ST 32
Aircraft Signal Conditioner

Installation Manual

SANDIA aerospace
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305952-00-IM

Record of Revisions

Revision	Date	Description	Approval
A	20110210	DRN 365	Leah Harrison
B	20110317	ECN3790	Leah Harrison
C	20110406	ECN3794	Leah Harrison
C1	20111215	ECN3861	Leah Harrison
D	20130722	ECN3991	Leah Harrison

Table Of Contents

List Of Illustrations

SECTION 1
GENERAL DESCRIPTION

1.1 INTRODUCTION

This sheet describes the installation of the ST 32 Aircraft Signal Conditioner. It is intended for use by FAA certified repair stations and original equipment manufacturers (OEM's) to install the ST 32 and includes both mechanical and electrical installation information. The installer should insure that the ST 32 is operating according to its intended function.

1.2 PRODUCT DESCRIPTION

The ST 32 is dual function signal conditioner. It converts four channels of the sinusoidal output of Tach Generators and one channel of analog strain gauge pressure to a digital signal that can be used by aircraft display and/or control systems.

1.2.1 PRODUCT VARIATIONS

The **-00** is original Variation
The **-01** in a minor change to the input Power Pins. Both Oinbs 1 and 20 have sseperate revese portection diodes to allow the ST 32 to be powered form independent power buses.

1.3 TECHNICAL CHARACTERISTICS

1.3.1 PHYSICAL CHARACTERISTICS

Width	4.80"	Height	1.00"
Depth	4.80"	Weight	0.62 lb

1.3.2 OPERATIONAL CHARACTERISTICS

Operating Voltage	18-32.2Vdc
Current	Less Than 1A (Heater On) Less Than 100mA (Heater Off)
Operating Temp	-55°C to +70°C
Max Operating Altitude	55,000 Feet

1.3.3 Approved Equipment

1.3.3.1 Tach Input Requirements

The ST 32 requires the following input from the on-board Tach Generator.
Signal: Sinusoidal 3 Phase or Monopole
Signal Frequency Range, Sinusoidal 3 Phase:1-30,000Hz
Signal Frequency Range Monopole: 50-30,000Hz
Signal Amplitude Range: 0.4Vpp-150Vpp

1.3.3.2 Approved Tachometers include:

Globe 22A703
AAE 32005-007
Electro-Mech EM-8001
MS28054-1 Two Pole, Three Phase Tach Generators
MIL-G-26611 Two Pole, Three Phase Tach Generators

1.3.3.3 Tach Input Requirements

The ST 32 requires the following input from the on-board strain gauge pressure transducer:
Exitation Voltage: 9.0 Vdc-10.5Vdc
Signal Voltage:
Common Mode: 2Vdc to Aircraft Voltage -2Vdc
Differential Mode: 0mVdc - 100mVdc

1.3.3.4 Approved strain gauge pressure transducers are:
Kulite APT-20-1000 or Equivalent

1.3.3.5 The ST 32 digital output signal is:
Totem Pole outputs to Aircraft Power
Rise time: 5 usec
Fall time: 5 usec
Low voltage: < 1.9 Vdc
High Voltage: Aircraft Power

Voltage to Frequency Conversions
Signal Conversion:

Input	Output	Accuracy
0 mVdc	20KHz	0.1% Full Scale
100mVdc	100KHz	0.1% Full Scale

Excitation Conversion:

Input	Output	Accuracy
9.0 Vdc	20KHz	0.1% Full Scale
10.5Vdc	100KHz	0.2% Full Scale

NOMENCLATURE: TACH- AND PRESSURE ADAPTER
TYPE/MODEL/PART NO: ST 32/305952-[XX]
Tray/306057-[XX]

MANUFACTURER'S SPECIFICATION AND/OR OTHER APPLICABLE SPECIFICATION: 305952-[XX]
MANUFACTURER: SANDIA AEROSPACE
ADDRESS: 3700 OSUNA RD. NE, SUITE 711
ALBUQUERQUE, NM 87109
REVISION & CHANGE NUMBER OF DO-160: REV F
DATE OF TEST: 201101 - 201103. Additional testing Dec 2012 and March 2013

CONDITIONS	SECTION	DESCRIPTION OF TESTS CONDUCTED
Temperature and Altitude	4.0	Tested to Category [A2F2]
Low Temperature	4.5.1 4.5.2	-55°C Ground/-55°C Short -55°C Operating
High Temperature	4.5.3 4.5.4	+85°C Ground/+70°C Short +70°C Operating
Loss of Cooling	4.5.5	Not Applicable
Altitude Decompression Overpressure	4.6.1 4.6.2 4.6.3	55,000' 55,000' -15,000'
Temprature Varitation	5.0	Tested to Category S1 15° C/min
Humidity	6.0	Tested to Category B
Operational Shock and Crash Saftey Sustained Crash Saftey	7.0 7.3.2	Tested to Category B
Viibration	8.0	Tested to Category S, curves B and M with Tray Tested to Category U curve G without Tray
Explosion	9.0	Equipment indenified as Category H
Waterproofmess	10.0	Equipment indentified as Category W
Fluids Suseptibility	11.0	Equipment indentified as Category X, no test performed
Sand and Dust	12.0	Equipment identified as Catgeory X ,no test performed
Fungus	13.0	Equipment identified as Category X, no test performed
Salt Spray	14.0	Equipment identified as Category X, no test performed
Magnetic Effect	15.0	Tested to Category Z, Less than 0.3 deflection
Power Input	16.0	Tested to Category A, Note 1
Voltage Spike	17.0	Tested to Category A
Audio Frequency Susceptibility	18.0	Tested to Category Z
Induced Signal Susceptibility	19.0	Tested to Category [ZC]
Radio Frequency Susceptibility	20.0	Tested to Category [RR]
Radio Frequency Emmissions	21.0	Tested to Category M
Lightning Induced Transient Susceptibility	22.0	Tested to Category [AZJ33], Note 2
Lightning Direct Effects	23.0	Equipment indentified as Category X, no test performed
Icing	24.0	Equipment indentified as Category X, no test performed
Electrostatic Discharge	25.0	Equipment identified as Category A
Fire, Flammability	26.0	Equipment indentified as Category X, no test performed

Note 1: Tested to Category Z with the exception that for momentary power interruption the system meets Category A requirements of 200mS interruptions.

Figure 1-1
DO-160F Enviromental Test Chart

Note 2: Initial pin injection performed without series inpedance. Input series was impedance added to the following pins and waveforms during the pin injection tests. All other pins meet pin injection without and resistance placed in series with the generator.

Pin Group	Circuit	Impedance Added (Ohms)	Waveform
26, 29, 32, 35	Tach Outputs	75	3
26, 29, 32, 35	Tach Outputs	1K	4
3, 21	VFC Outputs	75	3
3,21	VFC Outputs	1K	4
22	Discrete Output	75	3
22	Discrete Output	1K	4

1.3.4 CERTIFICATION

TSO C49b (Incomplete System)
TSO C47a (Incomplete System)
DO 160F

> "The conditions and test required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install the article either on or within a specific type or class of aircraft to demonstrate that the aircraft installation conditions are within the TSO standards. The article may be installed only if installation of the article is approved by the Administrator"

SECTION 2
INSTALLATION CONSIDERATIONS

2.1 Introduction

The ST 32 has been designed to covert four channels of sinusoidal and monopole outputs of approved Tach Generators and one channel of strain gauge pressure to a digital output that can be used by onboard navigation systems. .

2.2 Mounting

The ST 32 can be mounted in any axis either inside or outside the pressure vessel. To ensure protection against lightning strikes, the case should be grounded to airframe ground. This can be most easily accomplished by mounting the case on a grounded surface. An option mounting tray, Sandia part number 305057-00 is available as an option. Bonding of the case to airframe ground shall be less than 2.5 mohms

2.3 Cooling

The ST 32 does not require external Cooling

2.4 Electrical

The ST 32 operates on 18-32.2 Vdc. Power to the ST 32 should be protected by a 1.5 Amp breaker or circuit protection can be shared with the interfaced display unit using the appropriate breaker size (refer to the installation manual of the system being interfaced). The ST 32 can be wired to use from one to four channels depending upon system interface requirements. All twisted pairs are #22 AWG. Power and ground are single wires and should be #22 AWG or larger.

SECTION 3
INSTALLATION PROCEDURES

3.1 General

The ST 32 is supplied with a mounting connector and twenty-five crimp contacts. The ST 32 can be hard mounted using four (4) number 6 or 8 screws or with an optional mounting tray. If the optional mounting tray options selected it is mounted using four (4) number 6 or 8 screws.

3.2 Equipment Required

3.2.1 Supplied

ST 32	P/N 305952-00	(Garmin Model GSC 46, P/N 013-00337-00)
or	P/N 305952-01	(Garming Model GSC46, P/N 013-00337-10)

Elecrtrical Installation Kit	P/N 306031-01
Connector DSUB, 37 POS, w/crimp pins	P/N 306033
Connector Clamp	P/N 306053

3.2.2 Required But Not Supplied

Four (4) Number 6-32, 8-32 or equivalent mounting screws

3.2.3 Optional

Mounting Tray, Sandia Aerospace Part Number 306057-00, Garmin P/N 011-02599-01

3.3 Mounting

The ST 32 mounts with four (4) number 6-32 or 8-32 or equivalent machine screws.

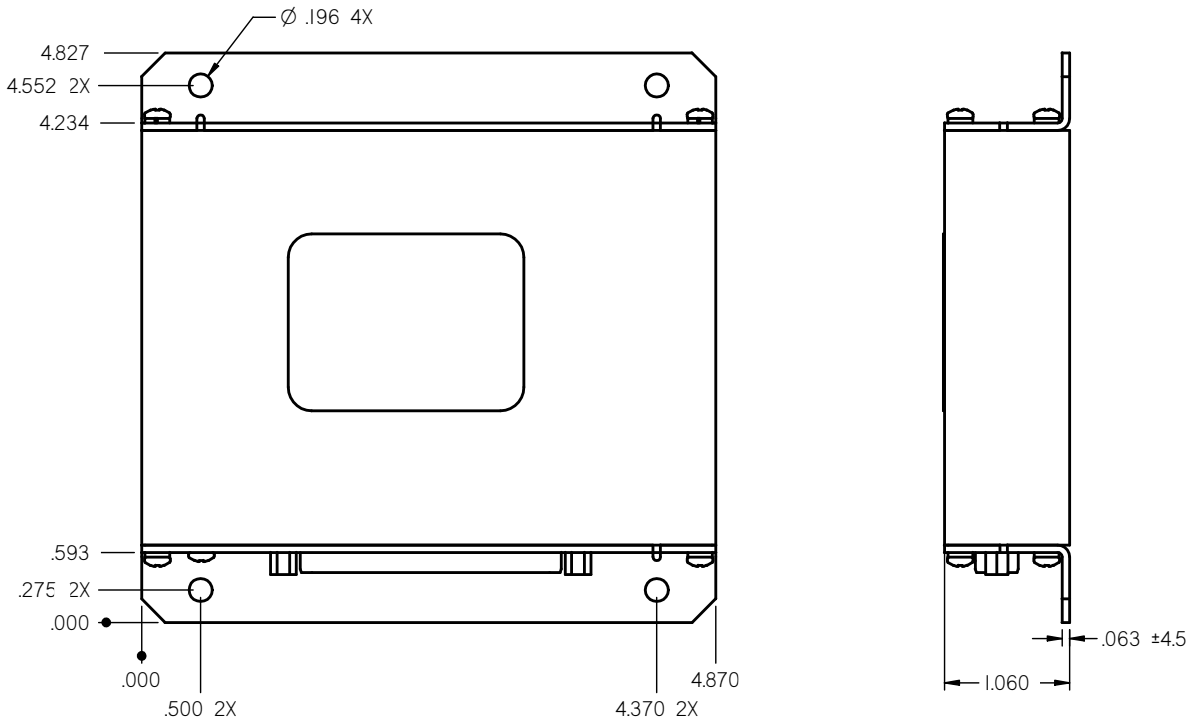

Figure 3-1
ST 32 Dimensional Drawing

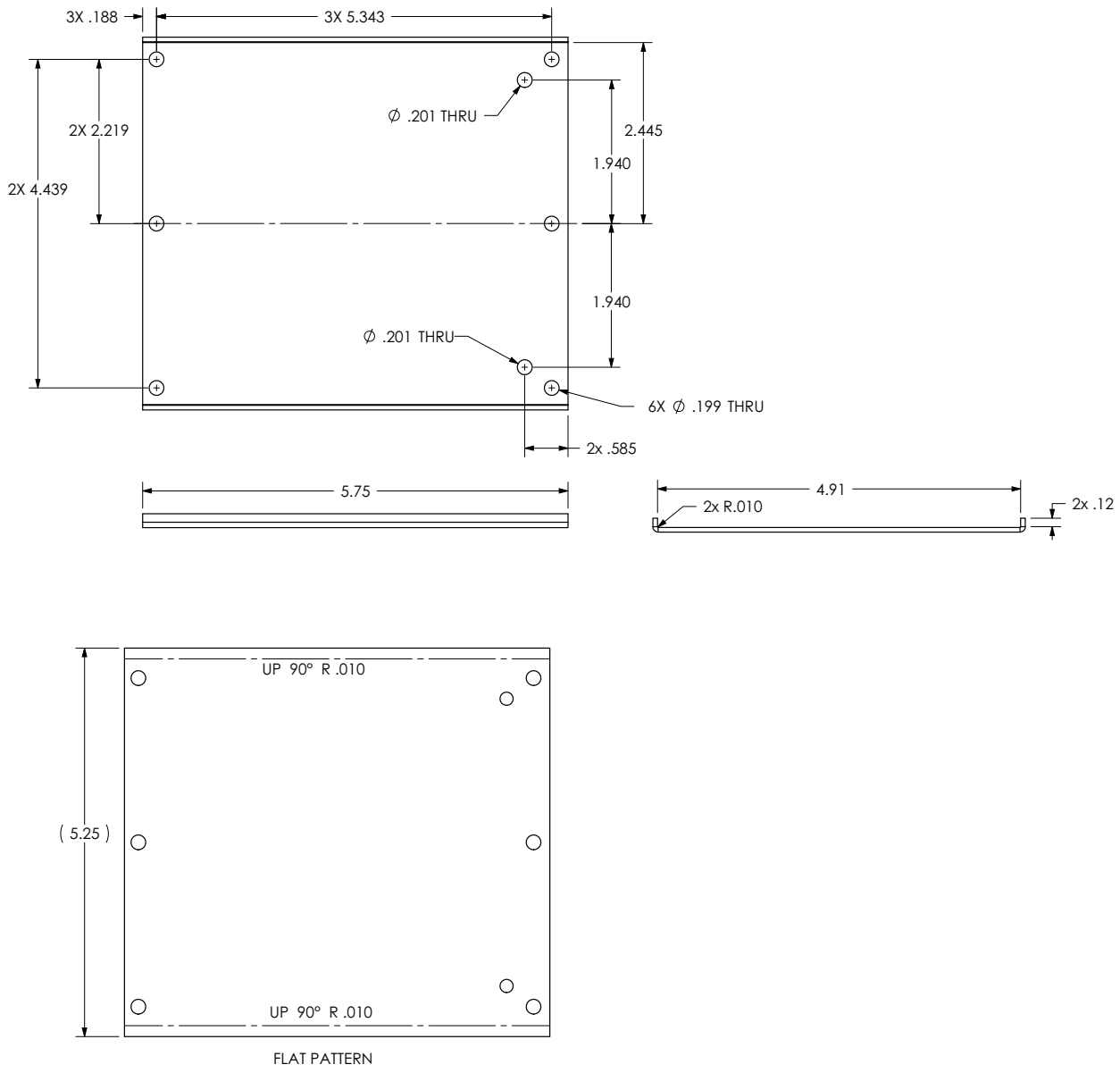

Figure 3-2
Optional Mounting Tray Dimensions

3.4 ELECTRICAL

The ST 32 operates on 18-32.2Vdc. Power to ST 32 should be protected by a 1.5 amp breaker or circuit protection can be shared with the display unit being interfaced (see installation manual of unit being interfaced). All twisted pairs are #22 AWG.. Power and ground are single wires and should be #22 AWG or larger. Figure 2 shows the interconnect of the ST 32 to the Garmin system.

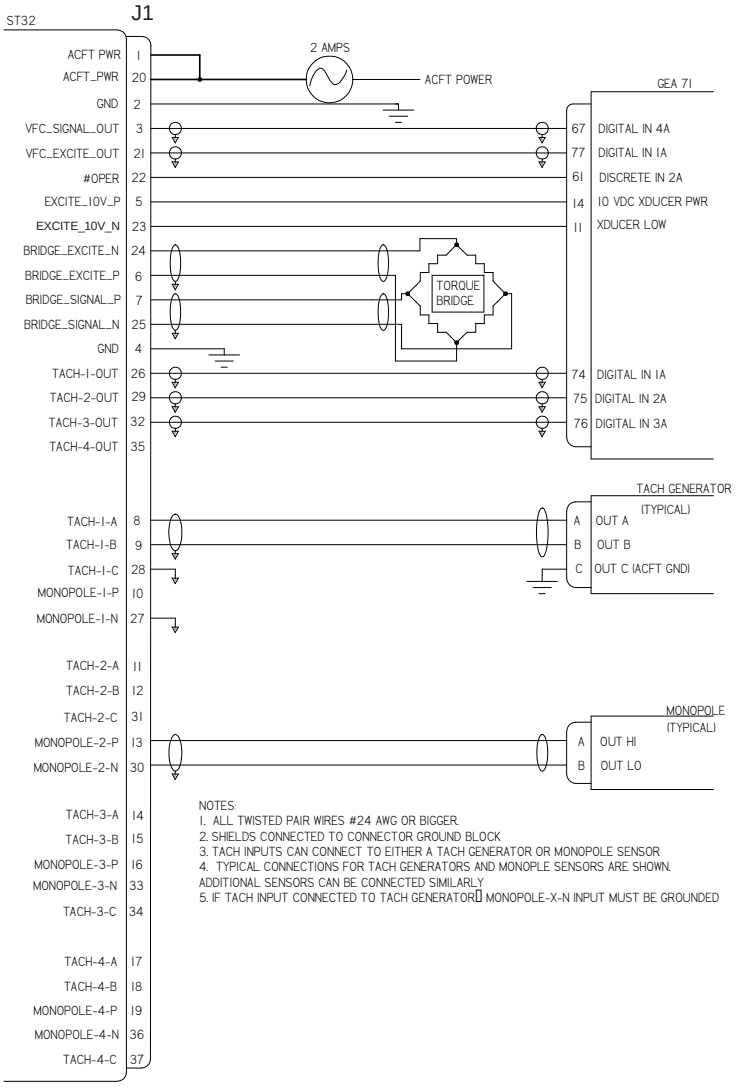

Figure 3-3
Interconnect Diagram

3.5 OPERATING INSTRUCTIONS AND LIMITATIONS

Refer to the display unit(s) being interfaced for operation and limitations.

3.6 CALIBRATION

No field calibration is required.

3.7 CONTINUED AIRWORTHINESS

Maintenance of the ST 32 is on condition only. No scheduled maintenance is required.