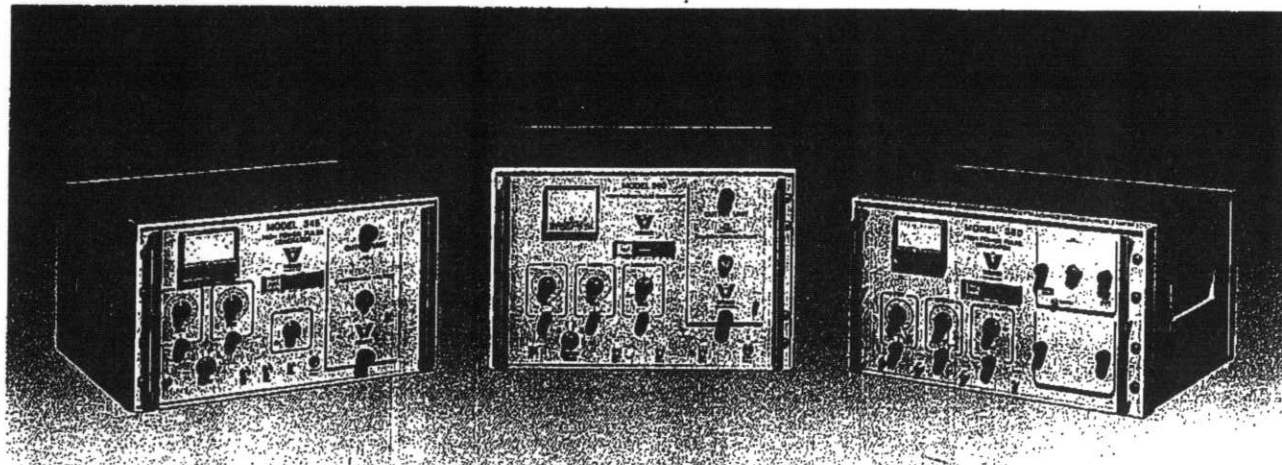


# HIGH-POWER PULSE GENERATORS

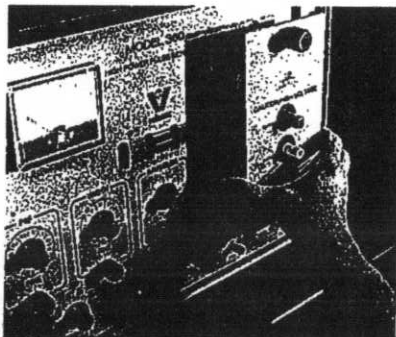


## EXTENSIVE HIGH POWER PULSE EXPERIENCE

Velonex has specialized in high-power pulsers (over 1,000 watts, peak), for over twenty-five years, producing general-purpose instruments that meet the specialized requirements of almost any application.

Before Velonex developments, when high power pulses were needed, your only choice was to build a special source for each application. Such generators were usually extremely limited in what they could do. Now, with the Velonex line of standard generators you can have convenient and repetitive clean waveform, high power pulses off-the-shelf.

Velonex high-power pulse generators produce pulses with characteristics you'd normally expect only in more common low power pulses: defined wave shape, precise repeatability, good flat top and minimum ringing.



## PLUG-IN VERSATILITY

One of the main reasons for the exceptional versatility of Velonex high-power pulse generators is the availability of a wide range of *fully-recessed* plug-ins.

These easily inserted and removed units provide a large selection of output currents and voltages (Impedance matching); DC Isolation; inversion of output pulse polarity; and varying rise and fall times. Interlocks remove high-voltage if a plug-in is removed while power is on.

Each Velonex generator comes with a direct feed-through output plug-in. Other plug-ins are available as options. In many cases, the same plug-ins can be used in several different generators. Velonex "Plug-In Output Units Brochure" describes the standard plug-in units.

## COMPACT, EASILY INSTALLED

Despite their high power outputs, Velonex generators are remarkably compact, and well suited for bench use. Most dimensions are 19 $\frac{3}{4}$ " wide by 11" to 18 $\frac{1}{4}$ " high to 21 $\frac{1}{2}$ " deep. Rack mounting is available for all models.

Hookup is a simple matter since the instruments use 115V, 60 Hz, single phase power (230V, 50/60Hz available). This also results in a degree of portability that you normally would not expect in such instruments.

## PROGRAMMABLE UNITS

Velonex Programmable High Power Pulse Generators may be operated with BCD inputs to set pulse width, prf, and amplitude. Alternately, the amplitude may be continuously programmed by low-level analog input. These units are ideal for testing surge protection devices, semiconductors, discharge devices, or other components requiring a High Power Pulse Generator with a computer interfaced programmed test

sequence. Inputs are TTL compatible and separate grounding is maintained to allow interconnection to computer systems without introducing problems of common ground return impedances. Programmable units may also be employed in a manually operated mode.

## VELONEX: UNLIMITED APPLICATIONS VERSATILITY

Listed below are a few of the many applications where Velonex high-power pulse generators can make your job easier, faster and more precise:

- Surge Protection Device Testing (Spark-Gaps, VDR's)
- Nuclear Pulse Simulation
- Electric Arc Studies
- Lightning Simulation
- Electro Optics (Pockel & Kerr Cell pulsing)
- Exploding-Wire Phenomena
- Magnetic Field Studies
- Electromagnetic Interference Testing
- Ultrasonics
- Gaseous Discharge Device Pulsing
- Solid State Component Testing

## EXTENSIVE APPLICATIONS ASSISTANCE

An extra benefit of dealing with Velonex is access to applications experience gained by Velonex engineers in over twenty-five years of solving high-power pulse problems: from one-of-a-kind specials to production-line testing instruments. This saves you substantial time and money, and can often make your "special requirement" routine.

**VELONEX**

# HIGH-POWER PULSE GENERATORS

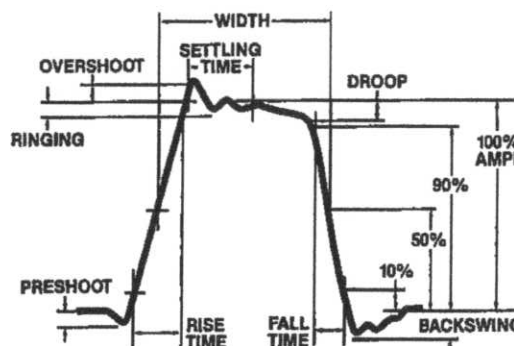
## HIGH POWER PULSE TERMS

High-power pulse terminology is the same as for any pulse. Unless otherwise indicated, the following definitions and/or measuring techniques are used:

- Parameters are specified for operation into a non-reactive (resistive) load of a specified value.
- Pulse rise-time is measured from the 10% to the 90% pulse amplitude points.
- Pulse fall-time is measured from 90% to the 10% pulse amplitude points.
- Pulse width is measured from the 50% response points on the rising and falling edges of the waveform.

- Duty factor is the ratio of pulse "on-time" to pulse period. This equals the product of pulse width and pulse repetition rate.

- Average output power is the product of peak power and duty factor.



## SAFETY AND RELIABILITY

### INSTRUMENT SAFETY

Velonex designs-in numerous instrument and customer load safety features.

For example, each generator is completely protected against short-circuits and duty cycle overloads. If there's any momentary loss of power, the instrument comes back on in a standby mode instead of at high voltage. The operator must take an intentional action to get the high voltage back on. Included on the front panel are an overload indicator light and a reset pushbutton.

There are also several overload sensors in the instrument. Any one of these can trip the power off when necessary. Fuses are also used to protect the instrument and load if there is a malfunction.

On some models where heat might become a problem, there's also a sensor that automatically turns the power off if the temperature gets too high. This might be caused, for example, by blockage of the forced air flow.

### OPERATOR SAFETY

Operator safety is provided by making all plug-ins *fully-recessed* (flush with the front panel)—a Velonex exclusive. This is especially important when semi-skilled operators are using the instrument. Even where there's very high output voltage, the fully recessed plug-in eliminates any possible interconnection contact.

The plug-ins are also interlocked: the high voltage automatically shuts off if they are removed.

Another operator safety feature, in all Velonex generators that produce over 500 volts, is "High Voltage Reset" on the amplitude control. Once power has been turned off, the operator must turn the amplitude control all the way back to zero before they can again get high voltage output. Where exact reproducibility is critical, Velonex furnishes a keylock that overrides the High Voltage Reset. A positive operator action is required: they must insert and turn the key.

Additional operator safety features include a flashing red light on the front panel, to indicate the presence of high voltage, and a meter that shows relative pulse level. All external parts of the generator, including all controls, are always at ground potential.

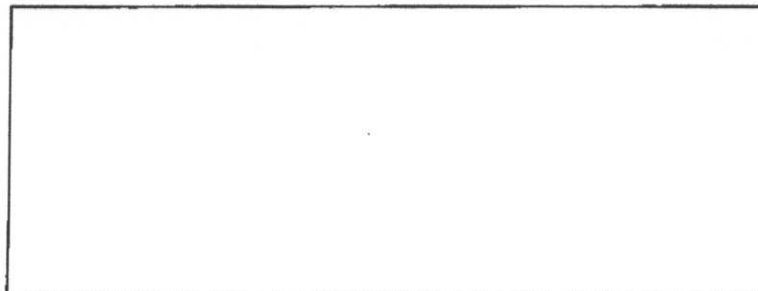
### FIELD PROVEN RELIABILITY

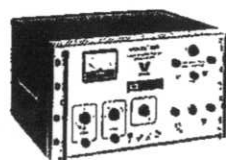
Velonex high-power pulse generators have earned an *unequaled* reputation for in-the-field reliability. The number needing factory repair has been virtually insignificant over the last twenty-five years.

The reasons? For one thing, all components are substantially derated. In addition, all units are forced-air cooled to provide long life for all parts. There is no marginal performance anywhere. Furthermore, all Velonex generators are burned-in before final testing, to detect any possible sources of trouble.

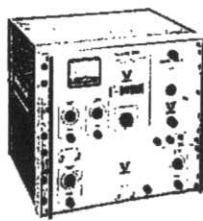
Specifications subject to change without notice. **Your Local Velonex Rep. is:**

**VELONEX**  
560 Robert Avenue  
Santa Clara, CA 95050  
Telephone: (408) 727-7370  
Telex: 756562 VELONEX SNTAVD

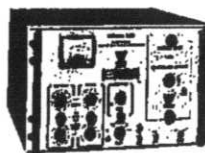




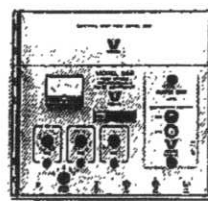
**380**  
**ULTRA FAST**  
 **$t_R$  &  $t_F$**



**570<sup>(3)</sup>**  
**MODEL 350**  
**WITH BURST**  
**CAPABILITY**



**580<sup>(3)</sup>**  
**MODEL 360**  
**WITH BURST**  
**CAPABILITY**



**660**  
**VERY HIGH**  
**POWER**  
**PROGRAMMABLE**

500V  
1000V

2100V  
24000V

2500V  
30000V

2500V  
30000V

10.0 A  
100 A

10.5 A  
600 A

12.5 A  
750 A

12.5 A  
750 A

5000 W  
5000 W  
50 W

26000 W  
22000 W  
220 W

31000 W  
31000 W  
460 W

31000 W  
31000 W  
460 W

1.0%  
1.0%

to 50%<sup>(3)</sup>  
to 50%

to 50%<sup>(3)</sup>  
to 50%

1.5%  
1.5%

15 ns  
25  $\mu$ s

100 ns  
300  $\mu$ s

50 ns  
3 ms

75 ns  
1 ms

One Shot  
400 K pps  
0 to 400 K pps

3 KHz<sup>(3)</sup>  
2 MHz  
0 to 100 K pps

3 KHz<sup>(3)</sup>  
2 MHz  
0 to 1M pps

One Shot  
300 K pps  
0 to 300 K pps

7 ns  
7 ns

30 ns  
50 ns

20 ns  
30 ns

20 ns  
30 ns

0.1%/ $\mu$ s

0.04%/ $\mu$ s

0.003%/ $\mu$ s

0.009%/ $\mu$ s

50  $\Omega$

200  $\Omega$

200  $\Omega$

200  $\Omega$

F, J, L, R

F, J, M, R

C, D, F, H, J,  
M, R<sup>(6)</sup>

F, H, J, M, R

YES  
YES  
NO  
YES  
NO  
YES

NO  
YES  
YES  
YES  
NO  
NO

YES  
YES  
YES  
YES  
NO  
YES

YES  
YES  
YES  
YES  
YES<sup>(6)</sup>  
YES

#### OPTIONS

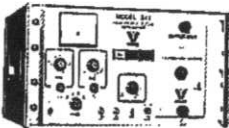
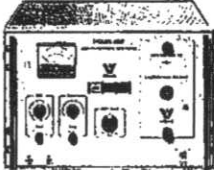
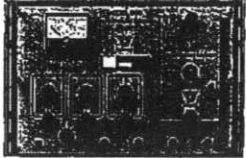
- A. Allows operation with either 115 V ( $\pm 5\%$ ) 400 Hz or 60 Hz.
- B. Adds line regulation. Output amplitude change  $< 0.9\%$  for  $\pm 10.0\%$  input line change. Input line 115 V 60 Hz.
- C. Extends pulse width range to 10 milliseconds.
- D. Extends pulse repetition rate to 1 megahertz. Maximum power out reduced to  $\leq 3.2$  KW.
- E. Allows generator to be operated at 10% duty factor at 10% of rated output power with modified specifications.
- F. Input power requirements changed from 115 V 50/60 Hz to 230 V 50/60 Hz.
- G. Reduced Rise and Fall Times to 30 ns and min PW to 50 ns.
- H. T<sup>2</sup>L input logic on External Drive.
- J. Input power requirements changed to 100 V 50/60 Hz.
- L. Remote "one shot" trigger.
- M. Remote safety feature (see Application Note 121).
- R. Rack mounting.

(4) To 10% with option E.

(5) PRF, Width and Amplitude. Accessory unit allows GPIB Interface.

(6) Options "C" & "D" are not available simultaneously.

# SPECIFICATIONS

			
CHARACTERISTICS	345 LOW COST	350 HIGH POWER	360 REGULATED VERY HIGH POWER
VOLTAGE PEAK, Max			
Direct Out	1000V <sup>(2)</sup>	2100V	2500V
With Standard Plug-in	11400V	24000V	30000V
CURRENT PEAK, Max			
Direct Out	5.0 A	10.5 A	12.5 A
With Standard Plug-in	290 A	600 A	750 A
POWER OUTPUT			
Peak One Shot	6000 W	26000 W	31000 W
Full Duty Factor	5000 W	22000 W	31000 W
Average	50 W	220 W	460 W
DUTY FACTOR			
Full Output Power	1.0%	1.0%	1.5%
<sup>(1)</sup> Reduced Output Power	10%	1.0% <sup>(4)</sup>	1.5%
PULSE WIDTH			
Internal Minimum	80 ns	100 ns	50 ns
Internal Maximum	10 ms	300 $\mu$ s	3 ms
PULSE REPETITION			
Internal Minimum	1 pps	3 pps	One Shot
Internal Maximum	100 K pps	100 K pps	300 K pps
External	0 to 100 K pps	0 to 100 K pps	0 to 300 K pps
TRANSITION TIME			
Rise	35 ns	30 ns	20 ns
Fall	35 ns	50 ns	30 ns
DROOP			
Maximum	0.004%/ $\mu$ s	0.04%/ $\mu$ s	0.003%/ $\mu$ s
IMPEDANCE			
Load for above data	200 $\Omega$	200 $\Omega$	200 $\Omega$
AVAILABLE OPTIONS			
	A, B, F, G, H, J, L, M, R	E, F, J, M, R	C, D, F, H, J, L, M, R <sup>(6)</sup>
MODES OF OPERATION			
One Shot Button	YES	NO	YES
Internal PRF	YES	YES	YES
External Drive	YES	YES	YES
External Trigger	YES	YES	YES
Programmable	NO	NO	NO
Line & Duty Factor Reg.	NO	NO	YES

(1) Increased duty factor may degrade some specifications.

(2) Can be increased to >1500 V, with  $R_L > 400 \Omega$ ; other specifications may be altered.

(3) Data shown for burst mode, specifications in non-burst are same as generator indicated in heading.

Power Input 115V  $\pm$  10%, 50/60 Hz unless otherwise indicated.