Supplement for

EVN4140E

and Radio Service Software Manual: 68P02058U56-O

The EVN4140E Radio Service Software, release R05, supports programming of 900 series mobile radios, HT1100 / GP900 and Visar portable radios. This supplement describes the specific features for Visar portable radios available within this release.

VISAR PROGRAMMING OPTIONS:

as per HT1100 / GP900 except for the following:

BUTTON ASSIGNMENTS At the Main Menu press **F4, F2, F2**

Visar only has two buttons which may be programmed, Side Buttons 1 and 2. Moreover, the Display may be programmed to be either LOCKED or INVERTED.

LOCKED : By simultaneously pressing both channel up-down buttons for a fixed duration channel selection can be locked out. Channel selection can be resumed by simultaneously pressing both channel up-down buttons again.

INVERTED: By simultaneously pressing both channel up-down buttons for a fixed duration the display can be inverted for viewing at an angle of 180 degrees.

Default: INVERTED.

ALERTS II At the Main Menu press **F4, F2, F6, F6**

No Mandown Warning option is available on Visar.

MISC II At the Main Menu press **F4, F2, F9, F6**

No Vehicle Adaptor Power or Mandown options are available on Visar.

CHANNEL ALIAS DEFINITIONS At the Main Menu press **F4, F3, F6**

As for the 900 series radios the Channel Alias Definitions option is available on Visar.

ADDRESS DEFINITIONS At the Main Menu press **F4, F4, F3**

For Visar the Multicall Keypad option is not available from the Address definitions screen.

The Send Button is now called Send Telegram option

DTMF KEYPAD OPTION At the Main Menu press **F4, F2, F7**

Unlike HT1100 it is not possible to Enable/Disable the DTMF function of the keypad on Visar.

CHANNEL DEFINITIONS III At the Main Menu press **F4, F3, F4, F6, F6**

The Keypad Function is a Visar only option. (Erroneously described in supplement 68P02058U91 as an HT1100 option).

ENCODER/DECODER ASSOCIATED At the Main Menu press **F4, F2, F3**

No External Alarm/External Alarm Duration option is available on Visar.

EMERGENCY At the Main Menu press **F4, F2, F5**

No Emergency On/Off switch option is available on portable radios.

Supplement for

EVN4140D

and Radio Service Software Manual: 68P02058U56-O

HT1100 / GP900 Programming Information

The mobile 900 series software EVN4140D, software release R04, also supports programming of HT1100 / GP900 portable radios. This supplement describes the specific features for portable radios available with this release.

TRANSMIT DEVIATION TUNING

At the Main Menu press **F2, F2, F6**

The Transmit Deviation Tuning screen will be redundant for future radios with a revised hardware fracN chip. When tuning a radio with the new fracN I. C the values you will be trying to use will be near the upper limit. The screen will remain to ensure compatibility with the radios already in the field.

DTMF ALIGNMENT

At the Main Menu press **F2, F4, F2**

The DTMF Deviation Softpot is used to tune the FFSK signalling deviation. Tuning is performed at one frequency and for 25 kHz channel spacing. The radio generates a DTMF signal for tuning. Values for other frequencies and channel spacings are calculated by the radio software.

DTMF Deviation should be checked any time the radio is serviced and must be adjusted whenever any of the modulation circuitry has been replaced.

Note: All radio compensation/deviation adjustments must be made before adjusting DTMF deviation.

1. From the Service menu, press F4 to select SIGNALLING alignment.
2. Press F2 again to select the DTMF softpot.
3. Press F6 to key the radio on the test frequency. The screen will indicate that the radio is transmitting.
4. Measure the DTMF deviation on your service monitor.
5. Use the UP/DOWN arrow keys to adjust the DTMF deviation to be within 3.05 and 3.45 kHz.
6. Press F6 again the dekey the radio.
7. Press F8 to program the softpot value; press F10 to return to the SIGNALLING menu.

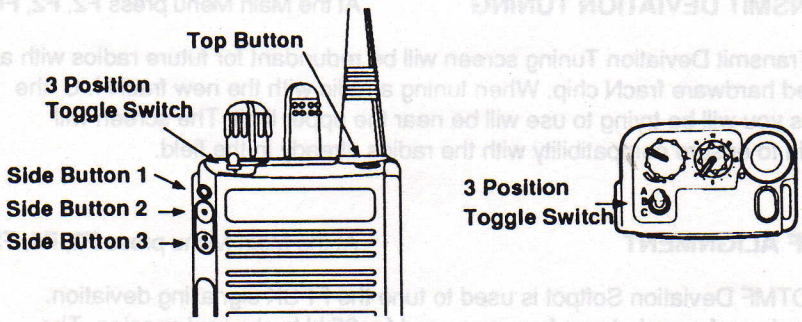
VOLUME SCREEN ENHANCEMENT At the Main Menu press **F4, F2, F4**

External Fixed Volume

This option allows the user to define the fixed volume setting when the radio is installed in a vehicle adaptor.

BUTTON ASSIGNMENT At the Main Menu press **F4, F2, F2**

The Radio Buttons screen for portable radios allows the user to program Side Buttons 1, 2 and 3, the Top Button and the 3 Position Toggle Switch.



Available selections for Side Buttons 1, 2, 3:

Side Button 1	Side Button 2	Side Button 3
Disabled	Disabled	Disabled
Call 1 ....(default)	Call 2 ....(default)	Call 3
Monitor	Monitor	Monitor
Call Revert	Call Revert	Call Revert
Emergency	Emergency	Emergency
Nuisance Delete	Nuisance Delete	Nuisance Delete ...(default)
Scan On/Off	Scan On/Off	Scan On/Off

Disabled: When a disabled side button is pressed the side button error alert will be given.

Call 1, Call 2, Call 3: Encodes the corresponding call telegram.

Monitor: Allows the user to toggle between different programmed squelch settings.

Call Revert: The call revert feature will cause the radio to change to a pre-programmed channel number, and encode the Call 1 telegram provided that a Call 1 telegram is defined on the channel.

Emergency: Invokes the emergency operation on the current channel. If, however, an emergency revert channel has been selected, then emergency operation will take place on the revert channel.

Nuisance Delete: Allows channels to be deleted from a scan list during scanning.

Scan On/Off: Allows the channel scan feature to be switched between active and inactive.

Note: the Scan On/Off feature cannot be selected if Position A, B and C is set to Scan On.

Available selections for Top Button:

Disabled ....(default)
Call 1
Emergency
Nuisance Delete

Disabled: The top button may be configured as disabled if it is not required to perform any of the other possible functions. When a disabled top button is pressed the top button error alert will be given.

Call 1: Encodes the corresponding call 1 telegram.

Emergency: Invokes the emergency operation on the current channel. If however an emergency revert channel has been selected, then emergency operation will take place on the revert channel.

Nuisance Delete: Allows channels to be deleted from a scan list during scanning.

Available selections for Three Position Toggle Switch:

Position A	Position B	Position C
High Power	High Power	High Power..(default)
Low Power	Low Power	Low Power
VOX On	VOX On	VOX On
Whisper Mode	Whisper Mode	Whisper Mode
Repeater Talkaround	Repeater Talkaround	Repeater Talkaround
Open Squelch	Open Squelch	Open Squelch
Carrier Squelch	Carrier Squelch	Carrier Squelch
PL Squelch	PL Squelch....(default)	PL Squelch
Scan On	Scan On	Scan On
External Alarm	External Alarm	External Alarm
Disabled....(default)	Disabled	Disabled

High Power / Low Power: Overrides the per channel power setting programmed via the Channel Definitions screen (F4, F3, F4).

VOX On: Enables Vox operation (see VOX Operation, page 5).

Repeater Talkaround: Activates repeater talkaround feature if enabled on the channel.

Open Squelch: Sets radio squelch to open.

Carrier Squelch: Sets radio squelch to carrier.

PL Squelch: Sets radio to squelch to PL if enabled on the channel.

Scan On: Activates scan operation if enabled on the channel.

External Alarm: Enables the external alarm feature. Note that this feature will only operate on channels with a select 5 decoder.

Disabled: To be selected when none of the other functions are required.

EMERGENCY ENHANCEMENT At the Main Menu press **F4, F2, F5**

Emergency Cycle Mode/Number of Cycles: If the Tx and Rx Cycle Durations are set to other than 0 the Emergency Cycle Mode will appear on the screen. In Emergency Cycle Mode the radio will alternate between periods of transmitting and receiving. The radio can be configured to leave emergency mode after a programmable number of cycles (LIMITED) or to continue to cycle until it is externally reset (FOREVER).

ALERTS II At the Main Menu press **F4, F2, F6, F6**

An "Alerts II" screen for portable radios has been added to the RSS. If an alert is Enabled, it may be set to either FIXED or VARIABLE volume. The volume of a variable volume alert will be proportional to the setting of the volume switch, unlike a fixed alert which is a constant volume regardless of the volume switch. The following alerts are available:

Keypad Error: The Keypad Error will sound if an illegal keypad button press is made. The Keypad error is a 260 msecs medium pitched tone.

Scanned Channel: The Scanned Channel alert will sound when the channel selector is moved to the channel on which the radio has found an unmuted condition during scanning. The alert is a 130 msecs high pitched tone.

Low Battery: The Low Battery alert is sounded when the low battery condition is detected. This condition is pre-defined by the user setting the low battery threshold for both receive and transmit fields on the Miscellaneous screen. This alert is a 40 msesc on / 40 msecs off medium pitched tone.

Mandown Warning: The Mandown Warning is sounded when the Mandown condition is detected. This condition is pre-defined by the user setting the Mandown alert duration on the Miscellaneous screen. This alert is a 130 msesc on / 130 msecs off medium pitched tone sounding twice.

DTMF

At the Main Menu press **F4**, **F2**, **F7**

DTMF Keypad Option: This option allows the user to Enable or Disable the DTMF function of the keypad. This can be configured on a per radio basis.

DTMF Sidetones: The sidetones may be enabled per radio. If this option is Enabled then the actual DTMF tones will be heard from the speaker.

DTMF Dial Selection: The following selections are available:

LIVE dialling: the tones will have a minimum duration programmable per radio.

FIXED dialling: the tones are of a fixed duration.

It is recommended that if a 5 tone connection telegram is required then this is configured to the PTT button of the radio. This will enable the 5 tone telegram to be sent immediately the user has enabled DTMF and starts to dial.

DTMF Inter Digit Delay: is the programmable delay between the DTMF digits.

DTMF Digit Duration: is the DTMF digit duration.

DTMF Pretime: is the programmable delay before the first DTMF digit is sent.

DTMF Hold Time: is the programmable delay after the last DTMF digit is sent.

VOX OPERATION

At the Main Menu press **F4**, **F2**, **F8**

This option allows the user to Enable the feature where voice transmission is fed back through the headphones. To Disable the VOX feature per radio press **F5** (Delete VOX). The following features can be set:

VOX Sidetones

This option allows audible feedback from the microphone to the speaker/headphones indicating to the user that he is transmitting in case the radio LED is not visible.

VOX Activation Threshold: specifies the microphone activation level. When this level is exceeded the exceeded level must be present for a pre-defined period of time before the channel will key up.

VOX Noise Rejection: defines the sensitivity level of the VOX Activation to the average background noise

VOX Hold Time: defines the hold time during which the radio remains keyed after the user has stopped talking.

MISC II At the Main Menu press **F4, F2, F9, F6**

A "Miscellaneous II" screen for portable radios has been added to the RSS. The features are:

Vehicle Adapter Power: This option allows the user to select either Low or High power setting for the vehicle adaptor.

Whisper Mode Mic Gain: During Whisper mode this is used to define the sensitivity of the external microphone.

External Mic Gain: During normal operation this is used to define the sensitivity of the external micophone.

Front Panel Air Test: This option allows the user to enter the radio Test Mode (see section 4 in the Service Manual).

Keypad Badklight: allows the user to Enable/Disable the keypad backlight.

Cloning: Cloning is used to copy the personality data from one radio (the master) to another (the slave).
During the cloning operation tuning and model data is not copied. All personality data will be copied during a cloning operation.
Note: Cloning is only possible between radios with the same model numbers.

Mandown: allows the user to Enable or Disable the Mandown function. The Mandown feature requires that Emergency is enabled.

Pre-Alert Duration (for Mandown): defines the period of time the mandown condition has to be present before the Warning Alert timer is started and the Mandown Alert is sounded.

Warning Alert Duration (for Mandown): defines the period of time the alert is sounded. On expiry of this timer emergency operation will be invoked.

Battery Saver Off Time: specifies the amount of time the battery saver remain Off before alternating to the On condition. During battery saver, radio power

requirements are reduced by switching off some fo the radio circuitry for short periods. While the radio circuitry is switched off the radio is not able to detect carrier so the saver alternates between the on and off state. This MAY affect receiver sensitivity on 5 tone decode channels.

Battery Saver Dwell Time: specifies the amount of time the radio will wait for a carrier signal before entering the battery saver cycle.

TX Low Battery Threshold: allows the user to specify the low battery threshold which is tested whilst the radio is transmitting. The low battery LED indication will be given if the level falls below the transmit threshold.

RX Low Battery Threshold: allows the user to specify the low battery threshold which is tested whilst the radio is receiving. The low battery alert will be sounded periodically when the radio is receiving.

Low Battery LED: allows the user to Enable or Disable the low battery LED during transmit.

TX Low Battery Alert: allows the user to Enable or Disable the low battery alert on dekey, should the level fall below the transmit threshold while transmitting.

Low Battery Alert Time: allows the user to define the delay period between each low battery alert being sounded.

CHANNEL DEFINITIONS III

At the Main Menu press **F4, F3, F4, F6, F6**

A "Channel Definitions III" screen for portable radios has been added to the RSS. The features available are Enabled/Disabled on a per channel basis:

Battery Saver: This feature prolongs the time between battery recharging. Radio power requirements are reduced whilst the radio is receiving by switching off some of the radio circuitry for short periods of time.

VOX: This option allows VOX to be Enabled/Disabled per channel.

Keypad Function: The Keypad has three operating modes:

Disabled:	Buttons 0 - 9, *, # are locked out.
Multicall Variable Digit Entry:	Buttons 0 - 9, *, # are enabled and can be used in the multicall feature. The * key may be used as a Send Button if the appropriate option is enabled.
DTMF Encode Enable:	Buttons 0 - 9, *, # are enabled and can be used in the DTMF feature.

Whisper: The Whisper feature increases radio microphone gain thus allowing the user to speak quietly.

DESIGNATED CHANNEL & DESIGNATED KEYUP CHANNEL At the Main Menu press **F4, F3, F5**

The Designated Channel option allows the user to enable and select a designated channel for the radio to key up on during active scan.

ADDRESS DEFINITIONS At the Main menu press **F4, F4, F3**

An "Address Definitions" screen for portable radios has been added to the RSS. The features are:

Multicall Keypad Option: allows the user to Enable the address (or Multicall) function of the keypad.

Send Button: when this option is Enabled the keypad button "*" is used to send the modified multicall sequence.

Send Tgm: will select a predefined telegram sequence. Sixteen predefined telegrams are supported.

Digit - Locked Out:

The user can designate digits to be locked out from all address entry. This is e.g. used to prevent users from manually entering an Emergency Call

Supplement for
EVN4140D
and
Radio Service Software Manual
68P02058U56-O

This supplement describes the changes to EVN4140D for software release R04 versions.

RADIO PERSONALITY

The upgraded Radio Service Software is backward compatible, and is thus able to handle both existing and new radios.

The new functions are detailed in the subsequent sections of this supplement.

PATCH FILES AND DIRECTORY PATH

Some former versions of the radio software have known problems which can be solved by a software patch. The RSS will automatically load the correct patch file into the radio when the radio is programmed.

The patch files MUST be stored in the same directory as the RSS executable files (runtime.exe, 900_xxx.odb, 900_xxx.bat).

DELETING RECORDS

To increase the available radio personality free space the users now have the capability of deleting features they do not use. The following features can be deleted:

- Scan Sequences
- Decoder Sequences
- Group Decoder Definitions
- Single Tones
- User Defined Signalling

Please ensure that, if all Single Tone records are deleted, there are no references to them in the Encode or Decode Sequences.

NEW SERVICE SCREEN

At the Main Menu press **F2, F9**

Hardware Configuration Screen

A new screen has been added to give engineers access to functions not normally required by the typical user. The following functions are available:

PL Noise Filtering: The default is 28 Hz, 57 Hz, 57 Hz and should normally not be changed to get the best possible PL noise rejection. The option 28 Hz, 57 Hz, 28 Hz should only be used in very specific cases. All other options should not be used at all.

Audio Filtering: The default is NORMAL and should not be changed. If OPTIONAL is selected the voice audio path is disconnected from the receiver demodulator. This option is for future plug in filter boards only.

Microphone AGC: The default is DISABLED. If ENABLED the microphone sensitivity will automatically be adapted to the users sound preassure level to get a constant transmitter voice deviation independent from the distance between the user and the microphone. To minimize unwanted background noise please do not use more than 5 cm distance.

Data Modem Application: The default is DISABLED. If ENABLED the TX to RX and RX to TX transition times are minimized to less than 35 ms (30 ms). The PTT debounce times are reduced from 10 ms to 2 ms typically. This mode also allows the use of pin 24 at the accessory connector for data modulation with flat response from 50 Hz to 3 kHz.

Phase Lock Special: This option is only available if the Data Modem Application is Enabled. Default is DISABLED. To reduce receiver demodulator transients this line should be enabled for data applications.

ASFIC TX to RX Settling Timer: Default is 5 ms. This should normally not be changed to get a fast TX to receiver demodulator signal. For external data applications it is possible to change it to 0 ms to further speed up the receiver but this will cause a demodulator transient which can only be filtered out with an external 300 Hz highpass filter at pin 25 of the accessory connector.

NEW TRANSMITTER ALIGNMENTS

Current Limit

At the Main Menu press **F2, F2, F7**

A new Service alignment has been added to the Transmitter alignments menu.

Note: After POWER tuning, measure and note the DC current to the radio on each channel in the high power level. These values are needed for the Current Limit tuning.

Transmit Current Limit Alignment

1. Press F7 to select the Current Limit softpot. The screen will indicate the transmit test frequencies to be used.
2. Select the frequency with the highest DC current drain as measured during the power tuning procedure.
3. Press F6 to key the radio and use the UP/DOWN arrow keys to adjust the transmit Current Limit until the power has reached the maximum nominal power of the radio (25 Watts or 10 Watts). If the value cannot be exactly tuned set the output power one step above the nominal value.
4. On VHF radios increase the current limit by three steps.
   On UHF radios leave the value as tuned in step 3.
5. Press F6 to dekey the radio.
6. Press F8 to program the value. (The six other softpot values do not need tuning because only one Current Limit value is held in the radio).

Voltage Limit At the Main Menu press **F2, F2, F8**

A new Service alignment has been added to the Transmitter alignments menu.

Transmit Voltage Limit Alignment

1. Set the supply voltage to 15.6 V.
2. Press F8 to select the Voltage Limit softpot. The screen will indicate the transmit test frequencies. Select the first frequency shown.
3. Press F6 to key the radio, and use the UP/DOWN arrow keys to adjust the transmit Voltage Limit until the RF power has reached the values shown in the table below:

Max. nominal RF Power of the radio	Output Power to be tuned by Voltage Limit tuning
10 W	12.5 W
25 W	31.5 W

4. Press F6 to dekey the radio, and then press F8 to program the value
5. Repeat steps 3 - 5 for the remaining test frequencies.
6. Set the supply votage back to 13.6 V.
7. Press F10 to return to the TRANSMIT menu.

Power Range Screen (VHF only) At the Main Menu press **F2, F2, F9**

To support VHF radios with power ranges <2.5 Watt a new service screen has been implemented which allows the power setting to be set to low.

VOLUME SCREEN ENHANCEMENT

At the Main Menu press **F4, F2, F4**

The Variable Alert Volume and the Side Tone Volume fields have been altered so that the valid ranges are now from -120 to +120 in steps of 10.

EMERGENCY ENHANCEMENT

At the Main Menu press **F4, F2, F5**

Emergency Mic Gain Option: This option allows the possibility to use an alternative emergency microphone gain. When the option is set to Disabled the microphone sensitivity will have the same gain as non emergency operation. When the option is set to Enabled, the emergency microphone gain will be selected. This can be used to increase the microphone sensitivity.

HOOK OPERATION

At the Main Menu press **F4, F2, F9**

A new screen has been added to allow the user to define the Hook Operation.

Available selections are:

Disabled:	Selecting this option means that going on/off hook has no effect.
Timed:	When the radio goes off hook, select 5 and optionally PL squelch is defeated for the autoreset duration. PL squelch willl be defeated if the PL override is ENABLED on the selected channel. Subsequently, going on hook will stop the autoreset timer.
Permanent:	When the radio goes off hook, select 5 and optionally PL squelch is defeated until the radio returns on hook.

Note: 900 series R07.07 only.

USER SELECTABLE OUTPUT

At the Main Menu, press **F4, F2, F9**

A new screen has been added to allow the user to define pin 8 on the mobile radio's accessory connector.

Available selections are:

No output:	pin 8 is floating
Car Radio Mute:	Pin 8 is low when speaker is unmuted and for five seconds after speaker is muted.
Carrier Present:	Pin 8 is low when carrier is detected.
Speaker Unmuted:	Pin 8 is low when speaker is unmuted.

Note: 900 series R07.07 only.

TX ADMIT IN AUTORESET

At the Main Menu press **F4**, **F3**, **F4**

When "Tx Admit" is set to IF CHANNEL FREE the new option "In Autoreset" will appear. This option allows the user to ENABLE/DISABLE transmit inhibit during autoreset.

Available selections are:

Applied: applies TX Admit Criteria during Autoreset

Always: allows TX during Autoreset

Note: 900 series R07.07 only.

TALKBACK

At the Main Menu press **F4**, **F3**, **F5**

This option allows the user to Enable/Disable the talkback option of the current scan list. While the radio is "landed" on a channel the user can "talk back" by using the PTT button provided that the option has been enabled for the current scan list. Note that for channels with PL encode, PL will be encoded while the radio is keyed, as usual. Talk back whilst in "sweep" mode will cause the radio to go into "listen" mode on release of the PTT.

CHANNEL ALIAS DEFINITIONS

At the Main Menu press **F4**, **F3**, **F6**

When the Channel Alias function is ENABLED the user can define alternative channel numbers to be displayed instead of the normal sequence of numbers.

Valid entry: blank, 0 - 9, C,E,F,G,H.

Note: 900 series R07.07 only.

REMINDER ALERT

At the Main Menu press **F4**, **F5**, **F2**

Once a radio has been individually called the individual call alert (or programmed alternative) will be given. If Reminder Alert is ENABLED a call reminder alert will sound every 15 seconds after the initial call alert. The call reminder alert is cancelled if one of the radio buttons is pressed.

NEW PRINT SUMMARY

At the Main Menu, press **F5**

The **F5** function key on the RSS main menu is now used to print a summary of

the radio's codeplug information. The following informatin is printed in tabular form:

- Channel Definitions I & II
- Channel Alias
- Scan Sequences
- Decoder Sequences
- Group Decoder Definitions
- Telegrams
- Acknowledges Definitions
- Encoder Sequences

The following screens can be printed as required by using the print screen option on the PC keyboard:

Buttons, Volume, Encoder/Decoder associated, Alerts, Emergency, Misc I, Misc II, Address definition, Status definition, DTMF, VOX, Single tone definintion, User definined signalling, GR redefinition.

FURTHER IMPROVEMENTS ARE:

- permissible range and step size for all numeric fields have been added to the message area.
- defaullt values have been updated.
- improved tuning help screens reflecting the complete tuning procedure.
- improved navigation between screens:
  PL and FREQ DEF screens can be accessed from Channel Definition I screen.
  SINGLE TONES can be accessed from the Encoder, Decoder Sequence and Group Decoder screens.
- The RSS checks the Encoder, Decoder and Group Decoder Definitions for valide Single tone definitions before saving the codeplug to the radio.
- Tuning screen enhancements: tuning values scrolling, low audio level, full volume during squelch tuning, overwriting 25 kHz squelch setting while tuning 20 and 12.5 kHz.
- The Multicall Address Upper and Lower digit range can now be set to other than default.
- Both upper and lower characters now allowed to be entered.
- Channel spacing can be selected: 12.5, 20 or 25 kHz.

900 SERIES RSS USER MANUAL

Operational Notes for EVN4140A

This section should be read before using the 900 Series RSS

This section details some of the restraints with the first RSS release. As our policy is to continuously improve the quality of the product, these issues will be addressed in future upgrades.

1. FUNCTIONAL DATA CHECK PRIOR TO PROGRAMMING

Due to the comprehensive range of features and flexibility offered, the RSS is not able to validate all combinations of functional data settings prior to programming.

In order to verify that the functional data is set up as required, the user should check that there are no "invalid fields" i.e. fields marked with "?", before programming.

The following guidelines are provided to aid this checking process:

With reference to Figures 1 to 4, if the screens shaded ▨ have been modified then the corresponding screens shaded ▭ are most likely to be affected and should be checked by the user for invalid functional data settings.

2. RESPONSE SPEED

Due to the level of constraints checking required (see section 2.1), the speed of response from the user interface may be slower than experienced on previous RSSs. This will be mostly noticable when a large complex codeplug has been set up. The PC disc access lamp will normally flash when the RSS is in the process of activating a keystroke.

3. CODEPLUG SPACE INDICATION

Although a display of the available codeplug space is not currently provided, a warning message will be displayed if the user attempts to program a codeplug which exceeds the available space.

4. CHANNEL FREQUENCY DISPLAY PROBLEM WORKAROUND

When adding a new frequency in the "Channel Frequency Definition" menu, sometimes not all bandwidth settings are offered.

Initially type in the frequency directly using the ARROW keys.

If this does not give access to the required bandwidth, the following steps should be followed:

- Enter the required "Frequency"
- Scroll to the next frequency then back to the required value using the ARROW keys

On returning to the channel spacing field, the desired bandwidth will be available.

5. MONOCHROME SCREEN OPTION

The monochrome screen option in the "Screen Colours" menu, should not be selected. Note, that the RSS will still operate on a monochrome PC with the colour option selected.

6. TRANSMIT FREQUENCY SELECTION

When in the "Channel Definitions Screen" menu, the transmit frequency "pointer" (i.e. the first field), should be entered using the UP/DOWN arrow keys, rather than using a numeric value.

7. KEYBOARD REPEATS

As with other PC s/w packages the RSS will store and act on repeated activations of a single key, i.e if a key is kept pressed down for a period of time the software will action that key a number of times in sequence. This should be avoided, in particular when using keys which take time to action such as "F2" to read the radio. In this case, if the key is held down, the user will not regain control of the RSS until several succesive read operations have been completed.

To reduce the impact of repetetive key activations, the autoexec.bat file on the PC should be modified to include the following command:

MODE CON: RATE=1 DELAY=4

8. RETURN FROM SCAN/TELEGRAM SCREENS

It should be noted that when entering the Scan or Telegram screens from a channel screen, on occasions when exiting from these screens control is

returned to a different channel screen. The channel number should be checked before modifying data.

9. RECEIVE ONLY CHANNELS

On a receive only channel, the frequency and bandwidth must be selected on the channel screen before enabling the receive only feature.

10. PRINTING

The full codeplug printing capability is not currently supported. The "Print Screen" key on the PC should be used to gain a hard copy of the codeplug.

11. SINGLE TONE SELECTION

The user should not define a "single tone" (i.e. from the "Single Tone Definition" menu), to be the same frequency as one of the "standard tones" defined in any of the Select 5 decode sequences.

12. FRONT END TUNING

Front end tuning (i. e. use of the "Front End Filter Alignment" menu) is not required as this operation is performed in the Factory.

13. SELECT 5 DEVIATION

Refer to the procedure in the tuning section of the 900 Series Service manual before tuning Select 5 deviation

14. RECEIVER ALIGNMENT - SQUELCH DISPLAY

If the squelch menu is re-entered after following the tuning squelch procedure, then the displayed value may not be as originally set. Please note that this is a display issue only and does not affect the validity of the alignment setting.

15. SELF QUIETERS

Self Quieters are frequencies also used by the radio and cause internal interference. On these frequencies the interference caused by the self quieter spurs is great enough that the radio will not meet the receiver sensitivity specification. The frequencies are:

VHF: 151.2 MHz, 168.0 MHz

UHF: 403.2 MHz, 420.0 MHz, 436.8 MHz, 440.1 MHz, 453.6 MHz

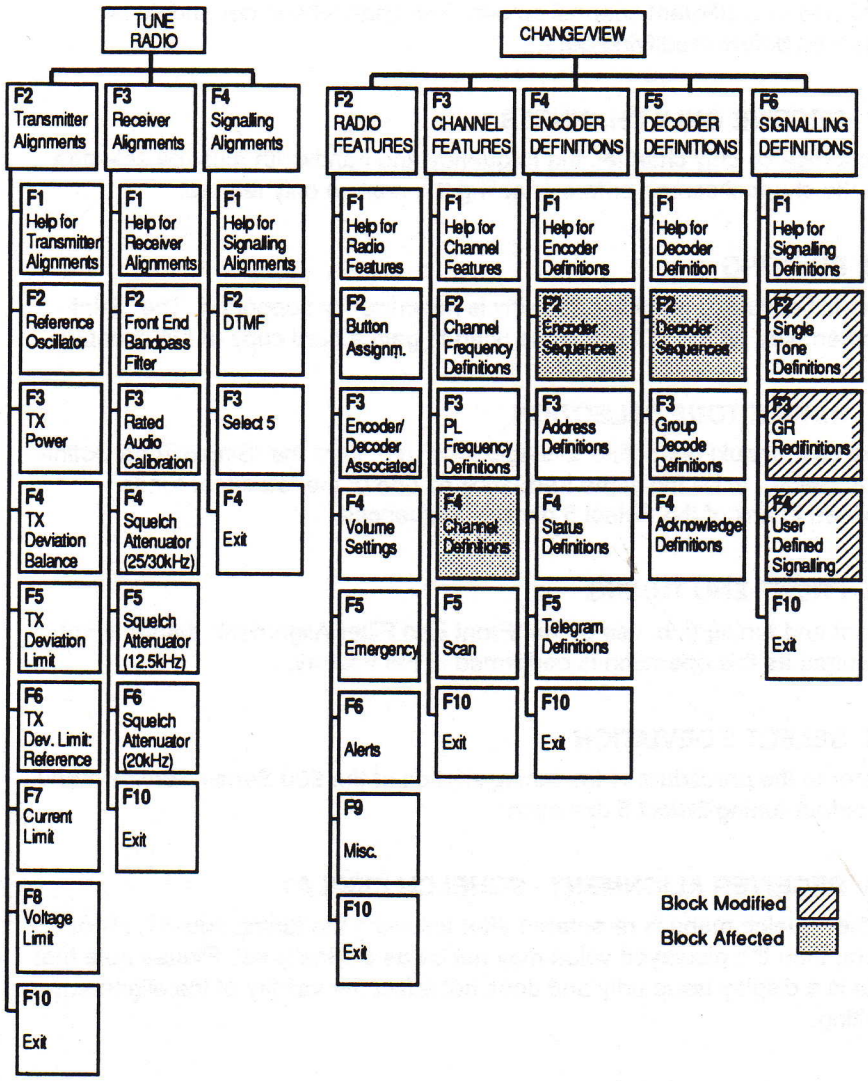


Figure 1. Functional Data Checking

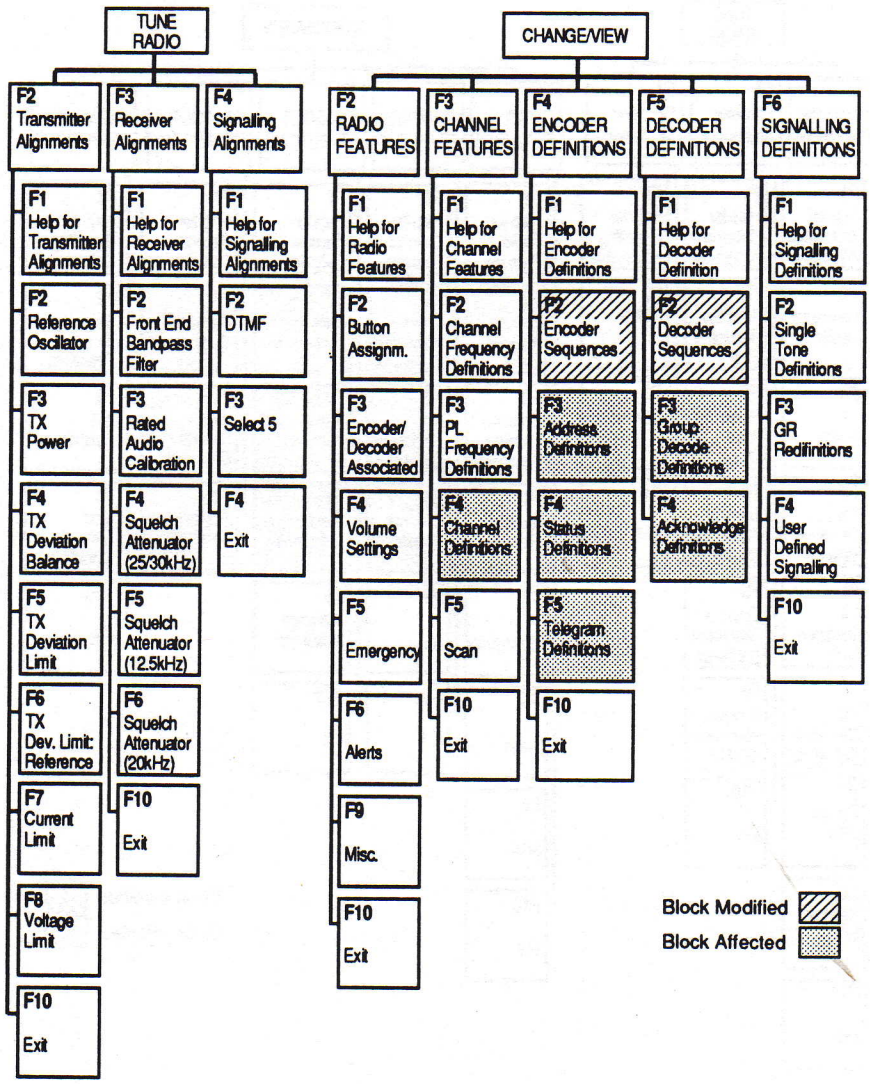


Figure 2. Functional Data Checking

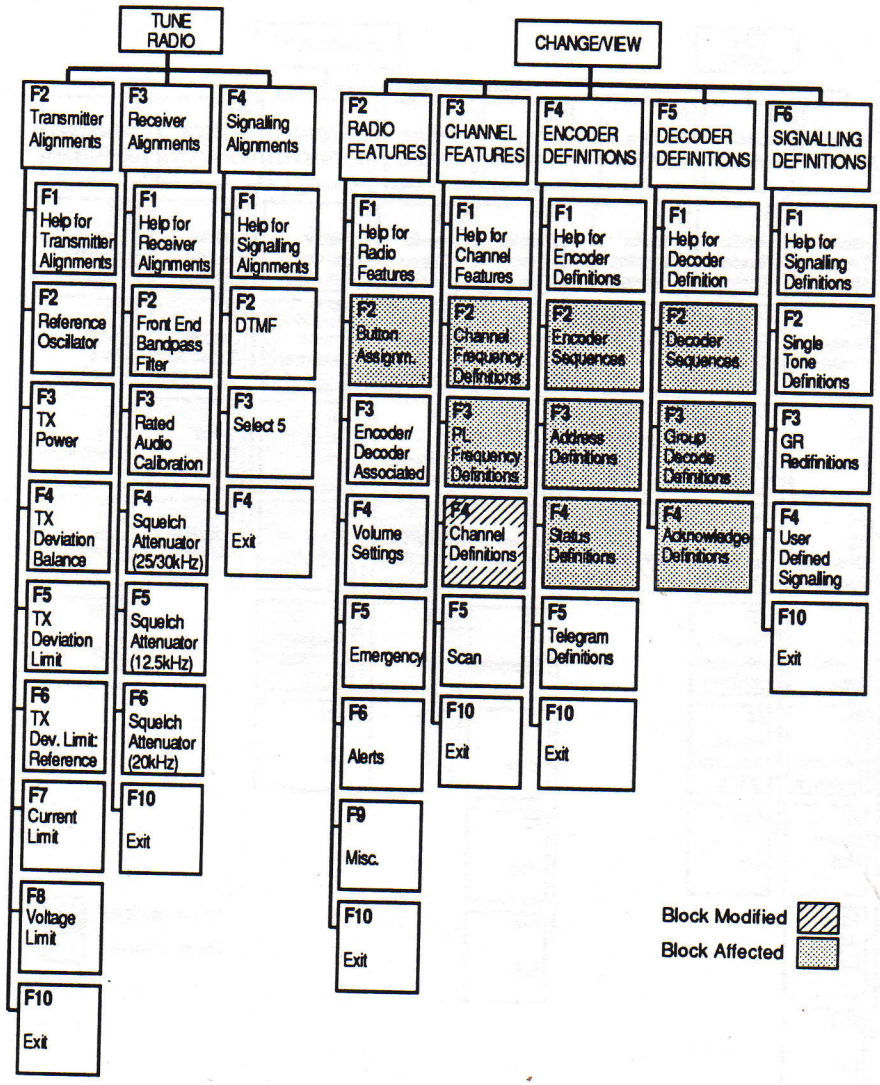


Figure 3. Functional Data Checking

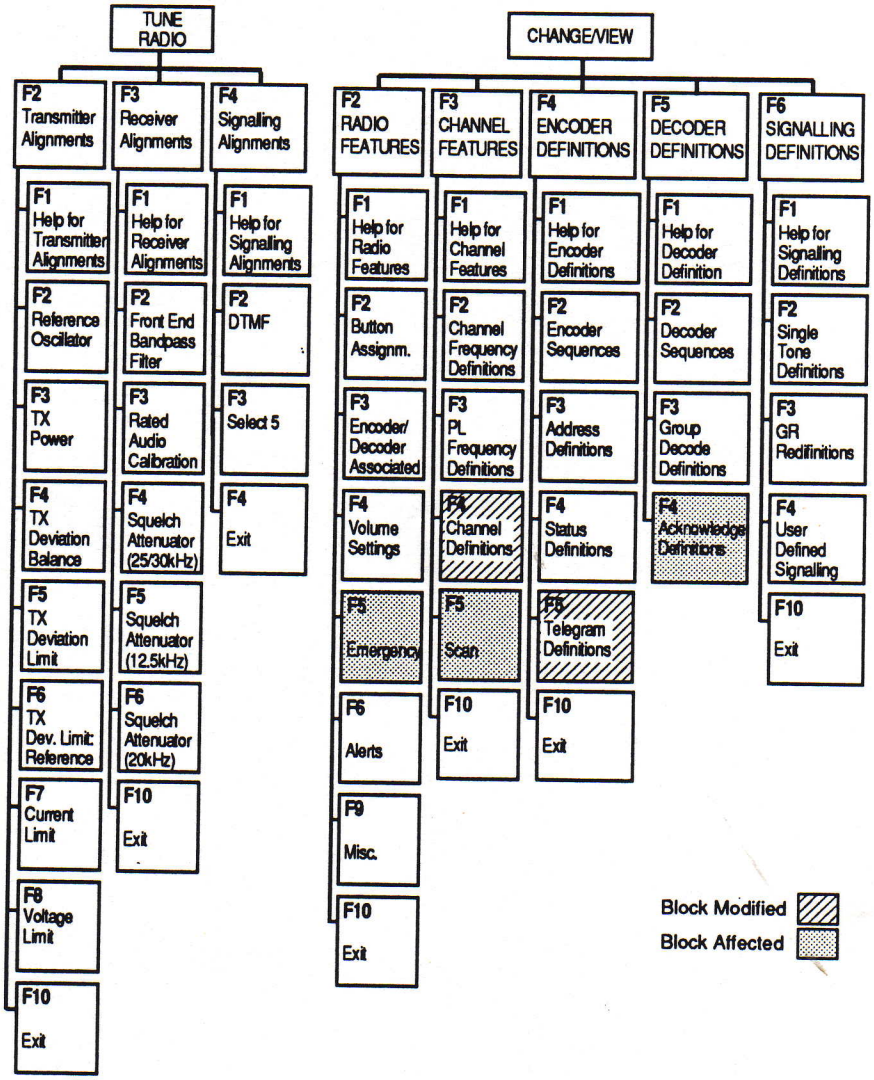
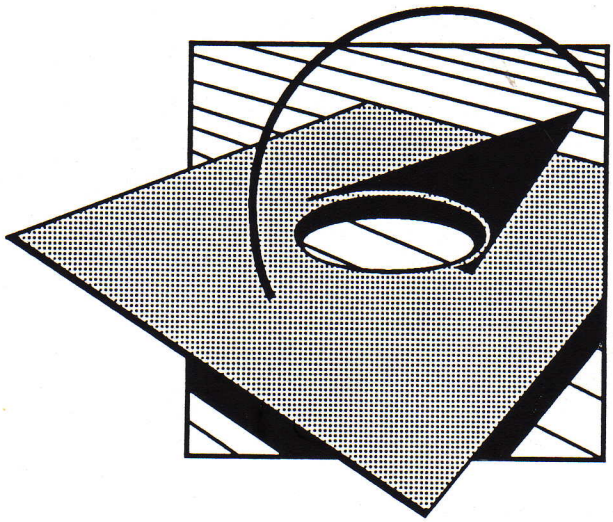


Figure 4. Functional Data Checking

900 SERIES

RADIO SERVICE SOFTWARE MANUAL



This manual is for the following kit: EVN4140

Issue: 06.93

Publication no.: 68P02058U56-O

Table of Contents

1. INTRODUCTION

The purpose of this manual is to familiarise you with the use and capabilities of the Radio Service Software (RSS) for the 900 series radio. The radio is capable of operating with up to 16 channels as well as supporting Select 5 signalling schemes, Tone PL operation as well as different types of squelch operation.

1.1. RADIO PERSONALITY AND DATA

The Radio Service Software allows the user to review and modify the "personality" data of a radio as well as to perform radio alignment. The personality of a radio is the information that makes a given radio unique to the customer. The personality is formed by items such as frequencies, PL codes, unit IDs, signalling systems and other features.

Some of the Personality changes are made on a "per radio" basis and some of the changes on a "per channel" basis. Data changed on a "per channel" basis allows tailoring of each mode or channel to the customer's specific needs.

The RSS will write data to the radio's programmable memory, the Codeplug, which will contain data defining the personality of the radio.

The Radio Service Software (RSS) will allow you to perform the following functions :

- Program Data into a Radio
- Read Data from a Radio
- Load Data from a Disk
- Save Data to a Disk
- Modify Data
- Print Radio Data
- Tune a Radio

1.2. SIGNALLING FEATURES

The 900 series mobile is a versatile radio, with many signalling features. Using the RSS, the radio can be programmed to meet the customer's signalling requirements.

The 900 series mobile is capable of supporting the six common Select 5 signalling standards used in Europe. The radio also supports one User Defined signalling sequence, which is manually set up using the programmer. While these standards are described as Select 5, or 5

Tone, the 900 series mobile allows the signalling (encode and decode) to be either a Single Tone or two to seven Sequential Tones.

Up to three encode sequences can be concatenated and sent by the PTT and Call Button on any channel.

The radio can be programmed with up to 8 decode sequences, and 16 encode sequences. Each sequence can be one to seven tones, including up to four programmable Single Tones.

The radio may be programmed for Private Line (CTCSS) and/or Select 5 (both encode and decode, with simultaneous operation) on any channel.

The radio can be programmed with unique Private Line (CTCSS) tones for all transmit and receive channels (32 maximum). Each unique Private Line tone and any Select 5 sequence can be simultaneously encoded and decoded on a per channel basis.

1.3. RADIO HARDWARE FEATURES

1.3.1. Radio Controls

Some of the controls of the 900 series radio have fixed functions and some of the controls are programmable, thus allowing further personalization of the radio to the individual user.

Volume & On/Off

The Volume & On/Off switch turns the radio On or Off as well as providing the Volume Control of the radio.

Scroll Button

The Scroll Button is used to scroll up and down channel, address and status values indicated on the display.

Side 1, 2 & 3 Buttons

The radio Side Buttons are programmable independently per radio giving a variety of choices to the user. Details on available functions for the Side Buttons can be found in section 6.1.1.

Select 1, 2 & 3 Buttons

The Select Buttons are used to select one of three possible operating modes.

The Select 1 Button is always used for Channel Selection and cannot

be re-programmed, whereas the Select 2 & 3 Buttons are programmable. Details on available functions for the latter two buttons can be found in section 6.1.1.

Annunciators 1 & 2

Annunciator 1 is used to indicate Channel Selection and Annunciator 2 is used to indicate Address Selecton.

1.3.2. LED Indicators

Three LED indicators (red, yellow, green) are used to indicate a variety of radio conditions. The LEDs are enabled either per radio, per sequence, per group call or per scan list as indicated below:

Normal transmission:	Continuous Red, per radio
Channel busy:	Blinking Red during receive, per radio
Radio selectively called:	Yellow during alert - double blink, used as individual call reminder, per decode sequence - single blink, used as group call reminder, per group call block
Scanning:	Blinking Green, per scan list
Hardware error: *	Blinking alternately Green and Red
Codeplug error: *	Blinking alternately Red, Yellow and Green (at radio turn-on), Blinking Yellow (radio and codeplug incompatible)
Codeplug programming*	Continuous Green

* Cannot be disabled

Note: Radio selectively called has priority over Channel busy.

1.3.3. Alert Tones

For each alert it is possible to specify whether it is to have variable volume, fixed volume or not be sounded at all (see section 6.1.5).

For variable volume alerts, the volume will be proportional to the setting of the volume switch.

2. GETTING STARTED

In the Getting Started section we will guide you through identifying, installing and learning the necessary hardware and software to run the RSS which will be used to service and program a radio. In the Getting Started section, we will also familiarize you with the keyboard and the RSS menus, screens and fields.

2.1. PREREQUISITES

It is strongly recommended that this RSS be run on a computer with the configuration described below in the Required Equipment, section 2.2.

The powerful features and extensive flexibility of these new radio families require much more codeplug data validation than in the past. For complex configurations, it is recommended that the RSS be executed from a RAM disk. This will reduce execution time significantly (an order of magnitude).

To configure your computer with a RAM disk, you need to modify your CONFIG.SYS file. An example of the change required for DOS 5.0 is shown below:

DEVICE=C:\DOS\RAMDRIVE.SYS 4096 512 1024/E

where:

DEVICE=C:\DOS\RAMDRIVE.SYS is the path name of where the DOS RAM drive program resides.

4096 is the size of the RAM disk in Kbytes (2048 would configure a 2 Mbyte RAM disk).

512 is the size of the sectors to use in the RAM drive (in bytes).

1024 is the number of files and directories you can create in the RAM disks root directory.

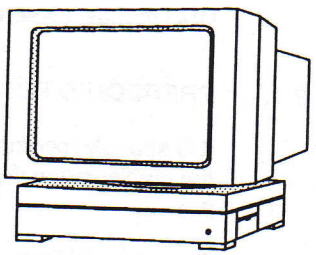
/E creates the RAM disk in Extended memory instead of expanded or conventional memory. If your computer is configured to use expanded memory, replace the /E switch with /A.

In order to run the RSS from the RAM disk, a BAT (batch) file should be used to copy the necessary files from the hard drive to the RAM disk. Archive files are not affected and must be saved on the hard drive or floppy drive as usual.

2.2. REQUIRED EQUIPMENT

The following is a list of the required and optional equipment that you need in order to be able to use the RSS and program a radio:

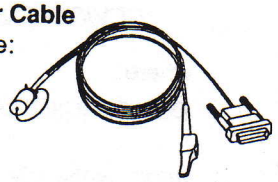
Ⓐ Computer



We recommend an IBM AT Personal Computer, or compatible, with an 80486 microprocessor, 33 MHz Clock speed or faster, 8 MB of RAM, a 120 MB Hard Drive, a 1.44 MB 3.5" Floppy Drive, two serial ports, an 80 column Monochrome or Colour Display and running MS-DOS 5.0 or higher. However, the RSS will run with an 80286 microprocessor, 4 MB RAM, and a hard drive, but this will result in loss of performance.
Make sure that no memory resident programmes are running on the computer.

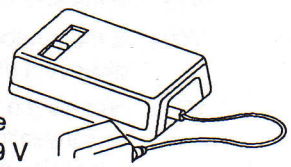
> ***Note:*** *the Programmer is NOT compatible with networked computers or windows.*

Ⓑ Radio Interface Box (RIB)-to-Computer Cable



9 pin serial communications adaptor cable: Part no: 3080369B72
25 pin asynchronous communications adaptor cable: Part no: 3080390B49

Ⓒ Radio Interface Box (RIB)

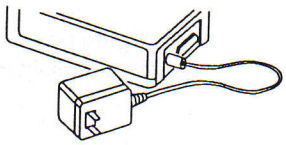


Kit no: RLN4008
To connect the PC to the radio top connector
For laptop computer and on-the-road use only: omit RIB Power Supply and use a 9 V battery

> ***Caution:*** *Use a fresh, 9 V battery. LED remains lit with a weak battery - this may cause certain errors on screen.*

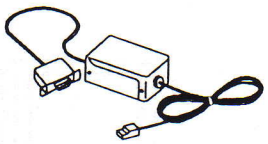
Ⓓ Power Supply for RIB

9 V Battery: 60-82728J01
220 V (Euro Plug): EPN4041
240 V (UK Plug): EPN4040



Ⓔ RIB-to-Radio Cable

Kit no.: GTF372



Ⓕ Radio

900 series mobile radio.

Test Box

Kit no: GTF180.
Used for tuning purposes.

Test Box-to-Radio Cable

Kit no: GTF373.

Printer

IBM Compatible Printer with an LPT1 configured parallel port, optionally required for producing a hard copy of the radio data.

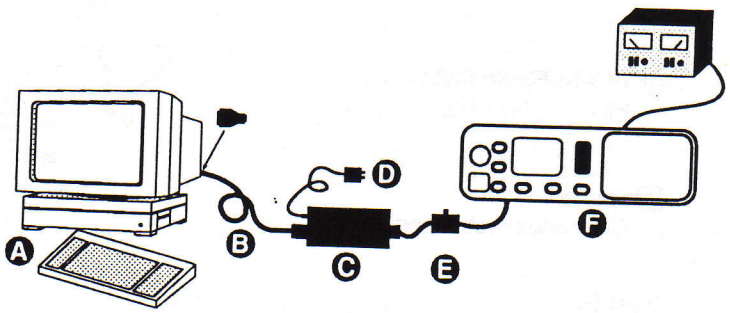
> ***Note:*** *The printer port is not configurable by the RSS.*

Radio Service Software

Kit no: EVN4140 (English language version)
Programmer Disk(s) and Manual.

2.3. ASSEMBLING THE HARDWARE

The figure below illustrates the connection principle of the required and optional equipment used to program a portable radio.



Equipment Set-up

Steps to connect the hardware:

- Connect the PC Ⓐ and the RIB Ⓒ using the RIB Cable Ⓑ.
- Connect the Radio Ⓕ and the RIB Ⓒ using the RIB-to-Radio Cable Ⓔ.
- This program uses "COM1" as the default communications port. This is redefinable via the configuration file (see section 8).
- Plug the RIB Power Supply Ⓓ into the wall outlet and the other end to the RIB Ⓒ.
- Connect the printer to the PC's parallel interface port (LPT1).

Now, switch on your PC and turn on the radio.

You can install, start or explore the RSS using just the diskettes and your computer if you do not have all the hardware. You can even update existing radio archive files stored on disk. What you cannot do without the hardware is read from or program to an actual radio.

> ***CAUTION**: When programming or calibrating a radio, DO NOT disconnect the radio from the RIB when the computer is communicating with the radio - it may leave the radio in an inoperable state. The only recommended time to disconnect the radio is at the MAIN Menu or GET/SAVE/PROGRAM screens.*

2.4. SOME DOS COMMANDS

DOS commands can be entered either in upper case or lower case letters. Below is a table of the most common DOS commands. Words in italic mean you should switch that word for the word that is appropriate for your specific situtation.

A:	Go to drive "A".
**CD **	Return to the Root Directory. **CHDIR** also works.
CD *DIRNAME*	Change directory to the directory named "dirname". Maximim directory length is 8 characters. cd used alone will display the current working path name.
COPY B:*.* A:	Makes an identical copy of all files. The *.* means all files within the directory specified. You can also copy files in the same directory giving the file a different name as the second argument to copy command, and you can combine several files into one file or append files. In all cases, the first argument is the source file and the last argument is the target file.
DEL *FILENAME*	Deletes the filename in the current directory.
DIR	Lists the files in the current directory. You can list files in other directories too, by specifying a path name following the command. If you have more files than will fit on the display, you can type **DIR/P**, which will make DOS pause when the display is full. **DIR/W** specifies a wide display (5 columns) of file names.
DISKCOPY B: A:	Copies the contents of the disk in drive B to the disk in drive A. Drives must be of the same size and density. If your drives are not the same size and density, use the same drive name twice, such as DISKCOPY A: A:.
FORMAT A:	Formats an unused, new or old diskette in drive "A" of the computer so it will accept MS-DOS files.
MD *DIRNAME*	Makes a new subdirectory called "dirname" of 8 characters or less. **MKDIR** also works.
PROMPT $P $G	Change the display's prompt to include the current working directory's drive and path name, followed by the ">" sign.

PATH	Set a command search path (such as **PATH= C:\MRSS\XXX\ARCHIVE**). This tells the computer to search this directory after the working directory when a command is entered.
RD ***DIRNAME***	Remove a subdirectory called "dirname". Removal of the subdirectory requires that it be empty. Files can be deleted by the **DEL** command. **RMDIR** is the same as **RD**.
VER	Prints MS-DOS version installed on the computer, such as MS-DOS version 5.0.
XCOPY	Copies files and directories, including all subdirectories. This command uses disk space more efficiently and can speed up file access time.

Certain keyboard characters mean special things to DOS. The most frequently used of these are:

*	Wildcard character. You can substitute this character for any type or quantity of characters/digits that follow (not precede) it.
\	Backslash. A special character to separate directories when specifying path names. By itself, it also represents the root directory.
?	Wildcard character meaning you can substitute/match it for any single-digit or character.

Limitations about DOS, RSS files, and directories.

- DOS only allows file names to be 8 characters long. However, file names can have an optional 1, 2 or 3-character extension after the file name. The extension must be separated from the file name by a period (.).
- DOS allows only 111 files under the root directory on any diskette or hard disk. We highly recommend that you further subdivide your files into more directories before accumulating them in any directory, not just the root directory.
  Note the maximum number of files allowed by the RSS in any non-root directory is approximately 400.

For further information on these and other commands, consult your MS-DOS User's Manual.

2.5. WHAT IS ON THE RSS DISKETTES

The RSS diskettes contain the following files:

- RUNTIME.EXE: the executable file
- 900_ENG.ODB: the database file
- 900_ENG.BAT: the startup batch file

2.6. BACKUP AND INSTALLATION

Before you first use the RSS you must make a backup copy of the disk. The recommended method of backup depends on the type of computer that you have.

We recommend making a backup copy of the RSS diskette(s) even if you have a hard disk.

TO MAKE A BACKUP, follow the procedure below. Assuming you have one diskette drive named A and that DOS is loaded.

Insert the RSS diskette in drive A and type the command:

diskcopy a: a: and press **Return**

This copies the data on the source diskette (RSS) in drive A to the target diskette. DOS will tell you when to insert the source diskette and when to insert the target diskette. Careful - accidental reversing the insertion order of the diskettes will erase the contents of the RSS diskette.

Repeat this process if more diskettes need to be copied.

> ***Note:*** *When the diskcopy is complete, store the original RSS diskettes in a safe place and work with the copy.*

TO INSTALL the RSS on your hard disk follow the steps below:

In the following example it is assumed that the RSS is installed onto the hard disk in directory "\RSS_900\RSS".

Create the directory "\RSS_900" on your hard disk. Create the sub-directory "\RSS"

Insert your working copy in drive A, and type the command:

cd \RSS_900\RSS and press **Return**

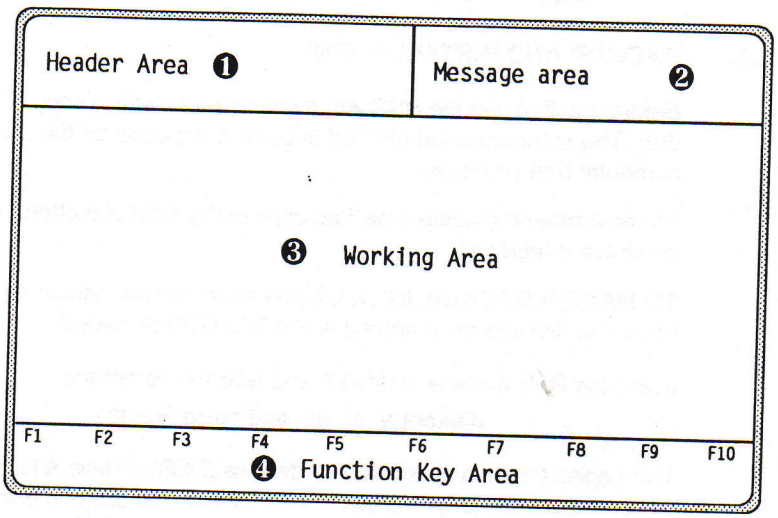
to go to that drive.

To copy the RSS to the current directory type:

xcopy a:*.* /s and press **Return**

2.7. SCREEN LAYOUT

All screens displayed by the RSS, with the exception of the entry screen, have the same basic layout as shown below. The screen is split into a number of areas each of which is used to display a particular class of information.



Basic Screen Layout

The screen is divided into 4 areas as follows:-

❶ The Header Area
This area is used for showing product information and for the current menu or screen title. If a radio is connected, the current radio model being read will also be displayed here.

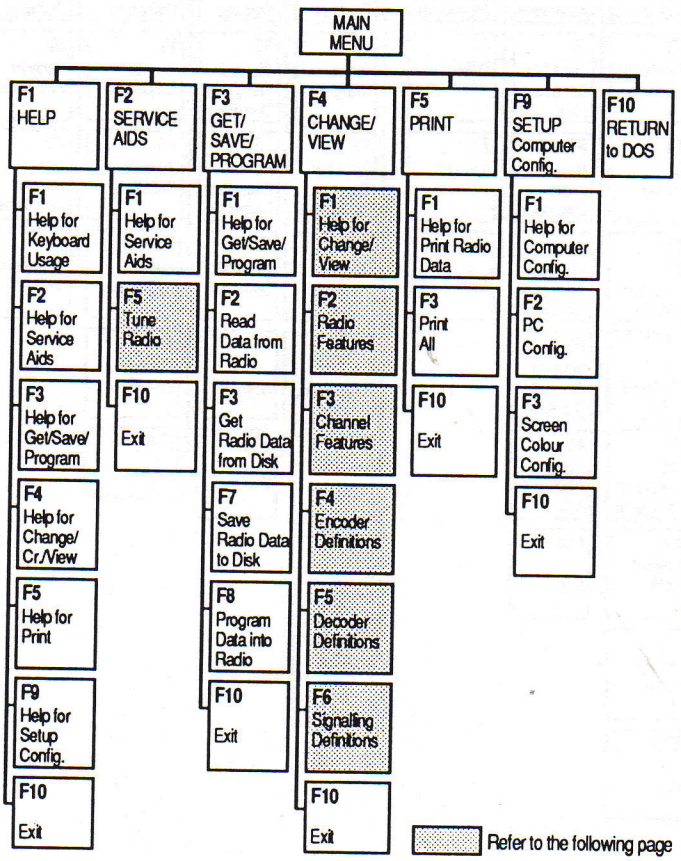
❷ The Message Area
Status, instruction and error information will be displayed in this area.

❸ The Working Area
This is the main display area of the menu or screen. It will be used for displaying menu options, help information, data fields etc. The Working area on a screen lists features that can be viewed or edited.

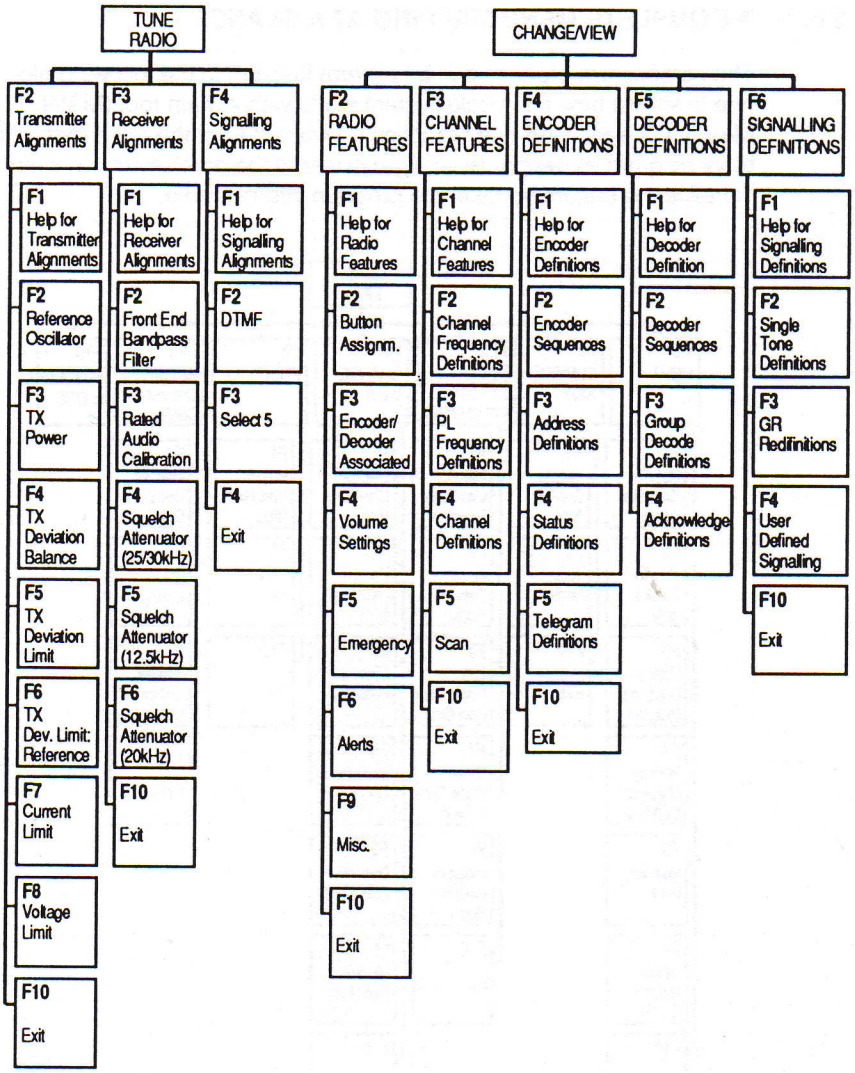
❹ The F-Key (Function Key) Area
The function key area displays the F-Keys (F1 - F10) and their function names for the current menu or screen.

2.8. A COMPLETE MENU MAPPING AT A GLANCE

The screens are organized in a tree-root fashion. In the following picture is shown how the whole system starts with a main root (MAIN Menu) at the top side and branches downward from the main root. This branching grows deeper as you get closer to the precise screen which contains the feature you want to program into the radio.



RSS Menu mapping at a glance (pg. 1 of 2)



RSS Menu mapping at a glance (pg. 2 of 2)

2.9. DATA ENTRY AND KEY USAGE

A data field that is active is shown in reverse video. If an error is found during the validation, an error message will be displayed on the screen and the field will remain active until a valid entry has been made.

Two types of data entry fields are used:

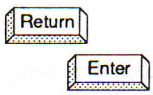
List of Values
The **CurUp/CurDn** key is used to scroll through a list of values.

Direct Data Entry
These data fields are marked with a blinking cursor. The user must type in the appropriate value for the data field. For all data inputs the user is informed about valid data entries in the message area of the screen.

Ranges and invalid entries for the data field will be checked before leaving the data field. An error message will inform the user about what is wrong and the cursor will be positioned on the first invalid digit in the field, where possible.

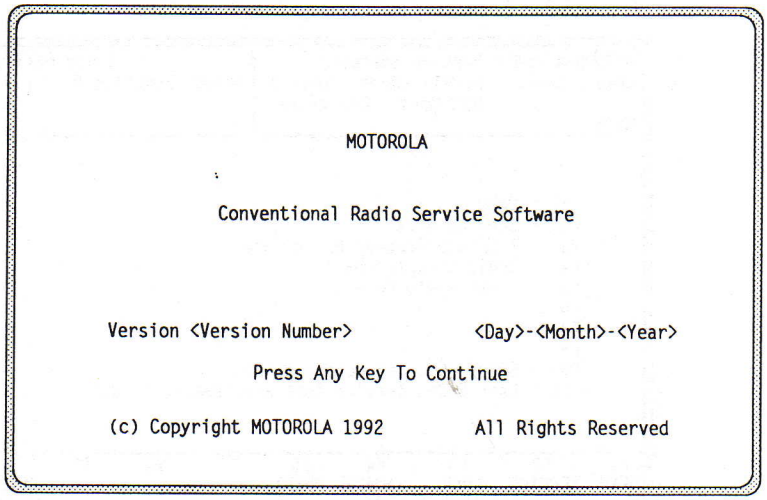
Below is listed the keyboard keys and a description of the functions allocated to them.

Keyboard Key	Function
F1	Calls up help information on every screen and menu. This on-line help provides information on how to use the currently displayed menu, screen, line or field.
F2 - F9	These keys are used to perform special functions and actions which can vary from menu to menu and from screen to screen.
F10	Returns the user to the previous menu or screen. At the main menu, F10 exits the RSS program.
ESC	Returns the user to the Main Menu.
Tab	Terminates data entry and moves prompt to next editable field. If entry is not accepted an error beep will sound.
Shift + Tab	Terminates data entry and moves prompt to previous data field.

	Terminates data entry and moves prompt to next editable data field. If entry is not accepted an error beep will sound.
	Moves the cursor right one space in a data field.
	Moves the cursor left one space in a data field.
	Scrolls through selections or decreases the current relative value.
	Scrolls through selections or increases the current relative value.
	Deletes character on the left of the cursor.
	Selects previous screen, previous set of table entries.
	Selects next screen, next set of table entries.
	Selects first data field of the current screen.
	Selects last data field of the current screen.
	Deletes character below cursor.
	Inserts a space below cursor. If the field is full the Insert key will not affect the field contents and a beep will sound.

3. LOADING THE PROGRAM

To start using the programmer type **900_ENG** and press **Return.** This action causes the computer to load the programmer, and the Banner Screen will be displayed.



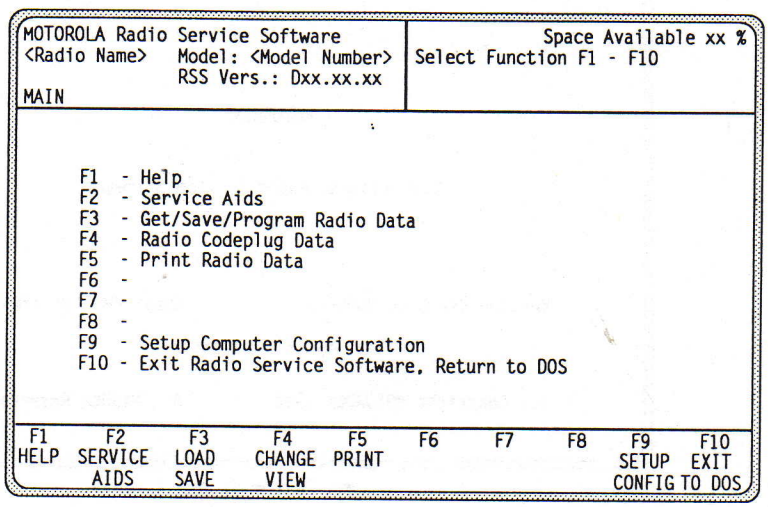
Banner Screen

On entry the RSS will check various parameters. If any of the checks fail an error message will be displayed and the RSS will exit.

If the program loads successfully, press any key to move on to the MAIN Menu.

3.1. THE MAIN MENU

The MAIN MENU is entered after the Banner Screen. It provides access to the five main functions of the RSS, plus the help facility. The options available to you on the Main Menu are as shown on the screen below. To select the option you require simply press the corresponding F(unction) key.



Main Menu Screen

Before you start using the programmer facilities it should be considered whether the parameters of the system configuration should be changed.

The SETUP Menu (**F9** on the MAIN Menu) allows you to save certain default computer information. Setting the computer defaults eliminates the need to specify them every time you enter the RSS or program a radio.

The SETUP Computer Configuration Menu gives access to:

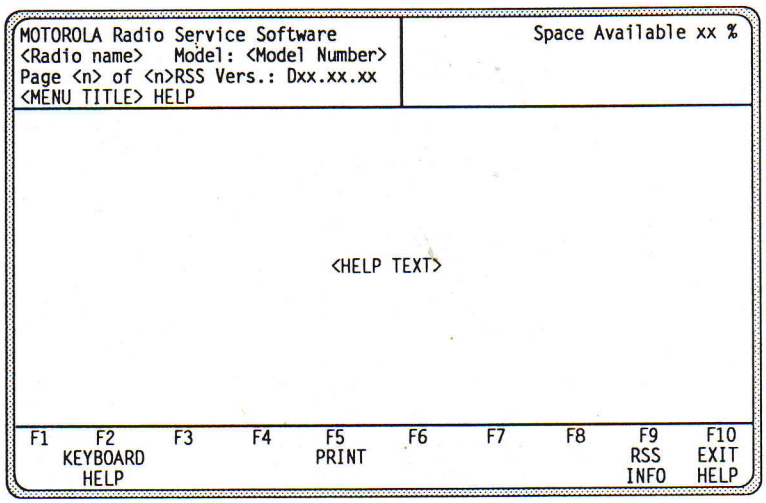
- Setting a default file path name so that you will not have to specify it every time you save a radio archive file.
- Setting or changing the computer default port used to interface with the radio and RIB.
- Setting the default colours you see on your RSS screen

Refer to section 8 for default settings and options.

3.2.. HELP SCREENS

At all Menus/Screens press **F1**

On every screen, specific help information is available by pressing **F1**. The number of available help screen pages is shown in the header area of the screen. The Main Menu help screen holds general information about the menu structure and the submenus. The **PgUp** and **PgDn** keys are used to scroll the help screen. Press **F10** to return to the previous screen.



Help Screen format (general)

In addition, on every Menu/Option specific help screen, the following general RSS help information can be activated:

3.2.1. Keyboard Help

Press **F2** to access the Keyboard help. This screen contains a general description of how to use the keyboard. See also section 2.9 for key functions.

3.2.2. Print

This function is not currently supported.

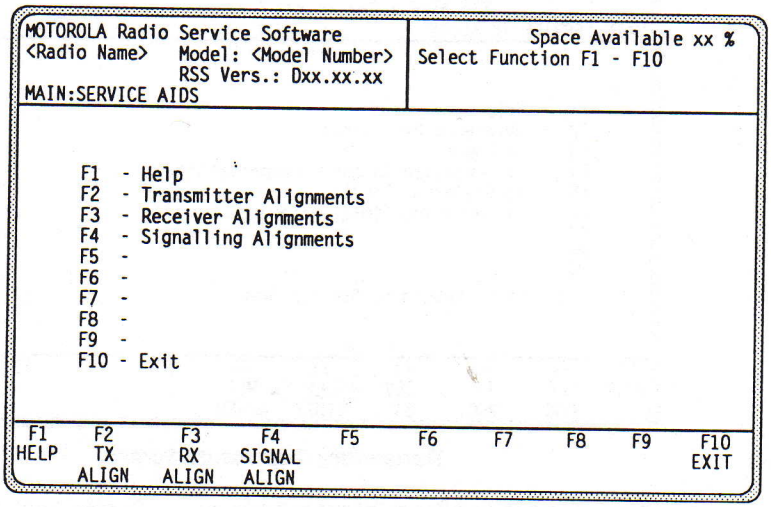
3.2.3. RSS Info

Press **F9** to access the RSS INFO screen.It contains information about the RSS version number and an overview of the required programming equipment. See section 2.2 and 2.3 for more details on the equipment and how to connect the different parts.

4. SERVICE AIDS MENU FUNCTIONS

At the MAIN Menu press **F2**

The Service Aids menu gives the user access to the tuning facility.



Service Aids Screen

The following paragraphs are constructed to guide a qualified service technician through the allowable alignments and configurations to keep the radio(s) at full capability throughout its design life.

Radios are normally tuned in the factory. Any modifications of the tuning data may decrease the radio performance. Tuning should only be performed by qualified service technicians.

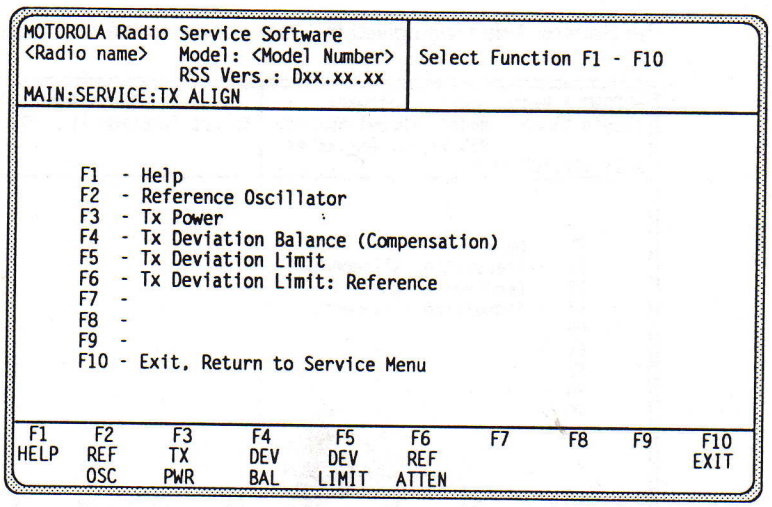
All radio alignment procedures are accessed from this menu. A radio must be connected to your computer via a RIB and cables, and the radio turned on before you will be permitted to access the SERVICE screens.

Read the radio's codeplug before accessing the tuning screen.

> ***CAUTION:*** *Do NOT switch radios in the middle of any SERVICE procedure. Always use the EXIT key to return to the MAIN menu screen before disconnecting the radio. Improper exits from the Service screens may leave the radio in an improperly configured state and result in seriously degraded radio or system performance. Refer to your Radio Service Manual for detailed service procedures.*

4.1. TRANSMITTER ALIGNMENTS

At the RADIO TUNE Menu press **F2**

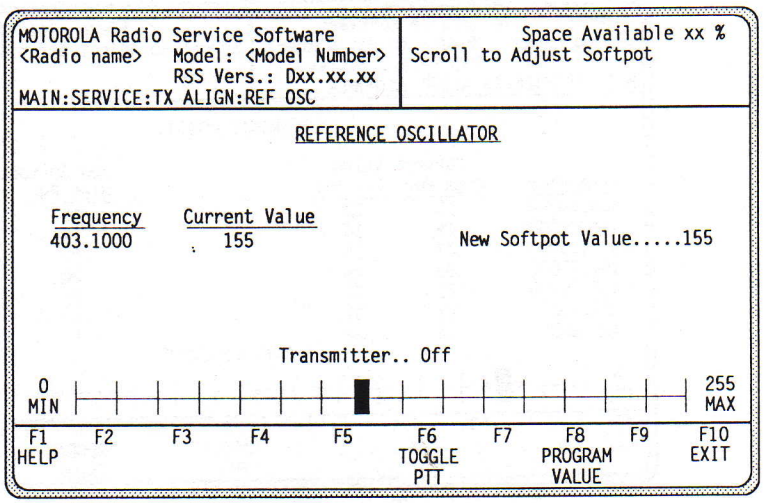


Transmitter Alignments Screen

Standard periodic alignment procedures are performed from this Menu. Refer to your Radio Service Manual for alignment procedures. These procedures should only be attempted by Qualified Service Personnel. Failure to perform Alignment procedures properly may result in seriously degraded radio or system performance.

4.1.1. Reference Oscillator Alignment

At the TRANSMITTER ALIGNMENTS Menu press **F2**



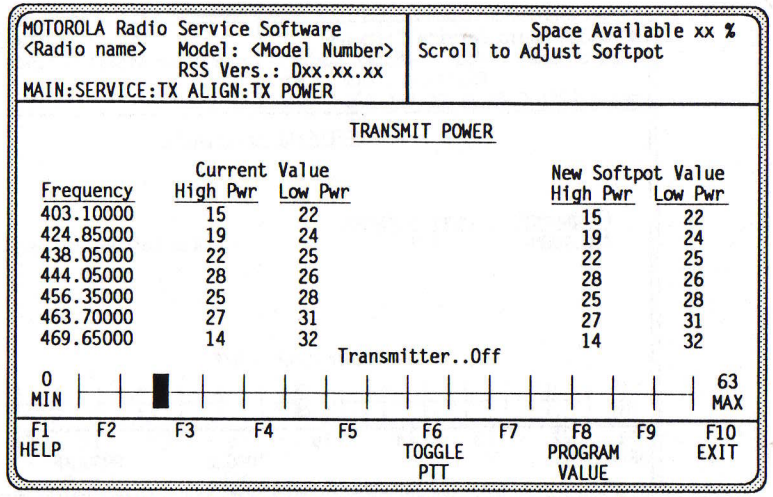
Reference Oscillator Screen

The New Softpot Value is the working value of the reference oscillator (reference frequency). Refer to your Radio Service Manual for the Reference Frequency Alignment procedure. The Reference Oscillator is warped by first keying the radio via the **F6 Toggle PTT** key, and then by pressing the **CurUp/CurDn** keys to increase or decrease the frequency respectively. The radio will transmit on the RF frequency shown. A relative warp value will be displayed, but the actual transmitter frequency must be determined from your frequency counter or service monitor.

Pressing the **F8 Program Value** key programs the selected value into the radio

4.1.2. Transmit Power Alignment

At the TRANSMITTER ALIGNMENTS Menu press **F3**



Transmit Power Screen

Refer to your Radio Service Manual for the Transmitter Power Alignment procedure. This procedure should only be attempted by qualified service personnel.

Transmitter Power is adjusted by first keying the radio via the **F6 Toggle PTT** key, and then by pressing the **CurUp/CurDn** keys to increase or decrease power respectively. A relative Tx Power value (NOT WATTS!) will be displayed, but the actual transmitter power output must be determined from your service monitor.

The radio will transmit on the RF frequency displayed on the screen and should be terminated into a 50 ohm load or service monitor.

Pressing the **F8 Program Value** key programs the selected value into the radio.

Note: For the mobile radios increasing the values decreases the power!

4.1.2.1. New Softpot Value High Pwr

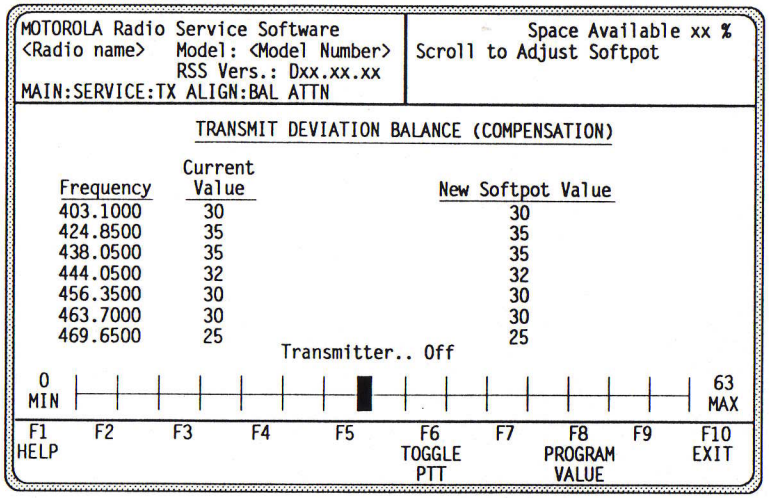
This is the power level 1 for this frequency. The status bar shows the setting in relation to the minimum and maximum settings.

4.1.2.2. New Softpot Value Low Pwr

This is the power level 2 for this frequency. The status bar shows the setting in relation to the minimum and maximum settings.

4.1.3. Transmit Deviation Balance (Compensation) Alignment

At the TRANSMITTER ALIGNMENTS Menu press **F4**



Transmit Deviation Balance Screen

Refer to your Radio Service Manual for the Balanced Attenuator Alignment (Compensation) procedure. This procedure should only be attempted by Qualified Service Personnel. Compensation Alignment is critical to the operation of signalling schemes that have very low frequency components (i.e. DPL) and could result in distorted waveforms if improperly adjusted.

Balanced Attenuator Alignment balances the modulation sensitivity of the VCO and reference modulation (synthesizer low-frequency port) lines. It is a way of correcting for deviation sensitivity versus RF frequency variations in the VCO. The transmit and receive bands are divided into frequency zones with a calibration point (value) in each zone. Balanced Attenuator Alignment is required after replacing (or servicing) the Controller Board or the RF Board. Using the **CurUp/CurDn** keys, adjust Compensations per your Service Manual.

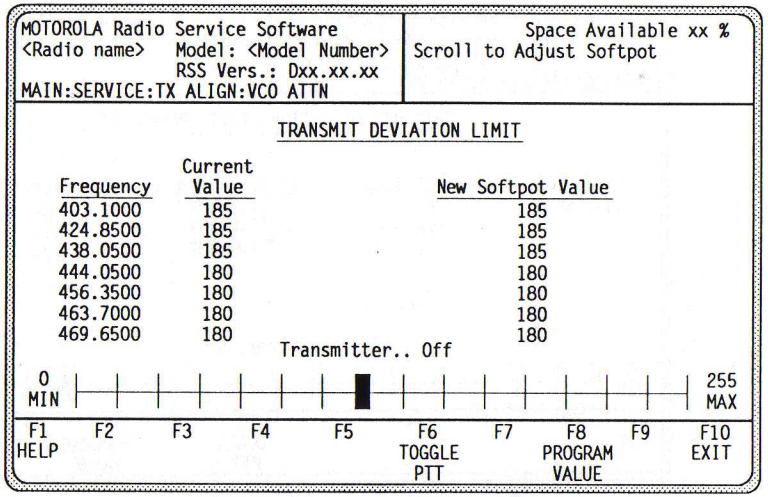
Performing this procedure automatically calculates Compensation Alignment.

4.1.3.1. New Softpot Value

Thsi is the balance value for this frequency. The status bar shows the relationship between this setting and the minimum and maximum settings.

4.1.4. Transmit Deviation Limit

At the TRANSMITTER ALIGNMENTS Menu press **F5**



Transmit Deviation Limit Screen

Refer to your Radio Service Manual for the Transmit Deviation Limit Alignment procedure. This procedure should only be attempted by Qualified Service Personnel.

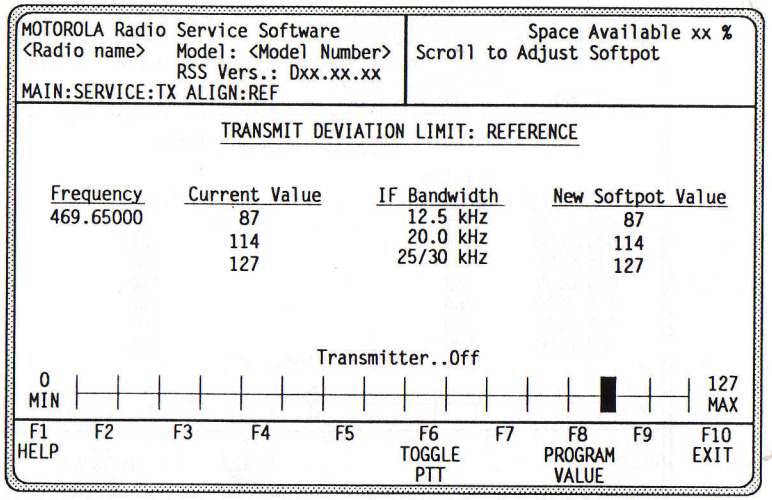
Transmit Deviation Limit Alignment is a way of correcting for deviation sensitivity versus RF frequency variations in the VCO. The transmit and receive bands are divided into frequency zones with a calibration point (value) in each zone. Compensation for each of these points must be checked and adjusted if the VCO is replaced.

4.1.4.1. New Softpot Value

This is the VCO Softpot value for this frequency. The status bar shows the relationship between this setting and the minimum and maximum settings.

4.1.5. Transmit Deviation Limit: Reference

At the TRANSMIT ALIGNMENT Menu press **F6**



Transmit Deviation Limit Reference Screen

Refer to your Radio Service Manual for the Transmit Deviation Limit Alignment Reference Attenuator procedure. This procedure should only be attempted by Qualified Service Personnel.

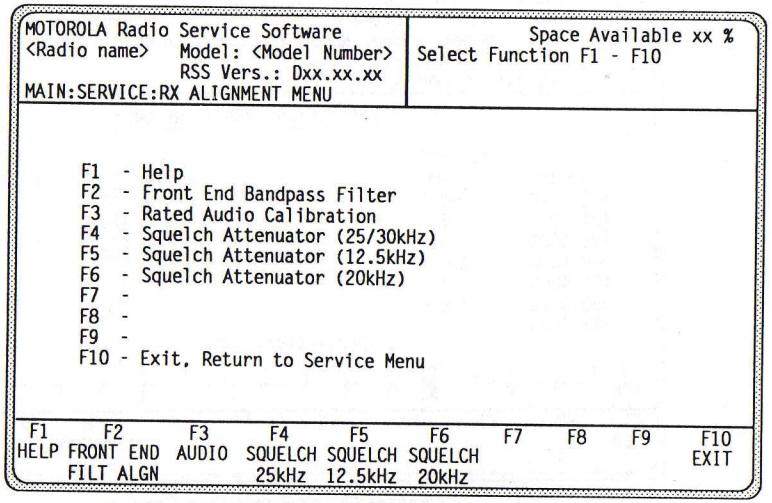
Transmit Deviation limit reference alignment is a way of correcting for the different channel bandwidths selectable on these radios.

4.1.5.1. New Softpot Value Channel Spacing

This is the reference softpot value for this frequency. The status bar shows the relationship between this setting and the minimum and maximum settings.

4.2. RECEIVER ALIGNMENTS

At the RADIO TUNE Menu press **F3**

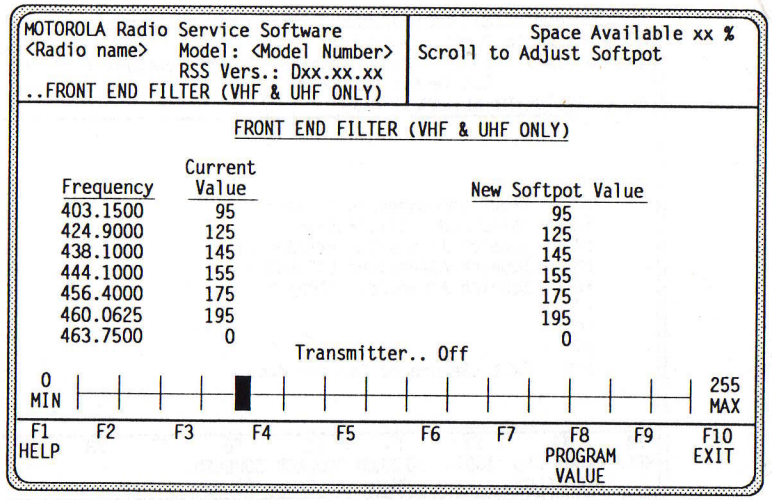


Receiver Alignments Screen

Standard periodic Receive alignment procedures are performed from this menu. Refer to your Radio Service Manual for Receive Alignment procedures. These procedures should only be attempted by Qualified Service Personnel. Failure to perform alignment procedures properly may result in seriously degraded radio or system performance.

4.2.1. Front End Filter Alignment

At the RECEIVER ALIGNMENTS Menu press **F2**



Receiver Front End Filter Screen

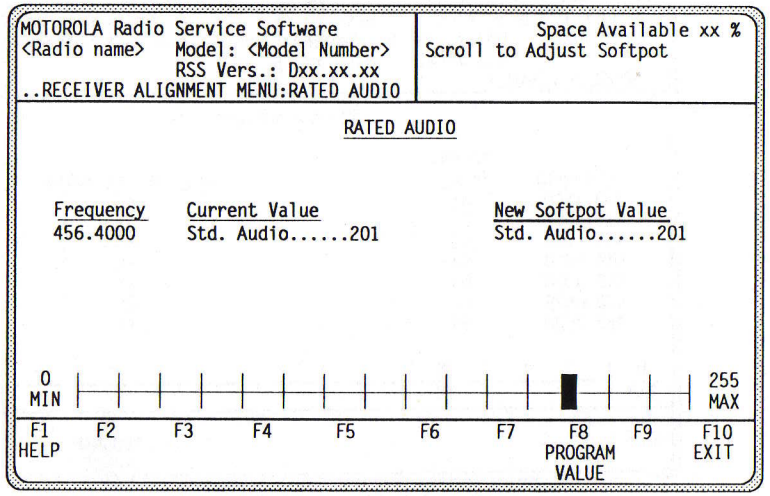
Refer to your Radio Service Manual for the Front End Filter Alignment. This procedure should only be attempted by Qualified Service Personnel.

4.2.1.1. New Softpot Value

This is the front end filter softpot value for this frequency. The status bar shows the relationship between this setting and the minimum and maximum settings.

4.2.2. Rated Audio Alignment

At the RECEIVER ALIGNMENTS Menu press **F3**



Rated Audio Alignment Screen

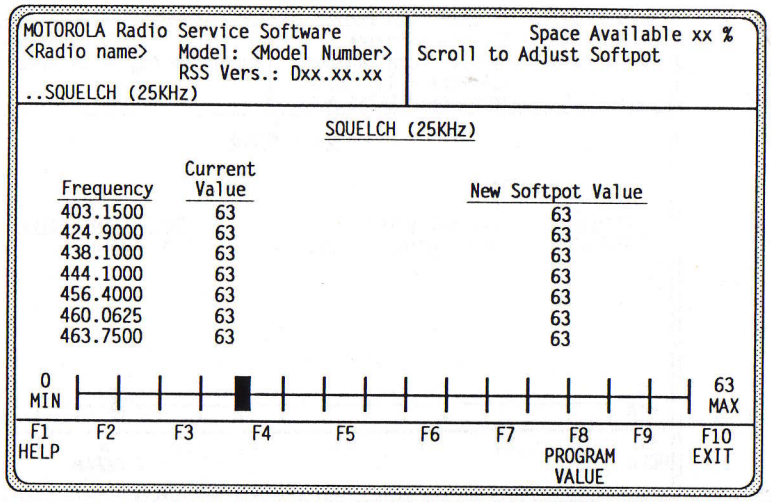
Refer to your Radio Service Manual for the Rated Audio Calibration procedure. This procedure should only be attempted by Qualified Service Personnel.

4.2.2.1. Std. Audio

This is the rated volume softpot value for this frequency. The status bar shows the relationship between this setting and the minimum and maximum settings.

4.2.3. Squelch Attenuator 25 kHz Alignment

At the RECEIVER ALIGNMENTS Menu press **F4**



Squelch Attenuator 25 kHz Screen

Refer to your Radio Service Manual for the Squelch Attenuator Alignment. This procedure should only be attempted by Qualified Service Personnel.

The Squelch Attenuator setting is increased or decreased by pressing the **CurUp/CurDn** keys respectively. A relative value between 0 and 63 will be displayed on the screen. Adjust the squelch setting to the desired value.

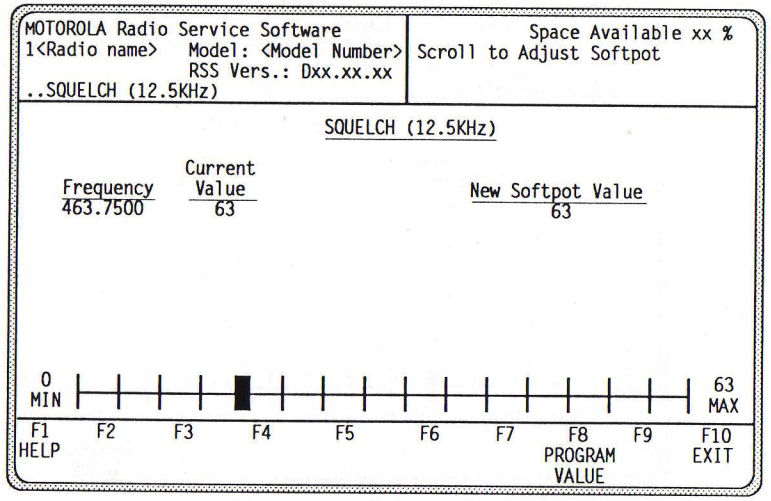
This screen allows you to adjust the squelch level for each RF Frequency shown. Use the **CurUp/CurDn** keys to change the value of the squelch. Use the **Tab** key to move between frequency points.

4.2.3.1. New Softpot Value

This is the squelch attenuator softpot value for this frequency. The status bar shows the relationship between this setting and the minimum and maximum settings.

4.2.4. Squelch Attenuator 12.5 kHz

At the RECEIVER ALIGNMENTS Menu press **F5**



Squelch Attenuator 12.5 kHz Screen

Refer to your Radio Service Manual for the Squelch Attenuator Alignment. This procedure should only be attempted by Qualified Service Personnel.

The Squelch Attenuator setting is increased or decreased by pressing the **CurUp/CurDn** keys respectively. A relative value between 0 and 63 will be displayed on the screen. Adjust the squelch setting to the desired value.

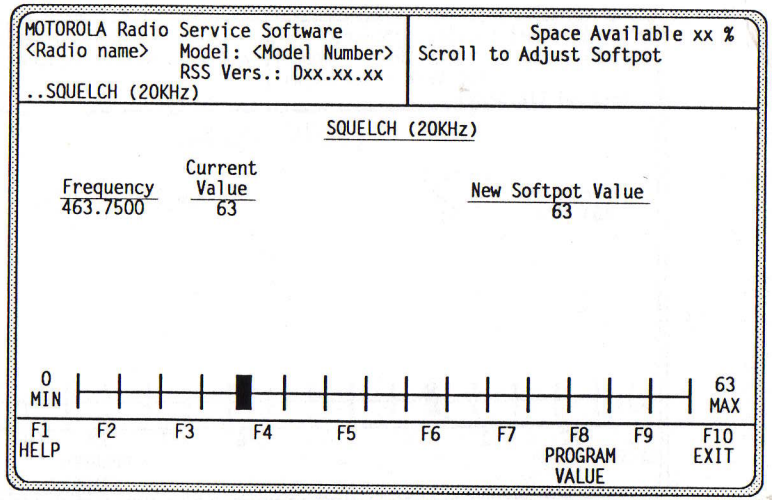
This screen allows you to adjust the squelch level to compensate for the change in characteristics between the 12.5 kHz IF Bandwidth mode and the previously calibrated 25 kHz mode.

4.2.4.1. New Softpot Value

This is the squelch attenuator softpot value for this frequency. The status bar shows the relationship between this setting and the minimum and maximum settings.

4.2.5. RX Squelch Attenuator 20 kHz

At the RECEIVER ALIGNMENTS Menu press **F6**



Squelch Attenuator 20 kHz Screen

Refer to your Radio Service Manual for the Squelch Attenuator Alignment. This procedure should only be attempted by Qualified Service Personnel.

The Squelch Attenuator setting is increased or decreased by pressing the **CurUp/CurDn** keys respectively. A relative value between 0 and 63 will be displayed on the screen. Adjust the squelch setting to the desired value.

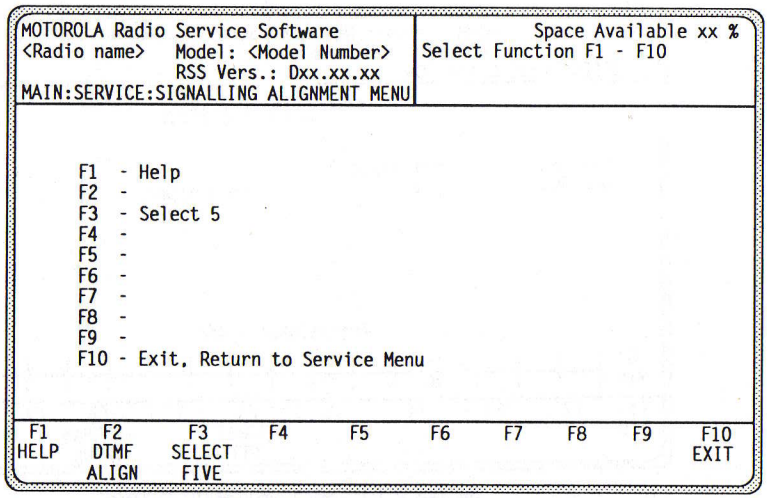
This screen allows you to adjust the squelch level to compensate for the change in characteristics between the 20 kHz IF mode and previously calibrated 25 kHz mode Bandwidth.

4.2.5.1. New Softpot Value

This is the squelch attenuator softpot value for this frequency. The status bar shows the relationship between this setting and the minimum and maximum settings.

4.3. SIGNALLING ALIGNMENTS

At the RADIO TUNE Menu press **F4**



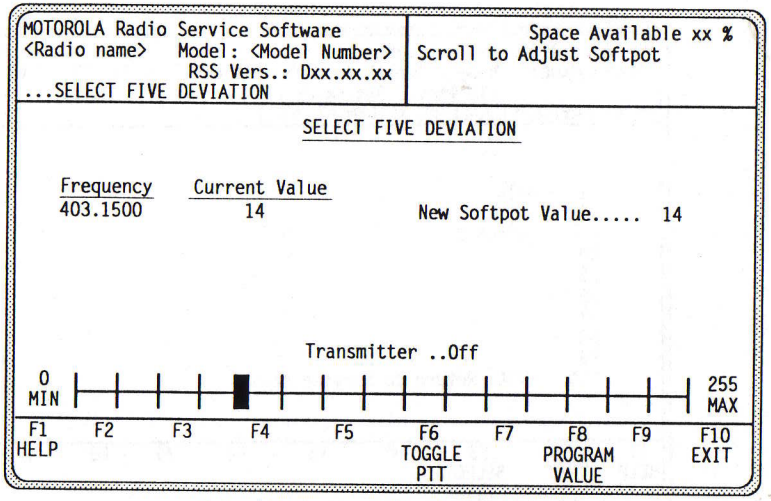
Signalling Alignment Screen

Standard periodic alignment procedures are performed from this Menu. Refer to your Radio Service Manual for ALIGNMENT procedures. These procedures should only be attempted by Qualified Service Personnel. Failure to perform Alignment procedures properly may result in seriously degraded radio or system performance.

Signalling Deviation should be checked any time the radio is serviced and must be adjusted whenever any of the modulation circuitry has been replaced. Before adjusting Signalling Deviation, radio Compensation/Deviation adjustments must be made.

4.3.1. Select 5 Transmit Deviation

At the SIGNALLING ALIGNMENT Menu press **F3**



Select 5 Transmit Deviation Screen

Refer to your Radio Service Manual for the Select 5 Signalling Deviation Alignment procedure. Select 5 Deviation should be checked any time the radio is serviced and must be adjusted whenever any of the modulation circuitry has been replaced. All radio compensation/ deviation adjustments must be made before adjusting Select 5 Deviation.

Select 5 Deviation is increased or decreased by first keying the radio via **F6**, and then by pressing the **CurUp/CurDn** keys respectively. A relative deviation value will be displayed, but the actual transmitter deviation must be determined from your service monitor. Set your modulation analyzer to read peak deviation.

4.3.1.1. New Softpot Value

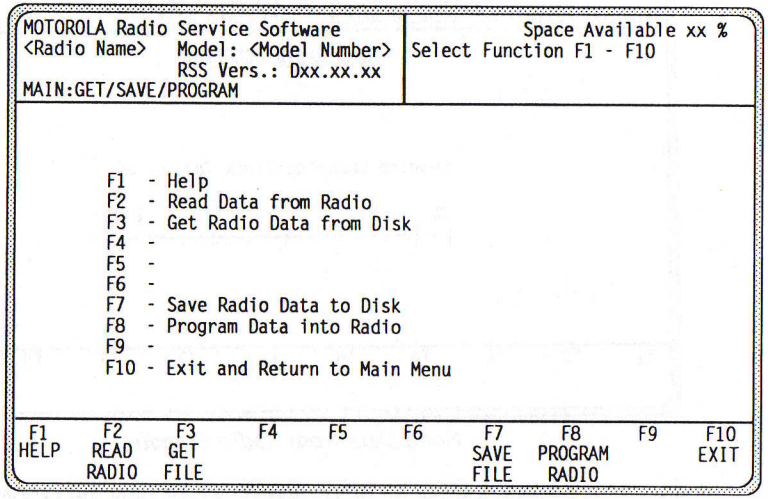
This is the Select 5 softpot value. The status bar shows the relationship between this setting and the minimum and maximum setings.

5. GET/SAVE/PROGRAM MENU FUNCTIONS

At the MAIN Menu press **F3**

The GET function is used to transfer codeplug data from your radio or an archive file into your computer in order for you to Change, View or Print it.

The menu also permits you to PROGRAM modified data back into your radio or to SAVE a copy of the codeplug data in an archive file.



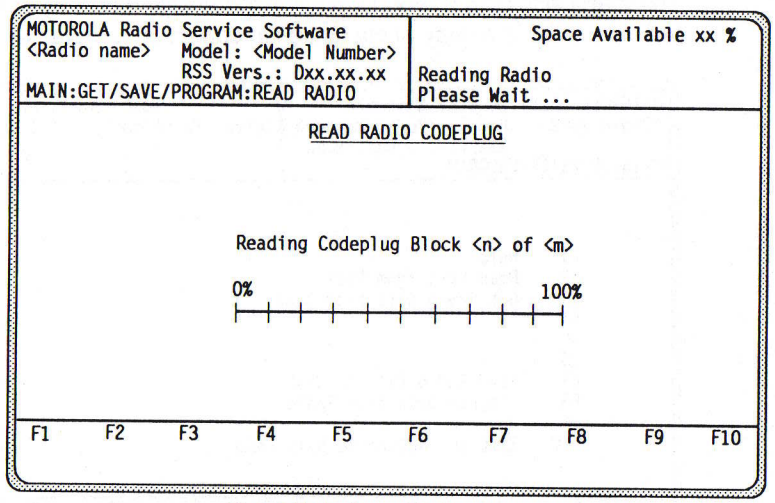
Get/Save/Program Screen

***CAUTION:** DO NOT turn off the radio or disconnect it from the computer while PROGRAMMING the Codeplug. This WILL destroy the codeplug contents and completely DISABLE the radio!*

5.1. READ DATA FROM RADIO

At the MAIN Menu press **F3, F2**

The Read Radio functions reads the information (data) stored in the radio codeplug (EEPROM) and transfers it to the computer's memory. The time required to READ a codeplug will depend directly on your computer type and the size of the codeplug you are reading.



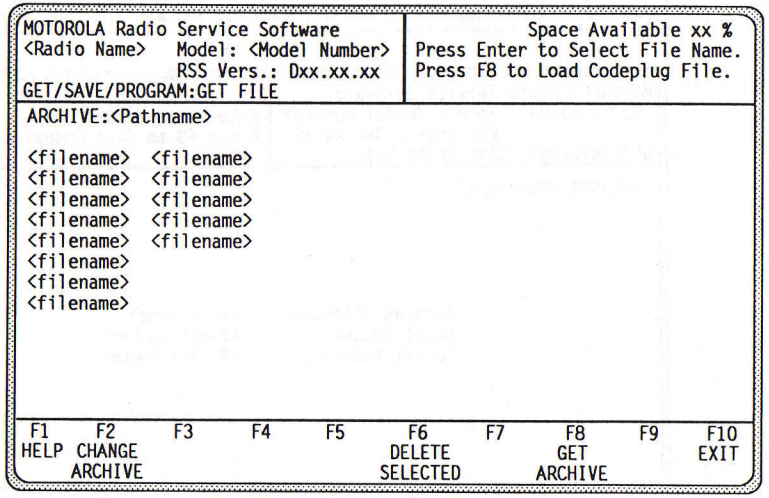
Read Data from Radio Screen

If no errors occur, the centre of the screen will display the progress of the codeplug read. After reading, the codeplug will be checked for valid serial number, model number, checksums etc. If any errors occur, they are shown on the screen.

5.2. GET RADIO DATA FROM DISK

At the MAIN Menu press **F3, F3**

The GET Radio Data from Disk function is used to retrieve an archive file from a diskette or hard disk to the computer. Once retrieved, the file may be modified via the CHANGE/VIEW functions or programmed into a radio via the PROGRAM function.



Get Radio Data from Disk Screen

An Archive path and the list of files in that path will be displayed. The path selected is the default path from the SETUP Menu. To **CHANGE** the Archive path press **F2**, type in the path name, and press **Enter**.

To **DELETE** a file, **Select** the desired file by pressing **Enter** or **Tab** and press **F6**.

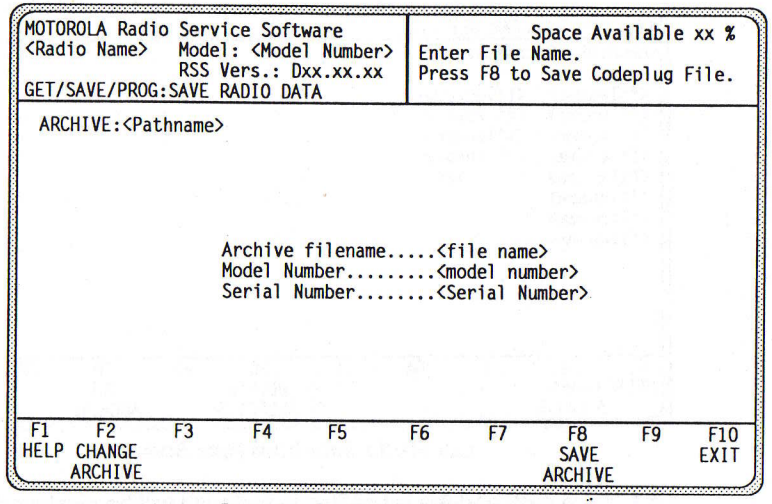
To **GET** (retrieve) a selected file press **F8**. The file will be retrieved, validated and stored in the computers memory. The read process will be displayed on the screen.

5.3. SAVE RADIO DATA TO DISK

At the MAIN Menu press **F3, F7**

The SAVE Radio Data function is used to create (or update) an archive copy of the codeplug information onto a diskette or hard disk.

> ***Note:*** *It is STRONGLY recommended to make an archive copy of every radio installed or serviced in order to be able to quickly restore customer information in case of codeplug failure.*



Save Radio Data to Disk Screen

The archive file name may be up to 8 characters long, and should have a 3 character extension.

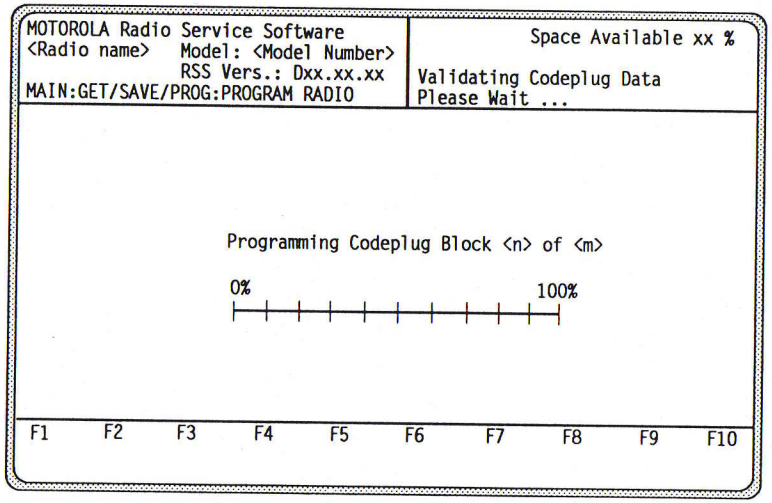
Press **F2** to **CHANGE** the archive path. Type in the directory path name and press **F8** to **SAVE** the file.

5.4. PROGRAM DATA INTO RADIO

At the MAIN Menu press **F3, F8**

The PROGRAM Radio function is used to transfer codeplug information from the computer to the radio codeplug.

A radio and RIB must be properly connected to the computer and power turned on before you attempt the PROGRAM function



Program Data into Radio Screen

The time required to PROGRAM a codeplug will depend directly on your computer type and the size of the codeplug you are programming.

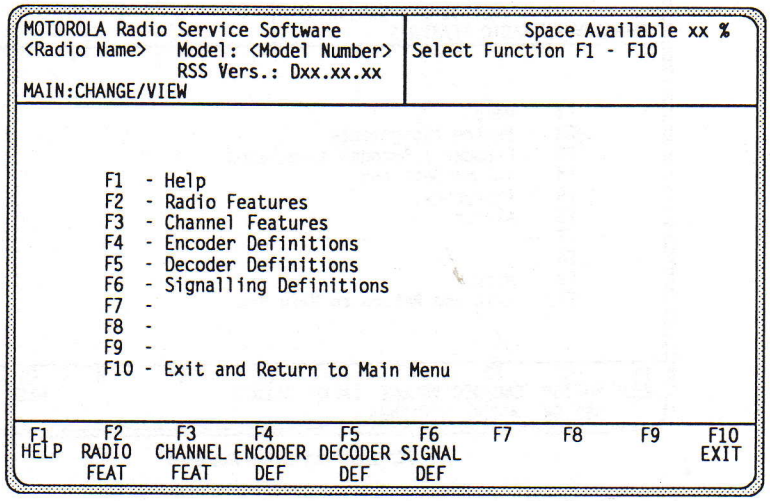
The status bar shows the relative value of the number of blocks programmed so far compared to the total number of blocks to be programmed.

Before programming the radio the RSS will perform various compatibility checks. If one of the checks fails the programming process will be stopped and the appropriate error message will be generated.

6. CHANGE/VIEW MENU FUNCTIONS

At the MAIN Menu press **F4**

The CHANGE/VIEW Menu allows you to change, view or modify codeplug features. A codeplug must be loaded into your computer's memory (via the GET/SAVE/PROGRAM Menu) before you can access the CHANGE/VIEW screens. You may change or view an archive file without a radio connected.



CHANGE/VIEW screen

> ***Important Note***
>
> *The CHANGE/VIEW Menu does NOT actually modify the radio codeplug data, but instead, modifies a copy of the data retrieved from the codeplug or archive file via the GET/SAVE/PROGRAM Menu functions.*

Having completed your CHANGE/VIEW modifications you MUST return to the GET/SAVE/PROGRAM Menu and program the changes back into the radio or save them to a new archive file. Otherwise, the modifications will be lost when you turn off your computer or load in another codeplug.

On all menus and screens **F1** - HELP will provide useful information about the currently displayed menu, screen or field.

The programmer will look for the nearest integer where decimal values are stated for the valid entry ranges.

6.1. RADIO FEATURES

At the MAIN Menu press **F4, F2**

This screen allows you to set up and modify radio parameters and options that affect overall radio operation, such as the button settings and volume settings.

```
MOTOROLA Radio Service Software          Space Available xx %
<Radio Name>   Model: <Model Number>   Select Function F1 - F10
               RSS Vers.: Dxx.xx.xx
CHANGE/VIEW:RADIO FEATURES

        F1  - Help
        F2  - Button Assignments
        F3  - Encoder / Decoder Associated
        F4  - Volume Settings
        F5  - Emergency
        F6  - Alerts
        F7  -
        F8  -
        F9  - Misc.
        F10 - Exit and Return to Main Menu

 F1     F2      F3      F4      F5     F6     F7     F8     F9    F10
HELP  BUTTON  ENC/DEC  VOLUME  EMERG  ALERTS                 MISC  EXIT
      ASSIGN  ASSOC.   SETTINGS
```

Radio Features screen

In the Radio Features screens a selected radio option is indicated by the data field being displayed in reverse video. Use **CurUp** and **CurDn** to select another status of the option.

On some options, data fields which belong together may appear on separate lines which can be accessed via the **Tab** or **Return** key.

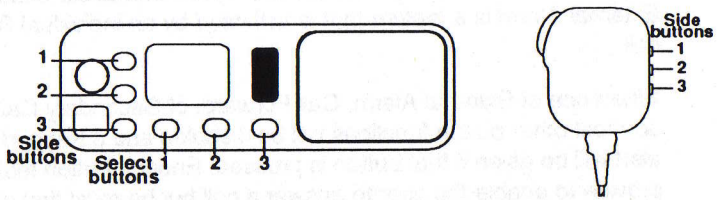
6.1.1. Button Assignment

At the MAIN Menu press **F4, F2, F2**

```
MOTOROLA Radio Service Software          Space Available xx %
<Radio Name>   Model: <Model Number>   Scroll to Select Choice.
               RSS Vers.: Dxx.xx.xx
...RADIO FEATURES:BUTTON ASSIGNMENTS

                        RADIO BUTTONS
          Side Button 1 ..................... CALL 1
          Side Button 2 ..................... CALL 2
          Side Button 3 ..................... CALL 3
          Select Button 1 ......CHANNEL SELECTION
          Select Button 2 ..............  DISABLED
          Select Button 3 ..............  DISABLED

                        MIC BUTTONS
          Mic Button 1 ..................... CALL 1
          Mic Button 2 ..................... CALL 2
          Mic Button 3 ..................... MONITOR

 F1     F2   F3   F4   F5   F6   F7       F8       F9   F10
HELP                              ADDRESS  STATUS       EXIT
                                  DEF      DEF
```

Button Assignment screen

This screen allows you to program the Radio Side buttons 1, 2 and 3 and the Select buttons 2 and 3 independently per radio. The function of Select Button 1 is fixed and cannot be changed via the RSS. Further, this screen allows you to program the Microphone Side buttons 1, 2 and 3.



Control Head/Microphone Programmable Buttons

Contraints:

*The **F7** ADDRESS DEFINITION function key is only available when Select Button 2 is set to ADDRESS SELECTION and Encoder Sequence 1 is defined. If so, the **F7** key will allow you to edit the Address Definitions.*

*The F8 STATUS SELECTION key is only displayed when Select Button 3 is set to STATUS SELECTION and Encoder Sequence 2 is defined. If so, the **F8** key will allow you to edit the Status Definitions.*

6.1.1.1. Radio Side Buttons 1, 2 & 3

Selections available for the Radio Side buttons are as follows,

Side Button 1	Side Button 2	Side Button 3
Disabled	Disabled ....(default)	Disabled
Call 1 ....(default)	Call 2	Call 3
Monitor	Monitor	Monitor ....(default)
Call Revert	Call Revert	Call Revert
Emergency	Emergency	Emergency
Nuisance Delete	Nuisance Delete	Nuisance Delete
	External Alarm	
	Call Forward	
	Secondary Call	
	Repeater Talkaround	

Use **CurUp** and **CurDn** keys to scroll through the available selections and use **Enter/Tab** to move to the next field and **Shift+Tab** to move to the previous field.

Scan operation will be stopped when either External Alarm, Secondary Call or Call Forward is selected.

If a button is configured as either External Alarm, Call Forward, Secondary Call or Repeater Talkaround select, but the corresponding feature is not available on the current channel, then the Keypad Error alert will be given if the user attempts to enable the feature. This will occur if for example a side button is configured as External Alarm but the current channel does not have the Select 5 decoder enabled. External Alarm is a feature that is activated by an individual Select 5 call

When one of External Alarm, Call Forward, of Secondary Call is selected most other button functions will be disabled and a Keypad Error alert will be given if that button is pressed. Enough button features are provide to enable the user to answer a call but he must first disable the External Alarm, Secondary Call, or Call Forward option before any other operations are attempted.

If enabled, the keypad acknowledge alert will be given in response to valid Side button presses.

6.1.1.2. Radio Select Buttons (1), 2 & 3

The Select Buttons are used to select one of three possible operating modes.

Channel Selection (button 1) allows the user to change radio channels using the Rocker Switch. If a radio channel is inhibited from selection then that channel number will be skipped as the user scrolls through the list of available channels.

Address Selection allows the variable digits in Multicall sequence 1 to be altered by using the Rocker Switch. The Rocker Switch will scroll through the range of values allowed (programmed) for address selection.

Status Selection is used to enter a single variable digit into a Multicall sequence in the same manner as Address Selection.An upper and lower limit to the range of selectable status numbers may be programmed per radio.

Scan On/Off will toggle the state of Scan On/Off.

Selections available for the Select Buttons are as follows,

Select Button 1	Select Button 2	Select Button 3
Channel Selection .....(Fixed)	Address Selection	Status Selection
	Disabled ....(Default)	Scan On/Off
		Disabled ....(Default)

6.1.1.3. Microphone Side Buttons 1, 2, & 3

In addition to the PTT and the Mic On/Off hook the Noise Cancelling microphone HMN4049 has three configurable buttons.

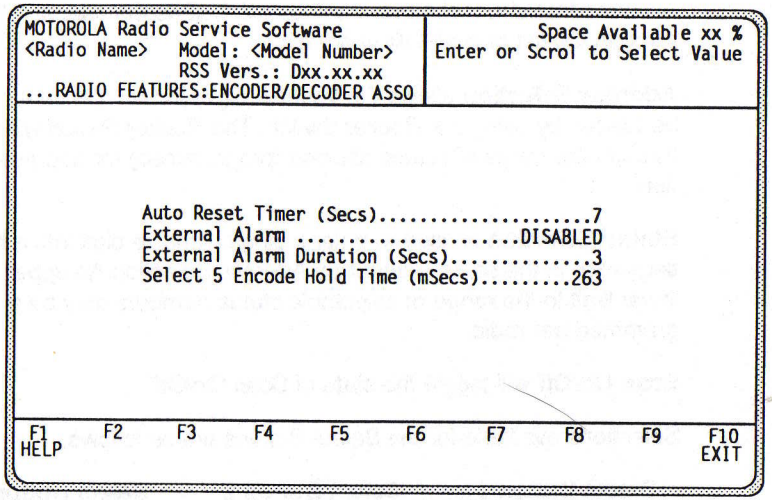
Selections available for the Microphone Side buttons are as follows,

Mic Button 1	Mic Button 2	Mic Button 3
Disabled ....(Default)	Disabled ....(Default)	Disabled ....(Default)
Call 1	Call 2	Call 3
Monitor	Monitor	Monitor
Call Revert	Call Revert	Call Revert
Emergency	Emergency	Emergency
Nuisance Delete	Nuisance Delete	Nuisance Delete

6.1.2. Encoder/Decoder Associated

At the MAIN Menu **F4, F2, F3**

This section describes the editable functions of the Encoder/Decoder associated codeplug data.



Encoder/Decoder Associated Screen

6.1.2.1. Auto Reset Timer

On entry to the Auto Reset mode the Auto Reset Timer will be started (programmable per radio). On expiry of the Auto Reset Timer the radio will reset to the programmed squelch mode.

Valid entry is in the range 1 - 60 secs
Default: 7 secs.

6.1.2.2. External Alarm

The External Alarm is used to switch external circuitry, e.g. horn, lights or other device. External alarm is stopped if the radio is switched off, or if any of the radio buttons are pressed when the alarm is being asserted. It may be enabled for Select 5 Group calls ONLY or for Select 5 Individual AND Group calls.

Available selections are DISABLED, INDIVIDUAL, INDIVIDUAL/GROUP, USER SELECT IND, USER SELECT GROUP.

Default: DISABLED.

Contraints:

If Side Button 2 is set to EXTERNAL ALARM then the only user selectable options available are USER SELECT IND and USER SELECT GROUP.

If Side Button 2 is set to anything other than EXTERNAL ALARM then the only options available are DISABLED, INDIVIDUAL and INDIVIDUAL/GROUP.

6.1.2.3. External Alarm Duration

If enabled, the External Alarm is switched active for the external alarm time.

Valid entry is in the range 1 - 32 secs.
Default: 4 secs

6.1.2.4. Select 5 Encode Hold Time

This is the period of time, after completion of the Encode Sequence, that the transmitter remains keyed (unmodulated or PL modulated). The Hold Time is applied to all of the defined sequences.

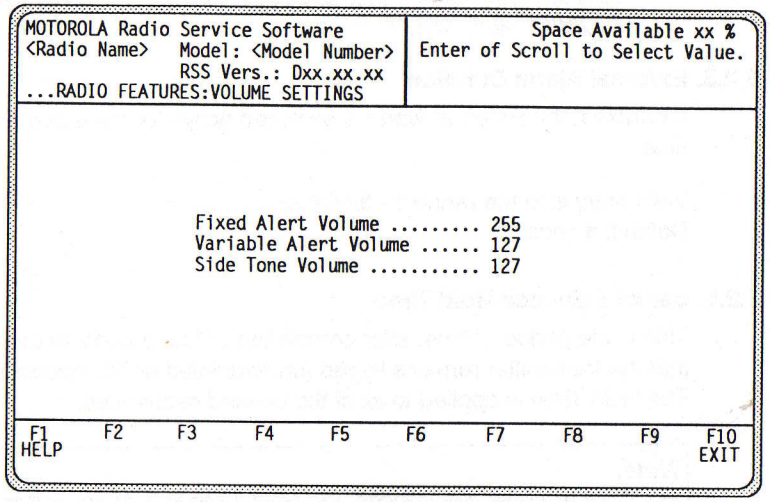
> ***Note:***
> *For Concatenated sequences, the Hold Time is only applied to the final sequence (the inter-sequence delay will only be equal to the Pre Time of the following sequence).*

Valid entry is in the range 0 - 2101 msecs in steps of 8 msecs.
Default: 263 msecs

6.1.3. Volume Settings

At the MAIN Menu press **F4, F2, F4**

This screen allows you to individually program the volume of the Fixed Alert, the Variable Alert and the Side Tone.



Volume settings Screen

6.1.3.1. Fixed Alert Volume

Fixed volume alerts are intended to be used in situations where the user will be some distance from his radio and wishes to hear for example a select 5 individual call alert but does not then want to have to turn down the radio volume to a suitable level for communication. 'Fixed Volume' therefore means that the volume at which alerts will be sounded will be fixed and will be independent of the position of the volume control knob on the radio.

Valid entry is in the range 1 - 255.
Default: 160

6.1.3.2. Variable Alert Volume

The volume of a variable volume alert will be proportional to the setting of the volume switch unlike a fixed volume alert which is a constant volume regardless of the volume switch.

Valid entry is in the range 0 - 255.
Default: 30.

Note that the value 127 corresponds to the loudest setting and that the value 128 corresponds to the quietest setting i.e. the volume increases in the following sequence :
128, 129, 130, ... 254, 255, 0, 1, 2, ... 125, 126, 127.

6.1.3.3. Side Tone Volume

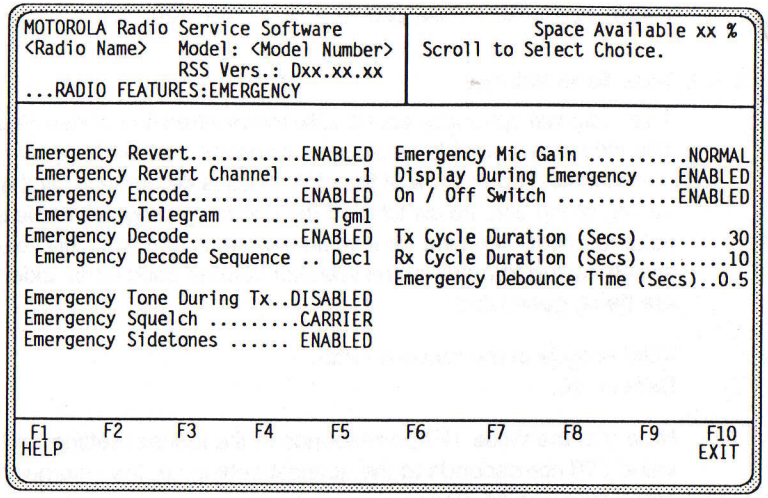
The radio will optionally sound side tones when it encodes Select 5. The side tones provide an audible indication that the tones are being-transmitted. The volume of the side tones is determined by the current setting of the volume switch and the codeplug programmable side tone volume offset. The side tone volume offset is added to the volume switch setting to arrive at the speaker volume used when side tones are being generated.

Valid entry is In the range 0 - 255.
Default: 16.

Note that the value 127 corresponds to the loudest setting and that the value 128 corresponds to the quietest setting i.e. the volume increases in the following sequence :
128, 129, 130, ... 254, 255, 0, 1, 2, ... 125, 126, 127.

6.1.4. Emergency

At the MAIN Menu press **F4, F2, F5**



Emergency Screen

Emergency is invoked via a button press or from an accessory. During emergency operation the battery TX and RX thresholds are ignored, but the flat battery threshold is not.

PL will be operational during emergency i.e. for a PL Encode channel the PL frequency will be encoded during the Emergency Transmit period and for a PL decode channel the PL frequency will be required in conjunction with the Emergency Decode sequence. If PL Squelch is selected for Emergency then PL will be required for the radio to unmute.

6.1.4.1. Emergency Revert & Emergency Revert Channel

It is possible to specify an emergency channel whose transmit and receive frequencies are used. The PL frequencies for the revert channel will also be used. The emergency revert channel may be disabled, in which case emergency will operate on the current radio channel. The default for Emergency Revert is DISABLED. If Emergency Revert is ENABLED the Emergency Revert Channel field appears and must be specified.

Valid entry is in the range 1 - N (number of channels the radio is configured for).

Default: 1

Constraints:

The channel number that can be entered depends on the radio configuration.
If Emergency Squelch is set to PL then only channels with PL Rx ENABLED can be entered/selected.
Channels that have Rx Only ENABLED cannot be entered/selected.

6.1.4.2. Emergency Encode & Emergency Telegram

At the beginning of each transmit Emergency cycle a Select 5 emergency telegram may be optionally encoded. Side tones may be enabled or disabled with this telegram. The default for Emergency Encode is DISABLED. If Emergency Encode is ENABLED the Emergency Telegram field appears and must be specified.

Valid entry is in the range Tgm1 - Tgm16.
Default: Tgm1.

Constraints:

A telegram must be defined before it can be referenced.

6.1.4.3. Emergency Decode & Emergency Decode Sequence

It is possible to specify a decode sequence which the radio will enable during the receive period. On decoding a Select 5 sequence which matches the specification for the emergency decode sequence, the radio will exit from the Emergency mode. Auto acknowledge may take place if enabled in the emergency decode sequence. The default for Emergency Decode is DISABLED. If Emergency Decode is ENABLED the Emergency Decode Sequence field appears and must be specified.

Valid entry is in the range Dec1 - Dec8.
Default: Dec1.

Constraints:

A decode sequence must be defined before it can be referenced.

6.1.4.4. Emergency Tone During Tx

The Emergency Tone is intended to inform any listeners of the emergency operation. The Emergency Tone is transmitted throughout the pre-defined Emergency TX Cycle, 10 dB below standard signalling level. Voice can be transmitted over this tone.

Available selections are: ENABLED, DISABLED
Default: DISABLED

6.1.4.5. Emergency Squelch

By defining the squelch mode, it is possible to simplify operation when calling the radio in emergency. Other users need not know the correct signalling code to call the unit. A simple push to talk channel can be established for the duration of the emergency by selecting Carrier.

Available selections are: CARRIER (carrier squelch controlled loudspeaker), PL, CLOSED (always closed loudspeaker)

Default: CARRIER

Constraints:

If PL is selected and the Emergency Revert Channel has PL Decoder DISABLED, the Emergency Revert Channel will display '??'.

6.1.4.6. Emergency Side tones

The Emergency Side tones allows the user to "hear" the emergency telegram being transmitted by the radio when in Emergency mode.

Available selections are: ENABLED, DISABLED
Default: DISABLED

6.1.4.7. Emergency MIC Gain

The gain of the microphone can be boosted during the Emergency Tx Cycle.

Available selections are: NORMAL, 3, 6, 9, 12, 18, 21 dB
Default: NORMAL

6.1.4.8. Display During Emergency

This feature enables/disables the display during Emergency operation. If disabled the display will "freeze" on invocation of emergency operation. LEDs will remain in the state they were on invocation of emergency.

Available selections are: ENABLED, DISABLED
Default: DISABLED

6.1.4.9. On/Off Switch

During emergency operation the On/Off may be optionally disabled. If the On/Off switch is disabled then emergency operation may only be stopped by removing the radio power supply or receiving the emergency decode sequence. Switching the radio off with the On/Off switch will stop all radio indications: LEDs, speaker output etc.

Available selections are: ENABLED, DISABLED
Default: DISABLED

6.1.4.10. Tx Cycle Duration

Once invoked, emergency alternates between periods of transmitting and receiving.

Valid entry is in the range 0 - 78.7 secs.
Default: 5 secs.

6.1.4.11. Rx Cycle Duration

Once invoked, emergency alternates between periods of transmitting and receiving. When configured for permanent receive the radio transmits once for the programmed transmit duration at the beginning of emergency operation and then dekeys and remains in receive.

Valid entry is in the range 0 - 78.7 secs.
Default: 0 secs.

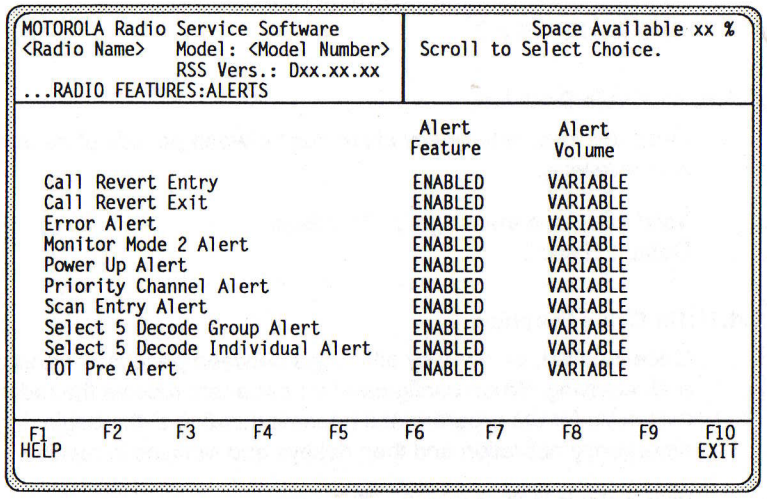
6.1.4.12. Emergency Debounce Time

The button which is configured to activate Emergency has a different programmable debounce time to that used with other radio buttons. The emergency debounce time may be set to a longer interval so as to reduce the chance of accidentally initiating emergency operation.

Valid entry is in the range 0 - 3.9 secs.
Default: 3.9 secs.

6.1.5. Alerts

At the MAIN Menu press **F4, F2, F6**



Alerts Screen

This screen gives access to individual programming of the 10 alerts of the radio.

The 10 alerts for the radio are:

Call Revert Entry	Sounded when the radio moves onto the Call Revert Channel
Call Revert Exit	Sounded when the radio exits the Call Revert channel and returns to normal operation.
Error Alert	Invalid operation/Keypad entry not accepted.
Monitor Mode 2 Alert	Sounded when monitor has been hold for long enough to enter the permanent Monitor 2 mode of operation.
Power Up Alert	Sounded when the radio is turned on to indicate that its power-up checks have passed.
Priority Channel Alert	Sounded if the radio lands on the priority channel during scanning.

Scan Entry Alert	Sounded when the radio starts scanning.
Select 5 Decode Group Alert	Sounded when the radio receives a tone sequence for a group to which it belongs.
Select 5 Decode Indiv. Alert	Sounded when the radio receives a tone sequence which corresponds to one of the decode sequence(s) for the channel.
TOT Pre Alert	Sounded prior to expiry of the Transmit Time Out Timer

Alert Feature:

The alerts can be enabled and disabled. If an alert is ENABLED it must be specified in the next field. By default all the alerts are ENABLED.

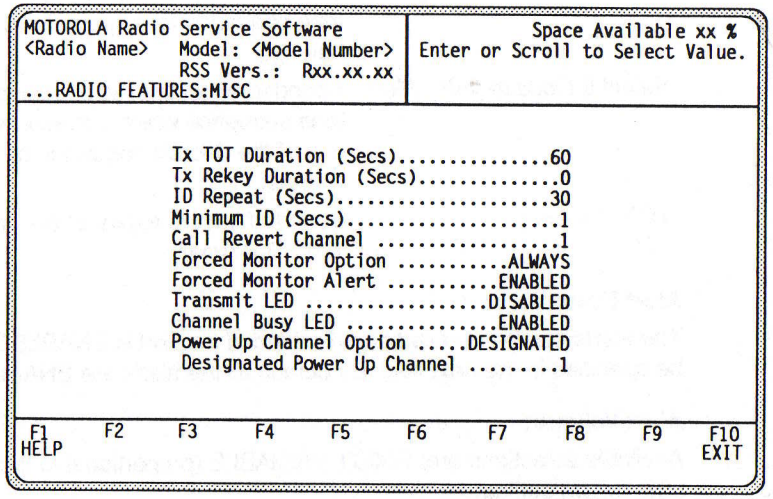
Alert Volume:

Available selections are: FIXED, VARIABLE (proportional to the volume switch setting).

Defaults: VARIABLE.

6.1.6. Misc(ellaneous)

At the Main Menu press **F4, F2, F9**



Misc(ellaneous) Screen

6.1.6.1. Tx TOT Duration

This field allows the user to define the Transmit Time Out Timer (TTOT) which limits the amount of time the radio operator will be able to transmit. If the operator exceeds the TTOT duration programmed for that radio. The radio will stop transmitting and sound an Error alert until the button which activated the transmission is released.

Valid entry is in the range 0-158 secs.
Default: 0 secs.

6.1.6.2. Tx Rekey Duration

The Transmit TOT Rekey Time option governs the amount of time the radio operator will be prohibited from keying up the radio following time out of the TTOT. If the operator attempts to transmit during the Rekey Time the radio will sound an Error alert until the button which attempted to activate the transmission is released.

This option is used to further control air-time usage and limit prolonged transmission.

Valid entry is in the range 0-47.2 secs.
Default: 0 secs.

6.1.6.3. ID Repeat

This feature allows the user to define the time interval in which the ID is transmitted by the radio automatically whilst pressing the PTT switch.

Valid entry is in the range 0-267.7 secs.
Default: 1 sec.

Constraints:

The value entered at this field must be greater than the minimum ID field value.

6.1.6.4. Minimum ID

This feature defines the minimum transmit duration of the ID used for ID Repeat.

Valid entry is in the range 0-267.7 secs.
Default: 0 secs.

Constraints:

The value entered at this field must be less than the ID Repeat field value.

6.1.6.5. Call Revert Channel

Call Revert is initiated by pressing the call button and will cause the radio to sound the Revert Channel alert, move to the specified channel and encode the call 1 telegram provided that a call 1 telegram is defined for the channel. The radio will go into auto reset (if enabled), or will remain on the channel until the monitor button is pressed, or the channel selector switch position is changed.

Monitor Operation can not be invoked during Call Revert.

Call Revert may be initiated during Scan, dependant on whether Call Revert is enabled for the channel on which scan was initiated and not on the channel which scan is on when the call button is pressed. On exit from Call Revert, Scan is restarted. (On exit from Call Revert the Revert Channel exit alert will be sounded).

> ***Note:*** *Forced Monitor and Transmit Inhibit will be applied according to their setting for the Revert Channel and not according to their setting on the channel from which Call Revert was invoked.*

Valid entry is 1 - N (Channel number configured for the radio)
Default: 1.

Constraints:

A channel that has Call Revert or Auto Scan enabled cannot be selected as the Revert Channel. Neither can a Receive Only channel be chosen as the Call Revert channel.

Call revert cannot be enabled unless a valid Revert Channel is specified.

6.1.6.6. Forced Monitor Option

This option forces the user to monitor the channel for any incoming signal before allowing transmission (including Select 5 Encode). The radio will then be allowed to transmit, regardless of whether there is an incoming carrier, unless Transmit Inhibit has been enabled.

If the user has already pressed the Monitor Button, then the Forced Monitor feature will be disabled until the radio has Auto Reset to coded squelch.

Available selections are:

ONLY IF BUSY: the radio will transmit immediately if there is no incoming carrier. If the channel is busy, the radio will not transmit, and, on release of the PTT switch (or Call Button 1 or 2), will monitor the channel. While the button is pressed, an alert will be sounded.

ALWAYS: the radio will not transmit, and, on release of the button, will monitor the channel. While the button is pressed, an alert will be sounded.

Default: ALWAYS.

Constraints:

To enable Forced Monitor, the Auto Reset option must also be enabled.

Settings which result in the radio sounding the Error Alert may not be selected unless the Error Alert is enabled.

6.1.6.7. Forced Monitor Alert

This option allows Forced Monitor to give an audible alert to make the user aware that monitor mode is entered before he can press the PTT switch.

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

6.1.6.8. Transmit LED

This field gives access to programming of the Transmit LED (continuous Red during normal transmission). If enabled the LED will be on while the radio is transmitting.

Available selections are: ENABLED, DISABLED.
Default: ENABLED.

Constraints:

The Transmit LED must be ENABLED if Auto Ack LED has been enabled for any Decode Sequence.

6.1.6.9. Channel Busy LED

This field gives access to programming of the Channel Busy LED (blinking Red during receive). If enabled the LED will indicate that a carrier is being detected

Available selections are: ENABLED, DISABLED.
Default: ENABLED.

6.1.6.10. Power Up Channel Option

In this field you indicate if your radio should power up on the channel that it was on when previously switched off, or if it should power up on a designated channel - specified below in Designated Power Up Channel.

Available selections are: DESIGNATED, LAST CHANNEL.
Default: LAST CHANNEL.

Constraints:

If DESIGNATED is selected a channel number MUST be designated under Designated Power Up Channel.

6.1.6.11 Designated Power Up Channel

The radio can be programmed to power up onto a codeplug programmed designated channel - the Power Up Channel. The radio will not remember previous Address and Status Selection values.

Valid entry is in the range 1 - N (Number of channels the radio is configured for).

Default: 1.

6.2. CHANNEL FEATURES

At the Main Menu press **F4, F3**

```
MOTOROLA Radio Service Software          Space Available xx %
<Radio Name>   Model: <Model Number>   Select Function Key F1 - F10
               RSS Vers.: Dxx.xx.xx
CHANGE/VIEW:CHANNEL FEATURES

        F1   -  Help
        F2   -  Channel Frequency Definitions
        F3   -  PL Frequency Definitions
        F4   -  Channel Definitions
        F5   -  Scan
        F6   -
        F7   -
        F8   -
        F9   -
        F10  -  Exit

F1     F2        F3        F4        F5     F6   F7   F8   F9   F10
HELP   CHANNEL   PL        CHANNEL   SCAN                      EXIT
       FREQS     FREQS     DEFS
```

Channel Features Screen

This screen allows you to program the 16 channels as well as the Scan lists.

6.2.1. Channel Frequency Definitions

At the Main Menu press **F4, F3, F2**

```
MOTOROLA Radio Service Software          Space Available xx %
<Radio Name>   Model: <Model Number>   Enter or Scroll to Select Freq.
               RSS Vers.: Dxx.xx.xx
...CHANNEL FEATURES:CHANNEL FREQ DEFS

Freq                Channel          Freq                Channel
No.   Frequency     Spacing    No.   Frequency     Spacing
---   ---------     -------    ---   ---------     -------
 1    146.5          20 kHz    09    170.0         25 kHz
 2    146.6          20 kHz
 3    173.5          25 kHz
 4    173.6          25 kHz
 5    167.2          25 kHz
 6    136.00625      12.5 kHz
 7    148.98750      25 kHz
 8    169.985        25 kHz

F1     F2        F3   F4   F5        F6   F7   F8   F9   F10
HELP   ADD            DELETE                           EXIT
       FREQ           FREQ
```

Channel Frequency Definitions Screen

The transmit and receive frequencies for each channel are programmable. A maximum of 32 frequencies is definable depending on the available Codeplug space.

The 32 channels which can be configured for the radio is split in two screens of 16 each. Use the **PgUp/PgDn** keys to select which 16 channels are to be displayed on the screen.

Frequencies can be **added (F2)** or **deleted (F5)**.

A frequency that is referenced from elsewhere in the codeplug, i.e. in a channel definition, cannot be deleted.

Only the last entry can be deleted. If an attempt is made to delete one of the previous entries a message will be displayed. Press **F5** to continue.

Freq No. field
This is a non editable field. It is used as a reference for the frequency e.g. when defining a channels transmit frequency on the channel definitions screen.

Frequency field
Enter or scroll to select the required radio frequency (in kHz).
Default: Depending upon radio bandwidth.

Constraints:

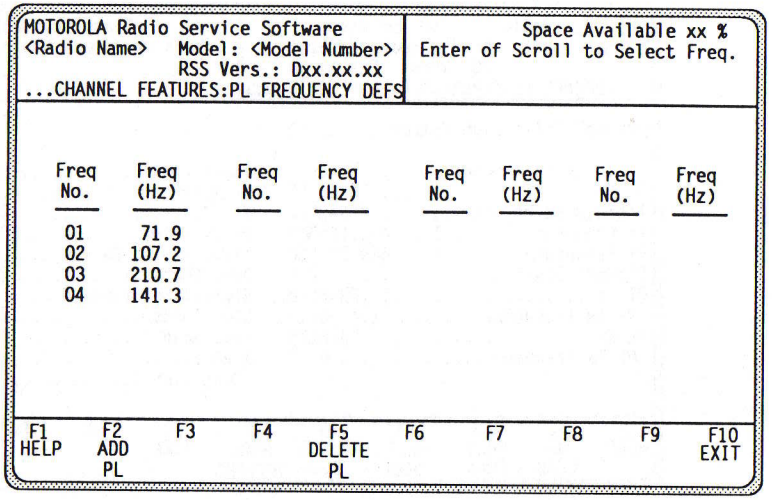
If the entered frequency is not divisible by 5 kHz or 6.25 kHz an error message will be generated.

Channel Spacing
Scroll to select the required channel spacing.

Available selections are: 12.5, 20.0, 25.0 kHz.
Default: 12.5 kHz.

6.2.2. PL Frequency Definitions

At the MAIN Menu press **F4**, **F3**, **F3**



PL Frequency Definitions Screen

This screen allows the user to enter the PL frequency information. The radio is capable of tone PL operation with independent PL encode and PL decode frequencies configured per channel and the PL encode and decode being independently enabled per channel. PL frequencies are programmable in the range 67 - 255 Hz. A maximum of 32 unique PL frequencies may be programmed subject to available codeplug space.

Frequencies can be **added** (**F2**) or **deleted** (**F5**).

A PL frequency that is referenced from elsewhere in the codeplug, i.e. in a channel definition, cannot be deleted.

Only the last entry can be deleted. If an attempt is made to delete one of the previous entries a message will be displayed. Press **F5** to continue.

Freq No. field
This is a non editable field. It is used as a reference for the PL frequency e.g. when defining a channels PL transmit frequency on the channel definitions screen

Frequency field
Enter or scroll to select the required PL frequency (in Hz).
Default: 67.0 Hz.

6.2.3. Channel Definitions

At the MAIN Menu press **F4**, **F3**, **F4**

```
MOTOROLA Radio Service Software                    Space Available xx %
<Radio Name>   Model: <Model Number>               Scroll to Select Choice.
               RSS Vers.: Dxx.xx.xx
...CHANNEL FEATURES:CHANNEL DEFINITIONS

Channel Definition Number ..... 1

Repeater Talkaround ..... ENABLED    Power Level ..... HIGH
Rx Only ..... ENABLED                Tx Admit .....ALWAYS
Inhibit Selection ..... DISABLED     Tx TOT .....DISABLED
Tx Frequency .....1... 403.125000    PL Override .....DISABLED
Rx Frequency .....1... 469.397500    TxPre-emp Rx De-emp .....ENABLED
Channel Spacing ..... 12.5           Data Emphasis.....DISABLED
Pl Tx .....ENABLED                   Signalling Standard .....ZVEI
 PL Tx Frequency..... 1....67.0      Side Tones .....DISABLED
PL Rx .....ENABLED                   Auto Scan .....DISABLED
 PL Rx Frequency..... 1....67.0      Scan .....ENABLED
                                      Scan List .....Scal

F1    F2     F3     F4     F5     F6     F7     F8     F9     F10
HELP  ADD    PREV   NEXT   DELETE MORE   SCAN                 EXIT
      CHAN   CHAN   CHAN   CHAN   OPTIONS
```

Channel Definitions Screen, page 1

The radio will support up to 16 channels. The channel definitions screens allow the user to enter the per channel information for every channel in the current configuration.

The amount of information stored against each channel exceeds one screen, therefore it is spread across 2 screens. Press the **F6** MORE OPTIONS key to display the additional options. If required, press **F10** to return to the previous screen.


```
MOTOROLA Radio Service Software                    Space Available xx %
<Radio Name>   Model: <Model Number>               Scroll to Select Choice.
               RSS Vers.: Dxx.xx.xx
...CHANNEL FEATURES:CHANNEL DEFINITIONS

Channel Definition Number ..... 1

Decode ..... ENABLED    Call 1 ..... ENABLED
 Decode Primary .....Dec1  Call 1 Telegram ..... Tgm1
 Decode Secondary .....Dec2  Call 2 ..... ENABLED
Receive Squelch .....CARRIER  Call 2 Telegram ..... Tgm2
Monitor 1 Squelch .....OPEN  Call 3 ..... ENABLED
Monitor 2 Squelch .....OPEN  Call 3 Telegram ..... Tgm3
                             Auto Reset .....MANUAL
PTT Key Option .....REPEAT   Forced Monitor .....DISABLED
PTT Key Telegram .....Tgm1     Privacy .....ENABLED
PTT Dekey .....ENABLED         Privacy Deauthorize..DISABLED
PTT Dekey Telegram .....Tgm1   Privacy Request.....ENABLED

F1    F2     F3     F4     F5     F6     F7     F8     F9     F10
HELP  ADD    PREV   NEXT   DELETE        DECODE TELG   SCAN   EXIT
      CHAN   CHAN   CHAN   CHAN          SEQ    DEF
```

Channel Definitions Screen, page 2

Channels can be **added** (**F2**) or **deleted** (**F5**). Any channels which are not set up are classified as "Non-Programmed". After programming of the radio, moving the Channel Selector switch to a "Non-Programmed" channel causes an error alert to be sounded. A channel that is referenced from elsewhere in the codeplug, i.e. in a scan list, cannot be deleted. Only the last channel can be deleted. If an attempt is made to delete one of the previous channels a message will be displayed. Press **F5** to continue.

Pressing the **F4** NEXT CHANNEL key will allow you to enter the channel information for the next channel and **F3** will take you to the PREVIOUS CHANNEL.

On the first "Channel Definitions screen F9 will take you to the SCAN screen. On the second Channel Definitions screen **F7** will allow you to edit the DECODE SEQUENCES and **F8** will take you to the TEGRAM DEFINITIONS screen. From either of these screens press **F10** to return to the Channel Definitions screen.

6.2.3.1. Channel Definition Number

This field is used to navigate the user through the defined channels.

Valid entry is in the range 1 - N (number of defined channels).

Default: 1.

6.2.3.2. Repeater Talkaround

When this function is selected the transmit frequency on a channel is switched to be the same as the channels receive frequency. This is intended to allow a radio to communicate directly with another radio without the need to use a repeater.

Selecting the Repeater Talkaround function when the radio is transmitting will not change the transmit frequency while the radio is transmitting. The new transmit frequency will take affect next time the radio is keyed up.

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

6.2.3.3. RX Only

When this option is enabled RSS will remove the transmit options previously selected. The "Receive Only" channel designation overrules the transmit options, e.g. Select 5 Encode sequences, Auto Acknowledge and PL Encode.

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

6.2.3.4. Inhibit Selection

It will be possible to program a channel such that the user is not allowed to move onto it using the channel selector. Should the user switch to that channel a continuous Side Button Error alert will be given until the channel selector is moved off the channel. This feature may be useful in conjunction with Call Revert in order to prevent the user from selecting the Revert channel.

Available selections are ENABLED, DISABLED.
Default: DISABLED.

Constraints:

This option should not be ENABLED on all channels.

This option should not be ENABLED on the designated power up channel.

6.2.3.5. Transmit Frequency

There are two fields associated with the radio transmit frequency. One is used as the index into the Channel Frequency block and the other to display the frequency. If a channel has been designated as Receive

Only you will not be allowed to enter a transmit frequency in the transmit frequency field.

Available selections are: the frequencies defined via the Channel frequency definition screen.

Default: none.

6.2.3.6. Receive Frequency

There are two fields associated with the radio receive frequency. One is used as the index into the Channel Frequency block and the other to display the frequency.

Available selections are: the frequencies defined via the Channel frequency definition screen. Only the frequencies that match the same channel spacing as the Transmit Frequency if defined.

Default: 1.

6.2.3.7. Channel Spacing

This is a non editable field. The field will display the corresponding channel spacing for the selected transmit/receive frequency.

6.2.3.8. PL Tx & PL Tx Frequency

If enabled, the specified PL frequency will be encoded by the radio whenever the radio is transmitting. It will be encoded simultaneously with any other signalling transmissions. If the radio is encoding PL then a PL "reverse burst" is generated just before the radio dekeys. The reverse burst consists of PL encoded with a 240 degree phase shift. Default for PL Tx is DISABLED. If the PL Tx is ENABLED itmust be specified in the PL Tx frequency field.

Available selections are: 1-N (number of frequencies defined via the PL Freqency definitions screen).

Default: 1.

Constraints:

The PL Tx freq. field will not be displayed if RX Only is ENABLED.

6.2.3.9. PL Rx & PL Rx Frequency

The PL Decoder will determine whether the correct PL frequency is present on the channel. If a Select 5 Decode Sequence is pro-

grammed for the channel then the radio will only recognise incoming Select 5 tones if the correct PL frequency has been detected and if carrier has not been lost since it was detected (this is to cater for radios that do not encode PL simultaneously with Select 5 tones). Default for PL Tx is DISABLED. If the PL Tx is ENABLED itmust be specified in the PL Tx frequency field.

Available selections are: 1-N (number of frequencies defined via the PL Freqency definitions screen).

Default: 1.

Constraints:

This PL Rx field cannot be DISABLED if either Received Squelch, Monitor 1 Squelch, Monitor 2 Squelch or Emergency Squelch is set to PL TYPE.

This PL Rx option cannot be DISABLED if Tx Admit Option is set to PL LOCKOUT.

6.2.3.10. Power Level

The transmit power level is programmable per channel.

Available selections are: LOW, HIGH.
Default: LOW.

6.2.3.11. Tx Admit Option

The Transmit Admit Option is intended to be used to prevent the user from being able to transmit on channels that are already being used. It should be noted that if a radio channel has different transmit and receive frequencies the Transmit Admit Criteria will check the receive frequency for activity but then the radio will transmit on the transmit frequency.

The transmit admit criteria are checked when the user attempts to make the radio transmit by pressing either the PTT or a Side button when it is configured as Call, or Call Revert. Emergency and Auto Acknowledge which also cause the radio to transmit are not subject to the transmit criteria.

The transmit admit criteria are applied regardless of the state of the Auto Reset timer. If the radio is called then it may still not be allowed to transmit if the transmit admit criteria are not met.

Available selections are:

ALWAYS: No transmit admit criteria. The user will always be allowed to transmit.

IF CHANNEL FREE: The radio will inhibit transmission if carrier is currently being detected on the receive frequency.

PAST PL LOCKOUT: Transmit if no carrier OR carrier and PL has been detected. The radio will inhibit transmission if carrier is present on the receive channel unless the PL decode frequency for the channel has also been detected since carrier was detected.

PL LOCKOUT: Transmit if no carrier OR carrier and PL is detected now. The radio will inhibit transmission if carrier is present on the receive channel unless the PL decode frequency for the channel is also currently being detected.

Default: ALWAYS.

Constraints:

This field is only displayed when Transmit Admit field is ENABLED.

Prevent the PL LOCKOUT option from being selected if PL decode is not ENABLED.

This field will only be displayed when Rx Only is DISABLED.

6.2.3.12. Tx TOT

The Transmit Time Out Timer (TTOT) limits the amount of time the radio operator will be able to transmit. If the operator exceeds the TTOT duration programmed for that radio the radio will stop transmitting and sound an Error alert until the button which activated the transmission is released.

This field allows the user to enable/disable the Transmit Time Out Timer (TTOT) for the individual channels channel.

Available selections are ENABLED, DISABLED.
Default: DISABLED.

Constraints:

The TTOT must be enabled if either the option TOT Rekey Time or the TTOT Pre Alert are enabled.
This field will only be displayed when Rx Only is DISABLED.

6.2.3.13.PL Override

The Carrier Override feature programmed under the Auto Reset Modes can be programmed to PL here. If enabled, the radio reverts to PL squelch after a continuous period of no channel activity.

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

6.2.3.14.Tx Pre-emp / Rx De-emp

The Transmit Pre-emphasis and Receive De-emphasis can be programmed per channel.

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

6.2.3.15.Data Emphasis

The Data Emphasis can be programmed per channel.

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

6.2.3.16.Signalling Standard

The radio supports the six common Select 5 Signalling Standards used in Europe (see Appendix A for the Signalling Standard definitions). The user can also programme and select one additional standard. (see sect.6.5.3.).

Available selections are: ZVEI, MOD ZVEI, FR MOD ZVEI, 70 ms CCIR, 100 ms CCIR, EEA, User Defined.

Default: ZVEI.

Constraints:

The radio must have a Signalling standard selected regardless of whether any signalling options are required.

6.2.3.17.Side Tones

Audible Side tones inform the user that the radio is transmitting an Encode Sequence (a Select 5 call is made). Voice will not be transmitted while Side tones are being sent.

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

6.2.3.18.Auto Scan

The auto scan feature will cause scan to be started automatically when a channel is selected.
This field allows the auto scan feature to be enabled/disabled for the channel

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

Constraints:

Option can only be ENABLED when a valid Scan sequence has been referenced in the Scan List.

6.2.3.19.Scan & Scan List

Scan causes the radio to search through a predefined list of channels looking for a condition that will cause the radio to unmute. Up to four scan lists may be defined per radio. This option allows the user to enable/disable the scan capability of the current channel.

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

If the Scan option is ENABLED you will be prompted to enter the appropriate scan sequence for the current channel.

Available selections are: Sca1 - Sca4.
Default: Sca1.

Constraints:

At least one scan list must be defined to enable the Scan option.

6.2.3.20.Decode Sequence: Decode Primary & Decode Secondary

Each channel may have a Primary and Secondary decode sequence specified. If two decode sequences are specified then the decoder will look for the two sequences simultaneously and indicate a Select 5 decode when either is received. The default for Decode Sequence is DISABLED. If Decode Sequence is ENABLED the Primary and secondary fields appear and must be specified.

Valid entries is in the range Dec1 - Dec8.
Defaults: Dec1.

Constraints:

Decode Primary:

Referenced decode sequence must be defined.

This option must be defined if either Received Squelch Monitor 1 or Monitor 2 Squelch are set to SELECT 5.

Decode Secondary

Referenced decode sequence must be defined.

This option can only be defined if the Decode primary is defined.

To disable this option set this field to the same value as the Decode Primary field.

6.2.3.21. Receive Squelch

The radio is capable of detecting three types of signalling: Carrier, PL, and Select 5. It is not possible for the radio to detect either PL or Select 5 unless carrier has already been detected. Programmable squelch settings determine what signalling the radio must detect if it is to unmute.

> ***Note:*** *Possible Squelch Transitions when Auto Reset Mode is entered indicates how the radio squelch may be affected by entry into Auto Reset mode. The general rule is that Auto Reset defeats Tone Squelch and optionally PL squelch. Section Auto Reset should be consulted for more details on Auto Reset.*

Available Selections are:

OPEN:
The radio is always unmuted.

CARRIER:
The radio will unmute if carrier is detected on the channel.

SELECT 5:
The radio will unmute if a correct select 5 decode sequence is received.

PLH:
The radio will unmute while the PL decode frequency is detected.

PL + SELECT 5:
The radio will unmute if the correct PL frequency and Select 5 decode sequence are detected together.

Default: CARRIER SQUELCH.

Constraints:

PL or PL + SEL 5 cannot be selected if PL decode is DISABLED.

SELECT 5 squelch cannot be selected unless a Primary Decode Sequence is defined.

6.2.3.22. Monitor 1 Squelch

The Squelch setting for each channel when in monitor mode can be defined here

Available selections are: OPEN, CARRIER, PL, SELECT 5, PL + SEL 5. Default: OPEN.

Constraints:

PL or PL + SEL 5 cannot be selected if PL decode is DISABLED.

SELECT 5 squelch cannot be selected unless a Primary Decode Sequence is defined.

6.2.3.23. Monitor 2 Squelch

The Squelch setting for each channel when in monitor mode can be defined here.

Available selections are: OPEN, CARRIER, PL, SELECT 5, PL + SEL 5. Default: OPEN.

Constraints:

PL or PL + SEL 5 cannot be selected if PL decode is DISABLED.

SELECT 5 squelch cannot be selected unless a Primary Decode Sequence is defined.

6.2.3.24. PTT Key(up) Option

The following mutually exclusive options programmable per channel will determine when the keyup telegram is transmitted.

Available selections are:

ALWAYS: The telegram will be sent every time the PTT is pressed.

SINGLE: The telegram will be sent on depression of the PTT if the radio is either not in Auto Reset mode, or is in Auto Reset mode but the PTT telegram has not yet been sent. The intention being that the sequences will only be sent when an attempt is made to initiate a call and not during or in response to a call. Note that the second case above caters for the situation whereby Auto Reset mode is entered via the Forced Monitor feature.

REPEAT: The telegram is encoded at intervals while the radio is transmitting. A "repetition timer", maintained by the radio, will be started whenever the telegram is sent. If PTT is pressed, the telegram will be sent if either, the timer is not running (either because it has not been started or because it has already expired), or if the time remaining

before the timer is due to expire is less than a specified threshold (the Repetition Threshold). In the latter case the outstanding timer will be cancelled and a new timer started. The telegram will also be sent if the PTT is in the pressed position when the timer expires.

Entry to Monitor Operation will stop the timer. Hence the user will be able to force the sending of the telegram on the next PTT press by tapping the monitor button (provided Monitor Operation is enabled).

NEVER: The PTT Keyup option is not used.

Default: NEVER.

Constraints:

This field will only be displayed when Rx Only is DISABLED.

A telegram must be specified (see PTT Keyup Telegram) for any option other than NEVER.

6.2.3.25. PTT Key(up) Telegram

Various options (see PTT Keyup Option) can be selected to determine when the telegrams are sent. If no sequence is specified for the PTT button on a given channel then the PTT button will still key the transmitter.

Valid entries are in the range Tgm1 - Tgm16.
Default: Tgm1.

Constraints:

If the PTT Keyup Option is anything other than NEVER then a telegram must be reference here.

Referenced telegram must be defined.

6.2.3.26. PTT Dekey & PTT Dekey Telegram

Select 5 PTT dekey telegrams are supported per channel. Various options (see PTT Keyup Option) can be selected to determine when the telegrams are sent. The dekey telegram can be enabled per channel and, if enabled, will be sent just before the radio stops transmitting.

If no sequence is specified for the PTT button on a given channel then the PTT button will still key the transmitter. The default for PTT Dekey is DISABLED. If PTT Dekey is ENABLED the PTT Dekey Telegram field appears and must be specified.

Valid entries are in the range Tgm1 - Tgm16.
Default: Tgm1.

Constraints:

PTT Dekey:

This field will only be displayed when Rx Only is DISABLED.

PTT Dekey Telegram

Telegram must be defined before it can be referenced.

6.2.3.27. Call1, Call2, Call3, & Call1, Call2, Call3 Telegrams

Three separate Select 5 call telegrams can be programmed per channel. If one or more of the side buttons is configured as a call then the corresponding call telegram will be encoded when the side button is pressed. If the side button is pressed but the transmit admit criteria are not met then the Side Button Error tone will be given until the side button is released. The defaults for Call1, Call2 and Call3 are DISABLED. If ENABLED, the Telegram field(s) will appear and must be specified.

Valid entries are in the range Tgm1 - Tgm16.
Defaults: Tgm1.

Constraints:

Call1, Call2, Call3:

These fields will only be displayed when Rx Only is DISABLED.

Call1 Telegram:

If either the Side Button 1 or MIC Button 1 is assigned the CALL1 function then the CALL1 telegram must be referenced here.

If Authorisation Request is enabled then a telegram must be referenced here.

Telegram must be defined before it can be referenced.

Call2 Telegram:

If either the Side Button 2 or MIC Button 2 is assigned the CALL2 function then the CALL2 telegram must be referenced here.

Telegram must be defined before it can be referenced.

Call3 Telegram:

If either the Side Button 3 or MIC Button 3 is assigned the CALL3 function then the CALL3 telegram must be referenced here.

Telegram must be defined before it can be referenced.

6.2.3.28. Auto Reset

The Auto Reset feature is generally used with Select 5 signalling systems, but is also applied to PL and may be enabled on a per channel basis. After receiving, or initiating a Select 5 call, the radio remains in Carrier Squelch, (or PL Squelch, if PL Decode is enabled for the chan-

nel). In addition it is possible to specify that PL Squelch is defeated during the Auto Reset Mode, until the Auto Reset Time has elapsed. Several Modes of Auto Reset can be selected for the radio.

Available selections are:

DISABLED
If Auto Reset is disabled, the radio will revert to Select 5 Squelch ("+" PL if enabled) immediately after the incoming Select 5 Call alert has been sounded, or a transmission is completed.

OVERRIDE
Detection of carrier within the Auto Reset period will reset the timer which will start again when the carrier is lost. Transmission by the radio will similarly reset the timer (e.g. PTT, Call).

INDEPENDENT
Detection of carrier within the Auto Reset period will not affect the Auto Reset Timer. On expiry of the timer the radio will "auto reset".

> ***Note:*** *for both of the above modes, assuming Monitor Operation has been enabled for the channel (see Channel Definitions), the radio can be manually reset to Select 5 Squelch by pressing the Monitor Button.*

MANUAL
The radio will remain in the Auto Reset mode until the Monitor Button is pressed.

Default: DISABLED.

Constraints:

If Privacy Deauthorise is ENABLED then Auto Reset cannot be DISABLED.

A Monitor button must be configured before the MANUAL option can be selected on this field.

6.2.3.29. Forced Monitor

This option forces the user to monitor the channel for any incoming signal before allowing transmission (including Select 5 Encode). This prevents the user from interrupting other conversations.

The radio will then be allowed to transmit, regardless of whether there is an incoming carrier, unless Transmit Inhibit has been enabled.

If the user has already pressed the Monitor Button, then the Forced Monitor feature will be disabled until the radio has Auto Reset to coded squelch.

Forced Monitor causes the radio to sound the Side Button Error alert if an attempt is made to key the radio through PTT, Call, or Call Revert while the radio is not in Auto Reset Mode. On release of the relevant button Auto Reset will be started. When in Auto Reset Mode the radio will be carrier squelched (may be PL squelched depending on the state of PL override), this allows the user to monitor the channel for any activity. Once in the Auto Reset Mode any subsequent attempt to key the radio will cause the radio to transmit (subject to Transmit Admit Criteria).

Forced Monitor will not have any affect if the radio is in a monitor state when an attempt is made to keyup the radio.

As per radio options (see Misc Screen) it can be defined if Forced Monitor is applied always or only if the channel is busy i.e. carrier is present and if the Forced Monitor Side Tone Alert should be sounded.

Available selections are ENABLED, DISABLED.
Default: DISABLED.

Constraints:

This field will only be displayed when Auto Reset is ENABLED.

This field cannot be ENABLED if Privacy Enable is ENABLED.

6.2.3.30. Privacy

This function prevents the user from monitoring or talking on the channel, until he is authorized by the infrastructure.

Available selections are ENABLED, DISABLED.
Default: DISABLED.

Constraints:

Primary decode sequence must be defined before this feature can be ENABLED.

This field will only be displayed if Forced Monitor is DISABLED.

6.2.3.31. Privacy Deauthorize

If the Privacy option is enabled this option, if enabled, will deauthorize the radio.

Available selections are ENABLED, DISABLED.
Default: DISABLED.

Constraints:

If this option is enabled then Auto Reset cannot be disabled.

6.2.3.32 Privacy Request

If the Privacy Option is enabled the Call1 button will encode a Call1 telegram.

Available selections are ENABLED, DISABLED.
Default: DISABLED.

Constraints:

A Call1 Telegram must be defined before this feature can be enabled.

6.2.4. Scan

At the MAIN Menu press **F4**, **F3**, **F5**

```
MOTOROLA Radio Service Software                Space Available xx %
<Radio Name>    Model: <Model Number>   Scroll to Select Choice.
                RSS Vers.: Dxx.xx.xx
...CHANNEL DEFINITIONS:SCAN

Scan Sequence ID : Sca1

Sweep Time (Secs).....6          Channel List Length.....nn
Reset Time (Secs)..... 4
Priority Timer (mSecs) ..... 791        Channel List
Acknowledge ..... ENABLED
CSQ Only ..... ENABLED                   1   5   9   13
Talkback ..... ENABLED                   2   6   10  14
LED ..... ENABLED                        3   7   11  15
Current Channel ..... INCLUDED           4   8   12
Priority Channel .....ENABLED

 F1     F2      F3      F4      F5      F6   F7   F8   F9   F10
HELP   ADD     PREV    NEXT    DELETE                     EXIT
       SCAN    SCAN    SCAN    SCAN
```

Scan Screen

The Scan feature causes the radio to search through a predefined list of channels looking for a condition that will cause the radio to unmute on the channel.

Up to four Scan Lists, with the IDs Sca1-Sca4, may be defined per radio. Each scan list may contain up to 16 channels. Channels may be included in the scan list more than once. This can be used to increase the scanning priority of a channel because it will be scanned more frequently than other channels which are entered only once in the scan list. The channels will be scanned in the order that they appear in the scan list.

> ***Note:*** *Read the list in column order not row order.*

This screen allows the user to configure each scan list as required so that they can be referred to when configuring the per channel information in the Channel Definitions screen.

Scan is activated by pressing either the Scan button on the keypad or by switching the channel selector to an Auto Scan channel.

Having landed on a channel the radio will either go into "sweep" mode or "listen" mode – programmable per scan list.

The **CurUp** and **CurDn** keys are used to scroll through the available selections in the fields.

Scan Lists can be **added (F2)** or **deleted (F5)**. If the cursor is on an existing, defined scan ID and the **F2 add** function key is pressed, then the new scan ID will be created with the contents of this scan ID. If no scan IDs are defined then the new scan ID will be created with default values. Deleting channels by pressing **F5** can only be performed on the last displayed scan ID, attempting to delete scan ID before the last scan ID will result in an error message being displayed.

Pressing the **F4** NEXT SCAN lists key will allow the user to go to the next scan list and pressing **F3** will take the user to the PREVIOUS SCAN list.

6.2.4.1. Scan Sequence ID

The ID field is not editable, but used to navigate the user through the defined scan lists.

Available selections are: Sca1 - Sca4.

6.2.4.2. Sweep Time

In sweep mode (entered if Sweep Timer is set to zero) the radio starts the timer and will recommence scanning when the unmute condition is lost or the sweep timer expires.

However, if the radio is selectively called with a Select 5 sequence it will go into "listen" mode regardless of whether sweep has been specified for the scan list.

Valid entry is in the range 0 - 31.5 secs.
Default: 6 secs.

6.2.4.3. Reset Time

In listen mode the radio operates in the same way as Auto Reset Carrier Override, except that it will use the Scan Reset time (programmable per scan list) instead of the Auto Reset time. I.e. when in Listen mode, Auto Reset operation will be modified such that it will operate Auto Reset Carrier Override regardless of the Auto Reset mode setting for the channel and the duration of the Auto Reset Timer will be modified to be the Scan Reset time (see Auto Reset).

> ***Note:*** *That the Auto Reset option to defeat PL will not be applicable to Scan Reset.*

While the radio is landed on a channel it will be possible to enter Monitor Mode 1 in the normal way (provided Monitor Operation is enabled for the channel.

The radio will remain on the channel while in Monitor Mode 1 i.e. it will not recommence scanning until monitor is exited. On exit from monitor the radio will recommence scanning immediately. Thus the user will be able to extend the time that the radio stays on a channel by monitoring and be able to manually cause the radio to recommence scanning by tapping the monitor button.

Scanning is terminated by pressing the Scan key or by changing the channel selector switch. The radio will remain on the channel indicated by the channel selector switch.

Valid entry is in the range 0 - 31.5 secs.
Default: 4 secs.

6.2.4.4. Priority Timer

The Priority timer defines the frequency at which the radio will check the Priority channel while scanning

Valid entry is in the range 0 - 16.8 secs.
Default: 791 msecs.

Constraints:

A Priority Channel cannot be specified if the Current Channel field is enabled and there are 15 channels in the Channel List.

6.2.4.5. Acknowledge

If enabled, the acknowledge option will activate auto acknowledge if the radio decodes a selective call sequence for a channel that is being scanned. Acknowledge may be enabled and disabled per scan list.

Available selections are ENABLED, DISABLED.
Default: DISABLED.

6.2.4.6. CSQ (Carrier Squelch Override) Only

For a given scan list it will be possible to specify that the radio operate Carrier Squelch scan. In this case the radio will ignore the unmute condition required by the channels and instead scan for the presence of carrier. If carrier is detected the radio will "land" on the channel and unmute (regardless of Receive Squelch setting).

Available selections are ENABLED, DISABLED.
Default: DISABLED.

Constraints:

If the channel list contains any channels that have authorization

ENABLED and the receive squelch is set to CARRIER, the CQS Only should be set to DISABLED.

6.2.4.7. Talkback

While the radio is landed on a channel the operator will optionally be able to "talk back" by using the PTT button. For channels with PL Encode, PL will be encoded whilst the radio is keyed. "Talkback" while in Sweep mode will cause the radio to go into Listen mode on release of the PTT.

Available selections are ENABLED, DISABLED.
Default: ENABLED.

6.2.4.8. LED

Scanning LED indication may be defined per scan list. If enabled, Scanning LED indication will be given while scanning. When scan lands on a channel then the Channel Busy LED indication will be given while carrier is detected.

Available selections are ENABLED, DISABLED.
Default: ENABLED.

6.2.4.9. Current Channel

For each list it will be possible to specify that the "Current Channel" be included in the scan, i.e. the channel from which scan was initiated.

Available selections are INCLUDED, EXCLUDED.
Default: INCLUDED.

Constraints:

Specifying a valid channel number in this field will reduce the maximum number of channels that can be defined in the Channel List by 1.

6.2.4.10. Priority Channel

One of the channels in the Scan List may be designated a Priority Channel. The radio will check the priority channel for the presence of carrier while checking each of the other channels in the list and also periodically while receiving on a "landed" channel. If carrier is present on the Priority Channel the radio will stay on the channel and look for any other condition required for the radio to unmute. The Priority Channel alert will be sounded when the radio detects the unmute condition.

Available selections are: ENABLED, DISABLED.

Default: ENABLED .

Constraints:

When the option is ENABLED then the first channel in the channel list will be used as the priority channel.

6.2.4.11. Channel List Length

A Channel List consists of up to 16 channels to be scanned. This field allows the user to define the number of channels in the scan list.

Valid entry is in the range 1 - 16.
Default: 1.

Constraints:

If the Current Channel and Priority Channel fields contain a valid channel number, then the Channel List will be limited to 15 if one is defined or 14 if both are defined.

6.2.4.12. Channel List

The Channel List consists of up to 16 channels. This field allows the user to define the channel list.

The number of channels displayed will depend on the number of channels specified in the Channel List Length field.

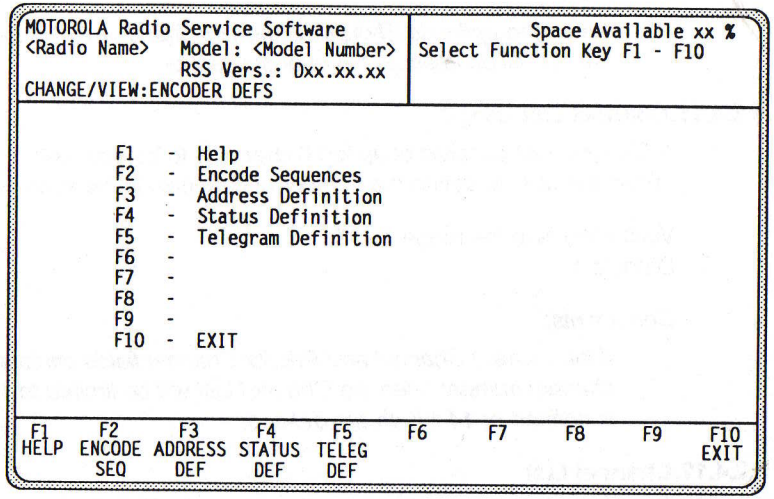
Constraints:

If the Current Channel field contains a valid channel number, then the Channel List will be limited to 15.

If the Priority Channel option is ENABLED then the first channel in the list shall be used as the Priority Channel.

6.3. ENCODER DEFINITIONS

At the MAIN Menu press **F4**, **F4**

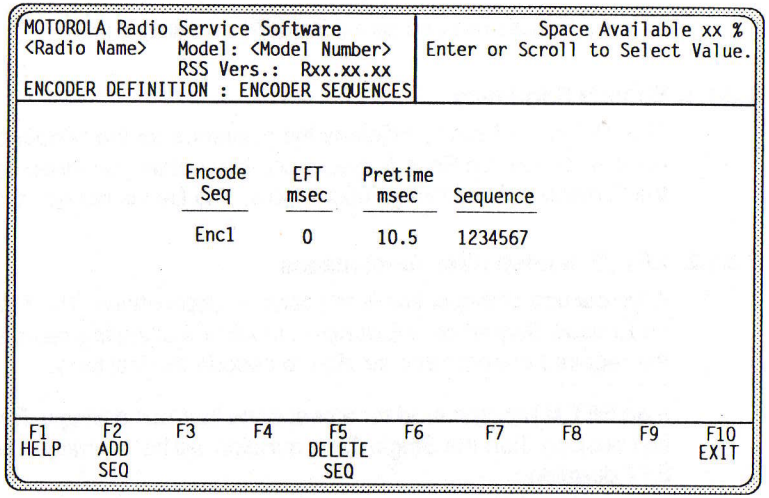


Encoder Definitions screen

> ***Note***
>
> *In order to access the Address Definition screen Select Button 2 must be set to ADDRESS SELECTION.*
>
> *In order to access the Status Definition screen Select Button 3 must be set to STATUS SELECTION.*

6.3.1. Encode Sequences

At the MAIN Menu press **F4**, **F4**, **F2**



Encode Sequences screen

This table is used to define up to 16 unique Encode Sequences, which can then be accessed on a per channel basis via PTT, Call 1, Call 2, Send Key and Auto Acknowledge.

The Signalling Standard which will be used for a sequence is that which has been defined for the particular channel.

If the cursor is on an existing, defined encode sequence and the **F2 add** function key is pressed, then the new encode sequence will be created with the contents of the existing one. If no sequence is defined then the new encode sequence will be created with default values. Deleting channels by pressing **F5** can only be performed on the last displayed sequence, attempting to delete encode sequence before the last encode sequence will result in an error message being displayed.

Constraints:

If Address Selection is ENABLED then ENC1 mus be defined.

If Status Selection is ENABLED then ENC2 must be defined.

Referenced telegrams cannot be deleted.

The 16 telegrams which can be configured for the radio is split in two screens of eight each. Use the **PgUp/PgDn** keys to select which eight telegrams are to be displayed on the screen.

Encode Sequences can be **added (F2)** or **deleted (F5)**.

6.3.1.1. Encode Sequence

The ID, Enc1 - Enc16, indicates the reference for the sequence, and is used whenever an Encode Sequence is required (i.e. when setting up the "Selective Call Configuration" table. The field is not editable.

6.3.1.2. EFT (Extended First Tone) msecs

A typical use of this option is in scanning applications. The First Tone of an Encode Sequence is Extended, to allow a scanning radio to reach the required channel and be able to decode the first tone.

If an EFT is programmed for a sequence that has a Single Tone in its first position then the Single Tone duration will be overridden by the EFT duration.

> ***Note:*** *When this field is left blank, the appropriate duration (as defined in the Signalling Standard or Single Tone Definition) will be used.*

Valid entry is in the range 8.24 - 2101.2 msecs.
Default: 0 msecs.

6.3.1.3. Pretime

Pretime is the period of unmodulated carrier preceding the transmission of any tone sequence. Pretimes are required for two purposes:

1) To ensure full portable transmit power is reached before tone transmission commences.
2) To set up the receiver circuitry of the repeater or receiving radio units to ensure proper decoding.

A typical Pretime length is 200 ms. The Pretime is always used (inter-sequence delay) - if a sequence of more than 7 consecutive tones is required, then the tones must be split between 2 sequences (see below), and the Pre Time for the second sequence set to 0 ms.

Valid entry is in the range 8.2 - 2101.2 msecs.
Default: 16 msecs.

Constraints:

If data is entered in this field then the Sequence field must be completed before the encode sequence is defined. Failure to complete both fields will result in an error message being displayed and the encode sequence not being defined.

6.3.1.4. Sequence

The encode sequence can be defined as having between 1 and 7 tones.

Valid entry is in the range 0-9 or G (Group Call Tone as defined in the Signalling Standard) or J, K, L, M (previously defined Single Tones) in the required positions for each sequence.

Default: 1234567.

Constraints:

If data is entered in this field then the Pretime field must be completed before the encode sequence is defined. Failure to complete both fields will result in an error message being displayed and the encode sequence not being defined.

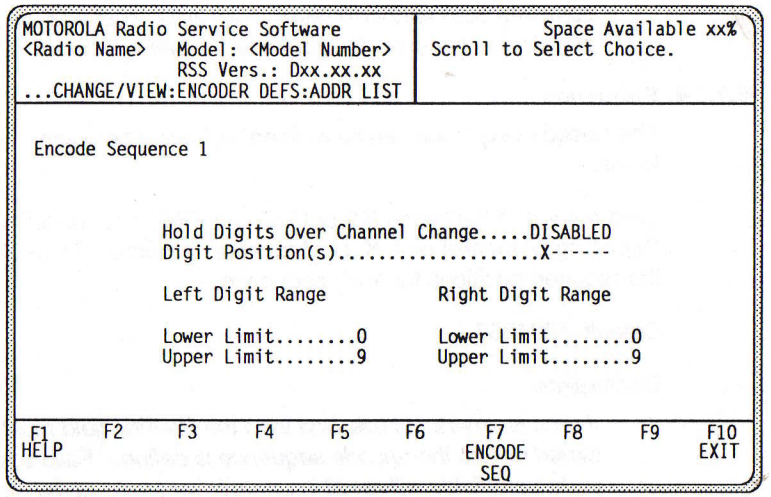
If J, K, L and M are referenced then they must be defined.

A sequence must contain at least one tone.

The sequence length must be greater than the highest "X" position in the Address and Status screen options. This applies only to Enc1 for Address Selection and Enc2 for Status Selection variable digit positions.

6.3.2 Address Definition

At the Main Menu press **F4, F4, F3**



Address Definition screen

This screen allows you to enter the data necessary for specifying the Address Selection data in the radio codeplug

Address Digits may only be defined if there are Variable Positions defined for the sequence.

Each Multicall Sequence will have a programmable maximum limit and minimum limit which determine the range of numbers which may be selected. In addition it is possible to enable group calls in which case combinations including the group call digit will also be selected.

Pressing **F7** take you directly to the previous screen "Encoder sequences".

6.3.2.1. Encode Sequence

This field is used to display the Encode Sequence block number. The field is not editable.

6.3.2.2. Hold Digits Over Channel Change

It is possible for each Multicall sequence to enable Hold Digits Over Channel change. If this option is not enabled then the act of changing the radio channel will cause any entered variable digits to be cleared.

Available selections are ENABLED, DISABLED.
Default: DISABLED.

6.3.2.3. Digit Position(s)

This entry specifies tone positions in an encode sequence where digits are substituted.

An X entered in this field corresponds to the position of the tone to be substituted. The tone sequence is read from left to right, therefore if the third and fifth tones are to be substituted the entered string would be "– – X – X – – ". This assumes that the radio is configured for 7 tone sequences.

Valid field entry is "–" or X.
Default: 9.

Constraints:

Entering Xs beyond the configured tone sequence length will result in an error message.

Entering more than 2 Xs will result in an error message.

For one variable digit selection there must only be one X specified in this field.

X's must be entered in upper case only.

6.3.2.4. Left Digit Range Lower Limit & Upper Limit

These fields specifies the lower and the upper limits on digit 1.

Valid field entries are in the range 0 - 9.
Defaults: 0 for lower, 9 for upper.

Constraints:

The Upper and Lower limit digits must NOT be the same.

The fields will only be displayed when there are two X's in the Digit positions field.

6.3.2.5. Right Digit Range, Lower Limit & Upper Limit

These fields specifies the lower and the upper limits on digit 2.

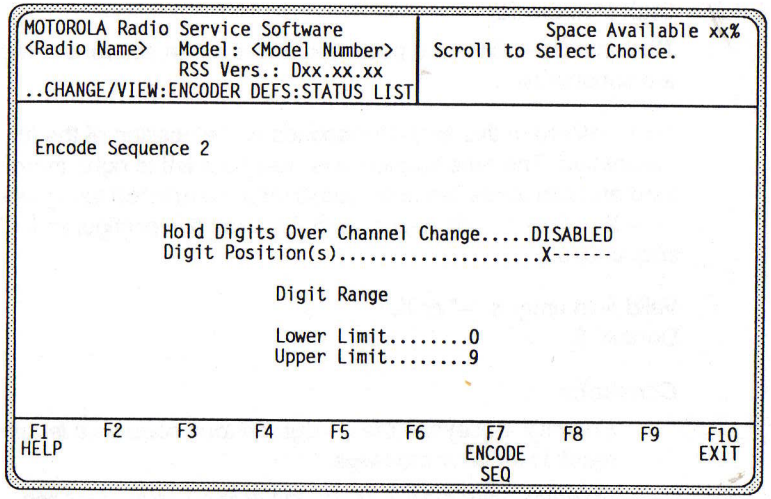
Valid field entry is in the range 0 - 9 or G.
Default: 0 for lower, 9 for upper.

Constraints:

The Upper and Lower limit digits must NOT be the same.

6.3.3 Status Definitions

At the MAIN Menu press **F4, F4, F4**



Status Definitions Screen

This screen gives access to entering the data necessary for specifying the Status Selection data in the radio codeplug

F7 will allow you to edit the encode sequences.

6.3.3.1. Encode Sequence

This field is used to display the Encode Sequence block number only. The field is not editable.

6.3.3.2. Hold Digits Over Channel Change

It is possible for each Multicall sequence to enable Hold digits Over Channel change. If this option is not enabled then the act of changing the radio channel will cause any entered variable digits to be cleared

Available selections are: ENABLED, DISABLED.
Default: DISABLED.

6.3.3.3. Digit Position

This entry specifies tone positions in encode sequence where digits are substituted. Only one location in a sequence can be designated.

An X entered in this field corresponds to the position of the tone to be substituted. The tone sequence is read from left to right, therefore if the fifth tone is to be substituted the entered string would be "– – – – X – –". This assumes that the radio is configured for 7 tone sequences.

Valid field entry is "–" or X.
Default: X – – – – – –.

Constraints:

Entering an X beyond the configured tone sequence length will result in an error message.

Entering more than 1 X will result in an error message.

X's must be entered in upper case only.

6.3.3.4. Digit Range Lower Limit & Upper Limit

These fields specifies the lower and upper limits on the status digits.

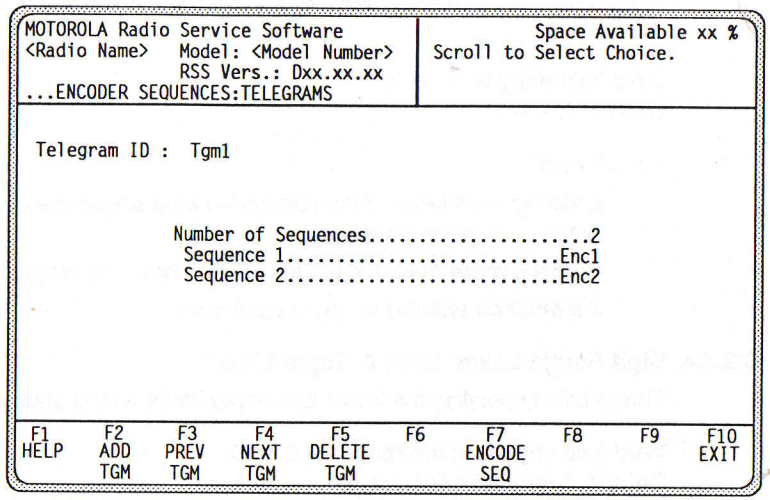
Valid field entry is in the range 0 - 9 or G.
Default: 0 for lower, G for upper.

Constraints:

The Upper and Lower limit digits must NOT be the same.

6.3.4. Telegram Definition

At the MAIN Menu press **F4**, **F4**, **F5**



Telegram Definition Screen

This screen allows you to designate Encode sequences to the defined telegrams.

Telegrams can be **added (F2)** or **deleted (F5)**. Deleting telegrams can only be performed on the last displayed telegram. Attempts to delete telegrams before the last telegram will result in an error message being displayed.

Pressing the **F4** NEXT TELEGRAM key will display the next telegram and pressing the **F3** PREVIOUS TELEGRAM will take you to the previous telegram.

F7 will allow you to edit the Encode Sequences. Press **F10** to return to the Telegram Definitions screen.

6.3.4.1. Telegram ID

This field is used to display the Telegram ID, Tgm1 - Tgm16. The field in not editable.

6.3.4.2. Number of Sequences

This field specifies the number of sequences to be defined in the radio.

Available selections are: 1, 2 or 3.
Default: 1.

6.3.4.3. Sequences 1, 2, 3

Enter the reference ID of the Encode Sequence which is to be included in the telegram.

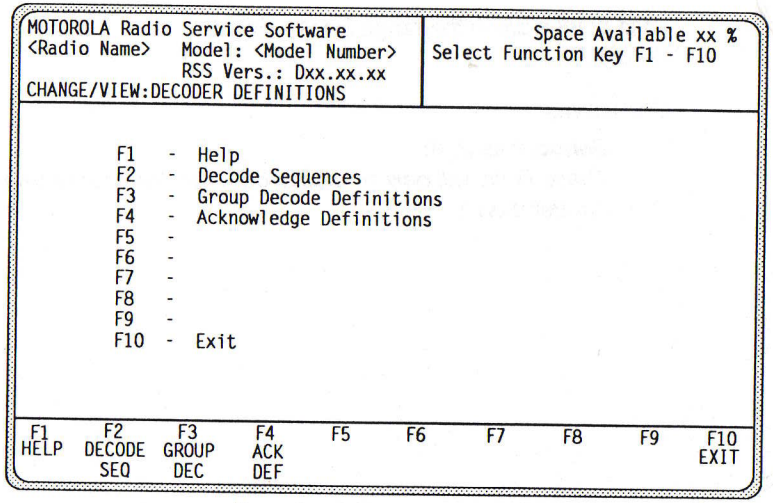
Valid entries are in the range Enc1 - Enc16.
Default Enc1.

Constraints:

Sequences 2, 3:
These fields will only be displayed when Number of Sequences is greater than 1.

6.4. DECODER DEFINITIONS

At the MAIN Menu press **F4**, **F5**

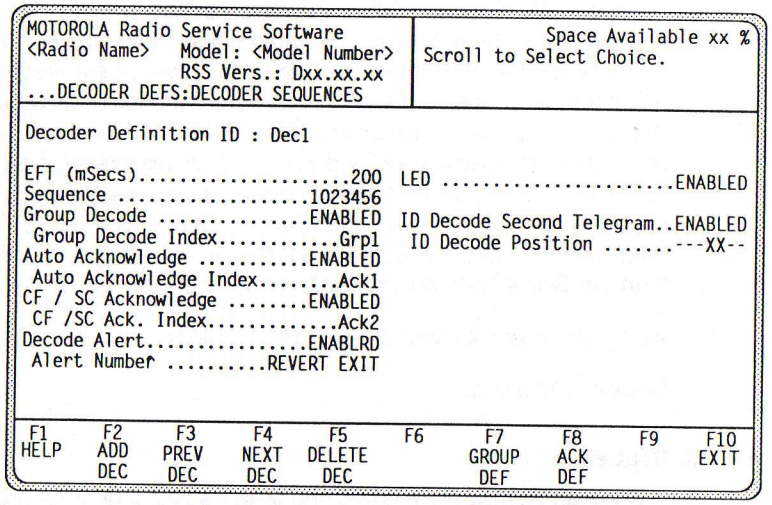


Decoder Definitions Screen1

This screen gives access to define all the radio decoder related option subset of the complete radio's feature set.

6.4.1. Decode Sequences

At the MAIN Menu press **F4**, **F5**, **F2**



Decoder Sequences Screen

CurUp and **CurDn** are used to scroll through available selections in the fields.

Decoder definitions can be **added** (**F2**)or **deleted** (**F5**). Deleting a decoder definition can only be performed on the last displayed definition. Attempts to delete decoder definitions before the last definition will result in an error message being displayed.

Pressing the **F4** NEXT DECODER key will display the next decoder ID and pressing the **F3** will take you to the previous ID

F7 allow you to edit the Group Decoder Definitions and **F8** will allow you to edit the Acknowledge Definitions. Press **F10** to return to the Telegram Definitions screen.

6.4.1.1. Decoder Definition ID

This field is used to display the Decode Sequence ID only. The field is not editable.

6.4.1.2. EFT (Extended First Tone) Time

A typical use of this option is in scanning applications. The First Tone of an Encode Sequence is Extended, to allow a scanning radio to reach the required channel and be able to decode the first tone. The

maximum first tone decode duration should typically be set to around 50 ms more than the equivalent Encode Sequence EFT, to ensure robust system operation. The minimum first tone decode duration is as defined in the Signalling Standard. When a tone from the decode sequence has been detected the radio will set a timeout for the receipt of the next tone in the sequence (so as to prevent false recognition e.g. if the tail of one sequence and the start of another matched its decode sequence). To accommodate different first tone lengths it will be possible to specify an EFT duration which will extend the length of the timeout for the second tone of the sequence. It will be possible to specify an EFT duration for each decode sequence. If an EFT is programmed for a sequence that has a Single Tone in its first position then the Single Tone duration will be overridden by the EFT duration.

Valid entry is in the range 8.24 - 2101.2 msecs.

Default: 197 msecs.

6.4.1.3. Sequence

Each channel may have none, one or two select 5 decode sequences specified. The decode sequence can consist of 1 - 7 tones. A maximum of 8 decode sequences may be defined subject to the available codeplug space.

Valid entry is in the range 0-9 or G (Group Call Tone as defined in the Signalling Standard) or J, K, L, M (previously defined Single Tones) in the required positions for each sequence.

Default: 1234567.

Constraints:

J, K, L and M must be defined before they can be referenced.

If ID Second Sequence is DISABLED then the number of tones defined in this field must be greater or equal to the position in the ID Decode Mask.

6.4.1.4. Group Decode & Group Decode Index

Group Call decode allows a number of portables to be simultaneously called as a group - this is in addition to the individual call function.

This option enables the user to enable/disable group decode for current decode sequence. Each decode sequence may reference one of 8 pre-defined group decode definitions using the group decode index.

If the Group Decode option is ENABLED the "Group Decode Index" field will appear on the screen to be specified.

Valid entry is in the range Grp1- Grp8.
Default: Grp1.

Constraints:

Group Decode Index:

Selected Group IDs must be already defined in section "Group Decode Definitions". Entering group IDs that are not defined will result in an error message being displayed.

6.4.1.5. Auto Ack(nowledge), CF / SC Ack(nowledge) & Indexes

Auto Acknowledge (AA), Call Forward (CF), and Secondary Call (SC) are all features which cause the radio to transmit a telegram in response to receiving an Individual call.

It is possible for the radio to transmit both an AA and CF or an AA and SC telegram in response to an individual decode.

All three features support Acknowledge Delay, and Acknowledge Revert Channel as described below.

Auto Acknowledge
The Acknowledge telegram will always be sent in reply to an Individual call

Secondary Call
Is intended to be enabled when a user is away from his radio. If the radio is then called the acknowledge sequence will be transmitted, possibly to a pager.

Call Forward
Is intended to be enabled when the user is away from his radio and wishes any calls to be passed onto a portable that he is carrying. CF will reply with the Acknowledge telegram.

If either of the options are enabled the "Auto Ack Index" and/or the "CF/SC Ack Index" will appear.

Defaults for Auto Ack and CF/SC Ack are DISABLED. If ENABLED, the Index fields will appear to be specified.

Valid entry is in the range Ack1 - Ack8.
Default: Ack1.

Constraints:

Selected acknowledge IDs must be defined in section "Acknowledge Definitions". Entering acknowledge IDs that are not defined will result in an error message being displayed.

6.4.1.6. Decode Alert & Alert Number

If the Decode Alert option is ENABLED the Alert Number field will appear on the screen. In this field you define the alert to be given when an individual decode sequence is received.

Available selections are POWER UP, KEYPAD ERROR, KEYPAD ACK, SELECT 5 GRP, SELECT 5 IND, TOT PRE ALERT, REVERT ENTRY, REVERT EXIT, SCAN START, PRIORITY CHAN.

Default: SELECT 5 IND.

6.4.1.7. LED

In this column you define the use of Call Reminder LED Indication.

Available selections are ENABLED, DISABLED
Default ENABLED

6.4.1.8. ID Decode Second Telegram

The digits to be displayed by the ID Decode feature may either be taken from the decode sequence itself or from a second sequence immediately following the decode sequence. This option specifies whether the 'ID' is to be taken from the second sequence (ENABLED) or from the decode sequence itself (DISABLED).

Available selections are ENABLED, DISABLED
Default DISABLED

Constraints:

If the option is DISABLED then the decode sequence length must be greater or equal to the highest X-position in the ID Decode Mask.

6.4.1.9. ID Decode Position

In this column you define the Position of the ID Digits in a sequence.

This entry specifies ID Decode positions in decode sequence where digits are decoded.

An X entered in this field corresponds to the position of the digits to be decoded. The tone sequence is read from left to right, therefore if the third and fifth tones are to be substituted the entered string would be "– – X – X – –". This assumes that the radio is configured for 7 tone sequences.

Valid field entry is "–" or X
Default: X – – – – – –.

Constraints:

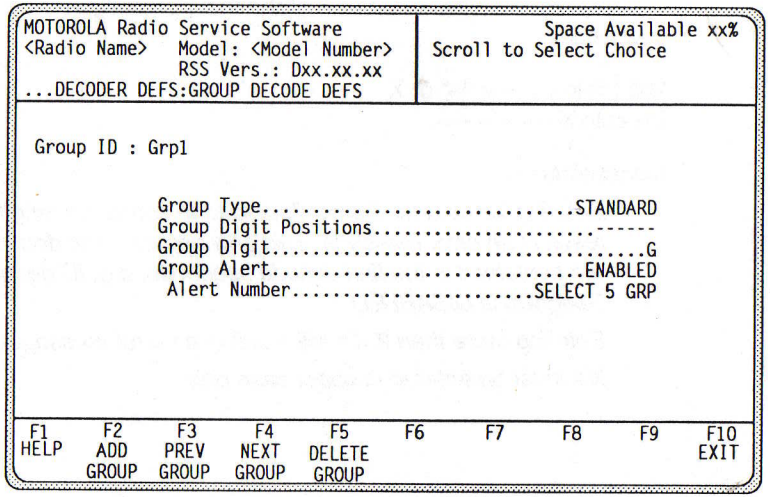
Entering Xs beyond the configured tone sequence length will result in an error message. This only applies if the decode digits are contained in the first decode sequence, e.g. ID decode 2nd Telegram is DISABLED.

Entering more than 2 X's will result in an error message.

X's must be entered in upper case only.

6.4.2. Group Decode Definitions

At the MAIN Menu press **F4**, **F5**, **F3**



Group Decode Definitions Screen

Group Call decode allows a number of portables to be simultaneously called as a group - this is in addition to the individual call function.

CurUp and **CurDn** are used to scroll through available selections in the fields.

Group definitions can be **added** (**F2**) or **deleted** (**F5**). Deleting a group definition can only be performed on the last displayed definition. Attempts to delete group definitions before the last definition will result in an error message being displayed.

Pressing the **F4** NEXT GROUP key will display the next group ID and pressing the **F3** will take you to the PREVIOUS ID.

6.4.2.1. Group ID

This field is used to display the Group ID. The field in not editable.

6.4.2.2. Group Type

Two types of group call are supported, Standard or Expanded, in either case a seven bit group mask indicates Group Positions where group tones are allowed in the sequence.

With Standard Group Call the radio will only decode the group call

sequence if the character, starting at the group call position, is the Group Tone and subsequent tones are alternating Repeat Tone and Group Tones until the end of the sequence.

The Expanded Group Call option allows the decoder to accept the group call tone in any number of non-contiguous positions in the code. With Expanded Group Call, upon detection of a Group call tone the following tone may be either the valid individual tone or (only if group call is enabled for the next tone) the Repeat Tone. Expanded Group Call provides more flexibility in selecting grouping and sub-grouping radios in a system.

Available selections are STANDARD, EXPANDED.
Default: STANDARD.

6.4.2.3. Group Positions

In this column you define the position of the Group Digit in a sequence.

This entry specifies positions in decode sequence where digits are decoded.

An X entered in this field corresponds to the position of the group digits. The tone sequence is read from left to right, therefore if the third and fifth tones are to be substituted the entered string would be "– – X – X – – ". This assumes that the radio is configured for 7 tone sequences.

Valid field entry is "–" or X.
Default: X – – – – – –.

Constraints:

Entering Xs beyond the configured tone sequence length will result in the digits being ignored.

6.4.2.4. Group Digits

It will be possible to specify the tone which is to be used as the Group tone for each group block.

Valid entry is in the range 0 - 9,(any of the standard signalling tones) or G (Group tone) or J, K, L and M (one of the Single tones).

Default: G.

Constraints:

J, K, L and M must be defined if referenced.

6.4.2.5. Group Alert & Group Alert Number

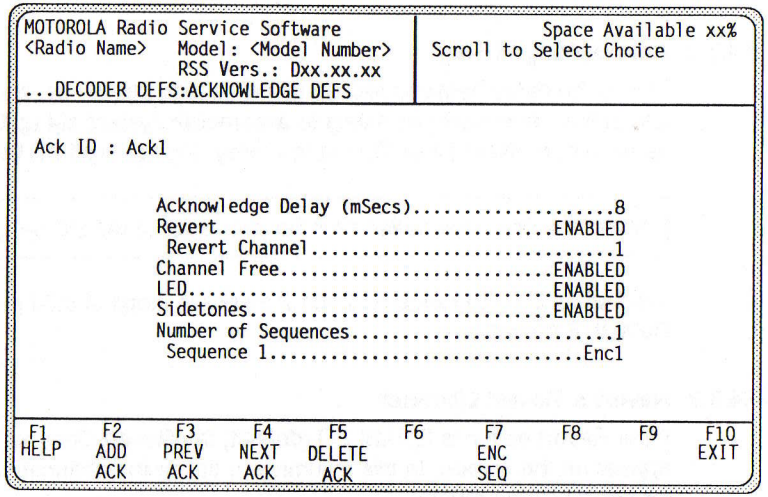
If the Group Alert option is ENABLED (default) the Group Alert Number field will appear on the screen. In this field you define the alert to be given when a group call decode sequence is received.

Available selections are POWER UP, KEYPAD ERROR, KEYPAD ACK, SELECT 5 GRP, SELECT 5 IND, TOT PRE ALERT, REVERT ENTRY, REVERT EXIT, SCAN START, PRIORITY CHAN.

Default: SELECT 5 GRP.

6.4.3. Acknowledge Definitions

At the MAIN Menu press **F4**, **F5**, **F4**



Acknowledge Definitions Screen

Auto Acknowledge causes the radio to transmit a telegram in reply to an individual call. Up to 8 acknowledge definitions blocks can be referenced by any one decode sequence by using the auto acknowledge index.

Constraints:

If Status Selection is ENABLED then ENC2 must be defined.

Acknowledge definitions can be **added** (**F2**) or **deleted** (**F5**). Deleting an acknowledge definition can only be performed on the last displayed definition. Attempts to delete acknowledge definitions before the last definition will result in an error message being displayed.

Pressing the **F4** NEXT ACKNOWLEDGE key will display the next Ack ID and pressing the **F3** will take you to the previous ID. **F7** will allow you to edit the Encoder Sequences. Press **F10** to return to the Decoder Definitions screen.

The **CurUp** and **CurDn** keys are used to scroll through available selections in the fields.

6.4.3.1. Ack(nowledge) ID

This field is used to display the Acknowledge ID. The field is not editable.

6.4.3.2. Acknowledge Delay

This is the delay between receipt of the decode sequence, and activation of the transmitter permitting to accomplish system set up timing, or as maximum delay timer. During the delay any user call will be denied.

> ***Note:*** *the Pre Time defined for the sequence(s) will still be applied.*

Valid entry is in the range 0 - 2101.2 msecs in steps of 8.24 msecs.
Default: 8 msecs.

6.4.3.3. Revert & Revert Channel

If the Revert option is ENABLED (default) the Revert Channel field will appear on the screen. In this column you define the channel number for acknowledge revert.

It will be possible to specify a channel on whose transmit frequency the acknowledge telegram will be encoded. PL will be encoded according to its setting for the revert channel. The revert channel number will be programmable per acknowledge block.

Valid entry is 1 - N (Number of channels configured for the radio).
Default: 1.

6.4.3.4. Channel Free

When this option is selected the radio will transmit the reply as soon as there is no RF carrier on the channel, or when the Acknowledge Delay timer expires, which ever occurs first. If the Acknowledge Revert Channel option is enabled then the radio will check for carrier on the revert channel.

Available selections are ENABLED, DISABLED.
Default ENABLED.

6.4.3.5. LED

This field gives access to programming of the Transmit LED (continuous Red during normal transmission). If enabled the LED will be on while the radio is transmitting unless low battery condition is detected.

Available selections are: ENABLED, DISABLED.-
Default: ENABLED.

6.4.3.6. Side Tones

Independently, per acknowledge block it is possible to disable Side tones which are normally given when the radio performs Auto Acknowledge, Call Forward, or Secondary Call.

Available selections are: ENABLED, DISABLED.
Default: ENABLED.

6.4.3.7. Number of Sequences & Sequences 1, 2, 3

This option allows the user to define the number of encode sequences required in theacknowledge sequence.

Available selections are: 1, 2 or 3.
Default: 1.

Sequences 1, 2, 3

In the Sequences 1, 2 and 3 fields you enter the reference ID of the Encode Sequence which is to form the acknowledge sequence.

Valid entry is in the range Enc1- Enc16.
Defaults: Enc1.

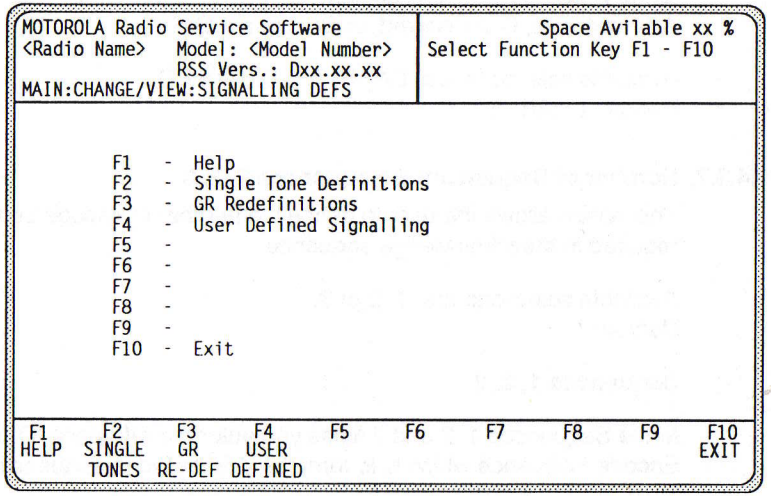
Constraints:

Sequences 2, 3:
These fields will only be displayed when Number of Sequences is greater than 1.

6.5 SIGNALLING DEFINITIONS

At the MAIN Menu press **F4, F6**

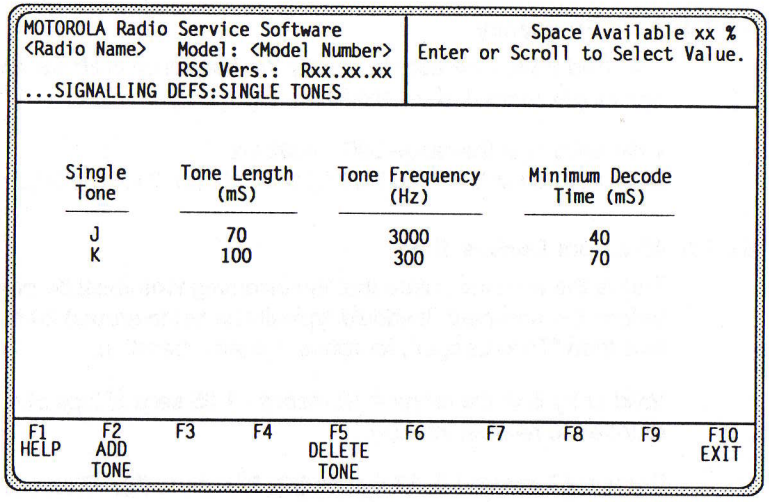
This Menu gives access to defining Single Tones, Redefining standard Group tones and the User Defined Signalling.



Signalling Definitions Screen

6.5.1. Single Tone Definitions

At the MAIN Menu press **F4, F6, F2**



Single Tone Definitions Screen

Single Tones are uniquely defined tones which can be used for accessing Repeater Stations. Up to 4 Single Tones can be defined for the radio, and then used in Encode and/or Decode sequences.

A single tone cannot be deleted if it is referenced from elsewhere in the personality i.e. Encode Sequence, Decode Sequence, Signalling Standard Redefinition Table.

6.5.1.1. Single Tone

The letters J, K, L and M indicate the reference for the Single Tone, for use when defining an Encode or Decode Sequence. The field is not editable.

6.5.1.2. Tone Length

This field indicates the duration for which the corresponding single tone will be encoded and the nominal duration for which the tone will have to be decoded.

Valid entry is in the range 4.12 msecs - 270.0 secs (Steps of 4.12 msecs rounded to nearest integer).

Default: 70 msecs (J), 78 msecs (K), 90 msecs (L), 61 msecs (M).

Constraints:

The value of the field must not be less than that of the Minimum Decode Time (see below).

6.5.1.4. Tone Frequency

This field allows the user to specify the frequency in Hz for each of the four single tones J, K, L, and M.

Valid entry is in the range 300 - 3000 Hz.
Default: 300 Hz (J), 1500 Hz (K), 1800 Hz (L), 2100 Hz (M).

6.5.1.5. Minimum Decode Time

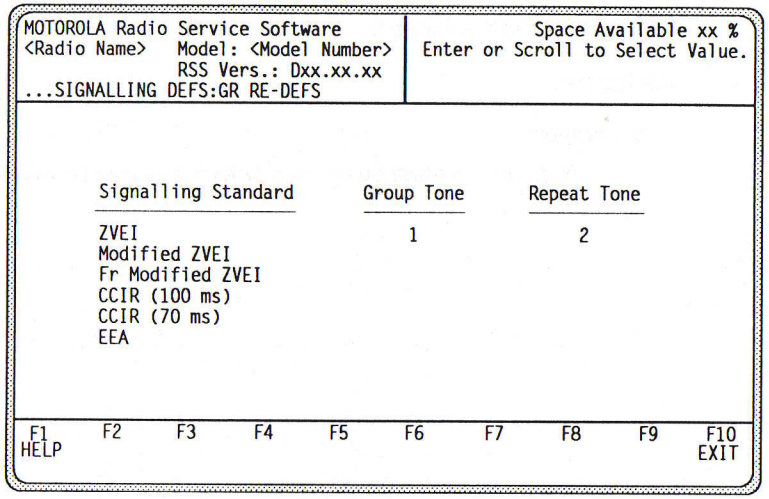
This is the amount of time that the incoming tone must be present before it is accepted. It should typically be set to around 20 to 100 ms less than "Tone Length", for robust system operation.

Valid entry is in the range 4.12 msecs - 1.05 secs (Steps of 4.12 msecs rounded to nearest integer).

Default: 57 msecs (J), 37 msecs (K), 37 msecs (L), 37 msecs (M).

6.5.2. GR Redefinition

At the MAIN Menu press **F4**, **F6**, **F3**



GR Redefinition Screen

This option allows the Group (G) and Repeat (R) tones to be redefined for all Select 5 Signalling Standards.

6.5.2.1. Signalling Standard

This field displays the six standard signalling schemes supported by the radio. The field is not editable.

6.5.2.2. Group Tone

This field specifies the tone that is to be used as the Group Tone when looking for a Group call.

Valid entry is in the range 0 - 9, J, K, L, M, G or R.

Default: G.

Constraints:

J, K, L, and M must be defined before they can be referenced.

6.5.2.3. Repeat Tone

This field specifies the tone that is to be used as the Repeat Tone (used when successive tones in a sequence are identical).

Valid entry is in the range 0 - 9, J, K, L, M, R.

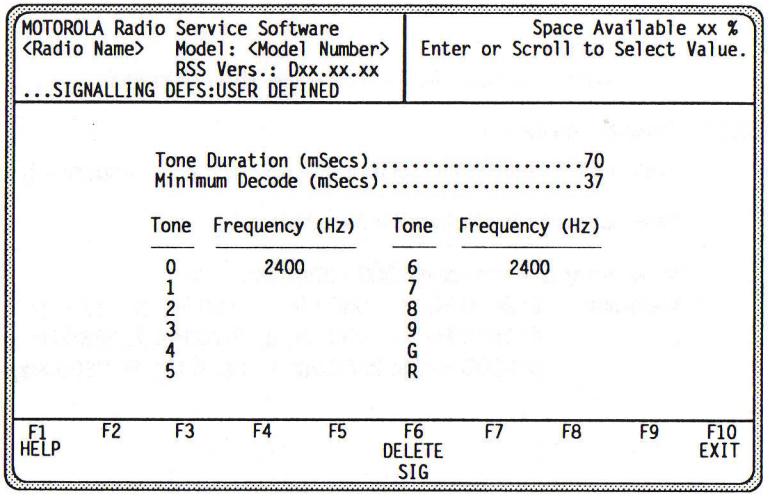
Default: R.

Constraints:

J, K, L, and M must be defined before they can be referenced.

6.5.3. User Defined Signalling

At the MAIN Menu press **F4**, **F6**, **F4**



User Defined Signalling Screen

In addition to the "standard" Select 5 signalling schemes it is possible to program data for "user-defined" signalling schemes into the radio. It will not be possible to de-select this option if Min. Decode Time for User Signalling Std is selected.

6.5.3.1. Tone Duration

This field defines the duration in milliseconds for which tones are to be encoded, and defines the maximum tone duration that will be accepted when decoding.

Valid entry is in the range 4.12 msecs - 270 secs (Steps of 4.12 msecs rounded to nearest integer).

Default: 70.

Constraints:

The value must be greater that the Minimum Decode time.

6.5.3.2. Minimum Decode

This option defines the minimum tone duration that will be accepted during decoding.

Valid entry is in the range 4.12 msecs -1.05 secs (Steps of 4.12 msecs rounded to nearest integer).

Default: 40.

Constraints:

The value must be less than the Tone Duration.

6.5.3.3. Tone & Frequency

This "table" defines the frequency in Hz of the corresponding tone.

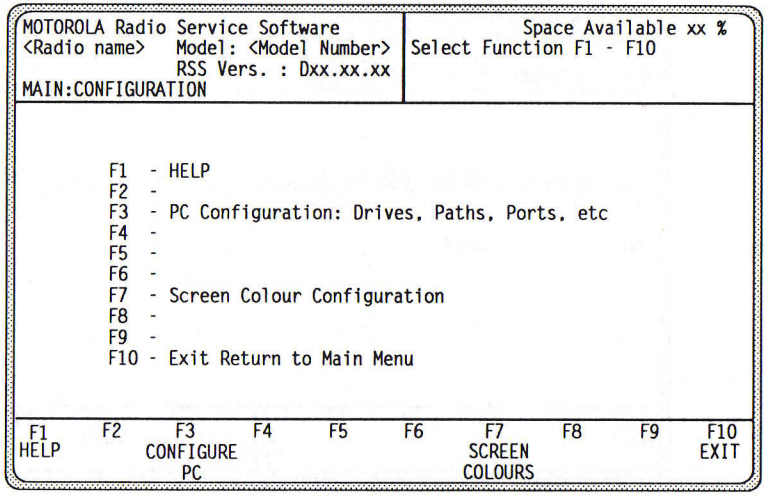
See Appendix for Select 5 tone table.

Valid entry is in the range 300 - 3000 Hz.

Defaults: 0: 2400 Hz, 1: 1060 Hz, 2: 1160 Hz, 3: 1270 Hz,
4: 1400 Hz, 5: 1530 Hz, 6: 1670 Hz, 7: 1830 Hz,
8: 2000 Hz, 9: 2200 Hz, G: 2800 Hz, R: 2600 Hz,

8. SETUP COMPUTER CONFIGURATION

At the Main Menu press **F9.**

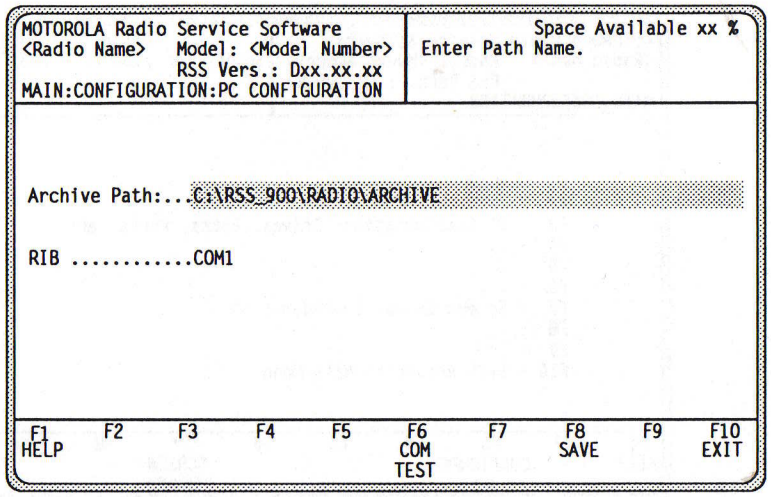


Setup Computer Configuration Screen

The SETUP Computer Configuration screen is used to configure the Radio Service Software to the user's particular application. Default disk drives, communication ports, and even screen colours may be customized to the user's specific needs.

8.1. PC CONFIGURATION

At the MAIN Menu press **F9**, **F3**



PC Configuration Screen

Use the **Tab/Return** key to move from field to field. Having done your selections press **F8** to **SAVE** the configuration. This configuration will now be default every time you use the RSS.

8.1.1. Archive Path

The PC Configuration is used to select the default disk drive paths for Radio Data archive files.
Select the Archive Path by entering the full path name, e.g. to save files to drive C in directory RSS_900 and in subdirectory RADIO and sub-subdirectory ARCHIVE enter:

C:\RSS_900\RADIO\ARCHIVE

Default: Blank entry: the directory where the RSS resides.

8.1.2. COM Test

Pressing the **F6** button will check the communication with the radio.

8.1.3. RIB

This feature allows you to choose the default asynchronous communications port for the computer to which the RIB is connected.

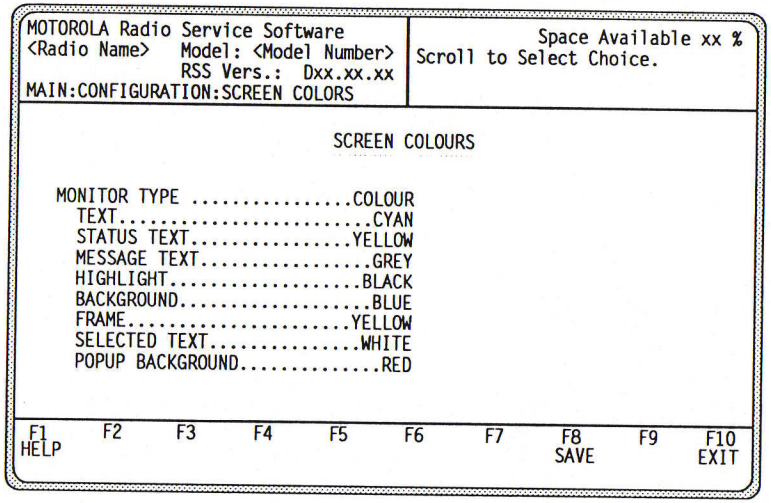
Available selections are COM1, COM2, COM3, COM4
Default: COM1.

8.2. SCREEN COLOUR CONFIGURATION

At the MAIN Menu press **F9**, **F7**

Screen Colour is used to select the type of display monitor that you are using with your computer, that is, Monochrome or Colour.

For proper colour operation, you must have a colour monitor and the appropriate colour display interface card installed in your computer.



Screen Colour Screen

You may also further customize your screen by selecting colours for the screen's TEXT, STATUS TEXT, MESSAGE TEXT, HIGHLIGHT, BACKGROUND, FRAME, SELECTED TEXT, POPUP BACKGROUND.

Use the **CurUp/CurDn** keys to select colours for the individual settings.

Having done your selections press **F8** to SAVE the configuration.This configuration will now be default every time you use the RSS.

APPENDIX A

SELECT 5 SIGNALLING FORMATS

Tone	ZVEI	French Modified ZVEI	Modified ZVEI	CCIR	EEA	70 ms CCIR
1	1060	1060	970	1124	1124	1124
2	1160	1160	1060	1197	1197	1197
3	1270	1270	1160	1275	1275	1275
4	1400	1400	1270	1358	1358	1358
5	1530	1530	1400	1446	1446	1446
6	1670	1670	1530	1540	1540	1540
7	1830	1830	1670	1640	1640	1640
8	2000	2000	1830	1747	1747	1747
9	2200	2200	2000	1860	1860	1860
0	2400*	2400*	2200*	1981*	1981*	1981*
G	2800	885	885	2400	1055	2400
R	2600	970	2400	2110	2110	2110
	70 ms	70 ms	70 ms	100 ms	40 ms	70 ms
* ALSO used for group call in some systems						

APPENDIX B

PL (CTCSS) TONE TABLE

The following lists the PL codes that can be supported by the Programmer, together with their nominal frequencies. It should be noted that the actual frequency generated or decoded may differ from the nominal value, but this will be within acceptable tolerance limits.

FREQ. (Hz)	PL CODE
67	xz
77	xb
88.5	YB
100	1Z
107.2	1b
114.8	2a
123	3Z
131.8	3b
141.3	4a
151.4	5Z
162.2	5b
173.8	6a
186.2	7Z
203.5	m1
218.1	me
233.6	m5
250.3	m7

FREQ. (Hz)	PL CODE
71	xa
82.5	xy
94.8	Za
103.5	1A
110.9	2z
118.8	2b
127.3	3A
136.5	4z
146.2	4b
156.7	5A
167.9	6z
179.9	6b
192.8	7A
210.7	m2
225.7	m4
241.8	m6