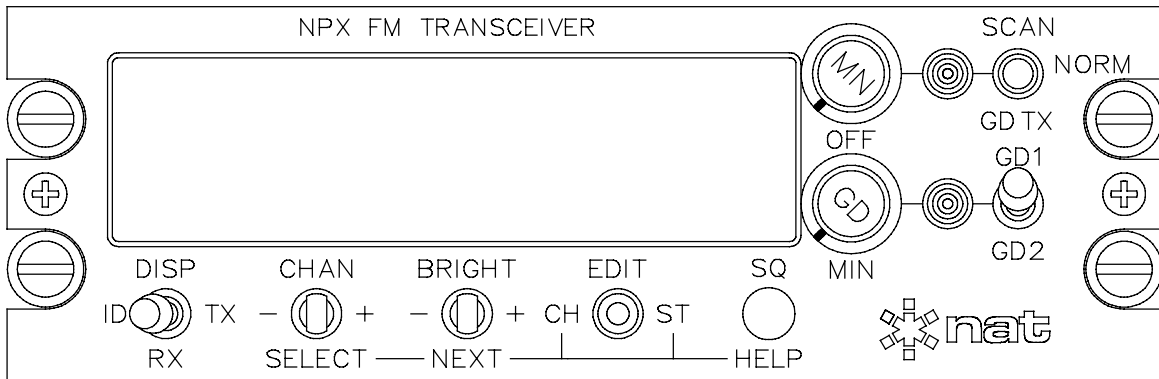




NPX138 Series Panel Mount Radio

Operator's Manual



REV 2.01 March 14, 2003

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1.1 Introduction

This manual contains description and operation information on the NPX138 series of panel mount FM transceivers serial number 1238 and subsequent.

The NPX138 incorporates NAT's proven user-friendly operating system with on-line help, making it easy to program and use. The small size makes this radio ideal for airframes where size and weight are a factor.

1.2 Purpose of Equipment

The NPX138 panel mount FM transceiver is a stand-alone radio designed for the single mission user. It provides all the features needed to satisfy FM communications within the VHF-FM high band.

1.3 Features

The NPX138 covers a frequency range of 138 MHz to 173.995 MHz in 5.0/6.25 kHz increments. Each of the 100 available channels can include a receive frequency and CTCSS tone, transmit frequency and CTCSS tone, and an alpha/numeric identifier.

The use of NAT's DTE12 allows DTMF encoding and direct keyboard programming. A SCAN function allows scanning of selected channels. Transmit power of either 1 watt or 10 watts is selectable from the front of the NPX138. Simplex and semi-duplex operations are available. An optional guard receiver is available with some models.

Conveniently located beside the display are separate main volume, guard volume and transmit select switches. Easily identified along the bottom of the front panel are squelch test, channel up/down and display brightness controls. The aircraft dimmer buss provides control for the panel lighting.

Dependent on model selected the NPX138 can provide wideband (± 5.0 kHz Rated System Deviation) and/or narrowband (± 2.5 kHz Rated System Deviation) by channel. Audio level will not change when mode changes.

1.4 Operation

1.4.1 General

In addition to the general functions that are available on other FM radios, the NPX has several features that extend its capability and make it easier to use. These features include alphanumeric channel labelling, built-in operator help, scanning, optional guard receiver, and numerous others.

For ease of use and operability, NAT uses the same control layout and operating system in the NPX138 series of radios as it does in its popular Tac/Com family of radio control heads.

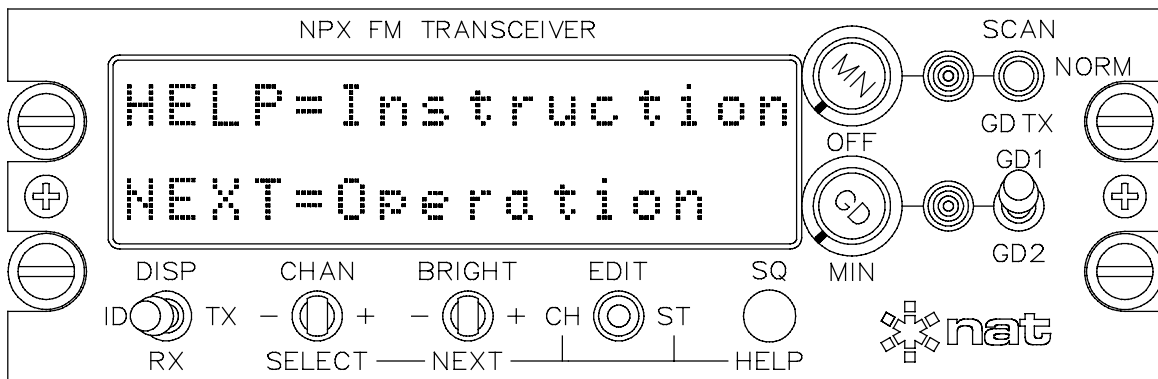
In addition to this manual, there is a help function built into the radio comprehensive enough to address most operational questions.

Many of the front panel controls have more than one function, dependent on the operating mode of the radio. For this reason, they have multiple labels. When the radio is in 'Normal' mode (**EDIT** switch in the centre 'Off' position), use the top label and when the radio is in 'Edit' mode (either 'CH' or 'ST'), use the bottom label.

1.4.2 Initial Operation

1.4.2.1 Power-up Help

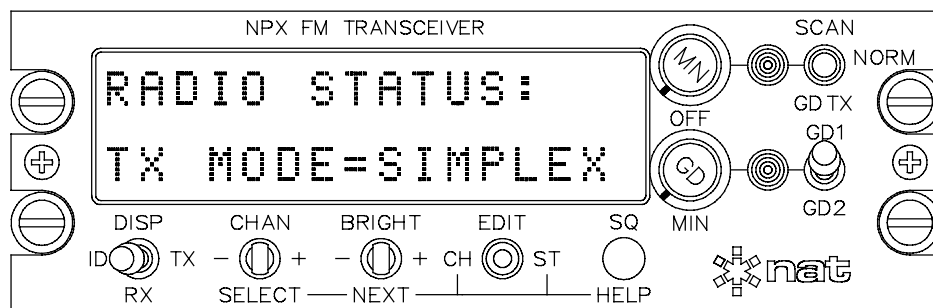
Turn the NPX on by rotating the main volume control clockwise, away from the 'Off' detent position. The software revision number will briefly display, followed by a screen presenting an option for use of the on-line Help system, as shown below.



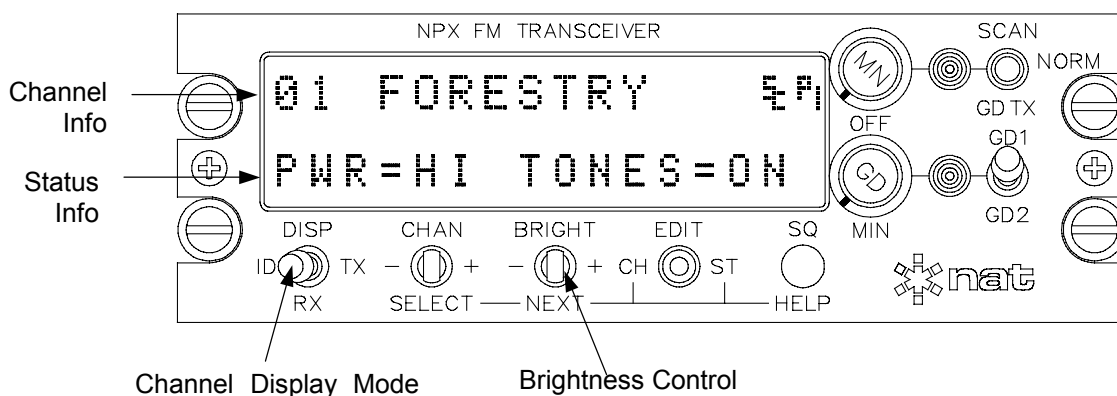
If you push the **HELP** button, the radio will present a tutorial on the operation of the radio. To advance through the tutorial, press **HELP** after reading each screen. To exit this initial **HELP** function at any time, move the **NEXT** switch momentarily left or right.

1.4.2.2 Initial Operating Display

If you decline 'Help' (by using the NEXT switch as directed), the radio is ready for normal operation. Alternatively, an option that displays a summary of the status features and current settings can be enabled at installation (see section 1.4.12).



1.4.3 Display



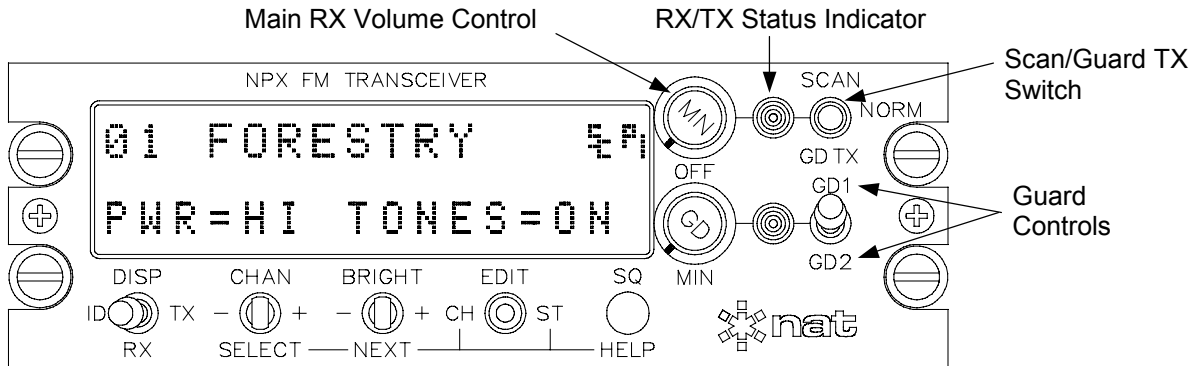
The diagram above shows a typical radio display in 'Normal' operating mode. The upper row of the display contains information related to the currently selected channel. The specific information displayed depends on the setting of the DISPLAY switch located in the bottom left hand corner of the front panel. When it is in the ID position (as shown above), the display shows the channel identifier or name. When it is in the RX or TX position, the display shows the respective receive or transmit information. See section 1.4.6 for further details on the Channel Display.

The lower row of the display contains information related to specific radio functions. Normally, it shows the settings for the power level and the CTCSS tones. However, entering the Status edit mode allows the display of other function settings. See section 1.4.8 for further details on displaying and changing Status information.

The BRIGHT switch controls the brightness of the display text. See section 1.4.5.2 for further details.

1.4.4 Function Controls

The controls located to the right of the display are 'Function' controls. These controls access the radio functions most often used. Access to all other functions is via the status lines (see section 1.4.8 for further details on 'Status Editing').



1.4.4.1 Main RX (Receive) Volume Control

Set this rotary control to the furthest counter-clockwise (ccw) position (past the 'Off' detent) to turn 'off' the radio. Rotating it clockwise will turn 'on' the radio. To increase the volume of the main receiver, turn this knob clockwise; to decrease the volume turn this knob ccw.

1.4.4.2 RX/TX Status Indicator

Next to the main RX volume control is a bi-colour LED indicator that displays the RX (Receive) status of the main receiver and the TX (Transmit) status of the radio. When the radio is transmitting the LED will light green. When the main receiver receives a signal, the LED will light amber. If the radio is idle (not receiving or transmitting), the LED will be dark. The colour-coding used for these functions corresponds to standard aircraft FM radio conventions. It is worth noting that this is the reverse of standard vehicular conventions so may confuse some emergency services staff familiar with land mobile equipment.

The receive indicator (amber) informs the operator that the channel is active with radio traffic of some kind. A radio that is receiving may still not produce any audio if the tones present on the receive signal do not match the tones set in the radio. See section 1.4.9 for further details on how CTCSS tones work.

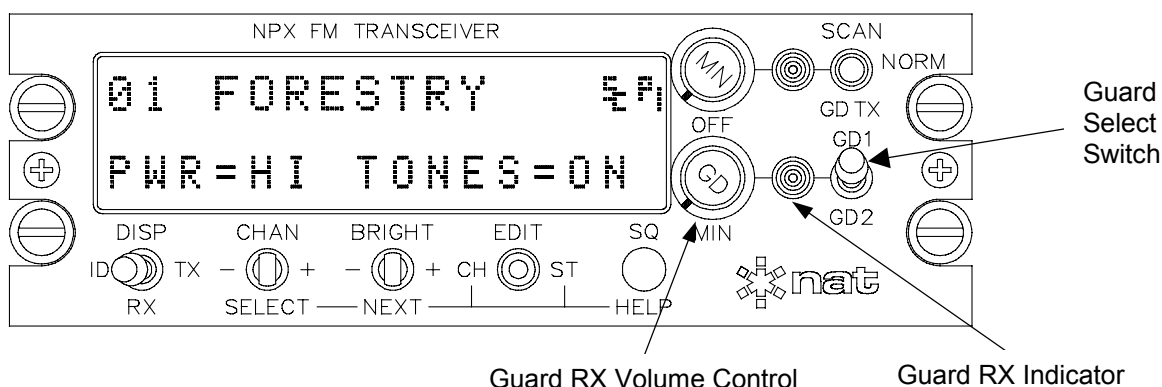
1.4.4.3 Scan/Guard TX Switch

When this switch is in the SCAN position, the radio will begin scanning. See section 1.4.10 for further details on scanning.

When this switch is in the GD TX position, all radio transmissions will be on the guard transmit frequency instead of the transmit frequency of the current channel, and any channel editing (Section 1.4.7) will affect Guard frequency data only (Rx and/or Tx, depending on the guard module installed and installation options enabled – see section 1.4.12). The radio continues to receive on both the Guard and Main receivers. This function only applies to radios with the guard receiver option installed. If not, the radio will display 'GD NOT INSTALLED' on the upper line when the switch is set to the GD TX position.

Set this switch to the NORM position to disable scanning. All radio transmissions will use the transmit frequency of the current channel.

1.4.4.4 Guard Controls

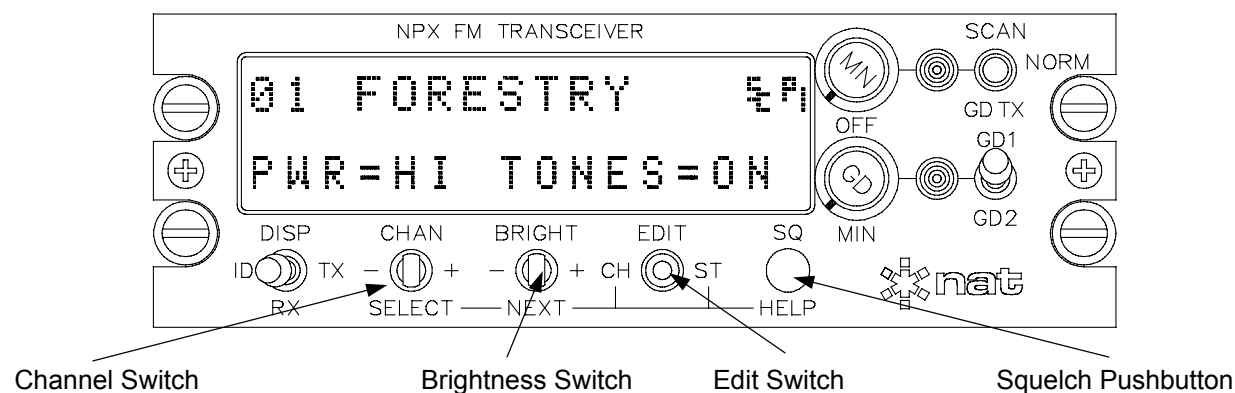


The guard controls are functional only in radios with the optional guard receiver installed.

The rotary knob independently sets the guard RX volume. In most models, there is no 'Off' detent position. On most NPX models, even with the guard RX volume set completely ccw, the operator will still hear activity on the guard channel (at the preset minimum level).

The Guard Select switch (marked GD1/GD2 on the faceplate) selects the active guard channel. For standard guard receiver modules (-050), the first guard channel (GD1) has a receive frequency of 168.625 MHz and the second guard channel (GD2) has a receive frequency of 167.950 MHz, as specified by the USFS. Radios with custom guard receiver modules are available (-060). Only the transmit frequencies of standard and custom Guard receivers are programmable (see Section 1.4.7), when the SCAN/NORM/GD TX switch is in the GD TX position. Transceivers with the synthesized Guard receiver modules (-07X), allow the user to edit both receive (if this feature is enabled at installation – see section 1.4.12) and transmit frequencies (see Section 1.4.7) when the SCAN/NORM/GD TX switch is in the GD TX position. The Guard RX LED indicator lights amber when there is activity on the selected guard channel, or flashes rapidly if an error has occurred during guard channel programming (section 1.4.7).

1.4.5 General Controls — Normal Operating Mode



The General Controls are those labelled in the above diagram and affect the over-all operation of the radio. The position of the EDIT switch determines the operating mode of the radio. The other three controls (the two centre-off momentary switches and the pushbutton) have dual functions, operating differently depending upon the selected operating mode.

When the EDIT switch is in the centre position (as shown), the radio is in 'Normal' operating mode and the functions of the other switches are those of the upper label.

Lock the EDIT switch to either the left (CH) or right (ST) position, to set the radio in one of the two 'EDIT' modes. In both 'EDIT' modes, the functions of the other switches are those of the lower label. Engraved panel lines tie related Edit functions together. See sections 1.4.7 and 1.4.8 for further details on editing.

1.4.5.1 Channel Switch

To scroll to the desired channel use the CHAN switch. Momentarily press it to the right '+' to increment by one channel and to the left '-' to decrement by one channel. Holding the switch in either the left or right position causes the radio to continue to change channels with increasing speed. This allows for quick selection of any channel.

Remote channel selection is possible with the installation of an external switch.

1.4.5.2 Brightness Switch

The BRIGHT switch controls the brightness of the radio display. Momentarily press it to the right '+' to increment the display brightness by one level and to the left '-' to decrement by one level. There are seven brightness levels from which to select. The radio will retain the display brightness information when turned off, but on power up will limit brightness to a maximum of level five.

1.4.5.3 Squelch Pushbutton

Pressing the squelch test button over-rides all squelch logic, and lets the radio's unsquelched audio receive signal pass to the aircraft's audio system. The squelch test function is useful for monitoring activity on the radio when tones prevent the squelch from opening, or to verify volume settings or radio function.

1.4.6 Channel Display

For each channel stored in the radio, there are three data lines; the ID line, the RX line, and the TX line. Depending on the position of the DISPLAY switch, one of these data lines will be shown on the top row of the display. Regardless of which of the three is being displayed, the channel number will always show on the far left hand side and RX/TX functions will be operational.

On applicable units, Guard channel information may be viewed at any time by moving the SCAN/NORM/GD TX switch to the GD TX position.

1.4.6.1 ID Display Line

For Main and Guard channels, the ID line includes the channel number and the channel label or name. For Main channels only, the ID line also includes the scan list flag, and the priority scan channel flag. A typical ID line might look like this:

01	FORESTRY	Sc P1
Channel	Label	Scan Flags

The channel label is an alphanumeric name that may be up to 10 characters long. The channel name has no effect on radio operation, and is provided for operator convenience in identifying the selected channel.

The scan list flag indicates whether or not the radio monitors the channel during scanning. The 'Sc' character means that the channel is in the scan list. A dash '-' indicates the channel is not in the scan list. The 'P1' character means that the channel is the priority scan channel. A dash '-' indicates the channel is not selected as a priority channel.

If the radio is a NPX138N, there will also be a bandwidth flag displayed on the ID line. This is applicable to both Main and Guard channels. A typical NPX138N ID line might look like this:

01	FORESTRY	\bar{n}	Sc P1
Channel	Label	Bandwidth	Scan Flags

The bandwidth flag indicates the current modulation acceptance and transmit deviation mode. A ' \bar{w} ' character indicates that the channel is operating in wide-band (± 5.0 kHz Rated System Deviation) mode. An ' \bar{n} ' character indicates that the channel is operating in narrow-band (± 2.5 kHz Rated System Deviation) mode (refer to section 1.4.11).

1.4.6.2 RX Display Line

The RX line includes the channel number, the receive frequency and the receive tone. A typical RX line might look like this:

01	156.8750r	91
----	-----------	----

Channel RX Freq. RX Tone

The radio will receive incoming FM signals that have a carrier frequency equal to that of the receive frequency of the displayed channel.

If the display shows the RX frequency as *****.*****, it means the programmed frequency is invalid. See section 1.4.7 for details on how to change it to a valid value. The small 'r' indicates that the data displayed is 'Receive' data. If the radio is in 'Simplex' mode, an 's' will replace the 'r'. In 'Simplex' or 'Direct' operation, the radio's TX data matches the RX data. This permits talk-around operation on repeaters. The programmed TX data remains in the radio, but is unused until the operator returns the radio to duplex mode.

The last three positions (far right hand side) on the RX line display an optional CTCSS (sub-audible) tone used for repeater or squelch control. The radio has several different methods by which to display the tone. See section 1.4.9 for further details on tones.

1.4.6.3 TX Display Line

The TX line includes the channel number, the transmit frequency and the transmit tone. A typical TX line might look like this:

01	156.8750t	91
----	-----------	----

Channel TX Freq. TX Tone

When you key the microphone the radio will transmit an FM signal that has a carrier frequency equal to that of the transmit frequency of the displayed channel.

If the display shows the TX frequency as *****.*****, it means the programmed frequency is invalid. See section 1.4.7 for details on how to change it to a valid value. The small 't' indicates that the data displayed is 'Transmit' data. If the radio is in Simplex mode, an 's' will replace the 't'. In 'Simplex' or 'Direct' operation, the radio's TX data matches the RX data. This permits talk-around operation on repeaters. The programmed TX data remains in the radio, but is unused until the operator returns the radio to duplex mode.

The last three positions (far right hand side) on the TX line display an optional CTCSS (sub-audible) tone used for repeater or squelch control. The radio has several different methods by which to display the tone. See section 1.4.9 for further details on tones.

1.4.7 Channel Editing

Editing is the general term for changing any information stored in the NPX radio. There are two basic types of editing, all selectable from the front panel of the radio. These are 'Channel editing' (CH) and 'Status editing' (ST). The labels below the general controls (connected by lines) represent the functions of those switches during editing.

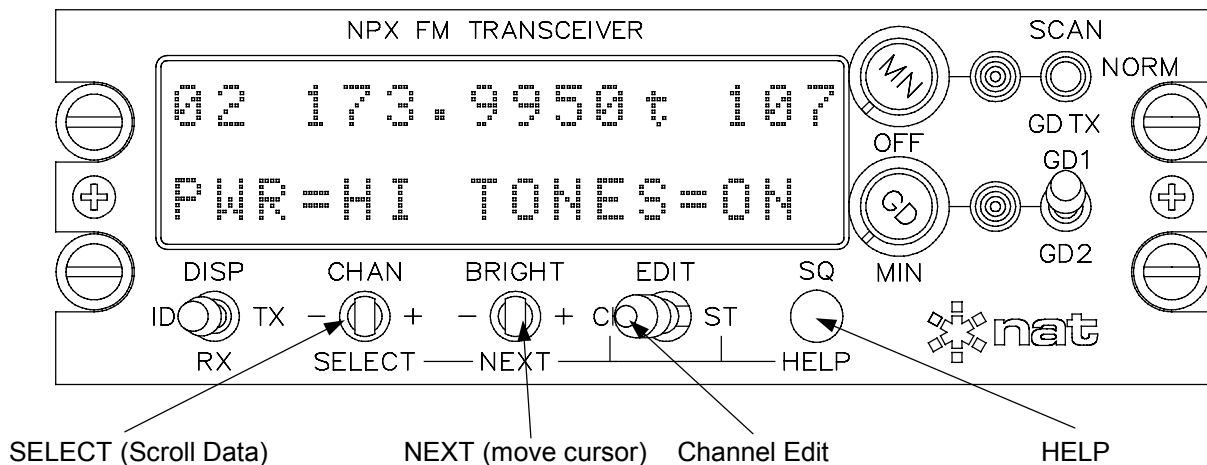
As the name implies, the channel editing feature, when enabled, permits the operator to change channel data. This data includes channel names, transmit and receive frequencies and tones, and list scan flags.

Editing of Guard receive frequencies is possible on transceivers with a synthesized Guard module installed (-07X) only if this feature is enabled at installation (see section 1.4.12). On transceivers with standard or custom Guard modules installed, editing of guard receive frequencies is not possible from the normal 'Channel Edit' mode.

Only those frequencies the radio recognizes as 'valid' are enterable, and only in the fractional multiples allowed.

To edit channel information, first, use the DISP switch to select the data line you wish to edit (ID, RX or TX), then enter 'Channel Edit' mode. To edit Main transmit and receive channel data, the SCAN/NORM/GD TX switch must be in the Norm position. To edit Guard channel data, the switch must be in the GDTX position.

To enter 'Channel Edit' mode, pull and lock the EDIT switch to the left (CH). The position or character to be edited will blink. This blinking character (editing cursor) indicates the data selected for editing.



When channel editing of data is in progress, the radio suspends normal operation and the dual function controls work as described in the following sections.

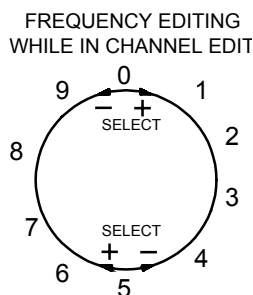
Note: If at any time the Guard RX indicator flashes and bursts of audio are heard from the transceiver, an error has occurred during guard channel programming. If this occurs, the guard channel(s) must be re-edited or reprogrammed with the correct channel data.

1.4.7.1 SELECT Switch

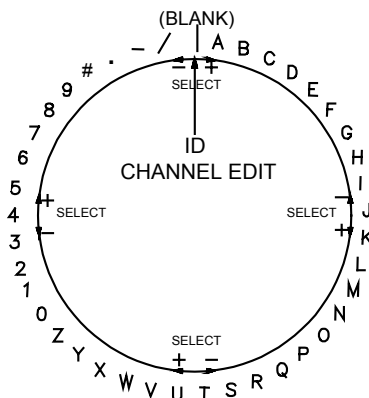
The SELECT switch steps the data entry up or down (+/-). The radio only permits a valid choice for each position selected for editing. This is to aid operators in reducing entry mistakes, particularly when busy with other flight procedures.

The selection choices string together as if in a circle, and the operator moves through this circle with the SELECT switch. Depending on which way the operator sets the SELECT switch (+ or -), the editor will move around the circle in either direction.

When editing frequency (TX or RX) the editor removes numbers from this circle that do not apply to the particular cursor position. For example, most NPX138 radios can only have a 3, 4, 5, 6 or 7 in the 10's of MHz position, so the editor does not permit any other numbers during editing from the front panel.



When editing a channel ID label the editor adds the alphabetic characters and frequently used symbols to this circle that apply. For example, the blank (visible as a flashing underline '_' to show the cursor location), the slash (/) and the number sign (#).



1.4.7.2 NEXT Switch

The NEXT switch moves the editing cursor one position to the right if momentarily set to '+' and one position to the left if momentarily set to '-'. The cursor will wrap around when it reaches either end of the line. The editor will change what choices are valid as the cursor moves from one character to the next.

Sometimes, more than one character will flash. This is because the only valid choices involve multiple characters, such as the fractional kHz entry for a channel frequency. This is also true for tone code entries. The SELECT switch will slew through the available entries from an internal table.

1.4.7.3 EDIT Switch

This locking, centre-off switch selects the operating mode of the radio. For NORMAL radio operation set the EDIT switch to the centre or 'Off' position. Edited data stores automatically when changed so when editing is complete, the operator need only set the EDIT switch back to 'Off'.

1.4.7.4 HELP Switch

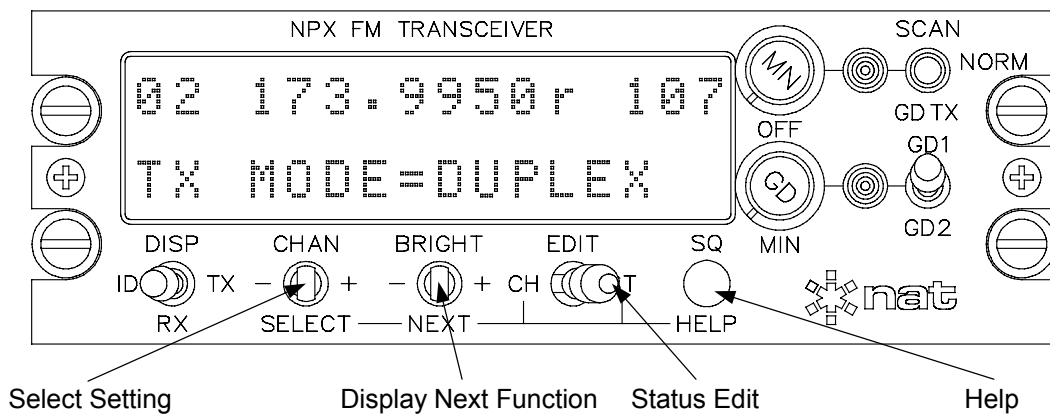
You can access general operation HELP from the initial power-up screen (see section 1.4.2.1). If you require basic help when the NPX radio is already on, cycle the radio off and then back on again (using the volume control or the external breaker). The option for comprehensive help will re-appear.

1.4.8 Status Editing

There is simply not enough room on the compact front panel of the NPX radio to fit a switch for every radio function. The solution for this is the use of status lines to display and control features that do not require immediate accessibility via the front panel.

As when editing channel data, the display shows only allowable options. This mode can also display the status of the radio quickly, without editing any data. The Status editing process is identical to the channel editing process only the select switch does not change any information.

To edit status line data, pull and lock the EDIT switch to the right (ST).



1.4.8.1 NEXT and SELECT Switch Use

Toggling SELECT will step to the previous/next available setting for the current function.

To advance to the next function, toggle NEXT. Use the SELECT switch to again choose the desired setting, and continue in this manner until all the radio status lines contain desired information.

When finished editing, simply return the EDIT switch to 'Off' (centre position) to store the information. Exit at any time; it is not necessary to go through the entire status listing.

1.4.8.2 Status Edit Features

The STATUS EDIT features currently implemented in NPX138 are as follows:

- TX MODE

There are two modes possible: DUPLEX (repeater) operation, and SIMPLEX (direct) operation. Duplex means that the radio uses both the RX and TX frequencies programmed into the selected channel. Simplex means that the radio uses the RX frequency programmed into the selected channel for both RX and TX purposes. The programmed TX data remains in the radio, but is unused until the operator returns the radio to duplex mode.

- POWER

The NPX radio can transmit at either a HI (10 watt) or LO (1 watt) power setting. Many radio station licenses have power restrictions at altitude, and must be set to low TX power above 5,000 feet for legal operation. This feature also helps prevent repeater interference at altitude and permit secure operations.

- TONES

Radio tones are selectable to ON, OFF, or TX ONLY, thus enabling or disabling any tones set on a per channel basis through channel editing. TX ONLY enables only the transmit tone, but not the receive one. See section 1.4.9 for further details on tones.

- TONE DISP

The radio permits the user to define the tone presentation to suit local operations. This selection can be for the tone frequency itself (truncated to whole Hz), referred to as FREQ, or it can be one of several codes. The sequential numbers for the EIA tones are 1-38. The alphanumeric Motorola codes are referred to as MCODES. The shifted octal codes used by Wulfsberg are referred to as WCODES. See section 1.4.9 for further details on tones.

- SCAN

There are three scanning modes available for selection: LIST, PRIORITY, and LIST+PRI. See section 1.4.10 for further details on scanning.

- P1

This is the Priority channel used in Priority and List+Priority Scanning. It can be set to any valid channel number, or if not required, can be set to NONE. When the SCAN option is selected to LIST, the priority channels are not active but are retained in memory. See section 1.4.10 for further details on scanning.

- PWR-UP CHAN

This is the channel the radio will go to when powered up. The operator can select a specific channel or set this option to PDC (Power-Down Channel). PDC will cause the radio to power up on the last used channel.

- PWR-UP HELP

This feature is either ON or OFF. When this feature is ON, the user is prompted with the initial help screen when the radio is first powered on. If this feature is OFF, the radio performs a brief autostart procedure before going directly to the 'Normal' operation screen.

1.4.9 Tones

1.4.9.1 General

The tone system used by the NPX radio is a Continuous Tone-Coded Squelch System (CTCSS), as defined by an Electronic Industries Association (EIA) standard. The radio adds these tones to the normal signal modulation (such as voice) to uniquely identify or select a particular radio or group of users.

More commonly, these tones are referred to as sub-audible tones. This is because the filtering action of the radio eliminates them from the received audio. Therefore neither the sending nor receiving party will hear them. These tones are also sometimes referred to as Private Line (PL) tones.

1.4.9.2 Tone Display and Selection

The NPX radio displays the tones for the selected channel on the last three positions (far right hand side) of the RX and TX lines. Use the Channel Edit mode to select and store the appropriate tones for each channel. The operator can set different tones for receive and transmit. Select '-' if you do not require a tone.

By editing the TONE DISP status line, the operator can configure the radio to display the tones using one of four different methods. The four tone display modes are:

- Tone Frequency (FREQ):

This is the actual frequency of the tone, measured in Hertz (cycles/second). There are only three digits available on the radio to display this data, so the radio truncates any decimal fraction on the display (i.e. 103.5 Hz becomes 103). Although not displayed, the radio uses the exact frequency.

- EIA Codes (1-38):

This is a number from 1-38 that identifies the tone in sequential order from lowest (67.0 Hz) to highest (250.3 Hz)

- Wulfsberg Codes (WCODES):

These are sequential shifted OCTAL codes based on the thumbwheel design of the Wulfsberg C-1000 control. Because they are missing numbers ending in 0 & 9, they can be confusing, especially to those familiar with the straight sequential number of the EIA codes.

- Motorola Codes (MCODES):

These are alphanumeric codes that often appear in the land mobile business, especially if Motorola equipment is used.

Table 1 below shows the four different display options for each of the available tones.

Tone Frequency (Hz)	1-38	WCODE	MCODE
67.0	1	01	XZ
71.9	2	02	XA
74.4	3	03	WA
77.0	4	04	XB
79.7	5	05	SP
82.5	6	06	YZ
85.4	7	07	YA
88.5	8	08	YB
91.5	9	11	ZZ
94.8	10	12	ZA
97.4	11	13	ZB
100.0	12	14	1Z
103.5	13	15	1A
107.2	14	16	1B
110.9	15	17	2Z
114.8	16	18	2A
118.8	17	21	2B
123.0	18	22	3Z
127.3	19	23	3A
131.8	20	24	3B
136.5	21	25	4Z
141.3	22	26	4A
146.2	23	27	4B
151.4	24	28	5Z
156.7	25	31	5A
162.2	26	32	5B
167.9	27	33	6Z
173.8	28	34	6A
179.9	29	35	6B
186.2	30	36	7Z
192.8	31	37	7A
203.5	32	38	M1
210.7	33	41	M2
218.1	34	42	M3
225.7	35	43	M4
233.6	36	44	M5
241.8	37	45	M6
250.3	38	46	M7

Display Options
Table 1

1.4.9.3 Turning Tones On and Off

The NPX radio also has the capability to have tones enabled or disabled globally. By editing the TONES status line, the operator can set all the tones ON, OFF or to TX ONLY.

TONES=ON enables all the tones programmed into the individual channels. (Remember that some channels may have no tones programmed.) Both the frequency and tone of incoming signals must be correct to hear the receive audio. If the incoming frequency is correct, but the incoming tone does not match the tone set in the radio, the radio will not produce any audio. The RX indicator lights whether the logic is correct for audio or not, to warn the operator that the channel is active with radio traffic of some kind.

TONES=OFF disables all tones. The radio will still display the individual tones on the RX and TX channel display lines, but only for reference purposes. All incoming transmissions on the RX frequency will be heard.

TONES=TX ONLY enables all transmit tones but disables all receive tones. This is used on U.S. Forest Service contracts, for example, where the tones are needed only to open the repeater and serve no RX squelch function.

1.4.10 Scanning

1.4.10.1 General

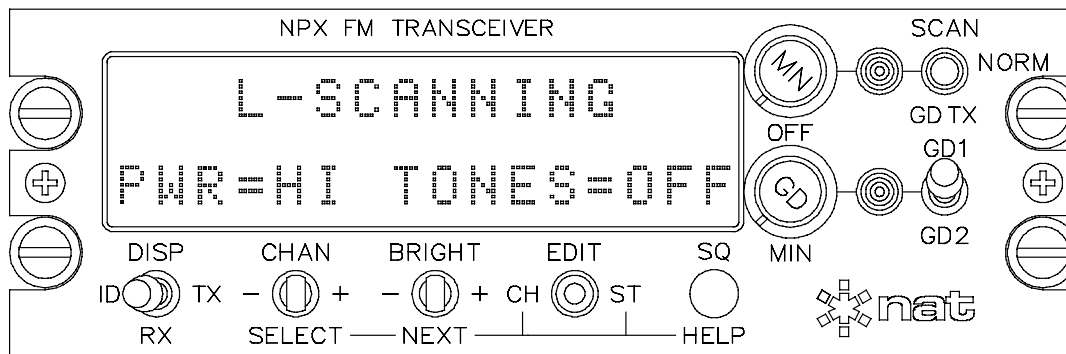
Note: This section is not applicable to Guard channels.

Scanning is an automatic internal function that rapidly samples a selected group of channels. It is very useful for checking radio traffic on one or more channels, while still working a 'home' or monitor channel.

When scanning is active, the radio ignores all CTCSS/Sub-audible Tones. It does not test for these conditions when determining whether or not to lock on to a channel (although tones do remain active for squelch control). This is because the delay to test for tones is so long (compared to the channel lock-up time), that it would seriously compromise scanning. It takes almost half a second to provide tone decoding, which would result in virtually useless scanning of 2 channels/second. The radio will stop on any flagged channel that has a correct RF signal present, but there may be no audible signal if the tones do not match those set in the radio. To avoid any confusion, set tones to OFF (via the status edit mode) during scanning so that you will hear all channels.

In order to be detected properly, a signal needs to be slightly stronger when the radio is scanning than when the radio is in 'Normal' operating mode.

1.4.10.2 Scan Operation



Activate scanning by moving the SCAN/NORM/GUARD TX toggle switch to the SCAN position. The 'home' channel is the channel that the radio was on before scanning was activated.

The radio scans the home channel and all channels on the 'scan list' at a maximum rate of 20 channels/second.

When the radio is actively scanning, a SCANNING message will appear on the upper row of the display. When the radio has found and locked onto an active channel, the display will show the correct channel data corresponding to the display mode selected (ID, RX or TX).

If the operator keys the transceiver while the radio is actively scanning, the radio will be re-channelled to the 'home' channel for transmission. If the radio is locked onto a channel, transmission will occur on that channel.

From the SCAN status line, the operator may select one of several pre-defined modes that control how the radio will carry out the scanning function. They are described in the following section.

1.4.10.3 Scan Modes

You can designate any NPX channel as a PRIORITY channel and/or a LIST channel. The appropriate scan flags will appear after the channel name on the ID line (P1 and/or Sc). Any or all of the channels can be in the scan list for LIST SCANNING, but only one channel can have the Priority designation.

Use the status edit mode to select both the priority channel and the SCAN MODE. Use the channel edit mode to tag channels for list scanning. The three scan modes are as follows:

- LIST Scanning

The second last space on each channel ID line indicates whether that channel is in the scan list or not. If it displays a dash '-', the channel is not in the list. If the channel is in the list it displays the scan flag (Sc). Use the channel edit mode to change the scan list status for each channel. You may place any number of channels in the scan list; but for effective scanning operation, you should keep the number to a minimum.

Once scanning is activated (using the front panel SCAN switch), the radio will move through all the flagged channels in consecutive order until it detects a carrier. It will remain on that channel until traffic stops, then wait for a 2-3 second latency period to permit the operator to reply. If there is no further activity, the radio will continue through the list, and then start over. When scanning is turned off, the radio resumes normal operation on the home channel (the one set before scanning began).

During List scanning, the operator can use the front panel CHAN switch to delete 'nuisance' channels. If the radio locks onto a channel, and the operator does not want to monitor that channel, he may move the CHAN switch to the left '-' to temporarily delete that channel from the scan list. That channel will remain out of the scan list until the operator disables the scan mode (either by moving the scan switch back to NORM or by turning off the radio).

- PRIORITY Scanning

The radio scans the home channel plus one priority channel. It will continue scanning the priority channel if it finds an active channel.

To avoid accidental duplication, use the Status Edit mode to set the priority channel. 'P1' designates the priority channel; the lowest priority is the home channel. The 'P1' flag will appear on the last space of the ID line of the appropriate channel.

If the radio receives a transmission on the home channel, it will continue to check 'P1'. The check during priority scan is very fast, about every 1/3 second, and will sound like a faint tick when occurring during other reception. If there is activity on the designated 'P1' channel, the radio will re-channel to that frequency, regardless of activity on other channels.

The radio will return to the home channel 2-3 seconds after activity on the priority channel has ceased.

- LIST+PRIORITY Scanning

In this mode, both LIST and PRIORITY features are combined, so that the radio checks 'list' while still periodically testing for activity on the priority channel. In this case, list channels have a lower priority than the home channel, and are scanned only when there is no activity on the other two.

1.4.11 Wideband/Narrowband Operation

The NPX138N is capable of operating in either a wideband mode (± 5.0 kHz Rated System Deviation) or narrowband mode (± 2.5 kHz Rated System Deviation).

1.4.11.1 Editing Wideband/Narrowband Flag

To edit the Wideband/Narrowband channel characteristic, place the 'DISP' switch to the ID position and place the radio into channel edit mode. Use the NEXT switch to place the EDIT CURSOR in the correct display position, marked by the current flag setting (Note: the character should be flashing). To change this selection use the '+' or '-' SELECT switch. The channel data will save automatically when you exit 'Edit' mode.

The ID line displays a 'W' character when the radio is in 'Wideband' mode. The ID line displays an 'N' when the radio is in 'Narrowband' mode (refer to section 1.4.6.1).

1.4.12 Configuration Mode

This mode of operation is not required for normal operation and is intended to aid in servicing and radio set-up. Various firmware functions of the radio, including guard channel programming for the -07x models, can be set via this mode. Entering this mode requires a special code and switch sequence, and should be USED ONLY AT THE FACTORY OR BY QUALIFIED SERVICE PERSONNEL.

1.5 Specifications

1.5.1 Electrical Specifications

Input power	28 Vdc nominal
Current consumption	0.5 A receive/2.0 A transmit (typical) 0.8 A receive/3.0 A transmit (max.)
Panel lighting	28 Vdc, 14 Vdc or 5 Vdc dependent on model.
Sidetone output	25 mW @ 600 Ω , adjustable.
Microphone	Amplified Dynamic or equivalent, 150 Ω balanced/ unbalanced
Frequency range	138.000 MHz to 173.995 MHz
Tone capability	38 standard CTCSS tones
Operating mode	Simplex or Semi-Duplex

1.5.2 Receiver

Channel increments	5 kHz/6.25 kHz
Audio output	100 mW @ 600 Ω Bal/Unbal
Sensitivity:	Main 0.5 μ V max. @ 12 dB SINAD Guard 0.5 μ V max. @ 12 dB SINAD
Spurious response rejection	>70 dB
Adjacent channel rejection:	
NPX138 (all models)	70 dB min. @ \pm 25 kHz
NPX138N (all models)	
Wideband	70 dB min. @ \pm 25 kHz
Narrowband	60 dB min. @ \pm 12.5 kHz
Intermodulation rejection	70 dB
Hum and Noise ratio	
Unsquelled	>50 dB
Squelched	<-80 dBw
Distortion	<4% @ rated output

1.5.3 Transmitter

RF power output	1 W/10 W Selectable
RF input/output impedance	50 Ω nominal
Rated System Deviation:	
NPX138 (all models)	\pm 5.0 kHz max., limited
NPX138N (all models)	
Wideband	\pm 5.0 kHz max., limited
Narrowband	\pm 2.5 kHz max., limited
Conducted spurious emissions	
High power	-64 dBc
Low power	-55 dBc
Carrier frequency stability	\pm 0.0003 %
FM hum and noise ratio	>40 dB
AM hum and noise ratio	>35 dB
Distortion	<4 %

1.5.4 Physical Specifications

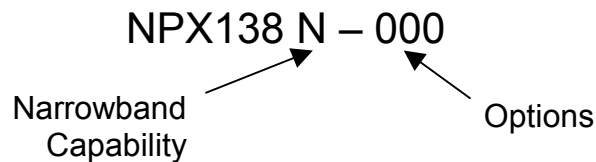
Height	1.875 inches (47.6 mm)
Overall length	8.64 inches (219.5 mm)
Depth behind panel	7.66 inches (194.6 mm)
Width	5.75 inches (146.1 mm)
Weight	3.0 lbs (1.4 kg)
Mounting	Std. Dzus mounting (4 fasteners)
Connector type	25 pin D-subminiature male (pins)
Antenna connector	BNC female

1.5.5 Environmental Specifications

Temperature	-30 C to +60 C
Altitude	50,000 feet
Humidity	95 %
Shock	12g (any axis)
DO-160C Env. Cat. [B4D1]ZBA[BMN]XXXXXXABABAUXXXX	

1.6 Unit Nomenclature

NPX138 radios are identified as follows:



1.6.1 Narrowband Capability

NPX138 **N** - 000

N = Wideband and Narrowband modulation
Blank = Wideband modulation only

1.6.2 Options

1.6.2.1 Lighting Power

NPX138 N - 000

0	=	28 Vdc Lights
1	=	14 Vdc Lights
5	=	5 Vdc Lights

1.6.2.2 Special Options

NPX138 N - 000

0	=	No Special options installed
5	=	USFS Standard Guard Receiver
6	=	Custom Guard Receiver
7	=	Synthesized Guard Receiver
Other	=	Special options installed - consult factory for details

1.6.2.3 Voice-Inversion Encryption

NPX138 N - 000

0	=	No Encryption
1	=	Encryption
Other	=	Special options installed - consult factory for details

Notes: