OPERATING INSTRUCTIONS
GATED RF PULSE AMPLIFIER
MODEL GA-2500A-0.25-7-5KW

The Model GA 2500A Gated RF Pulse Amplifier is a high power, limited duty cycle instrument designed to produce high amplitude RF tone bursts derived from either a continuous wave RF signal or from an externally generated RF tone burst. It covers one decades of frequency selected by the user within the frequency range of 250 kHz to 7 MHz. The specified output pulse power over the frequency range is 5000W RMS which is approximately 1440 Volts peak-to-peak into 50 Ohms; however output pulse powers, up to approximately 1 kW, are available at frequencies up to 10 MHz. Output level is controlled by a ten-turn potentiometer on the front panel. The total gain available, when operating into a 50 Ohm load, is approximately 70 dB. Specified maximum duty cycle for the instrument is 0.1%, but it will actually function up to approximately 0.2% under some conditions. The instrument will not normally be damaged by operating into an infinite VSWR, although such operation is not recommended. The maximum pulse width is hardware limited to 200 microseconds.

To place the unit into operation it must be supplied with an appropriate AC line source (100, 120, 230, or 240 V RMS at 50-60 Hz); a positive TTL gate and either a CW source or a tone burst (coincident with the gate) at a 800 mV peak-to-peak level. The power switch is located on the power entry module on the rear panel. Please see Figure 1.

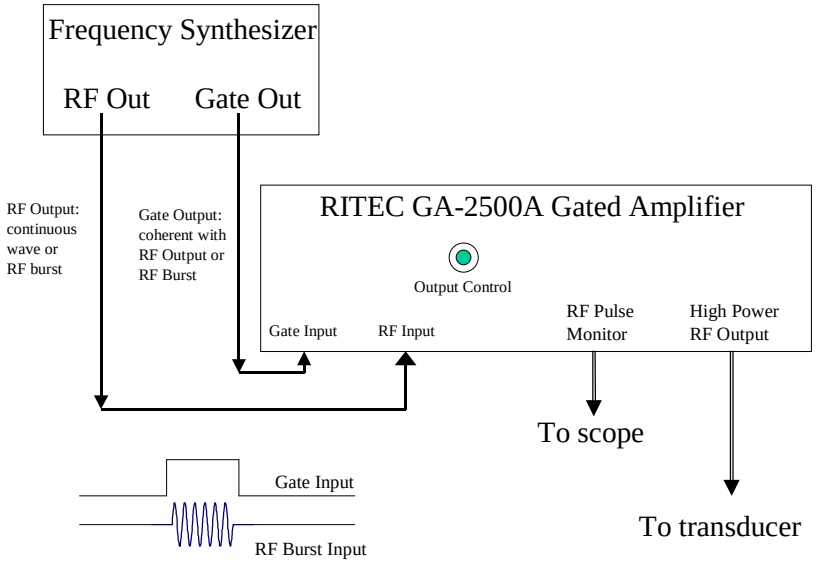

Figure 1

Cable Connections between GA2500A and External Synthesizer

If the RF pulse must be coherent with the gate, that function must be provided externally. There are two power switches; one located on the power entry module on the rear panel of the unit "Power" controls the low voltage supplies; the one labeled "High Voltage" on the front panel of the unit controls the +48V and +200V supplies. The GA-2500A is in a stand-by mode when the high voltage supplies are not energized and the blue high voltage LED is not illuminated.

To set up the instrument for operation, the "RF Power Level" control should be set at its counter-clockwise position (minimum control setting), and the device to be driven by the instrument should be connected to the "High Power RF Signal Out" connector. A positive TTL level gate must be connected to the "TTL Gate In" connector and either a CW signal or a tone burst (coincident with the gate) applied to the "RF Signal In" connector. Typically, this is an ultrasonic transducer connected directly to the output or though a resistive attenuator. If an attenuator is used, it should be rated for the maximum power and duty cycle of the GA-2500A. The GA-2500A may be turned on by the rear panel switch at this time, provided the high voltage switch is turned off on the front panel. This will energize the low voltage supplies and the power LED on the front panel will be illuminated. The High Power RF Signal can be energized by turning on the high voltage switch; there is an approximate 5-second delay between turning on the switch and the turn-on time of the +200 V supply. The blue LED, labeled as "High Voltage," will then be illuminated on the front panel. The intensity of the LED is coupled to the actual voltage of the high voltage supply. Thus, it can take approximately 30 seconds for the LED to dim as the voltage of the high voltage supply discharges. The duty cycle, which is the product of the burst width and the repetition rate, should not be programmed higher than 0.2% when turning on the "High Voltage." For example, with the burst width set to 50 microseconds, the repetition should not be set higher than 20 Hz, which is the maximum 0.1% duty cycle.

There are two overload conditions where the instrument will automatically disable the high power tone burst pulse output. The first is if an excessive amount of current is drawn from the high voltage supply and the second is if the temperature of the output stage exceeds a limit. If the duty cycle limit is exceeded, the yellow over-current LED will be illuminated on the front panel and the high power RF burst output will be disabled. To prevent the initial charging current from triggering the over-current circuitry, there is approximately a 5 second delay before the over-current shutdown circuitry is enabled after the high voltage switch is turned on. During this delay, it may be possible that the high voltage supply will shutdown, falling to approximately 48V and then turning off completely when the over-current circuitry is enabled. If this occurs, the duty cycle should be reduced by reducing the burst width or repetition rate. With some transducers, the over-current overload condition may be avoided by turning down the output level. To turn

off the yellow shutdown LED and to re-enable the high power output, a manual reset is required by turning off the high voltage switch and turning it back on. If the temperature of the output stage of the amplifier exceeds 170 degrees Fahrenheit, then the yellow over-temperature yellow shutdown LED will be illuminated and the high power RF burst will be disabled. To re-enable the high power output, manually reset the instrument by turning off the high voltage switch and turning it back on.

To monitor the signal appearing on the device to be driven, the output may be observed at the "RF Pulse Monitor" connector. This monitor point is at a -40 dB level (when operating into a 50 Ohm load) with respect to the "High Power RF Signal Out" connector. As the "RF Power Level" control is increased, (clockwise rotation of the control) a signal should be observed at the monitor point. The drive level may be increased until distortion occurs in the signal. (Distortion is typically seen as a squaring of the normal sinusoidal output.) Please see the attached calibration chart.

A 5 pin power output connector has been provided on the rear panel to bring the +5V, -5V, +15V, -15V power supplies and ground out to power an external clamped diplexer or preamplifier. The AC line fuse is located inside the power entry module. This unit is shipped with the AC line selector set for 120 V operation. To change to one of the other permissible line voltages, (100V, 220V and 240V) remove the line cord from the power entry module, remove the line voltage selector cover with a small screwdriver. The power entry module will look like the following:

Figure 2

Remove the power selector card, and move the white plastic indicator so that the arrow for the desired voltage will be pointing into the power entry module. For example, the setting for 120V is shown below:

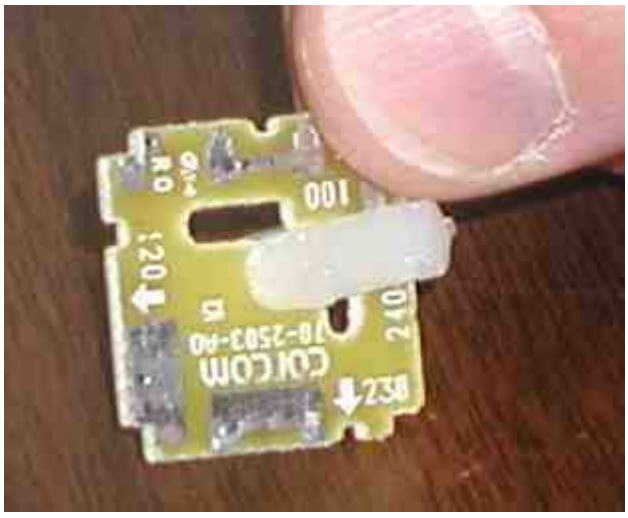

Figure 3

The left hand side of the board (with the 120 and the arrow pointing to the left) would be inserted into the power entry module. To set the voltage for 230V, the indicator would be moved so that the indicator stub is pointing up and the rounded end is pointing forward the 230V with the arrow.

The fuse labeled “High Voltage” Fuse located in a separate fuse holder on the rear panel is not the AC mains line fuse. The fuse is located between the high voltage supply and the gated amplifier output stage. The high voltage fuse should be replaced with the same type and rating fuse, specifically a Bussman GBB-8 8 ampere very fast blow (rectifier) fuse. Use of other fuses can result in damage to the gated amplifier circuitry and printed circuit board.

Power Output on GA-2500A

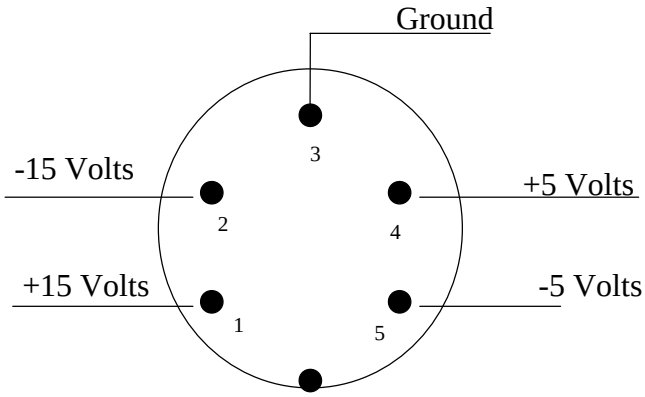

Figure 4

Specifications

Frequency Range for RF Bursts.....250 kHz to 7 MHz
RF Pulse Power (RMS) for RF Bursts.....5 KW
Nominal Output Impedance..... 50 Ohms
On/Off Ratio.....>140 dB
Output Level Control.....>20 dB
Maximum Pulse Width..... 200 microseconds (hardware limitation)
Maximum Duty Cycle..... 0.1 %
External Gate Input.....Positive +5V (CMOS compatible) level; 5mA current draw
Automatic Shutdown ..... Output disabled if the duty cycle limit is exceeded.
.....Output disabled if the temperature limit is exceeded (170 degrees F).
AC Power Requirements ..... 100, 120, 220, or 240 Volts RMS, 50-60 Hz,
..... Approximately 120 VA
AC Line Fuse for 100 and 120 Volt operation .....1A slow blow fuse (normally Bussman MDL-1)
AC Line Fuse for 220 and 240 Volt operation .....0.5A slow blow fuse (normally Bussman MDL-1/2)
High Voltage Fuse.....fast blow rectifier fuse 8 Ampere (normally Bussman GBB-8)
Dimensions ..... 17.66" (44.8 cm) side, 5.2" (13.25 cm) high, 11.75" (29.8 cm) deep
Shipping Weight .....Approximately 18 pounds (8 kg)
Cabinet Style ..... 3 U high rack mountable cabinet with front handles,
..... Can also be set for table top operation.

WARRANTY

All RITEC instruments are warranted against defects in material and workmanship for a period of **one** year after the date of shipment. RITEC agrees to repair or replace any assembly or component found to be defective after normal use during this period. RITEC's obligation under this warranty is limited solely to repairing any such instrument which, in RITEC's sole opinion, proves to be defective within the scope of the warranty when returned to the factory. **Transportation to the factory is to be prepaid by the purchaser.** Shipment should not be made without prior authorization by RITEC. Please contact RITEC for a return merchandise authorization (RMA) number. To prevent shipping damage to the instrument, it is recommended that the original shipping materials, cardboard boxes and foam, be saved and used to send back the instrument should the need arise. If for some reason, you have discarded the packing material, please contact RITEC before shipping the instrument back for instructions. RITEC is not responsible for any damage incurred to the instrument during shipping back to the factory.

This warranty does not apply to any products repaired or altered by persons not authorized by RITEC, or not in accordance with instructions furnished by RITEC. If the instrument is defective as a result of misuse, improper repair, or abnormal conditions or operations, repairs will be billed at cost.

RITEC assumes no responsibility for its product being used in a hazardous or dangerous manner either alone or in conjunction with other equipment. High voltage used in some instruments may be dangerous if misused. Special disclaimers apply to these instruments. RITEC assumes no liability for secondary charges or consequential damages and, in any event, RITEC's liability for breach of warranty under any contract or otherwise shall not exceed the purchase price of the specific instrument shipped and against which a claim is made.

Any recommendations made by RITEC for use of its products are based upon tests believed to be reliable, but RITEC makes no warranty of the results to be obtained. This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for RITEC any liability in conjunction with the sale of our products other than set forth herein.

This warranty covers only items manufactured by RITEC. It specifically excludes all items sold by RITEC which were manufactured by other companies. All of these items are subject to their original individual manufacturer’s warranty. Any claims for defective merchandise should be made to the original manufacturer for these items.