

AE TECHRON®



7224RLY

Operator's Manual Supplement

For Variable Very-Low Impedance Loads in Controlled Current Mode

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NOTE

This Supplement only provides information specific to the 7224RLY model and is intended to be used together with the *AE Techron 7224 Operator's Manual*. Please refer to the manual for general information about safety, installation, operation and trouble-shooting.

1 Introduction

The 7224RLY amplifier is a special model of the AE Techron 7224 amplifier that has been modified to make it suitable for driving a Protection Relay or other variable very-low impedance loads in a controlled current mode.

Features

- Factory preset for Controlled Current Operation
- Multi-pole Compensation optimized for resistive loads below 2 ohms.

About AE Techron

AE Techron focuses on the development of power conversion and amplifier solutions for difficult environments. In addition to a line of standard power supplies and power amplifier products, AE Techron provides the design and manufacture of custom, high-quality, low-volume electronic products for research, military and industrial applications.

2 Factory Configuration (Default Settings)

Your 7224RLY amplifier differs from a standard 7224 amplifier in the following ways:

1. The 7224RLY ships with Controlled Current set as the default mode of operation.

Note that the amplifier operation mode can be changed to Controlled Voltage mode by adjusting the setting for Jumper J4, located on the amplifier main board (see the “Advanced Configuration” section of the *AE Techron 7224 Operator's Manual*).

2. The 7224RLY ships with a multi-pole compensation enabled for the Controlled Current Mode Compensation Setting. The compensation is optimized for resistive loads below 2 ohms but is stable with higher impedances.

Note that the amplifier Compensation Setting can be changed to the standard 7224 setting by adjusting the setting for Jumper J5, located on the amplifier main board (see the “Advanced Configuration” section of the *AE Techron 7224 Operator's Manual*).

**CAUTION**

The 7224RLY is designed for pulsed operation and should not be run at high power levels for long periods of time (greater than 5 minutes). Damage to components in the output of the amplifier can result from extended high-power usage (1,000 watts or above).

3 Setup, Operation and Troubleshooting

Please refer to the **AE Techron 7224 Operator's Manual** for 7224RLY Setup Instructions. Note that the 7224RLY comes with the Mode setting pre-configured at the factory for Controlled Current Hook-up.

Please refer to the **AE Techron 7224 Operator's Manual** for standard 7224RLY Operation and Troubleshooting instructions.

4 Main Board Functions and Jumper Settings

Please refer to the following for details of main board jumper functions and the factory default settings.

KEY	NAME	REF. DES.	DESCRIPTION	FACTORY DEFAULT SETTING
A	Voltage Monitor	TL3	Observe the output voltage of the amplifier by connecting an oscilloscope and/or voltmeter from TL3, AMP OUT, to TL8 or TL18, GND,. This test point reads voltage directly. A 10 Ω resistor isolates it.	N/A
B	Master/Slave Jumpers	P1 and P2	ASSUMES BOTH JUMPERS MOVED TOGETHER When the <i>MODEL 7224RLY</i> is used as a single amplifier, or as a master in a multi-amp system, input is through the unbalanced BNC connector on the rear panel and the Master/Slave jumpers P1 and P2 will be in the Master (UP) position. If the amplifier is used as a slave in a multi-amp system, input will be through the interface connector J3, and the Master/Slave Jumpers P1 and P2 should be in the Slave (DOWN) position.	MASTER (UP)
C	CC/CV Jumper	J4	This jumper goes RIGHT for Controlled Voltage (CV) mode, and LEFT for Controlled Current (CC) mode. By placing the jumper on the right pair of pins, the amplifier's output voltage will be controlled by its input voltage signal. By placing the jumper on the left pair of pins, the input voltage signal controls the output current.	CC (LEFT)
D	Compensation Jumper	J5	The <i>MODEL 7224RLY</i> is factory-configured to be used in the CC mode as a controlled current amplifier. In CC mode, the current control loop is optimized with an RC network. The main board has provision for two of these networks. When J5 is in the DOWN position (default), the network CC2 (R82, C25) is selected. When J5 is in the UP position, the alternate network CC1 (R63, C16) is selected. NOTE: For RLY loads, the CC2 network must be used.	CC2 (DOWN)
E	Gain Trim Control	R210	This is a multi-turn potentiometer that is used to calibrate the gain of the amplifier Turn clockwise to increase gain; turn counter-clockwise to lower gain. R232 resistor sets the coarse gain and R247 sets the range or sensitivity of R210.	N/A
F	Circuit Ground	GND, TL18	This point is the signal ground to be used as a reference point for all measurements in the amplified signal path.	N/A
G	System Current Monitor	I _{fb} , TL2	This is the total system current feedback point for amplifiers used in a multi-amplifier configuration.	N/A
H	Current Monitor	I MON, TL4	The current monitor is an active buffered output observable with monitoring equipment. The scale factor is 20 Amps per Volt. Use GND (TL8), signal ground, with I MON (TL4) to monitor amplifier output current.	N/A
I	-TEMP and +TEMP	TL1 and TL10	-TEMP and +TEMP are monitor points for the temperature sensors in the output wells. -TEMP	N/A

KEY	NAME	REF. DES.	DESCRIPTION	FACTORY DEFAULT SETTING
			is used for the negative and +TEMP is used for the positive wells. The output voltage is measured in Kelvin, with 10 millivolts per degree K. To convert readings to Celsius, subtract 273.	
J	ENABLE / STOP	J11	The <i>MODEL 7224RLY</i> is factory-configured to automatically move into ENABLE mode on Start Up. In ENABLE mode, the amplifier will amplify an input signal. To place the amplifier in STOP mode on Start Up, move the jumper to the two RIGHT pins. When in STOP mode on Start Up, the amplifier will be placed in Standby mode until the front-panel ENABLE button is pressed or a remote ENABLE signal is received on the I/O Connector. To return the amplifier to ENABLE mode on Start Up, move the jumper to the two LEFT pins.	ENABLE (LEFT)
K	OT Latch	J12	The <i>MODEL 7224RLY</i> is factory-configured with the OT Latch disabled. When a jumper is in place across the two pins labeled J12, any activation of the Over Temp circuit will cause the amplifier to move to a Stand By condition and to remain there until the amplifier is reset by pressing the front-panel RESET button, or until a remote RESET signal is presented on the I/O Connector, to return the amplifier to a Run/Ready (Operational) condition.	DISABLED (jumper absent)
L	OVL D Latch	J13	The <i>MODEL 7224RLY</i> is factory-configured with the OVL D Latch disabled. When a jumper is in place across the two pins labeled J13, any activation of the IOC (Input Output Comparator), distortion alert circuit, (activation occurs at 0.5% error), will cause the amplifier to move to a Stand By condition. Once in Stand By, the amplifier must be reset by pressing the front-panel RESET button, or by presenting a remote RESET signal on the I/O Connector, to move the amplifier back to a Run/Ready (Operational) condition.	DISABLED (jumper absent)
M	SLAVE GAIN TRIM	R105	In multiple slave amplifier systems, this single-turn potentiometer can be used to make minor gain adjustments (+/- 2%) to balance the gain with the rest of the system. Turn clockwise to increase gain; turn counter-clockwise to lower gain.	N/A
N	+VCC and -VCC	TL9 and TL11	The point that the + (TL9) and - (TL11) voltage potential of the amplifier can be monitored.	N/A

The following illustration, showing the main board with captioned call-outs, provides a visual location of main board functions (see Figure 4.1).

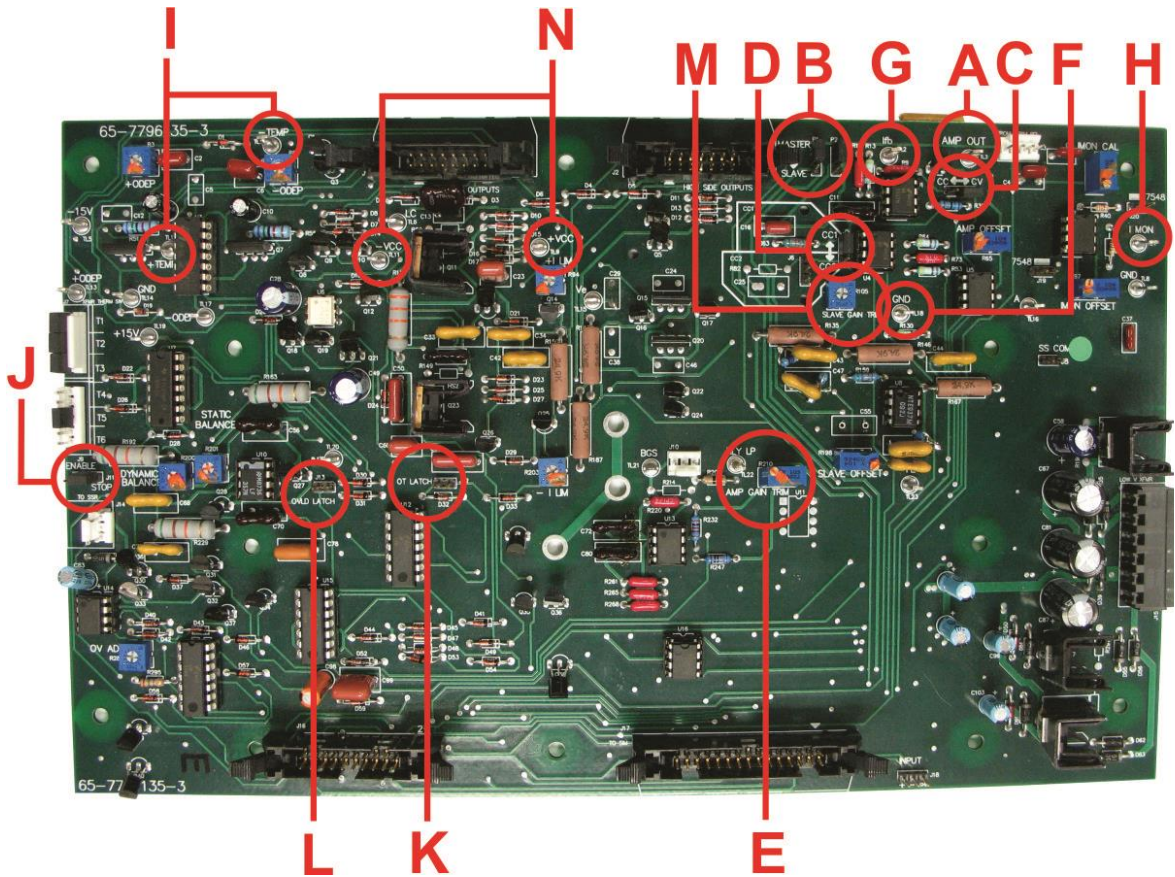


Figure 4.1 Main Board Component Locations

5 Accuracy

Amplitude vs. Frequency at 1V input, 20A output, amplifier transconductance set to 20:				
Load	Input Signal	Transconductance		
		1 kHz	100 Hz	
2 ohms	Sine	19.9	20	
1 ohm	Sine	20	20	
½ ohm	Sine	20	20	
Short (unimpeded wire)	Sine	20	20	

6 Specifications

Please refer to the **AE Techron 7224 Operator's Manual** "Specifications" section for basic amplifier performance, features and physical characteristics. The following specifications apply to a 7224RLY amplifier using the default factory settings.

7224RLY Pulse/Burst Specifications:

Maximum Current: 35Arms, 50Apeak, 0.5 ohms			
Maximum Voltage: 158Vpeak			
Total Load	Duration	Waveform	Output Power
1.0 ohm	5 minutes	60 Hz Sine	28Arms/40Apeak
		DC	20Apeak
	20 seconds	60 Hz Sine	30Arms/43Apeak
		DC	20Apeak
	0.2 second	60 Hz Sine	33Arms/47Apeak
		DC	30Apeak

Maximum Output Current:

50 amps peak

Maximum Output Voltage:

158 volts peak/72 volts peak field selectable

Maximum Output Power:

Dependent on load and frequency

Load Constraint for Maximum Output:

0.5 ohms + 200 μH

* All loads from 8-ohm to short are stable with 2 mH in series.

Output Offset Current:

Less than 10.0 milliamperes DC peak

Input:

Standard Transconductance: 20 ±0.2% from short to 1-ohm loads

Common Mode Rejection Ratio: -58 dB minimum, 40-600 Hz

Unit to Unit Phase Error:

Less than 0.1 at 60 Hz

Residual Noise:

Less than 2.5 milliamperes peak (40 Hz - 600Hz)

Input to Output Phase Delay:

-0.2

Out Accuracy:

Less than $\pm 1\%$



Figure 6.1 7224RLY Back Panel