed, the trim switch and trim servo will remain and will now be controlled by the 3100 computer.

For 55X installation without automatic pitch trim – this will need to be installed and the trim kit ordered at the time of purchase.

7.2.1.2 **Yaw Damper**
If an existing S-TEC Yaw Damper system is installed and the 3100 yaw functionality is available for that airframe, then the existing yaw servo can connect directly to the 3100 FGC. The Yaw Damper computer (P/N 0121-xx) and yaw trim pot are no longer required. Connecting directly to the 3100 FGC will add coordinated turn control as well as yaw dampening.

NOTE: A 3100 FGC dual board unit with yaw capability must be ordered to use the existing yaw servo.

The existing Yaw Damper system (P/N 0121-xx) can still be installed independently of the 3100 but the two systems will be separate and do not communicate. This will still have yaw dampening but cannot control coordinated turns.

7.2.1.3 **Air Data Computer**
The 3100 no longer uses pressure transducers for pitch rate information and instead requires digital air data information. For systems without an EFIS or electronic standby, a Sandia SAC 7-35 ADC will be supplied with the installation kit to feed the required data to the 3100 system. This ADC will require pitot and static connections and a test of the pitot/static system.

7.2.2 **S-TEC Single/Dual Axis Upgrades**
There is no specific adaptor harness drawing to cover each autopilot upgrade and it is recommended to fabricate a full new harness. The installation kit will contain all the necessary connectors, pins and sockets required to build this harness, it will not contain the wire.

Installers may opt to re-pin and extend some of the existing autopilot wiring at their own discretion.

7.2.2.1 **Single Axis Upgrades**
Single axis upgrades covers existing S-TEC autopilots that currently have pitch or roll control.

- System 20 (Roll only)
- System 40 (Roll only)
- System 60-1 (Roll only)
- System 30ALT (Pitch only)
- System 60PSS (Pitch only)

Single axis upgrades will require additional servos to add the second axis control. A trim servo and/or yaw servo may also be required depending on the current S-TEC equipment.

7.2.2.2 **Dual Axis Upgrades**
Dual axis upgrades covers existing S-TEC autopilots that currently have pitch and roll control.

- System 30
- System 50
- System 60-2
- System 65

Dual axis upgrades may require an additional trim servo and/or yaw servo may also be required depending on the current S-TEC equipment.
7.2.2.3 Manual Electric Trim

The S-TEC 3100 can use any existing S-TEC manual electric trim components and convert this to automatic electric trim. The existing yoke mounted trim switch and servo will now be connected directly to the 3100 FGC rather than as a standalone system. The existing pitch trim servo will be used.

Installations without an S-TEC manual electric pitch trim will need the S-TEC trim system installed and the trim kit should be ordered at the time of purchase.

7.2.2.4 Yaw Damper

If an existing S-TEC Yaw Damper system is installed and the 3100 yaw functionality is available for that airframe, then the existing yaw servo can connect directly to the 3100 FGC. The Yaw Damper computer (P/N 0121-xx) and yaw trim pot are no longer required. Connecting directly to the 3100 FGC will add coordinated turn control as well as yaw dampening.

The existing Yaw Damper system (P/N 0121-xx) can still be installed independently of the 3100 but the two systems will be separate and do not communicate. This will still have yaw dampening but cannot control coordinated turns.

7.2.2.5 Air Data Computer

The 3100 no longer uses pressure transducers for pitch rate information and instead requires digital air data information. For systems without an EFIS or electronic standby, a Sandia SAC 7-35 ADC will be supplied with the installation kit to feed the required data to the 3100 system. This ADC will require pitot and static connections and a test of the pitot/static system.

7.3 Other Existing S-TEC Equipment

There may be additional S-TEC equipment installed in the aircraft that will need to removed or repurposed when upgrading to an S-TEC 3100 digital autopilot.

7.3.1 ST-901 GPSS Converter

For older DG/HSI’s systems it will be required to install a 03976 heading converter unit. This converter box was also supplied with newer ST-901 systems that had a remote GPSS/HDG button and can be repurposed as a heading converter. Older ST-901 systems were shipped as a single unit and cannot be used.

Please ensure the 03976 is setup for the correct heading source configuration.

---

P/N 01278-1 and 01278-2
These cannot be used as a heading converter

P/N 01278-3 systems had remote units
The 03975 will be disconnected and removed from the panel.
The 03976 can be rewired and repurposed as a heading converter
7.3.2 **ST-360 Altitude Select / Alerter**

The ST-360 may be retained as required for installations that cannot provide barometric altitude information to the 3100 system. Please refer to section 4.4.4 for functionality details.

7.3.3 **SA-200 or ST-1000 Altitude Preselector**

This system was supplied with an encoding altimeter which can be used to send the barometric setting to the 3100 system on non-EFIS interfaces. The encoder output should be routed through the Sandia SAC 7-35 ADC which will send barometric altitude onto the 3100. Please refer to section 4.4.4 for functionality details.

7.3.4 **ST-670 Single Cue FD Interface**

This flight director interface is still required to drive analog flight director display such as a Bendix/King KI-256. This is also required for Aspen EFD1000 interfaces prior to the 2.9.1 software update.

7.3.5 **ST-645 Remote LCD Annunciator**

The ST-645 is not capable of displaying all the modes available from the 3100 and can therefore no longer be used as a remote annunciator. All active and armed modes will be displayed on the 3100 FGC bezel and should be within the pilots’ field of view.

The ST-645 was also used as an FD interface to drive analog flight directors and can be retained for this purpose. To avoid misleading annunciations, the annunciator unit should be blind mounted or the LCD display covered with a blank plate.

The ST-645 remote annunciator can be removed if it was installed as part of a G500/600 interface. The flight director bars will be driven by ARINC outputs from the 3100 and modes will be displayed on the 3100 FGC bezel.