

SKY CONNECT
MISSION MANAGEMENT UNIT II
(MMU II)

Installation Manual

Aviation Certification Issues

CERTIFICATION – Sky Connect has rights to several Supplemental Type Certificates. Use of this information is provided with purchase of the equipment. Assistance in certification efforts to the installers is offered at **no charge** to the customer or installer. Assistance is provided on Sky Connects scheduling.

Please plan your certification issues with the following in mind; Phone assistance is provided 8am to 5pm Central Time U.S. based on our available time and work load for the day.

Certification teams may be required to perform work on a deadline basis, there will be a fee for such work at the rate of \$150 US per hour. Please contact Sky Connect Technical Services for assistance.

IMPORTANT NOTE

The MMU II comes from the factory with a default Message Set (MSet) loaded to allow the installer to perform testing right out of the box.

The END USER MUST! load their own MSet in order to make the MMU II function as they desire. Creation of the customer's MSet is the responsibility of the customer, and must be done with MSet Manage Software.

IMPORTANT NOTE

WIFI Channels 12 and 13 are restricted in North America. These channels are not to be selected for aircraft being operated in North America.

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LIST OF REVISIONS

Rev.	Description of Change	Date	Approval
IR	Initial Release	6/20/2012	MLF
A	Added note restricting WIFI channels 12 & 13 in North America	3/18/2014	WFH
B	Added -020 and -022 model numbers	8/28/2014	

INDEX OF ACRONYMS

AT	Attention
Ctl	Control
DTMF	Dual Tone Multi Frequency
EASA	European Aviation Safety Agency
FAA	Federal Aviation Agency
MMU	Mission Management Unit
Mset	Message Set
NVG	Night Vision Goggle
POTS	Plain Old Telephone System
RMA	Return Material Authorization
SSID	Service Set IDentifier
VFD	Vacuum Fluorescent Displays

1 GENERAL DESCRIPTION

1.1 INTRODUCTION

This manual contains information relative to the physical, mechanical, and electrical installation of the Sky Connect MMU II. Operating procedures are also included.

Documents you will need in addition to this manual;
Sky Connect Forte' Pilot's Guide
Sky Connect MMU II Operator Guide
Sky Connect Forte' or Fleet Installation Manual

1.2 DESCRIPTION

This MMU II controller is designed to function with the transceiver RS-232 serial ports to control the dialing and text messaging of a transceiver so equipped.

The MMU II is a POTS (Plain Old Telephone System) telephony device that interfaces a 2-wire POTS system such as a satellite transceiver to 4-wire aircraft audio panel. A 2x16 VFD display, rotary knob/push-button and 12-digit keypad provide the user interface. Phone functionality is supported via direct keypad dialing as well as pre-configured phone numbers via a menu or speed dial button. In addition the MMU II serves as a messaging terminal providing pre-stored or freeform text messaging through a proprietary RS-232 serial interface. Messaging is supported on both the 2x16 character display as well as Wi-Fi devices via the built-in Wi-Fi support. An internal Wi-Fi antenna is provided and an optional external antenna may be used. Note: Default Wi-Fi channel is set to 6 with a Frequency of (lower/Center/Upper): 2.426/2.437/2.448 GHz. The Wi-Fi link will be available inside the fuselage.

1.3 TECHNICAL SPECIFICATIONS

1.3.1 DO-160 Qualification Table

ITEM	SPEC
Regulatory Compliance:	DO-160E
Temperature Range:	Section 4 Cat A1D1 (-20C to +55C) Short Term -40C to +70C
Altitude Range:	Section 4 Cat D2 (50,000 feet)
Temp Variation:	Section 4 Cat B
Operational Shocks and Crash Safety	Section 7 Cat B
Vibration:	Section 8 Cat S, U2 Curves (M,B,F,F1)
Magnetic Effect	Section 15 Cat Z
Power Input:	Section 16 Cat B
DC Spike:	Section 17 Cat B
Emission of Radio Frequency Energy	Section 21 Cat M

1.3.2 Mission Management Unit II1616-055-10/12/020/022

ITEM	SPEC
Regulatory Compliance:	DO-160E, FAA STC on Part 25, 29 aircraft. FAA-PMA
Weight:	15 oz.
Physical Dimensions:	
(Depth)	5.375 Inches
(Width)	5.75 Inches
(Height)	1.875 Inches
Power Requirements (Voltage):	10-33 VDC
Power Requirements (Current) :	250 ma max.
Inputs:	RS-232interface to transceiver, Audio:, 150Ω Mic input
Outputs:	RS-232, four discrete outputs 100ma sinked to ground, 500Ω Phones output 5.0VAC RMS nominal
Connectors:	2 ea. DB-25 male
Mounting:	Dzus rail

1.4 HISTORICAL PART NUMBERS

Part Number	Description	Mod Level
1616-055-10	Full function MMU II with WiFi and 4 wire Audio POTS interface	C, D,E
1616-055-10	MMU II with WiFi but no POTS interface	A
1616-055-10	MMU II no WiFi no POTS interface	AB
1616-055-10	MMU II with POTS but no WiFi	B
1616-055-12	NVG MMU II full functions	C, D,E
1616-055-12	NVG MMU II with WiFi but no POTS interface	A
1616-055-12	NVG MMU II no WiFi no POTS interface	AB
1616-055-12	NVG MMU II with POTS but no WiFi	B
1616-055-020	Full function MMU II with WiFi and 4 wire Audio POTS interface	-
1616-055-022	NVG MMU II full functions	-

Part numbers lined out are no longer available for order.

1.5 CERTIFICATION

1.5.1 FAA and EASA

The Sky Connect MMU II has been granted FAA and EASA certification on many airframes as a component of the Fleet or Forte' system. Those systems have been approved as non required, non essential supplemental long range communications equipment.

1.5.2 FCC

The Sky Connect MMU II complies with Part 15 of FCC rules. Changes or modifications not expressly approved by the manufacturer could void the user's authority to use the equipment.

1.5.3 Industry Canada (IC)

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, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

1.6 WARRANTY

1.6.1 Limited Product Warranty.

During the Warranty Period (as defined below), Product hardware and media are warranted (a) to conform to Seller's published specifications therefor in effect as of the date of shipment and (b) to be free from defects in material and workmanship. During the Warranty Period, software and firmware Products are warranted to conform to Seller's published specifications therefor in effect as of the date of shipment. The Warranty Period is twelve (12) months for Product hardware and twelve (12) months for Product software and firmware. Product support beyond these periods is available at additional cost under the terms of Seller's Extended Warranty programs. The Warranty Period for a Product shall commence upon shipment of the Product Warranty Claims.

Warranty claims are made by Buyer contacting the Seller's Customer Service Center ("CSC"). Seller's warranty includes one (1) year Monday through Friday 8 AM to 5 PM access to the CSC, excluding holidays, for the purpose of facilitating warranty claims. Seller shall incur no liability under this warranty if Buyer fails to provide Seller with notice of the alleged defect during the applicable Warranty Period. After receiving such notice, the CSC will notify Buyer of its designation of one of the following problem resolution methods:

1.6.1.1 Hardware: If CSC designates Seller's Return to Factory Program as the appropriate problem resolution method, the following provisions shall apply:

- a. The allegedly defective hardware, at Field Line Replaceable Unit ("FLRU") level, must be returned by Buyer to Seller in accordance with Seller's Return to Factory repair procedures
- b. Buyer agrees to pay Seller's NTF (no trouble found) charge for FRUs returned under warranty that are found not to be defective.
- c. During the twelve (12) months of the Warranty Period, Seller may, at its sole option, provide an advance replacement of a defective FRU. If Seller provides advance replacement Buyer must return the defective Product to Seller within twenty (20) days of receipt of the replacement Product. If Buyer does not return the defective Product to Seller within this twenty-day period, Seller will invoice Buyer for the replacement Product at the then list price. Buyer shall pay the invoiced amount in U.S. dollars, by cash, check or wire transfer to Seller's account, within thirty (30) days of the date of such invoice.
- d. The Warranty Period for the replaced Product shall be the remainder of the Warranty Period of the original unit.
- e. When product is in warranty the Buyer is solely responsible for all freight charges, taxes and duties associated with shipping the hardware or software Products to Seller for repair or replacement to:
 - * If Sky Connect branded equipment ship to EMS Aviation, Inc. Repair Center, 40070 Cane Street, Suite 600, Slidell, LA 70461
 - * If Formation or EMS Aviation branded equipment ship to EMS Aviation, Inc., Quality Assurance Department, Inc., 121 Whittendale Drive, Moorestown, NJ 08057

During warranty, Seller will ship the repaired, replaced or otherwise returned Product to customer's premises and Seller is responsible for the standard return freight and the Buyer

is responsible for the taxes and duties. When product is out of warranty, Buyer is responsible for all freight charges, taxes and duties (related to shipments to Seller and shipments returning to customer). Expedited freight is at Buyer's expense.

1.6.1.2 Software: Software Updates may be required from time to time for system optimization and improved performance. CSC will use commercially reasonable efforts to provide, on a non-priority basis, correction or workaround of the problem by means of telephone support by means reasonably determined by Seller. Seller agrees that it will support the then-current Release of Software for the applicable hardware level. Seller's warranty does not include the provision of Software Upgrades.

Seller shall incur no liability under this warranty if Seller's tests disclose that the alleged defect is due to causes not within Seller's reasonable control, including alteration or abuse of the goods. If a Product is determined not to be defective or to have a defect due to causes not within Seller's reasonable control, Buyer agrees to pay for such repair at the repair price as listed in Seller's then current U.S. price list. Buyer also agrees to pay for testing in such instance.

Seller also warrants, except as stated in Seller's published specifications, or as otherwise agreed, that any software provided to Customer by Seller shall, to Seller's knowledge as of the date of this Agreement: (a) contain no hidden files; (b) not replicate, transmit, or activate itself without control of a person operating computing equipment on which it resides; (c) not alter, damage, or erase any data or computer programs without control of a person operating the computing equipment on which it resides; or (d) contains no node lock, time-out or other function, whether implemented by electronic, mechanical or other means, which restricts or may restrict use of access to any programs or data developed under this Agreement, based on frequency or duration of use, or other limiting criteria.

Seller's Liability: Seller's liability, and Customer's sole and exclusive remedy, shall be limited to the express remedies set forth in this section.

1.6.2 Disclaimer of Warranties.

EXCEPT FOR THE EXPRESS WARRANTIES STATED IN THIS SECTION, THE PRODUCTS ARE PROVIDED "AS IS" AND SELLER DISCLAIMS ANY AND ALL OTHER WARRANTIES WHETHER EXPRESS, IMPLIED OR STATUTORY, WITH RESPECT TO THE PRODUCTS PROVIDED UNDER THIS AGREEMENT INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT AS WELL AS ANY WARRANTIES ARISING FROM COURSE OF DEALING, USAGE OR TRADE PRACTICE. FURTHER, THIS WARRANTY COVERS THE PRODUCT ONLY, AND NO WARRANTY IS MADE AS TO COVERAGE AVAILABILITY OR GRADE OF SERVICE PROVIDED BY EMS SEPARATELY FOR EMS SERVICES.

Software licensed or sold to Buyer by a third party, including without limitation application program interface software or any other software provided by third parties under a joint marketing, interface development or other arrangement with Seller, is not a Product for purposes of this Agreement and Seller provides no warranty, guarantee or other agreement, whether express, implied, or statutory, in respect thereof and bears no responsibility therefore or for services in respect thereof.

Out-of-Warranty Repair (Hardware): Seller will either repair or, at its option, replace defective Product hardware not covered under warranty within twenty (20) working days of its receipt. Repair charges are available from the Repair Facility upon request. The warranty on a serviced Product is thirty (30) days from date of shipment of the serviced unit. Out-of-warranty repair charges are based upon the prices in effect at the time of return.

1.6.3 Warranty Exclusions

Warranty does not cover any damage or failure caused by any cause beyond Seller's reasonable control, including without limitation acts of God, fire, flooding, earthquake, lightning, failure of electric power or air conditioning, neglect, misuse, improper operation, war, government regulations, supply shortages, riots, sabotage, terrorism, unauthorized modifications or repair, strikes, labor disputes or any product failure that Seller determines is not a result of failure in the Product provided by Seller. Warranty does not include: installation or maintenance of wiring, circuits, electrical conduits or devices external to the Products; replacement or reconditioning of Products which, in Seller's opinion cannot be reliably maintained or properly serviced due to excessive wear or deterioration; Buyer's failure to maintain the Product site in accordance with the environmental specifications of the Products; or Products disassembled or repaired in such a manner as to adversely affect performance or prevent adequate inspection and testing to verify any warranty claim; Products on which serial numbers or date tags have been removed, altered or obliterated; Products rented on a month-to-month basis; or normal wear and tear. Buyer will pay Seller's then current published charges to restore such Products to a condition eligible for further Extended Warranty Service under this Agreement.

2 INSTALLATION

PRIOR TO INSTALLATION

Perform a visual inspection of the equipment for evidence of damage incurred during shipment.

2.1 ITEMS REQUIRED BUT NOT SUPPLIED;

Table 1

QTY	ITEMS	USE
1	Daniels Manufacturing Crimper P/N M22520/2-01	P1
1	Daniels Manufacturing Crimper Positioner P/N K1S	All M24308 connectors
	Contact insertion/removal tool	M81969/1-4 (metal) or M81969/14-01 (plastic)
	Misc. installations supplies such as; wire ties, Adel clamps, Etc.	

2.2 SYSTEM COMPONENTS

Table 2

Part Number	Description		
1616-900-25	Kit, 25 D-subminiature		
Forte' typically uses two of any accessory listed below, up to four may be installed			
MMU II P/N	NVG Lens	POTS Audio	Wi-Fi Capable
1616-055-10	no	yes	yes
1616-055-12	yes	yes	Yes
1616-055-020	no	yes	yes
1616-055-022	yes	yes	Yes

2.3 INSTALLATION INSTRUCTIONS

MMU II is designed to be installed in a cockpit environment secured to Dzus rails. A suitable location should be found that will provide enough depth in the panel for the unit plus the connectors with ample bend radius for the wiring harness. Failure to do so may damage the harness and cause a malfunction of the system.

2.3.1 ELECTRICAL INSTALLATION

Follow the installation drawing in the appendix of this manual as a recommended method to interfacing the MMU II to a POTS or RS-232 connection. Completely read the notes provided.

2.3.1.1 POTS WIRING

This is a 600 Ohm tip/ring Subscriber Line Interface Circuit.

The ringing voltage and current is depended on the number of ringer loads. The POTS spec used calls for;

The ringing signal is generated by switching the transceiver into ringing mode. Ringing voltage of approximately 65Vrms is applied to a single handset. During ringing the integral DC/DC converter automatically switches to produce a battery voltage of -72V. This will produce greater than 40Vrms into a ring load of 3. The ringing waveform is set internally to give the correct waveform with 20Hz to 25Hz ringing frequency.

So ringing is provided by our transceiver at a 20 Hz cadence and a ring voltage of greater than 40Vrms with 3 ringer loads.

2.3.1.2 Inputs and Outputs

2.3.1.2.1 Outputs

Four discrete lamp outputs designed to illuminate the lamps used for Incoming Message and the Phone lamps. Two not used at this time. Phone audio output at 500 Ω impedance that provides nominal 5.0VAC RMS audio to the headsets or audio panel.

2.3.1.2.2 Inputs

Microphone audio at 150 Ω impedance .4VAC that connects to the headsets or audio panel.

2.3.1.2.3 Input/Output

RS-232 interface to the transceiver that allows the MMU II to control the transceiver dialing and messaging.

2.3.1.3 Panel Lighting

Panel lighting can be controlled using the following methods, and selectable from the configuration menu;

- a.) Photocell dimming
- b.) Manual dimming using the panel knob to vary the display intensity
- c.) Dimmer Buss - 5VAC, 5VDC, 14VDC, 28VDC wired to the designed pins on P1 connector.

2.3.2 MMU II PIN ASSIGNMENTS

The table below indicates the pin out of the MMU II

J1 - Data	
1	28 VDC
2	Polarized Key
3	RS 485 HI
4	RS 485 LO
5	RS 485 HI
6	RS 485 LO
7	Unit ID #1
8	Unit ID #2
9	Unit ID #4
10	Unit ID #8
11	Spare I/O #1
12	Ground
13	Ground
14	Spare I/O #2
15	Message Alert
16	Incoming Call
17	DTR Out
18	Ground
19	DSR In
20	Ground
21	5V Dimmer Input
22	14V Dimmer Input
23	28V Dimmer Input
24	MMU RS232 Input (RX)
25	MMU RS232 Output (TX)

J2 - Audio	
1	Polarized Key
2	28 VDC
3	28V Dimmer Input
4	5V Dimmer Input
5	POTS Ring
6	POTS Tip
7	Ground
8	Ringer Audio HI
9	Ground
10	Phones HI
11	Ringer
12	Ground
13	Mic HI
14	Ground
15	Ground
16	Ground
17	RS232 RX - Reserved
18	Ground
19	Key In
20	Ringer Audio LO
21	RS232 TX - Reserved
22	Phones LO
23	Ground
24	Key Out
25	Mic LO

2.4 POST INSTALLATION TESTING

No testing can occur until the transceiver in the installed system is activated where applicable. The customer is responsible for this activation as the customer receives the bills for the phone use. This process should be done in advance of the installation/testing.

2.5 HOW TO DIAL CALLS (REF. CIL 2006-002)

Dial the country code, area code, and number. You will hear call progress tones followed by the ringing sound.

For calls within the US, for example, dial as follows:

001-301-891-0600, where "00" is international access, "1" is the country code for the US. Optionally, dialing strings can be stored in phone memory locations.

3 OPERATION

The following will cover operation issues on the MMU II. See the MMU II Operator's Guide for a complete description of how to operate the MMU II.

The MMU II is computer controlled dialer and very flexible in operation. It communicates to the transceiver over an RS-232 port or POTS line.

This unit can be programmed in the aircraft with new message sets. It has an eight step dimming feature to the display.

The MMU II has 32K of internal memory. This is enough storage for 1000 phone numbers/text messages if all the screen characters were to be filled.

The MMU II provides a user interface to an external transceiver, allowing a user to control voice calls and send & receive text SBD messages. The MMU II contains a 2-line, 16 character alphanumeric display and a rotary knob with a pushbutton action. External I/O includes an RS232 port, and two lamp drivers.

The MMU II is loaded with a "Message Set", which is saved in Flash memory. The Message Set contains configuration data, the names and phone number choices for voice dialing, and the complete set of text messages that can be selected by the user for transmission to the ground.

The Message Set may be loaded on the ground via the MMU's RS232 port.

The MMU II communicates with the map application via binary SBD messages. Mobile Terminated ("MT") messages are sent from the ground to the MMU II (uplink), and Mobile Originated ("MO") messages are sent from the MMU II to the ground (downlink). These messages are sent to and from the Sky Connect Tracker Map. At release of this text, no other mapping system has the ability to make use of text messaging to or from the aircraft.

MSET Manage - Phone numbers and messages are created for the MMU II by using a Sky Connect program called MSET Manage. This program will create a message set of phone numbers and canned messages to be loaded into the MMU II via RS-232 connection or Wi-Fi connection. A connector should be installed as close to the back of the MMU II as practical, to allow the RS-232 port between the transceiver and the MMU II to be broken, and allow the connection of a PC for this purpose.

The MMU II supports driving two annunciators to indicate when a call or message is

incoming.

A popular example of a canned message the MMU II can send is a flight plan. FP data can contain; TO/FROM waypoints, ETA, Number of PAX, and Fuel on Board.

The MMU II can control the volume of the LBT through its serial port. The MMU II has a signal strength indicator as part of its functions.

There is an optional Wi-Fi interface to allow the communication with the MMU II from a PC wireless to provide text messaging over the MMU II without a wired connection. The Wi-Fi connection can also serve to program the MMU II without the use of a cable.

3.1 SPEED KEY SETUP

3.1.1 First Grp Speed Keys

When enabled, the first group speed keys causes the press-n-hold of the keypad digits 1 to 9 to bring up on the display the corresponding mset page from the first group. Continuing to hold the key will eventually send the text or dial the phone number of that page. The '1' keypad key corresponds to the first page of the first group, the '2' keypad key to the second page of the first group, and so on. Up to 9 pages may be selected in this manner.

3.1.2 Last Grp Speed Keys

The last group speed keys operates the same as the first group, except the last group of the MSET is used as a source of text and/or dial pages for the speed keys. This policy is mutually-exclusive with the first group speed key policy – one or the other or none may be selected

3.1.3 Frequent Pages

The Frequent Page policy allows the MMU II user to save and associate any or all of the keys 1 thru 9 with either a text message or dial page. By pressing and holding the key while editing a page, it is stored with that key. By pressing and holding the key elsewhere, it brings up the stored page and then sends it (if a text message) or dials the number. The Frequent page policy is combined with the "Last Grp Speed Keys" policy; if the MMU II user tries to text or send with a key not associated with a frequent page, the last MSET group will be used instead.

3.2 SPEED KEY OPERATION

To dial or send a speed key page, from either any MMU II page not in an editing mode or the READY page, press and hold the desired key (assume key '4'). After a few seconds, the display will show "Speed key '4' in 4 secs" and then continue the seconds countdown. At the 2 second point in the countdown, the selected page will display. At this point, you can stop pressing the key thus aborting the transmit or dial of that page; that page will then be selected for viewing, editing, and transmit/sending. More typically, that key may be held thru the entire countdown to transmit or dial the page.

Frequent used pages are transmitted or dialed in the same manner. When

enabled, the MMU II first checks for a frequent page associated with the selected key; if none, then the speed key is dialed.

To store a frequently used page, it must have wildcards. Browse to the page, enter edit mode, and then press and hold the desired key. A "Frequent Text '4' in 4 secs" will be display. Holding the key throughout the countdown, the display will return back to the page with it stored as a frequent page.

3.3 MMU II ANNUNCIATORS

The MMU IIs have their own annunciator that will illuminate a light for the following;

- 3.3.1 Incoming Message - To provide a heads up indication to the pilot if the MMU II is installed out of the scan view of the pilot, the "Incoming MSG" light will blink slowly for five seconds.
- 3.3.2 Incoming Call - As above the "Incoming Call" light will flash with the ring of the phone to allow the pilot to know there is an incoming call if the audio monitor switch is off.

4 POST INSTALLATION CONFIGURATION

No testing can occur until a transceiver is activated. The customer is responsible for this activation as the customer receives the bills for the phone use. This process should be done in advance of the installation/testing.

IMPORTANT NOTE

The MMU II comes from the factory with a default Message Set (MSet) loaded to allow the installer to perform testing right out of the box.

The END USER MUST! load their own MSet in order to make the MMU II function as they desire. Creation of the customer's MSet is the responsibility of the customer, and must be done with MSet Manage Software.

4.1 MMU II CONFIGURATION

Prior to testing, assure te MMU II is configured correctly for the transceiver and functions that will be required.

Entering Installer Configuration mode is one CCW pushed-in detent of the rotary knob while pressing the '*' key from either the Ready page, or from the initial MMU II splash display page. The following parameters may be set in Configuration mode:

- 4.1.1 Config Version - Internal use, for informational purposes. This description is valid for Config Version 2.

- 4.1.2 WiFi Channel - Select the WiFi channel the MMU II should use, or “No” to deselect WiFi. Note: to shutoff WiFi completely, you must select and save a value of “No” and then power-cycle the MMU II. (only appears for MMU IIs with WiFi capability)

NOTE: Wi-Fi usage on the aircraft in flight requires the aircraft to have a EMI test against interference from TPEDs (Transmitting Personal Electronic Devices). This would be any device carried on to the aircraft that would emit 802.11 Wi-Fi signals. The MMU II itself transmits approx. 10mw of 802.11 signal. TPEDS can produce as much as 4 watts of 802.11 signal when searching for a hot spot. IF you are to use TPEDS, the EMI test must be complied with on your aircraft with your suit of avionics as installed.

IMPORTANT NOTE: WIFI Channels 12 and 13 are restricted in North America. These channels are not to be selected for aircraft being operated in North America.

- 4.1.3 WiFi Transmit Power - Select the power level for the MMU II to operate Wi-Fi. For aircraft use, this should typically be 6. (only appears for MMU IIs with Wi-Fi capability)
- 4.1.4 Brightness Control - Select one of the following:
- 1.) Manual – the user always controls display and keypad brightness
 - 2.) Dimmer Bus – the MMU II samples a connection to a dimmer bus and adjusts display and keypad brightness accordingly
 - 3.) Light Sensor – the MMU II samples ambient light and adjusts display and keypad brightness accordingly. The sensor is located just above the keypad “*” key.
- 4.1.5 Sensor/Dimmer Low End - This value aligns with the dimmer bus voltage or light sensor for the dimmest setting of the display and keypad brightness. For the light sensor, this value is in LUX. (only appears when brightness control on light sensor or dimmer bus)
- 4.1.6 Sensor/Dimmer High End - This value aligns with the dimmer bus voltage or light sensor for the brightest setting of the display and keypad brightness. For the light sensor, this value is in LUX. (only appears when brightness control on light sensor or dimmer bus)
- 4.1.7 Dial/In-call Mechanism - Determines the handling of the messenger port as well as

the mechanism used for establishing phone connections. Choose from the following:

- 1.) None – generally, not used.
- 2.) DTMF/DTMF – for POTS installations with a TRKR on the messenger port. Incoming and outgoing calls and in-call DTMF are made via POTS.
- 3.) AT/AT – Incoming and outgoing calls as well as in-call DTMF are made via commands to the TRKR.
- 4.) AT/DTMF – Incoming and outgoing calls are made via commands to the TRKR. In-call DTMF tones are generated.
- 5.) Reserved – generally, not used.
- 6.) POTSnoTRKR – Connection to a TRKR not required; no messaging required. Incoming and outgoing calls are made via POTS. The messenger port may optionally be connected, for example to MSETManage for MSET upload.

4.1.8 DTMF Total Time - This is the time for a tone from the start of one digit to the start of the next. The default value of 1016 works for most applications. To determine the duration in seconds, multiply the value by 246 uSecs. For example, the default value of 1016, times 246 uSecs, is 0.25 seconds. (only appears when Dial/In-call mechanism enables DTMF)

4.1.9 DTMF Interval Time - This is the duration of the pause between digit tones. The default value of 407 works for most applications. To determine the duration in seconds, multiply the value by 246 uSecs. For example, the default value of 407, times 246 uSecs, is 0.1 second. (only appears when Dial/In-call mechanism enables DTMF)

4.1.10 DTMF Output Volume - The volume level of DTMF PWM digit tones, a value from 0 to 127. Default value is 30.

4.1.11 Phones Volume - The volume level of the phones, a value from 0 to 127. Default value is 50.

4.1.12 Sidetone Level - The sidetone level, a value from 0 to 127. Default value is 0.

4.1.13 Microphone Volume - The microphone volume, a value from 0 to 127. Default value is 60.

4.1.14 Ringer Volume - The ringer volume, a value from 0 to 127. Default value is 50.

4.1.15 Volume Tap - Select from the following options:

- 1.) Not Enabled – neither offhook nor flash are enabled

- 2.) Offhook – allow taking phone offhook from ringer volume page
- 3.) Flash – allow flashing of the line (go onhook for 90 ms) from phone volume page
- 4.) Offhook & Flash – allow both of these options
- 5.) Offhook & KeyIn – allows multiple POTS MMUs to dial with only a single interface with an audio panel. See section 4.2.

- 4.1.16 Messenger Protocol - Select the protocol version to be used between MMU II and the TRKR box. For proper operation until noted otherwise, Version 1 protocol should be enabled.
- 4.1.17 Wi-Fi SSID Suffix - This 2-character string is added to the SSID used by the MMU II for the local WiFi network. It is useful if multiple WiFi-enabled MMU IIs operate within range of each other.
- 4.1.18 WiFi WEP key - Enter text here to enable WEP security, and specify the key to be used.
- 4.1.19 Text Message Notify - Turn this OFF to prevent alert tones upon receipt of text messages.
- 4.1.20 Dial Prefix - a two-digit prefix to be placed prior to the country code and phone number for all phone dialing. This prefix will not appear on the display, but will automatically be prepended for all calls.

To exit from Configuration mode, push-n-turn the knob one detent to “Exit Settings Mode”, and then tap the knob back to the “MMU Ready” display.

A mechanism known as “pocket-config” is available to change volumes and levels while in-call. To enable pocket-config, you must first enter Configuration mode, and then exit Configuration mode (it does not matter if any settings are changed; only that you were at one time in this mode). Once that is performed, pocket-config is then enabled any time while in-call. While pressing one of the following keypad keys, turn the knob to select:

- 1.) DTMF Output Volume
- 2.) Phones Volume
- 3.) Sidetone Level
- 4.) Microphone Volume
- 5.) Ringer Volume

4.2 MMU II MASTER vs. SLAVE CONFIGURATION

This configuration will allow two MMU IIs to be used connected to one transceiver. The function here, since the RS485 has not yet been implemented, would be to allow two MMU IIs to connect and carry on a phone conversation as in a party line situation. The Slave will not be able to indicate signal strength as that is a function of the RS232 control line and not implemented as part of this feature... yet.

Full operation of the MMU II in a master slave relationship will require implementation of the RS485 control bus. This is not yet released and when it is all slaves will function as the master does in an installation.

To configure two MMU IIs to communicate over POTS line with one transceiver, follow the below procedure.

Perform the following configuration and testing with reference to the MMU II Operators Guide, and the Pilot's Guide for description of function and use of the knobs and menus.

4.2.1 Master Unit Configuration

Step	Procedure
M1	Apply Power to the Master MMU II
M2	When the Screen displays the MMU Version and MSet hold the * button (Upper Right) and press the KNOB in while making a turn one click counter-clockwise, then release both the knob and the * button.
M3	The MMU II will now display the BRIGHTNESS CTL page.
M4	Rotate the Knob (do not press in) clockwise until the DIAL/In-Call Mech: page appears.
M5	Ensure that the display is set at DTMF/DTMF
M6	If not, TAB the knob and the selection will begin to flash.
M7	Rotate the knob until the DTMF/DTMF is displayed. Press the knob and hold. The screen will display “ Value Saved SUCCESS ”.
M8	Rotate the Knob (do not press in) clockwise until the Volume Tap: appears.
M9	If required, TAP knob and select Offhook & KeyIn.
M10	Press the knob and hold. The screen will display “ Value Saved SUCCESS ”.
M11	Press the knob in and rotate clockwise one click. Release.
M12	The screen should display Exit Settings Mode.
M13	Press the knob in and release. The screen will now display MMU Ready page.
M14	Master MMU II Configuration complete.
M15	Cycle Power to the Master MMU II.

4.2.2 MMU II Slave Configuration

Step	Procedure
S1	Apply Power to the Slave MMU II Controller.
S2	When the Screen displays the MMU Version and MSet version, press and hold the * button (Upper Right) and press the main KNOB in and turn one click counter-clockwise, then release both the knob and the * button.
S3	Rotate the Knob (do not press in) clockwise until the DIAL/In-Call Mech: page appears.
S4	The display probably is set at DTMF/DTMF.
S5	Press the knob and release. The selection will begin to flash.
S6	Rotate the knob until the Pots/NoTrkr is displayed.
S7	Press the knob and hold. The screen will display “Value Saved SUCCESS” .
S8	Rotate the Knob (do not press in) clockwise until the Volume Tap: page appears.
S9	The display probably is set at NOT ENABLED.
S10	Press the knob in and release. The selection will begin to flash.
S11	Rotate the knob until the selection Offhook displayed.
S12	Press the knob and hold. The screen will display “Value Saved SUCCESS” .
S13	Press the knob in and rotate clockwise one click. Release.
S14	The screen should display Exit Settings Mode.
S15	Press the knob in and release. The screen will now display MMU Ready page.
S16	Slave MMU II Configuration complete.

4.2.3 Master/Slave Testing

Step	Procedure
T1	Apply Power to the EMS Sky Connect Transceiver and the both the Master and Slave MMU II Controllers.
T2	Operation of the Master MMU II should be as normal.
T3	Place an incoming call to the aircraft. The external Call Annunciator should flash (if installed). The MMU II displays should display – Incoming Call
T4	On the Slave MMU II Controller, press the knob to answer the call. The Call should be answered after a slight delay, and the Call Connected / Duration screen appears and the timer starts and the external CALL annunciator (if installed) illuminates steady.
T5	Mic and Phone audio should be available to the Slave MMU II Controller
T6	Press the knob to end the test call.
T7	Initiate a call from the Slave MMU II Controller.
T8	The call should dial as normal. The external CALL annunciator (if installed) will be illuminated during the call
T9	END of Test

5 POST INSTALLATION TESTING

Follow the below check list for testing system after installation.

Step	Procedure	Pass/Fail
1	Before applying power, inspect the system installed unit to ensure that all units are properly installed.	NA
2	Apply power and ensure the circuit breaker is closed and power to the system is available.	NA
3	Verify that the system transceiver is functioning according to the applicable installation manual.	
4	The MMU II display will show the software version in the MMU II and the Message Set version. Then it will display MMU Starting. This is done while the MMU II communicates with the transceiver. If this is successful, the MMU II will display the tracker software version, and the LBT software version. The MMU II will then display waiting system registration. Once the system is registered, verify that 3 to 5 bars of signal are present on the display.	
5	MMU II Test Procedures	
6	NOTE: Following the MMU II Operator Guide as a reference For steps 7 through 8 establish communication with the dispatch center either through radio or cell phone connection as back up. Make sure the audio panel is selected to the Satcom transmit select position.	
7	Dial Test: Rotate the selector knob and select one of the preprogrammed phone numbers on the MMU II and push the knob to initiate the call. A ring should be audible in the headset. When answered, verify that the connection is clear and free of interference. Press the selector knob again to terminate the call.	
8	Receive Call Test: Request the dispatch center to place a call to the aircraft. Verify that the ring is heard. Answer the call by pressing the selection knob. Verify that the connection is clear and free of interference. Press the selector knob again to terminate the call.	

9	Send Data Test: Select one of the preprogrammed test messages on the MMU II and push the knob to send data. Verify that the data has been received by dispatch.	
10	Request the dispatch center to send a text message to the system via the map interface. Verify that the message has displayed on the face of the MMU II.	
11	END OF PROCEDURE	

6 TROUBLESHOOTING

TROUBLESHOOTING THE SKY CONNECT SYSTEMS

Description of Problem	Possible Causes
Unit has no external indication of power	<p>Check power and ground connections for proper polarity, and to ensure no shorts or opens.</p> <p>Verify 11-33 VDC at the 25 pin connector.</p> <p>Check connector seating.</p> <p>Contact Technical Support</p>
I can make calls out, but not to the aircraft when calling from a land-line.	<p>The dialing sequence is different.</p> <p>Verify that you are dialing an international access code followed by the Iridium number, or that you are following the proper Two-Stage-Dialing procedures.</p> <p>Contact your Service Provider.</p>
Unit was connected with reverse polarity and no longer operates, or operates for a short time followed by power loss.	<p>Contact Technical Support we will arrange for a replacement transceiver.</p>

7 INSTALLATION AND SYSTEMS DRAWINGS

The following attached drawings are presented as a suggestion on how the system could be installed. If you have any question on installation methods or techniques, please call Technical Services.

Electrical Interface of Components