MODEL 25A MANUAL

PRODUCT OVERVIEW

The Model 25A drive electronics is a high voltage push-pull linear power amplifier capable of output voltage swings in the order of 145v P-P, push-pull. The Model 25A provides an output frequency response from DC-25MHz and typical rise and fall times of 14ns.

TECHNICAL OVERVIEW

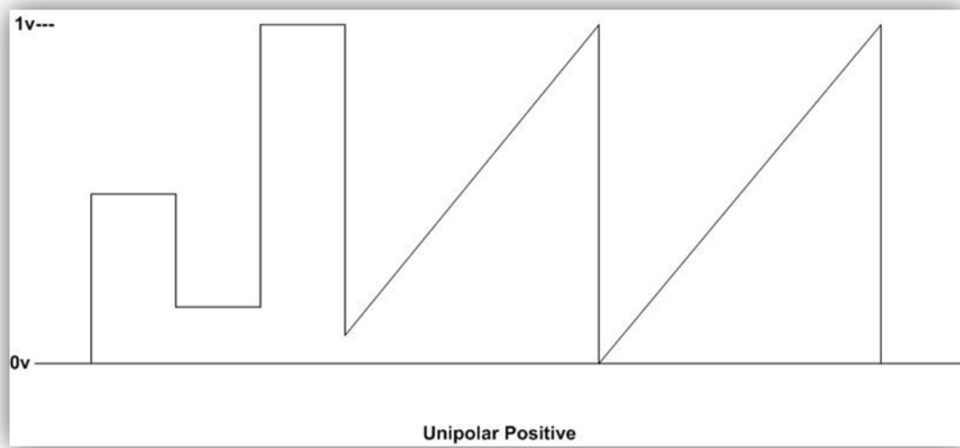
The Model 25A drive electronics is a DC coupled, RF differential amplifier. The amplifier is capable of outputting 145volts peak-to-peak, push-pull into a 100 ohm balanced load. The driver is designed to interface to Conoptics 2-port 100 ohms Electro-Optic Modulators and beam deflectors. The amplifier has a forward gain of 43db (140) and requires only 1v p-p input signal into 50 ohms to deliver its maximum output drive. The output section of the driver is designed to drive a balanced transmission line with a characteristic impedance of 100 ohms. The terminations for the transmission line are on the driver heat-sink and consist of two 50 ohm, 250w, thick film RF loads. The output signal of the amplifier is delivered to the E.O. Modulator via 100 ohm twin-axial cable. This signal propagates through the modulator and then returns to the driver to be terminated in the RF loads. There is little or no electrical power dissipated in the E.O. Modulator. The output stage of the amplifier looks like a push-pull current source, all the required DC and AC currents flow through the cables and the modulator.

The amplifier MUST have the cables connected to the modulator or have J1 connected to J2 on the rear panel with one of the connecting cables for the amp to operate properly. OPERATING THE SYSTEM WITHOUT THE INTERCONNECTING CABLES IN PLACE WILL RESULT IN PERMANENT DAMAGE TO THE DRIVE ELECTRONICS. If a loud beeping sound is heard when the driver is turned on, shut off the unit and check all cable connections between the driver and the modulator.

Input Signal Requirements:

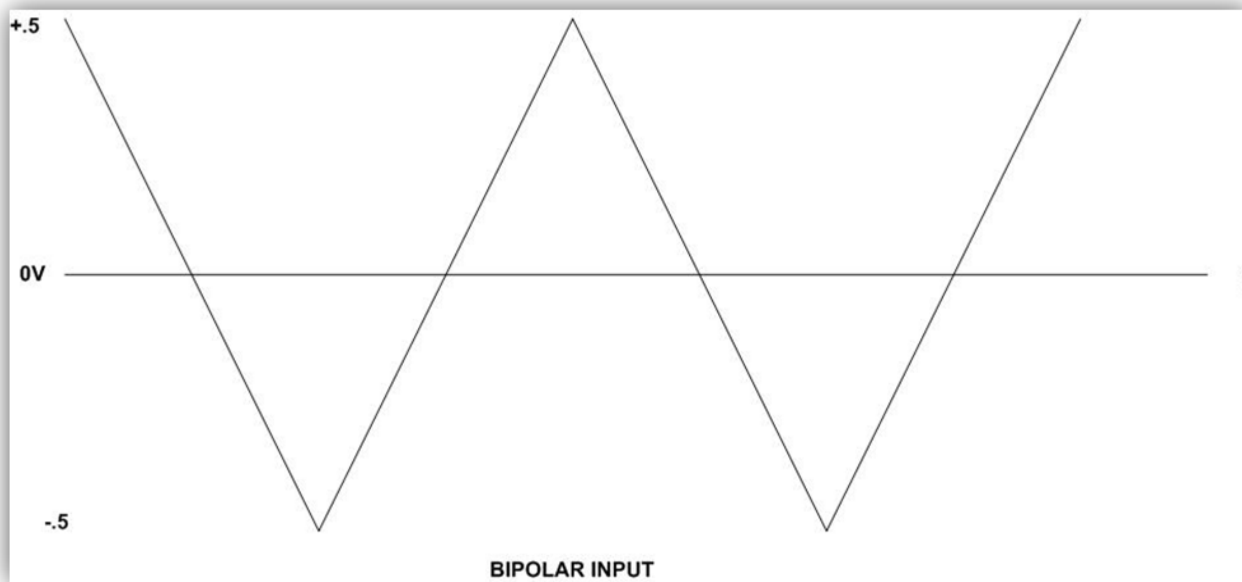
The Model 25A is DC coupled. It is important to properly match the input signal levels to that described below and on the front panel. The front panel of the driver contains a peel-off label instructing the user which of three different types of inputs the system is configured to accept. As with any DC coupled amplifier, offsets in the signal format will be amplified to the same degree that the actual signal content is, therefore this offset will reduce the overall dynamic range of the amplifier by reducing its “headroom”. Typically, most drivers when shipped are configured to accept a “unipolar positive” input signal. In some cases, when dealing with an AC coupled input signal from a signal source, the driver will be configured for a “bi-polar” input signal. In very few cases, when dealing with inputs from high-speed D/A converters with current outputs, the driver will be configured for a “unipolar-negative” input.

In any case, the driver may be configured to accept any one of the above inputs by the user if the output requirements are other than that depicted by the front-panel placard.

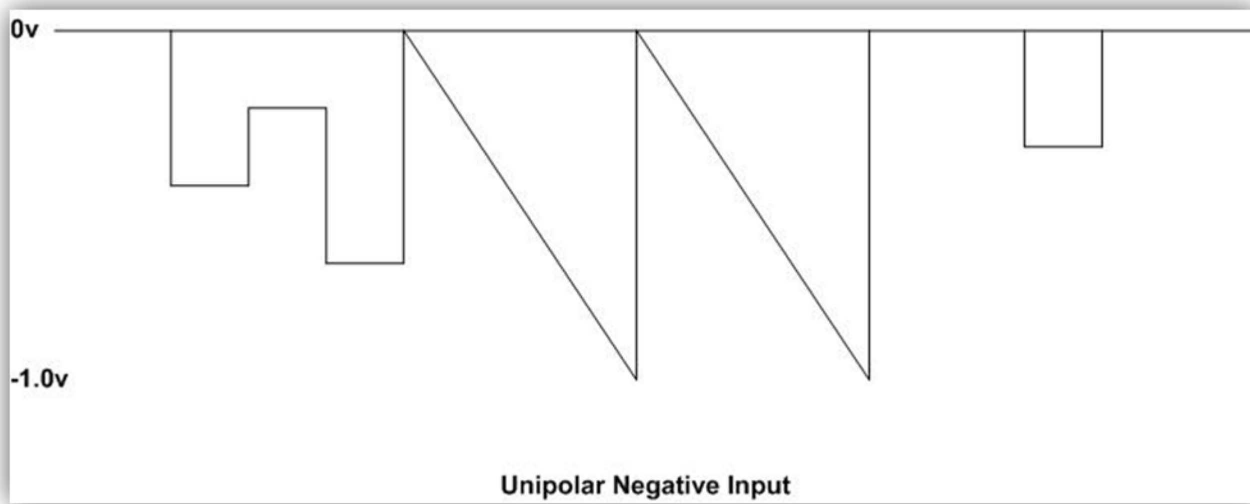


The above sketch depicts a unipolar positive input. This input format is the most common. If there were some DC offset (non-zero) signal, the top end of the input might extend past +1.0v. This could cause the amplifier to “rail” and introduce significant distortion in the output waveform. If the output voltage required to drive the modulator to the desired level is less than the maximum the amp can produce, then the DC offset may be ignored.

Note: If the amplifier is over-driven such that the output state goes into saturation and cut-off, substantial “storage delays” may result. The amplifier may take hundreds of microseconds to recover. Do not attempt to increase the input level beyond 1.0v limit.



The above waveform depicts a bipolar or AC coupled input signal. If the duty cycle of the waveform is always 50%, the DC term will stay at zero volts. If the duty cycle varies, so will the DC term (dependent on the duty cycle). If the duty cycle varies, remember that this will be seen by the driver as a varying DC signal and be amplified. This again may cause the amplifier to “clip” and it will affect the operating point of the E.O. modulator, causing “bounce” in the detected output. If the above input signal is DC coupled form the source, no precautions are necessary.



The unipolar negative waveform as shown above has the same requirements as the positive case except that -1.0v would naturally be the most negative limit.

INPUT WAVEFORM SETUP PROCEDURE

The drive electronics operating point may be adjusted by the user to allow any of the three previously discussed waveform types to be run in the system. A potentiometer labeled “DIF BALL” (R44) allows the system to be setup for any input signal. The “pot” is located on the driver PC board mounted on the inside of the rear panel. The control is on the left upper corner of the board as faced from the front panel.

Note: No input signal should be connect to the driver input.

Unipolar Positive

R44 should be adjusted fully CW. Monitor T.P. # 1 & 2 on the right side of the DC power connector J5 with a DVM. T.P. # 1 should read approximately 12vdc, T.P. 32 should read 49vdc (both readings are with respect to gnd).

Bipolar

R44 is adjusted to make both T.P. # 1 & #2 equal. Each test point should read approx. 29vdc with respect to gnd.

Unipolar Negative

R44 should be adjusted fully CCW. T.P. #1 should read approximately 49vdc, T.P. #2 should read approximately 12vdc.

Test points #1 & #2 may be used to examine the low frequency response of the driver. It should be noted that each test point divides the signal at the load resistors by two. Also, these test points have fairly high output impedance, 10K. Therefore, when looking at the AC response of the driver, any load capacitance placed at the test points will affect the -3db bandwidth of the test point. Typical scope probe input cap of 10pf will limit the bandwidth to 1.6MHz (Tr & Tf approximately 220ns). The signals at these test points may be summed by inverting one channel of the scope and adding algebraically. This action closely duplicates what the modulator sees electrically except for bandwidth and p-p signal.

Common Mode ADJ (R31)
This potentiometer is factory set and should never need adjustment. Proper setting is T.P. #1 & #2 = 30vdc with diff bal pot set to balance both test points.

Input Attenuator (R37)
This control allows the user to reduce the input level to the driver. Since the forward gain of the amplifier is fixed and slightly greater than 140 (43db), some attenuation is required to keep the amp in its linear range with a 1v p-p input.

Note: It is recommended that this control is left in its factory position and an external attenuator be used, if required, to limit the maximum input.

DC BIAS AMPLIFIER
This high voltage, differential, low frequency amp is included to allow the operator to adjust the quiescent operating point of the E.O. modulator. The amplifier will deliver approximately +/- 400vdc of DC bias to allow the user to properly position the no-signal or 0v intensity of the throughput beam exiting the modulator. This would typically be minimum transmission of the modulator. Not only does this amplifier allow the user to position the operating point of the modulator, but it also carries the low frequency content of the input waveform to the modulator. The low frequency of DC terms are summed with the DC bias and delivered to the modulator via the J3 connector on the rear panel of the driver. The 100 ohm balanced line is AC coupled to the crystal in the E-O modulator. By connecting the information on J3 to the E-O head, the optical response becomes completely DC coupled. Most of the electronics for the high voltage amp are to the right side of the DC power connector J5.

Note: There are hazardous voltages present in this area (-550VDC). There are no adjustments required for this amplifier.