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TRON TR20 PLUS



TRON TR20 GMDSS



# Users Manual

## Handheld VHF Radios

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**your safety – our concern**



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**CE 0434 (TR20 PLUS)**

EC Declaration of Conform, available at [www.jotron.com](http://www.jotron.com)

The equipment complies with the following Directives:

R&TTE 1999/5/EC

EMC 89/336/EEC

LVD 73/23/EEC

Harmonized Standards applied in order to verify compliance with the Directive(s):

ETS 300 225: 1998

EN 300 828: 1998

EN 301 178-1: 2000

EN 301 178-2: 2000

EN 60950: 1992

The information in this book has been carefully checked and is believed to be accurate. However, no responsibility is assumed for inaccuracies.



**CAUTION!**

This equipment contains CMOS integrated circuits. Observe handling precautions to avoid static discharges which may damage these devices.

JOTRON electronics a.s reserves the right to make changes without further notice to any products or modules described herein to improve reliability, function or design. JOTRON electronic a.s does not assume any liability arising out of the application or use of the described product.





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## GLOSSARY

### C O S P A S

Cosmicheskaya Sistyema Poiska Avariynich Sudov

(Space System for the Search of Vessels in Distress)

### S A R S A T

Search and Rescue Satellite-Aided Tracking System

**EPIRB**      Emergency Position Indicating Radio Beacon

**LUT**        Local User Terminal (Ground Station)

**MCC**        Mission Control Center

**RCC**        Rescue Coordination Center

**km**         kilometer

**MHz**        Mega-Hertz (10<sup>6</sup> Hertz)

**GPS**        Global Position System



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## BATTERY SAFETY DATA SHEET

(Form: EEC directive 91/155)

### (2) SAFETY ADVICE

- S2 Keep out of reach from children.
- S8 Keep container dry.
- S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S43 In case of fire, use D type extinguishers. Never use water.
- S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

### (3) FIRST AID MEASURES

In case of contact of cell contents with eyes, flush immediately with water for 15 min. With skin, wash with plenty of water and take off contaminated clothes. If inhalation, remove from exposure, give oxygen, seek medical advice.

### (4) FIRE-FIGHTING MEASURES

#### **Extinguishing media**

Suitable: Type D fire extinguishers

Not to be used: Water - CO<sup>2</sup> - Halon, dry chemical or foam extinguishers

#### **Special exposure hazards**

Generation of chlorine, sulfur dioxide, disulfur dichloride during thermal decomposition.

#### **Special protective equipment**

Use protective working boots, rubber apron and safety glasses with side shields.



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## **Instructions for keeping the Radio Log and the radio operators obligation according to national and international regulation.**

1. The radio log shall be kept in accordance with requirements in the Radio Regulations, SOLAS Convention, national regulations regarding radio installations and the STCW Convention (STCW 95 including the STCW Code) including relevant regulation regarding watchkeeping on board passenger- and cargo ships.
2. Unauthorized transmissions and incidents of harmful interference should, if possible, be identified, recorded in the radio log and brought to the attention of the Administration in compliance with the Radio Regulations, together with an appropriate extract from the radio log. (STCW Code B-VIII/2 No. 32).

## **Test of radio equipment and reserve source of energy.**

### Weekly:

GMDSS handheld VHF transceivers to be tested without using the mandatory required emergency batteries.







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## DISTRESS PROCEDURE FOR MARITIME VHF

START	USE CHANNEL 16, FULL POWER
DISTRESS	MAYDAY MAYDAY MAYDAY
CALL	THIS IS The call sign, or other identification of the vessel in distress, spoken 3 times
DISTRESS	MAYDAY
MESSAGE	The name, or other identification of the vessel in distress

- THE POSITION OF THE VESSEL
- THE NATURE OF DISTRESS
- THE KIND OF ASSISTANCE REQUIRED
- OTHER USEFUL INFORMATION

Write down the distress message. Speak slowly and distinctly.

<b>A</b> ALFA	<b>G</b> GOLF	<b>M</b> MIKE	<b>S</b> SIERRA	<b>Y</b> YANKEE
<b>B</b> BRAVO	<b>H</b> HOTEL	<b>N</b> NOVEMBER	<b>T</b> TANGO	<b>Z</b> ZULU
<b>C</b> CHARLIE	<b>I</b> INDIA	<b>O</b> OSCAR	<b>U</b> UNIFORM	<b>Æ</b> ÆGIR
<b>D</b> DELTA	<b>J</b> JULIETT	<b>P</b> PAPA	<b>V</b> VICTOR	<b>Ø</b> ØRNULF
<b>E</b> ECHO	<b>K</b> KILO	<b>Q</b> QUEBEC	<b>W</b> WHISKEY	<b>Å</b> ÅGOT
<b>F</b> FOXTROT	<b>L</b> LIMA	<b>R</b> ROMEO	<b>X</b> X-RAY	





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# 1 GENERAL

## 1.1 INTRODUCTION

The JOTRON Tron TR20 comes in two versions, Tron TR20 GMDSS and Tron TR20 PLUS. Tron TR20 GMDSS is specially designed for GMDSS applications. It conforms to ETS 300 225 standard and is waterproof to IP67. The housing is made from glassreinforced polycarbonate in a highly visible colour.

Tron TR20 PLUS is designed for commercial and leisure use and conforms to the EN 301 178 standard. This version is equipped with connectors for use of external headset and/or microphone. IP rating on this version is IP54. The housing is made in the same material as the Tron TR20 GMDSS, but the colour is dark grey as opposed to the orange GMDSS version.

## 1.2 FEATURES

### **Watertight**

Tron TR20 GMDSS is watertight to a depth of 1 metre (IP67).

Tron TR20 PLUS is spray proof (IP 54).

### **Rugged design**

Tron TR20 is made to resist a drop from 1 metre onto a hard surface. It is also resistant to seawater, oil and sunlight.

### **Handling**

Tron TR20 is made for easy operation, with a brief operating instruction printed on the rear. It is possible to fully operate Tron TR20 with one hand, even when wearing gloves. Both display and keys have integrated backlighting to ease operation in low light conditions.

### **Housing**

Tron TR20 is of small size (62mm x 160mm x 41mm), and has no sharp edges to damage raft or clothing. Belt clip is standard, wrist strap (standard for GMDSS) and carrier case are available options.



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### **Low power consumption**

Tron TR20 has low power consumption and with transmit, receive and standby ratio of 1: 1: 8 the battery lifetime is exceeding 8 hours with Lithium battery.

### **Graphical display**

Tron TR20 is equipped with a high contrast graphical display with built in backlight for clear indication of the radios settings.

### **Service**

Handheld VHF service is available through the Jotron worldwide service network. See details on [www.jotron.com](http://www.jotron.com).

## **1.3 LICENSING**

Prior to use please check your national requirements for the operators of VHF radios and also that your radio will conform to local regulations before use. Regulations for VHF radios may vary from country to country.

## **1.4 GETTING STARTED**

Congratulation on your JOTRON Tron TR20 purchase.

To ensure this unit gives trouble free performance from the outset, please adhere to the following safeguards; Read this User manual fully to familiarise yourself with the equipments functions and facilities.

Connect the antenna before use and charge the battery fully before connecting to the equipment.

Follow this manuals menu selection and set the battery option being used on the equipment to ensure the battery state indicator gives a true reading.

Follow the menu selection and set the squelch such that the background noise just disappears when in receive mode.



## 2 OPERATION

### 2.1 CONTROLS

Fig. 2.1 shows the location of different controls and facilities of the Tron TR20:

- 1 - PTT (Push To Talk)
- 2 - Up
- 3 - Menu
- 4 - Channel
- Scan (TRON TR20 PLUS only)
- 5 - High / Low power
- 6 - Channel 16
- 7 - Battery release
- 8 - ON / OFF
- 9 - Down
- 10 - Squelch
- 11 - Enter DW/TW
- 12 - Auxiliary connector (TRON TR20 PLUS only)
- 13 - Antenna



Fig. 2.1



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## 2.2 AUXILIARY CONNECTOR

The auxiliary connector on the Tron TR20 PLUS enables the user to connect an external microphone or headset.

- 1- Mic ground
- 2- Mic
- 3- Speaker
- 4- Speaker ground

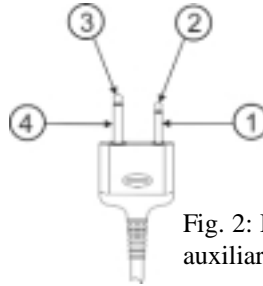


Fig. 2: Drawing of auxiliary connector

## 2.3 ANTENNA

The antenna for Tron TR20 is fitted with a standard SMA connector. A remote antenna can be connected for fixed applications.

## 2.4 BASIC OPERATION

### **On/Off**

Press this key (8) to switch on or off.

To switch off, the key must be pressed for approx. 2 seconds.

This is to prevent accidental power off.

### **Transmit**

Press the PTT key (1) to transmit.



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## **Adjusting the volume**

To adjust the volume, press the Up (2) or Down (9) key. Unless any other function is selected, the Up and Down keys will always function as the volume control. To return to volume adjustment from channel or squelch adjustment, press the «Enter» (11) key.

## **Squelch adjustment**

To adjust the squelch, press the SQ (10) key and use the arrow keys to adjust the threshold. When finished, press the enter key to return to default menu (volume). There is also a time out which automatically returns the radio to the default menu after approx 10 seconds.

## **Channel select**

To select a different channel, press the CH (4) key and use the arrow keys to select the required channel. To default menu, press «Enter» (11). Please refer to section 8 for complete docs on channel setup.

Pressing the red channel 16 (6) key will make the radio switch directly to channel 16.

## **Key lock**

To prevent accidental operation of the keypad, the unit is equipped with a key lock. To enable the key lock, press «Menu» (3) and «Up» (2) simultaneously and hold for 1 sec.

The same sequence will unlock the keys. When the key lock is activated a key symbol is seen on the display.

The «PTT» and «16» key will function even if the key lock is enabled.



## 2.5 PRACTICAL USE, VHF TRANSMISSION RANGE

The range of VHF communications is limited to «line of sight», because the VHF radio waves are travelling in straight lines. A higher position of the transceiver will then increase the coverage. This applies both to the receiving and transmitting end.

**Some figures are indicated in the table below:**

Table 2.1

		Transmitter – Location 1			
		1m mast	9m mast	30m mast	
Receiver – Location 2	1m mast	Nautical miles	4.3	7.0 – 8.6	10.8 – 14.0
		Miles	5.0	8.1 – 9.9	12.4 – 16.2
	9m mast	Nautical miles	7.0 – 8.6	10.8	24.8 – 28.6
		Miles	8.1 – 9.9	12.4	28.6 – 33.0
	30m mast	Nautical miles	10.8 – 14.0	24.8 – 29.0	47.0
		Miles	12.4 – 16.2	28.6 – 33.0	54.0

1 Nautical mile = 1852 Meters = 1.1508 Miles

1 Statute mile = 1.609 Kilometres

This indicates that with a handheld VHF, used at sea level, the range will be approx 8 Km (5 Miles). The range will increase if the height above sea level increases, and also if the other user in the other end is at a higher level





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## 3 BATTERY

### 3.1 BATTERY REMOVAL AND REPLACEMENT

To release the battery, press both battery release clips and gently pull the battery away from the radio.

To replace the battery, slide the battery into position, and make sure the battery clips fully engage.

Note! The radio is not watertight without the battery in place!



Fig. 3



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## 3.2 PRIMARY BATTERY

### 3.2.1 DESCRIPTION

The primary battery unit is a 7.2V / 2200mAh lithium battery. This unit is specially designed for GMDSS emergency use to preserve a long shelf- and operating-life.

This battery cannot be recharged.

Type no. of battery: 80060  
Colour: Orange

### 3.2.2 WHEN TO CHANGE BATTERY

Replace the lithium battery before expiry date. The lithium battery pack has a shelf life of 5 years. If Tron TR20 is indicating low voltage during normal use, the lithium battery will have to be replaced. Please refer to section 3.1 for battery replacement.

To prevent the possibility of being in an emergency situation with a Tron TR20 equipped with a used battery, we strongly recommend storing an extra battery, in lifeboats and rafts. Store this battery without breaking the sealing.

### 3.2.3 SPECIAL CARE

The primary battery is of a high-energy lithium type, and some precautions must be taken. Do not heat above 70°C, recharge, crush, disassemble or incinerate. This may result in fire, explosion and severe burn hazard.

Do not throw used batteries overboard, but return them to your local dealer.



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## 3.3 SECONDARY BATTERY AND CHARGER

### 3.3.1 USING THE NIMH BATTERY

Tron TR20 can be delivered with a rechargeable NiMH battery. This battery has a capacity of 7.2V / 1500mAh. The battery is supplied uncharged and must be charged before use.

Type no. of battery:           80059

Colour:                         Dark grey

After recharging the battery, it can be used in the same way as the primary battery unit. The battery condition indicator on the main display shows the approximate status of the battery's charging condition, and will indicate when it is time for recharging.

For correct battery status indication, ensure that the type of battery in use must be selected. See chap. 4.3.8

Please refer to section 3.1 for battery replacement.



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### 3.3.2 CHARGING THE BATTERY

The charger RCH-20 is a dual slot quick charger. The charger will accept a complete radio or the battery alone (see fig 4). If two batteries are present, the charger will automatically start fast charging the second battery when the first battery is fully charged. The first battery will then be trickle charged to keep it fully charged.

The charger will charge a fully discharged battery in approx. 3.5 hours.



Fig. 4

The charger operates from 12 – 24VDC or from 115 / 230VAC using an appropriate adapter. See section 9, Spare parts and accessories.

When using DC supply, the DC cable (80084) should be used. The connector is a standard 5.5mm AC adaptor type.



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To prevent problems with wrong polarity the RCH-20 is designed to be independent of the power supply polarity.

The charger has two LED indicators, one for each battery. They have the following functions:

Flashing orange	-	No battery detected
Flashing red	-	Battery detected, trickle charging
Continuous red	-	Fast charging
Continuous green-		Battery fully charged

### 3.4 NOTES ON CHARGING

The battery pack, 80059, is of NiMH type. To get the most out of your battery pack, a few precautions should be taken.

- Always charge the battery to full charge when charging.
- All rechargeable batteries lose charge while stored. The rate is dependent on the temperature. When stored at 25°C a fully charged battery will have more than 50% capacity after a few months, while at 45°C it might be down at 50% after approx one month.
- Although it is possible to charge the battery while the Tron TR20 is switched on it is recommended to charge with the radio switched off. Otherwise the current consumption of the radio may confuse the charger to terminate before full charge is reached.



- 
- If the battery has been totally discharged (below the Tron TR20 switch off threshold), or stored for a long time, the charger may terminate before full charge is reached.

In this case do as follows:

- Insert the battery and charge for a few minutes.
  - Discharge the battery by inserting it into the radio, and press PTT a few times.
  - Start charging.
- 
- Never short-circuit, solder, reverse charge, crush, disassemble or incinerate. This may result in fire, explosion and severe burn hazard.
- 
- Avoid charging under 0°C or over 40°C.



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## 4 CONFIGURING THE TRON TR20

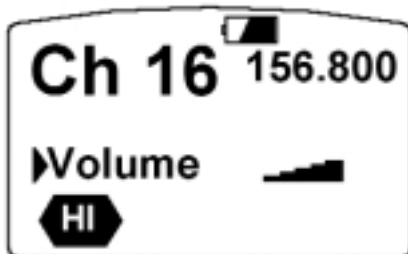
The operation of Tron TR20 is based on function keys and menus. The display indicates the chosen function by an arrow. To return to standard screen after operating the function keys, press «Enter»(11). To return to standard screen after entering the menus, press «Menu»(3).

### 4.1 STANDARD SCREEN

This is the standard/default screen for the Tron TR20. The display returns to this mode after a break of more than 10 sec.

In this mode the arrow buttons (2&9) adjusts the volume and the display gives a graphical volume indication.

The selected channel is indicated with channel number and frequency. The condition of the battery is indicated graphically at the top of the display and the symbol «HI» indicates that the transmitter is set to high output power.





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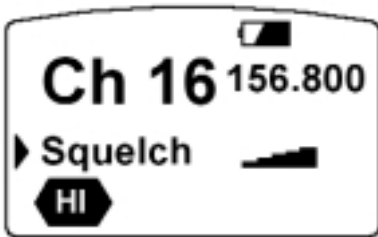
## 4.2 FUNCTION KEYS

### Channel selection - CH



To select the working channel, press the button «CH»(4). The channel is selected by pressing the arrow buttons (2&9).

### Squelch - SQ



To adjust the squelch level, press the button «SQ»(10). The level is adjusted by pressing the arrow buttons (2&9), and the display gives a graphical indication of the level.

### High and low output - Hi/Lo



The «Hi/Lo»(5) button select between high and low output. When high output is selected «HI» is indicated on the display. When low output is selected there is no indication on the display.



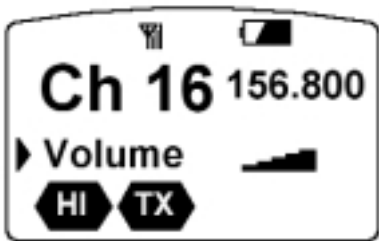


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## Channel 16

By pressing the red “16”(6) key, the Tron TR20 will enter channel 16. When on channel 16, PTT will function even if the key lock is enabled.

### TX Channel 16



Default display on Tron TR20 during transmit.

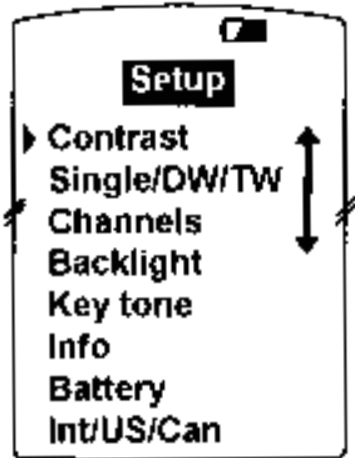
### RX Channel 16



When the Tron TR20 receive a signal the symbol «RX» is indicated in the display



## 4.3 MAIN MENU

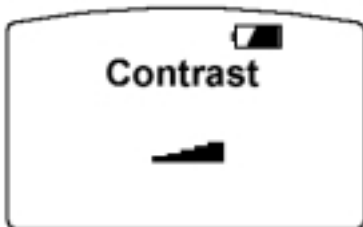


When the «Menu»(3) key is pressed the operator has access to the main menu.

The menu will scroll when pressing the arrow keys (2&9). When the arrow is pointing at the required parameter, press enter (11) to select.

Press "Menu"(3) to return to the standard screen.

### 4.3.1 CONTRAST



The contrast is adjusted by pressing the arrow buttons (2&9). The display gives a graphical indication of the level.



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### 4.3.2 SINGLE / DW / TW

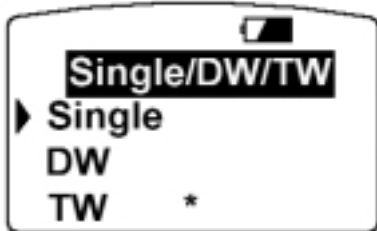
This feature enables Tron TR20 to check for signals at one, two or three channels simultaneously. Single means normal operation at one channel (the working channel).

Dual Watch (DW) means that the radio is listening at the working channel and at channel 16 simultaneously.

Triple Watch (TW) means that the radio is listening at the working channel, at channel 16 and at a third user selectable channel simultaneously.

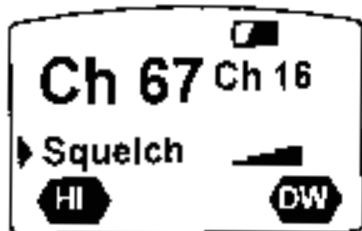
### SETUP OF DW

Press the Menu (3) Key and select Single/DW/TW



Use the arrow keys (2&9) to move the cursor to DW, and press Enter (11).

Press Menu (3) to return to the main display.



The working channel will then be displayed with large figures in the left part of the display, and channel 16 in the right part of the display.



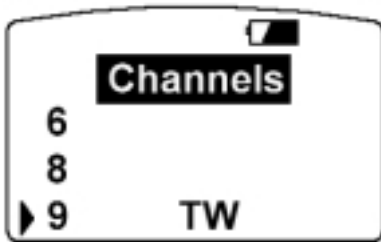
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The working channel can be changed at any time by pressing the «CH» (4) key and using the arrow keys (2&9) to select channel and then “Enter” (11) to confirm (ref 4.2).

## SETUP OF TW

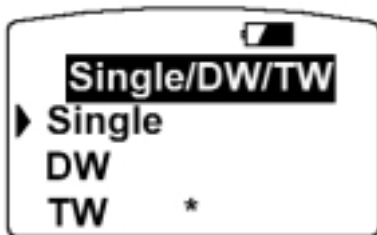
First we have to select the third watch channel.

Press the Menu (3) Key and select Channels.



Use the arrow keys (2&9) to move the cursor to the wanted channel and press «Enter» (11) for one second to select. TW will then be displayed next to the selected channel. Press «Menu» (3) to return to the main display.

Press the Menu (3) Key and select Single/DW/TW



Use the arrow keys (2&9) to move the cursor to TW, and press Enter (11).

Press Menu (3) to return to the main display.



The working channel will then be displayed with large figures in the left part of the display, channel 16 and the third watch channel in the right part of the display.

TW will then be indicated in the lower right corner of the display.

The working channel can be changed at any time by pressing the «CH» (4) key and using the arrow keys (2&9) to select channel and then «Enter» (11) to confirm (ref 4.2).

### **Switching DW/TW on and off.**

When double or triple watch is selected, DW or TW is turned on and off by pressing the «Enter» (11) key. When activated, «DW» or «TW» is indicated in the display.

When the Tron TR20 is in DW or TW and receives a signal, the channel number being received will be displayed on the left side of the display. If the «Enter» (11) key is pressed while receiving a signal, the Tron TR20 will switch to single watch and be able to transmit at the same channel.

To return to the original DW/TW setup, press «Enter»(11) again.

### **Note!**

The radio is not able to transmit when it is set to double or triple watch. To transmit, DW/TW has to be turned off by pressing the «Enter»(11) key.

However, if channel 16 is selected it is always possible to transmit, regardless of the DW/TW setting.



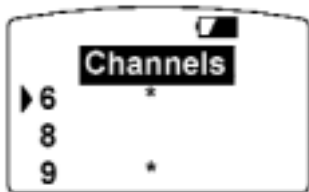
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### 4.3.3 PERSONAL CHANNELS (TR20 PLUS ONLY)

Under this menu item it is possible to select personal channels. If any personal channels are selected, a «P» is indicated in the upper right corner of the display. Using the «CH» (4) and the arrow keys (2&9) will then scroll through only the personal channels. If no personal channels are selected, all channels can be selected via the «CH» key.

#### **How to deselect personal channels:**

Use arrow keys (2&9) to move to the selected channel that are marked with an asterisk. Press "ENTER" to deselect channel. Deselecting of CH16 is only possible when all personal channels are deselected.



To select personal channels, enter the channel menu and use the arrow keys (2&9) to select channels. Pressing «Enter» (11) will select them as personal channels. Any number of channels can be selected. When finished, press the «Menu» key (3).  
**Note!** Personal channel selection is not available on the Tron TR20 GMDSS version.

### 4.3.4 SCANNING (TR20 PLUS ONLY)

Scanning of channels will be initiated by pressing the "CH" button for more than 1 second. If personal channels are selected (look for "P" in upper right corner of the display) they are the only channels that will be scanned. Otherwise all channels will be scanned.

The scanning function can be stopped in two ways. Pressing the "CH" button stop the scanning and return to your working channel. Pressing the "Enter" button stop the scanning at the previous channel.

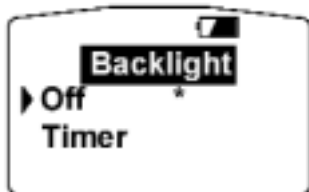
#### **NOTE!**

The "PTT" button are disabled during scanning. Scanning must be stopped before the radio can transmit. The receiver power consumption is doubled during scanning.



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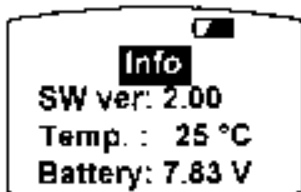
### 4.3.5 BACKLIGHT



Under this menu it is possible to switch the backlight on or off.

**Note!** On Tron TR20 GMDSS it is not possible to select «Off».

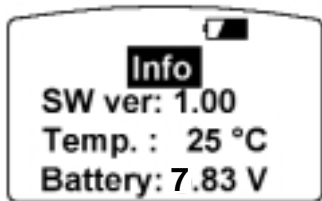
### 4.3.6 KEY TONE



Under this menu item the key tone (beep) can be selected between high pitch, low pitch or switched off.

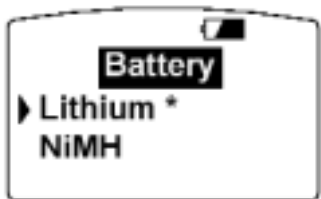


### 4.3.7 INFO



Information on software version, temperature and battery status.

### 4.3.8 BATTERY



To ensure correct battery status indication, the type of battery in use must be selected.

### 4.3.9 SELECT INTERNATIONAL, US OR CANADIAN CHANNEL SETS (TR20 PLUS ONLY)

There are three different channel sets incorporated in the Tron TR20 Plus. Those are the International with 35 duplex and 19 simplex channels, the US with 12 duplex and 39 simplex channels and Canada with 19 duplex and 38 simplex channels (See chapter 10 for complete listing).

**Press the Menu (3) and select "Int/US/Can"**

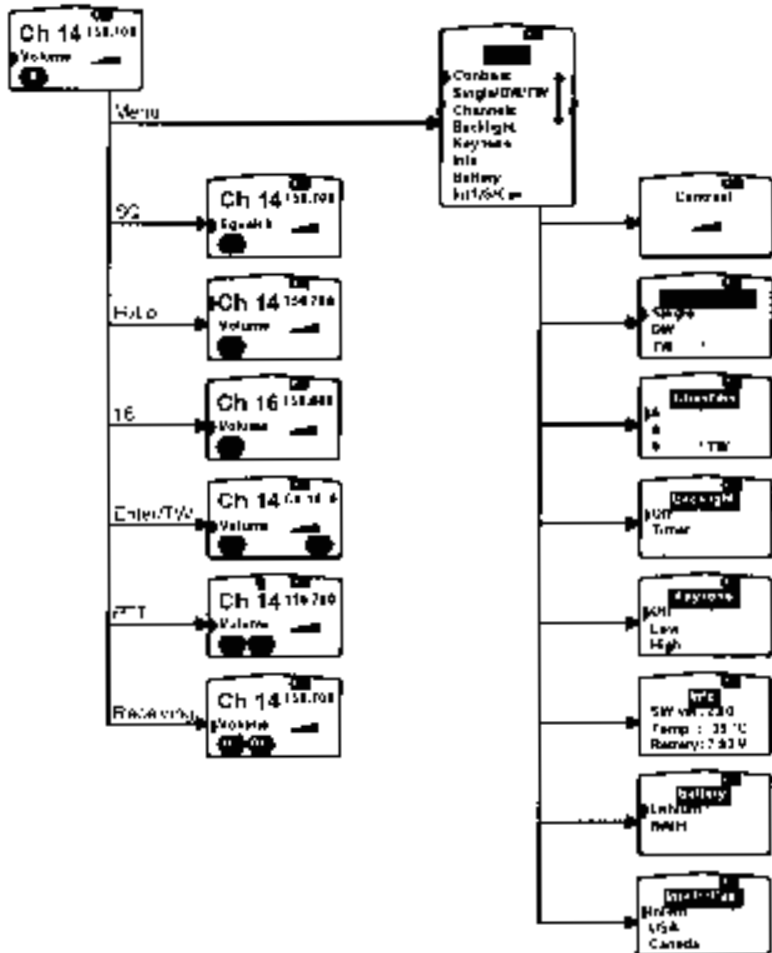


Use the arrow keys (2 & 9) to move to the wanted channel set, and press Enter (11). If the International channel set is selected, there is no indication on the display. If the USA channel set is selected, a "US" is written in the right upper corner of the display. If the Canadian channels set is selected, "CA" is written in the right upper corner of the display.





## 5 MENU FLOWCHART





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## 6 MAINTENANCE

### 6.1 HOW TO TAKE CARE OF YOUR TRON TR20

Tron TR20 is constructed to endure the rough maritime environment. Still the life is dependent on taking care of the equipment. It is a good practice to regularly inspect and test the equipment to detect error symptoms and prevent more serious problems.

#### **To keep in mind during inspection:**

- If Tron TR20 has been immersed into seawater, it is good practice to clean it in fresh water.
- Inspect battery connection pins, the gasket and the locking/release device.
- Inspect the housing for defects, which can affect the water sealing.

### 6.2 REGULAR TEST PROCEDURE

It is important to perform regular testing to ensure proper operation in case of a distress situation. If Tron TR20 is used regularly, perform test every month. When Tron TR20 is stored in a lifeboat or raft, perform test at least once a year. In order to avoid using a sealed lithium battery, we recommend keeping one battery available for this purpose.

#### **Regular test procedure:**

Step	Item	Description
1	Housing	Check the housing for mechanical defects and and keys check that all keys are in good working order.
2	Battery	Check the battery status indicator and charge or change battery if needed.
3	Transmit	Check that the Tx indicator is visible when transmitting. The Tx indicator indicates that carrier is produced at the antenna output.
4	Communications	Communicate with another radio-telephone to test test receive and transmit functions.

### 6.3 CLEANING OF DIRT AND OIL

To clean away oil and dirt from the radio, use ordinary dish-soap and water. The water temperature can be up to 45°C. Finish of by rinsing with fresh water.



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## 7 TROUBLESHOOTING

### 7.1 SERVICE AND WARRANTY

Your radio should seldom require service or repair.  
The unit is guaranteed for 1 year from date of retail sale.

Before shipping Tron TR20 for repair, please check the fundamental procedures on operation and battery condition.

If repair is necessary please contact the nearest JOTRON agent.

#### **IMPORTANT!**

The Tron TR20 is a sealed waterproof radio and there are no user serviceable parts inside. It must never be opened, except by authorised JOTRON agents.  
Unauthorised disassembly will invalidate the warranty.

See the next chapter for failure diagnosis. This may be of help when discussing problems with a JOTRON agent.



## 7.2 GUIDE TO TROUBLESHOOTING

### Troubleshooting steps:

Problem	Possible causes	Possible solutions
No indication on display	Battery is discharged.	Charge or change battery package.
You know there is a signal coming, but Tron TR20 is not responding.	a) Squelch is muting. b) Failure in receiver.	a) Adjust squelch to 0. b) An authorised agent must service the unit.
Tx indicator is on during transmitting but communication is impossible.	Use of wrong channel number.	Use same channel number as partner station.
E1 is indicated on the display.	Frequency synthesizer is out of lock.	a) Try a reset by switching power OFF. b) Failure in frequency synthesizer. An authorised agent must service the unit.
Tx indicator is not responding during transmitting, and/or E2 is displayed	a) DW or TW enabled b) Failure in transmitter.	a) Switch DW/TW off b) An authorised agent must service the unit.
Can't change to desired channel (TR20 PLUS)	a) personal channels is selected b) Not programmed channel from factory or agent.	a) Press "Menu-> Channels" and deselect the marked channels. IMPORTANT! Deselect all, but CH16 and then deselect CH16 as the last channel. This is because selection of CH16 is always done when you select one or more channels in this menu. b) Your sales representative can program custom channels wanted, if allowed by the local authorities.
Battery indicator only 30% after full re-charge	Battery indicator set to lithium, when NiMH battery is in use.	Change to correct battery type. See chap. 4.3.8



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## 8 SPECIFICATIONS

### General

Frequency range:	154 – 163 MHz
Channel spacing:	25kHz (12.5kHz optional)
Operating temperature range:	-20 to +55°C.
Battery life:	> 8 hours (Lithium battery, 2W power output, 10-10-80) > 7 hours (1500mAh NiMH battery, 5W power output, 5-5-90)

Antenna connector:	SMA
Microphone connector:	2.5mm jack (Tron TR20 PLUS)
Headset connector:	3.5mm jack (Tron TR20 PLUS)
AF output power internal:	>200mW.
AF output power external:	>100mW.
Size:	62mm wide x 160mm height x 41mm depth
Weight:	Approx. 420g with NiMH battery Approx. 350g with Lithium battery

### Receiver

Maximum usable sensitivity:	< 1 $\mu$ V for 20dB SINAD
Adjacent channel rejection:	> 70dB
Blocking:	> 90dB
Spurious response:	> 70dB
Harmonic distortion:	< 5%
Intermodulation rejection:	> 68dB

### Transmitter

RF output power:	1W (Lo) / 5 W (Hi) Tron TR20 PLUS 1W (Lo) / 2 W (Hi) Tron TR20 GMDSS
Harmonics and spurious:	< 0.25 $\mu$ W
Frequency error:	< $\pm$ 1.5kHz
Adjacent channel power:	< -70dBc

### Charger

Dual slot fast charger with trickle charging.	
Operates on 12 –24 DC, or 115/230VAC with external mains adapter.	
Wall and table mountable.	
Size:	155mm wide x 69mm height x 83mm depth
Weight:	Approx. 300g



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## 9 SPARE PARTS AND ACCESSORIES

<b>P/N</b>	<b>Description</b>
• 99930	Tron TR-20 GMDSS, transceiver only
• 99900	Tron TR-20 PLUS, transceiver only
• 80060	Lithium battery, not rechargeable.
• 80059	NiMH 7.2V, 1500mAh rechargeable battery pack
• 99920	Dual slot fast charger for 80059 batteries.
• 80080	Mains adapter for 99920 EURO style
• 80081	Mains adapter for 99920 UK style
• 80082	Mains adapter for 99920 US style
• 80084	DC cable for 99920 (12 – 24 VDC operation)
• 99880	Spare antenna
• 80083	Wrist strap
• 80085	Fist Microphone
• 80364	Carrier case



## 10 MARITIME VHF CHANNELS

Channel Designators	TX	Int. RX	USA RX	CAN RX	GMDSS channels
60	156.025	160.625	156.025	160.625	
1	156.050	160.650	156.050	160.650	
61	156.075	160.675	156.075	156.075	
2	156.100	160.700	156.100	160.700	
62	156.125	160.725	156.125	156.125	
3	156.150	160.750	156.150	160.750	
63	156.175	160.775	156.175	160.775	
4	156.200	160.800	156.200	156.200	
64	156.225	160.825	156.225	160.825	
5	156.250	160.850	156.250	156.250	
65	156.275	160.875	156.275	156.275	
6	156.300	156.300	156.300	156.300	*
66	156.325	160.925	156.325	156.325	
7	156.350	160.950	156.350	156.350	
67	156.375	156.375	156.375	156.375	*
8	156.400	156.400	156.400	156.400	*
68	156.425	156.425	156.425	156.425	*
9	156.450	156.450	156.450	156.450	*
69	156.475	156.475	156.475	156.475	*
10	156.500	156.500	156.500	156.500	*
70	-	-	-	-	DSC
11	156.550	156.550	156.550	156.550	*
71	156.575	156.575	156.575	156.575	*
12	156.600	156.600	156.600	156.600	*
72	156.625	156.625	156.625	156.625	*
13	156.650	156.650	156.650	156.650	*
73	156.675	156.675	156.675	156.675	*
14	156.700	156.700	156.700	156.700	*
74	156.725	156.725	156.725	156.725	*
15	156.750	156.750	156.750	156.750	*
75	-	156.775	156.775		
16	156.800	156.800	156.800	156.800	*
76	-	156.825	156.825		
M	157.850	157.850	-		
M2	161.425	161.425	-		



<b>Channel Designators</b>	<b>TX</b>	<b>Int. RX</b>	<b>USA RX</b>	<b>CAN RX</b>	<b>GMDSS channels</b>
17	156.850	156.850	156.850	156.850	*
77	156.875	156.875	156.875	156.875	*
18	156.900	161.500	156.900	156.900	
78	156.925	161.525	156.925	156.925	
19	156.950	161.550	156.950	156.950	
79	156.975	161.575	156.975	156.975	
20	157.000	161.600	161.600	161.600	
80	157.025	161.625	157.025	157.025	
21	157.050	161.650	157.050	161.650	
81	157.075	161.675	157.075	157.075	
22	157.100	161.700	157.100	157.100	
82	157.125	161.725	157.125	157.125	
23	157.150	161.750	157.150	161.750	
83	157.175	161.775	157.175	161.775	
24	157.200	161.800	161.800	161.800	
84	157.225	161.825	161.825	161.825	
25	157.250	161.850	161.850	161.850	
85	157.275	161.875	161.875	161.875	
26	157.300	161.900	161.900	161.900	
86	157.325	161.925	161.925	161.925	
27	157.350	161.950	161.950	161.950	
87	157.375	161.975	161.975	161.975	
28	157.400	162.000	162.000	162.000	
88	157.425	162.025	157.425	162.025	
29	-	-	157.450		
WX01	-	-	162.550		
WX02	-	-	162.400		
WX03	-	-	162.475		
WX04	-	-	162.425		
WX05	-	-	162.450		
WX06	-	-	162.500		
WX07	-	-	162.525		

The Jotron agent can insert additionally 20 national channels.





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