

5 OPERATING INSTRUCTIONS

5.1 Introduction

When operated locally, the operator has full access to all facilities using the various controls on the front panel. The menu system of the TA7450 is divided into three sections.

The first section the user encounters, is the main menu. Pressing the Enter button accesses the main menu (↵). In this section the user can change transmitter frequency, read data from the built in test equipment (BITE), store and recall frequencies and adjust the display brightness.

The second section, called settings menu, can only be accessed by depressing the Enter button (↵) while the Up button (↑) is kept depressed, when the display is showing the frequency. This section lets a user change parameters that are seldom changed. Careful selection of correct parameters will avoid negative effects on transmitter performance.

The third and last section is called configuration menu, and can only be accessed by depressing the Up button (↑) and Enter button (↵) in, at the same time as the power is turned on. This menu contains options that are only changed during service and installation, and should therefore only be used by a qualified technician.

5.2 Main Menu

When the transmitter is switched on, the display will first show "TA7450", then the version number, serial number and finally it ends up showing the operating frequency. The operating frequency is shown with 6 digits according to the ICAO standard.

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The user enters the main menu by pressing the enter button (↵), and he steps through the main menu by using the Up button (↑) and Down button (↓). The different submenus are selected by pressing the enter button (↵) on the wanted menu. It is possible to restrict the access to only the BITE selftest, display brightness adjustment and showing the frequency. Setting the lock option in the configuration menu does this.

5.2.1 Bite (Selftest)

Pressing the select button when the display shows the text "SELFTEST", changes the display to show internal measurements.

SELFTEST

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FCC ID: I32TA-7450
JOB #: 162U0
EXHIBIT #: 9a

The display will toggle automatically between the different measurements, or one particular can be selected by pressing the Up button (\wedge) or Down button (\vee).

The available measurements are:

- Reflected power:** The reflected power indicated in watts. Used to test the SWR of the antenna.
- Forward power:** Forward power reading in watts. Used for BITE control
- Temperature:** Internal temperature of the transmitter. Used for BITE control.
- LINE input level:** The modulation level on the input line, indicated in dBm. 0 dBm \approx 0.8 V.
- Modulation degree:** Maximum modulation degree of the transmission, in percent.
- Current:** In Amperes. This is an Internal measurement of the total current consumption. Used for BITE control.
- 27V DC:** In volts, internal regulated 27V DC. Used for BITE control.
- 12V DC:** In volts, internal regulated 12V DC. Used for BITE control.
- 5V DC (1,2,3):** In volts, internal regulated 5V DC - 3 different measurements. Used for BITE control.

5.2.2 Change Frequency Submenu

This submenu enables the user to change the transmitter frequency. While in the main menu the user uses the Up button (\wedge) and Down button (\vee) until he reaches the menu that looks like the one below.

FREQ

By pushing the Enter button (\lrcorner), the display will change, and show the frequency of the transmitter, an example is shown below.

>118.340

The Up button (\wedge) and Down button (\vee) lets the user increase or decrease the frequency. By keeping the button depressed, the frequency will first change in small steps, the step size will then increase as the button is depressed. The user can also increase the frequency in steps of 1 MHz by depressing the Up button (\wedge) and Down button (\vee) at the same time. When the wanted frequency is set, pressing the Enter button (\lrcorner) will return you to the main menu.

If the transmitter is fitted with the 8.33KHz-bandwidth option, the frequency will be shown according to the ICAO standard:

| | | |
|---------|--------------|---------------------------|
| 127.000 | 127.0000 MHz | 25 kHz channel spacing. |
| 127.005 | 127.0000 MHz | 8.33 kHz channel spacing. |
| 127.010 | 127.0833 MHz | 8.33 kHz channel spacing. |
| 127.015 | 127.1666 MHz | 8.33 kHz channel spacing. |
| 127.025 | 127.0250 MHz | 25 kHz channel spacing |
| etc. | | |

5.2.3 Recall Submenu

Recall is used for selecting pre-programmed frequencies by channel number (01 to 99). By stepping through the main menu with the Down button (v), one will reach the recall submenu:

RCL --

Select the recall submenu by pressing the enter button (↵).

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The selected channel is shown to the left with its corresponding frequency to the right in the display. Now, by pressing the Up button (^) or Down button (v) until the desired channel is shown in the display, a specific memory location between 01 and 99 can be recalled. First select the desired channel number, then press the Enter button (↵). After a channel is recalled the display will return to show the new operating frequency.

5.2.4 Store Submenu

By pressing the Down button (v) again, when the display shows RCL --, the display will show the store submenu:

STORE--

Now, by pressing the Up button (^) until the desired channel is shown in the display, a specific memory location between 01 and 99 can be programmed with the operating frequency.

>> 01

Having selected the required frequency as described in 4.2.2, select the desired channel number and press the enter button (↵) to store the frequency.

After the frequency is stored, the display will return to show the operating frequency.

5.2.5 Brightness Submenu

The brightness of the display is adjusted from this submenu. In the main menu the brightness submenu is shown as below.

BRIGHT 5

Pressing the Enter button (↵), leads the user to a menu where one can change the brightness of the display. An example is shown below.

>> 5

The intensity of the display corresponds to a number ranging from 0 to 6, where 6 is the brightest setting. The brightness is changed by using the Up button (↑) and Down button (↓). The Enter button (↵) stores the setting and returns to the main menu.

5.2.6 Offset Submenu (Optional)

The offset submenu, set an offset from the main carrier frequency according to ICAO annex 10. The offset can be chosen with Up button (↑) and Down button (↓) between the following values.

-8.0, -7.5, -7.3, -5.0, -4.0, -2.5, 0, +2.5, +4.0, +5.0, +7.3, +7.5 and +8.0.

OFS: -8.0

-8.0, -4.0, 0, +4.0, +8.0 are used for 5 channel offset.

-7.5, -2.5, +2.5, +7.5 are used for 4 channel offset.

-7.3, 0, +7.3 are used for 3 channel offset.

-5.0, +5.0 are used for 2 channel offset.

When the offset (or the frequency in offset mode) are changed, the transmitter use some time (up to 10 sec.) to synthesise the new frequency. This is because an optimum reference value is calculated for the synthesiser.

When the transmitter is offset from the carrier frequency, a "+" or "-" is added to the first character from the right of the display. A "+" shows that the transmitter is offset to a frequency above the frequency displayed, and a "-" means that the transmitter is offset to a frequency below the frequency displayed. By pressing the Down button (↓), one can see the channel offset in kHz. When the frequency is changed to another channel, the offset is reset to zero.

5.3 Settings Menu

The settings menu lets the user change parameters like remote address, line level, TX/RX monitor level, modulation degree, power level, alarm thresholds and transmitter timeout. It can only be accessed from the menu where the frequency is shown, and then by depressing the Enter button (↵) while the Up button (↑) is kept depressed.

5.3.1 Remote Address Submenu

The remote address is used by remote controls to access various radios in a system via the RS-485 serial data bus. The address of each radio must be unique and can be set to any number between 1 and 239. Note that the address is shown in hexadecimal notation, i.e. the address is set as a number between 01 and EF, where EF corresponds to decimal 239. From the settings menu the remote address is shown as below. No remote address is represented with "--" as shown in the display below.

REM.A --

By pressing the Enter button (↵) the user will enter the submenu shown below, where one can change the address by using the Up button (↑) and Down button (↓). The address is increased by 60 (decimal) when one press the Up button (↑) and Down button (↓) at the same time.

>> 5C

By pressing the Enter button (↵) the menu returns to the settings menu.

5.3.2 Line Level Submenu

The input level from the remote line, also called line level, is adjusted from this submenu.

In the settings menu, the submenu is shown with the text "LINE" and the line level in percent. An example is shown below.

LINE 50%

By pressing the Enter button (↵) the user will enter the submenu, as shown below, where the line level can be changed by using the Up button (↑) and Down button (↓). The linelevel is increased by 25%, when the Up button (↑) and Down button (↓) are pressed simultaneously.

>> 50%

By pressing the Enter button (↵) the menu returns to the settings menu.

5.3.3 Tx Monitor Level Submenu

This transmitter has a monitor output, where one can listen to the transmitted signal. The TX monitor level can be adjusted from this menu. In the settings menu this submenu is shown with the text “TX MON” and the TX monitor level in percent, as shown below.

TX MON 50

Pressing the Enter button (↵) lets the user enter the submenu where the Tx monitor level can be changed by using the Up button (↑) and Down button (↓). The TX monitor level is increased by 25%, when the Up button (↑) and Down button (↓) are pressed simultaneously.

>> 50%

Pressing the enter button (↵) returns the user to the settings menu.

5.3.4 Rx Monitor Level Submenu

In addition to TX monitor level, the transmitter also lets the user monitor the audio of the corresponding receiver in a RX/TX pair. The RX monitor level can be changed from this submenu. The RX monitor level submenu is shown in the settings menu with the text “RX MON”, and the RX monitor level in percent, as shown in the example below.

RX MON 50

Pressing the Enter button (↵) lets the user enter the submenu where the Rx monitor level can be changed by using the Up button (↑) and Down button (↓). The RX monitor level is increased by 25%, when the Up button (↑) and Down button (↓) are pressed simultaneously.

>> 50%

Pressing the Enter button (↵) returns the user to the settings menu.

NB! The Rx Monitor level must be adjusted after the Tx monitor level is set, as the Tx monitor level setting also affects the Rx monitor level.

5.3.5 Modulation Level Submenu

The modulation level is adjusted from this submenu. The display shows the text "MOD" followed by the modulation level in percent. The modulation level will correspond to the level set, but this is not a measurement, so the actual modulation level must be set with a test generator, and a modulation meter.

MOD 80%

The Enter button (↵) lets the user enter the submenu where the modulation level can be changed by using the Up button (↑) and Down button (↓). The Modulation level is increased by 25%, when the Up button (↑) and Down button (↓) are pressed simultaneously.

>> 80%

Pressing the Enter button (↵) returns the user to the settings menu.

5.3.6 Power Output Submenu

The RF power level of the transmitter, can be changed from maximum power to zero in six steps. This submenu lets the user change the power level. In the settings menu the power output submenu is shown with the text "PWR" followed by the power output level in percent. An example is shown below.

PWR 100%

Pressing the Enter button (↵) lets the user enter the submenu where the power output level can be changed by using the Up button (↑) and Down button (↓).

>> 100%

In this submenu the output power can be reduced from the full output power. I.e. 100% is 50W for a TA-7450, 25W for a TA-7425 or 10W for a TA-7450. Now the output power setting can be toggled between 100, 80, 50, 25, 10, or 0% to set the output power to the desired level.

Note 0% means there will be no power output from the transmitter. Press the Enter button (↵) to confirm the selection.

5.3.7 Power Threshold Submenu

The next menu item is the power threshold submenu. With this menu a fixed threshold can be set where the transmitter will generate an alarm if the output power, because of a failure, or a drop in the input voltage, falls below a set threshold. In the settings menu the power threshold submenu is displayed with the text "THRS" and the power current threshold value, in percent as shown below.

THRS 50%

Pressing the Enter button (↵) lets the user change the power threshold level by using the Up button (↑) and Down button (↓).

>> 50%

The threshold value can be toggled between 0-10-25-50 and 80% of the full power. 80% means that for a 50W transmitter (TA-7450), the alarm will be activated if the power output falls below 40W. To demonstrate this the transmitter can be operated on a DC power supply, and the DC input reduced to below app. 23 V. In this case the transmitter is not able to give the full output power and an alarm will be generated. Use this function with care. The above example should only be used if a main and a standby transmitter are operated on separate power supplies. If the threshold value is used only as detection that the power amplifier operates OK, the threshold value should be set lower (25% or 50%). A threshold setting of 0 is used to disable the function. Press the Enter button (↵) to confirm the selection.

5.3.8 Time-Out Submenu

By pressing the enter button once more, the display will show time-out setting for the transmitter. Time-out means that the transmitter will cease to transmit after a specified time delay. The delay may be set in 30 seconds intervals up to 5 minutes or switched off completely.

TOUT 3.0

Pressing the Enter button (↵) lets the user change the transmitter time-out .

>> 3.0M

The time-out setting is shown in minutes and can be toggled with the Up button (↑) and Down button (↓) between 0 - 0.5 - 1.0 - 1.5 - 2.0 - 2.5 - 3.0 - 3.5 - 4.0 - 4.5 - 5.0. Setting the time-out to 0 means that the time-out function is disabled and the transmitter can be keyed continuously. Press the Enter button (↵) to confirm the selection.

5.3.9 Modgen Submenu

From the Modgen submenu it is possible to activate the built in audio test generator. When the testgenerator is switched on, a tone of approx 1 kHz is fed into the modulation amplifier. This generator can be used when adjusting the modulation of the transmitter. The default setting is "OFF", i.e the generator is always switched off when powering up the transmitter.

MODGEN 0

Depressing the Enter button (↵), lets one change the return-time by using the Up button (↑) and Down button (↓).

>> ON

>> OFF

Return to the configuration menu by pressing the Enter button (↵).

5.3.10 End Submenu

This menu lets the user exit by saving the changes he has done, restore to preset values or exit without saving changes. This submenu is common to the settings menu and the configuration menu.

END

Depressing the Enter button (↵), lets the user choose between three choices with the Up button (↑) and Down button (↓). The choices are:

SAVE -This option saves the changes that have been made in the menu, and exits to the main menu.

RESET – This option restores the menu to factory pre-set values, and exits to the main menu.

EXIT – This option exits to the main menu without storing the changes in the menu.

>> SAVE

>> RESET

>> EXIT

To return to the main menu, depress the Enter button (↵).

5.4 Configuration Menu

The configuration menu lets the user change parameters that are usually only changed when the transmitter is installed or during service. It is important to note that changes to this menu can result in a degradation of the transmitter performance. Changes to this menu should only be performed by qualified technicians.

The configuration menu can only be entered by keeping the Up button (▲) and the Enter button (↵) depressed while the power is turned on.

The display will then show the following text.

CONFIG

Use the Up and Down button to browse in the menu.

5.4.1 Menu Lock/Unlock Submenu

This sub menu enables the user to restrict access to all menus except BITE, changing brightness and showing the frequency.

In the configuration menu the menu lock/unlock submenu is shown as "LOCKED" when access to menus are restricted or "UNLOCKED" when the menus are available. An example is shown below.

LOCKED

Depressing the Enter button (↵), lets the technician toggle between "LOCK" and "UNLOCK" by using the Up button (▲) and Down button (▼).

>>UNLOCK

Depressing the Enter button (↵) returns to the configuration menu.

5.4.2 Swr Alarm Submenu

Next step on the menu is the SWR alarm on/off. SWR AL 1 means that the SWR alarm check is switched on. SWR AL 0 means off.

SWR AL 1

SWR AL 0

When the SWR alarm is switched on, the alarm will be set if the SWR exceeds app. 3:1. If the transmitter is in MAIN mode, the transmitter will stop keying and the standby set will take over.

When the SWR alarm is switched off, alarm will not be generated even if there is high SWR on the antenna. The transmitter will still switch to low power if the SWR is to high.

Note: If a main/standby configuration of transmitters is operating with a common antenna, the SWR alarm should be set to off (0) because a high SWR on the main set will also be present on the standby set, therefore the control should not be switched to the standby set.

5.4.3 Mute Submenu

The transmitter has a mute-function that mutes the audio line when it goes below a certain level.

The mute function can be turned on or off from the mute submenu. In the configuration menu, the mute submenu is displayed with the text "MUTE" followed by a "1", meaning mute on or a "0", meaning mute off. An example is shown below.

MUTE 1

Depressing the Enter button (↵) enables the user to turn the mute function on or off with the Up button (↑) and Down button (↓).

>> ON

>> OFF

Depressing the Enter button (↵) returns to the configuration menu.

5.4.4 Agc Time Submenu

From the AGC time submenu, the return-time of the audio Automatic Gain Control (AGC), can be set to either fast or slow. In the configuration menu, the AGC time submenu is shown as "AGC FAST".

AGC FAST

Depressing the Enter button (↵), lets one change the return-time by using the Up button (↑) and Down button (↓). (i.e. OFF is Slow AGC)

>> ON

>> OFF

Return to the configuration menu by pressing the Enter button (↵).

5.4.5 Agc On/Off Submenu

The audio Automatic Gain Control (AGC) can be turned on or off from this menu. The AGC on/off submenu is displayed, in the configuration menu, with the text "AGC" followed by a 0 corresponding to off or a 1 corresponding to on, as shown below.

AGC 0

AGC 1

Depressing the Enter button (↵), lets one turn the AGC on or off by using the Up button (↑) and Down button (↓).

>> OFF

>> ON

Return to the configuration menu by pressing the Enter button (↵).

5.4.6 Line Termination Submenu

This menu controls the line termination of the audio line input. The user can either use a terminated 600Ω line or an unterminated line. In the configuration menu the line termination submenu is shown as below.

LINE TRM

Depressing the Enter button (↵), lets the technician change the line termination by toggling the 600Ω line termination on or off by using the Up button (↑) and Down button (↓).

>> OFF

>> ON

Return to the configuration menu by pressing the Enter button (↵).

5.4.7 Line Key Submenu

The transmitter can be keyed from the audio line by connecting one of the lines to GND or by connecting it to 12 V. This menu lets the user decide whether he wants to use line keying and if so, which type of keying. In the configuration menu, the line key submenu is shown as below.

LINE KEY

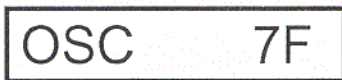
Pressing the Enter button (↵) lets the user choose between no line keying, displayed as "NONE". Line keying by grounding one of the lines, this is displayed as "GND". And line keying by applying 12 V onto one of the lines, this is displayed as "12V". The Up button (↑) and Down button (↓) are used to browse between the different choices.



Return to the configuration menu by pressing the Enter button (↵).

5.4.8 Reference Oscillator Submenu

This menu lets service personnel fine-tune the transmitter frequency. One should not attempt to change this setting without proper test equipment. The reference oscillator submenu is shown as below in the configuration menu.



Depressing the Enter button (↵) lets one change the oscillator frequency with the Up button (↑) and Down button (↓). The value changes between 00 and FF(Hexadecimal). The Ref. Osc. settings is increased by 64 (decimal), when the Up button (↑) and Down button (↓) are pressed simultaneously.



Return to the configuration menu by pressing the Enter button (↵).

5.4.9 RS232/RS485 Submenu

The transmitter is communicating with other peripherals through a serial interface, which can be a RS232 or a RS485 interface. The RS232/RS485 submenu lets the user set up the right type according to the system specifications. In the configuration menu the RS232/RS485 submenu is shown as below. There are two states, either RS232 or RS485, depending on which one that is used.



After depressing the Enter button (↵), the technician can toggle between RS232 and RS485 by using the Up button (↑) and Down button (↓).



The Enter button (↵) returns the user to the configuration menu.

5.4.10 Baud-Rate Submenu

The baud-rate submenu lets the user choose between a baud-rate of 1200 baud or 9600 baud on the serial interface. Reducing the baud-rate can decrease the error rate on long lines. In the configuration menu the baud-rate submenu is shown as below. There are also two states, "BDR 9600" and "BDR 1200" depending on the baud-rate used.

BDR 9600

BDR 1200

Depressing the Enter button (↵), changes the baudrate by using the Up button (↑) and Down button (↓).

>> 9600

>> 1200

Returns to the configuration menu by depressing the Enter button (↵) again.

5.4.11 Normal / Main Submenu

The normal/main submenu will display either NORM TX or MAIN TX in the configurations menu.

NORM TX

MAIN TX

Depressing the Enter button (↵), changes between normal and main configuration.

>> NORM

>> MAIN

The display will toggle between MAIN TX and NORM TX using the Up button (↑) and Down button (↓). Return to the configuration menu by depressing the Enter button (↵) again.

The difference between the two operating modes is:

Operated as a NORM TX the transmitter will continue to operate even if the BITE detects an error.

As a MAIN TX it is supposed that the transmitter has a «slave» or standby transmitter attached to the standby antenna input. The standby transmitter should receive the same keying and audio signals as the main transmitter.

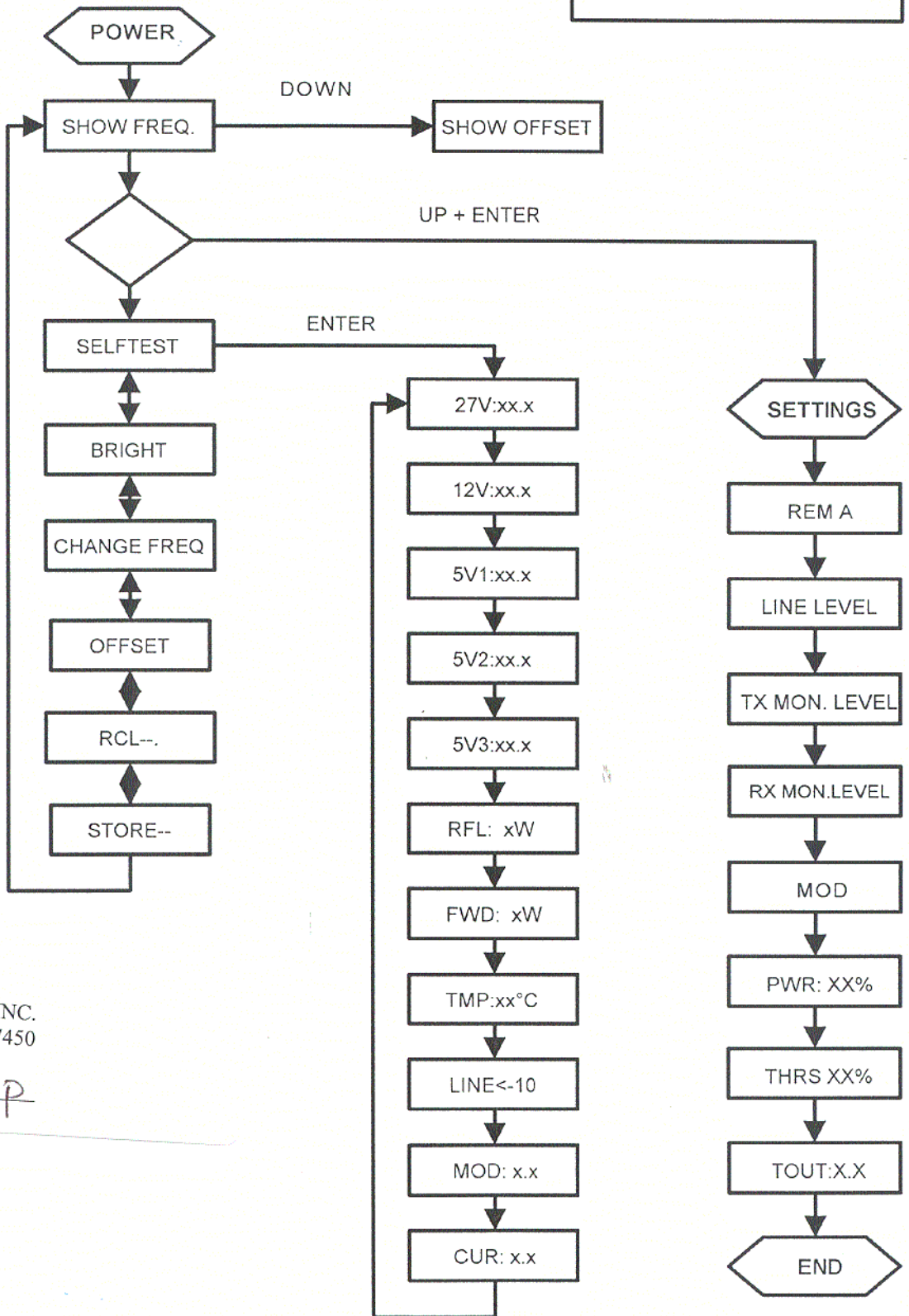
By connecting the ALARM output from the MAIN to the select input of the Standby transmitter this combination makes an efficient single frequency backup system.

5.4.12 End Submenu

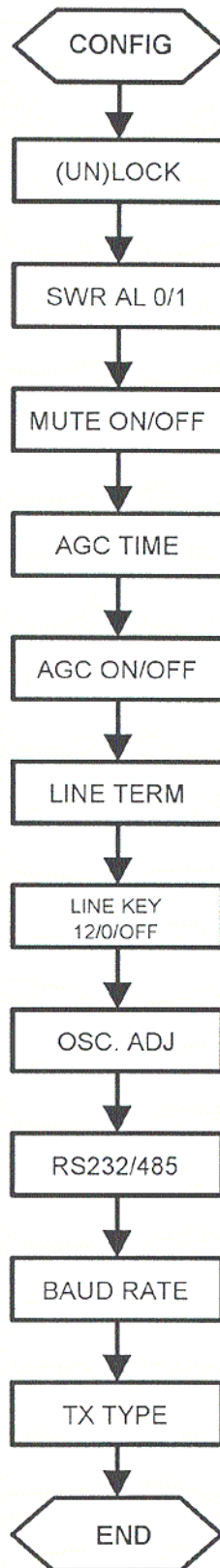
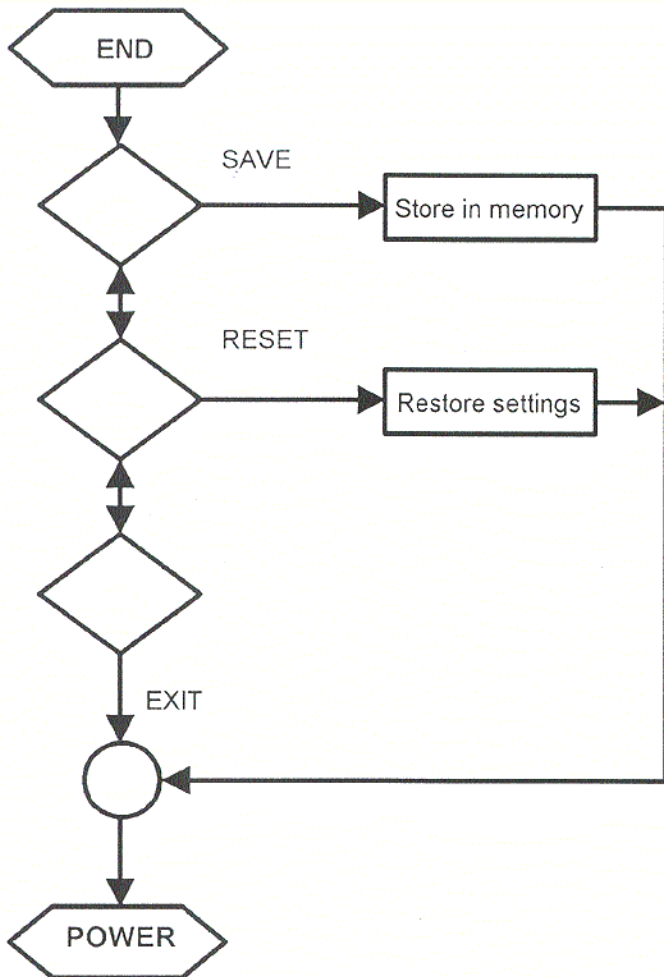
This menu lets the user exit by saving the changes he has done, restore to preset values or exit without saving changes. This submenu is common to the settings menu and the configuration menu. A more thorough explanation is found in chapter 4.3.9.

5.4.13 MENU FLOWCHART

Menu for TA7450



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TAC SYSTEMS INC.
 FCC ID: I32TA-7450
 JOB #: 162U0
 EXHIBIT #: 99

5.5 Remote Operation

5.5.1 Introduction

When using the remote control DRC, the functions in the transmitter can be controlled from this unit.

The radio can also be used with a simpler remote control, one that only use one line for keying and audio (ARC).

The transmitter TA-7450/25/10 allows line loop keying (phantom keying) on the remote line for this purpose.

With the RCU unit it is possible to control the radio with a standard IBM compatible personal computer using special RACS software and a RS-485 interface.

5.6 Remote Data Interface

The data on the RS-232/RS-485 bus is transferred both ways with a data rate of 1200 b/s, using 9 bit data format, and 1 stop bit.

A command to the radio is terminated with an address byte. The first byte is an unique address, the second is the command and the next two are parameters. The radio detects the first data byte and compares it with its unique address if and only if the parity bit of the byte is set high. The data- and parameter bytes are transferred with the parity bit set low. Finally the command is terminated with the address once more, with parity bit set high.

DATA FORMAT to equipment:

<ADDRESS (parity high)> <COMMAND (parity low)> <PARAM1 (parity low)>
<PARAM2 (parity low)><ADDRESS(parity high)>

DATA FORMAT from equipment:

<ADDRESS (parity low)> <COMMAND (parity low)> <PARAM1 (parity low)>
<PARAM2 (parity low)> <PARAM n (parity low)>
<ADDRESS(parity high)

<ADR¹> means address with parity high.

Computation of checksum:

All bytes are added together except address, command and the checksum itself. The 8 least significant bits are used as checksum.

For samples and listing of available commands, refer to the document:

REMOTE SYSTEM, SERIAL COMMANDS AND PROTOCOL.

The document is available from JOTRON ELECTRONICS.

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