# Airtext Installation Manual

Doc# 2016-25-05  Oct 30 2018, Rev F

Send Solutions
1765 Grassland Parkway, Suite D
Alpharetta, GA 30004

# Trademarks and Copyrights

©2015,2016,2017 The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Send Solutions is under license. Other trademarks and trade names are those of their respective owners.

# Record of Revisions

| Revision | Revision Date | Description |
|---|---|---|
| IR | April 2016 | Initial Revision |
| A | August 2016 | Part Number changes |
| B | April 2017 | Added information for Airtext + |
| C | May 2017 | Added digital IO Info |
| D | September 13, 2017 | Clarified Doc Number |
| E | Dec 7 2017 | Fixed coax cable information chart on page 11. Updated Figure 1. |
| F | Oct 30 2018 | Improved accuracy of RF Cable loss information in coax cable information chart and added some recommended Iridium Antenna information on page 11. |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Current Revision Description

| Section Number / Page Number | Description of Change |
|---|---|
| Pg. 11 | Fixed coax cable RF Loss information chart and added additional recommended Iridium Antenna information. |
| | |
| | |

# Definition of Warnings, Cautions, and Notes

**Warnings**

Warnings indicate that immediate attention must be given to avoid potential equipment damage and personal injury should the instructions be disregarded.

**Cautions**

Cautions indicate an alert to potential damage to the equipment if the procedural step is not directly followed.

# *Aviation Limited Warranty*

Send Solutions warrants Airtext against material or manufacturing defects for a two-year period. Warranty begins on date of installation.

If product support is required, please call our Technical Support team at 678-208-3087 to obtain assistance. If the return of the unit to the factory is required, an RMA number will be issued at that time. Send Solutions will, upon receipt of the failed hardware, remanufacture or replace the unit at our discretion.

Send Solutions will pay Ground Shipping charges for warranted items. Charges for express shipment will be the responsibility of the sender.

This warranty is not transferable. Any implied warranties expire at the expiration date of this warranty. We shall not be liable for incidental or consequential damages.

This warranty does not cover a defect or failure that has resulted from improper or unreasonable installation, use, or maintenance as determined by Send Solutions. This warranty is void if there is any attempt to disassemble or open this product without factory authorization.

Any labor charges associated with the removal of product or related troubleshooting by a firm other than Send Solutions or its designee will not be covered.

# Table of Contents

## Contents

## List of Figures



# General Description

## Introduction

This manual is intended to provide physical, mechanical, and electrical information for use in the planning and design of an Airtext hardware unit into an aircraft. It is not a substitute for an approved airframe-specific maintenance manual, installation design drawing, or complete installation data package. Attempting to install equipment by reference to this manual alone, and without first planning or designing an installation specific to your aircraft, is not recommended. The content of this manual assumes use by competent and qualified avionics engineering personnel and/or avionics installation specialists using standard aviation maintenance practices in accordance with Title 14 of the Code of Federal Regulations and other relevant accepted practices. It is not intended for use by individuals who lack the competencies set forth above.

## Equipment Description

Airtext solves the problem of staying connected electronically to business, friends, and family without the high cost of a traditional internet option. Airtext allows up to 16 passengers the ability to send and receive SMS messages anywhere in the world. Using the Iridium satellite network, we have designed a product that allows connectivity through your cell phone while on the airplane.

# Technical Specifications

## Physical Characteristics

| Specification | Airtext | Airtext + |
|---|---|---|
| Operating Temperature Airtext | -40C to +75C (At less than 75% RH) | -40C to +65C (At less than 75% RH) |
| Storage Temperature | -40C to +85C (At less than 95% RH) | -40C to +85C (At less than 95% RH) |
| Operating Voltage | +11 VDC to +32 VDC | +11 VDC to +32 VDC |
| Operating Current | .276 Amps @ 12 Volts, and .12 Amps @ 28 Volts | .276 Amps @ 12 Volts, and .12 Amps @ 28 Volts |
| Inrush Current | 10 Amps for 8uS @ 28 Volts | 10 Amps for 8uS @ 28 Volts |
| Size (Without antennas & cables) | 7.5” X 4.6” X 1.4” | 7.5” X 4.6” X 1.4” |
| Weight Airtext | 1 lb. 1 oz. | 1 lb. 2 oz. |
| Materials | Black Anodized Aluminum | Black Anodized Aluminum |
| DO-160 Testing | Section 16 Category Z, Section 21 Category M | Section 16 Category Z, Section 21 Category M |
| Antenna Connector | TNC, Female Standard | TNC, Female Standard |

## Bluetooth Specifications

| Characteristics | Specification |
|---|---|
| Bluetooth Version | 4.1 |
| Bluetooth Class | 2.0 |
| Maximum Transmitter Power | 4 dBm (2.5 mW) |
| Effective unimpeded range | 33 feet (10 m) |

## Certification

FAA STC Number: ST04269AT with PMA approval.

This device complies with DO-178B design assurance Level E.

## Limitations

**Operation**

Airtext wireless system has been tested for interference. Its operation must not interfere with the proper operation of any required aircraft equipment or systems. The installation requires the installer to verify that there is no interference using the post-installation check-out procedure.

**Installation**

For preservation of essential equipment in aircraft with multiple power busses, Airtext should be powered from a non-essential, shedable bus.

# Installation Overview

## Introduction

This section provides the equipment information for installing Airtext and related optional accessories. Installation of Airtext should follow the data detailed in this manual. Cabling is typically fabricated by the installing agency to fit each particular aircraft. Always follow acceptable avionics installation practices per advisory circulars AC 43.13-1B and AC 43.13-2B or later FAA approved revisions.

## Unit Hardware Configurations

Airtext is available with the following part numbers.

| Model | Part P/N | Description | Installation Kit |
|---|---|---|---|
| Airtext | 15G25 | 16 Text users | Airtext Install |
| Airtext + | 15G25-2 | 16 Text users and Voice | Airtext Install |
| Airtext + | 15G25-3 | 64 Text users | Airtext Install |

## Installation Material Required but Not Supplied

Airtext units are intended for use with standard aviation accessories. The following items are required for installation but not supplied:

1. Airtext™ Application
2. Wire (MIL-W-22759/20 or equivalent)

**NOTE**

Extra care must be taken to adequately support and protect the wiring due to its thin insulation.

3. Shielded wire (MIL-C-27500 cable utilizing M22759/20 wire (TG) or ETFE jacket (14), or equivalent)

4. Aircraft hardware for installation, including #6 screws, nuts / nut plates, washers, and rivets

5. Bonding strap hardware

**NOTE**

In order to reduce HIRF susceptibility for LRUs interfaced to Airtext, it is recommended to include a bonding strap on Airtext router. This bonding strap is not required per Airtext STC. However, certain STCs may require it. If applicable, please reference your installation's STC documentation for further installation requirements.

6. Push/pull (manually resettable) circuit breaker

7. Tie wraps or lacing cord

8. Ring terminals (MS25036 or equivalent)

9. Shield terminators (MIL-S-83519 or equivalent)

10. Silicon fusion tape (Send Solutions P/N 700-00022-100 or equivalent)

11. Compatible portable electronic device (PED)

## Special Tools Required

### Pin Contact Numbers

| Wire Gauge | DB 25 – pin Contacts<br>20-24 AWG |
|---|---|
| Send Solutions P/N | 460-00005-000 |
| Military P/N | M39029/7-357 |

### Recommended Crimp Tools

| Wire Gauge | Hand Crimping Tool | 20-24 AWG Positioner | Insertion Extraction Tool |
|---|---|---|---|
| Military P/N | M22520/2-01 | M22520/2-09 | M81969/1-04 |
| Positronic | 9507 | 9502-4 | M81969/1-04 |
| Amp | 601966-1 | 601966-6 | 91067-1 |
| Daniels | AFM8 | K42 | DAK95-22MB/ DRK95-22MB |
| Astro | 615717 | 615725 | M81969/1-04 |

**NOTE**

Non-Send Solutions part numbers shown are not maintained by Send Solutions and are subject to change without notice.

## Cabling and Wiring

Wiring should be installed in accordance with AC 43.13-1B Chapter 11. When wire separation cannot be achieved, the following issues should be addressed:

• The cable harness should not be located near flight control cables, high electrical capacity lines, or fuel lines.

• The cable harness should be located in a protected area of the aircraft.

• Do not route cable near high-energy sources.

See the interconnection diagrams in Figure 2 for the appropriate wiring. Once the cable assemblies have been made, attach the cable connector. Route the wiring bundle as appropriate. Avoid sharp bends.

For Airtext, use 22 AWG or 20 AWG wire for all connections including power/ground.

**CAUTION**

Check wiring connections for errors before connecting the 25-pin D-sub to Airtext. Incorrect wiring could cause component damage.

## Coax Iridium Antenna Cable Considerations

RF Path Signal loss is determined by the coax cable type, its length, and condition. Minimize cable length to preserve signal strength. The total implementation loss for an antenna, connectors, cable, disconnects, lightning arrestor, and any other RF component between the Airtext router and the antenna should not exceed 3dB.

| Coax Cable Type | Approx. Signal Loss per 100 ft. | Cable Diameter inch | Minimum Bend Radius |
|---|---|---|---|
| PIC S86208 (RG-142) | 18.04 dB | .13 | .65 inch |
| Emteq PFLX195-500 (RG-142) | 14 dB | .20 | .5 inch |
| PIC S33141 (RG-393) | 8.63 dB | .27 | 1.4 inch |
| PIC S55122 (RG-393) | 6.5 dB | .31 | 1.55 inch |
| Emteq PFLX240-500 | 11 dB | .242 | .75 inch |
| RG-8A (non-aviation) | 8 dB | .405 | 1 inch |

Example cable: Pic Wire and Cable Company; www.picwire.com
Part Number: 34480-4300-04. 10' CABLE ASSEMBLY W/ S33141 CABLE & 190308 TNC Male Straight connector & 190309 TNC Male Right Angle Connector.

## Iridium Antenna Options

Antcom, Cobham/Comant, Sensor Systems… are some of the manufacturers of Iridium antennas. Newer models of Iridium antennas such as Sensor Systems S67-1575-410 support higher transmit power capability that may be needed for Iridium Certus℠ Broadband, available starting in 2019 as Iridium's next-generation satellites come online. Dual and Quad antennas are available to permit replacing a single channel GPS antenna or single channel Iridium antenna with a GPS/Iridium or GPS/multiple iridium that are designed to use existing mounting hole pattern and existing doubler.

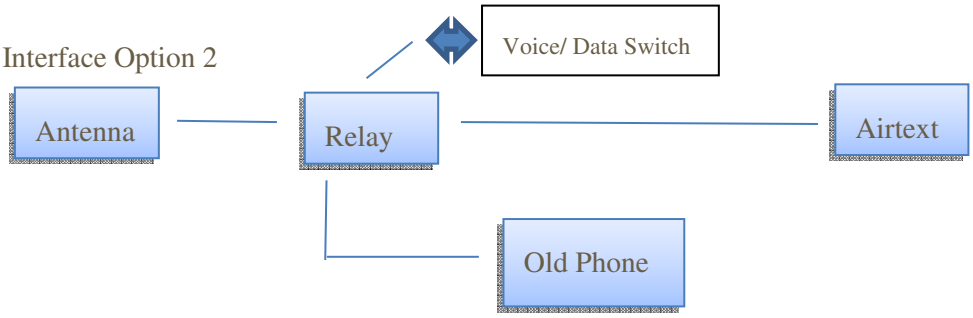
## Sharing an Antenna

If there is an existing Iridium antenna on the airplane that is occasionally utilized for a phone it may be possible to share the antenna with Airtext. This is accomplished with a relay and switch to share the use of the antenna. The switch should be marked Voice (for phone use) and Data (for Airtext use). For the STC a Pasternak PE7147 Relay was used. Any similar coax relay would be sufficient.

If antenna sharing is not required, then interface option 1 can be used. If the existing Iridium antenna is to be shared with the phone, then interface option 2 may be used. Components are: Airtext, an A/B switch, a coaxial relay, and the Iridium phone antenna. The second interface would require installing an Iridium antenna. Components are: Airtext and the Iridium antenna.

Interface Option 1


Interface Option 2




## Mounting Requirements

Airtext should be mounted in a pressurized and heated location. To achieve optimal Bluetooth reception, mount Airtext as close as possible to the cabin. The optimum location is in a side wall near the center of the cabin. Alternate Bluetooth antennas are available if the Airtext router must be mounted beneath a metal or carbon fiber floorboard, or in a cabinet or behind a partition made from metal honeycomb where Bluetooth transmissions may be degraded. A multitude of sizes and shape antennas and various length antenna cables are available. Select one that is designed to work with Bluetooth radios. These antennas and their extension cables replace the stub antennas supplied by Send Solutions. Some models may be purchased through Send Solutions.

Cooling air is not required except in locations where the specified maximum ambient operating temperature may be exceeded.

# HARDWARE INSTALLATION PROCEDURE

This section provides hardware equipment information for installing Airtext. For interconnects with interfaced equipment, see Figure 2.

## Wiring Harness Installation

Allow adequate space for installation of cables and connectors. Observe minimum bend radius for the coax cable. All electrical connections are made through a 25-pin D-sub connector provided by Send Solutions. Construct the wiring harness according to the information contained in this and the following sections. Cable lengths will vary depending upon installation.

1. Strip all wires going to the D-sub connectors 0.17".

2. Insert the wire into the pin and crimp with one of the recommended (or equivalent) crimping tools.

3. Insert the pin into the D-sub connector housing locations as specified by the interconnect drawing.

4. Verify the pin is properly engaged into the connector by gently tugging on the wire.

5. Route and secure the cable run from Airtext to the other units away from sources of electrical noise. See cable and wiring above for the electrical characteristics of all input and output signals. Required connectors and associated hardware are supplied with the connector kit. See Figure 3 for sample interconnect wiring diagrams.

## Airtext Backshell Assembly and D-sub Connector

| | Description | Send Solutions P/N |
|---|---|---|
| Qty 2 | Spring Latch Plate ITT Cannon D110278 | 460-00002-000 |
| Qty 1 | Backshell, 25 Pin ITT Cannon DB11533922 | 460-00003-025 |
| Qty 1 | Conn, HD D-Sub, 25 Pin TE Connectivity 1757820-3 | 330-00626-15 |

### Backshell Assembly Procedure

The parts for the connector and backshell assembly for Airtext installations are listed above.

Connector and Backshell should be assembled in such a way that the shield (if used) of the cable is attached to the ground return or airframe at one end only. If the shield is connected to the connector backshell at the Airtext end, then it should not be connected to the airframe at the far termination or mid disconnects.

Shielded Cable Preparation

1. At the end of the shielded cable, strip back a 2.5" maximum length of the jacket to expose the braid. Remove this exposed braid. Carefully score the jacket 1/4" to 5/16" from the end and remove the jacket to leave the braid exposed.

**NOTE**

Solder sleeves with pre-installed shield drains may be used instead of separate shield terminators and individual wires. Using solder sleeves with pre-installed lead effectively takes the place of step 7.

2. Connect a 22 AWG wire to the exposed shield of the prepared cable assembly. AC 43.13 may be a helpful reference for termination techniques.

**NOTE**

Solder Sleeves with pre-installed lead: A preferred solder sleeve is the Raychem S02 Series with the thermochromic temperature indicator. These solder sleeves come with a pre-installed lead. For detailed instructions on product use, refer to Raychem installation procedure.

3. Slide a shield terminator onto the prepared cable assembly and connect the wire to the shield using a heat gun approved for use with solder sleeves. The chosen size of solder sleeve must accommodate both the number of conductors present in the cable and the wire to be attached.

**NOTE**

Each tapped hole on the shield block may accommodate only two ring terminals. It is preferred that a maximum of two wires be terminated per ring terminal. Two wires per ring terminal will necessitate the use of a ring terminal, #8, insulated, 14-16 AWG (MS25036-153). If only a single wire is left, or if only a single wire is needed for this connector a ring terminal, #8, insulated, 18-22 AWG (MS25036-149) can accommodate this single wire. If more wires exist for the connector than two per ring terminal, it is permissible to terminate three wires per ring terminal.

5. Terminate the ring terminals to the shield block by placing items on the pan head screw in the following order: split washer, flat washer, first ring terminal, second ring terminal if needed, before finally inserting the screw into the tapped holes on the shield block.

6. Wrap the cable bundle with silicone fusion tape (P/N 700-00022-100 or a similar version) at the point where the backshell strain relief and cast housing will contact the cable bundle.

7. Place the smooth side of the backshell strain relief across the cable bundle and secure using the two screws.

**WARNING**

Placing the grooved side of the strain relief across the cable bundle may damage wires.

**NOTE**

Ensure the Airtext router's serial number and Iridium Radio's IMEI number, located on the bottom of the unit is noted and saved in a convenient location for future reference.

## Airtext Mounting

The Airtext transceiver is mounted using four #8 pan head screws (MS35206, AN526, or equivalent) onto a solid surface. Install Airtext in accordance with AC 43.13-2B chapter 2. Torque fasteners until snug, plus one-quarter turn. The unit can be mounted either horizontally or vertically to match the best space found in the aircraft. Because the weight of Airtext is only 1.1 lbs., the impact of the weight to the surrounding structure is negligible. Airtext should be mounted inside the cabin to get better signal strength.

An alternative STC approved mounting option is via hook and loop (Velcro) fastener. Airtext mounting via two 3" strips of 1" Velcro exceeded a 9G pull test for securing the device. Velcro used was Part # PBEGE1.00H (hook) and Part # PBGE1.00L (loop) manufactured by Skandia Inc. www.skandiainc.com

# ROUTER CONFIGURATION

The personality of the Airtext router can be tailored for use in several kinds of environments. Each unit is shipped with a standard configuration suitable for type 25 aircraft using ARINC-429 data that is connected to the Airtext router's channel 1 input using GAMA protocol at HIGH speed. This works for most aircraft even if ARINC-429 wiring is not connected to the Airtext router. Send Solutions technical staff can tailor a configuration specific to your use case. It is applied to the Airtext router using a phone or tablet in a few seconds in the same manner that the router is updated with new revisions of firmware.

ARINC data or Weight on Wheels status is useful to the Airtext router as it can automate some take-off and landing functions for a more pleasant and intuitive experience for both flying and ground-based users.

## List of configurable items

## System Firmware Configuration.

A portion of the configuration file is used for internal housekeeping and verification. Do not make changes to the configuration without knowing what effect each change will have on the system operation.

Landing delay: optional time delay can be inserted between the physical landing of the airplane and the triggering of the automated landing functions.

Iridium mailbox inquiry time. Settings are available for Airplane and Fixed location use.

Ground speed threshold: The ground speed that determines Flying and Landed.

## Digital IO configuration

Three digital inputs exist on the Airtext router. Currently the router can be configured to monitor signals such as the state of the optional Iridium antenna sharing relay and the state of the aircrafts Weight on Wheels. The digital inputs support signals from 0 to 50 Volts. Voltages below 2 Volts are interpreted as OFF and voltages above 9 Volts are interpreted as ON. Voltages between 2 Volts and 9 Volts are indeterminate.

Weight on Wheels: Which input (1, 2, or 3) and does it have 28V when landed or when flying.

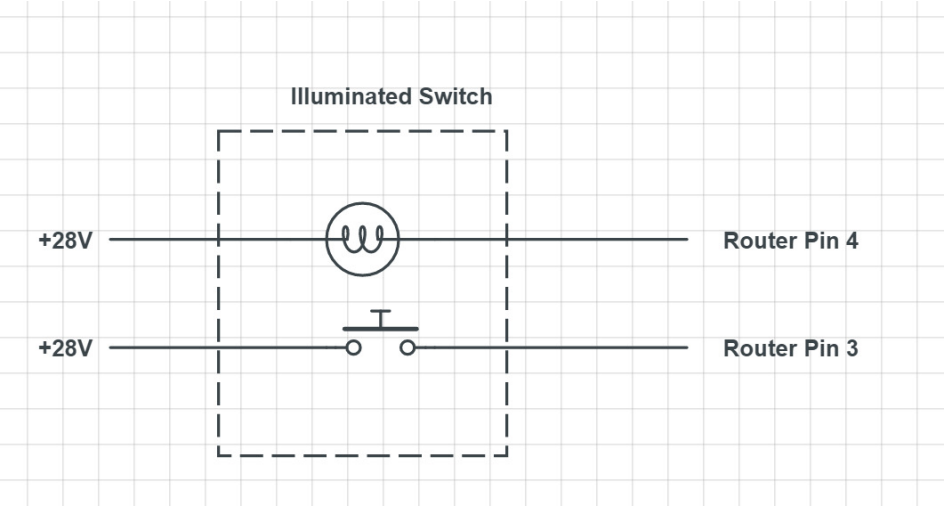
Antenna Sharing: Which input (1, 2, or 3) and does it have 28V when available or not available.

Mailbox check rate: Which input (1, 2, or 3) and the delay values for the active and inactive states.

Fleetlink Message Ack. Which input (1, 2, or 3).

The digital output can be configured for a few different uses such as an indication of the reception of a Fleetlink Message. It is a "Current Sinking" output. It typically drives two terminal peripheral devices such as lamps, annunciators, and relays. One terminal of these devices is typically connected to a power source of up to 50 Volts DC, and the other terminal is connected to the digital output of the Airtext Router (pin 4).

A Sample wiring diagram showing typical Digital Input and Output connections is shown below.




## ARINC Configuration

ARINC configuration specifies which ARINC labels are expected at which bus speed (High or Low), on which port (1 or 2). Typically GAMA labels are predictable. Some FMS publish different data on different labels.

Configurations can be created by Send Solutions Technical Staff to support most Flight Management Systems. Some information about the hardware installation, FMS type, and customer preferences is required. Airtext routers have two ARINC input ports. Each port can be independently set to LOW or HIGH speed. Typically only ARINC Ground speed or the Weight on Wheels signal is needed to automate the take-off and landing functionality. Optional customer preference information might include Altitude, Headwind/tailwind, ETE, Date/Time, GPS Location, Distance to destination, Destination Airport. Ground speed, Air speed, Mach, etc.

Send Solutions recommends that the connection to the airplanes FMS to be GAMA HIGH Speed Protocol with physical connection of the FMS ARINC-429 wiring to the Airtext routers port 1.

## Standard ARINC-429 labels:

Label: 75 ACTIVE WAYPOINT FROM/TO DATA (DSC)
Label: 113 Message Checksum
Label: 125 GREENWICH MEAN TIME (BCD)
Label: 204 BARO CORRECTED ALTITUDE (Feet) (BNR)
Label: Mach number (BNR)
Label: 210 TRUE AIR SPEED (BNR)
Label: 260 DATE (BCD)
Label: 300 STN DECLINATION, TYPE AND CLASS (BNR)
Label: 301 MESSAGE CHARACTERS 7-9 (BNR)
Label: 302 MESSAGE CHARACTERS 10-12 (BNR)
Label: 303: Record (Message) Length/Type/Number
Label: 304: IDENT Characters 1 - 3
Label: 305: IDENT Characters 4 - 6
Label: 306: Waypoint Latitude
Label: 307: Waypoint Longitude
Label: 310 PRESENT POSITION LATITUDE (BNR)
Label: 311 PRESENT POSITION LONGITUDE (BNR)
Label: 312 GROUND SPEED (BNR)
Label: 351 DISTANCE TO DESTINATION (VIA FLIGHT PLAN) (BNR)
Label: 352 ESTIMATED TIME TO DESTINATION (VIA FLIGHT PLAN) (BNR)

Additional configuration specifies how the altitude is presented and if checksums are valid.

# POST-INSTALLATION CHECKOUT

After Airtext is installed, complete the checkout procedures herein to verify proper basic operation.

## Mounting, Wiring, and Power Checks

Check that Airtext is mounted rigidly. Do not connect Airtext to the aircraft harness until the following checks have been performed:

1. Check that all cables are properly secured and shields (if used) are connected at one end only. Either to the shield block of the connector at the Airtext router, at ONE of the disconnects, or at the far termination of the cable. Check the movement of the flight and engine controls to verify there is no interference between the cabling and control systems.

2. Prior to powering up Airtext, check the wiring harness for point to point continuity to expose any faults such as shorting to ground or swapped pins. Any faults or discrepancies must be corrected before proceeding.

3. After accomplishing a continuity check, perform power and ground checks to verify proper power distribution to Airtext. Any faults or discrepancies should be corrected at this time. Remove power from

the circuit powering the Airtext router upon completion of the harness checkout. Airtext connector can be plugged in after completion of the continuity and power checks.

4. Ground checks: Enable power to Airtext when the aircraft placed outside of the hanger with a view of the sky and out of the shadow of tall buildings. Open the Airtext app and send an Airtext text message to your own or your co-workers phone. The message should be delivered within a minute or two. See troubleshooting section below if it is not delivered. Respond to that message after receipt. Again the message should be delivered back to the plane within a minute or two. Detailed instructions to load and use the APP are contained in the next section of this document.

5. Checkout is considered complete when the text message makes the full round trip.

## Bluetooth Texting Setup

When the Airtext router is powered on, it will immediately go into a mode to discover new users. It will form a Dynamic Bluetooth LE bond with up to 16 simultaneous users. It will also form a Dynamic Bluetooth LE bond with up to 64 users on a round-robin connect and release process. That list of bonded devices is rebuilt with each new flight. Explicit or permanent Bluetooth Pairing the way that a hands-free cell phone head set is not needed for Texting.

## First time use.

Airtext system needs three things: Airtext router installed in airplane, Airtext application hosted on a compatible Android or iOS phone or tablet, and a ground based person using a standard SMS cell phone to exchange texts with. The Airtext router connects flying users to ground based users anywhere in the world without altitude or geographical limitations.

The Airtext application is available as a free download on the Google Play Store for Android devices, and available on the Apple App Store for iOS devices. It is installed the same as any other common application or game from the stores.

## Send your first Text.

Place airplane in area with clear view of sky (Airtext rarely works inside hanger and is extremely sluggish under an awning).

Enable power to airplane from ground cart, APU, or main engines.

Launch the Airtext application on your phone or tablet the same way as any other typical application by tapping the Airtext icon.

Enter your full name on the welcome screen and press the Enter or Done button. This name will be the name that is contained in the canned welcome message that each new ground user will see so it should be immediately recognizable.

Press the small Green or Blue button in the bottom right of the Airtext screen to create a new Chat session with a person to whom you wish to communicate with on the ground. Enter their phone number on the top line of the Airtext screen. The application will start listing the phone numbers from the contacts in the phone if any are close to matching. Alternately you can type a name that is in the phones contact list and again, close matches will appear. Click a name or phone number if a perfect match is listed or simply complete the new phone number.

Click the text area at the bottom of the screen to enable the keyboard on the phone and enter the first text that you wish to send. Press the send button to the right of that text area. A small check mark will appear on the message within a few seconds indicating that the Airtext router in the airplane received the message. The message will be sent to the ground user in just a few seconds. Wait a bit for the person to read the message and send a reply. That reply will appear on the screen just below the text that you sent them. Repeat as necessary. Each flying user can set up chats with multiple ground users. Each chat has its own section and message history the same as common cell phones.

At the conclusion of the flight, the flying user simply closes the application and they are done. The Airtext router is simply powered down along with the rest of the airplane. There is no shutdown procedure or process required.

## Bluetooth Voice Setup (Airtext+ only)

Airtext+ uses common Bluetooth hands free headsets the same way that they are used with a cell phone. The Airtext app permits the user to dial with its keypad or from the devices phone book and the audio/voice is handled with the hands free headset. Just like with a cell phone, a Bluetooth hands free headset must be paired and connected. Airtext can be paired with multiple hands free headsets. Bluetooth Pairing means that the router has saved information that permits fast and easy connection. Bluetooth Connection means that there is currently data flowing between the two devices. The Airtext router automatically connects to the last used headset if it is currently available. An icon displaying head set connection status is shown at the top of the Voice Dial screen. It is bright blue when connected and grey when not connected.

Just as with any cell phone and hands free headset, users must initiate a headset disconnection (button push or power down) on the headset before the Airtext router or a common cell phone can connect to a different headset.

A pop-up will appear on the screen asking the user to confirm the new Bluetooth pairing. Bluetooth setup only needs to be run when pairing with a device for the first time. Once a connection is established with a Bluetooth device, Airtext+ will automatically connect to the Bluetooth device upon power-up. Airtext+ will save multiple Bluetooth hands free headset device pairings.

### Make your first Voice call

The system is 95% setup for voice after all the steps for a text conversation have been performed.

The Voice dialing menu is not enabled or visible by default. Navigate to the advanced menu in your Airtext app and enable the “voice dialing” option.

A voice call is started from the Airtext menu. Access the menu in the Airtext app by sliding the menu out from the left edge on Android, or selecting the dialer tab at the bottom of the Apple app. Select the voice dialer and you can select someone from your contacts or dial a new number just like you did for texting.

Connect a Bluetooth hands free headset as described in the previous section if its connection icon is not bright blue.

Select a contact from your phone book and press dial. You will hear progress tones on the head set as the system connects.

Iridium calls take a few extra seconds to connect, but once connected, act just like any other cell phone call. Simply select the “disconnect” button on the Airtext app or the “disconnect” button on the headset when the call is complete. The Iridium call will also be disconnected if the ground user hangs up or the Bluetooth headset loses connection with the Airtext router for more than 30 seconds.

## Optional Configuration

Almost all of Airtext and Airtext+ functionality is enabled and ready to use without any custom configuration. There are a few features that enhance operation that can be enabled or configured from the

Android or iOS (Apple) Airtext applications. These features have very likely already been enabled or configured for your specific install at the factory during the final QA shipment process.

If changes to the configuration or additional configuration is desired, then it can be accomplished using the standard Airtext app. New users should make configuration changes while on a phone call with a member of the Send Solutions technical support staff. Some Airtext configuration settings are only available when Dealer Mode is activated. Call Send Solutions technical support for the instructions for accessing the advanced setup screens.

## Testing Optional features

There is a menu section in the Airtext app for installation. It permits the installer to view ARINC messages on a label by label basis, and view the state of the discrete digital inputs typically connected to weight on wheels and antenna sharing relay status.

## Software Updates

A compatible PED with an active Dealer Mode subscription, and an active Send Solutions Dealer account is required to perform software updates. To activate Dealer Mode, contact Airtext Product Support at (678) 208-3087 extension #1. Request access to update Airtext firmware as a Send Solutions Dealer.

A detailed firmware update procedure is described in Appendix A of this document. In summary:

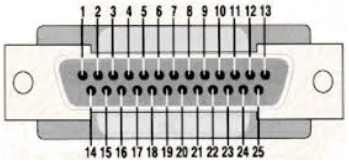
Turn on power to the Airtext router and enable the Airtext App. Clear view of sky and satellite connection is NOT needed.

Open the Dealer menu and click to get the latest version of firmware from the Send Solutions servers and put it on the phone while in WiFi or Cellular data plan range. Then click to send that firmware from the phone to the router.

Older versions of firmware take a little over 15 minutes to update. Newer versions of the firmware transfer in about 3 minutes.

# CONTINUED AIRWORTHINESS

Maintenance of Airtext transceiver unit is on condition. No general maintenance, air filter cleaning, or system monitoring is required.




# CONNECTOR PINOUT INFORMATION

Table 6-1 Airtext Pinout List

| Pin # | Airtext | Airtext + | I/O |
|---|---|---|---|
| 1. | Aircraft Power | Aircraft Power (Plus) | In |
| 2. | Aircraft Power Return (Minus) | Aircraft Power Return (Minus) | -- |
| 3. | Digital Input #1 | Digital Input #1 | In |
| 4. | Digital Output | Digital Output | Out |
| 5. | Reserved | Reserved | -- |
| 6. | ARINC RX 1 A | ARINC RX 1 A | In |
| 7. | ARINC RX 2 A | ARINC RX 2 A | In |
| 8. | Ground | Ground | -- |
| 9. | CAN Bus High 1 | CAN Bus High 1 | In |
| 10. | CAN Bus High 2 | CAN Bus High 2 | In |
| 11. | RS-485 A/ RS-232 TX | RS-485 A/ RS-232 TX Port 1 | Out |
| 12. | Reserved | RS-485 A Port 2 | Out |
| 13. | Ground | Ground | -- |
| 14. | Reserved | Reserved | -- |
| 15. | Reserved | +5V Output (.25 Amp Max) | Out |
| 16. | Digital Input #2 | Digital Input #2 | In |
| 17. | Digital Input #3 | Digital Input #3 | In |
| 18. | Reserved | Reserved | -- |
| 19. | ARINC RX1 B | ARINC RX1 B | In |

| | | | |
|---|---|---|---|
| 20. | ARINC RX2 B | ARINC RX2 B | In |
| 21. | CAN Bus Low 1 | CAN Bus Low 1 | Out |
| 22. | CAN Bus Low 2 | CAN Bus Low 2 | Out |
| 23. | Ground | Ground | -- |
| 24. | RS-485B/ RS-232 RX | RS-485B/ RS-232 RX Port 1 | In |
| 25 | Reserved | RS-485 B Port 2 | In |

# TROUBLESHOOTING

## Initial Installation Troubleshooting.

Enable the "Show Connection Icon" option in the menu if not already enabled. Is it green, yellow, or grey? Green indicates successful recent connection between the phone/tablet and the Airtext router. Yellow indicates a marginal or sluggish connection. If the icon is grey then there is no Bluetooth connection. This may be caused by loss of power, missing Bluetooth antennas, incompatible phone, or disabled Bluetooth on the phone.

Do you get a checkmark in the bottom right corner of a message immediately when you send it, or is there a delay? The check mark indicates successful reception of the message by the Airtext router. This is the first step in getting your message to the ground.

If you get check marks with each sent message and the messages are still not making it to the ground. Did you call us to have the Airtext router commissioned or provisioned? Airtext routers are typically shipped in their enabled condition. If the Airtext unit was shipped more than a month or two prior to installation, then it may be in IRIDIUM SUSPEND condition in order to suspend monthly data charges. Please call Send Solutions Technical support to put the Airtext router in operate condition. Please have the Airtext Serial number or the Iridium IMEI number (from the label on the rear of the unit) available when calling.

Select the "Send Health Message" from the menu. This exercises the Airtext system from the flying PED to the Public Switched Telephone network and back again by sending a message around the full loop and reporting the number of seconds for that full round trip.

Is there a problem with a specific region or country? Try texting a USA SMS phone number.

Are you sure that the antenna for the Airtext router is designed for and certified for use with the Iridium satellite system? Is it an unknown model or might it be designed for GPS, XM, or some other avionics use?

Is the cable between the Airtext router and the Iridium antenna in good condition? Is it crimped, crushed, or abraded? Tighten Type TNC connectors to a torque of 0.45 to 0.68 N-m (4 to 6 inch-lbs.). Is the connector tight but cross threaded or jammed?

Could you have excessive RF attenuation (power loss) between the Airtext unit and the Iridium antenna? What kind of cable is used for the Iridium antenna? Are connector adapters needed at either end of the antenna cable? Are there disconnects in the antenna cable? Are all connectors used between the Airtext router and the antenna specifically designed for use with the exact cable used? What is the length of the antenna cable? What is the loss per foot rating on the cable? Ensure that all this information does not explain more than a 3dB power loss for the antenna system.

Are the Bluetooth antennas connected? Are they bent or broken? If they have cables, are they crimped, crushed, or abraded?

Is the Iridium antenna mounted outside on the top of the fuselage? Is it adjacent to an INMARSAT, Satellite TV, Satellite Radio, or an avionics antenna? Is it in the shadow of a vertical stabilizer? Is it in view of a RADAR antenna?

Is the Airtext unit getting power? Check for open circuit breakers.

Do you have a Voice/Data switch? (Antenna sharing relay). If so, then change the state of the relay to check if perhaps the switch is labeled incorrectly or installed backwards.

Where is the Airtext router mounted? Under a Carbon fiber floor? Behind metal honeycomb partitions hatches, and doors. Is there 6 inches of open space between the Bluetooth antennas and nearby plumbing, wiring, or ribs? Any nearby high current wires from strobes, valves, power converters, galley appliances, microwave ovens, avionics equipment?

Where is the airplane? Is it in the hangar on in a deep canyon formed from buildings/hangars? Optimum location permits 360-degree view of horizon with no obstructions extending into the 8.2 degree (from horizontal plane) free zone.

## If service has slowly degraded over time.

Is the cable between the Airtext router and the Iridium antenna in good condition? Is it crimped, crushed, or abraded? Tighten Type TNC connectors to a torque of 0.45 to 0.68 N-m (4 to 6 inch-lbs). Is the connector tight but cross threaded or jammed?

Are the Bluetooth antennas connected? Are they bent or broken? If they have cables, are they crimped, crushed, or abraded?

Has other equipment be added since Airtext was installed? Have there been any wiring changes or interior work that may have crushed or damaged cables or wiring?

## If Service Suddenly Stopped Working.

Did you pause or suspend your service using the Customer Web Portal? Owners can put their Airtext unit in IRIDIUM SUSPEND condition in order to suspend monthly data charges. The Suspend/Active condition can be inquired and changed using the Airtext Customer Portal. Send Solutions Technical support can also let you know the condition and change it for you. Please have the Airtext Serial number or the Iridium IMEI number (from the label on the rear of the unit) available when calling.

Check your Airtext Customer Portal. It can let you know if your service is in suspend mode or if there are billing or accounting problems.

Do you have a Voice/Data switch? (Antenna sharing relay). Try changing the switch position.

Check for an open Circuit breaker.

Although unlikely, consider hardware failures of the Antenna, Antenna cable, or Airtext router. Lightning strike damage from the antenna connection or the power connection is not impossible. Contact Send Solutions technical support for assistance in diagnosing hardware related problems

## PED (Personal Electronics Device) APP Problems

Get the free Airtext App from the Apple App Store or Google Play Store. Search for Airtext – Inflight Text Messaging and this logo:

## Compatible PED (Personal Electronics Device)

**Android devices** must run on Android version 5 or above. The following devices are known to work. Most new devices are expected to work.

- Google Nexus 5, 6, & 6P
- HTC One mini 2*
- LG G2, G4
- OnePlus One, X
- Samsung Galaxy S2, S4, S4 Mini, S5, S6, S7, Note 2, Note 4
- Sony Xperia Z, Z3

**Apple iOS devices** should as a minimum run iOS version 9.3.

- iPhone 4s and above.
- iPads should be 3rd generation or above.
- iPod Touch should be 5th generation or above.

Airplane mode: The exact operation of Airplane mode varies from phone to phone, and even from one operating system release to another. The most common effect of enabling airplane mode is that it turns off all possible radios in the cell phone. Most devices let you enable airplane mode and then permit the user to re-enable just the radios that they want to use. Be sure to enable Bluetooth after enabling airplane mode in order to use Airtext.

## Wired Data Problems

Airtext routers support several wired data connections to aircraft systems and companion products. ARINC-429 and RS-232 are commonly used to input a variety of avionics information such as GPS, Altitude, and Ground Speed. A common problem with ARINC is swapped A and B wires. Messages will still appear if the wires are swapped, but the channel may have unexpected labels, and those labels may contain wildly incorrect data. The most common problem with RS-232 is improper configuration caused by a mis-communication of the manufacturer, model number, and firmware version of the avionics that it is connected to. Verify that info and Send Solutions Technical support staff can verify the configuration.

## Voice Problems

The menu item for Voice dialing is not made available to users unless enabled via the dealer menu. Call Send Solutions technical support @ 678-208-3087 for instructions on how to enable the voice dialer menu item.

If the Airtext router works for texting but not voice, then check to see if the Iridium Voice SIM card is expired, depleted, suspended, or has billing or accounting problems.

Check to see if the Bluetooth hands free headset is paired and connected.

## What more can be done?

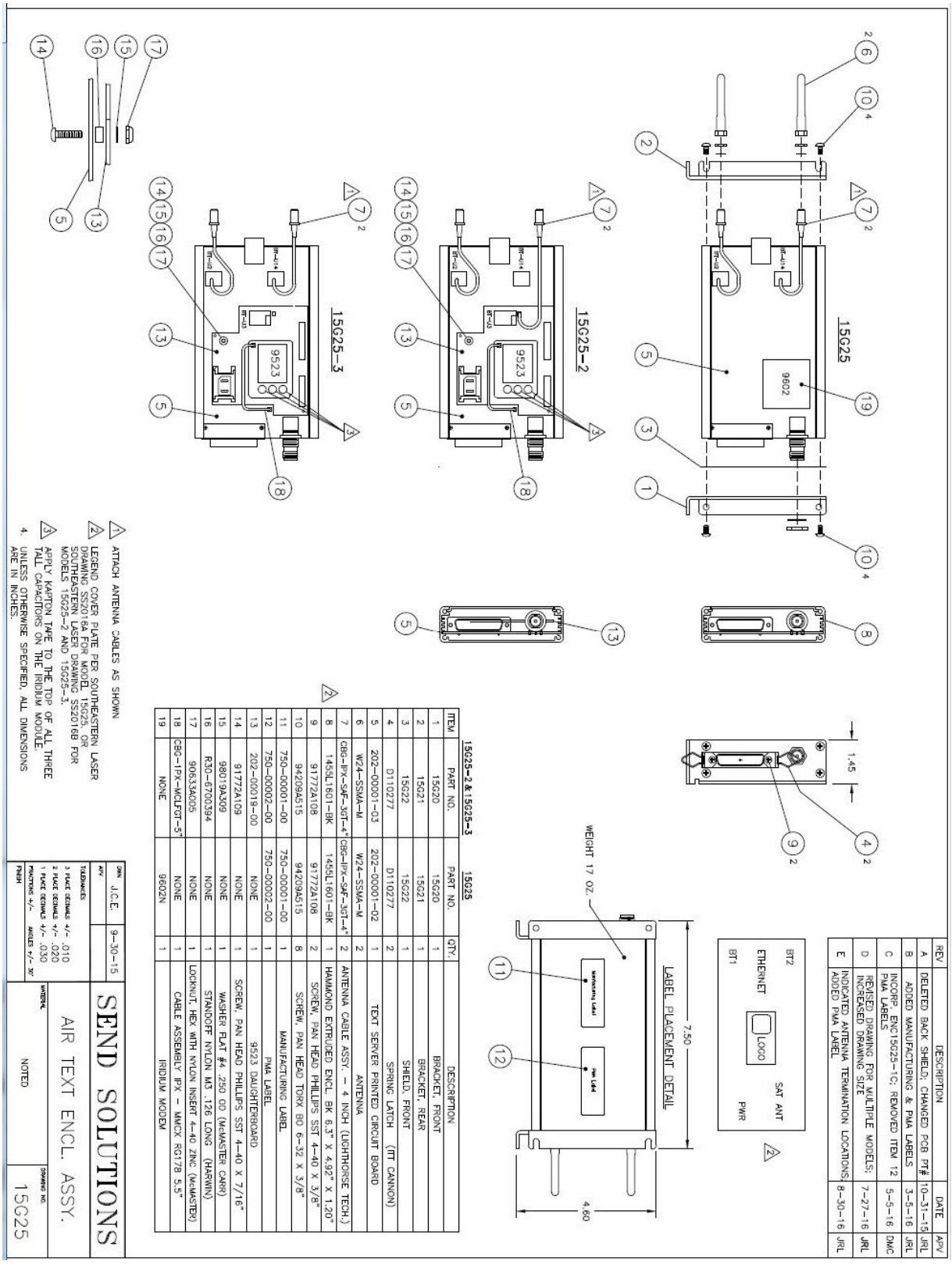
Send Solutions Technical support staff has advanced Network analysis tools available during normal business hours 8am to 5pm Eastern Standard Time. (GMT-5). Please call to schedule a time when we can send test and tracing messages between the Send Solutions ground based servers and your Airtext router.

Aircraft antenna installation vendors have test equipment and historical knowledge that could be useful.

Several Iridium and Satellite communication resources are available on the web.

http://www.beamcommunications.com/media/com_beamcommunications/uploads/downloads/Iridium_antenna_guide_installation_and_user_manual.pdf

**Figure 1 - OUTLINE AND INSTALLATION DRAWING**




| REV | DESCRIPTION | DATE | APV |
|---|---|---|---|
| A | DELETED BACK SHIELD; CHANGED PCB PT#. | 10-31-15 | JRL |
| B | ADDED MANUFACTURING & PMA LABELS | 3-5-16 | JRL |
| C | INCORP. ENC15G25-1C; REMOVED ITEM 12 PMA LABELS | 5-5-16 | DMC |
| D | REVISED DRAWING FOR MULTIPLE MODELS; INCREASED DRAWING SIZE. | 7-27-16 | JRL |
| E | INDICATED ANTENNA TERMINATION LOCATIONS; ADDED PMA LABEL | 8-30-16 | JRL |

| ITEM | 15G25-2 & 15G25-3 PART NO. | 15G25 PART NO. | QTY. | DESCRIPTION |
|---|---|---|---|---|
| 1 | 15G20 | 15G20 | 1 | BRACKET, FRONT |
| 2 | 15G21 | 15G21 | 1 | BRACKET, REAR |
| 3 | 15G22 | 15G22 | 1 | SHIELD, FRONT |
| 4 | D110277 | D110277 | 2 | SPRING LATCH (ITT CANNON) |
| 5 | 202-00001-03 | 202-00001-02 | 1 | TEXT SERVER PRINTED CIRCUIT BOARD |
| 6 | W24-SSMA-M | W24-SSMA-M | 2 | ANTENNA |
| 7 | CBG-IPX-SAF-30T-4" | CBG-IPX-SAF-30T-4" | 2 | ANTENNA CABLE ASSY. - 4 INCH (LIGHTHORSE TECH.) |
| 8 | 1455L1601-BK | 1455L1601-BK | 1 | HAMMOND EXTRUDED ENCL. BK 6.3" X 4.92" X 1.20" |
| 9 | 91772A108 | 91772A108 | 2 | SCREW, PAN HEAD PHILLIPS SST 4-40 X 3/8" |
| 10 | 94209A515 | 94209A515 | 8 | SCREW, PAN HEAD TORX BO 6-32 X 3/8" |
| 11 | 750-00001-00 | 750-00001-00 | 1 | MANUFACTURING LABEL |
| 12 | 750-00002-00 | 750-00002-00 | 1 | PMA LABEL |
| 13 | 202-00019-00 | NONE | 1 | 9523 DAUGHTERBOARD |
| 14 | 91772A109 | NONE | 1 | SCREW, PAN HEAD PHILLIPS SST 4-40 X 7/16" |
| 15 | 98019A309 | NONE | 1 | WASHER FLAT #4 .250 OD (McMASTER CARR) |
| 16 | R30-67700394 | NONE | 1 | STANDOFF NYLON M3 .126 LONG (HARWIN) |
| 17 | 90633A005 | NONE | 1 | LOCKNUT, HEX WITH NYLON INSERT 4-40 ZINC (McMASTER) |
| 18 | CBG-IPX-MCLFGT-5" | NONE | 1 | CABLE ASSEMBLY IPX - MMCX RG178 5.5" |
| 19 | NONE | 9602N | 1 | IRIDIUM MODEM |

| | |
|---|---|
| DRN | J.C.E. |
| APV | |
| | 9-30-15 |
| TOLERANCES | |
| 3 PLACE DECIMALS +/- .010 | |
| 2 PLACE DECIMALS +/- .020 | |
| 1 PLACE DECIMALS +/- .030 | |
| FRACTIONS +/- | ANGLES +/- 30' |
| FINISH | |
| MATERIAL | |
| DRAWING NO. | 15G25 |

**Figure 2 - INTERCONNECT DRAWING**

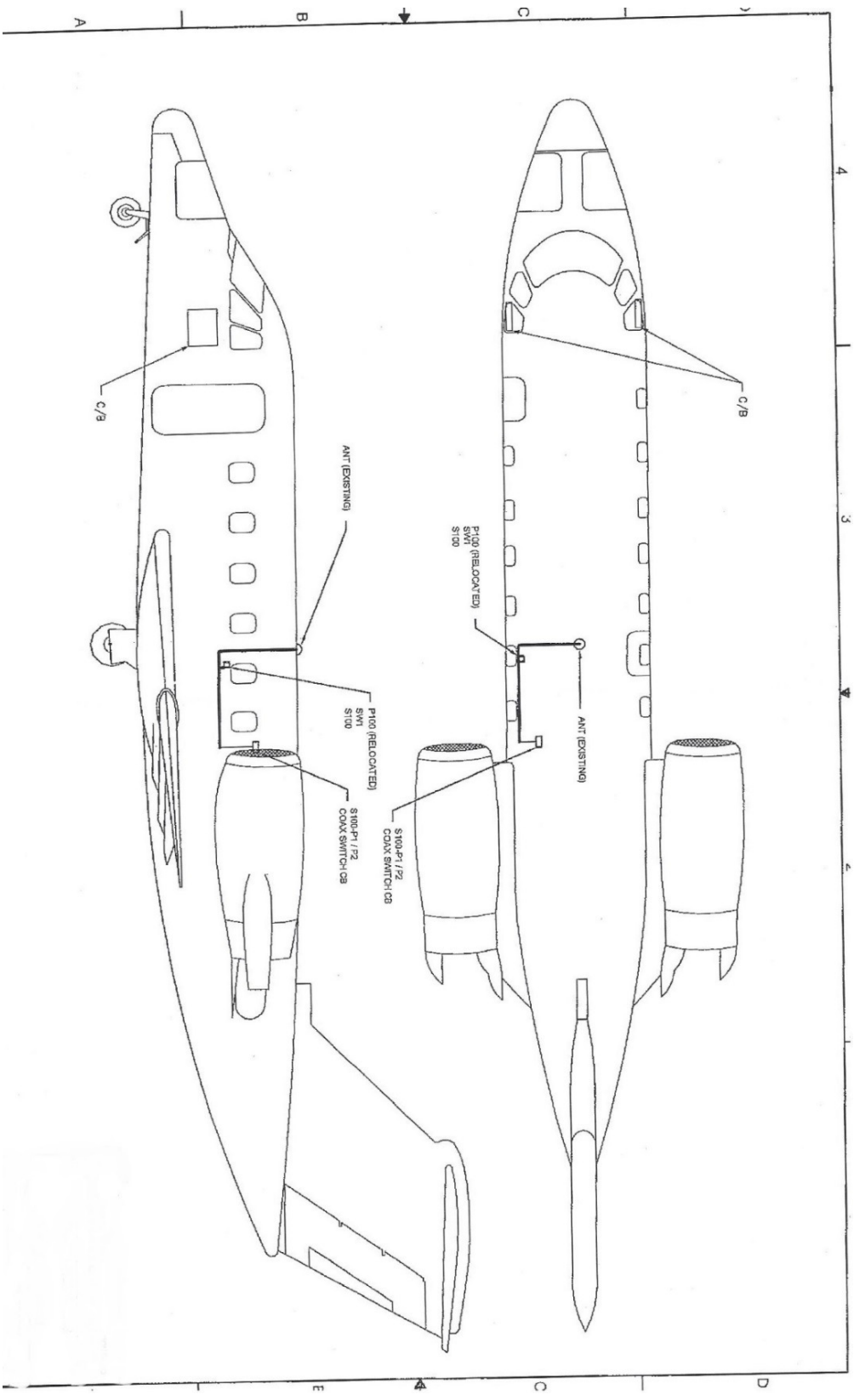


**Figure 3 - Sample Wiring Diagram**

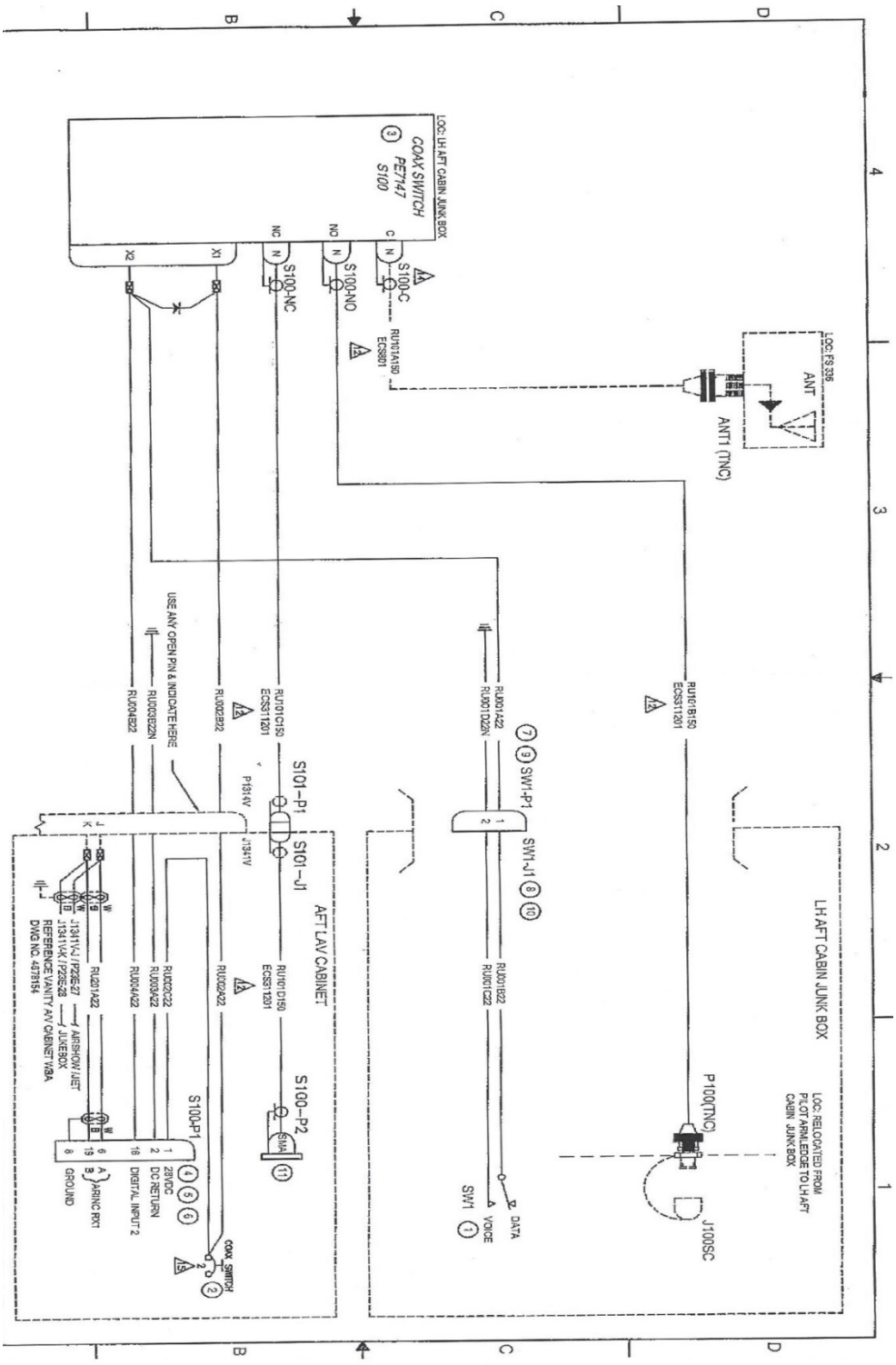
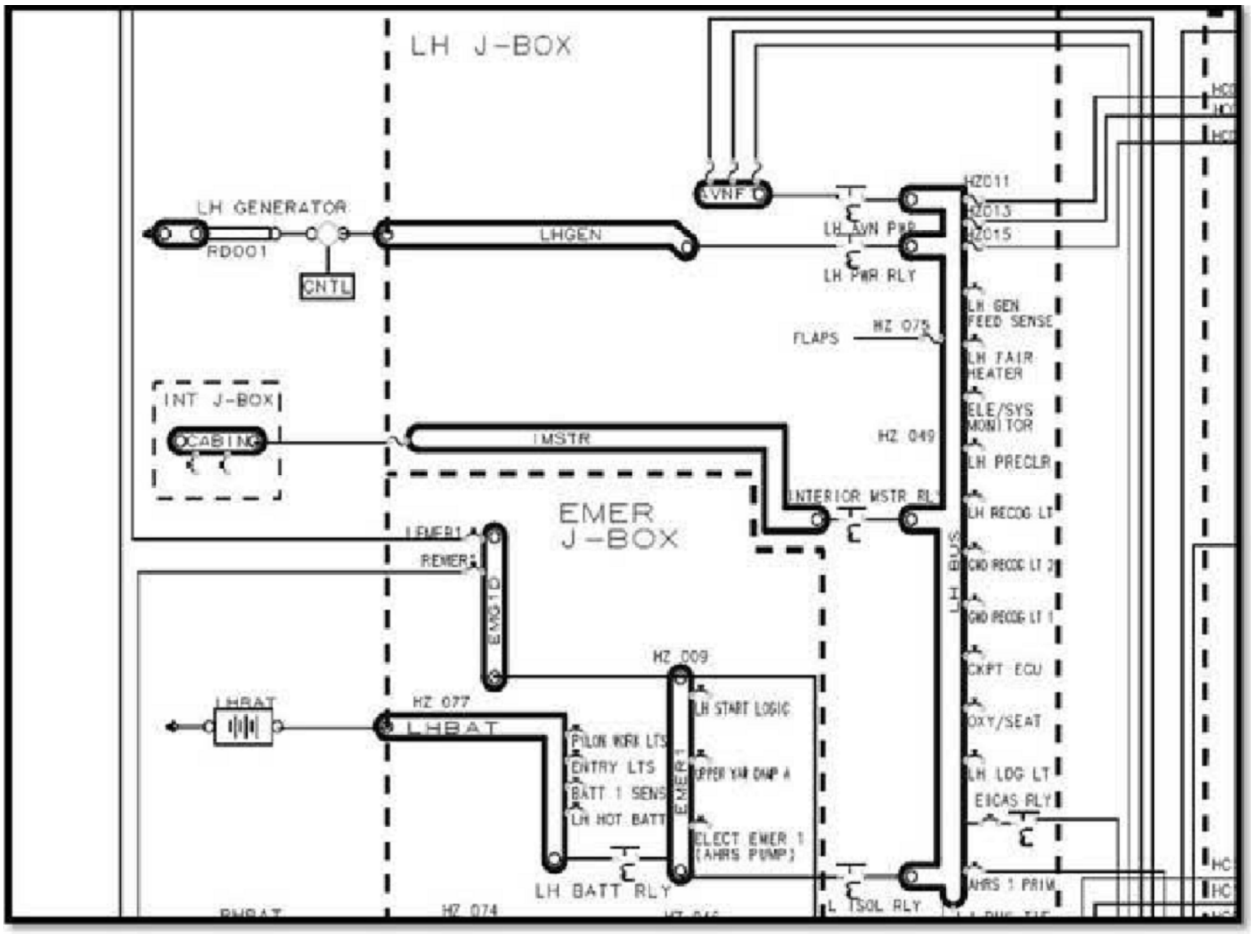


Figure 4 - Sample Interior Power Circuitry – Shedable load




**NOTES**

1 ALL WIRES 22 AWG OR LARGER UNLESS OTHERWISE SPECIFIED.

2 GROUND DESIGNATIONS: SHIELD BLOCK GROUND AIRFRAME GROUND

3 Airtext SUPPORTS BOTH HIGH AND LOW SPEED ARINC 429 CONNECTIONS ON THE ARINC 429 INPUT PORT.

## Airtext - Iridium Antenna Interconnect

Ensure that all components used to connect Airtext to the antenna are designed to work with each other. Slight changes in connector part numbers can mean the difference in a rugged and reliable resulting cable with perfect performance and an unreliable texting system.

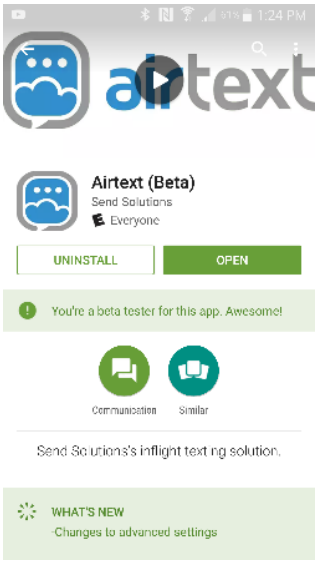
# Appendix A: Airtext router Firmware Updates

## Update Airtext router using ANDROID phone or Tablet

**Section I**

If you have an android tablet or phone that has the Airtext application already installed then skip to section II.

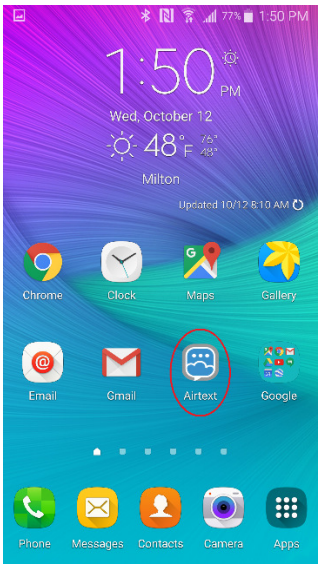
Airtext app can be found on the Google Play store. It will be the one with the Sends Solutions LOGO. The latest version will always be available in the play store. Install and launch just like any other app.

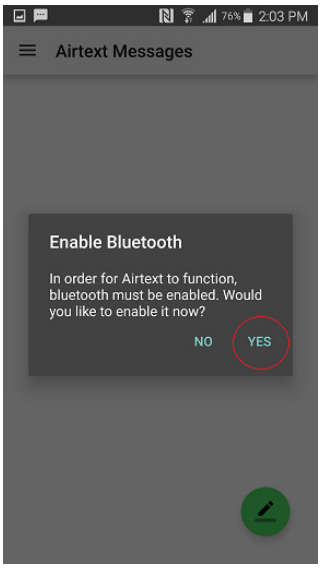



**Section II**

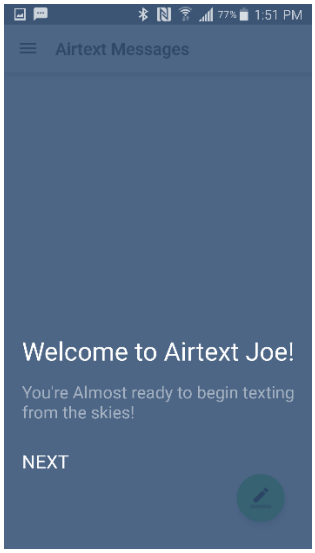
Open the app by selecting the Airtext Icon.

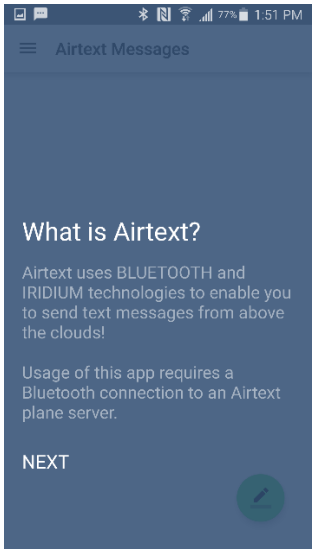
Enable Bluetooth if asked.



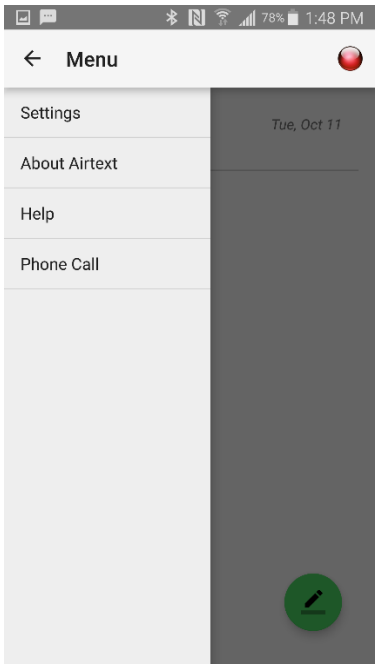



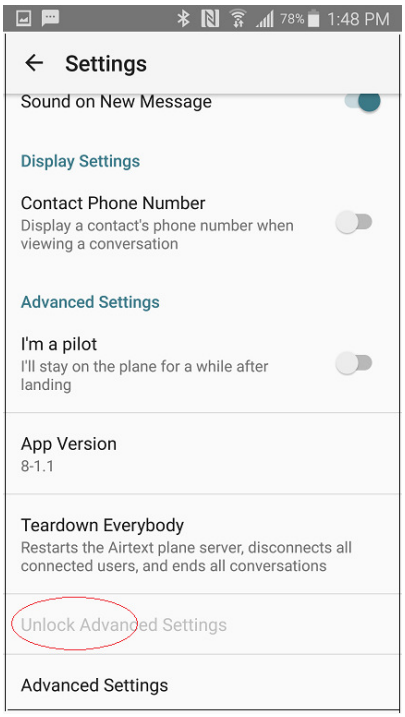

Input your full name such as “Joe Smith” if asked to do so. Step through all of the welcome screens if they show up. The user name you enter here will be the name that ground users will see when they receive a text from you via the Airtext Service.

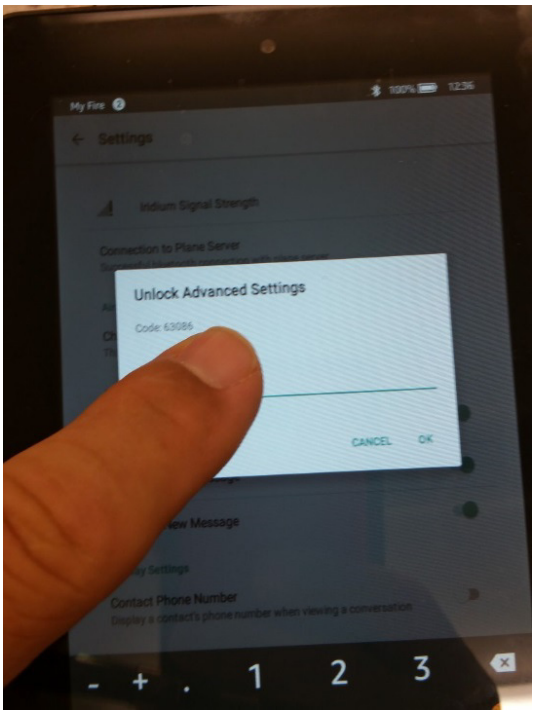




Select the Menu system on the upper left corner. It is indicated with the three lines.

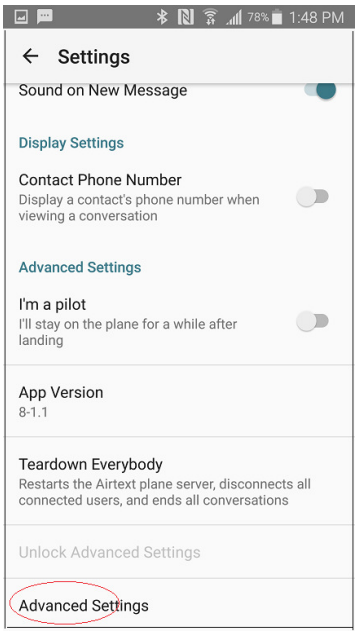




Select the Settings menu, then select the last menu item called “unlock Advanced settings”. A password window will pop up with a randomly generated code number. Please call Send Solutions Technical Support: Telephone: 678-208-3087 Voice Menu 1. Have the code number ready and a member of the technical support staff will issue a password with a limited expiration time.

Enter that password into the menu screen then Press OK. A new menu item appears at the bottom of the menus that permits access all of the advanced settings. Take care while in these menus to guard against inadvertent or unintended changes.

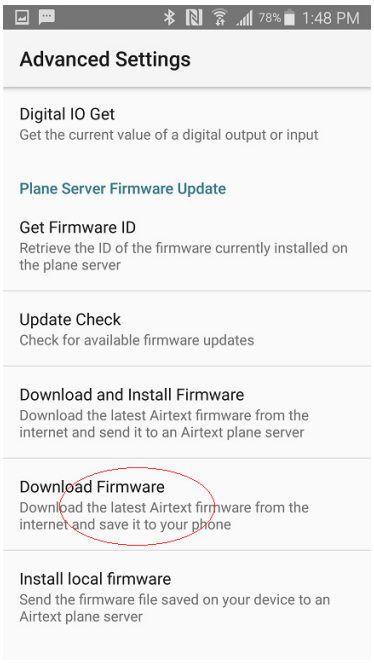
A new menu item appears at the bottom called advanced settings. Select it.




If you already have the latest router firmware saved on the Android device, then skip to section III.

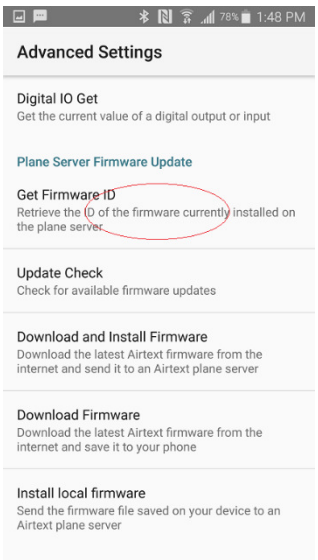
Load the latest firmware from the internet to your Android Phone or Tablet:

While the Android device is within WiFi or Cell Data coverage area, scroll down to the menu item called Download Firmware and select it. It will load the latest router firmware from the Airtext Servers and place a copy in the Android device. The Android device is now ready to update the firmware on the Airtext router.



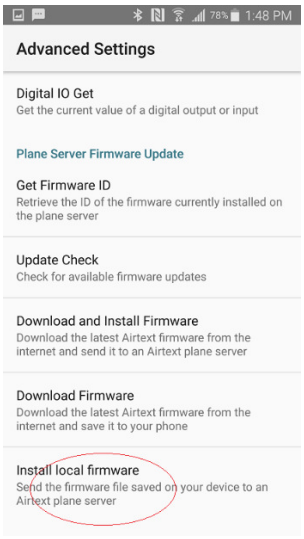

## Section III

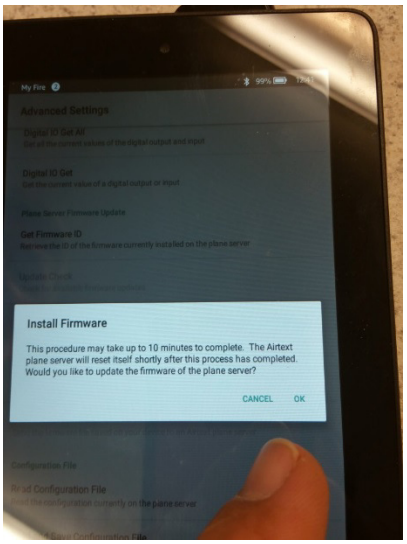
Power up the Airtext router and move within the range of its Bluetooth radios. While in the advanced menu, select "Get Firmware ID"

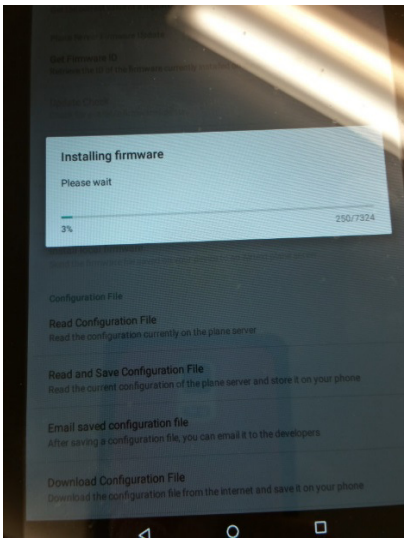



This takes a few seconds. The screen should show the current version firmware that is on the Airtext router. It should be something like "10041610". Record that value. It is in Month/Day/Year/Hour format. Press "ok" to dismiss that screen. This proves that the Android device and the Airtext router have proper Bluetooth connectivity.

Select “install Local Firmware”. Select OK on the popup to approve the load process. There will be a five or ten second delay while the devices connect then a pop up appears with a progress bar. It takes approximately 10 minutes to transfer the new program.




Note: Android phones and tablets typically sleep if no activity is detected on the screen while running on battery power. You can touch the screen every minute or so or connect to a charger to keep it awake. The firmware update process continues during sleep, but it may run at half speed.

The firmware load is complete when the progress bar disappears.

Re-select the “Get Firmware ID” menu item as you did at the beginning of section III when the load is complete. Ensure that the firmware version is different. As of the creation date of this document, the latest revision is 02071710.

Please call Send Solutions Technical Support - Telephone: 678-208-3087 Voice Menu 1. With any questions or comments.


airtext