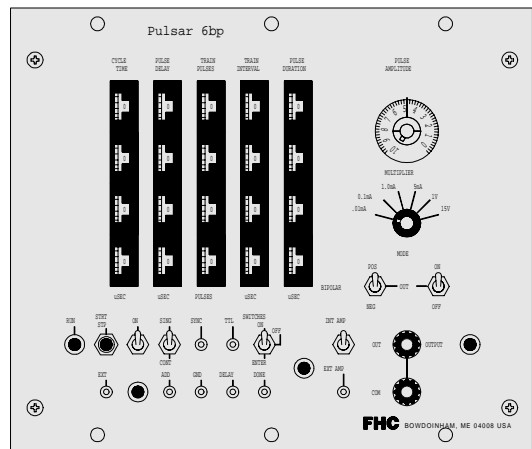


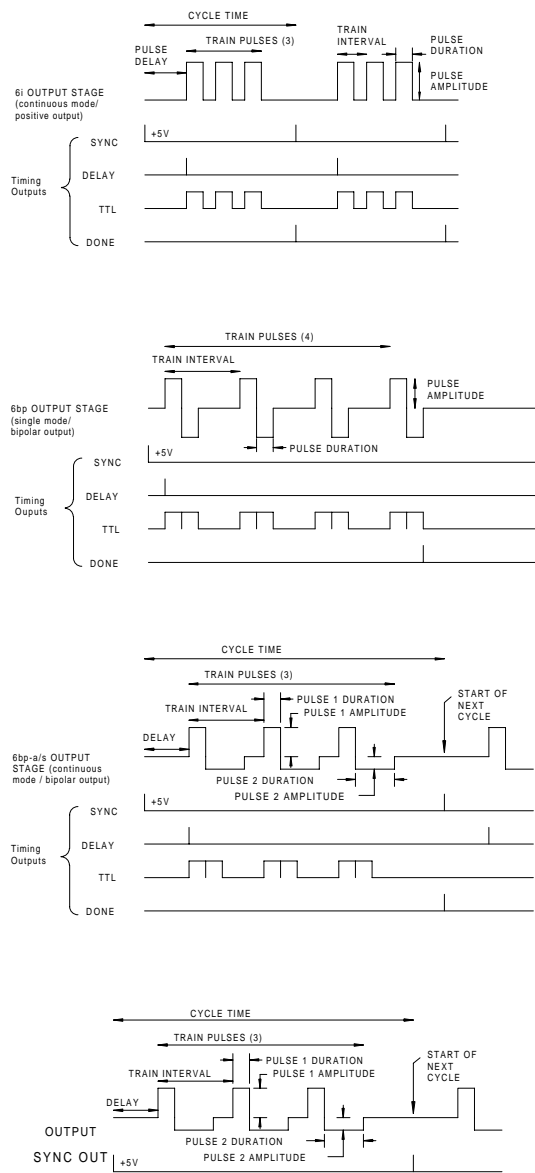
PULSAR Stimulators

- VARIETY OF OUTPUT STAGES FOR VIRTUALLY ALL APPLICATIONS
- ASYMMETRIC BIPOLAR VERSION bp-a/s
- CONSTANT VOLTAGE AND CONSTANT CURRENT MODES
- ONE MICROSECOND DIGITAL ACCURACY
- UNIQUE SWITCHING PERMITS SYNCHRONOUS DATA ENTRY
- COMPACT SIZE FOR RACK MOUNT OR STAND ALONE OPERATION
- PRICED COMPETITIVELY WITH ANALOG TYPES



Pulsar 6bp bipolar stimulator

Pulsar 6i, 6bp and 6bp-a/s output waveforms showing parameters and timing relationships.



Unique features in a compact, lines powered package make the **Pulsar** series of stimulators and pulse generators the instrument of choice for brain and peripheral stimulation experiments as well as driving devices for voltage clamp and mechanical/visual/auditory protocols.

Controls are easy to operate and timing signals (TTL) are brought to the front panel for synchronizing other equipment.

Constant voltage or constant current output modes can be selected over the full range of biological requirements from microamps to 200 volts.

Pulsar stimulators actually consist of two separate circuits in a single package. The 6 designates the logic circuitry and i, b, bp and bp-a/s indicate the various output stage options.

Pulsar 6 has controls for CYCLE TIME, DELAY, NUMBER OF TRAIN PULSES, TRAIN INTERVAL, PULSE DURATION and PULSE AMPLITUDE. Pulsars have SINGLE or CONTINUOUS (recycle) modes and feature a unique 3-position SYNCHRONOUS SWITCH which, when in the OFF position, disconnects the thumbwheel switches even while a program is running, so that new values set are not entered until the end of cycle after the ENTER position is activated. In the third ON position, thumbwheel switch value changes are immediately effected.

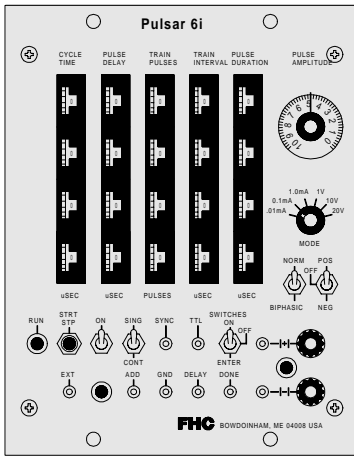
Digital values are set on 4-digit thumbwheel switches using the general form XXX10^P where XXX, the significant figures, are the first three digits and P, the exponent, is the fourth.

Additional Pulsar 6 units can be triggered from a master unit to generate complex timing sequences. The illustrative examples demonstrate many of the unique and useful features of the Pulsar stimulators.

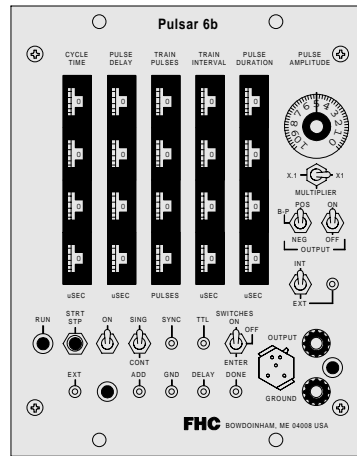
The i (isolated) output version is for general purpose stimulating experiments and features 6 constant current (0-10mA) or constant voltage (0-200V) ranges. It is optically coupled, powered by an isolated supply; no batteries are required. The output is single polarity with a reversing switch. A capacitor coupled (.47mFd) biphasic output is also included.

Our new bp-a/s output stage has been designed for chronic stimulation or other applications where an asymmetric waveform is required. It features a bipolar, optically isolated, constant voltage (0-150V) or current (0-50mA) output where the amplitude and duration of each phase are adjustable.

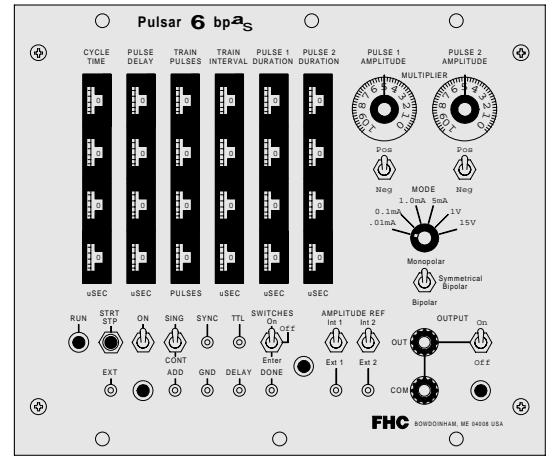




Pulsar 6i stimulator



Pulsar 6b bipolar pulse generator



Pulsar 6bp-a/s asymmetric bipolar stimulator

The **bp** output stage has the same output power as the bp-a/s but only a symmetrical bipolar, in addition to monopolar, pulse can be generated.

On both the bp and bp-a/s, the second phase is separated by 1-100uSec (internally adjustable).

The power of the bipolar output stages, 150V and 50mA, also makes them ideal for muscle stimulation experiments.

The **b** output is not isolated and is designed to drive either remote linear or pulse isolators and voltage clamp amplifiers. The output is adjustable from 0 to $\pm 10V$ in two ranges. The b output includes a symmetrical bipolar mode as well as provision for controlling the output amplitude with an external voltage level. The front panel output connector includes +/- taps to power external devices such as optical isolators.

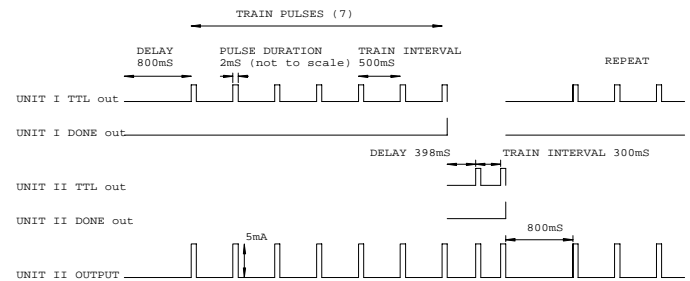
SPECIFICATIONS

- Cycle Time:** adjustable from 1uSec to 99,900Sec
- Cycle Delay:** adjustable from 1uSec to 99,900Sec
- Train Pulses:** adjustable from 1 to 999×10^8 pulses
- Train Interval:** adjustable from 1uSec to 99,900Sec
- Pulse Duration:** adjustable from 1uSec to 99,900Sec
- Pulse Duration 2(bp-a/s only):** adjustable from 1uSec to 99,900Sec
- i Output:** optically isolated; constant current (1-10,000uA in 3 ranges) or constant voltage (.1-200V in 3 ranges), positive or negative polarity; capacitively coupled (.47mF) biphasic output switch provided
- bp Output:** optically isolated; constant current (1-50,000uA in 4 ranges) or constant voltage (.1-150V in 2 ranges), positive, negative or symmetrical bipolar output
- bp-a/s output:** optically isolated; constant current(1-50,000uA in 4 ranges) or constant voltage (.1-150V in 2 ranges), positive, negative or asymmetrical bipolar output where the duration and amplitude of each phase is independently adjustable
- b output:** ground referenced, constant voltage (.01-10V in 2 ranges), positive, negative or symmetrical bipolar output
- Power Requirements:** 115/230V (switch selected), 50-60Hz, 1A
- Pulsar 6i and b Dimensions:** 5 1/2" w x 7" h x 12" d (14 x 18 x 30cm) 8 lbs. (3.6kg)
- Pulsar 6bp and bp-a/s Dimensions:** 8 1/4" w x 7" h x 11" d (21 x 18 x 27cm), 8 lbs.(3.6kg)

ORDERING INFORMATION

- 74-50-5 Pulsar 6i Stimulator
- 74-50-6 Pulsar 6b Stimulator
- 74-50-8 Pulsar 6bp Stimulator
- 74-50-8-02 Pulsar 6bp-a/s Stimulator

Cardiac stimulation sequence



HEART PACING WITH PULSAR DIGITAL STIMULATORS

Pulsar Stimulators' unique input/output characteristics make them ideal for heart pacing experiments.

Two units are required; each set in the SINGLE mode. The DONE pulse of each unit is used to trigger the START of the other.

Unit I is used to "pace" the tissue; the TRAIN PULSE switches are set to deliver the number of pacing pulses (in the example above: 7 pulses).

Unit II is used to deliver the "test" pulse(s). The DELAY set on unit II is the test interval. The TRAIN INTERVAL can be set to the same or another interval for the second and subsequent test pulses if required (the example has a second pulse).

The DELAY set on Unit I sets the "rest" period prior to the start of another series of pacing pulses.

Several output configurations are possible; in the example a monopolar test pulse of identical duration and amplitude to the pacing pulse is required. In that case the TTL output of unit I is connected to the ADD input of Unit II. The output of unit II is connected to the electrode and the amplitude and duration of the pacing and test pulses are set in unit II.

If different duration and amplitudes are required for the pacing and test pulses, the outputs of each unit must be summed at the input of a suitable linear amplifier, like our bp Isolator, in which case the parameters are independently controlled from each Pulsar unit.