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INSTRUCTION MANUAL

for

UNIBLITZ®

MODEL SD-10

SHUTTER DRIVER/TIMER

Vincent Associates
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Rochester, New York 14607
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Version 1.2
1987

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TABLE OF CONTENTS

INTRODUCTION.....Page 4

WARRANTY.....Page 4

FEATURES.....Page 5

SPECIFICATIONS.....Page 6
- System Characteristics.....Page 6
- Input Characteristics.....Page 6
- Output Characteristics.....Page 7
- General.....Page 8

OPERATOR CONTROLS.....Page 9
- Front and Rear Panel Diagram (Figure #1).....Page 12

OPTIONAL ACCESSORIES.....Page 13

OPERATING INSTRUCTIONS.....Page 14
- Initial Operation and Testing.....Page 14
- Operating Modes.....Page 14
  - Internally Timed Mode.....Page 14
    - Normally Open/Normally Closed.....Page 15
    - Trigger Methods.....Page 15
    - Reset Methods.....Page 16
    - Control Diagrams (Figure #2A, B, C)....Page 17
  - Continuous Mode.....Page 18
  - Externally Timed Mode (Timer Bypass).....Page 18
- Miscellaneous.....Page 19
  - System Timing Diagrams (Figures #3A, B, C)..Page 20
  - Mechanical Sync. Output.....Page 23
  - Trigger Cautions.....Page 23
  - Pulse Voltage Graphs (Figure #4).....Page 23
  - Overall Drawings (Figure #5A, B).....Page 24

MAINTENANCE.....Page 26

NOTES.....Page 27

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INTRODUCTION

The UNIBLITZ SD-10 is a medium cost Timer/Driver control unit capable of controlling all shutters in the UNIBLITZ line, including the 262X. The unit incorporates a precise timer with 396 pre-set steps and 1ms resolution for use in a multitude of shutter applications, ranging from photography to holography.

Another feature included with the SD-10 are dual delay outputs that provide delayed signals at the conclusion of a completed exposure interval. These signals can take the form of a square wave or a single trigger pulse 1ms in duration. The delay is adjustable from 8ms to 800ms in one range, which begins at the conclusion of the exposure interval. This output is useful for triggering some external event 8ms to 800ms after completion of the exposure interval, or can be used to chain SD-10 units for multiple exposure applications.

In addition to the delayed output structure, the SD-10, can retrigger itself continuously to provide a low level chopper control. In this way the delay interval control now becomes the recycle interval which adds to the exposure period. This determines the exposure frequency. By using external control capability and this mode, exposure bursts can be controlled. This would be accomplished by setting the SD-10 in the continuous mode and triggering the system (by external means) to begin cycling, by monitoring the pulse output the precise cutoff point can be determined and the unit can be reset without interrupting the exposure cycle.

A patented driver design also make the SD-10 unique. Its variable voltage feature allow a shutter to be operated to its maximum frequency without fear of coil burnout (provided proper coil used and shutter operation are followed).

Other features include, normally open or normally closed operation, selectable pulse energy switch for 262X operation, convenient output for shutters equipped with a mechanical sync switch, external regulated +5VDC supply, and extruded aluminum housing with tilt stand.

Enclosed is the complete operators manual for the UNIBLITZ SD-10 . It is suggested to read this manual completely before operating the unit. Due to the construction of this unit, we recommend that it be returned to the manufacturer if there be any need for repair, no user serviceable parts inside.

WARRANTY

Great care has been taken to ensure that our products are free from defect when shipped. Defective units will be replaced or repaired at no charge, excepting transportation charges, if returned within 90 days from the date of shipment. Vincent Associates will consider the return of unused equipment if returned within 30 days from the date of shipment subject to a 20% restocking charge. This offer does not apply to used or damaged equipment.

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FEATURES

396 Preset Exposure Settings	Built in timer with 1ms resolution allows the user a wide selection of exposure combinations.
High Speed Repeat Exposures	Driver able to operate shutter from DC-40/sec, continuously variable.
Variable Voltage Drive System	Patented drive system ensures as exposure frequency increases, pulse voltage drops to allow faster recycle rates.
External Timing (Timer Bypass)	Control input provided to allow external timing control to shutter without activating internal timer.
External Trigger	Input provided for remote activation of internal timer or triggering from external instrumentation.
Delay Outputs	Outputs provided to allow delayed event triggering at the conclusion of the exposure interval. Three delay modes available.
Continuous Exposure Operation	Self triggering allows the unit to be used in low level chopping applications as well as burst mode capability.
Normally Open/Normally Closed	System can be made to time the shutter in the open position as well as in the closed position.
Selectable Pulse Energy	Allows operation of our 262X shutter without special modification.
Mechanical Sync.	Output provided for shutters equipped with mechanical "X" contact.
Aluminum Enclosure w/Tilt Stand	Aluminum extruded case with tilt stand for convenient adjustment of front panel controls.

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SPECIFICATIONS

System Characteristics:

Exposure Interval	1ms-99sec. in four decade ranges variable within each decade with dual 10 position rotary switches.
Delay Interval	8ms-800ms in a single range continuously variable with logarithmic vernier.
Repeat Exposure	Single exposure or continuous, selectable with dual position toggle switch. 10ms minimum between exposures.
Shutter Drive	Continuously variable frequency of exposures from DC to 40/sec. Maximum peak pulse power 300W, pulse voltage 50VDC, and pulse current 5A. Minimum hold voltage 5VDC. (These ratings measured into standard 5V coil (12 ohms) with 20 ms exposure interval at recycle rate of 5 exposures per second.)
Accuracy	Exposures +-5% all ranges (RC time base). Delay +-20% on scale throughout range (RC time base).

Input Characteristics:

External Trigger	Input Impedance 10K ohms. Max. input voltage 20VDC (at 100% duty cycle). Min. input voltage 3.5VDC. Min. pulse width required to ensure triggering 10us. (Remote trigger SD-10 by switching +5VDC into EXT. TRIG.).
Pulse Input	Input impedance 1K ohm. Max. input voltage 12VDC (at 100% duty cycle). This input will drive internal shutter drive directly and bypass internal timer. Min. pulse width determined by shutter used. Max. pulse width determined by exposure desired.

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SPECIFICATIONS (cont.)

External Reset	Input impedance 1k ohm. Source current 500uA. Source Voltage 5VDC. Min. pulse to ensure reset 5ms. Max. voltage required to ensure reset .5VDC. (Remote reset **SD-10** by switching GND into EXT. RESET.)

Output Characteristics:

Pulse Output	Source impedance 470 ohms. Max. output voltage 3.5VDC. Rise time 10us. Fall time 15us. Duration determined by exposure setting.
Delay #1	Source impedance 1K ohms. Max. output voltage 4VDC. Provides a square or pulse output waveform, duration determined by DELAY INTERVAL control and selectable by PULSE/SQUARE toggle switch. PULSE produces 1ms pulse after completion of delay interval. SQUARE produces a falling edge at the completion of the exposure interval and a rising edge at the completion of the delay interval.
Delay #2	Source impedance 470 ohms. Max. output voltage 4VDC. Provides a square output waveform, duration determined by DELAY INTERVAL control plus exposure TIME SELECT interval. Produces a falling edge at the initiation of the exposure interval, and a rising edge at the conclusion of the delay interval.
Mechanical Sync.	Provides convenient output for shutters equipped with a mechanical "X" contact. When shutter is activated and achieves 90% aperture this output will be shorted to ground.

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SPECIFICATIONS (cont.)

Power Supply	+5VDC output provided for use in remote switching and to bias external circuits such as the optional electronic sync. contact.
General:	
Shutter On Indicator	LED indicates when shutter coil is activated.
Power Indicator	LED indicates when power is available.
Pulse Energy Select	Allows selection of additional pulse energy necessary when using the 262X shutter. Selected by 262/STAN. toggle switch.
Power Requirements	110/220VAC 60/50Hz. selected by printed circuit jumpers.
Fuse Requirements	3AG 1/4A Slow-Blow for 110VAC line. 3AG 1/2 Slow-Blow for shutter protection.
Size (HWD)	4.0 x 8.6 x 6.0 inches. (10.1 x 21.9 x 15.2 cm). Bail at rest position.
Weight	4.0 lbs. (1.8 kgs.)
Accessories	Six inch bail (tilt stand) included.

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OPERATOR CONTROLS
(Refer to Figure #1)

Please note that bail is at rest position and is not indicated in figure #1. Bail (tilt stand) is located on the underside of the unit and will hinge forward on front rubber feet. This will allow for easier viewing and selection of front panel controls. With stand fully extended all plugs and connectors will not interfere with bench top.

Please also note the position and layout of the rear panel banana jacks. Additional ground outlets have been provided to allow multiple connections to the rear panel at one time.

1. Tens Multiplier. Adjustment of this control will multiply selected position by timing range select (2). Please note that actual timing will be the sum of Tens multiplier (1) and Ones multiplier (11), multiplied by timing range select (2).

2. Timing Range Select. Allows selection of timing multiplier. 1ms range allows selection of 1ms to 99ms in 1ms steps. 10ms range allows selection of 10ms - 990ms in 10ms steps. 100ms range allows selection of 100ms - 9.9sec. in 100ms steps. 1 sec range allows selection of 1 sec - 99 sec in 1 sec steps.

3. ACTUATE Switch. Activation of this switch will activate internal timer. Subsequent activations have no effect until initial timing cycle is complete.

4. N.O./N.C. Switch. Controls normally open or normally closed position of shutter. Position of switch will indicate how shutter will be timed, open or closed. In the N.C. shutter will be timed in the open position. In the N.O. position the shutter will be timed in the closed position.

5. DELAY INTERVAL Vernier. Rotation of this control will adjust duration of delay interval which starts at the conclusion of the exposure pulse. Note, if in the continuous mode, rotation will continuously adjust the recycle interval (interval between exposures) from 8ms to 800ms.

6. Power Switch.

7. POWER Indicator.

8. PULSE/SQUARE Switch. Position of switch determines state of Delay #1 pulse output. PULSE selection delivers 1ms pulse at the conclusion of the delay interval, SQUARE selection delivers low level pulse for the duration of the delay interval. Delay #2 output is not affected.

9. OPEN Indicator. LED illuminates to indicate shutter coil is activated or N.O./N.C. switch is in the N.O. position.

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OPERATOR CONTROLS (cont.)
(Refer to Figure #1)

10. CONTinuous/NORMal Switch. Position of this switch determines single exposure operation (NORM position) or continuous exposure operation (CONT position). In the CONT position time between exposures is determined by Delay Interval vernier (5).

11. Ones Multiplier. See Tens Multiplier (1).

12. GrouND. Convenient ground point.

13. EXTernal RESET. This input will inhibit all functions of the unit when switched to ground by external low level logic or simply shorting to ground through a switch contact.

14. +5VDC Output. Supplies regulated +5VDC level for external switching or to bias external circuits which need +5VDC for operation.

15. GrouND. Convenient ground point.

16. PULSE Input/Output. This input will bypass internal timer and allow the user to access shutter driver only. High level logic or simply shorting to +5VDC will cause the shutter to open and remain open for the duration of the pulse or contact closure.

17. GrouND. Convenient ground point.

18. DELAY #2. This output will be high normally and go low at the start of the exposure interval. At the conclusion of the delay interval, (delay interval begins at the conclusion of the exposure interval) this output will return to the high state.

19. GrouND. Convenient ground point.

20. MECHanical SYNChronization. This output is provided for UNIBLITZ shutters equipped with mechanical "X" contact. This output will switch to ground when shutter is opened.

21. SHUTTER Output Jack. 4-pin female where shutter under control is connected. (A) Shutter Coil, (B) Shutter Coil, (C) Mech. Sync. Input (from shutter), and (D) Ground (Other Mech. Sync. switch connection from shutter.

22. Line Cord.

23. Product Information Label. Do Not Remove.

24. LINE FUSE. Replace with 1/4A Slow Blow fuse only.

25. SHUTTER FUSE. Replace with 1/2A Slow Blow fuse only for standard shutter operation.

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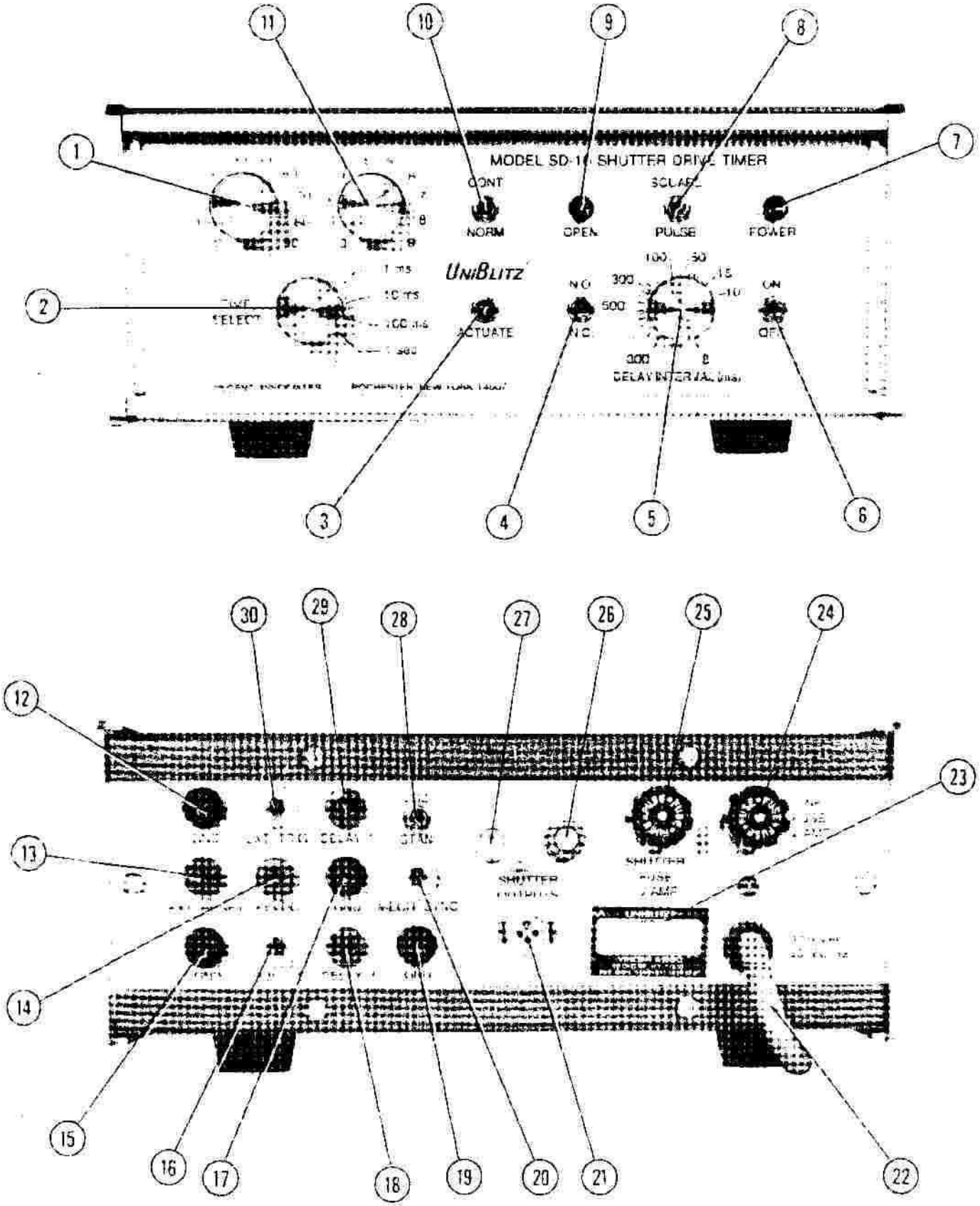


Figure 1 SD-10

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OPERATOR CONTROLS (cont.)
(Refer to Figure #1)

26. SHUTTER OUTPUT. Same connection as pin (B) on 4-pin (21).

27. SHUTTER OUTPUT. Same connection as pin (A) on 4-pin (21).

28. 262/STANdard Pulse Energy Switch. Switch allows built in selection of pulse energy for use with 262X shutter which requires additional pulse energy for its operation.

29. DELAY #1. This output will be determined by selection of PULSE/SQUARE switch (10) located on the front panel. See Output Characteristics for additional details.

30. EXTernal TRIGger. Input allows external control of timed exposure. A high level logic signal or switching +5VDC into this input will start exposure sequence.

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OPTIONAL ACCESSORIES

For special applications Vincent Associates provides the following accessories for use with your SD-10 Timer/Driver. If your SD-10 has been purchased as one of our SK shutter kits, all accessories necessary for system operation have been provided.

1. Rack Mount Handles - These can be provided to allow the user the capability to install the SD-10 into a racked system. When specifying this option please note the bail (tilt stand) will not be included. Note, this option must be factory installed. See figure #5 for mounting and dimensional information.

2. Cables - For applications where cables are needed the following are available for additional versatility and control of the SD-10.

   6-0011 Cable - 25 ft. cable 4-pin female one end, 4-pin male opposite end. For use as shutter interconnect or extension cable.

   6-0013 Cable - 10 ft. cable single pole double throw hand held switch on end, dual banana jack opposite end. For use as remote hand held trigger or reset.

   6-0020 Cable - 5ft. cable same as 6-0011.

   6-0030 Cable - 10ft. cable dual banana jack one end, dual banana jack opposite end. Used to interconnect signals from one control unit to another.

   6-0015 Cable - 5ft. cable 7-pin female one end 7-wire pigtail the other end. Used for shutter interconnect when shutter is equipped with electronic sync contact.

   6-0016 Cable - 25 ft. cable same as 6-0015.

   6-0091 Connector - 4-pin male connector with hood. Used for those who wish to assemble there own cables.

   6-0092 Connector - 4-pin female connector with hood. Use same as 6-0091.

Special cables are available upon request. Special control modifications may also be possible, however, please contact factory for feasibility and cost.

For proper UNIBLITZ shutter selection, consult the factory for your particular application. With the many apertures and accessories available, also consult our full line catalog for additional details.

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OPERATING INSTRUCTIONS

After unpacking unit inspect for any defects. If upon inspection a problem is found, or a part (or parts) are missing, notify Vincent Associates immediately.

After initial inspection, the unit is ready for use. Please read the following operating instructions thoroughly before attempting to operate the unit. Improper input/output connections to the unit may cause irreparable damage. Follow instructions carefully.

INITIAL OPERATION AND TESTING

Once line cord has been connected to properly grounded wall receptacle, unit may now be operated. *Be sure power switch is in the OFF position before connecting plug to line.*

Insert four pin male connector of shutter cable into four pin receptacle at rear of unit labeled SHUTTER OUTPUTS. Note yellow and blue binding posts at this position also, the yellow post is the same connection as the four pin connector pin (A) and the blue post pin (B). These posts are provided for shutter cables not equipped with a four pin male connector such as the 6-0021 cable and for applications where four pin connectors are not available. (See Operators Controls.)

Now place POWER switch to the ON position, POWER LED will illuminate. Place the N.O./N.C. switch into the N.O. position. The shutter will open and remain open until the switch is returned to the to N.C. position. At this time unit is ready for internally timed operation.

Set the TIME SELECT to a desired exposure time. This can be achieved by adjusting the multiplier and the range rotary switches. Once an exposure time has been selected and a UNIBLITZ shutter has been properly connected to the output (as noted above) depress ACTIVATE switch. Shutter will open for the timed period.

Caution

Should the shutter and/or control not respond as described previously, be sure line cord is installed into the receptacle and connections to the shutter are made properly. If using yellow and blue binding posts with pigtail wires be sure red and black wires are used and are connected tightly. Care should be taken to ensure that insulation of the wire does not get trapped between binding post, this can cause an inadequate connection. Note that the shutter output is fused, check for blown fuse. Also, particular shutter units respond to different minimum pulse widths. (For example a 225L shutter has a minimum exposure response of 5ms, if the timer is set for a pulse width less than 5ms the shutter will respond by not opening fully.) If unit still does not operate properly please notify Vincent Associates immediately.

OPERATING MODES

Internally Timed Mode

The start up procedure outlined previously is known as the INTERNALLY TIMED MODE of operation and is the standard operating

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Internally Timed Mode (cont.)

mode of the SD-10. In most applications the internal timer will be used to control shutter operation. However the shutter timer can be made to control the shutter in one of two states: Normally Open and Normally Closed. In the Normally Closed mode (here on in to be N.C.) the shutter will be closed and open for the timed period. In the Normally Open mode (here on in to be N.O.) the shutter will be open and close for the timed period. These states as described above can be selected with the N.O./N.C. switch located on the front panel. Regardless of the position of this switch, the timer operation will not be effected.

In this mode the unit may be triggered from the front panel as described in INITIAL OPERATING AND TESTING, however it may become necessary to control the triggering (and/or resetting) of the SD-10 from an external source or remote location. (Please note that resetting of the timed sequence can only be accomplished from some external source.) By connecting control jacks on the rear of the unit through switch contacts and/or supplying external signals, the SD-10 can be made more versatile.

By connecting the EXT. TRIG. input to the +5VDC output through a remote switch contact, remote triggering can be accomplished. This can be done by the use of a 6-0013 cable and connecting the dual banana jack of the 6-0013 as described. See figure #2A. Another method of triggering allows the SD-10 to be interfaced with another electrical device. By connecting a transistor as above (observe polarity) the unit will also trigger remotely. See figure #2A. The third method of external triggering can be initiated by placing a positive going signal to the EXT. TRIG input with respect to ground. This method of triggering can be usefull when interfacing the SD-10 with a computer (single bit from a parallel output port) or signal generator. See figure #2A. Any of the above triggering methods can be used to initiate the timing sequence as selected from the front panel controls.

To review the SD-10 internal timer can be triggered by the following methods: (See figure #2A.)

1. Mechanical switch contact connecting the EXT. TRIG. input to the +5VDC output. (6-0013 cable may be used.)
2. Transistor switch contact connecting the EXT. TRIG. input to the +5VDC output, polarity must be observed and NPN type transistor recommended.
3. Positive going signal (pulse) from external source to EXT. TRIG. with respect to ground (GND banana jack). Minimum duration of signal to ensure triggering is 10us. See EXT. TRIG. Input Specifications.

Once the timing of the SD-10 is initiated by whatever means, the timing sequence can be reset by similar means as described previously. For remote cable resetting connect the EXT. RESET banana jack to any GND jack through a switch contact closure. See figure #2B. A 6-0013 cable can also be used for this application. Upon this closure the timing sequence will be interrupted and the shutter will return to its original state. All additional internal systems will also be reset. The SD-10 can also be reset by

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Internally Timed Mode (cont.)

connecting a transistor from the EXT. RESET jack to any GND jack (note polarity). Resetting will occur as described and this will allow the reset to be connected to some external electrical device or instrumentation. See figure #2B. The third method of resetting is to apply a low (negative) pulse to the EXT. RESET with respect to ground (GND jack). Resetting will occur as described and a minimum pulse width of 5ms will be necessary to ensure the unit will reset. See specifications regarding the current sinking from the EXT. RESET to ensure that the device used to reset the SD-10 unit is rated to withstand this current.

To Review to SD-10 can be reset by one of the following methods: (See figure #2B.)

1. Mechanical switch contact connecting the EXT. RESET input to ground (GND). (6-0013 cable may be used.)
2. Transistor switch contact connecting the EXT. RESET input to ground (GND), polarity must be observed and NPN type transistor recommended.
3. Negative going signal (pulse) from external source to EXT. RESET with respect to ground (GND banana jack). Minimum duration of signal to ensure resetting is 5ms. Note current sink conditions as described in the system specifications.

The INTERNALLY TIMED MODE of operation begins its sequence of operation from the front panel ACTUATE switch or from a trigger supplied from a source described previously. See figure #3A. The rising edge of the trigger signal activates the exposure timer opening the shutter (or closing it depending on the position of the N.O./N.C. switch) for the exposure interval. This interval also appears at the PULSE I/O as a positive going pulse of equal duration. The exposure interval is set by adjustment of the TIME SELECT controls. See Operator Controls.

At the conclusion of the exposure interval the delay interval is triggered and continues for the duration set by the front panel DELAY INTERVAL control. The delay intervals are divided into two separate delay outputs DELAY #1 and DELAY #2. Delay #1 is further divided into separate output signal types and selected by the PULSE/SQUARE switch located on the front panel. If PULSE is selected, the output of DELAY #1 will be a 1ms pulse at the conclusion of the delay interval. If SQUARE is selected, the output of DELAY #1 will be a negative going signal falling low at the conclusion of the exposure interval and rising at the conclusion of the delay interval. Delay #2 will contain the same type of output as Delay #1 in the SQUARE mode, except the falling edge will change state at the beginning of the exposure interval. Note that in the Internally Timed Mode, the unit can be retriggered before the conclusion of the delay interval.

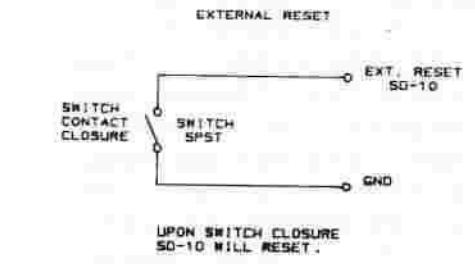
If the shutter used is equipped with a mechanical sync contact, the MECH SYNC OUT will be shorted to ground when the shutter achieves 90% aperture and will open when the shutter closes 10% aperture. See figure #2C. For full description see Mechanical Sync. Output under Miscellaneous.

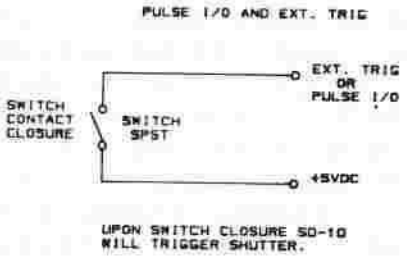
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Internally Timed Mode (cont.)

If a reset pulse occurs during an exposure sequence as shown in figure #3A, the exposure timer will be reset, the shutter will return to its original state (state before timer was initiated, can be N.O. or N.C.), all delays will return to their original state and the mechanical sync will open (if shutter is equipped). Note that a trigger pulse after a reset pulse will retrigger unit. If the reset is held low, the unit will be disabled even from front panel ACTUATE switch until the reset input is allowed to return to the high state, after which the unit will operate as described.

Control Diagrams





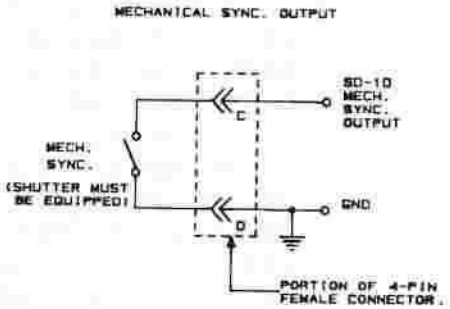
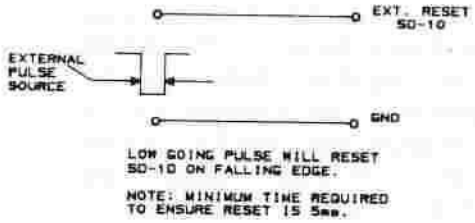
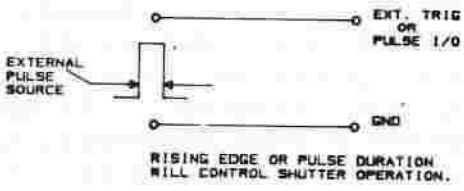


FIGURE #2C





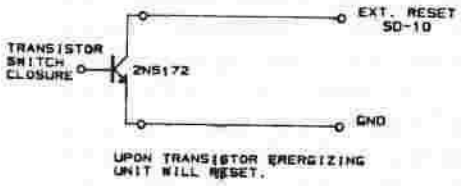


FIGURE #2A

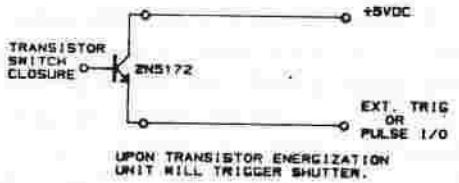


FIGURE #2B

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Continuous Mode

This mode can be selected by the NORM/CONT switch located on the front panel. With the switch in the NORM (normal) position the unit will operate as described in the Internally Timed Mode section. If the switched is placed in the CONT (continuous) position upon actuation the unit will complete an exposure and continue to expose at a frequency determined by the sum of the settings on the Time Select and the Delay Interval controls. This mode of operation will allow the SD-10 to operate the shutter as a low level chopper or for use of the unit as a pulse generator.

Figure #3B shows the timing diagram in this mode. The frequency of the shutter exposures is determined by the adjustment of the DELAY INTERVAL control and can be varied continuously over the entire Delay Interval range. [In the continuous mode overlap (between exposure and delay) will not occur, because the retrigger signal is not generated until the exposure is complete. Therefore no matter how long the exposure time is, the delay interval will start from the conclusion of the exposure interval.]

As shown in figure #3B the unit is retriggered by applying the delay #1 signal to the trigger input. (This is done internally and the trigger point will not be altered by the position of the PULSE/SQUARE select switch, only output type as described previously.) Also in this mode the DELAY #2 signal is disabled (remains in the low state after the initial trigger signal) because DELAY #2 will only change to the high state if there is a time difference between the trigger signal and the pulse delay output. (As seen in figure #3A.) Since the trigger and the pulse delay output occur at the same time in this mode, DELAY #2 will remain low until the unit is reset. Once a reset is encountered, DELAY #2 will change back to the high state. Resetting in the CONT mode can be accomplished in two methods: Method #1 - setting the CONT/NORM switch back to the NORM position, (not shown in figure #3B) will interrupt the last exposure interval. If the switch is returned to the NORM position during a long exposure, the exposure will time out and the unit will reset. Method #2 - the driver may also be reset by applying a reset signal as described in the Internally Timed Mode to the RESET input. Upon a reset signal the shutter will return to its original position and all internal delays will return to there original states. Please note that in this mode, as in the Internally Timed Mode, the Mechanical Sync Output will operate as described, if the shutter being used is so equipped. Method #2 can also be modified as method #1 so as not to disrupt the last exposure interval. This can be accomplished by monitoring the PULSE I/O counting the number of exposures desired and providing the reset pulse at the conclusion of last exposure interval. This application can only be initiated by some external control provided by the user. Contact factory for additional information.

Externally Timed Mode

In some applications it may become necessary to control the exposure interval of the shutter from some external source. May-

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Externally Timed Mode (cont.)

be the exposure interval you desire is not available with the internal timer or it is necessary to control the state of the shutter externally (N.O. or N.C.). When the unit is triggered externally, the exposure interval is measured by the duration of a high logic level to the PULSE I/O input. As described in the Internally timed Mode of operation, the PULSE I/O can be triggered by any method shown in figure #2B.

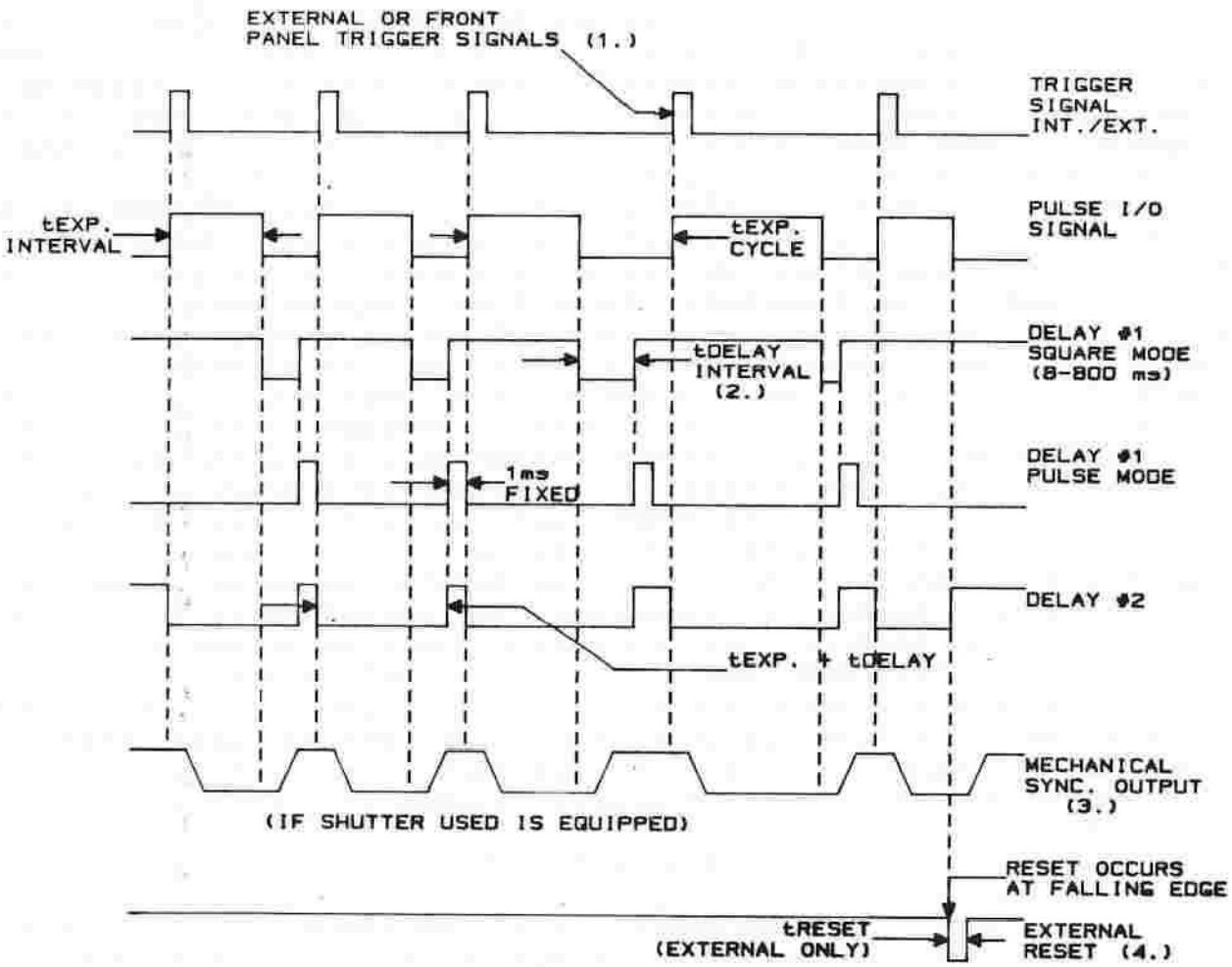
In this mode the shutter will follow an input present on the PULSE I/O input and the internal timer as previously described will be disabled. However all delays and the mech sync output will operate as described in the Internally Timed Mode, this is shown in figure #3C. There are only two exceptions, first, the reset input has no effect on the exposure interval, that is, if a reset signal is applied to the RESET input while an input exists to the PULSE I/O, the shutter state will not be effected. (Remember that in this mode of operation you can still select either active shutter state N.O. or N.C.) However, the delays (if activated by a previous exposure) will be reset. And if the RESET input is held to the low state, the delays will be disabled. This may be another reason to want to use this mode, so that on command the delays can be disabled for a pre-determined number of exposures. The second exception is that this input can also trigger the continuous mode of operation. By placing the NORM/CONT switch in the CONT position, at the conclusion of the initial input to the PULSE I/O, the timer will be retriggered at the conclusion of the delay interval and operate as described in the Continuous Mode. The mechanical sync will operate as described previously and always follows the operation of the shutter.

MISCELLANEOUS

The repeat exposure specification as listed in this manual is listed at 10ms. This is an optimum value to ensure enough pulse energy to open any Uniblitz or Microblitz shutter. However the SD-10 is capable of operating each Vincent shutter to its maximum frequency with a slight sacrifice in shutter opening speed. This is due to the drive circuit which allows the pulse voltage to drop with an increase in frequency to compensate for the heat that is developed in the shutter coil. (See graphs figure #4) Please contact the factory for specific information concerning shutter modifications and/or drive modifications that may be necessary for operating shutters at there maximum frequency. Please note also that fuse blowing problems, specifically shutter fuses, can be due to high frequency operation without proper fuse selection. Due to the large number of different frequencies and duty cycles that the shutter is used with, please contact the factory for further details regarding specific fuse selection.

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System Timing Diagrams



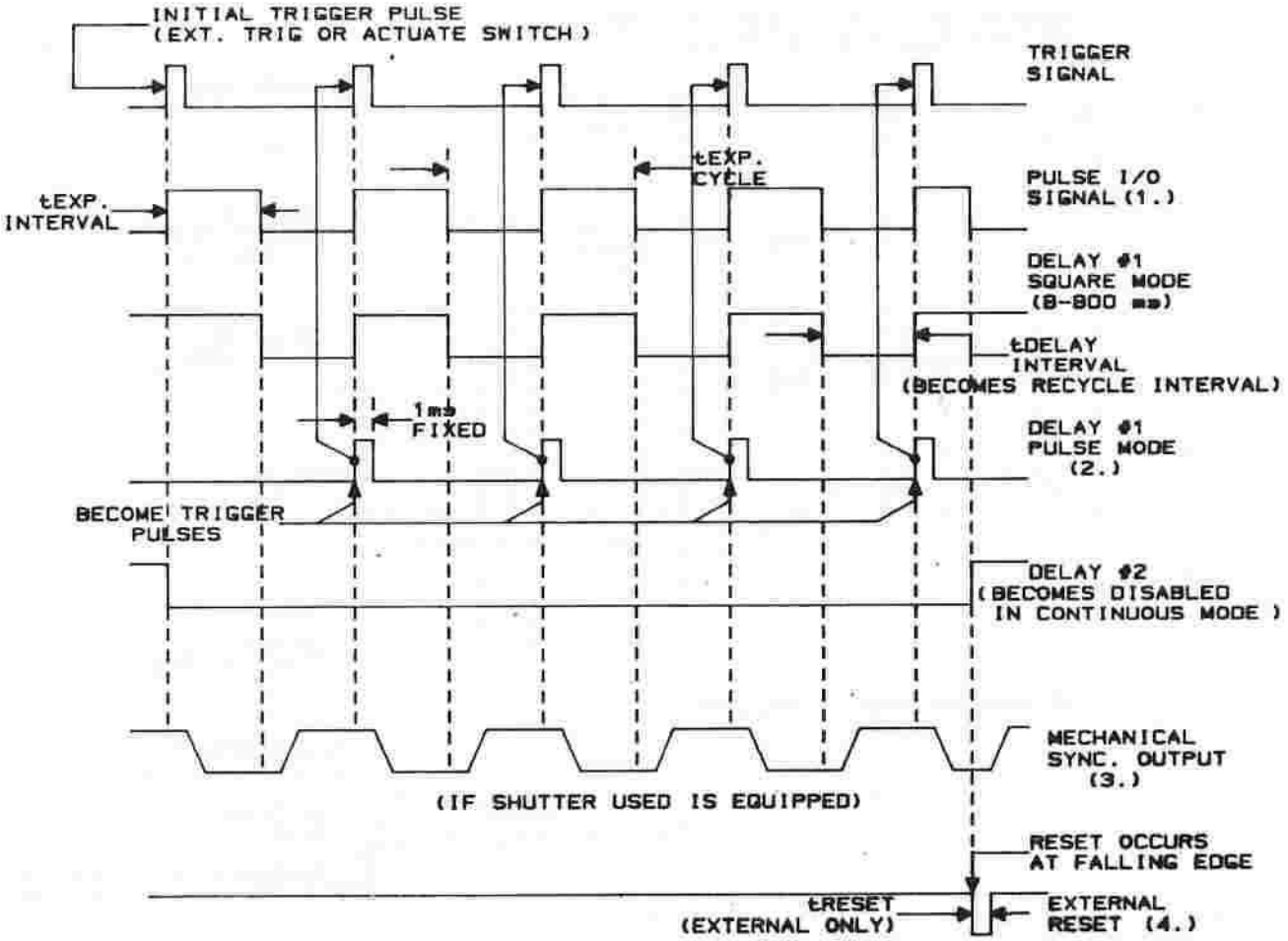
NOTES:

1. TRIGGER CAN OCCUR AT INDETERMINATE INTERVALS. PULSE WIDTH CAN BE MODIFIED BETWEEN TRIGGER SIGNALS.
2. DELAY CAN VARY MANUALLY AS SHOWN. DELAY CAN OVERLAP (NOT SHOWN).
3. MECHANICAL SYNC. CONTACT DURATION VARIES WITH tEXP. AS SHOWN. CONTACT CLOSES AT 90% OPEN, AND CONTACT OPENS AT 10% CLOSURE.
4. TRIGGER PULSES THAT OCCUR AFTER RESET PULSES WILL RETRIGGER UNIT. IF RESET IS HELD LOW, THE UNIT WILL BE DISABLED EVEN FROM FRONT PANEL ACTUATE SWITCH UNTIL RESET IS ALLOWED TO GO HIGH.

FIGURE #3A INTERNALLY TIMED MODE

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System Timing Diagrams (cont.)



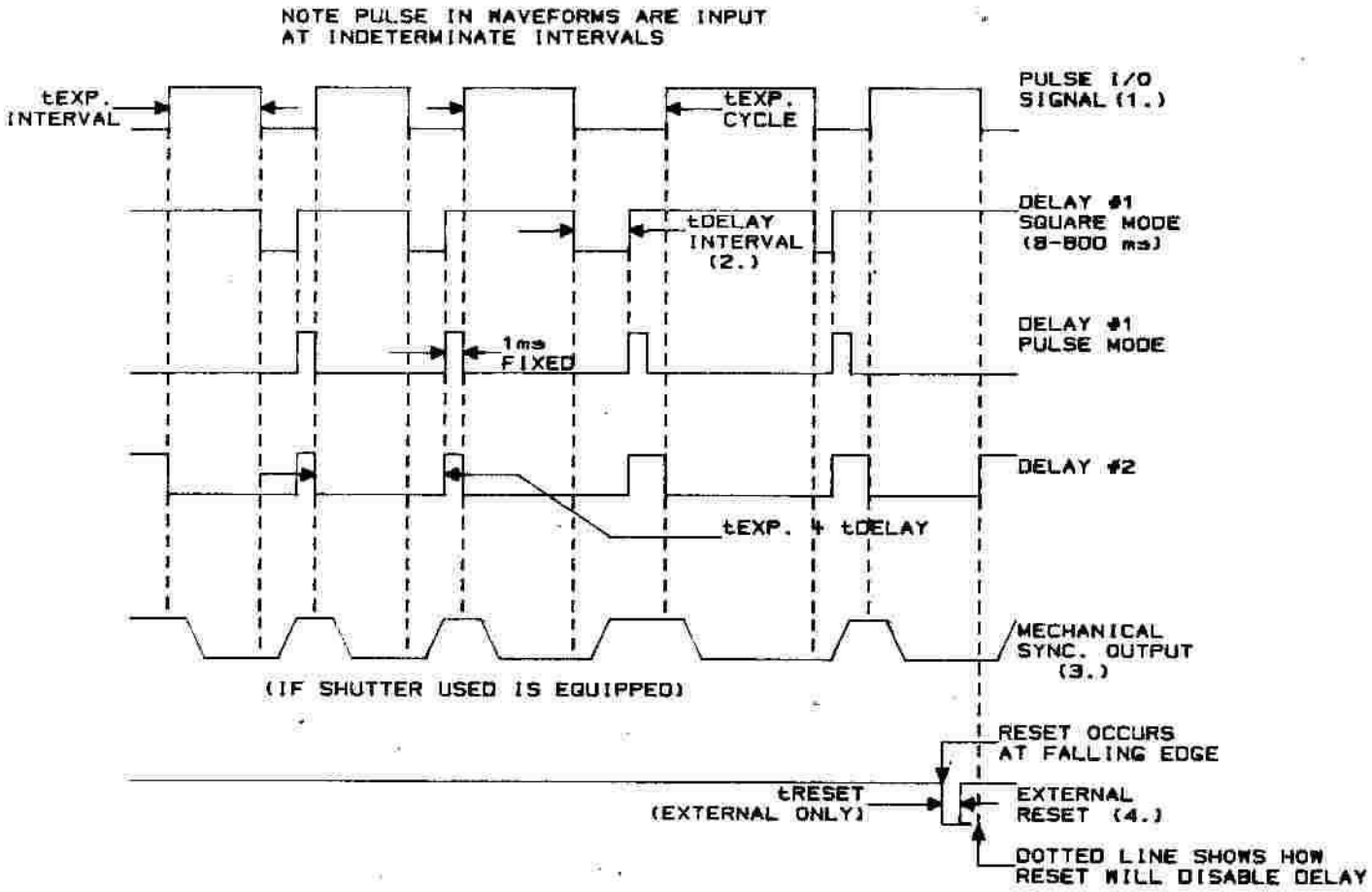
NOTES:

1. THIS SIGNAL PRESENT AT PULSE I/O AND USED TO OPERATE SHUTTER DRIVE.
2. IN CONT MODE DELAY PULSE IS ROUTED TO TRIG INPUT TO ALLOW CONTINUOUS OPERATION.
3. MECHANICAL SYNC. CONTACT DURATION VARIES WITH tEXP. AS SHOWN. CONTACT CLOSES AT 90% OPEN, AND CONTACT OPENS AT 10% CLOSURE.
4. UNIT CAN ALSO BE RESET BY MOVING CONT/NORM SWITCH TO NORM POSITION.

FIGURE 38 CONTINUOUS MODE

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System Timing Diagrams (cont.)



NOTES:

1. THIS WAVEFORM SHOWES EXTERNAL SIGNAL TYPE APPLIED TO PULSE I/O AS AN INPUT. INTERNAL TIMER IS NOT ACTIVATED. SIGNAL PULSE WIDTH DETERMINES EXPOSURE INTERVAL.

2. DELAY CAN VARY MANUALLY AS SHOWN. DELAY CAN OVERLAP (NOT SHOWN).

3. MECHANICAL SYNC. CONTACT DURATION VARIES WITH tEXP. AS SHOWN. CONTACT CLOSES AT 90% OPEN, AND CONTACT OPENS AT 10% CLOSURE.

4. IN THIS MODE THE RESET PULSE WILL ONLY RESET THE DELAY INTERVAL AND ONLY IF THE RESET PULSE IS SEEN AFTER THE DELAY INTERVAL HAS STARTED. AS SHOWN, THE RESET PULSE HAS NO EFFECT. IF THE RESET PULSE GOES LOW AND REMAINS LOW DURING AN EXPOSURE TRANSITION (FROM HIGH TO LOW) THE DELAY OUTPUT WILL BE DISABLED.

5. IF THE CONT/NORM SWITCH IS PLACED TO THE CONT POSITION WHEN USING THIS MODE, THE UNIT WILL BEGIN TO OPERATE AS TO THE CONTINUOUS MODE (FIGURE #3B) AFTER THE FIRST EXPOSURE INTERVAL IS INPUT.

FIGURE #3C EXTERNALLY TIMED MODE (TIMER BYPASS)

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Mechanical Sync Output

The mechanical sync. switch (if included with shutter) is mounted to the shutter mechanism. It consists of a single pole single throw switch. See figure #2C. When the shutter opens, the Mech. Sync. switch contacts make (the contacts will close) shorting pin (C) of the 4-pin connector to pin (D). Pin (C) is internally connected to the yellow banana jack labeled MECH. SYNC. and pin (D) is connected to GND. Therefore whatever signal is connected to the MECH. SYNC. output will be shorted to ground when the shutter achieves 90% aperture. This can be useful for triggering a flash or additional instrumentation for your particular application.

Cable Layout

The following is the layout of the cable (used with the **SD-10**) and 4-pin output female jack (located on the rear panel).

Cables 6-0011, 6-0020, 6-0021 can be used with the **SD-10** and have the following layout with the exception of the 6-0021 which will connect to the yellow and blue binding posts.

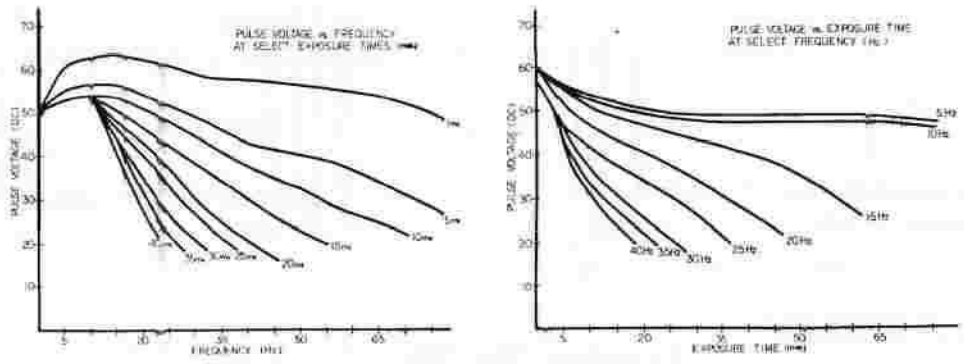
PIN #	FUNCTION	WIRE COLOR
A	Shutter Coil	RED
B	Shutter Coil	BLACK
C	Mechanical Sync*	WHITE
D	Ground	GREEN

*The MECH. SYNC. output will only function if the shutter used with the **SD-10** is equipped with a mechanical synchronization (sync.) contact.

Trigger Cautions

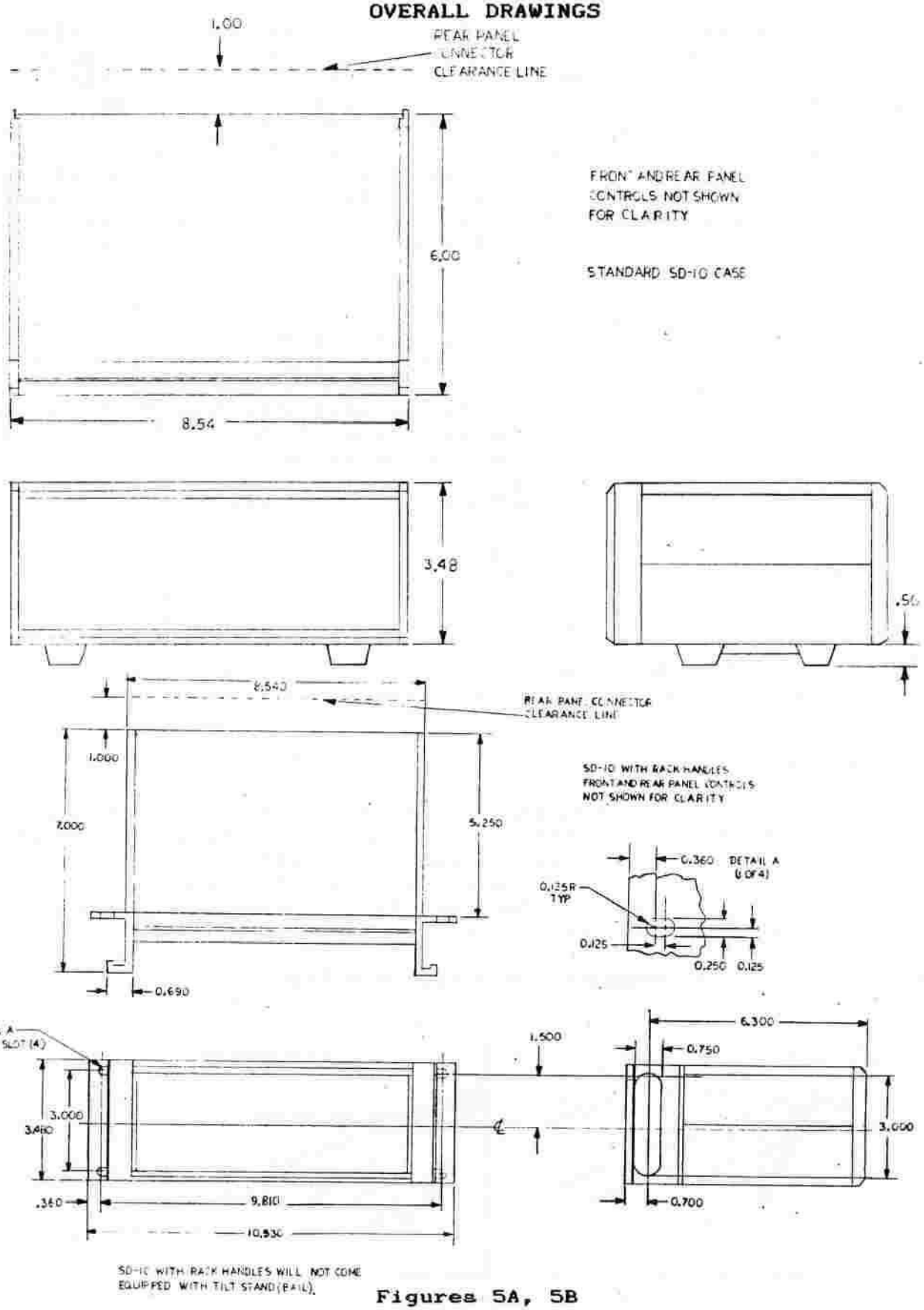
The system's capability can be greatly enhanced by external control as described previously, however, extreme care must be taken to ensure that high voltages (see Specifications) are not inadvertently switched into external control inputs. Also note that large negative voltages can cause irreparable damage to the unit's internal circuitry. Exercise extreme caution.

Pulse Voltage vs. Frequency and Exposure Time



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OVERALL DRAWINGS



Figures 5A, 5B

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MAINTENANCE

Although the stability of the timing and drive voltage is assured and calibrated prior to shipment, it may become necessary to make some minor adjustments to the operating systems of the SD-10 over time.

It is highly recommended that if you suspect a problem with your unit that it be returned to the factory for proper adjustments and calibration. The unit's complicated circuitry will be damaged and/or not function as specified if inadvertently adjusted improperly.

Proper care and maintenance of the unit should be taken as with any electronic instrument.

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NOTES

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SHUTTER DRIVER & TIMING UNIT MODEL SD 10

FEATURES

396 preset exposure time settings
High SPEED REPEAT EXPOSURES (continuously variable from DC-40/Sec.)
1 ms resolution of exposure time.
External pulse or push button triggering.
External pulse width determined exposure time.
Pulse out after delay (delay interval).
Delay function offers square wave or 1 ms pre-set pulse out.
Continuous or single exposure operation.
Normally open or normally closed shutter operation.
Selectable pulse energy switch to allow Model 262 operation.
Convenient output for mechanical sync.
Aluminum enclosure w/tilt stand.



APPLICATIONS

The **UNIBLITZ SD-10** is a new medium cost shutter control capable of timing exposures for the full line of **UNIBLITZ** ELECTRO-PROGRAMABLE Shutters. The unit features 396 preset timing ranges with 1ms resolution allowing the user a wide selection of exposure combinations.

A new feature unique to the **SD-10** is a delayed pulse out after a completed exposure in the form of either a square wave (square mode) or 1ms preset pulse (pulse mode). In the square mode there are two available outputs, Delay #1 and Delay #2. Delay #1 remains high and falls low (for a time selected by the DELAY INTERVAL control) at the conclusion of the exposure interval selected. DELAY #2 differs from the latter by falling low at the begining of the exposure interval selected and will stay low until the end of the delay interval (the delay interval is measured from the conclusion of the exposure interval). This allows the user a combination of outputs for controlling additional shutters, special external equipment or sequential events. When in the pulse mode, Delay #2 remains as above, Delay #1 will now produce a 1ms preset square wave pulse at the conclusion of the delay interval. This allows the user to trigger an external event, or additional **SD-10** TIMER/DRIVERS.

Exposure timing from 1ms to 99 sec. is standard with the **SD-10**. Five percent accuracy makes the unit suitable for exacting control applications.

Another unique feature of the **SD-10** is the normal/continuous mode. When in the normal mode, single exposures can be made via front panel controls or from an external trigger input. In the continuous mode, the unit will continuously retrigger on an interval selected by the DELAY INTERVAL control. This can be useful when operating **UNIBLITZ** shutters in a low level chopping or multiple exposure applications. The unit can also double as a limited range pulse generator. Resetting in the continuous mode can be achived by returning the CONT/NORM switch to the NORM position or providing a low level signal to the RESET input.

Additional outputs are available for shutters equipped with the mechanical synchronization contact. A pulse output is also available providing a positive going pulse with the same duration as selected via the front panel controls. This pulse can be used for controlling additional shutters for multiple switching applications.

Other features include normally open/normally closed shutter operation, selectable pulse energy switch (for operating our 262 shutter), a five volt power supply for remote triggering and providing bias for our electronic synchronization contact, shutter open, and power indicators for your convenience. The unit includes an adjustable tilt stand for convenient user operation and adjustment of front panel controls. Rack mount handles are available on special request.

SPECIFICATIONS

SYSTEM CHARACTERISTICS

EXPOSURE INTERVAL: 1ms-99sec. in four decade ranges variable within each decade with dual 10 position rotary switches. **DELAY INTERVAL:** 8ms-800ms in a single range continuously variable with logrithmic vernier. **REPEAT EXPOSURE:** Single exposure or continuous, selectable with dual position toggle switch. **SHUTTER DRIVE:** Continuously variable frequency of exposure from DC to 40 cps. Max. peak pulse power 300W. Max. peak pulse voltage 50VDC. Max. peak pulse current 5A. Min. hold voltage 5VDC. Min. time between exposures 10ms. (These ratings measured into standard 5V coil (12 ohm impedance) with 20ms exposure interval at a recycle interval of 5cps). **ACCURACY:** Exposures +−5%on all ranges (RC time base). Delay +−20% on scale throughout range (RC time base).

INPUT CHARACTERISTICS

EXTERNAL TRIGGER: Input impedance 10K ohms. Max. input voltage 20VDC (at 100% duty cycle). Min. input voltage 3.5VDC. Min. pulse width required to ensure triggering 10us. (Remote trigger SD-10 by switching +5V into EXT. TRIG.). **PULSE IN:** Input impedance 1K ohm. Max. input voltage 12VDC (at 100% duty cycle). This input will drive internal shutter drive directly and bypass timer circuitry. Min. pulse width determined by shutter used. Max. pulse width determined by exposure time desired. **EXTERNAL RESET:** Input impedance 1K ohm. Source current 500 uA. Source voltage 5VDC. Min. pulse width to ensure reset 1ms. Min. voltage required to ensure reset .5VDC. (Remote reset SD-10 by switching GND into EXT. RESET.

OUTPUT CHARACTERISTICS

PULSE OUT: Source impedance 470 ohms. Max. output voltage 3.5 VDC. Rise time 10usec. Fall time 15usec. **DELAY#1:** Source impedance 1K ohm. Max. output voltage 4VDC. Provides a square or pulse output waveform, duration determined by DELAY INTERVAL control and selectable by PULSE/SQUARE toggle switch. Pulse produces 1ms pulse after completion of delay interval. Square produces falling edge at the completion of exposure interval and rising edge at the completion of the delay interval. **DELAY#2:** Source impedance 10K ohms. Max. output voltage 4VDC. Provides a square output waveform, duration determined by DELAY INTERVAL plus exposure TIME SELECT interval. Produces a falling edge at initiation of exposure pulse, and a rising edge at the completion of the delay interval. **SHUTTER DRIVE:** 50VDC. discharge from stored capacitor into shutter coil dropping to 5VDC Min. to hold the shutter in the open position for the remainder of the exposure interval. **MECH. SYNC. OUT:** Provides convenient output for shutters equipped with the mechanical synchronization (X) contact. When shutter is activated MECH. SYNC. OUT is shorted to ground. **POWER SUPPLY:** +5VDC available for use in remote switching and electronic sync biasing.

OPERATING MODES

NORMALLY CLOSED: Standard SD-10 operating mode. Activation of timer will cause shutter to open for timed interval and close until next actuation occurs. Selected by N.O./N.C. switch in N.C. position. ALL additional features will operate as stated.
NORMALLY OPEN: Actuation of timer will cause shutter to close for timed interval and open until next actuation occurs. Selected by N.O./N.C. switch in N.O. position. All additional features will operate as stated except the MECH. SYNC. OUT will operated inveresly. **TIMER BYPASS:** Allows external pulse width (into PUL. I/O) to drive internal shutter drive system without activation of timer. Shutter will remain open for the duration of the input pulse presented to this input. **NORMAL/CONTINUOUS:** Allows shutter to be continuously retriggered until reset. Unit can be reset via front panel controls or low going signal to reset input. Mode selected by NORM./CONT. toggle switch.

GENERAL

SHUTTER ON INDICATOR: LED indicates when shutter coil is energized. **POWER INDICATOR:** LED indicates when power is on. **PULSE ENERGY SELECT:** Allows additional pulse energy for the 262 shutter. Selection made by 262/STAN. toggle switch. **POWER REQUIREMENTS:** 110/220VAC 50-60Hz. Selectable by printed circuit jumpers. **FUSE REQUIREMENTS:** 3AG 1/4A SLOW-BLOW for line; 3AG 1/2A SLOW-BLOW for shutter protection. **SIZE (HWD):** 4.0 x 8.6 x 6.0 inches (10.1 x 21.9 x 15.2 cm) Bail at rest position. **WEIGHT: 3(lbs). (1.4) kg. SHIPPING WEIGHT:** 4(lbs), (1.8)kg. **ACCESSORIES:** 6 inch Bail (tilt stand) included.

WARRANTY

Great care has been taken to ensure that our products are free form defect when shipped. Defective units will be replaced or repaired at no charge, excepting transportation charges, if returned within 90 days from the date of shipment.
Vincent Associates will consider the return of unused equipment if returned within 30 days from the date of shipment subject to a 20% restocking charge. This offer does not apply to used or damaged equipment.

PURCHASING TERMS AND DISCOUNTS

Terms 1/2% - 10 days, net - 30 days. Invoiced and payable in U.S. Dollars. F.O.B. - Rochester, New York. Quantity OEM discounts will be offered at the time of purchase. Due to our ongoing product development program, Vincent Associates reserves the right to discontinue or change specifications or designs of any products at any time, without incurring any obligations.

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