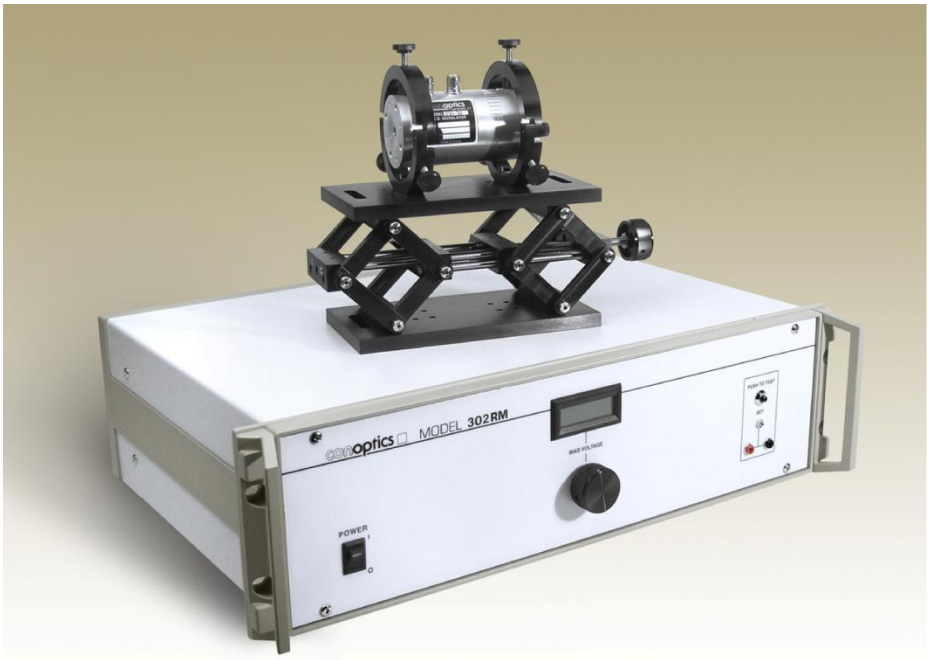
M302RM OPERATING MANUAL



The Model 302RM is a Linear, high voltage, differential amplifier designed to drive a capacitive load such as Conoptics 350, 360, 370 series E.O. modulators. The amplifier is DC coupled and is capable of putting out a maximum of 750 Volts Peak-to-Peak. The input of the amplifier will accept either bipolar or unipolar signal formats and has a switchable input impedance of either 50 ohms or 1K ohm. The maximum input level requirement of 2V P-P for full output.

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Email: sales@conoptics.com, or visit www.conoptics.com

CAUTION: BEFORE APPLYING POWER

Please review this manual and become familiar with all safety markings and instructions.

Insure that the equipment mains (line) voltage as specified on the rear panel is in accordance with desired AC source. Safe operation of this equipment may be jeopardized by use other than specified by Conoptics.

INTENDED USE

This equipment is designed for general laboratory use. It is intended to be used with a number of Conoptics Electro-Optic Modulators only. The amplifier is designed to drive a capacitive load that is floating with respect to ground. Any use other than in direct connection with supplied optical modulator can result in severe damage to the amplifier and potentially hazardous voltages to external equipment and personnel. This amplifier must only be used in accordance with the detailed instructions provided in the manual.

WARNING: HAZARDOUS VOLTAGES

Hazardous AC and DC voltages are present on the center pins of the BNC connectors on the rear panel marked J1 and J2 "AMPLIFIER OUTPUT". No attempt should be made to come into contact with these pins or to attempt to verify operation of the amplifier by monitoring these connectors with an oscilloscope or other test equipment. In addition, the equipment should be turned off before any of the supplied cables are connected to or disconnected from the driver or modulator.

SAFTEY GROUND

This equipment is equipped with a protective earth terminal. This terminal is provided by a common or ground wire in the power cord. The main power source must supply an uninterrupted return to an earth ground. The equipment must not be used if this earth return is not supplied.

SERVICE CAUTION

Only qualified personnel must perform adjustment, maintenance, or repair of the equipment. Hazardous voltages are present within the instrument and contact may result in personal injury. Any attempt to trouble shoot or adjust any controls within the system should be discussed with Conoptics first at support@conoptics.com.

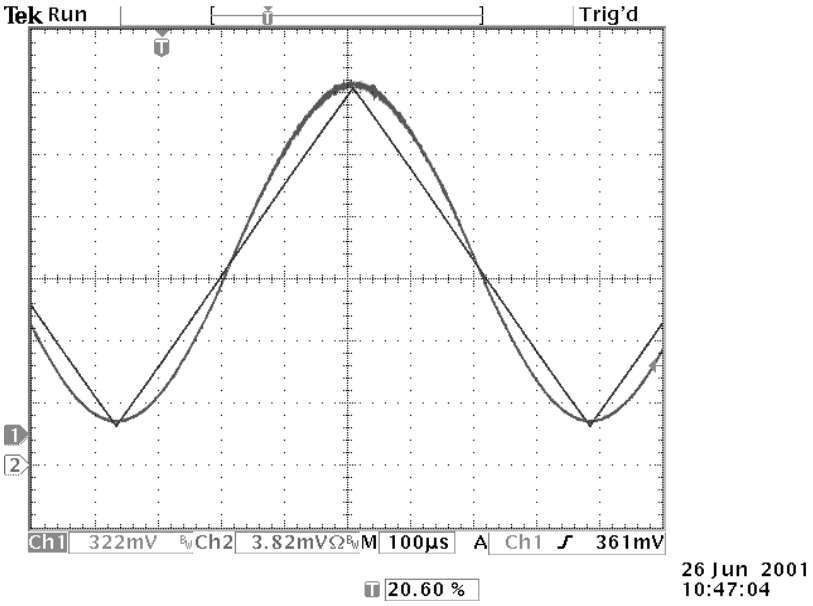
M302RM SYSTEM SPECIFICATIONS

Cabinet	Driver and power supply in single cabinet
Test Feature	Built-in test feature allows testing for max transmission of Pockel Cell without adjusting bias voltage
Input Impedance	Choice of amplifier input impedance by rear panel switch (50ohm/1K ohm)
DC Bias Range	+/- 450VDC controlled by ten-turn front panel pot. Digital meter monitors differential bias applied to E.O. Modulator
Linearity	10bits referenced to full scale (.1%)
Main Input	System is configured for country use. May be wired for 100, 120, 230/240. 50/60Hz. Refer to label on rear panel of power supply for correct AC input
Bandwidth	DC to >200Khz with 90pf load and 3M (RG-62) cables
Max. Output Drive Level	750VP-P into 90pf load
Amplifier Input Signal	2VP-P max into 50/1K ohms delivers 750VP-P out
Input Signal Format	Options include Unipolar positive, negative or bipolar
Input Power (AC)	60W typical. Input power is both load (modulator) and frequency dependent.
Dimensions	19" Rack Mountable, 5.25"H(133mm) (3U) x 14"D (356mm)
Cooling	Forced air
Operating Environment	Designed for laboratory use (indoor only) Temperature range +5deg C to +50deg C ambient Humidity 20%-80% RH up to 32deg C, Altitude <3000M
Weight	20lbs (9.07kg)

OPERATING INSTRUCTIONS

The Model 302RM amplifier is designed to drive a number of different Conoptics E.O. modulators. All types of modulators supplied with the system are configured as lumped capacitors (two terminal devices). The amplifier has a 50/1K ohm, single ended input (J3 SIGNAL INPUT) and a push/pull output (J1 & J2). The amplifier has a forward gain of approximately 375V/V push pull. Maximum output is 750V p-p. The amplifier is a linear, high voltage design for use as an optical shutter, phase modulator, or polarization rotator. It will accept a variety of different input signals and amplify them linearly within the bandwidth limitations of the amplifier. A variable DC bias voltage is summed into the output connectors (J1 & J2) to allow the operator to set the quiescent operating point of the optical modulator. This bias voltage is adjustable via a ten-turn potentiometer on the front panel. The digital meter on the front panel indicates the true dc differential bias voltage across the modulator terminals.

Figure 1:

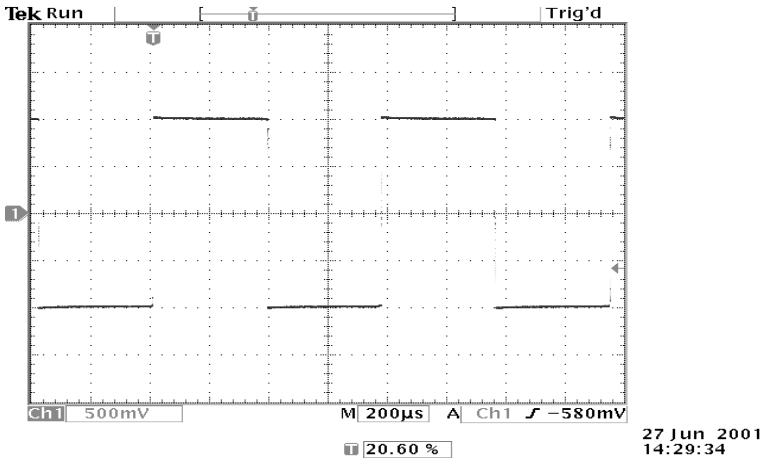


In Figure 1 above, the scope trace straight-line signal is the input waveform (triangular wave) to the driver. The sinusoidal waveform (sine squared) is the detected response to the linear input ramp. The DC bias voltage allows the operator to essentially "slide" the detected signal along the x-axis to allow the initial condition (0 volts in "equals" 0 light out) to be set correctly. The modulators static transmission (no voltage applied to modulator) may vary due to ambient temperature, throughput laser power etc. The bias voltage is employed to allow the user to compensate for these effects.

Because the system is DC coupled, provisions must be made in the drive electronics to accommodate various types of input signals. Naturally, any DC offset in the input waveform will be amplified to the same degree as the signal itself. To allow the driver to accept either bipolar or unipolar input signals, a DC offset is applied internally to the amplifier to maximize the useful dynamic range of the amplifier. This offset is controlled by two separate slide switches on the rear panel of the cabinet. The switch is marked BIPOLAR, UNIPOLAR +, UNIPOLAR -.

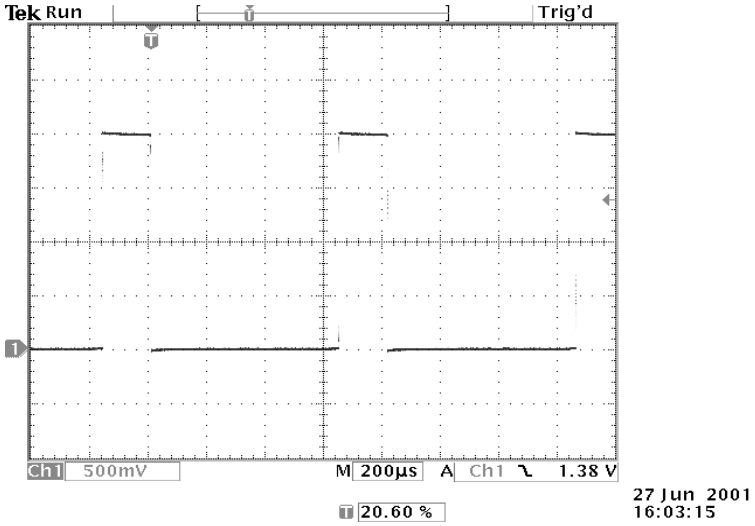
Bipolar: This format is used for input signals that extend both above and below ground by an equal amount.

Typical Bipolar Input



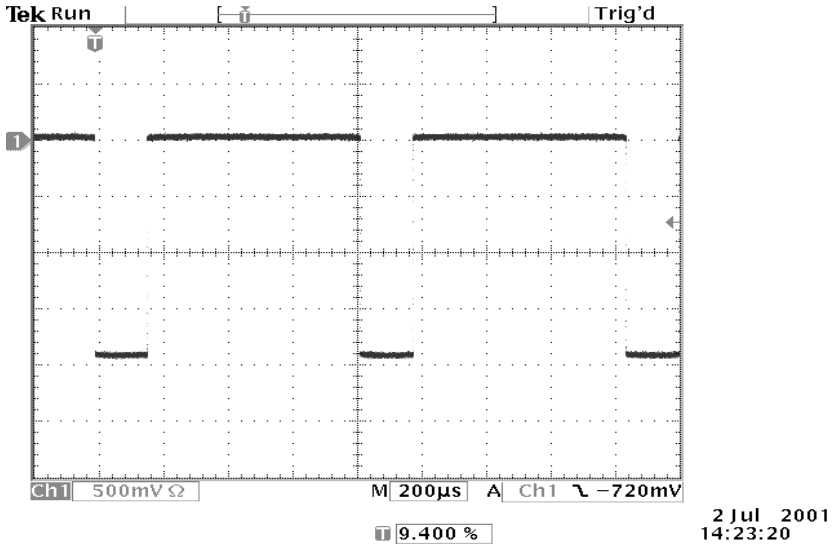
Unipolar positive: This is the most commonly used type of input signal. Typically the signal comes from a pulse generator, D-A converter or function generator. This signal goes from 0v to some positive value of less than 2v peak.

Typical Unipolar Positive Input



Unipolar Negative: This input format is not used that often, but it is included in the event that it is required. Typically, this format is obtained from a D-A converter.

Typical Unipolar Negative Input

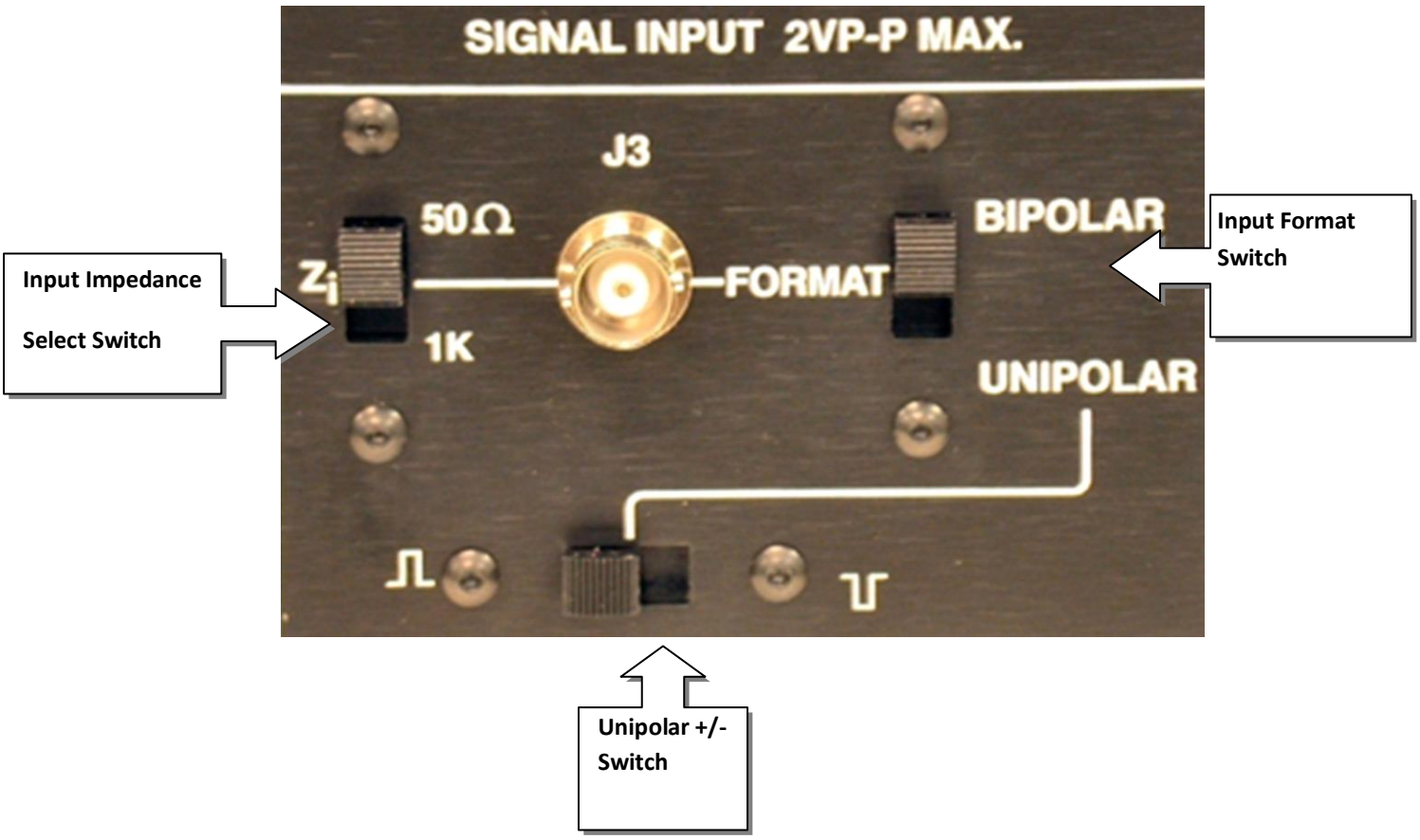


If the switches on the rear panel of the cabinet are not in the correct position for the desired input waveform, the input signal will drive the amplifier into saturation and cutoff. This action will severely distort the drive signal going to the modulator. The position of this switch should be set to the correct position before power is applied to the system. Since this amplifier is capable of outputting 750vp-p, it can easily overdrive the modulator at shorter wavelengths. Please check what the modulators "half wave" voltage is before applying an input signal to the driver. The forward gain of the amplifier is approximately 375v/v. The correct input level of the input signal can be determined by knowing both the amplifier gain and "half wave" voltage of the modulator at the desired operating wavelength.

Below is an example of the 1/2 wave voltage requirements for KD*P& LTA series modulators.

	Model Number	V ½ wave @ 500nm	V ½ wave @ 830nm	V ½ wave @1064nm	V ½ wave @2500nm	Aperture Diameter	Resonances	Contrast Ration @ 633nm and 1064nm	Length w/ Polarizer
*KD*P Crystal Series Wavelength Limits* ***(240 to 1100nm)****	M350-50	455	757	970	--	3.1mm	Yes **	500:1, 700:1	106mm
	M350-80	261	433	522	--	2.7mm	Yes	500:1, 700:1	137mm
	M350-80LA	360	600	720	--	3.5mm	Yes	500:1, 700:1	137mm
	M350-105	226	376	472	--	3.1mm	Yes	500:1, 700:1	162mm
LTA Crystal Series Wavelength Limits ***(700 to 2000nm)***	M360-40	--	312	400	950	2.7mm	Yes	N/A, 200:1	95mm
	M360-80	--	143	183	430	2.7mm	Yes	N/A, 100:1	137mm

INPUT SIGNAL SELECTION SWITCHES

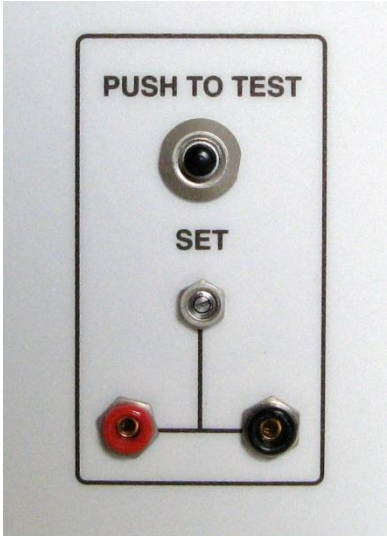


Input Impedance Select Switch: Sets the input impedance of the amplifier, typically 50ohms when input signal is from a pulse generator or function generator.

Input Format Switch: Sets the amplifier correctly to receive the desired input signal as described in the previous section

Unipolar +/- Switch: Sets the amplifier to receive either a positive or negative going unipolar type input signal.

Driver self test function



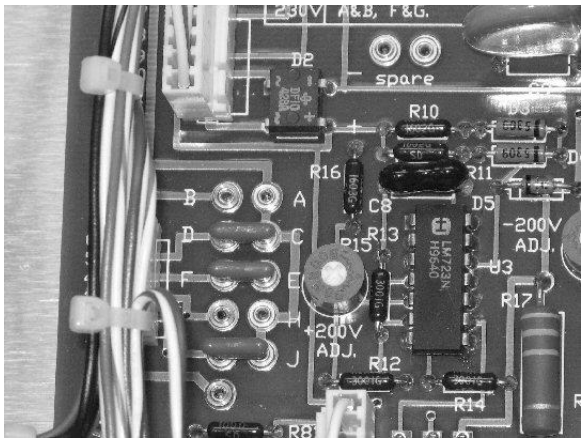
The self test inset on the front panel of the M302RM is designed to allow the user to check the operation of both the drive electronics and the optical head in one step. DC voltage that is user adjustable is injected into the front end of the drive electronics when the “Push to Test” button is momentarily depressed. This voltage is adjustable from 0 volts to + 2.0V which is sufficient to drive the amplifier to the rails of the power supply. The unit must be run in the unipolar positive input signal mode to operate this function.

Typical setup is as follows.

1. Remove any input signal connected to J3 on the rear panel. (this will not have to be done again after the proper test voltage is set)
2. Monitor both test pins with a DVM set to DC volts.
3. Adjust the trim potentiometer above the test points with a small screw driver to obtain the required DC voltage which is: [half wave voltage of the modulator at the operating laser wavelength] divided by 375.

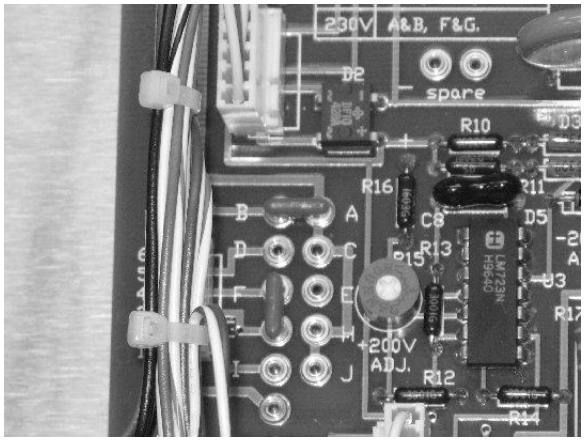
Placement of Push-Pins for Various AC Line Voltages

302RM Line Voltage Set at 100VAC



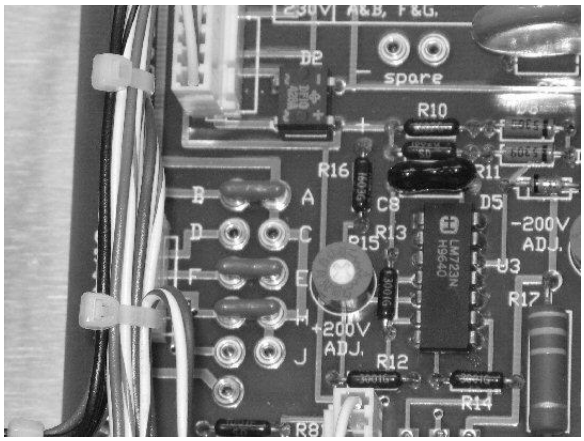
Connect: D-C, F-E, I-J

302RM Line Voltage Set at 230VAC



Connect: B-A, F-G

302RM Line Voltage Set at 115VAC



Connect: B-A, F-E, G-H