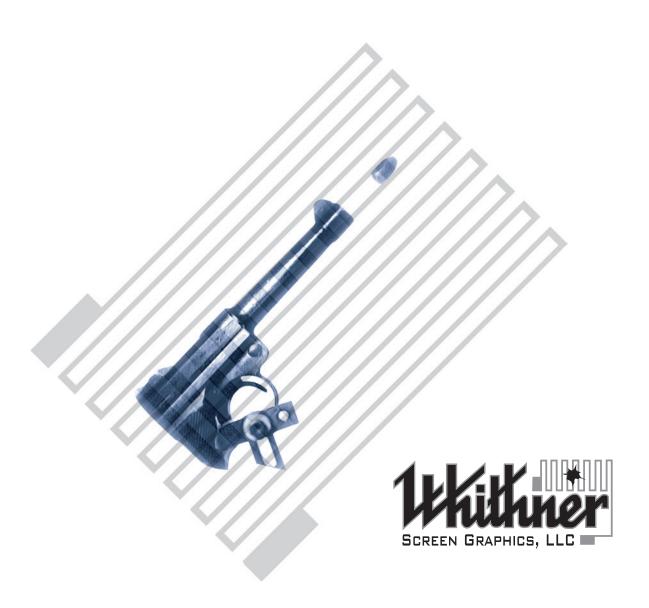


TRIGGERING SCREENS FOR BALLISTIC RESEARCH AND RELATED INDUSTRIES

www.whithner.com

BREAK SCREENS



TRIGGERING "BREAK" SCREENS

Whithner is capable of developing and producing all custom sizes & shapes of circuitry patterns to satisfy any requirement. Below is a list of popular items currently in production.

<u>ITEM</u>	PART NUMBER	<u>LINE</u>	<u>SPACE</u>	<u>CIRCUITRY</u> X" x Y"	<u>CARRIER</u> X" x Y" x Z"	<u>MATERIAL</u>
BS01	0303900350	1/32"	1/32"	3.5" x 9"	4.5" x 10" x .0045"	Paper 60 lb.
BS02	0303375D00	1/32"	1/32"	3.75" Dia.	4" x 7" x .0045"	Paper 60 lb.
BS03	0303400400	1/32"	1/32"	4" x 4"	5" x 4.875" x .0045"	Paper 60 lb.
BS04	03036D0000	1/32"	1/32"	6" Dia.	6.375" x 9.5" x .0045"	Paper 60 lb.
BS05-H	0303600600H	1/32"	1/32"	6" x 6"	7.5" x 8.5" x .0045"	Paper 60 lb.
BS05-V	0303600600V	1/32"	1/32"	6" x 6"	8.5" x 7.5" x .0045"	Paper 60 lb.
BS06	0303800800	1/32"	1/32"	8" x 8"	9" x 8.875" x .0045"	Paper 60 lb.
BS06-VP	0303800800VP	1/32"	1/32"	8" x 8"	9" x 10.5" x .0045"	Paper 60 lb.
BS07	0303120120	1/32"	1/32"	12" x 12"	13.25" x 13" x .0045"	Paper 60 lb.
BS07-BCD	0303300400	1/32"	1/32"	3" x 4"	3.5" x 8" x .0045"	Paper 60 lb.
BS08	0606350887	1/16"	1/16"	3.5" x 8.875"	4.75" x 10" x .0045"	Paper 60 lb.
BS09	0606400400	1/16"	1/16"	4" x 4"	5" x 4.875" x .0045"	Paper 60 lb.
BS09-CF	0606400400CF	1/16"	1/16"	4" x 4"	5" x 4.875" x .0045"	Conformable Decal
BS10	0606120120	1/16"	1/16"	12" x 12"	13.25" x 13" x .0045"	Paper 60 lb.
BS11	1250111075	1/8"	1/2"	11" x 10.75"	12.25" x 12" x .0045"	Paper 60 lb.
BS12	1250231075	1/8"	1/2"	23" x 10.75"	24.25" x 12" x .0045"	Paper 60 lb.
BS13	1250222212	1/8"	1/2"	22" x 22.125"	24" x 24" x .0045"	Paper 60 lb.
BS13-PB1X	1250222212PB1X	1/8"	1/2"	22" x 22.125"	26" x 30" x .050"	Poster Board 50 pt.
BS14	1225110110	1/8"	1/4"	11" x 11"	12.25" x 12" x .0045"	Paper 60 lb.
BS15	1225120125	1/8"	1/4"	12" x 12.5"	13.25" x 13.5" x .0045"	Paper 60 lb.
BS16	5020022023	1/2"	2"	22" x 23"	24" x 25" x .0045"	Paper 60 lb.
BS17	0606600600	1/16"	1/16"	6" x 6"	7.25" x 7" x .0045"	Paper 60 lb.
BS18	0303100100	1/32"	1/32"	10" x 10"	11.25" x 11" x .0045"	Paper 60 lb.
BS19	0606100100	1/16"	1/16"	10" x 10"	11.25" x 11" x .0045"	Paper 60 lb.
BS20	0606800800	1/16"	1/16"	8" x 8"	9" x 8.875" x .0045"	Paper 60 lb.
BS21	0606400120	1/16"	1/16"	4" x 12"	5.5" x 13.25" x .0045"	Paper 60 lb.
BS23	1212220220CF	1/8"	1/8"	22" x 22"	27" x 38" x .0045"	Conformable Decal
BS24	03031D0000CF	1/32"	1/32"	1" Dia.	2" x 2" x .0045"	Conformable Decal
BS25	0303900350CF	1/32"	1/32"	9" x 3.50"	4.5" x 10" x .0045"	Conformable Decal
BS26	0606240120	1/16"	1/16"	24" x 12"	14" x 26" x .0045"	Paper 60 lb.
BS27	062312NDBOSM	1.5mm	6mm	12" Dia.	15" x 15" x .008"	Submersible Film
BS28	06252424BOSM	1/16"	1/4"	24" x 24"	27" x 30" x .008"	Submersible Film
BS29	0816663DBOSM	2mm	4mm	6.63" Dia.	11"Dia w/Holes .008"	Submersible Film
BS30	1225240360	1/8"	1/4"	24" x 36"	25" x 38" x .0045"	Paper 60 lb.

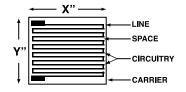
Inquire about available sample screens.

Parts list continues on next page-

TRIGGERING "BREAK" SCREENS

-Parts List Continued

-Parts	-Parts List Continued							
<u>ITEM</u>	<u>PART NUMBER</u>	<u>LINE</u>	<u>SPACE</u>	CIRCUITRY X" x Y"	<u>CARRIER</u> X" x Y" x Z"	<u>MATERIAL</u>		
BS31	2525400850	1/4"	1/4"	4" x 8.5"	4.5" x 8.5" x .0045"	Paper 60 lb.		
BS32	25373303306P1X	1/4"	3/8"	33" x 33"	40" x 40" x .024"	Poster Board 24 pt.		
BS33	2550220220PB1X	1/4"	1/2"	22" x 22"	26" x 30" x .050"	Poster Board 50 pt.		
BS34	0606011D00BOSM	1/16"	1/16"	11" Dia.	13" x 14" x .008"	Submersible Film		
BS35	12506011D00PBCD	1/8"	1/16"	11" Dia.	11.33" x 12.08" x .050"	Poster Board 50 pt.		
BS36	1212240240CF	1/8"	1/8"	24" x 24"	26" x 27" x .0045"	Conformable Decal		
BS37	252002404625PB1X	1/4"	2"	24" x 46.25"	27" x 50" x .050"	Poster Board 50 pt.		
BS38	3750380580PB1X	3/8"	1/2"	38" x 58"	40" x 60" x .050"	Poster Board 50 pt.		
BS39-H	025025350500H	1/4"	1/4"	5" x 3.50"	6" x 3.75" x .0045"	Paper 60 lb.		
BS40	0606600800	1/16"	1/16"	6" x 8"	7" x 9" x .0045"	Paper 60 lb.		
BS41	2525800800BKOL	1/4"	1/4"	8" x 8"	10" x 11.5" x .007"	Poly/Laminated		
BS42	2525120120BKOL	1/4"	1/4"	12" x 12"	15" x 15" x .007"	Poly/Laminated		
BS43	1212800800BKOL	1/8"	1/8"	8" x 8"	10" x 11.5" x .007"	Poly/Laminated		
BS44	1212120120BKOL	1/8"	1/8"	12" x 12"	15" x 15" x .007"	Poly/Laminated		
BS45	12126D0000	1/8"	1/8"	6" Dia.	6.875" x 10.09375" x .0045"	Paper 60 lb.		
BS46	06062D0000	1/16"	1/16"	2" Dia.	3.1875" x 4.625" x .0045"	Paper 60 lb.		
BS46-CF	06062D0000CF	1/16"	1/16"	2" Dia.	3.12" x 4.625" x .0045"	Conformable Decal		
BS47	0303075468	1/32"	1/32"	.468" x .75"	.64" x 2" x .0045"	Paper 60 lb.		
BS48	1212600600	1/8"	1/8"	6" x 6"	7.5" x 7" x .0045"	Paper 60 lb.		
BS49	25372817122X6P1X	1/4"	3/8"	28" x 17.125"	31" x 40" x .024"	Poster Board 24 pt.		
BS50	12122402406P1X	1/8"	1/8"	24" x 24"	25" x 38" x .024"	Poster Board 24 pt.		
BS51	030312DTM2S	1/32"	1/32"	1.25" Dia.	4" x 5" x .002"	Thin Mat. 2 sides		
BS52	03031D0000	1/32"	1/32"	1" Dia.	2" x 2" x .0045"	Paper 60 lb.		
BS53	0303375D00S	1/32"	1/32"	3.75" Dia.	4" x 7" x .0045"	Paper 60 lb.		
BS54	0303375D0SS	1/32"	1/32"	3.75" Dia.	6" x 7" x .0045"	Paper 60 lb.		
BS55	0303375DBKOL	1/32"	1/32"	3.75" Dia.	6" x 7" x .007"	Poly/Laminated		
BS56	0303180240	1/32"	1/32"	18" x 24"	25" x 38" x .0045"	Paper 60 lb.		
BS57	0606800800XP	1/16"	1/16"	8" x 8"	9" x 9.25" x .0045"	Paper 60 lb. extra pad		
BS58	0625300560B0SM	1/16"	1/4"	30" x 56"	36" x 60" x .008"	Submersible Film		
BS59	0606400300CF	1/16"	1/16"	4" x 3"	6" x 4.125" x .0045"	Conformable Decal		
BS60	0303600800BKOL	1/32"	1/32"	6" x 8"	10.5" x 10" x .007"	Poly/Laminated		
BS61	12200600120	1/8"	2"	6" x 12"	8" x 14" x .0045"	Paper 60 lb.		
BS62	1213120450	1/8"	1.31"	12" x 4.50"	6.5" x 4.5" x .0045"	Paper 60 lb.		
BS63	1250120120	1/8"	1/2"	12" x 12"	13" x 13.25" x .0045"	Paper 60 lb.		
BS64	0606600120	1/16"	1/16"	6" x 12"	8" x 13.25" x .0045"	Paper 60 lb.		



Inquire about available sample screens.

CONDITIONS PRIOR TO SCREEN BREAK

$$VSTATIC = \frac{Rs}{Rs + R} \times VT$$

VPULSE = VT - VSTATIC

EXAMPLE:
$$R = 1000 \Omega$$

 $Rs = 1000 \Omega$
 $VT = 50 \text{ Volts}$

THEN:

VSTATIC =
$$\frac{1000}{2000}$$
 x 50 V

EXAMPLE:
$$R = 1000 \Omega$$

 $Rs = 600 \Omega$
 $VT = 60 V$

THEN:

VSTATIC =
$$\frac{600}{1600}$$
 x 60 V

VSTATIC =
$$.375 \times 60V$$

VSTATIC =
$$22.5 \text{ V}$$

$$V_{PULSE} = 60 - 22.5$$

$$V_{PULSE} = 37.5 V$$

EXAMPLE:
$$R = 1000 \Omega$$

Rs =
$$400 \Omega$$

$$VT = 80 \text{ volts}$$

THEN:

VSTATIC =
$$.285 \times 80 \text{ V}$$

$$V_{PULSE} = 80 - 22.8$$

EXAMPLE:
$$R = 1000 \Omega$$

$$Rs = 1500 \Omega$$

$$V_T = 75 V$$

THEN:

VSTATIC =
$$\frac{1500}{2500}$$
 x 75 V

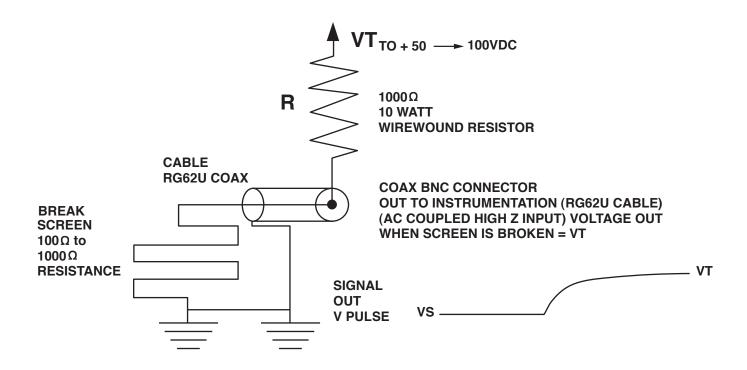
VSTATIC =
$$.6 \times 75V$$

$$Vstatic = 45V$$

$$VPULSE = 75 - 45$$

$$V_{PULSE} = 30 V$$

"BREAK" SCREEN CIRCUIT



- Keep coax cable connecting resistor to screen as short as possible.
 Use RG62U coax cable Low capacity: 13 Pico Farads per foot. (13 x 10 -12)
- Rise time of signal is determined by R and cable capacity.

```
One Time Constant = R X C
R is Resistance in ohms, C is capacity in Farads
One Time Constant = 1000 X 50FT RG62U
(using 50ft of cable)
= 1000 \times 50 \times 13 \times 10^{-12} (FARADS)
= 5 \times 10^4 \times 13 \times 10^{-12}
= .65 \times 10^{-6}
= .65 \mu sec.
```

• .65 μ sec. rise time is too long for a L-3 Communication's Flash X-Ray System. Use pulse shaping circuit.

The circuit shown above is a low cost break circuit that works with a majority of instrumentation input circuitry. More sophisticated screen circuitry is available from Whithner Screen Graphics, LLC.

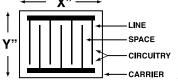
MAKE SCREENS



TRIGGERING "MAKE" SCREENS

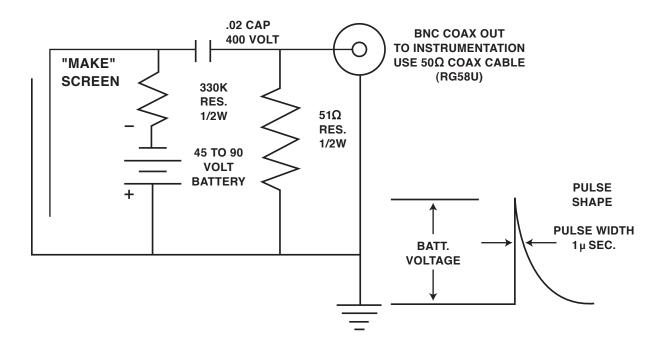
Whithner is capable of developing and producing all custom sizes & shapes of circuitry patterns to satisfy any requirement. Below is a list of popular items currently in production.

<u>ITEM</u>	PART NUMBER	<u>LINE</u>	<u>SPACE</u>	<u>CIRCUITRY</u> X" x Y"	<u>CARRIER</u> X" x Y"x Z"	<u>MATERIAL</u>
MS01	0303375287MP	1/32"	1/32"	.375" x 2.875"	.5" x 3" x .0045"	Paper 60 lb.
MS02	0303400400MK	1/32"	1/32"	4" x 4"	5" x 6" x .0055"	Poly
MS03	0303400400MP	1/32"	1/32"	4" x 4"	5" x 6" x .0045"	Paper 60 lb.
MS04	03034040MKOL	1/32"	1/32"	4" x 4"	5" x 6" x .007"	Poly/Laminated
MS05	0303287DMMOL	1/32"	1/32"	2.875" Dia.	80mm x 4.625" x .0065"	Mylar El/Laminated
MS06	0303287DMKOL	1/32"	1/32"	2.875" Dia.	80mm x 4.625" x .007"	Poly/Laminated
MS07	0303350DMMOL	1/32"	1/32"	3.5" Dia.	4" x 5.875" x .0065"	Mylar El/Laminated
MS08	0303350DMKOL	1/32"	1/32"	3.5" Dia.	4" x 5.875" x .007"	Poly/Laminated
MS09	0303550DMMOL	1/32"	1/32"	5.5" Dia.	6" x 8.75" x .0065"	Mylar El/Laminated
MS10	0303550DMKOL	1/32"	1/32"	5.5" Dia.	6" x 6.75" x .007"	Poly/Laminated
MS11	2525700900MP	1/4"	1/4"	7" x 9"	8" x 10" x .0045"	Paper 60 lb.
MS12	2525700900MK	1/4"	1/4"	7" x 9"	8" x 10" x .0055"	Poly
MS13	1250222212MP	1/8"	1/2"	22" X 22.125"	24" x 24" x .0045"	Paper 60 lb.
MS14	0303500600MK	1/32"	1/32"	5" x 6"	6" x 8" x .0055"	Poly
MS15	030350560MKOL	1/32"	1/32"	5" x 6"	6" x 8" x .007"	Poly/Laminated
MS16	0303120120MK	1/32"	1/32"	12" x 12"	13" x 14" x .0055"	Poly
MS17	0625120120MK	1/16"	1/4"	12" x 12"	13" x 14" x .0055"	Poly
MS18	0303550DMKLC	1/32"	1/32"	5.5" Dia.	6" x 6.75" x .007"	Poly/Laminated w/ copper tips
MS19	12126060MKOL	1/8"	1/8"	6" x 6"	8" x 8" x .0055"	Poly/Laminated
MS20	06126060MKOL	1/16"	1/8"	6" x 6"	8" x 8" x .0055"	Poly/Laminated
MS21	0606380400M6P	1/16"	1/16"	38" x 40"	40" x 60" x .024"	Poster Board 24 pt.
MS22	1212380400M6P	1/8"	1/8"	38" x 40"	40" x 60" x .024"	Poster Board 24 pt.
MS23	0606360360M6P	1/16"	1/16"	36" x 36"	40" x 60" x .024"	Poster Board 24 pt.
MS24	1212360480M6P	1/8"	1/8"	36" x 48"	40" x 60" x .024"	Poster Board 24 pt.
MS25	0625120200MK	1/16"	1/4"	12" x 20"	13" x 36" x .0055"	Poly
MS26	03036060MKOL	1/32"	1/32"	6" x 6"	14" x 14" x .007"	Poly/Laminated
MS26-LL	03036060MKOLL	1/32"	1/32"	6" x 6"	14" x 14" x .007"	Poly/Laminated w/ long leads
MS27	0303350DMP	1/32"	1/32"	3.5" Dia.	5" x 6" x .0045"	Paper 60 lb.
MS28	0390393DMKOL	1mm	1mm	3" Dia	4" x 5.685" x .007"	Poly/Laminated
MS29	0606375375MHP	1/16"	1/16"	3.75" x 3.75"	4.75" x 4.75" x .01"	Paper 110 lb.
MS30	0303287DMKLC	1/32"	1/32"	2.875" Dia.	4.625" x 3.125" x .007"	Poly/Laminated w/copper tips
MS31	0303600600MOSMLL	1/32"	1/32"	6" x 6"	10" x 37" x .008"	Submersible film w/long leads
MS32	0303120120MKOL	1/32"	1/32"	12" x 12"	13" x 14" x .0055"	Poly/Laminated
MS33	0303120120MP	1/32"	1/32"	12" x 12"	13" x 14" x .0045"	Paper 60 lb.



Inquire about available sample screens.

" MAKE " SCREEN CIRCUIT



This is a fast rise time circuit. It will trigger almost all types of instrumentation.

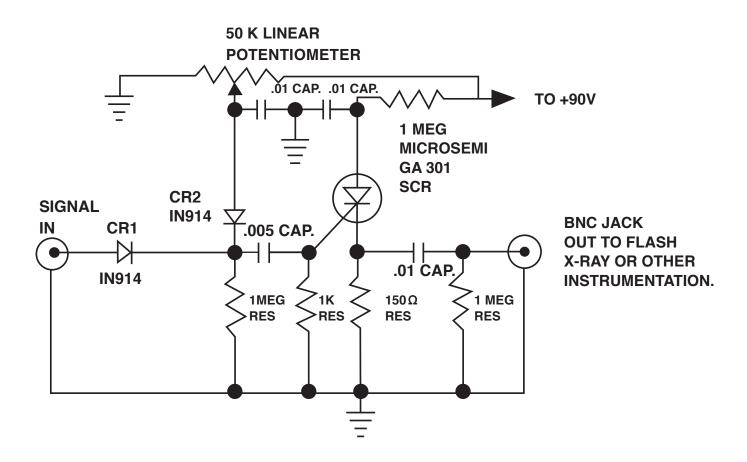
Pulse amplitude is determined by battery voltage. When using "MAKE" screens with shaped charge jets, use 90V battery supply. 50 Ω attenuators may be used to lower instrumentation input signal.

<u>Caution:</u> Some instruments can not handle voltages as high as 90V. An attenuator should be used in cable for instruments requiring lower voltages in.

Wire from circuit to screen can be twisted pair or RG58U Coax Cable.

Due to hydroscopic property of paper possibly causing a "short" in the circuitry, these screens are also available on polyester materials.

PULSE SHAPING CIRCUITRY FOR L-3 COMMUNICATION'S FLASH X-RAY SYSTEMS



*THIS CIRCUIT IS AN AVAILABLE OPTION ON L-3 COMMUNICATION'S FLASH X-RAY SYSTEMS.

THIS IS OPTION 005 ON THE L-3 COMMUNICATION'S DIGITAL DELAY GENERATOR MODEL 43114A.

LIST OF CURRENT USERS

AAI Corporation

American Optical Corp.

Armor Holdings, Inc.

Armor Source, LLC

ATR Corp

AWE

BAE Systems

Baker Risk Engineering

Battelle Memorial Institute

Benet Labs BPS S.R.L

California Polytechnic State University

Chang Industry

C Tech Development Corp.

D. E. Technologies

Dayton T. Brown

Day & Zimmerman, Inc.

Dynamic Science, Inc

Energetics Materials & Products, Inc.

Ensign-Bickford Aerospace & Defense Comp.

E. I. Dupont De Nemours & Co.

General Ordnance Corp.

General Research Corp.

Gentex Corporation

Global Tungsten & Powders Corp.

H. P. White Laboratories

H. S. Ballistics

Idaho National Laboratory

Jacobs Technology

Jet Propulsion Lab

Kaman Sciences

Kidde Aerospace

L-3 Communications

Lawrence Livermore National Laboratory

Los Alamos National Laboratories

Mast Technology

Ministry of Defense Singapore

Mission Research, Inc.

NAWC, China Lake

NSWC, Indian Head

Naval Coastal Systems Station

Naval Surface Warfare Center, Dahlgren

Naval Undersea Warfare Center Newport, RI

NAVEODTECH

New Mexico Tech.

Nobby Tech, Ltd

Oregon Ballistics Lab

Orlando Technology, Inc.

Plasan Sasa

Precon, Inc

Sandia National Laboratories

Schlumberger

School of Aerospace, Australia

Simula

Teijin Aramid, Inc

Teledyne Brown Engineering

Textron Systems

University of Alabama at Huntsville

University of Dayton Research Institute

University of Rhode Island

University of Texas at Austin

University of Virginia

U. S. Air Force, Eglin Air Force Base

U. S. Air Force, Holloman Air Force Base

U. S. Army, Research Laboratories

U. S. Army, Aberdeen Test Center

U. S. Army, Corp of Engineers

U. S. Army, Jefferson Proving Ground

U. S. Army, Materials Technology Laboratories

U. S. Army, Picatinny Arsenal ARDEC

U. S. Army, Redstone Technical Test Center

U. S. TACOM

U. S. Army, White Sands Missle Range

U. S. Army, Yuma Proving Ground

US Golf Assoc.

SUBMERSIBLE TRIGGERING SCREENS

Whithner has successfully developed a screen capable of being fully submersed. Under water testing is no longer a problem. Custom sizes and circuitry are available as well as stock screen sizes.

CONFORMABLE ADHESIVE BACKED SCREENS

As the finest make and break screen manufacturer in the world, we have helped a national testing facility resolve a triggering problem. The requirement was to attach the screen to the surface; however the testing surface consisted of compound curves and bends. We were able to supply a screen to do just that. This material used on the screen is perfect for testing body armor.

TWO SIDED SMALL FRAGMENT SCREENS

Whithner recently manufactured a break screen for a customer on material that will fracture very easily and offer minimum influence to the data being collected. This facility was shooting a very small fragment at a relatively slow velocity. These frags were so small and sharply pointed, there was a concern that the line of the break screen could be missed on initial contact. Whithner decided to also print the backside with the image offset. This way, if the circuit didn't break the front side on first contact it would break the back circuit. This material is also available with an adhesive backing, however only one side can be printed with the circuitry when adhesive is applied.

RIGID CARRIER SCREENS

Whithner Screen Graphics recently developed a triggering screen on a rigid carrier for one of our nation's Department of Defense Laboratories. By using this product, the customer was able to eliminate the labor intensive process of applying adhesive to our standard paper break screens and adhere the screen to a chipboard for rigidity. These screens are for testing larger projectiles and fragments. This application is very useful when a large screen is required.

THIN PAPER SCREENS

These screens work best while shooting small fragment or fléchette type projectiles when minimal influence of flight is desired. The thickness of the substrate is so thin that it will trigger with minimal impedance. This material is not suggested for large screens due to the thin and light nature of the material which can make handling difficult at a larger size.

WHITHNER TRIGGERBOX 1000

Whithner Screen Graphics can now offer a solution to many triggering problems experienced in the past.



FEATURES

- Optical Isolation for enhanced noise immunity and equipment protection
- Debounced outputs for jitter-free signal transitions
- Interface transition times typically ≤ 1 microsecond
- Four Channel system allows instrumentation of multiple break screens
- Each Channel provides + 5 volt and switch closure transition signals
- Output signals buffered to drive 50 ohm loads.
- Input and Output signal connectors are standard BNC
- Operates from two +24 volt regulated power supplies (included)
- Can be customized by Whithner or user to match the impedance of the screen up to 10,000 ohms.

The Triggerbox 1000 Four Channel Break Screen Signal Conditioner offers a convenient method for interfacing Whithner break screens with a wide variety of measurement apparatus. This device accepts signals from relatively high-impedance break screens as input. The penetration of a break screen triggers the generation of robust voltage and switch closure output signals that are available to activate the user's test equipment.

Since many break screen applications are associated with electronically noisy environments, the Triggerbox 1000 Four Channel Break Screen Signal Conditioner has been designed to offer a high degree of noise immunity. The break screen input circuit is optically isolated from the subsequent output circuitry to attenuate spurious noise that may be induced through the break screen. In the unfortunate event that external voltages are accidentally applied to the break screen, this optical isolation also provides 2500 volts of protection for the user's equipment. The output signal from each channel of signal conditioning is provided in two convenient forms. A +5 volt, 1 millisecond pulse is available that is capable of driving a 50 ohm load. In addition, a 1 millisecond switch-closure signal is also provided that mimics the output signal from a "make" screen. These outputs are debounced to guarantee jitter-free signal transitions. The response time of the Signal Conditioner is typically ≤ 1 microsecond.

The Triggerbox 1000 Four Channel Break Screen Signal Conditioner is housed in an 8" x 10" x 4" aluminum enclosure with BNC connectors for all input and output connections. A LED indicator light displays the ready status of each channel. A single push-button switch simultaneously resets all four channels for operation. Power is provided by two +24 volt regulated wall power supplies which are included.

-- Contact us today for more information

