

Function of RF Semiconductors & Other Active Devices

| Schematic Key                | Designator Motorola | Device Type          | Circuit Application | Operating Frequency | Source   |
|------------------------------|---------------------|----------------------|---------------------|---------------------|----------|
| <b>PA</b>                    |                     |                      |                     |                     |          |
| Q5800                        | 4880141L01          | TRANSISTOR           | RF PA               | 403-433 MHz         | MOTOROLA |
| Q5801                        | 4880182D50          | TRANSISTOR           | RF PA               | 403-433 MHz         | MOTOROLA |
| Q5803                        | 4880225C09          | TRANSISTOR           | RF PA               | 403-433 MHz         | MOTOROLA |
| Q5806                        | 4880141L02          | TRANSISTOR           | RF PA               | 403-433 MHz         | MOTOROLA |
| Q5850                        | 4880225C27          | TRANSISTOR           | RF PA               | 403-433 MHz         | MOTOROLA |
| Q5875                        | 4880225C30          | TRANSISTOR           | RF PA               | 403-433 MHz         | MOTOROLA |
| <b>EXCITER</b>               |                     |                      |                     |                     |          |
| Q3401                        | MMBR901             | VCO FDBACK BUFF      | SYNTHESIZER         | 403-433 MHz         | MOTOROLA |
| Q3402                        | MMBT3904            | REFERENCE BUFFER     | SYNTHESIZER         | 2.1 MHz             | MOTOROLA |
| Q3403                        | MMBT3904            | CHARGE PUMP          | SYNTHESIZER         | DC                  | MOTOROLA |
| Q3405                        | MMBT3904            | CHARGE PUMP          | SYNTHESIZER         | DC                  | MOTOROLA |
| Q3407                        | MMBT3904            | CHARGE PUMP          | SYNTHESIZER         | DC                  | MOTOROLA |
| Q3408                        | MMBT3904            | CHARGE PUMP          | SYNTHESIZER         | DC                  | MOTOROLA |
| Q3410                        | MMBT3904            | CHARGE PUMP          | SYNTHESIZER         | DC                  | MOTOROLA |
| Q3411                        | MMBT3904            | CHARGE PUMP          | SYNTHESIZER         | DC                  | MOTOROLA |
| Q3412                        | MMBT3904            | SYNTH ADAPT          | SYNTHESIZER         | DC                  | MOTOROLA |
| U3401                        | MC33074             | LOW PASS FILTER      | SYNTHESIZER         | AUDIO               | MOTOROLA |
| U3401                        | MC33074             | LO-FREQ MOD COMP     | SYNTHESIZER         | AUDIO               | MOTOROLA |
| U3402                        | C42                 | PHASE LOCKED LOOP    | SYNTHESIZER         |                     | MOTOROLA |
| U3403                        | 74HC4066            | TRANS. GATE          | SYNTHESIZER         | DC                  | MOTOROLA |
| U3404                        | MC33184             | LO PASS LOOP FILT    | SYNTHESIZER         | DC                  | MOTOROLA |
| Q3100                        | MMBT3904            | RF SWITCH CKT        | VCO                 | 403-433 MHz         | MOTOROLA |
| Q3200                        | MMBFJ310LT1         | RF OSCILLATOR        | VCO                 | 403-433 MHz         | MOTOROLA |
| Q3201                        | MMBR901LT1          | BUFFER AMP           | VCO                 | 403-433 MHz         | MOTOROLA |
| Q3230                        | MMBFJ310LT1         | RF OSCILLATOR        | VCO                 | 403-433 MHz         | MOTOROLA |
| Q3231                        | MMBR901LT1          | BUFFER AMP           | VCO                 | 403-433 MHz         | MOTOROLA |
| Q3260                        | MMBT3904T           | VCO SELECT           | VCO                 | DC                  | MOTOROLA |
| Q3261                        | MMBT3906T           | VCO SELECT           | VCO                 | DC                  | MOTOROLA |
| Q3262                        | MMBT3904T           | VCO SELECT           | VCO                 | DC                  | MOTOROLA |
| Q3263                        | MMBT3906T           | VCO SELECT           | VCO                 | DC                  | MOTOROLA |
| Q3280                        | MMBT3904T           | SUPER FILTER         | VCO                 | DC                  | MOTOROLA |
| U3270                        | MWA0311T1           | AMPLIFIER            | VCO                 | 403-433 MHz         | MOTOROLA |
| Q3000                        | MMBT3904T           | FAST KEY CTRL        | POWER CONTROL       | DC                  | MOTOROLA |
| Q3001                        | MMBT3904T           | FAST KEY CTRL        | POWER CONTROL       | DC                  | MOTOROLA |
| Q3002                        | MMBT3904T           | FAST KEY CTRL        | POWER CONTROL       | DC                  | MOTOROLA |
| Q3003                        | MMBT3904            | SERIES PASS          | POWER CONTROL       | DC REG              | MOTOROLA |
| Q3004                        | MJD32RL             | SERIES PASS          | POWER CONTROL       | DC REG              | MOTOROLA |
| U3000                        | 5183977M73          | D/A CONVERTER        | POWER CONTROL       |                     | MOTOROLA |
| U3001                        | 5183977M70          | PWR CTRL IC          | POWER CONTROL       | DC                  | MOTOROLA |
| U3002                        | 5113819A04          | PWR CTRL IC          | POWER CONTROL       | DC                  | MOTOROLA |
| U3002                        | 5113819A04          | FAST KEY CTRL        | POWER CONTROL       | DC                  | MOTOROLA |
| <b>STATION CONTROL BOARD</b> |                     |                      |                     |                     |          |
| Q301                         | MMBT3904            | BUFFER               |                     | DATA                | MOTOROLA |
| Q302                         | MUN2211             | LEVEL SHIFTER        |                     | DATA                | MOTOROLA |
| Q303                         | MUN2211             | LEVEL SHIFTER        |                     | DATA                | MOTOROLA |
| U301                         | 74HC4066            | GATE                 |                     | AUDIO               | MOTOROLA |
| U302                         | MC33074             | OP AMP               |                     | AUDIO               | MOTOROLA |
| U303                         | MAX543              | D/A CONVERTER        |                     | AUDIO               | MOTOROLA |
| U304                         | MAX543              | D/A CONVERTER        |                     | AUDIO               | MOTOROLA |
| U305                         | MC33074             | OP AMP               |                     | AUDIO               | MOTOROLA |
| U306                         | MAX281              | FILTER               |                     | AUDIO               | MOTOROLA |
| U307                         | 74HC4052            | 4:1 MUX              |                     | AUDIO               | MOTOROLA |
| U308                         | MAX281              | FILTER               |                     | AUDIO               | MOTOROLA |
| U309                         | 74HC4053            | 2:1 MUX              |                     | AUDIO               | MOTOROLA |
| U310                         | 74HC4052            | 4:1 MUX              |                     | AUDIO               | MOTOROLA |
| U311                         |                     | EPOT                 |                     | AUDIO               | MOTOROLA |
| U312                         | MC3303              | OP AMP               |                     | AUDIO               | MOTOROLA |
| U313                         | MC33074             | OP AMP               |                     | AUDIO               | MOTOROLA |
| U314                         | 74HC4051            | ANALOG MUX           |                     | AUDIO               | MOTOROLA |
| U315                         | MAX543              | D/A CONVERTER        |                     | AUDIO               | MOTOROLA |
| U316                         | MC145480            | PCM CODEC (D/A, A/D) |                     | AUDIO               | MOTOROLA |
| U317                         | LM380               | AUDIO AMP            |                     | AUDIO               | MOTOROLA |

### **TUNE UP PROCEDURE**

This exhibit contains the tune-up procedure as it will appear in the Radio Service Software (RSS) manual.

The following adjustments comprise the total transmitter alignment:

1. Reference Oscillator
2. VCO
3. Modulation Compensation
4. Instantaneous Deviation Control and Audio Levels
5. RF Power Output

Note: All adjustments are factory pre-set and do not require alignment under normal operating conditions. In the event alignment is needed, refer servicing to qualified radiotelephone personnel only.

### **TEST EQUIPMENT**

| Description        | Recommended Model |
|--------------------|-------------------|
| 1. Service Monitor | Motorola R-2600   |
| 2. PC with RSS     | DOS Based         |

### **TRANSMITTER ALIGNMENT PROCEDURE**

#### RSS Port

A 9-Pin D-Type connector is provided on the Station Control Module front panel to allow service personnel to connect a PC loaded with the Radio Service Software (RSS) and perform programming and maintenance tasks via this EIA-232 port. The following pages of this exhibit will show the important alignment screens.

ALIGNMENT SCREEN

MOTOROLA RADIO SERVICE SOFTWARE  
BASE STATION PRODUCTS  
VER:R10.03.00  
MAIN:SERVICE:ALIGNMENT

Press <F2> To Align Rx Wireline

\*\*\*\*\* Remember to F4-ACCESS DISABLE the station prior to alignment \*\*\*\*\*  
\*\*\*\*\* RESET STATION AFTER PERFORMING ALIGNMENTS \*\*\*\*\*

INSTALL/MODULE REPLACEMENT

Rx Wireline <Line 2>

Tx Wireline  
RSSI Calibrate  
Squelch Adjust  
Battery Equalization  
Reference Oscillator  
ASTRO Tx Align and Test  
TDATA Calibration

MODULE REPLACEMENT

Power Output  
Tx Deviation Gain Adjust  
Reference Modulation Compensation

BIT ERROR RATE AND RSSI REPORTS

U.52 Rx BER And RSSI Report  
PROJECT 25 Rx BER And RSSI Report  
RSSI Monitor

F1 F2 F3 F4 F5 F6 F7 F8 F9 F10  
HELP PERFORM ALIGNMENT ACCESS DISABLE RESET STN ACCESS ENABLE EXIT

REFERENCE OSCILLATOR ADJUSTMENT

MOTOROLA RADIO SERVICE SOFTWARE  
BASE STATION PRODUCTS  
VER:R10.03.00  
MAIN:SERVICE:ALIGNMENT:REF OSCILLATOR

Use Up/Dn Arrow Keys  
Use PgUp/PgDn Keys

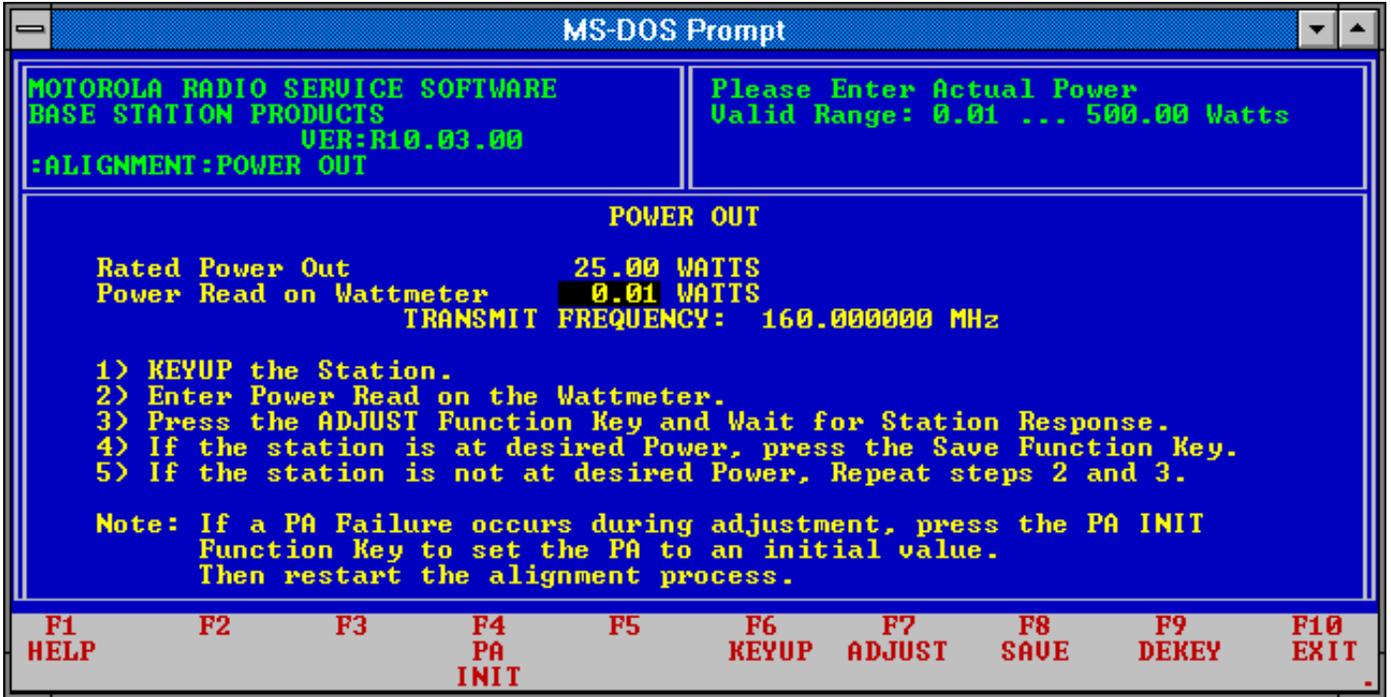
REFERENCE OSCILLATOR FREQUENCY

MIN MAX

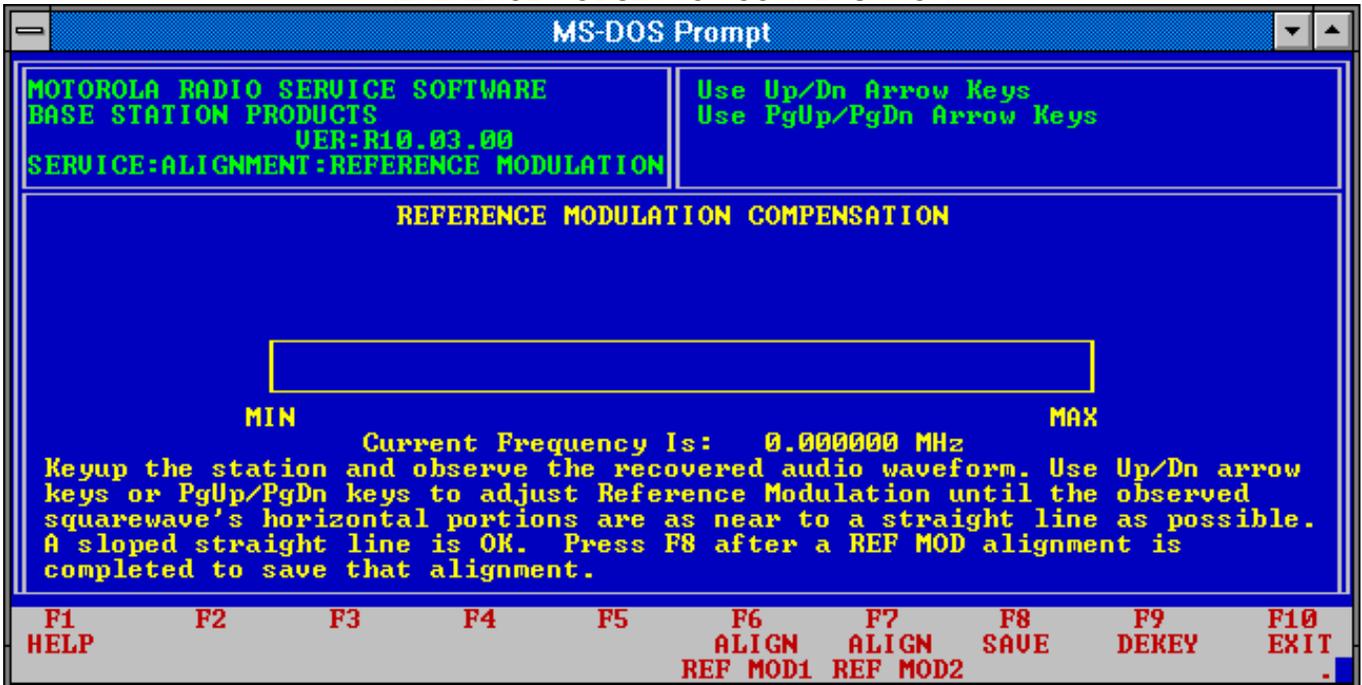
TRANSMIT FREQUENCY 160.000000 MHz

F1 F2 F3 F4 F5 F6 F7 F8 F9 F10  
HELP AUTO-NET 5 MHz AUTO-NET 10 MHz KEYUP SAVE DEKEY EXIT

RF POWER OUT ALIGNMENT



REFERENCE MODULATION COMPENSATION



TRANSMIT DEVIATION ADJUSTMENT

**MS-DOS Prompt**

MOTOROLA RADIO SERVICE SOFTWARE  
BASE STATION PRODUCTS  
VER:R10.03.00  
MAIN:SERVICE:ALIGNMENT:TX DEV GAIN ADJ

NON EDITABLE FIELD:  
Press F2 to Start The Alignment

**TX DEVIATION GAIN ADJUSTMENT**

|                         |          |     |
|-------------------------|----------|-----|
| 1st Frequency Deviation | 6.308    | kHz |
| 2nd Frequency Deviation | 6.448    | kHz |
| 3rd Frequency Deviation | 6.588    | kHz |
| 4th Frequency Deviation | 6.729    | kHz |
| Current Frequency       | 0.000000 | MHz |

F1 HELP    F2 FREQ 1 KEYUP    F3 FREQ 2 KEYUP    F4 FREQ 3 KEYUP    F5 FREQ 4 KEYUP    F6    F7    F8 SAVE    F9 DEKEY    F10 EXIT