

# AE 2990 AFS

## GENERAL SPECIFICATION

### AM/FM TRANSMITTER

RF POWER OUTPUT	AM 4.0 WATTS FM 4.0 WATTS
MODULATION CAPABILITY	AM 85%, FM 2KHz
SPURIOUS & HARMONIC SUPPRESSION	LESS THAN -37 dBm below 1 GHz, less than -54 dBm within the radio/ TV ranges
FREQUENCY STABILITY	better than +/-600 Hz
MICROPHONE SENSITIVITY	3.0mV
for 60% AM MODULATION or 1.2 kHz FM	40dB
A.M.C RANGE BETWEEN 50 TO 100% MODULATION	FM 4 Watt 1.2A
CURRENT DRAIN (NO MODULATION) :	

### SSB TRANSMITTER

RF OUTPUT / POWER	4.0WATTS PEP
CARRIER SUPPRESSION	MORE THAN 35 dB
UNWANTED SIDEBAND SUPPRESSION	MORE THAN 50dB
HARMONIC SUPPRESSION	better than -37 dBm / -54 dBm
CURRENT DRAIN AT FULL MODULATION	1.2A

### RECEIVER

SENSITIVITY	AM 0.5uV FOR 10dB(S+N) / N FM 0.25uV FOR 10dB(S+N) / N SSB 0.25uV FOR 10dB(S+N) / N
IMAGE REJECTION	MORE THAN 40dB
IF REJECTION	60dB
ADJACENT CHANNEL REJECTION	60dB
CROSS MODULATION	50dB
SQUELCH RANGE	ADJUSTABLE UP TO 1 mV
RF GAIN CONTROL	30dB
CLARIFIER RANGE	±0.6KHz
AUDIO OUTPUT POWER at LESS THAN 10% THD	500mW OUTPUT INTO 16 OHM Load
BATTERY DRAIN	MAXIMUM : 250mA NO SIGNAL : 100mA
Max. SINAD RATIO at 60 dBμV INPUT	40dB SINAD
S-METER SENSITIVITY 9 BAR	appr. 100 μV EMF

## ELECTRICAL SPECIFICATION

### GENERAL

CHANNELS : AM. FM. USB. LSB 40CH  
EMISSION TYPE : USB. LSB (J3E). AM(A3). FM(F3E).  
CONTROLS : POWER ON/OFF VOLUME. CLARIFIER VOLUME  
FUNC.ML/MS, SCAN/MSCAN, MODE/H.L, STEP/CH FREQ, CH9.19/LOCK ,  
RPT, BEEP,RGB, CALL , RIGHT, +/- SHIFT,  
RF-G / MIC-G./SQUELCH UP. DOWN. PTT.  
JACKS : ANTENNA. EXTERNAL MIC. EXTERNAL SPEAKER. POWER  
INDICATE : L. C. D. PANEL  
FREQUENCY RESOLUTION : AM/FM/SSB 0.5KHz STEP  
FREQUENCY RANGE AT CB : 26.565 to 27.405 MHz (German Band)  
(450channel) A BAND 25.165 – 25.605MHz  
B BAND 25.615 – 26.055MHz  
C BAND 26.065 – 26.505MHz  
D BAND 26.515 – 26.955MHz  
E BAND 26.965 – 27.405MHz  
F BAND 27.415 – 27.855MHz  
G BAND 27.865 – 28.305MHz  
H BAND 28.315 – 28.755MHz  
I BAND 28.765 – 29.205MHz  
J BAND 29.215 – 29.695MHz  
FREQUENCY RANGE AT HAM Radio 28.000MHz to 29.690 MHz  
SUPPLY VOLTAGE 9 x AA 1.2 V NiMH or 9 x AA 1.5 V Alkaline  
or DC 13.2 V via car adapter  
ANTENNA IMPEDANCE 50 ohm  
SPEAKER IMPEDANCE : 16 ohm  
OPERATING TEMPERATURE RANGE 0°C TO 40°C  
DIMENSION : 169 H. X 63 W. X 39 D.

## TRANSMITTER

		UNIT	NOMINAL	LIMIT
1. RF POWER OUTPUT (NO MODULATION)	AM	W	4.0	3.6 – 4.3
	FM	W	4.0	3.6 – 4.3
	SSB	W	6.0	3.6 – 4.3
2. FREQUENCY TOLERANCE (25°C)	AM	Hz	400	600
	FM	Hz	400	600
	SSB	Hz	300	400
3. MODULATION 100% CAPABILITY ( POSITIVE / NEGATIVE )	AM	%	85/90	80/80
	FM	KHz	1.8	1.6-2.0
4. SPURIOUS EMISSION (2nd / 3rd -7th)	AM	dB	-55 dBm	-54 dBm
	FM	dB	-55 dBm	-54 dBm
	SSB	dB	-56 dBm	-54 dBm
5. MODULATION FREQUENCY RESPONSE ( 1 KHz / 0dB REFERENCE ) LOWER AT 450Hz EIA UPPER AT 2500Hz EIA		dB	-6	-6±6
		dB	-6	-6±6
6. MICROPHONE SENSITIVITY 60% MODULATION 1.2 KHz MODULATION SSB 3W PEP OUTPUT	AM	mV	3.0	5.0
	FM	mV	3.0	5.0
	SSB	mV	3.0	5.0
7. AMC RANGE (BETWEEN 60 TO 100% MODULATION)	AM	dB	50	40
	FM	dB	50	40
	SSB	dB	50	40
8. CURRENT DRAIN AM NO MODULATION AM 80% MODULATION SSB MAX W PEP TWO TONE		A	1.0	1.2
		A	1.5	1.8
		A	1.0	1.2
9. MODULATION ATTACK TIME (AM) MODULATION RELEASE TIME (AM)		M/S	20	25
		M/S	350	100-500
10. CARRIER SUPPRESSION	SSB	dB	-40	-35

## RECEIVER

		UNIT	NOMINAL	LIMIT	
1. MAXIMUM SENSITIVITY	AM	uV	0.5	1.0	
	FM	uV	0.25	1.0	
	SSB	uV	0.25	0.5	
2. SENSITIVITY FOR 10dB S+N/N	AM	uV	0.5	1.0	
	FM	uV	0.25	1.0	
	SSB	uV	0.25	0.5	
3. SQUELCH SENSITIVITY AT THRESHOLD		uV	0.6	1.3	
	SQUELCH SENSITIVITY AT TIGHT	mV	1	0.32 – 32	
4. AGC FIGURE OF MERIT (50mV FOR 10dB CHANGE IN AUDIO OUTPUT)		dB	90	80	
5. OVERALL AUDIO FIDELITY AT 6dB DOWN	UPPER FREQUENCY	AM	Hz	2000	1500 – 3000
	LOWER FREQUENCY	AM	Hz	400	300 – 600
6. ADJACENT CHANNEL SELECTIVITY (10KHz)		dB	60	50	
7. MAXIMUM AUDIO OUTPUT Voltage		V	3.5	4.5	
8. AUDIO OUTPUT POWER AT 10% THD		V	0.5	--	
9. THD AT 500mV WITH 1mV RF INPUT		%	5	10	
10. S+N/N RATIO AT 1mV INPUT		dB	40	34	
11. IMAGE REJECTION RATIO		dB	70	66	
12. IF REJECTION RATIO		dB	70	60	
13. RF GAIN CONTROL AT S+N/N 10dB SENSITIVITY LEVEL		dB	30	20-40	
14. S METER SENSITIVITY AT "9BAR"		uV	100	30-320	
15. CURRENT DRAIN AT NO SIGNAL		mA	90	120	
16. CURRENT DRAIN AT MAX AUDIO OUTPUT		mA	250	300	
17. CLARIFIER RANGE		KHz	+/-0.8	0.5 kHz	



## AE 2990 AFS Handheld Multi Mode Features

### 1. Multi Mode Channel Conversion:

#### A. Codes and its Corresponding Mode Channel

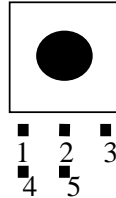
<b>Code1:</b>	<b>HAM BAND (AM/FM/SSB 4W)</b>
<b>Code 2:</b>	<b>12M (AM/FM/SSB 4W)</b>
<b>Code 3:</b>	<b>450ch. (AM/FM/SSB 4W)</b>
<b>Code 4:</b>	<b>450ch. (AM/FM/SSB 4W "0" Raster 0 Raster)</b>
<b>Code d:</b>	<b>Germany (80 FM4W; 40 AM 1W and SSB 4W).</b>
<b>Code EU:</b>	<b>40AM 1W, 40 FM/SSB 4W</b>
<b>Code E:</b>	<b>40Ch. AM/FM/SSB 4W</b>
<b>Code PL:</b>	<b>40ch. AM/FM/SSB 4W "0" Raster</b>
<b>Code U:</b>	<b>UK; U1 from 1 to 40; U2 from 1 to 40</b> <b>Frequency display is not necessary for UK mode.</b>
<b>Code US:</b>	<b>40ch. AM/SSB 4W (no FM mode allowed in the USA)</b>

#### B. Channel Conversion option for CB: Codes: d, EU, E, PL, U and US only

- Turn **Off** the unit (Volume switch off )
- Press **ML/MS** button & hold
- Turn **ON** the unit
- Release **ML/MS** button
- The display will show the code: d, EU, E, PL,U and US just press the **UP/DOWN** buttons to select the desired code.
- Turn **OFF** the unit to set the selected code
- Turn **ON** the unit to operate on the selected code

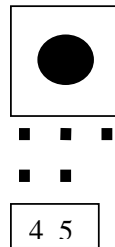
### C. Channel conversion for radio amateurs: codes 1 to Code: US

- Turn **OFF** the unit
- **Temporarily remove the rubber cover above the PTT button.**  
Below the PTT switch that found inside the PTT button there are three terminals provided for conversion. Terminal 1, 2 and 3



- By using a tweezers short terminal 1&2 and turn on the unit at the same time. After power on, release the short circuit across terminals 1&2 again.
- Using the **UP/DOWN** button select the desired code (between Code 1 to code US)
- After selecting the desired code turn **OFF** and then **ON** the unit to operate on the selected code.

### C: Locking the radio to any desired code



- Select the desired code number and let the radio work on this country code.
- Switch the radio off, take off the PTT rubber and solder a jumper across terminal 4&5
- Now the radio is permanently locked against any country code change and works only on the last used country code, as long as the jumper remains soldered.
- Add the rubber again at the PTT button location

## 2. Frequency Coverage List:

<b>Code 1:</b>	<b>(10 m Band) 28.000 to 29.690 MHz</b>
<b>Code 2:</b>	<b>(12m Band) 24.890 to 24.990 MHz</b>
<b>Code 3:</b>	<b>(454ch.) 25.165 to 29.655 MHz</b>
<b>Code 4:</b>	<b>(454ch.PL) 25.160 to 29.650 MHz</b>
<b>Code d:</b>	<b>(Germany 80ch.) 26.565 to 27.405 MHz</b>
<b>Code EU,US &amp; E:</b>	<b>(40ch.) 26.965 to 27.405 MHz</b>
<b>Code PL:</b>	<b>(40ch.) 26.960 to 27.400 MHz</b>
<b>Code U:</b>	<b>(UK) U1- 27.601 to 27.991MHz</b> <b>U2- 26.965 to 27.405 MHz</b>
<b>Code US:</b>	<b>USA: AM / SSB 40 ch: 26.965 to 27.405 MHz</b>

## 3. Memory Programming “M1 to M5”

1. Using **UP/DOWN** buttons select the desired frequency to be saved.
2. Press **FUN** button and then **ML/MS** button, notice the “**M**” icon blinking on the right side of the display.
3. Then press **SCAN/MENU** button to save in memory **M1**.
4. Repeat procedures **1 and 2** and save it to **MODE / H/L** button for memory **M2**, **STEP / CH/FREQ** button for **M3**, **CH9/19 / LOCK** button for **M4** and **SQ,MICG,RFG /RPT** for **M5**.

## 4. Memory Recall “M1 to M5”

1. Press **ME/MS** button and then **SCAN / MENU** button to recall memory **M1**  
Press **ME/MS** button and then **MODE / H/L** button to recall memory **Important Note:**
2. **M2**
3. Press **ME/MS** button and then **STEP/ CH/FREQ.** button to recall memory **M3**
4. Press **ME/MS** button and then **CH9/19 / LOCK** button to recall memory **M4**.
5. Press **ME/MS** button and then **SQ, MICG, RF-G/ RPT** button to recall memory **M5**.

### **Important Note:**

Only the green colored country codes (page 1) are legal codes to be used for standard CB radio purpose by any CB users in the European Union & R&TTE Countries. In some countries licensing procedures with 1 x or regular costs may apply

The blue colored amateur radio codes may be used by persons, who have a valid amateur radio license issued by a European member state authority.

The red colored codes are not for use in European countries. In some countries it may be allowed that radio amateurs can own radios where all country codes can be activated, but even if that is the case, radio amateurs are only allowed to use the dedicated amateur radio frequencies. In that case, the radio is not allowed to be used for any other purpose than for amateur radio.



### Modifications for Amateur Radio use

**General:** The radio is shipped as CB radio with factory pre-programmed limitation to the green marked **CB radio** standards. In Europe and USA. CB radio users can select between the modes Code d, Code EU, Code E, Code PL, Code U, and Code US.

**Radio amateurs with a valid radio amateur license** can expand the radio to Code 1 to Code 4 modes. Code 1 covers the amateur band 28.000 to 29.699 MHz, Code 2 the 12 m band and Code 3 is a summary of all technically possible Frequencies in a CB like radio channel mode with 450 channels, which is in use in some Eastern European countries for CB radio. Code 4 is the same, but with -5 kHz offset according to the Poland CB frequency system.

Amateurs are allowed to use Code 1 and Code 2 (Code 2 only in countries where the 12 m band is allowed). In Germany, amateurs with license may operate radios which are totally open in their frequency range (that means incl. Code 3 and 4, but the use is restricted to the allocated amateur Radio frequency bands and the use as amateur radio.

That means that any other use (for example as CB radio or commercial radio for business purposes) is forbidden for amateurs.

After any of the codes has been selected, it is possible to restrict the radio to exactly this one code by soldering a jumper (solder bridge) between position 4 and 5. In that case the radio can work only in one code as long as the jumper is soldered.

### Codes and its Corresponding Mode Channel Setting

<b>Code 1:</b>	<b>10 m Ham Band (AM/FM/SSB 4W)</b>
<b>Code 2:</b>	<b>12m Ham Band (AM/FM/SSB 4W)</b>
<b>Code 3:</b>	<b>450ch. (AM/FM/SSB 4W)</b>
<b>Code 4:</b>	<b>450ch. (AM/FM/SSB 4W "0" Raster 0 Raster)</b>
<b>Code d:</b>	<b>CB Germany (80 FM4W; 40 AM 1W and SSB 4W).</b>
<b>Code EU:</b>	<b>CB Europe 40AM 1W, 40 FM/SSB 4W</b>
<b>Code E:</b>	<b>CB Spain &amp; Europe(future) 40CH AM/FM/SSB 4W</b>
<b>Code PL:</b>	<b>CB Poland 40ch. AM/FM/SSB 4W "0" Raster</b>
<b>Code U:</b>	<b>CB UK; U1 from 1to 40 UK; U2 from 1to 40 INT</b>
<b>Code US:</b>	<b>USA 40 CH with (AM/SSB 4W) (no FM)</b>

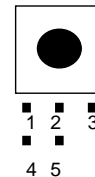
\*Frequency display is not necessary for UK mode

### Channel Conversion option of Code: d, EU, E, PL, U and US only

1. Turn Off the unit (Volume switch off)
2. Press ML/MS button & hold
3. Turn ON the unit
4. Release ML/MS button
5. The display will show the code: d, EU, E, PL, U and US.  
And then press the "UP/DOWN" buttons to select the desired code.
6. Turn OFF the unit to set the selected code
7. Turn ON the unit to operate on the selected code

### C. Channel conversion from code: 1 to Code: US

1. Turn OFF the unit
2. **Open the PTT button by removing the rubber cover.**
3. **Below the PTT switch you find five soldering contact terminals provided for conversion. Terminal 1,2,3,4 and 5.**



4. **Connect the terminals 1 and 2 together by a tool (e.g. tweezers)**
5. Switch the radio ON
6. Select the desired code number (with UP/DWN)
7. Switch the radio off
8. Release the temporary connection
7. Use the radio

### Restrict radio to only 1 selected code:

Select the code, solder a jumper between 4 and 5  
Now the radio works only with the previously selected country code and cannot change the code as long as the jumper remains soldered.

