

LIBRASCOPE *Sunnyvale*

for major missile
system functions
rocket engine
initiation stage
separation
bolt fracturing
thrust termination

EXPLODING BRIDGEWIRE SYSTEM

EBW



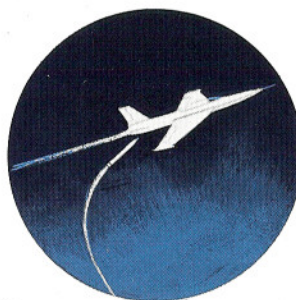
exploding bridgewire system

The EBW System was designed and developed by Librascope-Sunnyvale and offers a new concept for ordnance safety in missiles and space vehicles. The EBW System provides a high degree of safety and reliability during storage, handling and deployment of missile systems. EBW can be employed in major missile systems for rocket motor initiation, stage separation by primacord or bolt fracturing, thrust termination and as a direct replacement wherever squibs and detonators are used.

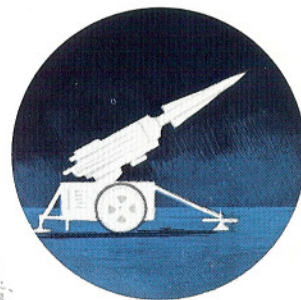
EBW



DESTRUCT UNITS



WARHEAD INITIATION



INITIATOR APPLICATIONS

safety of EBW system

Maximum safety is achieved in an EBW System by an initiation process which simultaneously provides high temperature, pressure and shock wave to cause explosion of the bridgewire. A special firing unit supplies the high energy pulse to meet these conditions.

Premature ignition caused by low voltage potentials and high energy RF fields cannot initiate an EBW ordnance component.

SAFE during handling, storage and deployment

The high degree of safety offered by this system eliminates the need for out-of-line safing mechanisms normally required in missile systems and reduces total missile weight and design complexity. Installation of the EBW ordnance components may be accomplished during initial assembly thereby simplifying handling procedures during the stockpile to target sequence.

TECHNITE*

In ordnance applications where additional energy is required to perform mechanical functions or to ignite other explosive materials, Librascope has developed TECHNITE, secondary explosive compounds, to supplement the EBW for many applications.

* TRADE MARK

EBW



GEOLOGICAL APPLICATIONS

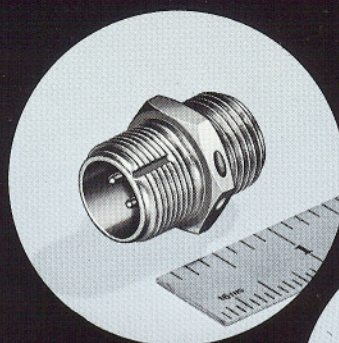
other applications

- Gas Generators
- Explosive Switches
- Guillotine Devices
- Frangible Bolts
- Diaphragm Rupture

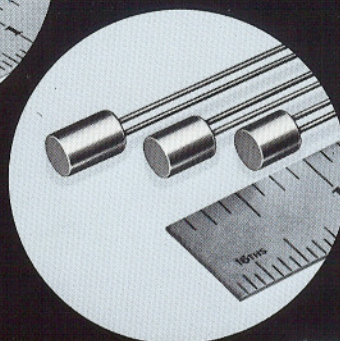
*Cabling between firing unit and components not included but would be comparable to conventional system. High voltage transmission line would weigh 2 pounds per 100 feet.

†No out-of-line blocking system included.

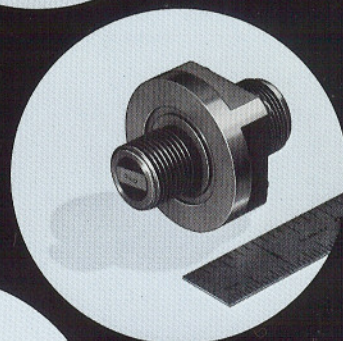
EBW
Primacord
Initiator



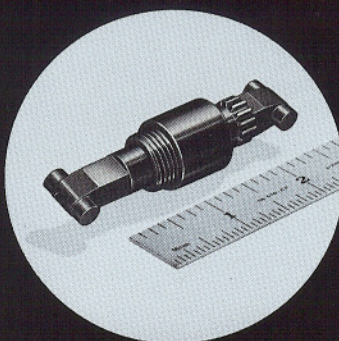
EBW
Rocket
Motor
Initiators



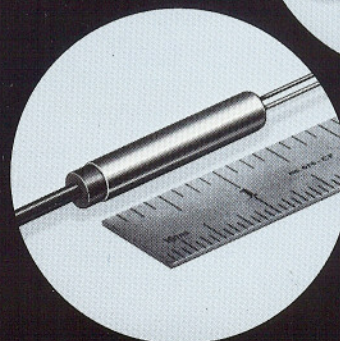
typical **EBW**
devices manufactured
by LIBRASCOPE/Sunnyvale



EBW
Rocket
Motor
Initiator



EBW Turnbuckle



EBW
String
Initiator

ESTIMATED WEIGHT COMPARISON

EBW system/conventional system

TYPICAL IRBM

BRIDGEWIRE SYSTEM	WT.	CONVENTIONAL SYSTEM	WT.
First Stage Ignition EBW Initiator	0.5	First Stage Ignition Squib — Out-of-line Blocking Device	5.0
First Stage Separation EBW Primacord Initiator	0.3	First Stage Separation Primacord — Out-of-line Blocking System	5.0
Second Stage Ignition EBW Initiator	0.5	Second Stage Ignition Squib — Out-of-line Blocking Device	5.0
Second Stage Separation EBW Primacord Initiator	0.3	Second Stage Separation Primacord — Out-of-line Blocking Device	5.0
Pressure Relief, Ring, Dome and EBW Sector per port	1.3	Pressure Relief per port†	6.0
Firing Unit*	6.0	None Required	0.0
TOTAL	8.9	TOTAL	26.0

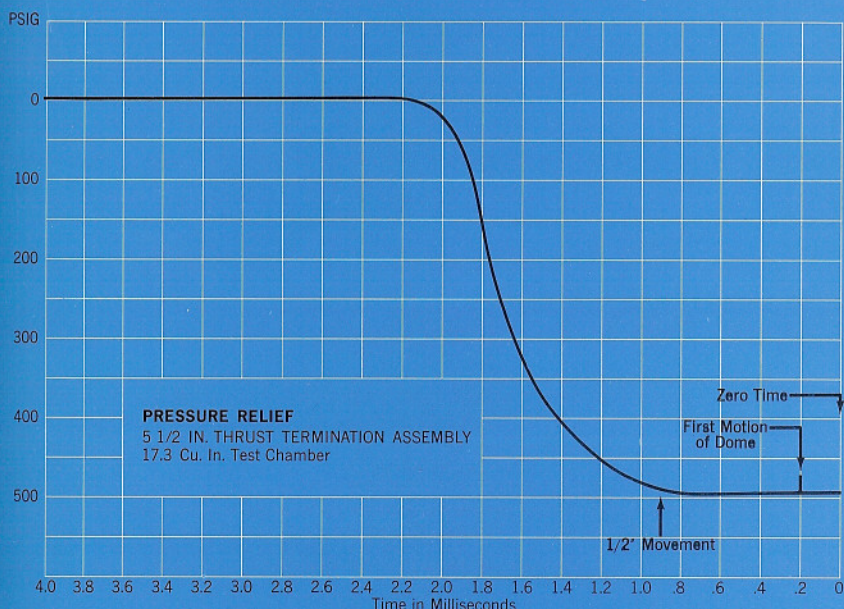


test data safety features

EBW/TECHNITE

INITIATORS *will not*
initiate prematurely
when subjected to the
following conditions:

- Application of 50 VDC from low impedance source.
- Discharge of a 1 microfarad capacitor charged to 500 V.
- Static discharge from 20 KV —100 millijoule source.
- A 10 mil nichrome wire heated to melting point over 30 sec.
- Application of heat to at least 1100°F.
- The environments of MIL-E-5272-A.



EBW thrust termination system

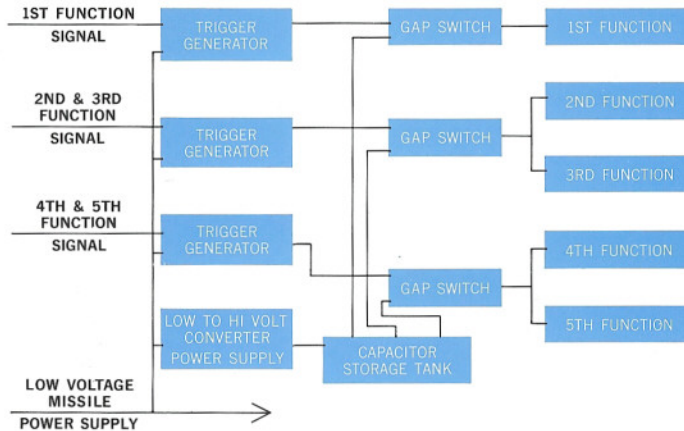
A thrust termination system has been developed and tested incorporating a ring and dome held in place by a frangible EBW sector. This assembly is fabricated in port sizes of 4.5 inches thru 8 inches. The weight of a complete assembly for 5 1/2 inches is 1.5 pounds. For a multi-port thrust termination system, simultaneity of ± 20 msec is possible.





principle of operation

typical
EBW
initiation
system

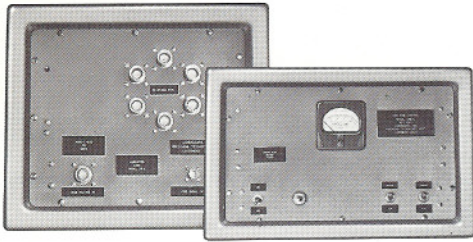


The energy to explode a bridgewire is produced when the time rise of the current pulse is less than one microsecond and a current density of at least one million amperes per square centimeter is applied to the wire. Due to the skin effect, the current is initially confined to the surface of the wire which causes the wire to melt from the surface to the center.

The concentric magnetic field exerts an inward radial pressure on the wire which is known as the "pinch effect." This causes molten beads of material to form due to the surface tension of the liquid surface. During this period effective surface temperature of the molten material may exceed 5000 degrees F. When the molten globules separate and current ceases to flow, the inward radial pressure ceases, causing the molten particles to be accelerated in random directions. The resulting high temperature, shock wave and high pressure causes direct initiation of secondary explosive materials.

EBW firing units

To cause initiation of an Exploding Bridgewire, a special firing unit is required to provide a high energy pulse to the wire. The EBW firing units are currently available either as Field Units or Flight Units.



FIELD FIRING UNITS

The EBW Field Firing Unit is designed and constructed to provide continuous operation in field installations where remote operation is desirable for laboratory investigations, static firings and ground fired use. Sufficient line lengths are provided to allow remote firings up to 1,000 feet from the firing source. Safety plugs and switches are also provided to prevent accidental firing from human error. Special firing units can be designed to monitor all EBW initiators and power levels if desired. The EBW Field Firing Unit will fire a single EBW initiator or multiple initiators simultaneously by internal circuitry adjustment.



FLIGHT FIRING UNITS

In a typical IRBM system the EBW flight firing unit can be programmed for single or multiple initiation and be sequenced to fire the next function. Firing unit power requirements from the missile system is in milliampere range. Present designs employ a 28 volt DC input, however, the firing unit can be designed to accept any input voltage. A range of weights from 2 through 8 pounds would be typical for a single point to 15 point system.

*introducing the
newest Librascope
facility*

Librascope-Sunnyvale engages in development, test and production of advanced ordnance components. The facility has developed an Electrostatic Scoring System known as a Proximity Indicator for missile-target measurement, and has produced an ultra-high speed electronic camera.



Librascope products for industry
The design and development of computers, computer components and controls has been the professional responsibility of Librascope, Inc. for some 22 years. Today, Librascope's achievement is represented by a broad range of advanced computer products for commercial application. Your inquiry will be welcomed. Write...

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