

Albrecht[®]

UltraForce

Amateur 10 m

Transceiver



OPERATING MANUAL

2005 Edition

ALAN Electronics GmbH
www.albrecht-online.de
www.alan-germany.de

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European Warranty Conditions

Your distributor, where You have purchased this radio warrants this product to be free of defects for a period of two (2) years from the original date of purchase. This warranty is non-transferable. This warranty is subject to repair or replacement of defective components only. This warranty is void if the radio has been tampered with or misused. Whenever Your radio should become defective during the warranty period, please contact Your dealer and ask him for his service proceedings. The distributor or dealer may repair the radio, replace it or arrange repair by an authorised Albrecht / ALAN Service subcontractor. Addresses of authorised service subcontractors will be also available from www.hobbyradio.de/service-anschriften.htm

IMPORTANT: RETAIN YOUR SALES RECEIPT

Please keep your sales receipt of the purchase and send this or a copy of this together with the radio for any repair during the warranty period. If the sales receipt or it's copy is not enclosed, the radio cannot be repaired under the warranty conditions.

INTRODUCTION

Congratulations on your purchase of this **Albrecht UltraForce** 10 meter FM/AM/SSB/CW transceiver. Your transceiver is designed to provide years of enjoyment and trouble-free service. There are many features and functions designed into this transceiver. To ensure that your investment is enjoyed to it's fullest extent please take a few moments and thoroughly read this manual.

Your UltraForce amateur radio transceiver is a microprocessor controlled, user programmable radio combining both high RF performance with a user-friendly environment. The radio is built rugged to withstand years of use in harsh mobile environments. Although engineered with mobile use in mind the radio, with the addition of a high quality 10 Amp regulated power supply, may be easily adapted to fixed station operation.

Some of the features of the UltraForce are:

- an advanced design liquid crystal display that provides the operator with a full visual account of the transceivers operating status,
- automatic frequency scanning from either the front panel or microphone, memory storage of your favorite frequencies,
- programmable frequency resolution of either 1 kHz, 10 kHz or 100 kHz, and split (offset) frequency operation for repeater use.

These are just a few of the features that make the UltraForce a pleasure to own and operate.

IMPORTANT: The UltraForce is designed for entry level amateur use. The transmitter of this radio can be operated in most countries of the world only with a valid amateur radio operator's licence.

If you are studying for your license and want to familiarize yourself with the operation of the radio, the receiver may be operated with or without a licensed operator present under the condition, that essential parts of the transmit section have been made temporarily inoperable. Under no circumstances it is allowed to use this amateur radio as "CB-Transceiver". Even licensed amateur radio operators are not allowed to use this transceiver for CB radio purposes. The regulations require that a dedicated notified or approved CB transceiver will be used for CB radio purposes.

For more information regarding amateur licensing, contact your nearest amateur radio dealer, or for complete details contact one of the world-wide amateur radio clubs, e.g. in Germany the "DARC-eV". You can also find more informations via www.darc.de

INSTALLATION

1. Contents

Unpack and inspect your UltraForce for missing or damaged components. Your UltraForce includes the following items:

- UltraForce Transceiver
- Up / Down Microphone
- Mounting Bracket and Installation Hardware
- Power Cord
- Operating Manual

Install the UltraForce

Choose a location where there is easy access to all front panel controls and air circulation available to the rear panel and aluminum heatsink. Do not install the transceiver in any compartment that restricts airflow. Attach the mounting bracket to the vehicle first then mount the transceiver to the bracket. If the rear panel is not easily accessible you may want to attach the power cord and antenna feed line prior to mounting.

Make Electrical Connections

The transceiver is designed to work on any 13.8 VDC power source with a negative ground. The condition of a vehicle's electrical system can affect operation. A low battery, worn generator/alternator, or poor voltage regulator will seriously impair the performance of the transceiver.

Any of the above conditions could result in a high level of receiver noise generation or a substantial loss of the transmitter's RF output. Make sure that all of these components of your vehicle's electrical system are in good condition prior to installing the transceiver. Before making any electrical connections make sure the AF gain (volume) control on the transceiver is in the "OFF" position. Connect the positive (+) red wire and negative (-) black wire from the transceiver directly to the battery. Connecting directly to the battery has several benefits, the first of which is to maximize RF output.

Secondly, the battery is a very large capacitor and will help eliminate certain types of ambient and vehicle noise. Depending on your mounting location, additional power cable may be required. On additional runs of 2 m or less use 2.5 qmm stranded wire. Use thicker wire for longer longer runs.

CAUTION!

- **ANY VOLTAGE EXCEEDING 15 VDC WILL DAMAGE THE RADIO**
- **MEASURE VOLTAGE AT BATTERY TERMINALS, WITH ENGINE RUNNING, PRIOR TO INSTALLATION!**

Legal information

The presently valid European "Automotive Directive" does not allow to operate this transceiver from the car's DC network in cars during motion.

Please do not use this transceiver while You are riding the car. However, the "Automotive Directive" is under revision, and the new edition **2004/104/EG (14. 10.2004)** again allows to use non-safety-relevant CE marked after-market equipment like amateur transceivers in car installations. Because of EMC reasons, the car manufacturers have the right to issue installation rules and instructions for installing transmitters and their antennas in cars. These

rules and instructions are valid for amateur radio installations as well as for any other transmitting device in cars.

Connect the Antenna

The transceiver will operate using any standard 50-ohm ground-plane, vertical, mobile whip, long wire or similar antenna. The antenna should be rated at 50 watts PEP minimum. A standard SO-239 type connector is provided on the rear panel of the transceiver. Connection is made using a PL-259 and high grade coaxial cable (RG213 or RG58A/U is recommended).

A ground-plane antenna provides greater coverage and is recommended for fixed station-to-mobile operation.

For point-to-point fixed station operation, a directional beam antenna operates at greater distances even under adverse conditions. A non-directional antenna should be used in a mobile installation; a vertical whip is best suited for this purpose. The base loaded whip antenna normally provides effective communications.

For greater range and more reliable operation, a full quarter wave whip may be used. Either of these antennas use the metal vehicle body as a ground plane.

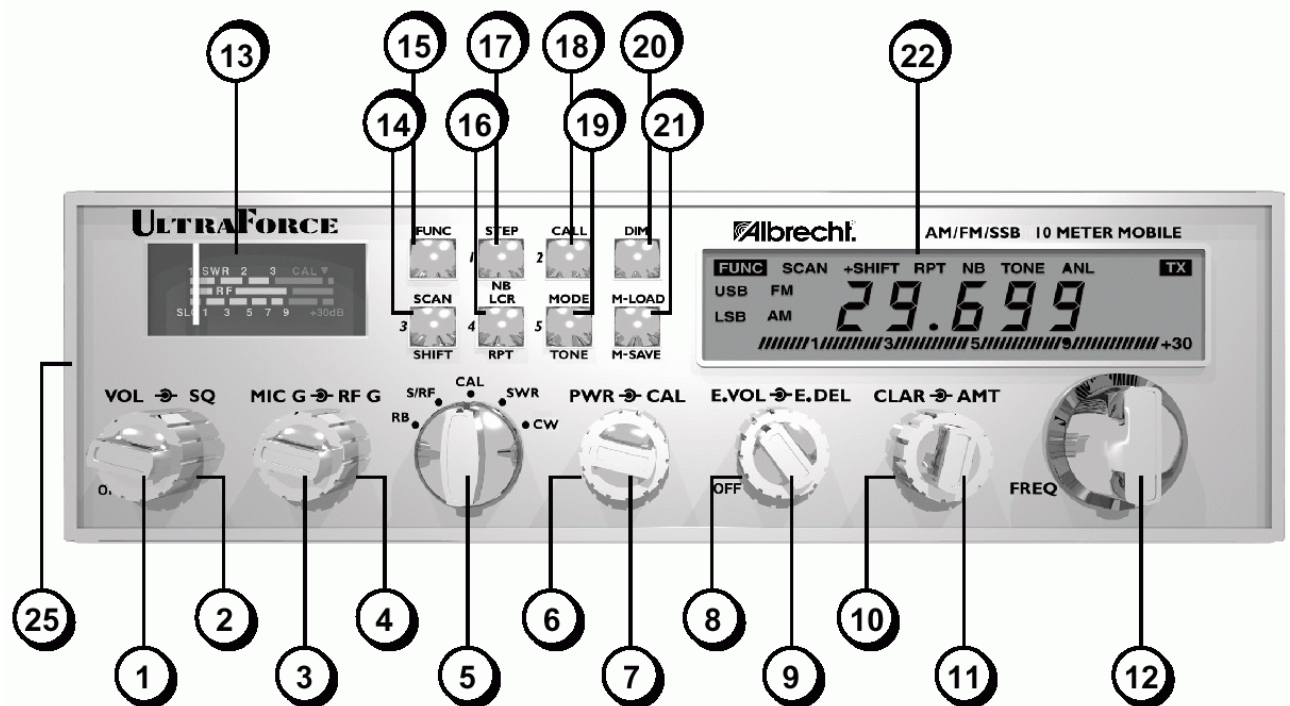
SWR Adjustment of the Antenna

After you have determined that the installation is correct and the radio is operational, it is important to determine the antenna system's SWR (Standing Wave Ratio). Prior to taking any measurements make

sure the SWR bridge (meter) is in good working order and is calibrated. To ensure your radio is performing properly the SWR should never exceed 1.5 to 1. This is critical due to the high level of gain developed in the RF deck. Never transmit on any antenna system where the SWR exceeds 1.8 to 1. This will stress the output stage and could destroy the RF transistors; this type of misuse and failure is not covered under warranty.

FRONT PANEL CONTROLS AND FUNCTIONS

Reference Front Panel Diagram



(1) POWER ON/OFF and VOLUME CONTROL

Turns the transceiver on and off, and adjusts the AF gain, or volume.

(2) SQUELCH CONTROL

Used to eliminate background or “white” noise when monitoring strong signals. Also used to activate SCAN feature (see 14). To properly adjust squelch circuit, slowly rotate the control clockwise until the received audio disappears. Now turn the control slightly counterclockwise - this will keep the threshold right on the edge so you will not miss any incoming signals.

(3) MICROPHONE GAIN CONTROL

Increases or decreases the energy developed in the microphone amplifier circuit. The gain increases as the control is rotated clockwise. For optimum setting, press the push-to-talk switch on the microphone (see 23) and speak in a constant tone into the microphone. A good test tone is to say the word “four” in a long, drawn out tone. While speaking, rotate the mic gain control clock-wise until the modulation LCD display reads +30(see 22). Next, rotate the control counterclockwise until the +30 segment of the display starts to flicker.

(4) RF GAIN CONTROL

Adjusts the receiver sensitivity to both signals and background noise. This affects the distance at which a signal can be detected. Turning the control counter-clockwise reduces the receiver sensitivity. This is particularly useful in areas where large volumes of traffic (signals) are present.

(5) ROGER BEEP CONTROL

RB position activates the end of transmission, or roger beep, tone. When activated a 1 kHz tone will automatically transmit upon release of PTT switch (see 23). This notifies contacts that your transmission has ended and you are ready to receive their signal. To turn off the roger beep, put the switch in the S/RF position.

NOTE: In the RB position, the meter (see 13) measures S/RF.

SIGNAL STRENGTH / RF METER CONTROL

S/RF position activates the meter (see 13) to measure receive signal strength and transmitter RF output power.

CALIBRATE CONTROL

CAL position activates the meter to calibrate for SWR measuring. To calibrate for SWR, set the switch to the

CAL position, press the PTT switch (see 23) and rotate the calibrate control (see 6) until the meter (see 13) needle lines up with the CAL mark on the far right side of the meter. Once lined up, release the PTT.

The transceiver is now ready to measure SWR.

NOTE:

When first attempting to calibrate make sure the transceiver is in the AM mode (see 19). If it is not possible to calibrate in AM, then switch to FM mode.

STANDING WAVE RATIO CONTROL

SWR position activates the meter to measure the standing wave ratio of the transceiver and antenna system. After the meter is calibrated, set the switch to the SWR position and press the PTT switch (see 23).

The meter (see 13) will measure the SWR. For optimum performance the SWR should be below 1.5 – the first green segment on the SWR portion of the meter indicates an acceptable standing wave ratio.

CW

CW position activates a separate connected CW key to make transmissions in Morse Code /CW instead by microphone.

(6) CALIBRATE CONTROL

Rotate to calibrate the meter (see 13) for SWR measurements. See instruction 5 for more information.

(7) RF OUTPUT POWER CONTROL

Continuously variable control for adjusting the RF output power of the transmitter in all modes for QRP operation. To reduce the RF output power rotate the control counterclockwise. To increase rotate the control clockwise. The power output is a linear control, therefore the peak to average output power ratios remain constant regardless of power level.

(8) ECHO DELAY CONTROL

Varies the amount of delay, or duration of the echo repetition. Rotate clockwise to increase the amount of delay and counterclockwise to decrease.

(9) ECHO ON/OFF and VOLUME CONTROL

Turns on and off the echo feature, and varies the volume or number of echo repetitions. To turn on the echo

feature and increase the echo volume, rotate the control clockwise. To turn off the echo feature rotate the control completely counterclockwise to the OFF position.

(10)ALL MODE TALK BACK CONTROL

All Mode Talk Back is an independent talk back monitor. The AMT functions in all modes and allows the operator to monitor the transmitted audio of the UltraForce. To increase the volume of the talk back rotate the control clockwise. To decrease rotate counterclockwise. To turn off the talk back rotate the control completely counterclockwise.

(11)CLARIFIER

Allows variation of the receiver operating frequency above and below the indicated frequency in all modes.

The receive clarifier is primarily used in tuning to an SSB signal. The receive clarifier has a range of +/-1 kHz above and below the indicated frequency.

(12)FREQUENCY

Rotate clockwise to increase the operating frequency and counterclockwise to decrease the operating frequency.

(13)METER

The meter indicates receive signal strength, RF output power, SWR calibrate and SWR. The top horizontal bar graph indicates calibration and measuring of the standing wave ratio. The center bar graph indicates RF output power. The bottom bar graph indicates receive signal strength.

IMPORTANT!

Operating some of the features in 14 through 21 require the use of the function control. To activate the function control, momentarily push the FUNC (15) control, the FUNC prompt will be displayed in upper left-hand corner of LCD. Push the control again to deactivate the function control.

(14)SCAN

Scans frequencies in increments of 10 kHz. There are two ways to scan using front panel entry.

(1) Receive Audio On Scanning: Press the SCAN button. Scan rate is one step every 5 seconds. To stop

scanning press the SCAN button again, or momentarily press the PTT button on the microphone (scanning will stop without transmitting).

(2) Receive Audio Mute Scanning: Carefully rotate squelch control to the threshold (see 2).

The receiver scan rate will now be five steps per second. When a signal is detected the squelch is automatically disengaged and the scanning is paused. The squelch circuit will automatically reengage and the receiver will continue to scan until to the moment the received signal is no longer detected. To stop scanning, press the SCAN button, or momentarily press the PTT button on the microphone (scanning will stop without transmitting).

SHIFT

Used for programming offsets to operate repeater networks.

The UltraForce can transmit and receive on different frequencies. To program the offset, press the FUNC button and hold down the SHIFT button for 3 or more seconds.

Three digits will appear on the LCD. This is the offset frequency in kHz. Rotate the FREQUENCY control until

the desired offset frequency is displayed. To return to the main display press the FUNC button and hold down

the SHIFT button for 3 or more seconds, or momentarily press the PTT button on the microphone (the

transmitter will not be engaged).

To activate the programmed offset frequency, press the FUNC button, and then press the SHIFT button

once. +SHIFT is displayed on the LCD. The UltraForce will now transmit on the frequency that is XXX kHz greater than the displayed, or receive, frequency (XXX represents the programmed offset frequency in kHz units).

To transmit on the frequency that is XXX kHz lower than the displayed, or receive, frequency press FUNC,

then the SHIFT button. Repeat this until -SHIFT is displayed on the LCD.

To disengage the programmed offset frequency, press the FUNC button and then press the SHIFT button.

Repeat this until the SHIFT indicator is no longer displayed on the LCD.

MEMORY CHANNEL 3

After programming this button is memory channel 3. See M.LOAD \ M.SAVE control for programming instructions.

(15)FUNCTION

This control is used to operate the functions that are printed below the control buttons. Press and release,

FUNC will be displayed on the LCD indicating that the function command is activated. After you have pressed

one of the buttons the FUNC will disappear from the screen.

(16)LAST CHANNEL RECALL

Press the LCR button to return to the last frequency that was transmitted on for more than 3 seconds.

REPEATER (interesting for USA repeaters only)

Repeater access tone on and off control. Most repeaters (in USA only) require an 88.5 Hz tone burst to access. To activate the 88.5 Hz tone burst, press the FUNC control and then press the RPT button. RPT will appear on the LCD indicating that the tone burst will now automatically be transmitted whenever the PTT is pressed. To deactivate, repeat the same process.

MEMORY CHANNEL 4

After programming, this button is memory channel 4. See M.LOAD \ M.SAVE control for programming instructions.

(17)STEP

The STEP button selects frequency resolution in either 1 kHz, 10 kHz or 100 kHz steps.

Press the STEP

button, one of the digits will flash on and off. Press the STEP button again to change stepping resolution.

To tune frequencies in either 10 kHz or 100 kHz increments, press the STEP button until the desired digit is

flashing. Rotate the FREQUENCY control in either direction.

The entire frequency range of the UltraForce can be stepped through in 10 or 100 kHz increments.

To tune in 1 kHz increments, press the STEP button until the 1 kHz digit flashes on and off.

Rotate the FREQUENCY control.

NOTE: When stepping in 1 kHz increments, you are limited to tuning within a 10 kHz frequency range.

NOISE BLANKER and AUTOMATIC NOISE LIMITER

Noise blanker on and off control. This circuit eliminates pulse type interference usually associated with auto-motive ignition systems. To activate the noise blanker, press the FUNC control and then press the NB button.

NB will appear on the LCD indicating the noise blanker is turned on. To turn off the noise blanker, repeat the same process.

MEMORY CHANNEL 1

After programming, this button is memory channel 1. See M.LOAD \ M.SAVE control for programming instructions.

(18)CALL

The USA national call frequency for SSB is 28.400 MHz. The radio's operating frequency is automatically reset to this frequency when the CALL button is pressed.

MEMORY CHANNEL 2

After programming this button is memory channel 2. See M.LOAD \ M.SAVE control for programming instructions.

(19)MODE

Each time the button is pressed the operating mode is changed. The operating mode is indicated on the liquid crystal display: AM, FM, USB, or LSB.

TONE LOW

To activate the tone low feature, press the FUNC button, and then press the T. Low button to turn on the

receive audio tone control. LOW will appear on the LCD when the low tone is activated. This feature will roll-off

high frequency noise (i.e. "white" noise). Under many operating conditions this will improve the clarity and understanding of received signals.

MEMORY CHANNEL 5

After programming this button is memory channel 5. See M.LOAD \ M.SAVE control for programming instructions.

(20)DIMMER

Press the DIM, or dimmer control to decrease the amount of back-lighting on the front panel and LCD screen.

(21)MEMORY SAVE

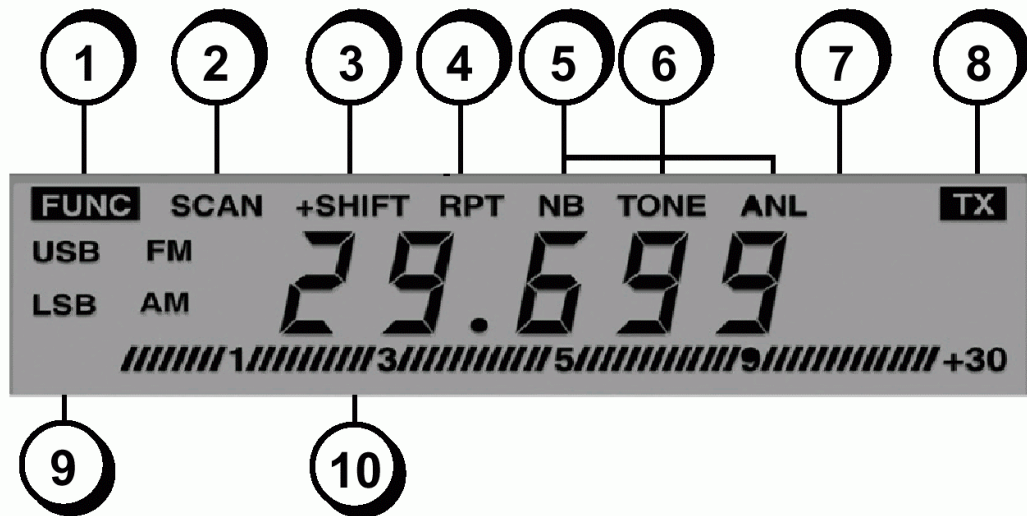
To save in memory a specific frequency and operating mode, select the desired mode and rotate the FREQUENCY control to the desired frequency. Press the FUNC button, and then press the M.SAVE button. S will appear on the LCD next to the frequency. While S is displayed, immediately press any of the memory channel buttons (1 - 5). The mode and frequency is now saved into memory. If the S indicator disappears before you press the memory channel button, the information will not be saved and the process must be repeated.

MEMORY LOAD

To load, or recall, any of the saved memory channels press the M.LOAD button. L will appear on the LCD for several seconds. While the letter is displayed press the desired memory channel button (1 - 5). The pro-grammed mode and frequency will be displayed.

(22) LIQUID CRYSTAL DISPLAY

The LCD screen is the status display for the majority of the transceiver's functions.



(3) +SHIFT \ -SHIFT

Indicates that the split or offset frequency function is activated.

(4) RPT

Indicates that the repeater access tone burst function is active.

(5) NB and ANL

Indicates that both the noise blanker and the automatic noise limiter are active.

(6) TONE

Indicates that the receive audio tone low feature is active.

(7) 5 DIGIT FREQUENCY DISPLAY

Indicates transmit and receive operating frequencies.

(8) TX

Indicates that the transmitter is on.

(9) USB \ LSB \ FM \ AM

Indicates the selected operating mode.

(10) PEAK READING RF POWER METER

Indicates relative peak RF output power.

(23) PUSH-TO-TALK (PTT) CONTROL

Activates the transmitter and/or receiver. Push and hold the PTT control to transmit. Release the PTT control to receive.

(24) UP and DOWN FREQUENCY CONTROLS

Allows remote control of frequency control. Press the up arrow to increase in frequency and press the down arrow to decrease in frequency.

(25) MICROPHONE INPUT JACK (not shown)

6-pin, lock ring type, microphone connector located on side chassis of transceiver. Mic wiring is as follows:

- Pin 1 : Microphone Audio
- Pin 2 : Receive
- Pin 3 : Transmit
- Pin 4 : Down (Up w/ 22K Ohm Resistor)

Pin 5 : Ground
Pin 6 : +13.8 VDC

(26) EXTERNAL SPEAKER JACK (not shown)

External speaker jack, marked EXP SP, is located on the rear panel of transceiver. For use with 4 to 8 ohm external speaker.

(27) CW KEY JACK (not shown)

The CW key jack is located on the rear panel. The CW Key is used for Morse Code transmission. You will need a 3.5mm Mono connector.

OTHER FEATURES

PROGRAMMING KEY TONE

This tone sounds each time the CPU is being programmed. It is helpful, in the beginning so you can be sure the command has been entered. You may eliminate the tone by simply pressing the PTT switch while turning on the ON/OFF POWER switch.

(1) FUNCTION

Indicates the function button has been activated and that the function dependent controls may be accessed.

(2) SCAN

Indicates that the transceiver is in scan mode..

PROGRAMMING OPTIONS

Extended Channel Mode

The radio comes programmed for the 10 m amateur band range with frequency display mode. It is possible to extend the operating range **to 454 Channels including the CB range** with channel numbers according to the CB standard numbering system with totally 10 bands. Since such modifications are not allowed in all countries, the export versions for Your country may have this function disabled from factory.

There are 2 possibilities: Your radio has an insulated yellow wire behind the channel switch (can be seen through the hole after pulling off the rotary knob). If this is the case, disconnect the radio from DC power, wait a minute and cut the wire.

The other possibility may be installed as a small sub PC Board inside with 4 jumper positions and a reset knob. If installed, You will find an instruction sheet together with Your radio about the jumper settings. Just change the jumper setting and push the reset knob.

Modified radios can now be **switched from Amateur to 454 channel mode** (and reverse) by

- Pushing **Function key** shortly and then release, Display shows **FUNC**
- Push **“Call / 2”** key and **keep pressed for longer than 3 seconds**

The unit starts now with Channel mode.

- You can switch through the 10 bands with the **“Call / 2”** key
- You can toggle between CH mode and Amateur Mode (Frequency display) any time by pressing **FUNC** followed by **Call / 2** (shortly)

Please see the frequency / channel table in the annex of this manual. For any further possible modification, please study our informations on www.hobbyradio.de/Amateurfunk and click to UltraForce.

• TECHNICAL SPECIFICATIONS

TRANSMITTER

Frequency Range:	28.000 - 29.699 MHz
Tuning Steps:	1 kHz, 10 kHz, 100 kHz
Emission Types:	LSB, USB (J3E), AM (A3E), FM (F3E), CW
Carrier Suppression:	Better than 40 dB below peak output
Unwanted Sideband Suppression:	Better than 50 dB below peak output (1 kHz tone)
Spurious Radiation:	Better than 50 dB below peak output
Frequency Accuracy:	Better than +10 ppm from 0 – 40° C after 15 minute warm up
Modulation Type:	J3E: Balanced Modulator A3E: Voltage Modulator F3E: Frequency Modulator
Maximum FM Deviation:	+/-2 kHz
Output Impedance:	50 ohms (nominal), unbalanced
Microphone Impedance:	Dynamic, 600 ohms
Power Consumption:	6 amps maximum
Power Output:	FM: 30 Watts (Max.) AM: 8 Watts Average (Max.) SSB: 30 Watts Peak (Max.) PEP

RECEIVER

Frequency Range:	28.000 - 29.699 MHz
Circuit Type:	Superheterodyne, Dual Conversion
Clarifier Range:	+/-1.0 kHz
Sensitivity:	SSB and AM 0.25uV (SSB and AM figures measured for 10 dB S+N/N) FM better than 0.3uV for 12 dB SINAD
Intermediate Frequencies:	Minimum discernable signal -135 dBm 1st IF: 10.695 MHz 2nd IF: 455 kHz SSB IF: 10.695 MHz
Image Rejection:	Better than 70 dB
IF Rejection:	Better than 80 dB for all frequencies
Selectivity:	-6 dB -60 dB SSB: 4.2 kHz 8.5 kHz AM, FM: 6.0 kHz 18 kHz
Noise Blanker:	All mode, seven stage high gain type
Dynamic Range:	Better than 100 dB
Audio Output Power:	2 watts minimum (into 8 ohms, with less than 7% THD)
Audio Output Impedance:	8 - 16 ohms
Power Consumption:	500 milliamps
Dimensions:	7.75(L) x 10.75(W) x 2.5(H) Inches

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Service-Download: www.hobbyradio.de

Frequency Table for UltraForce (channel mode activated)

Channel Number	A	B	C	D	E	F	G	H	I	J
1	25.165	25.615	26.065	26.515	26.965	27.415	27.865	28.315	28.765	29.215
2	25.175	25.625	26.075	26.525	26.975	27.425	27.875	28.325	28.775	29.225
3	25.185	25.635	26.085	26.535	26.985	27.435	27.885	28.335	28.785	29.235
3°	25.195	25.645	26.095	26.545	26.995	27.445	27.895	28.345	28.795	29.245
4	25.205	25.655	26.105	26.555	27.005	27.455	27.905	28.355	28.805	29.255
5	25.215	25.665	26.115	26.565	27.015	27.465	27.915	28.365	28.815	29.265
6	25.225	25.675	26.125	26.575	27.025	27.475	27.925	28.375	28.825	29.275
7	25.235	25.685	26.135	26.585	27.035	27.485	27.935	28.385	28.835	29.285
7A	25.245	25.695	26.145	26.595	27.045	27.495	27.945	28.395	28.845	29.295
8	25.255	25.705	26.155	26.605	27.055	27.505	27.955	28.405	28.855	29.305
9	25.265	25.715	26.165	26.615	27.065	27.515	27.965	28.415	28.865	29.315
10	25.275	25.725	26.175	26.625	27.075	27.525	27.975	28.425	28.875	29.325
11	25.285	25.735	26.185	26.635	27.085	27.535	27.985	28.435	28.885	29.335
11A	25.295	25.745	26.195	26.645	27.095	27.545	27.995	28.445	28.895	29.345
12	25.305	25.755	26.205	26.655	27.105	27.555	28.005	28.455	28.905	29.355
13	25.315	25.765	26.215	26.665	27.115	27.565	28.015	28.465	28.915	29.365
14	25.325	25.775	26.225	26.675	27.125	27.575	28.025	28.475	28.925	29.375
15	25.335	25.785	26.235	26.685	27.135	27.585	28.035	28.485	28.935	29.385
15A	25.345	25.795	26.245	26.695	27.145	27.595	28.045	28.495	28.945	29.395
16	25.355	25.805	26.255	26.705	27.155	27.605	28.055	28.505	28.955	29.405
17	25.365	25.815	26.265	26.715	27.165	27.615	28.065	28.515	28.965	29.415
18	25.375	25.825	26.275	26.725	27.175	27.625	28.075	28.525	28.975	29.425
19	25.385	25.835	26.285	26.735	27.185	27.635	28.085	28.535	28.985	29.435
19A	25.395	25.845	26.295	26.745	27.195	27.645	28.095	28.545	28.995	29.445
20	25.405	25.855	26.305	26.755	27.205	27.655	28.105	28.555	29.005	29.455
21	25.415	25.865	26.315	26.765	27.215	27.665	28.115	28.565	29.015	29.465
22	25.425	25.875	26.325	26.775	27.225	27.675	28.125	28.575	29.025	29.475
23	25.435	25.885	26.335	26.785	27.235	27.685	28.135	28.585	29.035	29.485
24	25.445	25.895	26.345	26.795	27.245	27.695	28.145	28.595	29.045	29.495
25	25.455	25.905	26.355	26.805	27.255	27.705	28.155	28.605	29.055	29.505
26	25.465	25.915	26.365	26.815	27.265	27.715	28.165	28.615	29.065	29.515
27	25.475	25.925	26.375	26.825	27.275	27.725	28.175	28.625	29.075	29.525
28	25.485	25.935	26.385	26.835	27.285	27.735	28.185	28.635	29.085	29.535
29	25.495	25.945	26.395	26.845	27.295	27.745	28.195	28.645	29.095	29.545
30	25.505	25.955	26.405	26.855	27.305	27.755	28.205	28.655	29.105	29.555
31	25.515	25.965	26.415	26.865	27.315	27.765	28.215	28.665	29.115	29.565
32	25.525	25.975	26.425	26.875	27.325	27.775	28.225	28.675	29.125	29.575
33	25.535	25.985	26.435	26.885	27.335	27.785	28.235	28.685	29.135	29.585
34	25.545	25.995	26.445	26.895	27.345	27.795	28.245	28.695	29.145	29.595
35	25.555	26.005	26.455	26.905	27.355	27.805	28.255	28.705	29.155	29.605
36	25.565	26.015	26.465	26.915	27.365	27.815	28.265	28.715	29.165	29.615
37	25.575	26.025	26.475	26.925	27.375	27.825	28.275	28.725	29.175	29.625
38	25.585	26.035	26.485	26.935	27.385	27.835	28.285	28.735	29.185	29.635
39	25.595	26.045	26.495	26.945	27.395	27.845	28.295	28.745	29.195	29.645
40	25.605	26.055	26.505	26.955	27.405	27.855	28.305	28.755	29.205	29.655
41										29.665
42										29.675
43										29.685
										29.695