NEOS TECHNOLOGIES
A Gooch & Housego Company

OPERATING MANUAL

CAVITY DUMPER / PULSE PICKER DRIVER

MODEL NUMBER:

643ZZ.ZZZ-SYN-Y-X

Where: **X** is the division factors for the pulse rate.
Y is the multiplier of the reference input frequency
3ZZ.ZZZ is the output RF frequency

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SECTION I

INSPECTION PROCEDURE

Examine the shipping carton for damage. If the shipping carton or packing material is damaged it should be kept for the carrier's inspection. Notify the carrier and NEOS Technologies of any damage. Check the contents of the shipment for completeness, mechanical damage, and then test the equipment electronically. Operating procedures are contained in Section VI. If the contents are incomplete, or the equipment does not pass the electrical testing please notify NEOS Technologies.

If there is any problem with the use of this equipment, or if the equipment fails to function as expected contact NEOS Technologies, do not try to trouble shoot or repair this equipment. Consult with a NEOS service engineer. If the equipment needs repair or replacement, contact NEOS Technologies, Inc for a Return Authorization Number.

SECTION II

DESCRIPTION

The **643ZZ.ZZZ-SYN-Y-X** RF driver is designed to provide a pulse of RF energy to an AO modulator used either internal to a laser cavity (Cavity Dumper) or external to a laser (Pulse Picker) and is used to efficiently divert the laser beam into a second path. The **643ZZ.ZZZ-SYN-Y-X** RF driver locks the phase of the output RF frequency to an externally applied reference input signal (factory set frequency) and delivers a RF pulse to an acousto-optic device. The pulse has a peak RF power of 10 watts into a 50 Ohm load and a pulse width of 10 nsec. The driver has RF power control, phase adjustment, time delay adjustment, and divide down electronics to synchronously output the RF pulses.

The output pulse rate is an integral division of the external reference input signal frequency. The division factors are factory set to one of four available bands (**X**) (Customer selected when ordered.) Band 1 has division factors of: 5, 10, 25, 50, 100, 250, and 500. Band 2 has division factors of: 10, 20, 50, 100, 200, 500 and 1000. Band 4 has division factors of: 20, 40,100, 200, 400, 1000, and 2000. Band 8 has division factors of: 40, 80, 200, 400, 800, 2000, and 4000. This provides a pulse repetition rate in the range of from 8 MHz down to 10 KHz.

The RF output frequency is a multiple (**Y**) of the reference input frequency that is applied to the "External Signal Input" jack. The multiplier is factory set. The 10 nano-second output pulse can be moved in time, relative to the reference input signal. The phase of the RF output frequency (**3ZZ.ZZZ** MHz) can also be varied. See Figure 1.

The driver, when in the CW mode, outputs approximately 0.4 Watts of RF power, but only if the reference input signal is at the system's factory set operating frequency. If the signal source is not at factory set operating frequency, the CW RF power **must** be measured and set to less than 0.5 Watt to protect the AO Device. NEOS Technologies will not warrant damage caused by application of too much RF power to the AO Device.

There are two pulse modes of operation. When the "Division Factor" knob is set to the "External" mode, a user supplied TTL signal applied to the "External Pulse In" jack will produce an asynchronous RF energy pulse. When the knob is set to a division factor, the RF energy pulses are synchronized to the input reference signal frequency at the selected division rate. The internal pulse rate is displayed on the "Pulse Rate Monitor". The monitor is disabled when the system is in the "External" mode. The pulse rate can also be monitored at the "Pulse Sync Out" jack. The applied reference input signal can be monitored at the "DIV-10 RF Sync Out" jack.

There are also two methods of applying the input reference signal to the system. The "Input Select" button selects either the "External Signal In" or the "Detector Input" jack. When the "External Signal In" input is selected, the input reference signal, such as from a mode locked driver or from the internal oscillator of the driver, is applied to the system through the "External Signal In" jack. When in the "Detector Input" mode, a "detected signal" is applied to the system through the "Detector Input" jack. This signal should be the detected output pulse train of the laser, if mode locked. The "Detector Input" jack outputs a DC voltage which can be used to drive a photo detector, and, can supply several hundred milli-amps, so caution is necessary. If either a signal generator or a user supplied, detector is used, a DC block may be necessary.

An internal oscillator is provided for use when testing. When the internal oscillator is selected as the input reference signal, the oscillator's output is present on the "Internal Oscillator Out" jack and the systems input defaults to the "External Signal Input" jack. If a short length of coax (supplied) is connected between the "Internal Osc Out" and "External Signal Input" jacks, the internal oscillator is used for as the input reference signal source for operation or for a system self- test function. When an external signal source is used, the pulse response of the system may be different than when tested with the internal signal source, since the system is optimized for its internal operating factory set operating frequency. When the internal oscillator is not needed, turn the "Internal Oscillator" off so no beat frequencies are present. When a user supplied signal source is used, it is imperative that the RF output power in the CW mode be set up to be less than 0.5 Watt before connecting to the AO device or damage will occur. NEOS Technologies will not warrant damage caused by application of to much power to the AO device.

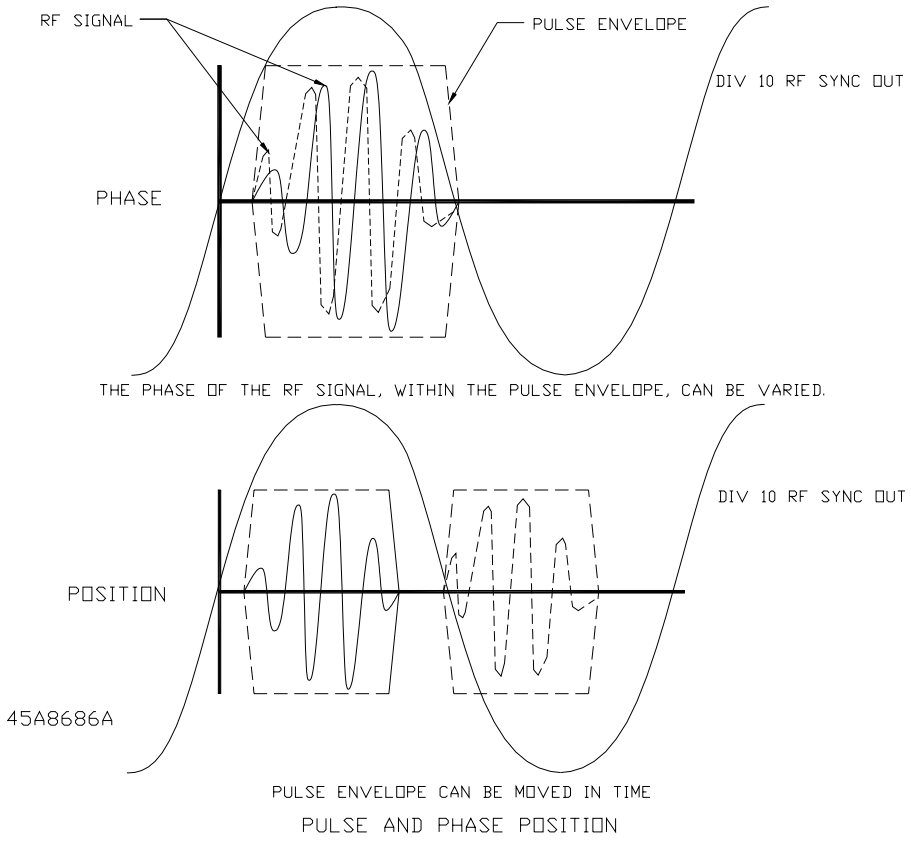


FIGURE 1
PULSE TIMING AND PHASE ADJUSTMENTS.

SECTION III
SPECIFICATIONS
643ZZ.ZZZ-SYN-Y-X

PARAMETER	SPECIFICATION
Output Frequency:	RF output @ **3ZZ.ZZZ** MHz
Multiplier of the reference input signal	**7.5, 8.5, 9.5, 10.5, or 11.5**
Output Power:	CW 0.4 Watt average, when set to internal signal source. CW Must be set to < 0.5 Watt, when set to external signal source. Pulse 10 Watts peak nominal
Power Adjustment Range:	10 dB from Maximum
Divide down rate:	"**X**" customer selected when ordered. Band 1: 5, 10, 25, 50, 100, 250, and 500 of reference input frequency Band 2: 10, 20, 50, 100, 200, 500 and 1000 Band 4: 20, 40,100, 200, 400, 1000, and 2000 Band 8: 40, 80, 200, 400, 800, 2000, and 4000
Time delay adjust:	0 – 5 nsec continuous (note: the AO modulator can also provide delay by adjusting it's position in the beam.)
Phase adjust:	0 - 90 degrees continuous
External Reference Input:	-10 dBm to –6 dBm into 50 Ohms
Detector Reference Input:	-10 dBM to 0 dBM into 50 Ohms
Detector Input Bias Voltage:	10.8 Volts DC supplied
External Pulse Input:	TTL level
Pulse Sync out:	TTL level
DIV 10 Sync Out:	1.75 mW Typical
Internal Osc. Out:	1.5 mW Typical
Power input	100-240 VAC 47 / 63Hz
Housing	53D2287

Acceptance Test Results Form: Reference 52A8560

SECTION IV
OUTLINE DRAWING 643ZZ.ZZ-SYN-Y-X

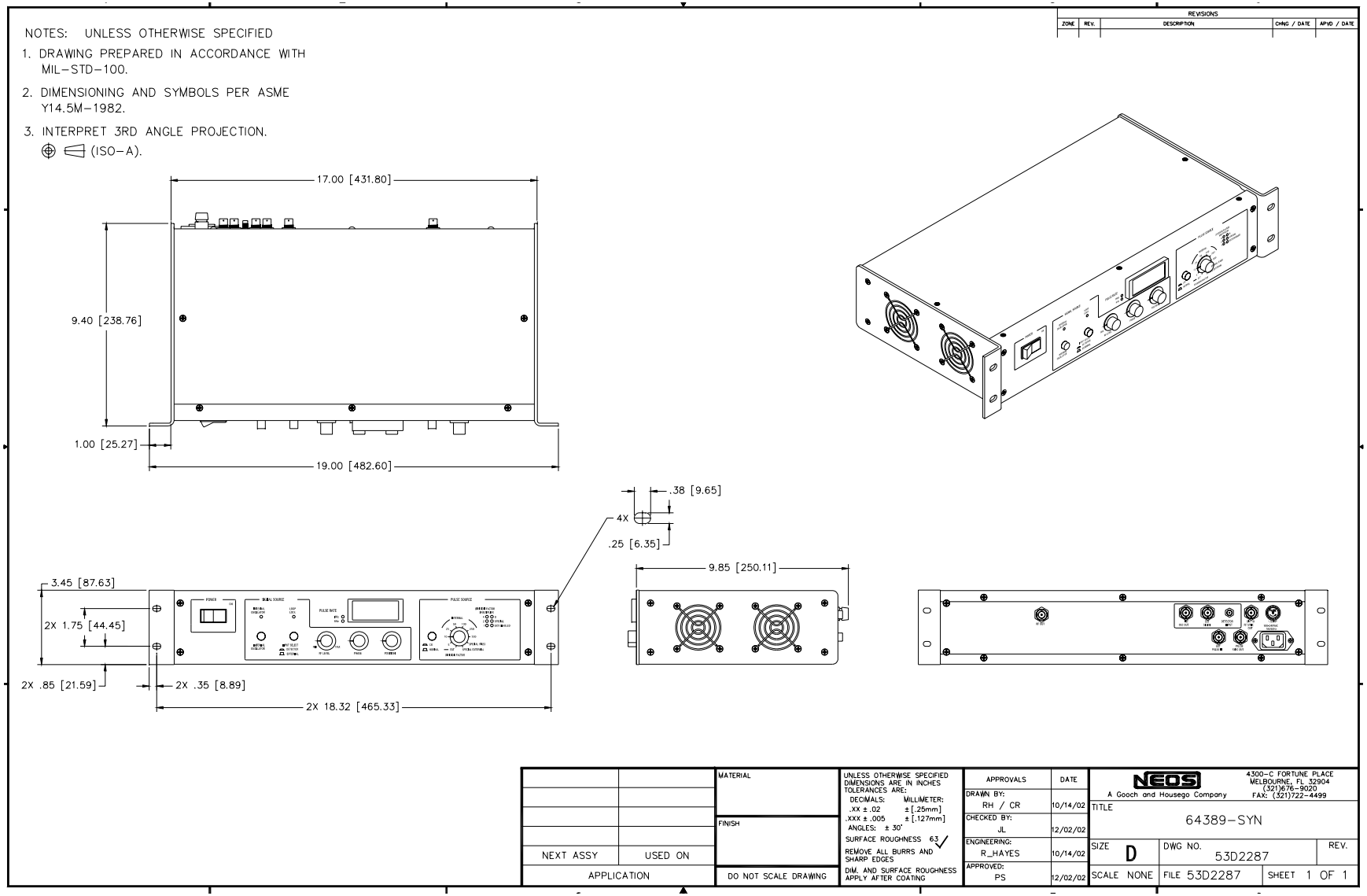
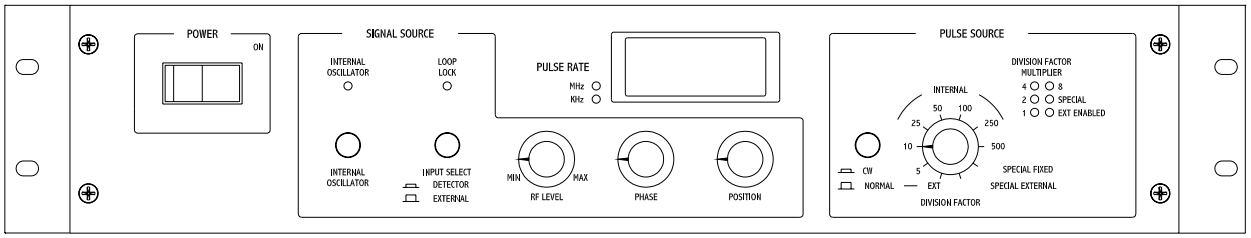


FIGURE 2

SECTION V
CONNECTIONS AND CONTROLS



53D2287 FIGURE 3

Front Panel Controls:

Switches:

a. Power – This applies ac power to the system.

b. Internal Oscillator – This enables both the internal oscillator and the "External Signal In" jack and disables the "Detector In" jack.

c. Input Select – This selects either the "External Signal In" or the "Detector In".

d. CW / Normal – This switch selects 0.4 Watt CW RF output or the normal 10 Watt pulse mode.

Knobs:

a. Position – Adjusts the timing of the pulse relative to the external input signal.

b. Phase – Adjusts the phase of the RF signal relative to the pulse envelope.

c. RF Level – Adjusts the amplitude of the RF signal.

d. Internal Division Factor –This sets the pulse repetition rate. The "Ext." is for the "External Pulse Input". The "special" settings are for custom future use.

Indicators:

a. Internal Oscillator – Indicates that the internal oscillator is on and that the "External Signal In" is enabled and the "Detector In" is disabled.

b. Loop Lock – Indicates that the RF synthesizer is synchronized to the applied signal.

c. Pulse Rate – Displays the pulse rate. The monitor is disabled when in "Ext".

d. Division Factor Multiplier – Indicates the rate multiplier.

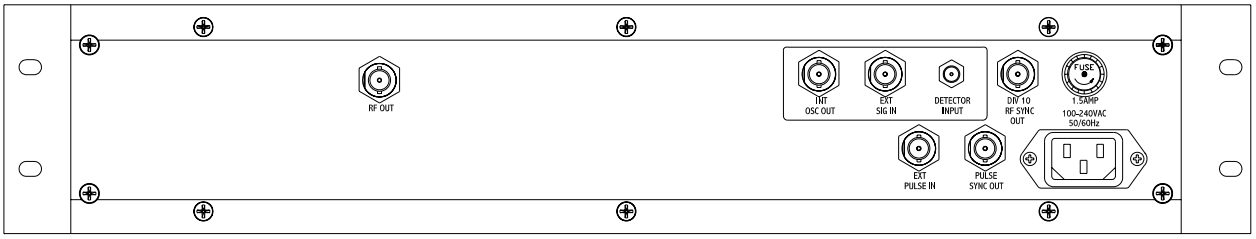


FIGURE 4

53D2287

Rear Panel:

a. RF Out BNC– The RF output of the system. 10 Watts pulsed, 0.4 Watts CW.

b. Internal Osc. Out BNC– The output of the internal oscillator used for setup.

c. Ext. Signal In BNC- Accepts the Internal Osc Out signal or an external reference signal which sets the RF frequency. This is normally a –10 dBm signal level.

d. DIV 10RF Sync Out BNC– Outputs a signal proportional to the input frequency.

e. Pulse Sync Out BNC– Outputs a TTL level signal into 50 Ohms.

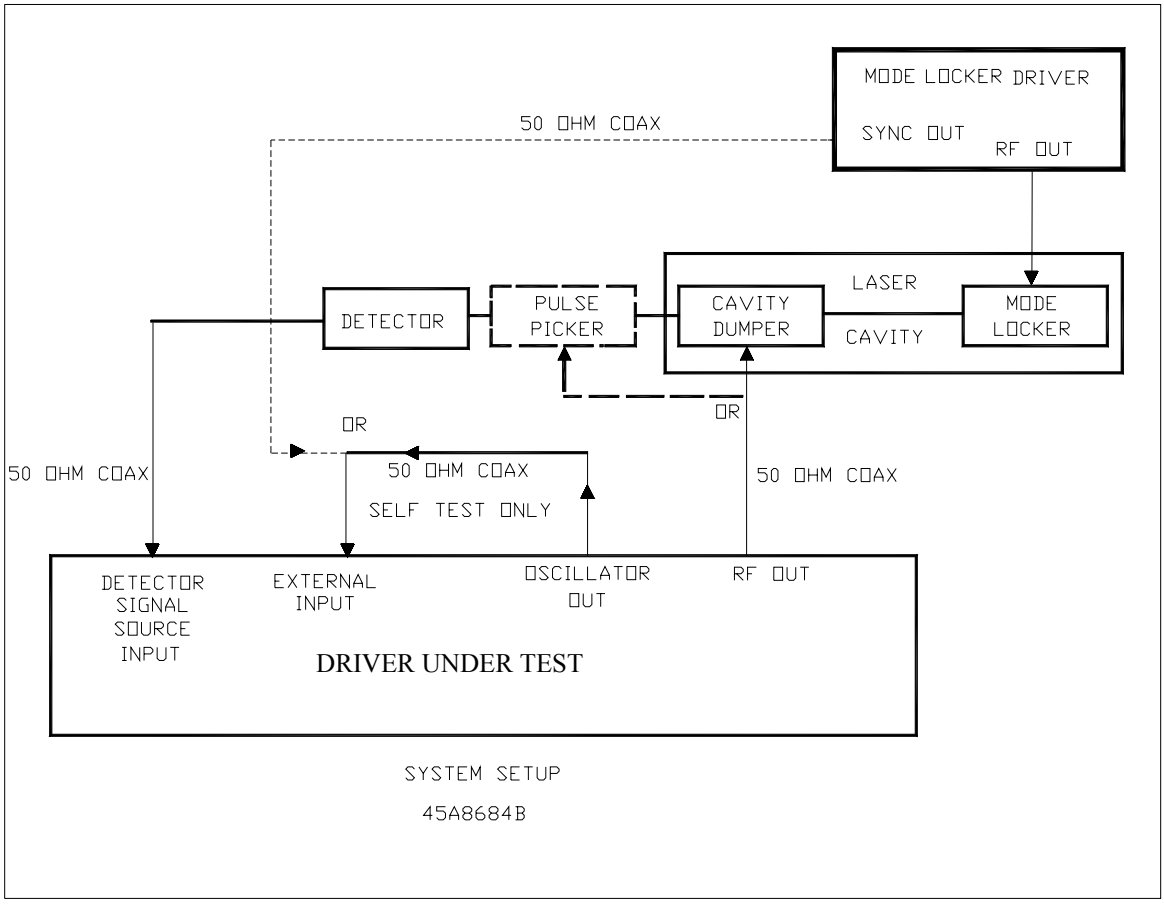
f. Ext Pulse In BNC– Accepts an asynchronous TTL pulse signal when the "Internal Division Factor" is set to "Ext."

g. Detector In SMA- Accepts a signal from a photo detector and supplies a DC Voltage to bias the photo detector. A DC block may be used if necessary. Note: This signal must be twice the "Ext. Signal In" Reference signal frequency and at a level of –10 dBm. Normally, the drive frequency for a "mode locker" is half the C/2L frequency of the Laser, so that the detected frequency is twice the drive frequency.

h. Fuse – 3AG 1.5A Slo-Blo

i. Power socket – Accepts 100 to 240 VAC @ 50/60 HZ.

SECTION VI
OPERATING PROCEDURE



TYPICAL SYSTEM SETUP

FIGURE 5

TESTING:

Make all connections with the power off.

Connect the "RF Out" to a 50 Ohm input of a oscilloscope having a bandwidth ≥ 500 MHz through a 50 Ohm attenuator to prevent damage to the oscilloscope.

Connect the "DIV 10 RF Sync Out" to the same oscilloscope to use as a sync signal.

Connect " Internal Osc out" to the "External Signal In" with a short 50 Ohm cable.

Set the internal Osc to on. Set the "Division Factor Knob" to "10". Set the "Input select" to "External".

Turn on the power.

Test the system parameters as listed on the ATR report.

OPERATION:

Make all connections with the power off.

If an external reference input signal is to be used, remove the cable between the " Internal Osc out" to the "External Signal In". Set the "Internal Osc" to off.

Connect to the "External Signal In" a reference input signal, of the proper frequency (from a modelocker Driver) or "Internal Osc out", or connect a photo detector to the "Detector In".

Connect to the "External Pulse In" an external pulse rate generator, if needed.

Connect the "Pulse Sync Out" to a 50 Ohm input of the oscilloscope or to other equipment.

Connect to the "DIV 10 RF Sync Out" to a 50 Ohm oscilloscope to monitor the reference input frequency.

Set the "Internal Osc" to off if an external signal source is used. Set the "Division Factor Knob" to "10" or "Ext.", if an External pulse rate generator is used. Set the "Input select" to "External" if connecting to the internal oscillator or a reference input signal frequency (from a mode locker driver) or set to "Detector" if using a photo detector to supply the reference signal. Set the "CW/ Normal" to "Normal". Set the "RF Level" fully clock-wise. Turn the power on. The indicators and monitor will show the system status.

Follow the instructions in the AO device manual to optically align and adjust the AO device (Cavity Dumper or Pulse Picker) in the laser beam. Follow the instructions in the Mode Locker manual to setup, adjust and operate the Mode locker device in order to produce laser pulses.

Adjust the "RF power Level", "Position" (time delay), and "Phase" to grab the laser output pulse as desired. Adjust the "Internal Division Factor" to the desired pulse rate needed. If using a Cavity Dumper AO device, do not exceed the recovery rate of the laser or the output pulse will be reduced in intensity.

Note: Cable lengths, position of the laser beam in the AO device (acoustic delay), and photo detector position will effect the timing of the system and the output pulse. Change the cable length or the position of the detector if you can not grab the laser pulse with the internal delay adjustment of the **643ZZ.ZZZ-SYN-Y-X** Driver

Warning: **Do not changer the system operating frequency with the AO device connected to the RF output of the driver!** If an external signal source, other than the factory specified frequency is used (from a mode locker driver or detected laser pulse), then the CW output RF power must be checked and set to <0.5 Watt before connecting to the AO device. Damage will result if the average power exceeds this value. The system output power is very sensitive to operating frequency.