

Shock Tube Saver System Installation and Operation Manual Duke Part No. 515800 Rev. B



INTRODUCTION

The Duke Pro Shock Tube Saver System (STSS) shock tube initiator is designed to provide a substitute for long strands of shock tube and provide a reliable means of shock tube initiation, thus saving the user money and allowing the reduction of up to 95% of shock tube usage per shot. It typically pays for itself in 25 shots.

The shock tube initiator has been safety tested by the U.S. Military for safety, accidental firing, and electromagnetic compatibility. Operating radios, radar, and static discharges near the unit will not cause it to fire. It has passed all tests related to these safety requirements.



DANGER!!! NEVER look into the tip when firing the shock tube tip. Material may be ejected from the tip during firing and lodge in the users eye.



DANGER!!! Potentially lethal voltages exist on the output terminals of the shock tube initiator when firing. Do not insert any object other than an approved Duke Pro switch tip into the output terminals.



DANGER!!! Do not attempt to fire electric blasting caps using the initiator or power pack. This system was designed to ignite shock tube only.



NOTICE: This equipment is intended for use only by properly licensed and professionally trained personnel. Duke Pro, Inc. and its employees are not responsible for any damages or monetary losses whatsoever, whether anticipated or real, resulting from the use or misuse of this equipment. The user of this equipment must determine the suitability of this product in conjunction with any other product to make the determination whether it is safe to use in a particular application.

Aborting a Shot

If the user wishes to abort the shot they simply release the charge button on the power pack and the down range unit safely discharges the stored energy internally and goes into a safe standby mode. Firing the unit requires a continual application of DC power for 2~3 seconds.

SETUP

The STSS (Shock Tube Saver System) is composed of 5 parts:

- 1.) The downrange initiator
- 2.) The 500' lead line reel
- 3.) The 27 volt power pack
- 4.) Banana plug quick connect plugs
- 5.) Shorting plug for cable reel up range banana plug connector

Two quick connect banana plug adapters are supplied for attachment to the wire. This allows rapid attachment of the lead line to the down range initiator, a shorting plug, and the 27 volt power pack.

The power pack contains three nine volt batteries in series with a battery voltage level monitor circuit. The output remains shunted until the fire button is depressed. When the fire button is depressed, the shunt is removed from the output and power is applied to the output terminals and the LED power output indicator. When the output voltage falls below 22 volts the LED will no longer illuminate and the user should replace the batteries. The battery's voltage will be equal to 22VDC / 3 or 7.33 volts each.

The down range initiator unit is an automatic charge/fire system for initiating shock tube. It uses a nominal 220 milliamps of current at 15 volts input to charge the energy storage capacitors to a nominal voltage of 2,500 volts over a two second period. When the capacitors are charged the energy is then applied to the shock tube initiator tip. If power is removed from the unit, before firing, it will automatically go into a standby mode and safely discharge the high voltage capacitors. Do not insert anything other than a Duke Pro switch tip into the output banana jacks of the initiator. It is not designed to initiate electric blasting caps.

Lead Line Lengths: The 500' of lead line that is supplied with the STSS is 20 AWG duplex wire. 20 AWG wire has a resistance of approximately 10.0 ohms per thousand feet, and 500 feet of duplex wire has two 500 foot conductors. The shock tube initiator requires 0.22 amps, so one can expect a voltage drop of :

$$V_{drop} = \frac{0.22 A}{10.0 \Omega} = 2.2 V$$

The minimum input voltage to the shock tube initiator is 15 V. Maximum lead line lengths can be calculate based on know resistances per foot of various wire sizes and the battery voltage. These are provided in table form (Table 1) and in chart form (Illustration 1) below.

Gauge	Battery Voltage					
	27	25	23	21	19	17
16 AWG	6792	5660	4528	3396	2264	1132
18 AWG	4271	3560	2848	2136	1424	712
20 AWG	2686	2239	1791	1343	895	448
22 AWG	1689	1408	1126	845	563	282
24 AWG	1062	885	708	531	354	177
26 AWG	668	557	445	334	223	111
28 AWG	420	350	280	210	140	70

Table 1: Table of Lead Line Lengths

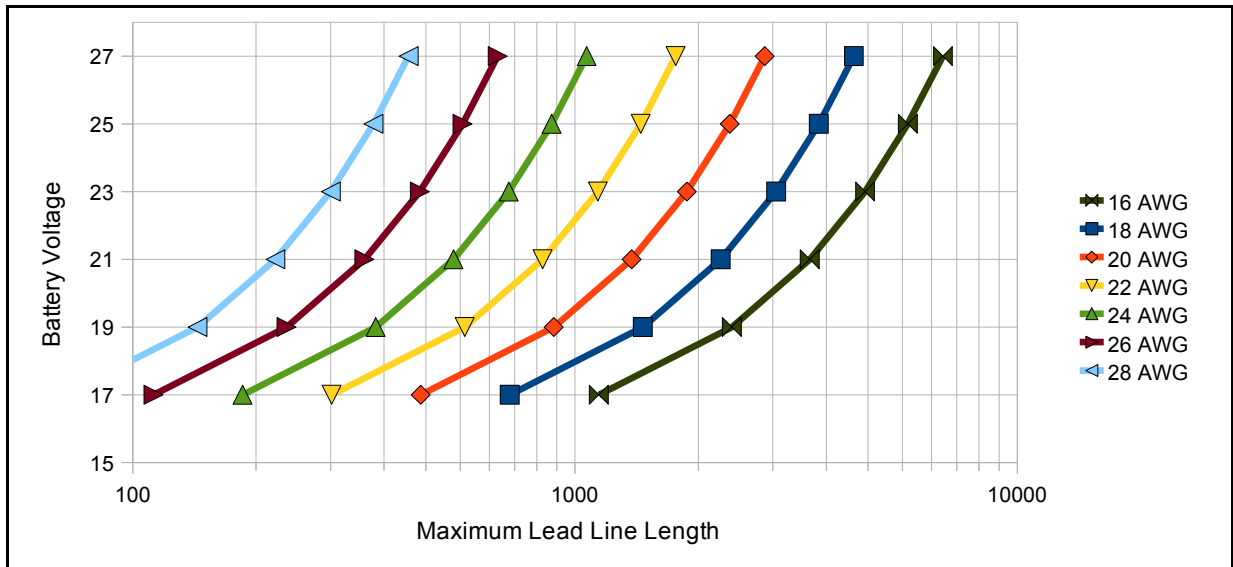


Illustration 1: Chart of Lead Line Length vs. Battery Voltage and Wire Gauge

Setup for a shot:



Never place a shot under high power wires, the duplex wires can be blown into the high voltage lines and cause serious injury or death by electrocution! Always do a quick test shot, dry firing the unit, using the downrange initiator, cable reel, and power pack.

- 1.) Test the unit. Without any shock tube connected to the initiator, close the handle on the switch tip and insert the tip into the shock tube initiator. Connect the shock tube initiator to the spool of wire, and the power pack to the other end of the spool. Make sure the shorting plug assembly is disconnected. Using the power pack depress and hold the power pack charge button for 3 seconds. The shock tube initiator should fire. If it does not, follow the tip calibration procedures and check the battery level lamp when power is applied.
- 2.) Disconnect the power pack and connect the shorting plug to the up range connector on the reel of wire, and disconnect the down range connector from the shock tube initiator. Never leave the power pack up range unsecured as a general safety precaution.
- 3.) Go down range with the power pack, the initiator, and the spool of wire.
- 4.) Remove the switch tip from the initiator, load the tip with shock tube and close the cross piercing lever on the shock tube tip (red dot exposed). Make sure the shorting plug is installed on the uprange connector of the spool of wire before connecting the spool of wire. Once the shorting plug is installed, connect the downrange connector on the spool of wire to the shock tube initiator.
- 5.) Install the switch tip into the shock tube initiator. Pay out the line while walking up range to a safe distance* to ensure you are safe from fly rock, avalanche hazards, and ballistic events caused by primary and secondary explosions, overpressure, and shock waves.
- 6.) Once up range and after you have given the proper safety warnings of the impending shot, scour the surrounding area for any signs of people or animals trespassing into the blast zone.
- 7.) Make your last safety call and sound your safety horn or siren (shout out “fire in the hole” three times and in three different directions, listen carefully for 30 seconds while observing for any persons or animals straying into the blast zone). Give a final blast of your safety siren or horn and listen. If no response is heard or witnessed then proceed to the next step.
- 8.) Connect the up range plug to the power pack, then remove the shorting plug. (The lead line wires will be shorted internally by the power pack until the fire button is depressed.)
- 9.) To fire the shot, press and hold the fire button for three seconds. Observe that the battery level lamp is on. Ignition of the shock tube down range should occur within 2 to 3 seconds.
- 10.) After releasing the fire button, reinstall the shorting plug into the uprange connector and disconnect the wire reel from the power pack. Walk toward the down range initiator while winding the duplex wire on the reel.

If you have any questions or comments please don't hesitate to call us at the number listed below.

TOLL FREE: 1-866-587-3853 or 1-TOOL-UP-DUKE



* ISEE Table of distances is based on explosives placed in the ground. Above ground detonations of explosives is extremely hazardous due to the ability of the explosives to propel objects to ballistic velocities, create lethal over pressure, and generate shock waves and air blasts, which can travel for many miles and do extensive damage to property and cause great personnel harm.

SPECIFICATIONS

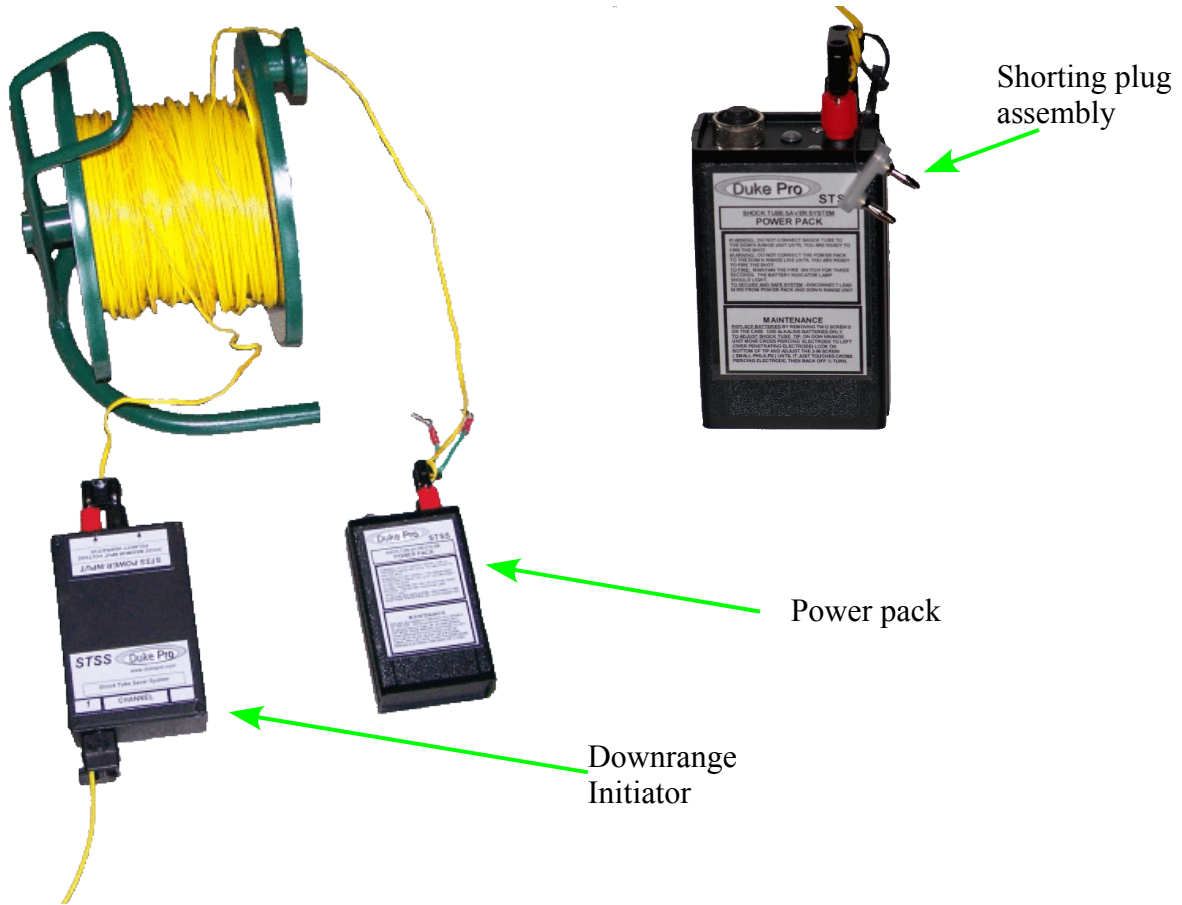
INITIATOR

Input Voltage:	17 ~ 27 volts D.C.
Firing Voltage:	2,500 Volts D.C. + 3% -0%
Charge Time:	2 seconds nominal
Firing Sequence:	Charge time 2 seconds followed automatically 5 milliseconds later by fire relay cycle, the unit then goes into low current standby until power is removed.
Nominal Current:	0.220 amps @ 27 VDC
Tip Life:	10,000 shots typical
Dimensions:	5.7"L x 3.5"W x 2.25"H
Weight:	1.2 lbs
Operating Temperature:	-40° F ~ 185° F
Storage Temperature:	-40° F ~ 185° F
Relative Humidity:	0 ~ 95% NON-CONDENSING

POWER PACK

Output Voltage:	22 ~ 27 volts D.C.
Nominal Current:	0.220 amps @ 27 VDC
Dimensions:	6.0"L x 3.3"W x 2.0"H
Weight:	0.4 lbs
Operating Temperature:	0° F ~ 120° F (alkaline battery operational temperature limitation)
Storage Temperature:	-40° F ~ 185° F
Relative Humidity:	0 ~ 95% NON-CONDENSING

Shock Tube Saver System Components



ESI Tip Operating Instructions and Calibration Procedure



www.dukepro.com
Asheville, North Carolina
866-587-3853

STEP ONE
PLACE CROSS-PIERCING
ELECTRODE CONTROL LEVER
IN THE SAFE POSITION (*AWAY*
FROM SHOCK TUBE HOL .

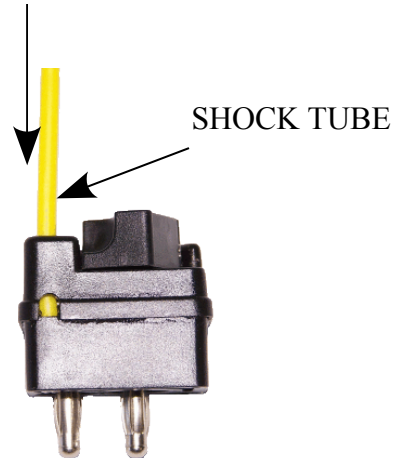


FIRE ↔ SAFE

STEP TWO
PUSH SHOCK TUBE THROUGH
THE LOADING HOLE UNTIL
THE CENTER ELECTRODE IS
INSIDE OF THE SHOCK TUBE.
DO NOT TWIST THE SHOCK
TUBE WHILE INSERTING OR
REMOVING.

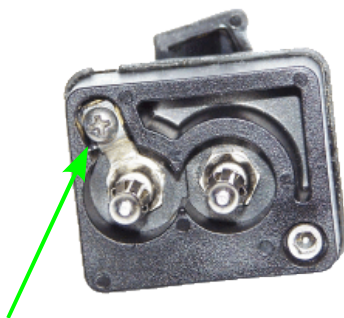
STEP THREE
MOVE THE CONTROL ARM
LEVER TO THE FIRE POSITION.

***** IMPORTANT *****
ALWAYS MOVE PIERCING
CONTROL ARM LEVER TO SAFE
POSITION *BEFORE* REMOVING
SHOCK TUBE



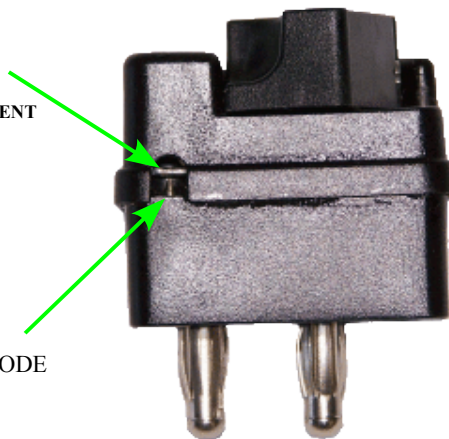
CALIBRATION PROCEDURE:

1. MOVE CONTROL HANDLE TO SAFE POSITION.
2. BACK OFF ADJUSTMENT SCREW 3 OR 4 TURNS.
3. MOVE CONTROL HANDLE TO FIRE POSITION.
4. INSPECT THE POSITION OF THE CROSS-PIERCING ELECTRODE. WHEN LOOKING FROM THE SIDE, THE CROSS-PIERCING ELECTRODE SHOULD BE STRAIGHT AND NOT HAVE AN UP OR DOWN TILT. WHEN LOOKING FROM THE TOP, IT SHOULD PASS DIRECTLY OVER THE CENTER ELECTRODE.
5. SCREW CENTER ELECTRODE IN UNTIL IT TOUCHES CROSS-PIERCING ELECTRODE. *TIP: AN OHM METER CONNECTED TO BANANA PLUGS CAN BE USED TO DETECT ELECTRODE CONTACT.*
6. BACK OFF 1/3 - 1/2 TURN COUNTER- CLOCKWISE.
7. TEST UNIT.
8. BACK OFF CENTER ELECTRODE AS NECESSARY TO PREVENT PREMATURE ARCING.



CENTER ELECTRODE
ADJUSTMENT SCREW

CROSS-PIERCING
ELECTRODE
(MUST GO STRAIGHT
ACROSS AND NOT BE BENT
UP OR DOWN)



CENTER ELECTRODE