PRATT & WHITNEY - ENGINE SERVICES

ADAS+ STC DOCUMENTATION

MANUAL PART NO. 3136065

Aircraft Data Acquisition System Digital (ADAS+)

APPLICABLE TO:
ADASx INSTALLATION – Raytheon Model 200, 300, and 1900 Series

Issued April 8, 2019

Export Control Classification			
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LOG OF REVISIONS

REV. NO	DESCRIPTION	DATE
A	Initial Release	April 8, 2019

INTRODUCTION

This ADAS+ Document Collection is used for the ADAS+ installation on the Raytheon Model 200, 300, and 1900 Series aircraft and maintained by P&W Engine Services **D**iagnostics, **P**rognostics and **H**ealth **M**anagement (DPHM).

⇒ To access documents listed below, open ‘Attachments Panel’ within PDF viewer.

Document Number	Document Title	Revision	Revision date
ADAS-G-010-1	ADAS+ Installation Manual	G	February 24, 2009
ADAS-G-260-1	ADAS+ Instructions for Continued Airworthiness	I	February 24, 2009
ADAS-G-010-1/C	ADAS+ Addendum C Installation Instructions	H	August 24, 2011
ADAS-G-260-1/C	ADAS+ Instructions for Continued Airworthiness	J	November 14, 2014
ADAS-T-250-1	FLIGHT MANUAL SUPPLEMENT	E	October 22, 2007
SA00171BO	STC – FAA	N/A	October 22, 2007
1A-12/2004 R1	STC – SCT Mexico	N/A	May 16, 2008
CUST-T-400-1	ALTAIR OPERATORS HANDBOOK	N/A	October 6, 2006

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ADAS+

Installation Manual

ADAS-G-010-1

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Revision Ltr:	G		
Pages:	44		

PREFACE

Disclaimer

Like all instrumentation, the Pratt & Whitney Engine Services, Inc. ADAS+ requires knowledgeable interpretation by the pilot. Any recommendations and operating procedures contained in this manual shall not supersede the Aircraft or Engine manufacturer recommendations, operating procedures, or limits. The Pratt & Whitney Engine Services, Inc. ADAS+ should not be used as a primary guide monitoring the Aircraft and Engine manufacturers operating limits. Pratt & Whitney Engine Services, Inc. is not liable for any damages resulting from the use of this product.

Proprietary Information Notice

REVISION HISTORY

Rev Status of Sheets	Rev	F	G	F	F	F	F	F	G	F	F	F	F	F	F	F	F
	Sheet	i	ii	iii	iv	v	1	2	3	4	5	6	7	8	9	10	11
	Rev	F	F	G	F	F	F	F	F	F	F	F	F	F	G	F	F
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	Sheet	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
	Rev	F	F	F	F	F	F	F									
	Sheet	44	A	B	C	D	E	F									
	Rev																
	Sheet																

LOG OF REVISIONS

REV. NO.	ECO #	DESCRIPTION	PAGES REVISED
B		Add Addendum B & C	Cover, iv, B, C
C		Add Addendum D & E	Cover, ii, iii, D, E
D		Added Addendum F and reformatted manual	All
E	812	Added split lamp option	Cover, ii, iii, iv, v, 10-43
F	957	Changed Split Lamp. Corrected spelling and grammar. Revised calibration procedures. Updated company name, address and logos. Updated formatting. Removed Warranty information.	All
G	997	Added note that the Vertical Accelerometer is no longer available.	Cover, ii, 3, 14, 29 and 39

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REFERENCE DOCUMENTS

ADAS-G-260-1 *"ADAS+ Instructions for Continued Airworthiness"*
MLP User's Guide "*P&W Engine Services Monitor Link Program"*

1 INTRODUCTION

Aircraft and engine maintenance procedures are critical to flight safety and lower operating costs. P&W Engine Services has developed an aircraft data acquisition system known as ADAS+ to perform three primary functions:

Exceedance Event Recording: The ADAS+ can monitor critical engine parameters and record instances where they have exceeded preset values (exceedances).

Engine Trend Monitoring: The ADAS+ can gather and store engine data samples for trend analysis.

Cockpit Indication: The ADAS+ can be configured to warn the pilot of a prior exceedance on start up or shutdown, and provide system self-test indication.

The ADAS+ enables the operator to control, quantify, and manage engine maintenance operations and reduce direct operating costs.

In its data acquisition role, ADAS+ is a passive receiver of information. It can be configured to record data either manually or automatically.

Manual Operation: The pilot can quickly record a dataset from all sensors by pressing a cockpit-mounted TREND switch.

Automatic Operation: The system may be configured to automatically record exceedance events and trends. It may also be configured to record data samples when stable aircraft conditions are achieved. These conditions are configurable, and the data gathered may be used for engine trend analysis.

Retrieving Data: Collected data is accessed through a download serial port. Communication with the ADAS+ is achieved through P&W Engine Services Monitor Link Program (MLP), which can be used to download data and upload system configuration files. The MLP can also be used to assist maintenance personnel in performing system diagnostics, calibrations, and real-time live sensor display.

System Configuration: The ADAS+ system is shipped with a predefined set of software sensor configurations, exceedance event specifications, cycle specifications, and engine start/stop definitions. System configurations can be altered to reflect the customer’s operating environment or requirements.

1.1 Scope

The purpose of this document is to provide users of this product with P&W Engine Services approved installation instructions. Any deviation from the procedures described within this document could result in a failure of the product to perform properly and could possibly result in damage to other systems of the aircraft.

NOTE: To perform an installation, select the appropriate aircraft model addendum, read the system overview, then, complete the preparation section checklist. Find the aircraft wiring diagram and follow the steps described in the mechanical and electrical assembly sections. Check off each instruction as it is completed. When finished, proceed to post-installation, configuration, and testing sections of the manual.

1.2 About This Manual

This document contains general information regarding mechanical and electrical hardware. It also includes a series of addenda with specific installation instructions. For specific aircraft model installation procedures, refer to the appropriate addendum attached.

In all documents, mechanical and electrical sections are made up of instruction lists that take the following form:

1. A heading that lists the applicable aircraft or engine. Headings appear as follows:

For All Aircraft:

2. Cautions present things to be aware of while performing the installation. Cautions appear as follows:

   INSTALLATION CAUTION:

   ⇨ ***Excessive torque on the processor-mounting studs can deform the shock mounts. The locking nut should be tightened only to the point of contact with the shock mount.***

3. Numbered assembly and wiring instructions, which include boxes for checking off steps as they are performed. Instructions appear as follows:

   Wiring Instructions:

   Perform the following steps:

   ❑ *010* Trim the cable to length

4. Notes present things that require specific attention to detail. Notes appear as follows:

   NOTE: To perform an installation, select the appropriate aircraft model addendum.

1.3 System Description

A typical ADAS+ (Figure 1) is depicted as follows:

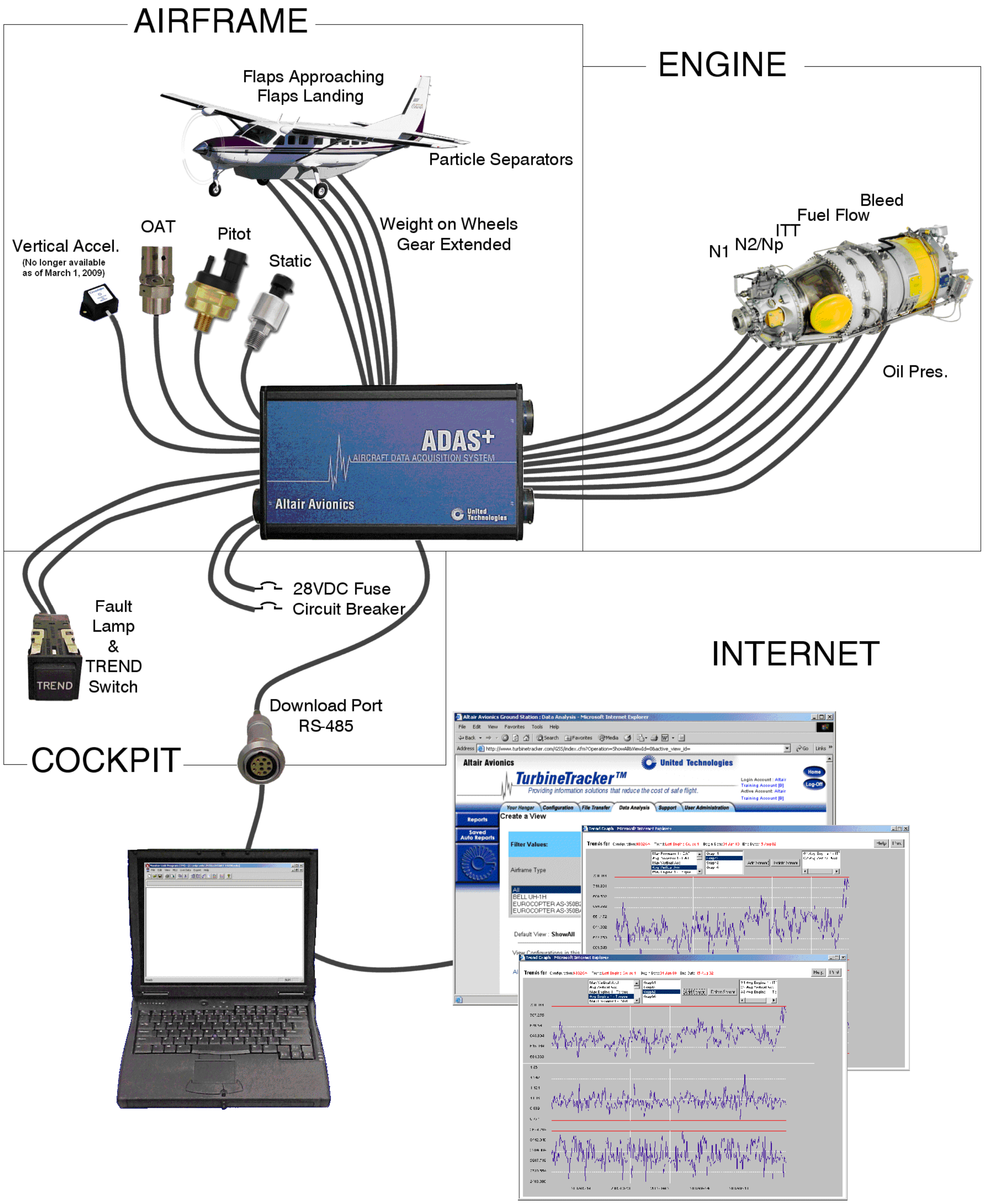

Figure 1: Typical ADAS+

1.4 Unpacking the Equipment

Carefully remove each component from the original shipping container. Place each component on a roll-away cart or suitable workbench in the work area.

1.5 Parts List

Care must be taken when handling all parts and equipment. Before opening packages, perform an inventory check by comparing the receivables to the appropriate bill of materials.

1.6 Weight and Balance

Calculating weight and balance of the ADAS+ after installation is the responsibility of the installer. Although the system weight is less than 11 pounds (excluding miscellaneous hardware not supplied with the kit – e.g. clamps, tie wraps etc…), P&W Engine Services suggests that the installer weigh each kit individually and record the weight prior to installation. During the installation, save all items that are not installed on the aircraft, for example: cable that has been trimmed to length and any plastic or paper bags that individual components were packaged in. After the completion of the installation, weigh all materials that were not installed on the aircraft. Subtract this weight from the weight of the kit prior to the installation. This will give you the total system weight that is installed on the aircraft. For LRU weights and locations, refer to the addendum specific to your aircraft application.

2 INSTALLATION AND MAINTENANCE PROCEDURES

INSTALLATION CAUTION:

⇨ ***Use of any procedure (e.g. addendum) that does not apply to your specific application could cause unnecessary damage to the aircraft and/or result in a system or product malfunction.***

2.1 Standard Practices-Airframe/Powerplant

Prior to installation, be sure that you have read the appropriate model addendum that applies to your specific installation. Review all manufacturer provided airframe and powerplant documentation in order to understand installation requirements and technical capability of the system.

NOTE: General wiring supplies (solder, crimp splices, heat shrink, tape, cable ties and cable tie holders, etc…) are not included with the installation kit.

Prior to installation, verify and follow each of the following instructions and guidelines:

1. All work to be done in accordance with FAA Advisory Circular 43.13-1B "Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair" and with FAA Advisory Circular 43.13-2A "Acceptable Methods, Techniques and Practices - Aircraft Alterations"
2. Read all instructions completely before beginning any installation. Only qualified mechanics or avionics technicians shall perform the installation.
3. All aircraft systems interfacing with the P&W Engine Services ADAS+ must be checked for full functionality before installation begins.
4. All illustrated mounting locations should be used as a general guide for mounting. Locations shown in illustrations may be altered to fit special individual installation requirements as needed, provided accepted structural procedures and practices are followed.
5. Refer to the manufacturer's manual for approved locations or cautions for clamping hoses and cables, or modifying the aircraft structure.

2.1.1 Procedure for Wiring Connections

INSTALLATION CAUTION:

⇨ ***The ADAS+ cables have shields that connect to the processor chassis ground. When terminating the shielded harness at the airframe connection, these shields must be trimmed back and insulated to prevent possible shorting with the signal wires.***

NOTE: Each cable is marked with a shrink on label near the end to indicate its connection. When you shorten the cable behind the label, be sure to re-label it.

2.1.2 Wiring Splices

The use of Raychem™ hermetic style wire splices (Figure 2 and Figure 3) is recommended. When making connections between two shielded cables, the shields should also be maintained using Raychem™ or equivalent shield splices. The entire cable splice should be encased in heat shrink tubing when completed.

A general procedure for wire splices (See Figure 2 and Figure 3) is illustrated as follows:

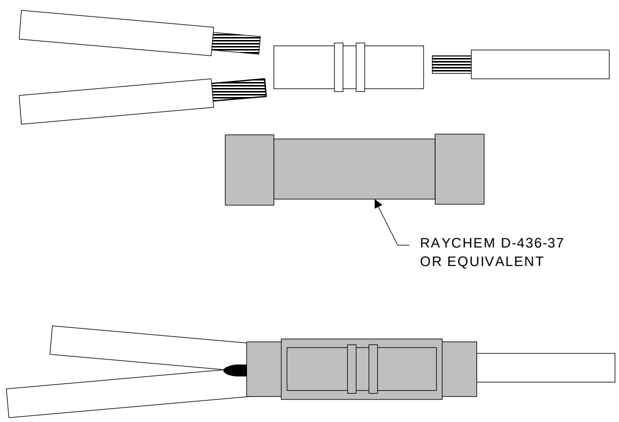

Figure 2: Single or Dual Wire Splices

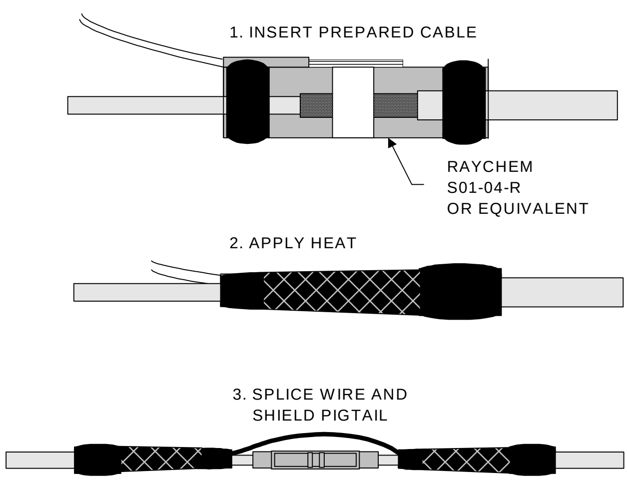

Figure 3: Shielded connection (Outer Heat-Shrink Tubing Not Shown)

2.1.3 Maintenance

The P&W Engine Services ADAS+ has been designed with the latest solid-state technology. The only component that has a limited life span is the internal battery. This battery, under normal operating conditions, is expected to last 10 years. If the battery is discharged, the processor must be returned to P&W Engine Services for battery replacement.

The calibration of the system should remain within documented specifications under normal operation. It is suggested that operators initially monitor the calibration of the ADAS+ every other 100-hour inspection. If the calibration does not change after 3 inspections the calibration check period can be increased to coincide with the planned aircraft instrument schedule.

Care of the processor under normal operation consists of general cleaning and inspection for bracket and connector security during every major engine or aircraft inspection. Refer to ADAS+ Instructions for Continued Airworthiness, ADAS-G-260-1.

Comments and findings should be forwarded to P&W Engine Services for inclusion into their continued product improvement program.

In the event that the ADAS+ must be returned for service, contact the P&W Engine Services Help Desk for a Returned Material Authorization (RMA) number. When you receive the RMA number, include it in the package address and ship it, postage and insurance prepaid, to the address listed below.

When shipping an item for service, please include a complete detailed description of the symptoms you are experiencing. This will greatly assist our technicians in rapidly identifying the problem. After service, the processor will be returned to you or your dealer with the shipping prepaid.

Pratt & Whitney Engine Services, Inc.
Help Desk
249 Vanderbilt Avenue
Norwood, MA 02062
Phone: (781) 762-8600
Fax: (781) 762-2287
E-mail: support@altairavionics.aero

3 INSTALLATION - MECHANICAL

3.1 System Processor

The processor (Figure 4) collects and interprets data from airframe and engine mounted components. Data is retrieved by the operator through an RS485 cockpit interface connection. The processor does not require access during flight.

The processor measures 3.7" high by 6.9" long by 1.7" deep and weighs 1.4 lbs. (22 oz.). An aluminum bracket with Lord Aerospace shock mounts is used to mount the processor to the aircraft.

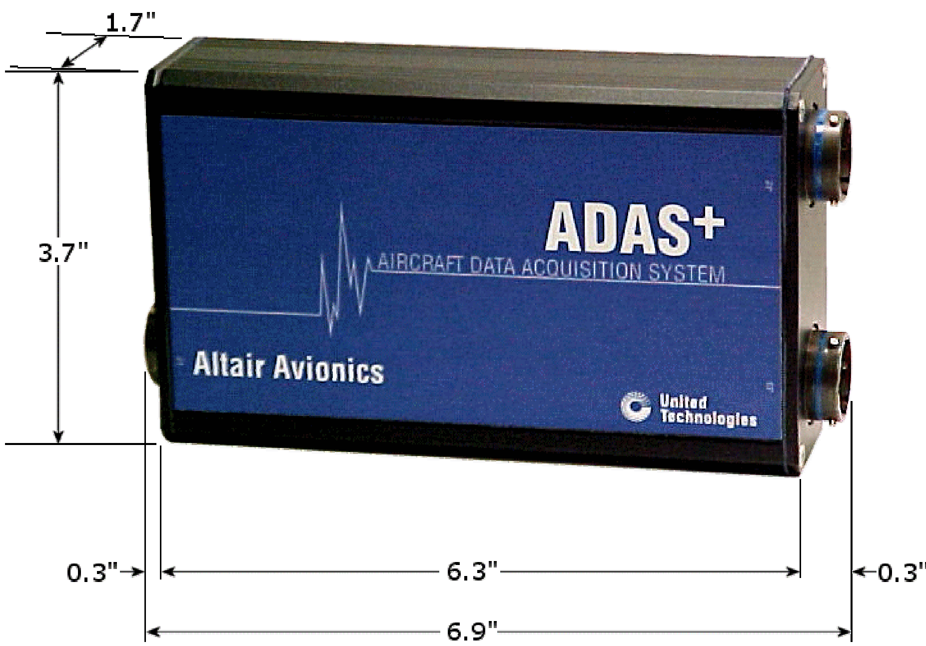

Figure 4: Processor

The system processor is mounted in a remote area of the aircraft using the P&W Engine Services supplied mounting brackets (Figure 5 and Figure 6). Although the processor will not require access during normal operation, care should be taken to install the processor in an area that complies with the environmental requirements of the system.

NOTE: For mounting instructions, refer to the appropriate addendum that applies to your specific aircraft.

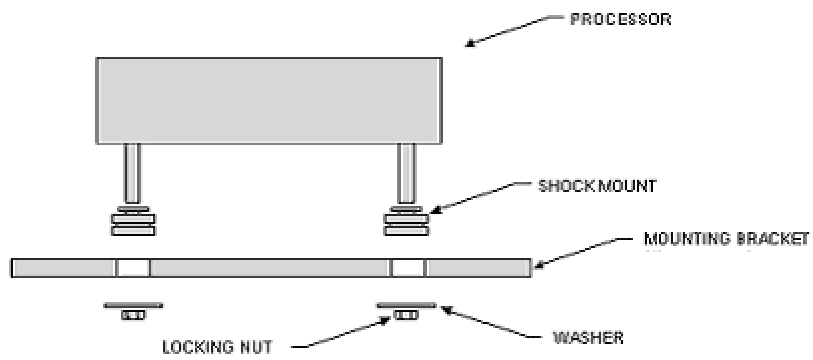

Figure 5: Typical Avionics Compartment Shock Mount Detail

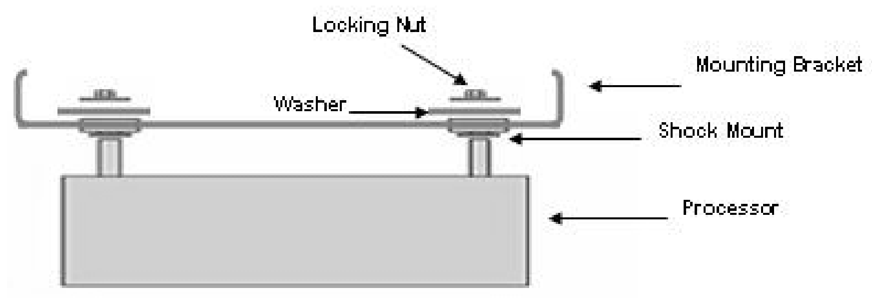

Figure 6: Typical Engine Compartment Shock Mount Detail

3.2 Cockpit Components

There are two components that must be mounted so that they are accessible. Following are the descriptions and functions of the cockpit components and indicators:

3.2.1 TREND Switch / Fault Lamp

The TREND switch/fault lamp (Figure 7) consists of a .75″ x .75″ square push-to-test combination lamp. The lamp is mounted on the console and is used to initiate a processor loop back test or initiate a manual trend sample. Fault indications are displayed to the operator through the on/off or flashing status of the lamp.

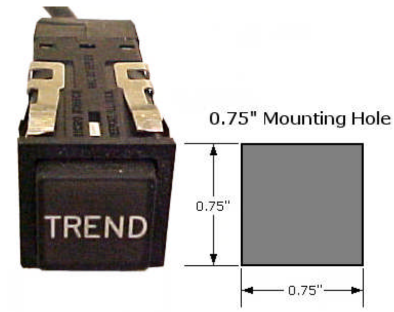

Figure 7: TREND Switch/Fault Lamp

NOTE: ADAS+ may also be connected to an existing aircraft cockpit panel indicator (annunciator) lamp.

3.2.2 Engine/Trend Split Lamp Option

The split lamp (annunciator) shown in Figure 9, consists of a single Engine/Trend switch fault lamp that is mounted in the cockpit instrument panel or console. The annunciator consists of a .75" x .75" square push-to-test lamp that is split into two segments. The ENGINE segment is amber in color when illuminated and the Trend segment is white in color when illuminated. Similar to the standard Trend Switch/Fault Lamp the Engine/Trend switch fault lamp is used to initiate a processor loop back test or initiate a manual trend sample. Fault indications are displayed to the operator through the on/off or flashing of the Trend lamp.

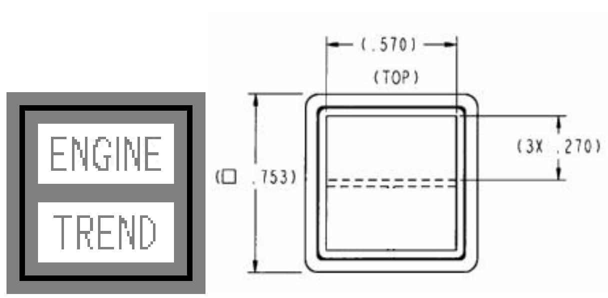

Figure 8: ENGINE/Trend Split Lamp

3.2.3 Download (COMM) Port

The COMM Port is used to interface with the processor. Data can be transferred and downloaded through this port (Figure 9).

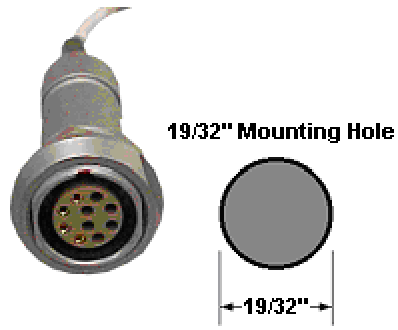

Figure 9: Download Port

NOTE: Installation instructions for each of the cockpit components can be found in the addendum specific to your aircraft.

3.3 Airframe Components

A description of airframe components as well as their function is described in the following:

3.3.1 Circuit Breaker

The 1 amp circuit breaker automatically interrupts the electrical circuit under abnormal conditions. Specific mounting and installation instructions can be found in the addendum applicable to your aircraft.

3.3.2 Fuse (+28VDC)

The 1 amp fuse is mounted in a remote location and automatically interrupts the electrical circuit under abnormal conditions. Specific mounting and installation instructions can be found in the addendum applicable to your aircraft.

3.3.3 Outside Air Temperature (OAT) Probe

The temperature probe (Figure 10) is mounted on the underside of the aircraft to provide the processor with OAT data. Specific mounting and installation instructions can be found in the addendum applicable to your aircraft.

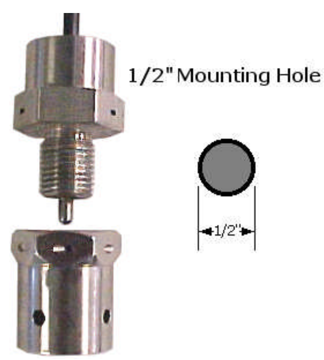

Figure 10: OAT Probe

3.3.4 Pitot/Static Pressure Transducers

Airspeed and altitude are calculated by installing a 5 VDC, 0-3 PSID transducer and 0-15 PSIA transducer that can be mounted directly in-line with the existing pitot/static system. Illustrations in Figure 11 and Figure 12 are typical representations of P&W Engine Services supplied Pitot/Static Transducers. Refer to Table 1 and Table 2 for transducer specifications.

Figure 11: Pitot Transducer

Table 1: Pitot Transducer Specifications

Pressure Range	0-3 PSID
Supply Current	5mA Max. @ 5VDC
Supply Voltage	5.00 VDC
Output Voltage	0.5 – 4.5 VDC
Range	0 PSID (0 Knots) to 3.00 PSID (340 Knots)
Hysteresis & Repeatability	+/- .05% of Span MAX
Weight	4.1 oz

Figure 12: Static Transducer

Table 2: Static Transducer Specifications

Pressure Range	0 – 15 PSIA
Supply Current	5mA Max @ 5 VDC
Supply Voltage	5.00 VDC
Output Voltage	0.5 – 4.5 VDC
Range	3.4 PSIA (35000Ft) to 15.00 PSIA (-568 Ft)
Hysteresis & Repeatability	+/- .05% of Span MAX
Weight	2.7 oz

NOTE: Specific mounting and installation instructions for the Pitot/Static Transducers can be found in the addendum applicable to your aircraft.

3.3.5 Vertical Accelerometer

The system uses a +/- 5g accelerometer (Figure 13), typically mounted aft of the spar, to monitor exceedances such as hard landings and/or excessive in-flight structural loads. Refer to the appropriate model addendum for wiring instructions.

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

Figure 13: Vertical Accelerometer

3.3.6 Firewall/Pressure Bulkhead Feedthru

When the wiring from the engine compartment to the cockpit passes thru a firewall the wiring is routed thru a stainless steel feedthru and sealed with a high temperature resistant potting compound. When the wiring from the engine compartment to the cockpit passes a pressure bulkhead, a Raychem™ pressure bulkhead fitting is used. Refer to the appropriate model addendum for installation instructions.

3.3.7 Discrete Aircraft Signals

The ADAS+ comes equipped with thirteen discrete sensors that can be configured to measure bleed air position, particle separator position, weight on wheels, hour meter, landing gear position, emergency power lever position, flap position, etc. Refer to the appropriate model addendum for wiring instructions.

3.4 Engine Indicating Components

The following is a list of individual engine performance indicating components:

3.4.1 Engine Temperature Sensors (T4, T4.5, ITT, EGT, MGT, TOT)

The processor determines the temperature for each engine through a connection at the aircraft engine temperature indicator. The ADAS+ connects to the existing aircraft sensor by using the supplied alumel and chromel terminal connectors. Wiring instructions can be found in the addendum specific to your particular aircraft.

3.4.2 Engine N1 (Ng) Speed Sensor

The processor determines engine N1 (Ng) speed(s) through spliced connections to the sensor inputs of the existing N1 cockpit indicator or engine tachometer. Wiring instructions can be found in the addendum specific to your particular aircraft.

3.4.3 Engine N2 Speed Sensor

The processor determines engine N2 speed(s) through spliced connections to the sensor inputs of the existing N2 cockpit indicator or engine tachometer. Wiring instructions can be found in the addendum specific to your particular aircraft.

3.4.4 Propeller (Np) Speed Sensor

The processor determines propeller (Np) speed(s) by way of a splice at either the cockpit indicator or the engine sensor input of the existing Np cockpit indicator or engine tachometer. Wiring instructions can be found in the addendum specific to your particular aircraft.

3.4.5 Engine Torque (Tq) Pressure

The processor has two ways of measuring aircraft torque. The first option is to install P&W Engine Services supplied pressure transducers (Figure 14) on the engine. The second option is to read the signal directly from the cockpit gauge. Installation option and instructions can be found in the addendum applicable to your aircraft. Refer to Table 3 for transducer specifications.

Figure 14: Torque Transducer

Table 3: Torque Transducer Specifications

Pressure Range	0-150 PSIG
Supply Current	5mA Max. @ 5VDC
Supply Voltage	5.00 VDC
Output Voltage	0.5 – 4.5 VDC
Range	0.5 VDC at 0 PSI 4.5 VDC at Full Scale
Hysteresis & Repeatability	+/- .05% of Span MAX
Weight	2.7 oz

4 INSTALLATION - ELECTRICAL

For specific wiring schematics, refer to the addendum that applies to your specific aircraft installation. All wire used in the three external harnesses meet the specifications of MIL-C-27500.

4.1 Electrical Power

The ADAS+ system consists of three external harnesses. These harnesses are appropriately labeled J1, J2, and J3.

1. Aircraft bus power is required primarily to supply power to the system and is also required by the cockpit fault lamp. The aircraft master battery switch controls this power source. The connection utilizes a 1 Amp circuit breaker.

2. A second power source is required to supply backup power to the processor during all operating conditions including intentional primary bus power-down in flight. This connection is protected by a supplied 1 Amp fuse.

INSTALLATION CAUTION:

⇨ ***The second power source connection must not be controlled by the aircraft master battery switch and must route directly to the battery.***

NOTE: Power connections are defined in the addendum applicable to your aircraft.

4.1.1 J1 Harness (Power and Sensor Signals)

The J1 external harness connects to the connector plug on the ADAS+ processor labeled J1. This harness provides aircraft battery and bus power to the processor. The individual cables are appropriately labeled. This harness also provides the processor with the airspeed and altitude connections.

Detailed wire routing and connection instructions can be found in the addendum that is applicable to your aircraft.

4.1.2 J2 Harness (Sensor Signals)

The J2 external harness connects to the connector plug on the ADAS+ processor labeled J2. This harness provides the processor with a variety of engine signals. Depending on the application, it will provide signals from one or two aircraft engines. The individual cables are appropriately labeled.

Detailed wire routing and connection instructions can be found in the addendum that is applicable to your aircraft.

4.1.3 J3 Harness (Sensor Signals)

The J3 external harness connects to the connector plug on the ADAS+ processor labeled J3. This harness provides the processor with a variety of aircraft engine sensors, outside air temperature, TREND switch and download port. Depending on the application, it will provide signals from one or two aircraft engines. The individual cables are appropriately labeled.

Detailed wire routing and connection instructions can be found in the addendum that applies to your specific aircraft.

5 SYSTEM OPERATION OVERVIEW

The ADAS+ is a dual function instrument that gathers and records engine information from sensors for later downloading.

The ADAS+ is designed to perform the following functions:

- Sensor Monitoring
- Exceedance/Event Monitoring
- Engine Run Logging
- Trend Data Collection
- Status Display in Cockpit
- Operator Initiated Self-Test
- Automatic Self-Test
- Data Downloading
- Calibration Parameter Control
- Configuration Control

5.1 ADAS+ Functional Description

5.1.1 Engine Run Logging

The ADAS+ is capable of recording engine runs with up to 4 different engine run criteria for each engine. For each engine run, the following is recorded:

- Engine number (if dual engine)
- Engine start date and time
- Engine run duration
- Maximum start temperature
- Minimum battery voltage
- Start length (“Light Off” to Engine Idle)
- Maximum sensor values
- Cycle count

5.1.2 Cycle Logging

ADAS+ can be configured for up to four different types of cycle count types during each engine run.

1. Incremental cycles (sensor based)
2. Duration cycle (sensor based)
3. Peak value cycle (based on one or two sensors)
4. Cumulative valley cycle (sensor based)

5.1.3 Event Monitoring and Time History Buffer

Events: The ADAS+ can be configured to monitor and record airframe or engine exceedances or events. Up to thirty-two (32) basic Airman's Flight Manual (AFM) exceedances and operator specific events can be configured. Each event is logged independently of engine run logging. Each event records the date and time of the event; its duration, average sensor value, and minimum or maximum sensor value. Events can be set to comprise inputs from either one, two or three sensors.

Time History Buffer: The ADAS+ continually updates a temporary memory buffer with sampled sensor values. This buffer of sequential data sets is called the Time History Buffer. The amount of data requested from the buffer is configurable by the user.

By transferring a set of data samples from the buffer to permanent memory, the processor can store data for a period before, during, or after an event. The operator can set the point before an event and the point after an event to log the time history buffer to permanent memory. The maximum time stored by the processor that can be held by the time history is two minutes.

5.1.4 Trend Monitoring

Engine trend information (data is compatible with P&WC ECTM®) is described as follows:

Manual Trend: Pressing the standard TREND switch or the optional Engine/Trend Split Lamp when the engine is running will initiate a manual trend. The ADAS+ will take a snapshot of all sensors for a pre-defined duration (default is 5 seconds but is configurable) and record the maximum values and average values for all sensors during the entire duration. If using the standard TREND switch the lamp will flash during the entire duration of the trend. If using the optional Engine/Trend Split Lamp the Trend lamp will flash during the entire duration of the trend.

Autotrend: The ADAS+ can be configured to initiate a trend automatically without pressing the standard TREND switch or the optional Engine/Trend Split Lamp. The ADAS+ can be configured to initiate an autotrend by defining a stable criteria consisting of up to ten (10) sensors. If the stable criteria are met, the ADAS+ will initiate a trend automatically. The TREND lamp will flash during the entire duration of the trend when using the standard TREND lamp. The TREND lamp will flash during the entire duration of the trend when using the optional Engine/Trend Split lamp.

5.2 System Initialization and Lamp State Description

When the system initializes, the fault lamp will indicate the various stages of the process. The initialization sequence will proceed as follows:

When the processor's power is first applied, the fault lamp will illuminate for 3 to 5 seconds while the system performs a series of self-tests. The following self-tests are performed during initialization:

- Micro Controller Test
- Lamp Test (momentary flicker)
- Temporary Memory Test
- Data Log Memory Test
- Program Integrity Test

If any of these tests fail, the processor will restart the initialization cycle. The lamp will extinguish briefly and illuminate for a period until the test failure is repeated. This cycle will continue until the processor power is removed. The illumination of the lamp will be a period of ON followed by a very brief OFF, repeated every 5 seconds, or less.

If the initial self-tests do not fail, the processor will normally extinguish the lamp for approximately 3 to 5 seconds, indicating completion of the self-test phase. It will then proceed to check for:

- A Matching Engine Configuration Value

This test is performed as follows: if the hard-wired engine/sensor/system configuration does not match the expected software value stored internally, the lamp will illuminate solid. This type of fault indication may not actually indicate a problem with the installation. It may result simply from a processor factory reset, which cleared the last stored configuration value. Such a fault can be corrected by loading a configuration file using the P&W Engine Services Monitor Link Program (MLP).

NOTE: If the engine configurations do not match, the system will be in Fault State.

If the test passes, the lamp will remain out and the processor will enter a system mode.

5.3 System Modes

After Initialization, the processor will enter one of two primary system modes of operation: **Run Mode**, or **Configuration Mode**. For data collection it is operated in Run mode. For communication through the download port with a laptop computer for the purposes of data transfer, it is in Configuration Mode. Configuration Mode is entered when a download cable is attached and the cable's RUN/CONF switch is set to CONF. Run Mode is entered when the cable is not attached, or when it is attached and the RUN/CONF Switch is set to RUN.

5.4 Run Mode Description (States and Fault Lamp Display)

There are four possible states for the system in **Run Mode**. Each state determines the fault lamp display.

System States:

1. Normal
2. Maintenance
3. Caution
4. Fault

Definitions:

- In **Normal state**, the system is performing normally OR recorded an input programmed to indicate Normal state.
- In **Maintenance state**, the system recorded an input programmed to indicate Maintenance state.
- In **Caution state**, the system recorded an input programmed to indicate Caution state.
- In **Fault state**, the system has failed OR the system recorded an input programmed to indicate Fault state.

Fault Lamp Display:

Lamp Out – Normal State:
This is the normal condition of the ADAS+ when all system checks have passed and there are no previous flight exceedances recorded.

Lamp Flashing (pressing button will turn lamp off) – Maintenance State:
When the ADAS+ is in Maintenance State, either a previous flight exceedance has occurred, or the system has detected a minor fault condition that will not affect its ability to function as an exceedance monitor.

Lamp Flashing (pressing button will NOT turn lamp off) – Caution State:
When the ADAS+ is in Caution State, the system has detected a fault condition that may affect its ability to function as an exceedance monitor.

Lamp Solid – Fault State:
When the ADAS+ is in Fault State, the system has detected a fault condition that WILL affect its ability to function as an exceedance monitor.

Note: The ADAS+ will extinguish any of the above lamp conditions once an engine has started. Once the engine has been started, or either engine has started in a dual engine aircraft, the ADAS+ lamp is used to display trend and exceedance information to the pilot and/or crew as follows:

Trend Mode:
The ADAS+ can be configured to take an automatic trend sample whenever certain engine/flight conditions are met. Once the trend criteria are met, the system will collect a sample of data for later review by maintenance personnel. During this trend sample the ADAS+ lamp will flash at a slow (1 Hz) rate. Pressing the TREND switch will manually initiate the same trend data sample.

Exceedance Mode:
Exceedance Mode is defined as anytime the aircraft or engine has met the criteria defined for an exceedance and where the pilot and/or crew should be alerted. These exceedances are typically torque or temperature exceedances. Exceedance Mode is displayed to the pilot via a 2 HZ lamp flash.

Note: The exceedance can be configured such that Exceedance Mode can be acknowledged by pressing the TREND switch. If configured this way, the Exceedance Mode lamp display will extinguish when the TREND switch is pressed.

Single/Dual Engine Functions:
The ADAS+ monitoring system will monitor and record engine run, trend, cycle and exceedance information for both single and dual engine aircraft. All interface to the pilot and/or crew is done through a single cockpit mounted TREND switch/fault lamp. If the pilot and/or crew are notified during an exceedance by the lamp, the pilot and/or crew must use standard aircraft/engine instrumentation to determine the cause of the exceedance and take corrective action as appropriate

5.4.1 Fault Lamp Display for Optional ENGINE/TREND Split Lamp

Trend Lamp Out - Normal State:
This is the normal condition of the ADAS+ when all system checks have passed and there are no previous flight exceedances recorded.

Trend Lamp Flashing (pressing button will turn lamp off) - Maintenance State:
When the ADAS+ is in Maintenance State, either a previous flight exceedance has occurred, or the system has detected a minor fault condition that will not affect its ability to function as an exceedance monitor.

Trend Lamp Flashing (pressing button will NOT turn lamp off) - Caution State:
When the ADAS+ is in Caution State, t either a previous flight exceedance has occurred, or the system has detected a fault condition that may affect its ability to function as an exceedance monitor.

Trend Lamp Solid - Fault State:
When the ADAS+ is in Fault State, either a previous flight exceedance has occurred, or the system has detected a fault condition that WILL affect its ability to function as an exceedance monitor.

Engine Lamp Solid:
When the ENGINE lamp is illuminated, a previous engine flight exceedance has occurred.

Note: The ADAS+ will extinguish any of the above lamp conditions once an engine has started. Once the engine has been started, or either engine has started in a dual engine aircraft, the ADAS+ lamp is used to display trend and exceedance information to the pilot and/or crew as follows:

Trend Mode:
The ADAS+ can be configured to take an automatic trend sample whenever certain engine/flight conditions are met. Once the trend criteria are met, the system will collect a sample of data for later review by maintenance personnel. During this trend sample the ADAS+ Trend lamp will flash at a slow (1 Hz) rate. Pressing the Engine/Trend Split Lamp switch will manually initiate the same trend data sample.

Exceedance Mode:
Exceedance Mode is defined as anytime the aircraft or engine has met the criteria defined for an exceedance and where the pilot and/or crew should be alerted. Engine exceedances are displayed to the pilot via a solid amber ENGINE lamp. Aircraft exceedances are displayed to the pilot via a solid white Trend lamp.

Note: The Exceedance Mode will be configured so that the exceedance can be acknowledged by pressing the ENGINE/TREND switch. When configured this way, the Exceedance Mode lamp display will extinguish when the ENGINE/TREND switch is pressed.

Single/Dual Engine Functions:
The ADAS+ monitoring system will monitor and record engine run, trend, cycle and exceedance information for both single and dual engine aircraft. All interface to the pilot and/or crew is done through a single cockpit mounted ENGINE/TREND Split Lamp. If the pilot and/or crew are notified during an exceedance by the lamp, the pilot and/or crew must use standard aircraft/engine instrumentation to determine the cause of the exceedance and take corrective action as appropriate.

6 SYSTEM CONFIGURATION AND CALIBRATION

The ADAS+ is a combination of hardware and software designed to have a wide range of application. In order to correctly operate with the specific aircraft type it is installed in, the system must first be configured to expect the particular sensor and signal combinations available on that aircraft as well as the engine type and other necessary information.

When it has been properly configured, the ADAS+ must be **calibrated** to correctly compensate for the precise range and level of the available sensor signals on that specific aircraft. This last function is similar to the calibration performed on aircraft instruments, and may, in part, use some of the same calibration equipment. The system is also capable of being calibrated without such equipment, by utilizing the existing cockpit flight instruments as calibration standards. However, this option depends on the accuracy of the cockpit instruments (and their own calibration), and is more difficult to perform. It requires flying the aircraft to get a useful range of readings. The preferred method of calibration for ADAS+ is to use conventional calibration equipment.

The installer, with the help of a computer and software communication tools, performs configuration and calibration. Configuration and calibration require a laptop computer connected to the system with a download cable and running P&W Engine Services **Monitor Link Program (MLP)**. The MLP gives field personnel the ability to monitor the sensors in real time (Live Data Display) as well as to alter the configuration and calibration data stored by the system.

In addition to MLP, P&W Engine Services offers an Internet based data management and analysis system called TurbineTracker™. MLP and TurbineTracker™ make it possible to quickly transfer and manage the aircraft's configuration and calibration data, as well as operational data (log data) for fleet comparison and analysis. The TurbineTracker™ website is located at `www.turbinetracker.aero`. To obtain a TurbineTracker™ user account and password, contact P&W Engine Services Help Desk.

Current manuals for both TurbineTracker and MLP are available through the TurbineTracker™ website. The following sections and instructions for configuration and calibration of the system require familiarity with the MLP and TurbineTracker™ manuals and software. While this section of the installation manual cannot replace the software manuals, a few of the special terms and concepts used in the configuration and calibration instructions are briefly described in this manual. See the software manuals for full descriptions and procedures for use of the applicable software product.

6.1 Definitions

Configuration File: An MLP data file that contains engine, sensor, and calibration information for a specific aircraft. This information is transmitted to the processor during configuration and updated during calibration.

Configuration Version: A number stored with a particular configuration file. The MLP and TurbineTracker™ both maintain version numbers of the current configuration file in use. These must match each other and correspond with the data collected and stored by the system processor. When a new calibration is performed and accepted, the version number is automatically incremented.

Live Data Display: An MLP mode of operation that presents periodically updated aircraft sensor readings in real time. Live Data Display may be used in flight and on the ground when adjusting the calibration or testing and troubleshooting the system.

Log Data: The stored operational aircraft exceedance, event, cycle, and sensor readings collected by the processor. In normal aircraft use, the information gathering function of the system creates Log Data. This data is stored in raw form (a Log File) and can be extracted and further processed into useful information through MLP and TurbineTracker™.

MLP (Monitor Link Program): The P&W Engine Services communication program is used to transfer data to and from the processor. It can also display live operational data.

MLU (Monitor Link Unit): Files loaded into MLP that enables MLP to communicate with the ADAS+.

One Point Offset Calibration (P2): A method that uses a single reading (or point) to correct (calibrate) a sensor signal. A One Point Offset Calibration is a less precise offset method of calibration than a Two Point Calibration. A One Point Offset Calibration is used when the calibration occurs on the low end of a sensor's potential operating range and a Two Point Calibration cannot be accomplished. To increase the useful precision of the one point offset method, a reading at the **low** end of a sensor's signal range is preferred. For example, if a sensor reading is supposed to fall between 10 degrees and 100 degrees, a test reading at 20 degrees will calibrate the system better than one at 70 degrees. *If a reading at 0 has been attempted as a One Point Offset Calibration, the system has not been usefully calibrated **at all.***

NOTE: The One Point Offset Calibration Method only ensures that the low end of a sensor signal's range is calibrated. Never use 0 when accomplishing the One Point Offset Calibration Method.

One Point Slope Calibration (P1): A second method that uses a single reading (or point) to correct (calibrate) a sensor signal. A One Point Slope Calibration is a less precise method of calibration than a Two Point Calibration. A One Point Slope Calibration is used when the calibration occurs on the high end of a sensor's potential operating range and a Two Point calibration cannot be accomplished. To increase the useful precision of the one point slope method, a reading at the **high** end of a sensor's signal range is preferred. For example, if a sensor reading is supposed to fall between 100 and 500, a test reading at 400 will calibrate the system better than one at 150. *If a reading at 0 has been attempted as a One Point Slope Calibration, the system has not been usefully calibrated **at all.***

NOTE: The One Point Slope Calibration Method only ensures that the high end of a sensor signal's range is calibrated. Never use 0 when accomplishing the One Point Slope Calibration Method.

Two Point Calibration (P1 & P2): The most accurate method of calibration, requiring both a low and high value to correct (calibrate) a sensor signal. A Two Point Calibration occurs when calibration equipment or the manual sensor calibration methods are used. *If a reading at 0 has been attempted as a Two Point Calibration, the system has not been usefully calibrated **at all.***

NOTE: The Two Point Calibration Method ensures that the low end AND high end of a sensor's signal range are calibrated. Never use 0 when accomplishing the Two Point Calibration Method.

6.2 Processor Configuration

These instructions require that the installer have a laptop computer with the current version of MLP and has created the required installation configuration file. The current version of the MLP and its manual are available from the TurbineTracker™ website.

NOTE: Ensure that you have the correct copy of the Configuration File to be loaded.

010 Connect the download cable to the download port of the ADAS+ to be configured. The cable can only be plugged in one way. Connect the other end of the cable to the serial port on a laptop computer with the current version of the MLP.

020 Place the download cable "RUN/CONF" switch on the cable in the "CONF" position.

030 Establish connection to the processor using MLP. If unable to establish connection, proceed with the MLP Troubleshooting Procedure (See the MLP manual).

040 Select "Configure Unit" under the MLU Menu.

050 Follow the on-screen prompts and select the appropriate installation configuration file.

060 Select "Open". (If you are prompted to retrieve the Log File, retrieve the log data from the processor first, and then select "Open.")

6.2.1 Pre-Calibration Sensor Test

After configuration and before calibrating the sensors, accomplish View Live Data to make sure that all the sensors are operating.

NOTE: Failed Sensors are displayed as 9999.9999. If unexpected values are displayed that are not 9999.9999, that means that the sensor signal is being processed incorrectly.

These instructions require that the installer have a laptop computer with the current version of MLP and has created the required installation configuration file. The current version of the MLP and its manual are available from the TurbineTracker™ website.

NOTE: Although the data will be viewed in real time, the data is stored in a file for future reference. Live Data updates once every second.

010 Connect the download cable to the download port. The cable can only be plugged in one way. Connect the other end of the cable to the serial port on a laptop computer with the current version of MLP.

020 Place the download cable "RUN/CONF" switch on the cable in the "CONF" position.

030 Establish a connection to the processor using MLP. If unable to establish a connection, proceed with the MLP Troubleshooting Procedure in the MLP Manual (*P&W Engine Services Monitor Link Program – MLP User's Guide*).

040 Select "Live Data" then "Text View". Name the "Live Data" file and select "Save."

050 When prompted by MLP, place the "RUN/CONF "switch in the "Run" position and click "OK."

060 The sensor values will display and update once a second. The analog sensor values may slightly differ from actual readings since the processor has yet to be calibrated. A failed sensor will display 9999.9999. Troubleshoot failed sensors using ADAS+ Instructions for Continued Airworthiness Manual (EMU-G-260-1).

070 Click "Stop Live Data" to stop viewing live data.

080 When prompted, place the "RUN/CONF" switch in the "CONF" position and click "OK."

6.3 Calibration of Optional Sensors

The ADAS+ is capable of measuring additional engine and airframe parameters. The only sensor that needs to be calibrated at this time is the vertical accelerometer (no longer available as of March 1, 2009). This must be done by physically removing the unit from its mounting and performing the following steps:

010 Connect the download cable to the download port. The cable can only be plugged in one way. Connect the other end of the cable to the serial port on a laptop computer with the current version of the MLP.

020 Place the download cable "RUN/CONF" switch on the cable in the "CONF" position.

030 Establish a connection to the processor using the MLP. If unable to establish a connection, proceed with the MLP Troubleshooting Procedure in the MLP Manual (*P&W Engine Services Monitor Link Program – MLP User's Guide*).

040 Select "Sensor Calibration" under the MLU Menu.

050 Select "Vertical Accl" And perform a Two Point Calibration by using the following values:

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

a. Turn the accelerometer crossbow label side down and enter -1 in the Upper Box

b. Turn the accelerometer crossbow label side up and enter 1 in the Lower Box

060 After calibration, upload the new configuration file version to your TurbineTracker™ account. It is important to keep the processor, MLP, and Turbine Tracker™ configuration versions synchronized.

6.4 Calibration Using Test Equipment

These instructions require that the installer have a laptop computer with the current version of MLP and has created the required installation configuration file. The current version of MLP and its manual are available from the TurbineTracker™ website.

The same test equipment that is used to check cockpit instruments can be used for calibrating the ADAS+. You can calibrate the torque sensors using a dead weight tester, the temperature using a Barfield tester, the pitot pressure sensor using a pitot/static tester, and the OAT sensor using a calibrated thermometer or equivalent testers. This test equipment should be verified to be accurate.

NOTE: The Static Pressure Sensor can be calibrated with a pitot/static tester only if the Static Pressure Sensor is plumbed into the aircraft static system.

NOTE: Opening MLP for a calibration session will increment the configuration file version by one. Any number of sensors may be calibrated during this session without increasing the version number further. Opening, closing, and reopening MLP for calibration multiple times will increment the configuration file version each time a sensor is calibrated, and should be avoided.

010 Connect the download cable to the download port. The cable can only be plugged in one way. Connect the other end of the cable to the serial port on a laptop computer with the current version of the MLP.

020 Place the download cable “RUN/CONF” switch on the cable in the “CONF” position.

030 Establish a connection to the processor using the MLP. If unable to establish a connection, proceed with the MLP Troubleshooting Procedure in the MLP Manual (*P&W Engine Services Monitor Link Program – MLP User’s Guide*).

040 Select “Sensor Calibration” under the MLU Menu. Only the following sensors should be calibrated: Engine Temperature, OAT, Engine Torque, Airspeed, and Altitude.

NOTE: Some of the sensors are duplicated to differentiate between Engine 1 and Engine 2 sensors

050 Select Engine Temperature and perform a Two Point Calibration using a Barfield tester.

060 Select Engine Torque and perform a Two Point Calibration using a deadweight tester.

070 Select OAT and perform a One Point Offset calibration adjusting the value to the calibrated thermometer.

080 Select Airspeed and perform a Two Point Calibration using a Pitot/Static Test Set.

090 Select Altitude and perform a Two Point Calibration using a Pitot/Static Test Set with the barometric pressure set to 29.92” (14.7 psi or 1013 mb depending on gauge).

100 After calibration, upload the new configuration file version to your TurbineTracker™ account. It is important to keep the processor, MLP, and Turbine Tracker™ configuration versions synchronized.

6.5 Calibration Using Aircraft Cockpit Instruments

These instructions require that the installer have a laptop computer with the current version of MLP and that the installer has created the required installation configuration file. The current version of MLP and its manual are available at the TurbineTracker™ website.

This procedure is generally less precise than using calibration equipment standards and requires both calibrations on the ground and in the air to obtain instrument readings. A Manual Sensor Calibration will be performed in this procedure – the calibrations are accomplished AFTER the values are collected, not during.

NOTE: Opening MLP for a calibration session will increment the configuration file version by one. Any number of sensors may be calibrated during this session without increasing the version number further. Opening, closing, and reopening MLP for calibration multiple times will increment the configuration file version each time a sensor is calibrated, and should be avoided.

010 Start the aircraft and let the aircraft gauge readings stabilize at engine idle.

020 Write down the Current Temperature, Torque, Altitude, and Airspeed values. These values shall be called USER 1.

030 Press the TREND switch and note the lamp flashes for 5 seconds and then extinguishes.

040 Fly the aircraft and attain a stable cruise flight.

050 Write down the Current Temperature, Torque, Altitude, and Airspeed values. These values shall be called USER 2.

060 Press the TREND switch and note that the lamp flashes for 5 seconds and then extinguishes. Keep the aircraft steady while the lamp is flashing to ensure a valid trend.

070 Land and shutdown the aircraft.

080 Connect the download cable to the download port. The cable can only be plugged in one way. Connect the other end of the cable to the serial port on a laptop computer with the current version of MLP.

090 Place the download cable “RUN/CONF” switch on the cable in the “CONF” position.

100 Establish connection to the processor using MLP. If unable to establish a connection, proceed with the MLP Troubleshooting Procedure (See the MLP manual).

110 Select “Retrieve Unit’s Data Log” under MLU Menu.

120 Choose a file name.

130 After the log data is retrieved, you will be prompted to reset the log. Choose “Yes” and wait for the reset to complete.

140 Select “View Data Log” under View Menu and open the log file that was just retrieved. The log file should contain at least the engine run and two manual trends that were just accomplished.

150 Write down the AVG Temperature, Torque, Altitude, and Airspeed values of the manual trend accomplished on the ground. These values shall be called TREND 1.

160 Write down the AVG Temperature, Torque, Altitude, and Airspeed values of the manual trend accomplished during cruise flight. These values shall be called TREND 2.

170 Select “Manual Sensor Calibration” under Expert Menu. Only the following sensors should be calibrated: Engine Temperature, Engine Torque, Airspeed and Altitude.

NOTE: Some of the sensors are duplicated to differentiate between Engine 1 and Engine 2 sensors.

180 Accomplish a Two Point Calibration for Temperature, Torque, Altitude, and Airspeed.

NOTE: You will see four empty boxes for each calibration

> ***Enter the sensor values collected in TREND 1 in the upper left hand box (Unit's Value Column, Top Row)***
>
> ***Enter the sensor values collected in TREND 2 in the lower left hand box (Unit's Value, Bottom Row)***
>
> ***Enter the gauge values collected in USER 1 in the upper right hand box (Calibrate to Values Column, Top Row)***
>
> ***Enter the gauge values collected in USER 2 in the lower right hand box (Calibrate to Values Column, Bottom Row)***

190 After completing the calibrations, exit Manual Sensor Calibration mode.

200 Select "Sensor Calibration" under the MLU Menu. Only the OAT sensor should be calibrated.

210 Select OAT and perform a One Point Offset Calibration and adjust the value to the reading on the calibrated thermometer.

220 After calibration, upload the new Configuration File version to your TurbineTracker account. It is important to keep the processor, MLP and Turbine Tracker™ configuration versions synchronized

Recommended calibration points when using TEST EQUIPMENT

Calibrated Sensor	Two Point Calibration Point 1	Two Point Calibration Point 2	Single Point Offset	Units	Calibration Equipment
Airspeed	30	VNE	N/A	knots	Pitot-Static Test Kit
Altitude (helicopters)	3,000	12,000	Pressure Altitude at 29.92" Hg (14.7 psi or 1013 mb)	feet	Pitot-Static Test Kit
Altitude (fixed wing)	5,000	20,000	Pressure Altitude at 29.92" Hg (14.7 psi or 1013 mb)	feet	Pitot-Static Test Kit
ITT	400	1,000	N/A	°C	Barfield Meter
OAT	N/A	N/A	Ambient	°C	Calibrated Digital Thermometer
Torque	30	Max takeoff	N/A	%	Dead-Weight Tester
	500	Max takeoff	N/A	foot-lbs	Dead-Weight Tester
	approx 20	Max takeoff	N/A	psi	Dead-Weight Tester
Mast Torque	0	Max	N/A	%	Aircraft Instrument (Pilot OVER TORQ warning light)
(if applicable)	0	Max	N/A	foot-lbs	Aircraft Instrument (Pilot OVER TORQ warning light)
(if applicable)	0	Max	N/A	psi	Aircraft Instrument (Pilot OVER TORQ warning light)

*****NOTE: When performing a Manual Calibration, use NORMAL OPERATING RANGES for engine and Airframe*****

7 AIRCRAFT TESTING

While following the requirements of FAR 91.407, it is recommended that the aircraft be inspected for airworthiness prior to testing. If the ground and/or flight testing of the modified aircraft are not successfully completed, the aircraft should be returned to the original aircraft configuration until the tests are completed and acceptable.

After installation and calibration of the ADAS+, it is recommended that ground and flight tests be performed to verify the correct operation of the system in the aircraft. The following sections outline the suggested aircraft and system test procedures.

7.1 Aircraft Ground Test

The circuit breaker for the ADAS+ may not be accessible with the engine running. This is true for the Cessna Caravan. Please refer to the appropriate Ground Test for the particular aircraft under test.

For All Listed Engine Models with Inaccessible Circuit Breaker:

- ❑ *010* With the aircraft battery connected and master switch on, verify that the fault lamp illuminates, indicating system boot-up. After approximately 5 seconds, the lamp will extinguish and either:
  - a. Remain extinguished (NORMAL STATE)
  - b. Flash (MAINTENANCE OR CAUTION STATE)
  - c. Illuminate Solid (FAULT STATE)

  If the processor does NOT go into NORMAL STATE, retrieve the log data, and troubleshoot the system.
- ❑ *020* Turn battery switch off
- ❑ *030* With external power connected to aircraft, apply external power to the aircraft bus
- ❑ *040* Power on all avionics
- ❑ *050* Tune Comm 1 and Comm 2 VHF radios to the frequencies in Table 4 and verify that there is no interference caused by the ADAS+. This can normally be conducted by checking for auto squelch break on each listed frequency.
- ❑ *060* If interference is suspected at any particular frequency, pull the ADAS+ circuit breaker to see if the interference subsides
- ❑ *070* If the aircraft is equipped with a GPS navigation receiver, display the satellite status page and cycle power on the ADAS+.
- ❑ *080* Verify that the GPS signal strength is not affected by the operation of the ADAS+
- ❑ *090* Tune the #1 and #2 VHF NAV receivers to receive a valid navigational signal from either a VOR ramp tester or a locally tuned VOR navigation transmitter
- ❑ *100* Verify that valid course deviation and a retracted NAV flag are displayed on the HIS or the VOR course indicator.
- ❑ *110* Cycle power on the ADAS+ and verify that there is no effect on the displayed NAV data
- ❑ *120* If the aircraft is equipped with an autopilot, initiate autopilot self test. This may require pulling, and then resetting the autopilot circuit breaker with power applied to the ADAS+

- ❑ *130* Verify that the autopilot completes a successful self-test.
- ❑ *140* Survey the aircraft for any other installed equipment that may be affected by interference from the ADAS+. Perform any additional tests as required to determine if the ADAS+ creates objectionable interference. This may be accomplished by pulling the ADAS+ circuit breaker while observing the subject equipment. List the additional equipment tested and any observed effects in the Electromagnetic Compatibility Testing Table (See Table 5).
- ❑ *150* Remove external power from aircraft and start engine
- ❑ *160* Monitor the engine torque lines for oil leaks. If leaks are found, shut down and correct the leaks.

Frequency	Pass/Fail	Frequency	Pass/Fail
118.00 MHZ		127.00 MHZ	
119.00 MHZ		128.00 MHZ	
120.00 MHZ		129.00 MHZ	
121.00 MHZ		130.00 MHZ	
122.00 MHZ		131.00 MHZ	
123.00 MHZ		132.00 MHZ	
124.00 MHZ		133.00 MHZ	
125.00 MHZ		134.00 MHZ	
126.00 MHZ		135.00 MHZ	

Table 4: VHF Frequency Table

For All Listed Engine Models with Accessible Circuit Breaker:

Engine Running:

- ❑ *010* Start engine.
- ❑ *020* Monitor the engine torque lines for oil leaks. If leaks are found, shut down and correct the leaks
- ❑ *030* With the engine running and the ADAS+ system operational, tune Comm 1 and Comm 2 VHF radios to the frequencies in Table 4 and verify that there is no interference caused by the ADAS+. This can normally be conducted by checking for auto squelch break on each listed frequency
- ❑ *040* If interference is suspected at any particular frequency, pull the ADAS+ circuit breaker to see if the interference subsides.
- ❑ *050* If the aircraft is equipped with a GPS navigation receiver, display the satellite status page and cycle power on the ADAS+.
- ❑ *060* Verify that the GPS signal strength is not affected by the operation of the ADAS+
- ❑ *070* Tune the #1 and #2 VHF NAV receivers to receive a valid navigational signal from either a VOR ramp tester or a locally tuned VOR navigation transmitter

- ❑ *080* Verify that valid course deviation and a retracted NAV flag are displayed on the HIS or the VOR course indicator.
- ❑ *090* Cycle power on the ADAS+ and verify that there is no effect on the displayed NAV data
- ❑ *100* If the aircraft is equipped with an autopilot, initiate autopilot self test. This may require pulling, and then resetting the autopilot circuit breaker with power applied to the ADAS+
- ❑ *110* Verify that the autopilot completes a successful self-test
- ❑ *120* Survey the aircraft for any other installed equipment that may be affected by interference from the ADAS+. Perform any additional tests as required to determine if the ADAS+ creates objectionable interference. This may be accomplished by pulling the ADAS+ circuit breaker while observing the subject equipment. List the additional equipment tested and any observed effects in the Electromagnetic Compatibility Testing Table (See Table 5)
- ❑ *130* Stabilize the engine(s) at a convenient partial power setting
- ❑ *140* Once the engine readings are stabilized, write down the cockpit instrument values in the Ground Test Data Table (See Table 6).
- ❑ *150* As soon as the cockpit instrument values are recorded, press the TREND switch. The aircraft engine(s) running condition should remain stable while the fault lamp is flashing and the processor is recording trend data.

Table 5: Electromagnetic Compatibility Test Table

Equipment	Problem Found Y/N?	Comments Ground Test	Comments Flight Test

Comments: ____

____

____

____

____

The ADAS+ stored data will be retrieved at the conclusion of the ground and/or flight test. Once retrieved, this data will also be inserted into the Ground Test Data Table (See Table 6) and compared to the aircraft instrumentation.

Table 6: Ground Test Data

Ground Test	Eng. #1			Eng. #2 (If Applicable)		
	Cockpit	ADAS+	Delta	Cockpit	ADAS+	Delta
Tq						
N1						
N2						
Np						
Engine Temp						
OAT						
Alt						
IAS						

Comments: ____

7.2 Aircraft Flight Test

- ❑ *010* Takeoff and climb to cruise altitude.
- ❑ *020* During the en-route phase of the flight, check all radios and navigation equipment for normal performance. Ensure the absence of electromagnetic interference between the ADAS+ and the rest of the aircraft systems. Record the results of all tests in the Electromagnetic Compatibility Test Table (See Table 5).
- ❑ *030* Check all other aircraft equipment and verify normal operation.
- ❑ *040* Once the engine readings are stabilized, record the cockpit instrument values in the Flight Test Data Table (See Table 7).
- ❑ *050* As soon as the data is recorded, press the TREND switch. Ensure the aircraft is stable while the fault lamp is flashing and the processor is recording data.

The ADAS+ stored data will be retrieved at the conclusion of the ground and/or flight test. Once retrieved, this data will also be inserted into the Flight Test Data Table (See Table 7) and compared to the aircraft instrumentation.

Table 7: Flight Test Data

Ground Test	Eng. #1			Eng. #2 (If Applicable)		
	Cockpit	ADAS+	Delta	Cockpit	ADAS+	Delta
Tq						
N1						
N2						
Np						
Engine Temp						
OAT						
Alt						
IAS						

Comments: ________________________________

____

____

____

____

7.3 Test Data Retrieval and Review

After the ground and/or flight tests have been completed perform the following:

- ❑ *010* Download the ADAS+ trend data for each engine to a laptop computer with MLP.
- ❑ *020* Fill in the Ground and/or Flight Test Table (Table 6 and Table 7) with the trend data.
- ❑ *030* Review the tables for any discrepancies between the ADAS+ data and the aircraft instrument readings.

7.4 Continued Airworthiness Instructions

See ADAS+ Instructions for Continued Airworthiness (ADAS-G-260-1) for troubleshooting the system. If you require further assistance, contact the Help Desk:

Pratt & Whitney Engine Services, Inc.
Help Desk
249 Vanderbilt Avenue
Norwood, MA 02062
(781) 762-8600
Fax: (781) 762-2287
E-mail: support@altairavionics.aero

8 SERVICE

8.1 Customer Support

P&W Engine Services provides customer support in accordance with the product warranty detailed within the customer's sales contract. If you have any questions concerning any P&W Engine Services product, please do not hesitate to contact us. Our Help Desk accepts calls Monday through Friday between 9:00 AM and 5:00 PM EST. Please have your model and serial number ready when you call.

Pratt & Whitney Engine Services, Inc.
Help Desk
249 Vanderbilt Avenue
Norwood, MA 02062
(781) 762-8600
Fax: (781) 762-2287
E-mail: support@altairavionics.aero

9 SPECIFICATIONS

9.1 System Specifications

GENERAL

Chassis Size (each):	3.7" x 1.7" x 6.9"
Chassis Weight:	1.4 lbs (22 oz.)
System Weight:	Approximately 11 lbs. – Refer to applicable addendum for actual system weight

POWER REQUIREMENTS

Voltage Range:	11 to 32 VDC
Current Draw	< 1.0 A
Power Draw	8 Watts operating
	20 mWatts standby

ENVIRONMENTAL (ALL TESTS TO RTCA/DO-160D)

Test Performed	RTCA Section	Level
Temperature & Altitude	Section 4.0	Equipment tested to category D3
- Low Temperature	Section 4.5.1	- 40 ºC Operating
- High Temperature	Section 4.5.2	70 ºC, +85 ºC Short-Time
Operating		
- In-Flight Loss of Cooling	Section 4.5.4	Test not required
- Altitude Test	Section 4.6.1	50,000 Ft
- Decompression Test	Section 4.6.2	Test not required
- Overpressure Test	Section 4.6.3	Test not required
Temperature Variation	Section 5.0	Equipment tested to category B
Humidity	Section 6.0	Equipment tested to category B
Shock	Section 7.0	Equipment tested to category B
- Operational	Section 7.2	Equipment tested to category B
- Crash Safety Test	Section 7.3	Equipment tested to category B
Vibration	Section 8.0	Robust test performed to category R2
Explosion	Section 9.0	Equipment identified as category E
Waterproofness	Section 10.0	Equipment identified as category R

Fluids Susceptibility	Section 11.0	Equipment identified as category F
Sand and Dust	Section 12.0	Equipment identified as category D
Fungus	Section 13.0	Equipment identified as category F
Salt Spray	Section 14.0	Equipment identified as category S
Magnetic Effect	Section 15.0	Equipment identified as category Z
Power Input	Section 16.0	Equipment tested to category B
Voltage Spikes	Section 17.0	Equipment tested to category B
Audio Freq. Susceptibility	Section 18.0	Equipment tested to category B
Induced Signal Susceptibility	Section 19.0	Equipment tested to category B
Radio Freq. Susceptibility	Section 20.0	Equipment identified as category V
Radio Freq. Emission	Section 21.0	Equipment tested to category L
Transient Susceptibility	Section 22.0	Equipment identified as category XXC2
Lightning Direct Effect	Section 23.0	Equipment identified as category X
Icing	Section 24.0	Test Not Required
Electrostatic Discharge	Section 25.0	Equipment identified as category A

DATA INTERFACE

Computer Interface: RS-485 Serial Interface, 57,600 Baud

SYSTEM SOFTWARE

The ADAS+ has been designed and tested to RTCA/DO-178B Level C

SAMPLE RATE

The ADAS+ samples Engine Temperature up to 50 times per second. All other inputs are sampled up to 5 times per second

DATA STORAGE

System Data:	Installation ID / Version
Engine Run Data:	Engine Run Date, Engine Run Time, Engine Run Duration, Maximum Sensor Values Observed, Cycles Counted, Maximum Start Temp, Minimum Battery Voltage, Start Duration
Exceedance Data:	Exceedance Date, Exceedance Time, Exceedance Duration, Exceedance Type, Maximum/Minimum Value Observed, Average Value Observed, Time History Sensor Recording
Trend Sample:	Trend Type (Auto/Manual), Trend Time, Sensor Max Value Observed, Sensor Average Value Observed
Flash Storage Memory:	4 MB

9.2 SPECIFICATIONS FOR P&W ENGINE SERVICES SUPPLIED SENSORS

ENGINE - TORQUE PRESSURE SENSOR

The ADAS+ provides a torque pressure signal interface as follows:

Parameter	Specification	Comments
Operating Pressure	0-150 PSIG	
Proof Pressure	450 PSIG	
Hysteresis & Repeatability	+/- .05% of Span MAX	
Environmental	-40 ºC to 125 ºC	Operating

AIRCRAFT - PA AMBIENT PRESSURE SENSOR

The ADAS+ provides a Pa sensor and interface as follows:

Parameter	Specification	Comments
Operating Pressure	0-15 PSIA	
Proof Pressure	75 PSI	
Hysteresis & Repeatability	+/- .05% of Span MAX	
Environmental	-40 ºC to 125 ºC	Operating

AIRCRAFT - PITOT PRESSURE SENSOR

The ADAS+ provides a pitot pressure sensor and interface as follows:

Parameter	Specification	Comments
Operating Pressure	0-3 PSIA	
Proof Pressure	6 PSI	
Hysteresis & Repeatability	+/- .05% of Span MAX	
Environmental	-40 ºC to 125 ºC	Operating

AIRCRAFT - TA AMBIENT TEMPERATURE SENSOR

The ADAS+ provides a Ta sensor and interface as follows:

Parameter	Specification	Comments
Sensor Type	Platinum Resistance Probe	
Accuracy	+/- 3 ºC (Uncalibrated)	
	+/- 1 ºC (Calibrated)	
Range	-54 ºC To 100 ºC	

AIRCRAFT – ACCELEROMETER

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

The ADAS+ provides a vertical accelerometer and interface as follows:

Parameter	Specification	Comments
Accuracy	+/- .06G	
Range	+/- 5G	

9.3 Interface Requirements For Aircraft Sensors

FAULT/CAUTION LAMP

The ADAS+ may interface with an existing cockpit lamp.
The lamp shall have the following characteristics:

Nominal Voltage	+28 VDC
Current	40 mA +/- 10%
Power Dissipation	1.24 Watts
Average Rated Life (0°C)	1,500 Hours

PILOT COMMAND SWITCH

The ADAS+ may interface with an existing cockpit switch. The input shall have the following characteristics:

Parameter	Specification	Comments
Input Threshold	0 VDC	Switch Depressed
	> 0 VDC	Switch Disengaged

POWER INPUT +28VDC

The ADAS+ requires power via one (1) 1 Amp circuit breaker and one (1) 1 Amp fuse, both installed in a remote location. The input shall have the following characteristics:

Parameter	Specification	Comments
Nominal	+28 VDC	
Typical	20 – 30 VDC	
Minimum	11 VDC	
Maximum	32 VDC	

HOUR METER/WEIGHT ON WHEELS

The ADAS+ requires a discrete signal input to detect actuation of the aircraft hour meter or weight on wheels. The input shall have the following characteristics:

Parameter	Specification	Comments
Input Voltage Range	0 - 30.0 VDC	
Input Threshold	5.0 VDC	
	< OR = 5.0 VDC	

ENGINE – TEMPERATURE

The ADAS+ measures Engine Temperature using the aircraft's existing Chromel/Alumel (Type K) assembly. The input is isolated from ground and isolated from other instruments. The ADAS+ measures Engine Temperature with the following specifications:

Parameter	Specification	Comments
Input Range	0°C to 1098 °C	
Accuracy	+/- 5 °C	Isolation Connections to the thermocouple are isolated from ground to prevent interference from other indicators.
Parallel Loads	TBD	

ENGINE - N1/Ng GAS GENERATOR SPEED

The ADAS+ measures N1/Ng gas generator speed using the existing aircraft sensors installed on the engine. Requirements and specs for an N1/Ng sensor of the tachometer type are as follows:

Parameter	Specification	Comments
Conversion	100% N1	
Range	0 –150%	
Generator Output	21.0 VAC +/- 0.5% @ 70.0 Hz w/40 Ohm Y load at 4200 RPM	
Accuracy	+/- 0.2% of point	
Min Req	5%N1	

Requirements and specs for an N1 sensor of the magnetic pickup type are as follows:

Parameter	Specification	Comments
Input Impedance	2K Ohms Min	Differential
Frequency at (100%)	As specified by the aircraft manufacturer	
Range	As specified by the aircraft manufacturer	
Sensor Resistance	As specified by the aircraft manufacturer	

Accuracy	+/- 0.2% of FS

ENGINE - N2 POWER TURBINE SPEED

The ADAS+ measures the N2 power turbine speed using the existing sensors installed on the engine. Requirements and specs for an N2 sensor of the tachometer type are as follows:

Parameter	Specification	Comments
Conversion	100% N2	
Range	0 –150%	
Generator Output	21.0 VAC +/- 0.5% @ 70.0 Hz w/40 Ohm Y load at 4200 RPM	
Accuracy	+/- 0.2% of point	

Requirements and specs for an N2 sensor of the magnetic pickup type are as follows:

Parameter	Specification	Comments
Input Impedance	2K Ohms Min	Differential
Frequency at (100%)	As specified by the aircraft manufacturer	
Range	As specified by the aircraft manufacturer	
Sensor Resistance	As specified by the aircraft manufacturer	
Accuracy	+/- 0.2% of point	

ENGINE - Np PROPELLER SPEED

The ADAS+ measures the Np propeller speed using the existing sensors installed on the engine. Requirements and specifications for an Np sensor of the tachometer type are as follows:

Parameter	Specification	Comments
Conversion	100% Np	
Range	0 –150%	
Generator Output	21.0 VAC +/- 0.5% @ 70.0 Hz w/40 Ohm Y load at 4200 RPM	
Accuracy	+/- 0.2% of point	

Requirements and specs for an Np sensor of the magnetic pickup type are as follows:

Parameter	Specification	Comments
Input Impedance	2K Ohms Min	Differential
Frequency at (100%)	As specified by the aircraft manufacturer	
Range	As specified by the aircraft manufacturer	
Sensor Resistance	As specified by the aircraft manufacturer	
Accuracy	+/- 0.2% of FS	

AIRCRAFT - Wf FUEL FLOW SPEED

The ADAS+ measures the Wf speed using the existing sensors installed on the engine. Requirements and specs NR sensors of the tachometer type are as follows:

Conversion	100% Wf	4190 Tach Generator RPM (69.973 Hz)
Range	0 –150%	
Generator Output	21.0 VAC +/- 0.5% @ 70.0 Hz w/40 Ohm Y load at 4200 RPM	
Accuracy	+/- 0.2% of point	

Requirements and specs for a Wf sensor of the magnetic pickup type are as follows:

Parameter	Specification	Comments
Input Impedance	2K Ohms Min	Differential
Frequency at (100%)	As specified by the aircraft manufacturer	
Range	As specified by the aircraft manufacturer	
Sensor Resistance	As specified by the aircraft manufacturer	
Accuracy	+/- 0.2% of FS	

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Glossary of Terms

AC – Alternating current

AFM – Airman's Flight Manual

EGT – Exhaust Gas Temperature

HSP – Hot Start Prevention

ITT – Inlet Turbine Temperature

Log Data - Stored Operational Readings

LRU – Line Replaceable Unit

MEL– Minimum Equipment List

MGT – Measured Gas Temperature

MLP – Monitor Link Program

MLU – Monitor Link Unit

Nf – Free Turbine

Np – Propeller

Nr Speed – Main Rotor Speed

N1 (Ng) Speed – Low Compressor Rotor Speed

N2 Speed – High Compressor Rotor Speed

OAT – Outside Air Temperature

OEI – One Engine Inoperative

Pa – Ambient Pressure

P/N – Part Number

PRV – Pressure Regulating Valve

P/T – Power Turbine

P1 – One Point Slope Calibration

P2 – One Point Offset Calibration

Ta – Ambient Temperature

TOT – Turbine Outlet Temperature

T4.5 – Power Turbine Inlet Temperature

Wf – Fuel Flow (PPH)

ΔP – Differential Pressure

ΔT – Differential Temperature

ADDENDUM A: ADAS+ Installation Manual for Cessna Caravan Model Series 208

ADDENDUM B: ADAS+ Installation Manual for Raytheon Model Series 90

ADDENDUM C: ADAS+ Installation Manual for Raytheon Model Series 200, 300, & 1900

ADDENDUM D: ADAS+ Installation Manual for Embraer Model EMB-110P1 and EMB-110P2

ADDENDUM E: ADAS+ Installation Manual for Air Tractor Models AT-400, 400A, 402, 402A, 402B 501, 502, 502A, 502B, 503, 503A, 602, 802, 802A

ADDENDUM F: ADAS+ Installation Manual for Pilatus Porter Model PC-6B & C Series

Pratt & Whitney Engine Services, Inc.
249 Vanderbilt Ave
Norwood, MA 02062

ADAS +

Instructions for Continued Airworthiness

ADAS-G-260-1

Manual Number:	ADAS-G-260-1		
Preparation Date:	November 14 , 2002	**Prepared By:**	D Desaulnier
Release Date:	December 1, 2002	**Approvals:**	D Fetherston, Manager of Engineering
Revision Date:	February 24, 2009		S Sackos, Manager of Manufacturing Services
Revision Ltr:	I		
Pages:	57		

PREFACE

Disclaimer

Like all instrumentation, the Pratt & Whitney Engine Services, Inc. ADAS+ requires knowledgeable interpretation by the pilot. Any recommendations and operating procedures contained in this manual shall not supersede the Aircraft or Engine manufacturer recommendations, operating procedures, or limits. The Pratt & Whitney Engine Services, Inc. ADAS+ should not be used as a primary guide monitoring the Aircraft and Engine manufacturers operating limits. Pratt & Whitney Engine Services, Inc. is not liable for any damages resulting from the use of this product.

Proprietary Information Notice

REVISION HISTORY

Rev Status of Sheets	Rev	H	I	H	H	H	H	I	H	I	H	H	H	H	I	H	H
	Sheet	i	ii	iii	iv	v	1	2	3	4	5	6	7	8	9	10	11
	Rev	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
	Sheet	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	Rev	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
	Sheet	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
	Rev	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
	Sheet	44	45	46	47	48	49	50	51	52	53	54	55	56	57	A	B
	Rev	H	H	H	H												
	Sheet	C	D	E	F												

LOG OF REVISIONS

REV. NO	ECO #	DESCRIPTION	PAGES REVISED
A		Initial Release	
B		Add Addendum B & C	Cover, iii, B, C
C	12/15/03	Add Addendum D & E	Cover, ii, iii, D, E
D		Add Aircraft Test Procedures, Revision Notice, and reformatted Revision History Table	Cover, ii, iii, iv, v, 44, 45
E	5/24/04	Edited Addendums for proper section heading	Cover, I, ii, iii, A, B, C, D, E
F	779	Reformatted to new standard.	All
G	812	Added Split Lamp Option, single & twin engine illustration, and corrected typos in flow charts	Cover, ii, iii, iv, v, 3, 4, 7-11, 13-57
H	957	Update split lamp. Corrected spelling and grammar. Changed UTC logo to P&WC logo. Updated address.	All
I	997	Added note that the Vertical Accelerometer is no longer available.	Cover, ii, 4, 9

Note: ***Revisions to this document shall be coordinated through the Boston Aircraft Certification Office, the Aircraft Evaluation Group, and the STC holder. If the ADAS+ Instructions for Continued Airworthiness are revised, all operators will be provided with a copy of the applicable revision. If you have a subscription with TurbineTracker™, you will be informed via email of new revisions to this manual. In addition to this, P&W Engine Services maintains the latest versions of all manuals in the Support Section of TurbineTracker™.***

If you are not a subscriber to TurbineTracker™, you may call P&W Engine Services Customer Support at 781-762-8600 for the latest revision.

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LIST OF TABLES

1 INTRODUCTION

1.1 Scope

The purpose of this document is to provide users of this product with the P&W Engine Services approved instructions for continued airworthiness. Any deviation from the procedures described within this document could result in a failure of the product to perform properly and could possibly result in damage to other systems of the aircraft.

1.2 Applicability

This document applies to aircraft that have P&W Engine Services ADAS+ monitors installed.

1.3 Definitions and Abbreviations

ADAS+ – Aircraft Data Acquisition System
ICA – Instructions for Continued Airworthiness
MLP – Monitor Link Program
STC – Supplemental Type Certificate

1.4 Precautions

This section not applicable

1.5 Units of Measure

This section not applicable

1.6 Referenced Publications

ADAS-G-010-1	Generic Installation Instructions
ADAS-G-010-1/A	Addendum A, Installation Instructions for Cessna Caravan Model Series 208
ADAS-G-010-1/B	Addendum B, Installation Instructions for Raytheon Model Series 90
ADAS-G-010-1/C	Addendum C, Installation Instructions for Raytheon Model Series 200, 300, & 1900.
ADAS-G-010-1/D	Addendum D, Installation Instructions for Embraer Model EMB-110P1/P2
ADAS-G-010-1/E	Addendum E, Installation Instructions for Air Tractor Model Series AT-400, 500, 602, & 802.
ADAS-G-010-1/F	Addendum F, Installation Instructions for Pilatus Porter Model PC-6B & C Series
ADAS-G-260-1/A	Addendum A, Instructions for Continued Airworthiness for Cessna Caravan Model Series 208
ADAS-G-260-1/B	Addendum B, Instructions for Continued Airworthiness for Raytheon Model Series 90
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ADAS-G-260-1/F	Addendum F, Instructions for Continued Airworthiness for Pilatus Porter Model Series PC-6B & C

1.7 Distribution

These Instructions for Continued Airworthiness are to be furnished with new production ADAS+ units for Part 23 aircraft and is to become part of the permanent aircraft record upon installation

2 DESCRIPTION

2.1 Aircraft Data Acquisition System (ADAS+) General Description

Aircraft and engine maintenance procedures are critical to flight safety and lower operating costs. P&W Engine Services has developed an aircraft data acquisition system known as ADAS+ to perform three primary functions:

Exceedance Event Recording: The ADAS+ can monitor critical engine parameters and record instances where they have exceeded preset values (exceedances).

Engine Trend Monitoring: The ADAS+ can gather and store engine data samples for trend analysis.

Cockpit Indication: The ADAS+ can be configured to warn the pilot of a prior exceedance on start up or shutdown, and provide system self-test indication.

The ADAS+ enables the operator to control, quantify, and manage engine maintenance operations and reduce direct operating costs.

In its data acquisition role, ADAS+ is a passive receiver of information. It can be configured to record data either manually or automatically.

Manual Operation: The pilot can quickly record a dataset from all sensors by pressing a cockpit-mounted trend button.

Automatic Operation: The system may be configured to automatically record exceedance events and trends. It may also be configured to record data samples when stable aircraft conditions are achieved. These conditions are configurable, and the data gathered may be used for engine trend analysis.

Retrieving Data: Collected data is accessed through a download serial port. Communication with the ADAS+ is achieved through P&W Engine Services Monitor Link Program (MLP), which can be used to download data and upload system configuration files. The MLP can also be used to assist maintenance personnel in performing system diagnostics, calibrations, and real-time live sensor display.

System Configuration: The ADAS+ system is shipped with a predefined set of software sensor configurations, exceedance event specifications, cycle specifications, and engine start/stop definitions. System configurations can be altered to reflect the customer's operating environment or requirements.

Figure 1 and Figure 2 show a typical single engine and twin engine ADAS+ application.

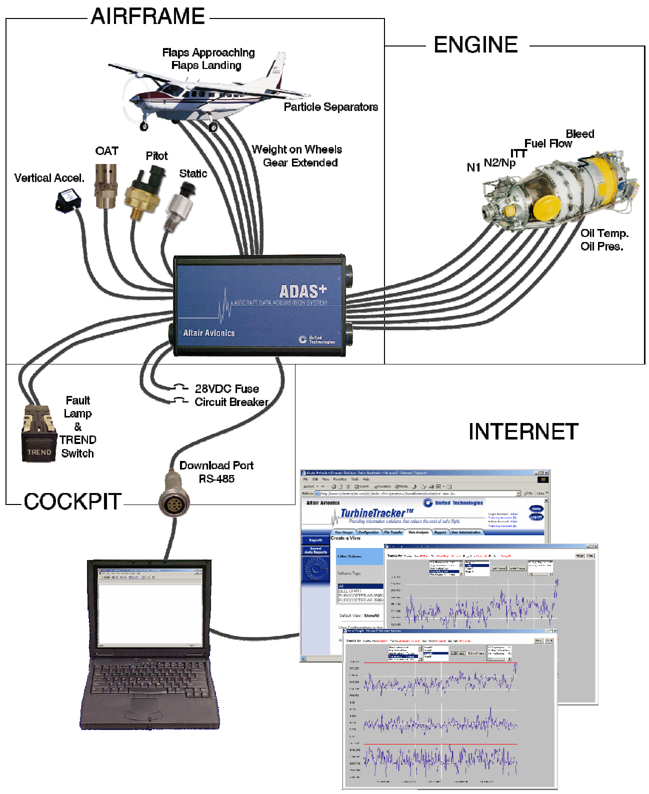

Figure 1: Typical ADAS+ Single Engine Application

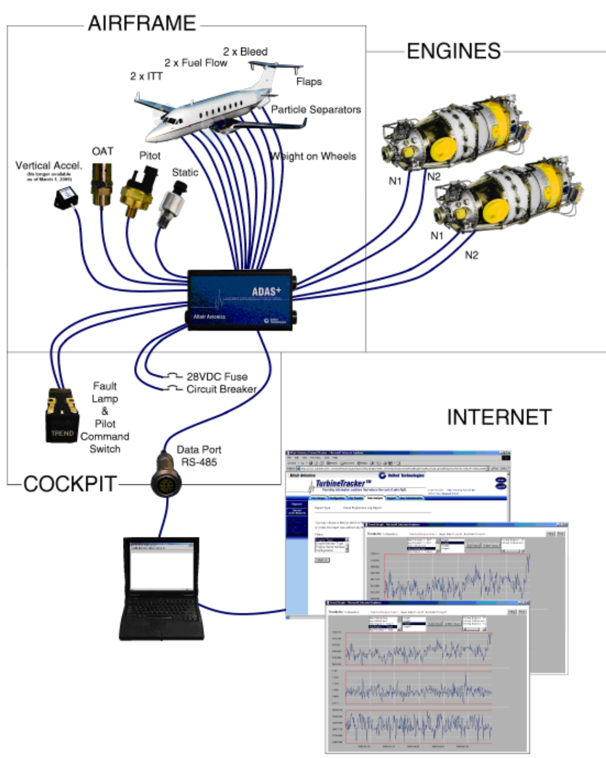

Figure 2: Typical ADAS+ Twin Engine Application

2.2 System Processor

The processor (Figure 3) collects and interprets data from airframe and engine mounted components. Data is retrieved by the operator through an RS485 cockpit interface connection. The processor does not require access during flight.

The processor measures 3.7" high by 6.9" long by 1.7" deep and weighs 1.4 lbs. (22 oz.). An aluminum bracket with Lord Aerospace shock mounts is used to mount the processor to the aircraft.

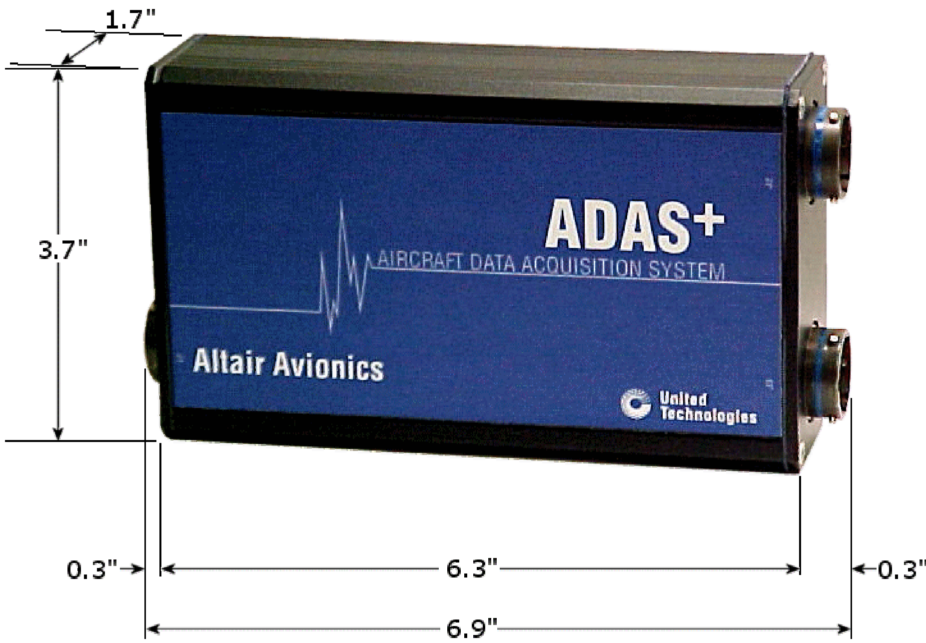

Figure 3: Processor

The system processor is mounted in a remote area of the aircraft using the P&W Engine Services supplied mounting brackets (Figure 4 and Figure 5). Although the processor will not require access during normal operation, care should be taken to install the processor in an area that complies with the environmental requirements of the system.

NOTE: For mounting instructions, refer to the appropriate addendum that applies to your specific aircraft.

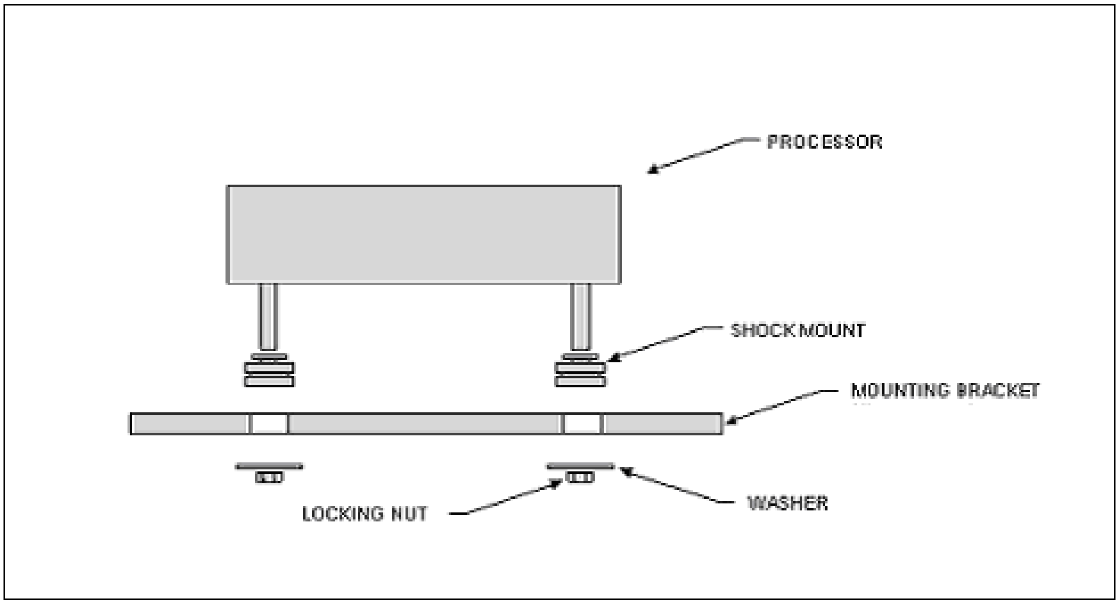

Figure 4: Typical Avionics Compartment Shock Mount Detail

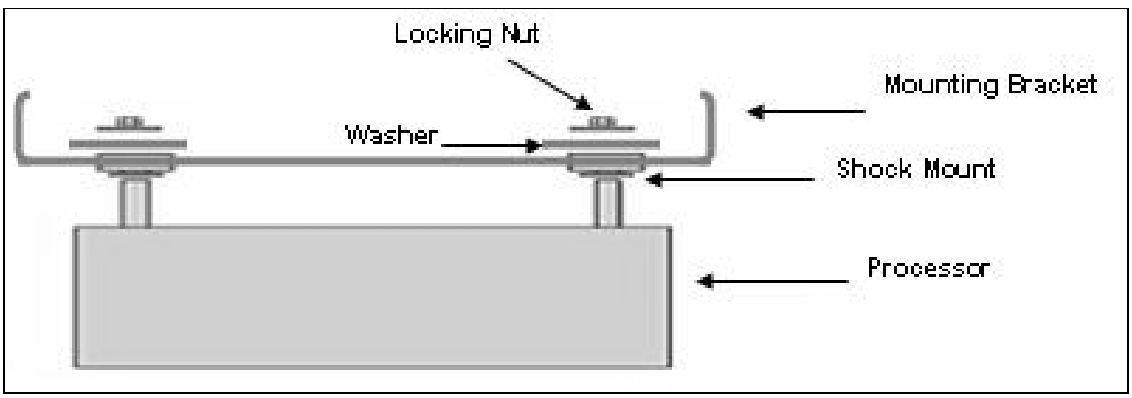

Figure 5: Typical Engine Compartment Shock Mount Detail

2.3 Indicating / Control Components

Following are the descriptions and functions of the control components and indicators.

- **Trend Switch / Fault Lamp** – The TREND switch / fault lamp (Figure 6) consists of a .75″ x .75″ square push-to-test combination lamp. The lamp is mounted on the console and is used to initiate a processor loop back test or initiate a manual trend sample. Fault indications are displayed to the operator through the on/off or flashing status of the lamp

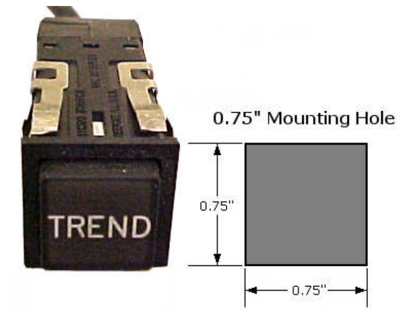

Figure 6: TREND Switch/Fault Lamp

- **ENGINE/TREND Split Lamp Option** – The split lamp (annunciator), shown in Figure 7, consists of a single Engine/Trend switch fault lamp that is mounted in the cockpit instrument panel or console. The annunciator consists of a .75" x .75" square push-to-test lamp that is split into two segments. The ENGINE segment is amber in color when illuminated and the TREND segment is white in color when illuminated. Similar to the standard Trend Switch / Fault Lamp the Engine/Trend switch fault lamp is used to initiate a processor loop back test or initiate a manual trend sample. Fault indications are displayed to the operator through the on/off or flashing of the TREND lamp.

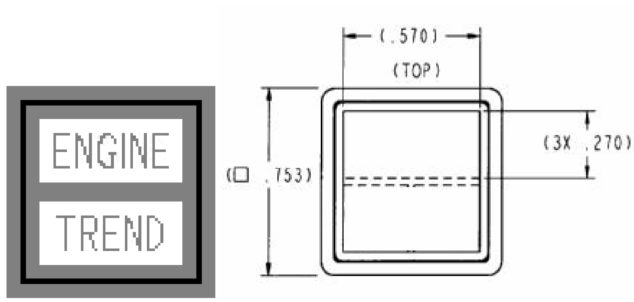

Figure 7: ENGINE/TREND Split Lamp

- **Circuit Breaker (+28 VDC)** – Automatically interrupts the electrical circuit under abnormal conditions. This connection is made to aircraft primary bus power that should be active whenever the aircraft battery switch is activated.
- **Fuse (+28 VDC)** – Automatically interrupts the electrical circuit when the electrical current exceeds the specified amperage. This connection is made directly to the aircraft battery and must have power at all times.

- **Communications (COMM) Port** – Used to interface with the processor. Data can be transferred and downloaded through this port (Figure 8).

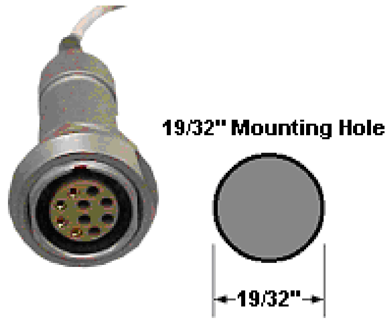

Figure 8: Communications Port

2.4 Airframe Components

A description of airframe components as well as their functions is described in the following:

2.4.1 Outside Air Temperature (OAT) Probe

The temperature probe (Figure 9) is mounted on the underside of the aircraft to provide the processor with OAT data. Specific mounting and installation instructions can be found in the addendum applicable to your aircraft.

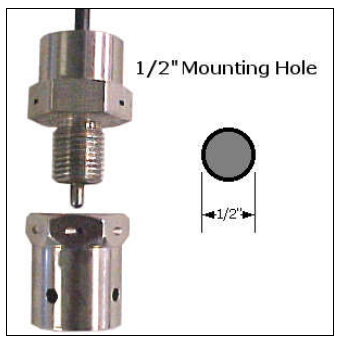

Figure 9: OAT Probe

2.4.2 Pitot/Static Pressure Transducers

Airspeed and altitude are calculated by installing a 5 VDC, 0-3 PSID transducer and 0-15 PSIA transducer that can be mounted directly in-line with the existing pitot/static system. Illustrations in Figure 10 and Figure 11 are typical representations of P&W Engine Services supplied Pitot/Static Transducers. Refer to Table 1 and Table 2 for transducer specifications.

Figure 10: Pitot Transducer

Pressure Range	0 – 3 PSID
Supply Current	5mA Max @ 5VDC
Supply Voltage	5.00 VDC
Output Voltage	0.5 – 4.5 VDC
Range	0 PSID (0 Knots) to 3.00 PSID (340 Knots)
Hysteresis & Repeatability	+/- .05% of Span MAX
Weight	4.1 oz

Table 1: Pitot Transducer Specifications

Figure 11: Static Transducer

Pressure Range	0 – 15 PSIA
Supply Current	5mA Max @ 5 VDC
Supply Voltage	5.00 VDC
Output Voltage	0.5 – 4.5 VDC
Range	3.4 PSIA (35000Ft) to 15.00 PSIA (-568 Ft)
Hysteresis & Repeatability	+/- .05% of Span MAX
Weight	2.7 oz

Table 2: Static Transducer Specifications

NOTE: Specific mounting and installation instructions for the Pitot/Static Transducers can be found in the addendum applicable to your aircraft.

2.4.3 Vertical Accelerometer

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

The system uses a +/- 5g accelerometer (Figure 12), typically mounted aft of the spar, to monitor exceedances such as hard landings and/or excessive in-flight structural loads. Refer to the appropriate model addendum for wiring instructions.

Figure 12: Vertical Accelerometer

2.4.4 Firewall/Pressure Bulkhead Feedthru

When the wiring from the engine compartment to the cockpit passes thru a firewall the wiring is routed thru a stainless steel feedthru and sealed with a high temperature resistant potting compound. When the wiring from the engine compartment to the cockpit passes a pressure bulkhead, a Raychem™ pressure bulkhead fitting is used. Refer to the appropriate model addendum for installation instructions.

2.4.5 Discrete Aircraft Signals

The ADAS+ comes equipped with thirteen discrete sensors that can be configured to measure bleed air position, particle separator position, weight on wheels, hour meter, landing gear position, emergency power lever position, flap position, etc. Refer to the appropriate model addendum for wiring instructions.

2.5 Engine Indicating Components

The following is a list of individual engine performance indicating components:

2.5.1 Engine Temperature Sensors (T4, T4.5, ITT, EGT, MGT, TOT)

The processor determines the temperature for each engine through a connection at the aircraft engine temperature indicator. The ADAS+ connects to the existing aircraft sensor by using the supplied alumel and chromel terminal connectors. Wiring instructions can be found in the addendum specific to your particular aircraft.

2.5.2 Engine N1 (Ng) Speed Sensor

The processor determines engine N1 (Ng) speed(s) through spliced connections to the sensor inputs of the existing N1 cockpit indicator or engine tachometer. Wiring instructions can be found in the addendum specific to your particular aircraft.

2.5.3 Engine N2 Speed Sensor

The processor determines engine N2 speed(s) through spliced connections to the sensor inputs of the existing N2 cockpit indicator or engine tachometer. Wiring instructions can be found in the addendum specific to your particular aircraft.

2.5.4 Propeller (Np) Speed Sensor

The processor determines propeller (Np) speed(s) by way of a splice at either the cockpit indicator or the engine sensor input of the existing Np cockpit indicator or engine tachometer. Wiring instructions can be found in the addendum specific to your particular aircraft.

2.5.5 Engine Torque (Tq) Pressure

The processor has two ways of measuring aircraft torque. The first option is to install P&W Engine Services supplied pressure transducers (Figure 13) on the engine. The second option is to read the signal directly from the cockpit gauge. Installation option and instructions can be found in the addendum applicable to your aircraft. Refer to Table 3 for transducer specifications.

Figure 13: Torque Transducer

Pressure Range	0-150 PSIG
Supply Current	5mA Max @ 5VDC
Supply Voltage	5.00 VDC
Output Voltage	0.5 – 4.5 VDC
Range	0.5 VDC at 0 PSI 4.5 VDC at Full Scale
Hysteresis & Repeatability	+/- .05% of Span MAX
Weight	2.7 oz

Table 3: Torque Transducer Specifications

3 CONTROL AND OPERATION

3.1 ADAS+ Functional Description

3.1.1 Engine Run Logging

The ADAS+ is capable of recording engine runs with up to 4 different engine run criteria for each engine. For each engine run, the following is recorded:

- Engine number (if dual engine)
- Engine start date and time
- Engine run duration
- Maximum start temperature
- Minimum battery voltage
- Start length ("Light Off" to Engine Idle)
- Maximum sensor values
- Cycle count

3.1.2 Cycle Logging

ADAS+ can be configured for up to four different types of cycle count types during each engine run.

1. Incremental cycles (sensor based)
2. Duration cycle (sensor based)
3. Peak value cycle (based on one or two sensors)
4. Cumulative valley cycle (sensor based)

3.1.3 Event Monitoring and Time History Buffer

Events: The ADAS+ can be configured to monitor and record airframe or engine exceedances or events. Up to thirty-two (32) basic Airman's Flight Manual (AFM) exceedances and operator specific events can be configured. Each event is logged independently of engine run logging. Each event records the date and time of the event; its duration, average sensor value, and minimum or maximum sensor value. Events can be set to comprise inputs from either one, two or three sensors.

Time History Buffer: The ADAS+ continually updates a temporary memory buffer with sampled sensor values. This buffer of sequential data sets is called the Time History Buffer. The amount of data requested from the buffer is configurable by the user.

By transferring a set of data samples from the buffer to permanent memory, the processor can store data for a period before, during, or after an event. The operator can set the point before an event and the point after an event to log the time history buffer to permanent memory. The maximum time stored by the processor that can be held by the time history is two minutes.

3.1.4 Trend Monitoring

Engine trend information (data is compatible with P&WC ECTM®) is described as follows:

Manual Trend: Pressing the standard TREND switch or the optional Engine/Trend Split Lamp when the engine is running will initiate a manual trend. The ADAS+ will take a snapshot of all sensors for a pre-defined duration (default is 5 seconds but is configurable) and record the maximum values and average values for all sensors during the entire duration. If using the standard TREND switch the lamp will flash during the entire duration of the trend. If using the optional Engine/Trend Split Lamp the Trend lamp will flash during the entire duration of the trend.

Autotrend: The ADAS+ can be configured to initiate a trend automatically without pressing the standard TREND switch or the optional Engine/Trend Split Lamp. The ADAS+ can be configured to initiate an autotrend by defining a stable criteria consisting of up to ten (10) sensors. If the stable criteria are met, the ADAS+ will initiate a trend automatically. The TREND lamp will flash during the entire duration of the trend when using the standard TREND lamp. The TREND lamp will flash during the entire duration of the trend when using the optional Engine/Trend Split lamp.

3.2 System Initialization and Lamp State Description

When the system initializes, the fault lamp will indicate the various stages of the process. The initialization sequence will proceed as follows:

When the processor's power is first applied, the fault lamp will illuminate for 3 to 5 seconds while the system performs a series of self-tests. The following self-tests are performed during initialization:

- Micro Controller Test
- Lamp Test (momentary flicker)
- Temporary Memory Test
- Data Log Memory Test
- Program Integrity Test

If any of these tests fail, the processor will restart the initialization cycle. The lamp will extinguish briefly and illuminate for a period until the test failure is repeated. This cycle will continue until the processor power is removed. The illumination of the lamp will be a period of ON followed by a very brief OFF, repeated every 5 seconds, or less.

If the initial self-tests do not fail, the processor will normally extinguish the lamp for approximately 3 to 5 seconds, indicating completion of the self-test phase. It will then proceed to check for:

- A Matching Engine Configuration Value

This test is performed as follows: if the hard-wired engine/sensor/system configuration does not match the expected software value stored internally, the lamp will illuminate solid. This type of fault indication may not actually indicate a problem with the installation. It may result simply from a processor factory reset, which cleared the last stored configuration value. Such a fault can be corrected by loading a configuration file using the P&W Engine Services Monitor Link Program (MLP).

NOTE: If the engine configurations do not match, the system will be in Fault State.

If the test passes, the lamp will remain out and the processor will enter a system mode.

3.3 System Mode

After Initialization, the processor will enter one of two primary system modes of operation: **Run Mode**, or **Configuration Mode**. For data collection it is operated in Run mode. For communication through the download port with a laptop computer for the purposes of data transfer, it is in Configuration Mode. Configuration Mode is entered when a download cable is attached and the cable's RUN/CONF switch is set to CONF. Run Mode is entered when the cable is not attached, or when it is attached and the RUN/CONF Switch is set to RUN.

3.3.1 Run Mode Description (States and Fault Lamp Display)

There are four possible states for the system in **Run Mode**. Each state determines the fault lamp display.

System States:

1. Normal
2. Maintenance
3. Caution
4. Fault

Definitions:

- In **Normal state**, the system is performing normally OR recorded an input programmed to indicate Normal state.
- In **Maintenance state**, the system recorded an input programmed to indicate Maintenance state.
- In **Caution state**, the system recorded an input programmed to indicate Caution state.
- In **Fault state**, the system has failed OR the system recorded an input programmed to indicate Fault state.

3.3.1.1 Fault Lamp Display for Trend Switch / Fault Lamp:

Lamp Out – Normal State:
This is the normal condition of the ADAS+ when all systems checks have passed and there are no previous flight exceedances recorded.

Lamp Flashing (pressing button will turn lamp off) – Maintenance State:
When the ADAS+ is in Maintenance State, either a previous flight exceedance has occurred, or the system has detected a minor fault condition that will not affect its ability to function as an exceedance monitor.

Lamp Flashing (pressing button will NOT turn lamp off) – Caution State:
When the ADAS+ is in Caution State, either a previous flight exceedance has occurred or the system has detected a fault condition that may not affect its ability to function as an exceedance monitor.

Lamp Solid – Fault State:
When the ADAS+ is in Fault State, either a previous flight exceedance has occurred or the system has detected a fault condition that WILL affect its ability to function as an exceedance monitor.

Note: The ADAS+ will extinguish any of the above lamp conditions once an engine has started.
Once the engine has been started, or either engine has started in a dual engine aircraft, the ADAS+ lamp is used to display trend and exceedance information to the pilot and/or crew as follows:

Trend Mode:
The ADAS+ can be configured to take an automatic trend sample whenever certain engine/flight conditions are met. Once the trend criteria are met, the system will collect a sample of data for later review by maintenance personnel. During this trend sample the ADAS+ lamp will flash at a slow (1 Hz) rate. Pressing the TREND switch will manually initiate the same trend data sample.

Exceedance Mode:
Exceedance Mode is defined as anytime the aircraft or engine has met the criteria defined for an exceedance and where the pilot and/or crew should be alerted. These exceedances are typically torque or temperature exceedances. Exceedance Mode is displayed to the pilot via a 2 HZ lamp flash.
The exceedance can be configured such that Exceedance Mode can be acknowledged by pressing the TREND switch. If configured this way, the Exceedance Mode lamp display will extinguish when the TREND switch is pressed.

Single/Dual Engine Functions:
The ADAS+ monitoring system will monitor and record engine run, trend, cycle and exceedance information for both single and dual engine aircraft. All interface to the pilot and/or crew is done through a single cockpit mounted TREND switch/fault lamp. If the pilot and/or crew are notified during an exceedance by the lamp, the pilot and/or crew must use standard aircraft/engine instrumentation to determine the cause of the exceedance and take corrective action as appropriate.

3.3.1.2 Fault Lamp Display for Optional ENGINE/TREND Split Lamp

TREND Lamp Out - Normal State:
This is the normal condition of the ADAS+ when all systems checks have passed and there is no previous flight exceedances recorded.

TREND Lamp Flashing (pressing button will turn lamp off) - Maintenance State:
When the ADAS+ is in Maintenance State, either a previous flight exceedance has occurred, or the system has detected a minor fault condition that will not affect its ability to function as an exceedance monitor.

TREND Lamp Flashing (pressing button will NOT turn lamp off) - Caution State:
When the ADAS+ is in Caution State, either a previous flight exceedance has occurred or the system has detected a fault condition that may affect its ability to function as an exceedance monitor.

TREND Lamp Solid - Fault State:
When the ADAS+ is in Fault State, either a previous flight exceedance has occurred or the system has detected a fault condition that WILL affect its ability to function as an exceedance monitor.

ENGINE Lamp Solid:
When the ENGINE lamp is illuminated, a previous engine flight exceedance has occurred.

Note: The ADAS+ will extinguish any of the above lamp conditions once an engine has started. Once the engine has been started, or either engine has started in a dual engine aircraft, the ADAS+ lamp is used to display trend and exceedance information to the pilot and/or crew as follows:

Trend Mode:
The ADAS+ can be configured to take an automatic trend sample whenever certain engine/flight conditions are met. Once the trend criteria are met, the system will collect a sample of data for later review by maintenance personnel. During this trend sample the ADAS+ TREND lamp will flash at a slow (1 Hz) rate. Pressing the Engine/Trend Split Lamp switch will manually initiate the same trend data sample.

Exceedance Mode:
Exceedance Mode is defined as anytime the aircraft or engine has met the criteria defined for an exceedance and where the pilot and/or crew should be alerted. Engine exceedances are displayed to the pilot via a solid amber ENGINE lamp. Aircraft exceedances are displayed to the pilot via a solid or flashing white TREND lamp. The exceedance Mode will be configured so that the exceedance can be acknowledged by pressing the ENGINE/TREND switch. When configured this way, the exceedance Mode lamp display will extinguish when the ENGINE/TREND switch is pressed.

Single/Dual Engine Functions:
The ADAS+ monitoring system will monitor and record engine run, trend, cycle and exceedance information for both single and dual engine aircraft. All interface to the pilot and/or crew is done through a single cockpit mounted ENGINE/TREND Split Lamp. If the pilot and/or crew are notified during an exceedance by the lamp, the pilot and/or crew must use standard aircraft/engine instrumentation to determine the cause of the exceedance and take corrective action as appropriate.

4 SERVICING INFORMATION

This section is not applicable

5 MAINTENANCE INSTRUCTIONS

The P&W Engine Services ADAS+ has been designed with the latest solid-state technology. The only component that has a limited life span is the internal battery. This battery, under normal operating conditions, is expected to last 10 years. If the battery is discharged, the processor must be returned to P&W Engine Services for battery replacement.

5.1 Recommended Periodic Scheduled Servicing Tasks

None required

5.2 Recommended Periodic Scheduled Preventive Maintenance Tests/Checks

None Required

5.3 Recommended Periodic Scheduled Inspections

Specific recommended periodic scheduled inspections can be found in the addendum applicable to your aircraft.

5.4 Recommended Periodic Structural Inspections

Specific recommended periodic scheduled inspections can be found in the addendum applicable to your aircraft.

6 SYSTEM TROUBLESHOOTING

When the system does not function properly (or as you expect it to operate), the first thing that you must do is identify and isolate the problem. When you have accomplished this, you can effectively begin to resolve the problem.

The first step in troubleshooting is to isolate each system component and ensure that each component functions properly when it is run independently. Using the Monitor Link Program (MLP), you can interrogate the system to determine which function or component may have failed. Occasionally you may have to replace existing components to correct the problem. Determine if the problem is in the aircraft, DTU processor, wiring, the antenna or configuration of the processor.

Ask the question, can you repeat or recreate the problem? Random events may appear to be related, but they are not necessarily contributing factors to your problem. You may be experiencing more than one problem. You must isolate and solve one problem at a time. Log (document) all testing and problem isolation procedures. You may need to review and consult this document later. This will also prevent you from duplicating your testing efforts.

Once you have isolated a problem, take the necessary steps to resolve it. Refer to the problem solutions contained in this document. If you cannot solve your system problems using this troubleshooting guide, or if the problem persists, refer to Section 4 herein and contact P&W Engine Services Help Desk.

Before contacting the Help Desk, have someone from your organization with a technical understanding of the Aircraft Data Acquisition System (ADAS+) and its application provide answers to the following questions:

- Engine Type?
- Airframe Type?
- Processor Type?
- Airframe Tail Number?
- Processor Serial Number?
- Is there a problem history?
- Visual or computer indications?
- Has the processor worked previously?
- What activity was being performed when the failure occurred?

The ADAS+ will monitor and record system failures in a log that can be downloaded and reviewed. Status of the system can be obtained through the status/fault lamp.

Detailed troubleshooting for the system processor as well as for the various input channels can be found in the topic-specific sections that follow.

6.1 System Processor

The first point of troubleshooting the ADAS+ is to be able to power up and communicate to the system processor.

During the initial power up phase, the system processor will perform self-test and display lamp indications on the cockpit fault lamp (Figure 14). If the system powers up and will communicate with the Monitor Link Program (MLP), the download log will define any system faults. These faults can be investigated by following the troubleshooting methods in this section.

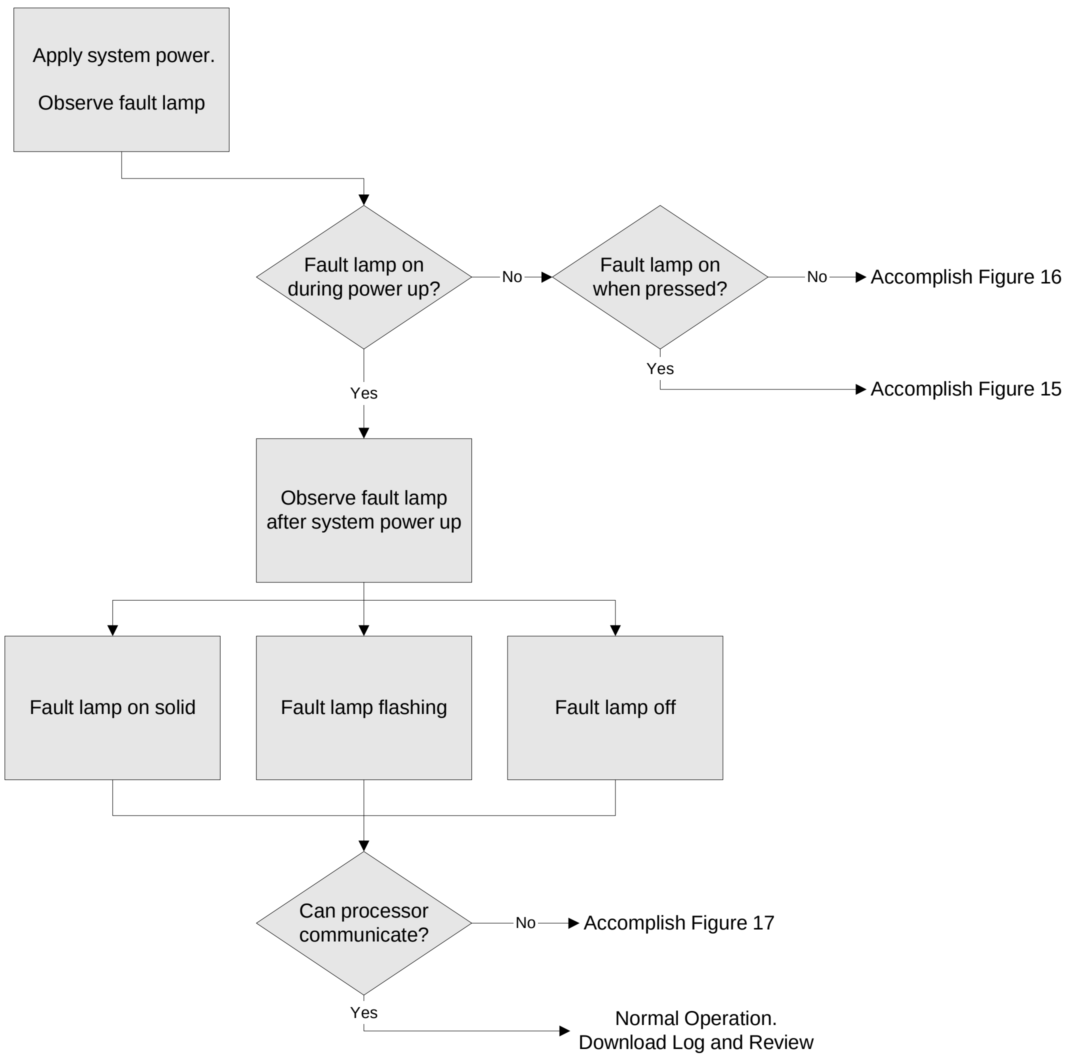

Figure 14: System Processor Start-Up Test Flow Diagram

6.1.1 Processor Test

This section defines the basic test to determine if the processor is powered and functioning properly. Follow the processor test flow diagram (Figure 15) to determine failure.

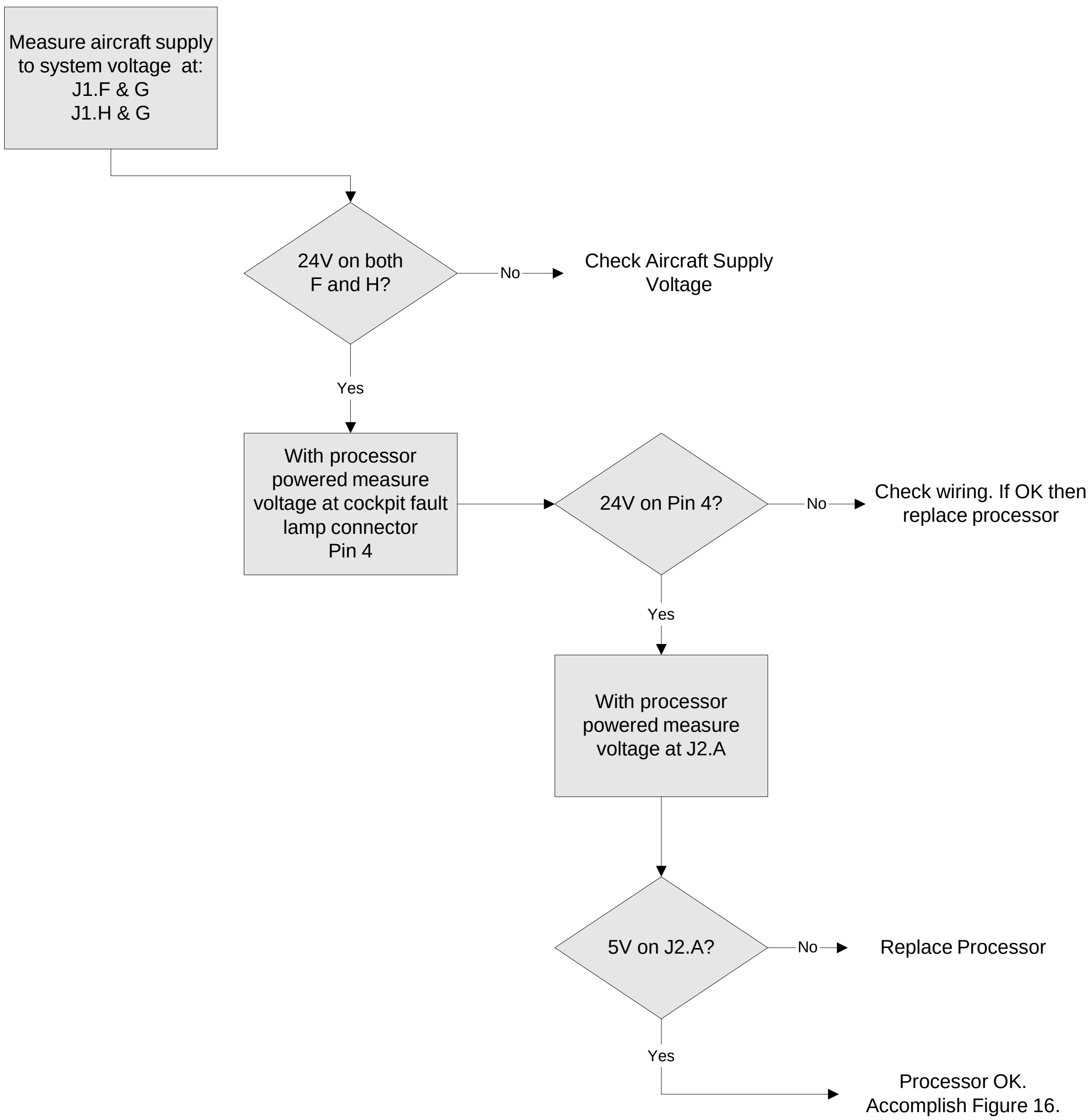

Figure 15: System Processor Test Flow Diagram

6.2 Indicating Components

6.2.1 Status / Fault Lamp Display Test

This section defines the basic test to determine if the cockpit fault lamp display is functioning. Follow the fault lamp test flow diagram (Figure 16) to determine failure.

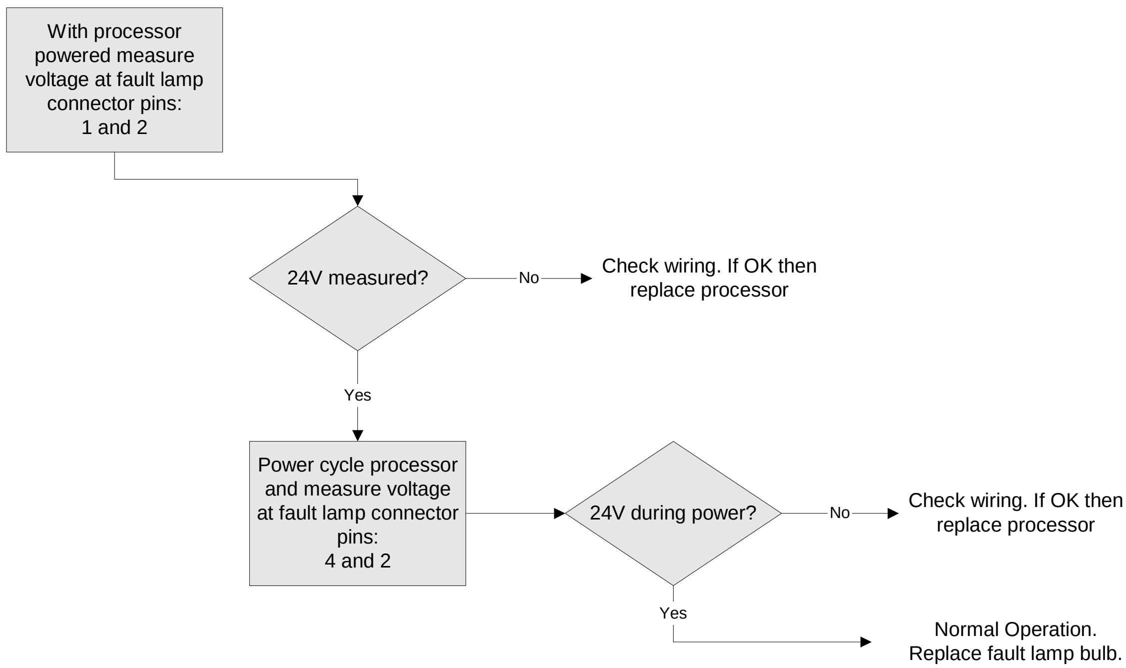

Figure 16: Cockpit Fault Lamp Test Flow Diagram

6.2.2 Download Port Test

This section defines the basic test to determine if the communications port is functioning. Follow the download port test flow diagram (Figure 17) to determine failure.

NOTE: Pin (1) one is identified by a dimple.

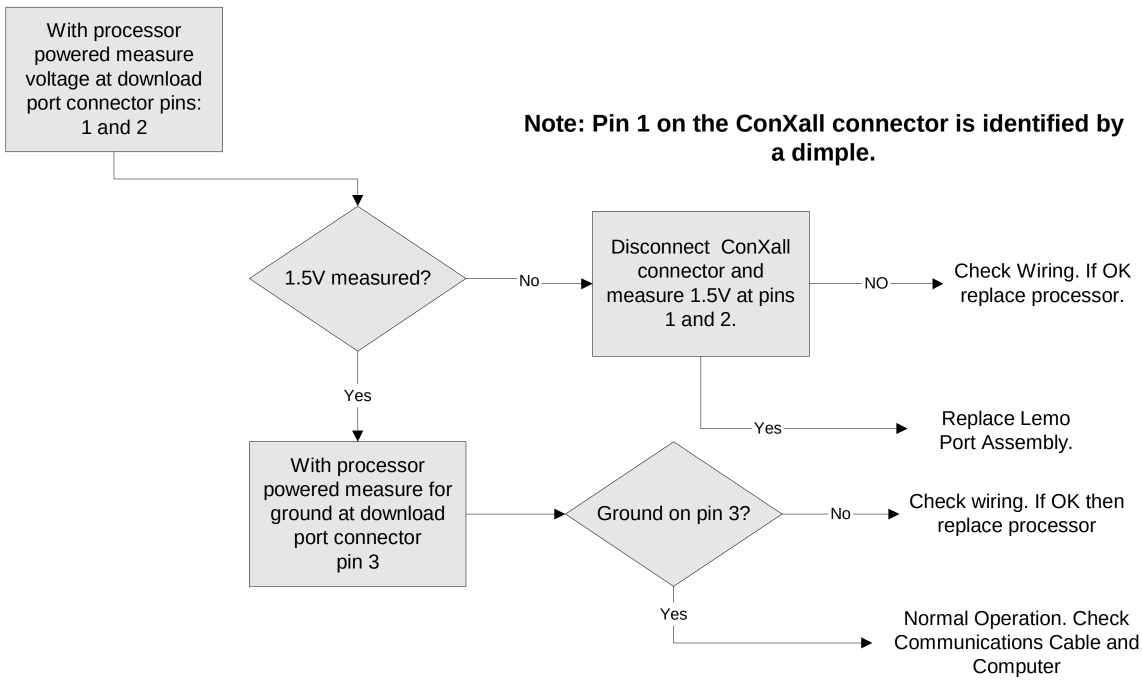

Figure 17: Download Port Test Flow Diagram

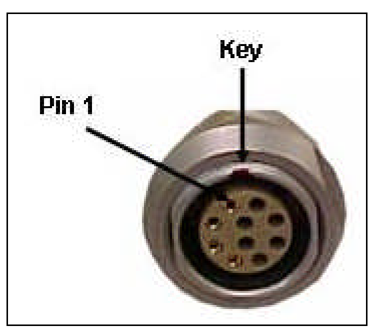

Figure 18: Download Port Socket – Front View

6.3 *Airframe Components*

6.3.1 Outside Air Temperature (OAT) Troubleshooting

This section defines the troubleshooting procedure (Figure 19) to determine if an OAT problem is caused by the processor, the OAT probe, or wiring (Figure 23) from the processor to the probe.

Perform the appropriate procedure if the MLP indicates any of the following symptoms:

a. Bit Failure - Refer to Figure 20.

b. Range Failure – Refer to Figure 21.

c. Rate Failure – Refer to Figure 22.

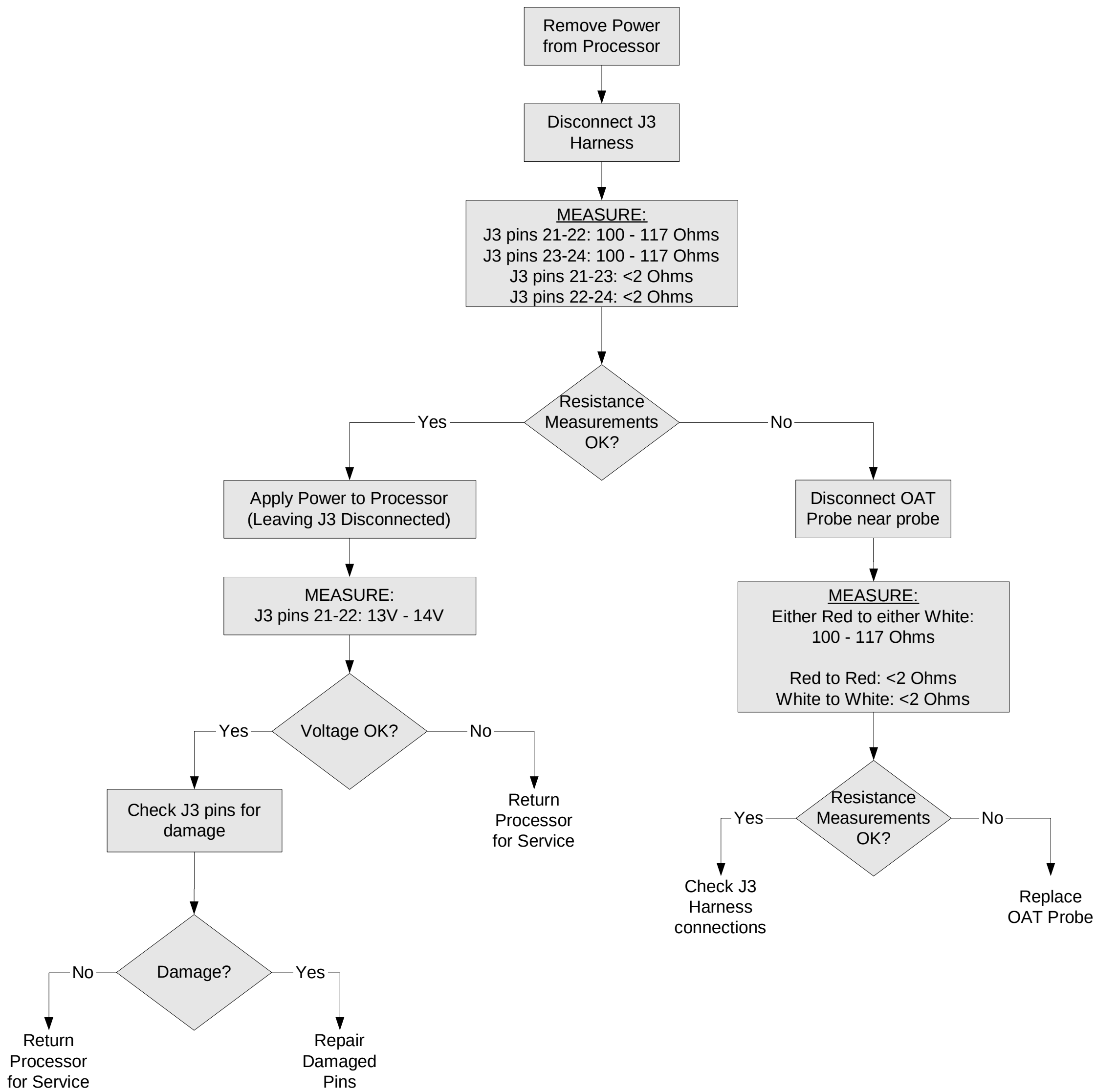

Figure 19: OAT Probe Test Flow Diagram

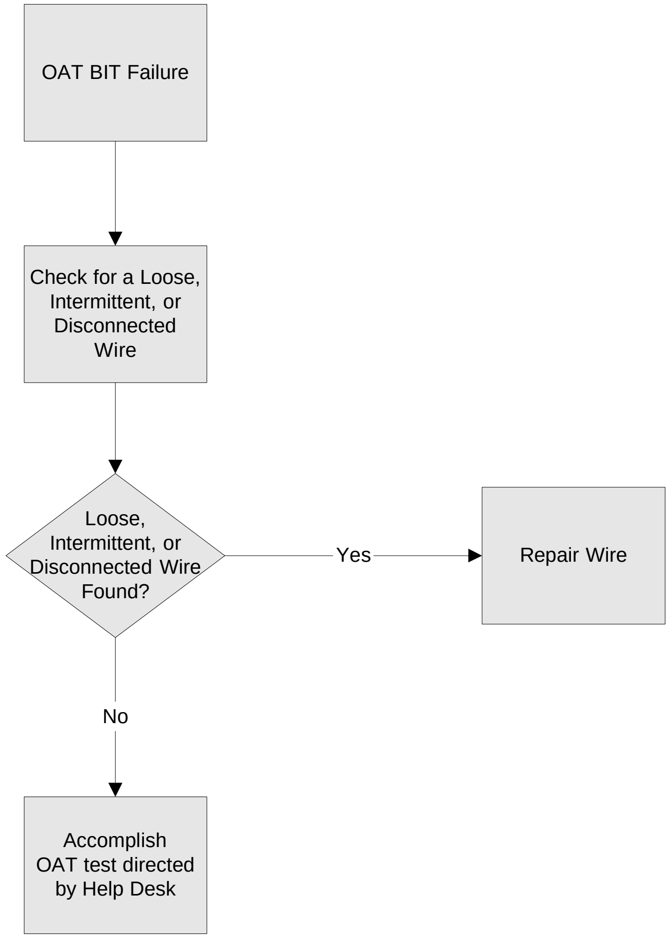

Figure 20: OAT BIT Failure Troubleshooting

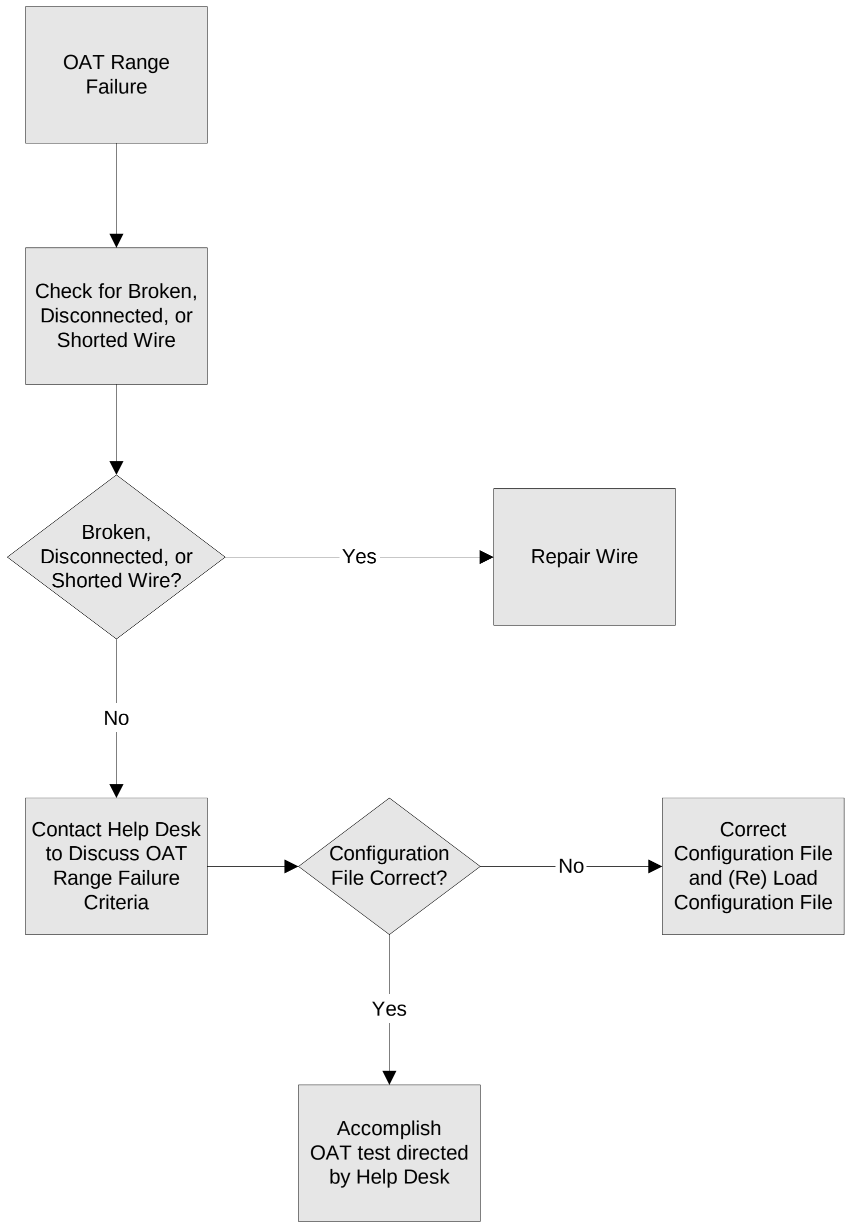

Figure 21: OAT Range Failure Troubleshooting

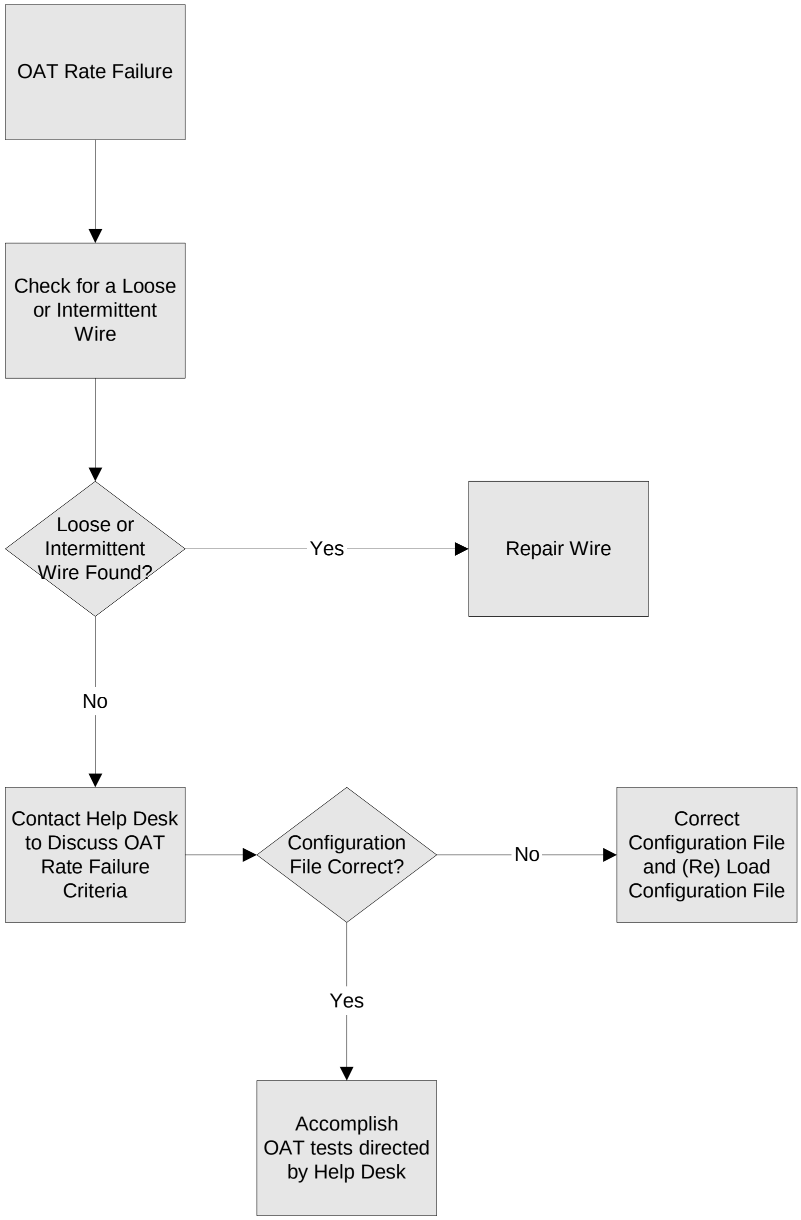

Figure 22: OAT Rate Failure Troubleshooting

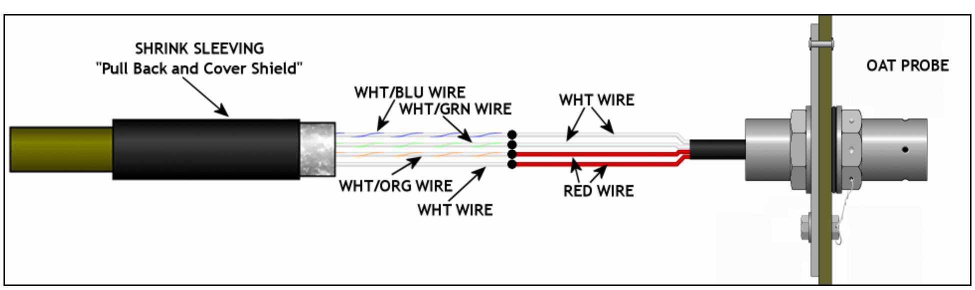

Figure 23: OAT Probe Wiring

6.3.2 Pitot / Static Transducer and Channel Test

This section defines the troubleshooting procedure (Figure 24) to determine if the problem is caused by the processor, transducers, or wiring (Figure 27) from the processor to the transducer.

Perform the appropriate procedure if the MLP indicates any of the following symptoms:

a. Transducer Range Failure – Refer to Figure 25.

b. Transducer Rate Failure – Refer to Figure 26.

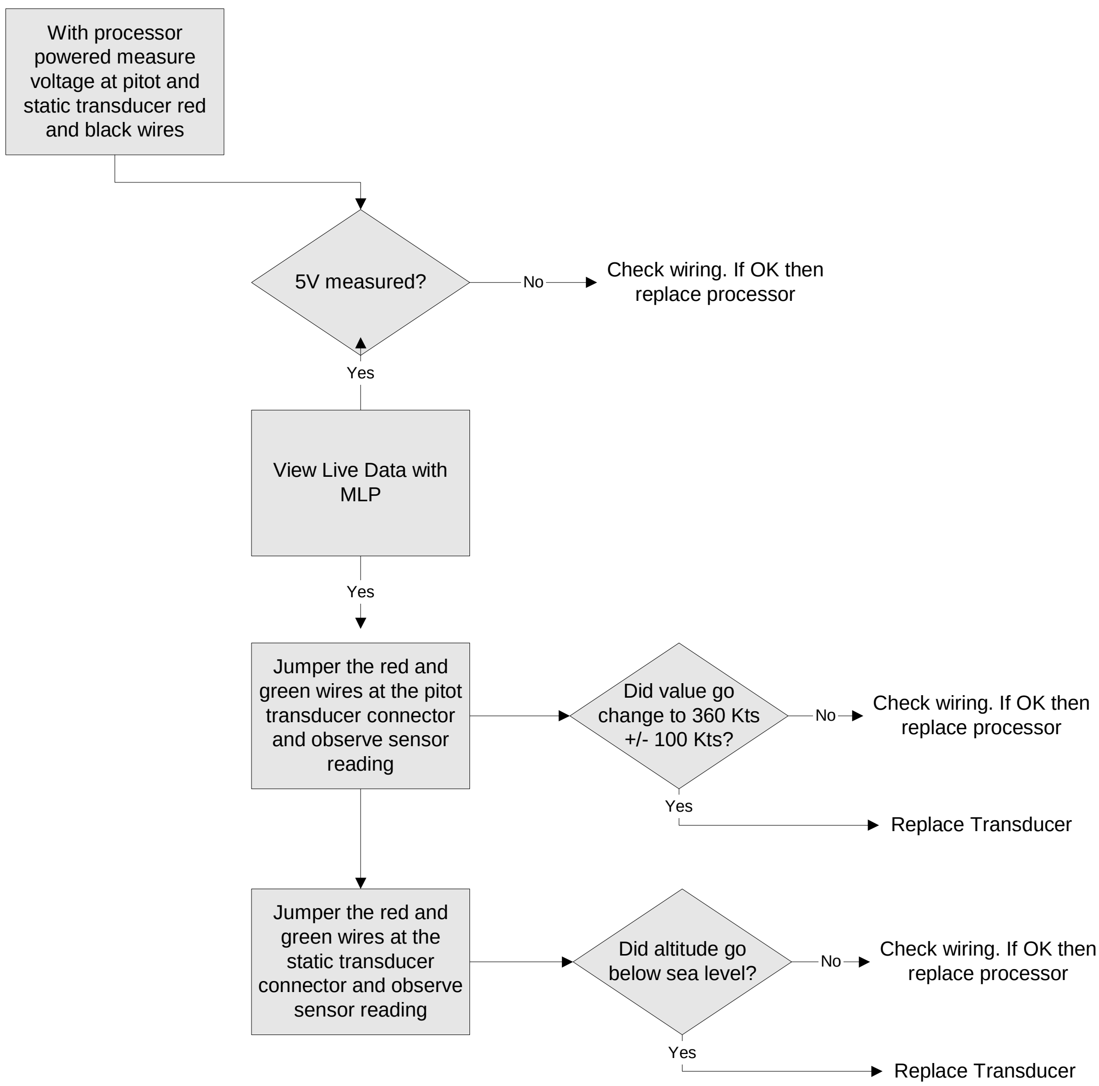

Figure 24: Pitot/Static Transducer Test Flow Diagram

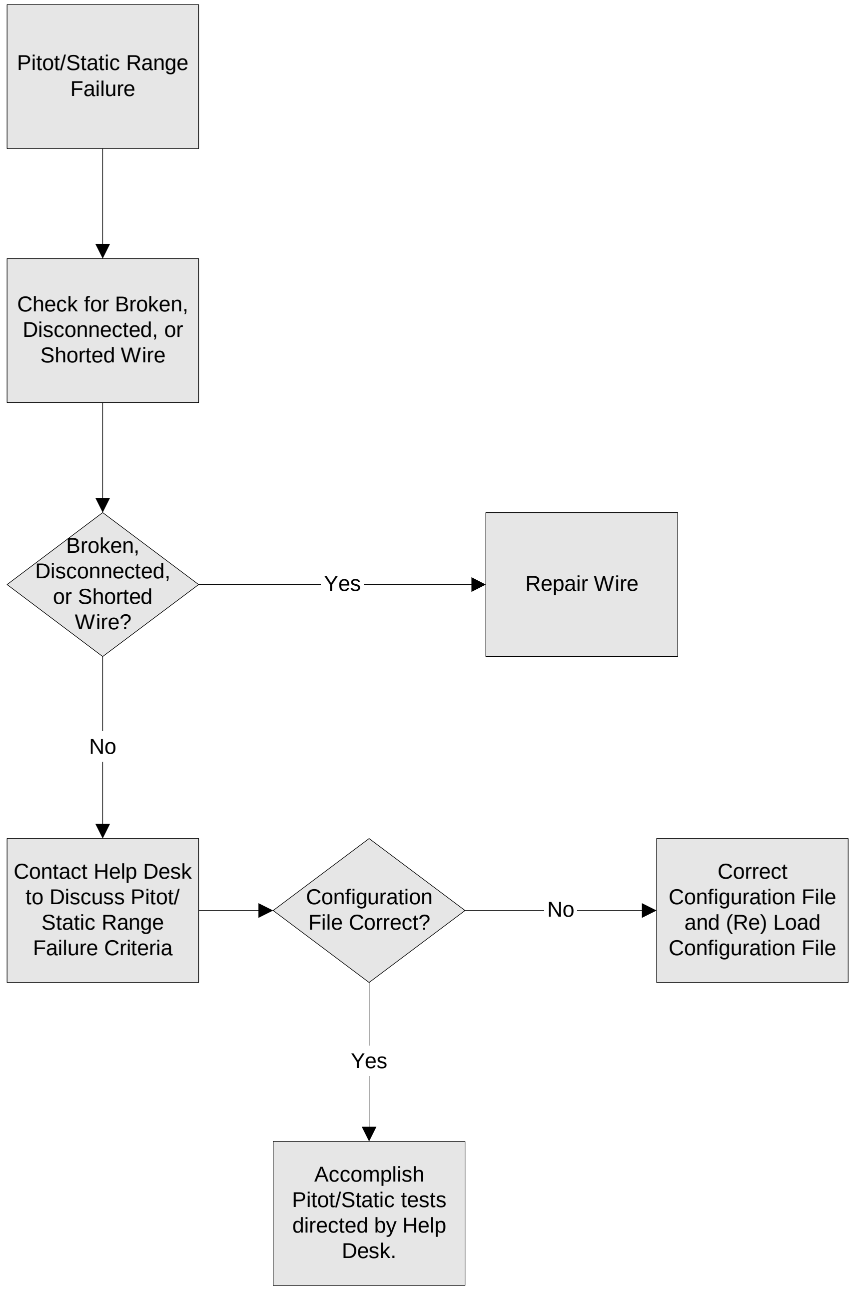

Figure 25: Pitot/Static Range Failure Troubleshooting

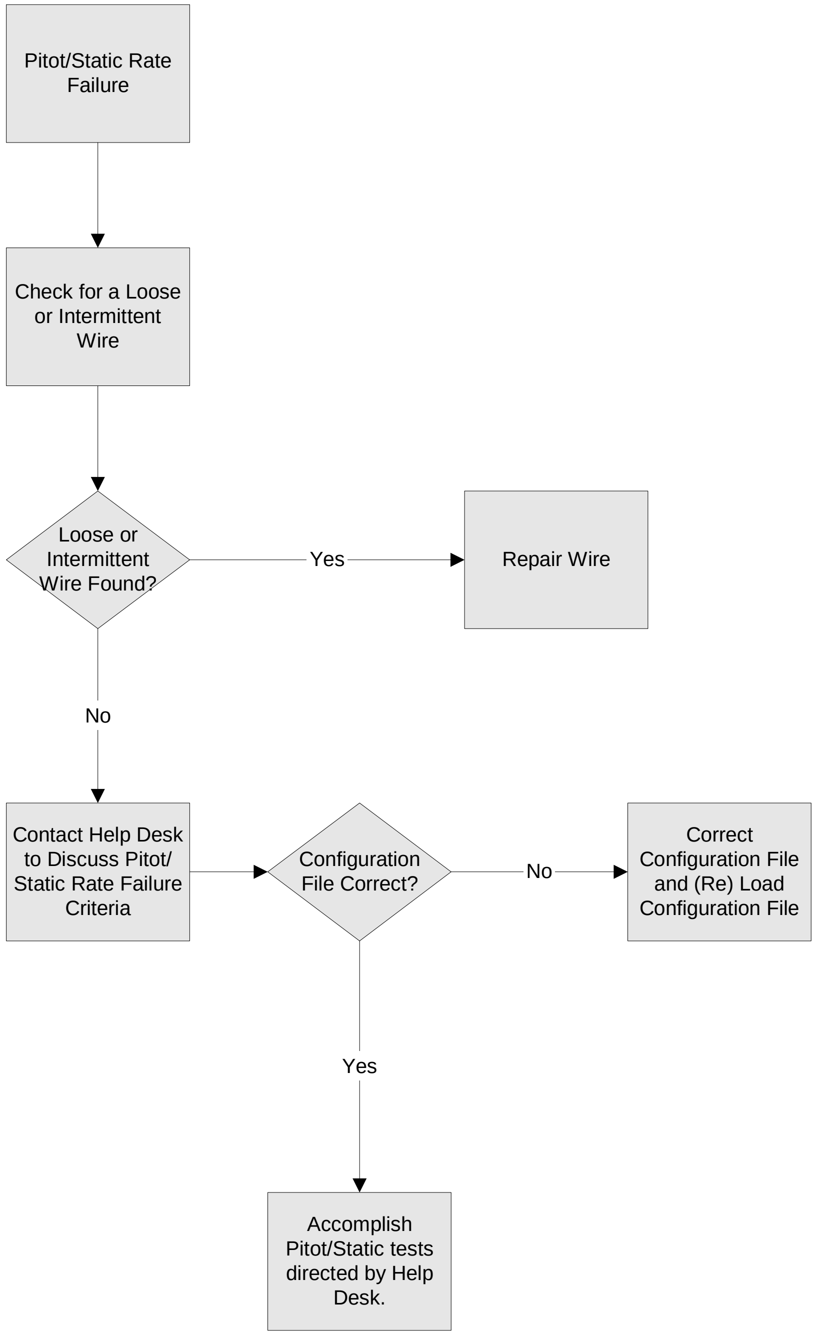

Figure 26: Pitot/Static Rate Failure Troubleshooting

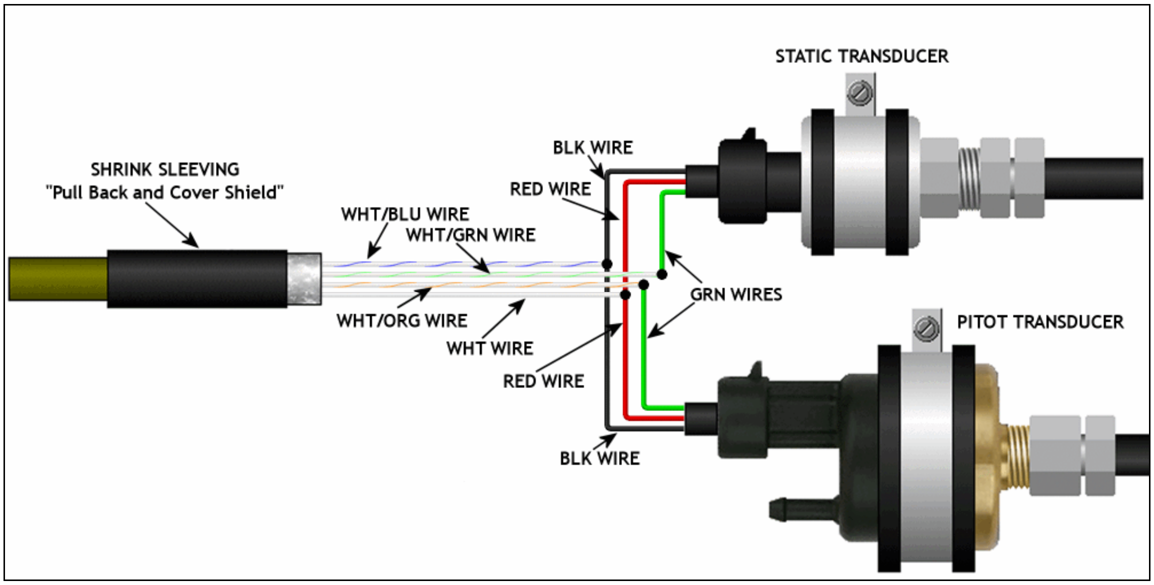

Figure 27: Pitot/Static Wiring

6.4 Engine Indicating

6.4.1 Engine Temperature

This section defines the troubleshooting procedure to determine if the problem is caused by the processor, sensor, or wiring.

Perform the appropriate procedure if the MLP indicates any of the following symptoms:

a. Temperature Bit Failure – Refer to Figure 28.

b. Temperature Range Failure – Refer to Figure 29.

c. Temperature Rate Failure – Refer to Figure 30.

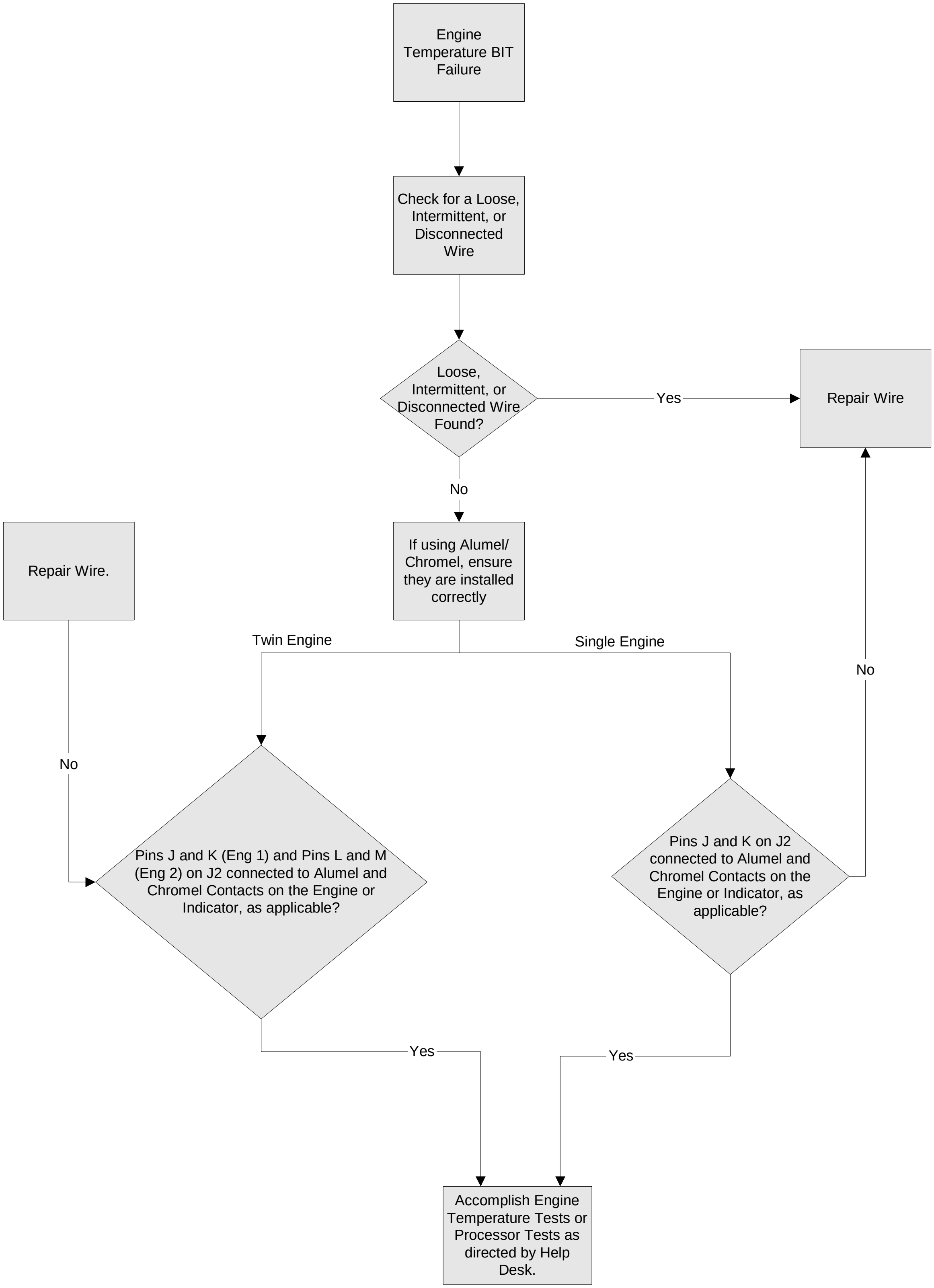

Figure 28: Engine Temperature BIT Failure Troubleshooting

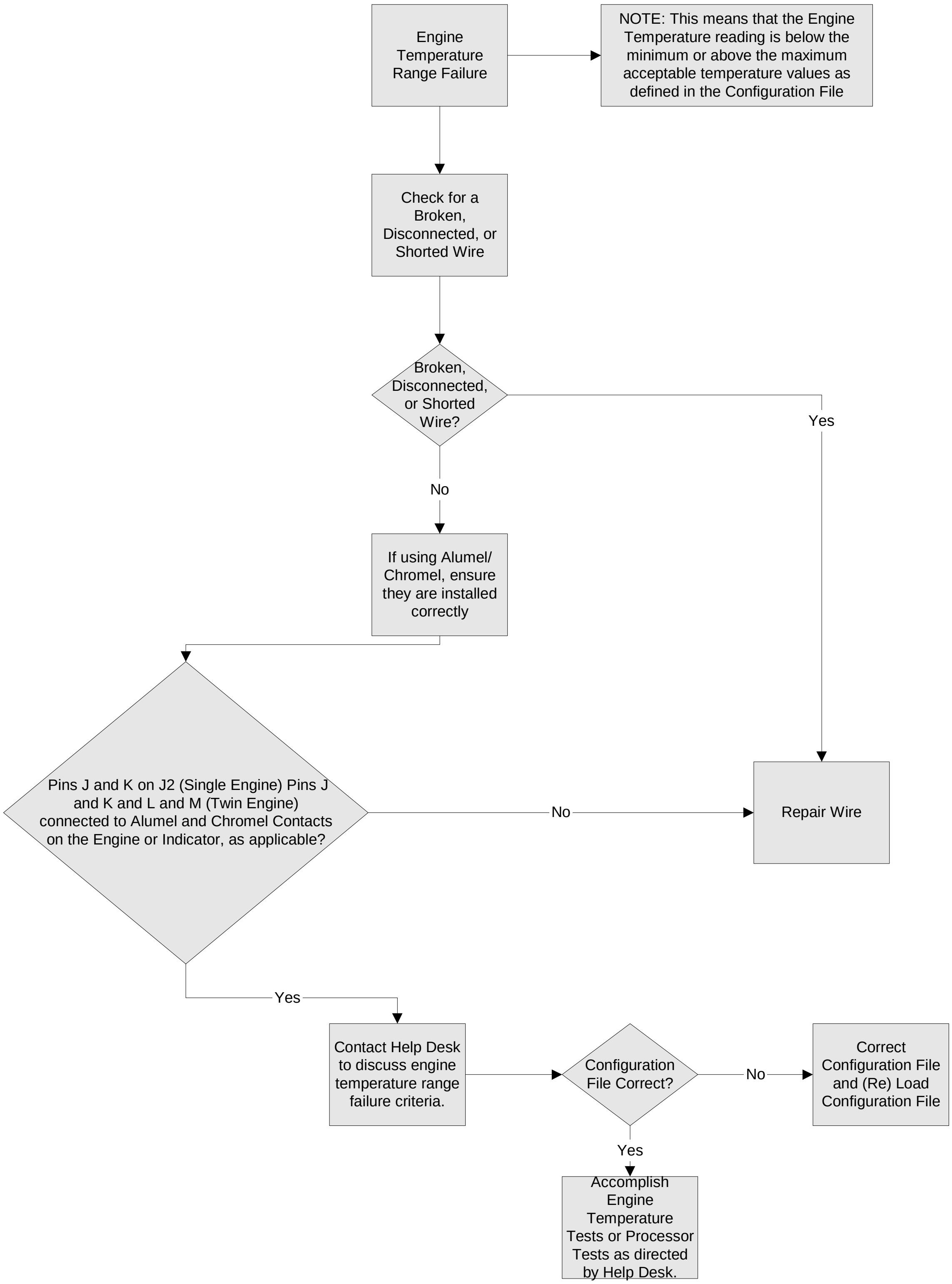

Figure 29: Engine Temperature Range Failure Troubleshooting

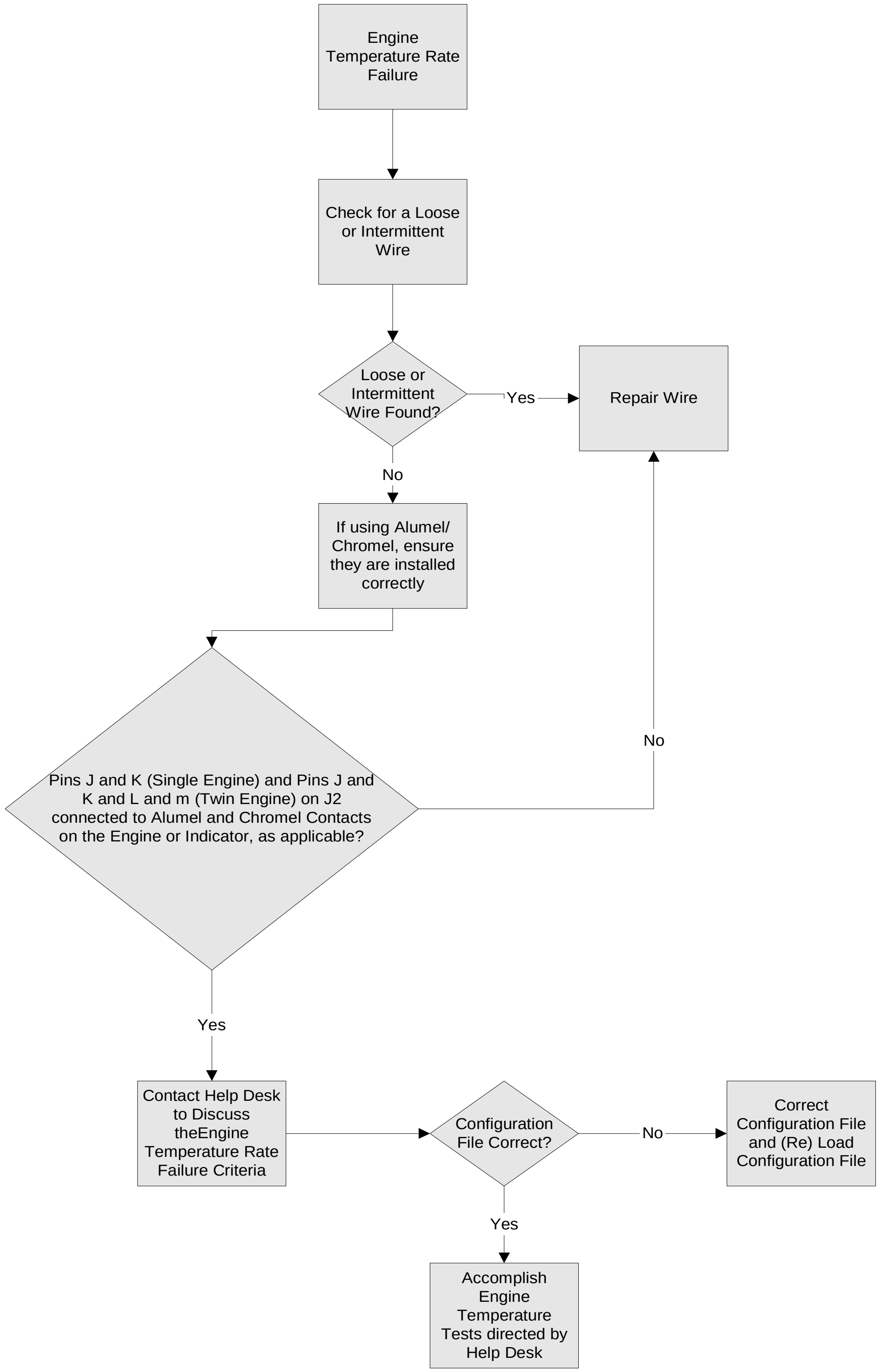

Figure 30: Engine Temperature Rate Failure Troubleshooting

6.4.2 N1 (Ng) Sensor Troubleshooting

This section defines the troubleshooting procedure to determine if the problem is caused by the processor, sensor, or wiring.

Perform the appropriate procedure if the MLP indicates any of the following symptoms:

a. Signal Failure – Refer to Figure 31

b. Range Failure – Refer to Figure 32

c. Rate Failure – Refer to Figure 33

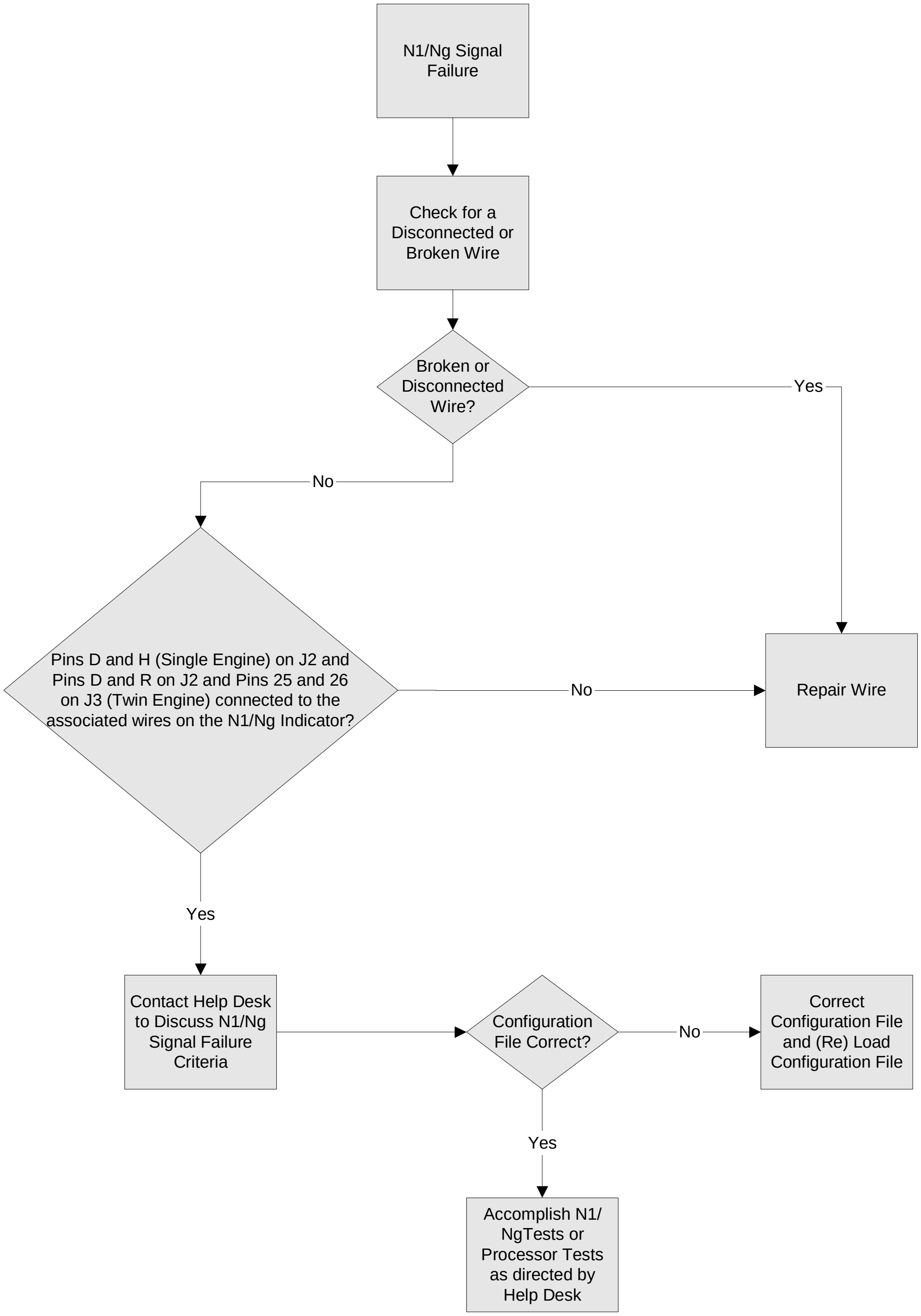

Figure 31: N1 (Ng) Signal Failure Troubleshooting

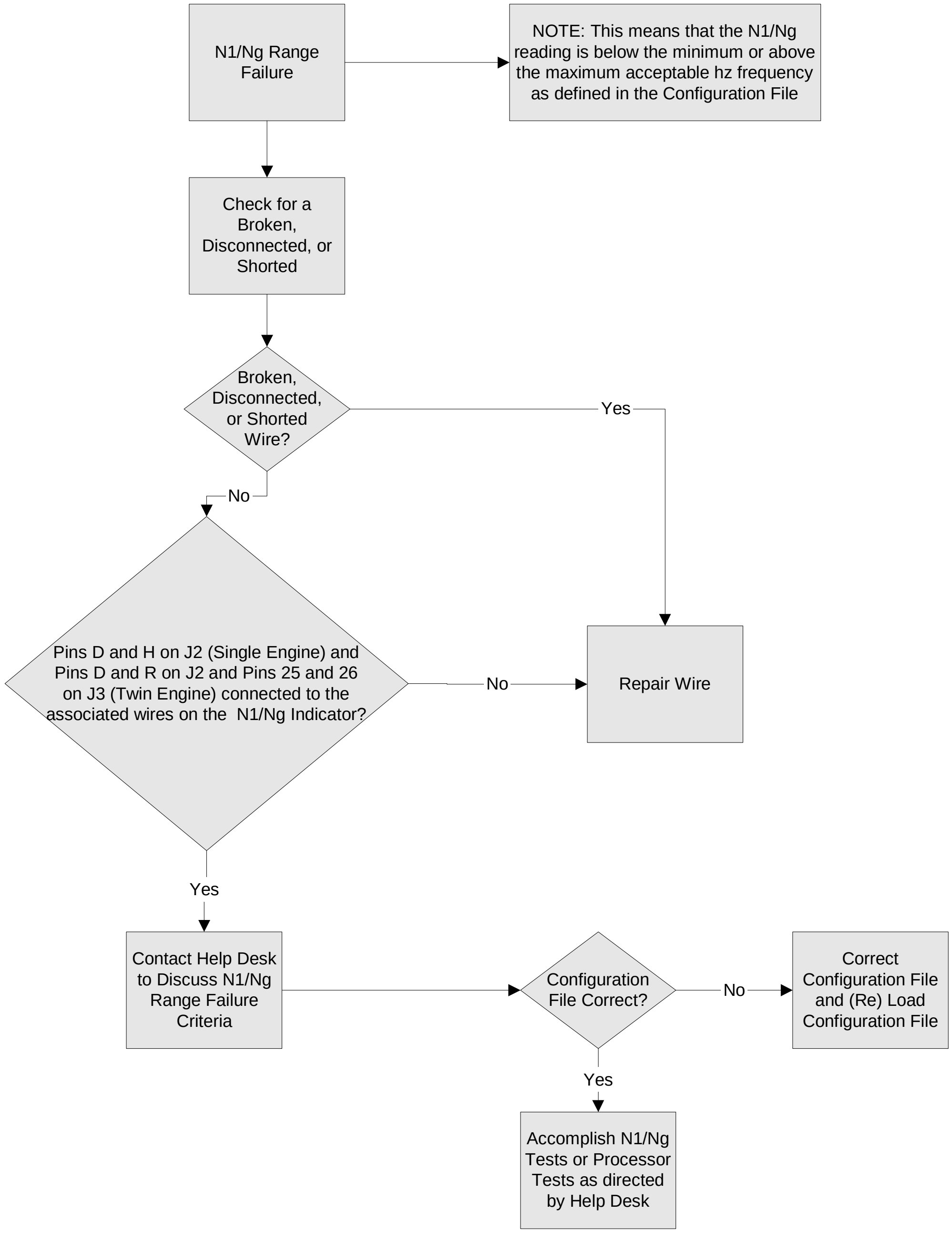

Figure 32: N1 (Ng) Range Failure Troubleshooting

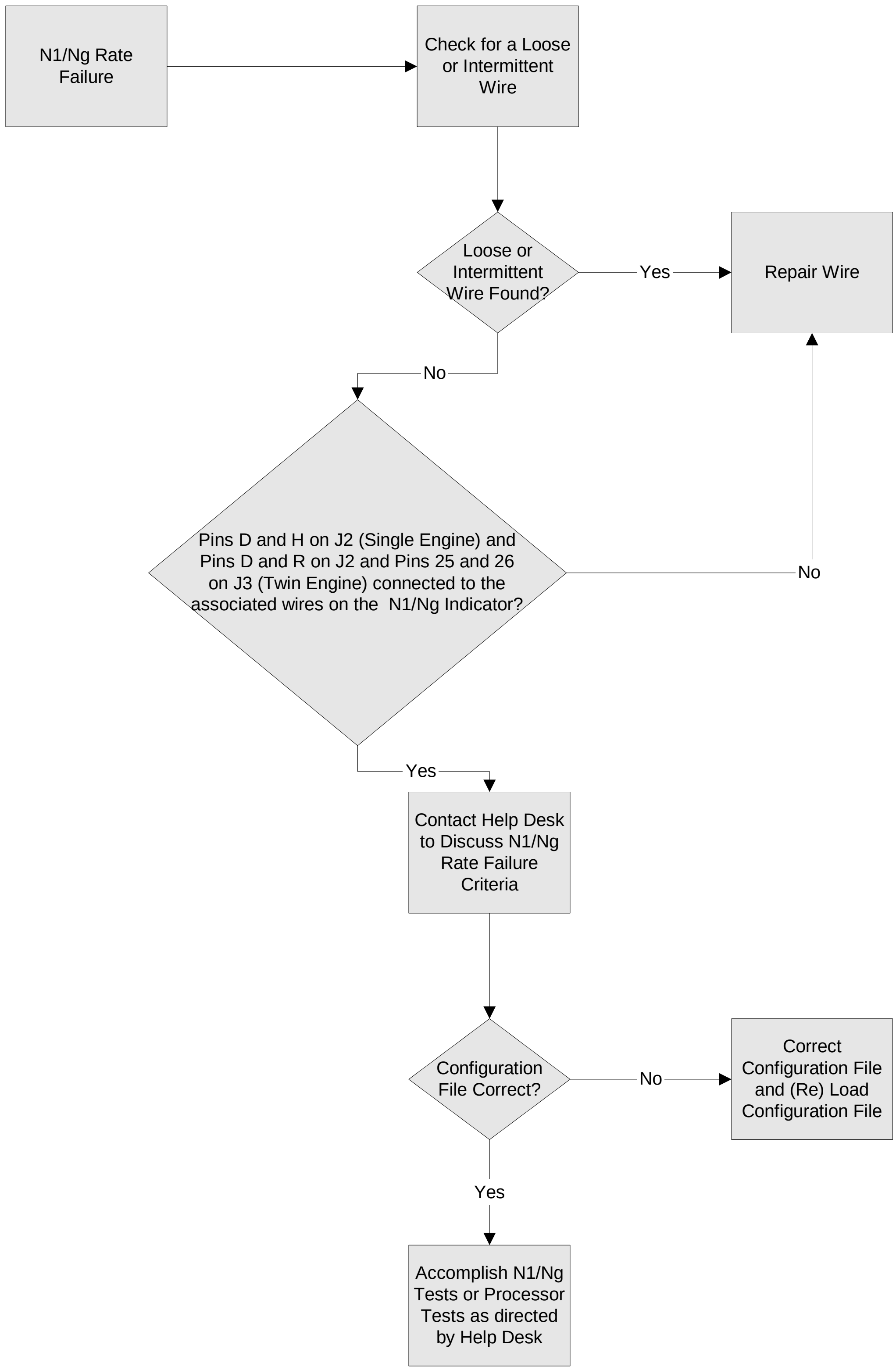

Figure 33: N1 (Ng) Rate Failure Troubleshooting

6.4.3 N2 (Np) Sensor Troubleshooting

This section defines the troubleshooting procedure to determine if the problem is caused by the processor, sensor, or wiring.

Perform the appropriate procedure if the MLP indicates any of the following symptoms:

a. Signal Failure – Refer to Figure 34

b. Range Failure – Refer to Figure 35

c. Rate Failure – Refer to Figure 36

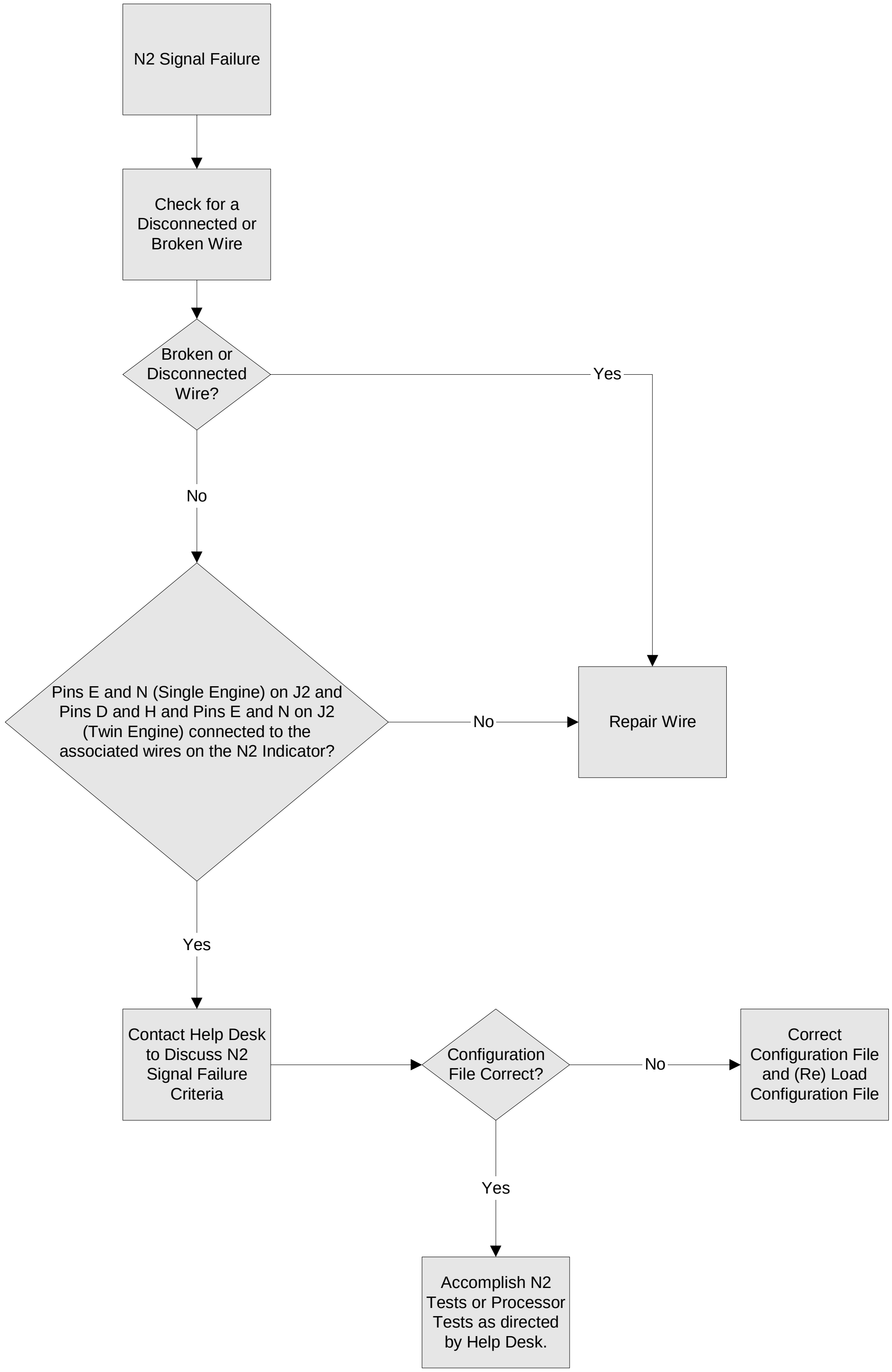

Figure 34: N2 (Np) Signal Failure Troubleshooting

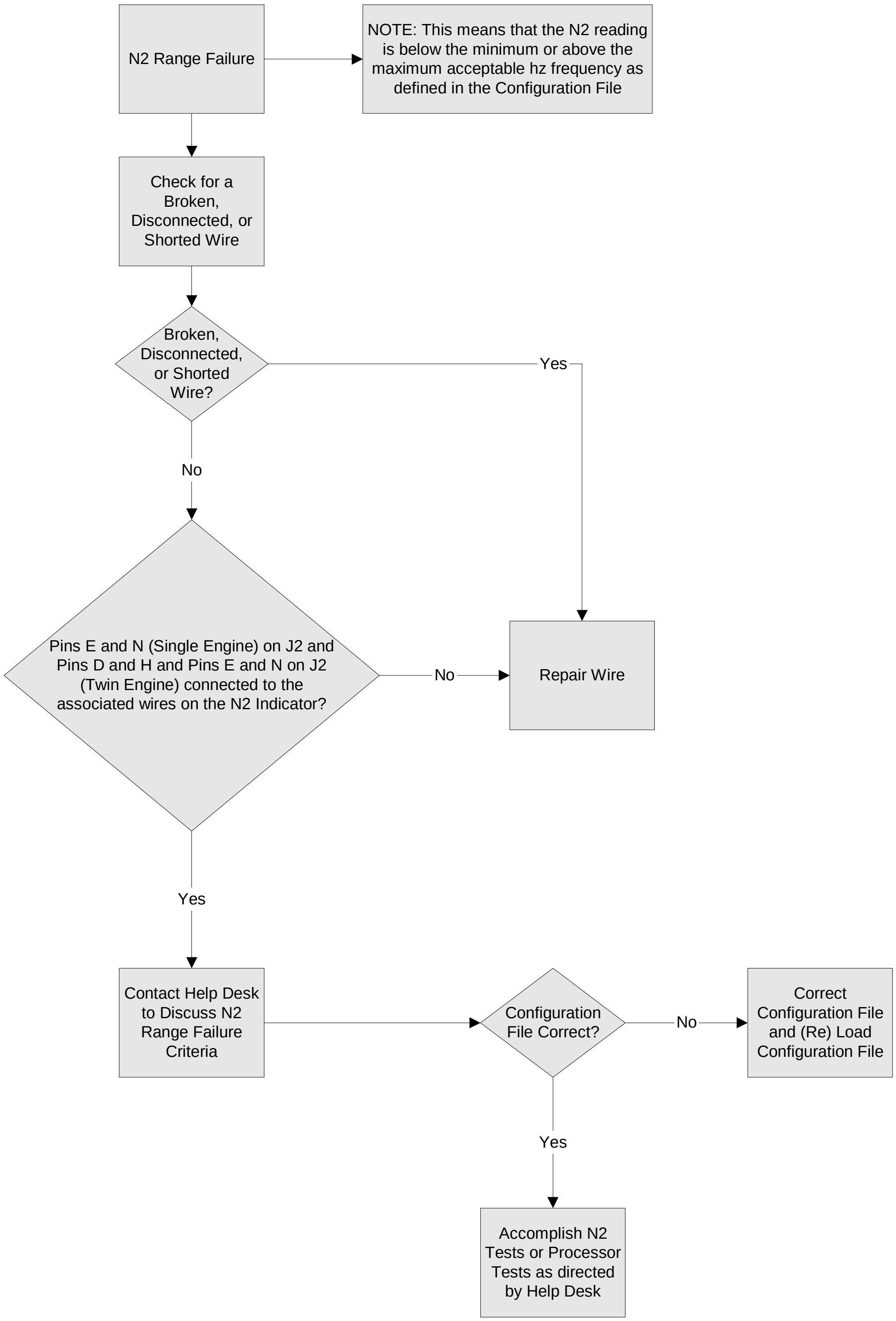

Figure 35: N2 (Np) Range Failure Troubleshooting

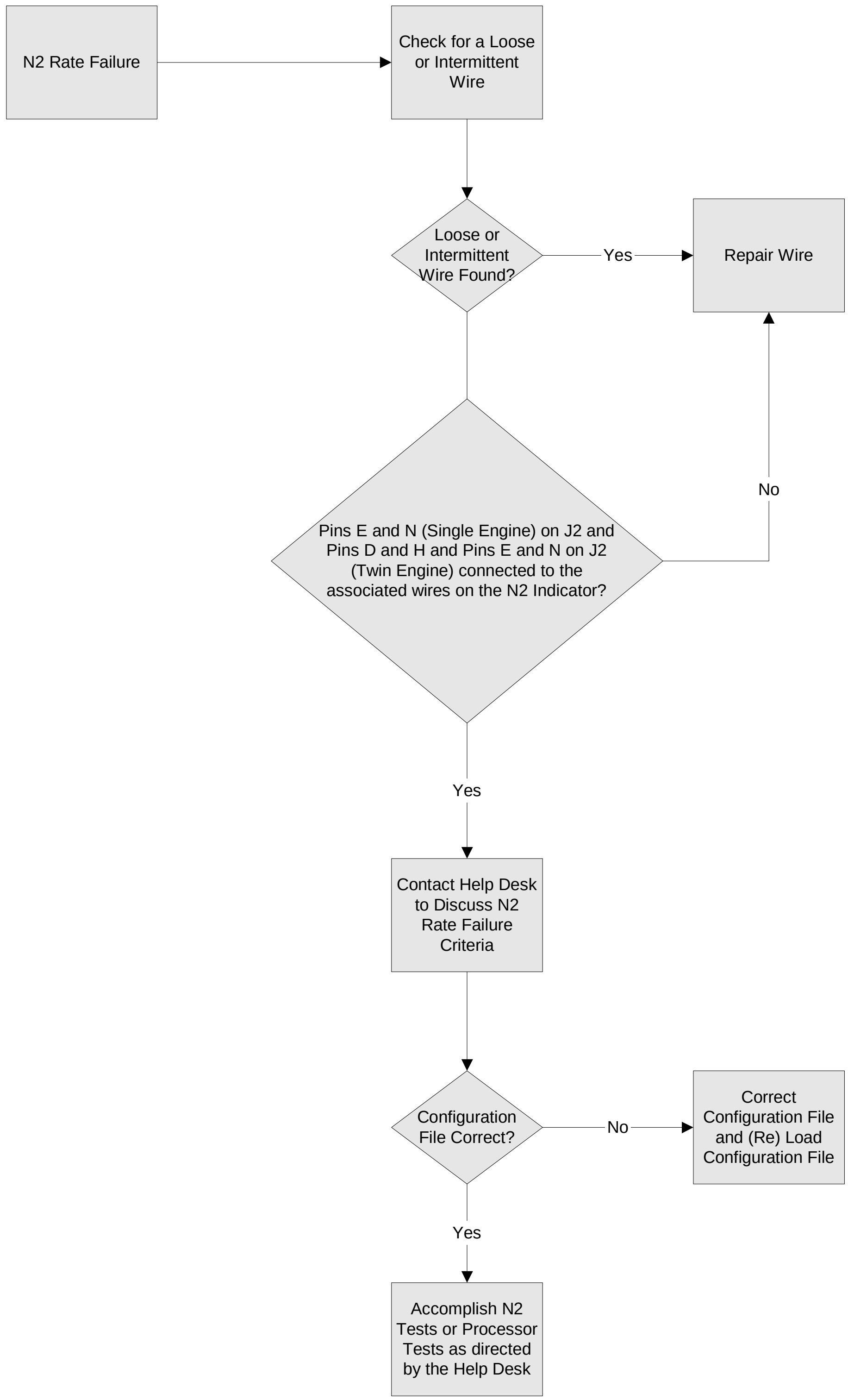

Figure 36: N2 (Np) Rate Failure Troubleshooting.

6.4.4 Fuel Flow (Wf) Sensor Troubleshooting

This section defines the troubleshooting procedure to determine if the problem is caused by the processor, sensor, or wiring.

Perform the appropriate procedure if the MLP indicates any of the following symptoms:

a. Range Failure – Refer to Figure 37

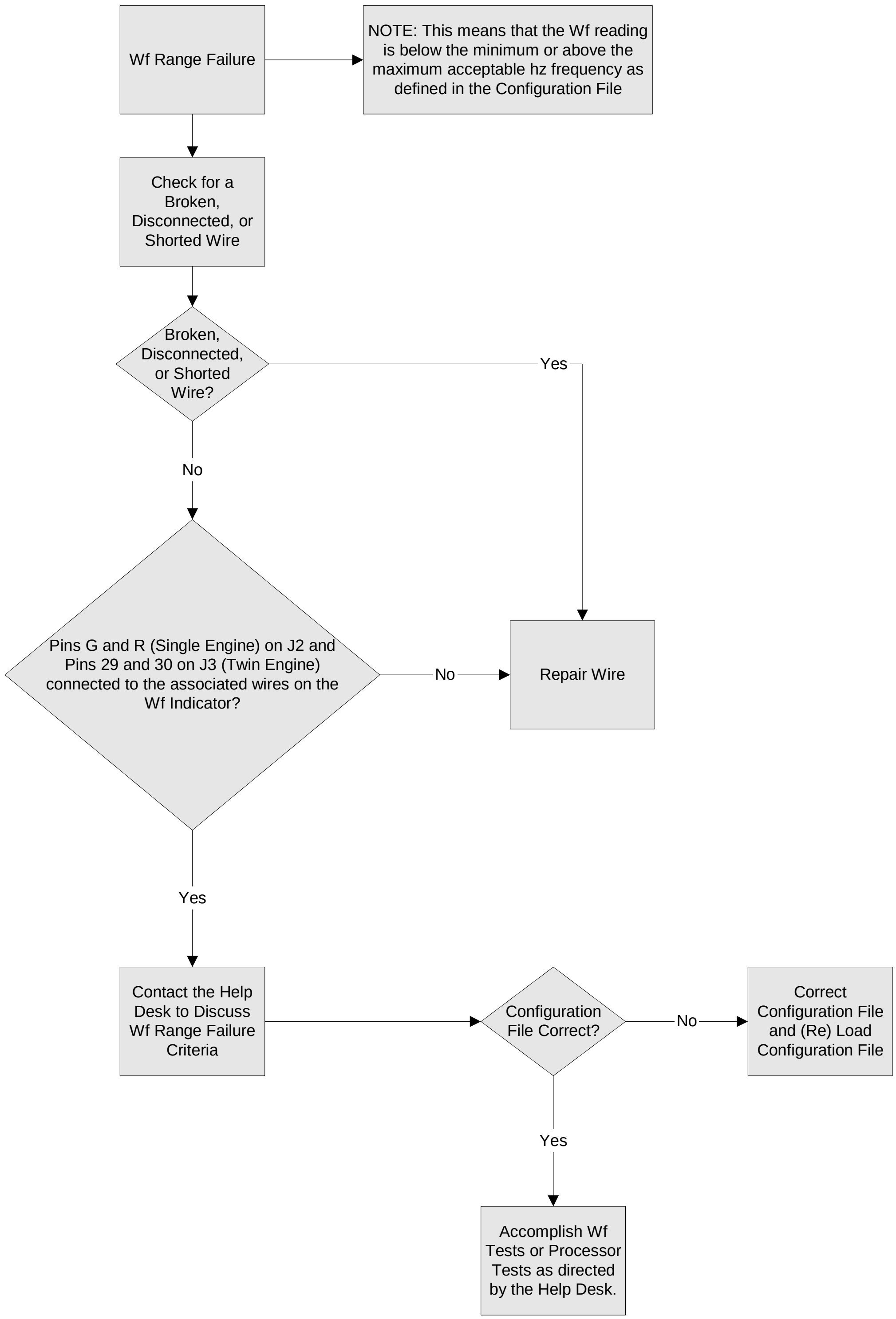

Figure 37: Fuel Flow (Wf) Range Failure Troubleshooting

6.4.5 Torque Sensor Troubleshooting

This section defines the troubleshooting procedure to determine if the problem is caused by the processor, sensor, or wiring. Refer to Figure 43 for the torque transducer wiring.

Always perform the Transducer Functional Test first. This test must be accomplished to determine if the associated failures are being caused by a defective transducer.

Perform the appropriate procedure if the MLP indicates any of the following symptoms:

a. Transducer Functional Test – Refer to Figure 38

b. Transducer Signal Failure – Refer to Figure 39.

c. Transducer BIT Failure – Refer to Figure 40.

d. Transducer Range Failure – Refer to Figure 41.

e. Transducer Rate Failure – Refer to Figure 42

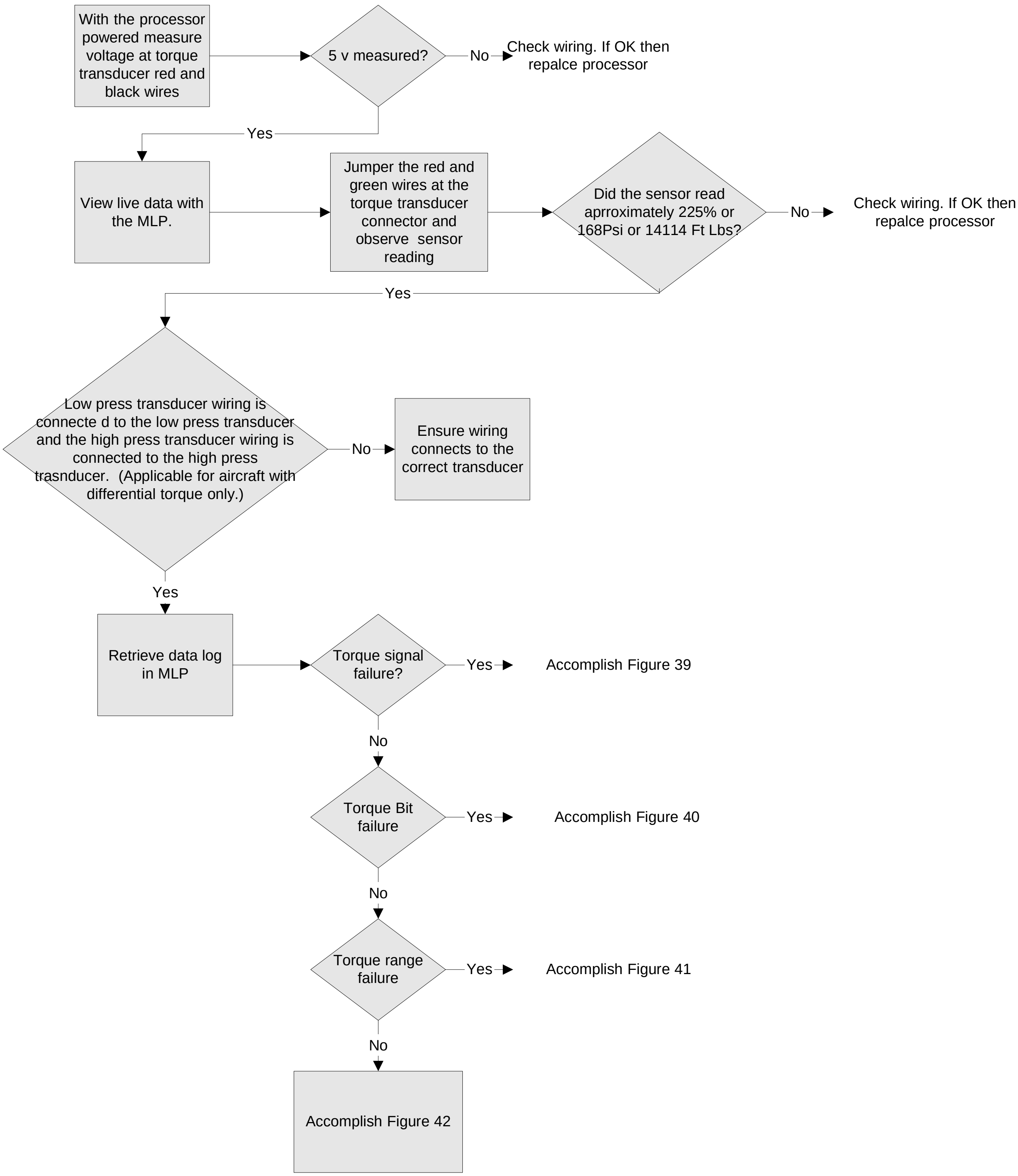

Figure 38: Torque Transducer Functional Test

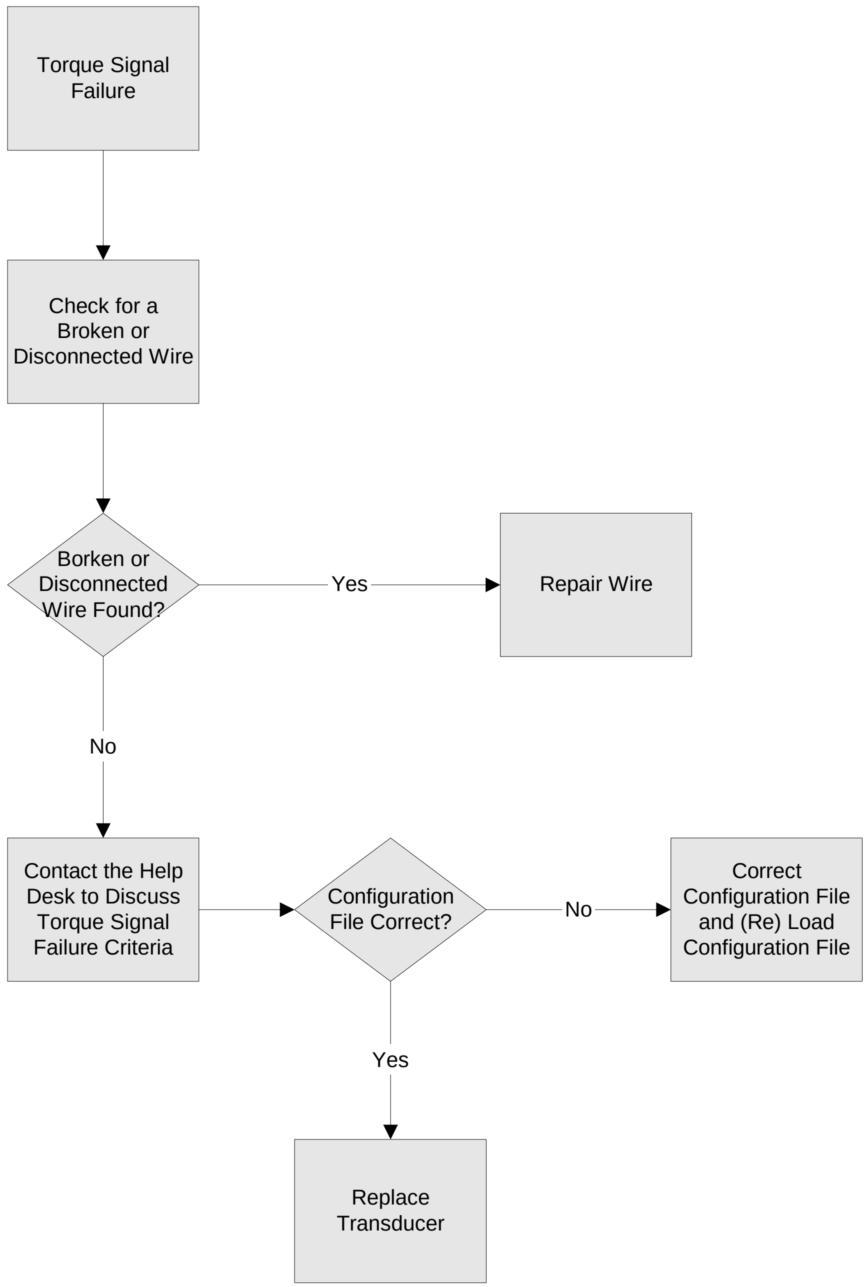

Figure 39: Torque Signal Failure Troubleshooting

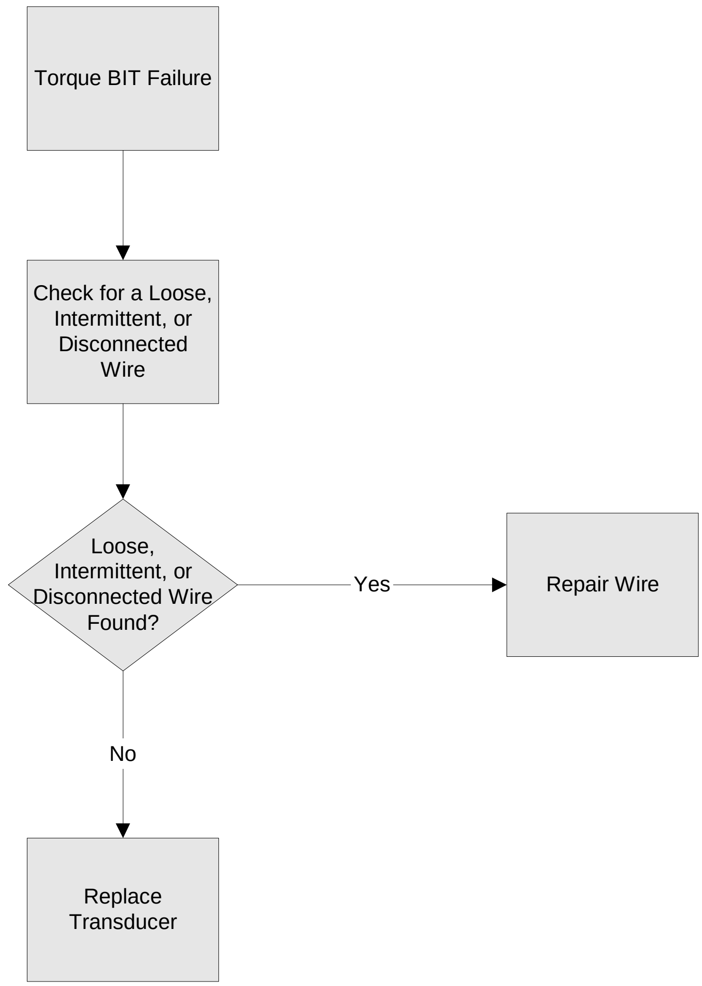

Figure 40: Torque BIT Failure Troubleshooting

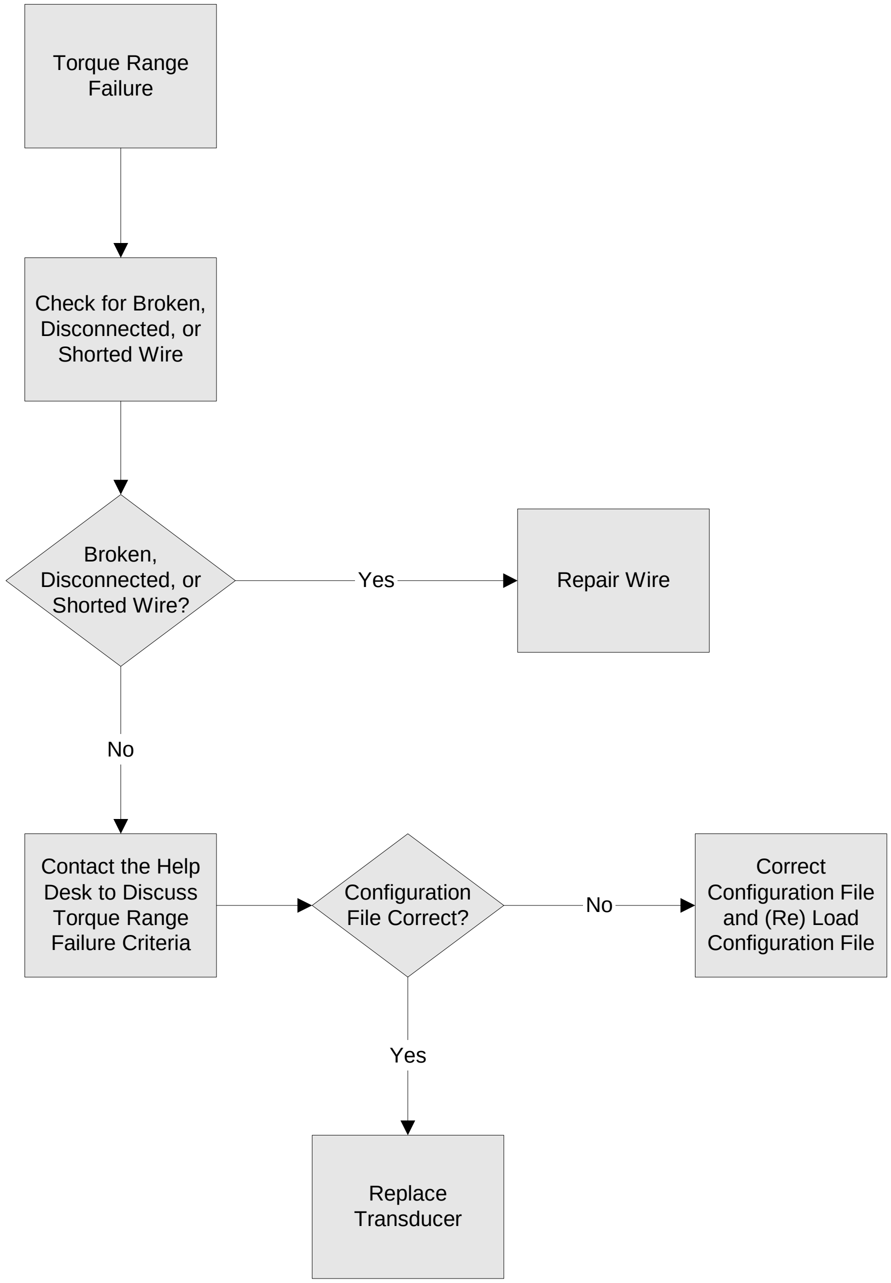

Figure 41: Torque Range Failure Troubleshooting

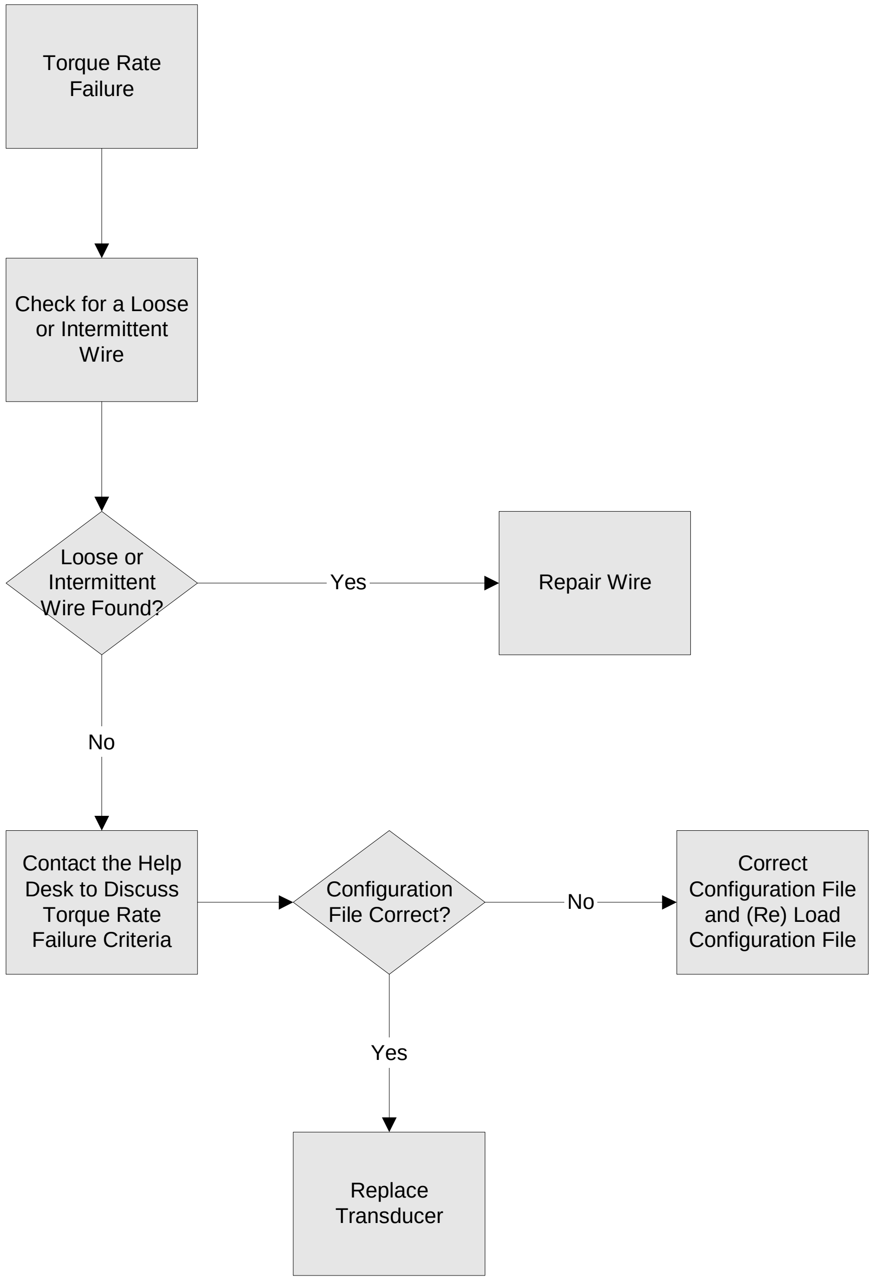

Figure 42: Torque Rate Failure Troubleshooting

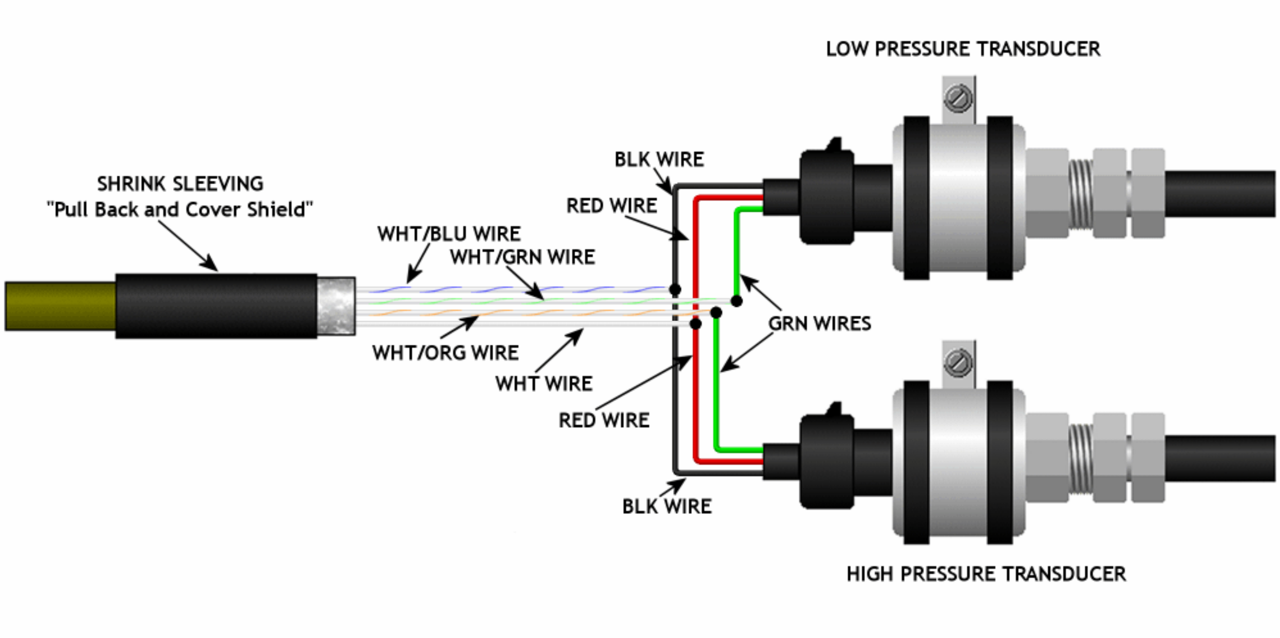

Figure 43: Torque Transducer Wiring

6.4.6 Oil Pressure Sensor Troubleshooting

This section defines the troubleshooting procedure to determine if the problem is caused by the processor, sensor, or wiring. Refer to Figure 49 for the oil pressure transducer wiring.

Always perform the Transducer Functional Test first. This test must be accomplished to determine if the associated failures are being caused by a defective transducer.

Perform the appropriate procedure if the MLP indicates any of the following symptoms:

a. Figure 44Transducer Functional Test – refer to Figure 44
b. Transducer Signal Failure – Refer to Figure 45.
c. Transducer BIT Failure – Refer to Figure 46.
d. Transducer Range Failure – Refer to Figure 47.
e. Transducer Rate Failure – Refer to Figure 48

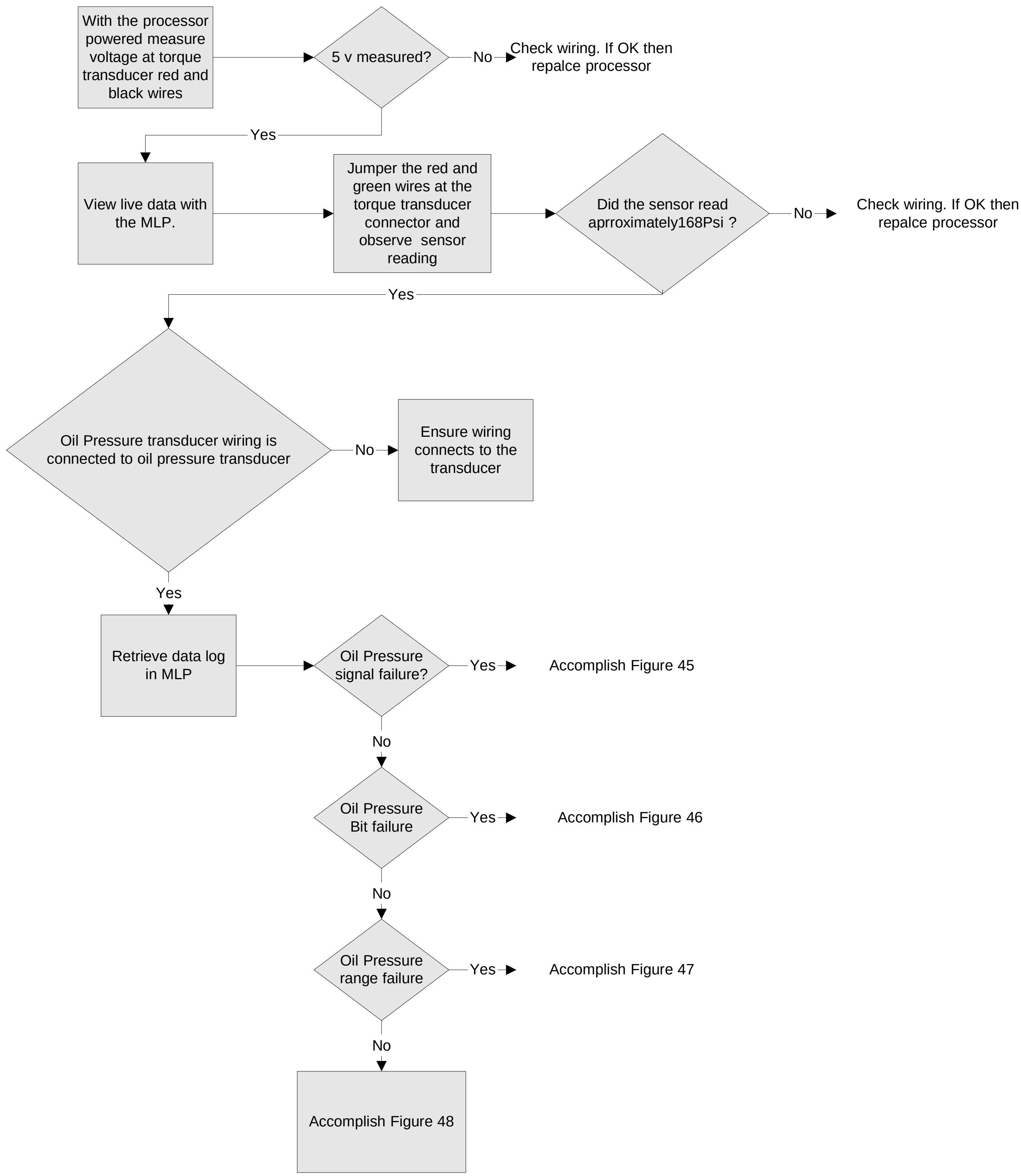

Figure 44: Oil Pressure Transducer Functional Test Diagram

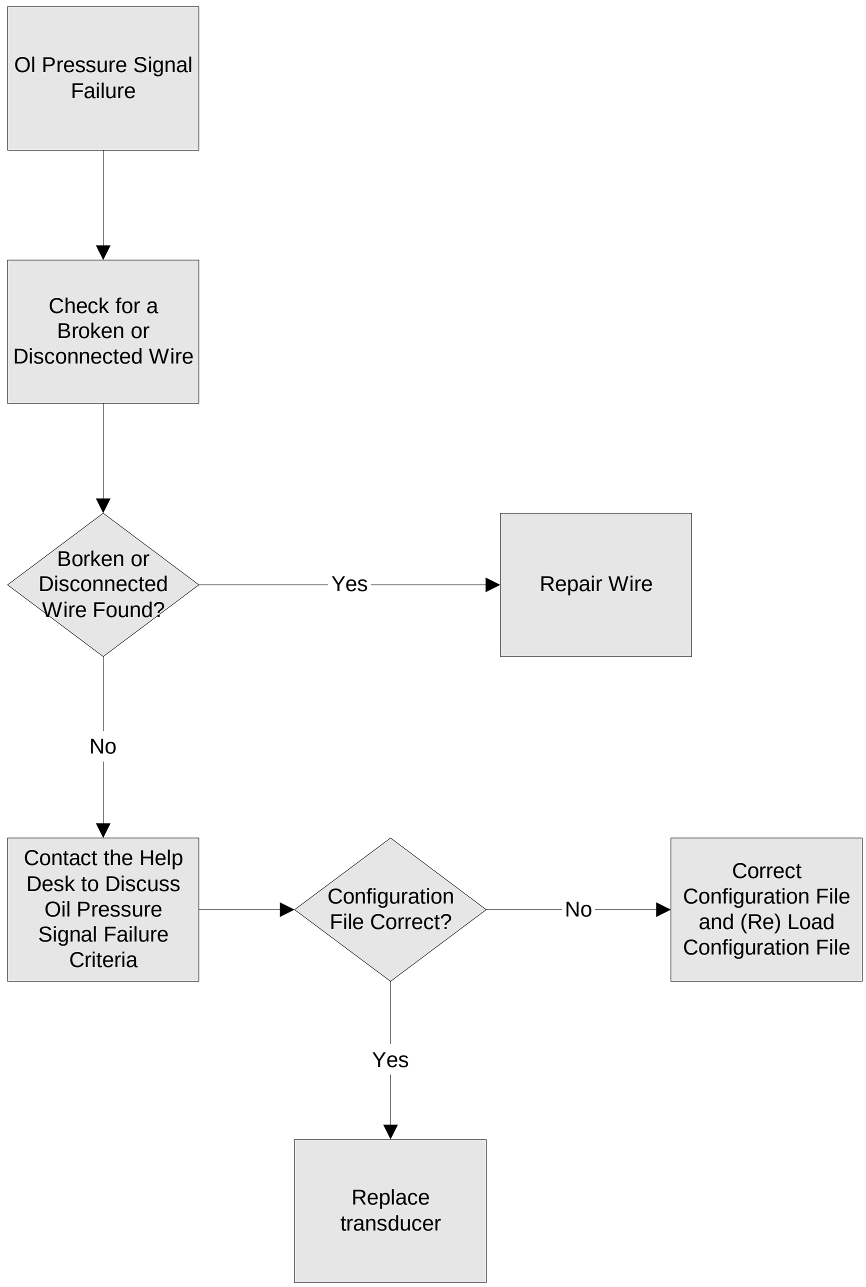

Figure 45: Oil Pressure Signal Failure Troubleshooting

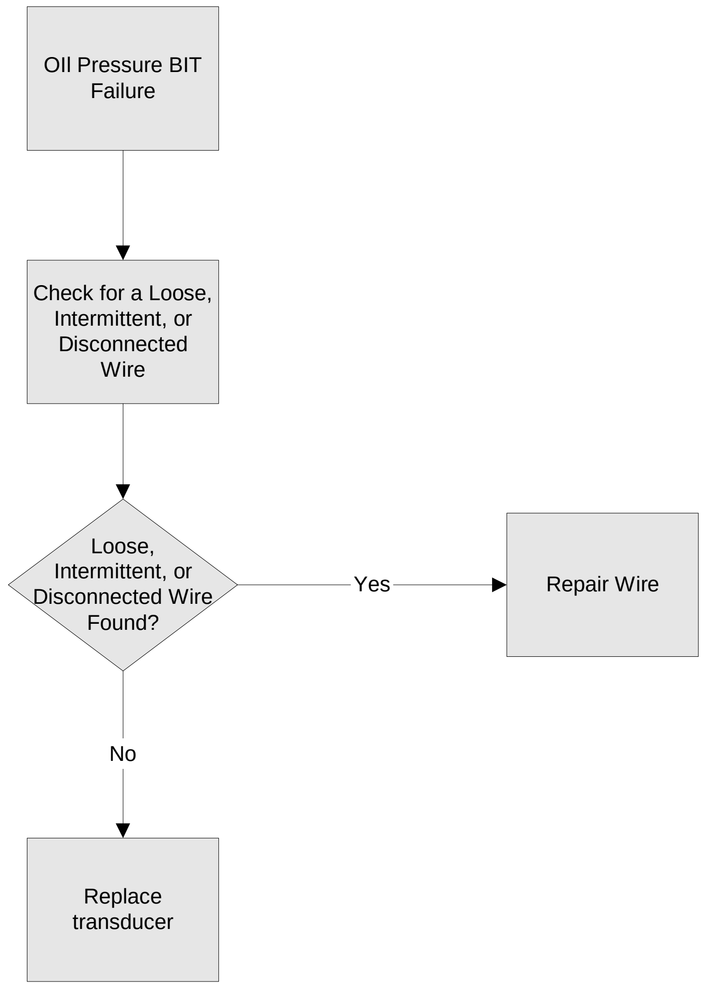

Figure 46: Oil Pressure BIT Failure Troubleshooting

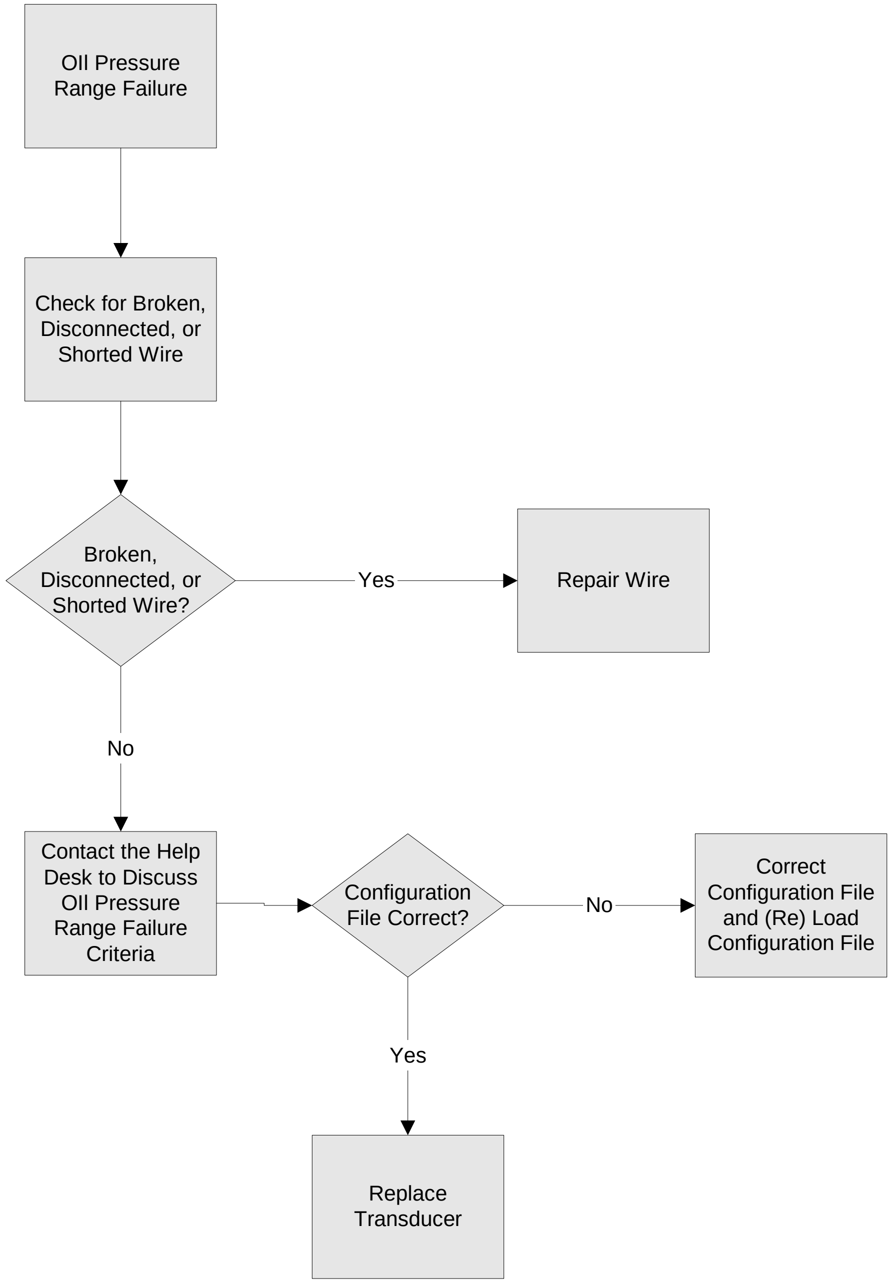

Figure 47: Oil Pressure Range Failure Troubleshooting

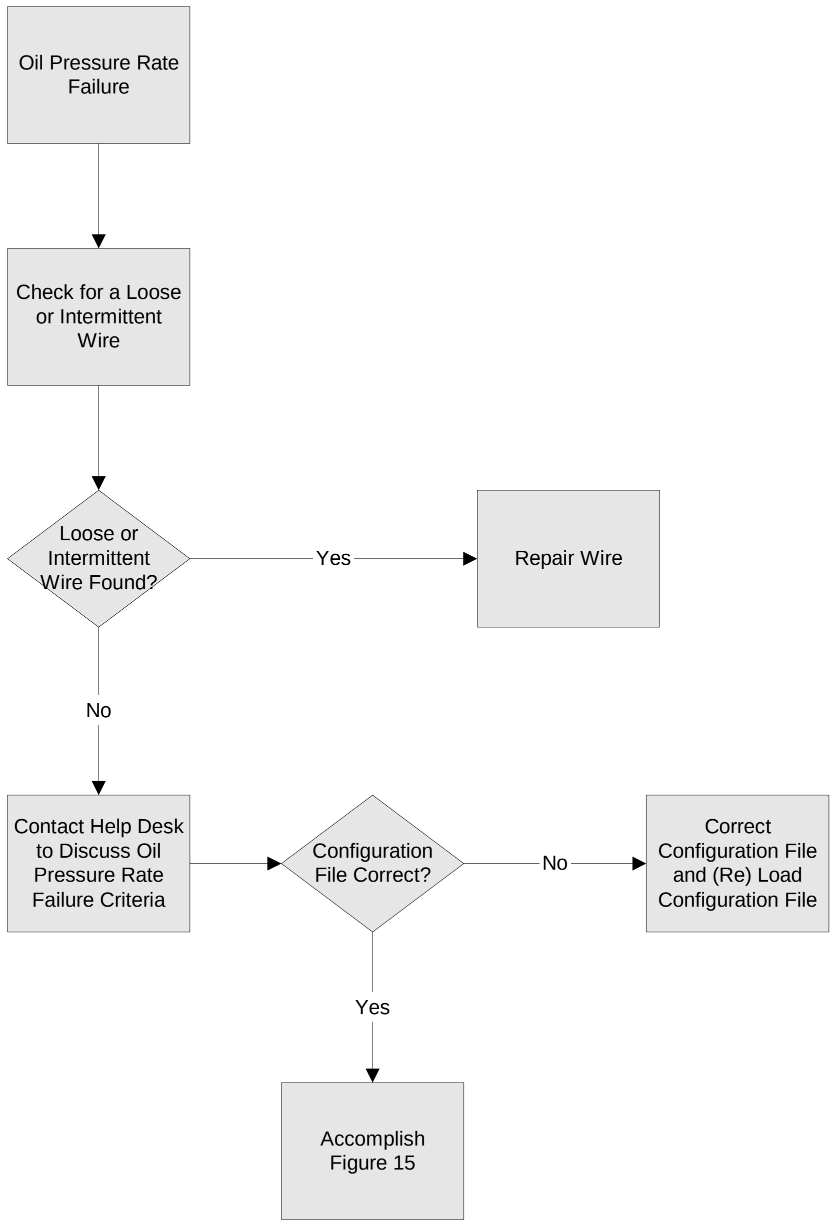

Figure 48: Oil Pressure Rate Failure Troubleshooting

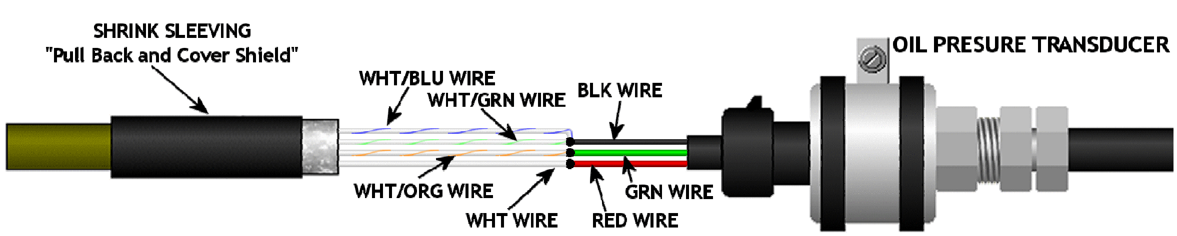

Figure 49: Oil Pressure Transducer Wiring

7 REMOVAL AND REPLACEMENT INFORMATION

Specific Removal and replacement instructions can be found in the addendum applicable to your aircraft

8 SPECIAL INSPECTION REQUIREMENTS

None required

9 APPLICATION OF PROTECTIVE TREATMENTS

This section is not applicable

10 DATA

Specific instructions for structural fasteners and parts used in the installation of the ADAS+ can be found in the addendum applicable to your aircraft

11 LIST OF SPECIAL TOOLS

A list of special tools can be found in the addendum applicable to your aircraft

12 FOR COMMUTER CATEGORY AIRCRAFT

For Commuter Category Aircraft, electrical load data applicable for each system and aircraft weight and balance must be identified. The ADAS+ has a current draw of < 1 amp at 28V DC continuously. The ADAS+ kit weighs approximately 11 lbs.

13 RECOMMENDED OVERHAUL PERIODS

This section is not applicable

14 AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

15 DIAGRAMS

Specific diagrams can be found in the addendum applicable to your aircraft.

ADDENDUM A: ADAS+ Instructions for Continued Airworthiness for Cessna Caravan Model Series 208.

ADDENDUM B: ADAS+ Instructions for Continued Airworthiness for Raytheon Model Series C90

ADDENDUM C: ADAS+ Instructions for Continued Airworthiness for Raytheon Model Series 200, 300, & 1900.

ADDENDUM D: ADAS+ Instructions for Continued Airworthiness for Embraer Model Series EMB-110P1/P2

ADDENDUM E: ADAS+ Instructions for Continued Airworthiness for Air Tractor Models AT-400, 400A, 402, 402A, 402B 501, 502, 502A, 502B, 503, 503A, 602, 802, 802A

ADDENDUM F: ADAS+ Instructions for Continued Airworthiness for Pilatus Porter Model PC-6B & C Series

Pratt & Whitney Engine Services, Inc.
249 Vanderbilt Ave
Norwood, MA 02062

Pratt & Whitney
A United Technologies Company

ADAS+

Addendum C Installation Instructions
ADAS-G-010-1/C
For Raytheon Model 200, 300, & 1900 Series

Manual Number:	ADAS-G-010-1/C		
Preparation Date:	July 27, 2003	**Prepared By:**	D Desaulnier
Release Date:	August 08, 2003	**Approvals:**	J Miller, Manager of Hardware Engineering
Revision Date:	August 24, 2011		S Sackos, Manager of Manufacturing
Revision Ltr:	H		
# of Pages:	68		

REVISION HISTORY

Rev Status of Sheets	Rev	H	E	E	E	F	F	F	F	E	F	E	E	E	E	E	E
	Sheet	i	ii	iii	iv	1	2	3	4	5	6	7	8	9	10	11	12
	Rev	E	F	E	E	E	E	E	E	E	E	E	E	F	E	E	E
	Sheet	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	Rev	E	E	E	E	E	E	E	E	F	E	E	E	E	F	E	E
	Sheet	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
	Rev	E	E	E	E	E	E	E	E	F	E	E	G	H	E	E	E
	Sheet	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
	Rev	E	E	E	E	E	E	E	E								
	Sheet	61	62	63	64	65	66	67	68								

LOG OF REVISIONS

REV. NO	ECO#	DESCRIPTION	DATE	PAGES REVISED
A		Initial Release	08/08/2003	
B	761	Add Revision Note. Add Installation Cautions in section 4.5. Add Fuel Flow Converter to Connection Chart. Revise Battery Power Connection. Revise Wiring Schematics and Connection Charts.	06/15/2005	Cover, i-iv, 2-9, 15-18, 23, 24, 37, 38, 45-64.
C	825	Add Installation Notes and Connection Chart for Pro Line 21.	06/23/2005	Cover, i-iv, 25-27, 40-44, 61-68
D	849	Correct Typographical Error Regarding the Wiring of the Center Console Assembly.	01/20/2006	Cover, I, 29
E	869 886 957	Reformat and revise Pressure Bulkhead Feed Through Instructions. Update parts list to include Pressure Bulkhead Doubler. Revise fuel flow wiring on model 300 series connection charts. Add wire numbering to connection charts and schematics. Correct typographical errors. Update company name, address, and logos.	11/09/2007	All
F	997	Added note that the Vertical Accelerometer is no longer available.	02/24/2009	Cover, i, 1-4, 6, 14, 25, 37, 42 and 53
G	1025	Update Raytheon 300 WOW Connection in the Connection Chart.	05/04/2010	Cover, i, 57
H	1094	Add Torque Wiring Connection for B300 Config 3.	08/24/2011	Cover, i, 57

NOTE:

If the ADAS+ Installation Manuals are revised, all operators will be provided with a copy of the applicable revision. If you have a subscription with TurbineTracker™, you will be informed via email of new revisions to this manual. In addition to this, P&W Engine Services maintains the latest versions of all manuals in the Support Section of TurbineTracker™.

If you are not a subscriber to TurbineTracker™, you may call P&W Engine Services Customer Support at 781-762-8600 for the latest revision.

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LIST OF FIGURES

LIST OF TABLES

1 Raytheon Series Application

1.1 *Scope*

The purpose of this document is to provide users of this product with P&W Engine Services approved installation instructions for the ADAS+. Any deviation from the procedures described within this document could result in a failure of the product to perform properly and could possibly result in damage to other systems of the aircraft.

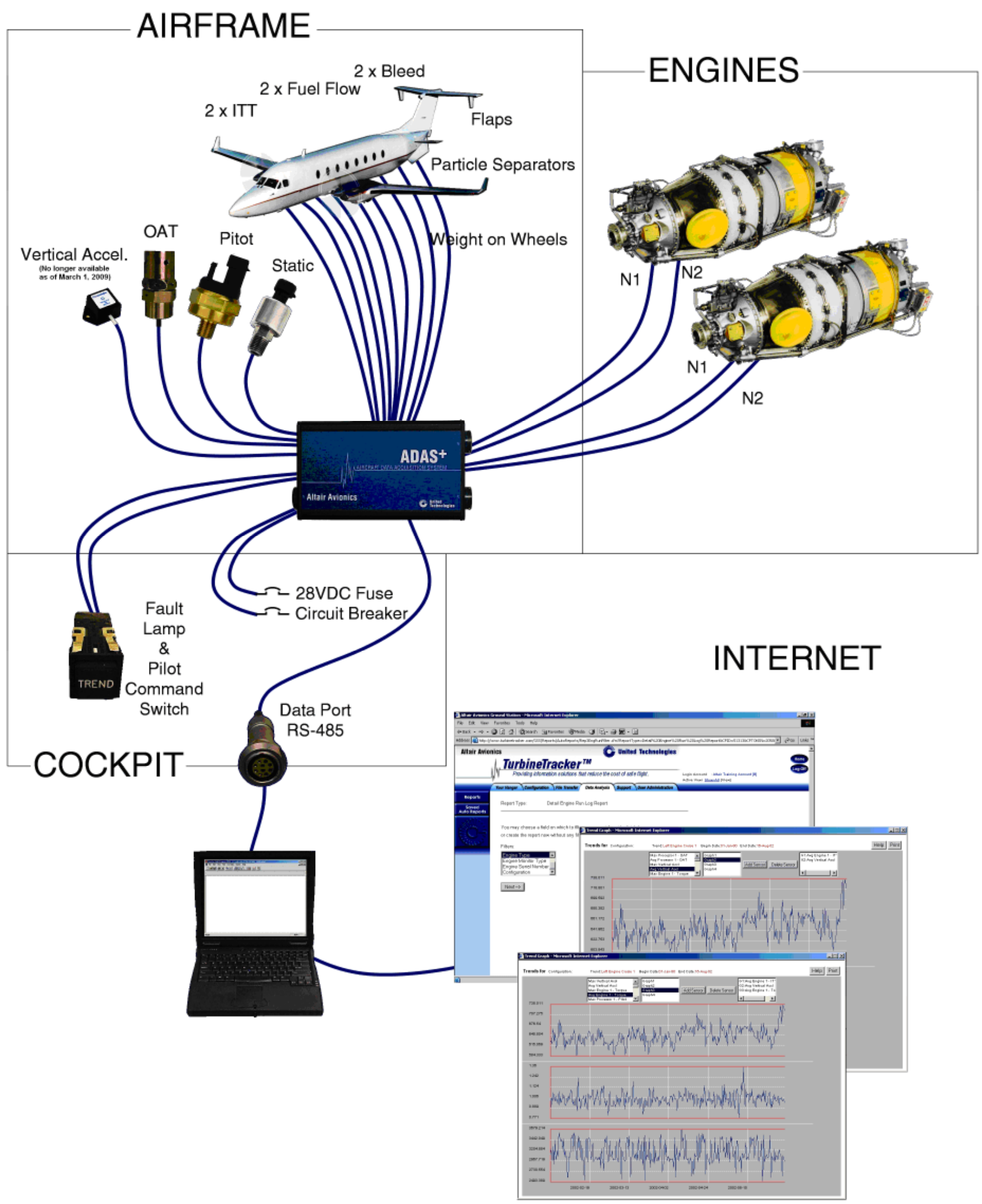

Figure C- 1: ADAS+ Twin Engine Application

2 INSTALLATION AND MAINTENANCE

2.1 *Parts List*

The parts listed below consist of the installation kits for the ADAS+ for the Raytheon Model 200, 300, and 1900 Series aircraft. Assembly kit numbers are listed in section 2.1.1 and individual components are detailed by kit numbers in section 2.1.2.

2.1.1 ADAS+ by Parts Kits

1900 and 1900C	Pedestal Display		ADAS-K-010-21
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-3	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-1	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-1	

1900 and 1900C	Individual Display		ADAS-K-010-22
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-3	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-1	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-1	

1900D UE1 to UE92	Pedestal Display		ADAS-K-010-23
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-4	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-4	

1900D UE1 to UE92	Individual Display		ADAS-K-010-24
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-4	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-4	

1900D UE93 and after	Pedestal Display		ADAS-K-010-25
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-4	

1900D UE93 and after	Individual Display		ADAS-K-010-26
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-4	

200, 200T, 200C, 200CT, A200, A200C, A200CT, B200, B200C, B200T, B200CT, 300, 300LW, B300, and B300C

Pedestal Display with Torque Kit		ADAS-K-010-27	
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-4	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-1	
Voltage to Frequency Converter Kit	1	TWIN-K-046-1[1]	

200, 200T, 200C, 200CT, A200, A200C, A200CT, B200, B200C, B200T, B200CT, 300, 300LW, B300, and B300C

Pedestal Display without Torque Kit		ADAS-K-010-30	
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-1	
Voltage to Frequency Converter Kit	1	TWIN-K-046-1[2]	

[1] The A P&W Engine Services Voltage to Frequency Converters are not required for all aircraft types or models. Refer to the Aircraft Configuration Charts for which aircraft require them.
[2] The P&W Engine Services Voltage to Frequency Converters are not required for all aircraft types or models. Refer to the Aircraft Configuration Charts for which aircraft require them.

200, 200T, 200C, 200CT, A200, A200C, A200CT, B200, B200C, B200T, B200CT, 300, 300LW, B300, and B300C
Individual Display with Torque kit ADAS-K-010-31

ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-4	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-1	
Voltage to Frequency Converter Kit	1	TWIN-K-046-1[2]	

200, 200T, 200C, 200CT, A200, A200C, A200CT, B200, B200C, B200T, B200CT, 300, 300LW, B300, and B300C
Individual Display without Torque kit ADAS-K-010-32

ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-1	
Voltage to Frequency Converter Kit	1	TWIN-K-046-1[2]	

2.1.2 Components by Kit

COCKPIT TREND SWITCH KIT		TWIN-K-027-2
Assy., Cockpit Trend Switch	TWIN-A-064-2	Qty 1
Connector, Hi-Density	MS24308/2-11F	Qty 1
Backshell	400-00038	Qty 1
Screw, Lock Post	990-00052	Qty 1

PROCESSOR ASSEMBLY		ADAS-K-017-2
Processor	EMU-A-010-5	Qty 1
Mounting Bracket	DPU-D-030-1	Qty 1
Shock Mounts, Lord	990-00020	Qty 4
Washer, Processor Mount	920-00006	Qty 4
Nut, Locking, Processor Mount	MS21042-06	Qty 4
Nut, Rivet, #10	910-00015	Qty 4
Screw, #10	MS35207-261	Qty 4
Washer, Flat, #10	AN960-10L	Qty 4
Strap, Ground	DPU-C-050-1	Qty 1

ENGINE HARNESS KIT		ADAS-K-014-2
Cable Assembly, J1	EMU-C-025-1	Qty 1
Cable Assembly, J2	ADAS-C-035-1	Qty 1
Cable Assembly, J3	ADAS-C-037-1	Qty 1

ENGINE HIGH PRECISION TORQUE KIT		TWIN-K-031-3
Transducer, 0 – 100 PSIG	750-00005	Qty 4
Elbow, Double Swivel, 37° Flare	960-00014	Qty 4
Fitting, “T”, Swivel	960-00006	Qty 4
Adapter, Boss O ring, 37° flare	960-00015	Qty 4
Clamp	MS21919WCJ12	Qty 4
Clamp	MS21919WCJ14	Qty 4
Alternate	MS21919WCH14	
Screw	MS35207-271	Qty 4
Nut	AN363-1032	Qty 4
Spacer	940-00004	Qty 4
Washer	AN960-10L	Qty 4
Wall Mount Connector	MS3450KT16S-8S	Qty 2
Alternate	MS3450KT14S-5S)	
Cable Connector	MS3456KT16S-8P	Qty 2
Alternate	MS3456KT14S-5P	
Backshell	M85049/41-10A	Qty 4
Alternate	M85049/41-8A)	
Cable	M27500/20RC4S06	Qty 60 ft.
Transducer Harness	750-00006	Qty 4

ENGINE HIGH PRECISION TORQUE KIT — TWIN-K-031-4

Transducer, 0 – 100 PSIG	750-00005	Qty 4
Elbow, Double Swivel, 37° Flare	960-00014	Qty 4
Fitting, “T”, Swivel	960-00006	Qty 4
Adapter, Boss O ring, 37° flare	960-00015	Qty 4
Clamp	MS21919WCJ12	Qty 4
Clamp	MS21919WCJ14	Qty 4
Alternate	MS21919WCH14	
Screw	MS35207-271	Qty 4
Nut	AN363-1032	Qty 4
Spacer	940-00004	Qty 4
Washer	AN960-10L	Qty 4
Cable	M27500/20RC4S06	Qty 60 ft.
Transducer Harness	750-00006	Qty 4

AIRCRAFT VERTICAL ACCELEROMETER KIT — TWIN-K-032-1

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

Accelerometer, 5g	TWIN-D-035-1	Qty 1
Screw	MS35206-230	Qty 2
Nut	AN365-632A	Qty 2
Washer	AN960-6	Qty 2
Connector	400-000026	Qty 1

PITOT / STATIC PRESSURE KIT — TWIN-K-033-1

Bracket, Transducer Mounting	TWIN-D-014-1	Qty 1
Nipple, Pipe	AN911-1D	Qty 2
‘T”, Pipe	AN917-1D	Qty 2
Nipple, Flare	AN816-4D	Qty 2
Hose, Inlet Pressure	990-00028	Qty 4 Ft.
Fitting, Inlet Pressure Hose	960-00027	Qty 4
Adapter, Pipe to 37° Flare	960-00002	Qty 1
Tee, Pipe	AN917-2D	Qty 1
Nipple, Flare	AN816-4-4D	Qty 1
Bushing	AN912-1D	Qty 1
Fitting, Male Nylo-Seal	960-00024	Qty 1
Tubing, Tygon	990-00030	Qty 1 Ft
Insert	920-00010	Qty 1
Transducer, 0 – 3 PSID	750-00001	Qty 1
Transducer, 0 – 15 PSIA	750-00002	Qty 1
Clamp, Inlet Pressure Hose	MS21919WDG17	Qty 1
Clamp, Inlet Pressure Transducer	MS21919WDG26	Qty 1
Screw, 6-32	MS35206-227	Qty 3
Washer, Flat, #6	AN960-6	Qty 3
Nut, Locking, 6-32	AN365-632A	Qty 3
Bolt, 10-32	MS35207-263	Qty 2
Nut, Locking, 10-32	AN365-1032A	Qty 2
Washer, #10	AN960-10	Qty 2
Standoff	940-00003	Qty 1

PITOT / STATIC PRESSURE KIT TWIN-K-033-2

Bracket, Transducer Mounting	TWIN-D-014-1	Qty 1
Hose, Inlet Pressure	990-00028	Qty 4 Ft.
Fitting, Inlet Pressure Hose	960-00027	Qty 4
Adapter, Pipe to 37° Flare	960-00002	Qty 1
“T”, Pipe	AN917-2D	Qty 1
Nipple, Flare	AN816-4-4D	Qty 1
Bushing	AN912-1D	Qty 1
Fitting, Male Nylo-Seal	960-00024	Qty 1
Tubing, Tygon	990-00030	Qty 1 Ft
Insert	920-00010	Qty 1
Transducer, 0 – 3 PSID	750-00001	Qty 1
Transducer, 0 – 15 PSIA	750-00002	Qty 1
Clamp, Inlet Pressure Hose	MS21919WDG17	Qty 1
Clamp, Inlet Pressure Transducer	MS21919WDG26	Qty 1
Screw, 6-32	MS35206-227	Qty 3
Washer, Flat, #6	AN960-6	Qty 3
Nut, Locking, 6-32	AN365-632A	Qty 3
Bolt, 10-32	MS35207-263	Qty 2
Nut, Locking, 10-32	AN365-1032A	Qty 2
Washer, #10	AN960-10	Qty 2
Standoff	940-00003	Qty 1
Reducer	960-00031	Qty 1
“T” Swivel, -6	960-00032	Qty 1
“T” Swivel, -4	960-00003	Qty 1

ADDITIONAL INSTALLATION MATERIALS KIT TWIN-K-034-1

Grommet, Pressure Bulkhead	990-00035	Qty 1
T5 Crimp Lug, Alumel	400-00034	Qty 2
T5 Crimp Lug, Chromel	400-00035	Qty 2
Fuse Holder, In-Line	DPU-C-057-1	Qty 2
Fuse, 1 Amp	990-00033	Qty 2
Terminal, End	400-00030	Qty 4
Doubler, Pressure Bulkhead	ADAS-D-059-1	Qty 1

ADDITIONAL INSTALLATION MATERIALS KIT TWIN-K-034-4

Grommet, Pressure Bulkhead	990-00035	Qty 1
T5 Crimp Lug, Alumel	400-00034	Qty 2
T5 Crimp Lug, Chromel	400-00035	Qty 2
Fuse Holder, In-Line	DPU-C-057-1	Qty 1
Fuse, 1 Amp	990-00033	Qty 1
Breaker, Circuit 1 Amp	990-00032	Qty 1
Terminal, End	400-00030	Qty 4
Doubler, Pressure Bulkhead	ADAS-D-059-1	Qty 1

AIRCRAFT OUTSIDE AIR TEMPERATURE PROBE KIT	DPU-K-032-1	
Probe, Temperature	TWIN-A-050-2	Qty 1
Nut, Jam	TWIN-D-061-1	Qty 1
Washer	AN960-816L	Qty 2
Washer	AN960-10	Qty 1
Nut	AN365-1032A	Qty 1
Seal, “O” Ring	AN6227B-10	Qty 1
Screw, Drilled	AN3H-4A	Qty 1
Doubler, OAT Probe	DPU-D-047-1	Qty 1

COCKPIT FAULT LAMP AND DOWNLOAD PORT KIT	DPU-K-046-3	
Assy., Cockpit Fault Lamp	DPU-A-043-1	Qty 1
Connector, 6 Pin Female	400-00026	Qty 1
Assy., Download Port	DPU-A-044-1	Qty 1
Connector, 6 Pin, Male	400-00027	Qty 1
Cover, Receptacle	990-00031	Qty 1
Lens	TREND-D-041-1	Qty 1
Screw	900-00009	Qty 1
Washer	AN960-4	Qty 1
Nut	910-00001	Qty 1

VOLTAGE TO FREQUENCY CONVERTER KIT	TWIN-K-046-1	
Voltage to Frequency Converter	TWIN-A-042-1	Qty 1
Cable harness Assemble	TWIN-C-043-1	Qty 1

3 INSTALLATION – MECHANICAL

3.1 *Processor*

3.1.1 System Processor Mounting

The system processor is mounted in the avionics compartment using mounting bracket, DPU-D-030-1. The processor will not require access during normal operation.

For All Listed Aircraft Models:

Installation Caution:

⇨ **Excessive torque on the processor mounting studs can deform the shock mounts. The locking nut should be tightened only to the point of contact with the shock mount.**

Assembly Note:

Some configurations of the Raytheon fuel flow circuit require mounting P&W Engine Services Voltage to Frequency Converters. They are Models 200 & 200T using Raytheon fuel flow configurations 1 & 2 and Models 200CT, A200, A200C, A200CT, B200 B200C, B200CT, & B200T using Beech fuel flow configuration 1. P&W Engine Services converters are not used or supplied with other aircraft models and configurations.

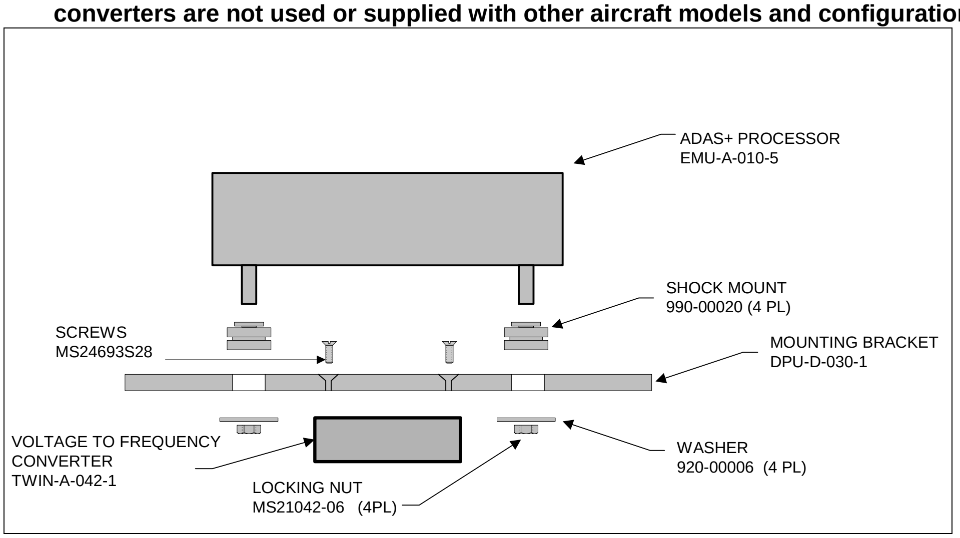

Figure C- 2: System Processor to Bracket Mounting

- ❑ *010* Assemble the system processor and P&W Engine Services Voltage to Frequency Converter (if used) to the mounting bracket as shown in Figure C- 2 and test fit in a convenient location within the avionics compartment. When the P&W Engine Services Voltage to Frequency Converter is used, the four mounting screws should be secured using Loctite® Blue or equivalent.
- ❑ *020* Mark the avionics tray for the location of the four mounting holes.
- ❑ *030* Drill and install the four supplied rivet nuts in the avionics tray.
- ❑ *040* Mount the system processor and bracket to the avionics tray using four screws and four washers as shown in Figure C- 3. Note: The processor may be mounted as shown or upside down (180° from the orientation shown).

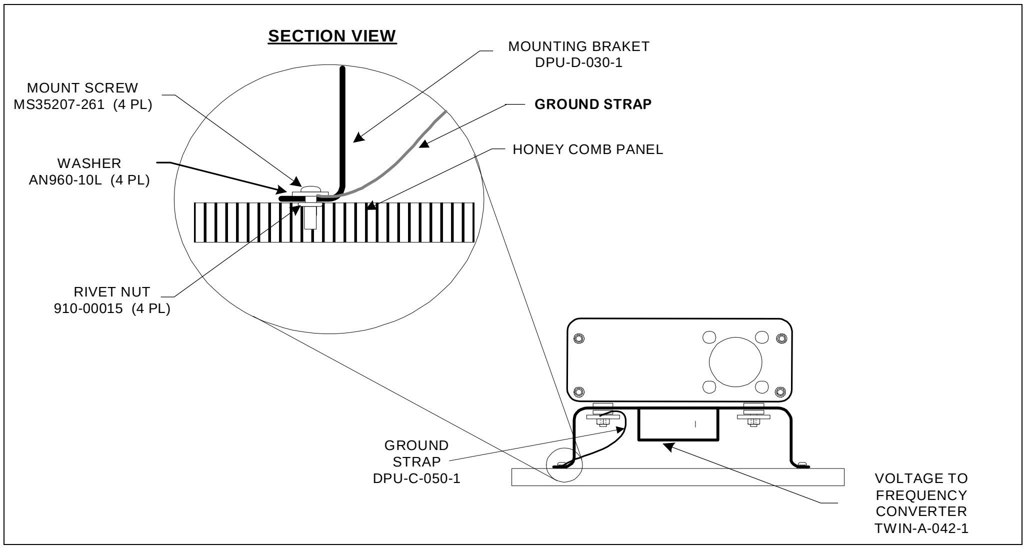

Figure C- 3: Bracket to Avionics Tray Mounting

3.1.2 Pressure Bulkhead Fitting

For All Listed Aircraft Models:

The twin engine ADAS+ uses a Raychem™ pressure bulkhead fitting for routing the harnesses into the aircraft. Depending on the aircraft and what equipment is installed you may or may not need a doubler (ADAS-D-059-1). Reference Figure C- 4 for typical clear bay areas numbered 1 through 22.

Installation Caution:

- ⇨ **No doubler is required if installing the feed through in bay 11, 12, 13, or 14. Any other clear bay indicated in Figure C- 4 requires the supplied doubler. If a doubler already exists on the bulkhead it may be used in place of the supplied doubler.**
- ⇨ **Maintain .25” edge distance between connector hole and structure (Bay 11, 12, 13, or 14).**
- ⇨ **Maintain .25” edge distance between doubler outer circumference and pressure bulkhead supporting structure and/or pressure bulkhead bonded doublers (bay locations other then 11 through 14).**
- ⇨ **Ensure that connector is placed as close to lateral bay centerline as possible.**
- ⇨ **Ensure that the connector through hole does not exceed 1.34”.**
- ⇨ **Install fasteners and doubler (if applicable) with wet sealant as per Raytheon Aircraft, Beech Airliner Maintenance Manual, Chapter 20, Section 20-10-00.**
- ⇨ **Choose a location to install the pressure bulkhead connector that will be clear of any obstructions. Because of possible aircraft alternate equipment the specific mounting location must be established by the installer. The position selected must not interfere with existing aircraft systems.**

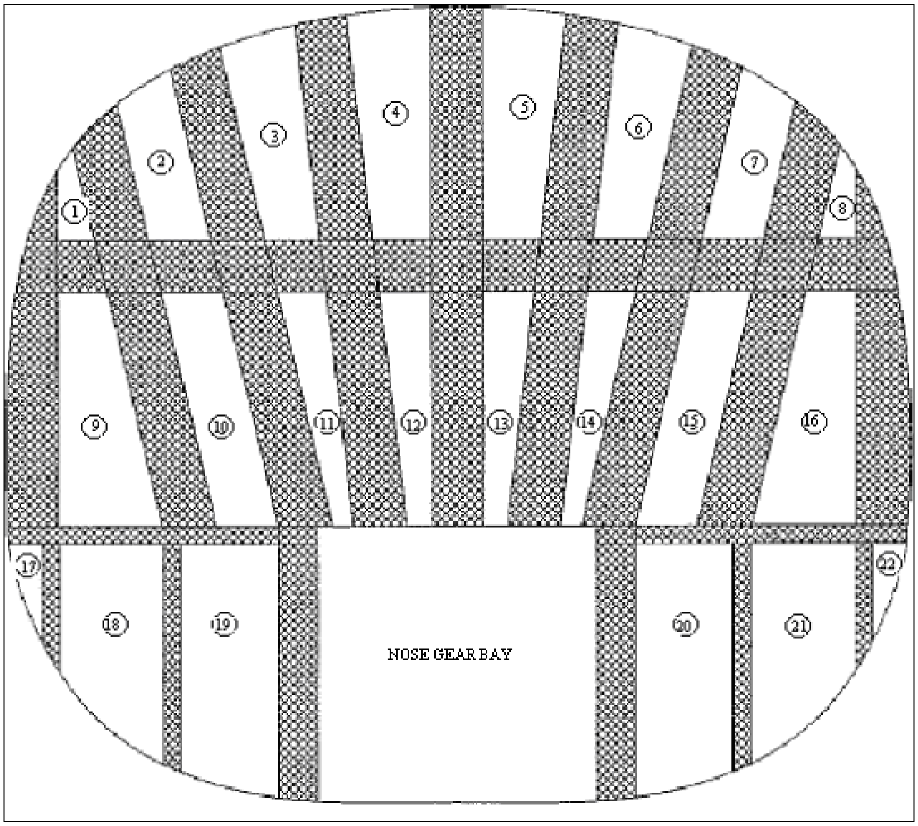

Figure C- 4: Typical Clear Bay Areas of Fwd Pressure Bulkhead (looking aft)

Pressure Bulkhead Connector Installation in Bay 11, 12, 13, or 14:

- ❑ *010* Drill a 1.34” hole into the pressure bulkhead in bay 11, 12, 13, or 14 as specified in Figure C- 4 or any other bay if a doubler already exists.
- ❑ *020* Install the Raychem™ fitting with the tapered end located in the cabin side of the pressure bulkhead. Then secure the fitting from the avionics bay side using the “B” nut provided, being careful not to dislodge, damage, or misplace the o-ring installed in the “B” nut gland.

Pressure Bulkhead Connector Installation in Any Bay Except 11, 12, 13, or 14 and doubler does not already exists:

- ❑ *010* Using the doubler (ADAS-D-059-1) as a guide, mark and drill 12 #21 holes through a clear bay on the forward pressure bulkhead.
- ❑ *020* Deburr all the holes in the forward pressure bulkhead and then reinstall doubler.
- ❑ *030* Using a Cherrymax Grip Gauge, measure the holes for the proper rivet grip length.
- ❑ *040* Install the CR3213-5-X Cherrymax rivets or equivalent (supplied by installer).
- ❑ *050* Install the Raychem™ pressure bulkhead fitting with the tapered end located in the cabin side of the pressure bulkhead. Then secure the fitting from the avionics bay side using the “B” nut provided, being careful not to dislodge, damage, or misplace the o-ring installed in the “B” nut gland.

3.2 *Cockpit Components*

3.2.1 Cockpit TREND Switch / Fault Lamp and Download Port

The ADAS+ has a single TREND switch / fault lamp and download port (Figure C- 5 and Figure C- 6). The TREND switch and download port, explained in this section, consists of a .75” x .75” square push-to-test lamp and a serial download connector. The twin engine ADAS+ TREND switch/fault lamp, download port, and connector are available in a pre-wired center-console mount assembly (TWIN-A-064-2), or as a discrete component kit (TWIN-K-045-2).

The ADAS+ single cockpit display assembly fastens to a standard center console opening with Dzus™ fasteners.

For All Listed Aircraft Models:

- ❑ *010* Following Figure C- 5, mark and punch a .75” square hole for mounting of the system TREND switch/fault lamp.
- ❑ *020* Install the TREND switch/fault lamp into the instrument panel.
- ❑ *030* Mark and drill out 19/32” hole for the data download port in the instrument panel.
- ❑ *040* Install the download port using Loctite® Blue on the threads of the download port.

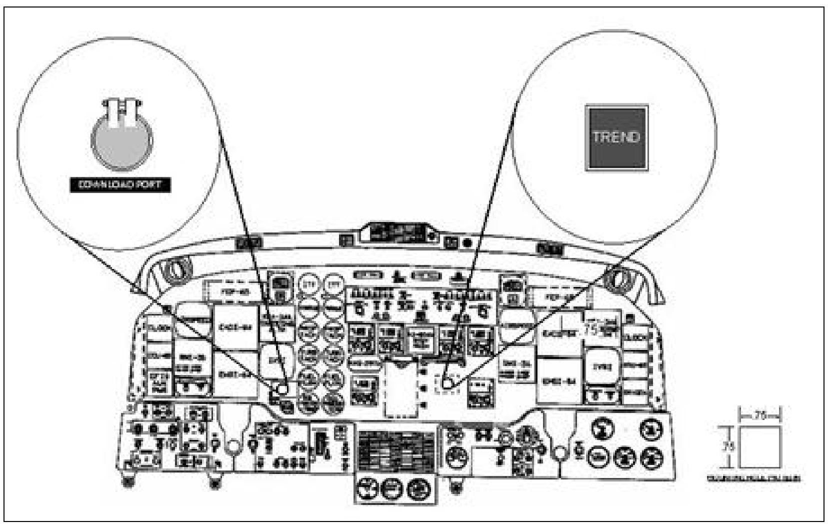

Figure C- 5: Cockpit Display (Discrete Component Mount)

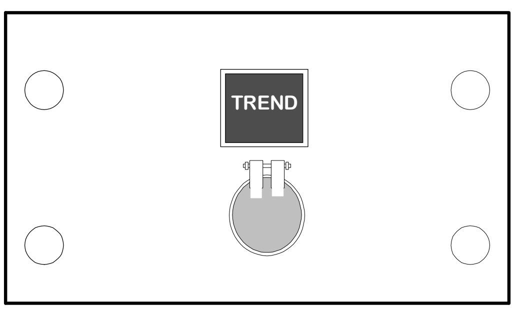

Figure C- 6: Single Cockpit Display (Center Console Mount Assembly)

3.3 *Airframe Components*

3.3.1 Circuit Breaker Mounting

The 1 amp circuit breaker automatically interrupts the electrical circuit under abnormal conditions.

All Listed Aircraft Models **Except 1900D**:

- ❑ *010* Ensure that no power is connected to the aircraft and that the battery cable is disconnected from the battery.
- ❑ *020* Gain access to the copilot's circuit breaker panel located in Aircraft Zone 246.
- ❑ *030* Mount the circuit breaker in an unused location in the Avionics section of the copilot's circuit breaker panel. See Figure C- 7.
- ❑ *040* Identify circuit breaker with proper markings.

Figure C- 7: Co-pilot's Circuit Breaker Panel

1900D Model, Only:

The breaker is mounted in location 60 or 61 of the primary bus, located in the floor compartment aft of the center console.

- ❑ *010* Ensure that no power is connected to the aircraft and that the battery cable is disconnected from the battery.
- ❑ *020* Gain access to the *A187 Panel Assembly – Circuit Breaker, Under floor.*
- ❑ *030* Mount the circuit breaker in location 60 or 61.
- ❑ *040* Identify circuit breaker with proper markings.

3.3.2 Vertical Accelerometer

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

The twin engine ADAS+ records vertical accelerations for hard landing and in-flight loads using a +/- 5g accelerometer mounted aft of the wing spar on the DC generator control panel. To mount the accelerometer, perform the following steps:

For All Listed Aircraft Models:

- ❑ *010* Gain access to the wing spar in the center of the fuselage.
- ❑ *020* Following Figure C- 8 , find a convenient location and mount the accelerometer with the supplied screws (MS35206-230) and lock nuts (AN365-632A).
- ❑ *030* Ensure that the vertical accelerometer is mounted so that the label with the Crossbow legend and Model # is facing up and the label with the Serial # is facing towards the ground. No other orientation is necessary.

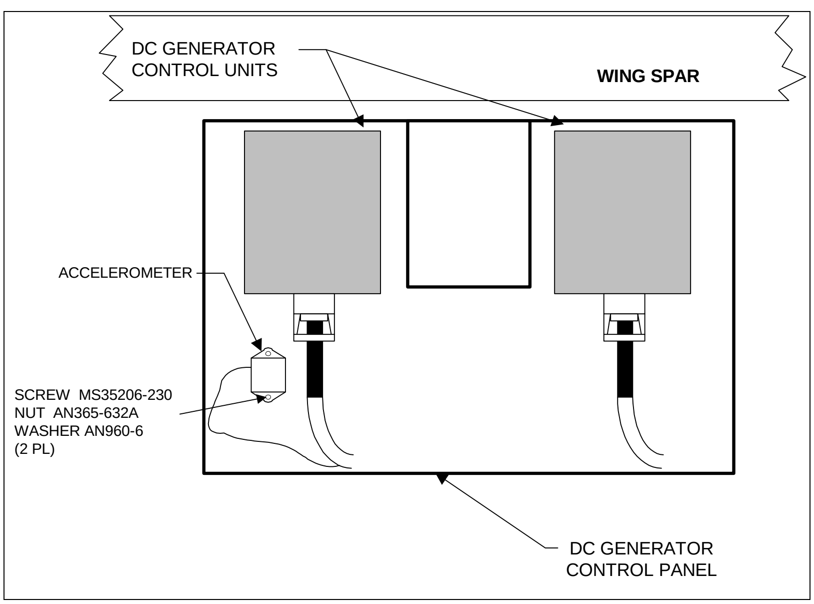

Figure C- 8: Accelerometer Mount and Orientation (Viewed From Above)

3.4 *Navigation*

3.4.1 Pitot / Static Pressure Transducer Mounting

The twin engine ADAS+ is capable of measuring airspeed and altitude for event and trend monitoring. Both transducers are mounted in the avionics compartment of the aircraft. The following instructions are divided into two sections due to the different pitot/static configurations.

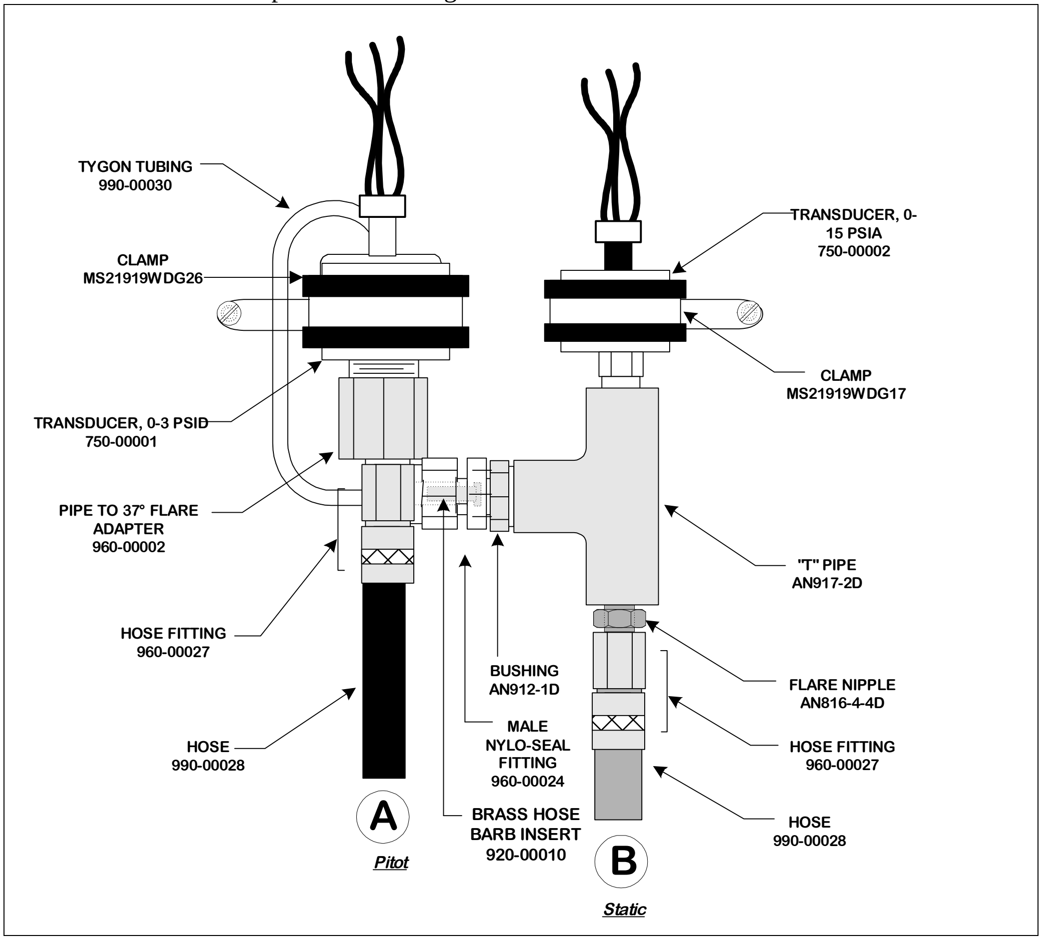

Figure C- 9: Pitot/Static Transducer Mounting

For All Listed Aircraft Models:

Installation Caution:

- ⇨ **Use Teflon® tape on all pipe threads.**
- ⇨ **For mounting areas where space is limited, TWIN–D-014-1 is not required. A standoff (940-00003) is used with a bolt (MS35207-263) to secure the transducers.**
- ⇨ **If the supplied static transducer is not plumbed into the aircraft's static system, airspeed and altitude may not be accurate in a climb or decent.**

- ❑ *010* Apply Teflon® tape to the male ¼" transducer threads (750-00001 and 750-00002) and pre-assemble pipe fittings and Tygon tube and brass hose insert (920-00010) illustrated in Figure C- 9, above. The pitot and static port pressure hoses will be attached later when they are made up to length.
- ❑ *020* Attach the transducers to the transducer mounting bracket (TWIN-D-014-1).
- ❑ *030* Locate a position for the transducer assembly in the avionics compartment.
- ❑ *040* Using the transducer mounting bracket as a guide, mark and drill three #6 screw holes into the aircraft angle support brackets.
- ❑ *050* Mount the transducer assembly in the avionics compartment using three screws (MS35206-227), three washers (AN960-6), and three lock nuts (AN365-632A).

All Listed Aircraft Models **Except 1900D**:

- ❑ *060* Install "T" fittings (AN917-1D) onto the bulkhead pitot and static pressure ports (Figure C- 10). These ports are located in the upper section of the avionics compartment on the co-pilot's side.
- ❑ *070* Install pipe nipple fittings (AN911-1D) into the forward ends, and flare nipple fittings (AN816-4-4D) into the side branches of the "T" fitting.

1900D Model, Only:

- ❑ *061* Install swivel "T" fittings onto the bulkhead pressure ports located in the forward avionics compartment on the co-pilot's side (Figure C- 11). The static "T" (960-00032) is larger than the pitot "T" (960-00003).
- ❑ *071* Install reducer (960-00031) onto the side branch of the static "T" fitting.

All Listed Aircraft Models, **Including 1900D**:

- ❑ *080* Install the original pitot and static inlet hoses onto the "T" fitting forward (run) ends.
- ❑ *090* Using hose (990-00028), and fittings (960-00027), fabricate pressure hoses. Connect the hoses between the ADAS AND ADAS+ pitot and static pressure transducers and the side branches of the respective "T" fittings.
- ❑ *100* Tighten and secure all fittings.

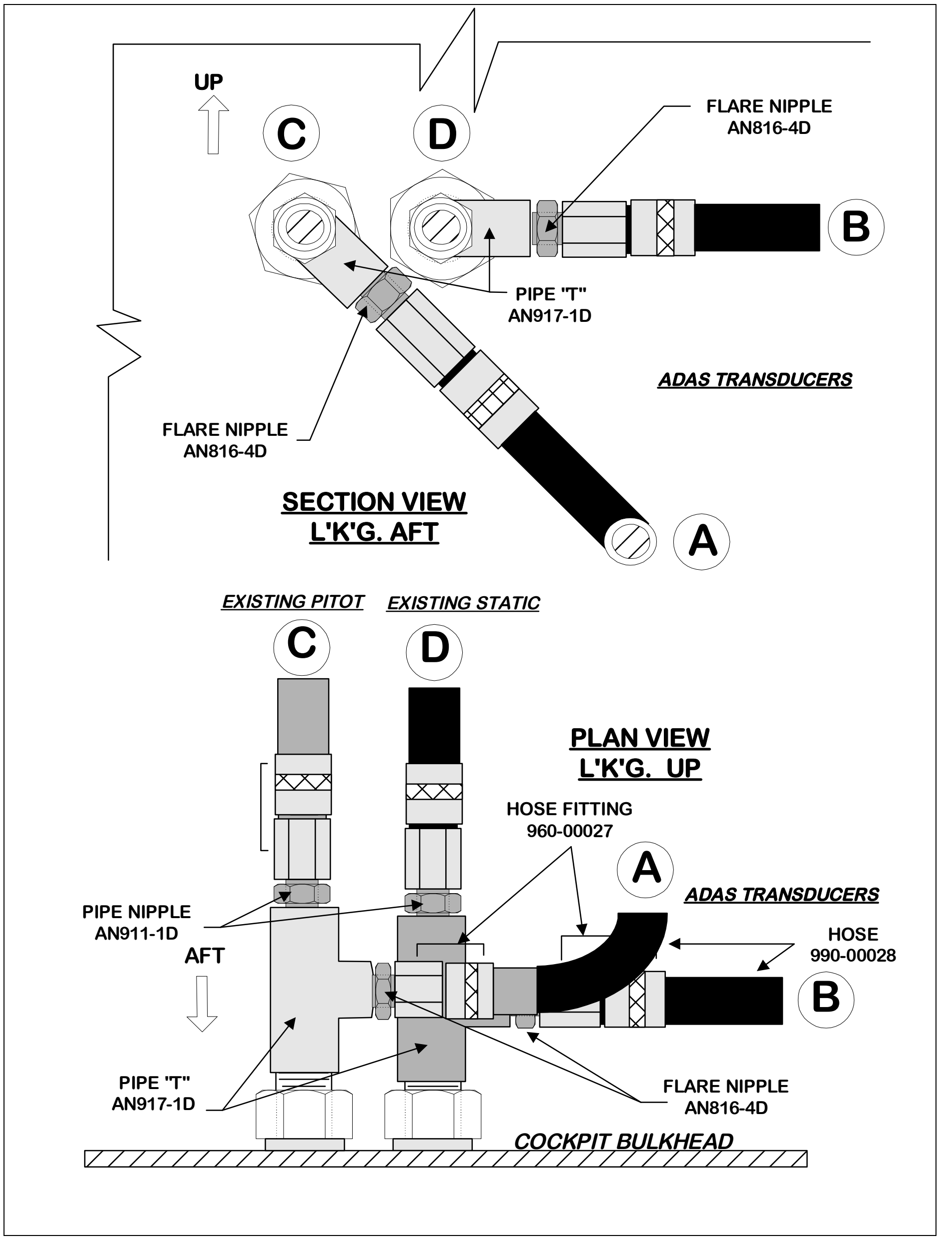

Figure C- 10: Pitot / Static Bulkhead Pressure Connections (Non-1900D)

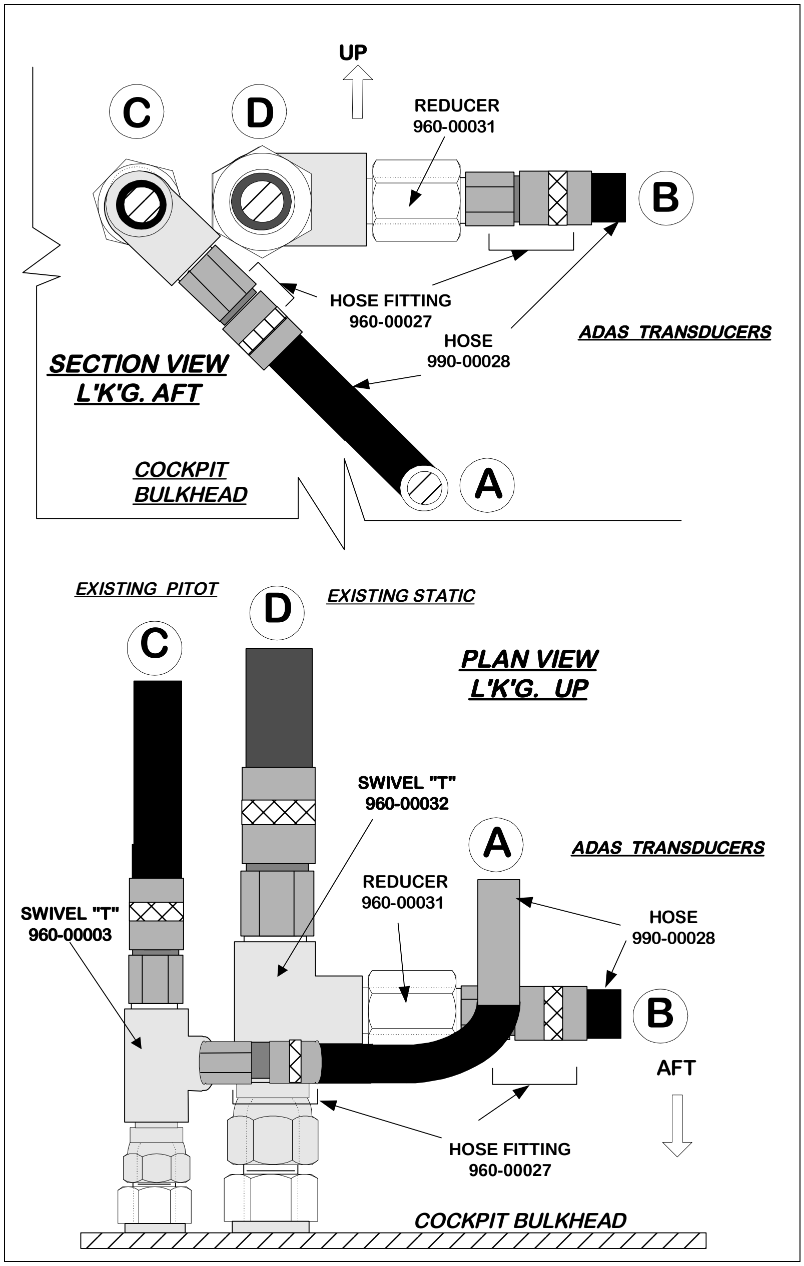

Figure C- 11: Pitot / Static Bulkhead Pressure Connections (1900D)

Figure C- 12: Pitot/Static Installation on 1900D

3.4.2 Outside Air Temperature Probe

The twin engine ADAS+ receives its indication of outside air temperature using a temperature probe located on the underside of the aircraft near the nose gear housing. The temperature probe is mounted in the fairing and routed to the avionics bay through the nose wheel housing

The OAT probe is installed differently for 1900 Series aircraft than it is for the other listed aircraft models. 1900 Series aircraft require a honeycomb panel mounting procedure, while the other models mount through an area of sheet metal skin. Refer to the appropriate instructions for your model below.

For All Listed Aircraft Models Except 1900, 1900C, and 1900D:

Installation Caution:

- ⇨ **The OAT harness should be routed through the nose wheel housing into the avionics bay and spliced inside the avionics bay. Use existing drain hole from wheel well to avionics bay to route wire. Install a rubber grommet to prevent chaffing of the OAT probe wire against the edge of the drain hole.**
- ⇨ **Care must be taken to clamp the OAT harness inside the nose wheel housing to prevent chafing.**
- ⇨ **It is recommended that spiral wrap be use on the harness as added protection.**

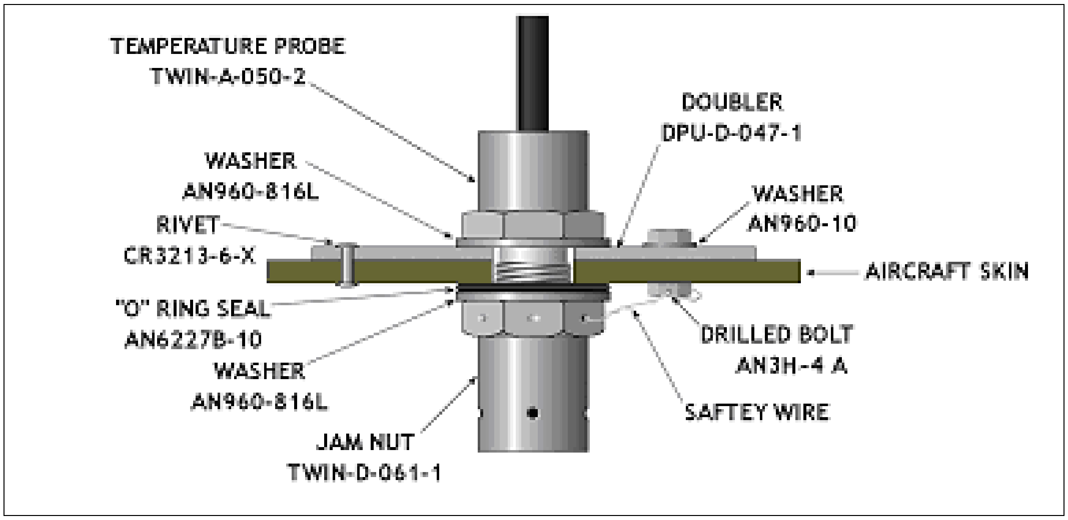

Figure C- 13: OAT Probe Mounting (Non-1900 Series Aircraft)

- ❑ *010* Gain access to the underside of the aircraft.
- ❑ *020* Recommended location for the OAT probe is between Aircraft Stations 47 and 79 on the starboard side. See the aircraft manufacturer's maintenance manual station diagram for your specific aircraft model. The position selected should be clear of obstructions. Because of possible aircraft alternate equipment or modification in this area, the specific mounting location must be established by the installer. The position selected must not interfere with existing aircraft systems.
- ❑ *030* Using the doubler as a guide, mark and drill 5 # 40 holes through the aircraft skin, increase the diameter of the holes using a # 20 / 21 drill bit.
- ❑ *040* Using the doubler as a guide, mark and drill .5"dia hole through the aircraft skin.
- ❑ *050* Deburr all the holes in the aircraft skin and the doubler.
- ❑ *060* Burnish an area on the aircraft skin and the doubler to ensure bonding between the two surfaces.
- ❑ *070* Coat all exposed surfaces (except the burnished areas) of the doubler and the aircraft skin with Zinc Chromate Primer.
- ❑ *080* Reinstall the doubler on the inside surface of the aircraft skin.
- ❑ *090* Using a Cherrymax Grip Gauge, measure four of the five small holes for the proper rivet grip length.
- ❑ *100* Coat the end of four CR3213-5-X Cherrymax rivets with Zinc Chromate Primer.
- ❑ *110* With the Zinc Chromate Primer still wet, install the CR3213-5-X Cherrymax rivets. Four rivets are to be installed 90 degrees apart from each other, inserted from the outside of the aircraft.
- ❑ *120* Insert the temperature probe into the hole and install washers (AN960-816L), "O" ring (AN6227B-10) and jam nut (TWIN-D-061-1).
- ❑ *130* Install bolt (AN3-5A), washer (AN960-10), and nut (AN365-1032A) in the fifth hole drilled through the doubler / skin).
- ❑ *140* Tighten and safety wire the jam nut to the bolt (AN3-5A).

For 1900, 1900C and 1900D Models Only

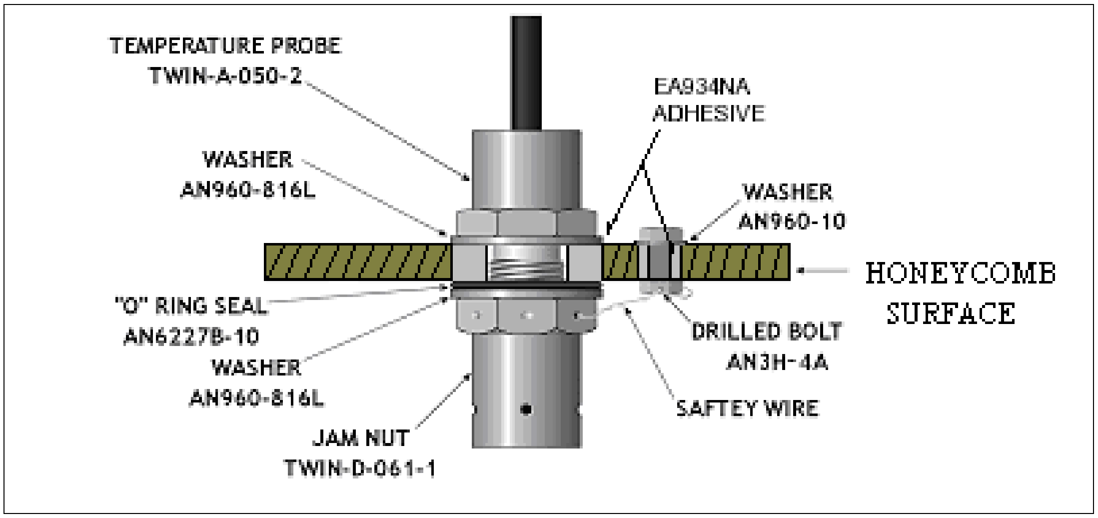

Figure C- 14: OAT Probe Mounting (1900, 1900C, 1900D Series Aircraft, only)

- ❑ *010* Gain access to the underside of the aircraft.
- ❑ *020* Drill a .50-inch hole in the proper location for the OAT Probe.
- ❑ *030* Remove the adjacent core material to a diameter of 1 inch. Make sure that the panel skins are not damaged.
- ❑ *040* Clean out all loose material.
- ❑ *050* Measure and mark a location for installing a safety bolt 1.5 inches away from the .50-inch hole.
- ❑ *060* Drill a #10 diameter hole at the marked location.
- ❑ *070* Remove core material in this location to a diameter of .4 - inches. Make sure the panel skins are not damaged.
- ❑ *080* Clean out all loose material.
- ❑ *090* Using Dexter / Hysol's EA934NA epoxy paste adhesive, or equivalent, completely fill each section of panel where the honeycomb (core) was removed.

NOTE:

The requirements for a suitable <u>equivalent</u> paste adhesive are:

- ⇨ **A pot life long enough to perform the assembly.**
- ⇨ **Sag resistance (thixotropic).**
- ⇨ **A room temperature cure.**
- ⇨ **An adhesive appropriate for aircraft structural metal bonding with mechanical properties equal to or greater than EA 934NA.**

- ❑ *100* Allow the adhesive to cure.
- ❑ *110* Re-drill the .50-inch diameter hole.
- ❑ *120* Re-drill the #10 diameter hole.
- ❑ *130* Burnish an area on the aircraft skin and the doubler to ensure bonding between the two surfaces.
- ❑ *140* Using Zinc Chromate Primer, coat all exposed surfaces (except the burnished areas) of the aircraft skin and adhesive.
- ❑ *150* Refer to instruction 010. From inside the aircraft, insert the temperature probe (TWIN-A-050-2) with a washer (AN960-816L) through the .5" diameter hole.
- ❑ *160* Install a washer (AN960-816L), "O" ring (AN6227B-10) and jam nut (TWIN-D-061-1) onto the probe on the outside of the aircraft.
- ❑ *170* Install the safety bolt (AN3-5A), washer (AN960-10), and nut (AN365-1032A) in the # 10 hole drilled in the skin.
- ❑ *180* Tighten the OAT nut and safety-wire the OAT nut to the safety bolt.

3.5 *Engine Indicating*

3.5.1 Torque Transducer Installation

The twin engine ADAS+ obtains the engine torque level by using (2) 0 – 100 PSIG, 0 – 5 volt transducers installed in the high and low pressure lines, Figure C- 15. Perform each procedure listed for each engine and check off the appropriate box.

ASSEMBLY NOTE:

> **Some models of aircraft use existing transducers and do not require the P&W Engine Services torque transducers. Refer to the Aircraft Connection Table for your aircraft and configuration.**

INSTALLATION CAUTION:

> **Care should be taken to mount transducers away from the engine hot section.**

Engine 1	Engine 2	Step	Procedure
❑	❑	*010*	Install and torque each High Precision high and low pressure 0 – 100 PSIG transducer (750-00005) into an "O" ring flare adapter (960-00015).
❑	❑	*020*	Install each transducer assembly onto a double swivel elbow (960-00014).
❑	❑	*030*	Remove the aircraft torque high-pressure line from the manifold on the left side of the engine, leaving the existing elbow fitting.
❑	❑	*040*	Install the swivel end of the supplied "T" fitting (960-00006) onto the existing manifold elbow fitting.
❑	❑	*050*	Install the aircraft torque high-pressure line on the opposite end of the "T" adapter.
❑	❑	*060*	Install the transducer/elbow assembly to the branch line of the "T" adapter. Orient the transducer beneath and along the existing pressure line so these can be clamped together in the next step.
❑	❑	*070*	Using supplied clamp (MS21919WCJ12), clamp (MS21919WCJ14 or MS21919WCH14), screw (MS35207-271), washer (AN960-10), spacer (940-00004), and lock nut (AN363-1032) secure transducer to the existing pressure line.
❑	❑	*080*	Remove the aircraft torque low-pressure line from the manifold on the left side of the engine, leaving the existing elbow fitting.
❑	❑	*090*	Install the swivel end of the supplied "T" fitting (960-00006) onto the existing manifold elbow fitting.
❑	❑	*100*	Install the aircraft torque low-pressure line on the opposite end of the "T" adapter.
❑	❑	*110*	Install the transducer/elbow assembly to the branch line of the "T" adapter. Orient the transducer beneath and along the existing pressure line so these can be clamped together in the next step.
❑	❑	*120*	Using supplied clamp (MS21919WCJ12), clamp (MS21919WCJ14 or MS21919WCH14), screw (MS35207-271), washer (AN960-10), spacer (940-00004), and lock nut (AN363-1032) secure transducer to the existing pressure line.
❑	❑	*130*	Secure all lines and pressure transducers.

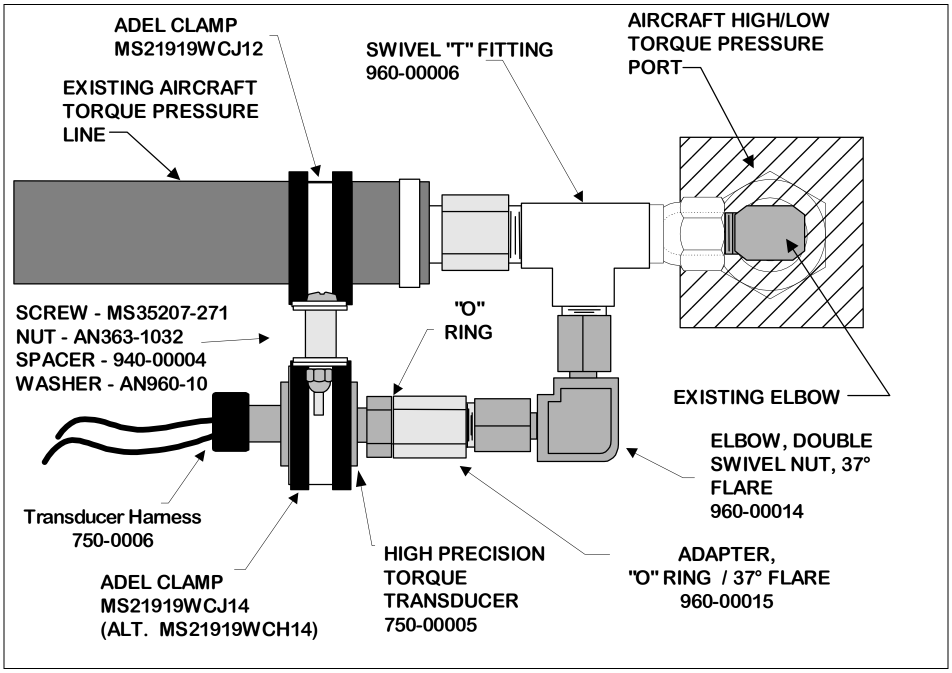

Figure C- 15: P&W Engine Services High Precision Torque Transducer Installation

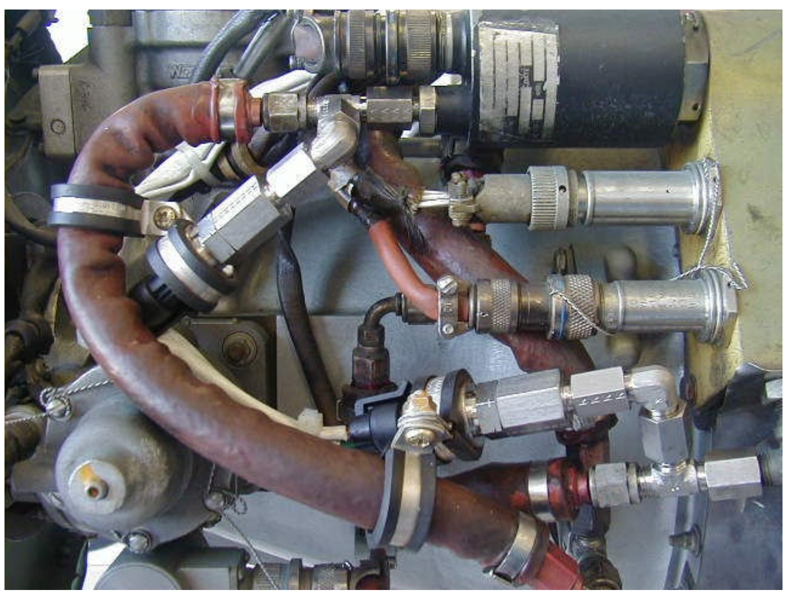

Figure C- 16: Torque Transducers Installation Model 1900

3.6 *Harness Installation*

NOTE: Route all cables to follow existing wiring harnesses.

3.6.1 "J1" Harness Installation

For All Listed Aircraft Models:

- ❑ *010* Connect the J1 harness to the J1 connector on the ADAS+ processor.
- ❑ *020* Route the AAV00B22 cable to the aircraft battery and ground connections. This power source will be protected by a 1 Amp fuse and is not accessible by the pilot and/or crew.
- ❑ *030* Route the AAV10A22 cable to the aircraft switched power connection. This power source will be protected by a 1 Amp circuit breaker.

  Note: This circuit breaker is accessible by the pilot and/or crew only on the 200 & 300 series aircraft. The circuit breaker is located under the floor on the 1900 series aircraft and is not accessible by the pilot and/or crew.
- ❑ *040* Route the AAA22D22 cable to the installed Pitot and Static transducers.

3.6.2 "J2" Harness Installation

For All Listed Aircraft Models:

- ❑ *010* Connect the J2 harness to the J2 connector on the ADAS+ processor.
- ❑ *020* Route the AAP10B24, AAP11B24, AAA10B22, and AAP00B24 cables behind the Engine 1 gauges in the instrument panel.

  Note: If aircraft is equipped with a Pro Line 21, route the AAP10B24, AAP11B24, AAA10B22, and AAP00B24 cables to the appropriate connector on the DCU-3001 located in the avionics bay of the aircraft.

  Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.
- ❑ *030* Route the AAA11B22 cable behind the Engine 2 gauges in the instrument panel.

  Note: If aircraft is equipped with a Pro Line 21, route the AAA11B22 cable to the appropriate connector on the DCU-3001 located in the avionics bay of the aircraft.

  Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.
- ❑ *040* Route the AAA24C24 cable down the fuselage to the accelerometer.

  NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009. If the kit was purchased after March 1, 2009 and does not come with a Vertical Accelerometer, then cap and stow the wire as it will not be needed.
- ❑ *050* Route the AAA20D24 cable down fuselage to the appropriate side wing root.

  Note: Some aircraft models do not require P&W Engine Services Avionics Torque Transducers. In this case, skip Instructions (050) through (080), route Torque cable behind the Engine 1 gauges in the instrument panel and continue with (090).

  Note: If aircraft is equipped with a Pro Line 21, route the AAA21D24 cable to the appropriate connector on the DCU-3001 located in the avionics bay of the aircraft.

  Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.

- ❑ *060* Trim the AAA20D24 cable to length and splice it to five existing aircraft wing root spare pass-through wires, using the fifth wire for the cable shield.
- ❑ *070* Outside of the aircraft, splice the five aircraft pass-through wires to the remaining length of torque cable and route the cable along the wing spar to the engine nacelle.
- ❑ *080* Refer to Figure C- 17. Determine whether the existing aircraft engine bulkhead/firewall mounted connectors have enough spare pins to connect the torque signal cable. If they do, utilize the existing connector to route the cable to the engine torque transducers. If not, install the supplied MS3450KT16S-8S and MS3450KT16S-8P bulkhead connectors, together with the M85049/41-10A backshells to route the wires to the torque transducers. Mount the connectors near the existing connector, but not so close as to interfere with it.
- ❑ *090* Route the AAD11A24 single conductor cable to the Engine 1 bleed hookup location as listed in the Aircraft Connection Table.
- ❑ *100* Route the AAD12A24 single conductor cable to the Engine 2 bleed hookup location as listed in the Aircraft Connection Table.
- ❑ *110* Route the AAD13B24 two conductor cable to the ice vane control panel location as indicated in the appropriate Aircraft Connection Table.
- ❑ *120* Route the AAD14B24 two conductor cable to the FLAPS APPROACH and FLAPS LANDING control panel location as indicated in the appropriate Aircraft Connection Table.
- ❑ *130* Route the AAD00A24 single conductor cable to the WOW SWITCH control panel location as indicated in the appropriate Aircraft Connection Table.
- ❑ *140* Route the AAD15A24 single conductor cable to the GEAR EXTENDED SWITCH control panel location as indicated in the appropriate Aircraft Connection Table.

3.6.3 “J3” Harness Installation

For All Listed Aircraft Models:

- ❑ *010* Connect the J3 harness to the J3 connector on the ADAS+ processor.
- ❑ *020* Route the AAV30D24 and AAV32A24 cable to the installed TREND switch / fault lamp assembly.
- ❑ *030* Route the download port AAB40D24 cable to the installed download port.
- ❑ *040* Route the AAA00D24 cable to the installed OAT sensor.
- ❑ *050* Route the AAP13B24, AAP12B24, and AAP01B24 cables behind the Engine 2 gauges in the instrument panel. Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.

  Note: If aircraft is equipped with a Pro Line 21, route the AAP13B24, AAP12B24, and AAP01B24 cables to the appropriate connector on the DCU-3001 located in the avionics bay of the aircraft.

  Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.
- ❑ *060* Route the AAA21D24 cable down fuselage to the appropriate side wing root.

  Note: Some aircraft models do not require P&W Engine Services Torque Transducers. In this case, skip Instructions (060) through (090) and route Torque cable behind the Engine 2 gauges in the instrument panel.

  Note: If aircraft is equipped with a Pro Line 21, route the AAA21D24 cable to the appropriate connector on the DCU-3001 located in the avionics bay of the aircraft.

Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.

- ❑ *070* Trim the AAA21D24 cable to length and splice it to five existing aircraft wing root spare pass-through wires, using the fifth wire for the cable shield
- ❑ *080* Outside of the aircraft, splice the five aircraft pass-through wires to the remaining length of torque cable and route the cable along the wing spar to the engine nacelle
- ❑ *090* Refer to Figure C- 17. Determine whether the existing aircraft engine bulkhead/firewall mounted connectors have enough spare pins to connect the torque signal cable. If they do, utilize the existing connector to route the cable to the engine torque transducers. If not, install the supplied MS3450KT16S-8S and MS3450KT16S-8P bulkhead connectors, together with the M85049/41-10A backshells to route the wires to the torque transducers. Mount the connectors near the existing connector, but not so close as to interfere with it

For All Listed Aircraft Models:

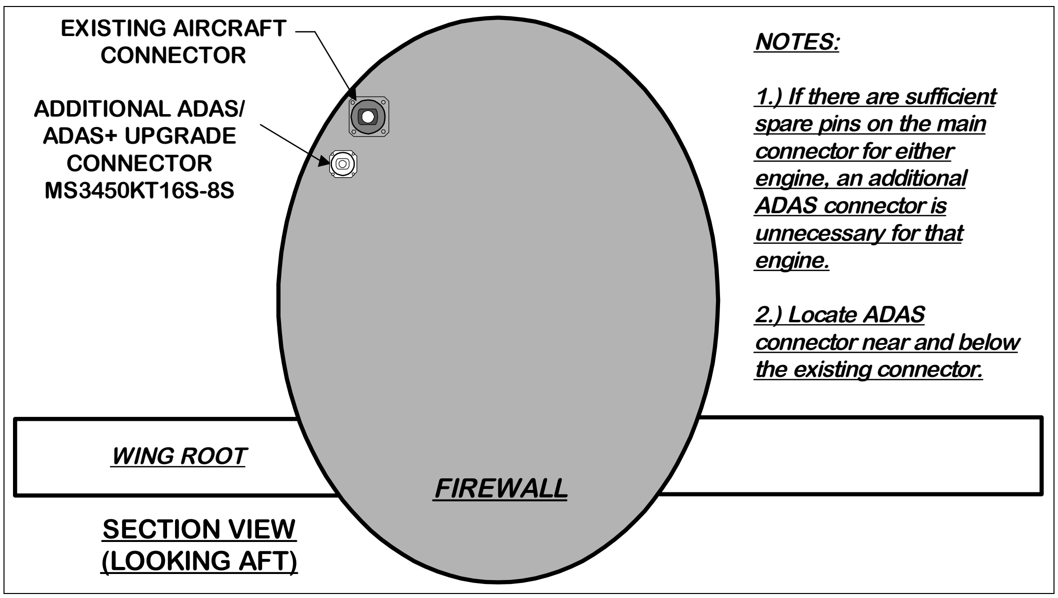

Figure C- 17: Firewall With Additional ADAS/ADAS+ Upgrade Connector

4 INSTALLATION - ELECTRICAL

4.1 *Cockpit Components*

4.1.1 Cockpit TREND Switch Wiring

The twin engine ADAS+ TREND switch and download port may be mounted on either a center console assembly or individually (discrete component).

Wiring Notes:

ConXall™ connectors are installed in this and the next section. The following tools are recommended by the vendor for use with these connectors (vendor P/Ns): Insertion Bit (356-20), Pin Removal Bit (356-201), Socket Removal Bit (356-202), Handle (356-1), Crimp Tool (359-21), Locator (357-122). The vendor address is: ConXall Corporation, 601 East Wildwood, Villa Park, IL 60181.

INSTALLATION CAUTION:

The TREND switch and the download port cables both use 6 pin connectors. The TREND switch cable uses a socket connector (6SG type) and the download port cable uses a pin connector (6PG type). Be sure to use the correct connector with the appropriate cable.

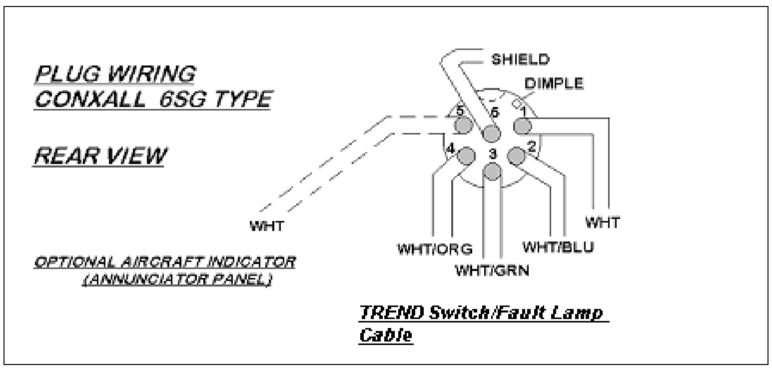

Figure C- 18: TREND Switch and Lamp Connector Wiring

4.1.1.1 Discrete Component Mounting

For All Listed Aircraft Models:

- ❑ *010* Trim the Indic Sw "AAV30D24" and Indic Sw Open "AAV32A22" cables to length, and slide the correct ConXall™ connector backshell parts onto the cable.

NOTE: The "Lamp 2" cable is not used, but should be tied back near the lamp ConXall™ connector for future upgrades.

- ❑ *020* Refer to the illustration Figure C- 18 and connect the cable to the included ConXall™ connector using the socket configuration shown. Splice a short wire lead to the cable shield with a shrink-on solder sleeve to make the Pin 6 shield connection, upper and middle.
- ❑ *030* If an optional aircraft indicator (annunciator) display is required, connect a length of cable to socket 5 of the connector. Route and connect the other end of the cable to the indicator lamp.

NOTE: The ADAS+ lamp output provides a ground signal when the lamp is active. If an existing aircraft lamp is used, it must have 28 VDC supplied continuously to the opposite lead.

- ❑ *040* Assemble the backshell to the connector, connect it to the lamp, and secure all wiring.

4.1.1.2 Center Console Assembly

For All Listed Aircraft Models:

- ❑ *010* Route the TREND switch (INDIC SW “AAV30D24”& INDIC SW OPEN “AAV32A24”) and Download Port “AAB40D24” cables into the cockpit through the bulkhead fitting in the pressure bulkhead to the center console.

NOTE: The INDIC SW OPEN “AAB40D24” cable is not used, but should be tied back near the Center Console Assembly for future upgrades.

- ❑ *020* Trim back and crimp wires to the contacts (748610-4) of the 15 pin high-density connector (748565-1). Feed wires through backshell (DE24657) and insert into connector, connecting to the pins per section 6.
- ❑ *030* Connect the harness to the console assembly
- ❑ *040* Secure the wire harness to console assembly using slide latch (DE51224-1).
- ❑ *050* Install the panel assembly into the center console, secure by fastening four Dzus™ fasteners

4.1.2 Download Port Connector Wiring

4.1.2.1 Discrete Component Mounting

For All Listed Aircraft Models:

- ❑ *010* Trim the download port connector “AAB40D24” cable to length, and slide the correct ConXall™ connector backshell parts onto the cable.
- ❑ *020* Refer to the illustration Figure C- 19, and connect the cable to the included ConXall™ plug connector using the illustrated pin configuration. Pin 1 is identified by a dimple. Pin 6 has no connection.
- ❑ *030* Assemble the backshell to the connector, connect it to the port, and secure all wiring.

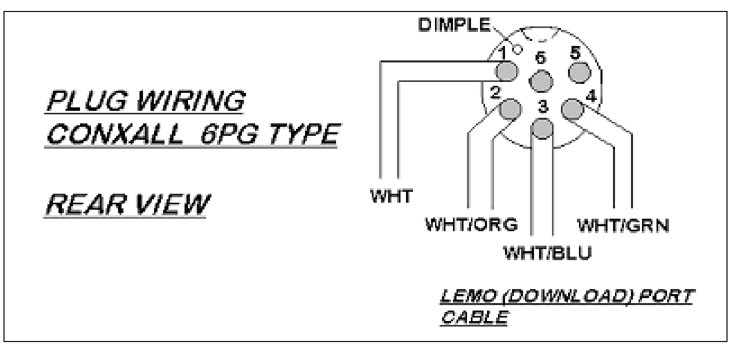

Figure C- 19: Download Port Connector

4.1.2.2 Center Console Assembly

For All Listed Aircraft Models:

See Section 4.1.1.2 TREND switch instructions for the Center Console Assembly.

4.2 *Navigation*

4.2.1 Pitot / Static Pressure Transducer Wiring

For All Listed Aircraft Models:

- ❑ *010* Trim the Pitot/Static “AAA22D22” cable to length. Following Figure C- 20, splice to the transducer harnesses using the following wire splice configuration:

Color	Transducer Wires
WHT/ORG	GRN Wire Pitot Pressure Transducer
WHT	RED Wire Both Transducers
WHT/BLU	BLK Wire Both Transducers
WHT/GRN	GRN Wire Static Pressure Transducer

- ❑ *020* Secure all wiring.

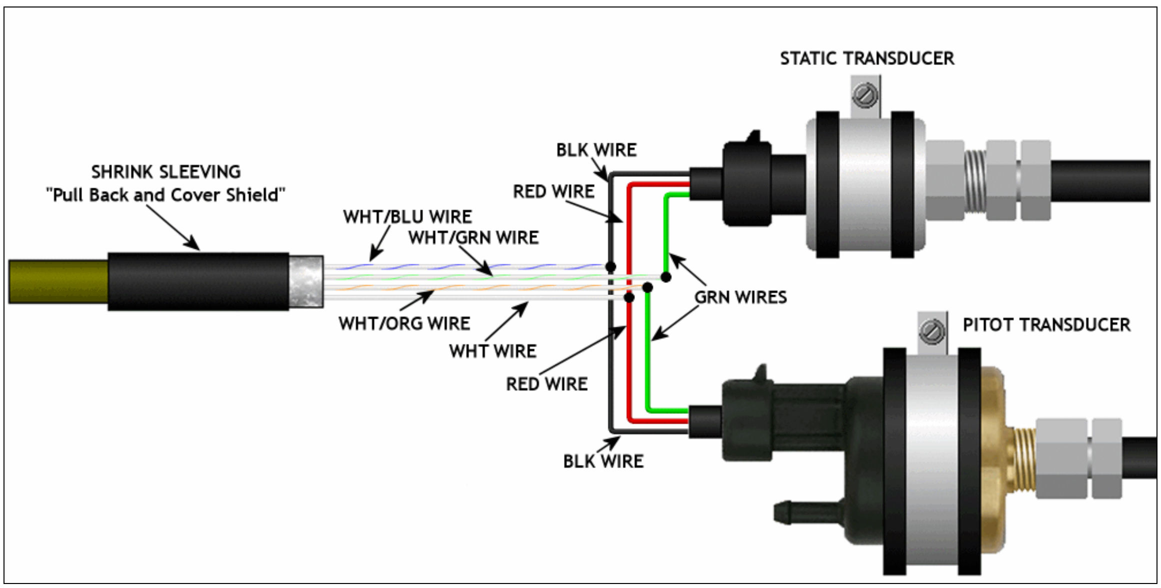

Figure C- 20: Pitot/Static Transducer Wiring.

4.2.2 Outside Air Temperature (OAT) Probe Wiring

For All Listed Aircraft Models:

- ❑ *010* Trim the OAT "AAA00D24" cable from the processor to length. Following Figure C- 21, Splice to the transducer harnesses using the following wire splice configuration:

Processor Wires	OAT Wires
WHT/ORG	RED OAT Probe Wire
WHT	RED OAT Probe Wire
WHT/BLU	WHT OAT Probe Wire
WHT/GRN	WHT OAT Probe Wire

- ❑ *020* Secure all wiring.

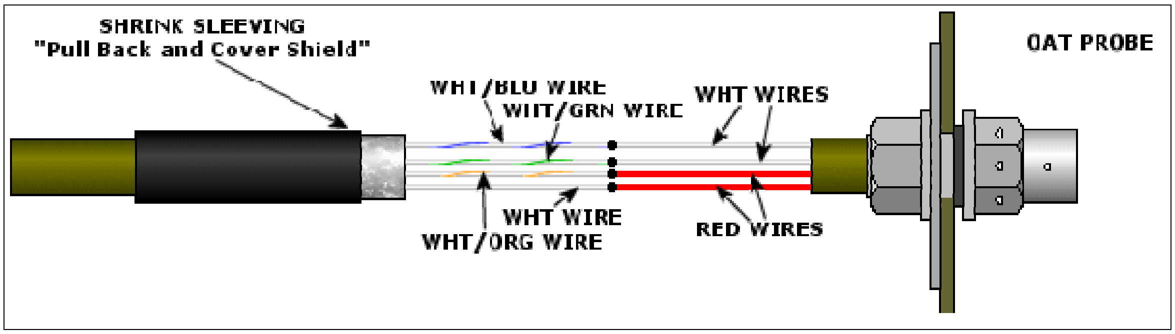

Figure C- 21: OAT Probe Wiring.

4.3 *Engine Indicating*

4.3.1 Engine Temp (ITT)

For All Listed Aircraft Models:

Engine
1 2

❑ ❑ *010* Trim the Engine 1 ITT "AAA10B22" AND Engine 2 ITT "AAA11B22" cables to length

❑ ❑ *020* If the existing thermocouple wires connect to the gauge with wire lugs, attach the "CR" lug to the yellow wire and the "AL" lug to the red wire, and connect to the gauge.

❑ ❑ *030* If the existing thermocouple wires connect to the gauge with a connector, splice into the wires using the pin configuration listed in Aircraft Connection Table for your model A/C.

❑ ❑ *040* Secure all wiring.

4.3.2 Engine N1 Speed Sensor

For All Listed Aircraft Models:

Engine
1 2

❑ ❑ *010* Trim the Engine 1 N1 "AAP10B24" and Engine 2 N1 "AAP12B24" cables to length. Splice and terminate at the connector using the pin configuration listed in Aircraft Connection Table for your model A/C.

Color	**Engine N1 (Ng) Speed Sensor**
WHT	N1 Signal +
WHT/BLU	N1 Signal –

❑ ❑ *020* Secure all wiring.

4.3.3 Engine N2 Speed Sensor

For All Listed Aircraft Models:

Engine
1 2

❑ ❑ *010* Trim the Engine 1 N2 "AAP11B24" and Engine 2 N2 "AAP13B24"cable to length. Splice and terminate at the connector using the pin configuration listed in Aircraft Connection Table for your model A/C

Color	**Engine Np Speed Sensor**
WHT	N2 Signal +
WHT/BLU	N2 Signal –

❑ ❑ *020* Secure all wiring.

4.3.4 Voltage to Frequency Converter

Only 200 & 200T with Beech fuel flow Configurations 1 & 2, and 200CT, A200, A200C, A200CT, B200 B200C, B200CT, B200T with Beech fuel flow Configuration 1

Refer to the appropriate wiring diagram and Aircraft Connection List. The Fuel Flow Voltage to Frequency Converter harness consists of a nine-pin connector and five multi-conductor cables. The converter's output leads will be connected to the ADAS+ processor's fuel flow signal input leads, which are part of the J2 and J3 harnesses. The converter's power leads will be spliced into the Processor's J1 harness bus power and ground connections. To reduce the length of cable runs, make all connections close to the processor, where practical.

- ❑ *010* Trim the converter's "AAP00B24" cable to length.
- ❑ *020* Trim the J2 harness "AAP00B24" cable to length.
- ❑ *030* Splice the two cables together, maintaining the wire color code when making the individual connections.

Processor Cable	**Converter Cable**
WHT	WHT
WHT/BLU	WHT/BLU

- ❑ *040* Trim the converter's "AAP01B24" cable to length.
- ❑ *050* Trim the J3 harness "AAP01B24" cable to length.
- ❑ *060* Splice the two cables together, maintaining the wire color code when making the individual connections.

Processor Cable	**Converter Cable**
WHT	WHT
WHT/BLU	WHT/BLU

- ❑ *070* Trim the converter's "AAV11A22" cable to length.
- ❑ *080* Cut the J1 "AAV10A22" cable where the converter's power cable will be spliced in, near the processor. Label the processor side "PROC PWR, and the bus side "BUS PWR.
- ❑ *090* Splice the converter cable to both the processor and bus power cables, maintaining the wire color code when making the individual connections.

Processor Cable	**Converter Cable**	**Bus Power Cable**
WHT	WHT	WHT
WHT/BLU	WHT/BLU	WHT/BLU

- ❑ *100* Secure all wiring. Proceed to Section 4.3.5, to connect the remaining converter cables to the fuel flow sender signal.

4.3.5 Engine Wf Sensor

For All Listed Aircraft Models:

The engine fuel flow connection will either be made from the J2 harness or the P&W Engine Services Voltage to Frequency Converter harness, depending on whether a converter was installed in the previous section. Perform the following steps:

4.3.5.1 Aircraft *With* P&W Engine Services Voltage to Frequency Converters

Engine
1 2
❑ ❑ *010* Trim the FUEL SPD 1 “AAV20B22” and FUEL SPD 2 “AAV21B22” cables to length. Splice and terminate at the connector using the pin configuration listed in Aircraft Connection Table for your model A/C.

Harness	**Location**
WHT	Fuel Flow +
WHT/BLU	Fuel Flow –

❑ ❑ *020* Secure all wiring.

4.3.5.2 Aircraft *Without* P&W Engine Services Voltage to Frequency Converters

Engine
1 2
❑ ❑ *010* Trim the FUEL SPD 1 “AAP00B24” and FUEL SPD 2 “AAP01B24” cables to length. Splice and terminate at the connector using the pin configuration listed in Aircraft Connection Table for your model A/C.

Harness	**Location**
WHT	Fuel Flow +
WHT/BLU	Fuel Flow –

❑ ❑ *020* Secure all wiring.

4.3.6 Engine Torque Wiring

4.3.6.1 Aircraft Not Requiring P&W Engine Services Transducers

Engine
1 2
❑ ❑ *010* Trim the ENGINE 1 TORQUE “AAA20D24” and ENGINE 2 TORQUE “AAA21D24” cables to length. Splice and terminate at connector using the pin configuration listed in the appropriate Aircraft Connection Table for your model A/C.

Note: There are four (4) wires in each cable, but only two connections per engine. Insulate and tie back the unused wires (WHT and WHT/BLU).

Color	**P119**
WHT/ORG	Engine 1 Torque+
WHT/GRN	Engine 1 Torque-

Color	**P120**
WHT/ORG	Engine 2 Torque+
WHT/GRN	Engine 2 Torque-

❑ ❑ *020* Secure all wiring.

4.3.6.2 A/C Requiring P&W Engine Services Transducers

Engine
1 2

❑ ❑ *010* Trim the ENG 1 TORQUE “AAA20D24” and ENGINE 2 TORQUE “AAA21D24” cables to length. Following Figure C- 22, splice to the transducer harnesses using the following wire splice configuration:

Color	Transducer Wires
WHT/ORG	GRN Wire Torque Pressure Transducer HIGH
WHT	RED Wire Both Transducers
WHT/BLU	BLK Wire Both Transducers
WHT/GRN	GRN Wire Torque Pressure Transducer LOW

❑ ❑ *020* Secure all wiring.

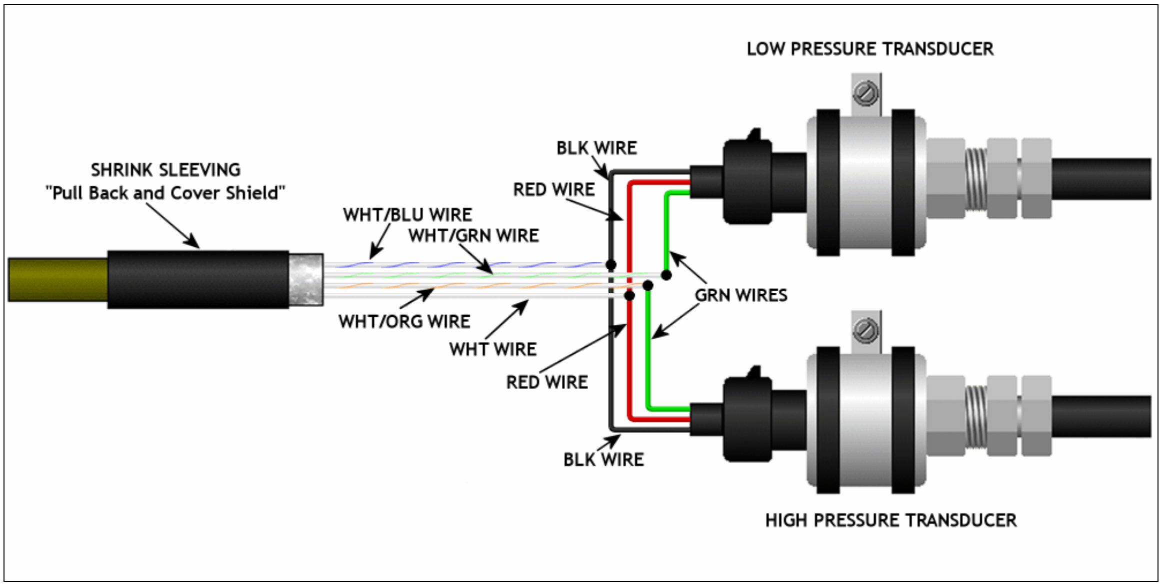

Figure C- 22: Engine Torque Wiring

4.4 *Airframe Sensors*

4.4.1 Flaps Approach/Flaps Final

For All Listed Aircraft Models:

❑ *010* Trim the FLAPS “AAD14B24” cable to length. Splice and terminate at the connector using the pin configuration listed in the Aircraft Connection Table for your model A/C.

Harness	**Location**
WHT	Flaps – Approach (see Aircraft Connection Table)
WHT/BLU	Flaps - Final (see Aircraft Connection Table)

❑ *020* Secure all wiring.

4.4.2 Ice Vanes

For All Listed Aircraft Models:

Engine
1 2
❑ ❑ *010* Trim the ICE VANES “AAD13B24” cable to length. Splice and terminate at the connector using the pin configuration listed in the Aircraft Connection Table for your model A/C.

Harness	**Location**
WHT/BLU	Ice Vane Signal, Engine 1 (see Aircraft Connection Table)
WHT	Ice Vane Signal, Engine 2 (see Aircraft Connection Table)

❑ ❑ *020* Secure all wiring.

4.4.3 Bleed Air

For All Listed Aircraft Models:

Engine
1 2
❑ ❑ *010* Trim the ENG 1 BLEED “AAD11A24” and ENG 2 BLEED “AAD12A24” cable to length. Splice and terminate at the connector using the pin configuration listed in the Aircraft Connection Table for your model A/C.

Harness	**Location**
WHT	Bleed Air Signal, Engine 1 (see Aircraft Connection Table)
WHT	Bleed Air Signal, Engine 2 (see Aircraft Connection Table)

❑ ❑ *020* Secure all wiring.

4.4.4 Weight On Wheels (WOW)

For All Listed Aircraft Models:

- ❑ *010* Trim the WOW “AAD00A24” cable to length. Splice and terminate at the connector using the pin configuration listed in the Aircraft Connection Table for your model A/C.

Harness	**Location**
WHT	Weight on Wheels (see Aircraft Connection Table)

- ❑ *020* Secure all wiring.

4.4.5 Gear Extended

For All Listed Aircraft Models:

- ❑ *010* Trim the GEAR “AAD15A24” cable to length. Splice and terminate at the connector using the pin configuration listed in the Aircraft Connection Table for your model A/C.

Harness	**Location**
WHT	Gear Extended (see Aircraft Connection Table)

- ❑ *020* Secure all wiring

4.4.6 Vertical Accelerometer

For All Listed Aircraft Models:

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009. If the kit was purchased after March 1, 2009 and does not come with a Vertical Accelerometer, then cap and stow the wire as it will not be needed.

- ❑ *010* Trim the VERT ACCL “AAA24C24 cable to length. It will be wired to a supplied ConXall™ connector (400-000026). This connector mates with the pre-wired transducer cable connector. Refer to the wiring diagram and connect as follows:

Color	**Gear Junction**
WHT/BLU	Pin 1 on mating ConXall™ connector
WHT/ORG	Pin 2 on mating ConXall™ connector
WHT	Pin 3 on mating ConXall™ connector

- ❑ *020* Plug the two connectors together. Secure all wiring

4.5 *Electrical Power*

4.5.1 Battery Power / Ground Connection

For All Listed Aircraft Models:

Installation Caution:

- ⇨ **The "Bus" power supply must be chosen to provide power to the ADAS+ through an entire engine's running cycle. This is usually a "Essential" power supply directly controlled by the aircraft "Battery Switch"**
- ⇨ **Ensure that any connection to aircraft power incorporates a minimal wire length from the power source to the protection device, fuse or breaker. Recommended length is six (6) inches or less.**
- ⇨ **Ensure that the wire is protected from shorting out against the airframe or any other sharp objects.**

❑ *010* Refer to the appropriate wiring diagram and Figure C- 23. Trim the BAT PWR "AAV00B22" cable to length. Splice a supplied fuse into the "AAV00B22" wire. Connect the white (positive) wire to the supplied fuse, and then connect to the aircraft battery. Connect the white/blue (negative) wire to aircraft ground following the pin configuration below.

Color	Aircraft Power Source
WHT	Aircraft Battery
WHT/BLU	Aircraft Ground

❑ *020* Secure all wiring.

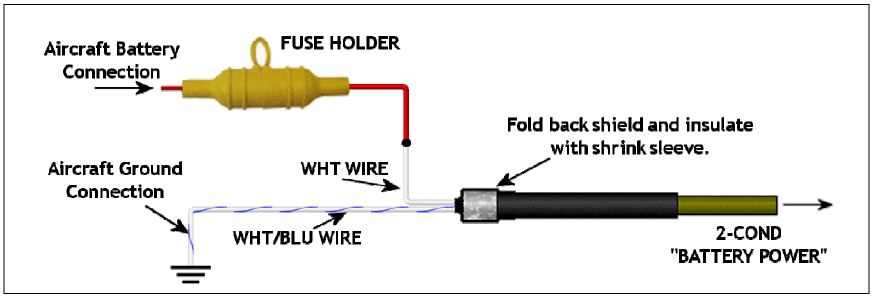

Figure C- 23: Aircraft Battery Final Wiring

4.5.2 Bus (Switched) Power Connection

For All Listed Aircraft Models:

❑ *010* Trim the SW PWR "AAV10A22" cable to length.

❑ *020* Connect the supplied breaker to aircraft bus (switched) power.

❑ *030* Secure all wiring.

4.6 *Final Installation Notes*

- ❑ *010* Route and secure all wires making sure engine / aircraft control movements will not be affected by the ADAS+ wiring. Properly dress all splices and shield terminations. Make sure wiring will not come in contact with hot sections of the engine. Make sure wire harness will not come in contact with sharp sections of the aircraft.
- ❑ *020* Refer to Installation Manual ADAS-G-010-1 for all calibration and system verification procedures.
- ❑ *030* After successful completion of all ground tests, pot the processor harness Raychem™ bulkhead connector (see Section 3.1.2) with PRC (MC236 B-1/2) and heat shrink the fitting.

5 HARNESS CONNECTOR SIGNAL PINOUTS

5.1 *Power/ Sensor Cable J1, 15 Pin S Keyed Connector*

INSTALLATION CAUTION:

- ⇨ **Before making any wiring connections, verify all connection locations with the aircraft manufacturer's wiring diagram manuals.**
- ⇨ **Perform a continuity check on all wires before final connection.**
- ⇨ **Route all harnesses along existing harnesses wherever possible.**
- ⇨ **Cables may be marked with shrink-on labels near the terminal end. When you shorten a cable behind a label, be sure to re-label it.**

Connector Pin	Harness Wire Color	Signal Name	Wired To Refer to Section 6
4 COND CABLE			
J1 A	WHT/ORG	Pitot (Signal +)	GRN Wire Pitot Transducer
J1 B	WHT	Pitot/Static (5 VDC)	RED Wire Pitot/Static Transducer
J1 N	WHT/BLU	Pitot/Static (Ground)	BLK Wire Pitot/Static Transducer
J1 D	WHT/GRN	Static (Signal +)	GRN Wire Static Transducer
1 COND CABLE			
J1 F	WHT	SW PWR 1 (28 VDC)	Bus Power, Supplied 1 Amp Breaker
2 COND CABLE			
J1 H	WHT	CONT PWR (28 VDC)	Battery Power, 1 Amp Fuse
J1 G	WHT/BLU	System Ground	Aircraft Ground
J1 J	Unused		
J1 K	Unused		
J1 C	Unused		
J1 E	Unused		
J1 L	Unused		
J1 M	Unused		
J1 R	Unused		
J1 P	Unused		

5.2 *Sensor Cable J2, 37 Pin SA Keyed Connector*

INSTALLATION CAUTION:

- ⇨ **Before making any wiring connections, verify all connection locations with the aircraft manufacturer's wiring diagram manuals.**
- ⇨ **Perform a continuity check on all wires before final connection.**
- ⇨ **Route all harnesses along existing harnesses wherever possible.**
- ⇨ **Cables may be marked with shrink-on labels near the terminal end. When you shorten a cable behind a label, be sure to re-label it.**

NOTE: If aircraft is equipped with a Pro Line 21, route the engine sensor cables to the appropriate connector on the DCU-3001 located in the avionics bay of the aircraft. Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.

Connector Pin	Harness Wire Color	Signal Name	Wired To Refer to Section 6
4 COND CABLE			
J2 1	WHT	Eng 1 Torque (5 VDC)	RED Wire Both Torque Transducers
J2 2	WHT/ORG	Eng 1 Torque (Signal +)	GRN Wire High Torque Transducer
J2 3	WHT/BLU	Eng 1 Torque (Ground)	BLK Wire Both Torque Transducers
J2 4	WHT/GRN	Eng 1 Torque (Signal –)	GRN Wire Low Torque Transducer
2 COND CABLE			
J2 5	WHT	Eng 1 N1 Spd (Sig +)	Eng 1 N1 Instrument Gauge +
J2 6	WHT/BLU	Eng 1 N1 Spd (Sig –)	Eng 1 N1 Instrument Gauge –
2 COND CABLE			
J2 7	WHT	Eng 1 N2 Spd (Sig +)	Eng 1 Np Instrument Gauge +
J2 8	WHT/BLU	Eng 1 N2 Spd (Sig –)	Eng 1 Np Instrument Gauge –
2 COND CABLE			
J2 9	WHT	Eng 1 Fuel Flow (Sig +)	Eng 1 Fuel Flow Instrument Gauge +
J2 10	WHT/BLU	Eng 1 Fuel Flow (Sig –)	Eng 1 Fuel Flow Instrument Gauge –
THERMOCOUPLE			
J2 11	RED	Eng 1 ITT (Alumel –)	Eng 1 ITT Instrument Gauge –
J2 12	YEL	Eng 1 ITT (Chromel +)	Eng 1 ITT Instrument Gauge +
THERMOCOUPLE			
J2 13	RED	Eng 2 ITT (Alumel –)	Eng 2 ITT Instrument Gauge –
J2 14	YEL	Eng 2 ITT (Chromel +)	Eng 2 ITT Instrument Gauge +
2 COND CABLE			
J2 15	WHT	Flaps Approach	Flap Control
J2 16	WHT/BLU	Flaps Final	Flap Control

Connector Pin	Harness Wire Color	Signal Name	Wired To Refer to Section 6
2 COND CABLE			
J2 17	WHT	Eng 1 Particle Separator	Cockpit Particle Separator Control
J2 18	WHT/BLU	Eng 2 Particle Separator	Cockpit Particle Separator Control
1 COND CABLE			
J2 19	WHT	Eng 1 Bleed Air	Cockpit Bleed Air Control
1 COND CABLE			
J2 20	WHT	Eng 2 Bleed Air	Cockpit Bleed Air Control
1 COND CABLE			
J2 21	WHT	Weight On Wheels (WOW)	Cockpit WOW Control
1 COND CABLE			
J2 22	WHT	Gear Extended	Cockpit Gear Extended Control
3 COND CABLE			
J2 23	WHT/BLU	Vertical Accl. (GND)	Pin 1 ConXall™ Assy.
J2 24	WHT/ORG	Vertical Accl. (Signal +)	Pin 2 ConXall™ Assy.
J2 25	WHT	Vertical Accl. (5 VDC)	Pin 3 ConXall™ Assy.

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009. If the kit was purchased after March 1, 2009 and does not come with a Vertical Accelerometer, then cap and stow the wire as it will not be needed.

5.3 *Cockpit Trend / Sensor Cable, J3, 37 Pin S Keyed Connector*

INSTALLATION CAUTION:

- ⇨ **Before making any wiring connections, verify all connection locations with the aircraft manufacturer's wiring diagram manuals.**
- ⇨ **Perform a continuity check on all wires before final connection.**
- ⇨ **Route all harnesses along existing harnesses wherever possible. Do not connect to engine scavenge lines.**
- ⇨ **Cables may be marked with shrink-on labels near the terminal end. When you shorten a cable behind a label, be sure to re-label it.**

NOTE: If aircraft is equipped with a Pro Line 21, route the engine sensor cables to the appropriate connector on the DCU-3001 located in the avionics bay of the aircraft. Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.

Connector Pin	Harness Wire Color	Signal Name	Wired To Refer to Section 6
4 COND CABLE			
--	WHT	IND SW (VCC)	Lamp ConXall™ Pin 1
J3 19	WHT/ORG	IND SW (Switched)	Lamp ConXall™ Pin 4
J3 18	WHT/BLU	IND SW (GND)	Lamp ConXall™ Pin 2
J3 1	WHT/GRN	IND SW (TREND Switch)	Lamp ConXall™ Pin 3
1 COND CABLE			
J3 37	WHT	LAMP 2 (TREND Switch)	Cap and Stow (near trend lamp assembly)
4 COND CABLE			
J3 16	WHT	Download Port (RS485+)	Download ConXall™ Pin 1
J3 17	WHT/ORG	Download Port (RS485-)	Download ConXall™ Pin 2
J3 18	WHT/BLU	Download Port (GND)	Download ConXall™ Pin 3
J3 2	WHT/GRN	Download Port (Run/Conf)	Download ConXall™ Pin 4
4 COND CABLE			
J3 21	WHT	Air Temp ("D")	OAT ConXall™ Pin 1
J3 22	WHT/BLU	Air Temp ("G")	OAT ConXall™ Pin 2
J3 23	WHT/ORG	Air Temp ("R+")	OAT ConXall™ Pin 3
J3 24	WHT/GRN	Air Temp ("R-")	OAT ConXall™ Pin 4
4 COND CABLE			
J3 31	WHT	Eng2 Torque (5 VDC)	RED Wire Both Torque Transducers
J3 32	WHT/BLU	Eng2 Torque (Ground)	BLK Wire Both Torque Transducers
J3 33	WHT/ORG	Eng2 Torque (Signal +)	GRN Wire High Torque Transducer
J3 34	WHT/GRN	Eng2 Torque (Signal –)	GRN Wire Low Torque Transducer
2 COND CABLE			
J3 35	WHT	Digital 1 +	Cap & Stow
J3 36	WHT/BLU	Digital 1 –	Cap & Stow

Connector Pin	Harness Wire Color	Signal Name	Wired To Refer to Section 6
4 WIRE JUMPER			
J3 7	GRN	Configuration Ground	Set at Factory
J3 8	GRN	Configuration ID 1	Set at Factory
J3 9	GRN	Configuration ID 2	Set at Factory
J3 10	GRN	Configuration ID 4	Set at Factory
2 COND CABLE			
J3 29	WHT	Eng 2 N1 Spd (Sig +)	Eng 2 N1 Instrument Gauge +
J3 30	WHT/BLU	Eng 2 N1 Spd (Sig –)	Eng 2 N1 Instrument Gauge –
2 COND CABLE			
J3 27	WHT	Eng 2 N2 Spd (Sig +)	Eng 2 Np Instrument Gauge +
J3 28	WHT/BLU	Eng 2 N2 Spd (Sig –)	Eng 2 Np Instrument Gauge –
2 COND CABLE			
J3 25	WHT	Eng 1 Fuel Flow (Sig +)	Eng 2 Fuel Flow Instrument Gauge +
J3 26	WHT/BLU	Eng 1 Fuel Flow (Sig –)	Eng 2 Fuel Flow Instrument Gauge –
3		Unused	
4		Unused	
5		Unused	
6		Unused	
11		Unused	
12		Unused	
13		Unused	
14		Unused	
15		Unused	
20		Unused	

5.4 *ADAS+ Connection Chart*

5.4.1 Model 1900 & 1900C

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**All**	**ENG1 ITT Instrument Gauge**	***J2***
			M112 – Al (–)	Pin 11 *Alumel* Red
			M112 – Ch(+)	Pin 12 *Chromel* Yel
ENG2 ITT	**AAA11B22**	**All**	**ENG2 ITT Instrument Gauge**	***J2***
			M113 – Al (–)	Pin 13 *Alumel* Red
			M113 – Ch (+)	Pin 14 *Chromel* Yel
ENG1 N1 (Ng)	**AAP10B24**	**All**	**ENG1 N1 Instrument Gauge**	***J2***
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**All**	**ENG2 N1 Instrument Gauge**	***J3***
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**All**	**Supplied Torque Transducers**	***J2***
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**All**	**Supplied Torque Transducers**	***J3***
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**All**	**ENG1 N2 Instrument Gauge**	***J2***
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**All**	**ENG2 N2 Instrument Gauge**	***J3***
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf) *	**AAP00B24**	**All**	**ENG1 Wf Instrument Gauge**	***J2***
			P131 – Pin A	Pin 9 WHT
			P131 – Pin I	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf) *	**AAP01B24**	**All**	**ENG2 Wf Instrument Gauge**	***J3***
			P132 – Pin A	Pin 25 WHT
			P132 – Pin I	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Control Switch**	***J2***
			H131A20	*Pin 19 WHT*
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Control Switch**	***J2***
			H143A20	*Pin 20 WHT*

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H218A20	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H125A20	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 14C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			J125 – Pin 2	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			P200 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**Bus Bar - Hot Battery**	**J1**
			W214	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

WIRING NOTE:

Some configurations of Raytheon aircraft have the Foxboro Fuel Flow Indicator and/or Totalizer System installed. Please refer to the change in wiring for the fuel flow circuit if the following kits are installed:

Kit No. 114-9026-3 S

Kit No. 114-9026-5 S

Kit No. 114-9026-7 S

Sensor	Wire Number	Aircraft Component	ADAS+ Connector
ENG1 Fuel Flow (Wf) *	**AAV20B22**		**J2**
		P131 - Pin E (+)	Pin 9 WHT
		P131 - Pin F (–)	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf) *	**AAV21B22**		**J3**
		P132 - Pin E (+)	Pin 25 WHT
		P132 - Pin F (–)	Pin 26 WHT/BLU

Table C- 1: Model 1900 and 1900C

5.4.2 Model 1900D

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**S/N UE1 thru UE 92**	**ENG1 ITT Instrument Gauge**	**J2**
			M13 – Term E1 Al (–)	Pin 11 Alumel Red
			M13 – Term E2 Ch (+)	Pin 12 Chromel Yel
		S/N UE93 & higher	P237 – Pin G Al (–)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**S/N UE1 thru UE 92**	**ENG2 ITT Instrument Gauge**	**J2**
			M12 – Term E1 Al (–)	Pin 13 Alumel Red
			M12 – Term E2 Ch (+)	Pin 14 Chromel Yel
		S/N UE93 & higher	P238 – Pin G Al (–)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**S/N UE1 thru UE 92**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		S/N UE93 & higher	P115 – Pin H	Pin 5 WHT
			P115 – Pin P	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**S/N UE1 thru UE 92**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		S/N UE93 & higher	P116 – Pin H	Pin 29 WHT
			P116 – Pin P	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**S/N UE1 thru UE 92**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
		S/N UE93 & higher	**ENG1 Tq Instrument Gauge**	**J2**
			P119 – Pin S (+)	Pin 2 WHT/ORG
			P119 – Pin T (–)	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**S/N UE1 thru UE 92**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
		S/N UE93 & higher	**ENG2 Tq Instrument Gauge**	**J3**
			P120 – Pin S (+)	Pin 33 WHT/ORG
			P120 – Pin T (–)	Pin 34 WHT/GRN

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 N2 (Np)	**AAP11B24**	**S/N UE1 thru UE 92**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		S/N UE93 & higher	P146 – Pin H	Pin 7 WHT
			P146 – Pin P	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**S/N UE1 thru UE 92**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		S/N UE93 & higher	P147 – Pin H	Pin 27 WHT
			P147 – Pin P	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**All**	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**All**	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin F	Pin 25 WHT
			P132 – Pin E	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Switch**	**J2**
			H131A20	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Switch**	**J2**
			H143A20	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H218A20	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H125A20	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 14C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			J542 – Pin M	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			P200 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**P202**	**J1**
			Pin 11 or 12	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 2: Model 1900D

5.4.3 Model 200 & 200T

⇨ **P&W Engine Services Voltage to Frequency Converters are required for Beech Configuration 1 and 2 Fuel Flow systems for these model aircraft.**

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**All**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (–)	Pin 11 Alumel Red
			M112 – Ch(+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**All**	**ENG2 ITT Instrument Gauge**	**J2**
			M113 – Al (–)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Config. 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Config. 2	P115 – Pin H	Pin 5 WHT
			P115 – Pin P	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Config. 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Config. 2	P116 – Pin H	Pin 29 WHT
			P116 – Pin P	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**All**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**All**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Config. 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Config. 2	P146 – Pin H	Pin 7 WHT
			P146 – Pin P	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Config. 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Config. 2	P147 – Pin H	Pin 27 WHT
			P147 – Pin P	Pin 28 WHT/BLU
Battery Power	**AAV00B22**	**Config. 1**	**Bus Bar Panel Assy.**	**J1**
			W103	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Battery Power	**AAV00B22**	**Config. 2**	**Bus Bar Panel Assy.**	**J1**
		Config. 3	W1	Pin H WHT
		Config. 4	Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Fuel Flow (Wf) *	**See Fuel Flow Converter Below**			
ENG2 Fuel Flow (Wf) *	**See Fuel Flow Converter Below**			
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Control Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Control Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT

*** Fuel Flow Converter**

ENG1 Fuel Flow (Wf)	**AAV20B22**	**Config. 1**	**ENG1 Wf Instrument Gauge**	**Wf Converter**
			P131 – Pin D	Pin 5
			P131 – Pin C	Pin 9
			ADAS+ Connector J2	**Wf Converter**
			Pin 9 WHT	Pin 4
			Pin 10 WHT/BLU	Pin 8
		Config. 2	**ENG1 Wf Instrument Gauge**	**Wf Converter**
			P131 – Pin C	Pin 5
			P131 – Pin B	Pin 9
			ADAS+ Connector J2	**Wf Converter**
			Pin 9 WHT	Pin 4
			Pin 10 WHT/BLU	Pin 8
ENG2 Fuel Flow (Wf)	**AAV21B22**	**Config. 1**	**ENG2 Wf Instrument Gauge**	**Wf Converter**
			P132 – Pin D	Pin 1
			P132 – Pin C	Pin 6
			ADAS+ Connector J3	**Wf Converter**
			Pin 25 WHT	Pin 2
			Pin 26 WHT/BLU	Pin 7
		Config. 2	**ENG2 Wf Instrument Gauge**	**Wf Converter**
			P132 – Pin C	Pin 1
			P132 – Pin B	Pin 6
			ADAS+ Connector J3	**Wf Converter**
			Pin 25 WHT	Pin 2
			Pin 26 WHT/BLU	Pin 7

Table C- 3: Model 200 and 200T

5.4.4 Model 200CT, A200, A200C, & A200CT

⇨ **P&W Engine Services Voltage to Frequency Converters are required for Beech Configuration 1 Fuel Flow Indicator systems in these aircraft.**

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Config. 1**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (–)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Config. 2	M112 – Al (–)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Config. 3	P237 – Pin G Al (–)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Config. 1**	**ENG2 ITT Instrument Gauge**	**J2**
			M12 – Term E1 Al (–)	Pin 13 Alumel Red
			M12 – Term E2 Ch (+)	Pin 14 Chromel Yel
		Config. 2	M12 – Term E1 Al (–)	Pin 13 Alumel Red
			M12 – Term E2 Ch (+)	Pin 14 Chromel Yel
		Config. 3	P238 – Pin G Al (–)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Config. 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Config. 2	P115 – Pin H	Pin 5 WHT
			P115 – Pin P	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Config. 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Config. 2	P116 – Pin H	Pin 29 WHT
			P116 – Pin P	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**All**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**All**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Config. 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Config. 2	P146 – Pin H	Pin 7 WHT
			P146 – Pin P	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Config. 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Config. 2	P147 – Pin H	Pin 27 WHT
			P147 – Pin P	Pin 28 WHT/BLU

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Fuel Flow (Wf) *	**AAP00B24**	**Config. 1 ***	**See Fuel Flow Converter Below**	
		Config. 2 & 3	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf) *	**AAP01B24**	**Config. 1 ***	**See Fuel Flow Converter Below**	
		Config. 2 & 3	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin F	Pin 25 WHT
			P132 – Pin E	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Ext. Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**Config. 1**	**A228 Panel Assy. Batt-Bus**	**J1**
			W103	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Battery Power	**AAV00B22**	**Config. 2**	**A228 Panel Assy. Batt-Bus**	**J1**
		Config. 3	W1	Pin H WHT
		Config. 4	Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

*** Fuel Flow Converter**

Sensor	Wire Number	Configuration	Component	
ENG1 Fuel Flow (Wf)	**AAV20B22**	**Config. 1**	**ENG1 Wf Instrument Gauge**	**Wf Converter**
			P131 – Pin C	Pin 5
			P131 – Pin B	Pin 9
			ADAS+ Connector J2	**Wf Converter**
			Pin 9 WHT	Pin 4
			Pin 10 WHT/BLU	Pin 8
ENG2 Fuel Flow (Wf)	**AAV21B22**	**Config. 1**	**ENG2 Instrument Gauge**	**Wf Converter**
			P132 – Pin C	Pin 1
			P132 – Pin B	Pin 6
			ADAS+ Connector J3	**Wf Converter**
			Pin 25 WHT	Pin 2
			Pin 26 WHT/BLU	Pin 7

Table C- 4: Model 200CT, A200, A200C, and A200CT

5.4.5 Model B200C, B200CT, B200, B200T

⇨ **P&W Engine Services Voltage to Frequency Converters are required for Beech Configuration 1 Fuel Flow Indicator systems in these aircraft.**

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Config. 1 & 2**	**ENG1 ITT Gauge**	**J2**
			M112 – Al (–)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Config. 3	P237 – Pin G Al (–)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Config. 1 & 2**	**ENG2 ITT Gauge**	**J2**
			M113 – Al (–)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
		Config. 3	P238 – Pin G Al (–)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Config. 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Config. 2	P115 – Pin H	Pin 5 WHT
			P115 – Pin P	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Config. 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Config. 2	P116 – Pin H	Pin 29 WHT
			P116 – Pin P	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Config. 1**	**Supplied Tq Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
		Config. 2	**ENG1 Tq Instrument Gauge**	**J2**
			P119 – Pin S (+)	Pin 2 WHT/ORG
			P119 – Pin T (–)	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Config. 1**	**Supplied Tq Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
		Config. 2	**ENG2 Tq Instrument Gauge**	**J3**
			P120 – Pin S (+)	Pin 33 WHT/ORG
			P120 – Pin T (–)	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Config. 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Config. 2	P146 – Pin H	Pin 7 WHT
			P146 – Pin P	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Config. 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Config. 2	P147 – Pin H	Pin 27 WHT
			P147 – Pin P	Pin 28 WHT/BLU

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Fuel Flow (Wf) *	**AAP00B24**	**Config. 1 ***	**See Fuel Flow Converter Below**	
		Config. 2 & 3	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf) *	**AAP01B24**	**Config. 1 ***	**See Fuel Flow Converter Below**	
		Config. 2 & 3	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin F	Pin 25 WHT
			P132 – Pin E	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Ext. Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**Config. 1**	**A228 Panel Assy. Batt-Bus**	**J1**
			W103	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Battery Power	**AAV00B22**	**Config. 2**	**A228 Panel Assy. Batt-Bus**	**J1**
		Config. 3	W1	Pin H WHT
		Config. 4	Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

*** Fuel Flow Converter**

Sensor	Wire Number	Configuration	Component	
ENG1 Fuel Flow (Wf)	**AAV20B22**	**Config. 1**	**ENG1 Wf Instrument Gauge**	**Wf Converter**
			P131 – Pin C	Pin 5
			P131 – Pin B	Pin 9
			ADAS+ Connector J2	**Wf Converter**
			Pin 9 WHT	Pin 4
			Pin 10 WHT/BLU	Pin 8
ENG2 Fuel Flow (Wf)	**AAV21B22**	**Config. 1**	**ENG2 Wf Instrument Gauge**	**Wf Converter**
			P132 – Pin C	Pin 1
			P132 – Pin B	Pin 6
			ADAS+ Connector J3	**Wf Converter**
			Pin 25 WHT	Pin 2
			Pin 26 WHT/BLU	Pin 7

Table C- 5: Model B200C, B200CT, B200, and B200T

5.4.6 Model 300

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**All**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (–)	Pin 11 Alumel Red
			M112 – Ch(+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**All**	**ENG2 ITT Instrument Gauge**	**J2**
			M113 – Al (–)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**All**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**All**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**All**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**All**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**All**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**All**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**All**	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin I	Pin 9 WHT
			P131 – Pin D	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**All**	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin I	Pin 25 WHT
			P132 – Pin D	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Ext. Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**A1 Circuit Breaker Box Assy.**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 6: Model 300

5.4.7 Model B300

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Config. 1**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (–)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Config. 2	P237 – Pin G Al (–)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Config. 1**	**ENG2 ITT Instrument Gauge**	**J2**
			M113 – Al (–)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
		Config. 2	P238 – Pin G Al (–)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Config. 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Config. 2	P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Config. 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Config. 2	P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Config. 1 & 2**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
		Config. 3	**ENG1 Tq Instrument Gauge**	**J2**
			P119 – Pin H (High)	Pin 2 WHT/ORG
			P119 – Pin G (Low)	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Config. 1 & 2**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
		Config. 3	**ENG2 Tq Instrument Gauge**	**J3**
			P120 – Pin H (High)	Pin 33 WHT/ORG
			P120 – Pin G (Low)	Pin 34 WHT/GRN

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 N2 (Np)	**AAP11B24**	**Config. 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Config. 2	P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Config. 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Config. 2	P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Config. 1**	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin I	Pin 9 WHT
			P131 – Pin D	Pin 10 WHT/BLU
		Config. 2, 3 & 4	P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Config. 1**	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin I	Pin 25 WHT
			P132 – Pin D	Pin 26 WHT/BLU
		Config. 2, 3 & 4	P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Ext. Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**A1 Circuit Breaker Box Assy.**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 7: Model B300

5.4.8 Model B300C & 300LW

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Config. 1**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (–)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Config. 2	P237 – Pin G Al (–)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Config. 1**	**ENG2 ITT Instrument Gauge**	**J2**
			M113 – Al (–)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
		Config. 2	P238 – Pin G Al (–)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Config. 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Config. 2	P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Config. 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Config. 2	P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Config.1 & 2**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
		Config. 3	**ENG1 Tq Instrument Gauge**	**J2**
			P119 – Pin H (High)	Pin 2 WHT/ORG
			P119 – Pin G (Low)	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Config.1 & 2**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
		Config. 3	**ENG2 Tq Instrument Gauge**	**J3**
			P120 – Pin H (High)	Pin 33 WHT/ORG
			P120 – Pin G (Low)	Pin 34 WHT/GRN

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 N2 (Np)	**AAP11B24**	**Config. 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Config. 2	P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Config. 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Config. 2	P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Config. 1**	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin I	Pin 9 WHT
			P131 – Pin D	Pin 10 WHT/BLU
		Config. 2, 3 & 4	P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Config. 1**	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin I	Pin 25 WHT
			P132 – Pin D	Pin 26 WHT/BLU
		Config. 2, 3 & 4	P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Ext. Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**A1 Circuit Breaker Box Assy.**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10B22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 8: Model B300C and 300LW

5.4.9 Model 200 Series with Pro Line 21

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 28	Pin 11 Alumel Red
			7710P3 – Pin 1	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Pro Line 21**	**NO. 2 DCU-3001**	**J2**
			7710P4 – Pin 28	Pin 13 Alumel Red
			7710P4 – Pin 1	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P1 – Pin 23	Pin 5 WHT
			7710P1 – Pin 47	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P2 – Pin 23	Pin 29 WHT
			7710P2 – Pin 47	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 72	Pin 2 WHT/ORG
			7710P3 – Pin 59	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P4 – Pin 72	Pin 33 WHT/ORG
			7710P4 – Pin 59	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P1 – Pin 24	Pin 7 WHT
			7710P1 – Pin 48	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P2 – Pin 24	Pin 27 WHT
			7710P2 – Pin 48	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 67	Pin 9 WHT
			7710P3 – Pin 68	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P4 – Pin 67	Pin 25 WHT
			7710P4 – Pin 68	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**Pro Line 21**	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**Pro Line 21**	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**Pro Line 21**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**Pro Line 21**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**Pro Line 21**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**Pro Line 21**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**Pro Line 21**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**Pro Line 21**	**Gear Ext. Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT

Battery Power	**AAV00B22**	**Pro Line 21**	**A1 Circuit Breaker Box Assy.**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10B22**	**Pro Line 21**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 9: Model 200 Series with Pro Line 21

5.4.10 Model 300 Series with Pro Line 21

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 28	Pin 11 Alumel Red
			7710P3 – Pin 1	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Pro Line 21**	**NO. 2 DCU-3001**	**J2**
			7710P4 – Pin 28	Pin 13 Alumel Red
			7710P4 – Pin 1	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P1 – Pin 23	Pin 5 WHT
			7710P1 – Pin 47	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P2 – Pin 23	Pin 29 WHT
			7710P2 – Pin 47	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 72	Pin 2 WHT/ORG
			7710P3 – Pin 59	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P4 – Pin 72	Pin 33 WHT/ORG
			7710P4 – Pin 59	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P1 – Pin 24	Pin 7 WHT
			7710P1 – Pin 48	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P2 – Pin 24	Pin 27 WHT
			7710P2 – Pin 48	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 67	Pin 9 WHT
			7710P3 – Pin 68	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P4 – Pin 67	Pin 25 WHT
			7710P4 – Pin 68	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**Pro Line 21**	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**Pro Line 21**	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**Pro Line 21**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**Pro Line 21**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**Pro Line 21**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**Pro Line 21**	**Flaps Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**Pro Line 21**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**Pro Line 21**	**Gear Ext. Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT

Battery Power	**AAV00B22**	**Pro Line 21 Config. *1***	**A228 Panel Assy. Batt-Bus**	**J1**
			W103	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
		Pro Line 21 Config. *2,3 & 4*	**A228 Panel Assy. Batt-Bus**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**Pro Line 21**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 10: Model 300 Series with Pro Line 21

6 WIRING DIAGRAM

6.1 *ADAS+ Interconnect Schematic – With Supplied Torque Transducers and Without Fuel Flow Voltage to Frequency Converter*

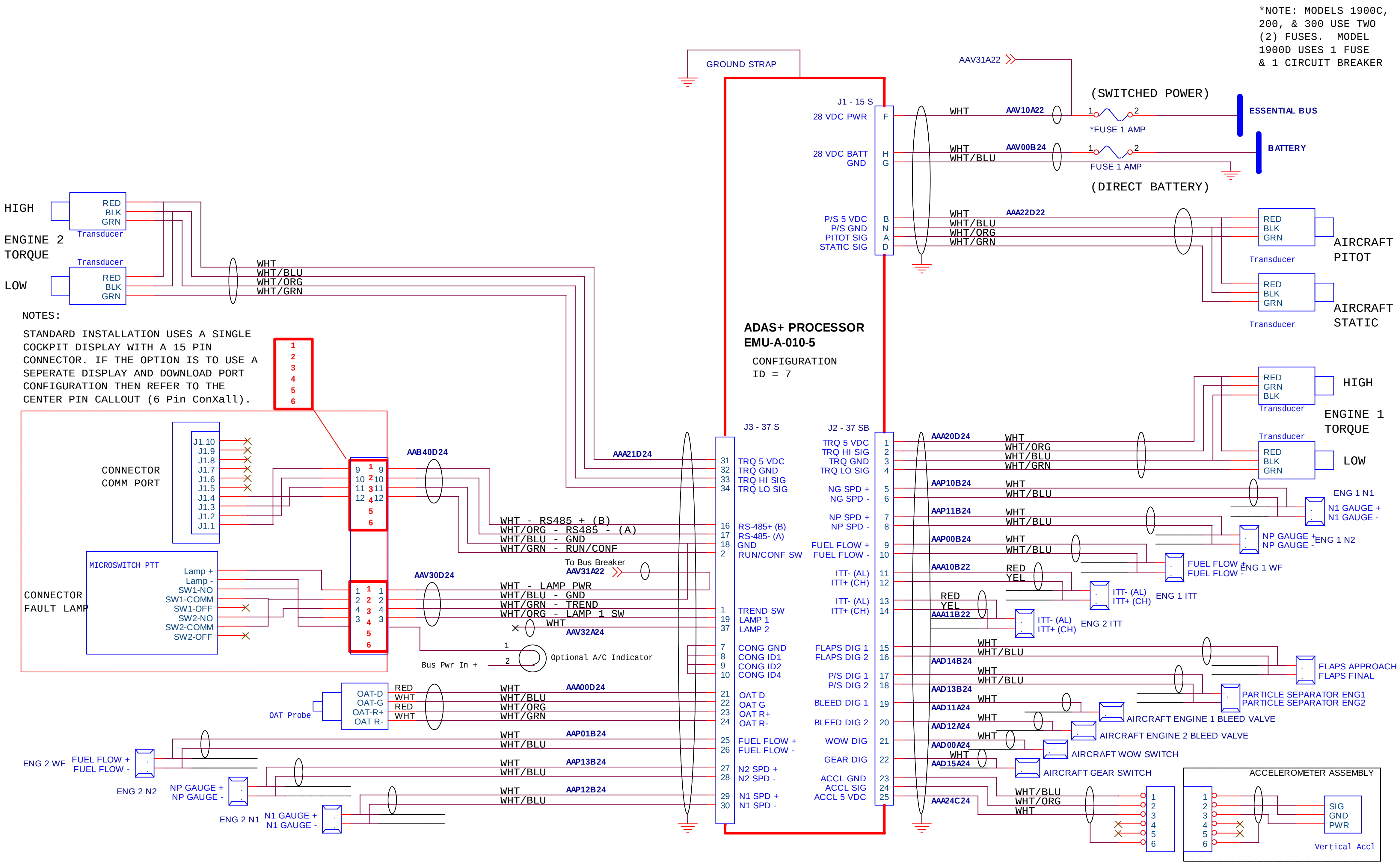

Figure C- 24: Wiring Schematic – With Torque Transducers and Without Fuel Flow Converter

6.2 *ADAS+ Interconnect Schematic – Without Supplied Torque Transducers and With Fuel Flow Voltage to Frequency Converter*

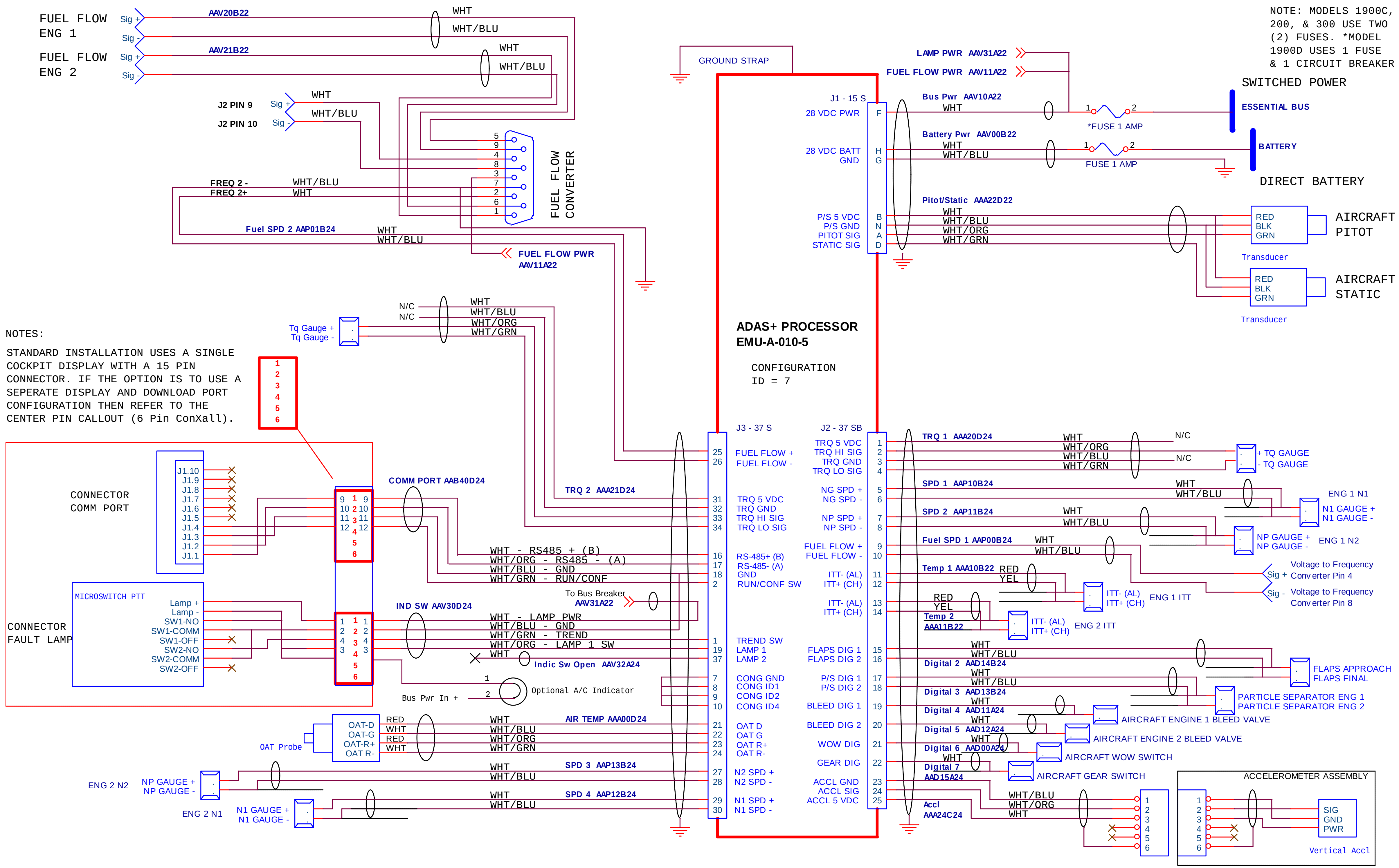

Figure C- 25: Wiring Schematic – Without Torque Transducers and With Fuel Flow Converter

6.3 *ADAS+ Interconnect Schematic – With Supplied Torque Transducers and With Fuel Flow Voltage to Frequency Converter*

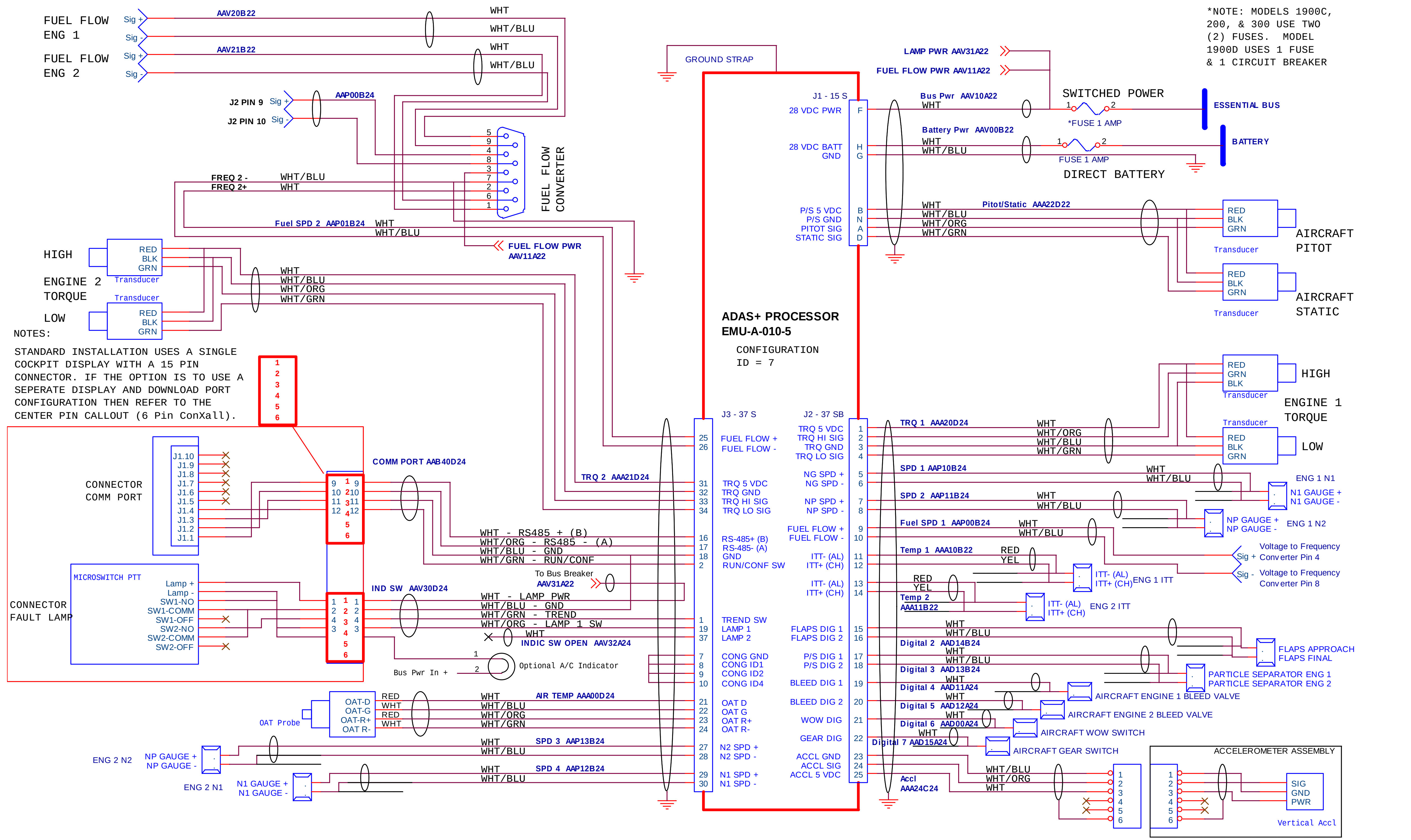

Figure C- 26: Wiring Schematic – With Torque Transducers and With Fuel Flow Converter

6.4 *ADAS+ Interconnect Schematic – Without Supplied Torque Transducers and Without Fuel Flow Voltage to Frequency Converter*

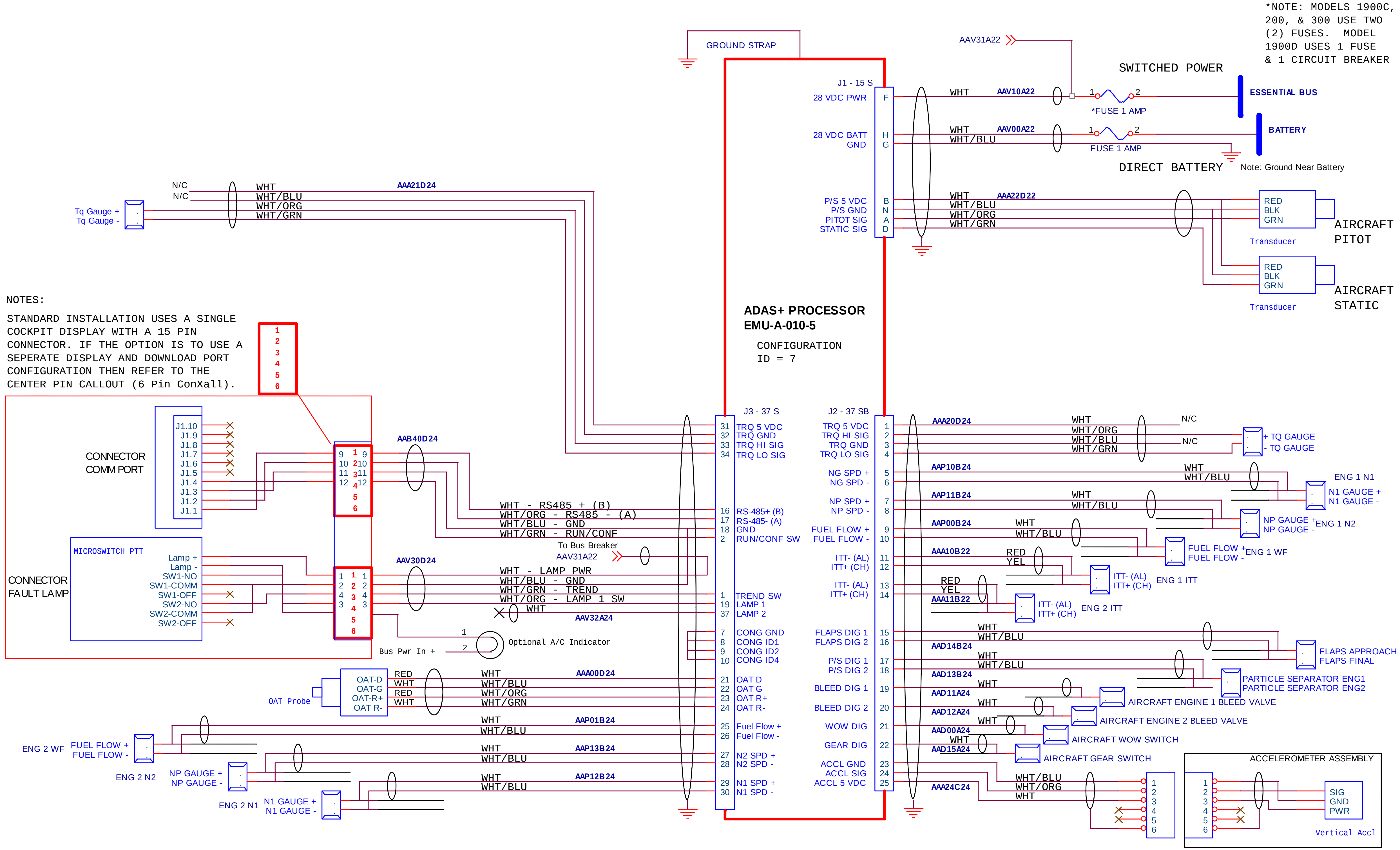

Figure C- 27: Wiring Schematic – Without Torque Transducers and Without Fuel Flow Converter

Pratt & Whitney Engine Services, Inc.
249 Vanderbilt Ave
Norwood, MA 02062

Pratt & Whitney
A United Technologies Company

ADAS+

Instructions for Continued Airworthiness
ADAS-G-260-1/C
For Raytheon Model 200, 300, & 1900 Series

Proprietary Information Notice

Export Control Classification

Contains No Technical Data ☐

	Regulation	Classification Number
* Data is subject to the jurisdiction of the Export and Import Controls Bureau of the Department of Foreign Affairs and International Trade of Canada, Department of Commerce of the United States and/or Department of State of the United States.	Canadian ECL(s)*	
** Data is not subject to the jurisdiction of the Department of Commerce of the United States or Department of State of the United States but would become subject if exposed to any US involvement.	ECCN(s)*	9E991
	P-ECCN(s)**	
	USML(ITAR)*	
	P-USML**	

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Revision Ltr:	J		Jon Miller, Engineering Manager
Total Pages:	61		signature date 11/14/14
			Steve Sackos, Supply Chain & QA Manager
			signature David Monasterio date 11/14/14
			David Monasterio, Customer Support & Operations Manager
			signature date

REVISION HISTORY

Rev Status of Sheets	Rev	J	F	F	F	F	F	J	F	F	F	G	F	J	F	F	F
	Sheet	i	ii	iii	iv	1	2	3	4	5	6	7	8	9	10	11	12
	Rev	F	G	F	F	G	G	G	G	F	G	F	F	F	F	F	G
	Sheet	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	Rev	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	H
	Sheet	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
	Rev	I	F	F	F	F	F	F	F	F	F	F	F				
	Sheet	45	46	47	48	49	50	51	52	53	54	55	56				
	Rev																
	Sheet																

LOG OF REVISIONS

REV. NO	ECO#	DESCRIPTION	DATE	PAGES REVISED
A		Initial Release	08/08/03	
B	740	Add Revision Note. Revised pitot / static remove and replacement. Revised wiring schematics and connection charts	03/08/04	Cover, i, 16, 26, 27, 28, 29, 31, 33, 35, 37, 39, 41, 43, and 45
C	761	Reformat entire manual. Correct OAT Picture. Add Fuel Flow Converter to Connection Chart. Revise Battery Power Connection. Revise Wiring Schematics and Connection Charts	06/15/05	All
D	825	Add Installation Notes and Connection Chart for Pro Line 21.	06/23/05	Cover, i-iv, 26-30, 47-54
E	886	Revise fuel flow wiring on model 300 series connection charts.		Cover, i, 41, 44, 46
F	957	Add wire numbers to schematics and connection charts. Change UTC logo to P&W logo. Updated address. Corrected spelling and grammar.	08/22/07	All
G	997	Added note that the Vertical Accelerometer is no longer available.	02/24/09	Cover, i, 7, 14, 17 - 20, 22 and 28
H	1025	Update Raytheon 300 WOW Connection in the Connection Chart	05/04/10	Cover, i, 44
I	1094	Add Torque Wiring Connection for B300 Config 3.	08/24/11	Cover, i, 45
J	1206	Update Inspection Interval Wording.	11/14/2014	Cover, i, 3, 9

NOTE:

Revisions to this document shall be coordinated through the Boston Aircraft Certification Office, the Kansas City AEG, and the STC holder. If the ADAS+ Instructions for Continued Airworthiness are revised, all operators will be provided with a copy of the applicable revision. If you have a subscription with TurbineTracker™, you will be informed via email of new revisions to this manual. In addition to this, P&W Engine Services maintains the latest versions of all manuals in the Support Section of TurbineTracker™.

If you are not a subscriber to TurbineTracker™, you may call P&W Engine Services Customer Support at 781-762-8600 for the latest revision.

TABLE OF CONTENTS

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LIST OF TABLES

1 INTRODUCTION

1.1 Scope

The purpose of this document is to provide users of this product with P&W Engine Services approved Instruction for Continued Airworthiness for the ADAS+. Any deviation from the procedures described within this document could result in a failure of the product to perform properly and could possibly result in damage to other systems of the aircraft.

1.2 Applicability

This document applies to aircraft that are altered by the installation of a P&W Engine Services' ADAS+, EMU-A-010-5

1.3 Definitions and Abbreviations

ADAS+ – Aircraft Data Acquisition System Plus
AML – Approved Model List
ICA – Instructions for Continued Airworthiness
MLP – Monitor Link Program
STC – Supplemental Type Certificate

1.4 Precautions

This section not applicable

1.5 Units of Measure

This section not applicable

1.6 Referenced Publications

ADAS-G-260-1 generic Instructions for Continued Airworthiness

1.7 Distribution

These Instructions for Continued Airworthiness are to be furnished with ADAS+ engine trend monitors for Raytheon Aircraft Model 200, 300, 1900 Series aircraft and is to become part of the permanent aircraft record upon installation.

2 DESCRIPTION

A detailed description of the system can be found in *ADAS-G-260-1, ADAS+ Instructions for Continued Airworthiness, Section 2.*

3 CONTROL AND OPERATION INFORMATION

A detailed description of the control and operation of the system can be found in *ADAS-G-260-1, ADAS+ Instructions for Continued Airworthiness, Section 3.*

4 SERVICING INFORMATION

This section is not applicable

5 MAINTENANCE INSTRUCTIONS

Scheduled Maintenance Program tasks are to be added to the aircraft operator's appropriate maintenance program as follows:

5.1 Recommended Periodic Scheduled Servicing Tasks

The P&W Engine Services ADAS+ has been designed with the latest solid-state technology. The only component that has a limited life span is the internal 3 volt battery. The Poly-carbonmonofluoride Lithium Coin Battery is used for the real time clock and under normal operating conditions, is expected to last 10 years. If the internal battery drops below 2.5 volts the date stamp on the ADAS+ log file will default to 1997. If this occurs, the processor must be returned to P&W Engine Services for battery replacement.

5.2 Recommended Periodic Scheduled Preventive Maintenance Tests/Checks

None Required

5.3 Recommended Periodic Scheduled Inspections

The following information should be used to insure the continuous and trouble free operation of the ADAS +. These inspection steps should be followed at every Phase or Detailed inspection.

It is the responsibility of the owner or operator to obtain specific approval from their local airworthiness authority for any variation to the inspection interval.

These instructions describe general inspection methods. All inspections should look for general deterioration of hoses, brackets, and any other component of the ADAS+ system. Other than the specific periodic inspections, maintenance is on-condition, and there is no other scheduled maintenance.

5.3.1 System Processor

The system processor is mounted in the avionics compartment. For the System Processor installation (Figure C-1), perform the following inspections:

- ❑ *010* Inspect processor for security to the mounting bracket.
- ❑ *020* Inspect electrical ground strap for proper connection.
- ❑ *030* Inspect electrical connectors for proper connection to ADAS+ processor.

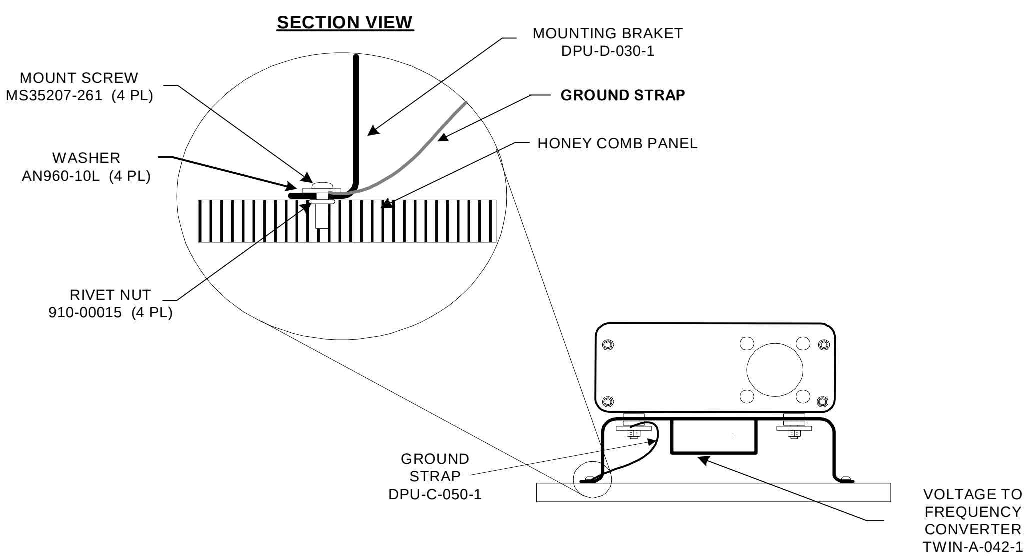

Figure C- 1: Bracket to Avionics Tray Mounting

5.3.2 Cockpit TREND Switch / Fault Lamp and Download Port

The ADAS+ has a TREND switch / fault lamp that is installed in the cockpit and consist of a 75" x .75" square Push-to-test lamp. The ADAS+ also has a download port installed in the cockpit and consist of a 19/32" serial download connector.

For the TREND switch / fault lamp and download port installations (Figure C- 2 and Figure C- 3), perform the following inspections:

- ❑ *010* Verify that the proper connectors are in place. Refer to Figure C- 4 and Figure C- 5.
- ❑ *020* Inspect electrical connectors for loose connections.
- ❑ *030* Inspect wiring for proper routing and security.
- ❑ *040* Inspect wiring for signs of interference and wire chaffing.

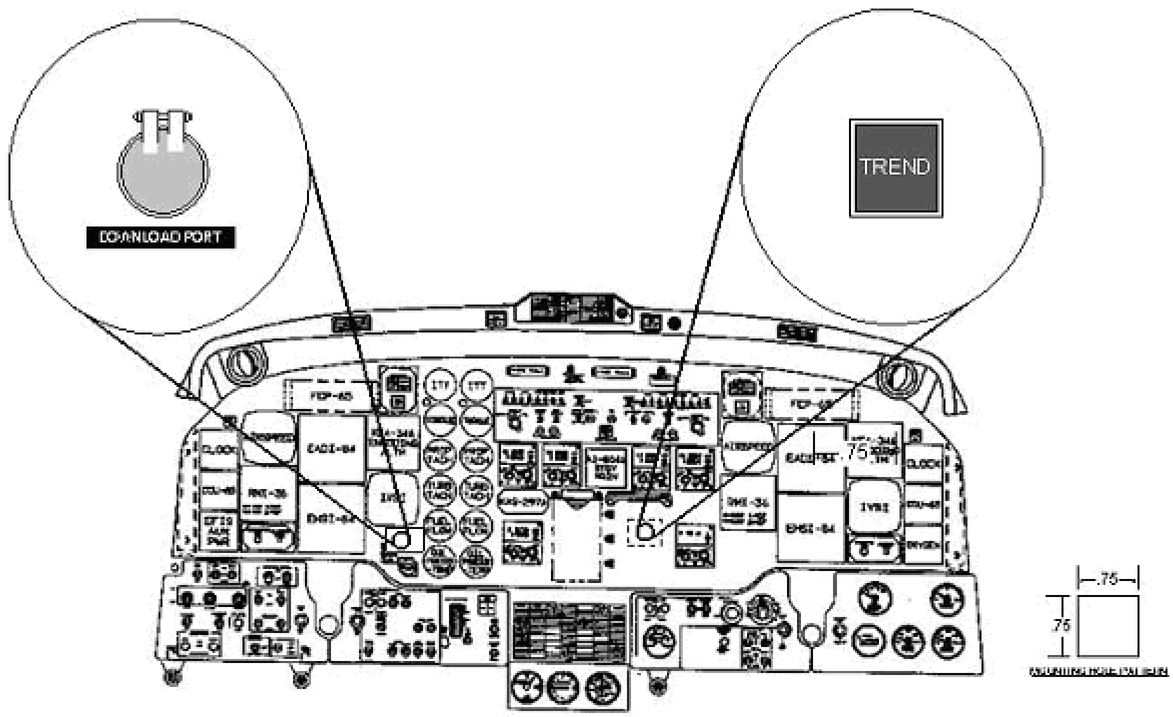

Figure C- 2: Cockpit TREND Switch / Fault Lamp & Download Port (Discrete Mount)

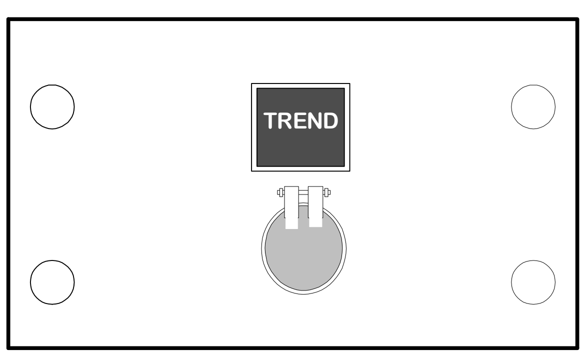

Figure C- 3: Cockpit TREND Switch / Fault Lamp & Download Port (Center Console Mount)

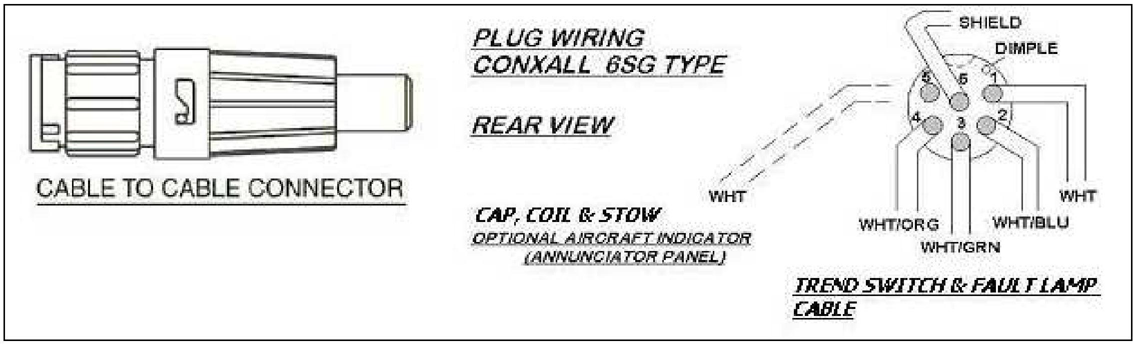

Figure C- 4: TREND Switch/Fault Lamp Connector (Discrete Mount)

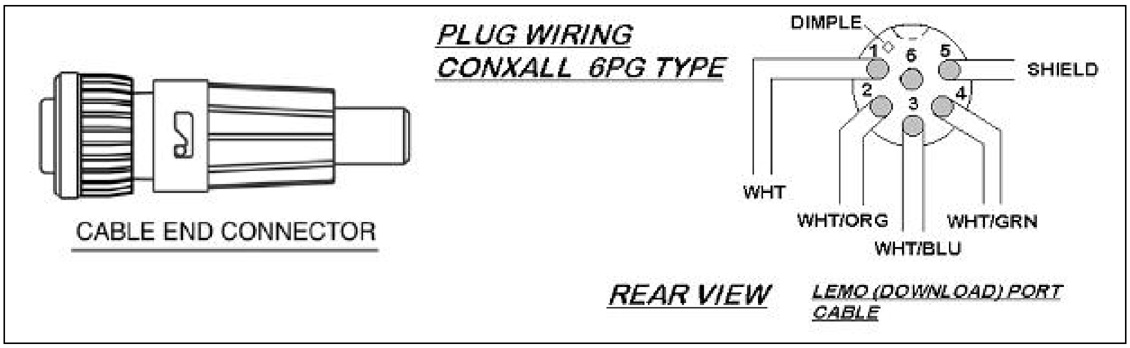

Figure C- 5: Download Port Connector (Discrete Mount)

5.3.3 Pitot / Static Transducers

ADAS + has the capability of measuring airspeed and altitude for event monitoring or trend monitoring. Both pitot and static transducers are plumbed (Figure C- 6) into the aircraft's existing pitot and static systems. Both transducers are mounted forward of the passengers window on the right side of the aircraft at approximately.

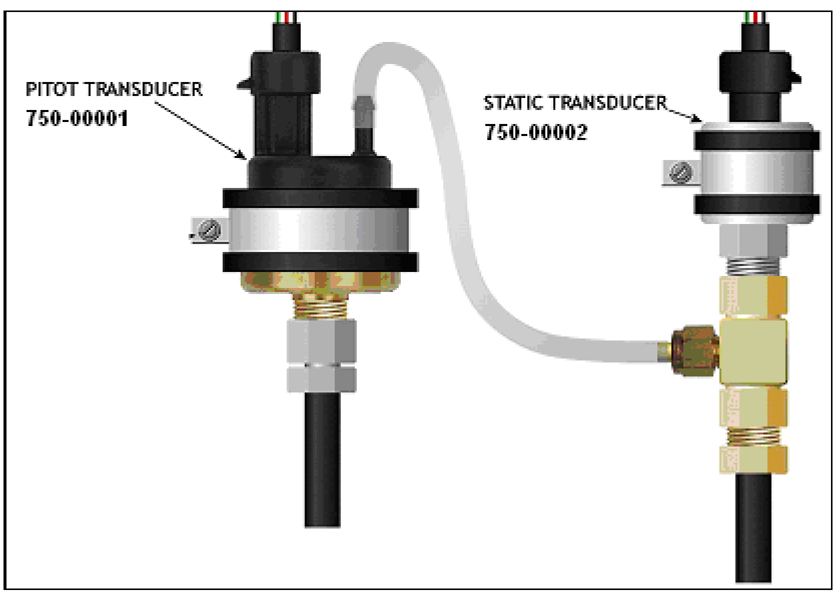

Figure C- 6: Pitot / Static Transducer Installation

To insure the integrity of the system, perform the following inspection:

- ❑ *010* Verify that the proper connectors are in place. Refer to Figure C- 7.
- ❑ *020* Inspect electrical connectors for loose connections.
- ❑ *030* Inspect wiring for proper routing and security.
- ❑ *040* Inspect wiring for signs of interference and wire chaffing.

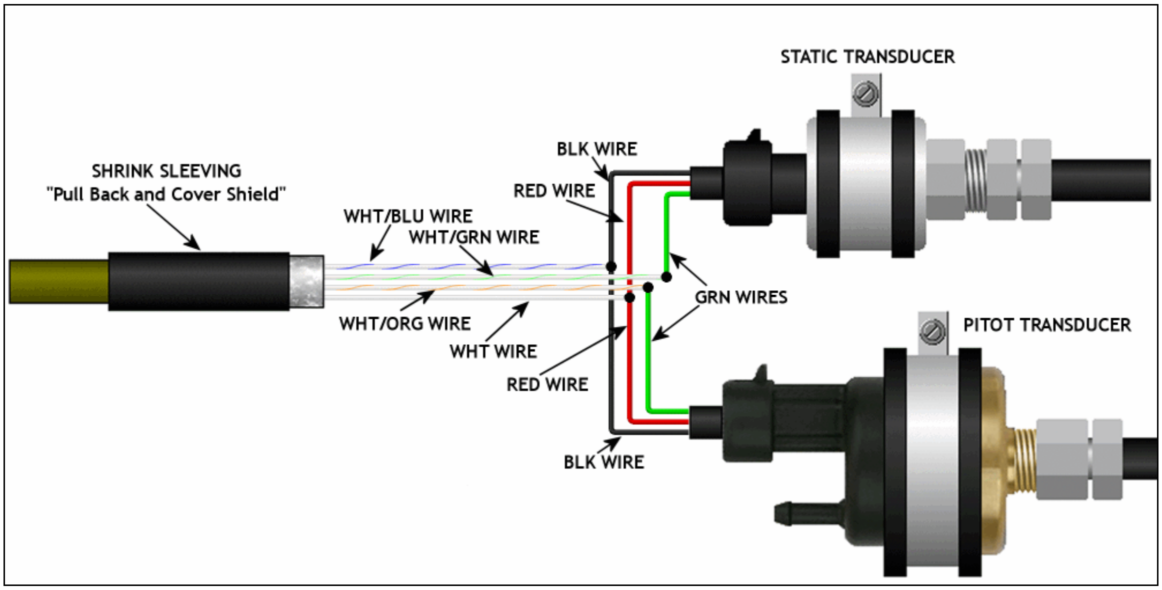

Figure C- 7: Pitot/Static Wiring

5.3.4 Outside Air Temperature Probe

The temperature probe is mounted on the underside of the aircraft to provide the processor with OAT data.

For the OAT probe installation (Figure C- 8) perform the following inspection:

- ❑ *010* Inspect wiring for proper routing and security.
- ❑ *020* Inspect wiring for signs of interference and wire chaffing.

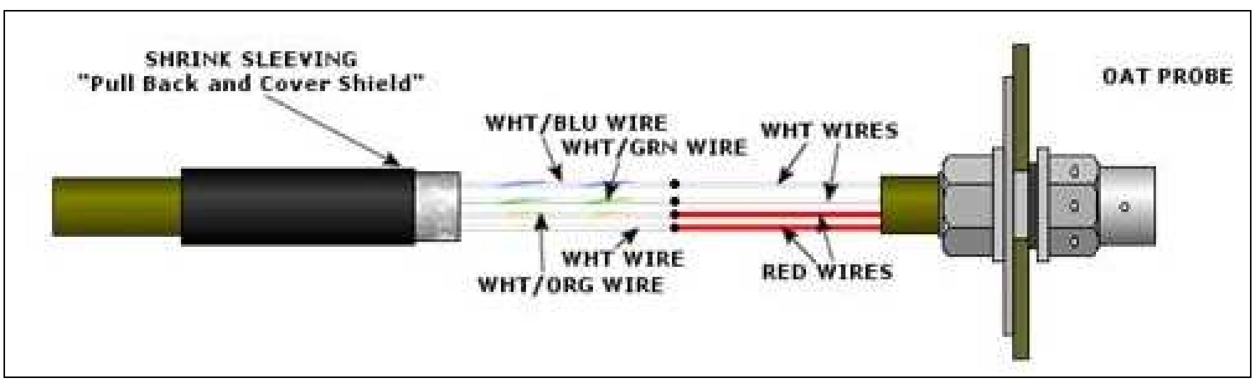

Figure C- 8: OAT Probe Wiring

5.3.5 Torque Transducer

The ADAS + obtains the engine torque level by using two (2) 0 – 150 PSIG transducers installed in the torque pressure lines.

- ❑ *010* Verify that the proper connectors are in place. Refer to Figure C- 9.
- ❑ *020* Inspect electrical connectors for loose connections.
- ❑ *030* Inspect wiring for proper routing and security.
- ❑ *040* Inspect wiring for signs of interference and wire chaffing.

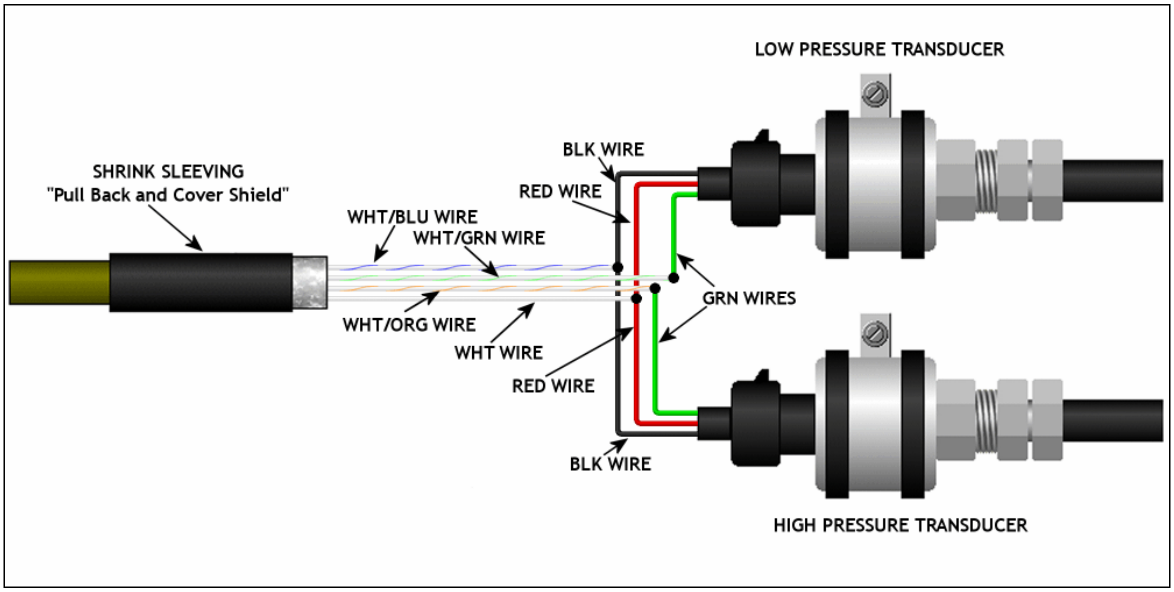

Figure C- 9: Torque Transducer Wiring

5.3.6 Vertical Accelerometer

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

The twin engine ADAS+ records vertical accelerations for hard landing and in-flight loads using a +/- 5g accelerometer mounted aft of the wing spar on the DC generator control panel.

- ❑ *050* Verify that the proper connector is in place. Refer to Figure C- 10.
- ❑ *060* Inspect electrical connector for loose connections.
- ❑ *070* Inspect wiring for proper routing and security.
- ❑ *080* Inspect wiring for signs of interference and wire chaffing.

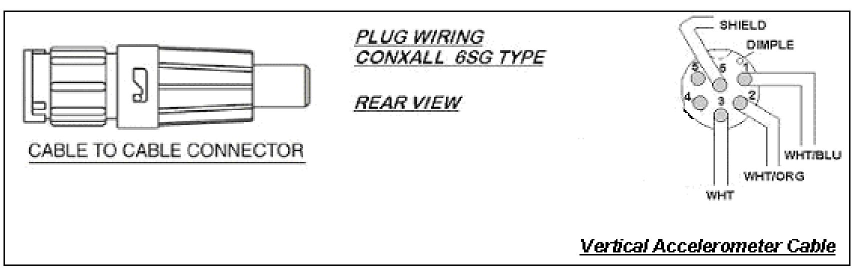

Figure C- 10: Vertical Accelerometer Wiring

5.3.7 J1, J2, and J3 Harnesses

- ❑ *010* Inspect harness for proper routing and security.
- ❑ *020* Inspect harness for signs of interference and wire chaffing.

5.3.8 System Test

- ❑ *010* With the aircraft battery connected and master switch on, verify that the TREND lamp illuminates, indicating system boot-up. After approximately 1 - 5 seconds, the TREND lamp will extinguish and the Trend Lamp will do one of the following:
  - Remain extinguished (NORMAL STATE)
  - Flash (MAINTENANCE OR CAUTION STATE)
  - Illuminate Solid (FAULT STATE)

  If the processor does NOT go into NORMAL STATE, retrieve the log data, and troubleshoot the system.
- ❑ *020* Turn battery switch off.

5.4 Recommended Periodic Structural Inspections

The following information should be used to insure the continuous and trouble free operation of the ADAS +. These inspection steps should be followed at every Phase or Detailed inspection.

It is the responsibility of the owner or operator to obtain specific approval from their local airworthiness authority for any variation to the inspection interval.

These instructions describe general inspection methods. All inspections should look for general deterioration of hoses, brackets, and any other component of the ADAS+ system. Other than the specific periodic inspections, maintenance is on-condition, and there is no other scheduled maintenance.

5.4.1 System Processor

For the System Processor installation (Figure C- 11), perform the following inspections:

- ❑ *010* Inspect processor for security to the mounting bracket.
- ❑ *020* Inspect mounting bracket for cracking.

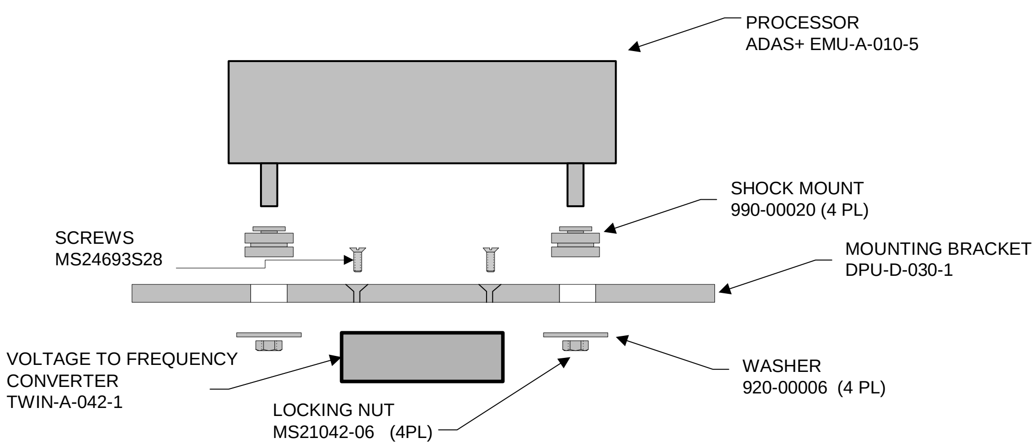

Figure C- 11: Processor Mounting Configuration

5.4.2 Cockpit TREND Switch / Fault Lamp and Download Port

For the TREND switch / fault lamp and download port installations (Figure C- 12 & Figure C- 13), perform the following inspections:

- ❑ *030* Inspect TREND Switch / Fault Lamp for proper mounting.
- ❑ *040* Inspect Download Port for proper mounting.

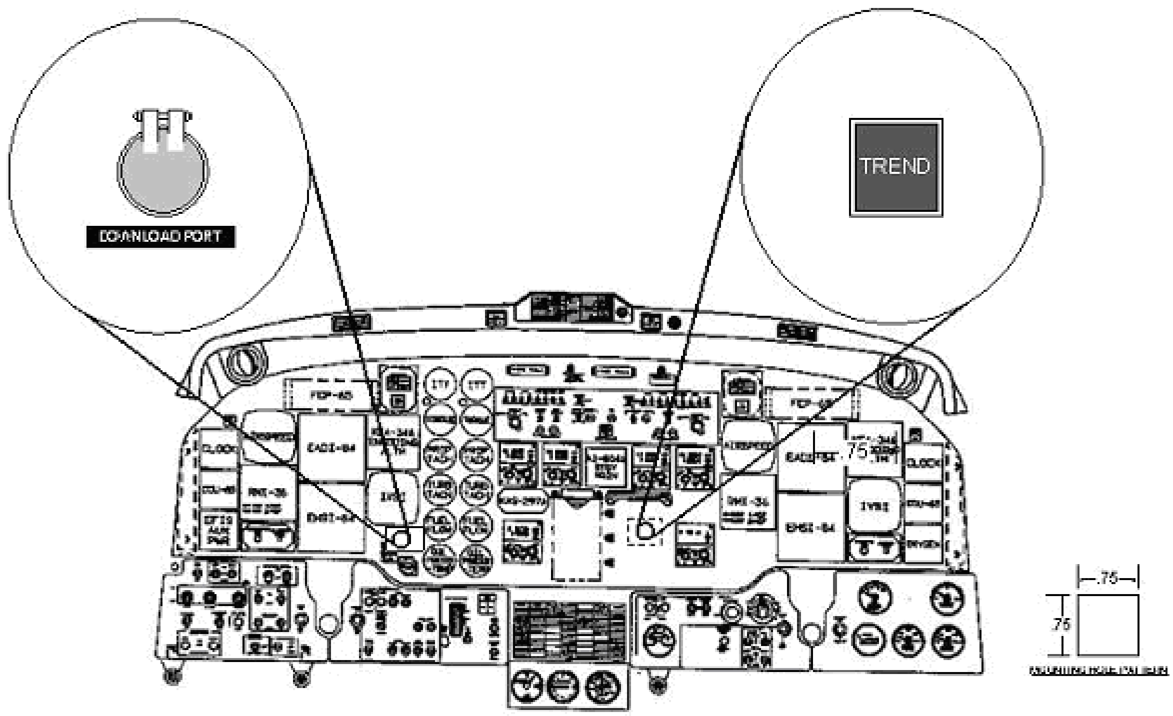

Figure C- 12: Cockpit TREND Switch / Fault Lamp & Download Port Installation (Discrete Mount)

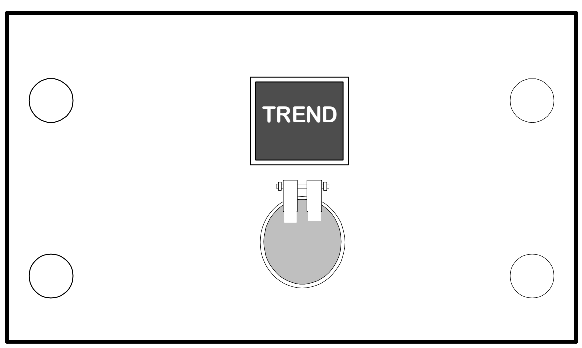

Figure C- 13: Cockpit TREND Switch / Fault Lamp & Download Port Installation (Center Console Mount)

5.4.3 Pitot / Static Transducers

For the Pitot/Static transducer installation, perform the following inspection:

- ❑ *010* Inspect and make sure that transducer mountings are secure. Refer to Figure C- 14.
- ❑ *020* Inspect Adel™ clamps for deterioration.
- ❑ *030* Inspect fittings to make sure they are secure.

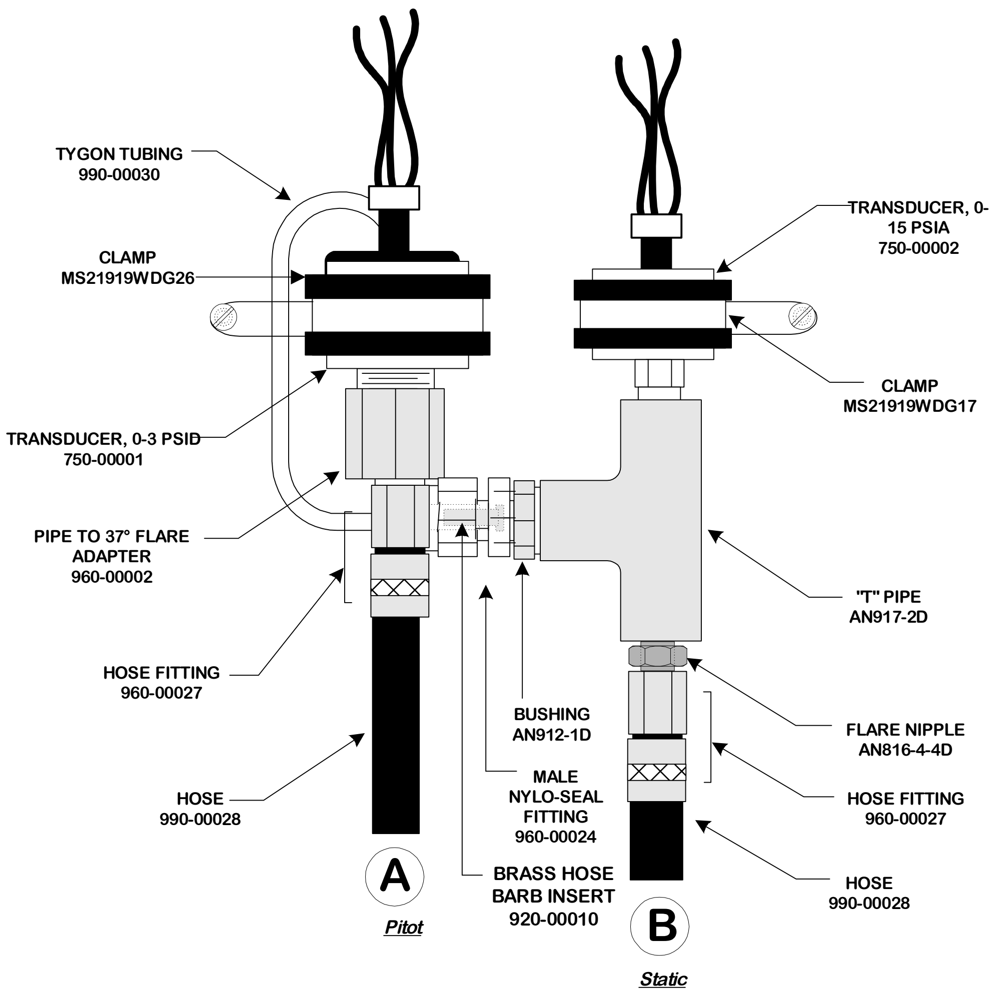

Figure C- 14: Pitot/Static Installation (Side View)

5.4.4 Outside Air Temperature Probe

For the OAT probe installation (Figure C- 15), perform the following inspection:

- ❑ *010* Inspect OAT probe assembly form proper mounting.
- ❑ *020* Inspect aircraft skin around OAT probe for signs of cracking.
- ❑ *030* Perform continuity test to ensure proper bonding with the aircraft skin.

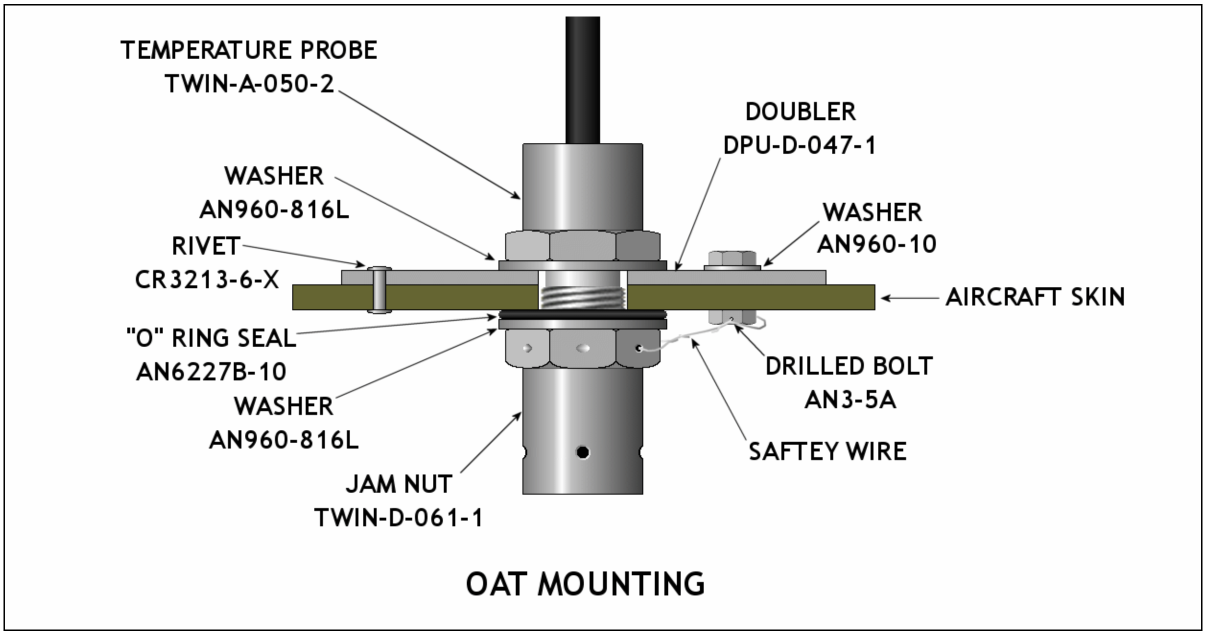

Figure C- 15: OAT Probe Illustration

5.4.5 Torque Transducer

The ADAS + obtains the engine torque level by using two (2) 0 – 150 PSIG transducers installed in the torque pressure lines. The torque transducer installation is referenced in illustration Figure C- 16.

To insure the integrity of the system, perform the following inspection:

- ❑ *010* Inspect and make sure that transducer mounting is secure.
- ❑ *020* Inspect Adel™ clamps for deterioration.
- ❑ *030* Inspect pressure lines for signs of deterioration.
- ❑ *040* Inspect fittings to make sure they are secure.
- ❑ *050* Inspect each transducer for signs of fluid leaking.

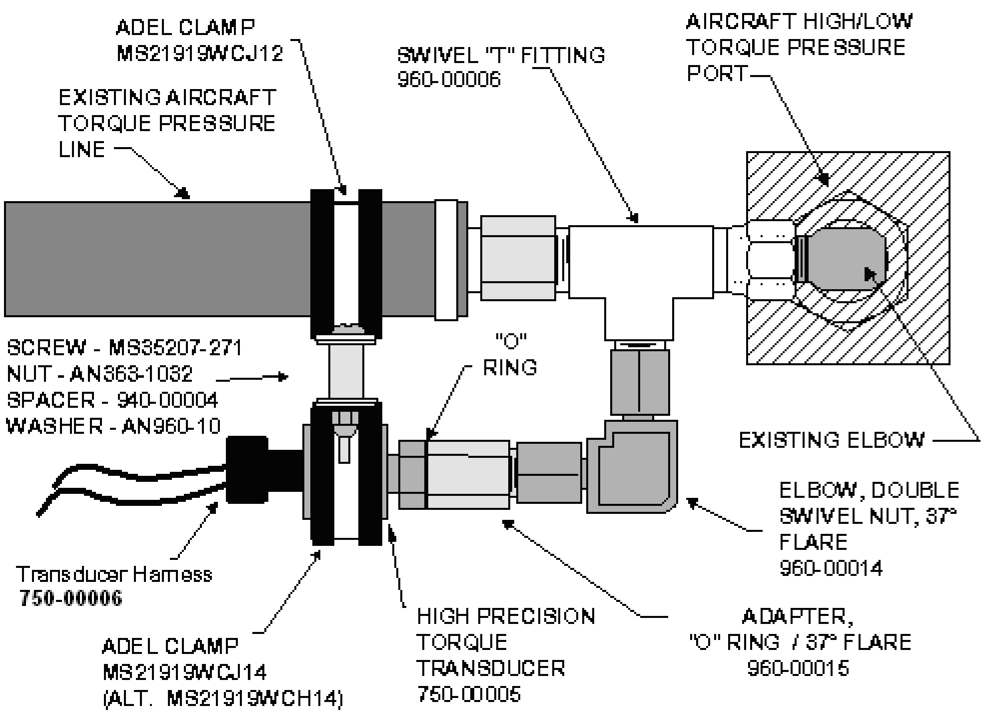

Figure C- 16: Torque Transducer Installation Configuration

5.4.6 Vertical Accelerometer

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

The twin engine ADAS+ records vertical accelerations for hard landing and in-flight loads using a +/- 5g accelerometer mounted aft of the wing spar on the DC generator control panel. Refer to Figure C- 17.

- ❑ *010* Inspect vertical accelerometer for security.
- ❑ *020* Inspect vertical accelerometer for proper mounting.

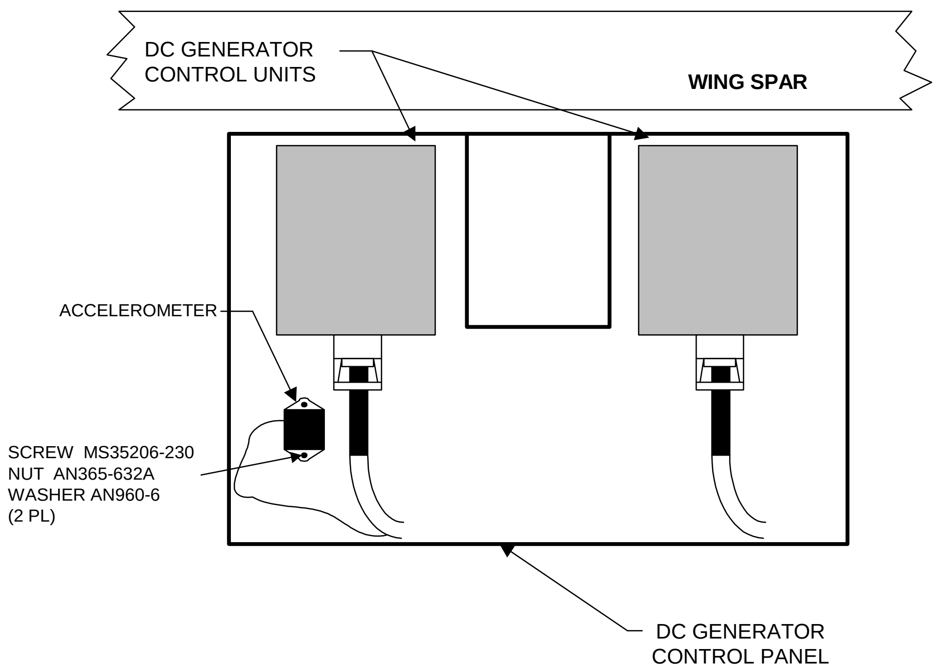

Figure C- 17: Vertical Accelerometer Installation Configuration

6 SYSTEM TROUBLESHOOTING

Detailed troubleshooting for the system can be found in *ADAS-G-260-1, ADAS+ Instructions for Continued Airworthiness, Section 6.*

7 REMOVAL AND REPLACEMENT INFORMATION

7.1 Processor Removal/Replacement

NOTE: Insure that power is removed from the aircraft and the battery is disconnected

- ❑ *010* Disconnect the J1, J2, and J3 wiring harnesses from the processor.
- ❑ *020* Disconnect the ground strap between the processor mounting stud and the aircraft chassis.
- ❑ *030* Disassemble the ADAS+ processor from the mounting bracket shown in Figure C- 11.
- ❑ *040* Assemble the ADAS+ processor to the mounting bracket shown in Figure C- 11. Ensure that the processor does not interfere with wiring or controls.

INSTALLATION CAUTION:

⇨ ***Excessive torque on the processor-mounting studs can deform the shock mounts. The locking nut should be tightened to the point of contact with the shock mount.***

- ❑ *050* Install ground strap between one of the processor mounting studs and the aircraft chassis.
- ❑ *060* Connect wiring harnesses J1, J2, and J3 to the processor.
- *070* Perform configuration and calibration per instructions in ADAS+ Installation Manual ADAS-G-010-1, System Configuration and Calibration.

7.2 TREND Switch / Fault Lamp Removal/Replacement

- ❑ *010* Insure that power is removed from the aircraft and the battery is disconnected.
- ❑ *020* Disconnect TREND Switch / Fault Lamp ConXall™ connector under instrument panel.
- ❑ *030* Remove TREND Switch / Fault Lamp by squeezing locking springs on sides of switch and pushing the switch thru the hole in the instrument panel.
- ❑ *040* Replace TREND switch / Fault Lamp and reconnect ConXall™ connector.

7.3 Download Port Removal/Replacement

- ❑ *010* Insure that power is removed from the aircraft and the battery is disconnected.
- ❑ *020* Remove nut and washer from Download Port connector.
- ❑ *030* Disconnect Download Port ConXall™ connector. Remove Download Port.
- ❑ *040* Install Download Port into Instrument Panel and secure in place with washer and nut using Loctite® Blue on the threads of the download port.
- ❑ *050* Reconnect ConXall™ connector.

7.4 Pitot/Static Transducer Removal/Replacement

NOTE: A Pitot/Static Leak test must be done after the replacement of a transducer

- ❑ *010* Insure that power is removed from the aircraft and the battery is disconnected.
- ❑ *020* Refer to Figure C- 14. Disconnect Pitot hose (990-00028) from adaptor (960-00002).
- ❑ *030* Disconnect Tygon tubing from the Pitot Transducer.
- ❑ *040* Disconnect Static hose (990-00028) from "T" pipe (AN917-2D).
- ❑ *050* Remove the pitot and static transducers by removing the bolt, washer, and nut which secures the two transducers to the supplied plate (ADAS-D-018-1) and clamp (ADAS-D-019-1).
- ❑ *060* Remove the adapter, (960-00002) from the Pitot Transducer if you are replacing the Pitot Transducer or the "T" pipe, (AN917-2D) from the Static Transducer if you are replacing the Static Transducer.
- ❑ *070* Replace the appropriate transducer as necessary.
- ❑ *080* Apply Teflon® tape to the Pitot Transducer threads and install adapter (960-00002) or apply Teflon® tape to the Static Transducer threads and install "T" pipe (AN917-2D).
- ❑ *090* Attach the pitot and static transducers to the supplied plate (ADAS-D-018-1), clamp (ADAS-D-019-1, clamp (MS21919WDG26 & MS21919WDG17), bolt (AN3-5A), washer (AN960-10) and lock nut (AN365-1032A).
- ❑ *100* Connect the Pitot hose (990-00028) to the adaptor (960-00002).
- ❑ *110* Connect the Static hose (990-00028) to the "T" pipe (AN917-2D).
- ❑ *120* Connect Tygon tubing to the Pitot Transducer.
- ❑ *130* Secure and tighten all hoses and fittings.
- ❑ *140* Perform Pitot/Static calibration per instructions in ADAS+ Installation Manual ADAS-G-010-1, System Configuration and Calibration.

7.5 OAT Removal/Replacement

- ❑ *010* Insure that power is removed from the aircraft and the battery is disconnected.
- ❑ *020* Remove safety wire from OAT jam nut (TWIN-D-061-1).
- ❑ *030* Remove OAT jam nut.
- ❑ *040* Remove temperature probe from hole.
- ❑ *050* Insert new temperature probe into the hole and install washers (AN960-816L), "O" ring (AN6227B-10) and jam nut (TWIN-D-061-1).
- ❑ *060* Tighten and safety wire the jam nut to the bolt (AN3-5A).
- ❑ *070* Apply a bead of sealant (ProSeal PR1422 or equivalent) around edge of doubler after installation and smooth to produce a filleted profile.
- ❑ *080* Apply a bead of sealant (ProSeal PR1422 or equivalent) around the inner and outer edges of the OAT probe after installation and smooth to produce a filleted profile.
- ❑ *090* Perform OAT calibration per instructions in ADAS+ Installation Manual ADAS-G-010-1, System Configuration and Calibration.

7.6 Torque Transducer Removal/Replacement

NOTE: A Leak test must be done after the replacement of a transducer

- ❑ *010* Insure that power is removed from the aircraft and the battery is disconnected.
- ❑ *020* Referring to Figure C- 16, remove the "T" swivel (960-00006) from the adapter fitting (960-00015).
- ❑ *030* Remove the adapter (960-00015) from the transducer.
- ❑ *040* Remove the transducer from the clamp (MS21919WCJ14).
- ❑ *050* Replace the transducer.
- ❑ *060* Using Teflon® tape, install and torque the 0 – 100 PSIG transducers (750-00005) into the adapter fitting (960-00015).
- ❑ *070* Connect the torque transducer / adapter fitting assembly to the "T" swivel (960-00006).
- ❑ *080* Secure / torque all lines and fittings per the manufacturer's recommendations.
- ❑ *090* Perform Torque calibration per instructions in ADAS+ Installation Manual ADAS-G-010-1, System Configuration and Calibration.

7.7 Vertical Accelerometer Removal/Replacement

- ❑ *010* Insure that power is removed from the aircraft and the battery is disconnected.
- ❑ *020* Remove both screws (MS35206-230), nuts (AN365-632A), and washers (AN960-6) from the vertical accelerometer.
- ❑ *030* Disconnect the ConXall™ connector and remove vertical accelerometer.
- ❑ *040* Connect the new vertical accelerometer ConXall™ connector.
- ❑ *050* Install both screws (MS35206-230), nuts (AN365-632A), and washers (AN960-6) into the mounting holes on the vertical accelerometer.
- ❑ *060* Perform vertical accelerometer calibration per instructions in ADAS+ Installation Manual ADAS-G-010-1, System Configuration and Calibration.

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

8 SPECIAL INSPECTION REQUIREMENTS

This section is not applicable

9 APPLICATION OF PROTECTIVE TREATMENTS

This section is not applicable

10 DATA

10.1 Parts List

For Raytheon Aircraft Company Model 200, 300, & 1900 Series:

The parts listed below consist of the installation kits for the ADAS+ system for the Raytheon Model 200, 300, and 1900 Series. Assembly kit numbers are listed in section 10.1.1 and individual components are detailed by kit numbers in section 10.1.2.

10.1.1 ADAS+ by Parts Kits

1900 and 1900C Pedestal Display		ADAS-K-010-21	
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-3	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-1	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-1	

1900 and 1900C Individual Display		ADAS-K-010-22	
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-3	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-1	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-1	

1900D UE1 to UE92 Pedestal Display		ADAS-K-010-23	
ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-4	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-4	

1900D UE1 to UE92 Individual Display		ADAS-K-010-24	

ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-4	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-4	

1900D UE93 and after Pedestal Display ADAS-K-010-25

ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-4	

1900D UE93 and after Individual Display ADAS-K-010-26

ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-4	

200, 200T, 200C, 200CT, A200, A200C, A200CT, B200, B200C, B200T, B200CT, 300, 300LW, B300, and B300C
Pedestal Display with Torque Kit ADAS-K-010-27

ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-4	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-1	
Voltage to Frequency Converter Kit	1	TWIN-K-046-1[1]	

[1] The P&W Engine Services Voltage to Frequency Converters are not required for all aircraft types or models. Refer to the Aircraft Configuration Charts for which aircraft require them.

200, 200T, 200C, 200CT, A200, A200C, A200CT, B200, B200C, B200T, B200CT, 300, 300LW, B300, and B300C
Pedestal Display without Torque Kit ADAS-K-010-30

ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Trend Switch Kit	1	TWIN-K-027-2	
Additional Installation Materials Kit	1	TWIN-K-034-1	
Voltage to Frequency Converter Kit	1	TWIN-K-046-1[2]	

200, 200T, 200C, 200CT, A200, A200C, A200CT, B200, B200C, B200T, B200CT, 300, 300LW, B300, and B300C
Individual Display with Torque kit ADAS-K-010-31

ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Engine Torque Kit	1	TWIN-K-031-4	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-1	
Voltage to Frequency Converter Kit	1	TWIN-K-046-1[2]	

200, 200T, 200C, 200CT, A200, A200C, A200CT, B200, B200C, B200T, B200CT, 300, 300LW, B300, and B300C
Individual Display without Torque kit ADAS-K-010-32

ADAS+ Processor Assembly	1	ADAS-K-017-2	
Engine Harness Kit	1	ADAS-K-014-2	
Aircraft Outside Air Temperature Probe Kit	1	DPU-K-032-1	
Aircraft Vertical Accelerometer Kit	1	TWIN-K-032-1	**(No longer Available)**
Pitot / Static Pressure Kit	1	TWIN-K-033-2	
Cockpit Fault Lamp and Download Port Kit	1	DPU-K-046-3	
Additional Installation Materials Kit	1	TWIN-K-034-1	
Voltage to Frequency Converter Kit	1	TWIN-K-046-1[2]	

[2] The P&W Engine Services Voltage to Frequency Converters are not required for all aircraft types or models. Refer to the Aircraft Configuration Charts for which aircraft require them.

10.1.2 Components by Kit

TWIN-K-027-2	COCKPIT TREND SWITCH KIT	
Assy., Cockpit Trend Switch	TWIN-A-064-2	Qty 1
Connector, Hi-Density	MS24308/2-11F	Qty 1
Backshell	400-00038	Qty 1
Screw, Lock Post	990-00052	Qty 1

ADAS-K-017-2	PROCESSOR ASSEMBLY	
Processor	EMU-A-010-5	Qty 1
Mounting Bracket	DPU-D-030-1	Qty 1
Shock Mounts, Lord	990-00020	Qty 4
Washer, Processor Mount	920-00006	Qty 4
Nut, Locking, Processor Mount	MS21042-06	Qty 4
Nut, Rivet, #10	910-00015	Qty 4
Screw, #10	MS35207-261	Qty 4
Washer, Flat, #10	AN960-10L	Qty 4
Strap, Ground	DPU-C-050-1	Qty 1

ADAS-K-014-2	ENGINE HARNESS KIT	
Cable Assembly, J1	EMU-C-025-1	Qty 1
Cable Assembly, J2	ADAS-C-035-1	Qty 1
Cable Assembly, J3	ADAS-C-037-1	Qty 1

TWIN-K-031-3	ENGINE HIGH PRECISION TORQUE KIT	
Transducer, 0 -- 100 PSIG	750-00005	Qty 4
Elbow, Double Swivel, 37° Flare	960-00014	Qty 4
Fitting, “T”, Swivel	960-00006	Qty 4
Adapter, Boss O ring, 37° flare	960-00015	Qty 4
Clamp	MS21919WCJ12	Qty 4
Clamp	MS21919WCJ14	Qty 4
	(Alternate: MS21919WCH14)	
Screw	MS35207-271	Qty 4
Nut	AN363-1032	Qty 4
Spacer	940-00004	Qty 4
Washer	AN960-10L	Qty 4
Wall Mount Connector	MS3450KT16S-8S	Qty 2
(Alternate	MS3450KT14S-5S)	
Cable Connector	MS3456KT16S-8P	Qty 2
(Alternate	MS3456KT14S-5P)	
Backshell	M85049/41-10A	Qty 4
(Alternate	M85049/41-8A)	
Cable	M27500/20RC4S06	Qty 60 ft.
Transducer Harness	750-00006	Qty 4

TWIN-K-031-4	ENGINE HIGH PRECISION TORQUE KIT

Transducer, 0 – 100 PSIG	750-00005	Qty 4
Elbow, Double Swivel, 37° Flare	960-00014	Qty 4
Fitting, "T", Swivel	960-00006	Qty 4
Adapter, Boss O ring, 37° Flare	960-00015	Qty 4
Clamp	MS21919WCJ12	Qty 4
Clamp	MS21919WCJ14	Qty 4
	(Alternate: MS21919WCH14)	
Screw	MS35207-271	Qty 4
Nut	AN363-1032	Qty 4
Spacer	940-00004	Qty 4
Washer	AN960-10L	Qty 4
Cable	M27500/20RC4S06	Qty 60 ft.
Transducer Harness	750-00006	Qty 4

TWIN-K-032-1 AIRCRAFT VERTICAL ACCELEROMETER KIT

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009.

Accelerometer, 5g	TWIN-D-035-1	Qty 1
Screw	MS35206-230	Qty 2
Nut	AN365-632A	Qty 2
Washer	AN960-6	Qty 2
Connector	400-000026	Qty 1

TWIN-K-033-1 PITOT / STATIC PRESSURE KIT

Bracket, Transducer Mounting	TWIN-D-014-1	Qty 1
Nipple, Pipe	AN911-1D	Qty 2
Tee, Pipe	AN917-1D	Qty 2
Nipple, Flare	AN816-4D	Qty 2
Hose, Inlet Pressure	990-00028	Qty 4 Ft.
Fitting, Inlet Pressure Hose	960-00027	Qty 4
Adapter, Pipe to 37° Flare	960-00002	Qty 1
Tee, Pipe	AN917-2D	Qty 1
Nipple, Flare	AN816-4-4D	Qty 1
Bushing	AN912-1D	Qty 1
Fitting, Male Nylo-Seal	960-00024	Qty 1
Tubing, Tygon	990-00030	Qty 1 Ft
Insert	920-00010	Qty 1
Transducer, 0 – 3 PSID	750-00001	Qty 1
Transducer, 0 – 15 PSIA	750-00002	Qty 1
Clamp, Inlet Pressure Hose	MS21919WDG17	Qty 1
Clamp, Inlet Pressure Transducer	MS21919WDG26	Qty 1
Screw, 6-32	MS35206-227	Qty 3
Washer, Flat, #6	AN960-6	Qty 3
Nut, Locking, 6-32	AN365-632A	Qty 3
Bolt, 10-32	MS35207-263	Qty 2
Nut, Locking, 10-32	AN365-1032A	Qty 2
Washer, #10	AN960-10	Qty 2
Standoff	940-00003	Qty 1

TWIN-K-033-2 PITOT / STATIC PRESSURE KIT

Bracket, Transducer Mounting	TWIN-D-014-1	Qty 1
Hose, Inlet Pressure	990-00028	Qty 4 Ft.
Fitting, Inlet Pressure Hose	960-00027	Qty 4
Adapter, Pipe to 37° Flare	960-00002	Qty 1
Tee, Pipe	AN917-2D	Qty 1
Nipple, Flare	AN816-4-4D	Qty 1
Bushing	AN912-1D	Qty 1
Fitting, Male Nylo-Seal	960-00024	Qty 1
Tubing, Tygon	990-00030	Qty 1 Ft
Insert	920-00010	Qty 1
Transducer, 0 – 3 PSID	750-00001	Qty 1
Transducer, 0 – 15 PSIA	750-00002	Qty 1
Clamp, Inlet Pressure Hose	MS21919WDG17	Qty 1
Clamp, Inlet Pressure Transducer	MS21919WDG26	Qty 1
Screw, 6-32	MS35206-227	Qty 3
Washer, Flat, #6	AN960-6	Qty 3
Nut, Locking, 6-32	AN365-632A	Qty 3
Bolt, 10-32	MS35207-263	Qty 2
Nut, Locking, 10-32	AN365-1032A	Qty 2
Washer, #10	AN960-10	Qty 2
Standoff	940-00003	Qty 1
Reducer	960-00031	Qty 1
“T” Swivel, -6	960-00032	Qty 1
“T” Swivel, -4	960-00003	Qty 1

TWIN-K-034-1 ADDITIONAL INSTALLATION MATERIALS KIT

Grommet, Pressure Bulkhead	990-00035	Qty 1
T5 Crimp Lug, Alumel	400-00034	Qty 2
T5 Crimp Lug, Chromel	400-00035	Qty 2
Fuse Holder, In-Line	DPU-C-057-1	Qty 2
Fuse, 1 Amp	990-00033	Qty 2
Terminal, End	400-00030	Qty 4

TWIN-K-034-4 ADDITIONAL INSTALLATION MATERIALS KIT

Grommet, Pressure Bulkhead	990-00035	Qty 1
T5 Crimp Lug, Alumel	400-00034	Qty 2
T5 Crimp Lug, Chromel	400-00035	Qty 2
Fuse Holder, In-Line	DPU-C-057-1	Qty 1
Fuse, 1 Amp	990-00033	Qty 1
Breaker, Circuit 1 Amp	990-00032	Qty 1
Terminal, End	400-00030	Qty 4

DPU-K-032-1 AIRCRAFT OUTSIDE AIR TEMPERATURE PROBE KIT

Probe, Temperature	TWIN-A-050-2	Qty 1
Nut, Jam	TWIN-D-061-1	Qty 1
Washer	AN960-816L	Qty 2
Washer	AN960-10	Qty 1
Nut	AN365-1032A	Qty 1
Seal, "O" Ring	AN6227B-10	Qty 1
Screw, Drilled	AN3H-4A	Qty 1
Doubler, OAT Probe	DPU-D-047-1	Qty 1

DPU-K-046-3 COCKPIT FAULT LAMP AND DOWNLOAD PORT KIT

Assy., Cockpit Fault Lamp	DPU-A-043-1	Qty 1
Connector, 6 Pin Female	400-00026	Qty 1
Assy., Download Port	DPU-A-044-1	Qty 1
Connector, 6 Pin, Male	400-00027	Qty 1
Cover, Receptacle	990-00031	Qty 1
Lens	TREND-D-041-1	Qty 1
Screw	900-00009	Qty 1
Washer	AN960-4	Qty 1
Nut	910-00001	Qty 1

TWIN-K-046-1 VOLTAGE TO FREQUENCY CONVERTER KIT

Voltage to Frequency Converter	TWIN-A-042-1	Qty 1
Cable harness Assemble	TWIN-C-043-1	Qty 1

11 LIST OF SPECIAL TOOLS

ConXall™ connectors are installed in this system. The following tools are recommended by the vendor for use with these connectors (vendor P/Ns): Insertion Bit (356-20), Pin Removal Bit (356-201), Socket Removal Bit (356-202), Handle (356-1), Crimp Tool (359-21), Locator (357-122). The vendor address is: ConXall Corporation, 601 East Wildwood, Villa Park, IL 60181.

12 FOR COMMUTER CATEGORY AIRCRAFT

For Commuter Category Aircraft, electrical load data applicable for each system and aircraft weight and balance must be identified. The ADAS+ has a current draw of 300 milliamps at 28V DC. The ADAS+ kit weighs 10.55 lbs.

13 RECOMMENDED OVERHAUL PERIODS

This section is not applicable

14 AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved. There are no airworthiness limitations for this equipment.

15 DIAGRAMS

15.1 Power/ Sensor Cable J1, 15 Pin S Keyed Connector

INSTALLATION CAUTION:

- ⇨ **Before making any wiring connections, verify all connection locations with the aircraft manufacturer's wiring diagram manuals.**
- ⇨ **Perform a continuity check on all wires before final connection.**
- ⇨ **Route all harnesses along existing harnesses wherever possible.**
- ⇨ **Cables may be marked with shrink-on labels near the terminal end. When you shorten a cable behind a label, be sure to re-label it.**

Connector Pin	Harness Wire Color	Signal Name	Wired To Refer to Section 6
4 COND CABLE			
J1 A	WHT/ORG	Pitot (Signal +)	GRN Wire Pitot Transducer
J1 B	WHT	Pitot/Static (5 VDC)	RED Wire Pitot/Static Transducer
J1 N	WHT/BLU	Pitot/Static (Ground)	BLK Wire Pitot/Static Transducer
J1 D	WHT/GRN	Static (Signal +)	GRN Wire Static Transducer
1 COND CABLE			
J1 F	WHT	28 VDC Bus Power	Bus Power, Supplied 1 Amp Fuse
2 COND CABLE			
J1 H	WHT	28 VDC Battery Power	Battery Power, 1 Amp Fuse
J1 G	WHT/BLU	System Ground	Aircraft Ground
J1 J	Unused		
J1 K	Unused		
J1 C	Unused		
J1 E	Unused		
J1 L	Unused		
J1 M	Unused		
J1 R	Unused		
J1 P	Unused		

15.2 Sensor Cable J2, 15 Pin SA Keyed Connector

INSTALLATION CAUTION:

- ⇨ **Before making any wiring connections, verify all connection locations with the aircraft manufacturer's wiring diagram manuals.**
- ⇨ **Perform a continuity check on all wires before final connection.**
- ⇨ **Route all harnesses along existing harnesses wherever possible.**
- ⇨ **Cables may be marked with shrink-on labels near the terminal end. When you shorten a cable behind a label, be sure to re-label it.**

NOTE: If aircraft is equipped with a Pro Line 21, route the engine sensor cables to the appropriate connector on the DCU-3001 located in the avionics bay of the aircraft. Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.

Connector Pin	Harness Wire Color	Signal Name	Wired To Refer to Section 6
4 COND CABLE			
J2 1	WHT	Eng 1 Torque (5 VDC)	RED Wire Both Torque Transducers
J2 2	WHT/ORG	Eng 1 Torque (Signal +)	GRN Wire High Torque Transducer
J2 3	WHT/BLU	Eng 1 Torque (Ground)	BLK Wire Both Torque Transducers
J2 4	WHT/GRN	Eng 1 Torque (Signal –)	GRN Wire Low Torque Transducer
2 COND CABLE			
J2 5	WHT	Eng 1 N1 "Spd 1" (Sig +)	Eng 1 N1 Instrument Gauge +
J2 6	WHT/BLU	Eng 1 N1 "Spd 1" (Sig –)	Eng 1 N1 Instrument Gauge –
2 COND CABLE			
J2 7	WHT	Eng 1 N2 "Spd 2" (Sig +)	Eng 1 Np Instrument Gauge +
J2 8	WHT/BLU	Eng 1 N2 "Spd 2" (Sig –)	Eng 1 Np Instrument Gauge –
2 COND CABLE			
J2 9	WHT	Eng 1 Fuel Flow (Sig +)	Eng 1 Fuel Flow Instrument Gauge +
J2 10	WHT/BLU	Eng 1 Fuel Flow (Sig –)	Eng 1 Fuel Flow Instrument Gauge –
THERMOCOUPLE			
J2 11	RED	Eng 1 ITT (Alumel –)	Eng 1 ITT Instrument Gauge –
J2 12	YEL	Eng 1 ITT (Chromel +)	Eng 1 ITT Instrument Gauge +
THERMOCOUPLE			
J2 13	RED	Eng 2 ITT (Alumel –)	Eng 2 ITT Instrument Gauge –
J2 14	YEL	Eng 2 ITT (Chromel +)	Eng 2 ITT Instrument Gauge +
2 COND CABLE			
J2 15	WHT	Flaps Approach	Flap Control
J2 16	WHT/BLU	Flaps Final	Flap Control

Connector Pin	Harness Wire Color	Wired To Signal Name	Refer to Section 6
2 COND CABLE			
J2 17	WHT	Eng 1 Particle Separator	Cockpit Particle Separator Control
J2 18	WHT/BLU	Eng 2 Particle Separator	Cockpit Particle Separator Control
1 COND CABLE			
J2 19	WHT	Eng 1 Bleed Air	Cockpit Bleed Air Control
1 COND CABLE			
J2 20	WHT	Eng 2 Bleed Air	Cockpit Bleed Air Control
1 COND CABLE			
J2 21	WHT	Weight On Wheels (WOW)	Cockpit WOW Control
1 COND CABLE			
J2 22	WHT	Gear Extended	Cockpit Gear Extended Control
3 COND CABLE			
J2 23	WHT/BLU	Vertical Accl. (GND)	Pin 1 ConXall™ Assy.
J2 24	WHT/ORG	Vertical Accl. (Signal +)	Pin 2 ConXall™ Assy.
J2 25	WHT	Vertical Accl. (5 VDC)	Pin 3 ConXall™ Assy.

NOTE: The Vertical Accelerometer is no longer available as of March 1, 2009. If the kit was purchased after March 1, 2009 and does not come with a Vertical Accelerometer, then cap and stow the wire as it will not be needed.

15.3 Cockpit Trend / Sensor Cable, J3, 37 Pin S Keyed Connector

INSTALLATION CAUTION:

- ⇨ **Before making any wiring connections, verify all connection locations with the aircraft manufacturer's wiring diagram manuals.**
- ⇨ **Perform a continuity check on all wires before final connection.**
- ⇨ **Route all harnesses along existing harnesses wherever possible. Do not connect to engine scavenge lines.**
- ⇨ **Cables may be marked with shrink-on labels near the terminal end. When you shorten a cable behind a label, be sure to re-label it.**

NOTE: If aircraft is equipped with a Pro Line 21, route the engine sensor cables to the appropriate connector on the DCU-3001 located in the avionics bay of the aircraft. Refer to the Wiring Diagrams and the Aircraft Connection Tables for the proper wiring connection locations.

Connector Pin	Harness Wire Color	Signal Name	Wired To Refer to Section 6
4 COND CABLE			
--	WHT	IND SW (VCC)	Lamp ConXall™ Pin 1
J3 19	WHT/ORG	IND SW (Switched)	Lamp ConXall™ Pin 4
J3 18	WHT/BLU	IND SW (GND)	Lamp ConXall™ Pin 2
J3 1	WHT/GRN	IND SW (TREND Switch)	Lamp ConXall™ Pin 3
1 COND CABLE			
J3 37	WHT	IND SW Open	Cap, Coil, and Stow (Near Lamp ConXall™)
4 COND CABLE			
J3 16	WHT	Download Port (RS485+)	Download ConXall™ Pin 1
J3 17	WHT/ORG	Download Port (RS485–)	Download ConXall™ Pin 2
J3 18	WHT/BLU	Download Port (GND)	Download ConXall™ Pin 3
J3 2	WHT/GRN	Download Port (Run/Conf)	Download ConXall™ Pin 4
4 COND CABLE			
J3 21	WHT	Air Temp ("D")	OAT Probe
J3 22	WHT/BLU	Air Temp ("G")	OAT Probe
J3 23	WHT/ORG	Air Temp ("R+")	OAT Probe
J3 24	WHT/GRN	Air Temp ("R–")	OAT Probe
4 COND CABLE			
J3 31	WHT	Eng 2 Torque (5 VDC)	RED Wire Both Torque Transducers
J3 32	WHT/BLU	Eng 2 Torque (Ground)	BLK Wire Both Torque Transducers
J3 33	WHT/ORG	Eng 2 Torque (Signal +)	GRN Wire High Torque Transducer
J3 34	WHT/GRN	Eng 2 Torque (Signal –)	GRN Wire Low Torque Transducer

Connector Pin	Harness Wire Color	Signal Name	Wired To Refer to Section 6
2 COND CABLE			
J3 35	WHT	Digital 1+	Cap, Coil, and Stow
J3 36	WHT/BLU	Digital 1 –	Cap, Coil, and Stow
4 WIRE JUMPER			
J3 7	GRN	Configuration Ground	Set at Factory
J3 8	GRN	Configuration ID 0	Set at Factory
J3 9	GRN	Configuration ID 1	Set at Factory
J3 10	GRN	Configuration ID 2	Set at Factory
2 COND CABLE			
J3 29	WHT	Eng 2 N1 "Spd 4" (Sig +)	Eng 2 N1 Instrument Gauge +
J3 30	WHT/BLU	Eng 2 N1 "Spd 4" (Sig –)	Eng 2 N1 Instrument Gauge –
2 COND CABLE			
J3 27	WHT	Eng 2 N2 "Spd 3" (Sig +)	Eng 2 Np Instrument Gauge +
J3 28	WHT/BLU	Eng 2 N2 "Spd 3" (Sig –)	Eng 2 Np Instrument Gauge –
2 COND CABLE			
J3 25	WHT	Eng 2 Fuel Flow (Sig +)	Eng 2 Fuel Flow Instrument Gauge +
J3 26	WHT/BLU	Eng 2 Fuel Flow (Sig –)	Eng 2 Fuel Flow Instrument Gauge –
3		Unused	
4		Unused	
5		Unused	
6		Unused	
11		Unused	
12		Unused	
13		Unused	
14		Unused	
15		Unused	
20		Unused	

16 Wiring Diagram

16.1 ADAS+ Connection Charts

16.1.1 ADAS+ Connection Chart – Raytheon Model 1900 & 1900C

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**All**	**ENG1 ITT Instrument Gauge**	***J2***
			M112 – Al (-)	Pin 11 *Alumel* Red
			M112 – Ch(+)	Pin 12 *Chromel* Yel
ENG2 ITT	**AAA11B22**	**All**	**ENG2 ITT Instrument Gauge**	***J2***
			M113 – Al (-)	Pin 13 *Alumel* Red
			M113 – Ch (+)	Pin 14 *Chromel* Yel
ENG1 N1 (Ng)	**AAP10B24**	**All**	**ENG1 N1 Instrument Gauge**	***J2***
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**All**	**ENG2 N1 Instrument Gauge**	***J3***
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**All**	**Supplied Torque Transducers**	***J2***
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**All**	**Supplied Torque Transducers**	***J3***
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**All**	**ENG1 N2 Instrument Gauge**	***J2***
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**All**	**ENG2 N2 Instrument Gauge**	***J3***
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf) *	**AAP00B24**	**All**	**ENG1 Wf Instrument Gauge**	***J2***
			P131 – Pin A	Pin 9 WHT
			P131 – Pin I	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf) *	**AAP01B24**	**All**	**ENG2 Wf Instrument Gauge**	***J3***
			P132 – Pin A	Pin 25 WHT
			P132 – Pin I	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Control Switch**	***J2***
			H131A20	*Pin 19 WHT*
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Control Switch**	***J2***
			H143A20	*Pin 20 WHT*

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H218A20	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H125A20	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 14C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			J125 – Pin 2	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			P200 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**Bus Bar - Hot Battery**	**J1**
			W214	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 1: 1900 and 1900C

WIRING NOTE:

Some configurations of Raytheon aircraft have the Foxboro Fuel Flow Indicator and/or Totalizer System installed. Please refer to the change in wiring for the fuel flow circuit if the following kits are installed:

Kit No. 114-9026-3 S

Kit No. 114-9026-5 S

Kit No. 114-9026-7 S

		J2
ENG1 Fuel Flow (Wf) *	P131 - Pin E (+)	Pin 9 WHT
	P131 – Pin F (–)	Pin 10 WHT/BLU
		J3
ENG2 Fuel Flow (Wf) *	P132 - Pin E (+)	Pin 25 WHT
	P132 – Pin F (–)	Pin 26 WHT/BLU

16.1.2 ADAS+ Connection Chart – Raytheon Model 1900D

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**S/N UE1 thru UE 92**	**ENG1 ITT Instrument Gauge**	**J2**
			M13 – Term E1 Al (-)	Pin 11 Alumel Red
			M13 – Term E2 Ch (+)	Pin 12 Chromel Yel
		S/N UE93 & higher	P237 – Pin G Al (-)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**S/N UE1 thru UE 92**	**ENG2 ITT Instrument Gauge**	**J2**
			M12 – Term E1 Al (-)	Pin 13 Alumel Red
			M12 – Term E2 Ch (+)	Pin 14 Chromel Yel
		S/N UE93 & higher	P238 – Pin G Al (-)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**S/N UE1 thru UE 92**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		S/N UE93 & higher	P115 – Pin H	Pin 5 WHT
			P115 – Pin P	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**S/N UE1 thru UE 92**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		S/N UE93 & higher	P116 – Pin H	Pin 29 WHT
			P116 – Pin P	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**S/N UE1 thru UE 92**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
		S/N UE93 & higher	**ENG1 Tq Instrument Gauge**	**J2**
			P119 – Pin S (+)	Pin 2 WHT/ORG
			P119 – Pin T (-)	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**S/N UE1 thru UE 92**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
		S/N UE93 & higher	**ENG2 Tq Instrument Gauge**	**J3**
			P120 – Pin S (+)	Pin 33 WHT/ORG
			P120 – Pin T (-)	Pin 34 WHT/GRN

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 N2 (Np)	**AAP11B24**	**S/N UE1 thru UE 92**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		S/N UE93 & higher	P146 – Pin H	Pin 7 WHT
			P146 – Pin P	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**S/N UE1 thru UE 92**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		S/N UE93 & higher	P147 – Pin H	Pin 27 WHT
			P147 – Pin P	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**All**	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**All**	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin F	Pin 25 WHT
			P132 – Pin E	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Control Switch**	**J2**
			H131A20	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Control Switch**	**J2**
			H143A20	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H218A20	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H125A20	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 14C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			J542 – Pin M	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			P200 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**P202**	**J1**
			Pin 11 or 12	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 2: 1900D

16.1.3 ADAS+ Connection Chart – Raytheon Model 200 & 200T

⇨ **P&W Engine Services Voltage to Frequency Converters are required for Beech Configuration 1 and 2 Fuel Flow systems for these model aircraft.**

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**All**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (-)	Pin 11 Alumel Red
			M112 – Ch(+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**All**	**ENG2 ITT Instrument Gauge**	**J2**
			M113 – Al (-)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Configuration 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Configuration 2	P115 – Pin H	Pin 5 WHT
			P115 – Pin P	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Configuration 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Configuration 2	P116 – Pin H	Pin 29 WHT
			P116 – Pin P	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**All**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**All**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Configuration 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Configuration 2	P146 – Pin H	Pin 7 WHT
			P146 – Pin P	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Configuration 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Configuration 2	P147 – Pin H	Pin 27 WHT
			P147 – Pin P	Pin 28 WHT/BLU
Battery Power	**AAV00B22**	**Configuration 1**	**Bus Bar Panel Assy.**	**J1**
			W103	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Battery Power	**AAV10A22**	**Configuration 2**	**Bus Bar Panel Assy.**	**J1**
		Configuration 3	W1	Pin H WHT
		Configuration 4	Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Fuel Flow (Wf) *	AAP00B24	See Fuel Flow Converter Below		
ENG2 Fuel Flow (Wf) *	AAP01B24	See Fuel Flow Converter Below		
ENG1 Bleed Air	AAD11A24	All	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	AAD12A24	All	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	AAD13B24	All	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	AAD13B24	All	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	AAD14B24	All	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	AAD14B24	All	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	AAD00A24	All	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	AAD15A24	All	**Gear Extended Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT

***Fuel Flow Converter**

Sensor	Wire Number	Configuration	Component	
ENG1 Fuel Flow (Wf)	AAP00B24	Configuration 1	**ENG1 Wf Instrument Gauge**	**Fuel Flow Converter**
			P131 – Pin D	Pin 5
			P131 – Pin C	Pin 9
			ADAS+ Connector J2	**Fuel Flow Converter**
			Pin 9 WHT	Pin 4
			Pin 10 WHT/BLU	Pin 8
		Configuration 2	**ENG1 Wf Instrument Gauge**	**Fuel Flow Converter**
			P131 – Pin C	Pin 5
			P131 – Pin B	Pin 9
			ADAS+ Connector J2	**Fuel Flow Converter**
			Pin 9 WHT	Pin 4
			Pin 10 WHT/BLU	Pin 8
ENG2 Fuel Flow (Wf)	AAP01B24	Configuration 1	**ENG2 Wf Instrument Gauge**	**Fuel Flow Converter**
			P132 – Pin D	Pin 1
			P132 – Pin C	Pin 6
			ADAS+ Connector J3	**Fuel Flow Converter**
			Pin 25 WHT	Pin 2
			Pin 26 WHT/BLU	Pin 7
		Configuration 2	**ENG2 Wf Instrument Gauge**	**Fuel Flow Converter**
			P132 – Pin C	Pin 1
			P132 – Pin B	Pin 6
			ADAS+ Connector J3	**Fuel Flow Converter**
			Pin 25 WHT	Pin 2
			Pin 26 WHT/BLU	Pin 7

Table C- 3: 200 and 200T

16.1.4 ADAS+ Connection Chart – Raytheon Model 200CT, A200, A200C, & A200CT

⇨ **P&W Engine Services Voltage to Frequency Converters are required for Beech Configuration 1 Fuel Flow Indicator systems in these aircraft.**

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Configuration 1**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (-)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Configuration 2	M112 – Al (-)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Configuration 3	P237 – Pin G Al (-)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Configuration 1**	**ENG2 ITT Instrument Gauge**	**J2**
			M12 – Term E1 Al (-)	Pin 13 Alumel Red
			M12 – Term E2 Ch (+)	Pin 14 Chromel Yel
		Configuration 2	M12 – Term E1 Al (-)	Pin 13 Alumel Red
			M12 – Term E2 Ch (+)	Pin 14 Chromel Yel
		Configuration 3	P238 – Pin G Al (-)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Configuration 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Configuration 2	P115 – Pin H	Pin 5 WHT
			P115 – Pin P	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Configuration 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Configuration 2	P116 – Pin H	Pin 29 WHT
			P116 – Pin P	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**All**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**All**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Configuration 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Configuration 2	P146 – Pin H	Pin 7 WHT
			P146 – Pin P	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Configuration 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Configuration 2	P147 – Pin H	Pin 27 WHT
			P147 – Pin P	Pin 28 WHT/BLU

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Fuel Flow (Wf) *	**AAP00B24**	**Configuration 1 ***	**See Fuel Flow Converter Chart on next page**	
		Configuration 2 & 3	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf) *	**AAP01B24**	**Configuration 1 ***	**See Fuel Flow Converter Chart on next page**	
		Configuration 2 & 3	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin F	Pin 25 WHT
			P132 – Pin E	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Control Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Control Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**Configuration 1**	**A228 Panel Assy. – Batt Bus Pwr**	**J1**
			W103	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Battery Power	**AAV00B22**	**Configuration 2 Configuration 3 Configuration 4**	**A228 Panel Assy. – Batt Bus Pwr**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

*** Fuel Flow Converter**

Sensor	Wire Number	Configuration	Component	
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Configuration 1**	**ENG1 Wf Instrument Gauge**	**Fuel Flow Converter**
			P131 – Pin C	Pin 5
			P131 – Pin B	Pin 9
			ADAS+ Connector J2	**Fuel Flow Converter**
			Pin 9 WHT	Pin 4
			Pin 10 WHT/BLU	Pin 8
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Configuration 1**	**ENG2 Wf Instrument Gauge**	**Fuel Flow Converter**
			P132 – Pin C	Pin 1
			P132 – Pin B	Pin 6
			ADAS+ Connector J3	**Fuel Flow Converter**
			Pin 25 WHT	Pin 2
			Pin 26 WHT/BLU	Pin 7

Table C- 4: 200CT, A200, A200C, and A200CT

16.1.5 ADAS+ Connection Chart – Raytheon Model B200C, B200CT, B200, & B200T

⇨ **P&W Engine Services Voltage to Frequency Converters are required for Beech Configuration 1 Fuel Flow Indicator systems in these aircraft.**

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Configuration 1 & 2**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (-)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Configuration 3	P237 – Pin G Al (-)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Configuration 1 & 2**	**ENG2 ITT Instrument Gauge**	**J2**
			M113 – Al (-)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
		Configuration 3	P238 – Pin G Al (-)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Configuration 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Configuration 2	P115 – Pin H	Pin 5 WHT
			P115 – Pin P	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Configuration 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Configuration 2	P116 – Pin H	Pin 29 WHT
			P116 – Pin P	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Configuration 1**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
		Configuration 2	**ENG1 Tq Instrument Gauge**	**J2**
			P119 – Pin S (+)	Pin 2 WHT/ORG
			P119 – Pin T (-)	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Configuration 1**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
		Configuration 2	**ENG2 Tq Instrument Gauge**	**J3**
			P120 – Pin S (+)	Pin 33 WHT/ORG
			P120 – Pin T (-)	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Configuration 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Configuration 2	P146 – Pin H	Pin 7 WHT
			P146 – Pin P	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Configuration 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Configuration 2	P147 – Pin H	Pin 27 WHT
			P147 – Pin P	Pin 28 WHT/BLU

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Fuel Flow (Wf) *	**AAP00B24**	**Configuration 1 ***	**See Fuel Flow Converter Below**	
		Configuration 2 & 3	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf) *	**AAP01B24**	**Configuration 1 ***	**See Fuel Flow Converter Below**	
		Configuration 2 & 3	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin F	Pin 25 WHT
			P132 – Pin E	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Control Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Control Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**Configuration 1**	**A228 Panel Assy. – Batt Bus Pwr**	**J1**
			W103	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Battery Power	**AAV00B22**	**Configuration 2 Configuration 3 Configuration 4**	**A228 Panel Assy. – Batt Bus Pwr**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

*** Fuel Flow Converter**

Sensor	Wire Number	Configuration	Component	
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Configuration 1**	**ENG1 Wf Instrument Gauge**	**Fuel Flow Converter**
			P131 – Pin C	Pin 5
			P131 – Pin B	Pin 9
			ADAS+ Connector J2	**Fuel Flow Converter**
			Pin 9 WHT	Pin 4
			Pin 10 WHT/BLU	Pin 8
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Configuration 1**	**ENG2 Wf Instrument Gauge**	**Fuel Flow Converter**
			P132 – Pin C	Pin 1
			P132 – Pin B	Pin 6
			ADAS+ Connector J3	**Fuel Flow Converter**
			Pin 25 WHT	Pin 2
			Pin 26 WHT/BLU	Pin 7

Table C- 5: B200C, B200CT, B200, and B200T

16.1.6 ADAS+ Connection Chart – Raytheon Model 300

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**All**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (-)	Pin 11 Alumel Red
			M112 – Ch(+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**All**	**ENG2 ITT Instrument Gauge**	**J2**
			M113 – Al (-)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**All**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**All**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**All**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**All**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**All**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**All**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**All**	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin I	Pin 9 WHT
			P131 – Pin D	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**All**	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin I	Pin 25 WHT
			P132 – Pin D	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Control Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Control Switch**	**J2**
			H124A22	Pin 20 WHT

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**A1 Circuit Breaker Box Assy.**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 6: 300

16.1.7 ADAS+ Connection Chart – Raytheon Model B300

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Config. 1**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (-)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Config. 2	P237 – Pin G Al (-)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Config. 1**	**ENG2 ITT Instrument Gauge**	**J2**
			M113 – Al (-)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
		Config. 2	P238 – Pin G Al (-)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Config. 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Config. 2	P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Config. 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Config. 2	P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Config. 1 & 2**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
		Config. 3	**ENG1 Tq Instrument Gauge**	**J2**
			P119 – Pin H (High)	Pin 2 WHT/ORG
			P119 – Pin G (Low)	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Config. 1 & 2**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
		Config. 3	**ENG2 Tq Instrument Gauge**	**J3**
			P120 – Pin H (High)	Pin 33 WHT/ORG
			P120 – Pin G (Low)	Pin 34 WHT/GRN

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 N2 (Np)	**AAP11B24**	**Configuration 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Configuration 2	P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Configuration 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Configuration 2	P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Configuration 1**	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin I	Pin 9 WHT
			P131 – Pin D	Pin 10 WHT/BLU
		Configurations 2, 3, & 4	P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Configuration 1**	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin I	Pin 25 WHT
			P132 – Pin D	Pin 26 WHT/BLU
		Configurations 2, 3, & 4	P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Control Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Control Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**A1 Circuit Breaker Box Assy.**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 7: B300

16.1.8 ADAS+ Connection Chart – Raytheon Model B300C & 300LW

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Configuration 1**	**ENG1 ITT Instrument Gauge**	**J2**
			M112 – Al (-)	Pin 11 Alumel Red
			M112 – Ch (+)	Pin 12 Chromel Yel
		Configuration 2	P237 – Pin G Al (-)	Pin 11 Alumel Red
			P237 – Pin H Ch (+)	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Configuration 1**	**ENG2 ITT Instrument Gauge**	**J2**
			M113 – Al (-)	Pin 13 Alumel Red
			M113 – Ch (+)	Pin 14 Chromel Yel
		Configuration 2	P238 – Pin G Al (-)	Pin 13 Alumel Red
			P238 – Pin H Ch (+)	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Configuration 1**	**ENG1 N1 Instrument Gauge**	**J2**
			P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
		Configuration 2	P115 – Pin A	Pin 5 WHT
			P115 – Pin B	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Configuration 1**	**ENG2 N1 Instrument Gauge**	**J3**
			P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
		Configuration 2	P116 – Pin A	Pin 29 WHT
			P116 – Pin B	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Configurations 1 & 2**	**Supplied Torque Transducers**	**J2**
			RED Wire	Pin 1 WHT
			GRN Wire High	Pin 2 WHT/ORG
			BLK Wire	Pin 3 WHT/BLU
			GRN Wire Low	Pin 4 WHT/GRN
		Configuration 3	**Eng1 Tq Instrument Gauge**	**J2**
			P119 – Pin H (High)	Pin 2 WHT/ORG
			P119 – Pin G (Low)	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Configurations 1 & 2**	**Supplied Torque Transducers**	**J3**
			RED Wire	Pin 31 WHT
			BLK Wire	Pin 32 WHT/BLU
			GRN Wire High	Pin 33 WHT/ORG
			GRN Wire Low	Pin 34 WHT/GRN
		Configuration 3	**Eng 2 Tq Instrument Gauge**	**J3**
			P120 – Pin H (High)	Pin 33 WHT/ORG
			P120 – Pin G (Low)	Pin 34 WHT/GRN

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 N2 (Np)	**AAP11B24**	**Configuration 1**	**ENG1 N2 Instrument Gauge**	**J2**
			P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
		Configuration 2	P146 – Pin A	Pin 7 WHT
			P146 – Pin B	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Configuration 1**	**ENG2 N2 Instrument Gauge**	**J3**
			P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
		Configuration 2	P147 – Pin A	Pin 27 WHT
			P147 – Pin B	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Configuration 1**	**ENG1 Wf Instrument Gauge**	**J2**
			P131 – Pin I	Pin 9 WHT
			P131 – Pin D	Pin 10 WHT/BLU
		Configurations 2, 3, & 4	P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Configuration 1**	**ENG2 Wf Instrument Gauge**	**J3**
			P132 – Pin I	Pin 25 WHT
			P132 – Pin D	Pin 26 WHT/BLU
		Configurations 2, 3, & 4	P131 – Pin F	Pin 9 WHT
			P131 – Pin E	Pin 10 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**All**	**ENG1 Bleed Air Control Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**All**	**ENG2 Bleed Air Control Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**All**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**All**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**All**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**All**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**All**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**All**	**Gear Extended Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT
Battery Power	**AAV00B22**	**All**	**A1 Circuit Breaker Box Assy.**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**All**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 8: B300C and 300LW

16.1.9 ADAS+ Connection Chart – Raytheon Model 200 Series with Pro Line 21

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 28	Pin 11 Alumel Red
			7710P3 – Pin 1	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Pro Line 21**	**NO. 2 DCU-3001**	**J2**
			7710P4 – Pin 28	Pin 13 Alumel Red
			7710P4 – Pin 1	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P1 – Pin 23	Pin 5 WHT
			7710P1 – Pin 47	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P2 – Pin 23	Pin 29 WHT
			7710P2 – Pin 47	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 72	Pin 2 WHT/ORG
			7710P3 – Pin 59	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P4 – Pin 72	Pin 33 WHT/ORG
			7710P4 – Pin 59	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P1 – Pin 24	Pin 7 WHT
			7710P1 – Pin 48	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P2 – Pin 24	Pin 27 WHT
			7710P2 – Pin 48	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 67	Pin 9 WHT
			7710P3 – Pin 68	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P4 – Pin 67	Pin 25 WHT
			7710P4 – Pin 68	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**Pro Line 21**	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**Pro Line 21**	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD13B24**	**Pro Line 21**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**Pro Line 21**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**Pro Line 21**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**Pro Line 21**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**Pro Line 21**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**Pro Line 21**	**Gear Extended Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
Battery Power	**AAV00B22**	**Pro Line 21**	**A1 Circuit Breaker Box Assy.**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**Pro Line 21**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 9: Model 200 Series with Pro Line 21

16.1.10 ADAS+ Connection Chart – Raytheon Model 300 Series with Pro Line 21

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
ENG1 ITT	**AAA10B22**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 28	Pin 11 Alumel Red
			7710P3 – Pin 1	Pin 12 Chromel Yel
ENG2 ITT	**AAA11B22**	**Pro Line 21**	**NO. 2 DCU-3001**	**J2**
			7710P4 – Pin 28	Pin 13 Alumel Red
			7710P4 – Pin 1	Pin 14 Chromel Yel
ENG1 N1 (Ng)	**AAP10B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P1 – Pin 23	Pin 5 WHT
			7710P1 – Pin 47	Pin 6 WHT/BLU
ENG2 N1 (Ng)	**AAP12B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P2 – Pin 23	Pin 29 WHT
			7710P2 – Pin 47	Pin 30 WHT/BLU
ENG1 Engine Torque (Tq)	**AAA20D24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 72	Pin 2 WHT/ORG
			7710P3 – Pin 59	Pin 4 WHT/GRN
ENG2 Engine Torque (Tq)	**AAA21D24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P4 – Pin 72	Pin 33 WHT/ORG
			7710P4 – Pin 59	Pin 34 WHT/GRN
ENG1 N2 (Np)	**AAP11B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P1 – Pin 24	Pin 7 WHT
			7710P1 – Pin 48	Pin 8 WHT/BLU
ENG2 N2 (Np)	**AAP13B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P2 – Pin 24	Pin 27 WHT
			7710P2 – Pin 48	Pin 28 WHT/BLU
ENG1 Fuel Flow (Wf)	**AAP00B24**	**Pro Line 21**	**NO. 1 DCU-3001**	**J2**
			7710P3 – Pin 67	Pin 9 WHT
			7710P3 – Pin 68	Pin 10 WHT/BLU
ENG2 Fuel Flow (Wf)	**AAP01B24**	**Pro Line 21**	**NO. 2 DCU-3001**	**J3**
			7710P4 – Pin 67	Pin 25 WHT
			7710P4 – Pin 68	Pin 26 WHT/BLU
ENG1 Bleed Air	**AAD11A24**	**Pro Line 21**	**ENG1 Bleed Air Switch**	**J2**
			H119A22	Pin 19 WHT
ENG2 Bleed Air	**AAD12A24**	**Pro Line 21**	**ENG2 Bleed Air Switch**	**J2**
			H124A22	Pin 20 WHT
ENG1 Particle Separator	**AAD14B24**	**Pro Line 21**	**ENG1 P/S Control Switch**	**J2**
			H208A22	Pin 17 WHT
ENG2 Particle Separator	**AAD13B24**	**Pro Line 21**	**ENG2 P/S Control Switch**	**J2**
			H211A22	Pin 18 WHT/BLU
Flaps Approach	**AAD14B24**	**Pro Line 21**	**Flaps Approach Cockpit Control**	**J2**
			P194 – Pin 5C	Pin 15 WHT
Flaps Final	**AAD14B24**	**Pro Line 21**	**Flaps Final Cockpit Control**	**J2**
			P194 – Pin 12C	Pin 16 WHT/BLU
WOW	**AAD00A24**	**Pro Line 21**	**WOW Cockpit Control**	**J2**
			A100 – Pin 1	Pin 21 WHT
Gear Extended	**AAD15A24**	**Pro Line 21**	**Gear Extended Cockpit Control**	**J2**
			A100 – Pin 6	Pin 22 WHT

Sensor	Wire Number	Configuration	Aircraft Component	ADAS+ Connector
Battery Power	**AAV00B22**	**Pro Line 21** ***Configuration 1***	**A228 Panel Assy. -Batt Bus Pwr**	**J1**
			W103	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
		Pro Line 21 ***Configuration 2, 3, & 4***	**A228 Panel Assy. -Batt Bus Pwr**	**J1**
			W1	Pin H WHT
			Aircraft Ground	Pin G WHT/BLU
Bus Power	**AAV10A22**	**Pro Line 21**	**Main Bus**	**J1**
			Supplied Circuit Breaker	Pin F WHT

Table C- 10: Model 300 Series with Pro Line 21

16.2 ADAS+ Interconnect Schematics

16.2.1 ADAS+ Interconnect Schematic – With Supplied Torque Transducers and Without Fuel Flow Voltage to Frequency Converter

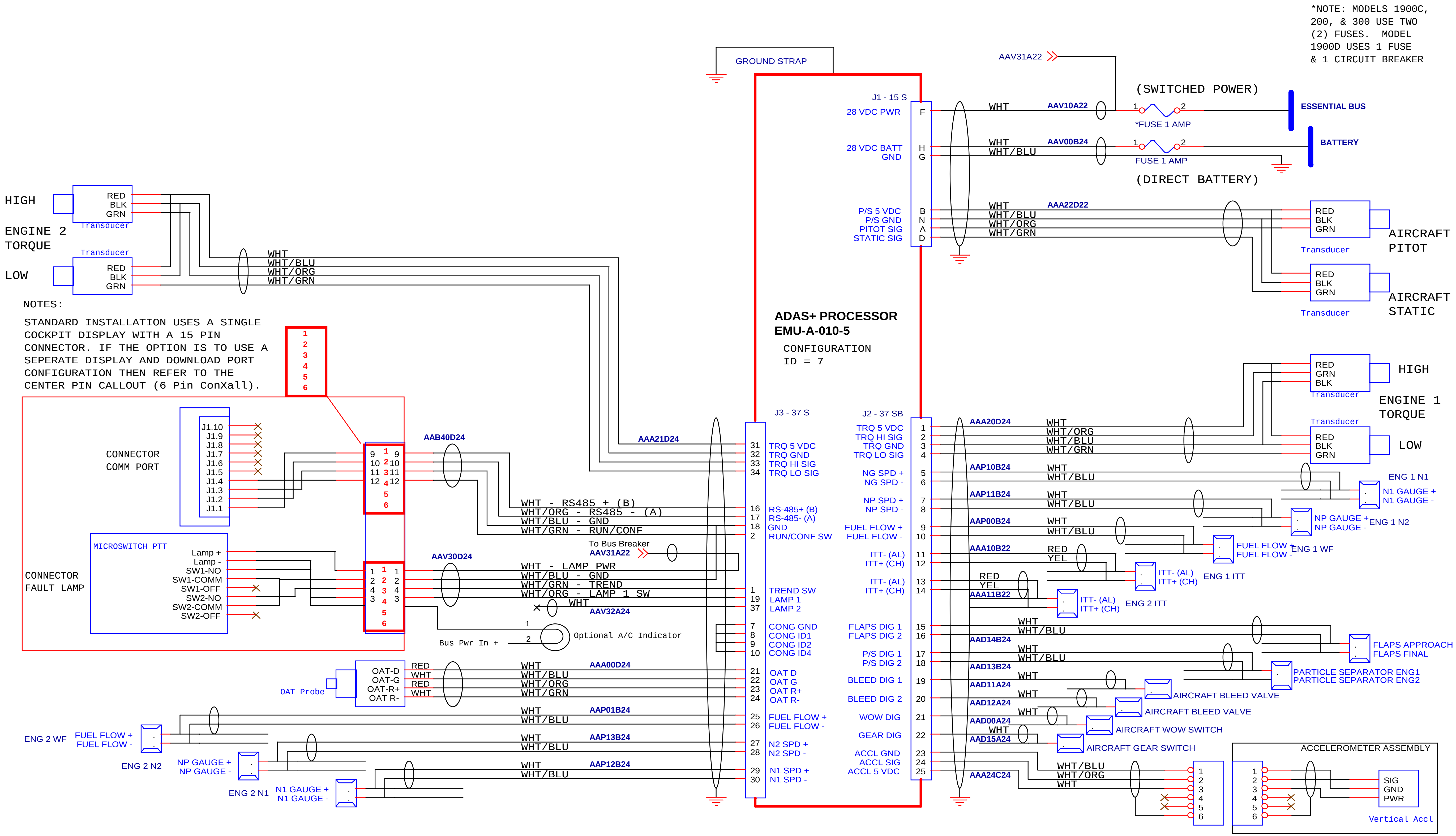

Figure C- 18: Wiring Schematic – With Torque Transducers and Without Fuel Flow Converter

16.2.2 ADAS+ Interconnect Schematic – Without Supplied Torque Transducers and With Fuel Flow Voltage to Frequency Converter

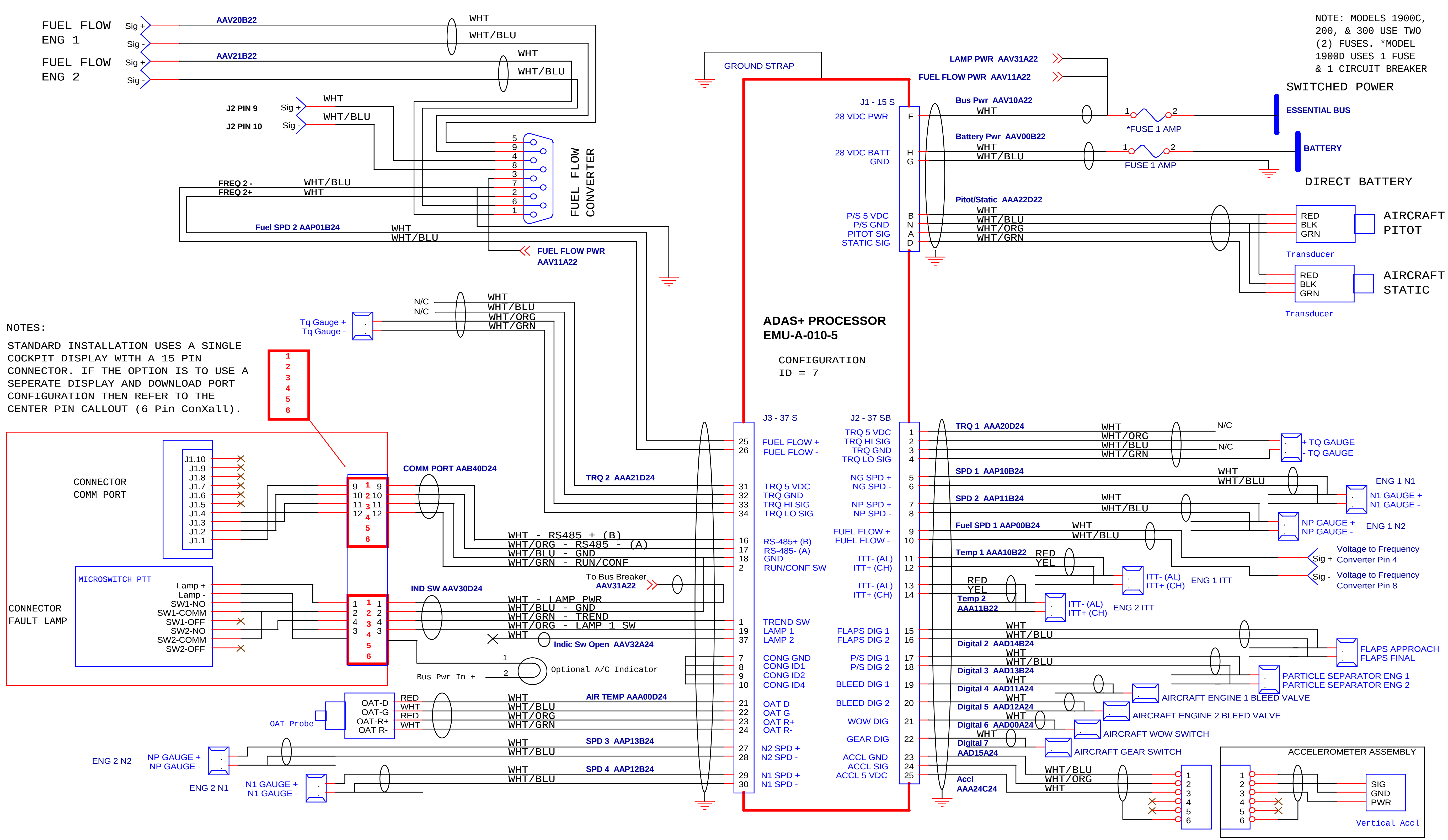

Figure C- 19: Wiring Schematic – Without Torque Transducers and With Fuel Flow Converter

16.2.3 ADAS+ Interconnect Schematic – With Supplied Torque Transducers and With Fuel Flow Voltage to Frequency Converter

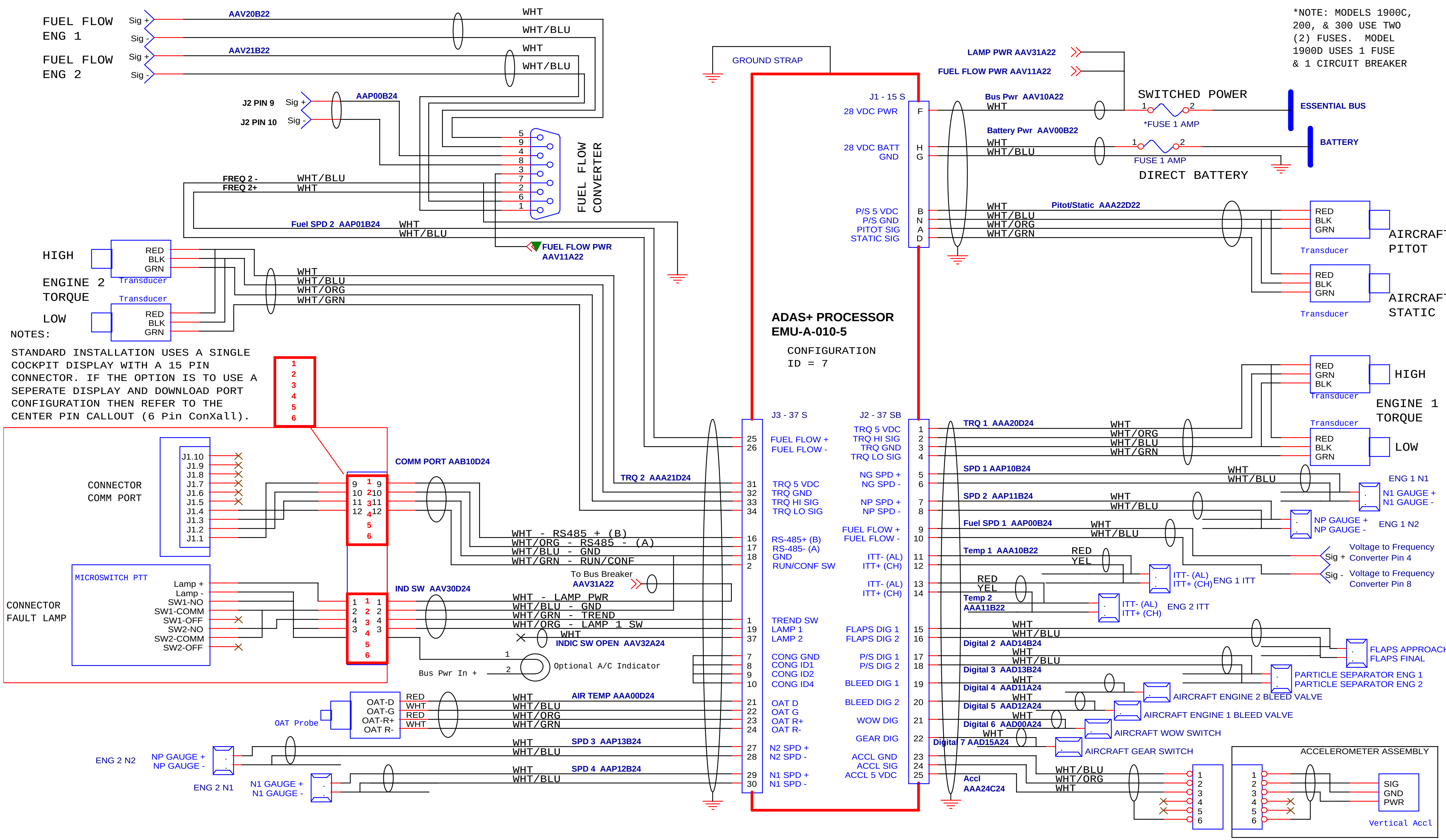

Figure C- 20: Wiring Schematic – With Torque Transducers and With Fuel Flow Converter

16.2.4 ADAS+ Interconnect Schematic – <u>Without</u> Supplied Torque Transducers and <u>Without</u> Fuel Flow Voltage to Frequency Converter

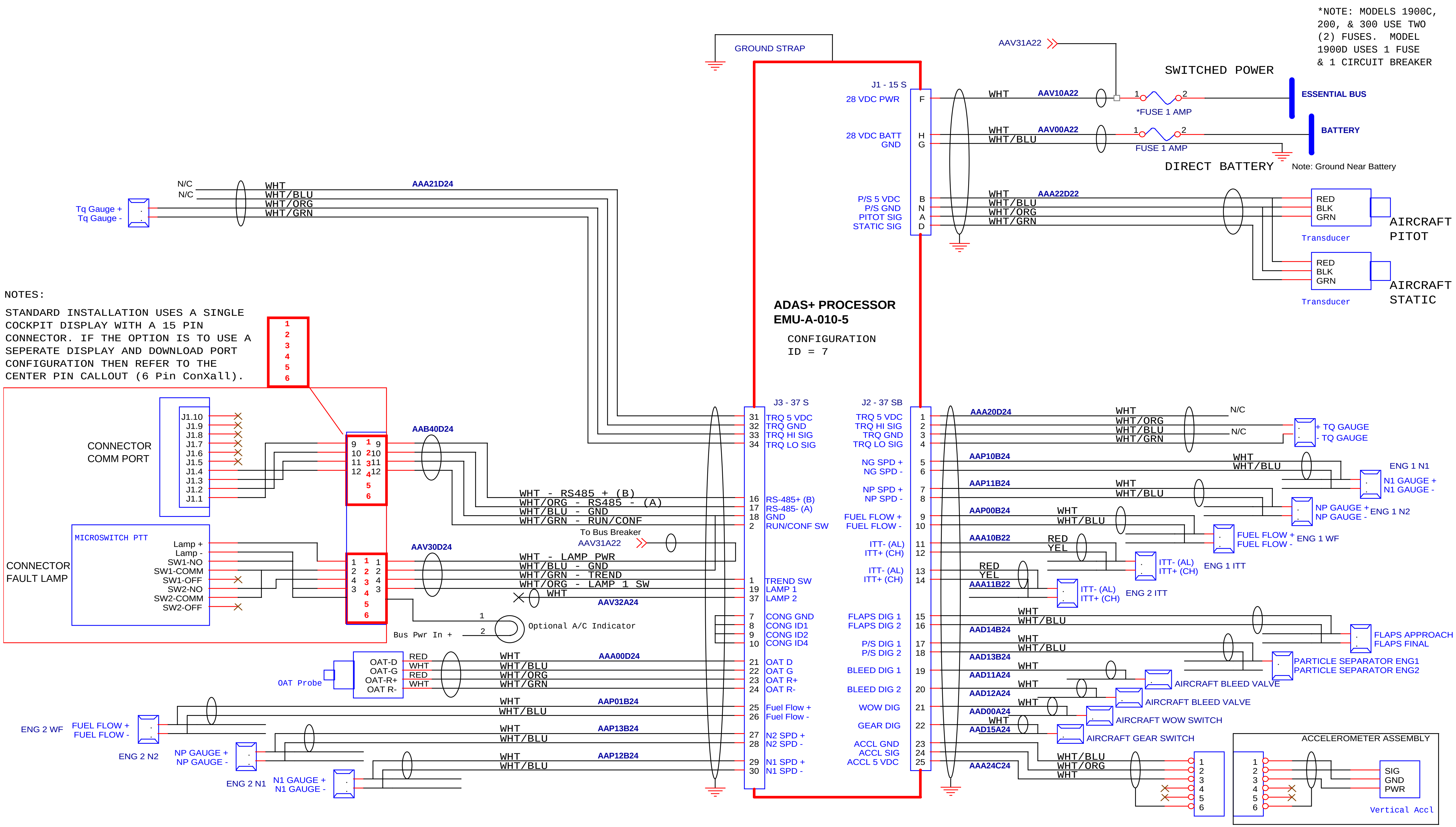

Figure C- 21: Wiring Schematic – Without Torque Transducers and Without Fuel Flow Converter

Pratt & Whitney Engine Services, Inc.
249 Vanderbilt Ave.
Norwood, MA 02062

Pratt & Whitney
A United Technologies Company

FLIGHT MANUAL SUPPLEMENT
ADAS-T-250-1

For Part 23 Aircraft

Pratt & Whitney Engine Services, Inc.
Aircraft Data Acquisition System Plus (ADAS+)

AIRCRAFT MAKE: ____________________

AIRCRAFT MODEL: __________

AIRCRAFT REGISTRATION NO.: _____________

AIRCRAFT SERIAL NO.: _____________

This document must be carried in the aircraft at all times. It describes the operating procedures for the Pratt & Whitney Engine Services, Inc. ADAS+ engine monitoring system when it has been installed in accordance with STC SA00171BO.

For aircraft with an FAA Approved Airplane Flight Manual, this document serves as the FAA Approved Flight Manual Supplement for the Pratt & Whitney Engine Services, Inc. ADAS+. For aircraft that do not have an approved flight manual, this document serves as the FAA Approved Supplemental Flight Manual for the Pratt & Whitney Engine Services, Inc. ADAS+.

The Information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this document, consult the basic Airplane Flight Manual.

FAA APPROVED:

Robert G. Mann ____________________ Date: OCT 2 2 2007

Manager, Aircraft Certification Office
Federal Aviation Administration:

LOG OF REVISIONS

REV NO.	DESCRIPTION	PAGES REVISED	APPROVED
A	Initial Release	All	
B	Correct typographical error in cover sheet, description of Caution State, and added solid lamp function for exceedance	1, 5, 6	
C	Corrected typos and added split lamp configuration	4, 5, 6, 7, 8	
D	ECO 871 Revise Exceedance Mode wording	2, 6	
E	Company Name and Address Change	All	OCT 2 2 2007

TABLE OF CONTENTS

I. GENERAL

The Aircraft Data Acquisition System Plus (ADAS+) has been developed to provide the aircraft owner and/or operator with engine and airframe operational data. The ADAS+ is a recording device and exceedance monitor. It is designed as a tool for the maintenance staff and owner to monitor the overall health of the aircraft as well as to document any abuse while in service. The system records the date, time, duration, maximum value and average value of any exceedance. It counts cycles, records flight times, identifies and measures hot starts and records the maximum value observed by each sensor during flight. The system will also perform the data collection requirement of the P&WC ECTM® trending program.

The ADAS+ has been designed to reduce pilot workload and provide the maintenance staff with additional engine and airframe data. The ADAS+ will monitor single and dual engine aircraft and provide status, trending, and exceedance information using a single cockpit mounted lamp.

With the exception of the TREND or ETM/ENGINE switch/fault lamp, the ADAS+ has no interface with the aircraft pilot or crew. Communication with the system processor is done using a Windows™ based computer and Pratt & Whitney Engine Services, Inc. Monitor Link Program (MLP). All features of the Pratt & Whitney Engine Services, Inc. system are set using MLP. A complete description of the capabilities of MLP and detailed instructions on its use can be found in the Pratt & Whitney Engine Services, Inc. MLP Users Guide.

II. LIMITATIONS

Required engine maintenance, as prescribed in the applicable airframe or engine Instructions for Continued Airworthiness, shall not be predicated on the data obtained from the Pratt & Whitney Engine Services, Inc. engine monitoring/recording system.

CAUTION

This system shall not be used to supersede or replace the pilot's responsibility to monitor and record engine exceedance information.

Because the ADAS+ may be programmed with engine operating limits different from those in the Aircraft Flight Manual, the aircraft's existing engine instruments shall be used to ensure that the engine is operated within the limits specified in the Aircraft Flight Manual, and shall also be used to identify exceedances of these limits.

III. EMERGENCY PROCEDURES

No Change

IV. NORMAL PROCEDURES

The ADAS+ can be equipped with either a TREND switch/fault lamp or a split ETM/ENGINE switch/fault lamp.

The TREND lamp is white in color and can be configured to display an exceedance or sensor fault to the pilot as well as an automatic trend sample. The TREND lamp is also a switch which when depressed, will take a trend sample of specific engine parameters.

The split ETM/ENGINE lamp is comprised of two segments, a white ETM segment and an amber ENGINE segment. The white ETM segment of the lamp will display exceedance pre-limits, airframe exceedances, and automatic trend samples. The amber ENGINE segment of the split lamp will illuminate only when an engine limit occurs or is exceeded. The ETM/ENGINE lamp is also a switch which when depressed, will take a trend sample of specific engine parameters.

1. Single TREND Lamp Operation

When power is first applied to the processor, the TREND switch/fault lamp will illuminate for approximately 5 seconds while the system performs self-tests. If any of these tests fail, the lamp will remain on.

If the test passes, the lamp will extinguish and the processor will enter a system state as described below:

Lamp Out – Normal State:

This is the normal condition of the ADAS+ when all systems checks have passed and there are no previous flight exceedances recorded.

Lamp Flashing (pressing lamp will turn lamp off) – Maintenance State:

When the ADAS+ is in Maintenance State, either a previous flight exceedance has occurred, or the system has detected a minor fault condition that will not affect its ability to function as an exceedance monitor.

Lamp Flashing (pressing lamp will NOT turn lamp off) – Caution State:

When the ADAS+ is in Caution State, either a previous flight exceedance has occurred, or the system has detected a fault condition that may affect its ability to function as an exceedance monitor.

Lamp Solid – Fault State:

When the ADAS+ is in Fault State, either a previous flight exceedance has occurred, or the system has detected a fault condition that WILL affect its ability to function as an exceedance monitor.

Note: The ADAS+ will extinguish any of the above lamp conditions once an engine has started.

Once the engine has been started, or either engine has started in a dual engine aircraft, the ADAS+ lamp is used to display trend and exceedance information to the pilot and/or crew as follows:

Trend Mode:

The ADAS+ can be configured to take an automatic trend sample whenever certain engine/flight conditions are met. Once the trend criteria are met, the system will collect a sample of data for later review by maintenance personnel. During this trend sample the ADAS+ lamp will flash at a slow (1 Hz) rate. Pressing the TREND switch will manually initiate the same trend data sample.

Exceedance Mode:

Exceedance Mode is defined as anytime the aircraft or engine has met the criteria defined for an exceedance and where the pilot and/or crew should be alerted. These exceedances are typically torque or temperature exceedances. If configured, Exceedance Mode is displayed to the pilot via a 2 HZ lamp flash or a solid lamp.

The exceedance can be configured such that Exceedance Mode can be acknowledged by pressing the TREND switch. If configured this way, the Exceedance Mode lamp display will extinguish when the TREND switch is pressed.

CAUTION

The ADAS+ is an advisory system only. Exceedance annunciations are based on user-programmed powerplant limits that may not reflect Aircraft Flight Manual limits. If an exceedance is noted, in all cases refer to the aircraft's existing instruments for proper powerplant operation.

Single/Dual Engine Functions:

The ADAS+ monitoring system will monitor and record engine run, trend, cycle, and exceedance information for both single and dual engine aircraft. All interface to the pilot and/or crew is done through a single cockpit mounted TREND switch/fault lamp. If the pilot and/or crew are notified by the lamp during flight that an exceedance occurred, the pilot and/or crew must use standard aircraft/engine instrumentation to determine the cause of the exceedance and take corrective action as appropriate.

2. Split Lamp Operation

When power is first applied to the processor, the ETM/ENGINE switch/fault lamp will illuminate for approximately 5 seconds while the system performs self-tests. If any of these tests fail, the lamp will remain on.

If the test passes, the lamp will extinguish and the processor will enter a system state as described below:

Lamps Out – Normal State:

This is the normal condition of the ADAS+ when all systems checks have passed and there are no previous flight exceedances recorded.

ETM Lamp Flashing (pressing lamp will turn lamp off) – Maintenance State:

When the ADAS+ is in Maintenance State, either a previous flight exceedance has occurred, or the system has detected a minor fault condition that will not affect its ability to function as an exceedance monitor.

ETM Lamp Flashing (pressing lamp will NOT turn lamp off) – Caution State:

When the ADAS+ is in Caution State, either a previous flight exceedance has occurred, or the system has detected a fault condition that may affect its ability to function as an exceedance monitor.

ETM Lamp Solid – Fault State:

When the ADAS+ is in Fault State, either a previous flight exceedance has occurred, or the system has detected a fault condition that WILL affect its ability to function as an exceedance monitor.

ENGINE Lamp Solid:

When the ENGINE lamp is illuminated, a previous engine flight exceedance has occurred.

Note: The ADAS+ will extinguish any of the above lamp conditions once an engine has started.

Once the engine has been started, or either engine has started in a dual engine aircraft, the ADAS+ lamp is used to display trend and exceedance information to the pilot and/or crew as follows:

Trend Mode:

The ADAS+ can be configured to take an automatic trend sample whenever certain engine/flight conditions are met. Once the trend criteria are met, the system will collect a sample of data for later review by maintenance personnel. During this trend sample the ETM segment of the split lamp will flash at a slow (1 Hz) rate. Pressing the ETM/ENGINE lamp will manually initiate the same trend data sample.

Exceedance Mode:

Exceedance Mode is defined as anytime the aircraft or engine has met the criteria defined for an exceedance and where the pilot and/or crew should be alerted.

ENGINE Lamp:

The amber ENGINE segment of the split lamp will illuminate only when an engine limit occurs or is exceeded. Monitored parameters may consist of engine torque, temperature (ITT, etc.), engine gas producer RPM, and/or propeller speed.

When an engine limit occurs, the amber lamp will illuminate solid in flight and will extinguish when the lamp is pressed.

ETM Lamp:

The white ETM segment of the lamp will display pre-limits and airframe exceedances. Exceedance Mode is displayed to the pilot via a 2 HZ lamp flash or a solid lamp.

CAUTION

The ADAS+ is an advisory system only. ENGINE and ETM exceedance annunciations are based on Maintenance Manual criteria that may not reflect Aircraft Flight Manual limits. If an exceedance is noted, in all cases refer to the aircraft's existing instruments for proper powerplant operation.

Single/Dual Engine Functions:

The ADAS+ monitoring system will monitor and record engine run, trend, cycle, and exceedance information for both single and dual engine aircraft. All interface to the pilot and/or crew is done through a single cockpit mounted ENGINE/ETM switch/fault lamp. If the pilot and/or crew are notified by the lamp during flight that an exceedance occurred, the pilot and/or crew must use standard aircraft/engine instrumentation to determine the cause of the exceedance and take corrective action as appropriate

V. PERFORMANCE

VI. No change.

United States Of America

Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

Number SA00171BO

This Certificate issued to

Pratt & Whitney Engine Services, Inc.
249 Vanderbilt Ave.
Norwood, MA 02062

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 23 of the Federal Aviation Regulations.

Original Product Type Certificate Number: See attached FAA Approved Model List (AML), Document No. ADAS-T-225-1, dated July 3, 2003, or later FAA-approved revisions for the list of approved aircraft models and applicable airworthiness regulations.

Make:

Model:

Description of Type Design Change:

Installation of Pratt & Whitney Engine Services, Inc. Aircraft Data Acquisition System ADAS+, P/N ADAS-K-010, in accordance with Master Document List ADAS-T-100-1, Revision J, dated March 28, 2005, or later FAA-approved revision. Reference AML ADAS-T-225-1 for applicable installation instructions for a particular aircraft.

Limitations and Conditions:

1. Pratt & Whitney Engine Services, Inc. Aircraft Flight Manual, Document No. ADAS-T-250-1, Revision C, FAA-approved on March 31, 2005, or later FAA-approved revision, is required and must be carried in the aircraft during all flights.

(See Continuation Sheet 2 of 2)

If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: October 1, 2002

Date of issuance: July 3, 2003

Date reissued: October 22, 2007

Date amended: March 31, 2005

By direction of the Administrator

(*Signature*)

Robert G. Mann
Manager, Boston Aircraft Certification Office

(*Title*)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

United States Of America

Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

(Continuation Sheet)

Number SA00171BO

Limitations and Conditions (Cont'd):

2. Instructions for Continued Airworthiness (ICA) as listed in AML ADAS-T-225-1, dated July 3, 2003, or later FAA accepted revision, shall be made available to the operator at the time of installation.

3. Compatibility of this design change with previously approved modifications must be determined by the installer.

4. Required maintenance, as prescribed in the applicable airframe or engine Instructions for Continued Airworthiness, shall not be predicated on the data obtained from the Pratt & Whitney Engine Services, Inc. monitoring/recording system.

5. This system shall not be used to supersede or replace the pilot's responsibility to monitor and record engine exceedance information.

….END….

Pratt & Whitney Engine Services, Inc.
249 Vanderbilt Ave
Norwood, MA 02062

Pratt & Whitney
A United Technologies Company

ADAS+
Part 23 Approved Model List for STC No. SA00171BO

Document Number:	ADAS -T-225-1		
STC Number:	SA00171BO		
FAA Approved Date:	OCT 2 2 2007	**FAA Approved:**	Robert G. Mann
Revision:	E		Robert G. Mann, Manager Boston Aircraft Certification Office Federal Aviation Administration Burlington, MA
Total Pages:	5		

1 Revision History

Revision Number	Revised Pages	Description of Revisions	FAA Approval	Date
(-)	ALL	Initial Release	Wayne Gaulzetti	03 Jul 03
A	ALL	Add Raytheon Model, 200, 300, & 1900 Series	Robert G. Mann	11 Sep 03
B	ALL	Add Raytheon Model C90 Series	Robert G. Mann	23 Sep 03
C	ALL	Add Air Tractor Model ST-400, 400A, 402, 402A, 402B, 501, 502, 502A, 502B, 503, 503A, 602, 802, 802A	Robert G. Mann	19 Mar 04
D	All	Add Pilatus PC6/B Model	Robert G Mann	25 Jan 07
E	All	Company Name and Address Change		OCT 2 2 2007

FAA Approved Date: OCT 2 2 2007

TABLE OF CONTENTS

2 Introduction

This document is the FAA Approved Model List for the STC No. SA00171BO for the installation of the Pratt & Whitney Engine Services, Inc. ADAS+ ADAS-K-010-XX monitoring system into eligible aircraft. Revisions to the AML must be coordinated through the STC holder, and requires FAA approval.

IMPORTANT NOTICE

This STC is only applicable to the 14CFR Part 23 aircraft, which are listed in this AML.

FAA Approved Date: OCT 22 2007

3 Approved Model List

Aircraft Make	Aircraft Model(s)	Type Certificate Number	Certification Basis	Installation Manual	Instructions for Continued Airworthiness
Cessna Caravan	208 208A 208B	A37CE	Part 23	*ADAS-G-010-1* *ADAS-G-010-1/A*	*ADAS-G-260-1* *ADAS-G-260-1/A*
Raytheon	C90 Series	3A20	Part 23	*ADAS-G-010-1* *ADAS-G-010-1/B*	*ADAS-G-260-1* *ADAS-G-260-1/B*
Raytheon	200, 300, & 1900 Series	A24CE	Part 23	*ADAS-G-010-1* *ADAS-G-010-1/C*	*ADAS-G-260-1* *ADAS-G-260-1/C*
Air Tractor	AT-400, 400A	A9SW	Part 23	*ADAS-G-010-1* *ADAS-G-010-1/E*	*ADAS-G-260-1* *ADAS-G-260-1/E*
Air Tractor	AT-402, 402A, 402B, 501, 502, 502A, 502B, 503, 503A	A17WS	Part 23	*ADAS-G-010-1* *ADAS-G-010-1/E*	*ADAS-G-260-1* *ADAS-G-260-1/E*
Air Tractor	AT-602, 802, 802A	A19SW	Part 23	*ADAS-G-010-1* *ADAS-G-010-1/E*	*ADAS-G-260-1* *ADAS-G-260-1/E*
Pilatus	PC-6/B-H2, B1-H2, B2-H2, B2-H4	7A15	Part 23	*ADAS-G-010-1* *ADAS-G-010-1/F*	*ADAS-G-260-1* *ADAS-G-260-1/F*

FAA Approved Date: OCT 2 2 2007

SUBSECRETARÍA DE TRANSPORTE
DIRECCIÓN GENERAL DE AERONÁUTICA CIVIL
DIRECCIÒN DE AVIACIÒN
4.1.205.-IA-1221

SECRETARÍA DE COMUNICACIONES Y TRANSPORTES

SCT

CONVALIDACIÓN DEL CERTIFICADO TIPO SUPLEMENTARIO No. SA00171BO

La Secretaría de Comunicaciones y Transportes, en base al Artículo 145 del Reglamento de la Ley de Aviación Civil y al Artículo 18 fracción XIV del Reglamento Interior de la Secretaria de Comunicaciones y Transportes a través de la Dirección General de Aeronáutica Civil otorga este documento a:

PRATT & WHITNEY ENGINE SERVICES, INC.

Convalidando el Suplemento al Certificado Tipo No. SA00171BO, de fecha 22 de Octubre de 2007, otorgado por la Administración Federal de Aviación (Federal Aviation Administration, F.A.A.) de los Estados Unidos de América.

Por lo cual lo enunciado a continuación, reúne las especificaciones mínimas aplicables para su operación segura en acuerdo a las Normas, Procedimientos y Regulaciones requeridas por esta Dirección General de Aeronáutica Civil.

NO. CONTROL D.G.A.C.	IA-12/2004 R1			
PROPIETARIO	PRATT & WHITNEY ENGINE SERVICE, INC.			
MODIFICACIÓN	INSTALACIÓN DE EQUIPO ADAS+, NÚMERO DE PARTE ADAS-K-010			
LIMITACIONES	• El Manual de Vuelo de la Aeronave, emitido por Pratt & Whitney Engine Service, Inc. Documento No. ADAS-T-250-1, revisión C, aprobada por la FAA el 31 de marzo de 2005, o revisiones posteriores aprobadas, deberán de llevarse en la aeronave durante todos los vuelos. • Las Instrucciones de Aeronavegabilidad Continua (ICA) enlistadas en AML ADAS-T-225-1 aceptadas posteriormente por la FAA el 3 julio de 2003 , deberá estar disponible para el operador a la hora de ser instalado. • La compatibilidad de este cambio de diseño con modificaciones aprobadas previamente, deberán ser determinadas por el instalador. • Mantenimiento requerido conforme a lo prescrito en las instrucciones de Aeronavegabilidad aplicables al motor o planeador. No deberá basarse en los datos obtenidos del sistema de monitoreo de Pratt & Whitney Service, Inc. • Este sistema no deberá de usarse para remplazar la responsabilidad de los pilotos para monitorear y anotar la información complementaria del motor.			
APLICABLE A LAS AERONAVES	CESSNA	RAYTHEON	AIR TRACTOR	PILATUS
MODELOS	208, 208A 208B	C90 SERIES 200 SERIES 300 SERIES 1900 SERIES	AT-400, 400A AT-402, 402A 502, 502A, 502B 503, 503A, AT-602 802, 802A	PC-6/B-H2 B1-H2 B2-H2 B2-H4

VIGENCIA: Esta Convalidación tiene validez indefinida a no ser que sea Suspendido o Revocado por la Autoridad Aeronáutica correspondiente.

FECHA DE EMISIÓN

16 DE MAYO DEL 2008.

A T E N T A M E N T E.
SUFRAGIO EFECTIVO. NO REELECCIÓN.
EL DIRECTOR DE AVIACIÓN

ING. JOSÉ JAVIER ROCH SOTO

Cualquier alteración a esta Convalidación será sancionado con todo el rigor que corresponda, de acuerdo a lo establecido en la Ley de Aviación Civil.

ALTAIR
OPERATORS HANDBOOK

All of the information in this handbook is to be used only as a reference guide to help you understand the methods and concepts required to accomplish successful operation of your Altair Avionics monitoring system.

You must use your current ICA for all troubleshooting
Any deviation from the procedures described within your Instructions for Continued Airworthiness document could result in a failure of the product to perform properly and could possibly result in damage to other systems of the aircraft.

Basic Engine Monitoring Tasks

Processor is configured and calibrated with MLP
Configuration created and maintained in TurbineTracker

Flight Data collected by processor and stored as log data

Log Data is retrieved and uploaded into TurbineTracker™ using MLP or the DTU
Raw data

NOTE: MLP can only view logs in raw format

Log Data can be viewed in TurbineTracker™
Raw data parsed into user friendly tables

Checklist Index

NOTE: All of our updated Installation Manuals, Instructions for Continued Airworthiness, User Guides and Checklist are available for download in **TurbineTracker™** under the “**Support**” tab.

User’s Manuals

GSS-T-301-1	MLP User’s Guide	17 APR 06
GSS-T-300-2	TurbineTracker User’s Guide Gen 2 & 3	09 JUN 06
GSS-T-300-3	DAC User’s Guide No Monitor	09 JUN 06
GSS-T-300-1	TurbineTracker User’s Guide All	10 MAR 00

CUST–T-401-1
Create Configuration File from an Existing Configuration
21 NOV 2005
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Create Configuration File from an Existing Configuration

Create Configuration File within TurbineTracker™

1. Log on to TurbineTracker using your User ID and Password.

2. Upon successful log on, click the "**Configuration**" Tab.

Note: Use the engine pool administration to add engines and create engine tags for your configuration.

3. Select "**New Config**" from button on the left hand side of the screen.

4. Select "**I wish to create a new configuration based on an existing configuration**".

5. Click "**Next**"

6. Click on the appropriate configuration by clicking on the hyperlinked text.

7. Enter a description of the install and the airframe S/N in the appropriate text fields.*

8. Select "**Keep These Values**" and wait for the page to refresh. **

9. (Optional) Select the "**Tags**" button from the left hand side of the screen.

10. (Optional) Select the "**Add a new tag**" hyper text.

11. (Optional) Create a new tag called (Name of Tag) in the Tag Name field.

CUST-T-401-1
Create Configuration File from an Existing Configuration

12. (Optional) Enter the desired information in the Tag Value field.

13. Select "**Keep These Values**" button at the bottom of the screen.

14. Select the "**Save This Configuration**" hyper text.

Note: Your configuration file has been created, but you should click on the Configuration tab on the top of the web page then select the List Configs button from the left hand side of the screen to verify that the file is listed in your active configuration list.

* Be sure that the processor type, aircraft type and the serial number range, where appropriate, all match.

** Always select the Keep These Values while modifying the configuration until all the changes have been made. Only after you have finished modifying all the parameters of the file should you select Save This Configuration, by doing this you increase the version of the config by one. Every time you select Save This Configuration it will increase the version by one.

CUST-T-402-1
Create Configuration File from a System Template
31 OCTOBER 2005
Page 1 of 2

Create Configuration File from a System Template

Create Configuration File within TurbineTracker™

1. Log on to TurbineTracker™ using your User ID and Password.

2. Upon successful log on, click the "**Configuration**" Tab.

3. Select "**New Config**" from button on the left hand side of the screen.

4. Select "**I wish to create a new configuration from a system template**."

5. Click "**Next**"

6. Click on the appropriate template by clicking on the hyperlinked text.*

If the desired template is not available, exit this checklist and contact Customer Support. Otherwise, continue.
Install Details shall be accomplished first.

7. Enter a description of the install and the airframe S/N in the appropriate text fields.

8. Select "**Keep These Values**" and wait for the page to refresh. **

9. (Optional) Select the "**Tags**" button from the left hand side of the screen.

10. (Optional) Select the "**Add a new tag**" hyper text.

11. (Optional) Create a new tag called Processor Serial Number in the Tag Name field.

CUST-T-402-1
Create Configuration File from a System Template
Page 2 of 2

12. (Optional) Enter the processor serial number in the Tag Value field.

13. Select "**Keep These Values**" button at the bottom of the screen.

14. Select the "**Save This Configuration**" hyper text.

Note: Your configuration file has been created, but you should click on the Configuration tab on the top of the web page then select the List Configs button from the left hand side of the screen to verify that the file is listed in your active configuration list.

* Be sure that the processor type, aircraft type and the serial number range , where appropriate, all match.

** Always select the Keep These Values while modifying the configuration until all the changes have been made. Only after you have finished modifying all the parameters of the file should you select Save This Configuration, by doing this you increase the version of the config by one. Every time you select Save This Configuration it will increase the version by one.

CUST-T-403-1
Download Configuration File
6 NOVEMBER 2005
Page 1 of 1

Download Configuration File

Turbine Tracker™ to Computer

NOTE: The preferred method of downloading your configuration is to use the Synch to TurbineTracker™ feature in the Monitor Link Program (See Checklist CUST-T- 413-1).

1. Log on to TurbineTracker™ using your User ID and Password.
2. Upon successful log on, click the “File Transfer” Tab for an engine trend monitor configuration or “DTU” tab for a DTU configuration.
3. Click “Download Config.”
4. Select the file to download by clicking on the desired version.

NOTE: A File Download Box Will Appear.

5. Save the File onto your computer.

TIPS AND TRICKS: Although the File may be saved anywhere on the computer, it is recommended that you save the File in the “c:\mlp\cfg” folder. This folder is the default folder that the Monitor Link Program (MLP) uses to find configuration files for transfer.

NOTE: The File Download box will disappear when download is complete.

6. Log off from Turbine Tracker if no longer needed.
7. End

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Engine Administration Checklist
31 OCT 05
Page 1 of 6

ENGINE ADMINISTRATION

TIPS AND TRICKS: All of the functions of engine administration are embedded TurbineTracker™ routines. Changes, additions or deletions will not modify the monitor configuration file version.

Creating an Engine

- ❑ Log in to TurbineTracker™
- ❑ Select **Configuration** tab on the top of the web page
- ❑ Select **Engine Admin** from buttons on the left hand side of the screen
- ❑ Select **Add Engine to pool**
- ❑ Select Engine Type from the drop down menu
- ❑ In the text field enter engine information (serial number and dates if known) *
- ❑ Click **Submit**
- ❑ Click **OK** on Add Engine Success Page

* If dates are not known, they can be edited at a later date.

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Engine Administration Checklist
Page 2 of 6

Cycle Tags

Add New Engine Tag(s) ***Alternative method is to copy tags from existing engines. See below for the process on how to copy engine tags***

- ❑ Log into TurbineTracker™
- ❑ Select **Configuration** tab on the top of the web page
- ❑ Select **Engine Admin** from buttons on the left hand side of the screen
- ❑ Select **Add/Edit Engine Tags** from buttons on the left hand side of the screen
- ❑ The Add/Edit Engine Tags radio button is already selected, click **Submit**
- ❑ Select Engine Serial Number from the drop down menu
- ❑ Click **Submit**
- ❑ Click the **Add a new tag** hyperlink
- ❑ Enter a Tag Name in the Engine Tag Name Field
- ❑ Choose a type of cycle from the drop down menu *
- ❑ Click **Save**
- ❑ Click **OK** on Engine Tag Creation Success Page

* The cycle types are: None, Incremental, Duration, Cumulative, Peak, and RHL.

None:	Not associated with any sensors.
Incremental:	Counts each time a condition occurs.
Duration:	Measures the amount of time a condition exists.
Cumulative:	Determine the lowest value for a sensor when it drops below a value threshold and then returns above the threshold.
Peak:	Determine the highest value above a threshold during flight.
RHL:	As described in Honeywell SB T53-L-703-0020 and SB T53-L-13B-0020.

Cycle Tags

Copy Engine Tag(s)

- ☐ Log into TurbineTracker™
- ☐ Select **Configuration** tab on the top of the web page
- ☐ Select **Engine Admin** from buttons on the left hand side of the screen
- ☐ Select **Add/Edit Engine Tags** from buttons on the left hand side of the screen
- ☐ Select the Copy Engine Tags radio button
- ☐ Click **Submit**
- ☐ Select Engine Serial Number from the drop down menu (Engine to copy tags **from)**
- ☐ After the page reloads, check all the engine tags to be copied to the new engine
- ☐ Click **Next**
- ☐ Select Engine Serial Number from the drop down menu (Engine to copy tags **to**)
- ☐ Click **Copy Tags**
- ☐ On the confirmation screen, if the information is correct, click **Confirm Tag Copy**
- ☐ Click **OK** on Tag Copy Completed Screen

CUST-T-404-1
Engine Administration Checklist

Engine Installation

- ❑ Log into TurbineTracker™
- ❑ Select **Configuration** tab on the top of the web page
- ❑ Select **Engine Admin** from buttons on the left hand side of the screen
- ❑ Select **Install Engine** from buttons on the left hand side of the screen
- ❑ Select Aircraft Configuration from the drop down menu
- ❑ Click **Submit**
- ❑ Select Engine Serial Number from the drop down menu
- ❑ Select Engine Position from the drop down menu
- ❑ Enter Date of Engine Install*
- ❑ Click **Submit**
- ❑ Click **OK** on Install Engine Confirmation Page
- ❑ Cycle Mapping page pops up
- ❑ Choose appropriate configuration cycle to associate engine tag(s) with
- ❑ Click **Submit**
- ❑ Update tag information (some value must be entered) *
- ❑ Click **Submit**
- ❑ Click **OK** on Install Engine Success Page

* If dates and current tag information are not known, enter zeros (0) and actual values can be edited at a later date.

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Engine Administration Checklist
Page 5 of 6

Engine Removal

- ❑ Log into TurbineTracker™
- ❑ Select **Configuration** on the top of the web page
- ❑ Select **Engine Admin** from buttons on the left hand side of the screen
- ❑ Select **Remove Engine** from buttons on the left hand side of the screen
- ❑ Select Aircraft Configuration from the drop down menu
- ❑ Click **Submit**
- ❑ Select Engine Position from the drop down menu
- ❑ Enter Date and time of Engine Removal
- ❑ Click **Remove**
- ❑ Click **OK** on Remove Engine Confirmation Page
- ❑ Click **OK** on Remove Engine Success Page

Engine Deletion from Pool

- ❑ Log into TurbineTracker™
- ❑ Select **Configuration** on the top of the web page
- ❑ Select **Engine Admin** from buttons on the left hand side of the screen
- ❑ Select **Delete Engine From Pool** from buttons on the left hand side of the screen
- ❑ Select Engine Serial Number from the drop down menu
- ❑ Click **Delete**
- ❑ Click **OK** on Delete Engine Confirmation Page
- ❑ Click **OK** on Delete Engine Success Page

CUST-T-405-1
Upload Configuration File
31 October 2005
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Upload Configuration (.cal) File

Computer to TurbineTracker™

NOTE: The preferred method of uploading your configuration is to use the Synch to TurbineTracker™ feature in the Monitor Link Program (See Checklist CUST-T- 413-1).

1. Log on to TurbineTracker™ using your User ID and Password.

2. Upon successful log on, click the "**File Transfer**" Tab.

3. Click "**Upload Config**".

4. Click "**Browse**" to find the File when the Choose File Box appears, if necessary.

NOTE: You no longer upload the entire configuration file, only the calibration file as denoted by the .cal extension. The .cal files are the only file types that should be uploaded into TurbineTracker™ as configurations.

5. Select the File and click "**Open**."

NOTE: The File and its path shall appear in the text box.
(c:\mlp\sync\cfg\tx\filename)

6. Ensure that the File selected is the correct file.

7. Click "**Upload File**" Button below the text box.

NOTE: A successful upload is denoted by the following -
Upload Okay Loaded Successfully: Install ID (a number), Version (a number)
If the upload is unsuccessful or occurs with errors, exit this procedure and accomplish troubleshooting in accordance with the TurbineTracker™ User's Guide.

NOTE: If you are uploading an updated configuration file (e.g. due to calibration), the version number of the configuration file shall increment to a higher version.
9. End

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Upload Log File
21 NOV 2005
Page 1 of 2

Upload Log File

Computer to Turbine Tracker™

NOTE: For logs generated from **Altair Processors** the preferred method of uploading your log is to use the current version of the Monitor Link Program (MLP) and automatically transfer all files using the Synch to TurbineTracker™ feature (See Checklist CUST-T- 413-1).

1. Log on to Turbine Tracker using your User ID and Password.
2. Upon successful log on, click the "File Transfer" Tab.
3. Click "Upload Log."
4. Click "Browse" to find the File when the Choose File Box appears, if necessary.

NOTE: Only log files of the following types can be uploaded through the TurbineTracker™ file transfer tab.

.BIN	binary log files of G3 systems with version 3.2 or higher software
.LOG	log files from any Altair unit
.GZ	compressed DTU system or ACS binary log files
.BRC, .BRD, .BLC, .BOI, .BEC	PW30X files
.V01, .STD, .DAT	standard files
.KVD	Shadin data log files (only after conversion)
.TXT	SAGEM ATR files
.SAS	standard files from SAS

5. Select the File and click "Open."

NOTE: The File and its path shall appear in the text box.

6. Ensure that the File selected is the correct file.

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Upload Log File
Page 2 of 2

7. Click “Upload File” Button below the text box.

NOTE: A successful upload is denoted by the following -

Thank You – Your monitors log file has been transferred to TurbineTracker™. TurbineTracker™ will begin processing all files received momentarily.

.

Tips and Tricks: You can view your Account Status in Your Hanger Tab to verify successful upload or read error information.

8. End

CUST-T-407-1
Verify Uploaded Logs
23 JUL 2006
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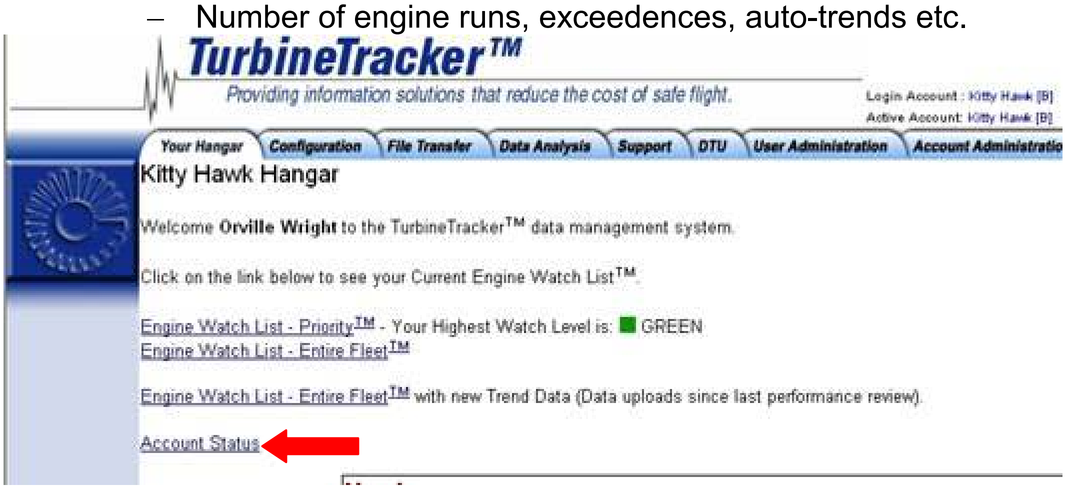
Verify Uploaded Logs

How to access your data

1) Checking your Account Status
    a. Loaded Successfully
    b. Loaded With Errors
2) Viewing your Uploaded Log Data
    a. Last upload
    b. Last Engine Run
        - Check Sensor Values
    c. Last Trend
        - Check Sensor Values
    d. Last Event
    e. Last Flag
    f. Last Fault
3) Viewing Uploaded DTU Logs
    a. Last Transmission Success

Checking your Account Status

- Shows you what has happened recently with your account in terms of data log and configuration uploads.
- Accessed via the Hangar page
- Provides detailed information about an upload
    - Number of engine runs, exceedences, auto-trends etc.



After you log in to TurbineTracker you will be presented with:

- Hyperlink to your present **Account Status**

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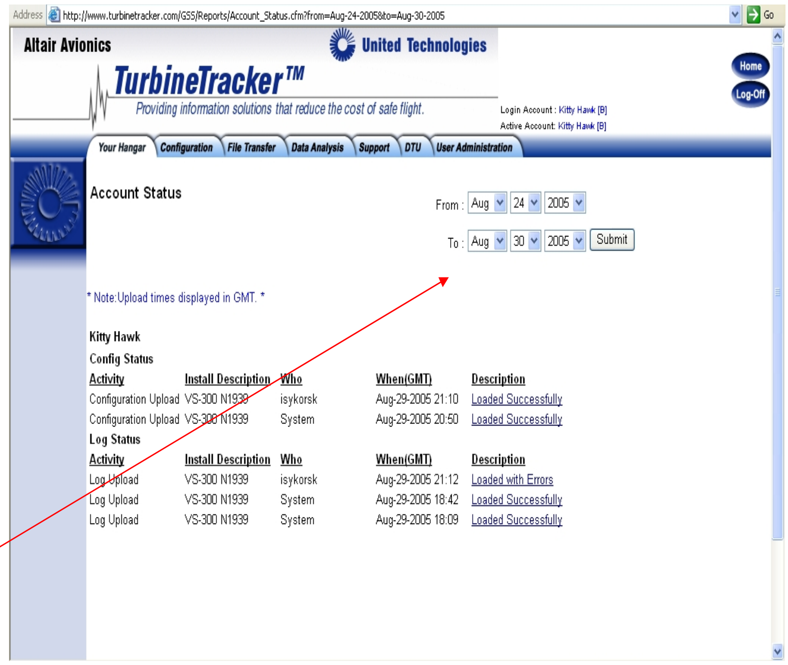
Verify Uploaded Logs
Page 2 of 7

Account Status

Displays a report of Configuration and Log File uploads to your account.

The Account Status Screen will display initially data for one week from the date of access as a default.

You can change the date range of the report by selecting the drop down date boxes.

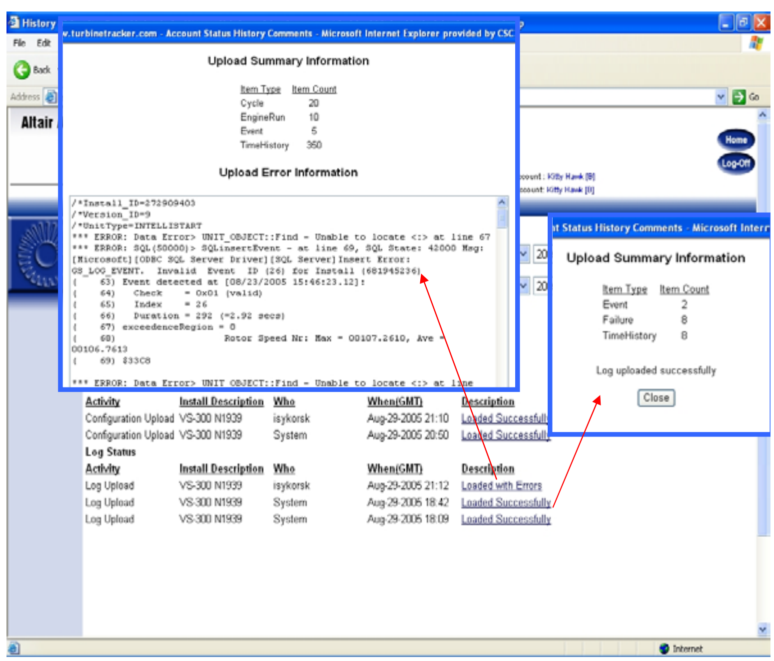


Account Status

All of your Log and Configuration upload activity during the selected dates will be listed in chronological order.

Reading Description Messages

The Hyperlink under the Description column opens the Upload Summary pop-up window. The reason for the upload error or the upload success summary will be displayed.



Select the description Hyperlink to:

- ➢ View a summery of what was contained in the uploaded logs
- ➢ View information about any errors

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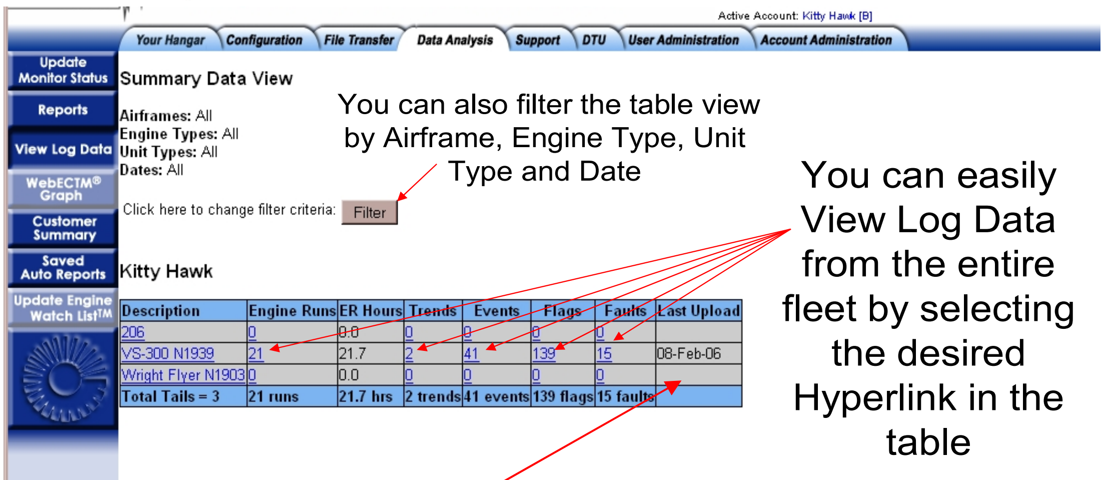
Verify Uploaded Logs
Page 3 of 7

Viewing your Uploaded Log Data

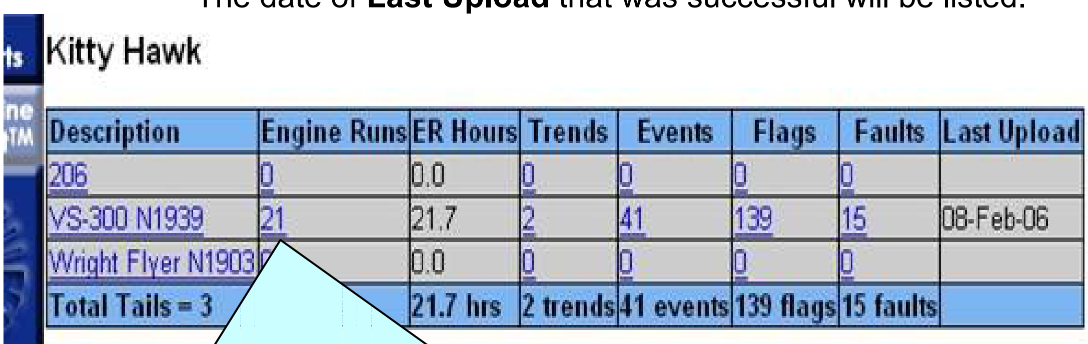
After selecting the **Data Analysis** tab on top, select the **View Log Data** button on the left. You will be presented with the Summary Data View table.

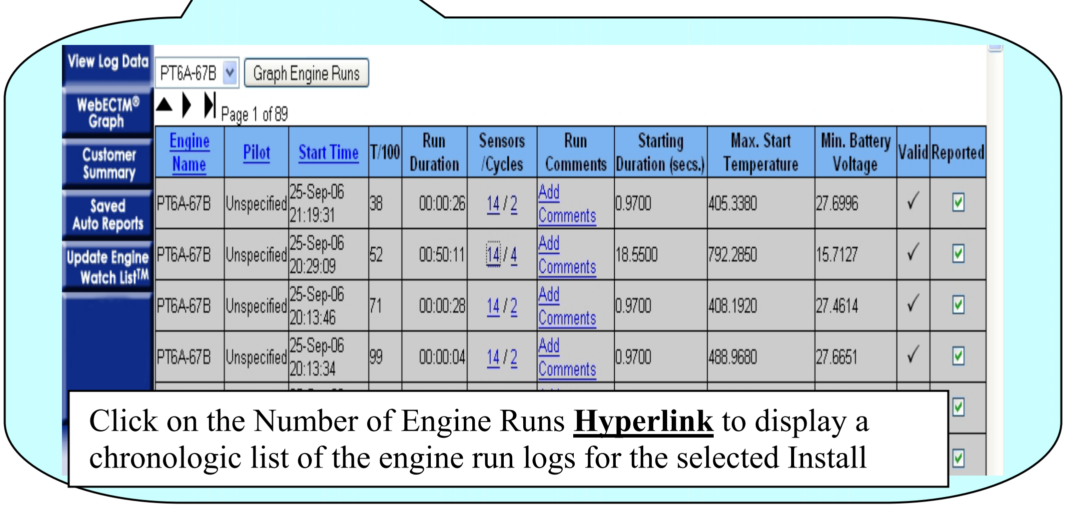


You can also filter the table view by Airframe, Engine Type, Unit Type and Date

You can easily View Log Data from the entire fleet by selecting the desired Hyperlink in the table

The date of **Last Upload** that was successful will be listed.





Click on the Number of Engine Runs **Hyperlink** to display a chronologic list of the engine run logs for the selected Install

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Verify Uploaded Logs
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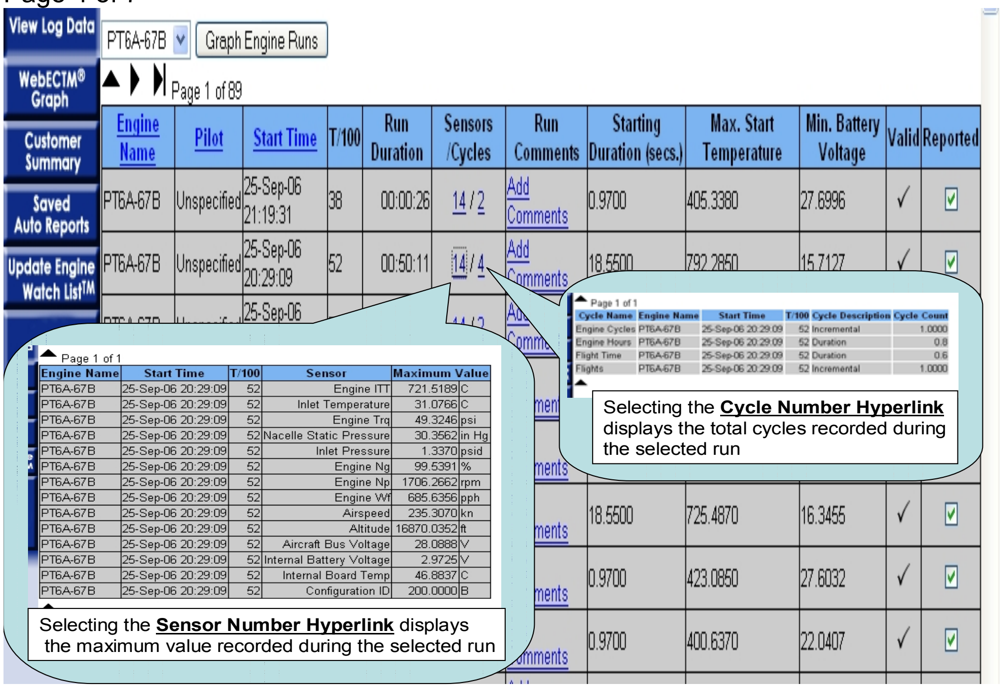

Engine Name	Pilot	Start Time	T/100	Run Duration	Sensors /Cycles	Run Comments	Starting Duration (secs.)	Max. Start Temperature	Min. Battery Voltage	Valid	Reported
PT6A-67B	Unspecified	25-Sep-06 21:19:31	38	00:00:26	14 / 2	Add Comments	0.9700	405.3380	27.6996	✓	☑
PT6A-67B	Unspecified	25-Sep-06 20:29:09	52	00:50:11	14 / 4	Add Comments	18.5500	792.2850	15.7127	✓	☑
							18.5500	725.4870	16.3455	✓	☑
							0.9700	423.0850	27.6032	✓	☑
							0.9700	400.6370	22.0407	✓	☑

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Cycle Name	Engine Name	Start Time	T/100	Cycle Description	Cycle Count
Engine Cycles	PT6A-67B	25-Sep-06 20:29:09	52	Incremental	1.0000
Engine Hours	PT6A-67B	25-Sep-06 20:29:09	52	Duration	0.8
Flight Time	PT6A-67B	25-Sep-06 20:29:09	52	Duration	0.6
Flights	PT6A-67B	25-Sep-06 20:29:09	52	Incremental	1.0000

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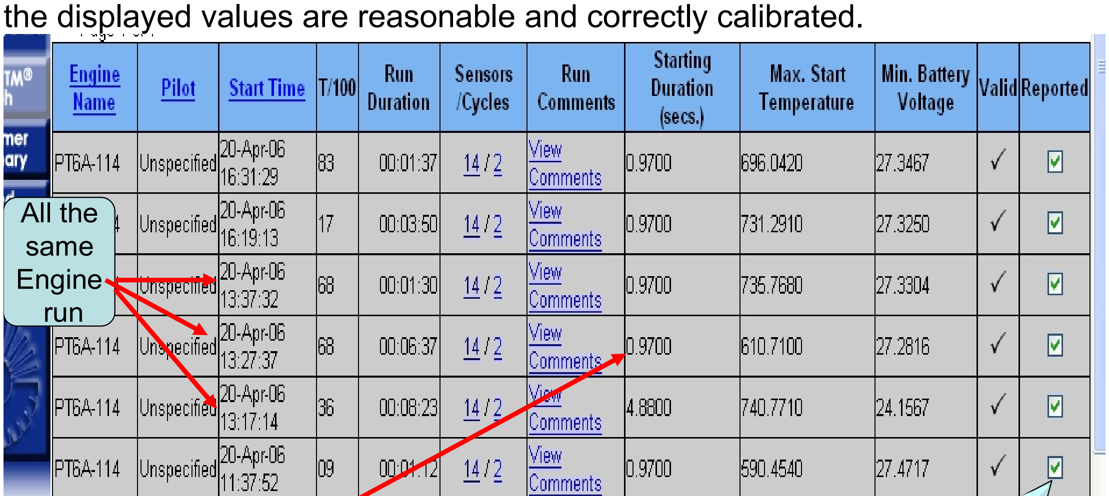
Engine Name	Start Time	T/100	Sensor	Maximum Value	
PT6A-67B	25-Sep-06 20:29:09	52	Engine ITT	721.5189	C
PT6A-67B	25-Sep-06 20:29:09	52	Inlet Temperature	31.0766	C
PT6A-67B	25-Sep-06 20:29:09	52	Engine Trq	49.3246	psi
PT6A-67B	25-Sep-06 20:29:09	52	Nacelle Static Pressure	30.3562	in Hg
PT6A-67B	25-Sep-06 20:29:09	52	Inlet Pressure	1.3370	psid
PT6A-67B	25-Sep-06 20:29:09	52	Engine Ng	99.5391	%
PT6A-67B	25-Sep-06 20:29:09	52	Engine Np	1706.2662	rpm
PT6A-67B	25-Sep-06 20:29:09	52	Engine Wf	685.6356	pph
PT6A-67B	25-Sep-06 20:29:09	52	Airspeed	235.3070	kn
PT6A-67B	25-Sep-06 20:29:09	52	Altitude	16870.0352	ft
PT6A-67B	25-Sep-06 20:29:09	52	Aircraft Bus Voltage	28.0888	V
PT6A-67B	25-Sep-06 20:29:09	52	Internal Battery Voltage	2.9725	V
PT6A-67B	25-Sep-06 20:29:09	52	Internal Board Temp	46.8837	C
PT6A-67B	25-Sep-06 20:29:09	52	Configuration ID	200.0000	B

NOTE: You should periodically analyze the sensor values and cycle counts of your run logs to help you insure that your system is functioning correctly and that the displayed values are reasonable and correctly calibrated.



Engine Name	Pilot	Start Time	T/100	Run Duration	Sensors /Cycles	Run Comments	Starting Duration (secs.)	Max. Start Temperature	Min. Battery Voltage	Valid	Reported
PT6A-114	Unspecified	20-Apr-06 16:31:29	83	00:01:37	14 / 2	View Comments	0.9700	696.0420	27.3467	✓	☑
4	Unspecified	20-Apr-06 16:19:13	17	00:03:50	14 / 2	View Comments	0.9700	731.2910	27.3250	✓	☑
	Unspecified	20-Apr-06 13:37:32	68	00:01:30	14 / 2	View Comments	0.9700	735.7680	27.3304	✓	☑
PT6A-114	Unspecified	20-Apr-06 13:27:37	68	00:06:37	14 / 2	View Comments	0.9700	610.7100	27.2816	✓	☑
PT6A-114	Unspecified	20-Apr-06 13:17:14	36	00:08:23	14 / 2	View Comments	4.8800	740.7710	24.1567	✓	☑
PT6A-114	Unspecified	20-Apr-06 11:37:52	09	00:01:12	14 / 2	View Comments	0.9700	590.4540	27.4717	✓	☑

0.9700 is to short for a start.

- Starting the engine while in config mode then switching to run mode (Run/Conf switch).
- Switching between run and config mode to view live data (Run/Conf switch).
- Applying power to the monitor while the engine is running (buss and/or battery)

Deselect the check mark and this engine run will not be included in reports

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A United Technologies Company

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Verify Uploaded Logs
Page 5 of 7

Kitty Hawk

Description	Engine Runs	ER Hours	Trends	Events	Flags	Faults	Last Upload
206	0	0.0	0	0	0	0	
VS-300 N1939	21	21.7	22	41	139	15	08-Feb-06
Wright Flyer N1903	0	0.0	0	0	0	0	
Total Tails = 3	21 runs		2 trends	41 events	139 flags	15 faults	

Click on the Number of Trends **Hyperlink** to display a chronologic list of the trend logs for the selected Install

Manual Trend Entry
NORMAL
PartSep ON

	ime	T/100	Samples	Sensors	Valid	Reported	Reference
	9:51:20	86	5.0	14	✓	✓	
NORMAL	25-Sep-06 11:27:04	28	5.0	14	✓	✓	
NORMAL	25-Sep-06 10:00:18	92	5.0	14	✓	✓	
NORMAL	25-Sep-06 07:38:41	76	5.0		✓	✓	
NORMAL	24-Sep-06 16:42:49	87	5.0			✓	
NORMAL	24-Sep-06 14:03:32	81	5.0			✓	
Manual Trend	17-Aug-06 16:49:06	68	5.0			✓	
Manual Trend	17-Aug-06 16:48:48	49	5.0			✓	
Manual Trend	17-Aug-06 16:48:02	43	5.0			✓	
Manual Trend	17-Aug-06 16:47:54	89	5.0				
Manual Trend	17-Aug-06 16:46:05	94	5.0				
Manual Trend	17-Aug-06 16:44:23	16	5.0				
Manual Trend	17-Aug-06 16:37:44	37	5.0				

Selecting the Sensor Number **Hyperlink** displays the maximum and average values recorded during the trend

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Trend Name	Sensor Name	Start Time	T/100	Max Value		Average Value	
NORMAL	Aircraft Bus Voltage	25-Sep-06 19:51:20	86	27.9706	V	27.9451	V
NORMAL	Airspeed	25-Sep-06 19:51:20	86	199.1000	kn	198.6294	kn
NORMAL	Altitude	25-Sep-06 19:51:20	86	22926.0137	ft	22917.3398	ft
NORMAL	Engine ITT	25-Sep-06 19:51:20	86	721.2557	C	720.4231	C
NORMAL	Engine Ng	25-Sep-06 19:51:20	86	99.8636	%	99.8398	%
NORMAL	Engine Np	25-Sep-06 19:51:20	86	1704.0728	rpm	1703.0889	rpm
NORMAL	Engine Trq	25-Sep-06 19:51:20	86	36.8977	psi	36.7582	psi
NORMAL	Engine Wf	25-Sep-06 19:51:20	86	430.1837	pph	428.4539	pph
NORMAL	Inlet Pressure	25-Sep-06 19:51:20	86	0.9409	psid	0.9376	psid
NORMAL	Inlet Temperature	25-Sep-06 19:51:20	86	-19.5750	C	-19.6781	C
NORMAL	Nacelle Static Pressure	25-Sep-06 19:51:20	86	12.1918	in Hg	12.1913	in Hg
NORMAL	P2.5 / P3 Bleed	25-Sep-06 19:51:20	86	0.0000	d	0.0000	d
NORMAL	Particle Seperator	25-Sep-06 19:51:20	86	0.0000	d	0.0000	d
NORMAL	Weight on Wheels	25-Sep-06 19:51:20	86	1.0000	d	1.0000	d

NOTE: You should periodically analyze the sensor values of your trend logs to help you insure that your system is functioning correctly and that the displayed values are reasonable and correctly calibrated.

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Verify Uploaded Logs
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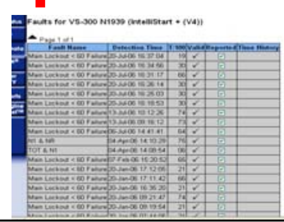
Kitty Hawk

Description	Engine Runs	ER Hours	Trends	Events	Flags	Faults	Last Upload
206	0	0.0	0	0	0	0	
VS-300 N1939	21	21.7	2	41	139	15	08-Feb-06
Wright Flyer N1903	0	0.0	0	0	0	0	
Total Tails = 3	21 runs	21.7 hrs	2 trends	41 events	139 flags	15 faults	

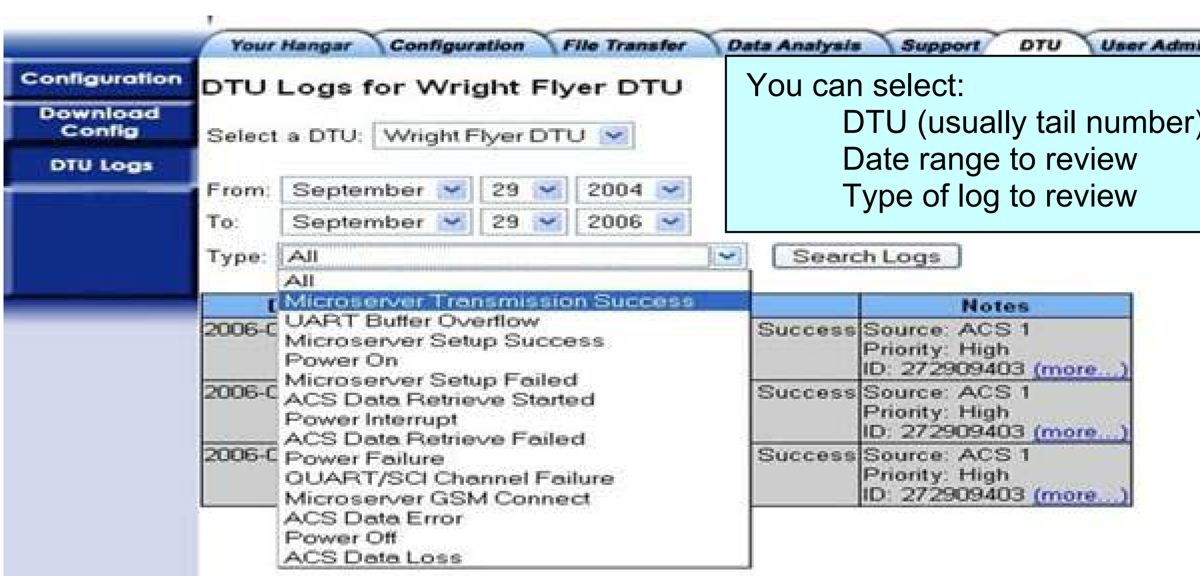


Event, Flag and Fault logs are also displayed in chronological order by selecting the desired **Hyperlink.**

NOTE: You should periodically analyze the event, flag and fault logs to help you insure that your system is functioning correctly and that the displayed values are reasonable and correctly calibrated.

Viewing your uploaded DTU Logs

After selecting the **DTU** tab on top, select the **DTU Logs** button on the left. You will be presented with the DTU selection page.



You can select:
DTU (usually tail number)
Date range to review
Type of log to review

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Verify Uploaded Logs
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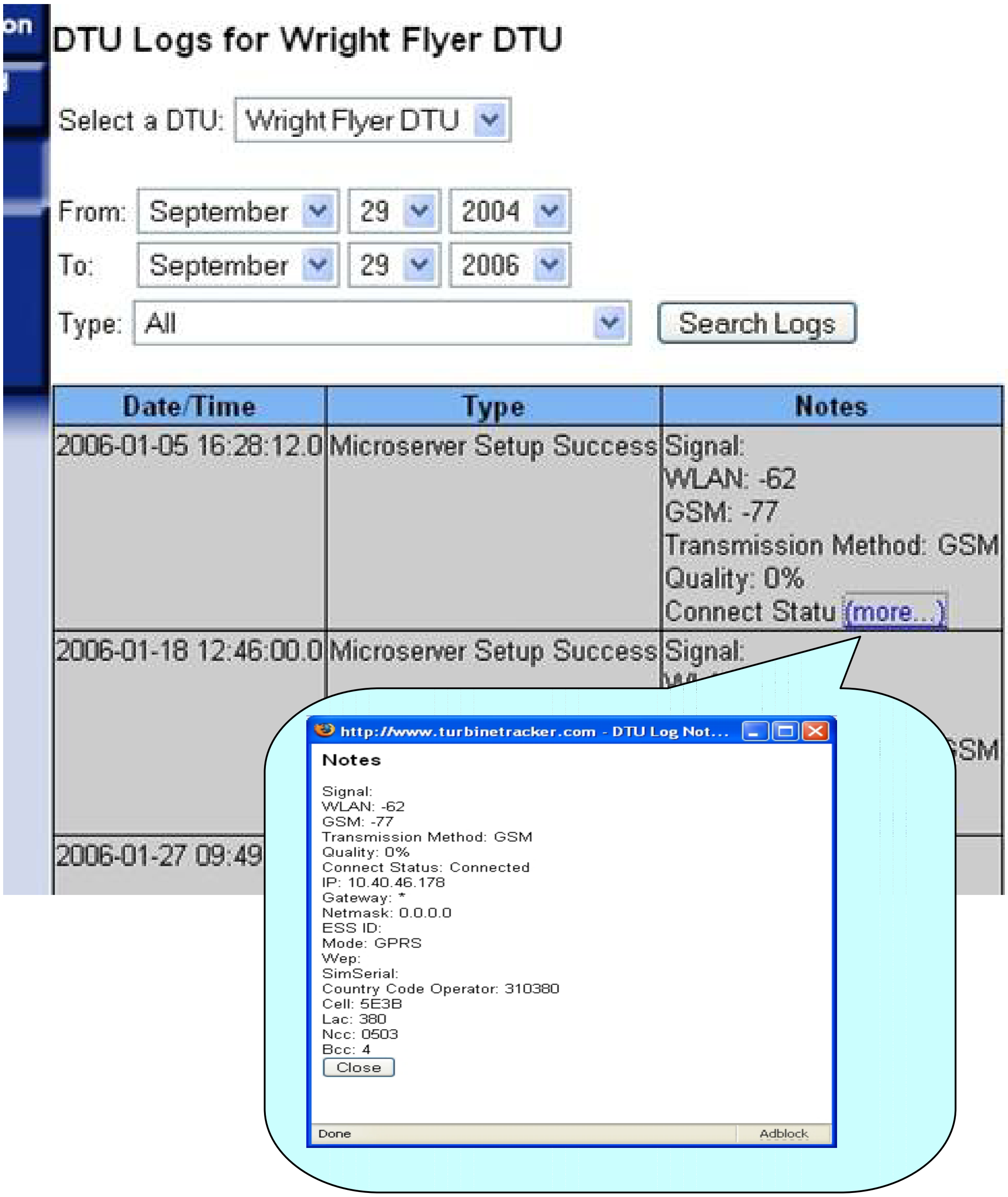

Select the **<u>(More…) Hyperlink</u>** to open a pop-up window and display any additional information that may be contained or associated with the DTU log.

CUST-T- 408 -1
USB Download Cable
Driver Installation
13 Sep 2006
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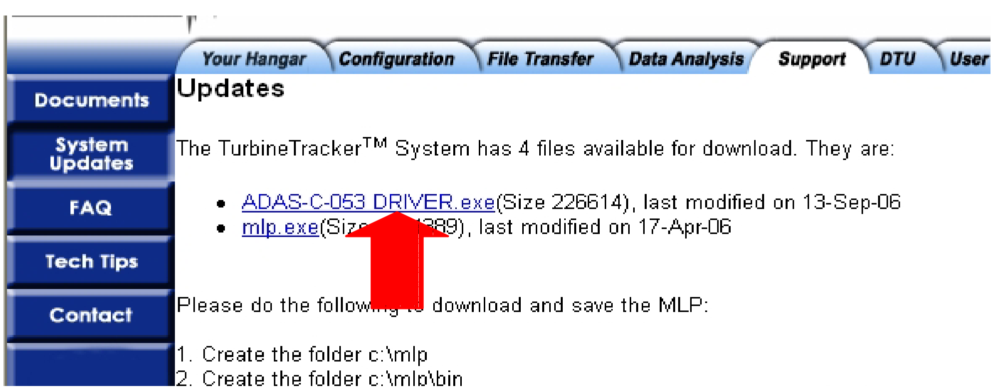
USB Download Cable Adapter Installation Checklist

Caution: Only for use with the ADAS-C-053-1 USB Download Cable

Overview
1) Download Diver information from TurbineTracker™
2) Install the USB to Serial converter driver on your laptop
3) Install the communications port driver on your laptop

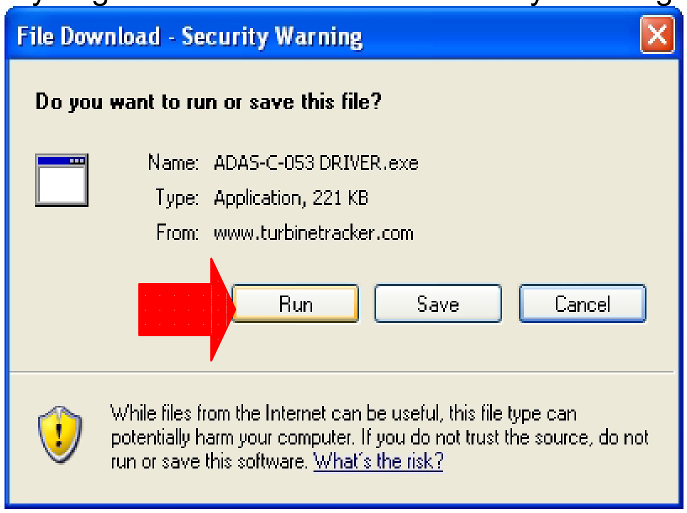
NOTE: Ensure you have the current version of the Monitor Link Program (MLP) installed on your computer before attempting to download the USB drivers.
The current version is available from the TurbineTracker™ website under the "Support Tab" by selecting the "Systems Update" button on the left and following the on screen instructions (See Checklist CUST-T- 417-1).

1. **DOWNLOAD DRIVERS** - Log in to TurbineTracker™ website with the Lap top you will be using the USB Download Cable on and download the <ADAS-C-053 DRIVER.zip> file located under the "**Support Tab**" by selecting the "**Systems Update**" button on the left and clicking on the **ADAS-C-053 DRIVER.exe** hyperlink.

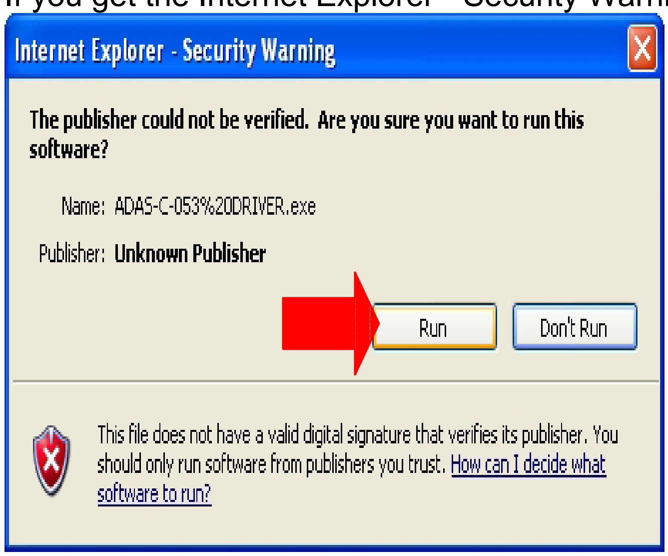


***NOTE:* ADAS-C-053 DRIVER.exe is a Self – Extracting WinZip file that contains the compressed USB driver information.**

If you get the File Download - Security Warning select **Run**

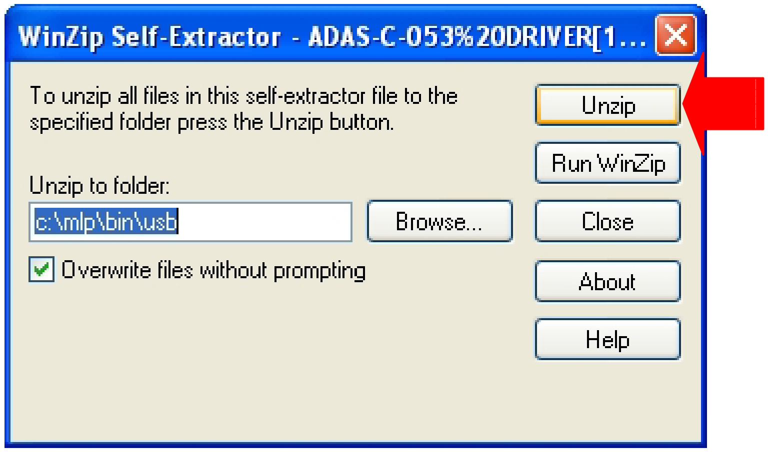


If you get the Internet Explorer - Security Warning select **Run**

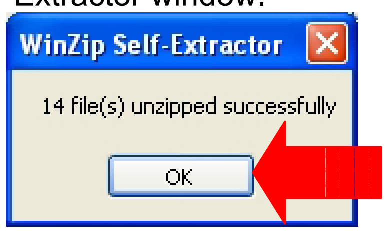


When the WinZip Self – Extractor pop-up opens, select the **Unzip** button.

NOTE: The Self – Extractor should default to the recommended **c:\mlp\bin\usb** folder on your computer, but the advanced user has the option to select a different folder.



After the download completes you should receive the WinZip pop-up message “14 files unzipped successfully”. After clicking on “**OK**” when the files are done extracting. Click on “**Close**” to close the WinZip Self – Extractor window.



Now that you have downloaded the USB Download Cable Drivers to the c:\mlp\bin\usb folder on your PC, there are two steps to completing the driver installation.

First, the USB Converter will be installed.

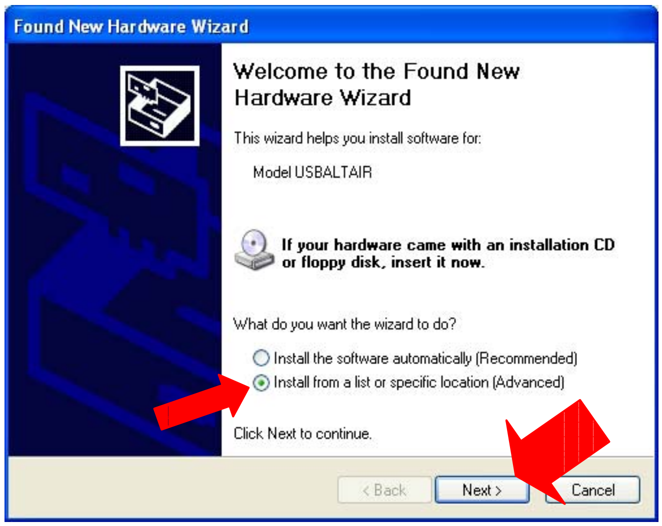
Second, the Communications Port will be installed.

The installation is not complete until both pieces are in place on your computer.

NOTE: You must complete the driver installation for the adaptor and the instructions need to be followed specifically in order for it to be recognized. Some operators experience problems that require them to manually edit their systems communication port settings; especially if the computer was used previously to communicate with other devices i.e. PDA & Active-synch (turn off other programs or devices that may be using comm. port resources).

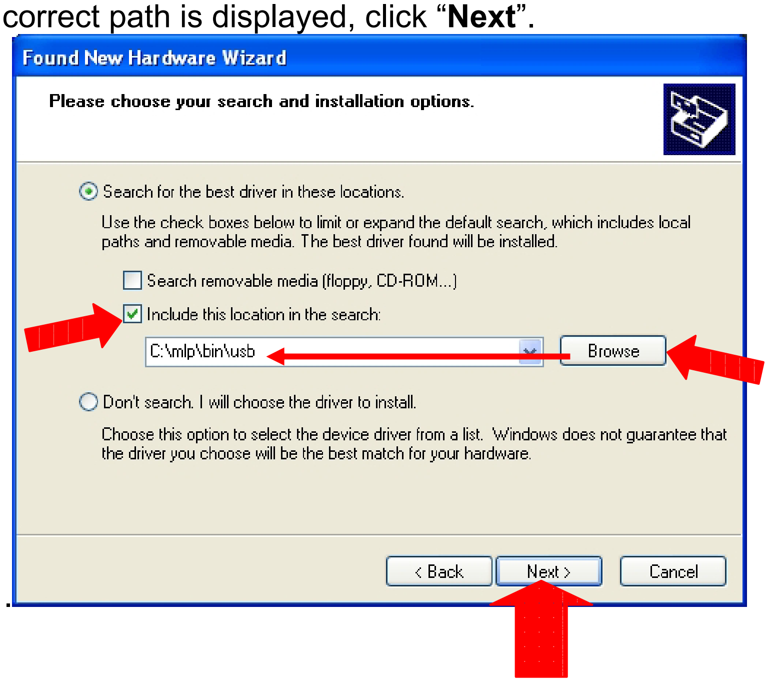
2. **Install the USB to Serial converter driver** - Insert the USB cable into your PC’s USB port. The computer should detect the hardware automatically. This first step will install the USB Converter on your PC.

The "Found New Hardware Wizard" screen should automatically pop up on your computer. Select "**Install from a list or specific location (advanced)**" in the wizard and then select "**Next**".



Note: Windows defaults to install the software automatically and will not be able the find the correct drivers unless you manually select the "**Install from a list or specific location (advanced)**" option

Select "**Include this location in the search**" and you can also de-select "Search removable media". Click **Browse** and navigate to c:\mlp\bin\usb then click **OK**. After you insure the correct path is displayed, click "**Next**".

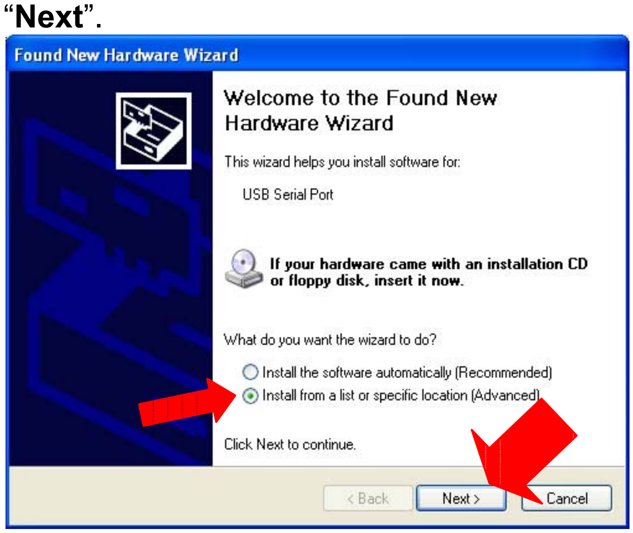


Click “**Finish**” to close the wizard after the driver file transfer completes.

3. **Install the communications port driver –** After the USB converter is successfully installed the computer should detect the communication hardware automatically. This next step will install the communication port driver.

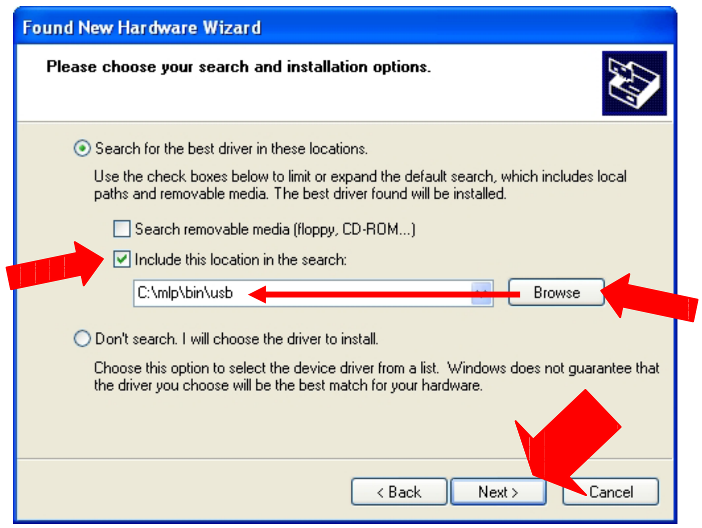
   The Wizard should re-appear to install the driver for the communications port automatically. You need to continue through the same steps just like you did for the USB converter.

   Select “**Install from a list or specific location (advanced)”** in the wizard and then select “**Next**”.

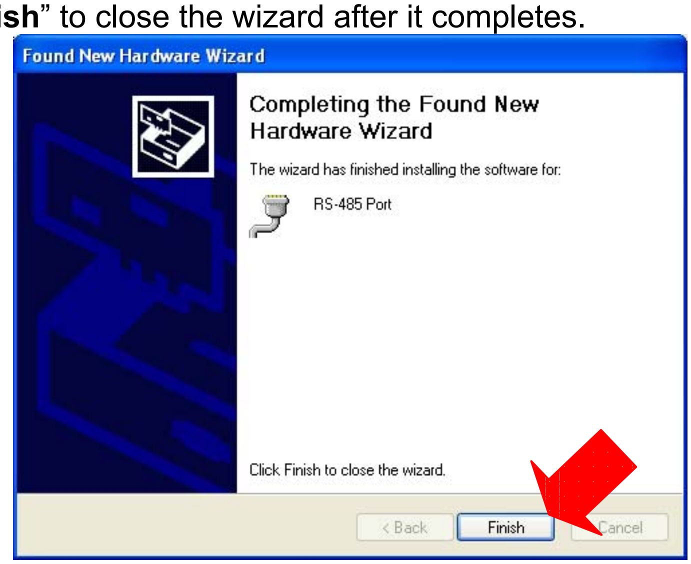


Note: Windows defaults to install the software automatically and will not be able the find the correct drivers unless you manually select the “**Install from a list or specific location (advanced)**” option.

- Make sure that the selections are the same as those you made when installing the USB driver. If they are not, repeat those steps from above, and then click "**Next**".



- Click "**Finish**" to close the wizard after it completes.



You have now installed the USB driver and the new communications port on your PC/Laptop. MLP will be able to auto-detect this port when you run MLP and follow the standard procedure for connecting to your monitor, as described in the MLP Manual.
If you have trouble connecting to your monitor with MLP, remember to check your Windows hardware settings and that you may have to manually edit comm. port settings.

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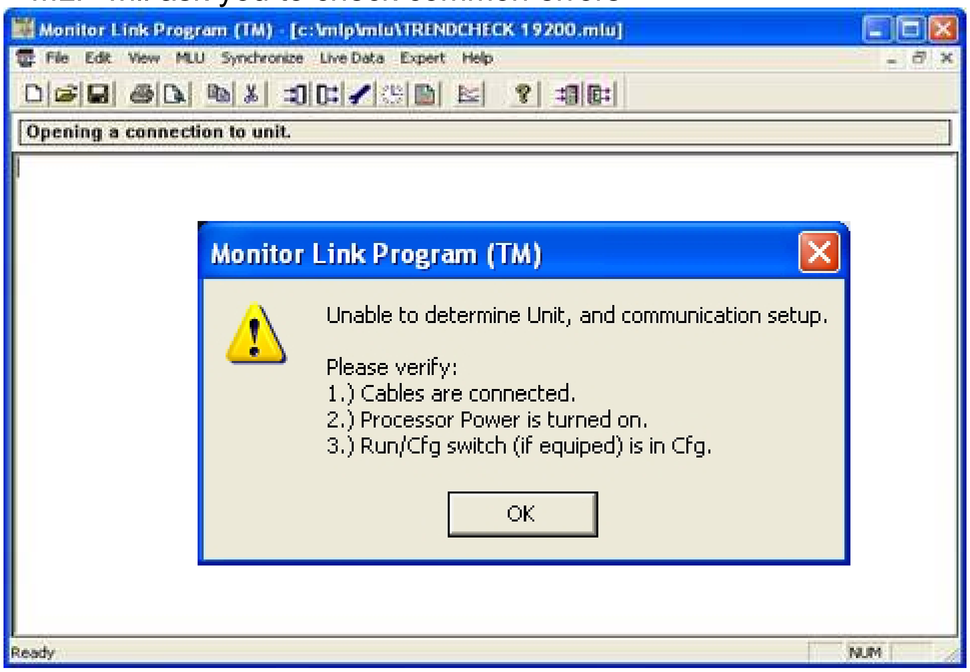
If MLP can not establish a connection with Autodetect:
MLP will ask you to check common errors



NOTE: If you have a Download Cable connected to a Generation 3 Monitor the Run/Conf switch should cause the Trend Lamp to illuminate when placed in the conf position.

DTU USERS: If you are trying connected to a DTU, the Download Cables Run/Conf switch has no function and should allow you to establish a connection in either position.

Communication Baud Rates of Altair Monitors

Generation I	***Generation II***	***Generation III***	***DTU & ADASd***
CrossCheck	*TrendCheck*	*IntelliStart+*	*DTU*
HUMS 1022	*ADAS*	*SmartCycle+*	*ADASd*
HUMS 1122	*SmartCycle*	*IntelliStart+ BA*	
	SmartCycle Twin	*TrendCheck+*	
		ADAS+	
		ADAS+ Upgrade	
		Configurable Baud Rate	***Configurable Baud Rate***
Fixed Baud Rate	***Fixed Baud Rate***	*19,200 On Reset*	*57,600 On Reset*
9600	*19,200*	*57,600 Maximum*	*57,600 Maximum*

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Trouble Shooting Tips

TIPS AND TRICKS: An easy way to verify successful connection between MLP and your Processor is to accomplish "**MLU Status**" under the MLU Menu.

Receiving the "**MLU Status Processing Complete**" prompt and the display of the processors status indicates a connection has been established between the computer and the processor.

Unable to Communicate with Processor

Most common communication failures:

- **Processor not powered on.** Insure completion of successful Power-On BIT Test.

- **Down-load cable Run/Conf Switch (in run).** Switch to config position to allow MLP to send commands and receive replies from the monitor.

Note: Except for DTU's the Trend Lamp should illuminate solid when the Down-load Cable Switch is in Conf position.

- **Faulty ConXall plug and Communication Port wiring installation.** Check comm. port IAW Instructions for Continued Airworthiness.

- **Computer setup:**
  - **Communications port not available.** Check your Windows Device Manager.
  - **Communications port being used by other Devices or Software.** Stop other applications like Active Synch, Camera programs, Serial Mouse & etc.
  - **USB to serial adapter drivers not correctly installed.** Re-install Drivers.
  - **USB hardware incompatible with RS 485.** Use Altair recommended adapter or Download Cable.
  - **Firewall and Security settings blocking MLP.** Insure MLP can operate through your Firewall and write files to your C:\ Hard Drive.

NOTE: All of our updated Manuals, User's Guides and Checklist are available free of charge for TurbineTracker™ users under the "**Support Tab**" by selecting the "**Documents**" button.

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Calibration

Calibrating Your Processor

***CAUTION**: Ensure you have the current version of the Monitor Link Program (MLP). The current version is available from Turbine Tracker under the "Support Tab" and "Systems Update" button. (See Checklist CUST-T- 417-1)*

NOTE: Calibration is usually required to analog type sensors due to the variance in harness resistance between aircraft. During the initial installation it is recommended to calibrate sensors in parallel to the aircraft instrumentation to determine that the aircraft and monitor are both correct and within tolerance.

METHODS OF CALIBRATION: There are basically two means for calibrating sensors.
1) With a calibration tool, such as a Barfield temp calibrator, deadweight pressure calibrator, or by referenced to the aircraft instrumentation.
2) Calibration to the aircraft can be accomplished real-time (while flying) or after the flight using "manual sensor calibration" described below.

NOTE: The following (and *ONLY* the following) shall be calibrated:
Engine Temperature (T4, T4.5, TOT, EGT, MGT, ITT, Etc.) for all processors
OAT, Engine Torque, Airspeed, Altitude for all processors
Accelerometer for the ADAS processor only
Engine Oil Temperature for the SmartCycle Plus processor only

NOTE: The examples shown within this checklist use a combination of monitors with one processor and monitors with two processors. Calibration is accomplished for each processor. When calibrating monitors with two processors, you must choose the processor AND sensor to be calibrated.

TIPS AND TRICKS: Processor 1 within the ADAS is called the ADAS Master. Processor 2 is called the ADAS Slave.

NOTE: Calibrating the Altitude Sensor also calibrates the Static Pressure Sensor. A separate Static Pressure calibration is not required.

NOTE: Calibrating the Airspeed Sensor also calibrates the Pitot Pressure Sensor. A separate Pitot Pressure calibration is not required.

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NOTE: Calibrating either processors ambient sensors (OAT, Airspeed, Altitude) for the ADAS monitor will calibrate the other processor at the same time.

NOTE: A *Barfield (or equivalent)* should be used to calibrate the "Engine Temperatures." If a Barfield is not available, an engine run must be accomplished to generate the required values for calibration.

NOTE: A *deadweight tester or pressure calibrator* should be used to calibrate Engine Torque. If a deadweight tester is not available, an engine run must be accomplished to generate the required values for calibration.

NOTE: A *pitot static test set* should be used to calibrate Airspeed (and Altitude for ADAS). If a pitot static test set is not available, the airspeed (and altitude for ADAS) shall be calibrated while the aircraft is in flight to generate the required values.

NOTE: Calibration will increase the configuration version number in your processor and configuration file. The new configuration .cal file must be uploaded to TurbineTracker™ once calibration is complete.

NOTE: The configuration version will only increment one step while you remain in MLP regardless of how many sensors you calibrate. Care should be taken to not close and open MLP during the process or the configuration version could increment more than one level.

TYPES OF CALIBRATION

TWO POINT: The two-point calibration is the most accurate and recommended whenever you can supply two separate calibration points. The two-point calibration will require a low and high calibration value. Using these values the MLP program will calculate a new P1 (Slope) and P2 (Offset) value for the sensor.

ONE POINT SLOPE: The one-point slope calibration can be used to calibrate the sensor to match the aircraft instrument at a high value. The one-point calibration will require a high calibration value. Using this value the MLP program will calculate a new P1 (Slope) value for the sensor.

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ONE POINT OFFSET: The one-point offset calibration can be used to calibrate the sensor to match the aircraft instrument at a low value. The one-point calibration will require a low calibration value. Using this value the MLP program will calculate a new P2 (Offset) value for the sensor.

TIPS AND TRICKS: Accomplish a *Two Point Calibration* if you can generate two values widely different from each other (e.g. Torque at 20% then at 80%), if directed by this checklist, OR if directed by Customer Support.

TIPS AND TRICKS: Accomplish a *One Point Calibration* ONLY if a two point cannot be accomplished, if directed by this checklist, OR if directed by Customer Support.

Recommended Types of Calibration

SENSOR CALIBRATION EQUIPMENT	CALIBRATION TYPE
"Engine Temperatures" (T4, T4.5, TOT, EGT, MGT, ITT)	
Barfield (or Equivalent)	Two Point
OAT Aircraft OAT Sensor	One Point Offset
Engine Torque Dead Weight Tester	Two Point
Airspeed Pitot Static Test Set	Two Point
Altitude (for all processors except ADAS)Aircraft Altimeter *	One Point Offset
Altitude (for the ADAS only) Pitot Static Test Set	Two Point
Accelerometer (for the ADAS only) Gravity (+/- 1g) **	Two Point
Engine Oil Temperature None ***	Manual Sensor Calibration

* Refer to Addendum 1 for calibration.
** Refer to Addendum 2 for calibration.
*** Refer to Addendum 3 for calibration.

LESSONS LEARNED: Prior to attempting calibration accomplish the Retrieve Data Log Procedure. Calibration cannot be accomplished with log data present in the processor.

LESSONS LEARNED: During the initial installation of the product it is advisable to view "live data" with MLP (see view live data checklist). This will allow you to

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perform a sanity check against the aircraft prior to calibration. Operators often attempt to calibrate a sensor that is not working correctly.
If the processor is displaying all 9s for a sensor, this indicates a sensor failure. CANCEL out of the calibration and accomplish System Troubleshooting IAW the Instruction for Continued Airworthiness.

TIPS AND TRICKS: If you feel that the sensor readings on the processor are close enough to the aircraft gages, you may decide that calibration is not required for that sensor.

LESSONS LEARNED: If the sensor readings are considerably off from the aircraft gages, contact Customer Support.

CALIBRATION CHECKLIST – TWO POINT

For this example Engine Temperature, using a barfield temperature calibrator, will be used.

1. Ensure the RUN/CONF switch on the serial cable is set to “CONF” (Skip this step for HUMS 1122 and CrossCheck) or enter TRANSPARENT MODE if using the DTU.
2. Select “MLU” then “Sensor Calibration.”

NOTE: The MLP will collect all sensors able to be calibrated through the “Select Sensor for Calibration” Dialog Box.

3. Select “Engine T4.5” from the drop down list.
4. Select “Two Point” from the Calibration Type.
5. Click “OK”

NOTE: The Two Point Sensor Calibration Dialog Box appears with two sets of (grayed out) numbers cycling on the left and two sets of white text boxes labeled “Enter a value” on the right. Use Set Point 1 for the low point and Set Point 2 for the high point.

6. Generate the low point value for the sensor (e.g. Engine T4.5 at 300$_o$ C) and wait for the sensor reading on the processor to stabilize.
7. Check the value on the aircraft gauge. VALUE ___________________.

(If the aircraft value is not within tolerance of the calibrated input, pause here and investigate. If the aircraft value is acceptable, continue).

8. Enter the value from the aircraft gauge in the upper white text box.
9. Click “Set Point 1” ONCE and note the grayed number on the left stops cycling.

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LESSONS LEARNED: Clicking a "Set Point" button more than once will cause the calibration value to be rejected. If this occurs, the number on the left will continue to cycle. Re-accomplish the step and remember to click the "Set Point" button once and only once.

10. Generate the high point value for the sensor (e.g. . Engine T4.5 at 900$_o$ C) and wait for the sensor reading on the processor to stabilize.
11. Check the value on the aircraft gauge. VALUE_________________.
(If the aircraft value is not within tolerance of the calibrated, pause here and investigate. If the aircraft value is acceptable, continue).
12. Enter the value from the aircraft gauge in the lower white text box.
13. Click "Set Point 2" ONCE and note the grayed number on the left stops cycling.
14. Click "OK"
15. The new configuration file values shall be displayed in a new dialog box. Click "Yes" to accept the new values.

TIPS AND TRICKS: If you feel a mistake has been made, click "No" and proceed through the dialog boxes. When the "Select Sensor for Calibration" Dialog Box appears, go to step 3.

NOTE: When you accept new calibration values, MLP automatically creates a .cal file in the MLP sync directory (C:\mlp\sync\cfg\tx) that will need to be loaded to TurbineTracker™ after completion of calibration.
NOTE: The preferred method to upload a .cal file is to synchronize MLP to TurbineTracker™ which well automatically transfer all files. If you can not connect MLP directly to TurbineTracker™ (firewall) you can manually upload the config .cal file using the websites File Transfer Tab.

16. Click "Yes" to review the sensor's calibration or "No" not to review the sensor's calibration.

TIPS AND TRICKS: Click "Yes" in step 16 to view the results of calibration. The Calibration Review Dialog Box will display the processor reading resulting from calibration. Compare that value to the aircraft gauge value to verify accuracy.

17. If you clicked "Yes" for step 16, click "Done." (*If you have completed calibration, select No. Otherwise, select Yes to calibrate another sensor).*

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CALIBRATION CHECKLIST – ONE POINT SLOPE

For this example Airspeed, matched against the aircraft instrument, will be used.
1. Ensure the RUN/CONF switch on the serial cable is set to “CONF” (Skip this step for HUMS 1122 and CrossCheck) or enter TRANSPARENT MODE if using the DTU.
2. Select “MLU” then “Sensor Calibration.”

NOTE: The MLP will collect all sensors able to be calibrated through the “Select Sensor for Calibration” Dialog Box.

3. Select “Airspeed” from the drop down list.
4. Select “One Point Slope” from the Calibration Type.
5. Click “OK”

NOTE: The One Point Sensor Calibration Dialog Box appears with one (grayed out) number cycling on the left and one white text boxes labeled “Calibrate to value” on the right.

6. Check the value on the aircraft gauge. VALUE ___________________.
7. Enter the value from the aircraft gauge in the white text box.
8. Click “Set Point” ONCE and note the grayed number on the left stops cycling.

LESSONS LEARNED: Clicking a “Set Point” button more than once will cause the calibration value to be rejected. If this occurs, the number on the left will continue to cycle. Re-accomplish the step and remember to click the “Set Point” button once and only once.

9. Click “OK”
10. The new configuration file values shall be displayed in a new dialog box. Click “Yes” to accept the new values.

TIPS AND TRICKS: If you feel a mistake has been made, click “No” and proceed through the dialog boxes. When the “Select Sensor for Calibration” Dialog Box appears, go to step 3.

NOTE: When you accept new calibration values, MLP automatically creates a .cal file in the MLP sync directory (C:\mlp\sync\cfg\tx) that will need to be loaded to TurbineTracker™ after completion of calibration.
NOTE: The preferred method to upload a .cal file is to synchronize MLP to TurbineTracker™ which well automatically transfer all files. If you can not connect MLP directly to TurbineTracker™ (firewall) you can manually upload the config .cal file using the websites File Transfer Tab.

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11. Click “Yes” to review the sensor’s calibration or “No” not to review the sensor’s calibration.

TIPS AND TRICKS: Click “Yes” in step 11 to view the results of calibration. The Calibration Review Dialog Box will display the processor reading resulting from calibration. Compare that value to the aircraft gauge value to verify accuracy.
12. If you clicked “Yes” for step 11, click “Done.” (*If you have completed calibration, select No. Otherwise, select Yes to calibrate another sensor).*

CALIBRATION CHECKLIST – ONE POINT OFFSET

For this example OAT, matched against the aircraft OAT probe, will be used.
1. Ensure the RUN/CONF switch on the serial cable is set to “CONF” (Skip this step for HUMS 1122 and CrossCheck) or enter TRANSPARENT MODE if using the DTU.
2. Select “MLU” then “Sensor Calibration.”
NOTE: The MLP will collect all sensors able to be calibrated through the “Select Sensor for Calibration” Dialog Box.
3. Select “OAT” from the drop down list.
4. Select “One Point Offset” from the Calibration Type.
5. Click “OK”
NOTE: The One Point Sensor Calibration Dialog Box appears with one (grayed out) number cycling on the left and one white text boxes labeled “Calibrate to value” on the right.
6. Check the value on the aircraft gauge. VALUE __________________.
7. Enter the value from the aircraft gauge in the white text box.
8. Click “Set Point” ONCE and note the grayed number on the left stops cycling.

LESSONS LEARNED: Clicking a “Set Point” button more than once will cause the calibration value to be rejected. If this occurs, the number on the left will continue to cycle. Re-accomplish the step and remember to click the “Set Point” button once and only once.

9. Click “OK”
10. The new configuration file values shall be displayed in a new dialog box.

Click “Yes” to accept the new values.

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TIPS AND TRICKS: If you feel a mistake has been made, click "No" and proceed through the dialog boxes. When the "Select Sensor for Calibration" Dialog Box appears, go to step 3.

NOTE: When you accept new calibration values, MLP automatically creates a .cal file in the MLP sync directory (C:\mlp\sync\cfg\tx) that will need to be loaded to TurbineTracker™ after completion of calibration.
NOTE: The preferred method to upload a .cal file is to synchronize MLP to TurbineTracker™ which well automatically transfer all files. If you can not connect MLP directly to TurbineTracker™ (firewall) you can manually upload the config .cal file using the websites File Transfer Tab.

11. Click "Yes" to review the sensor's calibration or "No" not to review the sensor's calibration.

TIPS AND TRICKS: Click "Yes" in step 11 to view the results of calibration. The Calibration Review Dialog Box will display the processor reading resulting from calibration. Compare that value to the aircraft gauge value to verify accuracy.

If you clicked "Yes" for step 11, click "Done."
If you have completed calibration, select No. Otherwise, select Yes to calibrate another sensor.

CALIBRATION CHECKLIST – MANUAL SENSOR CALIBRATION

NOTE: The manual sensor calibration can be used to match the processor to the aircraft. Prior to performing this type of calibration the operator will need to collect operational (flight) data from the aircraft and monitor. A suggested method is to have the pilot or crew start the engine and record engine values (to match sensors needing calibration) at idle. At the same time the processor trend button should be pressed to capture the same data. Fly the aircraft and perform the same process (collecting written and trend data) in cruise flight. These two samples from the aircraft and engine monitor will be used to complete the following manual sensor calibration.

For this example Altitude (ADAS) will be used.
1. Ensure the RUN/CONF switch on the serial cable is set to "CONF." (Skip this step for HUMS 1122 and CrossCheck) or enter TRANSPARENT MODE if using the DTU.

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2. Select “Expert Mode” then “Manual Sensor Calibration.”
NOTE: The MLP will collect all sensors able to be calibrated through the “Select Sensor for Calibration” Dialog Box.
3. Select “Processor 1 Altitude” from the drop down list.
4. Select “Two Point” from the Calibration Type.
5. Click “OK”
NOTE: The Manual Two Point Sensor Calibration Dialog Box appears with two sets of numbers on the left (both processor one and two for ambient channels) and two sets of white text boxes labeled “Enter a value” on the right.
NOTE: The ADAS is represented here with dual processors. Other monitors would be identical with the exception of the second (slave) processor.
6. Using the collected ground and flight data, input the processor one reading for low (ground idle) and high (flight cruise) under the “Master Values”.
7. Using the collected ground and flight data, input the processor two reading for low (ground idle) and high (flight cruise) under the “Slave Values”.
8. Using the collected ground and flight data, input the aircraft reading for low (ground idle) and high (flight cruise) under the “Calibrate To Values”.
9. Click “OK”
10. The new configuration file values shall be displayed in a new dialog box. Click
“Yes” to accept the new values.

TIPS AND TRICKS: If you feel a mistake has been made, click “No” and proceed through the dialog boxes. When the “Select Sensor for Calibration” Dialog Box appears, go to step 3.

NOTE: When you accept new calibration values, MLP automatically creates a .cal file in the MLP sync directory (C:\mlp\sync\cfg\tx) that will need to be loaded to TurbineTracker™ after completion of calibration.
NOTE: The preferred method to upload a .cal file is to synchronize MLP to TurbineTracker™ which well automatically transfer all files. If you can not connect MLP directly to TurbineTracker™ (firewall) you can manually upload the config .cal file using the websites File Transfer Tab.

11. Click “Yes” to review the sensor’s calibration or “No” not to review the sensor’s calibration.

TIPS AND TRICKS: Click “Yes” in step 11 to view the results of calibration. The Calibration Review Dialog Box will display the processor reading resulting from calibration. Compare that value to the aircraft gauge value to verify accuracy.

If you clicked "Yes" for step 11, click "Done."
If you have completed calibration, select No. Otherwise, select Yes to calibrate another sensor.

ADDENDUM 1

CALIBRATION CHECKLIST – ALTITUDE (for all processors except ADAS, HUMS 1122, and Crosscheck)

NOTE: Use the Calibration Checklist – One Point Offset to calibrate Altitude. THIS ADDENDUM DOES NOT REPLACE THE ONE POINT OFFSET. This addendum simply elaborates on what to do specifically for Altitude.

1. Ensure the RUN/CONF switch on the serial cable is set to "CONF" or enter TRANSPARENT MODE if using the DTU.
2. Select "MLU" then "Sensor Calibration."

NOTE: The MLP will collect all sensors able to be calibrated through the "Select Sensor for Calibration" Dialog Box.

3. Select "Altitude" from the drop down list.
4. Select "One Point Offset" from the Calibration Type.
5. Click "OK"
6. Dial 29.92 inHg (1013 mbar) on the Pressure Gage within the Altimeter.

NOTE: All engine monitoring systems represent Altitude as Pressure Altitude. Using 29.92 inHg (1013 mbar) in the Aircraft Altimeter will make the altimeter show Pressure Altitude.

Go to Step 6 of the ***CALIBRATION CHECKLIST – ONE POINT OFFSET***

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ADDENDUM 2

CALIBRATION CHECKLIST – ACCELEROMETER (for ADAS processor only)

NOTE: Use the Calibration Checklist – Two Point to calibrate the Accelerometer. THIS ADDENDUM DOES NOT REPLACE THE TWO POINT. This addendum simply elaborates on what to do specifically for the Accelerometer.

1. Ensure the RUN/CONF switch on the serial cable is set to "CONF" or enter TRANSPARENT MODE if using the DTU.

2. Select “MLU” then “Sensor Calibration.”
NOTE: The MLP will collect all sensors able to be calibrated through the “Select Sensor for Calibration” Dialog Box.
3. Select “Accelerometer” from the drop down list.
4. Select “Two Point” from the Calibration Type.
5. Click “OK”
NOTE: The Two Point Sensor Calibration Dialog Box appears with two sets of (grayed out) numbers cycling on the left and two sets of white text boxes labeled “Enter a value” on the right. It is recommended that you use Set Point 1 for the low point and Set Point 2 for the high point.
6. Invert the accelerometer and note the upper grayed out number becomes negative.
7. Enter –1 in the upper white text box.
8. Click “Set Point 1” ONCE and note the grayed number on the left stops cycling.

LESSONS LEARNED: Clicking a “Set Point” button more than once will cause the calibration value to be rejected. If this occurs, the number on the left will continue to cycle. Re-accomplish the step and remember to click the “Set Point” button once and only once.

9. Turn the accelerometer right side up and note the lower grayed out number becomes positive.
10. Enter 1 in the lower white text box.
11. Click “Set Point 2” ONCE and note the grayed number on the left stops cycling.
12. Click “OK”
*Go to Step 15 of the **CALIBRATION CHECKLIST – TWO POINT**.*

ADDENDUM 3

CALIBRATION CHECKLIST – Engine Oil Temperature (For Smartcycle Plus Only)

NOTE: Use the Calibration Checklist – Manual Sensor Calibration to calibrate Engine Oil Temperature. THIS ADDENDUM DOES NOT REPLACE THE MANUAL SENSOR CALIBRATION CHECKLIST. This addendum simply elaborates on what to do specifically for Engine Oil Temperature.
Collect the first set of data as follows.

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Calibration
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1. Start the Aircraft engine.
2. Wait for the engine oil temperature to stabilize at idle.
3. Record the engine oil temperature value from the aircraft gauge.
4. Press the Trend Button

Collect the second set of data as follows.

5. Run up the aircraft to a high power setting to increase oil temperature.
6. Wait for the engine oil temperature to stabilize at the high power setting.
7. Record the engine oil temperature value from the aircraft gauge.
8. Press the Trend Button

*Go to Step 1 of the **CALIBRATION CHECKLIST – MANUAL SENSOR CALIBRATION** using the collected values above as input.*

CUST-T-410-1
Establish MLP Connection
21 NOVEMBER 2005
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Establish MLP Connection

Connecting to the Processor with MLP

NOTE: Ensure you have the current version of the Monitor Link Program (MLP). The current version is available from Turbine Tracker under the "Support Tab" and "Systems Update" button. (See Checklist CUST-T- 417-1)

1. Apply Bus AND Battery Power to the Aircraft and ensure system bootup is successful, if not previously accomplished.

NOTE: System Bootup cannot be verified if aircraft does not have a Cockpit Lamp Assembly.

2. If you have the Cockpit Download Port Assembly Interface, connect your computer to the Download Port using the Serial or USB Cable. If you do NOT have the
Cockpit Download Port Assembly Interface, connect the computer to the processor directly using the Serial or USB Cable.

NOTE: (Cockpit Indicator Light Present with No DTU) the fault lamp will be on solid when the Run/Conf switch of the serial or USB cable is set to "Conf."

3. Ensure the RUN/CONF switch on the download cable is set to "CONF" (Skip this
step for HUMS 1122, CrossCheck and DTU)

4. Open MLP, Select "Edit," then "Communication Port," then "Autodetect." *If you are unable to establish communication, exit this checklist and proceed to the "MLP Troubleshooting" checklist.*

NOTE: The MLP defaults to the last used MLU when initially started.

TIPS AND TRICKS: Accomplish a "MLU Status" under the MLU Menu. Receiving a response and a "MLU Status Processing Complete" prompt indicates a connection has been established between the computer and the processor.

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Load Configuration File
6 NOVEMBER 2005
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Load Configuration File

Computer to Processor

NOTE: Ensure you have the current version of the Monitor Link Program (MLP). The current version is available from Turbine Tracker under the "Support Tab" and "Systems Update" button (See Checklist CUST-T- 417-1).

NOTE: The preferred method of updating your configuration is to use the Synch to Aircraft feature.

NOTE: If using a DTU it must be configured and in Transparent Mode first.

1. Establish connection to the processor using MLP. If unable to establish connection, accomplish MLP Troubleshooting Procedure.

TIPS AND TRICKS: Accomplish a "MLU Status" under the MLU Menu. Receiving a response and a "MLU Status Processing Complete" prompt indicates a connection has been established between the computer and the processor.

2. Select "Configure Unit" under the MLU Menu.
3. Browse to find the File when the Select Configuration Box appears, if necessary.

NOTE: Configuration Files are denoted by the .cfg and .bfg extension. .cfg and .bfg files are the only file types that are loaded into the processor.

TIPS AND TRICKS: The default directory for the File is the "c:\mlp\cfg" folder. It is recommended that you place all of your Configuration Files in this directory for easy access.

4. Select the File and click "Open"

NOTE: If you are prompted to retrieve the Log File, accomplish "Retrieve Log Data from Processor" checklist and re-enter this checklist at Step 2.

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Load Configuration File
Page 2 of 2

NOTE: Configuration File load may approximately take 4 to 6 minutes.

NOTE: If you are prompted that configuration errors occurred, go to the MLP Troubleshooting Checklist.

NOTE: A completed configuration file load will be noted by a "Configuration Complete" prompt.

TIPS AND TRICKS: Accomplish a "MLU Status" under the MLU Menu to verify your config version (serial B = config version)

5. Accomplish the Calibration Checklist, if required.

NOTE: Calibration is required on all sensors specified in the Calibration Checklist if this is the initial configuration file load (new installation and configuration file not previously loaded).

NOTE: Calibration is required for a particular sensor if the configuration file sensor values on an existing configuration were changed; processor parts, aircraft/engine parts, or cockpit instruments are changed. For example, if you change a TOT gauge, you may have to re-calibrate TOT.

6. End

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Retrieve Log Data
1 November 2005
Page 1 of 2

Retrieve Log Data

From Processor to Computer

NOTE: Ensure you have the current version of the Monitor Link Program (MLP). The current version is available from Turbine Tracker under the "Support Tab" and "Systems Update" button (See Checklist CUST-T- 417-1).

NOTE: You should always Synchronize to TurbineTracker™ first to ensure you have any available configuration updates loaded into MLP.

1. Ensure the RUN/CONF switch on the serial cable is set to "CONF" (Skip this step for HUMS 1122 and CrossCheck) or enter TRANSPARENT MODE if using the DTU and retrieving a log from a monitor.
2. Establish connection to the processor that you wish to retrieve the log from using MLP. If unable to establish connection, accomplish MLP Troubleshooting Procedure.

TIPS AND TRICKS: Accomplish a "MLU Status" under the MLU Menu. Receiving a response and a "MLU Status Processing Complete" prompt indicates a connection has been established between the computer and the processor.

3. Select "Aircraft" under the dropdown Synchronize menu in MLP. The Synchronize feature will automatically retrieve the unit's data log and prompt you to reset the log. After you reset the log any new configuration files will then be transferred automatically.

NOTE: The Reset Log Box appears when the upload is complete.

TIPS AND TRICKS: Resetting the Log means to clear the log data from the processor after uploading the data into your computer. If you do not Reset the Log, the log data shall remain in the processor and log data generated from that point on will be appended to the existing log data.

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Retrieve Log Data
Page 2 of 2

CAUTION: If you do not Reset the Log for a long period of time, the processor's memory may become full. If the processor's memory fills up, the processor will stop recording data.

TIPS AND TRICKS: It is impossible to say how often the log should be retrieved. It is recommended that when you initially deploy your processor, you should retrieve it at the two week point. If you determine that you can wait longer, then retrieve it once a month. You will need to decide the best interval for retrieval based on your operations and needs.

NOTE: Expert user's can perform log retrieval as follows.

1. Select MLU then "Retrieve Unit's Data Log."

NOTE: Destination of Log File Box appears.

2. Select a file name to store the log data.

TIPS AND TRICKS: Choose a file name that is easily recognizable. The file shall be saved in the c:\mlp\log directory.

3. Click "Save" *Depending upon the size of the log data, a binary file upload may*
occur. If a binary upload occurs, follow the prompts. Although slightly different from a non-binary upload, the result is the same.

NOTE: The Reset Log Box appears when the upload is complete.

4. Select "Yes" or "No" on whether or not to reset the log.
5. End

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Synchronize Checklist
23 January 2006
Page 1 of 2

Synchronize

The proper method of using the SYNCHRONIZE function is this:
Sync to TurbineTracker™
Sync to Aircraft.
Sync to TurbineTracker™

NOTE: Ensure you have the current version of the Monitor Link Program (MLP). The current version is available from Turbine Tracker under the "Support Tab" and "Systems Update" button (See Checklist CUST-T- 417-1).

1. Establish connection to the internet with the laptop computer to be used for loading and retrieving files to and from the processor in the aircraft.

2. Open the MLP.exe program.

3. Select "TurbineTracker™" under the Synchronize tab dropdown menu.

NOTE: This method requires the user to enter login ID and password.

4. Enter your login information when prompted.

NOTE: Once the computer has completed the Synchronization process the following message will appear in the status bar at the top of the MLP window:

"TTS Synchronization Process Complete"

NOTE: If MLP can not establish a connection through your firewall you may need to configure MLP to logon with correct account name through a proxy to enable the "Synchronize to TurbineTracker™" feature.
Refer to the MLP User's Guide for instructions on how to configure MLP with your user account information.

5. After synchronizing to TurbineTracker™ take the laptop computer to the aircraft and connect the computer to the processor using the download cable. Ensure the RUN/CONF switch on the cable is set to "CONF" (Switch position does not matter for HUMS 1122, CrossCheck and DTU) and apply aircraft power.

6. Select "Aircraft" under the dropdown Synchronize menu in MLP.

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Synchronize Checklist
Page 2 of 2

NOTE: If you are not able to establish a connection, accomplish the MLP Troubleshooting Procedure.

TIPS and TRICKS: Accomplish a "MLU Status" under the MLU Menu. Receiving a response and a "MLU Status Processing Complete" prompt indicates a connection has been established between the computer and the aircraft processor.

7. DTU users select "All" for your Sync Option from the pop-up window.

Note: The Synchronize feature will automatically retrieve the unit's data log and prompt you to reset the log. After you reset the log any new configuration files will then be transferred automatically.

NOTE: The Reset Log Box appears when the upload is complete. Select "Yes".

TIPS AND TRICKS: Resetting the Log means to clear the log data from the processor after uploading the data into your computer. If you do not reset the Log, the log data shall remain in the processor and log data generated from that point on will be appended to the existing log data.

CAUTION: If you do not reset the Log for a long period of time, the processor's memory may become full. If the processor's memory fills up, the processor will stop recording data.

NOTE: Once the computer has completed the Synchronization process the following message will appear:

"TTS Synchronization Process Complete"

8. Transfer your log data to TurbineTracker™ by performing steps 1 though 4 from page one.

NOTE: If you have calibrated your monitor your configuration .cal file will be automatically uploaded as well.

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MLP Troubleshooting
14 Sep 2006
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MLP Troubleshooting

Fault Isolation Checklist for MLP

NOTE: Ensure you have the current version of the Monitor Link Program (MLP) installed on your computer before attempting to use this Checklist.

The current version is available from the TurbineTracker™ website under the "**Support Tab**" by selecting the "**Systems Update**" button on the left and following the on screen instructions (See Checklist CUST-T- 417-1).

NOTE: All of our updated Manuals, User's Guides and Checklist are available free of charge for TurbineTracker™ users under the "**Support Tab**" by selecting the "**Documents**" button.

TIPS AND TRICKS: An easy way to verify successful connection between MLP and your Processor is to accomplish "**MLU Status**" under the MLU Menu. Receiving the "**MLU Status Processing Complete**" prompt and the display of the processors status indicates a connection has been established between the computer and the processor.

NOTE: This checklist addresses troubles most commonly encountered by operators and maintainers.

STEP 1. Define your Trouble and Probable Cause and accomplish the Remedy. If the Probable Cause and Remedy does not solve the problem, move to the next Probable Cause and Remedy. If the Trouble is not listed or all probably causes and remedies have failed, proceed to step 2.

TROUBLE	PROBABLE CAUSE	REMEDY
Unable to establish Communication with Processor	Bus AND Battery Power Not on	Activate Bus AND Battery Power
	Battery is disconnected	Ensure battery is connected and powered on

TROUBLE	PROBABLE CAUSE	REMEDY
Unable to establish Communication with Processor (continued)	System Power Up (Loopback Test) not successful	Accomplish Tests in accordance with the Instructions for Continued Airworthiness - If still fails Go to Step 2
	RS 485 Cable not connected	Connect RS 485 Cable from your computer to Cockpit Download Port
	RS 485 Cable not set to CONF (Configuration)	Set RS 485 Cable to CONF
	Laptop Communication port is not avalable	Check your Windows Device Manager for installed port
	Communications port being used by other Devices or Software	Stop other applications like Active Synch, Camera programs, Serial Mouse & etc
	USB adapter drivers not correctly installed	Re-install Drivers
	USB hardware incompatible with RS 485	Use Altair recommended adapter or Download Cable
	Firewall or Security settings blocking MLP	Insure MLP can operate through your Firewall and write files to your C:\ Hard Drive
	Improper .mlu loaded	Accomplish Auto Detect.
	ConXall Connector behind the Cockpit Download Port assembly is wired incorrectly or is loose	Ensure ConXall connector wired in accordance with the Installation Manual or ICA
	Download Port of processor is not functioning correctly	Accomplish Download Port Test in accordance with the ICA - If still fails Go to Step 2

TROUBLE	PROBABLE CAUSE	REMEDY
Unable to establish Communication with Processor (continued)	Processor is not functioning correctly	Accomplish Processor Test in accordance with the ICA - If it still fails Go to Step 2
After establishing a connection repeated message “Hit OK after ensuring the Unit is in configuration Mode”	RS 485 Cable no longer connected	Connect RS 485 Cable from your computer to Cockpit Download Port
	RS 485 Cable not set to CONF (Configuration)	Set RS 485 Cable to CONF
	Power was Removed	Ensure Bus AND Battery Power are still activated
	Configuration File Loaded with Errors - Temporary Fault occurred while loading configuration file	Accomplish “MLP manual load config into processor” checklist
After selecting “Reset Log” the “Unable to Verify Log is Reset” Message	Temporary Fault occurred while retrieving log data	Accomplish “MLP manual retrieve log data” checklist
MLP aborts or freezes during log retrieval	Power Manager, Screen Saver or other process interrupted MLP	Disable Power Manager or Screen Saver accomplish “MLP manual retrieve log data” checklist
Sensor Values display 9999.9999 in the log data or while viewing live data Is it the TOT sensor? If no, move to next sensor below	Alumel/Chromel wired backwards	Wire Alumel/Chromel in accordance with the Installation Manual, if OK Go to Probable Cause for All Other Sensors

TROUBLE	PROBABLE CAUSE	REMEDY
All Other Sensors Sensor Values display 9999.9999 in the log data or while viewing live data	Wire(s) not prepared nor connected properly	Ensure wire(s) is/are properly prepared and connected per the Installation Manual
	Sensors not functioning nor powered properly	Accomplish Sensor Tests in accordance with the Instructions for Continued Airworthiness
Sensor Values are **NOT** displaying 9999.9999 but are displaying unexpected values in the log data or while viewing live data Is it the Airspeed and Altitude Values? If no, move to next sensor.	NOTE: Airspeed and Altitude are not sensors but are calculated values from pitot and static sensors, respectively Airspeed displaying 345 Knots and Altitude displaying 145,000 Ft indicates Pitot and Static Sensors are wired backwards	Wire the Pitot Sensor and the Static Sensor in accordance with the Installation Manual Go to Probable Cause for All Other “Analog” Sensors (choose applicable trouble depending upon if calibration was previously done or not)
All Other Sensors (Analog Sensor Not Previously Calibrated)	Sensor not calibrated correctly	Accomplish Calibration Checklist
	Wire(s) not prepared nor connected properly	Ensure wire(s) is/are properly prepared and connected per the Installation Manual
	Sensors not functioning nor powered properly	Accomplish Sensor Tests in accordance with the Instructions for Continued Airworthiness
All Other Sensors (Speed Signal or Digital Sensors)	Wire(s) not prepared nor connected properly	Ensure wire(s) is/are properly prepared and connected per the Installation Manual

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MLP Troubleshooting
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The most common causes of MLP rejecting calibration entries: (Failed Calibration Reasonableness)

- **Attempting to calibrate a faulty sensor.**
- **Attempting to calibrate a new sensor after a faulty sensor calibration factor has been accepted** (after calibrating a faulty sensor).
- **Attempting to calibrate a sensor that is incorrectly defined in the configuration file.**

TROUBLE	PROBABLE CAUSE	REMEDY
MLP will not accept entered calibration factors	Calibration points are to close together	Use point one of <20% and point > 80% of sensors range
	Calibration values were entered for a bad sensor and MLP determined them unreasonable	Troubleshoot and/or replace the sensor as per ICA
	Calibration values entered where determined unreasonable by MLP	After determining why the values are so far from normal, disable MLP reasonableness checks

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MLP Troubleshooting
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User Entry Requirements for CALIBRATION (Input Validation)

MLP has built-in checks, which may be disabled (reasonableness) to ensure minimally acceptable values are supplied during calibration.

Two Point Calibrations Set Point Value Check(s)

Sensor Type	Two Point Calibrations Set Point Value Check(s)
Engine Temperature*	If any value is less then 400 degC, the value pairs must differ by 400 degC
Engine Temperature*	If all values are above 400 degC, the value pairs must differ by 200 degC
G2 OAT Sensor*	Value pairs must differ by 30 degC
Torque*	Value pairs must differ by 30%, or 22.5 PSI or 1900 ft-lb
G3 OAT Sensor	Must be less than 145 degC
G3 OAT Sensor*	Value pairs must differ by 15 degC
Static Pressure	Must be less than 5.3 inHg, or 2.6 PSIA
Static Pressure*	Value pairs must differ by 3 inHg, or 1.5 PSIA
Altitude	Must be less than 40500 ft
Altitude*	Value pairs must differ by 4000 ft

* A value pair is either the two values specified by the user or the two values read from the unit.

One Point Slope (P1) Calibrations Set Point Value Check(s)

Sensor Type	One Point Slope (P1) Calibrations Set Point Value Check(s)
Engine Temperature	Values must be greater than 400 degC
Torque	Values must be greater than 25%, or 18.75 PSI or 1550 ft-lb
Static Pressure	Must be less than 5.3 inHg, or 2.6 PSIA
Altitude	Must be less than 40500 ft
G3 OAT Sensor	Must be less than 145 degC
Pitot	Must be greater than 0.15 PSID
Airspeed	Must be greater than 80 knots

One Point Offset (P2) Calibrations Set Point Value Check(s)

Sensor Type	One Point Offset (P2) Calibrations Set Point Value Check(s)
Temperature Sensors	Values must be less than 70 degC
Torque	Values must be less than 25%, or 18.75 PSI or 1550 ft-lb
Static Pressure	Must be less than 5.3 inHg, or 2.6 PSIA
Altitude	Must be less than 40500 ft
G3 OAT Sensor	Must be less than 145 degC
Pitot	Must be less than 0.075 PSID
Airspeed	Must be less than 60 knots

Calibration Factor Change Check

Sensor Type	Factor	Calibration Factor Change Check
Engine Temperature	P1	Cannot change by more than 50%
All others	P1	Cannot change by more than 10%
Engine Temperature	P2	Cannot change by more than 250 degC
G2 OAT Sensor	P2	Cannot change by more than 10 degC
All others	P2	Cannot change by more than 10% of the original P1 for G2 units
All others	P2	Cannot change by more than 50% of the original P1 for G3 units

CUSTOMER CHECKLIST

Refer to the Calibration Checklist that can be downloaded from TurbineTracker by selecting the Documents button under the Support tab

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MLP Troubleshooting
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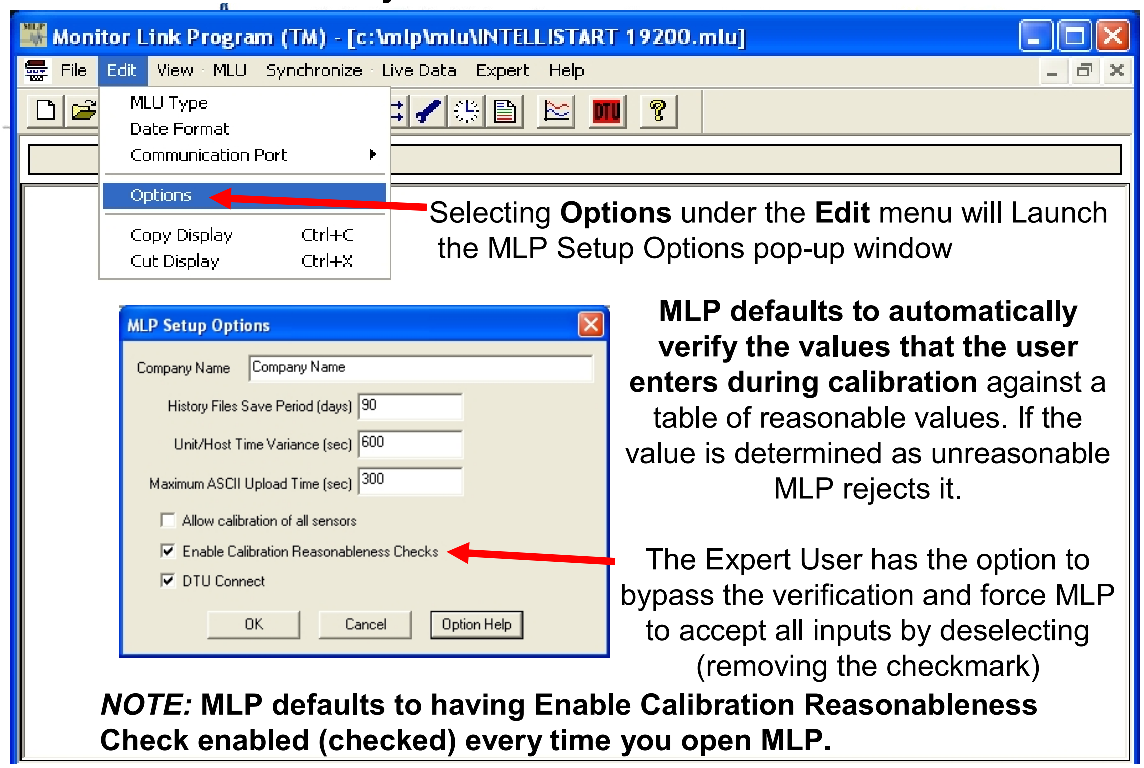
CAUTION: The disabling reasonableness procedure is for expert users under Altair direction only



Expert user's have the ability to de-select "Enable Calibration Reasonableness Checks" or select "Allow calibration of all sensors"

TROUBLE	PROBABLE CAUSE	REMEDY
Unable to view .log files	.log files are not associated with a text editor	Associate a text editor (recommend Wordpad) to open .log files
Unable to view .hst files	.hst files are not associated with a text editor	Associate a text editor (recommend Wordpad) to open .hst files
.DLL errors during MLP Installation or while using MLP	Outdated or Corrupt dlls on your computer	Write down the dll error, what you were doing, and go to step 2

Monitor
- **Failed System Bootup**
- **Bad Loopback Test**

Wiring from Monitor to Sensor
- **Bad sensor reading**
- **Bad resistance or voltage measurements on wires**

Sensor
- **Bad sensor reading**
- **Good Resistance and Voltage measurements on wires**

Cockpit Download Port
- **Unable to Communicate with Monitor**
- **Bad voltage measurements on Cockpit Download Port Wires**
- **Different download cable doesn't work**

Download Cable
- **Good Loopback Test**
- **Unable to communicate with Monitor**
- **Good voltage measurements on Cockpit Download-port wires**
- **Different download cable works**

Laptop
- **Laptop Com Port not configured (Device manager)**
- **Software Program or Hardware using Com Ports**

STEP 2. If unable to resolve trouble contact Altair Avionics Product Support and have the following information available:

NOTE: If you fail to provide any of the information below, turnaround time for solving your problem will be longer! Please have the information ready.

a. TurbineTracker Account Name
b. Install Description (Tail Number)
c. What you were doing & indications received
d. Problem history
e. MLP Session .hst files
f. Processor Log Files
g. Live Data Files
h. Contact information

CUST-T-415-1
DTU CONFIGURATION CHECKLIST
23 JAN 06
Page 1 of 1

DTU CONFIGURATION CHECKLIST

CAUTION: Steps 4 & 5 only to be carried out if directed by Altair Customer Support

NOTE: Before starting ensure active SIM card (use cell phone) is installed in DTU

1) ☐ Verify DTU config on TurbineTracker™ and download to MLP
   a) Description (usually tail number)
   b) DTU Serial Number (0123)
   c) Calling Plan (AT&T)
   d) ACS 0 (Monitor DTU is connected to)
   e) Monitor type (ALTAIR)
   f) Connect (ON)
2) ☐ Verify Monitor config on TurbineTracker™ and download to MLP
   a) Auto Inspect = binary
   b) Auto Rate = 100
3) ☐ Connect laptop to DTU and start MLP
   a) Auto detect comm. Port
   b) View MLU Status
   c) Retrieve DTU log

4) Skip unless directed by ☐ Enter MLP Expert Mode
   a) Type & enter DTU.RESET=REALLY (this erases possibly corrupted configs)
   b) Type & enter SYS.REBOOT (forces DTU to reload default config)

5) Altair ☐ Exit Expert Mode

6) ☐ Wait two full minutes (with power on)
7) ☐ Retrieve DTU log again (DTU will not correctly accept config if log not empty)
8) ☐ Load DTU config into unit
   a) View MLU status (Should be your ACS info. Note GSM info may not be displayed)
9) ☐ Enter Transparent Mode
   a) View live data (this verifies good comm. with the monitor)
   b) Retrieve Monitors log (prevents DTU from having long upload in the following steps)
10) ☐ Exit Transparent Mode
11) ☐ Enter Expert Mode
   a) Type & enter SYS.REBOOT
   b) Wait 30 seconds
   c) Type & enter DTU.MAINTENANCE=ON
12) ☐ Exit Expert Mode
13) ☐ Wait five minutes (with power on)

   NOTE: During this wait you should see "APN different" debug message if you are using Hyper terminal
14) ☐ View MLU status for the DTU
   a) You should see MS connected under the GSM status
15) ☐ Enter Expert Mode
   a) Type & enter SYS.REBOOT
   b) Wait 30 seconds
   c) Type & enter DTU.MAINTENANCE=ON
16) ☐ Exit Expert Mode
17) ☐ View MLU status for the DTU
   a) Keep refreshing Mlu status for up to three minutes and verify signal strength is better than -97db
   b) If signal strength is good verify logs uploaded to TurbineTracker™

If you don't make it to the end of the checklist contact customer support for further guidance.

CUST-T-416-1
View Live Data
6 NOVEMBER 2000
Change 2 – 4 August 2001
Page 1 of 1

View Live Data

MLP viewing live data from Processor

1. Establish an MLP connection to the monitor.
2. If connected to a DTU enter "Transparent Mode"
3. Select "Live Data" then "Text View."

NOTE: Although the data will be viewed in near real time, the data is stored on a file for future reference as a .tab file in the c:\mlp\log\livedata folder.

4. Choose a file name and click "Save."
5. When prompted place the Run/Conf switch in the "Run" position and click "OK." ***Note:*** DTU users will not get prompted

NOTE: It takes a while for sensor information to load, this is normal. The Live Data Screen appears displaying the real time values of the processor's sensors. Numbers will update once per second.

NOTE: Sensors that display "9999.9999" type values are faulted.
If there are sensors displaying unexpected values, accomplish MLP Troubleshooting AFTER completing this checklist.

6. Click "Stop Live Data" to stop viewing live data.
7. When prompted place the Run/Conf switch in the "Conf" position and click "OK." Note: DTU users will not get prompted
8. End

Note: Please send the Live Data .tab file from the c:\mlp\log\livedata folder when requested.

CUST-T-417-1
Download MLP
31 Aug 2006
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Download MLP Checklist

Please do the following to download and save the MLP:
NOTE: This is a two step installation in which the second step (update to MLP V6.7.2) is automatically installed when the user performs the Synchronize to TurbineTracker™ process with MLP V6.7.

OVERVIEW
1. Create the folder c:\mlp
2. Create the folder c:\mlp\bin
3. Retrieve the MLP from TurbineTracker™ and save it in the c:\mlp\bin folder.
4. Create a shortcut to the MLP on your desktop.
5. Run MLP and perform Synchronize to TurbineTracker™.

1) **CREATE MLP FOLDER on the laptop** (C:\mlp)
   a) Open the My Computer icon on your desktop
   b) Double Click on the C: drive so that it opens for you
   c) Click the RIGHT button on the mouse, a list should appear
   d) Highlight NEW, another list will open
   e) Click Folder
   f) Name this folder MLP
2) **CREATE MLP BIN FOLDER on the laptop** (C:\mlp\bin)
   g) Double Click the folder to open the MLP folder
   h) Click the RIGHT button on the mouse, a list should appear
   i) Highlight NEW, another list will open
   j) Click Folder
   k) Name this folder Bin

3) **Download MLP VERSION 6.7**
   l) Log onto TurbineTracker™ ***
   m) Click the Support tab at the top of the screen
   n) Click System Update on the left hand side of the screen
   o) Click on the MLP.exe link in blue
   p) Click Save
   q) Select the folder C:\mlp\bin
   r) Click Save

***If you do not have a TurbineTracker™ subscription and Login you will need to contact:

Altair Avionics Corp - Sales Department
63 Nahatan Street
Norwood, Ma 02062
Phone 781-762-8600
Fax 781-762-2287

CUST-T-417-1
Download MLP
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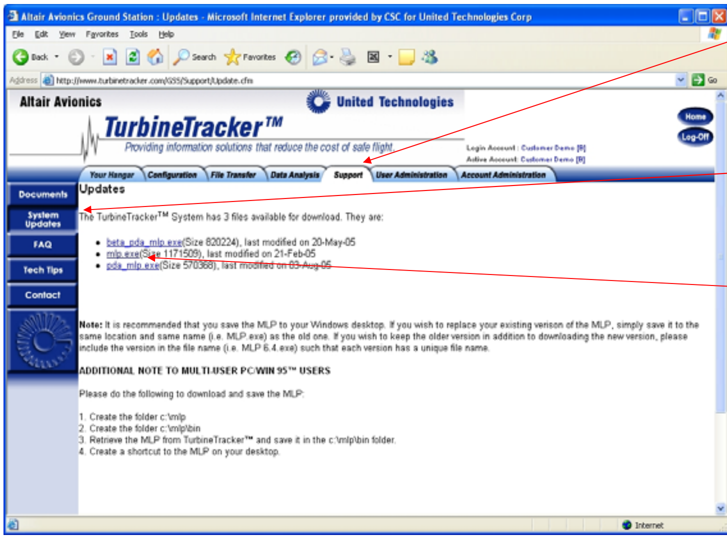
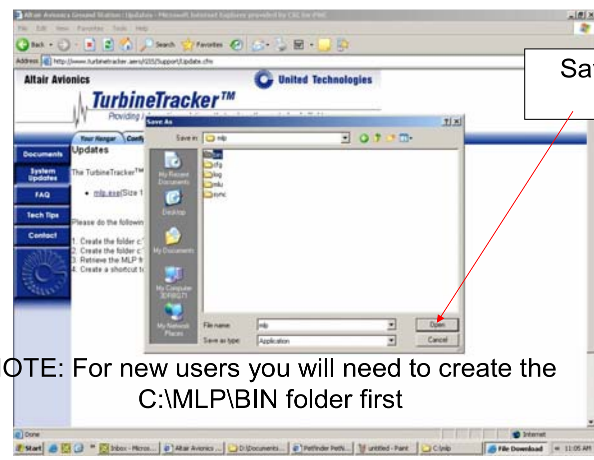


Download from TurbineTracker™ Support Tab

Go to System Updates Button

Click on mlp.exe link

When asked, download the file to your computers C:**MLP\BIN** folder.



Save mlp.exe to your C:\mlp\bin folder

NOTE: For new users you will need to create the C:\MLP\BIN folder first

Most users create a shortcut to MLP for the Desktop

4) After it downloads: **CREATE DESKTOP SHORTCUT**

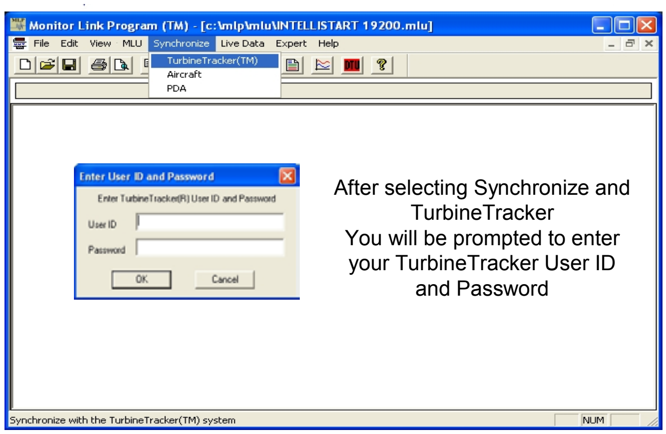
a) Open the My Computer icon on your desktop
b) Double Click on the C: drive so that it opens for you
c) Double Click on the MLP folder so it opens for you
d) Double Click on the Bin folder so it opens for you, there should be a file mlp.exe in there
e) Click on it with the RIGHT button on the mouse, a list should appear
f) Click on Create Shortcut, another file will appear that says “Shortcut to mlp.exe”
g) Click the shortcut with the RIGHT button on the mouse, a list should appear
h) Click Cut or copy
i) Close the window and place the mouse pointer back on the desktop
j) Click the RIGHT button on the mouse, a list should appear
k) Click Paste, the shortcut is now copied on your desktop

CUST-T-417-1
Download MLP
Page 3 of 3

If you open the new MLP Windows desktop shortcut, MLP will open for you.

5) **SYNCHRONIZE TO TURBINETRACKER**
First thing you should do with MLP 6.7 is Synchronize MLP to TurbineTracker to get the update to the newest version (6.7.2) of MLP.
NOTE: This may take a few minutes depending on your connection speed.

Click Synchronize and select TurbineTracker™ from the dropdown list.



After you enter your login ID and password and select OK, MLP automatically performs the functions of:

a) Connecting to TurbineTracker™,
b) Uploading the configuration (.cal) files
c) Uploading the log files
d) Determining if there are any new configurations, and downloading those configurations to the local computer.
e) MLP will also load any available software updates to automatically bring MLP up to the current version.

When MLP is done, the display will show
“TTS Synchronization Process Complete

The updated MLP User’s Guide, User Checklist and Current System Manuals are all available free of charge for TurbineTracker™ users under the TurbineTracker™ Support Tab by selecting the blue Documents button and navigating to the desired document.

CUST-T-418-1
View Session Log
31 Aug 2006
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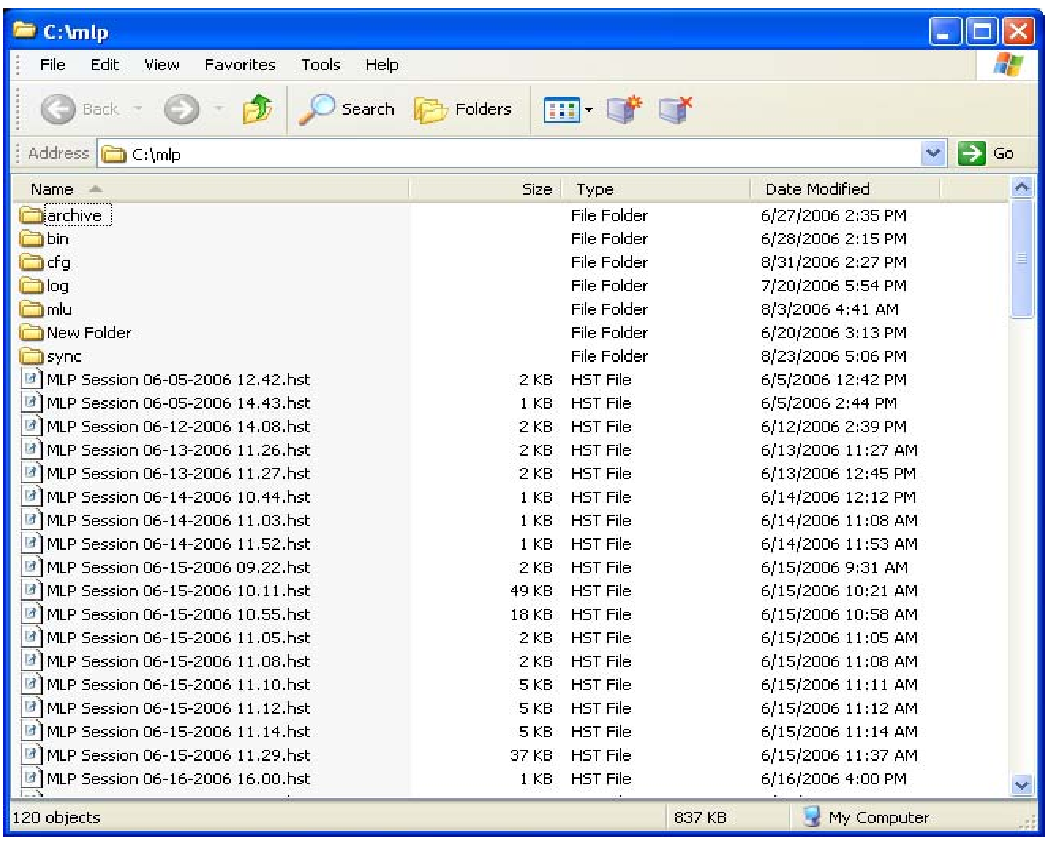
View MLP Session Log Checklist

A session log keeps track of all of the activities performed by MLP, the user, and the monitor. It also tracks the commands and responses in communicating with the monitor.

A new MLP Session Log is automatically created and stored in the computers MLP folder every time the MLP program is started (c:\mlp)

a) Session logs have the .hst file extension
b) Session logs are listed in chronological order
c) Session logs can be viewed with MLP
d) Session logs can be viewed with any standard Windows text editor program such as Note Pad
e) Session Logs can be viewed in MLP without connecting to the aircraft



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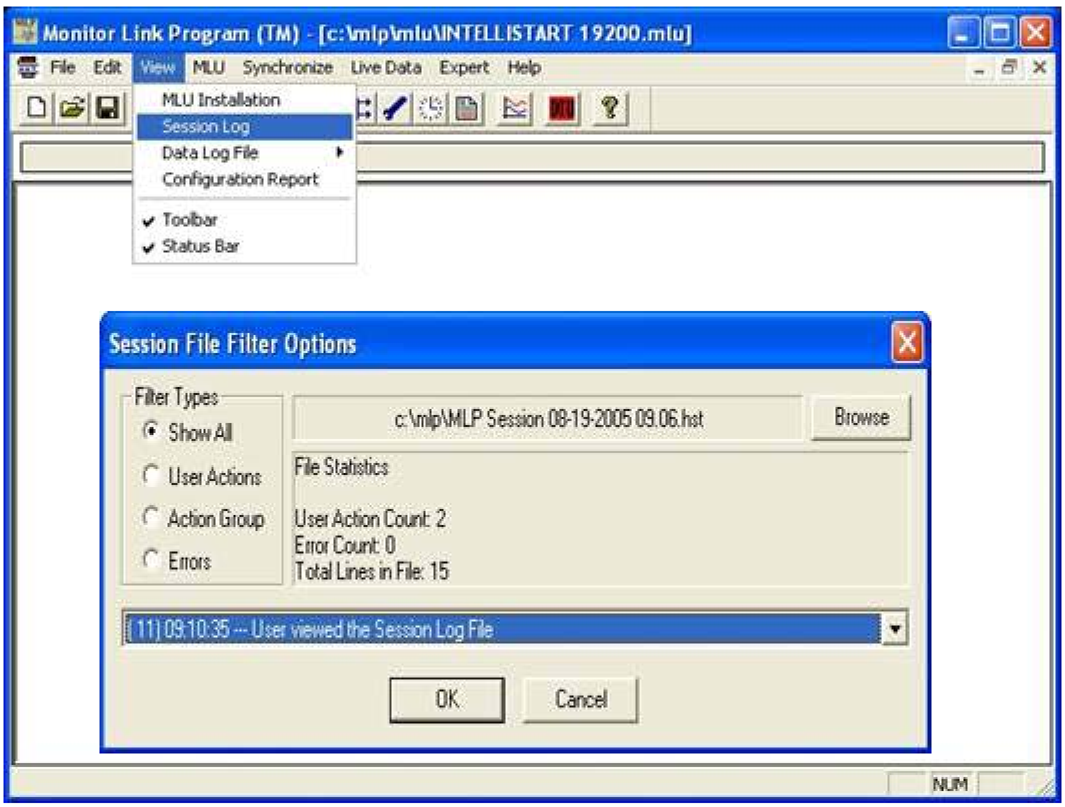
View Session Log
Page 2 of 3

NOTE: Ensure you have the current version of the Monitor Link Program (MLP). The current version is available from the TurbineTracker™ website under the "Support Tab" by selecting the "Systems Update" button on the left and following the on screen instructions.

Open MLP and Select the following from the drop down menu at the top of MLP:

a) **View** to open the selection menu
b) **Session Log** to open the Filter Options pop-up



MLP automatically defaults to work with the current open MLP session. To view a different MLP session, click the **Browse** button in the upper right corner of the options window and select the session history file (.hst) that you want to see.

To view a parsed list of the User Actions, Action Group or Errors* in the selected MLP session, choose the desired filter from Filter Types and click **OK** to open the file.
*User Actions, Action Group or Errors are explained below.

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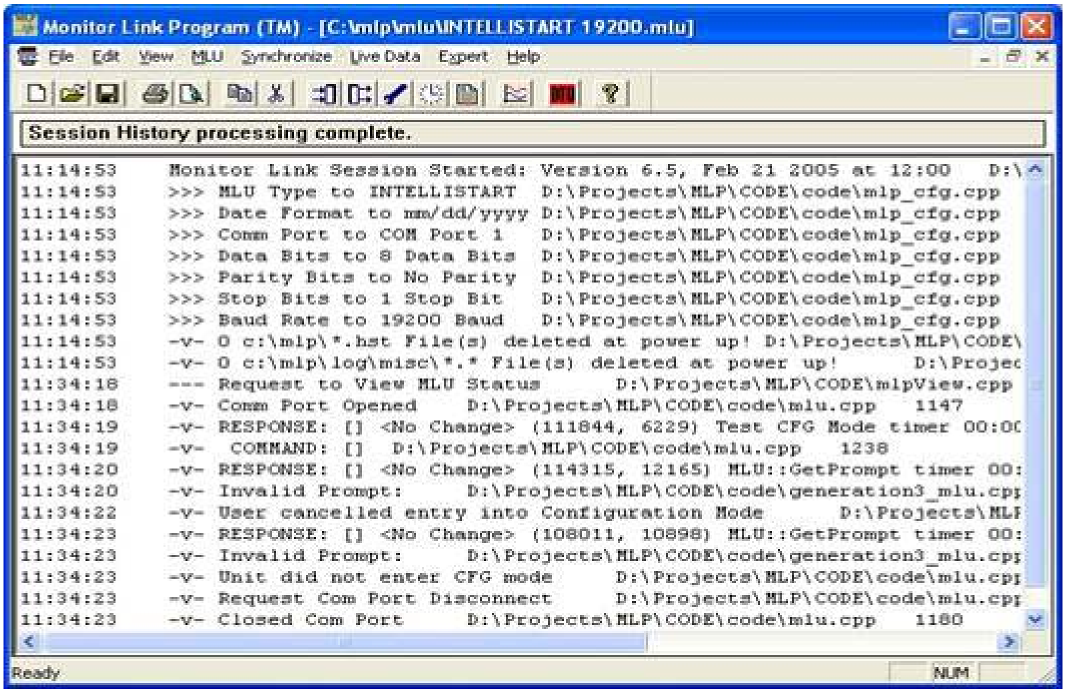
View Session Log
Page 3 of 3

Session Log viewed with MLP



SESSION LOGS AND
USER ACTION GROUPS

In a session log view, a user action group is a list of all of the activities that occur in the system as a result of your performing a single action in MLP.

Each user action is prefaced by a “---“.
System activity is prefaced by a “-v-” or a “>>>”.
Each detected error is prefaced by a “***”.

An action group includes everything after single user action, and before the next user action (graphically, between one “---“and the next “---“). There may be several lines of system activity (-v- or blank), or an error (***) between them.

Action groups make it easier to find information of interest in a long history session. First view the list of user actions available, and then view the specific action group you want to see in detail.

> ***NOTE:*** All of our updated Manuals, User's Guides and Checklist are available free of charge for TurbineTracker™ users under the Support Tab.

CUST-T-419-1
Config generation
31 Aug 2006
Page 1 of 3

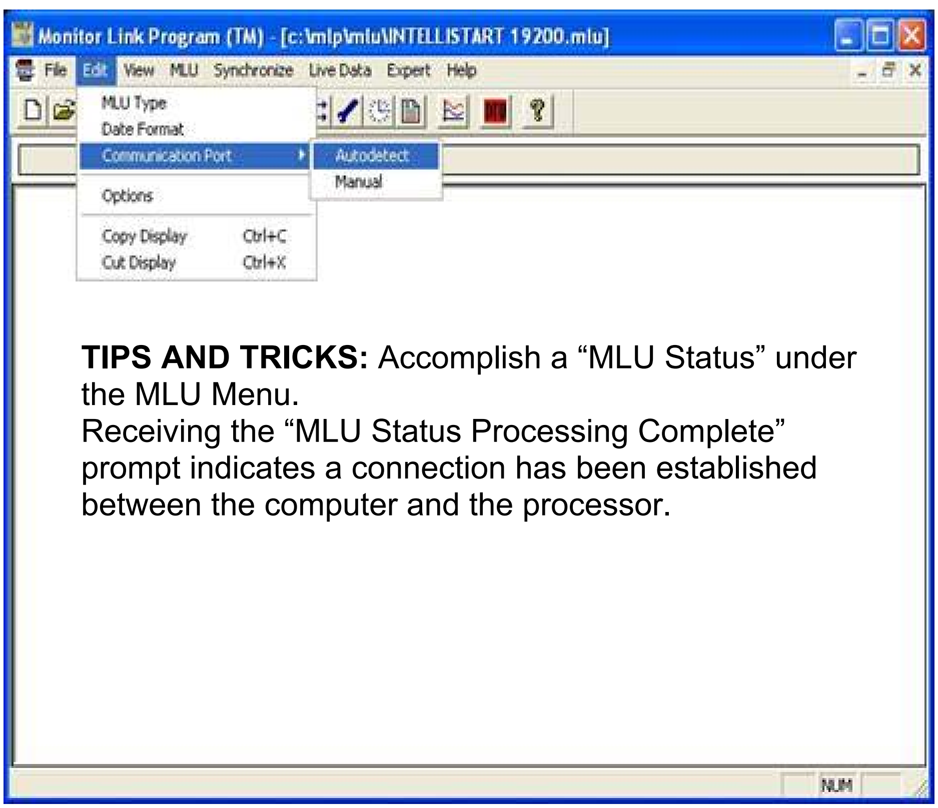
Expert Mode - Configuration file generation

NOTE: Ensure you have the current version of the Monitor Link Program (MLP). The current version is available from the TurbineTracker™ website under the "Support Tab" by selecting the "Systems Update" button on the left and following the on screen instructions.

1. Open MLP and establish a connection to the aircraft processor

Ensure the RUN/CONF switch on the serial cable is set to "CONF" (Skip this step for HUMS 1122 and CrossCheck) or enter TRANSPARENT MODE if using the DTU.

Select the following from the drop down menu at the top of MLP:
a. Edit
b. Communication Port
c. Autodetect



TIPS AND TRICKS: Accomplish a "MLU Status" under the MLU Menu.
Receiving the "MLU Status Processing Complete" prompt indicates a connection has been established between the computer and the processor.

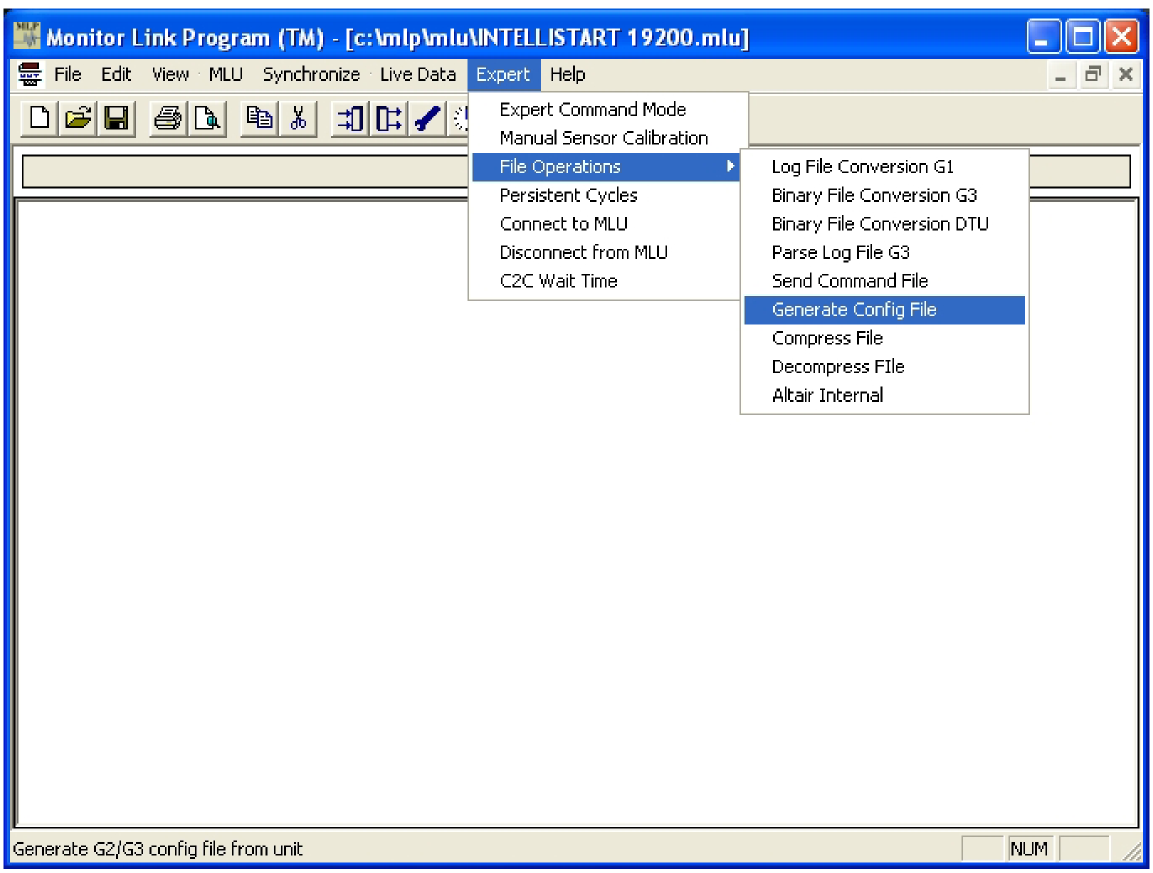
CUST-T-419-1
Config generation
Page 2 of 3

2. Once the “Successfully Detected Comm Port” message is displayed, select the following from the drop down menu at the top of MLP

   NOTE: MLP ***<u>can not</u>*** generate a config from a DTU.

   a. Expert
   b. File Operations
   c. Generate config file

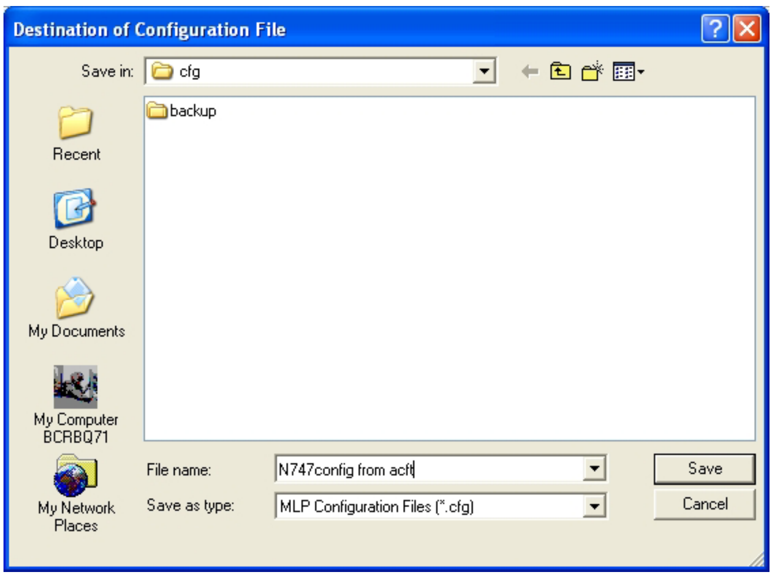
NOTE: Configuration files generated from the monitor can only be used as text files. They ***<u>can not</u>*** be uploaded to TurbineTracker™ or loaded as a configuration into a monitor.



CUST-T-419-1
Config generation
Page 3 of 3

This should give you the standard Windows prompt asking you to select a location to save the file and a name for the file.

It is best to name the file with the tail number of the aircraft for ease of keeping track.



MLP defaults to saving the file in the C:\mlp\cfg folder, but the user has the option to choose a different location.

After MLP has completed the configuration file saving process you have the option to use MLP or any standard text editing program such as Note Pad to view it.

> ***NOTE:*** All of our updated Manuals, User's Guides and Checklist are available free of charge for TurbineTracker™ users under the Support Tab.

CUST-T-420-1
System Validation
5 July 2006
Page 1 of 4

System Validation Checklist

Overview of recommended steps:

1) **Update MLP**
2) **Verify the wiring installation**
3) **Power on, troubleshoot and calibrate the systems as required**
4) **Collect trend data**
5) **Review data for accuracy**

Normally it takes one avionics tech to handle MLP while working with a mechanic for calibration. If you can get the systems working and taking the manual trends below, you will get a good estimate of the condition of the systems as well as possible **Manual Calibration** without opening the systems.

1) Check your laptop for MLP version 6.7 or higher. If you have a lower version then 6.7 you will need to download the updated version from the Support Tab in TurbineTracker™ following the on screen instructions. The first thing you should do after insuring that you have MLP version 6.7 or higher is to **Synchronize MLP to TurbineTracker to get the newest version**. This may take a few minutes to download and will also download your current configuration files for all of the aircraft in your account.

2) Now that you have MLP updated and the current aircraft configuration files loaded, the next step is to start with **continuity checks** on the wiring, paying particular attention to the power and com ports before applying power to the monitor.

NOTE: This is a very important step since we have found from previous experience that initially ringing out and double checking all of the wiring before applying power can prevent monitor damage and save you time later during system calibration and operation.

3) **Apply power** to the system making sure to note the system power on lamp status (described below) then establish communication with MLP and Synchronize MLP to the aircraft. This will retrieve any stored logs from the monitor (if prompted to reset the logs, select yes). After the Synch to Aircraft process is complete disconnect the download cable and recycle power again noting your lamp status.

Note: If unable to communicate or the Trend Lamp does not display a system condition after the boot up test refer to your ICA for trouble shooting steps.

a. **If Trend Lamp flashes 3-5 sec then continues a steady flash** (Maintenance, Caution mode) **or remains solid** (Fault Mode) - You will need to review the log to determine the cause and trouble shooting needed.
Note: A monitor that has no configuration file loaded will have config fault logs and be in Fault Mode (lamp solid) due to the default config mismatch.

b. **If Trend Lamp flashes 3-5 sec then remains extinguished** (Normal Mode) – You should **View Live Data** with MLP to see if all of the sensor values look reasonable and **troubleshoot or calibrate as needed.** Don't forget to Synchronize MLP to TurbineTracker™ when completed. This will upload the log and/or calibration files.

4) Next you should **collect data** during aircraft operation using the Manual Entry Form on page 4 of this checklist.

c. **Idle Trend** - Once during every flight have the pilot take a Manual Trend (push the Trend Lamp/Switch) one time and at the same time write down time & gauge readings with the engine(s) at idle.

d. **Cruise Trend** - Once for every flight have the pilot take a Manual Trend (push the Trend Lamp/Switch) one time and at the same time write down time & gauge readings during stabile cruise.

NOTE: If your configurations are set to illuminate the lamps during flight for Exceedence and Events you should tell the pilots to disregard them (or cover the lamp with tape) until the system has been validated as operational.

5) **Review the collected data** after a few days of operation. Most operators retrieve logs weekly.

e. Synchronize MLP to the Aircraft to retrieve the logs.

f. Synchronize MLP to TurbineTracker™ to upload the trend data.

g. Compare the Manual Trend data from the monitor to the pilot recorded written trends for accuracy and needed trouble shooting or calibration.
Note: It is recommended that both the pilots and the maintenance personnel be included in the review.

CUST-T-420-1
System Validation
Page 3 of 4

Manual Sensor Calibration

NOTE: This procedure requires both trends and written records on the ground and in the air to obtain instrument readings. A Manual Sensor Calibration will be performed in this procedure. The calibrations are accomplished with MLP **AFTER** the values are collected, not during.

1) Note the time and take a Manual Trend at stable idle (TREND1)
At the same time record the reading from Cockpit Instruments (USER 1)

2) Note the time and take a Manual Trend at stable cruise (TREND2)
At the same time record the reading from Cockpit Instruments (USER 2)

3) After engine shutdown, review your monitors log data and enter the recorded Trend1 & Trend2 values from the times noted earlier.

4) Establish a connection to the monitor with MLP and perform a **Manual Sensor Calibration**.

Select “Manual

should be calibrated: Engine Temperature, OAT, Engine Torque, Airspeed, and Altitude.

Accomplish a Two Point Calibration

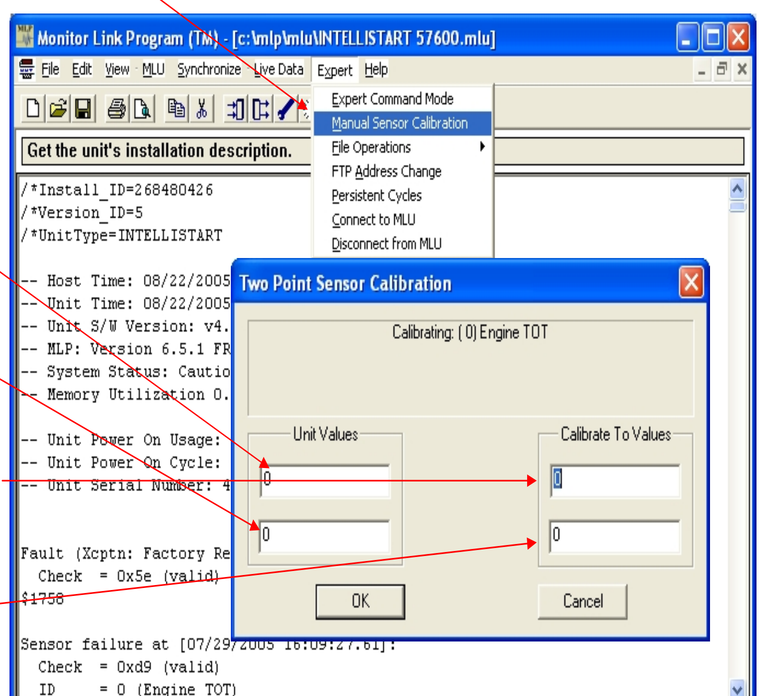
NOTE: You will see four empty boxes for each calibration

Enter the sensor values collected in TREND 1 in the upper left hand box (Unit's Value Column, Top Row)

Enter the sensor values collected in TREND 2 in the lower left hand box (Unit's Value, Bottom Row)

Enter the gauge values collected in USER 1 in the upper right hand box (Calibrate to Values Column, Top Row)

Enter the gauge values collected in USER 2 in the lower right hand box (Calibrate to Values Column, Bottom Row)



NOTE: Do not re-calibrate a sensor that is reading correctly

5) Synchronize to TurbineTracker to upload the monitor's updated calibration (.cal) file.

NOTE: Uploading a calibration session will increment the configuration file version by one. Any number of sensors may be calibrated in multiple sessions prior to uploading without increasing the version number further.

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System Validation
Page 4 of 4

MANUAL ENTRY FORM (fill in applicable fields only)

USER1 = Pilots Observed Instrument Readings at Stable Idle

Tail #	Date	Time	IAS		P-Alt 29.92	OAT
Eng Pos	**ITT**	**Comp. Ng/Nh/N1**	**N2**	**Prop. Np/NR**	**Tq**	**Fuel Wf**
LH						
RH						

TREND1 = Monitors Manual Trend Readings at Stable Idle

Tail #	Date	Time	IAS		P-Alt 29.92	OAT
Eng Pos	**ITT**	**Comp. Ng/Nh/N1**	**N2**	**Prop. Np/NR**	**Tq**	**Fuel Wf**
LH						
RH						

USER2 = Pilots Observed Instrument Readings at Stable Cruise

Tail #	Date	Time	IAS		P-Alt 29.92	OAT
Eng Pos	**ITT**	**Comp. Ng/Nh/N1**	**N2**	**Prop. Np/NR**	**Tq**	**Fuel Wf**
LH						
RH						

TREND2 = Monitors Manual Trend Readings at Stable Cruise

Tail #	Date	Time	IAS		P-Alt 29.92	OAT
Eng Pos	**ITT**	**Comp. Ng/Nh/N1**	**N2**	**Prop. Np/NR**	**Tq**	**Fuel Wf**
LH						
RH						

All of our updated Manuals, User's Guides and Checklist are available free of charge for TurbineTracker™ users under the Support Tab.

CUST- T-421 -1
Replace DTU
17 October 2006
Page 1 of 4

Replace DTU Checklist

Refer to the FAA Approved **Instructions for Continued Airworthiness** for Maintenance Instructions applicable to your aircraft.

NOTE: MLP **can not** Synchronize DTU config files. Before installing the DTU you will need to manually download the current DTU configuration file from the TurbineTracker™ website.

OVERVIEW

Download DTU Config from TurbineTracker
Load DTU Config into Processor
Verify Installation DTU & ACS
Verify Data Transmission

NOTE: ACS (Aircraft Component System) refers to the system connected to the DTU. It could be an IntelliStart+, ADAS[d], ADAS+, SmartCycle+ and or third party monitors.

Download DTU Configuration File

TurbineTracker to Computer

1. Log on to Turbine Tracker using your User ID and Password.

2. Upon successful log on, click the “DTU” Tab.

3. Click “Download Config” button on the left.

4. Select the file to download by clicking on the desired version.
NOTE: A File Download Box Will Appear.

5. Save the File onto your computer.

TIPS AND TRICKS: Although the File may be saved anywhere on the computer, it is recommended that you save the File in the “c:\mlp\cfg” folder. This folder is the default folder that the Monitor Link Program (MLP) uses to find configuration files for transfer.
NOTE: The File Download box will disappear when download is complete.

CUST-T-421-1
Replace DTU
Page 2 of 4

Load DTU Configuration File

Computer to DTU Processor

NOTE: Ensure you have the current version of the Monitor Link Program (MLP). The current version is available from Turbine Tracker under the "Support Tab" and "Systems Update" button.
CAUTION: Ensure you have installed an **active SIM card** (cell phone) into the DTU.

1. Using MLP, Autodetect to establish a connection to the processor (DTU). If unable to establish connection, accomplish MLP Troubleshooting Procedure.

TIPS AND TRICKS: Accomplish "MLU Status" under the MLU Menu to insure you are connected to the DTU (red button).Receiving a response and the "MLU Status Processing Complete" prompt indicates a connection has been established between the computer and the processor.

2. Under the Synchronize dropdown select "Aircraft" or Expert User's can manually "Retrieve Unit's Data Log".

NOTE: If you are prompted to "Reset the log, select "Yes".

3. Select "Configure Unit" under the MLU dropdown Menu.
4. Browse to find the File when the Select Configuration Box appears, if necessary.

NOTE: Configuration Files are denoted by the .cfg and extension. .cfg files are the only file types that are loaded into the processor.

5. Select the File and click "Open"

NOTE: Configuration File load may take as long as 4 minutes.
A completed configuration file load will be noted by the MLP "Configuration Complete" prompt.
TIPS AND TRICKS: Accomplish "MLU Status" of the DTU again under the MLU Menu to verify your config has been loaded.

Verify Installation

View Live Data with MLP

6. After you have verified the configuration is complete (verify with MLU Status), Recycle aircraft power.
7. After power on BIT test, establish a connection with MLP and Enter DTU transparent Mode (green button). This is to verify proper communication with the ACS.

TIPS AND TRICKS: Accomplish "MLU Status" of the IntelliStart+ under the MLU Menu to verify you are connected the ACS (IntelliStart+). Receiving the response and a "MLU Status Processing Complete" prompt indicates a connection has been established between the computer and the processor.

8. View live Data from the ACS using "Text View". This is to verify all Sensors are being displayed correctly (**no scrambled symbols**) paying particular attention to the engine off state sensors N1 & TOT.

NOTE: "Scrambled symbols are like "X&*" instead of "%" for percent or "{X^" instead of "c" for Celsius units. If you see something other then % or c contact Altair Support.

9. Stop viewing Live Data.
10. Exit DTU Transparent Mode (red button).

Verify Data Transmission

DTU to TurbineTracker

11. Under the Synchronize dropdown select "Aircraft", then select "All" to retrieve the log file from the ACS & DTU.

NOTE: Retrieving any log data from the ACS & DTU will reduce the upload time in step 12

NOTE: If you are prompted to "Reset the log, select "Yes".

Maintenance Mode Transmission

12. Enter DTU Maintenance Mode by pressing and holding the RF/Fault Lamp Switch for longer then 5 seconds.

NOTE: It can take up to several minutes for the DTU to load the data and the RF Lamp begins to flash during the data transmission.

13. Check TurbineTracker™ for successful uploading of the DTU and ACS logs (Your Hanger - **Account Status** hyperlink and the DTU Tab – **Log Data** Button)

NOTE: It can take up to several minutes for logs to be displayed after transmission.

Automatic Transmission

14. Conduct a normal engine run and shutdown.

NOTE: It can take up to several minutes for the DTU to load the data and the RF Lamp begins to flash during the data transmission.

13. Check TurbineTracker™ for successful uploading of the DTU and ACS logs (Your Hanger - **Account Status** hyperlink and the Data Analysis Tab – **View Log Data** Button)

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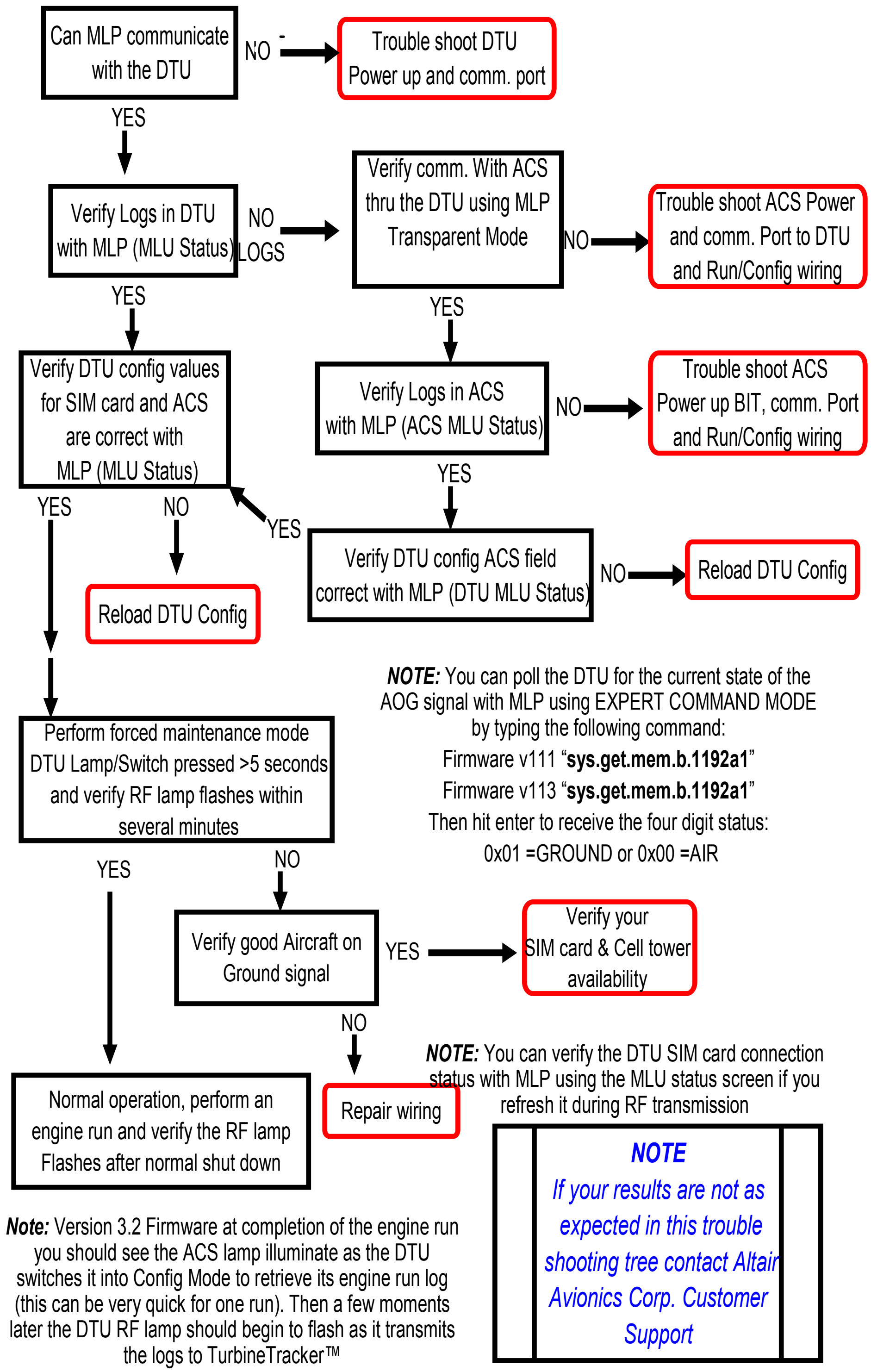
A United Technologies Company

NOTE: It can take up to several minutes for logs to be displayed after transmission.

If the DTU fails to transmit logs to TurbineTracker



How to Contact Customer Service?

- **Required Information**
  - Your name and contact info
  - Login information (User Name and Password)
  - Tail Number or Install ID
  - Mode of the Processor (lamp status)
  - Description of Problem
  - What Troubleshooting You've Done
  - The log (.log), live data (.tab), or session log (.hst) files available for us to review.

- AOG Only
  - **+1-781-929-4298**

- Joseph Welch , Customer Service Rep
  - **+1-781-762-8600, x113**
  - **jwelch@altairavionics.com**

- Jerry Brooks, Customer Service Mgr
  - **+1-781-762-8600, x115**
  - **jbrooks@altairavionics.com**