USER MANUAL DU 3500 AL
Automatic antenna tuner 3,5 kW

Made in Hungary

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1. FEATURES

The **DU 3500 AL automatic tuner** has been primarily manufactured for an automatic PA, but it can also be used with any manual PAs as well. The tuner is primarily compatible with the OM POWER automatic PA.

This tuner was designed for antennas calibrated to HAM BANDs. The maximum power can only be utilized with these antennas. With other antennas, it should be set at a lower power (max. 2kW).

The major advantage of the tuner is that during competitions it is possible to change BANDs particularly quickly.

2. SPECIFICATIONS:

Frequency range :	1,8-30MHz
Matching range :	max power 5:1 SWR
Matching range (28 MHz) :	max power 3kW, 1:3 > SWR
Output Power :	3,5kW
Compatibility:	All automatic OM-POWER
Tuning time:	1-3 s programmed memory
Display :	480x272 4,3” Color TFT Display
Capacitor :	510pF 5kV
Ceramic switch :	2 rotary switch
Antenna switch :	4 ant + 8 port
DC power :	12 - 13.8V 6A
Dimensions (cm) :	W34xD47xH16,5
Weight :	8 kg
Warranty:	1 year

3. FRONT PANEL CONTROL

1. **TFT DISPLAY:** 480x272 4,3” Color TFT Display
2. **+ CAPACITOR SWITCHES** C1 (220 pF) C2 (470 pF) C3 (470 pF)
3. **CAPACITOR:** 510pF 5kV
4. **FUNCTION BUTTONS:** Selection menu functions
5. **POWER SWITCH:** Power ON/OFF

4. REAR PANEL CONNECTORS

6. **ANTENNA CONFIGURATION:** 1-8 +12V INT. PWR

6-8 GND INT. PWR

9-8 EXT. PWR.

7. **ANTENNA SWITCH:** ANT & BPF SW DB-25 is used for switching external Antenna Switch. Maximum switching of 30V / 0.5A is possible.

PIN OUT:

1. antenna port 1
2. antenna port 2
3. antenna port 3
4. antenna port 4
5. antenna port 5
6. antenna port 6
7. antenna port 7
8. antenna port 8
9. NC
10. NC
11. COMMON port of ANT SW
12. NC
13. GND

8. **DUMMY LOAD**

9. **INPUT 50Ω**

10. **PTT IN:** RCA Input signal PTT switching voltage / current 30V / 50mA)

11. **PTT OUT:** RCA Output signal PTT (maximum switching of 30V / 50mA)

12. **TCVR:** DB9 serial port RS232 for KENWOOD, YAESU and ELECRAFT TCVRs. Correct baud rate and type is required for successful operation. If both CI-V and TCVR cables are connected then CI-V disables RS232. Otherwise selection of interface is done via TCVR type.

13. **PC:** DB -9 RS232 port is used for communication with your PC. Please use setting you would normally use if using direct TCVR – PC connection.

14. **GND**

15. **ANT OUTPUT**

16. **FUSE 6,3A**

17. **CI-V:** Mono 3.5mm Jack for connection of ICOM TCVRs or devices that provide compatible CI-V protocol. Correct baud rate is important.

18. **DC 12V 6,6A INPUT**

5. SETTINGS

TCVR & PORT – selects the radio type and the parameters for the serial port

ANTENNA – selects the antenna

DISPLAY CONTRAST – the brightness of the display

EXTERNAL ANT. SWITCH – sets the external antenna switch

SOFTWARE VERSION – the serial numbers of the programs used

LOAD DEFAULT VALUES – during manufacture the tuner is tuned to an ideal 50 ohm antenna. The values for this can be recalled from the memory. If we select this menu point with the SET button, then the question “Are You Sure?” appears. If the SET button is pressed again, then the base values set during manufacture reappear. Warning! In this case all the values set by you will be lost! If one reconsiders and does not want to erase this data, then press the BACK button.

5.1. TCVR & Serial port setup

Selection of the radio and communication parameters:

With the **DOWN** and **UP** buttons, it is possible to select the radio type.

With the **SPEED** button it is possible to determine the transmission speed, and with the **STBIT** button it is possible to determine the number of the STOP bits. The selected parameters are saved with the SAVE button, and then we return to the settings menu.

5.2. Antenna selection

The type of antenna does not directly affect the operation of the tuner. This menu point is only for ease of use, so that it is easier to note which antenna is connected to the tuner.

With the **ANT1, ANT2, ANT3** and **ANT4** buttons it is possible to select the antenna types connected to the individual outputs. The EXT.SW indicates that an external antenna switch is connected to the tuner.

With the SAVE button we place the selected antenna types into the memory and return to the settings menu point

5.3. Setting the brightness of the display

With the **DOWN** and **UP** buttons it is possible to set the brightness of the display. The value set is placed in the memory with the **SET** button, or with the **BACK** button it is possible to return to the settings menu. In this case the brightness value set is not put in the memory.

5.4. Selection of the internal or the external antenna switch

In this menu point it is possible to have the internal antenna switch be active, or instead the external antenna switch that is connected to the tuner. With the **DOWN** and **UP** switches it is possible to select the amateur band, and with the **CHANGE** button whether the internal or external antenna switch is selected.

If the external antenna switch is selected, then the word **PORT** appears in the empty button. By pressing this, the next menu point appears, where it is possible to select which port corresponds to the external antenna switch of the four possible antennas.

5.5. Antenna port

With the **DOWN** and **UP** buttons on the left side it is possible to select the individual antenna positions, and with the **DOWN** and **UP** buttons on the right side it is possible to select the corresponding ports on the external antenna switch. If all 4 antennas have been set, then it is possible to return to the previous menu point with the **BACK** button.

5.6. How to turn off the display timed?

IMPORTANT! Wait 2 seconds between pushing the function-buttons.

- push the SETUP button on the main display
- *SETTINGS*
- with the **DOWN** button go to the *DISPLAY CONTRAST*
- push the **SET** button
- *SETTINGS*
- with the **FUNC** button you can set the Contrast or the Delay (green is active). The Delay can be setted from 0 to 180 seconds. Set the value with **DOWN/UP**, save the value with the **SET** button, go back to the main display with the **BACK** button.
- after the setted time, the TFT goes out, but all the function of the tuner is working.
- if you push any of the function button, the display switches on for a short time
- how to erase the setted value? push the right **SETUP** function button twice *SETTINGS/DISPLAY CONTRAST/SET*/ value „0”, save it with the **SET** button /*BACK*

6. TUNING

After pressing the **TUNE** button it is possible to tune the individual antennas

The **FWD**, Refl and **SWR** functions are the same as described in the automatic mode. In this case the two yellow boxes show the current settings of the **SWITCH** and the **CAPACITOR**.

The contents of the red window:

BAND: the tuner's current band range

QRA: the frequency of the midpoint of the band range

ANT: the selected antenna

<u>Switches:</u>

SW.-DN – switch down

SW.-UP – switch up

SAVE – pressed briefly: saves the values set, pressed and held down: exits the tuning menu (in this case the values set are not saved)

ANT. – selects the antenna

SEGM. – pressed briefly: selects the band range, pressed and held down: selects the amateur band

Tuning occurs in the following manner:

It is possible to change the switch positions with the SW.-DN and SW.-UP buttons. The capacitor is rotated manually. Through the proper selection of these two controls it is possible to properly tune the power amplifier with the antenna. During tuning, attention should be paid to the bar graphs, and one should attempt to keep the SWR value as small as possible. If the smallest value is achieved, so that it cannot be reduced by manipulating either the switch or the capacitor, then the actual value can be saved in the memory with the SAVE button. Following this, one can either select a new antenna or perform the tuning on another frequency. If the tuning is completed, then by pressing and holding down the SAVE button we return to the automatic mode.

Rough tuning is performed at an output of TCVR 100W-200W. After this, the power can be increased and the settings refined with the CAPACITOR button. At high power output the SW-DN (Switch down) and SW-UP (Switch up) buttons **MAY NOT BE USED!!!**

The settings must be performed for every frequency segment in use for every BAND.

C1 (220 pF)
C2 (470 pF)
C3 (470 pF)
The switch is active only until the position 1-5. It is suggested to use from 1.8 MHz to 7 MHz.
You can switch on and switch off these plus capacitors only at **TUNE** stand.
You can save the settings only at **TUNE** stand with the **SAVE** button.
The C2 is from 14MHz to 28MHz not active (blocked).

Dividing of bands into segments

Band (MHz)	1,8	3,5	7	10	14	18	21	24	28
Width of the segments (kHz)	15	30	30	30	30	50	60	60	70

7. Automatic mode

In this mode the tuner is communicating with the radio. It automatically tunes the proper antenna based on the frequency set there.

The top bar graph shows the power output (FWD), the second the reflected power (Refl), and the bottom the standing wave ratio (SWR).

The CAT box shows the transmission speed of the tuner's serial port. If the connection between the tuner and the radio is broken, this field turns red and the word OFF appears.

The TCVR box shows the type of the selected radio.

<u>The green window shows information related to the frequency and the antenna:</u>

BAND: the tuner's current band range

QRA: AUTO indicates that the tuner is in the automatic mode. The following number is the actual current frequency.

ANT: The lower number shows which antenna output is selected. The T or U following shows whether the tuner is on line or not. T (tuned) indicates that the tuner is connected between the input and the output, while U (untuned) indicates that the input and the output are directly connected, bypassing the tuner. The text following this is a reminder of the type of antenna selected.

<u>Switches:</u>

ANT-DN – antenna down
ANT-UP – antenna up
MANUAL – switches the tuner to the manual mode
TUNE – switches the tuner to the tuning mode
SETUP – selection of settings

8. Manual setting

If the connection between the tuner and the radio is not established, then the tuner can be used in the manual control mode as well. In this case we must select the frequency.

The FWD, Refl and SWR functions are the same as described in the automatic mode section. In this case, the two yellow boxes show the current settings of the SWITCH and the CAPACITOR.

<u>The content of the light green window:</u>

BAND: the tuner's current band range

QRA: the frequency of the midpoint of the band range

ANT: the selected antenna

<u>Switches:</u>

SEG-DN – frequency segment down

SEG-UP – frequency segment up

BAND – amateur band selection. It goes up when pressed briefly, down when held down for a longer time

ANT – selection of antenna. It goes up when pressed briefly, down when held down for a longer time

AUTO – return to automatic mode.

9. Example of connection

9.1. Example of connection for antennas

Several antennas can be turned on within one band, but either only with the external Ant switch (Antenna switch) or only with the tuner's internal switch.

Connect the inputs of the antennas not in use to the ground point.

9.2. Example of connection for YAESU

9.3. Example of connection for Icom

9.4. Example of connection USB micro KEYER II with Yaesu or ELECRAFT

90W AC-DC Single Output Desktop

GS90 series

■ Features :

- Universal AC input / Full range
- 3 pole AC inlet IEC320-C14
- Built-in active PFC function, PF>0.91
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Fully enclosed plastic case
- Approvals: UL / CUL / TUV / BSMI / CCC / CB / FCC / CE
- Class I power (with earth pin)
- Pass LPS
- LED indicator for power on
- No load power consumption<0.5W
- Meet EISA 2007(Energy Independence and Security Act)
- 2 years warranty

(except for 48V)

SPECIFICATION

ORDER NO.		GS90A12-P1M	GS90A15-P1M	GS90A19-P1M	GS90A24-P1M	GS90A48-P1M
OUTPUT	SAFETY MODEL NO.	GS90A12	GS90A15	GS90A19	GS90A24	GS90A48
	DC VOLTAGE Note.2	12V	15V	19V	24V	48V
	RATED CURRENT	6.67A	6A	4.74A	3.75A	1.87A
	CURRENT RANGE	0 ~ 6.67A	0 ~ 6A	0 ~ 4.74A	0 ~ 3.75A	0 ~ 1.87A
	RATED POWER (max.)	80W	90W	90W	90W	90W
	RIPPLE & NOISE (max.) Note.3	80mVp-p	100mVp-p	150mVp-p	180mVp-p	240mVp-p
	VOLTAGE TOLERANCE Note.4	±5.0%	±5.0%	±4.0%	±3.0%	±2.0%
	LINE REGULATION Note.5	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%
	LOAD REGULATION Note.6	±5.0%	±5.0%	±4.0%	±3.0%	±2.0%
	SETUP, RISE TIME Note.8	1000ms, 20ms / 230VAC 1000ms, 20ms / 115VAC at full load				
	HOLD UP TIME (Typ.)	20ms / 230VAC 20ms / 115VAC at full load				
INPUT	VOLTAGE RANGE Note.9	90 ~ 264VAC 127 ~ 370VDC				
	FREQUENCY RANGE	47 ~ 63Hz				
	POWER FACTOR (Typ.)	PF>0.91 / 230VAC PF>0.95 / 115VAC at full load				
	EFFICIENCY (Typ.)	88%	89%	89%	89.5%	91%
	AC CURRENT (Typ.)	2A / 115VAC 1A / 230VAC				
	INRUSH CURRENT (max.)	70A / 230VAC				
	LEAKAGE CURRENT(max.)	1mA / 240VAC				
PROTECTION	OVERLOAD	110 ~ 150% rated output power				
		Protection type : Hiccup mode, recovers automatically after fault condition is removed				
	OVER VOLTAGE	105 ~ 135% rated output voltage				
		Protection type : Shut down o/p voltage, re-power on to recover				
	OVER TEMPERATURE	RTH30 > 100℃				
		Protection type : Shut down o/p voltage, re-power on to recover				
ENVIRONMENT	WORKING TEMP.	-30 ~ +50℃ (Refer to "Derating Curve")				
	WORKING HUMIDITY	20% ~ 90% RH non-condensing				
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH				
	TEMP. COEFFICIENT	±0.03% / ℃ (0~50℃)				
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes				
SAFETY & EMC (Note. 7)	SAFETY STANDARDS	UL60950-1, TUV EN60950-1, BSMI CNS14336, CCC GB4943, J60950-1(except for 48V) approved				
	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC I/P-FG:1.5KVAC O/P-FG:0.5KVAC				
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH				
	EMC EMISSION	Compliance to EN55022 class B, EN61000-3-2,3, FCC PART 15 / CISPR22 class B, CNS13438 class B, GB9254 class B, GB17625.1				
	EMC IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11, light industry level, criteria A				
OTHERS	MTBF	348.7Khrs min. MIL-HDBK-217F(25℃)				
	DIMENSION	145*60*32mm (L*W*H)				
	PACKING	0.45Kg; 30pcs/14.05Kg/1CUFT				
CONNECTOR	PLUG	Standard type P1M: 2.5ϕ * 5.5ϕ * 11mm, tuning fork type, center positive for stock ; Other type available by customer requested				
	CABLE	See page 2 ; Other type available by customer requested				

NOTE

1. All parameters are specified at 230VAC input, rated load, 25℃ 70% RH ambient.
2. DC voltage: The output voltage set at point measure by plug terminal & 50% load.
3. Ripple & noise are measured at 20MHz by using a 12" twisted pair terminated with a 0.1uf & 47uf capacitor.
4. Tolerance: includes set up tolerance, line regulation, load regulation.
5. Line regulation is measured from low line to high line at rated load.
6. Load regulation is measured from 10% to 100% rated load
7. The power supply is considered as an independent unit, but the final equipment still need to re-confirm that the whole system complies with the EMC directives.
8. Length of set up time is measured at first cold start. Turning ON/OFF the power supply may lead to increase of the set up time.
9. Derating may be needed under low input voltages. Pleas check the derating curve for more details.

■ Mechanical Specification

Case No. 978A Unit:mm

■ Plug Assignment

Standard plug: P1M

P1M	
P/N	OUTPUT
CENTER	+

■ Derating Curve

■ Static Characteristics