

Description ESP1000 FIELD RETROFIT (DATA)	Revision REV. A	Document No. DOC01000.01
Originator JMF	Effective Date <i>2/25/98</i>	Page No. 1 of 5

Jay M. Fanning

1. PURPOSE

- 1.1 This procedure provides for the uniform field retrofit of the ESP1000 repeaters to allow for the use of wide band data.

2. BILL OF MATERIAL

If retrofitting a ESP1000 repeater, the following items should have been received.

- | | | | |
|-----|-----|--------------|---|
| 2.1 | 1ea | DOC-1000-01 | Field Retrofit DOC |
| 2.2 | 1ea | INS-1000-01 | Field Retrofit Test and Alignment |
| 2.3 | 2ea | JUM-0002-055 | .55" Jumper |
| 2.4 | 1ea | OPS-1000-U2R | RX Can CPU Revision V2.00 or later |
| 2.5 | 1ea | OPS-1000-U2T | TX Can CPU Revision V2.00 or later |
| 2.6 | 1ea | OPS-1000-U3I | C/I Board PROM Revision V2.00 or later |
| 2.7 | 1ea | OPS-1000-U6R | RX Can DSP PROM Revision V2.00 or later |
| 2.8 | 1ea | OPS-1000-U6T | TX Can DSP PROM Revision V2.00 or later |
| 2.9 | 2ea | RES-0010-471 | 470 Ohm 1/8W Resistor |

3. ASY1000 RETROFIT INSTRUCTIONS

- 3.1 Remove the top cover from the ESP1000
- 3.2 Remove the transmitter can from the ESP1000
 - 3.2.1 Disconnect the DC power cable from the transmitter can to the septum.
 - 3.2.2 Disconnect the control cable from the transmitter can to the C/I board J10.
 - 3.2.3 Loosen the four (4) captive screws.
- 3.3 Remove the transmitter can's Top Cover.
 - 3.3.1 Remove the ten (10) screws from the top cover of the transmitter can.
 - 3.3.2 Remove the top cover of the transmitter can.
- 3.4 Replace the transmitter can's CPU firmware and DSP firmware.
 - 3.4.1 Remove U2 CPU firmware (OPS-1000-U2T, V1.01 or earlier).
 - 3.4.2 Install OPS-1000-U2T, V2.00 or later.
 - 3.4.3 Remove U6 DSP firmware (OPS-1000-U6T, V1.01 or earlier).
 - 3.4.4 Install OPS-1000-U6T, V2.00 or later.
- 3.5 Install R38 (470 ohm) load resistor.
 - 3.5.1 Using a Ohm Meter measure the resistance from U2 pin 21 to ground. If the resistance measured is 470 ohms \pm 20 ohms then continue on to step 3.6. If the measured resistance is greater then 500 ohms then do the following steps.
 - 3.5.2 Remove the four (4) screws from the personality board (ASY-1000-02T).
 - 3.5.3 Remove the personality board from the transmitter can.
 - 3.5.4 Install the 470 ohm resistor (RES-0010-471) on the bottom of the board from U2 pin 21 to ground.
 - 3.5.5 Replace the personality board back into the transmitter can.
 - 3.5.6 Replace the four (4) personality board screws.
- 3.6 Replace the transmitter can's Top Cover.
 - 3.6.1 Replace the top cover of the transmitter can.
 - 3.6.2 Replace the ten (10) screws in the top cover of the transmitter can.
- 3.7 Replace the transmitter can back into the ESP1000
 - 3.7.1 Tighten the four (4) captive screws.
 - 3.7.2 Connect the control cable from the transmitter can to the C/I board J10.
 - 3.7.1 Connect the DC power cable from the transmitter can to the septum.

- 3.8 Remove the receiver can from the ESP1000
 - 3.8.1 Disconnect the DC power cable from the receiver can to the septum.
 - 3.8.2 Disconnect the control cable from the receiver can to the C/I board J9.
 - 3.8.3 Loosen the four (4) captive screws.
- 3.9 Remove the receiver can's Top Cover.
 - 3.9.1 Remove the ten (10) screws from the top cover of the transmitter can.
 - 3.9.2 Remove the top cover of the receiver can.
- 3.10 Replace the receiver can's CPU firmware and DSP firmware.
 - 3.10.1 Remove U2 CPU firmware (OPS-1000-U2R, V1.03 or earlier).
 - 3.10.2 Install OPS-1000-U2R, V2.00 or later.
 - 3.10.3 Remove U6 DSP firmware (OPS-1000-U6R, V1.01 or earlier).
 - 3.10.4 Install OPS-1000-U6R, V2.00 or later.
- 3.11 Install R38 (470 ohm) load resistor.
 - 3.11.1 Using a Ohm Meter measure the resistance from U2 pin 21 to ground. If the resistance measured is 470 ohms \pm 20 ohms then continue on to step 3.12. If the measured resistance is greater then 500 ohms then do the following steps.
 - 3.11.2 Remove the four (4) screws from the personality board (ASY-1000-02R).
 - 3.11.3 Remove the personality board from the receiver can.
 - 3.11.4 Install the 470 ohm resistor (RES-0010-471) on the bottom of the board from U2 pin 21 to ground.
 - 3.11.5 Replace the personality board back into the can.
 - 3.11.6 Replace the four (4) personality board screws.
- 3.12 Replace the receiver can's Top Cover.
 - 3.12.1 Replace the top cover of the transmitter can.
 - 3.12.2 Replace the ten (10) screws in the top cover of the receiver can.
- 3.13 Replace the receiver can back into the ESP1000
 - 3.13.1 Tighten the four (4) captive screws.
 - 3.13.2 Connect the control cable from the receiver can to the C/I board J9
 - 3.13.1 Connect the DC power cable from the receiver can to the septum.

- 3.14 Remove the C/I Board
 - 3.14.1 Disconnect the DC power cable (J1) from the C/I board.
 - 3.14.2 Disconnect the ACC2 interface cable (J3) from the C/I board.
 - 3.14.3 Disconnect the Front Panel interface cable (J8) from the C/I board.
 - 3.14.4 Disconnect the RX Can interface cable (J9) from the C/I board.
 - 3.14.5 Disconnect the TX Can interface cable (J10) from the C/I board.
 - 3.14.6 Disconnect the Speaker interface cable (J11) from the C/I board.
 - 3.14.7 Remove the six (5) screws in the C/I board.
 - 3.14.8 Remove the C/I board from the repeater tray.

- 3.15 Replace C/I firmware
 - 3.15.1 Remove U3 operating system firmware memory chip (OPS-1000-U3I, Rev 1.07 or earlier)
 - 3.15.2 Install OPS-1000-U3I, rev 2.00 or later.
 - 3.15.3 Connect the DC power cable (J1) to the C/I board.

- 3.16 Remove audio transformer T2
 - 3.16.1 Remove the audio transformer T2 from the C/I board and discard.
 - 3.16.2 Install J2-A jumper wire (JUM-0002-055) from the transformer T2 primary (T2's via that connects to R80) to the secondary (T2's via that is in-between C57 and C51). This is from the input to the output High side.
 - 3.16.3 Install J2-B jumper wire (JUM-0002-055) from the transformer T2 primary (T2's via that connects to R81) to the secondary (T2's via that goes to ground near C51). This is from the input to the output Low side.

- 3.17 Install the C/I Board
 - 3.17.1 Install the C/I board from the repeater tray.
 - 3.17.2 Replace the six (5) screws in the C/I board.
 - 3.17.3 Connect the Speaker interface cable (J11) from the C/I board.
 - 3.17.4 Connect the TX Can interface cable (J10) from the C/I board.
 - 3.17.5 Connect the RX Can interface cable (J9) from the C/I board.
 - 3.17.6 Connect the Front Panel interface cable (J8) from the C/I board.
 - 3.17.7 Connect the ACC2 interface cable (J3) from the C/I board.
 - 3.17.8 Connect the DC power cable (J1) from the C/I board.

3.18 Set Defaults

- 3.18.1 With power applied to the ESP1000 rotate **LOCAL VOLUME** control clockwise to activate alphanumeric display and LEDs.
- 3.18.2 Press # key or your access code and then the # key to enter Setup Mode. Display is "DM=".
- 3.18.3 Press 93# keys to enter Program Mode. Display is "PM=".
- 3.18.4 Press 98# keys to enter the Set Default Mode. Display is "SETDFALT" then "PM=".

NOTE:

All programming will be lost when the "Set Default" function is run on the repeater with the exception of the RX and TX channels will not change. The operator must reprogram the repeater back to the previous configuration (HOME, AREA, TRUNKED or CONVENTIONAL or the new BASE STATION). Default will place the repeater into "Conventional, Home = 1, Area = 0, Local Transmit = OFF, TX Channel = Unchanged, TX Channel = Unchanged".

- 3.18.5 Press 99# to exit Setup Mode.

The conversion is now complete. Please refer to the instructions found on INS-1000-01 for use of the new Base Station Mode. This insert will contain instructions on Test and alignment.

3.10 Replace the top cover on the ESP1000

ESP1000 INSTRUCTION MANUAL INSERT

ESP1000 Modifications

To retrofit a ESP1000 for high speed data follow the steps found in DOC-1000-01 "*ESP1000 FIELD RETROFIT*".

The five socketed chips in the ESP1000 must be changed for high speed data compatibility:

- OPS-1000-U3I C/I CPU PROM (U2)
- OPS-1000-U2T TX CAN CPU (U2)
- OPS-1000-U2R RX CAN CPU (U2)
- OPS-1000-U6T TX CAN DSP PROM (U106)
- OPS-1000-U6R RX CAN DSP PROM (U106)

In addition, transformer T2 on the C/I board must be removed and its input to output terminals shorted on the board. All parts for the retrofit are supplied with KIT-1000-02.

ESP1000 Operation

A new operational mode called BASESTN has been added to the ESP1000. Base station modem equipment connects to the ESP1000 via the ACC2 connector. The pin out is:

<u>ESP1000 ACC2 Pin</u>	<u>Function</u>
1	TXAF
2	RXAF
4	PTT
12	GND

BASESTN mode does not use an external trunking controller. In BASESTN mode, the ESP1000 transmits audio present at the ACC2 TXAF pin when keyed from ACC2. Received audio is routed to the ACC2 RX AF pin. Half-second turnoff code bursts are transmitted by the ESP1000 to update mobile radio frequency tracking memories. The time in-between turnoff code burst is programmable to once every 5, 10 or 15 minutes. This function can be turned OFF by programming the turnoff code burst time to 0 minutes.

ESP1000 INSTRUCTION MANUAL INSERT

ESP1000 Modifications

To retrofit a ESP1000 for high speed data follow the steps found in DOC-1000-01 "*ESP1000 FIELD RETROFIT*".

The five socketed chips in the ESP1000 must be changed for high speed data compatibility:

- OPS-1000-U3I C/I CPU PROM (U2)
- OPS-1000-U2T TX CAN CPU (U2)
- OPS-1000-U2R RX CAN CPU (U2)
- OPS-1000-U6T TX CAN DSP PROM (U106)
- OPS-1000-U6R RX CAN DSP PROM (U106)

In addition, transformer T2 on the C/I board must be removed and its input to output terminals shorted on the board. All parts for the retrofit are supplied with KIT-1000-02.

ESP1000 Operation

A new operational mode called BASESTN has been added to the ESP1000. Base station modem equipment connects to the ESP1000 via the ACC2 connector. The pin out is:

<u>ESP1000 ACC2 Pin</u>	<u>Function</u>
1	TXAF
2	RXAF
4	PTT
12	GND

BASESTN mode does not use an external trunking controller. In BASESTN mode, the ESP1000 transmits audio present at the ACC2 TXAF pin when keyed from ACC2. Received audio is routed to the ACC2 RX AF pin. Half-second turnoff code bursts are transmitted by the ESP1000 to update mobile radio frequency tracking memories. The time in-between turnoff code burst is programmable to once every 5, 10 or 15 minutes. This function can be turned OFF by programming the turnoff code burst time to 0 minutes.

An abbreviated version of the "Quickstart Procedure" from the ESP1000 manual page 6-43 is given below, modified for DDS operation.

1. Determine RF Channel Numbers - same as in ESP1000 manual
2. Access Setup/Program Mode - same as in EPS1000 manual
3. Program Frequencies - same as in ESP1000 manual
4. Select BASESTN Operation: (Default is CONVENTL)
 - a. Press 7# from the PM= prompt. Display is TRUNKED, CONVENTL, or BASESTN.
 - b. Press 0 until display reads BASESTN.
5. Press #. Display is AREA=0 or AREA=1. (Default is AREA = 0)
 - a. Press 0 or 1 to select the proper area bit for the repeater system.
6. Press #. Display is HOME=01,02, etc. (Default is HOME = 01)
 - a. Enter the normal home channel number for the repeater.
7. Press #. Display is TOCRT=00,05,10, or 15. (Default is TOCRT = 10)
 - a. Press 0 until the display reads the desired time interval (minutes) between automatic turnoff code transmissions. Suggested value = 10 minutes. 00 = no automatic turnoff codes.
8. Press #. Display is TOTE=N or Y. (Default is TOTE = N)
 - a. Press 0 so display read TOTE=N. This disables the transmit time-out timer.
9. Press #, then 99#. Display is ESP1000 and unit is ready for operation in Base Station mode.

Modem Drive Levels

External modems connected to the ESP1000 should be adjusted for the following peak-to-peak modulation drive levels input to the ACC2 TXAF pin:

<u>Modulation Type</u>	<u>Drive Level, mVpp</u>
1200 bps MSK	400
1200 bps Bell 202	650
2400 bps GMSK	650
2400 bps BPSK	500
4800 bps QPSK	400
DDS 7200 bps	450
DDS 9600 bps	450