Programming and Configuring the Base Station

This section applies to the 851-866 frequency range of the *IP*Series Base Station. **Important!** The base station's IP address must be known prior to performing the procedures in this section.

The programming procedure should be performed when it is necessary to upgrade a base station's Firmware or to change the operating parameters to suit client needs.

Viewing the Base Station's Configuration Data

Step 1 At the HyperTerminal window, type in the appropriate password and press **[ENTER]**.

Step 2 Type **?** and press **[ENTER]**. The following example displays in the HyperTerminal window:

```
Host serial = 115200,N,8,1, timeout=200
Host framing = SLIP, no split frames no status messages
tunnel = 0
TX format = new
Injection = LOW SIDE, 45MHz
channel spacing = 25000
Channel = 0
        Channel     Tx freq      Rx freq      Inj freq
Frequency=0      ,    815.100000,    860.100000,    815.100000
Serial number: yyyyyyyyy
RIM address = 1
Frequency group = 1
TX quiet time = 5
Symbol sync time = 12 milliseconds, 0 extra inter-split-frame count
TX tail time = 5
Radio data rate = 19200
Max data tx time = 60 seconds
Carrier detect delay time = 1 millisecond
Station ID = ABC123
Station ID time =10 minutes
Polarity = TX+, RX+
Allow crc errors = 0
Suppress keep alive = 0
Allow base to base = 0
Timeslot status = 0
Duplicate time = 10 milliseconds
Control head grant delay = 50 milliseconds
RIM DD delay = 0 milliseconds
Retry interval = 0 milliseconds
Retry time limit = 0 milliseconds
RSSI step = 25   (=19dBm)
IPNC = 192.168.3.3
SLIP Address = 192.168.4.6
RF IP Address = 192.168.3.1
SNTP interval = 60 seconds
num timeslots = 16
timeslot period = 992ms
timeslots per voice packet = 4
noise = -128dBm
Fixed TX Delay = 0 milliseconds
Scale TX Delay = 0 microseconds
```

Adjustment / Alignment Procedures

Make appropriate notations of any items that require attention during this procedure. This information is needed later during the repair process.

Startup

Step 1 Remove the base station cover placing the screws in a location where they will not be misplaced.

Step 2 Connect the base station to the appropriate components.

Step 3 Power up the base station and computer. The power supply ammeter must read 1.2 amps or less with a 13.8 VDC input.

Receiver Injection

Step 1 Using the HP high frequency probe verify that the receiver injection frequency is present at each of the three (3) receivers by monitoring the receivers R24 surface mount pad which lies on the 50 ohm track between P1 and C43.

Step 2 Adjust R23 on the receiver injection circuit board to set the injection frequency within 10 Hz of the exact injection frequency. The amplitude of the injection frequency should read approximately +5 dBm ±1 dBm.

Receiver

Step 1 **Using the high frequency probe, monitor the** 44.545 MHz second injection frequency at U6 pin 3, adjust trimmer capacitor (C22) to the center of the oscillator's oscillation range. The amplitude level of pin 3 of U6 should read between +5 and +10 dBm.

Step 2 Inject an on-frequency signal at a level of –80 dBm, modulated with a 1 KHz test tone at ±5.0 KHz deviation into the receiver under test.

Step 3 Check the receiver's sensitivity, verifying that the SINAD is 12 dB or better at a maximum level of –119 dBm (-120 is typical).

Diversity Reception

Step 1 Inject an on-frequency signal at a level equal to Receiver 1 12dB SINAD level, modulated with a 1 KHz test tone at ±5.0 KHz deviation into Receiver 1.

Step 2 While monitoring TP1 with the digital multi-meter, adjust RSSI1 low adjust potentiometer (R12) for a reading of 0.750 VDC ±10 mV.

Step 3 Increase the amplitude of the signal by 50 dBm.

Step 4 While monitoring TP1 with the digital multi-meter, adjust RSSI1 high adjust potentiometer (R11) for a reading of 2.75 VDC ±10 mV.

Adjustments R11 and R12 are interactive adjustments, therefore continue adjustments until the DC voltage at TP1 is 0.750 VDC for the receiver's 12 dB SINAD level and 2.75 VDC for a 50 dBm increase from the receiver's 12 dB SINAD level.

Step 5 Inject an on-frequency signal at a level equal to Receiver 2 12dB SINAD level, modulated with a 1 KHz test tone at ±5.0 KHz deviation into Receiver 2.

Step 6 While monitoring TP2 with the digital multi-meter, adjust RSSI1 low adjust potentiometer (R10) for a reading of 0.750 VDC ±10 mV.

Step 7 Increase the amplitude of the signal by 50 dBm.

Step 8 While monitoring TP2 with the digital multi-meter, adjust RSSI1 high adjust potentiometer (R9) for a reading of 2.75 VDC ±10 mV.

Adjustments R9 and R10 are interactive adjustments, therefore continue adjustments until the DC voltage at TP2 is 0.750 VDC for the receiver's 12 dB SINAD level and 2.75 VDC for a 50 dBm increase from the receiver's 12 dB SINAD level.

Step 9 Inject an on-frequency signal at a level equal to Receiver 3 12dB SINAD level, modulated with a 1 KHz test tone at ±5.0 KHz deviation into Receiver 3.

Step 10 While monitoring TP3 with the digital multi-meter, adjust RSSI1 low adjust potentiometer (R33) for a reading of 0.750 VDC ±10 mV.

Step 11 Increase the amplitude of the signal by 50 dBm.

Step 12 While monitoring TP3 with the digital multi-meter, adjust RSSI1 high adjust potentiometer (R35) for a reading of 2.75 VDC ±10 mV.

Adjustments R33 and R35 are interactive adjustments, therefore continue adjustments until the DC voltage at TP3 is 0.750 VDC for the receiver's 12 dB SINAD level and 2.75 VDC for a 50 dBm increase from the receiver's 12 dB SINAD level.

Step 13 Inject on-frequency signal at a level of –80 dBm, modulated with a 1 KHz test tone at ±5.0 KHz deviation into Receiver 1.

Step 14 While monitoring the AC voltage at TP6 adjust audio 1 AC adjustment potentiometer (R72) for 350 mVRMS (±1 mV).

Step 15 While monitoring the DC voltage at TP6 adjust audio 1 DC adjustment potentiometer (R57) for 2.500 VDC (±1 mV).

The audio AC and DC adjustments are interactive, therefore continue adjusting R72 for 350 mVRMS and R57 for 2.500 VDC until further adjustments are no longer required.

Step 16 Inject on-frequency signal at a level of –80 dBm, modulated with a 1 KHz test tone at ±5.0 KHz deviation into Receiver 2.

Step 17 While monitoring the AC voltage at TP6 adjust audio 1 AC adjustment potentiometer (R71) for 350 mVRMS (±1 mV).

Step 18 While monitoring the DC voltage at TP6 adjust audio 1 DC adjustment potentiometer (R58) for 2.500 VDC (±1 mV).

The audio AC and DC adjustments are interactive, therefore continue adjusting R71 for 350 mVRMS and R58 for 2.500 VDC until further adjustments are no longer required.

Step 19 Inject on-frequency signal at a level of –80 dBm, modulated with a 1 KHz test tone at ±5.0 KHz deviation into Receiver 3.

Step 20 While monitoring the AC voltage at TP6 adjust audio 1 AC adjustment potentiometer (R53) for 350 mVRMS (±1 mV).

Step 21 While monitoring the DC voltage at TP6 adjust audio 1 DC adjustment potentiometer (R59) for 2.500 VDC (±1 mV).

The audio AC and DC adjustments are interactive, therefore continue adjusting R53 for 350 mVRMS and R59 for 2.500 VDC until further adjustments are no longer required.

Step 22 Adjust the carrier detect potentiometer (R74) to illuminate a level of –116 dBm.

Receive Data

Step 1 Using a calibrated mobile radio, generate uplink data messages using the **X=1400,19** command in the *IP*Message Utility program.

Step 2 Attach an antenna to one of the base station’s receiver ports and verify on the base station monitor screen (HyperTerminal) that the received message data quality are consistently 240 and higher for 1400 character messages. Repeat test for each receiver.

Exciter

Step 1 Using the **X=1400,19** command, generate data messages so the transmit power and frequency can be checked.

Step 2 Note the power level and then on the power amplifier circuit board adjust the potentiometer (R3) fully counterclockwise (this will enable low power transmit operation).

Step 3 Connect the base stations' transmit port to the HP communication test set.

Step 4 While transmitting data messages using the **X=1400,19** command, adjust the following:

- TCXO Y1 for minimum frequency error
- R42 for ±5 KHz deviation

Transmit output power should be approximately 1mWatt. The REFMOD adjustment needs to be made while the base station is transmitting real data messages to and from a mobile radio. This is most easily done using the ping command to ping the IPNC from a mobile radio. This will cause the base station to repeatedly send data messages and will facilitate the REFMOD adjustment.

Step 5 Connect the base station to the IPNC.

Step 6 Using a calibrated mobile radio operating on the base station's channel, adjust R30 for consistent data quality readings of 248 (as observed on the mobile radio's attached PC *IP*Message window). Access the MSDOS prompt and ping using the following command:

```
>;ping 192.168.3.3 -t -l 500 -w 2000
```

This command will ping the IPNC continuously with a 500-character test message. Press **[Ctrl]+C** to stop the ping.

Power Amplifier

Step 1 Connect the base station's transmit port to the communication test set.

Step 2 Using the **X=1400,19** command, generate data messages.

Step 3 Slowly increase the base station output power by turning the power control potentiometer clockwise until the power noted in Step 2.

Do not exceed 40 watts output power, as this will reduce the life of the amplifier module. If the base station uses a power amplifier, output power must be set to achieve power output specified for the specific base station installation.

Step 4 Perform a close visual inspection of the base station paying close attention to manufacturing related problems such as loose screws, solder practices, etc.