conoptics INC. 19 Eagle Road, Danbury, CT 06810

# CAUTION

## MODEL 302A USERS

ENSURE THAT POWER IS OFF BEFORE
CONNECTING DRIVER TO POWER SUPPLY

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# 302A DRIVE ELECTRONICS

**THEORY OF OPERATION:** The model 302A drive electronics is a DC coupled, high voltage, analog amplifier, capable of driving a number of different optical modulators. The amplifier is "Push-pull" and capable of 400v P-P output into a capacitive load. Bandwidth of the amplifier is limited by load capacitance, but typical response times of 400ns ($T_r$ and $T_f$) are obtainable with load capacitance of 90pf or less. The high voltage output is obtained by two high power operational amplifiers, operating push-pull, one operating in the inverting connection, the other operating non-inverting.(refer to schematic file # 302HFDE)

Amplifiers $U_1$ and $U_2$ are the output drive amps. Each has a supply rail of +/- 140v. $U_2$ is operating non-inverting, and $U_1$ is inverting. They are driven by a single high speed op-amp, $U_4$. The output amps run at a forward gain of 100, thus delivering a total forward gain of 200v/v. $U_{10}$ and $U_5$ are used to regenerate the "tweeker pulses" derived by the Sampled auto bias servo card in the power supply electronics when the system is configured with this option. In order to obtain the maximum dynamic range out of the amplifier, some method must be employed to account for differing types of video input formats, for example,

1) Bipolar,(+/- 1v about gnd):

2) Unipolar pos. or Unipolar neg.:

If the output amplifier's output voltage were zero volts for zero volts in, then each amplifier would be capable of taking +/- 1 volt at its input, amplifying it to +/- 100v without going into saturation because of the power supply rails. If the input signal

were unipolar (say 0v to +2v) and the output amplifiers were zero volts out for zero in, the maximum output for each amplifier would be limited to 140v, for a maximum of 280v output swing total. Thus the operating point of the output stage should be optimized for different types of input signals. This operation is performed by $U_3$ with inputs from $U_6$,$U_7$, and $U_9$. For bipolar input signals, $U_3$'s output is zero volts, making $U_4$'s quiescent output zero volts. This sets the output amplifiers at zero volts out for zero volts in (video in). For unipolar positive input signals, $U_3$'s output is approximately +2v, making $U_4$'s quiescent output -2v. This forces $U_2$ to go to -125v, $U_1$ to +125v, for zero input volts. Now the amplifiers are able to swing from -125 to +125 and from +125 to -125 respectively, in response to a zero to + 2v video input signal. For unipolar negative inputs, $U_3$'s output is -2v, making all the amplifiers "flip" to the opposite operating extreme. $U_3$ operates as a buffer with $U_7$ selecting the appropriate input reference voltage from $U_6$ and $U_9$.

Bias voltage for positioning the modulator's quiescent operating point is obtained from the differential amplifier $Q_1$,$Q_2$,$Q_4$,and $Q_5$. This amplifier is capable of +/-550v, bias voltage, at the driver output terminals.

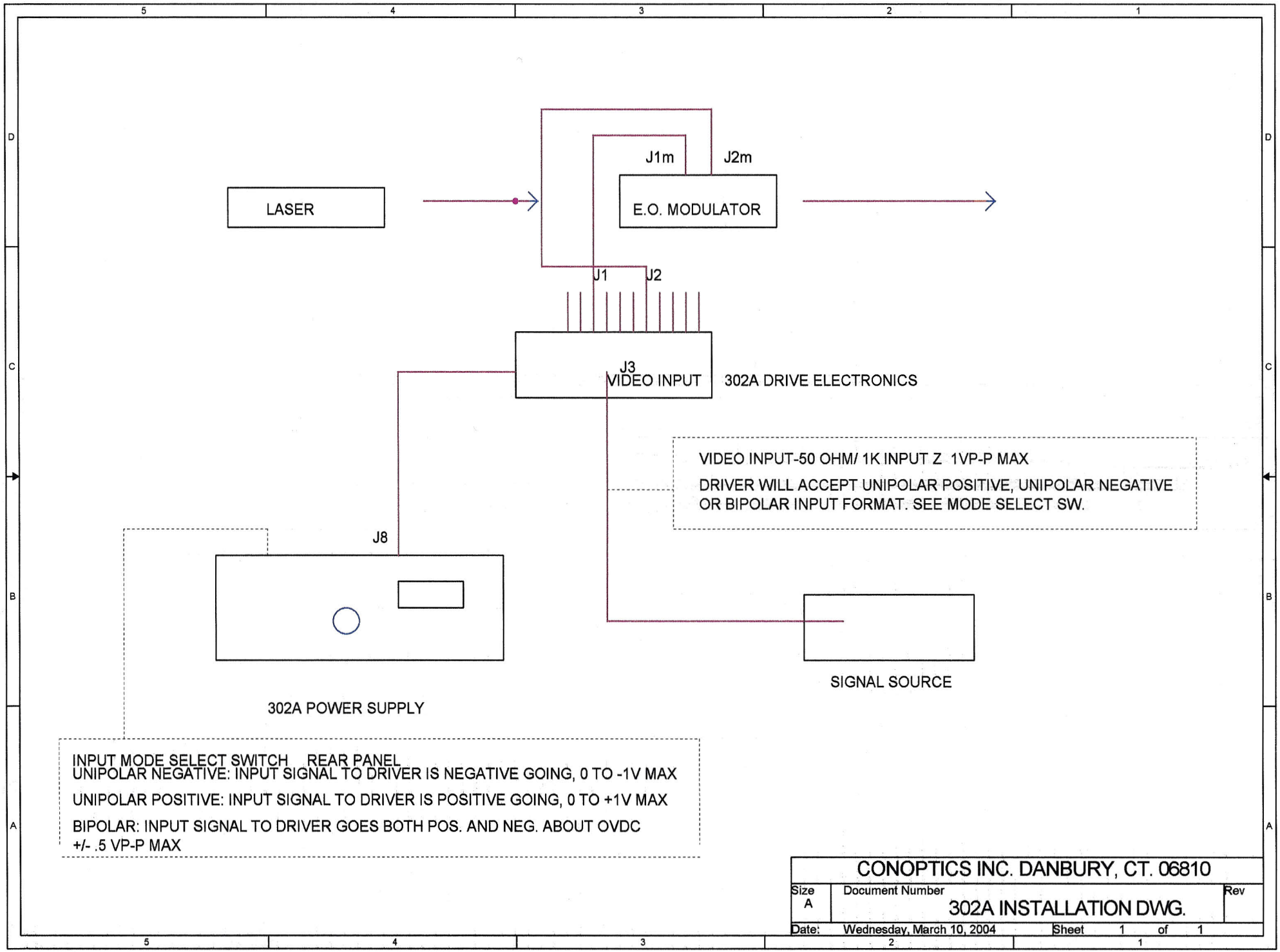
# M302 and M302A USERS

In order to minimize the static DC operating potential across the E.O. cell, the bias voltage as noted on the front panel of the power supply should be adjusted as follows:

1) When operating in the **Unipolar positive mode,** the bias as noted on the front panel should be adjusted in a positive direction to reduce the static offset introduced by the drive electronics when operating in this mode.

2) When operating in the **Unipolar negative mode,** the bias as noted on the front panel should be adjusted in a negative direction to reduce the static offset.

3) When operating in the **Bipolar mode,** either direction is acceptable as the static offset of the driver is zero volts.


LASER
J1m
J2m
E.O. MODULATOR
J1
J2
J3
VIDEO INPUT
302A DRIVE ELECTRONICS
VIDEO INPUT-50 OHM/ 1K INPUT Z 1VP-P MAX
DRIVER WILL ACCEPT UNIPOLAR POSITIVE, UNIPOLAR NEGATIVE OR BIPOLAR INPUT FORMAT. SEE MODE SELECT SW.
J8
SIGNAL SOURCE
302A POWER SUPPLY
INPUT MODE SELECT SWITCH REAR PANEL
UNIPOLAR NEGATIVE: INPUT SIGNAL TO DRIVER IS NEGATIVE GOING, 0 TO -1V MAX
UNIPOLAR POSITIVE: INPUT SIGNAL TO DRIVER IS POSITIVE GOING, 0 TO +1V MAX
BIPOLAR: INPUT SIGNAL TO DRIVER GOES BOTH POS. AND NEG. ABOUT OVDC
+/- .5 VP-P MAX
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