

## Adjustments

### Voltage regulators

#### RF unit voltages

Drawing 08-05869 (sheet 2) Issue 2 and 08-05910 (sheet 1) Issue 1

Table 3: Supply voltages for the PA PCB and Filter and Control PCB in the RF unit

| Supply | Description                | Source                           |
|--------|----------------------------|----------------------------------|
| 'A'    | Unregulated battery supply | external battery or power supply |
| +10 VA | +10 V regulated supply     | IC1                              |
| +5 VA  | +5 V regulated supply      | IC4                              |
| +5 V   | +5 V regulated supply      | IC200                            |

### Adjustment locations and test points

Figure 1: PA PCB in the RF unit (08-05869)

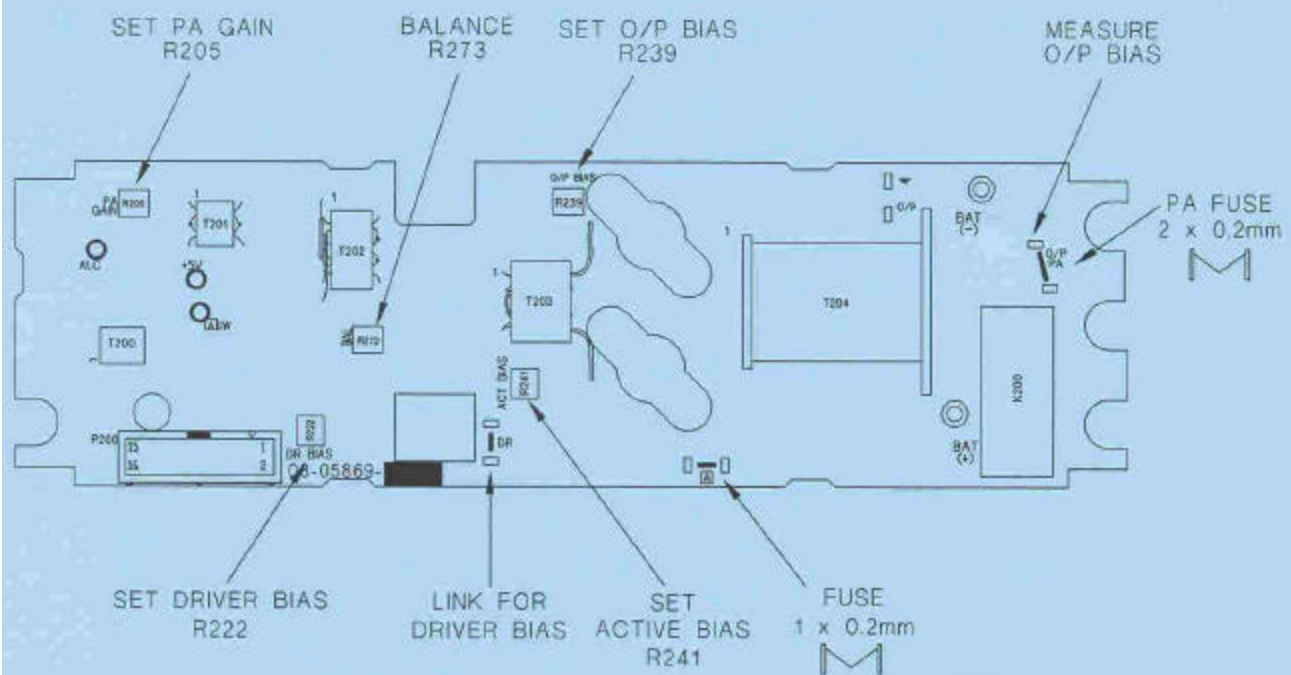
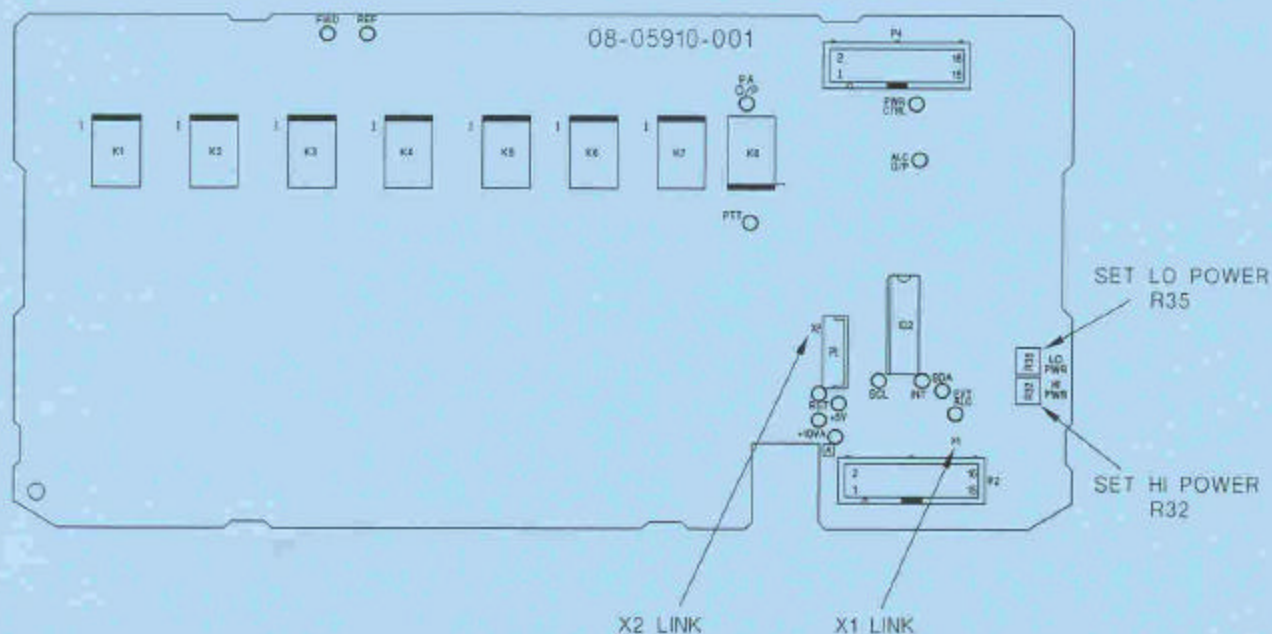


Figure 2: Filter and Control PCB in the RF unit (08-05910)



## Adjusting the PA

### Adjusting the driver bias

Drawing 08-05869 (sheet 2) Issue 2



You do not have to be in Service mode to make this adjustment.

To adjust the driver bias:

- ☐ Ensure the transceiver is switched off and the DC supply is disconnected.
- ☐ Disconnect the exciter output from the PA by removing the connector from J2 (Tx coaxial) on the RF/IF PCB in the RF unit (drawing 08-05261 (sheet 1) Issue 10 or 08-05889 (sheet 1) Issue 1).
- ☐ Unsolder the link labelled DR (DC supply to the driver transistors V207 and V208) (see Figure 1 on page 6).
- ☐ Set a multimeter to DC 20 mA range and connect it in place of the removed link.
- ☐ Connect the DC supply and switch the transceiver on.
- ☐ Select any transmit channel and push PTT (Transmit mode). Check that the driver current measures  $13 \pm 2$  mA.
- ☐ If the current is out of the specified limit stated above, change it by adjusting DR BIAS (R222) (see Figure 1 on page 6).
- ☐ Switch the transceiver off, disconnect the multimeter and replace the link with a length of tinned copper wire.

## Adjusting the PA bias

Drawing 08-05869 (sheet 2) Issue 2



You do not have to be in Service mode to make this adjustment.

To adjust the bias of the PA output transistors:

- ☐ Ensure the transceiver is switched off and the DC supply is disconnected.
- ☐ Disconnect the exciter output from the PA by removing the connector from J2 (Tx coaxial) on the RF/IF PCB in the RF unit (drawing 08-05261 (sheet 1) Issue 10 or 08-05889 (sheet 1) Issue 1).
- ☐ Unsolder the fuse PA O/P (F201) next to the power relay (DC supply to the output transistors V211 and V212) (see Figure 1 on page 6).
- ☐ Set a multimeter to DC 1 A range and connect it in place of the removed fuse (positive near to relay).
- ☐ Connect the DC supply and switch the transceiver on.
- ☐ Select any transmit channel and push PTT (Transmit mode). Check that the output current measures 400 mA  $\pm$  50 mA.

If the current is out of the specified limit stated above, change it by adjusting the preset potentiometer PA BIAS (R239) (see Figure 1 on page 6).

- ☐ Switch the transceiver off, disconnect the DC supply and resolder the fuse PA O/P.

If the fuse is broken, replace it with two strands ( $2 \times 0.2$  mm TCW) taken from a piece of  $7 \times 0.2$  mm cable. Extend the centre of the wire down from the two stakes to form a V, ensuring it does not touch the PCB. Solder the wire to the two stakes, making sure the solder does not run down the strand of wire (see Figure 1 on page 6, PA Fuse).

## Adjusting high output power

Drawing 08-05910 (sheet 1) Issue 1



You do not have to be in Service mode to make this adjustment.

To set the high output power:

- ☐ Select any test channel frequency between 4 and 6 MHz (for example, test channel 16).
- ☐ Connect an average or PEP power meter with a 50  $\Omega$  dummy load to the antenna connector.
- ☐ Connect an oscilloscope via a 47 k $\Omega$  resistor to the antenna connector.
- ☐ Set the oscilloscope timebase to 500  $\mu$ s per division and the trigger to Auto.

- ☐ Connect a signal generator to provide two-tone audio (700 Hz and 2300 Hz) via the test unit to the audio input on the GPIO connector on the junction box.
- ☐ Select PTT (Transmit mode) and adjust the two-tone level for compression.
- ☐ Adjust the Y sensitivity of the oscilloscope for on-screen display and adjust the trigger for a stationary waveform.
- ☐ Adjust the two-tone balance control for good crossover display.
- ☐ Adjust HI PWR (R32) (see Figure 2 on page 7) for the required output.

The indicated PEP level with two-tone modulation will depend on the type of measuring instrument, as shown in Table 7-11 in the *NGT Transceiver System Technical Service Manual*.

 The output power is factory-set, so it is not likely to be outside the specified limits. Check that there are no faults with the transmitter circuits before attempting to adjust the power output.

- ☐ Check that the two-tone waveform is clean and undistorted.
- If it is not clean and undistorted, further analysis is required.

### Adjusting low output power

Drawing 08-05910 (sheet 1) Issue 1

 Before setting the low output power, set the high output power (see page 8, *Adjusting high output power*).

 You must be in Service mode to make this adjustment (see *Accessing Service mode* in the *NGT Transceiver System Technical Service Manual*).

To set the low output power:

- ☐ Select any test channel frequency between 4 and 6 MHz (for example, test channel 16).
  - ☐ Press **7/8** to select low power.
  - ☐ Proceed as for page 8, *Adjusting high output power*.
  - ☐ Adjust LO PWR (R35) for 12 W PEP (5 W on an average reading meter) (see Figure 2 on page 7 or Figure 7-7 and Table 7-11 in the *NGT Transceiver System Technical Service Manual*).
  - ☐ Check that the two-tone waveform is clean and undistorted.
- If it is not clean and undistorted, further analysis is required.

## Adjusting the active bias

Drawing 08-05869 (sheet 2) Issue 2



The active bias must be set before any intermodulation tests are performed.



You must be in Service mode to make this adjustment (see *Accessing Service mode* in the *NGT Transceiver System Technical Service Manual*).

To adjust the active bias:

- ☐ Connect a 50  $\Omega$  dummy load to the antenna output (see Figure 7-12 in the *NGT Transceiver System Technical Service Manual*).
- ☐ Connect a spectrum analyser via a 47 k $\Omega$  resistor to the antenna output (see Figure 7-12).

This provides a low level output for the spectrum analyser.

- ☐ Select test channel 16 (4.6 MHz).
- ☐ Connect the signal generator to provide two-tone audio (700 Hz and 2300 Hz) via the test unit to the GPIO connector on the junction box.
- ☐ Set up the spectrum analyser as follows:

|                  |                                                                                                   |
|------------------|---------------------------------------------------------------------------------------------------|
| Centre frequency | 4.6 MHz                                                                                           |
| Frequency span   | 20 kHz (2 kHz per division)                                                                       |
| Vertical level   | 10 dB per division                                                                                |
| Video bandwidth  | 300 Hz                                                                                            |
| Sensitivity      | Depends on the signal level applied to the analyser and will require adjustment when transmitting |

- ☐ Select PTT (Transmit mode) and adjust the level of the two tones for compression.
- ☐ Adjust the two tones displayed on the spectrum analyser for equal amplitude by adjusting the balance control on the two-tone signal generator.
- ☐ Adjust the sensitivity control on the spectrum analyser to set the two tones at the top of the screen.
- ☐ Adjust the ACT BIAS potentiometer (R241) for a minimum high order (>9<sup>th</sup>) intermodulation distortion level (see Figure 1 on page 6).
- ☐ Measure the intermodulation distortion levels relative to each tone.

Add 6 dB to the reading if referenced to PEP (see *Transmitter specifications* in the *NGT Transceiver System Technical Service Manual* for limits).

## Adjusting balance control

Drawing 08-05869 (sheet 2) Issue 2



You must be in Service mode to make this adjustment (see *Accessing Service mode* in the *NGT Transceiver System Technical Service Manual*).

To adjust the balance control:

- ☐ Connect setup as per the active bias adjustment (see page 10, *Adjusting the active bias*).
- ☐ Select test channel 18 (5.7 MHz).
- ☐ Connect the signal generator to provide single-tone audio via the test unit to the GPIO connector on the junction box.
- ☐ Set up the spectrum analyser as follows:

|                  |                                                                                                   |
|------------------|---------------------------------------------------------------------------------------------------|
| Centre frequency | 11.4 MHz                                                                                          |
| Frequency span   | 20 kHz (2 kHz per division)                                                                       |
| Vertical level   | 10 dB per division                                                                                |
| Sensitivity      | Depends on the signal level applied to the analyser and will require adjustment when transmitting |

- ☐ Select PTT (Transmit mode) and adjust the single tone level for compression.
- ☐ Adjust the balance control (R273) for a minimum on 11.4 MHz.
- ☐ Check that the level of the 2<sup>nd</sup> harmonic (11.4 MHz) is below 60 dB.

## Checking intermodulation

Drawing 08-05910 (sheet 1) Issue 1



The bias gain or active bias must be set before any intermodulation tests are performed (see page 10, *Adjusting the active bias* or page 10, *Adjusting the active bias*).



You must be in Service mode to perform this check (see *Accessing Service mode* in the *NGT Transceiver System Technical Service Manual*).

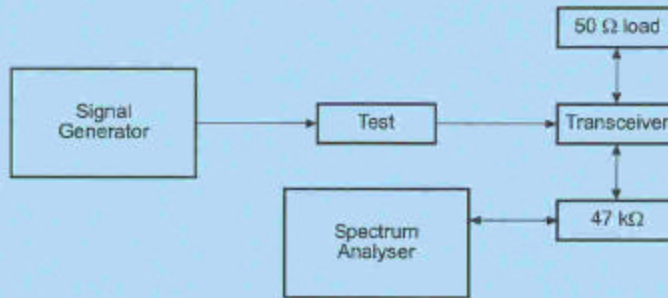
The test channels 9 to 30 can be used to check for IMD. To facilitate checking each band, there is a test channel allocated near the bottom, top and centre of each band.

To check the IMD:

- ☐ Connect a 50  $\Omega$  dummy load to the antenna output.
- ☐ Connect a spectrum analyser via a 47 k $\Omega$  resistor to the antenna output (see Figure 3).

This provides a low level output for the spectrum analyser.

Figure 3: Setup for checking intermodulation distortion



- ☐ Connect a signal generator to provide two-tone audio (700 Hz and 2300 Hz) via the test unit to the GPIO connector on the junction box.
- ☐ Set up the spectrum analyser as follows:

|                  |                                                                                                   |
|------------------|---------------------------------------------------------------------------------------------------|
| Centre frequency | Set to frequency of selected test channel                                                         |
| Frequency span   | 20 kHz (2 kHz per division)                                                                       |
| Vertical level   | 10 dB per division                                                                                |
| Video bandwidth  | 300 Hz                                                                                            |
| Sensitivity      | Depends on the signal level applied to the analyser and will require adjustment when transmitting |

- ☐ Select PTT (Transmit mode) and adjust the level of the two tones for compression.
- ☐ Adjust the two tones displayed on the spectrum analyser for equal amplitude by adjusting the balance control on the two-tone signal generator.
- ☐ Adjust the sensitivity control on the spectrum analyser to set the two tones at the top of the screen.
- ☐ Measure the IMD levels relative to each tone.

Add 6 dB to the reading if referenced to PEP (see *Transmitter specifications* in the *NGT Transceiver System Technical Service Manual* for limits).

If IMD is outside of the specified limits, further analysis is required.

- ☐ Check the IMD on the remaining frequencies (see Table 7-9 in the *NGT Transceiver System Technical Service Manual*). The centre frequency of the spectrum analyser must be set to the channel frequency selected.



To check for spurious and harmonic components during the IMD checks, adjust the frequency span of the spectrum analyser.

### Adjusting the PA gain

Drawing 08-05261 (sheet 1) Issue 10 or 08-05889 (sheet 1) Issue 1 and drawing 08-05869 (sheet 2) Issue 2



You must be in Service mode to make this adjustment (see *Accessing Service mode* in the *NGT Transceiver System Technical Service Manual*).

To adjust the PA gain:

- ☐ Select any test channel frequency between 4 and 6 MHz (for example, test channel 16).
- ☐ Connect an oscilloscope to the Tx test point (exciter output) on the RF/IF PCB in the RF unit (use connector J2 body as earth) (see Figure 7-2 in the *NGT Transceiver System Technical Service Manual* or Figure 1 on page 11 in *Publication Update 2*).
- ☐ Using a single-tone audio, adjust the audio input level until the exciter output level is 225 mV P-P.
- ☐ Adjust the PA GAIN control (R205) on the PA PCB to give a 45 W output (see Figure 7-5 in the *NGT Transceiver System Technical Service Manual* or Figure 1 on page 6).