

ADTS542F

ADTS552F/553F/554F

ADTSTOUCH

ADTSTOUCH-ER

Air Data Test Set
Instruction Manual



Introduction

This technical manual provides operating instructions for the Druck Air Data Test System ADTS542F/552F/553F/554F series.

Scope

This technical manual contains a brief description, operation and testing procedures for the user of this equipment.

Safety



CAUTION See Safety and Installation Guide K0554.

The manufacturer has designed this equipment to be safe when operated using the procedures detailed in this manual:

- Do not use this equipment for any other purpose than that stated. Incorrect use can prevent the protection given by the equipment from working.
- See Safety and Installation Guide K0554, also supplied, for essential operating and Safety instructions that must be followed to ensure safe operation.
- Use suitably qualified¹ Technicians and good engineering practice for all procedures in this publication.

Pressure

Do not apply pressure greater than the maximum safe working pressure specified in this manual when using the ADTS542F/552F/553F/554F series.

Maintenance








The equipment must be maintained using the manufacturer's procedures and should be carried out by authorized service agents or the manufacturer's service departments.

Technical Advice

For technical advice contact Druck or subsidiary manufacturer of this product.

1. A qualified technician must have the necessary technical knowledge, documentation, special test equipment and tools to carry out the necessary work on this equipment.

Marks and Symbols on the Equipment

Symbol	Description
	This equipment meets the requirements of all relevant European safety directives. The equipment carries the CE mark.
	This equipment meets the requirements of all relevant UK Statutory Instruments. The equipment carries the UKCA mark.
	This symbol, on the equipment, indicates that the user should read the user manual.
	This symbol, on the equipment, indicates a warning and that the user should refer to the user manual.
	This symbol warns the user of the danger of electric shock.
	<p>Druck is an active participant in the UK and EU Waste Electrical and Electronic Equipment (WEEE) take-back initiative (UK SI 2013/3113, EU directive 2012/19/EU).</p> <p>The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.</p> <p>In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way. The crossed-out wheeled bin symbol invites you to use those systems.</p> <p>If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.</p> <p>Please visit the link below for take-back instructions and more information about this initiative.</p>
	https://druck.com/weee

Abbreviations

The following abbreviations are used in this manual; the abbreviations are the same in the singular and plural.

Abbreviation	Description
A	Ampere
abs	Absolute
ac	Alternating Current
ADTS	Air Data Test Set

Abbreviation	Description
ADS-B	Automatic Dependent Surveillance–Broadcast
ALT	Altitude
Alt1	Altitude static channel 1
Alt2	Altitude static channel 2
AMM	Aircraft Maintenance Manual
ARINC	Air Radio Incorporated
ASI	Airspeed Indicator
CAS	Calibrated Airspeed
cm	Centimeter
COSHH	Control of Substances Hazardous to Health Regulations
CSV	Comma Separated Value
dc	Direct Current
e.g.	For example
EALT	Extended Altitude (Druck ADTS option)
EPR	Engine Pressure Ratio
FS	Full Scale
ft	Foot
g	Gauge
H	Hysteresis
Hg	Mercury
Hz	Hertz
in	inch
inHg	Inches of Mercury
k	Uncertainty coverage factor
kg	Kilogram
L	Liter
LED	Light Emitting Diode
m	Meter
mA	Milliampere
Mach	Speed ratio to the speed of sound
max	Maximum
mbar	Millibar
min	Minimum
mm	Millimeter
mV	Millivolts
NL	Non-Linearity
PC	Personal Computer

Abbreviation	Description
PIN	Personal Identification Number
Ps	Static pressure
Ps1	Static pressure channel 1
Ps2	Static pressure channel 2
psi	Pounds per square inch
Pt	Total pressure (pitot)
Pt1	Pitot pressure channel 1
Pt2	Pitot pressure channel 2
Qc	Differential pressure Pt - Ps
Qc1	Differential pressure Pt - Ps channel 1
Qc2	Differential pressure Pt - Ps channel 2
R	Repeatability
RF	Radio Frequency
RGA	Return Goods Authorization (Druck procedure)
RMS	Root Mean Square
ROC	Rate of climb
Rt	Rate
RtPs	Rate static pressure
RtQc	Rate differential pressure Pt - Ps
RSVM	Reduced Vertical Separation Minimum
TAS	True Airspeed
USB	Universal Serial Bus
V	Volts
VA	Volt Ampere
°C	Degrees Celsius
°F	Degrees Fahrenheit

Glossary

The terminology used in this manual is specific and individual interpretation must not be introduced. The terms are defined as follows:

Item	Description
Adjust	To bring to a more satisfactory state; to manipulate controls, levers and linkages, to return equipment from an out-of-tolerance condition to an in-tolerance condition.
Align	To bring into line; to line up; to bring into precise adjustment, correct relative position or coincidence.
Assemble	To fit and secure together the several parts of; to make or form by combining parts.
Calibrate	To determine accuracy, deviation or variation by special measurement or by comparison with a standard.

Item	Description
Check	Make a comparison of a measure of time, pressure, temperature, resistance, dimension or other quality with a known figure for that measurement.
Disconnect	To detach the connection between; to separate keyed or matched equipment parts.
Dismantle	To take apart to the level of the next smaller unit or down to all removable parts.
Ensure	To confirm that a proper condition exists; to find out with certainty.
Examine	To perform a critical visual observation or check for specific conditions; to test the condition of.
Fit	Correctly attach one item to another.
Inspect	Review the work carried out by Specialists to ensure it has been performed satisfactorily.
Install	To perform operations necessary to properly fit an equipment unit into the next larger assembly or system.
Maintain	To hold or keep in any particular state or condition especially in a state of efficiency or validity.
Operate	Ensure that an item or system functions correctly as far as possible without the use of test equipment or reference to measurement.
Readjust	To adjust again; to move back to a specified condition; to bring back to an in-tolerance condition.
Reconnect	To rejoin or refasten that which has been separated.
Refit	Fit an item which has previously been removed.
Remove	To perform operations necessary to take an equipment unit out of the next larger assembly or system. To take off or eliminate. To take or move away.
Repair	To restore damaged, worn out or malfunctioning equipment to a serviceable, usable or operable condition.
Replace	Remove an item and fit a new or a serviced item.
Reset	To put back into a desired position, adjustment or condition.
Service	To perform such operations as cleaning, lubricating and replenishing to prepare for use.
Test	Ascertain by using the appropriate test equipment that a component or system functions correctly.

Return Goods/Material Procedure

If the unit requires calibration or is unserviceable, return it to the nearest Druck Service Centre listed at: <https://druck.com/service>.

Contact the Service Department to obtain a Return Goods/Material Authorization (RGA or RMA). Provide the following information for a RGA or RMA:

- Product (e.g. ADTS542F)
- Serial number.
- Details of defect/work to be undertaken.
- Calibration traceability requirements.
- Operating conditions.

- Include any error code(s) and hex value(s) if available. See Section 6.4, “Fault Codes and Error Messages,” on page 87 for more details.

Safety Precautions



INFORMATION Service by unauthorized sources will affect the warranty and may not guarantee further performance.

You must inform Druck if the product has been in contact with any hazardous or toxic substance. The relevant COSHH or in the USA, MSDS, references and precautions to be taken when handling.

Approved Service Agents

For the list of service centers: <https://druck.com/service>

Pressure Units and Conversion Factors

Pressure Units	Factor (hPa)	Pressure Units	Factor (hPa)
mbar	1.0	cmH ₂ O @ 20°C	0.978903642
bar	1000.0	mH ₂ O @ 20°C	97.8903642
Pa (N/m ²)	0.01	kg/m ²	0.0980665
hPa	1.0	kg/cm ²	980.665
kPa	10.0	torr	1.333223684
MPa	10000.0	atm	1013.25
mmHg @ 0°C	1.333223874	psi	68.94757293
cmHg @ 0°C	13.33223874	lb/ft ²	0.4788025898
mHg @ 0°C	1333.223874	inH ₂ O @ 4°C	2.4908891
inHg @ 0°C	33.86388640341	inH ₂ O @ 20°C	2.486413
mmH ₂ O @ 4°C	0.0980665	inH ₂ O @ 60°F	2.487641558
cmH ₂ O @ 4°C	0.980665	ftH ₂ O @ 4°C	29.8906692
mH ₂ O @ 4°C	98.0665	ftH ₂ O @ 20°C	29.836983
mmH ₂ O @ 20°C	0.097890364	ftH ₂ O @ 60°F	29.8516987

To convert from pressure Value 1 (in pressure Units 1) to pressure Value 2 (in pressure Units 2), calculate as follows:

$$\text{Value 2} = (\text{Value 1} \times \text{Factor 1}) / \text{Factor 2}$$

Associated Documents

Part Number	Description
189M2378	ADTS5xxF SCPI Manual
K0554	Safety and Installation Guide.

EU Declaration of Conformity

This is available from the product pages of our website here:



www.druck.com

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1. Introduction

The Druck family of Air Data Test Sets (ADTS) provide accurate air data to test two, three and four-channel systems.

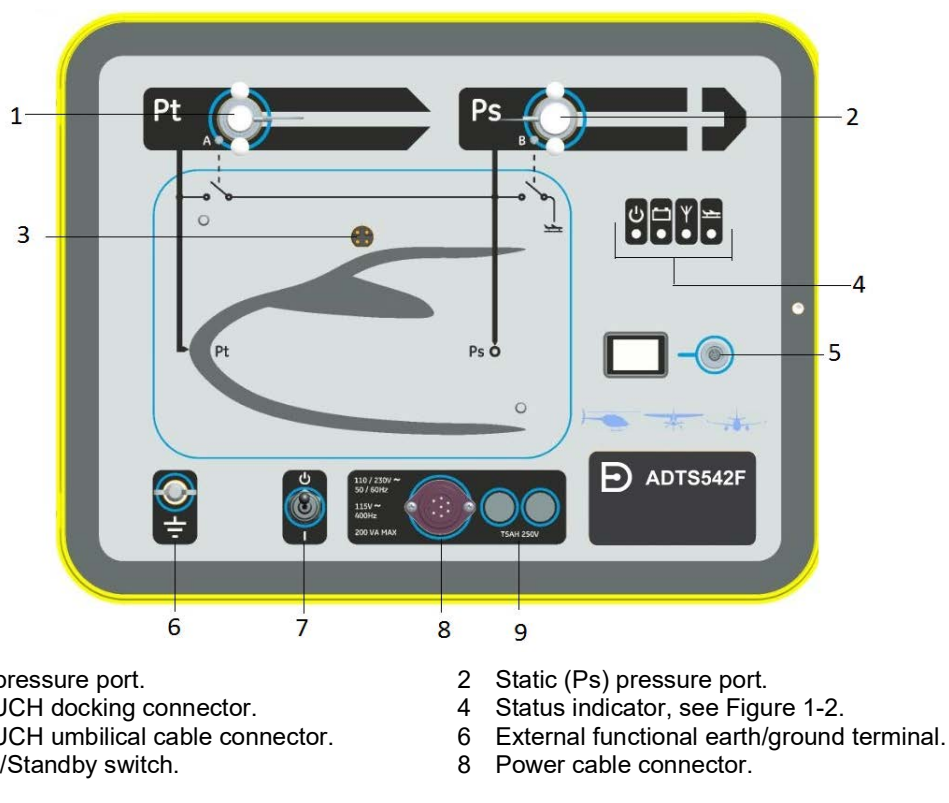
The manufacturer has designed this equipment to be safe when operated using the procedures detailed in this user manual.

The necessary aircraft instrument test values can be entered in either aeronautical or pressure units.

The ADTS will then automatically generate the correct pressure aims for all necessary channels.

The aircraft air data computer system receives these parameters and calculates altitude, airspeed and angle of attack (if applicable).

1.1 ADTS542F



- | | |
|--|--|
| 1 Pitot (Pt) pressure port. | 2 Static (Ps) pressure port. |
| 3 ADTSTOUCH docking connector. | 4 Status indicator, see Figure 1-2. |
| 5 ADTSTOUCH umbilical cable connector. | 6 External functional earth/ground terminal. |
| 7 Power On/Standby switch. | 8 Power cable connector. |
| 9 Fuses. | |

Figure 1-1: ADTS542F Front Panel

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The ADTS status indications are as follows:

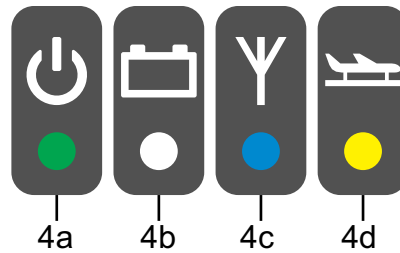


Figure 1-2: ADTS542F/552F/553F/554F Status Indicators

ADTS Status Indications (4):

Power on and self test:

- Off (Power Off)
- Standby (Yellow)
- 4a • Self test in Progress (flashing Green)
- Pass/Ready (Green)
- Fault (Red)

Battery pack status (if fitted - ADTS542F only):

- 4b • For LED indications, see User Manual K0553 “ADTS542F Battery Pack”

Note: Battery pack is currently not a purchasable option.

Bluetooth® wireless technology connection status:

- Wireless connection present (Blue)
- Wired connection and Bluetooth® option enabled (Flashing blue)
- Fast flash - enabled and visible for pairing (available for 5 minutes after power-up)*
- Slow blink - enabled but not visible for pairing*
- 4c • Bluetooth® option disabled (Wireless LED off)
- Initialization fault (Red) *
- * Only applicable to ADTS controller software variant DK0467

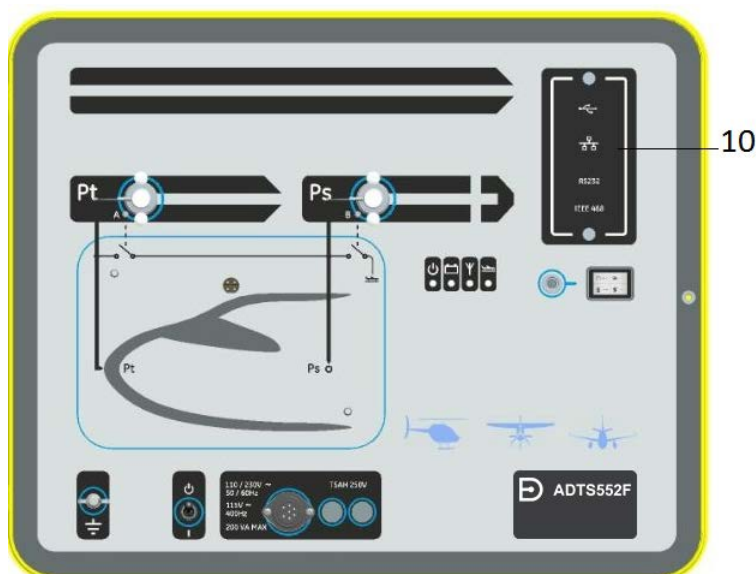
Note: The “fast flash” state also occurs when switching the ON/standby switch from standby to ON. If the Bluetooth® link drops during use then “fast flash” will resume. This occasionally requires the unit to be returned to standby mode before the link can be re-established.

Aircraft status:

- When the ADTS is controlling the aircraft and it is “off ground”, the LED will be Yellow.
- 4d • When the ADTS is controlling the aircraft to “going to ground”, the LED will flash Yellow.
- When the ADTS has made the aircraft “safe at ground”, the LED is Green.
- In standby-mode, this LED will be off.

1.2 ADTS552F

The ADTS552F incorporates all the features of the ADTS542F but with an optional communications board, which is located below the cover (10).

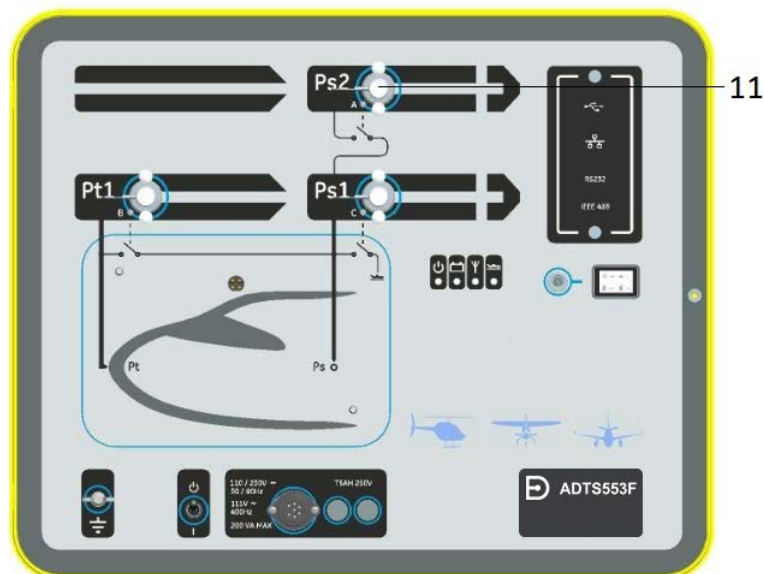


10 Cover for, optional, communications board.

Figure 1-3: ADTS552F Front Panel

1.3 ADTS553F

The ADTS553F incorporates all the features of the ADTS552F but with an additional Static (Ps2) port (11), making it a three channel test set.

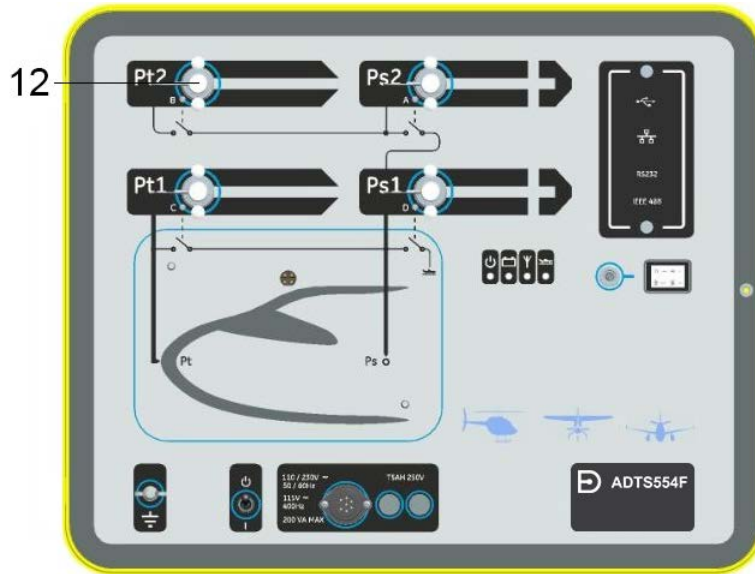


11 Static (Ps2) port.

Figure 1-4: ADTS553F Front Panel

1.4 ADTS554F

The ADTS554F incorporates all the features of the ADTS553F but with an additional Pitot (Pt2) port (12), making it a four channel test set.



12 Pitot (Pt2) port.

Figure 1-5: ADTS554F Front Panel

1.5 ADTSTOUCH

The ADTSTOUCH can control all necessary functions. It can be positioned (docked) on the ADTS or used as a hand held mobile unit via an umbilical cable or using Bluetooth® wireless technology.

This allows a person to complete the entire test program remotely while conveniently seated in the aircraft.

The ADTSTOUCH will have power applied when docked on a powered-on ADTS, or using an umbilical cable connected to a powered-on ADTS, or can be battery powered.

The ADTSTOUCH is a touch screen device which features a swipe-action (up/down/left/right) touch screen user interface with color graphics and menus.



Figure 1-6: ADTSTOUCH

1.5.1 Status Indicators

The top edge of the ADTSTOUCH screen features a set of status indicators (A):

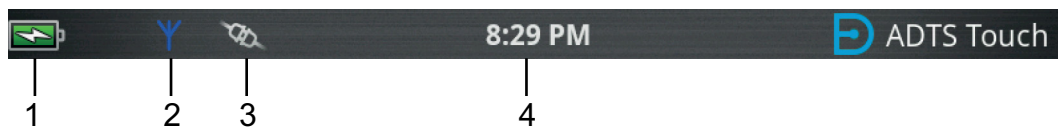


Figure 1-7: Status Indicators

1. **Battery Icon:** Battery charge level indication is only visible when a battery is fitted to the ADTSTOUCH.
2. **Bluetooth® Antenna Icon:** Visible when the ADTSTOUCH is connected by Bluetooth® wireless. The CAN link icon will not be visible.
3. **CAN Link Icon:** Visible when the ADTSTOUCH is connected using a wired connection. The Bluetooth® antenna icon will not be visible.
4. **Time:** System time.

1.5.2 Dashboard Controls

The ADTSTOUCH features a set of controls along the bottom edge of the screen (B). These controls only become visible after selecting a main menu item on the Dashboard:

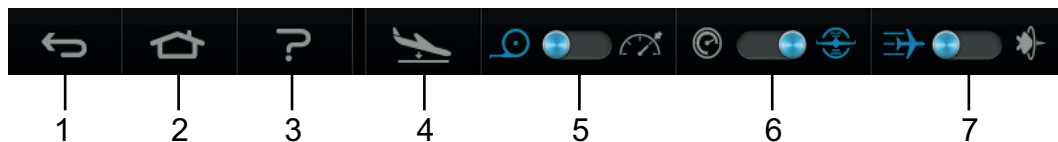


Figure 1-8: Dashboard Controls

1. **Back/Return:** takes you back to the previous selection and will continue taking you back, one step at a time, until you reach the Dashboard again.
2. **Home:** Returns you directly to the Dashboard.
3. **Help:** Displays help topics related to the currently selected main menu item.
4. **Aircraft Status:** displays the aircraft status screen which gives information about whether the aircraft is ramping, stable at set point, going to ground or actually at ground pressure. Options available in this screen are: Go to Ground, Change rate of descent to ground and Hold (will allow a temporary pressure HOLD state on all channels during a controlled ramp to either set-point or ground). See Section 3.8 for a detailed description.
5. **Measure/Control Mode:** toggle function. The blue indicator identifies the currently selected function:
 - Indicator left: Measure mode.
 - Indicator right: Control mode.
6. **Pressure/Aeronautical units selection:** toggle function. The blue indicator identifies the currently selected function:
 - Indicator left: Pressure units.
 - Indicator right: Aeronautical units.
7. **Pressure mode selection:** toggle function. The blue indicator identifies the currently selected function:

With pressure units selected:

- Indicator left: Ps (static) and Pt (pitot) (absolute pressures).
- Indicator right: Ps (static) and Qc.

With Aeronautical units selected:

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- Indicator left: ALT (altitude) and CAS (calibrated air speed).
- Indicator right: ALT (altitude) and Mach speeds.

To turn the ADTSTOUCH off, the ON/OFF key (Figure 5-3, item 1) should be pressed until the display goes blank.

A momentary press will be ignored. To turn the unit ON, press the ON/OFF key until the display appears.

1.6 Dual ADTSTOUCH Hand Terminals



INFORMATION Software version DK0429 does not support dual hand terminal functionality in the ADTSTOUCH or ADTSTOUCH-ER.

The ADTS542F/552F/553F/554F utilizing DK0467 software can be operated with two ADTSTOUCH hand terminals.

Only one of the units (the 'Primary') can control the ADTS. The second unit (the 'Secondary') operates as a display when the Primary is connected. The ADTSTOUCH hand terminals can be connected to the controller in three ways:

- Docked (sitting on top of the unit, on the docking connector)
- Via Umbilical Cable.
- Via Bluetooth® wireless connection.

The allocation of Primary and Secondary status when two ADTSTOUCH hand terminals are used is shown in the following table:

Configuration	Primary	Secondary
Umbilical/Docked	Umbilical	Docked
Umbilical/Bluetooth®	Bluetooth®	Umbilical
Docked/Bluetooth®	Bluetooth®	Docked
Bluetooth®/Bluetooth®	Not allowed	Not allowed

If one of the ADTSTOUCH hand terminals is connected via Bluetooth®, this will always be the Primary. The second unit (either umbilical or docked) will be the Secondary. All control parameters and ADTS setting entry shall be disabled on the Secondary unit. In the event that the Primary communication is lost, the Secondary unit shall become the Primary unit until the link is

re-established. The Secondary unit can be distinguished from the Primary unit visually. The Secondary unit includes a “REMOTE” banner on the display at all times, see Figure 1-9.



Figure 1-9: ADTSTOUCH in Remote Mode

2. Installation

2.1 Packaging

On receipt of the ADTS check the contents of the packaging against the following lists:

1. ADTS542F/552F/553F/554F
2. ADTSTOUCH
3. Mains cable.
4. K0554, Installation and Safety Guide.

Note: Please keep the special packing boxes so that the ADTS can be safely shipped for calibration, repair or storage.

2.1.1 Options

The following options are included, but not limited to:

1. ADTSTOUCH batteries.
2. ADTSTOUCH extension cable.
3. Power supply adaptor and cables.
4. Threaded adaptors.
5. Accessories bag.
6. Hoses
7. Backpack (ADTS542F only)
8. ADTSTOUCH carry case.
9. Second ADTSTOUCH (not for ADTS542F).

For a complete list of available options, refer to product data sheet: ADTS542F/552F/553F/554F, 920-648x, 920-659x.

2.2 Packing for Storage or Transportation

To store the ADTS or to return it for calibration or repair carry out the following procedures:

1. The ADTS should be at zero/ambient pressure. Disconnect the hose assemblies and stow in the accessory bag.
2. Switch OFF and disconnect from the electrical power supply.
3. Close and latch the lid to the ADTS.
4. The power supply cable should be placed in the original packing material.
5. Place the ADTS in the original special packing box or appropriate transport container.
6. Mark carton "FRAGILE" on all sides, top, and bottom of the container.
7. The battery (Lithium based) must be removed from the ADTSTOUCH during transportation. If shipping an ADTSTOUCH and/or battery unit please contact your local service center beforehand for shipping requirements.
8. To return the ADTS for calibration or repair complete the return goods procedure as detailed in "Return Goods/Material Procedure" on page v.

2.2.1 Environment

Note: Items in storage are defined as being non-operational.

Chapter 2. Installation

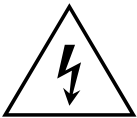
The following conditions apply for both shipping and storage:

Environment	Condition
Storage:	Store in a cool dry place.
Storage Temperature Range:	ADTS542F: -20°C to 70°C (-4°F to 158°F)
	ADTS552F/553F/554F: -30°C to 70°C (-22°F to 158°F)
	ADTSTOUCH Battery: Short Term (e.g. during Shipping): -20°C to 60°C, < 80 %RH Long Term: The battery should be stored in an environment with low humidity, free from corrosive gas at a recommended temperature range between 5 and 25°C. Extended exposure to temperatures above 45°C could degrade battery performance and life.
Storage Altitude:	Up to 50,000 feet (15,000 metres)

If the ADTS becomes exposed to moisture or very high humidity, dry as soon as possible and temporarily store in a low humidity area.

Note: It is important that the customer be sure the ADTS is in compliance with the OEM re-certification.

2.3 Electrical Connection



RISK OF ELECTRIC SHOCK Voltages in excess of 30 Volts (RMS) AC or 50 Volts DC, in certain circumstances, can be lethal. Care must be taken when working on live, exposed conductors.

2.3.1 Power Supply

Single phase	110/230 Vac, 50/60Hz	200 VA Max – ADTS542F/552F
	115 Vac, 400Hz	300 VA Max – ADTS553F/554F

2.3.2 Power Supply Connection



RISK OF ELECTRIC SHOCK The supply must provide connection to a protective ground terminal. The unit must, at all times, be connected to the supply earth (ground).

The power supply cable and connector must be correctly rated for the power supply.

The unit must be connected to the correct electrical power supply as stated, adjacent to the power connector.

A qualified technician (see “Safety” on page i) must carry out the following procedure.

A power isolation device must be accessible at all times. This device can be considered as disconnecting the ADTS power cable or building wall isolation switch. The ADTS front panel switch is not classed as a power isolator.

European Color	US Color	Function
Brown	Black	Live
Blue	White	Neutral
Green/Yellow	Green	Protective Earth (Ground)

2.3.3 Fuses

The two fuses, located in the holders and mounted on the front panel, protect the unit. The fuses are connected in the live and neutral supply circuit and are rated at:

- AC, 5 A, T5H250V, 5 x 20 mm

2.3.4 External Functional Earth/Ground Terminal

An external earth/ground connection stud is available as functional earth on the front panel providing a connection point for other equipment to be connected to the same earth/ground connection as the ADTS. This is not a protective earth/ground connection.

2.4 Pneumatic Pressure Connections

When not in use, blanking caps must be fitted to Ps/Pt ports.

Note: When carrying out a leak test, a leak of the blanking cap affects the performance of the ADTS.

The ADTS uses the following AN pneumatic connectors:

- AN-3, 37° flare (option).
- AN-4, 37° flare.
- AN-6, 37° flare (option).

2.5 Positioning the ADTS



CAUTION To operate, place the ADTS on a horizontal surface with the front panel uppermost, this allows the water in the water filter to vent. Water can contaminate the ADTS manifold and affect ADTS performance.

Note: In control mode, the water drain, located on the left-hand side of the unit near the cooling vent, produces a flow of air and some water. The amount of water depends on the humidity and the operating time in control mode.

Chapter 2. Installation

2.5.1 Connection to Aircraft



CAUTION Observe the appropriate safety instructions and testing procedures detailed in the aircraft maintenance manuals and component maintenance manuals.

Figure 2-1 shows a typical 2-channel Pitot Static aircraft connection.

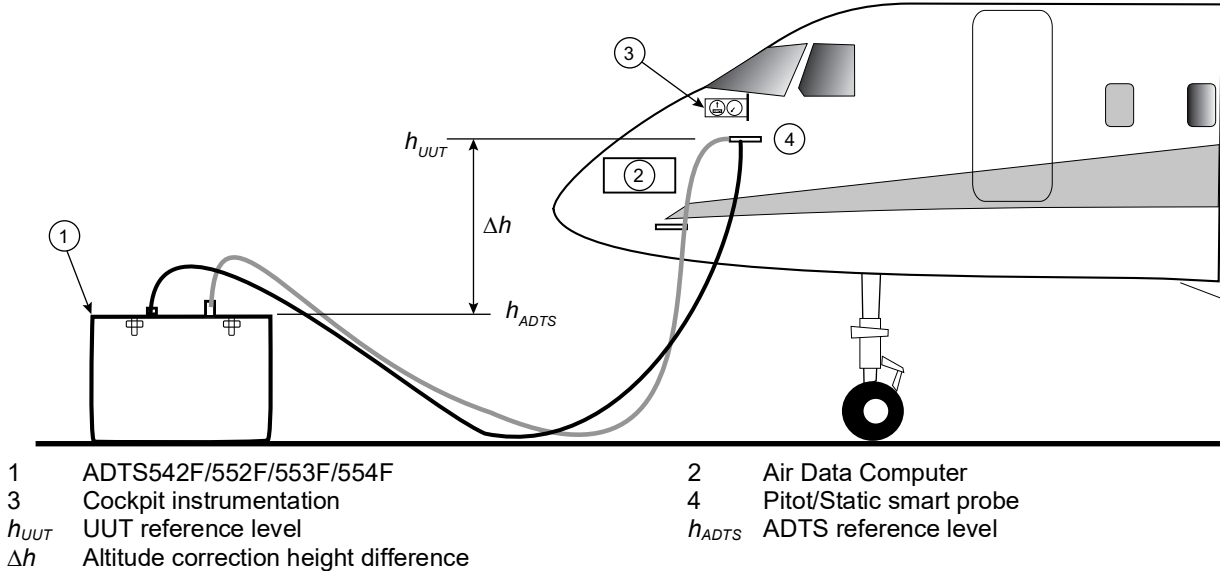


Figure 2-1: Pitot and Static Aircraft Connection

Figure 2-2 shows a Pitot only aircraft connection.

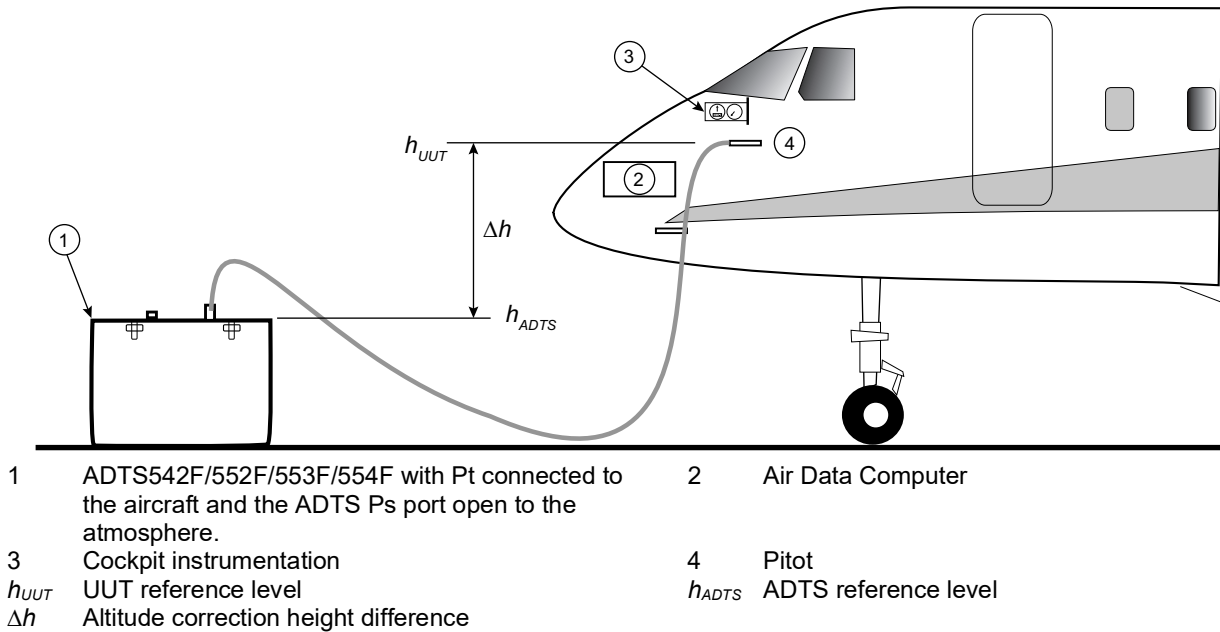


Figure 2-2: Pt Only Aircraft Connection

2.5.2 Altitude Correction

It is important that the position of the ADTS in relation to the aircraft altitude sensors is known. An altitude correction must be made to allow for the difference in height between the ADTS reference level and the reference level of the aircraft's altitude sensors. Refer to the Aircraft Maintenance Manual for this information.

The corrected altitude output equals the true altitude output increased by the height difference. See equation below and refer to Figure 2-1 and Figure 2-2:

$$\Delta h = h_{UUT} - h_{ADTS}$$

Note: The Δh altitude correction value should be positive when the ADTS is positioned below the aircraft.

See Section 3.6.4.4 for instructions on how to enter the altitude correction value into the ADTS.

3. Operation

3.1 Preparation



WARNING Observe safety precautions stated in local orders and the aircraft or equipment servicing procedures.



CAUTION It is the responsibility of the user to make sure that the pneumatic control range limits are set below the maximum operating limits of the equipment under test.

Do not use sharp objects on the touch screen. Sharp objects will permanently damage the touch screen, it cannot be repaired.

Make sure the electrical and pneumatic connectors, electrical cables and pipes and positioning of the ADTS comply with the instructions and requirements in “Positioning the ADTS” on page 11.

Carry out the following before use:

1. If necessary, carry out the maintenance tasks detailed in Section 5.
2. Make sure the power at the wall connection point is switched OFF. Connect the ADTS to the electrical power supply at the wall connection point.



RISK OF ELECTRIC SHOCK Make sure that the supply includes a connection to a protective earth.

Note: Make sure that the power supply switch can be accessed at all times.

3. Inspect the pneumatic hoses for damage, ingress of dirt and moisture. Make sure the aircraft adapters are serviceable.
4. Make sure the air vents do not become obstructed.
5. Connect hoses to the ADTS that are necessary for the test procedures to be carried out.
6. Fit the necessary adapters for aircraft testing to the hoses.

Note: When connected, take care not to kink or stand on the hoses.

7. Fit blanks to all the adapter test points.
8. Carry out the leak test procedure detailed in Section 6.3.
9. If necessary carry out an altitude correction, see Section 2.5.2.

Note: Read the whole procedure before starting the test process on an aircraft or component.

3.2 Power-up Routine

Make sure the power at the wall connection point is switched ON.

3.2.1 Wired Connection

1. Either position the ADTSTOUCH on the docking connector of the ADTS, or connect the ADTSTOUCH to the ADTS using the umbilical cable connector.
2. Set the On/Standby Switch on the front of the ADTS to ON.

Chapter 3. Operation

The ADTS performs a self test, resulting in an ADTS status indication of Pass or Fault.

Table 3-1: ADTS Status Indication (4a)

Indicator Color	Condition
No LEDs	OFF
Yellow	Standby
Green (flashing)	Self test in progress
Green	Pass
Red	Fault

If the self test fails (red Fault indication), or for any other reason the ADTS is considered to be unserviceable, contact Druck and return the ADTS to Druck or to a Druck approved service center.

During the Power-up routine, the following screen shows a Progress bar at the bottom of the screen:

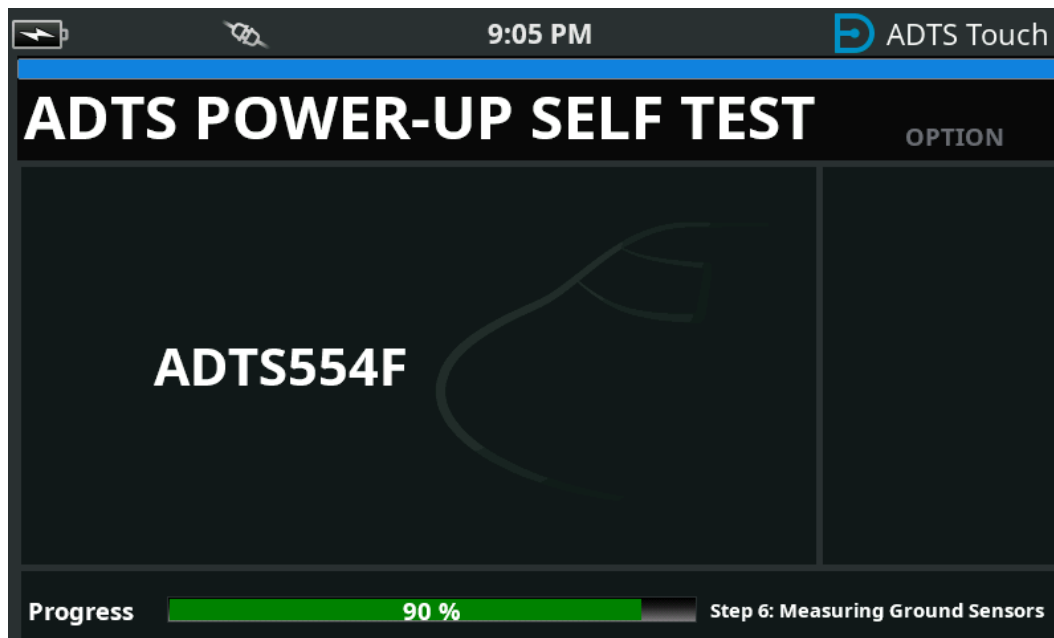


Figure 3-1: ADTS Power-up Self Test Screen

The ADTS power-up self test screen is shown for a short time followed by the Dashboard.

3.2.2 Wireless Connection

Wireless connections can only be made on ADTS units which have the Wireless option previously enabled, see Section 3.16. Options that are currently enable are shown on the Power-up Self Test screen. Shown on the screen in Figure 3-2, both Bluetooth® and EPR options are enabled.

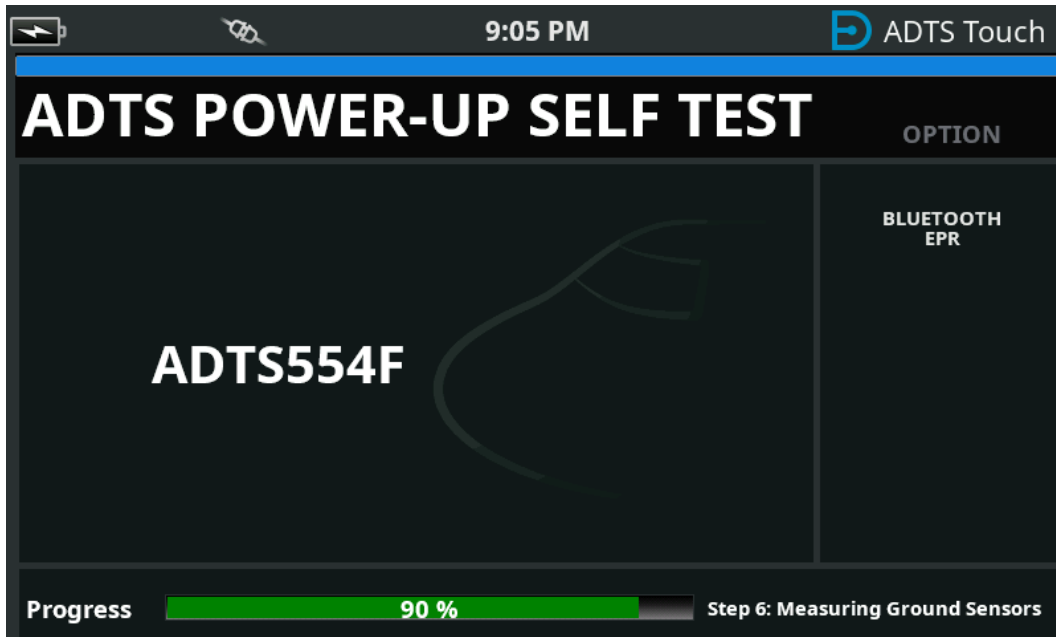


Figure 3-2: ADTS Power-up Self Test Screen with Bluetooth® and EPR

3.2.2.1 Wireless Connection (DK0429 Software)

To establish a wireless connection:

1. Ensure that the ADTSTOUCH is not positioned on the docking connector of the ADTS, or connected to the ADTS using the umbilical cable connector.
2. Switch the ADTSTOUCH ON.
3. Navigate to Dashboard >> Tools >> Bluetooth. The Bluetooth® sub-menu opens.
4. Select 'New scan for devices'. Wait while a search for active devices is performed.
5. Select the necessary serial number device from the list and tap the "tick" icon. Wait while connection is established.

If the link has been successful the Bluetooth® antenna icon is shown in the status indicator area of the ADTSTOUCH, see Figure 1-7.

3.2.2.2 Wireless Connection (DK0467 Software)

Bluetooth® pairing is slightly different on the product using DK0467 software. This has been introduced to improve product cyber security. To establish a Bluetooth® wireless connection:

1. Pairing must be done when the ADTS controller unit is first powered up. A time period of approximately 5 minutes is allowed to achieve pairing.
2. Ensure that the ADTSTOUCH is not positioned on the docking connector of the ADTS, or connected to the ADTS using the umbilical connector.
3. Apply power to the ADTS Controller, with the unit in STANDBY mode and switch the ADTSTOUCH ON.
4. After power up, the Bluetooth® LED on the ADTS Controller will be FAST FLASHING. Pairing can only be achieved whilst the LED is in this state. After approximately 5 minutes the Bluetooth® LED will change to a slower blink.
5. While the Bluetooth® LED is FAST FLASHING:

Chapter 3. Operation

- a. Navigate to Dashboard >> Tools >> Bluetooth. The Bluetooth® sub-menu opens.
- b. Select 'New scan for devices'. Wait while a search for active devices is performed.
- c. Select the necessary serial number device from the list and tap the “tick” icon. Wait while connection is established.

If the pairing has been successful the Bluetooth® antenna icon is shown in the status indicator area of the ADTSTOUCH (Figure 1-7), and the Bluetooth® LED (Figure 1-2, item 4c) on the ADTS will be solid.

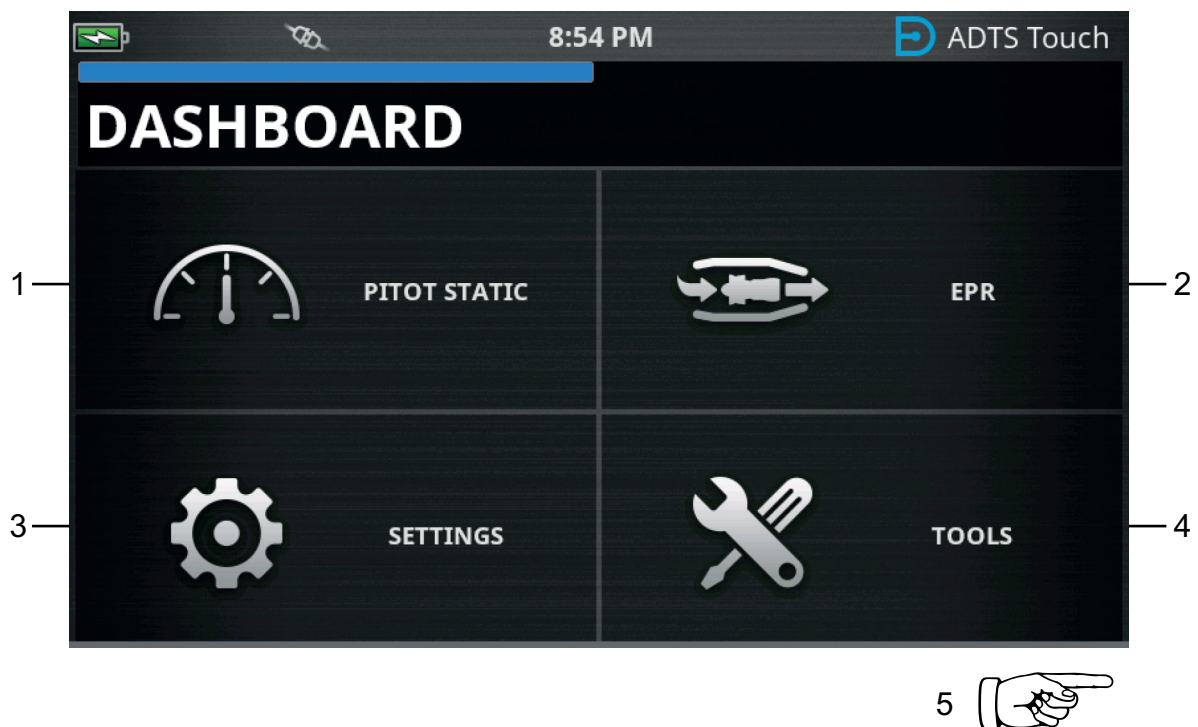
Bluetooth® is available in both ON and Standby modes on ADTS553F and ADTS554F due to the dual hand terminal support requirement.

Wireless operation of the ADTS is now available. See Section 3.16.

3.3 Dashboard

The Dashboard shows the top-level menu items, which are:

- PITOT STATIC
- EPR
- SETTINGS
- TOOLS
- TEST SEQUENCE
- TRANSPONDER



- 1 Pitot Static
- 3 Settings

- 2 EPR
- 4 Tools
- 5 Swipe horizontally to view Test Sequence menu.

Figure 3-3: Dashboard Main Menu

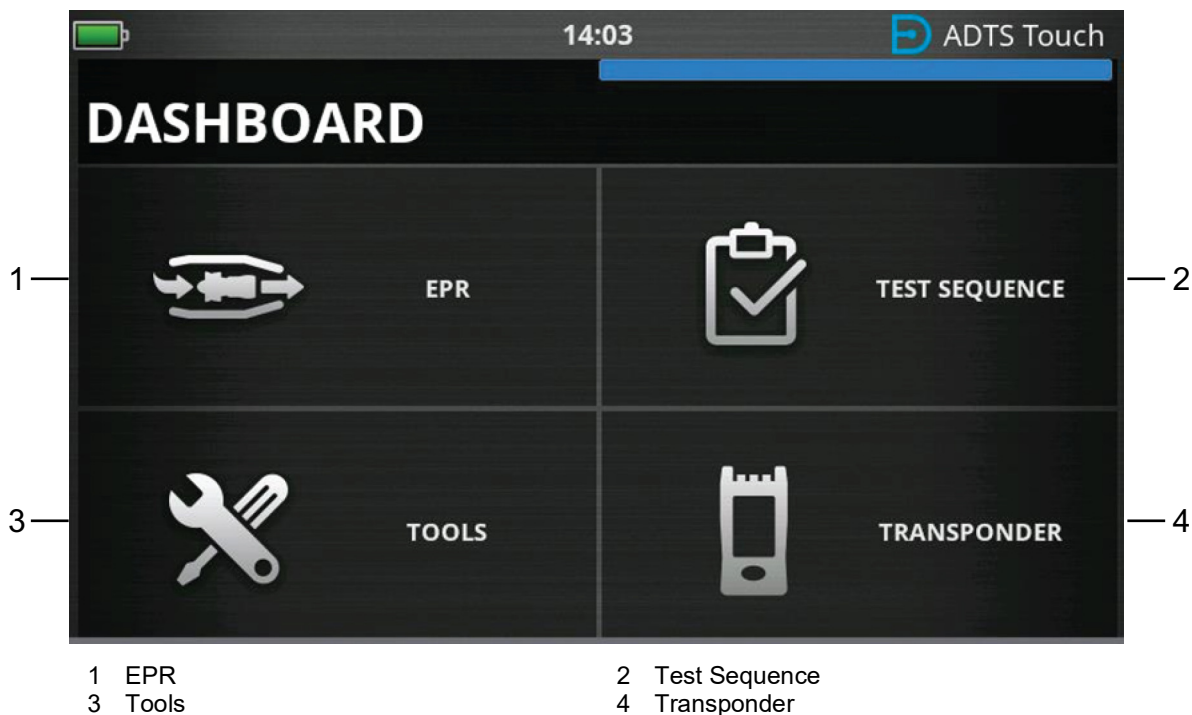


Figure 3-4: Dashboard Menu Showing Test Sequence

3.4 Pitot Static

When Pitot Static is selected on the dashboard, the resulting screen will clearly display whether the ADTS is currently controlling the pressures at the Ps and Pt ports (CONTROL) or passively measuring the pressures at the Ps and Pt ports (MEASURE).

The condition immediately after power up is always MEASURE, so as to protect any connected systems.

To switch between the two modes, tap the related icon (1) at the bottom of the screen. See Figure 3-5.

3.4.1 Measure Mode

The MEASURE mode screen displays real time Pitot Static parameter measurements (2) based on the current pressures and rates of change (3) of pressures present at the Ps and Pt ports of the ADTS or any connected aircraft systems. All ADTS pumping and pressure control functions are inactive unless Autoleak protection is enabled.

Chapter 3. Operation

This baseline Pitot Static information screen will typically be used to passively monitor the pressure and leak rate status of the connected aircraft.

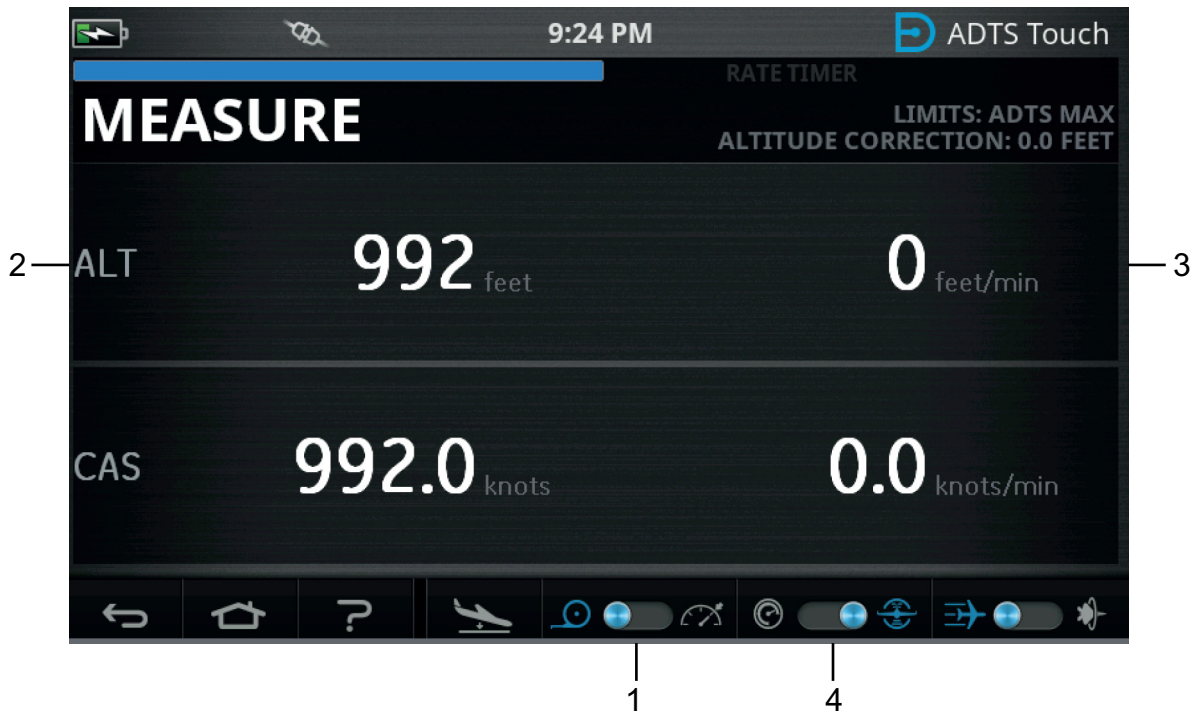


Figure 3-5: Measure Mode – Single Channel



Figure 3-6: Measure Mode – Multi Channel

The system can be switched between aeronautical units and pressure units by toggle control (4).

3.4.2 Control Mode

When CONTROL mode is selected at icon (1), the ADTS pumps and pressure control functions are activated but will not cause any change in the current pressures unless requested by the operator.

The CONTROL mode screen also displays real time Pitot Static parameter measurements based on the current pressures and rates of change of pressures present at the Ps and Pt ports. It also has a 'Aim' field for each parameter to allow the entry of new target values for the ADTS.

This screen can be configured at icon (2) to accept and present data in either aeronautical or pressure units.

The Pt channel display can be configured at icon (3) to present either CAS or Mach (when in Aero units) and either Qc or Pt (when in Pressure units).

A progress bar (4) indicates rate and percentage completion towards the requested new target aim.

The effort meter (5) can swing left or right according to whether control of the requested pressure for that channel is requiring predominantly vacuum (left) or pressure (right), e.g, an excessive left swing when at an altitude set-point might give early indication of a leak to atmosphere.

This baseline Pitot Static control screen will typically be used to actively exercise the connected aircraft or system over the necessary Ps/Pt parameter test range.



Figure 3-7: Control Mode – Single Channel

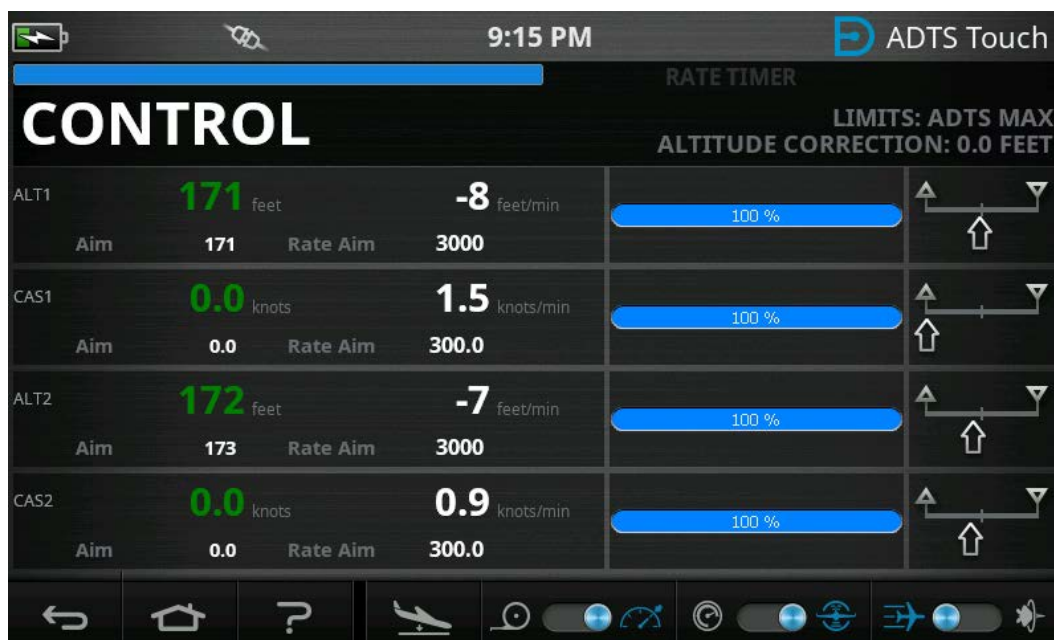


Figure 3-8: Control Mode – Multi Channel

3.4.3 ALT, CAS and Mach

The following controls are available when “Aeronautical” units are selected:

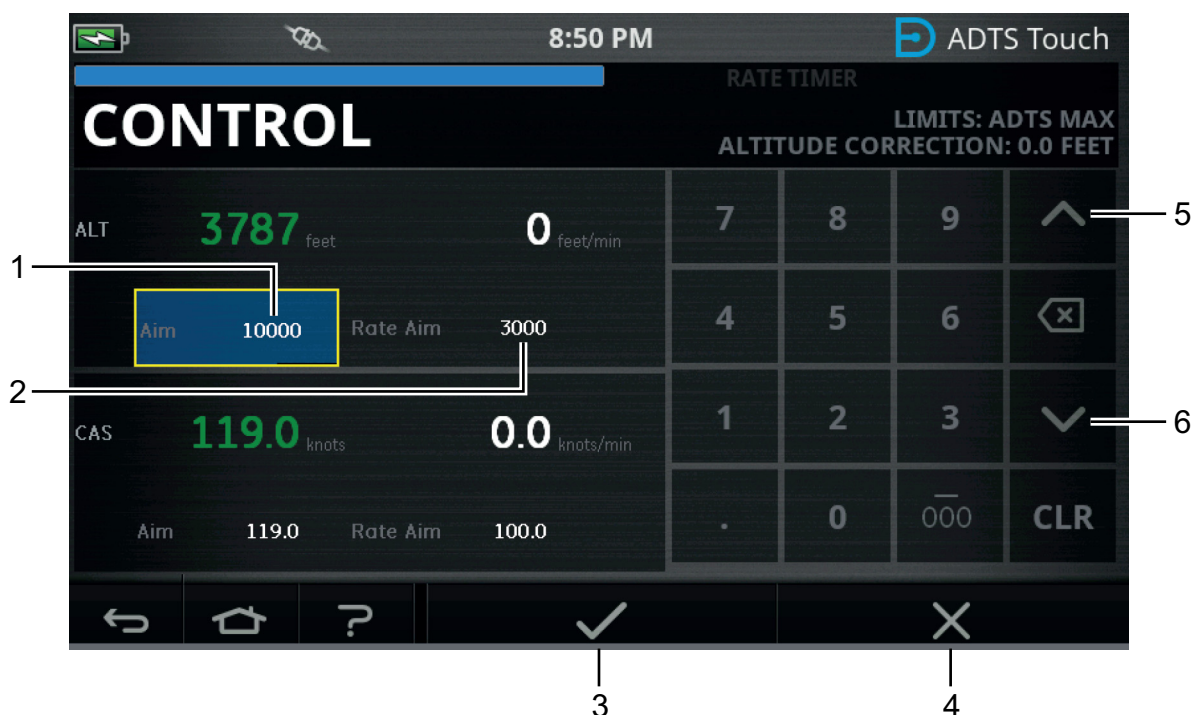


Figure 3-9: Control Mode – ALT, CAS and Mach Aims

3.4.3.1 ALT (ALT1, ALT2 on ADTS553F and ADTS554F)

Displays the currently selected altitude. To change the altitude value:

1. Tap the “Aim” value (1) to highlight it.
2. Use the numbered keypad to input the new value.

3. If necessary, change the rate of change value by tapping the “Rate Aim” value (2) and input the new value, or use the nudge up/down controls (5/6) to increment/decrement the value by a pre-defined factor.
4. To change the nudge increment/decrement factor:
 - a. Press and hold one of the up/down controls (5/6) for 2 seconds. The increment/decrement factor panel opens.



Figure 3-10: Nudge Increment/Decrement Factor Selection

- b. Select the new factor (7) from the list. The new factor is selected and the increment/decrement factor panel closes.

Tapping the up/down controls (5/6) will increment/decrement the “Rate Aim” value by the new factor.
- c. Tap the “Tick” icon (3), the new value appears in the “Aim” field. The altitude value changes to the new value, at the rate of change value, and provided that the new value is within acceptable limits the text will turn green.
- d. Tapping the “Cross” icon (4), cancels the action and closes the keypad.

Note: It is possible to change multiple values at the same time by selecting the appropriate aim values (Repeat steps 1 to 4) and then tap the “Tick” item once all changes have been entered. This method is preferable on the ADTS553F and ADTS554F as on a multichannel controller system it is preferable for all controllers to start at the same time.

3.4.3.2 CAS (CAS1, CAS2 on ADTS554F)

Displays the currently selected calibrated air speed. To change the value, repeat the same procedure of Section 3.4.3.1 for CAS.

3.4.3.3 Mach (MACH1, MACH2 on ADTS554F)

Displays the current selection. To change the value, repeat the same procedure of Section 3.4.3.1 for Mach.

3.4.4 Ps, Pt and Qc

The following controls are available when “Pressure” units are selected:

Chapter 3. Operation

3.4.4.1 Ps (Ps1, Ps2 on ADTS553F and ADTS554F)

Displays the currently selected pressure. To change the value, repeat the same procedure as Section 3.4.4.1 for Ps.

3.4.4.2 Pt (Pt1, Pt2 on ADTS554F)

Displays the currently selected pressure. To change the value, repeat the same procedure as Section 3.4.4.1 for Pt.

3.4.4.3 Qc (Qc1, Qc2 on ADTS554F)

Displays the currently selected pressure. To change the value, repeat the same procedure as Section 3.4.4.1 for Qc.

3.4.5 Altitude Dropback

The ADTS542F/552F/553F/554F series use a single set of pumps to generate the internal pressures and vacuums which are ultimately presented at the Static and Pitot ports. During control situations where high gas flows are necessary, it is possible for these source pressures to start to collapse. This can manifest itself as an unwanted drop in altitude on a channel that was previously under control and stable.

To prevent this effect, the software inside the ADTS will limit the CAS or Altitude rate changes to maintain a non-ramping (stable) channel.

Note: In extreme cases the rate limiting effect can make altitude and CAS changes appear very slow.

3.5 Rate Timer Mode

To access this screen tap and drag the whole MEASURE or CONTROL screen across to the left. The Rate Timer has an associated wait period that allows pressures to settle before timing starts. The wait period counts down to zero before the timed period starts.



Figure 3-11: Rate Timer Panel – Single Channel



Figure 3-12: Rate Timer Panel – Multi Channel

The Rate Timer starts an internal timer for a pre-defined Test time. On the completion of the timed period, the display shows the average rate of change over the specified time period.

3.5.1 WAIT Period

To set the WAIT period:

1. On the Rate Timer panel, tap WAIT (1) to highlight it, the Set Time panel opens.



Figure 3-13: Set Wait Time Panel

2. On the Set Time panel, select the necessary “hours”, “minutes” and “seconds” (2).

Chapter 3. Operation

3. Tap the “Tick” icon (3), the Set Time panel closes and the new time is shown in the Rate Timer panel.
4. Tapping the “Cross” icon (4), cancels the action and closes the Set Time panel.

3.5.2 TEST Period

1. On the “Rate Timer” panel, tap “TEST” (5) to highlight it, the “Set Time” panel opens.
2. On the Set Time panel, select the necessary “hours”, “minutes” and “seconds”.
3. Tap the “Tick” icon, the Set Time panel closes and the new time is shown in the Rate Timer panel.
4. Tapping the “Cross” icon, cancels the action and closes the Set Time panel.

3.5.3 Start the Rate Timer

To start the Rate Timer:

1. To start the timer, tap the “play” icon (6). The timer starts counting down, the elapsed time (percentage) indicator turns blue and the word “Wait” is shown underneath the percentage indication.
2. When the timer reaches 100%, it starts to count down again and the word “Test” is shown underneath the percentage indication. When the timer reaches 100%, it stops, the elapsed time indicator remains blue and the word “End” is shown. At the end of the timed testing period the measured average rates of change are shown for each channel with the capital letter “T” as a suffix.



Figure 3-14: Rate Timer Results

3. To stop or reset the timer, tap the “cross” icon (7). The timer is reset, the elapsed time indicator is white and the word “Idle” is shown.

3.6 Settings

Navigate to Dashboard >> Settings. The Settings screen opens showing the available controls.

Note: The ADTS contains PIN protected menus. A list of factory default PIN codes can be found in Section 4.2.

The following table is a settings menu overview:

Table 3-2: Settings Menu Overview

Tier 1	Tier 2	Tier 3
Intensity ^a		
Theme		
Volume		
ADTS settings	Channel mode	
	Auto leak recovery	
	Pressure units	
	Aero units	
	Altitude correction	
	Auto Airspeed Rate	
	PS1 - PS2 Limits (3-channel only) (ADTS553F/554F)	
	Airspeed mode	
	ADTS limits	View limits Select limits Default limits Edit limits Create new limits Delete limits
	Auto zero	
	Change supervisor PIN	
Configuration ^b	2-Channel Test Set 3-Channel Test Set 4-Channel Test Set	
Battery Saver	Battery Saver	
	Turn off After - Timer duration	
Regional settings	Date	Date Format
	Time	Time format
	Language	
Screen rotation	0 180	
Bluetooth® Autoconnect		

- a. This menu and its sub-menus are only available when the On/Standby toggle switch is set to On.
 b. The configuration can only be changed when the On/Standby toggle switch is set to Standby.

Note: Options shown will be dependent on product variant.

3.6.1 Intensity

Adjusts the brightness of the screen displays.

Chapter 3. Operation

3.6.2 Theme

Changes the screen view from a dark background with white text to a light background with black text for bright sunlight use.

3.6.3 Volume

Adjusts the volume of the audible indications.

3.6.4 ADTS settings

Opens a sub-menu containing eleven items:

3.6.4.1 Auto Leak Recovery

Auto leak recovery automatically regains control if the leak rate becomes too high for any of the control channels. Auto leak operates at pre-set rates of 3000 ft/min and 600 knots/min.

To turn auto leak recovery On and Off:

1. Tap the auto leak recovery panel inside the white box. When auto leak recovery is On, a “tick” appears inside the box. If no “tick” is visible, auto leak recovery is Off.

3.6.4.2 Pressure Units

Shows the current selection. To change the pressure units setting:

1. Tap the pressure units panel.
2. Tap the necessary units radio button. The units radio button panel closes and the pressure units panel shows the selected units.

3.6.4.3 Aero Units

Shows the current selection. To change the aero units setting:

1. Tap the aero units panel.
2. Tap the necessary aero units radio button. The aero units radio button panel closes and the aero units panel shows the selected units.

3.6.4.4 Altitude Correction

Shows the current selection. To change the altitude correction setting:

1. Tap the altitude correction panel, a numbered keypad is shown.

Note: Enter a positive correction factor when ADTS is below the aircraft reference. Enter a negative correction factor when ADTS is above the aircraft reference.

2. On the numbered keypad, select the necessary altitude correction setting.
3. Tap the “Tick” icon, the numbered keypad closes and the new altitude correction setting is shown in the altitude correction setting panel.
4. Tapping the “Cross” icon, cancels the action and closes the numbered keypad.

3.6.4.5 Auto Airspeed Rate

This function adjusts the airspeed rate so the altitude and airspeed arrive at the setpoints at the same time.

Note: The airspeed rate will be capped to the limits.

When auto airspeed rate is **On**, a “tick” shows inside the box. If no “tick” is visible, auto airspeed rate is **Off**.

When auto airspeed rate is **On**, a (A) indication will be shown next to the Rate Aim unit on the airspeed channel.

3.6.4.6 Ps1 - Ps2 Differential Limit in 3-Channel Operation

The default value for the Ps1 - Ps2 limit is 84.66 mbar (2.5 inHg). This can be changed in the menu below.

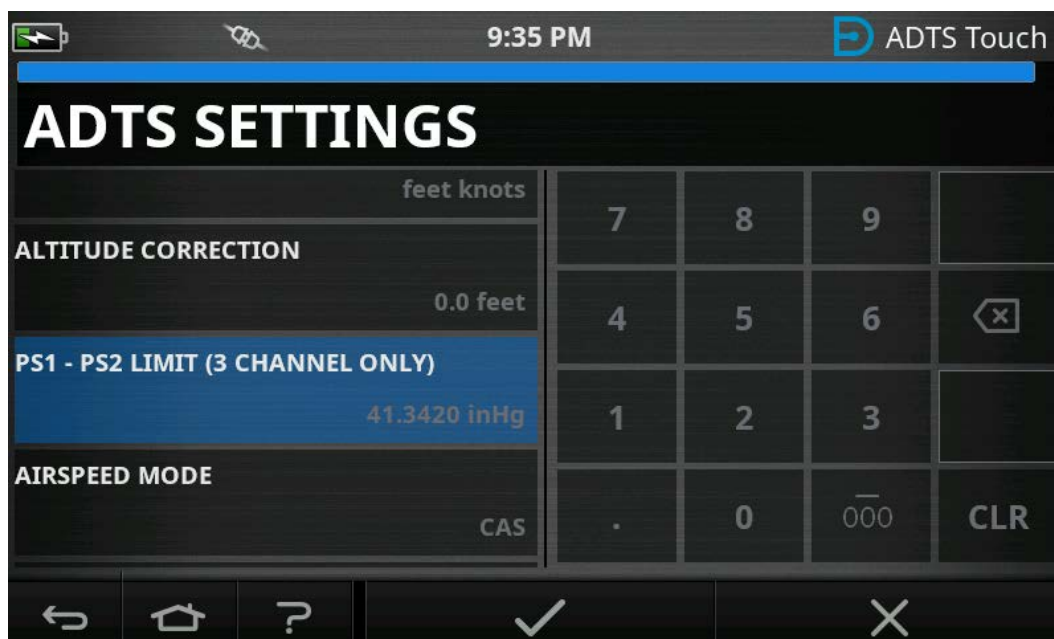


Figure 3-15: Setting Ps1 - Ps2 Limit (3/4-Channel Only)

3.6.4.7 Airspeed Mode

Shows the current selection. To change the setting:

1. Tap the airspeed mode panel.
2. Tap the necessary units radio button:
 - a. CAS: selects the Calculated Airspeed mode and closes the airspeed mode panel.
 - b. TAS: opens the True Airspeed sub-panel containing two additional items:
 - i. True Airspeed Temperature: shows the currently selected temperature. To change the selected temperature setting: tap the True Airspeed Temperature panel. A numbered keypad is shown. Use the keypad to enter the new temperature and tap the "tick" icon. The new temperature is shown in the True Airspeed Temperature panel and the keypad closes.
 - ii. Temperature units: shows the currently selected temperature units. To change the selected temperature units: tap the Temperature units panel. Tap the necessary units radio button. The Temperature units panel closes and the new Temperature units are shown in the Temperature units panel.

3.6.4.8 ADTS Limits

Opens the "ADTS limits" sub-menu. The "ADTS limits" sub-menu contains the following items:

- View limits
- Select limits
- Default limits
- Edit limits
- Create new limits
- Delete limits.

Chapter 3. Operation

1. View Limits

Table 3-3: ADTS Max (ADTS552F/553F/554F)

Limit	Value
Minimum Altitude	-3000 feet
Maximum Altitude	60,000 feet (65,000 feet optional ^a)
Minimum CAS	-100.0 knots
Maximum CAS	650.0 knots
Minimum Ps	35.00 mbar
Maximum Ps	1400.00 mbar
Minimum Qc	-1365.00 mbar
Maximum Qc	1962.00 mbar
Maximum Mach	3.500 Mach
Maximum ROC	20,000 feet/min
Maximum RtPs	1000 mbar/min
Maximum RtQc	1000 mbar/min
Alt correction	± 100.0 feet
ARINC	Off

a. Extended Altitude (EALT) option will be made available through pin number.

Table 3-4: Max Aero (ADTS542F)

Limit	Value
Minimum Altitude	-3000 feet
Maximum Altitude	55,000 feet
Minimum CAS	0.0 knots
Maximum CAS	650.0 knots
Minimum Ps	91.20 mbar
Maximum Ps	1130.00 mbar
Minimum Qc	-1000.00 mbar
Maximum Qc	867.00 mbar
Maximum Mach	3.000 Mach
Maximum ROC	6000 feet/min
Maximum RtPs	500.00 mbar/min
Maximum RtQc	500.00 mbar/min
Alt correction	± 100.0 feet
ARINC	Off

Table 3-5: Max Aero (ADTS552F/553F/554F)

Limit	Value
Minimum Altitude	-3000 feet
Maximum Altitude	60,000 feet (65,000 feet optional ^a)
Minimum CAS	0.0 knots
Maximum CAS	650.0 knots
Minimum Ps	71.72 mbar (56.40 mbar optional ^a)
Maximum Ps	1130.00 mbar
Minimum Qc	-1000.00 mbar
Maximum Qc	867.00 mbar
Maximum Mach	3.000 Mach
Maximum ROC	6000 feet/min
Maximum RtPs	500.00 mbar/min
Maximum RtQc	500.00 mbar/min
Alt correction	± 100.0 feet
ARINC	Off

a. Extended Altitude (EALT) option will be made available through pin number.

Table 3-6: Fixed Wing

Limit	Value
Minimum Altitude	-1000 feet
Maximum Altitude	50 000 feet
Minimum CAS	0.0 knots
Maximum CAS	450.0 knots
Minimum Ps	115.97 mbar
Maximum Ps	1051.00 mbar
Minimum Qc	0.00 mbar
Maximum Qc	368.01 mbar
Maximum Mach	0.900 Mach
Maximum ROC	6000 feet/min
Maximum RtPs	109.85 mbar/min
Maximum RtQc	109.85 mbar/min
Alt correction	± 100.0 feet
ARINC	Off

Table 3-7: Helicopter

Limit	Value
Minimum Altitude	-1000 feet
Maximum Altitude	35,000 feet
Minimum CAS	0.0 knots
Maximum CAS	250.0 knots
Minimum Ps	230.00 mbar
Maximum Ps	1051.00 mbar
Minimum Qc	0.00 mbar
Maximum Qc	110.00 mbar
Maximum Mach	0.700 Mach
Maximum ROC	3000 feet/min
Maximum RtPs	109.85 mbar/min
Maximum RtQc	109.85 mbar/min
Alt correction	± 100.0 feet
ARINC	Off

Table 3-8: ADS Probe

Limit	Value
Minimum Altitude	-2000 feet
Maximum Altitude	50,000 feet
Minimum CAS	0.0 knots
Maximum CAS	450.0 knots
Minimum Ps	91.00 mbar
Maximum Ps	1130.00 mbar
Minimum Qc	-16.93 mbar
Maximum Qc	368.01 mbar
Maximum Mach	1.000 Mach
Maximum ROC	10,000 feet/min
Maximum RtPs	366.16 mbar/min
Maximum RtQc	366.16 mbar/min
Alt correction	± 100.0 feet
ARINC	Off

Table 3-9: FL280 MAX (ADTS542F)

Limit	Value
Minimum Altitude	-3000 feet
Maximum Altitude	28,000 feet
Minimum CAS	0.0 knots
Maximum CAS	450.0 knots
Minimum Ps	329.32 mbar
Maximum Ps	1400.00 mbar
Minimum Qc	-1000.00 mbar
Maximum Qc	368.01 mbar
Maximum Mach	1.094 Mach
Maximum ROC	6000 feet/min
Maximum RtPs	500.00 mbar/min
Maximum RtQc	500.00 mbar/min
Alt correction	±100.0 feet
ARINC	Off

Table 3-10: FL280 (ADTS542F)

Limit	Value
Minimum Altitude	-1000 feet
Maximum Altitude	28,000 feet
Minimum CAS	0.0 knots
Maximum CAS	250.0 knots
Minimum Ps	329.32 mbar
Maximum Ps	1050.41 mbar
Minimum Qc	0 mbar
Maximum Qc	110.00 mbar
Maximum Mach	0.7 Mach
Maximum ROC	3000 feet/min
Maximum RtPs	109.85 mbar/min
Maximum RtQc	109.85 mbar/min
Alt correction	± 100.0 feet
ARINC	Off

2. Select Limits

Select limits displays the current setting. To change the select limits setting:

- a. Tap the select limits panel.

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- b. Tap the necessary select limits radio button. The select limits radio button panel closes and the select limits panel shows the new selection.

3. Default Limits

Allows the user to select the limits that the unit defaults to following a power down of the unit. The supervisor pin is necessary in order to change the default limits.

4. Edit Limits

When selected, this function requires the entry of a PIN code. An existing limits set can be edited using this function. To edit limits:

- a. Tap Edit limits, a numbered keypad is shown.
- b. Enter your PIN number and tap the “tick” icon. The Edit limits panel opens. Tapping the “cross” icon closes the numbered keypad without making any changes.
- c. On the Edit limits panel, tap the user limits set to be edited. If no user limits have been created, the screen will be empty.
- d. Tap a limit, a numbered keypad opens allowing the current limit to be edited.
- e. Edit the limit and tap the “tick” icon. The parameter is changed and the keypad closes. Tapping the “cross” icon closes the numbered keypad without making any changes.
- f. Tap the Back/Return button to return to the ADTS Settings menu.

5. Create New Limits

When selected, this function requires the entry of a PIN code. A new limits set can be created following the deletion of an existing limits set or by overwriting existing limits. To create new limits:

- a. Tap Create new limits, a numbered keypad is shown.
- b. Enter your PIN number and tap the “tick” icon. The Create new limits panel opens. Tapping the “cross” icon closes the numbered keypad without making any changes.
- c. On the Create new limits panel, tap the panel for the limits set to be used as a template.
- d. The Custom limits name panel and keyboard opens. Enter a name for the new limits set.
- e. Tap the “tick” icon. The new limits set can now be edited.
- f. Tapping the desired item in the list opens a numbered keypad.
- g. Input the new numbers and tap the “tick” icon. The numbered keypad closes and the new parameter is shown for the selected item. Tapping the “cross” icon closes the numbered keypad without making any changes.
- h. If necessary, repeat this procedure for other parameters.
- i. Tap the Back/Return button to return to the ADTS Settings menu.

6. Delete Limits

When selected, this function requires the entry of a PIN code. To delete limits:

- a. Tap Delete limits, a numbered keypad is shown.
- b. Enter your PIN number and tap the “tick” icon. The Delete limits panel opens. Tapping the “cross” icon closes the numbered keypad without making any change.
- c. On the Delete limits panel, tap the panel for the custom limits to be deleted (there can be up to five).
- d. The message ‘Are you sure you want to delete this Limits Set?’ is shown.
- e. Tap Yes. The selected limits set is removed from the list. Tapping No returns to the Delete limits panel without making any changes.
- f. If necessary, repeat this procedure to delete other user limits sets.

- g. If necessary, a new limits set can be created to replace deleted limits sets, see 'Create New Limits'.
- h. Tap the Back/Return button to return to the ADTS Settings menu.



CAUTION

- The ADTS applies **aeronautical limits** when showing **aeronautical units**.
- The ADTS applies **pressure limits** when showing **pressure units**.

3.6.4.9 Auto Zero (Only in Measure Mode)

When auto zero is On (default), the Pt and Ps sensors are automatically aligned using the Ps channel as the reference channel.

To turn auto zero On and Off:

1. Tap the auto zero panel inside the white box. When auto zero is On, a “tick” appears inside the box. If no “tick” is visible, auto zero is Off.

3.6.4.10 Change Supervisor PIN

Note: The Supervisor pin can only be changed when the ADTSTOUCH is on a docked connection (not by Bluetooth).

When selected, this function requires the entry of a PIN code. To change your PIN:

1. Tap the Change supervisor PIN panel. A numbered keypad opens and the text Enter Supervisor Pin is shown.
2. Enter your current PIN. The text “New PIN” is shown. Tapping the “Cross” icon cancels the action and closes the numbered keypad without changing the PIN.
3. Enter the new PIN number and tap the “tick” icon. You will be asked to confirm the change.
4. Enter the new PIN again and tap the “tick” icon again. The numbered keypad closes and the new PIN is now active.
5. You will be prompted to remember the new PIN.
6. Tap OK. The new PIN is now active and the Change supervisor PIN panel closes.

3.6.5 Configuration

The ADTS Configuration (2-Channel, 3-Channel or 4-Channel modes) can be changed by selecting the appropriate radio button in the right hand menu.

Note: This menu option is only active when the ADTS Controller is switched to Standby mode.

3.6.6 Battery Saver

This section has controls that manage automatic power-down to save battery life.

- Battery Saver

Turns the Battery Saver feature On or Off. When On, the instrument will power down after the configured timeout unless activity prevents it (for example an active CAN connection).

- Timeout

Sets the Battery Saver timeout using an hours: minutes: seconds selector. Range: minimum 1 minute, maximum 2 hours.

You can enter whole hours with zero minutes (for example 01:00:00 or 02:00:00). These are valid within the allowed range.

After you confirm the selection the new timeout is saved and the Battery Saver timer restarts.

Notes:

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If selecting 00:00:00, the system will treat this as the minimum (1 minute) to avoid disabling the feature by mistake.

Connecting a CAN device will stop the timer and the Battery Saver does not trigger.

If Bluetooth is connected the timer is normally stopped unless the controller is in STANDBY or UNKNOWN state. In that case the timer may run (and will power down when it elapses).

When the timeout elapses the system attempts a controlled shutdown. If shutdown cannot proceed, the system may retry.

3.6.7 Regional Settings

Opens a sub-menu containing three items:

3.6.7.1 Date

To change the date setting:

1. Tap the date panel. The current setting is shown.
2. On the calendar shown, select the necessary “Day”, “Month” and “Year”.
3. Tap the “Tick” icon, the calendar closes and the new date is shown in the date panel.
4. Tapping the “Cross” icon cancels the action and closes the calendar.

3.6.7.2 Date Format

Shows the current format. To change the date format:

1. Tap the date format panel.
2. Tap the necessary date format radio button. The date format radio button panel closes and the date format panel shows the selected format.

3.6.7.3 Time

To change the time setting:

1. Tap the time panel. The current setting is shown.
2. On the shown panel, select the necessary “hours”, “minutes” and “seconds”
3. Tap the “Tick” icon, the time panel closes and the new time is shown in the time panel.

Tapping the “Cross” icon, cancels the action and closes the time panel.

3.6.7.4 Time Format

Shows the current format. To change the time format:

1. Tap the time format panel.
2. Tap the necessary time format radio button. The time format radio button panel closes and the time format panel shows the selected format.

3.6.7.5 Language

Shows the current language setting. To change the language setting:

1. Tap the language panel.
2. Tap the necessary language radio button. The language radio button panel closes and the language panel shows the selected language.

3.6.8 Screen Rotation

Shows the current screen rotation (0 or 180). To change the screen rotation:

1. Tap the screen rotation panel.
2. Tap the necessary screen rotation radio button. The screen rotation radio button panel closes and the screen rotation panel shows the selected screen rotation.

3.6.9 Bluetooth® Autoconnect

When this option is selected (ticked) the ADTS Controller and ADTSTOUCH will automatically try to reconnect over Bluetooth® when the wired connection between the two is broken. When the option is deselected, the ADTS Controller and ADTSTOUCH will not reconnect over Bluetooth® when the wired connection between the two is broken until the option is selected again.

3.7 Tools

Navigate to Dashboard >> Tools to display the Tools screen.

Note: The ADTS contains PIN protected menus. A list of factory default PIN codes can be found in Section 4.2.

The Tools screen opens showing the available controls. The following table is a tools menu overview:

Table 3-11: Tools Menu Overview

Tier 1	Tier 2	Tier 3
Calibration (Calibrate sensors)	Calibration Check	Internal/External
	Main Calibration	Internal/External
	Revert Calibration	
	Clear Calibration	
	Change CAL pin	
Calibration (Software update)	Upgrade: ADTSTOUCH	Application Operating system
	Upgrade: ADTS	Update main code Update boot code
Bluetooth®	New scan for devices	
	Certifications	
Connections	USB-A	None
		Communications
	USB-Mini	Storage Mode
		Communications
	Communications settings (only if USB-A selected)	Baud rate
		Parity
Flow Control		
System status	ADTSTOUCH	
	ADTS	
	Communications	
	Software installed	
	History	
	Summary	
	Support	

Table 3-11: Tools Menu Overview

Tier 1	Tier 2	Tier 3
Save/Recall ADTS settings	Save ADTS settings	
	Recall ADTS settings	
	Delete ADTS settings	
	Copy all files from USB	
	Copy all files to USB	
	Restore last ADTS settings	
	Set ADTSTOUCH defaults	
	Set ADTS defaults	
	default channel configuration	
	ADTS Manuals	Safety Manual
	User Manual	
Customer documents		

3.7.1 Calibration (Calibrate Sensors)

To access this function, enter the necessary PIN code. This function is used to set new corrected values for the sensors based on the outcome of the calibration procedures detailed in Section 4.4. The Calibration sub-menu contains the following items:

3.7.1.1 Sensor

Opens the Calibration check sub-menu showing the current values for Ps and Pt:

To enter new correction values for Ps:

1. Tap the Ps panel. The Ps sensor correction panel opens.
2. Follow the on-screen instructions. Tap the “tick” icon. A numbered keypad opens.
3. Perform the same procedure to enter new correction values for Pt.

3.7.1.2 Change CAL PIN

When selected, this function allows the calibration PIN code to be changed. To change your PIN:

1. Tap the “Change CAL PIN” panel. A numbered keypad opens.
2. Enter the new PIN number and tap the “tick” icon. You will be asked to confirm the change.
3. Enter the new PIN again and tap the “tick” icon again. The numbered keypad closes and the new PIN is now active.
4. Tapping the “Cross” icon cancels the action and closes the numbered keypad without changing the PIN.

3.7.2 Calibration (Software Upgrade)

To access this function, enter the necessary PIN code. This function is used to implement software upgrades for the ADTSTOUCH and the ADTS following installation of updated software.

3.7.2.1 ADTSTOUCH Software Upgrade

The “ADTSTOUCH Software Upgrade” sub-menu contains the following items:

- Application
- Operating system.

For a detailed description of the software download and installation procedures see Section 5.5.

3.7.2.2 ADTS Software Upgrade

The “ADTS Software Upgrade” sub-menu contains the following items:

- Main code.
- Boot code.

For a detailed description of the software download and installation procedures see Section 5.5.

3.7.3 Bluetooth®

Opens a sub-menu containing three items. Functions related to the first two items are only available when the ADTSTOUCH is not connected to the mains supply, see Section 3.16.

3.7.3.1 New Scan for Devices

This function initiates a scan of the local area for other ADTS's and ADTSTOUCH's, which will then be listed. To select another device:

1. Tap on the device name.
2. Tap the “Tick” icon, the device is selected and the list closes.
3. Tapping the “Cross” icon, cancels the action and closes the list.

3.7.3.2 Certifications

Shows certification and compliance information for the area in which the ADTS is being used.

3.7.4 System Status

Opens the Status sub-menu. The Status sub-menu contains the following items:

3.7.4.1 ADTSTOUCH

Opens the “ADTSTOUCH status” window containing the following items:

- ADTSTOUCH: shows the model number and serial number of the ADTSTOUCH in use.
- Battery: status information about the battery in use.

3.7.4.2 ADTS

Opens the “ADTS status” window containing the following items:

1. Sensors

Shows related sensor status information as follows:

- Ps: sensor Ps status.
- Pt: sensor Pt status.
- Source: sensor source status.
- Vacuum: sensor vacuum status.

2. Pumps

Shows related information about the following pumps:

- Source pump: usage, shown in running hours and time to next service in hours.
- Vacuum pump: usage, shown in running hours and time to next service in hours.

3.7.4.3 Communications

Shows the communication status between the ADTSTOUCH and the ADTS:

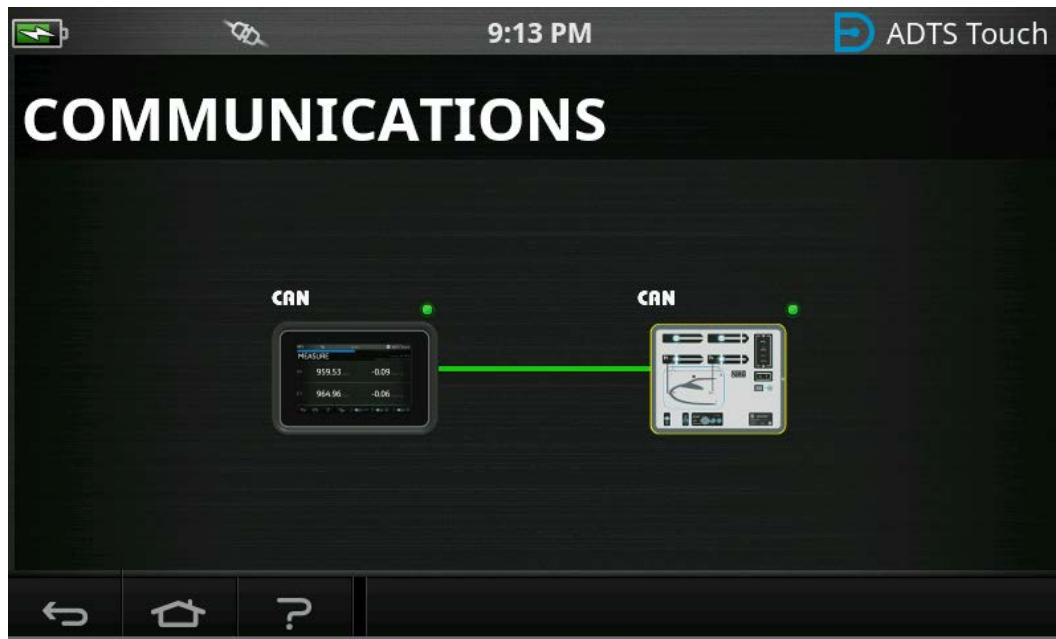


Figure 3-16: Communications Screen

To view the status information for the ADTSTOUCH or ADTS:

1. Tap the image on the screen for the item of interest (1) or (2). Information related to that item is shown.
2. Tap the information panel to close the panel.

3.7.4.4 Software Installed

Information about the installed software and version numbers.

3.7.4.5 History

Opens the “History” sub-menu. The “History” sub-menu contains the following items:

1. Calibration history: shows the “Calibration history” for:
 - Ps: Sensor Ps history.
 - Pt: Sensor Pt history.
2. Software history: shows the “Software history” for:
 - ADTSTOUCH main code: shows the software versions and installation dates.
 - ADTSTOUCH OS build: shows the OS versions and installation dates.
 - ADTSTOUCH boot ROM: shows the boot ROM versions and installation dates.
3. Hardware history: if applicable, information relating to any hardware fitted.
4. Message history: shows the main event log for activities such as; switching on, error messages and codes, and system status changes.

3.7.4.6 Summary

Shows relevant information relating to the unit, including:

- ADTSTOUCH serial number.
- ADTSTOUCH main code.
- ADTSTOUCH OS build.
- ADTSTOUCH boot ROM.

- Area of use.
- Bluetooth®
- Real Time Clock.
- ADTS Product Code.
- ADTS serial number.
- ADTS main code.
- ADTS boot ROM.

3.7.4.7 Support

Contact information for technical support. You can also get support at:
<https://druck.com/service>

3.7.5 Save/Recall ADTS Settings

Opens the “Save/Recall User Setup” sub-menu. The “Save/Recall User Setup” sub-menu contains the following items:

3.7.5.1 Save ADTS Settings

Opens the “Save settings as” panel and keyboard, the cursor is already positioned in the text box:

1. Type a unique ID name for the setting to be saved.
2. Tap the “Tick” icon, the settings are saved and the panel and keyboard closes.
3. Tapping the “Cross” icon, cancels the action and closes the panel.

3.7.5.2 Recall ADTS settings

Displays a list of previously saved settings:

1. From the list, tap the necessary settings ID. Settings specific to that ID are restored.

3.7.5.3 Delete ADTSTOUCH settings

Displays a list of previously saved settings:

1. From the list, tap the necessary settings ID.
2. A dialog appears asking the question “Erase Files”, “Yes” or “No”.
3. Tap “Yes” followed by “OK” to delete the settings.
4. Tap “No” to cancel the action and return to the “Save/Recall User Setup” sub-menu.

3.7.5.4 Copy all Files from USB

Allows files to be copied from a USB device:

1. Tap the “Copy all files from USB” panel.
2. A dialog appears asking the question “Are you sure you want to copy all the files from the USB?”, “Any files with the same name will be overwritten”, “Yes” or “No”.
3. Tap “Yes” to copy the files from the USB device.
4. Tap “No” to cancel the action and return to the “Save/Recall User Setup” sub-menu.

3.7.5.5 Copy all Files to USB

Allows files to be copied to a USB device:

1. Tap the “Copy all files to USB” panel.
2. A dialog appears asking the question “Are you sure you want to copy all the files to the USB?”, “Any files with the same name will be overwritten”, “Yes” or “No”.
3. Tap “Yes” to copy the files to the USB device.

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4. Tap “No” to cancel the action and return to the “Save/Recall User Setup” sub-menu.

3.7.5.6 Restore Last ADTSTOUCH Settings

Restores the settings to the last power-up state:

1. Tap the “Restore last settings” panel.
2. A dialog appears asking the question “Are you sure you want to restore the ADTS settings to the last power-up state?”, “Yes” or “No”.
3. Tap “Yes” to restore to the last power-up settings.
4. Tap “No” to cancel the action and return to the “Save/Recall User Setup” sub-menu.

3.7.6 ADTS Manuals

Tapping “ADTS Manuals” displays a list of available ADTS manuals installed on your ADTS. Tapping the screen on one of the documents results in the display of that document. When a document is shown, tapping the “cross” icon, in the top right corner, closes the document window.

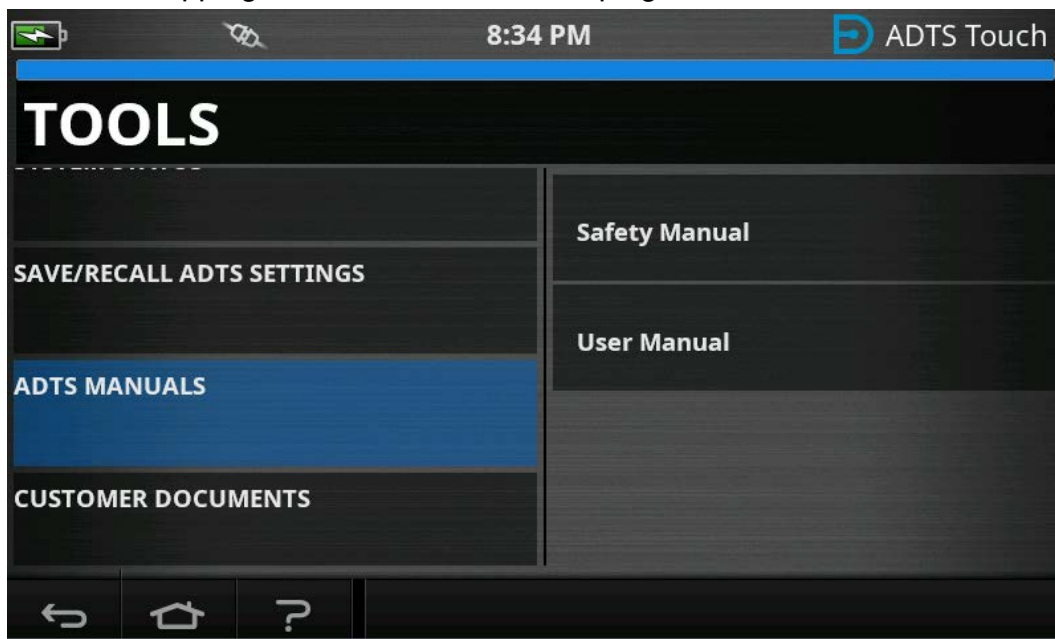


Figure 3-17: ADTS Manuals Screen

3.7.7 Customer Documents

Tapping “Customer documents” displays a list of available customer specific documents installed on your ADTS. Tapping the screen on one of the documents results in the display of that document.

When a document is shown, tapping the “cross” icon, in the top right corner, closes the document window.

3.8 Go to Ground

Go to Ground instructs the ADTS Controller to actively control all channels to atmospheric (ground) pressures.

On a multichannel system (ADTS553F and ADTS554F), the channels can be at different altitudes. These will take different times to go to ground. This is represented on the ADTSTOUCH by two aircraft. These show the status of Ps1, Pt1 and Ps2, Pt2 channels whilst they are transitioning to ground status. The ADTSTOUCH and the ADTS Controller front panel status LED will only indicate ‘Safe at Ground’ when all channels are safely at ground.

To start the ‘Go to Ground’ procedure for all channels:

1. Tap the Aircraft Status icon, see Figure 1-8, item 4. The new overlay screen shows the current aircraft status.
2. The display shows the current Rate at which the aircraft will go to ground (1).

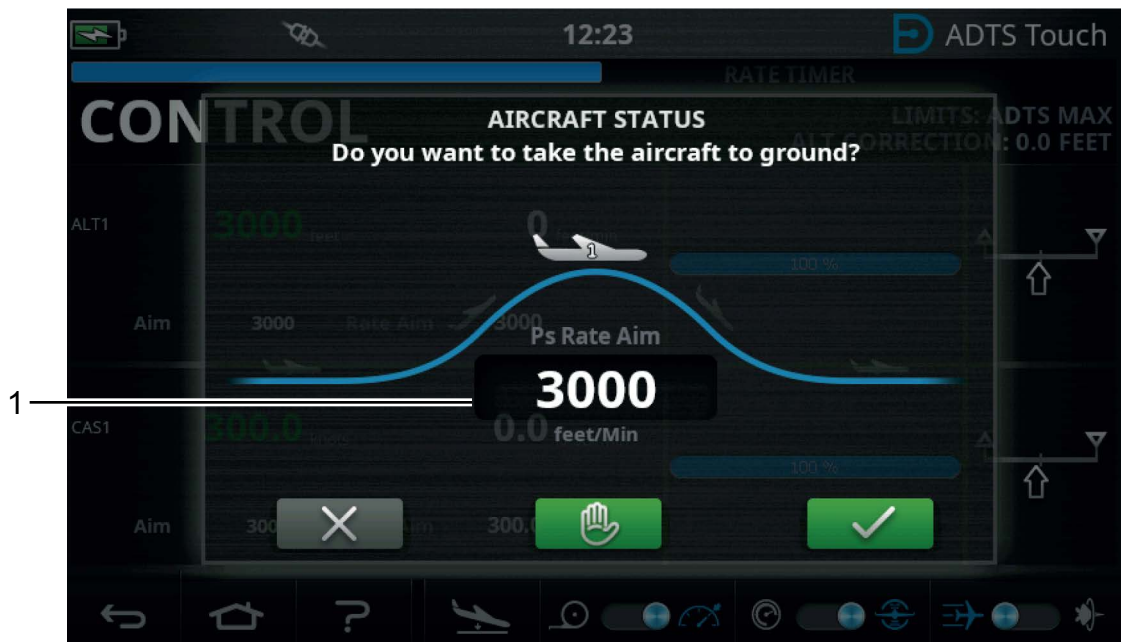


Figure 3-18: Go to Ground Main Screen – Single Channel

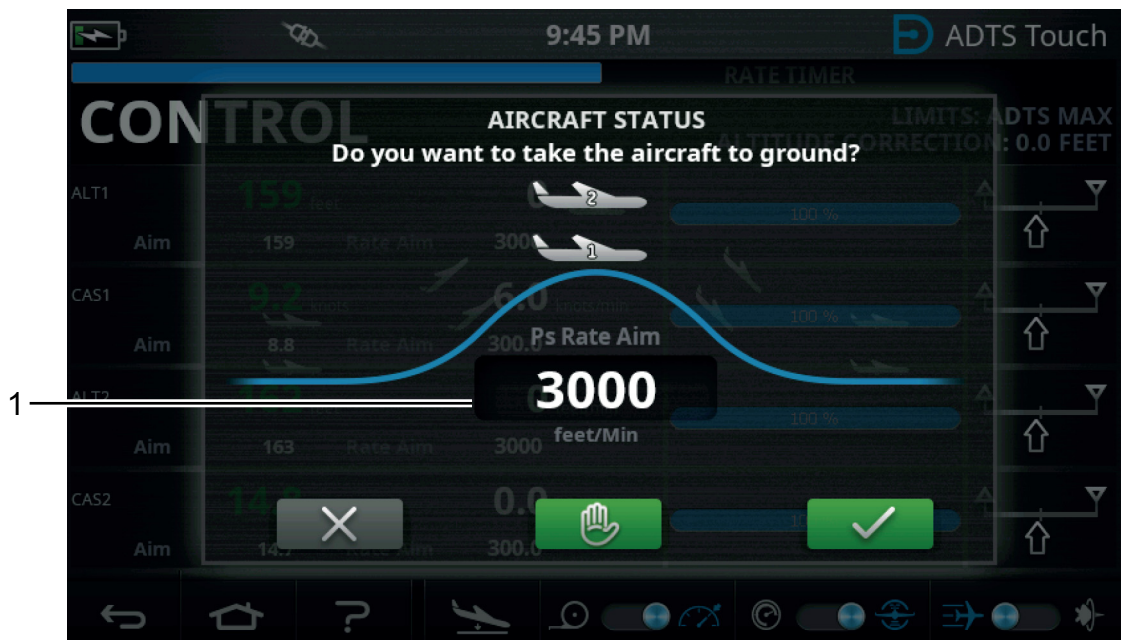


Figure 3-19: Go to Ground Main Screen – Multi Channel

3. To change the "Rate":

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- a. Tap the “Rate” window (1), the Set Rate panel is shown.



Figure 3-20: Set Rate Panel

- b. Use the numbered keypad to input the new go to ground rate.
 - c. Tap the “tick” icon on the keypad (2). The keypad closes and the new rate is shown.
 - d. Tapping the “Cross” icon on the keypad (3), cancels the action and closes the Set Rate panel.
4. Tap the green “tick” icon on the Go to Ground screen (4).



Figure 3-21: Start Go to Ground Action – Multi Channel

The aircraft color changes to orange while it is being controlled to ground pressure.

Note: Once the green “tick” has been tapped, the Go to Ground process cannot be stopped. The “cross” icon only closes the dialogue window.

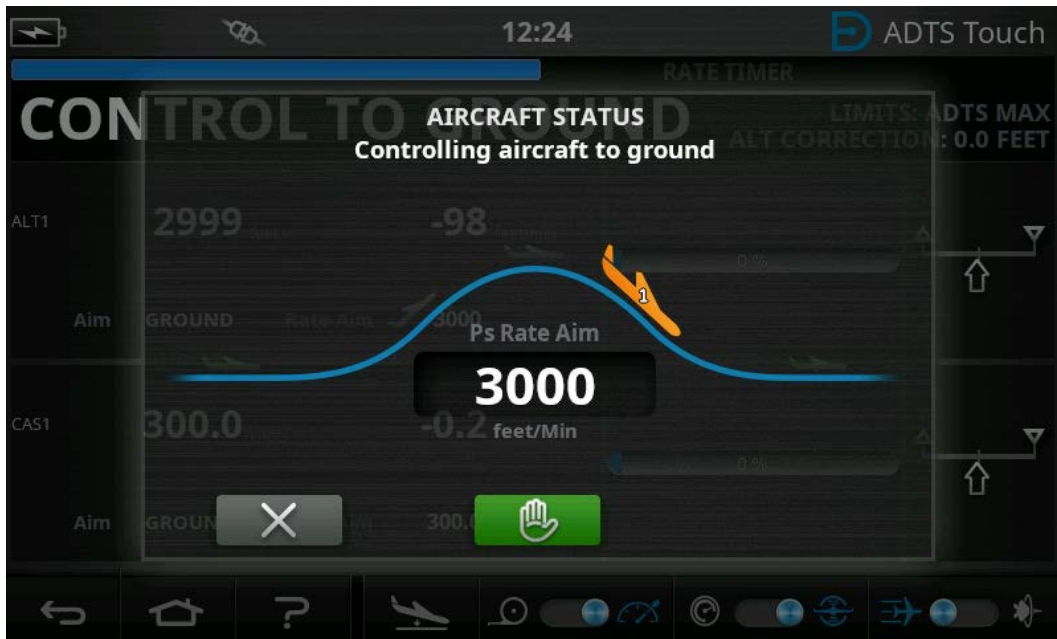


Figure 3-22: Aircraft Going to Ground – Single Channel

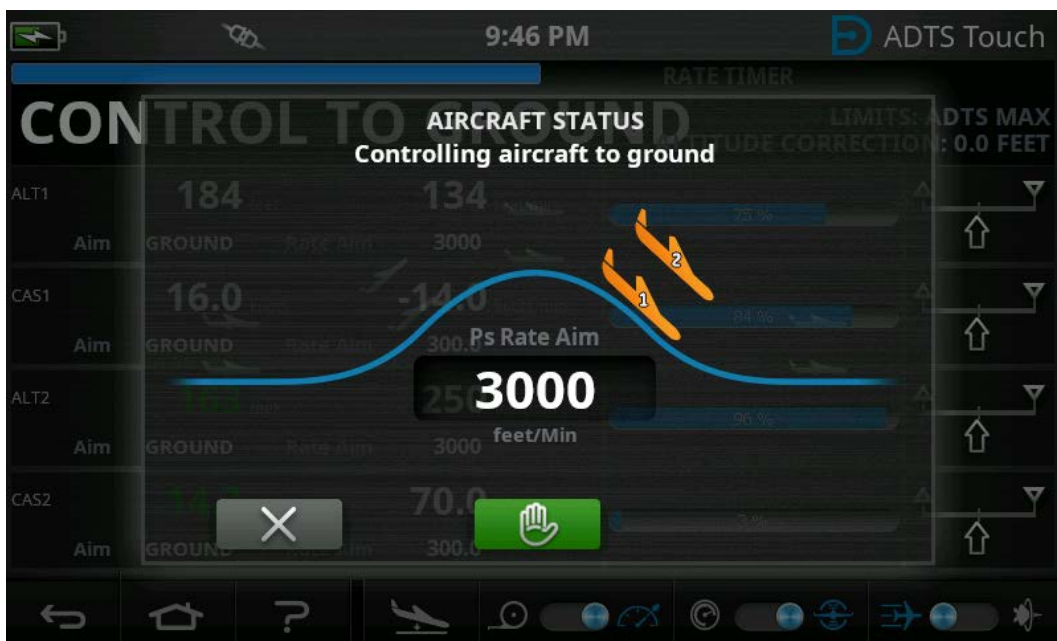


Figure 3-23: Aircraft Going to Ground – Multi Channel

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- To request all channels to temporarily hold at the current controlled pressure, tap the green “hand” icon (5).

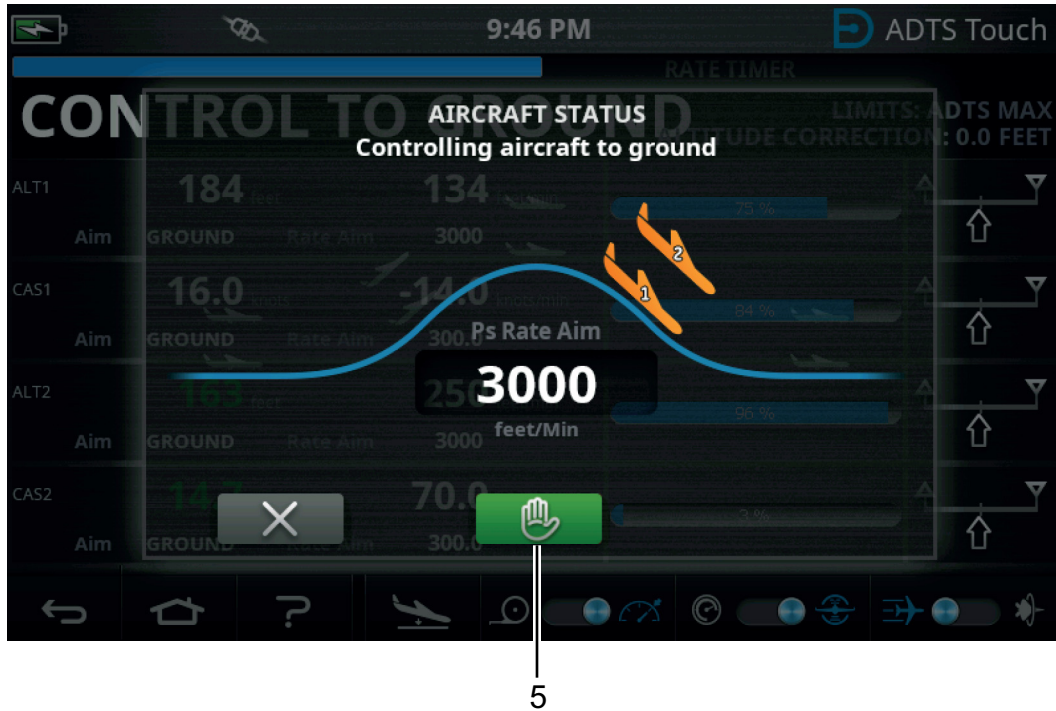


Figure 3-24: Aircraft Going to Ground – Multi Channel

The controller status bar will change from CONTROL to HOLD and the “hand” will turn orange.

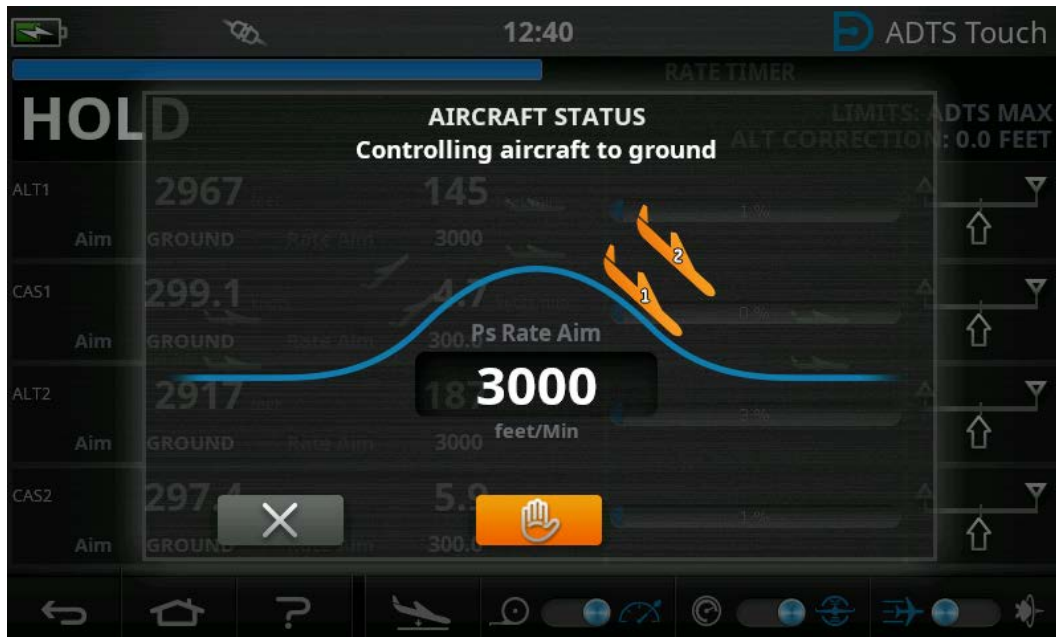


Figure 3-25: Hold Status During Go to Ground – Multi Channel

The HOLD state can be released either by again tapping the orange “hand” icon or by returning to MEASURE mode. The “hand” will turn green to indicate hold is released.

6. When at ground pressure, the aircraft color changes to green. Tap the “cross” icon (6) to close the Go to Ground screen.



Figure 3-26: Aircraft at Ground – Multi Channel

7. The display shows “AT GROUND”. The ADTS will remain in this aircraft safe condition for as long as necessary so that Ps or Pt port pipe connections can be added or removed without creating pressure transients to connected systems.



Figure 3-27: Go To Ground Complete – Multi Channel

Note: Operating the MEASURE/CONTROL icon will cancel the AT GROUND state.

3.9 Manual Venting of the Aircraft Pitot and Static Systems

3.9.1 ADTS Status on Power Failure

On removal of power, the output valves linking external ports Pt and Ps to the internal pressure controllers will automatically close. The aircraft pitot and static systems remain safe, but with the last applied pressures now isolated and maintained in the hoses.

3.9.2 ADTS Status on Restoration of Power

When power is restored to the ADTS, its self test routine will equalize the internal manifold pressures to the external aircraft hoses. This process will at all times protect the aircraft's pitot and static systems from adverse pressure transients, differentials or excessive rates.

Once equalized, the output valves will fully open. The normal parameter measurement screens become available from the Dashboard and full control is again available. Testing can either continue from the same point (when the power failure occurred) or the aircraft's pitot and static systems can be safely controlled back to ground pressures.

3.9.3 Actions if Power Cannot be Quickly Restored

Two courses of action are possible at this point:

1. Leave the ADTS connected to the aircraft's pitot and static systems. The pipes will remain safely isolated, but maintaining trapped pressures until such time as power can be restored.
2. Use the manual let-down valves on the ADTS front panel to safely bleed the trapped hose pressures back to ambient ground. This must be carried out in a way that ensures the Pt to Ps differential pressure remains at zero whilst the whole connected system is brought to ground pressure.

3.10 Manual Let-down Procedure



CAUTION Open the manual let-down valves slowly. Fast changes in pressure can damage the aircraft. Monitor the cockpit gauges for excessive rate of change.

3.10.1 ADTS542F/552F Manual Let-down

This procedure describes the order in which the manual let-down valves are opened for 2-channel pitot and static applications.

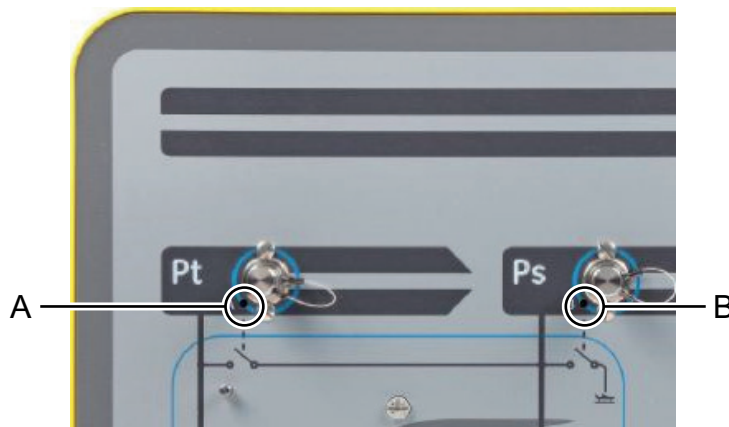


Figure 3-28: ADTS542F/552F Manual Let-down Valves

1. Slowly open valve (A), Pt to Ps.
2. Slowly open valve (B), Ps to atmosphere.

3.10.2 ADTS553F Manual Let-down

This procedure describes the order in which the manual let-down valves are opened for 3-channel Smart Probe angle of attack applications.

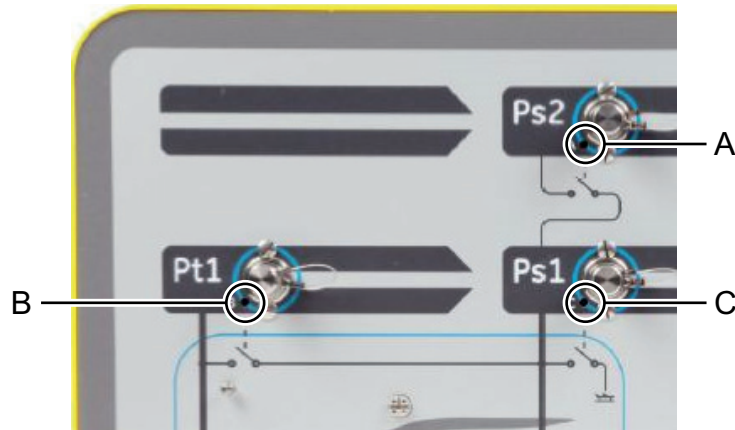


Figure 3-29: ADTS553F Manual Let-down Valves

1. Slowly open valve (A), Ps2 to Ps1.
2. Slowly open valve (B), Pt1 to Ps1.
3. Slowly open valve (C), Ps1 to atmosphere.

3.10.3 ADTS554F Manual Let-down

This procedure describes the order in which the manual let-down valves are opened for 4-channel Pitot & Static, Pilot & Co-pilot applications.

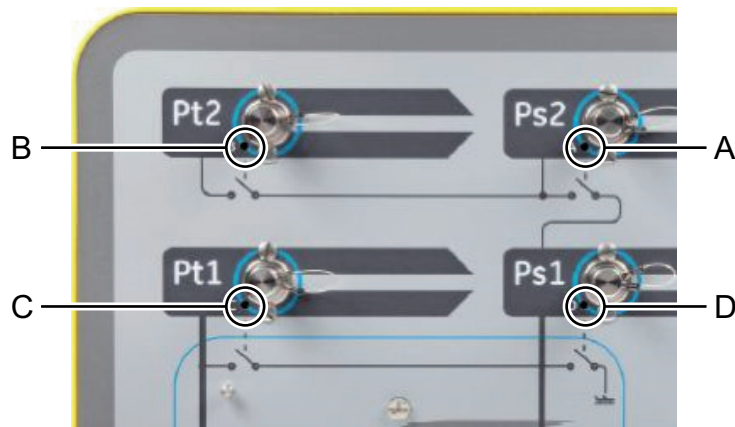


Figure 3-30: ADTS554F Manual Let-down Valves

1. Slowly open valve (B), Pt2 to Ps2.
2. Slowly open valve (C), Pt1 to Ps1.
3. Slowly open valve (A), Ps2 to Ps1.
4. Slowly open valve (D), Ps1 to atmosphere.

3.11 Multi-Channel Advanced Features

3.11.1 Multi-Channel Operation

The ADTS553F can function as an ADTS552F by disabling the second static channel.

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The four channel ADTS554F can function as a three channel ADTS553F by disabling the second pitot channel. It can also function as an ADTS552F by disabling the second pitot channel.



Figure 3-31: Settings Menu to Disable Channels

3.11.2 Independent Pilot / Co-pilot Testing

The ADTS554F can accomplish simultaneous independent control of pilot and co-pilot Ps and Pt systems. A user selectable differential validation between pilot and co-pilot instrument systems can be performed.

3.11.3 Angle of Attack (Smart Probe) Testing

The ADTS553F and ADTS554F operating in 3-channel mode is primarily designed for Smart Probe validation.

The pitot channel Pt1 is referenced to Ps1 for air speed. The second static channel Ps2 is used to generate the extra test pressure necessary for smart probe applications. Aims for the 3-channels can be entered manually. However, it is highly recommended to use a test script to reduce operator error.

Before using the ADTS, ensure that the ADTS limits are correctly set for the aircraft, including the correct Ps1 - Ps2 differential limit. This ensures that Ps2 is kept within the Ps1 - Ps2 differential limit during ramping and set point control.

Note: The angle of attack is not calculated and shown on the ADTS. This is because the angle of attack calculation varies between different smart probe models.

3.12 Example Basic Aircraft Test Operation

3.12.1 Preparation for Testing

If unfamiliar with the features and functions of the ADTS542F/552F/553F/554F then it is important for operators to read and understand the following documents before use:

- K0554, Safety and Installation Guide.
- K0553, User Manual (this document).

If the ADTS has just been delivered, been stored for an extended period, or the operability is unknown for any reason, then perform a standard serviceability test of the ADTS before use on aircraft. Details of this test can be found in Section 6.2.

Familiarize yourself with all aircraft specific test requirements, personal and aircraft safety precautions from the manufacturer's Aircraft Maintenance Manual (AMM).

3.12.2 Aircraft Connections

Firstly, consider where to place the ADTS Controller such that it can be safely accessed by the operator but also has practical routes for piping to the aircraft ports that will not get knocked or damaged during test operations. This can be either on the hangar/apron floor or a cockpit level gantry.

Any difference in height between the ADTS front panel and the aircraft ports must be configured on the ADTS as an altitude correction, see Section 2.5.2. If working on the aircraft outdoors, the signal strength of the radio data link to the ADTSTOUCH will be optimized if the ADTS is placed with line of sight to the cockpit windows.

Assess the hose lengths that will be necessary and procure either from Druck or local stores. The ADTS542F/552F/553F/554F can be supplied with low temperature red and blue flexible hoses if requested when procuring your ADTS. Hose lengths are customizable to a preferred length. A configurable label kit is provided so that Ps and Pt channel color coding can be set in line with regional standards. The hoses do not come fitted with standard pressure fittings. These should be specified at the time of purchase.

The direct connections to the aircraft Pitot and Static ports should be made using the adaptor set approved in the AMM, or using equivalents supplied by a specialist port adaptor manufacturer.

Druck does not recommend the use of improvised connections since this can lead to excessive leakage and potential damage to the aircraft avionics systems.

When all the necessary pipework has been connected, the ADTS should be turned on as soon as possible to allow a few minutes for it to reach a stable operating temperature. This is a safe action for the aircraft regardless of whether the ADTSTOUCH is connected or not at this time. No changes in pressure will be applied to the aircraft until actively requested. Make the ADTSTOUCH data connection to the ADTS, either by Bluetooth® wireless connection or cable, see Section 3.16.

3.12.3 Altimeter and Airspeed Indicator Testing

3.12.3.1 Limits Protection Checks

The ADTS will automatically power up with the HELICOPTER limits in force. This limits set enforces the most restricted control range on the ADTS output pressures, so this default configuration is the safest of the predefined limit sets if working on small, low speed aircraft.

Consult the AMM to check the approved maximum test ranges for Altitude, Rate of Climb, Airspeed and Mach for your aircraft.

It is important to have the ADTS limits set correctly configured for the following reasons:

- a. Prevents operators mistakenly entering test aims which exceed the aircraft maximums.
- b. Provides early real time warnings that ranges and rates are being exceeded (due to Pitot Static system leak and others).
- c. Will prevent inadvertent creation of excessive Mach conditions due to selection of inappropriate altitude and airspeed combinations.
- d. Will ensure that the ADTS can successfully reach any extended range test points as necessary.

Consult the ADTS limits values for the three predefined tables, HELICOPTER, FIXED WING and MAX AERO in the SETTINGS menu, see Section 3.6. If a suitable protective limits match cannot be found in one of the three predefined tables then choose CREATE NEW LIMITS and edit your own custom limits table name and preferred values from the offered starting values. This protected operation will require use of the Supervisor PIN code. Any attempt to enter limit values

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greater than the ADTS pneumatic control maximums will create a warning to the user requesting a lower value. Before attempting to create a new custom named limit, first check that there are no more than four existing user named tables. A maximum of five are allowed, but old unused tables can be deleted as necessary.

3.12.3.2 Leak Checks

Since the leak status of the aircraft is initially likely to be unknown, it is recommended to perform a preliminary assessment at low altitude and airspeed stimulus so as to minimize risk to the aircraft instruments, should a high rate leak be present.

It is strongly recommended to enable the ADTS “AUTO LEAK RECOVERY” function. This will automatically attempt to regain control of the aircraft pressures if the measured rates of change (leak rate) exceed 3000 feet/min or 600 knots/min.

If no specific leak check procedure is described in the AMM, first select safe rates of parameter change for the Ps and Pt channels according to aircraft type. It is suggested to start with simultaneous aims of 2000 feet and 200 knots, following the procedure described for the standard equipment serviceability test described in Section 6.2.

Correct any leak issues found with the hose connections or aircraft systems before proceeding with further testing. The leak status of the ADTS alone can be verified using the procedures in Section 6.3.

3.12.3.3 Typical Aircraft Instrument Performance Checks

The necessary aircraft specific procedures will be detailed in the AMM, but the following generic test is provided purely as an example of how the ADTS facilities might be best utilized.

The ADTS produces controlled altitudes based on the standard sea level pressure (zero feet reference) that is defined in the ICAO international standard atmosphere model. In order to correctly check the aircraft instruments for accuracy against the ADTS, it is vital that the altimeter baroscale datum adjustment is set to 1013.25 mbar (29.92 inHg).

Systematically enter the necessary aims for the Ps and Pt channel from each row of the test table. Aims can be entered either in aeronautical units or absolute/differential pressure units according to the requirements of the AMM. For each of the six test row conditions, allow the ADTS to approach and stabilize the aims until the ADTSTOUCH shows each measurement in green. Record the difference between the ADTS and the aircraft instrument under test.

Test Point	Altitude (feet)	Ps Pressure (mbar Abs.)	Airspeed (knots)	Pt Pressure (mbar Abs.)	Qc Differential Pressure (mbar)
1	0	1013.25	90.0	1026.44	13.19
2	5,000	843.07	130.0	870.73	27.66
3	15,000	571.82	250.0	676.80	104.98
4	29,000 ^a	314.85	310.0	479.37	164.52
5	35,000	238.42	280.0	371.30	132.88
6	41,000 ^a	178.74	270.0	301.91	123.18
7	Ground	Ambient	0.0	Ambient	0.00

a. RVSM boundary.

The ADTSTOUCH can show Ps and Pt channel data in a selection of common aeronautical or pressure units. The aeronautical/pressure units can be changed whilst the ADTS is operating. The aircraft status screen can be used to give a quick overview of whether the aircraft is climbing, descending or at a stable altitude.

If a mistake is made on entering an aim, tap the green “hand” icon. This immediately stops the ADTS from ramping and holds the current pressures stable. The aim point can now be corrected to the intended value. On entering the correct aim value, press the orange “hand” icon to release the hold. The “hand” icon turns to green and the ADTS ramps to the corrected aim.

If the ADTSTOUCH loses its Bluetooth® connector, or its umbilical cable becomes accidentally disconnected, the ADTS automatically enters into a hold state after 10 seconds. If communications has not been re-established after 10 minutes, the ADTS will automatically Go to Ground.

3.12.3.4 End of Testing

When testing is complete, use the Aircraft Status screen to initiate a descent to ambient ground pressure at a safe rate. The rate can be increased or decreased if necessary from within this screen. To see full parameter details, simply clear the status screen view. This can be recalled at any time by pressing the Aircraft Status icon.

When the ADTS displays the status as AT GROUND, it is then safe to disconnect the aircraft Ps and Pt connections. The ADTS Controller will also show steady green on the rightmost aircraft status LED when in this state.

3.13 Engine Pressure Ratio (EPR)

Engine Pressure Ratio (EPR), the ratio of P_{out}/P_{in} is sold as a software product option. Contact Druck for more details.

The ADTS can be used to check EPR sensors and indicators. Use Ps (static) for INLET pressure and Pt (Pitot) for OUTLET pressure.

To carry out an EPR check, the display must be in pressure units e.g. mbar or inHg.

Note: Altitude correction applies to EPR values. Make sure this correction does not adversely affect accuracy. The difference in height between the ADTS and the EPR sensor can be different to the altitude correction previously set for the aircraft instruments.

The EPR function can be operated using one of two methods, as follows:

1. Direct control of Inlet pressure and target EPR value (outlet pressure is auto-set).
2. Direct control of Inlet and Outlet pressure (equivalent EPR aim is auto-set).

The actual method to be used will be specified in the aircraft maintenance manual.

Note: The EPR function can only be launched after ‘Go to Ground’ has been selected and the ADTS is at ground pressures.

3.13.1 Setting the EPR – Method 1

1. On the “Dashboard”, select “EPR”. The EPR control screen appears.

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2. On the EPR control screen, set the toggle control (1) for direct control of Inlet pressure and target EPR value.



Figure 3-32: EPR Control Screen (Method 1)

3. Select control mode.
4. Tap the “Aim” value (2). A numbered keypad opens.
5. Enter the desired “Aim” value and tap the “tick” icon. The numbered keypad closes and the previously entered value appears in the “IN” display.
6. Tap the “Aim” value (3). A numbered keypad opens.
7. Enter the desired “Aim” value and tap the “tick” icon. The numbered keypad closes and the previously entered value appears in the “EPR” display.

Wait for the controller to achieve the EPR aim value and inlet pressure. The outlet pressure has now been set based on the inlet pressure and EPR value.

On completion of the EPR checks, select “Go to Ground” and wait for the AT GROUND message to be shown, see Section 3.8. Refit the pitot and static blanking caps.

3.13.2 Setting the EPR – Method 2

EPR testing can also be performed by specifying the actual INLET and OUTLET values.

1. On the “Dashboard”, select “EPR”. The EPR control screen appears.

- On the EPR control screen, set the toggle control (1) for Direct control of Inlet and Outlet pressure.



Figure 3-33: EPR Control Screen (Method 2)

- Select control mode.
- Tap the “Aim” value (2). A numbered keypad opens.
- Enter the desired “Aim” value and tap the “tick” icon. The numbered keypad closes and the previously entered value appears in the “IN” display.
- Tap the “Aim” value (3). A numbered keypad opens.
- Enter the desired “Aim” value and tap the “tick” icon. The numbered keypad closes and the previously entered value appears in the “OUT” display.

Wait for the controller to achieve the IN and OUT aim values. The EPR has now been set based on the inlet pressure and outlet pressure.

On completion of the EPR checks, select “Go to Ground” and wait for the AT GROUND message to be shown, see Section 3.8. Refit the pitot and static blanking caps.

3.13.3 EPR Limits

Table 3-12: EPR Limits

Limit	Value
Min Inlet	60 mbar
Max Inlet	1355 mbar
Min Outlet	60 mbar
Max Outlet	2000 mbar
Min (Ratio)	0.1
Max (Ratio)	10.0
Min Inlet Rate	0
Max Inlet Rate	1000 mbar/min
Min EPR Rate	0
Max EPR rate	60/min
Min Outlet rate	0
Max Outlet rate	1000

3.14 Test Sequence

Test Sequence mode allows tests to be run, using the ADTS, based on previously defined and stored test sequence data.

1. On the Dashboard, swipe across to select TEST SEQUENCE. The “Test Sequence” screen appears showing the last used test sequence title.

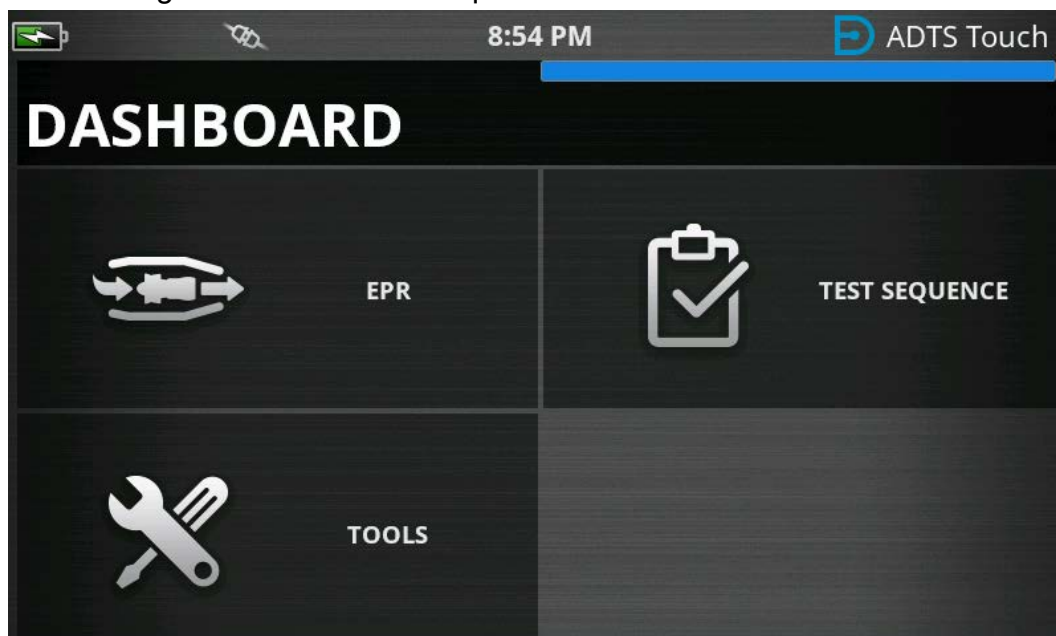


Figure 3-34: Dashboard Menu

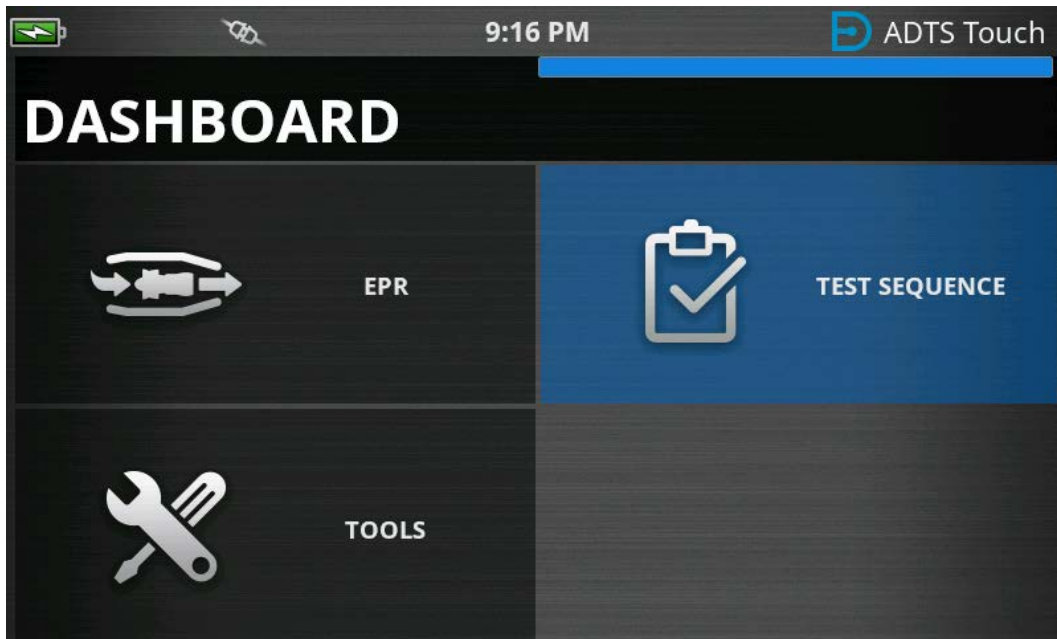


Figure 3-35: Dashboard Menu – Test Sequence Highlighted

2. If the ADTS is in Standby mode, the Test Sequence can only be viewed.



Figure 3-36: ADTS in Standby Mode Warning

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- It is possible to import, export and delete the test sequence files. First select the load test sequence button in the footer (highlighted).



Figure 3-37: Load Test Sequence Button

- Tap SELECT FILE to select the test sequence to load.

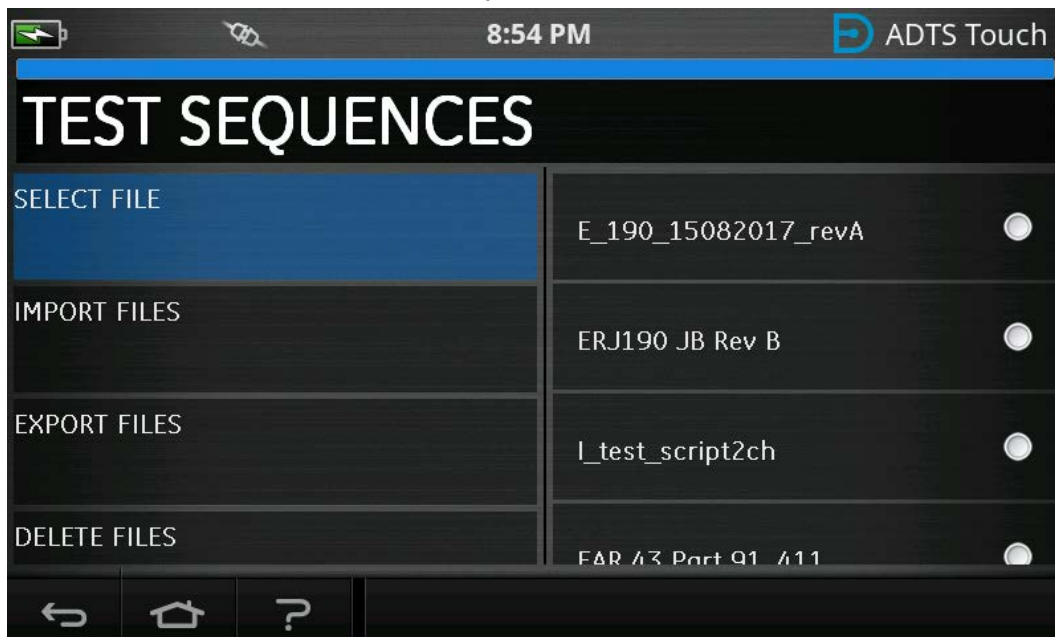


Figure 3-38: Select Test Sequence

5. Select the relevant test script to be loaded.

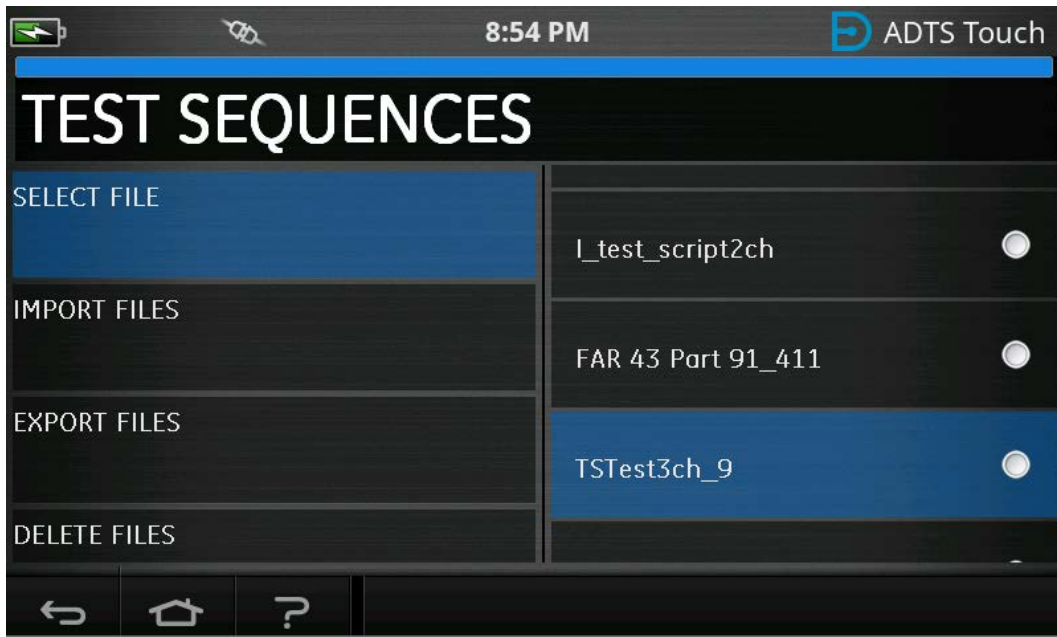


Figure 3-39: Select Test Sequence – File Selected

6. The ADTSTOUCH can import test sequences. Select IMPORT FILES to import test sequences from a USB device. The test sequences must be in a root folder named TEST SEQUENCES on the root of the USB device (*.csv file).

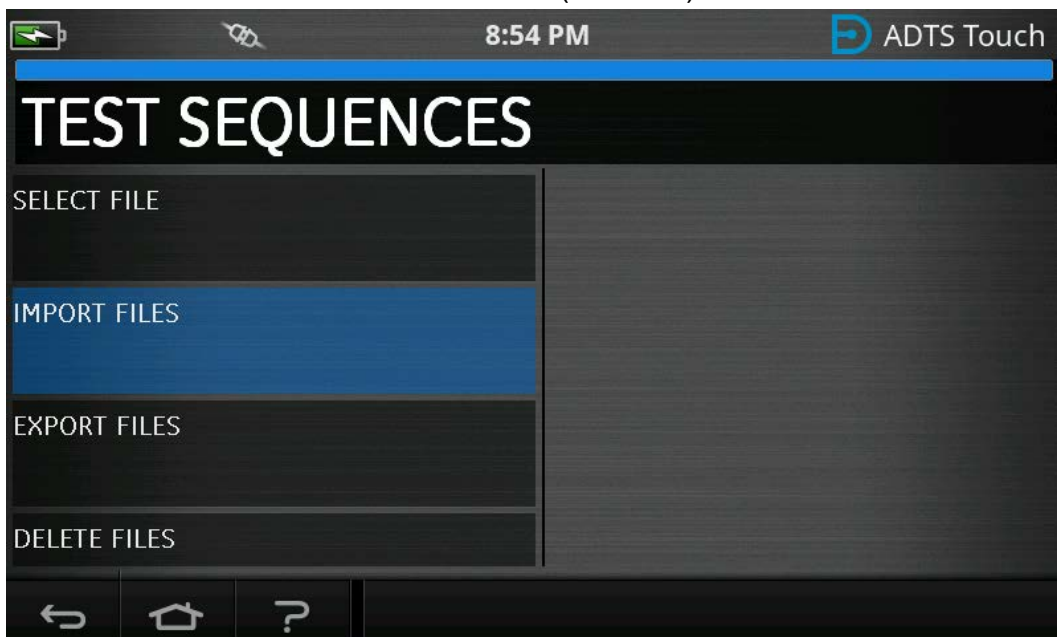


Figure 3-40: Import Test Sequences

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7. The error message in Figure 3-41 will be shown if no test sequence files are located on the USB device.

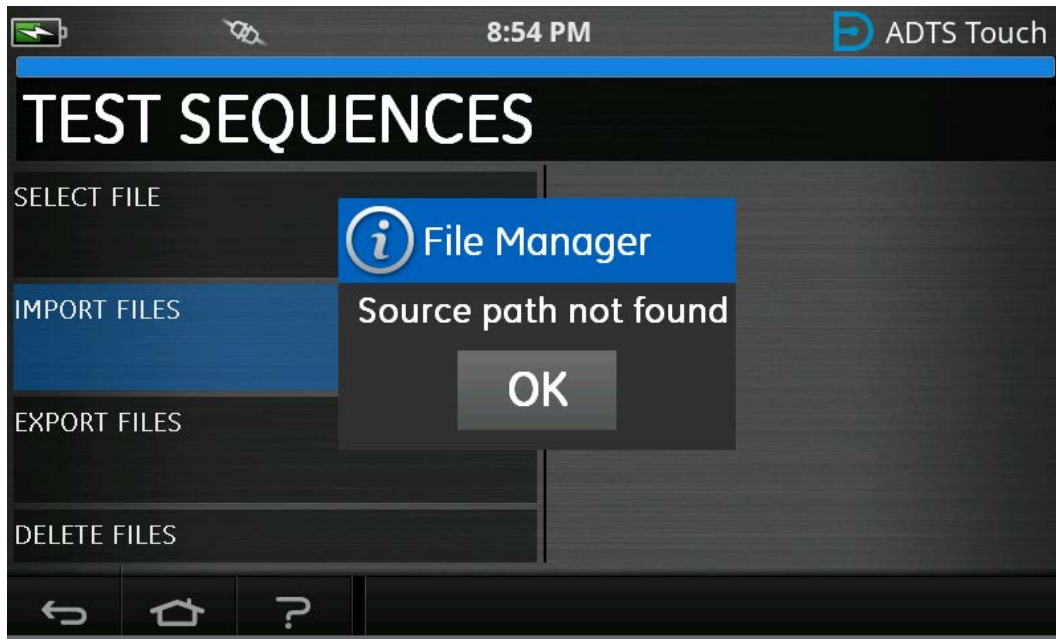


Figure 3-41: Import File Error Message

8. Select DELETE FILES if it is necessary to delete a particular test sequence.

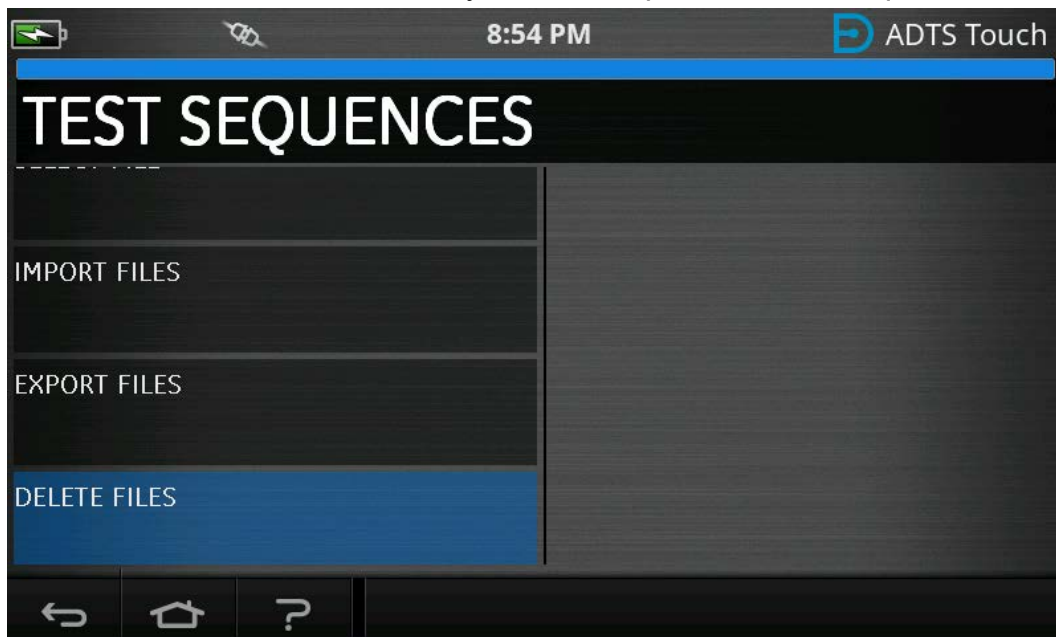


Figure 3-42: Delete Test Sequence Files

9. Select the desired test sequence to be deleted. One or more test sequences can be deleted simultaneously if necessary. Once the necessary files have been selected, press the trashcan icon to delete. The 'tick box' icon toggles between select all/select none. An 'Are

you sure?’ prompt will be shown prior to file deletion. If Yes is selected then a confirmation of deletion message is shown.

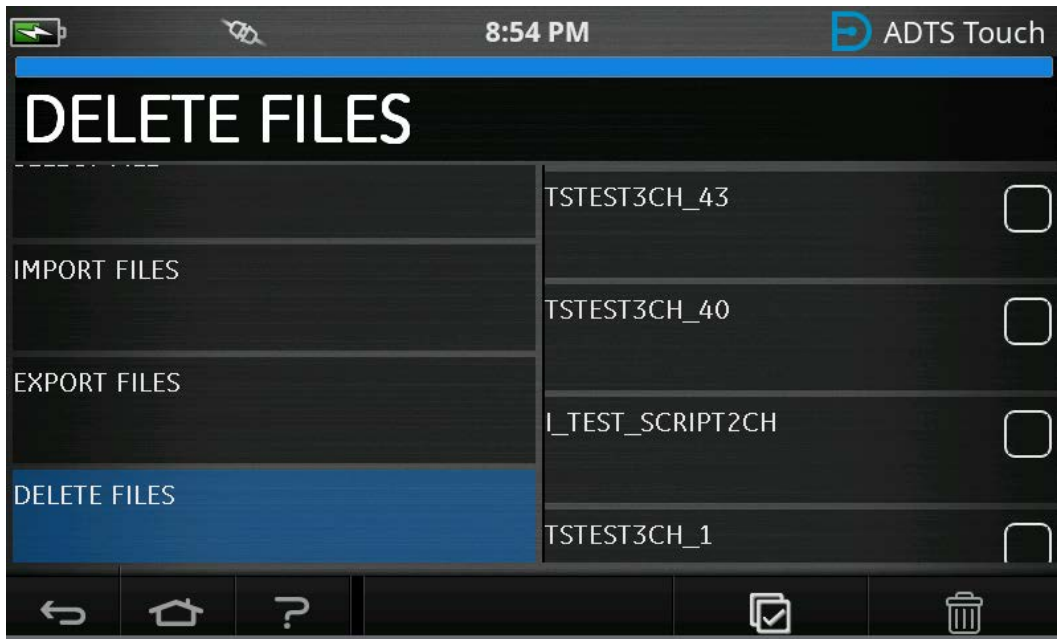


Figure 3-43: Delete Test Sequence Files – File Selected

- Once the desired test sequence has been loaded, the test points will be shown. See Figure 3-44 for an example test sequence. The blue horizontal line indicates the immediate test to be performed by the ADTS.

Note: If the ADTS is in standby mode, test sequences can only be viewed.



Figure 3-44: Test Sequence View

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- By using the highlighted up/down arrows the user can cycle between different test sequence pressure set points.



Figure 3-45: Cycling Between Set Points

- It is possible to have separate sub-tables within the test sequence menu, for example (leak test, air data test). Select the sub-table button (highlighted) to select a specific sub-table within the test sequence itself.



Figure 3-46: Test Sequence Sub-tables

- After selecting the sub-table button the ADTSTOUCH shows the available sub-tables that can be selected.

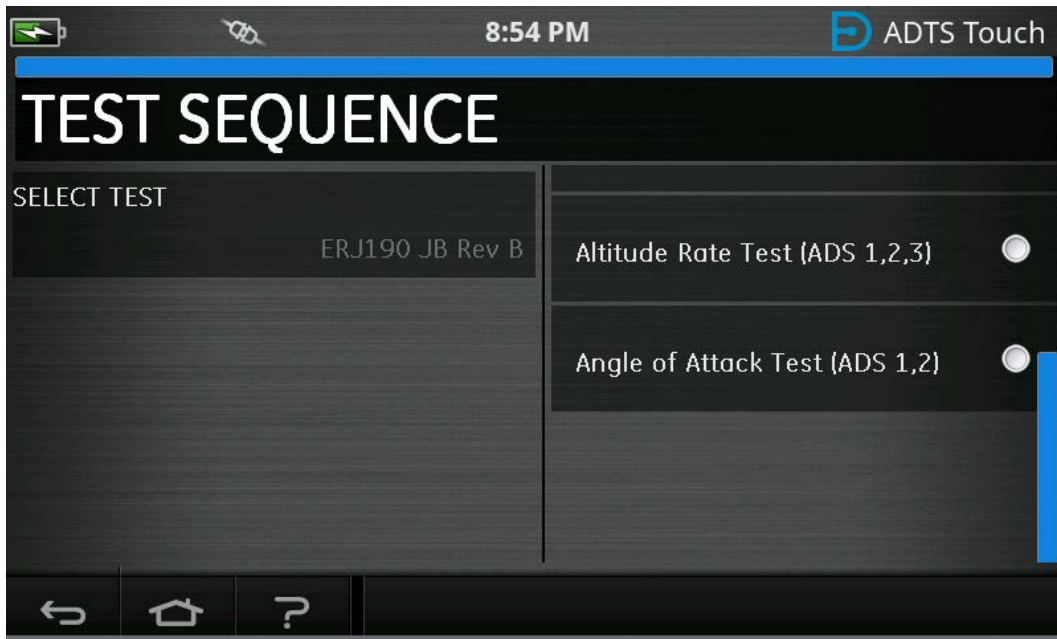


Figure 3-47: Test Sequence Sub-table Selection

- Once selected the new sub-table is shown.

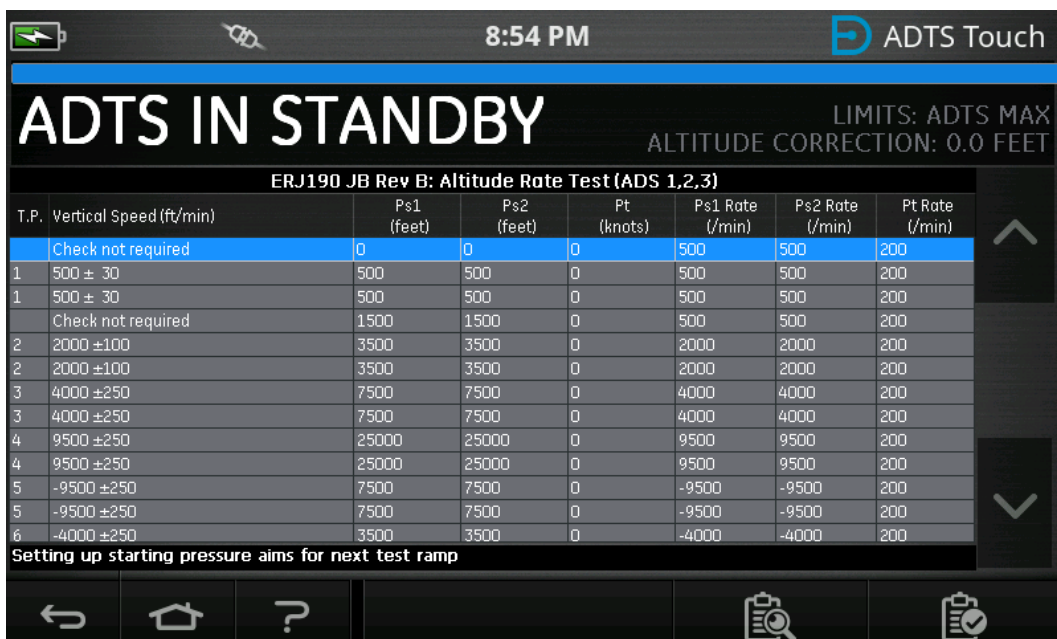


Figure 3-48: Test Sequence Sub-table View

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- The test sequence can only be utilized when the ADTS is set to ON. Set the On/Standby Switch on the front of the ADTS to ON. The ADTS will initially power up into MEASURE mode. Test sequences can only be viewed in MEASURE mode.



Figure 3-49: Test Sequence Measure Mode

- Tap the Measure/Control toggle button (highlighted) to enter into CONTROL mode. This allows the ADTS to control to the selected pressure set points. The set points highlighted in the horizontal blue line become the active set points for the ADTS.



Figure 3-50: Activating Control Mode

- Scrolling up and down the table via the highlighted up/down buttons sets the new pressure set points. The pressure on each of the channels will begin to ramp to the new set point.



Figure 3-51: Moving Between Set Points

3.14.1 Creating Custom Test Sequences

These instructions advise on how to create Test Sequence files. Test Sequence files are imported into the ADTSTOUCH as Comma Separated Value (.CSV) files. These files can be created in Microsoft® Excel® using the templates provided.

Importing new test sequence files can be accomplished by file transfer from a PC to the ADTSTOUCH using a USB cable, or by inserting a USB device into the ADTSTOUCH that contains the test sequence files.

The data presented on the ADTSTOUCH for a test sequence is contained in a single CSV file. Excel®. It is recommended to give each CSV file a meaningful name to assist easy identification and selection.

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The example shown in Figure 3-52 identifies the areas or ‘fields’ of the screen where user entries from the CSV file are used to format the screen layout and specific test information.

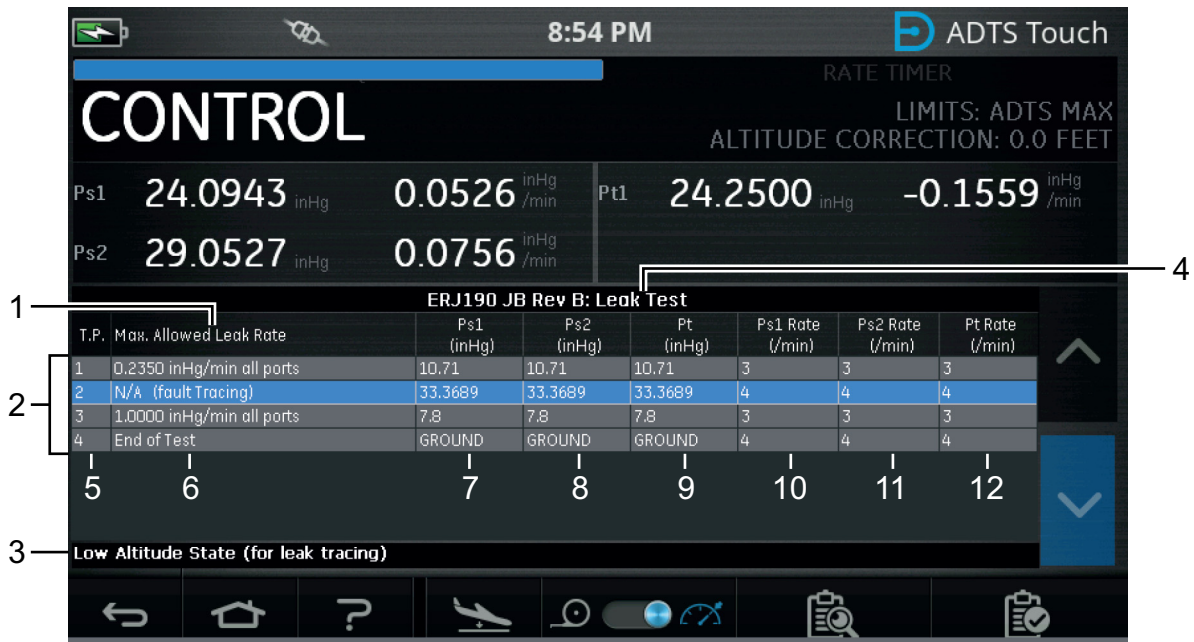


Figure 3-52: Example Custom Test Sequence

Figure 3-53 shows the CSV file used to create the custom test sequence shown in Figure 3-52.

	Test Identifier	Parameter Label	Prompt Message	Ps1 Aim	Ps2 Aim	Pt Aim	Ps1 Rate	Ps2 Rate	Pt Rate
	Begin Test Table								
	Leak Test -4								
	T.P. 1	Max. Allowed Leak Rate		inHg	inHg	inHg	inHg/min	inHg/min	inHg/min
	1	0.2350 inHg/min all ports	FAR25.1325(C)(2)(ii)	10.71	10.71	10.71	3	3	3
	2	N/A (fault Tracing)	Low Altitude State (for leak tracing)	33.3689	33.3689	33.3689	4	4	4
	3	1.0000 inHg/min all ports	Confirming ADTS control capability to 32,000 feet range	7.8	7.8	7.8	3	3	3
	4	End of Test	Wait for 'AT GROUND PRESSURES' indication	GROUND	GROUND	GROUND	4	4	4
	End Test Table								

Figure 3-53: CSV File of Custom Test Sequence

3.14.2 Saving Finished Test Sequences as CSV Format

1. When the test sequence data sheet has been completed, click “File”, “Save As”. The following screen is shown:

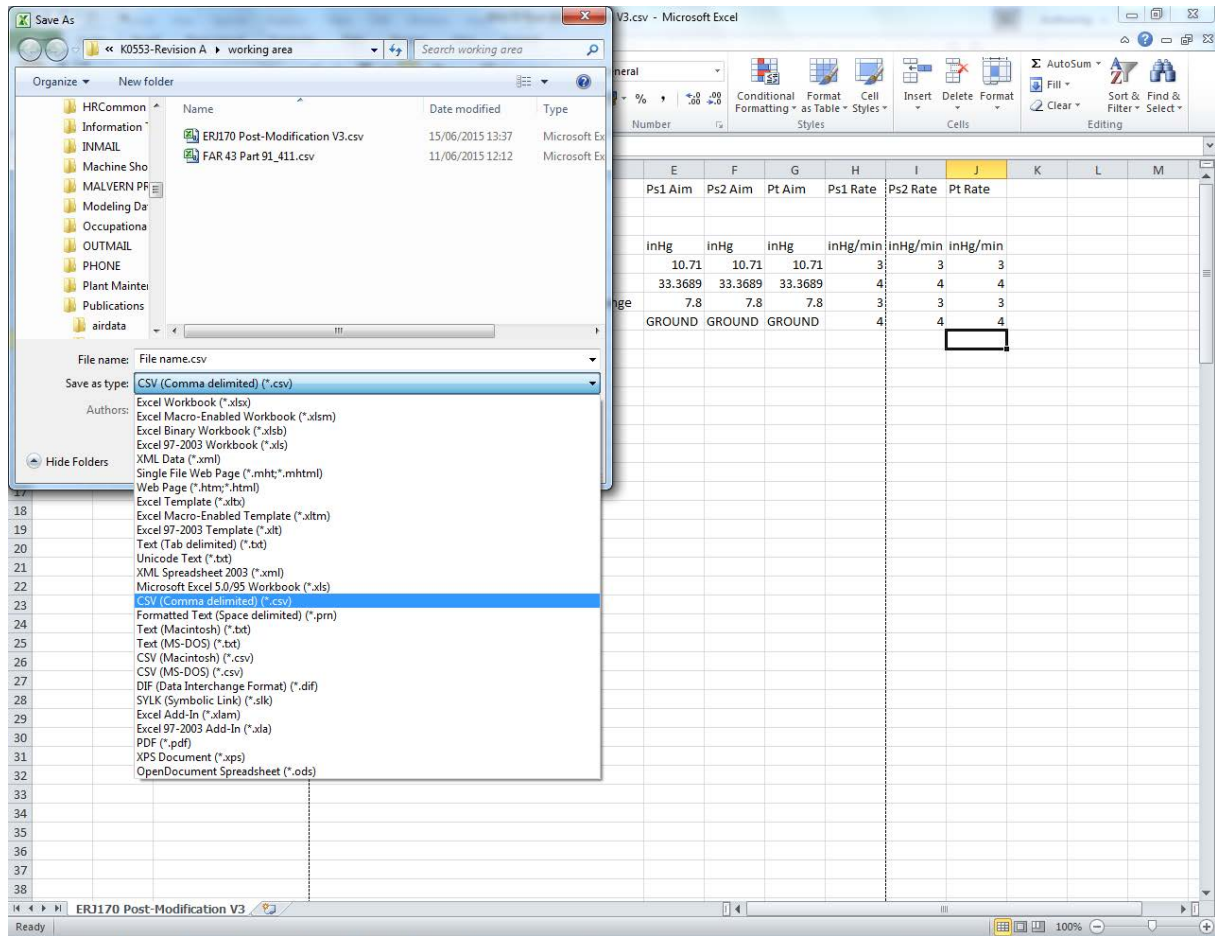


Figure 3-54: Saving the Test Sequence CSV File

2. Select the file folder destination in the explorer window.
3. Give the file an appropriate “File name” and select “CSV (Comma delimited) (*.csv)” from the drop-down list.
4. Click “Save”. The file is now saved in the destination folder.
5. Connect the PC to the ADTSTOUCH using a USB cable. The ADTSTOUCH file explorer window opens showing the following folders:

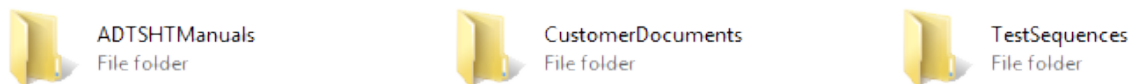


Figure 3-55: ADTSTOUCH “USB Mass Storage Device” Folders

6. Either, copy and paste the CSV file from the PC file explorer, or drag-and-drop the CSV file from the PC file explorer into the already created “TestSequences” folder on the ADTSTOUCH.

Note: Due to cyber security rules, only *.csv files are accepted. Any files with a similar name or file extensions other than *.pdf, *.csv or *.txt will be removed from the unit on start up. Any additional folders will also be removed from the unit on start up.

3.15 Pt Only or Ps Only Control Modes

This mode can be used as an alternative to test airspeed indicators (ASI) using just the ADTS Pt or Ps port connected to the ASI.

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3.15.1 Pt Only Control Mode

Refer to Figure 2-2 for Pt Only ADTS to aircraft connection details.

1. Navigate to Dashboard >> Pitot Static.
2. On the ADTSTOUCH, select the Aircraft status icon.
3. On the Aircraft status screen, tap the “tick” icon to start the Go to ground procedure for all channels. The ADTS takes all channels to ground pressure.
4. When the aircraft is at ground, tap the “cross” icon to return to the Pitot Static screen.
5. Tap the Home icon to return to the Dashboard.
6. Navigate to Dashboard >> Settings >> ADTS Settings >> CHANNEL MODE.
7. From the Channel Mode screen, select “Ps”.
8. Select Measure Only. The Ps label changes to Measure Only.
9. Tap the Home icon to return to the Dashboard.
10. On the Dashboard >> Pitot Static screen, the Measure screen is shown.
11. Tap the Control (1) icon to toggle the controller on. The following screen is shown:

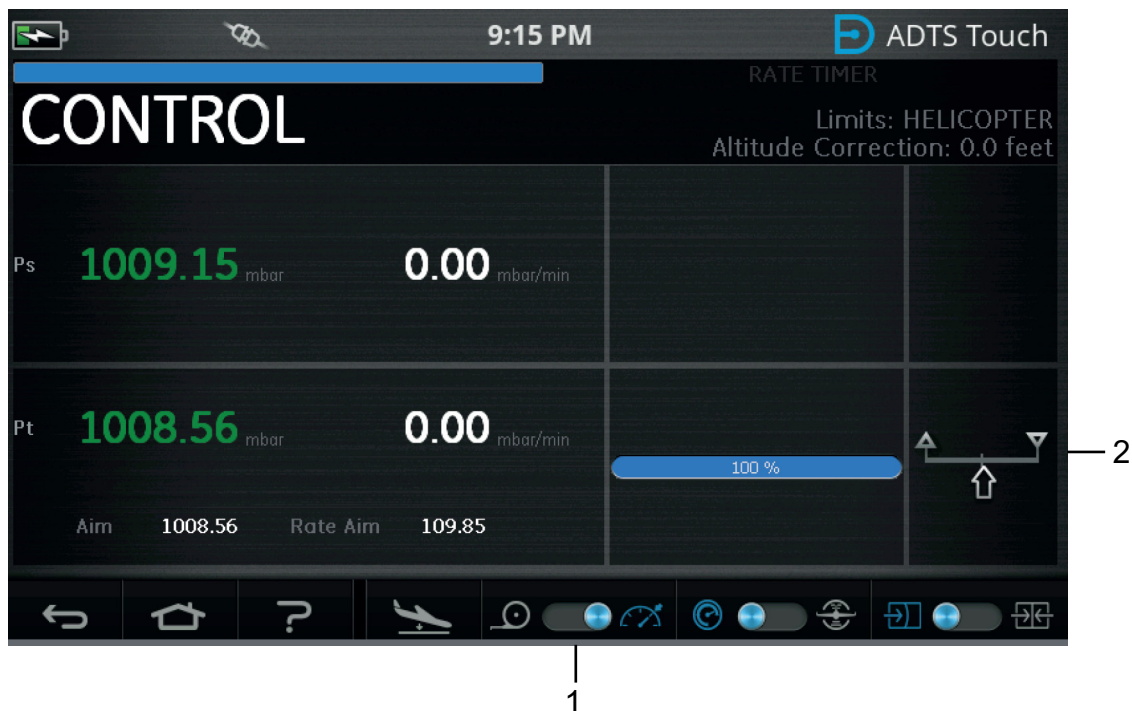


Figure 3-56: Pt Only Control Mode

Figure 3-56 shows that the Ps channel is in Measure mode and the Pt channel is in Control mode, as shown by the indication (2).

12. On the ADTS, open the Ps port cap to atmosphere.
13. Connect the Pt port to the aircraft Pitot system.
14. Begin single channel airspeed control.

3.16 Bluetooth®

Disclaimer: Due to individual country radio licensing requirements, Bluetooth® wireless technology is not available in some countries. An up-to-date list of countries that the ADTS with Bluetooth® wireless technology is licensed to be used in is available upon the request from Druck.

Bluetooth® operation is normally enabled at point of manufacture, but can also be enabled after sale (product option code ASTOUCH-36). For more details contact Druck.

3.16.1 Optimum ADTS Placement

In order to obtain the best results when using Bluetooth® wireless technology it is important to correctly position the ADTS Controller in a reliable coverage area with respect to the aircraft.

Figure 3-57 gives an example of good ADTS Controller positioning, which should be:

- Forward of a line level with the cockpit window.
- A minimum of 1 m away from the fuselage edge.
- A maximum of 8 m out from the nose wheel.
- A position the top edge of the ADTS Controller nearest to the aircraft with the output ports facing upwards.

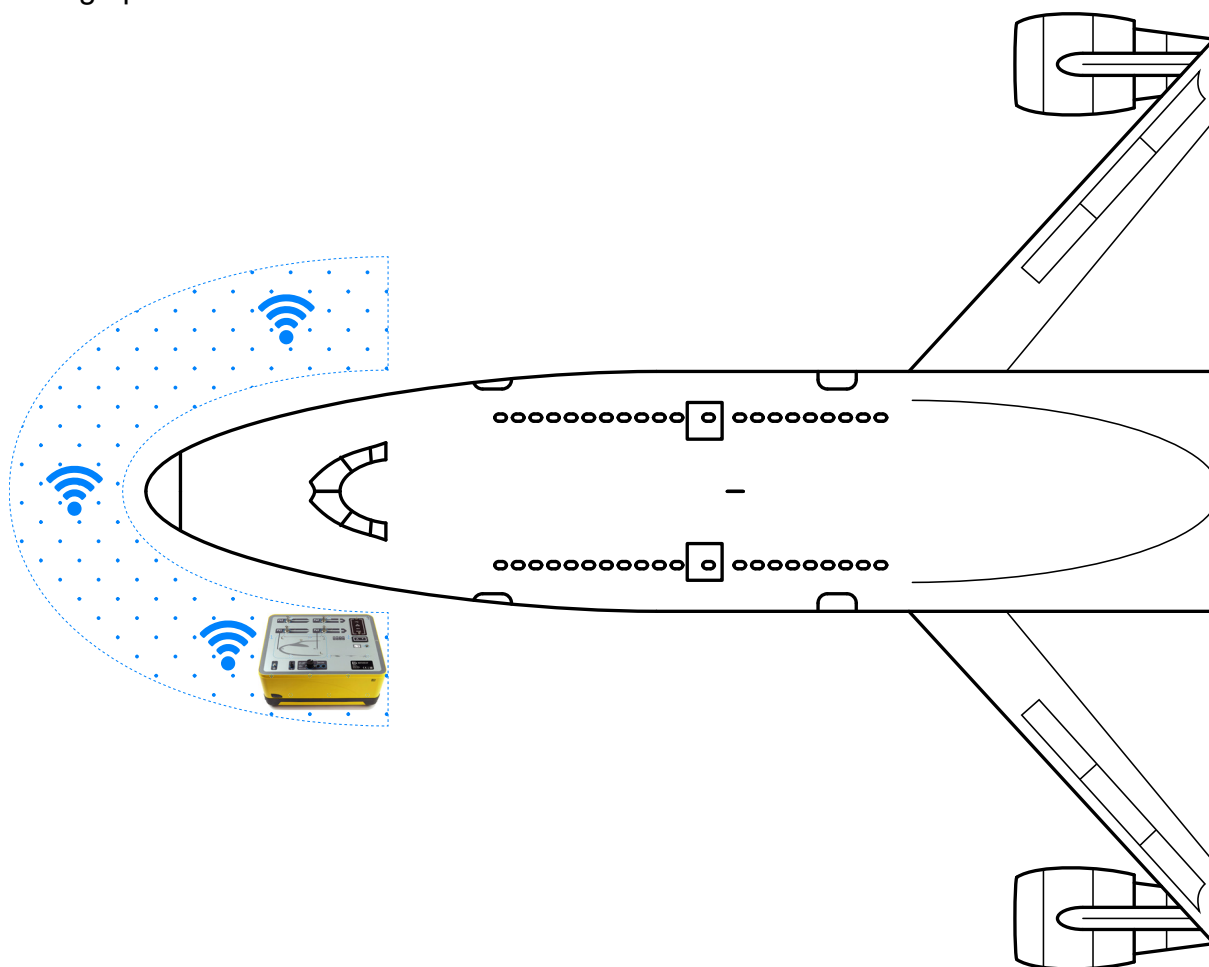


Figure 3-57: Bluetooth® Reliable Coverage Area

3.16.2 Optimum Pairing Procedure

The following procedure is used to “Pair” the ADTS Controller and ADTSTOUCH:

1. Place the ADTSTOUCH on (but not docked) or close to the ADTS Controller.
2. Power cycle the ADTS Controller and the ADTSTOUCH.
3. Navigate to Dashboard >> TOOLS >> BLUETOOTH. The Bluetooth® menu opens.
4. Select NEW SCAN FOR DEVICES. The message Please wait scanning for devices is shown.

Note: Must be done within five minutes of power-up on units using DK0467 software.

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5. A list of available devices shows the software version and serial numbers of the devices.
6. If necessary, scroll down the list and select (highlight) the desired ADTS Controller serial number from the list.
7. Tap the “tick” icon to confirm the selection and close the list of devices. The ADTS Controller and ADTSTOUCH are now “Paired”.
8. Tapping the “cross” icon closes the list of devices without making any changes.

If the Bluetooth® link drops and does not automatically reconnect, then repeat the procedure rather than pairing the devices from within the cockpit.

3.17 ADTSTOUCH-ER (Extended Range) Bluetooth®

On large aircraft, particularly if situated out in the open away from buildings or other reflective surfaces, Bluetooth® link performance can be impaired. The ADTSTOUCH-ER has been developed for these instances.

3.17.1 Standard External Antenna

This unit is the same as the standard ADTSTOUCH in every way with the exception of the Bluetooth® antenna, which is provided as a removable antenna connected to an external RF connector on the base of the unit.



Figure 3-58: ADTSTOUCH-ER with External Bluetooth® Antenna

3.17.2 Antenna Extension Kit



WARNING At least 20 cm of separation distance between the ADTSTOUCH-ER antenna and the user’s body must be maintained at all times when being used with the antenna extension kit. Ensure antenna suction cup is attached to the cockpit window before connecting extension kit to the ADTSTOUCH-ER to prevent the 20 cm separation from being infringed upon.

The ADTSTOUCH-ER is provided with both a standard external antenna and an antenna extension kit. The extension kit has a suction-cup assembly which enables the antenna to be mounted to the inside of the cockpit window. The antenna is connected to the RF connector on the body of the ADTSTOUCH-ER using a cable. Both options allow the operator to move freely

ADTSTOUCH-ER (Extended Range) Bluetooth®

around the cockpit. The most appropriate option should be chosen by the operator depending on local conditions on the day.



Figure 3-59: Bluetooth® Antenna Extension Kit

The relative performance of the ADTS Bluetooth® options is shown in Table 3-13.

Table 3-13: Bluetooth® Option Performance

Model	Antenna	Bluetooth® Performance
ADTSTOUCH	Internal	Good
ADTSTOUCH-ER	Standard External Antenna	Better
ADTSTOUCH-ER	External (Fixed to Cockpit Window)	Best

It should be noted that:

- Performance is very dependent upon aircraft type and its immediate environment. Factors include the absence of RF reflecting surfaces, or sources of interference.
- Performance inside a hangar is generally better compared to an open airfield.

Note: When using the antenna extension kit, for optimal performance the antenna should be placed on the cockpit window closest to the ADTS Controller, see Figure 3-60.

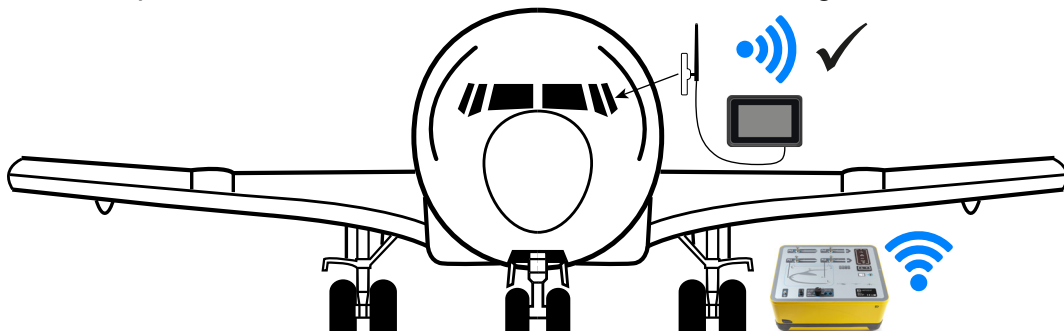


Figure 3-60: Optimal External Bluetooth® Antenna Placement

4. Calibration

4.1 Introduction

For the system to remain accurate, a calibration check should be carried out at regular intervals. The recommended calibration period can be found on the relevant specification sheet for each model of the ADTS542F/552F/553F/554F series. If the accuracy of the system is not within the specification, carry out a calibration adjustment.

4.2 PIN Codes and PIN Protection



INFORMATION Change these codes to prevent unauthorized access. Unauthorized access to these menus can make this system inaccurate and could, in control mode, cause excessive rates of pressure change.

The ADTS contains PIN protected menus. The following table lists the factory set default PIN numbers:

Table 4-1: ADTS PIN Numbers

Menu	Protected Menu Item	PIN Number
ADTS Settings	Edit Limits	0268
	Create New Limits	0268
	Delete Limits	0268
	Change Supervisor PIN	0268
Tools	Calibration (Calibrate Sensors)	4321
	Calibration (Software Update)	5487
	Calibration (Option Configuration)	1234

4.3 Calibration Process

The calibration process is PIN protected. This chapter describes the Ps and Pt sensor calibration. The Tools >> Calibration Sensor menu contains the calibration adjustment as part of the function Calibration check.

Note: Calibration checks must be performed within the calibration check menu because the main Ps/Pt measure display screen Pt reading includes an “Auto Zero” correction for any residual offset error between the Ps and Pt sensors.

Note: Precision is a term which includes the ADTS measurement system errors of non-linearity, hysteresis and repeatability over the ADTS operating temperature range. Precision does not include errors introduced by the equipment used for calibration of the ADTS or ADTS calibration stability errors as stated on the ADTS data sheet.

Chapter 4. Calibration

4.3.1 Calibration Requirements

Note: Calibration period dependent on calibration option selected at time of product purchase.

Table 4-2: Calibration Requirements ADTS542F

Function	Accuracy Specifications ^a	Test Method
Pneumatic Pressure	Ps Range:	92 mbar to 1130 mbar absolute
	Accuracy:	Refer to current product data sheet.
	Pt Range:	92 mbar to 1997 mbar absolute
	Accuracy:	Refer to current product data sheet.

a. (k = 2, 95% uncertainty) Includes: NL, H and R over the ADTS operating temperature range and calibration stability over 15 months (see note) and calibration equipment uncertainty stated in Section 4.3.2.

Table 4-3: Calibration Requirements ADTS552F/553F/554F

Function	Accuracy Specifications ^a	Test Method
Pneumatic Pressure	Ps Range:	72 mbar to 1130 mbar absolute (EALT option 57 mbar)
	Accuracy:	Refer to current product data sheet.
	Pt Range:	72 mbar to 1997 mbar absolute (EALT option 57 mbar)
	Accuracy:	Refer to current product data sheet.

a. (k = 2, 95% uncertainty) Includes: NL, H and R over the ADTS operating temperature range and calibration stability over 18 months (see note) and calibration equipment uncertainty stated in Section 4.3.2.

4.3.2 Calibration Equipment Uncertainty

Specification for Calibration Standard:

- Range: 35 mbar to 2000 mbar absolute.
- Expanded uncertainty (k = 2): 0.042 mbar / (32 ppm of reading + 0.7 Pa) - whichever is greater.
- All traceable to national standards.

Note: If a calibration standard with higher uncertainty is used, the ADTS accuracy will be degraded and can exceed the ADTS sales data sheet specification.

4.3.3 Suggested Two-Point Calibration Adjustment Points

Calibration points are nominal pressures to allow for slight differences due to primary standard weights and actual corrected pressure calculations.

1. Ps: two point calibration points, suggested to be done in this order:
 - a. 1128 mbar (FS)
 - b. 92 mbar
2. Pt: two point calibration points, suggested to be done in this order:
 - a. 92 mbar
 - b. 1997 mbar (FS)

For suggested calibration check points, see Table 4-4 and Table 4-5.

Table 4-4: Ps Calibration Check Points

Ps	
Pressure	Approximate Altitude
56.39 mbar ^a	~65,000 ft
71.71 mbar ^b	~60,000 ft
92.00 mbar	~55,000 ft
178.74 mbar	~41,000 ft
314.85 mbar	~29,000 ft
465.63 mbar	~20,000 ft
696.82 mbar	~10,000 ft
843.07 mbar	~5,000 ft
1013.25 mbar	~0 ft
1128.03 mbar	~-3,000 ft

- a. ADTS552F/553F/554F EALT option.
- b. ADTS552F/553F/554F only.

Table 4-5: Pt Calibration Check Points

Pt
56.39 mbar ^a
71.71 mbar ^b
92.00mbar
178.74mbar
314.85mbar
465.63mbar
696.82mbar
843.07mbar
1013.25mbar
1128.03mbar
1500mbar
1997mbar

- a. ADTS552F/553F/554F EALT option.
- b. ADTS552F/553F/554F only.

4.4 Calibration Description

The date of calibration adjustment is logged and stored during this procedure. It is important that the ADTSTOUCH clock date is checked before starting a calibration adjustment or an incorrect

Chapter 4. Calibration

date can be recorded. Instructions for checking and setting the time and date can be found in Section 3.6.

“As found” data does not have to be recorded before an adjustment to the selected channel has been carried out. Record “as found” date as necessary.

4.4.1 Preliminary Operations

1. Review and become familiar with the whole procedure before beginning the calibration process.
2. Allow at least two hours for the ADTS to thermally stabilize after switching on and before performing any calibration routines.
3. Before starting a calibration procedure carry out a leak test, see Section 6.3.
4. The pressure reference level of the ADTS is the top face of the front panel when the front panel is facing upwards. In calibration check mode the ADTS sets its altitude correction to zero.

4.4.2 Calibration Check

This procedure checks the calibration accuracy without adjusting it. It can be used either to see if the system requires a calibration or to verify performance following a calibration adjustment.

1. Make sure the standard and the ADTS are at atmospheric pressure.
2. Connect your calibration standard to the Ps or Pt channel.

Note: An all-sensor check/adjust can be done using the Ps & Pt option. To do an all-sensor calibration the calibration standard must be connected to the Pt(1) channel.

3. Open the **Tools** menu, select **Calibration**. Enter your PIN, select "Calibration Check"
4. Select Pressure Source:
 - a. **Internal** - Use the ADTS internal controller to generate pressure.
 - b. **External** - Use an external source to generate pressure.
5. Select **Calibration check** sub-menu showing the current values for Ps and Pt.
6. Select either Ps & Pt (to check all sensors) or select an individual sensor to check.
7. Apply pressure to the selected channel to Full Scale (FS) and lowest point. Repeat this process a minimum of three times.
8. Adjust the calibration standard to apply pressure to the Ps or Pt channel. To decide if the applied pressure is stable, make sure that the value of the ADTSTOUCH pressure shown equivalent to a resolution of 0.001 mbar is stable, within ± 0.001 mbar, and free from ‘creep’. Calculate the actual applied pressure reading to at least 4 decimal places. No data is entered to the ADTS when doing a calibration check. Reference pressure entries are for the sensor adjustment operation only.
9. The leak rate must be low enough to prevent the primary standard dead weight tester piston from moving outside the mid operating point during the calibration procedure.
10. Compare the applied pressure value on the calibration standard to the value shown on the ADTSTOUCH and record the difference.
11. If the recorded difference exceeds the allowable tolerance, do the “Calibration Adjustment” procedure detailed.
12. Repeat this procedure for the other channel.

4.4.3 Calibration Adjustment

The procedure applies known pressures to the ADTS and then entering the exact applied pressure using the ADTSTOUCH. After all calibration points have been entered, the ADTS automatically calculates the necessary offset (zero) and slope (span) corrections.

1. Select **Main Calibration** from the **Calibration** Menu.
2. Select Pressure Source:
 - a. **Internal** - Use the ADTS internal controller to generate pressure.
 - b. **External** - Use an external source to generate pressure.
3. Select either Ps & Pt (to check all sensors) or select an individual sensor to calibrate.
4. Follow the on-screen instructions.
5. Calculate the reference pressure reading to at least 4 decimal places and enter this value into the ADTS.
6. Repeat this procedure for the other channel.

The adjustment requires two pressures for each channel. Adjustment pressures are the lowest and highest pressures of the selected channel, see Figure 4-6:

Table 4-6: Adjustment Points

ADTS542F		ADTS552F/553F/554F	
Ps Channel	Pt Channel	Ps Channel	Pt Channel
92 mbar	92 mbar	71 mbar	71 mbar
1130 mbar	1997 mbar	1130 mbar	1997 mbar

Following a calibration adjustment use the sensor precision values as the calibration check limits. Sensor precision value is shown under the Tools >> System Status >> ADTS >> Sensors >> Ps/Pt screen. Sensor precision values are intended for < 24 hour post adjustment verification of the ADTS against the calibration equipment used to adjust the ADTS. For > 24 hour specification values or where other calibration equipment was used to adjust the calibration refer to the ADTS sales data sheet accuracy specification.

4.4.4 Completion of Calibration

After completion of all calibration adjustment procedures, carry out the following:

1. Make sure the calibration standard and the ADTS are at atmospheric pressure. Disconnect the calibration standard from the ADTS.
2. If there is no further calibration or testing is necessary, exit menus, select standby or switch off the ADTS.

5. Maintenance

5.1 Introduction

This section details the before-use tasks and the weekly inspection to be carried out by the operator. The maintenance chart shows the maintenance tasks, the periodicity of each task and a code referenced to the tasks detailed in Table 5-1.

Table 5-1: Maintenance Chart

Task	Code	Period
Inspect	A	Daily, before use
Inspect	B	Weekly
Test	C	Before use
Test	D	Daily, before use

5.2 Battery Care and Maintenance

5.2.1 ADTSTOUCH Battery Pack

The lithium-ion battery pack requires no user maintenance.

Prolonged exposure to temperature extremes can significantly reduce battery lifetime. For maximum lifetime, avoid prolonged periods where the battery is exposed to temperatures outside the range -30°C to +45°C (-22°F to 113°F).

The recommended storage temperature range is 5°C to 21°C (41°F to 70°F).

The battery is removable. The manufacturer makes the following safety recommendations. The user should not:

- Short circuit the battery.
- Immerse the battery in any liquid.
- Disassemble or deform the battery.
- Expose to, or dispose of the battery in a fire.
- Subject the battery to excessive physical shock or vibration outside the specified limits for the ADTS.
- Use a battery that appears to have suffered abuse.

The battery pack is sealed for life, so leakage of electrolyte is not expected. If leakage of electrolyte from the battery is observed, stop using the battery immediately and avoid contact with the electrolyte. If skin or clothes come into contact with the electrolyte, wash immediately with soap and water. If electrolyte comes into contact with the eyes, wash the eyes thoroughly with water and consult a Doctor immediately.

5.3 Maintenance Tasks

Table 5-2: Maintenance Tasks

Code	Task
A	Check that all the equipment is present, record any deficiencies.
	Visually inspect the exterior of the ADTS and its associated equipment for obvious signs of damage, dirt and the ingress of moisture. If necessary, use mild liquid detergent and a lint-free cloth to clean the external surfaces, see the “Safety and Installation” guide K0554.
	Inspect the pressure outlet ports for ingress of dirt and moisture, if necessary, clean with a lint-free cloth.
B	Visually inspect the pneumatic output connectors for damage.
	Inspect the small o-ring on each pneumatic output connector for cuts and any signs of wear; replace as necessary.
C	Visually inspect pneumatic hoses, electrical cables for cuts, splits and damage; replace as necessary.
	Before use, power-up the unit as detailed in the “Safety and Installation” guide K0554. Check the date of the last calibration and, if necessary, refer to the manufacturer.
D	Record any error messages and refer to Section 6.4.
	Daily and before use, carry out the Standard Serviceability Test (Section 6.2) and ADTS Leak Check (Section 6.3).

5.4 Routine Maintenance

Absolute cleanliness of the work area, tools and equipment are essential.

5.4.1 Replacing the Output Connector O-ring

After inspection as detailed in maintenance task B, carry out the following if the o-ring is worn or damaged:

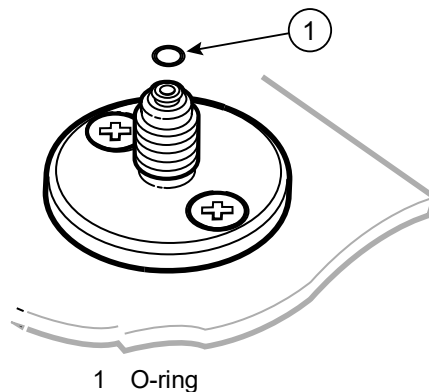
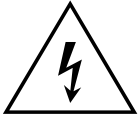


Figure 5-1: Replacing the O-ring

1. Carefully remove the o-ring from the small groove at the top of the connector. Fit a new o-ring in the small groove at the top of the connector.
2. Make sure the o-ring is tight in the groove and not damaged after fitting.

Note: Damage to this o-ring causes leaks.

5.4.2 Replacing a Fuse



RISK OF ELECTRIC SHOCK

1. Disconnect the electrical power supply.
2. Unscrew the fuse holder cap and remove the fuse.
3. Only fit a new fuse of the correct type and rating into the fuse holder cap.
4. Secure the fuse holder in the front panel.

5.5 Software Updates

When software updates are available, they can be downloaded from the Druck website to a USB memory stick and used to update the applications on the ADTS and ADTSTOUCH.

Context sensitive help pages are updated with software version increments. ADTS (PDF) manuals are updated without prompt when a newer version of the manual is available via the software update procedure.

Alternatively only the ADTS manual can be downloaded to the ADTSTOUCH from a PC.

5.5.1 Downloading Software Updates

1. Insert a USB memory stick into the computer to be used for the software download.
2. Go to <https://druck.com/software>.
3. Select the appropriate software update necessary for the product from the list. The “Open/Save” file dialogue is shown.
4. Click the “Save File” radio button.
5. Click “OK”. The “Enter name of file to save...” dialogue is shown.
6. Save the files directly onto the USB memory stick or to the computer.
7. If the downloaded files are saved onto the USB memory stick, you can transfer the files to the computer, if necessary.
8. The downloaded files are contained within a “zip” folder, e.g. “ADTS5XX_Release_6.zip”. You can choose to run this self-extracting file or simply unzip it to the necessary location.
9. The extracted directory, e.g. ADTS5XX_Release_6 contains a further five folders:

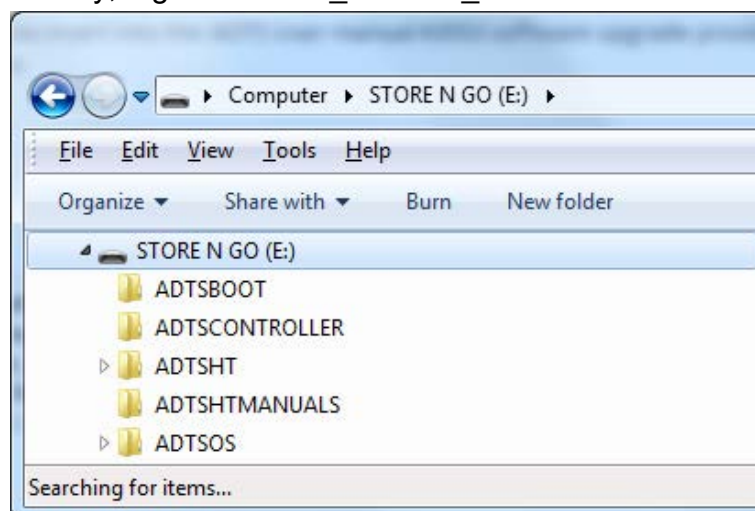


Figure 5-2: Software Update Folders

10. Copy these five folders to the root directory of the USB memory stick ready for transfer to the ADTSTOUCH.

Chapter 5. Maintenance

11. Once the files have been downloaded to the USB memory stick, safely remove the USB memory stick from the computer.

5.5.2 Installing Software Updates

Installation of software updates requires the entry of the software upgrade PIN.

Software updates can be installed for both the ADTS and the ADTSTOUCH via the ADTSTOUCH. If a powered ADTS Controller is connected to the ADTSTOUCH over a wired connection, then software updates can be installed for the ADTS and ADTSTOUCH. For integrity of the file transfer, the use of the umbilical cord is recommended.

If the ADTSTOUCH is only battery powered, then software updates are only possible for the ADTSTOUCH and not for the ADTS.

To install software updates for the ADTS and ADTSTOUCH:

1. Either, position the ADTSTOUCH on the ADTS Controller or connect the ADTSTOUCH to the ADTS Controller using the umbilical cable.
2. Power-up the ADTS in Standby mode.
3. Switch-on the ADTSTOUCH (1).



Figure 5-3: ADTSTOUCH Power Button and USB Port

4. Insert the USB memory stick into the ADTSTOUCH USB port (2).

Note: The USB stick must not be removed once the install process has started.

5. On the “Dashboard”, select “Tools”. The tools menu opens.
6. Select “Calibration”. A numbered keypad is shown.
7. Enter your software update PIN and tap the “tick” icon. The “Software Upgrade” menu is shown containing two items: ADTSTOUCH and ADTS.

Note: Ensure the README file contained in the software download pack is read and understood fully before attempting upgrade. Failure to follow the instructions can result in an unsuccessful update requiring the unit to be returned to a Service Centre.

a. ADTSTOUCH

- APPLICATION. You will be asked to confirm the software upgrade “Yes” or “No”.
- OPERATING SYSTEM. You will be asked to confirm the software upgrade “Yes” or “No”.

b. ADTS

- MAIN CODE. You will be asked to confirm the software upgrade “Yes” or “No”.
- BOOT CODE. You will be asked to confirm the software upgrade “Yes” or “No”.

8. Once you have selected “Yes”, follow the on-screen instructions.
9. Selecting “No” closes the dialog without making any changes.

5.5.3 Downloading ADTS Manuals

1. Go to <https://druck.com>. The “Druck” page is shown.
2. On the top level menu bar, click Products. Menu items under that header are shown.
3. Click ‘Test and Calibration Instrumentation’.
4. Click ‘Air Data Test Sets (ADTS) - Pitot Static Testers’.
5. Scroll down for a list of available downloads, containing all available user manuals and data sheets.
6. Select the appropriate manual from the list. The file is shown as a PDF with a set of function buttons in the top right corner.
7. Click the Download button.
8. The Open/Save file dialogue is shown.
9. Click OK. The “Enter name of file to save...” dialogue is shown.
10. Save the files directly onto the USB memory stick or to the computer.
11. If the downloaded files are saved onto the USB memory stick, you can transfer the files to the computer, if necessary.
12. Install the manuals onto the ADTSTOUCH using the procedure detailed in Section 5.5.4.

5.5.4 Installing ADTS Manuals or Customer Documents

When plugged into a computer, the ADTSTOUCH will appear as a USB mass storage device. The computer’s file explorer can be used to transfer files between the computer and the ADTSTOUCH.

1. Connect the ADTSTOUCH to a computer using a USB to mini-USB cable.
2. The ADTSTOUCH will appear as a USB mass storage device with the following two folders:
 - a. ADTS MANUAL
 - Contains the ADTS safety guide and the ADTS user manual.
 - b. CUSTOMER DOCUMENTS
 - Contains any additional customer specific (PDF) documents which can be viewed on the ADTSTOUCH.
3. Using the computer’s file explorer, transfer the ADTS manuals or customer documents from the computer to the ADTSTOUCH.
4. Safely remove the ADTSTOUCH from the computer.

5.6 Cyber Security

Cyber security support period is at least 5 years from date of purchase. For further detail and most current information, please see product web page at:

druck.com

Please contact Druck using email address cyber-incident@druck.com to report any suspected or observed cyber-security issues with this product.

6. Testing and Fault Finding

6.1 Introduction

Limited testing and fault finding can be carried out by the operator. Units can be returned to the nearest Druck or Druck approved service center for fault finding and rectification.

At power-up, the ADTS indicates if there is a fault by flashing an error code and/or displaying a message.

Any fault conditions must be rectified before the ADTS can be used for aircraft system testing.

6.2 Standard Serviceability Test

The following procedure shows if the ADTS is serviceable and checks functions and facilities:

1. Connect power to the unit.
2. Make sure the blanking caps are fitted to the front panel pitot and static ports.
3. Set the ON/Standby switch to ON.
4. Check that the power indicator is on and flashing green. This indicates that a self test is in progress. When the self-test is complete, the indicator will be steady green.
5. Ensure that the ADTSTOUCH is switched On and connected to the ADTS either by cable or front panel docking. Check the display shows the system starting screen and progress indicator.
6. Check that the display then changes to show the DASHBOARD.
7. Select PITOT STATIC.
8. Select CONTROL.
9. Select "ALT" channel "Aim" value of 2000 ft.
10. Select "CAS" channel "Aim" value of 200 knots.
11. Wait until the ALT and CAS have reached the "Aim" values and stabilized (indications will be green).
12. Check that the control effort meter arrows are approximately central within the range for each channel.
13. Select MEASURE.
14. Check that measured ALT and CAS values are not decaying at excessive rates (no worse than 25 ft/min and 2 knots/min).
15. Select Aircraft Status screen.
16. Select Go to Ground operation.
17. Confirm Aircraft Safe at Ground pressures state is reached.

This concludes the basic serviceability test.

6.3 ADTS Leak Check

Before carrying out a leak check, allow at least 15 minutes for the ADTS to warm-up.

6.3.1 Set-up

1. Navigate to Dashboard >> Settings >> ADTS Settings >> ADTS LIMITS >> SELECT LIMITS.
2. Select MAX AERO.
3. Return to ADTS Settings.
4. Select Pressure units.
5. Select the "mbar" radio button.

Chapter 6. Testing and Fault Finding

6. Exit the Settings menu and return to the Dashboard.
7. Select PITOT STATIC.

6.3.2 Pressure Leak Check

This procedure verifies that the unit is leak tight under positive pressure conditions.

1. Select CONTROL.
2. Toggle Pressure Aeronautical Units to mbar.
3. Swipe screen across right to left to select the Rate Timer and set the "WAIT" time to 5 minutes and 0 seconds and tap the "tick" icon.
4. Set the "TEST" time to 1 minute and 0 seconds and tap the "tick" icon.
5. Swipe back to the control mode.
6. Tap the Ps "AIM" value to highlight it.
7. Use the numbered keypad to input the new value: 1050.00 mbar, set rate aim to 500 mbar/min and tap the "tick" icon.
8. Tap the Qc "AIM" value to highlight it.
9. Use the numbered keypad to input the new value: 860.00 mbar, set rate aim to 500 mbar/min and tap the "tick" icon.
10. Wait until the Ps and Qc have reached the "Aim" values and stabilized (indications will be green).
11. Select MEASURE.
12. Swipe across to select the Rate Timer.
13. To start the timer, tap the "play" icon. The timer starts counting down, the elapsed time (percentage) indicator turns blue and the word "WAIT" is shown.
14. When the timer reaches 100%, it starts to count down again and the word "TEST" is shown. When the timer reaches 100%, it stops, the elapsed time indicator remains blue and the word "END" is shown.
15. The display shows the timed rates with a "T" after each value. Check that the Ps, and Qc rates are less than or equal to ± 0.6 mbar/min. If the rates are greater than this value, allow further thermal stabilization time and re-test.

If repeated failures occur, return the unit to Druck or a Druck authorized repair center.

6.3.3 Vacuum Leak Check

This procedure verifies that the unit is leak tight under negative pressure conditions.

1. Select CONTROL.
2. Swipe across to select the Rate Timer and set the "WAIT" time to 5 minutes and 0 seconds and tap the "tick" icon.
3. Set the "TEST" time to 1 minute and 0 seconds and tap the "tick" icon.
4. Swipe back to the control mode.
5. Tap the Ps "AIM" value to highlight it.
6. Use the numbered keypad to input the new value: 100.00 mbar, set rate aim to 500 mbar/min and tap the "tick" icon.
7. Tap the Qc "AIM" value to highlight it.
8. Use the numbered keypad to input the new value: 0.00 mbar, set rate aim to 500 mbar/min and tap the "tick" icon.

9. Wait until the Ps and Qc have reached the “Aim” values and stabilized (indications will be green).
10. Select MEASURE.
11. Swipe across to select the Rate Timer.
12. To start the timer, tap the “play” icon. The timer starts counting down, the elapsed time (percentage) indicator turns blue and the word “WAIT” is shown.
13. When the timer reaches 100%, it starts to count down again and the word “TEST” is shown. When the timer reaches 100%, it stops, the elapsed time indicator remains blue and the word “END” is shown.
14. The display shows the timed rates with a “T” after each value. Check that the Ps, and Qc rates are less than or equal to ± 0.6 mbar/min. If the rates are greater than this value, allow further thermal stabilization time and re-test.

If repeated failures occur, return the unit to Druck or a Druck authorized repair center.

6.4 Fault Codes and Error Messages

In the event of a malfunction, the built-in, self-test and diagnostic system displays a message and the status indicator flashes a code. The message heading Error indicates a fault or condition that interrupts normal operation.

If the display shows an error message, the unit should be switched off and then on again. If the display still shows an error message after switching on again, the unit should be returned to Druck or a Druck authorized repair center.

6.4.1 Front Panel Four LED Flash Code

In a situation arising where all four of the LEDs on the front panel are flashing together with a factory code sequence (presented in red and green LED colors), an ADTS controller and boot loader software download should be attempted in the first instance. Once the software downloads are complete the unit is to be power cycled. If all four of the LEDs, after the power cycle, are again presenting the flashing sequence the unit should be returned to a Druck service department.

Chapter 6. Testing and Fault Finding

6.4.2 Error, Warning and Information Codes

Table 6-1: Error Codes

Error Code	Description
1	Boot database queue has failed
2	Memory Allocation for Bootloader task has failed
3	Memory Allocation for Bootloader environment has failed
4	Bootloader task registration has failed
6	Ps sensor failed or disconnected
8	Bias Channel Pressure Ps Failed
9	Bias Channel Pressure Pt Failed
10	Bias Channel Vacuum Ps Failed
11	Bias Channel Vacuum Pt Failed
12	Invalid Current State
13	Pressure Ps valve curve has failed characterisation
14	Pressure Pt valve curve has failed characterisation
15	Vacuum Ps valve curve has failed characterisation
16	Vacuum Pt valve curve has failed characterisation
17	Invalid Curve Index
18	Invalid Curve Parameters
19	Zero Curve Volume
24	Demand NULL
25	EXP out of range
26	LOG out of range
27	Measured NULL
28	Controller Pool
29	Control Memory
30	Invalid Next State
34	Invalid Ps Demand
35	Ps pressure not settling
38	Invalid Ps Volume
39	Pt pressure not settling
42	Invalid Pt Volume
43	Control Task Failed
44	Control Timer
52	Invalid Curve Records
53	Invalid Curve State
54	Valve Bias Select Fail
55	Valve Bias Values

Table 6-1: Error Codes

Error Code	Description
58	Database Change Failed
59	Database Clear Failed
60	Database Copy
61	Database Enter Failed
62	Database Entered Failed
63	Database Memory Fail
64	Database Queue Failed
65	Database Read Options Failed
66	Database Read Failed
67	Database Read Int Failed
68	Database Receive
69	Database Rx Queue Size Failed
70	Database Semaphore Failed
71	Database Send Failed
72	Database Task Failed
73	Database Write Failed
74	Database Write Options Failed
75	Database Write Int Failed
78	ADC7822 Invalid Input
79	Calibration switch in ON position when commanded OFF
80	Calibration switch in OFF position when commanded ON
81	Calibration Latch indicates invalid inputs
82	ALTERA Event
83	ALTERA HISR Failed
84	ALTERA LISR Failed
85	ALTERA is not present or not responding
86	Application code FLASH is not blank
87	BIT Clear Byte
88	BIT Clear Word
89	BIT Get Byte
90	BIT get Word
91	BIT Set Byte
92	BIT Set Word
93	BOOT FLASH is not blank
94	Buzzer Timer Fail
95	Invalid CAN Task Arbitration

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Table 6-1: Error Codes

Error Code	Description
96	Invalid CAN Task Device ID
97	Invalid CAN Task RX
98	CAN Task Send Fail
99	Invalid CAN Task SPI Read
100	Invalid CAN Task SPI Write
101	CAN controller is not present or not responding
102	CAN Loopback using test remote device has failed
103	CAN test transmission has failed
104	No CAN Response from remote board
105	CAN Task Buffer Full
106	CAN Task HISR Fail
107	CAN Task LISR Fail
108	CAN Task Memory fail
109	CAN Task Queue Fail
110	CAN Task task Fail
111	Data FLASH is not blank
112	Device Error
113	Invalid Bitmap
114	Invalid Blank
115	Invalid Character
116	Display Coord Invalid
117	Invalid Font
118	Invalid Line
119	Invalid Page
120	Invalid Point
121	Graphics RAM (LSB) has failed
122	Graphics RAM (MSB) has failed
123	Graphics RAM (Both devices) have failed
124	Eeprom Readback not matched write
125	Invalid Text
126	EEPROM failed verification
127	Flash block exceeds the flash memory space
128	Flash has failed operation
129	Invalid Flash
130	Invalid FLASH device selected
131	Invalid sector

Table 6-1: Error Codes

Error Code	Description
132	FLASH device is not present
133	Sector is protected
134	Invalid I2C Board
135	Solenoid Null Pointer
136	Driver Initialisation Fail
137	Invalid FLASH device
138	Keypad Timer Failed
139	Device Length
140	Ps sensor failed
141	Pt sensor failed
142	Qc sensor failed
143	PDCR Interpolation Fail
144	Invalid PDCR Sensor
145	PDCR I2C interface fault
146	PDCR pic not present, not programmed and not responding
147	PDCR not connected
148	PDCR common mode voltage 1 out of range
149	PDCR common mode voltage 2 out of range
150	Unsupported PDCR Sensor
151	PDCR VC1 Failed
152	PDCR VC2 Failed
153	Invalid Pump Id
154	Pump monitoring has failed when pumps commanded ON
155	Pump monitoring has failed when pumps commanded OFF
156	Pump monitoring has failed when pressure pump commanded ON
157	Pump monitoring has failed when vacuum pump commanded ON
158	Pump monitoring has failed when heater commanded ON
159	Pump Timer Failed
160	Invalid PWM Channel
161	QSPI LISR Failed
162	SCI LISR Failed
163	RAM validation has failed
164	Driver Read
165	RPT diode out of range
166	ALTERA count = 0, indicating RPT not connected or failed
167	ALTERA Not complete, indicating RPT input frequency too low

Chapter 6. Testing and Fault Finding

Table 6-1: Error Codes

Error Code	Description
168	ALTERA overflowed, indicating RPT input frequency too high
169	RPT count is out of range at 1000 mB
170	Invalid RTC Data
171	RTC Null Pointer
172	Real time clock is not incrementing
173	Real time clock parameter RAM failed
174	Received Serial data is not identical to transmitted test data
175	No Received serial data during loopback test
176	PS apply valve failed - short
177	PS apply valve failed - open
178	PS release valve failed - short
179	PS release valve failed - open
180	PT apply valve failed - short
181	PT apply valve failed - open
182	PT release valve failed - short
183	PT release valve failed - open
184	Solenoid valves have failed when all commanded OFF
185	Solenoid Timer Failed
186	Invalid Solenoid ID
187	SPI Entry parameters are invalid
188	EEPROM Block is null
189	EEPROM invalid device selected
190	EEPROM Block is out of range
191	Water Dump Failed
192	Driver Write
193	Button registration
194	Event Overflow
195	Periodic Control
196	Periodic Reset
197	Periodic Object
198	ResData Handler
199	Restext Direct
200	Restext Display
201	Restext Format
202	Restext Handlers
203	Restext Paint

Table 6-1: Error Codes

Error Code	Description
204	Restext Select
205	Restext object
206	Restext Text Size
207	Screen
208	Screen Overflow
209	Screen has failed to initialize
210	Screen Failure
211	Invalid base screen
212	Screen Stack Default Handler
213	Screen Stack Overflow
214	Invalid screen selected
215	Screen Stack
216	Softkey overflow
217	Status Line
218	Internal Software Fault
224	Invalid stored end user
225	Invalid end user
226	Invalid end user switch
230	Fan 1 Failed
231	Fan 2 Failed
232	LDK Task Failed
234	Hoursscreen timer failed
235	Workstation event has failed to initialize
236	Workstation memory pool has failed
237	Workstation serial HISR failed to initialize
238	Workstation task has failed to initialize
239	SPI Parameter Error
240	Test Message
242	LDK has an invalid data flash archive
244	Controller has an invalid data flash archive
246	Hand terminal has an invalid data flash archive
251	Vacuum pump lead is disconnected
255	Pressure pump lead is disconnected
258	Watchdog Interrupt handler has failed to initialize
259	Hand terminal timer handler has failed to initialize
291	Controller limits corrupted

Chapter 6. Testing and Fault Finding

Table 6-1: Error Codes

Error Code	Description
292	Qc sensor failed
294	Limits in controller flash are invalid
301	Qc zero valve disconnected
302	Qc zero valve driver fault
303	Ground valve disconnected
304	Ground valve driver fault
305	Pt output valve disconnected
306	Pt output valve driver fault
307	Ps output valve disconnected
308	Ps output valve driver fault
314	No Handset code in LDK flash
319	Controller board in position 1 programmed as controller 2
320	Controller board in position 2 programmed as controller 1
321	Board temperature error
322	Source sensor pressure initialization error
323	Source sensor vacuum initialization error
324	Board temperature read error
325	Source sensor pressure read error
326	Source sensor vacuum read error
327	ADC synchronization initialization error
328	ADC apply valve acquisition error
329	ADC release valve acquisition error
330	ERROR_DRIVER_IO_MAIN_ADC_ACQ_TMR_APP
331	ERROR_DRIVER_IO_MAIN_ADC_ACQ_TMR_REL
332	Pump PWM hardware fault
333	PT control sensor checksum error
334	PT control sensor diode ADC acquisition error
335	PT control sensor frequency acquisition error
336	PT control sensor EEPROM write error
337	PS control sensor checksum error
338	PS control sensor diode ADC acquisition error
339	PS control sensor frequency acquisition error
340	PS control sensor EEPROM write error
341	LED IO expander initialization error
342	Valve IO expander initialization error
343	Power check initialization error in external ready

Table 6-1: Error Codes

Error Code	Description
344	Power check initialization error in internal ready
345	Power check error in internal power level
346	Power check error in internal ready
347	Power check error in external ready
348	Internal CAN connection timeout
349	Software version mismatch
350	Power check initialization external reset error
351	ERROR_DRIVER_PWR_INIT_EXT_MISC
352	Power check external reset error
353	Ps differential limit exceeded
354	Slave board synchronization error
355	Switched from three channel to four channel controller
356	Max. number of Ps Release valve bias retries
357	Max. number of Ps Apply valve bias retries
358	Max. number of Pt Release valve bias retries
359	Max. number of Pt Apply valve bias retries

Table 6-2: Warning Codes

Warning Code	Description
5	Failed to warm up. Allow unit to stabilize within the operating temperature range
7	Autoleak recovery activated
20	Flow decreased on entry
21	Flow at 40 V smaller than linear end
22	Theoretical max flow < 40 V flow
23	Curve fit error too large
31	Test set must be at ground. Control to ground
32	Pressure leak in Ps. Contact service center
33	Pressure leak in Pt. Contact service center
36	Ps Aim Overshoot
37	Ps aim value unobtainable. Check for Leaks
40	Pt Aim Overshoot
41	Pt aim value unobtainable. Check for Leaks
45	Vacuum leak in Ps. Contact service center
46	Vacuum leak in Pt. Contact service center

Chapter 6. Testing and Fault Finding

Table 6-2: Warning Codes

Warning Code	Description
47	Valve characterisation data missing
48	Ps pressure control valve cannot be calibrated
49	Pt pressure control valve cannot be calibrated
50	Ps vacuum control valve cannot be calibrated
51	Pt vacuum control valve cannot be calibrated
57	Current pressure limits exceeded. Re-select control mode. Control to ground and check for leaks
76	Abort Detected
77	ABORT INSTIGATED
219	Abort sequence started by user
220	Cannot Modify Altitude Correction in Pressure Units
221	Changed Aim to ARINC Limit
222	Calibration data failed
223	Cannot enter EPR in Aero Units
227	Changed Aim to Current Limit
228	Limits Overlap
229	Limits Saved
233	Read only Limits
241	Ground Request in Leak Mode. Select Control Mode then retry.
243	LDK has an invalid EEPROM archive
245	Controller has an invalid EEPROM archive
247	Hand terminal has an invalid EEPROM archive
248	LDK EEPROM Database has been rebuilt
249	Controller EEPROM Database has been rebuilt
250	Vacuum pump processor has failed
252	Vacuum pump transistor is faulty or drive inhibited
253	Vacuum pump has stalled
254	Pressure pump processor has failed
256	Pressure pump transistor is faulty or drive inhibited
257	Pressure pump has stalled
260	Connected hand term has failed to respond. Disconnecting power
261	Out of working temperature range. Ensure unit is within operating temperature range
262	Valve characterisation data is invalid. Restoring from FLASH
263	Valve constant a1 is out of range
264	Valve constant b1 is out of range
265	Valve constant Vb1 is out of range

Table 6-2: Warning Codes

Warning Code	Description
266	Valve constant VI1 is out of range
267	Valve constant FI1 is out of range
268	Valve constant G1 is out of range
269	Valve constant Fmax1 is out of range
270	Valve constant a2 is out of range
271	Valve constant b2 is out of range
272	Valve constant Vb2 is out of range
273	Valve constant VI2 is out of range
274	Valve constant FI2 is out of range
275	Valve constant G2 is out of range
276	Valve constant Fmax2 is out of range
277	Valve constant a3 is out of range
278	Valve constant b3 is out of range
279	Valve constant Vb3 is out of range
280	Valve constant VI3 is out of range
281	Valve constant FI3 is out of range
282	Valve constant G3 is out of range
283	Valve constant Fmax3 is out of range
284	Valve constant a4 is out of range
285	Valve constant b4 is out of range
286	Valve constant Vb4 is out of range
287	Valve constant VI4 is out of range
288	Valve constant FI4 is out of range
289	Valve constant G4 is out of range
290	Valve constant Fmax4 is out of range
293	Limit entry changed to Max limit set
295	CAS is outside maximum limits. Reduce pressure in system using letdown valves
296	Alt is outside maximum limits. Reduce pressure in system using letdown valves
297	ROC is outside maximum limit. Check system for leaks
298	Qc is outside maximum limit. Reduce pressure in system using letdown valves
299	Ps is outside maximum limit. Use letdown valve to bring pressure within limits
300	RtPs is outside maximum limit. Check system for leaks
309	Hand terminal short circuit
311	Cannot connect Hand Term while safe at ground for this version of ADTS505.
312	RtCAS is fixed and cannot be altered

Chapter 6. Testing and Fault Finding

Table 6-2: Warning Codes

Warning Code	Description
313	Calibration date not entered. Enter the calibration date
315	Invalid Pt/Pt rate aim entry whilst in aero units
316	Invalid Qc/Qc rate aim entry whilst in Pt ramp mode
317	Invalid Pt/Pt rate aim entry whilst in Qc ramp mode
318	Entry capped to ground pressure specification limit
353	Ps differential limit exceeded. Use letdown valve to bring pressure within limits
361	Zero Offset Too Large. Unit Requires Calibration

Table 6-3: Information Codes

Information Code	Description
56	Qc Negative so clamped to zero
360	Performing At Ground valve bias

7. Specification

For the most up to date equipment specification, refer to the current data sheet, as follows.

- ADTS542F, 920-648x
- ADTS552F/553F/554F, 920-659x

In addition to the information contained in the latest data sheet, note the following:

1. ADTS542F - Above 9,144 m (30,000 ft) the rate of climb (ROC/Rt Ps/Pt) into a 3L total volume (Ps 2L + Pt 1L) performance is limited by pump capability (that can vary higher or lower depending on pump running hours, equipment under test volume, ambient temperature and barometric pressure of the day).
2. ADTS552F/553F/554F - Above 9,144 m (30,000 ft) the rate of climb (ROC/Rt Ps/Pt) into a 6L total volume (Ps 4L + Pt 2L) performance is limited by pump capability (that can vary higher or lower depending on pump running hours, equipment under test volume, ambient temperature and barometric pressure of the day).
3. Max ADTS limits - Performance is limited by pump capability (that can vary higher or lower depending on pump running hours, equipment under test volume, ambient temperature and barometric pressure of the day).
4. Pump usage hours accumulation factor is dependent on operation temperature.

Appendix A. Compliance Statements

The compliance statements can be viewed on the ADTSTOUCH. Navigate to Dashboard >> Tools >> Bluetooth >> Certifications.

A.1 USA

A.1.1 FCC Warning Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

A.1.2 ADTS542F/552F/553F/554F

This device has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This device is only authorized for use in a mobile application. At least 20 cm of separation distance between the ADTS542F/552F/553F/554F device and the user's body must be maintained at all times.

- ADTS542F/552F/553F/554F: Contains Transmitter Module FCC ID: QQQWT41.
- (For DK0429 variants only) ADTS552F: FCC ID: 2AAVWADTS552F-01

A.1.3 ADTSTOUCH

This device has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This device must not be used with any other antenna or transmitter that has not been approved to operate in conjunction with this device.

FCC ID: 2AAVWADTSTOUCH-01.

A.1.4 ADTSTOUCH-ER

This device has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC rules.

Operation is subject to the following two conditions:

Appendix A. Compliance Statements

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This device must not be used with any other antenna or transmitter that has not been approved to operate in conjunction with this device.

FCC ID: 2AAVWADTSTOUCH-02.

A.2 Canada

A.2.1 ADTS542F/552F/553F/554F (English)

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
 2. This device must accept any interference, including interference that may cause undesired operation of the device.
- ADTS542F/552F/553F/554F: Contains IC ID: 5123A-BGTWT41 - patch antenna: 50 ohms, 6.662 dBi gain.
 - (For DK0429 variants only) ADTS542F: Contains IC ID: 5123A-BGTWT41 - dipole: 50 ohms, 2.3 dBi gain.
 - (For DK0429 variants only) ADTS552F: IC ID: 12097A - ADTS552F01 - patch antenna: 50 ohms, 6.662 dBi gain.

A.2.2 ADTS542F/552F/553F/554F (Français)

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs,

il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage.

2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
- ADTS542F/552F/553F/554F: Contient IC ID: 5123A-BGTWT41 - antenne patch: 50 ohms, 6.662 dBi gain.
- (Pour les variantes DK0429 seulement) ADTS542F: Contient IC ID: 5123A-BGTWT41 - antenne dipôle: 50 ohms, 2.3 dBi gain.
- (Pour les variantes DK0429 seulement) ADTS552F: IC ID: 12097A - ADTS552F01 - antenne patch: 50 ohms, 6.662 dBi gain.

A.2.3 ADTSTOUCH (English)

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter (12097A-ADTSTOUCH01) has been approved by Industry Canada to operate with the antenna types listed with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

- Dipole antenna: 50 ohms, 2.3 dBi gain.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Contains IC ID: 12097A-ADTSTOUCH01

A.2.4 ADTSTOUCH (Français)

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio (12097A-ADTSTOUCH01) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

- Antenne dipole: 50 ohms, 2.3 dBi gain.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage.
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Contient IC ID: 12097A-ADTSTOUCH01

Appendix A. Compliance Statements

A.2.5 ADTSTOUCH-ER (English)

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter (12097A-ADTSTOUCH02) has been approved by Industry Canada to operate with the antenna types listed with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

- Dipole antenna: 50 ohms, 2 dBi gain.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Contains FCC ID: 12097A-ADTSTOUCH02

A.2.6 ADTSTOUCH-ER (Français)

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio (12097A-ADTSTOUCH02) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

- Antenne dipole: 50 ohms, 2 dBi gain.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage.
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Contient IC ID: 12097A-ADTSTOUCH02

A.3 Mexico (México)

The operation of this equipment is subject to the following two conditions: (1) it is possible that this equipment or device may not cause harmful interference, and (2) this equipment or device must accept any interference, including interference that may cause undesired operation.

La operación de este equipo está sujeta a las siguientes dos condiciones: (1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

A.4 Brazil (Brasil)

This equipment operates in a secondary manner, that is, does not have the right of protection against prejudicial interference, even from stations of the same type, and nor can they cause interference to systems operating in a primary manner.

Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.

A.5 China (中华人民共和国)

ADTS542F (DK429 only): CMIIT - 2015DJ5155

ADTS552F (DK429 only): CMIIT - 2015DJ6744

ADTS542F (DK467): CMIIT - 2018DJ2161

ADTS552F (DK467): CMIIT - 2018DJ2155

ADTS553F (DK467): CMIIT - 2018DJ2158

ADTS554F (DK467): CMIIT - 2018DJ2163

ADTSTOUCH: CMIIT - 2015DJ5598

A.6 Korea (대한민국)

해당 무선설비는 운용 중 전파혼신 가능성이 있음

Appendix A. Compliance Statements

Appendix B. ADS-B Transponder Option

This is a software product option (AAADS-B) linked to the ADTS base unit serial number. It currently works with the VIAVI-AVX10K Flight Line Test Set to check that the simulated altitude and air speed are being correctly represented on the mode-S and mode-C aircraft transmissions. The ADTSTOUCH and the VIAVI-AVX10K connect using Druck cable kit AA500F-50. You then set the VIAVI-AVX10K to stream data to the ADTSTOUCH.

Note: This section refers to the standard ADSTOUCH hand terminal but you can also use the ADSTOUCH-ER option with the VIAVI-AVX10K.



Figure B-1: VIAVI-AVX10K

B.1 Option Key

The product option key links to the serial number of the base unit, which you can find on the front panel label of the ADTS. You can also find the base unit serial number by using the ADTSTOUCH menu if connected to the ADTS. To do this:

1. On the ADTSTOUCH screen, select **TOOLS > System Status > Summary**.
2. To apply the option key, select **TOOLS > Calibration**.
3. Enter the PIN 1234 and select the tick symbol.
4. Follow the on-screen instructions to enter the license key.

Note: The option key is for the ADTS base unit, so any ADTSTOUCH connected to the ADTS and running the latest firmware can be used for ADS-B Transponder tests.

B.2 Cable Connections

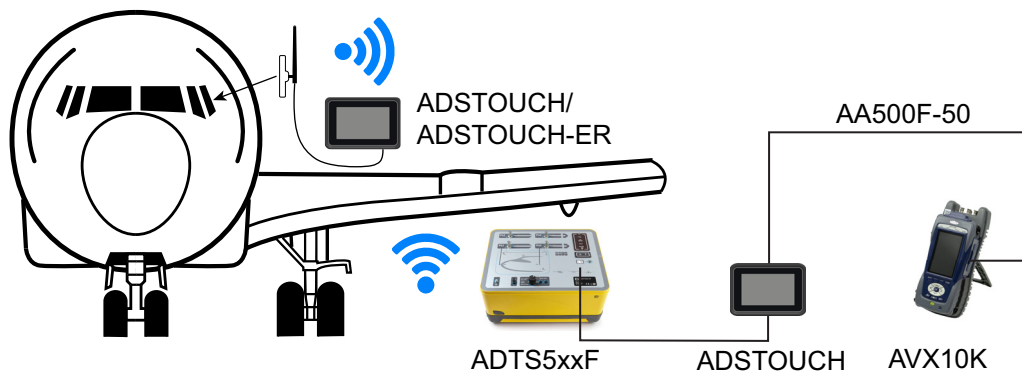


Figure B-2: Typical Cable Connections

Connect the VIAVI-AVX10K to the USB-A port of an ADSTOUCH using cable kit AA500F-50. Make sure that each adapter is correctly installed as identified on the cables.

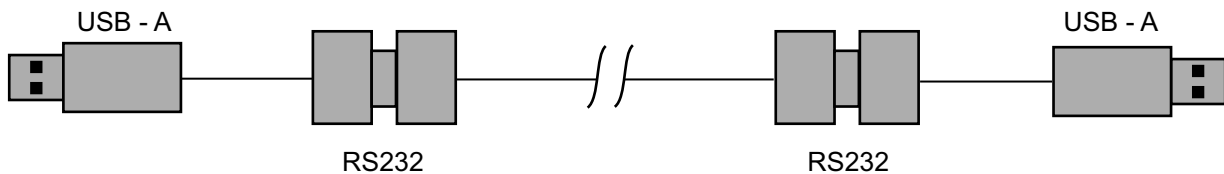


Figure B-3: AA500F-50 Cable Kit

The ADTS5xxF supports using up to two ADSTOUCH units. You can connect the VIAVI-AVX10K to either of the ADSTOUCH units connected to the ADTS5xxF. This means that you can connect to the VIAVI-AVX10 on the flightline while having another ADSTOUCH or ADSTOUCH-ER in the cockpit.

B.3 Software Communication and Connection

1. Set the VIAVI-AVX10K to stream the transponder data. See the VIAVI-AVX10K instruction manual for how to configure this.
2. Download the 'AVX-10K Altitude Streaming Feature' Application Note from the VIAVI website:

<https://www.viavisolutions.com/>

3. Connect the VIAVI-AVX10K and start sending data to the ADSTOUCH as shown in the VIAVI Application Note.

- On the ADSTOUCH screen, swipe left on the **DASHBOARD** to see the **TRANSPONDER** option.



Figure B-4: ADTSTOUCH Dashboard Screen

The ADTSTOUCH will scan for a transponder data stream, either locally or across any other ADTSTOUCH connected to the base unit. When it has found the stream, the ADTSTOUCH will show the mode-S and mode-C information.

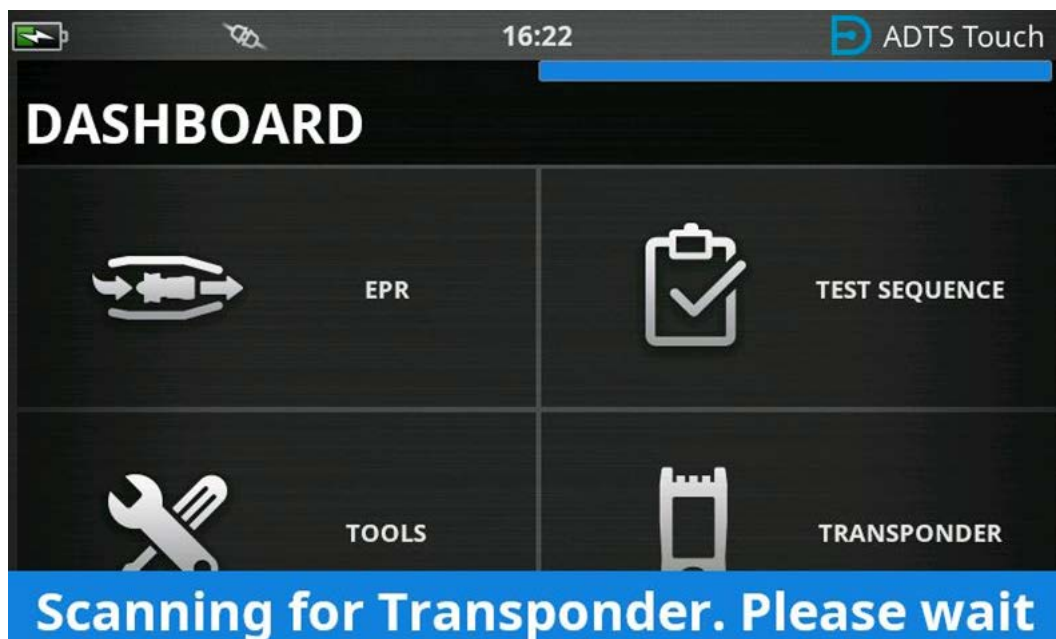


Figure B-5: Scanning for Transponder

Appendix B. ADS-B Transponder Option

If the ADSTOUCH does not receive data you will see the following screen. Check connections and setup of the VIAVI-AVX10K to make sure that it is sending data.

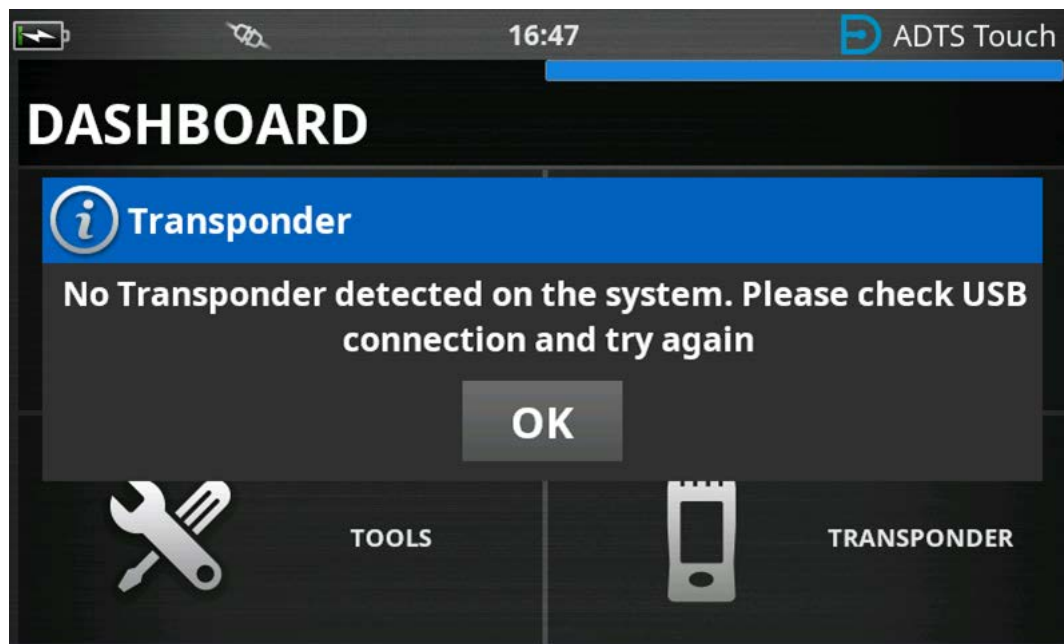


Figure B-6: No Transponder Detected

B.4 MEASURE Mode

If data is being successfully received by one of the ADSTOUCH units the transponder **MEASURE** screen will be as shown in Figure B-7. There is no further setup necessary.



Figure B-7: Transponder Measure Screen

By default, the ADTSTOUCH shows ALT1 & CAS1 channel data. It will select the same units as those transmitted by the aircraft, usually feet and knots.

This screen shows the following information from the aircraft transponder:

1. Tail number

2. Mode-S address
3. Mode-C altitude
4. Mode-S altitude
5. Mode-S airspeed

The user may toggle between aero and pressure units for the ADTS measurement channels. The ADS-B reading is always shown in aero units.

On a 4-channel unit, the user may select between three channel view (ALT1/ALT2/CAS1) and two channel view (ALT2/CAS2) using the channel toggle in the bottom right-hand corner of the transponder screen. Swipe left to view the tolerance settings for Mode S and Mode C and Time stamp of transmission.



Figure B-8: Transponder Measure Options

B.5 Connection Lost

If the data stream is lost at some point during the test the ADTSTOUCH screen will show the following message. It will then return to the **DASHBOARD** screen.

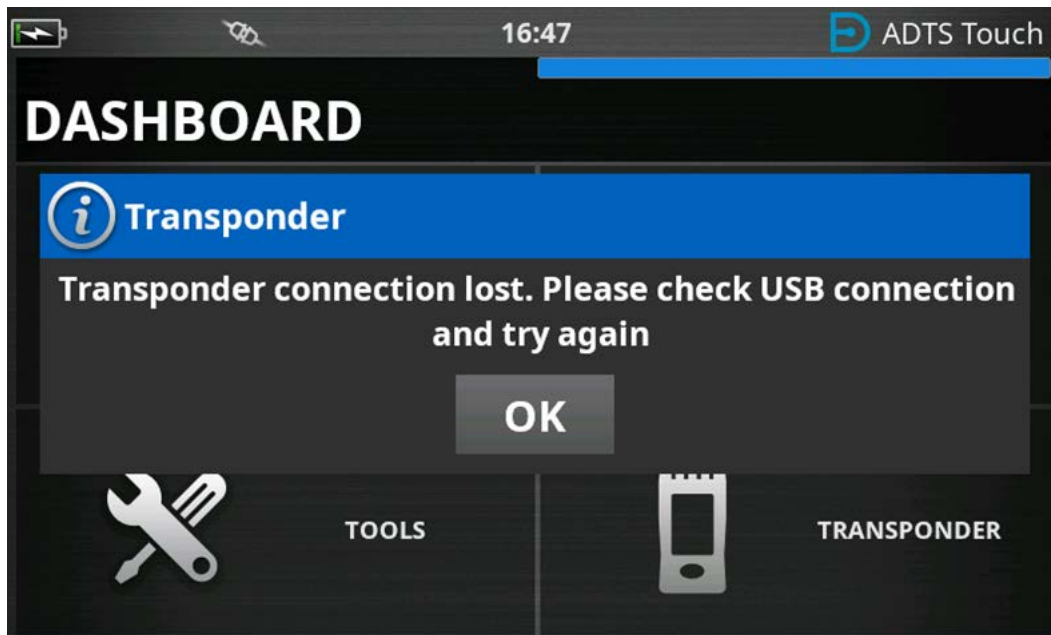


Figure B-9: Transponder Connection Lost

B.6 CONTROL Mode

1. Select **CONTROL Mode** to change the altitude and airspeed applied by the ADTS. The screen will change to show the control options as in Ps & Pt mode.



Figure B-10: Transponder Control Screen

2. Select the **Aim** or **Rate Aim** value to enter a new aim (see Ps screen instructions for more details). Select the 'tick' mark to confirm. The ADTS will move towards the new aim. The value will turn green when it reaches the Altitude or Airspeed setpoint.
3. When necessary, select **Go to Ground** to control the aircraft to ground.

B.7 Mode-C and Mode-S Readings

These readings will show a green border if:

- The Mode-C value reported by the aircraft is within 100 feet of the current ADTS altitude.
- The Mode-S value reported by the aircraft is within 25 feet of the current ADTS altitude.



Figure B-11: Transponder Control Screen at Setpoint

B.8 Completion of the Test

On completion of the test:

- Select **Go to Ground** to return the aircraft to ground conditions
- or
- Select **Home** to return to the **DASHBOARD** and select another function.

If the data stream is lost during testing the ADTSTOUCH will show a warning message asking the user to re-connect the transponder and try again. It will return to the **DASHBOARD** screen. Re-establish the connection and select **Transponder** to continue testing. If the connection cannot be remade, select the **Pitot Static** option to control the ADTS.

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