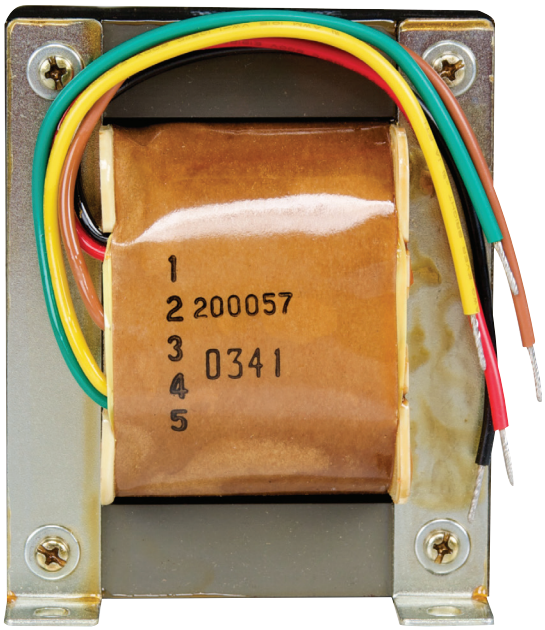
AF140

140 Watt Autoformer



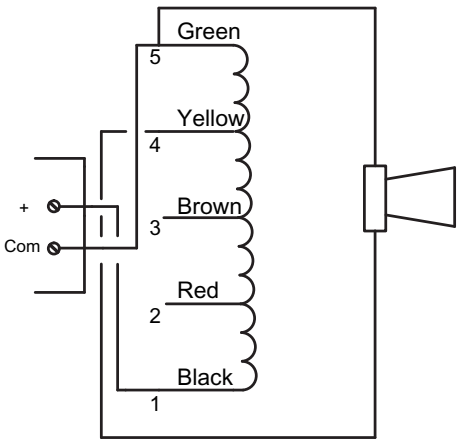
AF140

Features

- Serves as a Method for Matching Loudspeaker Loads to Amplifier Outputs
- Suitable for Professional and Commercial Sound Applications

General Description

Model AF140 consists of a single coil autoformer with multiple taps for maximum flexibility in matching a wide variety of loudspeaker loads to power amplifier outputs. A single AF140 will handle loads up to 150 Watts and by connecting two units in series, power handling capacity can be increased to 300 Watts.



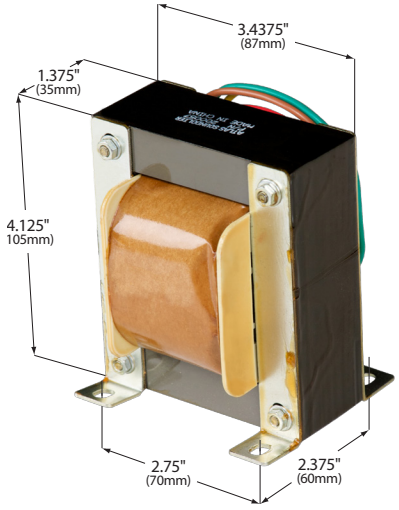
Note: The wire colors are for identification purposes only.

Specifications

Frequency Response	30Hz – 15kHz (±1dB)
Insertion Loss	.3dB
Terminations	6" (152mm) Color Coded Leads
Core Size	1⅜" Square (35mm)
Power Rating	140 Watts
Weight	6.25 lbs (2.8kg)

Architect & Engineer Spcifications

Auto transformer shall be AtlasIED Model AF140 or approved equal. It shall be capable of handling 140 Watts of audio power with a frequency response of 30Hz – 15kHz (±1dB).

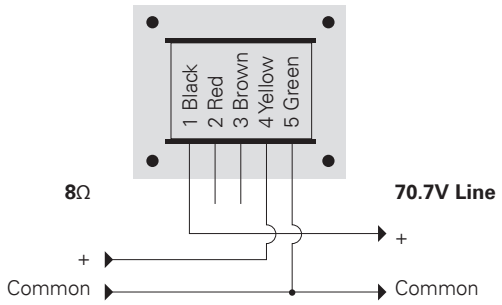


Using the AF140 Autoformer to Convert 8Ω Output to 70.7V Lines

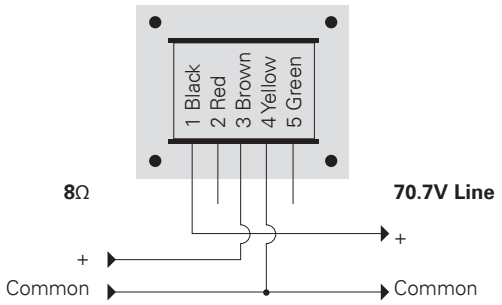
Step 1: Determine the wattage rating of the amplifier.

Step 2: Locate the diagram below that most closely matches the rating of your amplifier and follow the connections shown.

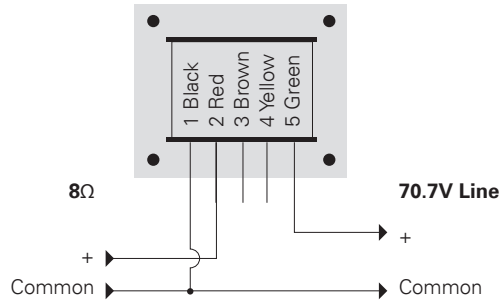
Amplifier Rating:
30 - 45 Watts



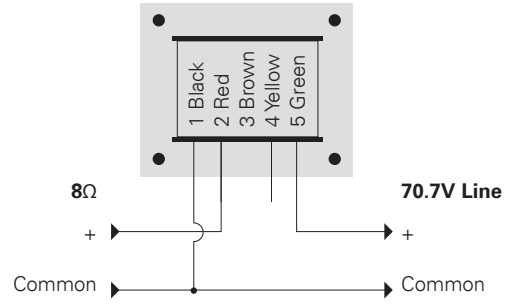
Amplifier Rating:
50 - 80 Watts



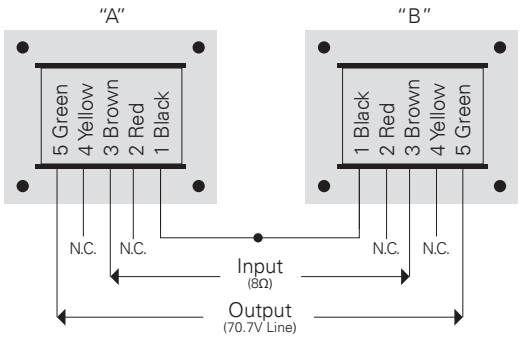
Amplifier Rating:
85 - 100 Watts



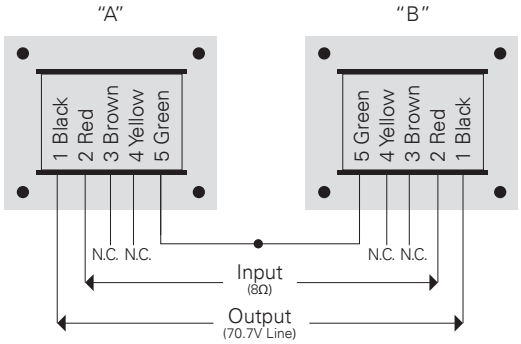
Amplifier Rating:
115 - 150 Watts



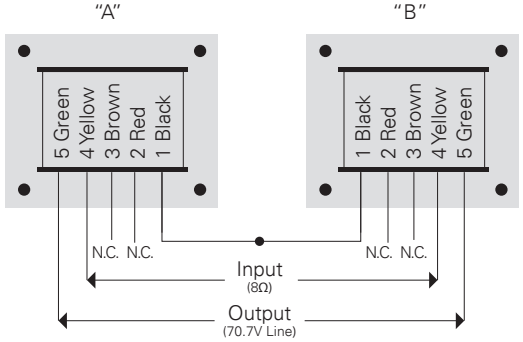
Amplifier Rating:
160 - 190 Watts



Amplifier Rating:
200 - 260 Watts



Amplifier Rating:
270 - 300 Watts



Using the AF140 Autoformer

The AF140 autoformer can be used to solve a wide variety of impedance-matching and voltage step-up/step-down problems. The key to understanding how to best utilize the AF140 depends upon being able to convert both the input and output to the same unit of measure. In other words, you must know the input voltage in order to determine the output voltage. Likewise, the input impedance must be known to find the output impedance. Both of these values can be determined by using simple Ohm's Law formulas and the reference chart.

Simply follow these steps:

Step 1: Convert the input and output to the same unit of measure using the formulas on the circle chart.

Step 2: Calculate the ratio between the input and the desired output (accomplished by dividing the output by the input).

Example: Converting 100 Watt, 8Ω Amplifier Output to a 70.7V Line

$$\frac{OUTPUT}{INPUT} = RATIO$$

- $\frac{70.7 \text{ Volts}}{28.3 \text{ Volts}}$ = 2.5 Voltage Ratio

Example: Matching Six 16Ω Loudspeakers Connected in Parallel to an 8Ω Amplifier Output

- $\frac{2.66\Omega}{8\Omega}$ = .332 Impedance Ratio

Step 3: Find the desired ratio (voltage or impedance) on the step-up or step-down charts on pages 4 and 5 and use the input and output connections indicated. (If the exact ratio needed is not shown on the chart, use the closest one available.)

The exact output can be determined by multiplying the input by the ratio shown on the chart.

Note: the "common" will be shared by both the input and output. Also, don't be confused by the color of the wires. They have no meaning other than to distinguish one from another. The black wire will not be "common" in every case.

A single AF140 will handle loads up to approximately 150 watts. For applications requiring more power, two AF140s can be connected in series.

The diagrams and charts on pages 6 and 7 show the connections and all the possible step-up and step-down ratios.

One of the more common applications of the AF140 is converting 8Ω amplifiers to "70V" lines. The handy reference guide on page 2 shows connections for amplifiers from 30 watts to 300 watts.

SINGLE AF140 APPLICATIONS: 20 - 150

Amplifier Power	Volts Into 4Ω	Volts Into 8Ω	Volts Into 16Ω	Impedance 25v Line	Impedance 50v Line	Impedance 70.7v Line	Impedance 100v Line
20W	8.9	12.6	17.9	31.3Ω	125.0Ω	250Ω	500Ω
25W	10.0	14.1	20.0	25.0Ω	100.0Ω	200Ω	400Ω
30W	10.9	15.5	21.9	20.8Ω	83.3Ω	166Ω	332Ω
35W	11.8	16.7	23.6	17.8Ω	71.4Ω	143Ω	286Ω
40W	12.6	17.9	25.3	15.6Ω	62.5Ω	125Ω	250Ω
45W	13.4	18.9	26.8	13.9Ω	55.5Ω	111Ω	222Ω
50W	14.1	20.0	28.3	12.5Ω	50.0Ω	10Ω	200Ω
55W	14.8	20.9	29.6	11.4Ω	45.5Ω	91Ω	182Ω
60W	15.5	211.9	30.9	10.4Ω	41.6Ω	83Ω	166Ω
65W	16.1	22.8	32.2	9.6Ω	38.5Ω	77Ω	154Ω
70W	16.7	23.6	33.5	9.0Ω	35.7Ω	71Ω	143Ω
75W	17.3	24.5	34.6	8.4Ω	33.3Ω	67Ω	134Ω
80W	17.9	25.3	35.8	7.8Ω	31.3Ω	63Ω	125Ω
85W	18.4	26.0	36.8	7.4Ω	29.4Ω	59Ω	118Ω
90W	18.9	26.8	37.9	7.0Ω	27.8Ω	56Ω	112Ω
95W	19.5	27.5	39.0	6.5Ω	26.3Ω	53Ω	106Ω
100W	20.0	28.3	40.0	6.2Ω	25.0Ω	50Ω	100Ω
110W	20.9	29.6	41.9	5.7Ω	22.7Ω	46Ω	92Ω
120W	21.9	30.9	43.8	5.2Ω	20.8Ω	42Ω	84Ω
130W	22.8	32.2	45.6	4.8Ω	19.2Ω	39Ω	78Ω
140W	23.6	33.4	47.3	4.5Ω	17.8Ω	36Ω	72Ω

TWO AF140 APPLICATIONS (CONNECTED IN SERIES): 160 - 300 WATTS

Amplifier Power	Volts Into 4Ω	Volts Into 8Ω	Volts Into 16Ω	Impedance 25v Line	Impedance 50v Line	Impedance 70.7v Line	Impedance 100v Line
160W	25.3	35.8	50.6	3.9Ω	15.6Ω	31.2Ω	62.5Ω
170W	26.0	36.9	52.1	3.6Ω	14.7Ω	29.4Ω	58.8Ω
180W	26.8	38.0	53.6	3.4Ω	13.8Ω	27.8Ω	55.5Ω
190W	27.5	39.0	55.1	3.3Ω	13.1Ω	26.3Ω	52.6Ω
200W	28.3	40.0	56.5	3.1Ω	12.5Ω	25.0Ω	50.0Ω
210W	29.0	41.0	57.9	2.9Ω	11.9Ω	23.8Ω	47.6Ω
29.6	29.6	42.0	59.3	2.8Ω	11.3Ω	22.7Ω	45.4Ω
230W	30.3	42.9	60.6	2.7Ω	10.8Ω	21.7Ω	43.5Ω
240W	31.0	43.8	61.9	2.6Ω	10.4Ω	20.8Ω	41.6Ω
250W	31.6	44.7	63.2	2.5Ω	10.0Ω	20.0Ω	40.0Ω
260W	32.2	45.6	64.5	2.4Ω	9.6Ω	19.2Ω	38.4Ω
270W	32.8	46.5	65.7	2.3Ω	9.2Ω	18.5Ω	37.0Ω
280W	33.5	47.3	66.9	2.2Ω	8.9Ω	17.8Ω	35.7Ω
290W	34.0	48.1	68.1	2.1Ω	8.6Ω	17.2Ω	34.5Ω
300W	34.6	49.0	69.3	2.0Ω	8.3Ω	16.6Ω	33.3Ω

Step Up Single AF140

Voltage Ratio	Impedance Ratio	Connections		Turns Ratio
		Input	Output	
4	16	5, 4	5, 1	1:4
3	9	4, 3	4, 1	1:3
2.5	6.25	1, 2	1, 5	1:2.5
2.4	5.76	5, 4	5, 2	1:2.4
2.14	4.57	4, 2	4, 1	1:2.14
2	4	1, 3	1, 5	1:2
1.875	3.51	1, 2	1, 4	1:1.875
1.71	2.92	2, 4	2, 5	1:1.71
1.66	2.75	5, 2	5, 1	1:1.66
1.4	1.96	4, 3	4, 2	1:1.4
1.33	1.76	1, 4	1, 5	1:1.33
1.25	1.56	1, 2	1, 3	1:1.25

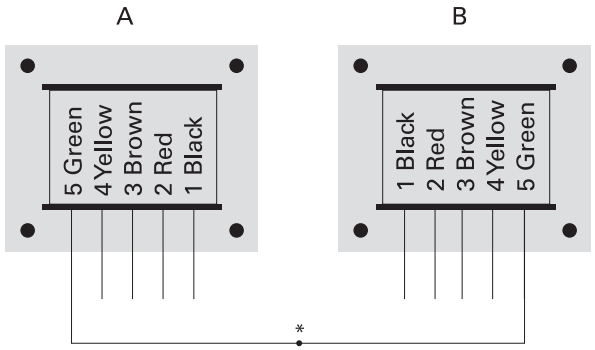
Step Down Single AF140

Voltage Ratio	Impedance Ratio	Connections		Turns Ratio
		Input	Output	
.25	.062	5, 1	5, 4	4:1
.33	.109	4, 1	4, 3	3:1
.40	.160	1, 5	1, 2	2.5:1
.42	.176	5, 2	5, 4	2.4:1
.46	.212	4, 1	4, 2	2.14:1
.50	.250	1, 5	1, 3	2:1
.53	.281	1, 4	1, 2	1.87:1
.58	.336	2, 5	2, 4	1.7:1
.60	.360	5, 1	5, 2	1.66:1
.71	.504	4, 2	4, 3	1.4:1
.75	.562	1, 5	1, 4	1.33:1
.80	.640	1, 3	1, 2	1.25:1

Two AF140 Applications (Connected in Series): 160 - 300 Watts

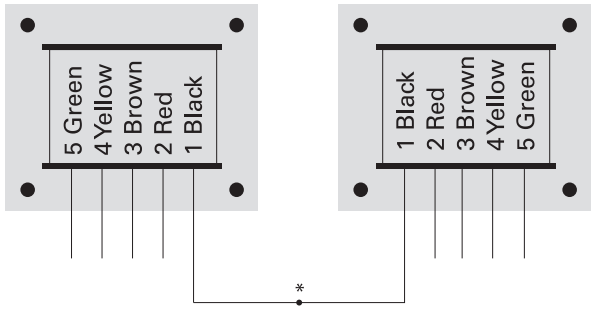
STEP-UP: Voltage Ratio = 1.66, 2.00, 2.40, 4.00; Impedance Ratio = 2.75, 4.00, 5.76, 16.00

STEP-DOWN: Voltage Ratio = .60, .50, .42, .25; Impedance Ratio = .36, .25, .176, .062



Step Up				
Voltage Ratio	Impedance Ratio	Connection		Turns Ratio
		Input	Output	
1.66	2.75	2A, 2B (Red)	1A, 1B (Black)	1:1.66
2.00	4.00	4A, 4B (Yellow)	3A, 3B (Brown)	1:2.00
2.40	5.76	4A, 4B (Yellow)	2A, 2B (Red)	1:2.40
4.00	16.00	4A, 4B (Red)	1A, 1B (Black)	1:4.00

Step Down				
Voltage Ratio	Impedance Ratio	Connection		Turns Ratio
		Input	Output	
.60	.36	1A, 1B (Black)	2A, 2B (Red)	1.66:1
1.66	.25	1A, 1B (Black)	3A, 3B (Brown)	2.00:1
1.66	.176	2A, 2B (Red)	4A, 4B (Yellow)	2.40:1
1.66	.062	1A, 1B (Black)	4A, 4B (Yellow)	4.00:1



Step Up				
Voltage Ratio	Impedance Ratio	Connection		Turns Ratio
		Input	Output	
1.25	1.58	2A, 2B (Red)	3A, 3B (Brown)	1:1.25
1.33	1.77	4A, 4B (Yellow)	5A, 5B (Green)	1:1.33
1.875	3.51	2A, 2B (Red)	4A, 4B (Yellow)	1:1.875
2.00	4.00	3A, 3B (Brown)	5A, 5B (Green)	1:2.00
2.50	6.25	2A, 2B (Red)	5A, 5B (Green)	1:2.50

Step Down				
Voltage Ratio	Impedance Ratio	Connection		Turns Ratio
		Input	Output	
.80	.64	3A, 3B (Brown)	2A, 2B (Red)	1.25:1
.75	.56	5A, 5B (Green)	4A, 4B (Yellow)	1.33:1
.53	.28	4A, 4B (Yellow)	2A, 2B (Red)	1.875:1
.50	.25	5A, 5B (Green)	3A, 3B (Brown)	2.00:1
.40	.16	5A, 5B (Green)	2A, 2B (Red)	2.50:1

Step Up (Amp Output Voltage to Match Speaker's Voltage Requirement)

Input Taps (From Amp)	Output Taps (To Speaker)	Turns Ratio	Voltage Ratio	Impedance Ratio
5,4	5,1	1:4	4	16
4,3	4,1	1:3	3	9
1,2	1,5	1:2.5	2.5	6.25
5,4	5,2	1:2.4	2.4	5.76
4,2	4,1	1:2.14	2.14	4.57
1,3	1,5	1:2	2	4
1,2	1,4	1:1.875	1.875	3.51
2,4	2,5	1:1.171	1.17	2.92
5,2	5,1	1:166	1.66	2.75
4,3	4,2	1:1.4	1.4	1.96
1,4	1,5	1:1.33	1.33	1.76
1,2	1,3	1:1.25	1.23	1.56

Application example for "step-up" configuration:

100 Watt 8Ω amp needs to drive speakers on a 70.7V line

Step 1. Determine the output voltage of the 8Ω amplifier at 100W
Voltage equals the square root of wattage multiplied by impedance
or

$$V = \sqrt{Wattage * Impedance}$$

SQRT(100*8) = 28.3 Volts

Step 2. To "step up" this 28.3 volts to the required 70.7 volts we must determine the ratio required to do so.
Ratio = OUTPUT/INPUT (output divided by the input)
70.7/28.3 = 2.5 (voltage ratio)

Using the chart below we select the settings required to provide this 2.5 voltage ratio:
From amp + to lead #2 (Red)
From amp – to lead #1 (Black)
To speaker + to lead #5 (Green)
To speaker – to lead #1 (Black

Other "Step Up" Power Rating Tap Selections for Common Amplifier Outputs

Power (Watts)	Impedance	Voltage	Ratio	Closest AF140 Ratio	Input Taps (From Amp)	Input Taps (To Speakers)
30	8	15.49	4.56	4.56	– to Lead #4 (yellow) + to Lead #2 (red)	– to Lead #4 (yellow) + to Lead #1 (black)
60	8	21.91	3.23	3.51	– to Lead #1 (black) + to Lead #2 (red)	– to Lead #1 (black) + to Lead #4 (yellow)
75	8	24.49	2.89	2.92	– to Lead #2 (red) + to Lead #4 (yellow)	– to Lead #2 (red) + to Lead #5 (green)
100	8	28.28	2.5	2.75	– to Lead #5 (green) + to Lead #2 (red)	– to Lead #5 (green) + to Lead #1 (black)
120	8	30.98	2.28	1.96	– to Lead #4 (yellow) + to Lead #3 (brown)	– to Lead #4 (yellow) + to Lead #2 (red)
125	8	31.62	2.24	1.96	– to Lead #4 (yellow) + to Lead #3 (brown)	– to Lead #4 (yellow) + to Lead #2 (red)
140	8	33.47	2.11	1.96	– to Lead #4 (yellow) + to Lead #3 (brown)	– to Lead #4 (yellow) + to Lead #2 (red)

Connections		Turns Ratio	Voltage Ratio	Impedance Ratio
Input	Output			
5, 1	5, 4	4:1	.25	.062
4, 1	4, 3	3:1	.33	.109
1, 5	1, 2	2.5:1	.40	.160
5, 2	5, 4	2.4:1	.42	.176
4, 1	4, 2	2.14:1	.46	.212
1, 5	1, 3	2:1	.50	.250
1, 4	1, 2	1.87:1	.53	.281
2, 5	2, 4	1.7:1	.58	.336
5, 1	5, 2	1.66:1	.60	.360
4, 2	4, 3	1.4:1	.71	.504
1, 5	1, 4	1.33:1	.75	.562
1, 3	1, 2	1.25:1	.80	.640

Step Down (Amp output voltage to match speaker's voltage requirement)

Application example for "step-down" configuration:

8Ω speaker needs to "receive" 100 Watts from a 70.7V line.

Step 1. We need to determine what voltage constitutes 100 Watts into this 8Ω speaker from the 70.7V line

Again, voltage equals the square root of wattage multiplied by impedance

$$V = \sqrt{Wattage * Impedance}$$

or

SQRT(100*8) = 28.3 Volts

Step 2 To "step down" the 70.7V line to the required 28.3 volts we must determine the ratio required to do so.
Ratio = OUTPUT/INPUT (output divided by the input)
28.3/70.7 = .40 (voltage ratio)

Using the chart above we select the settings required to provide this .40 voltage ratio:
From amp + to lead #5 (Green)
From amp – to lead #1 (Black)
To speaker + to lead #2 (Red)
To speaker – to lead #1 (Black)