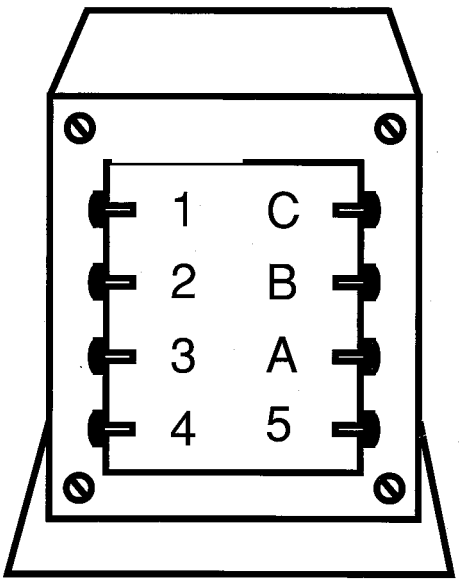
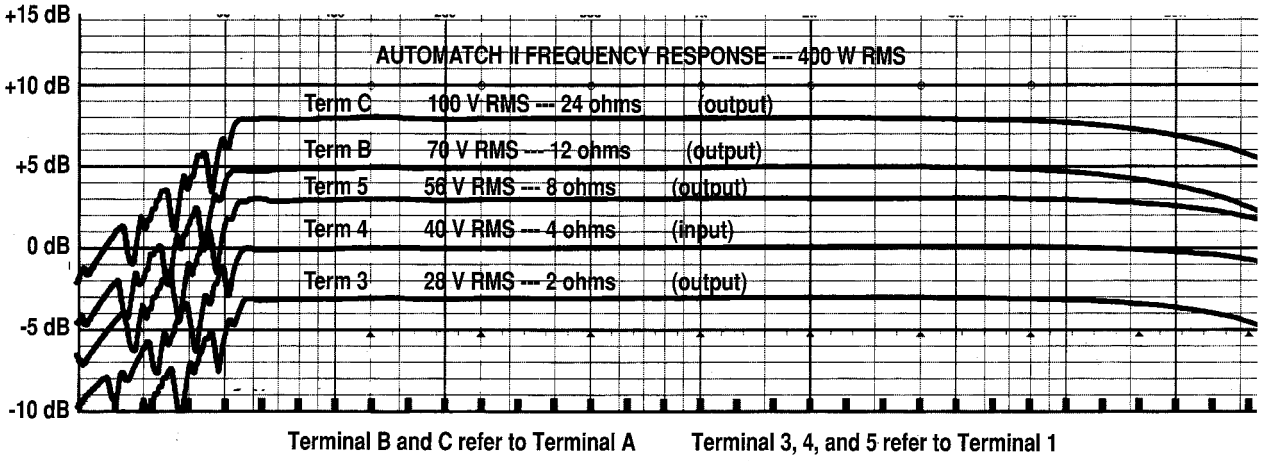


AUTO-MATCH™ II
OPERATING GUIDE

WARNING:
TO PREVENT ELECTRIC SHOCK OR FIRE HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

Figure 1



GENERAL DESCRIPTION

The Peavey Auto-Match™ II is a 400 watt line matching transformer with high-fidelity specifications and a primary winding that can be used to convert the output impedance of any direct coupled power amplifier upward or downward to effectively match the impedance of a particular loudspeaker system. Additionally, the unit has an isolated secondary winding to allow usage with 70 and 100 volt distribution systems.

The Auto-Match II utilizes a punched and welded bottom plate for convenient mounting and heavy-duty screw-type terminals for positive connection from the power amplifier and to the external speaker wires. An attached label provides terminal identification and voltage/power ratings to aid you in the proper connection and usage.

FUNCTION I - NORMAL LOUDSPEAKER MATCHING - USING PRIMARY ONLY

Most direct coupled solid-state power amplifiers are designed to deliver their maximum rated output power into one particular load impedance. For example, an amplifier rated at 400 watts RMS at 4 ohms will only deliver slightly more than 200 watts into an 8 ohm speaker load, and only slightly more than 100 watts into a 16 ohm load. Typically, the output power is cut in half each time the load impedance is

doubled. Operation of this same amplifier below its specified optimum impedance load might also cause a loss in power output capability due to internal current limiting circuitry employed in most amps to provide protection against short circuits. In addition, operation below the rated impedance could cause an amplifier to run significantly hotter than normal, reducing long-term reliability and possibly causing the amp to "thermal out" for short periods of time due to the excessive internal operating temperatures.

Since most folks want their power amplifier investment to deliver the rated power capability continuously and reliably, this is one of the functions of the Peavey Auto-Match II transformer. It can convert the rated load impedance of any power amp upward or downward to match the particular load impedance of the attached loudspeaker system. Another way of saying the same thing is that the Auto-Match II will convert a speaker system's load impedance to match the amplifier's optimum impedance. It should go without saying that the Auto-Match II is unnecessary when the amp impedance already matches that of the intended speaker load.

The Peavey Auto-Match II employs a single-winding primary with multiple taps to change voltage levels up or down. Taps for 20 V, 28 V, 40 V, and 56 V RMS are available. Because of the simplicity in primary construction, this design being called an autoformer, the Auto-Match II is considerably smaller and less costly than if the primary were split into separate windings. Such an approach offers exceptional frequency response characteristics. (See Fig. 1). At the 400 watt RMS level, the Auto-Match II has a +0, -1 dB response from 55 Hz to 30 kHz in all the configurations which just use the primary windings. The most significant disadvantage of an autoformer is its inability to provide the isolation of grounds between input and output signals, although this is usually not a problem for most typical loudspeaker arrangements. In this function the Auto-Match II is truly a high-fidelity unit.

FUNCTION II - DISTRIBUTION SYSTEMS - USING THE FULL TRANSFORMER

Most direct coupled solid-state power amplifiers are not capable of supplying 70 or 100 V RMS directly to a distribution system from the individual channels. However, many of these power amplifiers have a bridge mode capability which in essence doubles the output voltage capability of the individual channel, and as such, these amps can drive 70 volt distribution systems directly. In this case the Peavey Auto-Match II may not be necessary. It does, however, offer one very significant advantage when used on the individual channels of your typical stereo power amplifier. This advantage is the new, fully balanced, 70 volt output capability!

The Peavey Auto-Match II can accept the output voltage level of virtually any power amplifier and convert it (step it up) to 70 or 100 V RMS as a source for a 70 or 100 volt distribution system with total speaker loads of up to 400 W RMS. For this function the power amplifier is connected to the proper primary input tap which matches the amp's individual channel output voltage; the Auto-Match II is unique in that it can drive distribution systems fully balanced. This is an important characteristic which offers improved system performance by providing ground isolation between primary and secondary. This isolation is necessary to eliminate ground loops and the associated hum and "RF" problems that can plague distribution system installations which are not balanced. This feature alone makes using the Auto-Match II a better choice over the typical bridge mode direct connection which does not and cannot offer ground isolation and eliminate ground loops.

HOOKUP

The Auto-Match II utilizes eight screw-type terminals for input and output connections. Terminals are labeled 1 through 5, and A through C. Referring to the chart in figure 2, note that terminals 2 through 5 (the primary winding) are designed to operate at a specific maximum RMS voltage level, with reference to terminal 1, called the "primary common" terminal. For example: terminal 2 = 20 V RMS, terminal 3 = 28 V RMS, etc. For all primary applications, then, terminal 1 will always be used with another numbered terminal for input connection (and output connections if necessary). For all FUNCTION I applications, then, terminal 1 must be used for both the input and the output ground connections.

Again referring to the chart in figure 2, note that both terminals B and C (the secondary winding) referenced to terminal A (the "secondary common" terminal). For Example: terminal B = 70 V RMS, terminal C = 100 V RMS. For all FUNCTION II applications, then, terminal A must be used for one of the output connections.

Thus, the first and most important step in utilizing the Peavey Auto-Match II is to determine the correct terminals for input connections from the amp and output connections to the load.

SELECTING THE INPUT AND OUTPUT CONNECTIONS
FUNCTION I APPLICATIONS - NORMAL LOUDSPEAKER MATCHING

To select the proper input terminals, it is always necessary to determine the maximum RMS output voltage of the amplifier at full output (before clipping) into its specified load impedance. The chart in figure 2 may be used for this purpose as follows:

1. Select the proper column to match the amplifier power rating. The vertical power column closest to the amplifier's rating should be chosen; for a 130 watt amplifier, use the 100 W RMS column; for a 150 W RMS amplifier, use the 200 W RMS column; for a 300 W RMS amplifier, use the 400 W RMS column. If the power level is in the middle of choices, use the higher value.
2. Move down the selected power column to match the amplifier's rated load impedance at which it delivers full rated output.
3. Move left to the V RMS column and read the power amplifier's output voltage rating.
4. Move farther left to the terminal column and identify the proper # terminal to be used as an input. The power amp's positive (+) output must be connected to this # terminal.
5. The power amplifier's negative (-) output terminal must be connected to the #1 terminal.
6. Using the power column selected in step 1 above, move up or down the column to match the impedance of the loudspeaker system to be used.
7. Move left to the V RMS column and take note of the V RMS value required by the different impedance loudspeaker system.
8. Move farther left to the terminal column and identify the proper # terminal to be used as an output. Connect this # terminal to be used as an output. Connect this # terminal to the loudspeaker system's positive (+) input.
9. Connect the #1 terminal already used as the power amplifier's negative feed (from line 5 above) to the loudspeaker system's negative (-) input.

EXAMPLE

Let's assume that we want to use an amplifier with a power rating of 400 watts RMS at a rated load of 4 ohms (Peavey's CS® 800X and IPS™ 800 power amps are both rated at 400 W RMS per channel into 4 ohms). We want one channel of this amp, however, to deliver its full 400 W RMS capability into an 8 ohm loudspeaker load rather than a 4 ohm loudspeaker load. We would proceed as follows:

1. Select the 400 W RMS column from the chart in figure 2.
2. Move down the 400 W RMS column to 4 ohms.
3. Move left to the V RMS column. This 400 W RMS power amplifier has an output of 40 V RMS.
4. Move farther left to the terminal column. The amplifier's positive (+) output must be connected to the #4 terminal, and the amplifier's negative (-) output must be connected to the #1 terminal of the Auto-Match II transformer.
5. Move up the 400 W RMS column to 8 ohms (the impedance of the loudspeaker load to be used).
6. Move left to the V RMS column and notice that an 8 ohm load must have 56 V RMS delivered to it to produce 400 W RMS.
7. Move farther left to the terminal column. Terminal #5 must be connected to the loudspeaker's positive input, and terminal #1 must be connected to the loudspeaker's negative input.

A diagram of this connection is shown in figure 3.

The Auto-Match II can be used with any power amplifier with a rating up to 400 watts RMS and can

transform up or down to the impedances indicated on the chart.

A power amplifier's RMS voltage at rated power output may also be determined by measuring it with a good-quality RMS voltmeter, or can be calculated using the following formula:

V = (the square root of) (P x Z)

where V = the amplifier rated RMS output voltage
P = the amplifier rated output power in W RMS
Z = the amplifier rated load impedance in ohms

EXAMPLE
Using the same 400 W RMS @ 4 ohms amplifier in the above discussion, substitute into the formula as follows:

V = (the square root of) (P x Z)
V = (the square root of) (400 x 4)
V = (the square root of) 1600
V = 40

The formula indicates an RMS voltage of 40 V.

Similarly, the RMS voltage required by a different impedance loudspeaker system to deliver the rated power desired can be calculated using this same formula:

EXAMPLE
Using the same 400 W RMS system above, we can determine the RMS voltage required by a 16 ohm load as follows:

V = (the square root of) (P x Z)
V = (the square root of) (400 x 8)
V = (the square root of) 3200
V = 56.568542

When rounded off, the formula indicates an RMS voltage of 56 V.

NOTES
For optimum performance, it is important to maintain the proper phasing during terminal connection. The positive or "high" output of a power amplifier is usually marked with a (+), or is the red binding post. In the case of a 1/4" standard phone jack, the tip of the plug is the positive output. The negative or common output is usually marked with a (-), or is the black binding post. The sleeve of a 1/4" phone jack is negative or common output.

As is the case with any high-powered audio system, an appropriate wire size must be utilized. We recommend at least #16 AWG, and for longer runs in excess of 20 feet, #14 AWG should be used.

This may seem obvious to you, but for stereo applications, two Auto-Match II transformers are required -- one for each channel. All other operational instructions contained herein apply.

FUNCTION II APPLICATIONS - DISTRIBUTION SYSTEMS
Probably the most important application of the Peavey Auto-Match II is in sound distribution systems where 70 V RMS and 100 V RMS lines are required. 100 volt systems are more common in European countries, with 70 volts being the most popular one in the United States. As mentioned earlier, the new Auto-Match II now has an isolated secondary output capablity for 70 and 100 volts. To use the Auto-Match properly for these applications, one must simply repeat the input selection process as previously outlined. (i.e., match the power amplifier power rating and characteristic impedance to the proper primary input terminals). Then simply select either the 70 or 100 V RMS secondary output terminals.

Thus, as in our previous example, using a 400 W RMS rated power amplifier with a 4 ohm output rating, we would select the same input terminals as before, using the same scenario with the chart in figure 2 (the power amp's positive (+) output must be connected to the #4 terminal, and the power amp's negative (-) output must be connected to the #1 terminal of the Auto-Match II transformer).

Selecting the proper output terminals should present no problems. As indicated in the chart in figure 2, for a 70 volt system, one must use terminals A and B. For a 100 volt system, one must use terminals A and C. Of interest are the impedance values listed for the 70 and 100 volt terminals. These are the characteristic minimum load values of 70 and 100 volt distribution systems at the specified rated power. These load values are what the Auto-Match II will be driving with a fully loaded distribution system. The connections for a typical 70 V RMS distribution system are shown in figure 4, using the 400 watts RMS, 4 ohm amplifier as before.

NOTES

Notice in the above example, the Auto-Match II function is to simply transform 40 V RMS to 70 V RMS for distribution. It is assumed that the 70 volt system has been correctly installed by qualified personnel, and it will not be discussed in this manual. Peavey offers several publications covering distribution systems.

Even as a fully isolated transformer with separate input and output windings, the Auto-Match II offers exceptional frequency response characteristics. (See figure 1). At the 400 W RMS power level, the Auto-Match II has a +0, -1 dB response from 55 Hz to 20 kHz at both the 70 and 100 volt outputs. Again, because of the separate secondary winding, the distribution system is fully balanced, and this offers improved system performance by providing ground isolation between primary and secondary.

Although the Auto-Match II is rated at 400 W RMS, it can be used with any lesser rated power amplifier. For example, one could use a Peavey CS® 400X or IPS™ 400, which are both rated at 200 W RMS per channel into 4 ohms. In this case the correct primary input terminals to use would be #3 and #1; now the Auto-Match II's function is to transform 28 V RMS to 70 V RMS for distribution. One could use a 100 W RMS power amplifier as well, but using a transformer rated for 400 W RMS at a 100 W RMS power level is a rather poor economic choice.

Often installers use undersized wiring for 70 volt systems, thinking it is the proper thing to do. In the aforementioned 200 W RMS systems, the 70 volt line is delivering slightly under 3 A RMS at full power. Thus, an appropriate wire size must be used. We recommend at least #18 AWG, and for longer runs in excess of 100 feet, even a larger size is desirable. One should never consider #22 or smaller. It only wastes valuable power!

For the Auto-Match II, the two most important terminal selection criteria are voltage and power. One must never exceed the rated RMS voltage of a particular terminal by more than 100%, as indicated in the figure 3 selection chart. Also, one must never exceed the unit's maximum power rating of 400 W RMS. Operation at excessive voltage or power conditions can cause severe overheating and distortion.

Because of the isolated secondaries, it is possible to series either the 70 or 100 volt windings of two or more Auto-Match IIs to create even distribution voltages. Such arrangements are very popular in higher long-distance applications, such as for race tracks and theme parks. It is also possible to use the Auto-Match II as a distribution source and simultaneously drive a regular loudspeaker load. It can also be used as a high-powered line matching transformer at the loudspeaker end of a 70 volt distribution system. Such discussion, however, is beyond the scope of this manual. The Peavey technical service department can answer any further questions you might have on this product.

CAUTION

WHENEVER A TAP WITH AN OUTPUT VOLTAGE LEVEL ABOVE 25 VOLTS IS USED, ANY NECESSARY SYSTEM WIRING DONE INSIDE WALLS OR CEILNGS MUST BE DONE IN ACCORDANCE WITH APPLICABLE LOCAL WIRING CODES.

UNDER NO CIRCUMSTANCES SHOULD THE AUTO-MATCH II BE INSTALLED IN PERMANENT SYSTEMS WHICH MUST DELIVER A CONTINUOUS RMS POWER RATING OVER 400 WATTS. ALSO, NEVER OPERATE ANY TAP ON THE UNIT ABOVE ITS SPECIFIED RMS VOLTAGE RATING BY MORE THAN 110%. FAILURE TO OBSERVE THESE PRECAUTIONS MAY RESULT IN DAMAGE TO THE AUTO-MATCH II AND THE ASSOCIATED EQUIPMENT, AND COULD CAUSE A SHOCK OR FIRE HAZARD.

THE AUTO-MATCH II SHOULD ALWAYS BE ENCLOSED TO PREVENT ELECTRICAL SHOCK. THE

100 V RMS TAP IS CAPABLE OF CAUSING SEVERE BODILY HARM. IT IS SUGGESTED THAT THE UNIT BE MOUNTED INSIDE A RACK NEAR THE ASSOCIATED POWER AMPLIFIER OR INSIDE THE ASSOCIATED LOUDSPEAKER SYSTEM ENCLOSURE. IF NECESSARY, A METAL ENCLOSURE MAY BE UTILIZED.

TO PROTECT AGAINST THE POSSIBILITY OF FIRE OR SHOCK HAZARD, THE AUTO-MATCH II SHOULD NEVER BE OPERATED IN AN EXPOSED LOCATION OR IN PROXIMITY TO FLAMMABLE MATERIALS.

FOR INSTALLATION BETWEEN WALLS AND CEILINGS, CLASS 1 WIRING MUST BE USED PER LOCAL ELECTRICAL CODES.

THE AUTO-MATCH II SHOULD NEVER BE EXPOSED TO RAIN OR MOISTURE, OR OPERATED IN AMBIENT ENVIRONMENTS OVER 60° C (140° F).

THE POSSIBILITY OF A FIRE HAZARD EXISTS IF THE UNIT IS OPERATED INTO A SHORT CIRCUIT, A SERIOUSLY MISMATCHED LOAD, OR DC FAULT CONDITIONS SUCH AS A FAULTY POWER AMPLIFIER COULD PRODUCE.

THE AUTO-MATCH II TRANSFORMER IS DESIGNED FOR PROFESSIONAL USE AND INSTALLATION, AND SHOULD BE INSTALLED BY KNOWLEDGEABLE TECHNICAL PERSONNEL WITH A GOOD UNDERSTANDING OF AUDIO CIRCUITS.

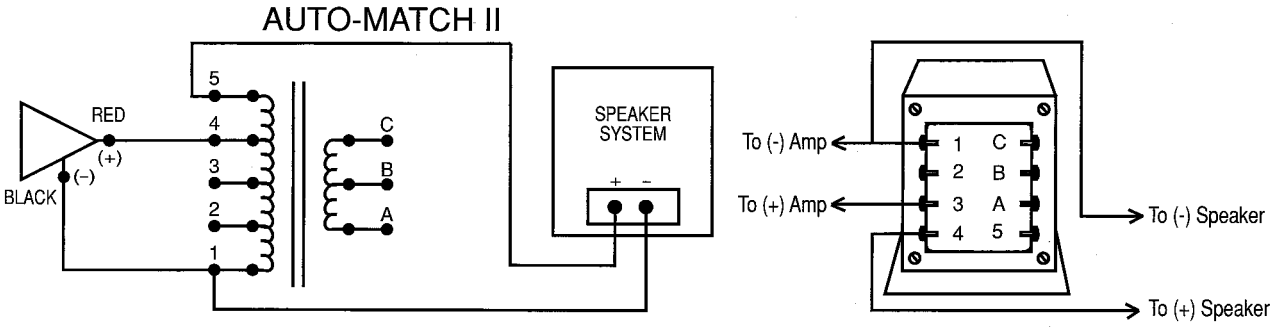
Figure 2

TERMINAL	V RMS	AMPLIFIER POWER RATING		
		400 W RMS	200 W RMS	100 W RMS
C	100 V	25 OHMS	50 OHMS	100 OHMS
B	70 V	12 OHMS	25 OHMS	50 OHMS
A	0 V	SECONDARY COMMON TERMINAL		
5	56 V	8 OHMS	16 OHMS	---
4	40 V	4 OHMS	8 OHMS	16 OHMS
3	28 V	2 OHMS	4 OHMS	8 OHMS
2	20 V	---	2 OHMS	4 OHMS
1	0 V	PRIMARY COMMON TERMINAL		

Auto-Match II Terminal Chart

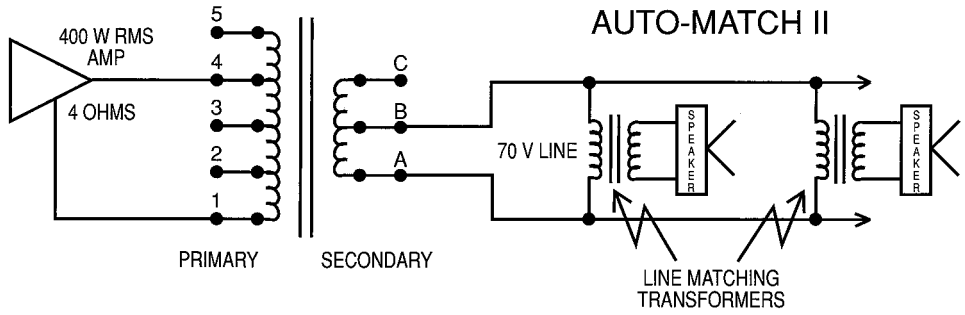
FUNCTION I APPLICATIONS -- PRIMARY ONLY

Figure 3



DISTRIBUTION (70 VOLTS) FUNCTION II APPLICATIONS -- PRIMARY & SECONDARY

Figure 4



SPECIFICATIONS

Input/Output Taps:	20, 28, 40, & 56 V RMS
Isolated Output Taps:	70 & 100 V RMS
Max Power Capability:	400 W RMS
Max Voltage Capability:	10% over tap value
Max Current Capability:	14 A RMS (Terminal 1 - 3)
Max Ambient Temperature:	60° C
Frequency Response:	±1 dB, 50 Hz to 20 kHz
Dimensions:	
Height:	4.63"
Width:	3.75"
Depth:	4.25"
Stack:	2.0"
Mounting plate:	3.750" x 4.344"
Mounting holes:	3.125" x 3.594"
Hole diameter:	.147"
Weight:	9.6 lbs