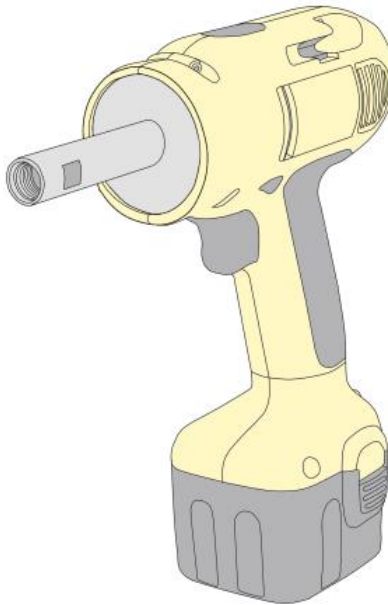


# Motivator™

## SYSTEM OPERATION AND MAINTENANCE MANUAL



**PN: 07070707 / 07070800**



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# HIGH ENERGY IGNITION FEATURES

The High-Energy Ignition system is comprised of:

- EXCITER
- EXTENSION ROD
- IGNITER TIP

## ***High Energy Ignition Systems***

Pulsed sparks of very high current characterize high Energy ignition. A capacitor is charged and abruptly discharged at periodic intervals. The igniter is typically a coaxial construction; some constructions use semi-conductor surfaces that can **spark when completely submerged in water**.

The voltage of the energy storage capacitor is usually less than 3000 volts; the spark voltage of a normal igniter tip is low (often less than 100 volts). When the spark occurs at the igniter tip, it creates a short circuit across the charged capacitor, which generates high currents. High Energy spark currents can exceed 2500 amps peak. Power levels during the spark can exceed 100 kilowatts. This high intensity spark will ignite natural gas, light and heavy oils. The spark is “self cleaning” because the spark clears carbon build-up or particulate located in the discharge path.

***CAUTION: Operation in water will damage the igniter tip very quickly.***



## ***HE Exciter Theory of Operation***

The High Energy Ignition Exciter operates without gas discharge tubes. Energy accumulates on storage capacitor  $C_{STG}$ , as the exciter draws power from the input power line. The capacitor slowly accumulates charge to a preset voltage during the interval between sparks. Additionally, the power input circuit provides galvanic isolation between the line and the discharge circuit potentials.

When the capacitor has charged to a preset voltage, an electronic switch rapidly discharges the capacitor through a pulse-forming network into the igniter. Although the discharge current amplitude can vary from several hundred to several thousand amperes (depending on the application), the life of the electronic switch is not affected by the accumulation of these pulses.

The pulse-forming network controls the amplitude and duration of the discharge current pulse to provide characteristics, which enhance ignition and extend the life of the storage capacitor and igniter. Where the exciter output is typically 1200V the pulse-forming network can provide a 7000V-trigger voltage as needed.

## ***Equipment Specifications***

### **Exciter, PN 07070707/07070800**

<b>Input Power:</b>	12VDC, 12W
<b>Stored Energy:</b>	1.5 Joules Minimum
<b>Spark Rate:</b>	6 Sparks per Second minimum
<b>Duty Cycle:</b>	5 MIN ON / 5 MIN OFF
<b>Temperature:</b>	Operating -25°C to 60°C

## ***Safety Instructions***

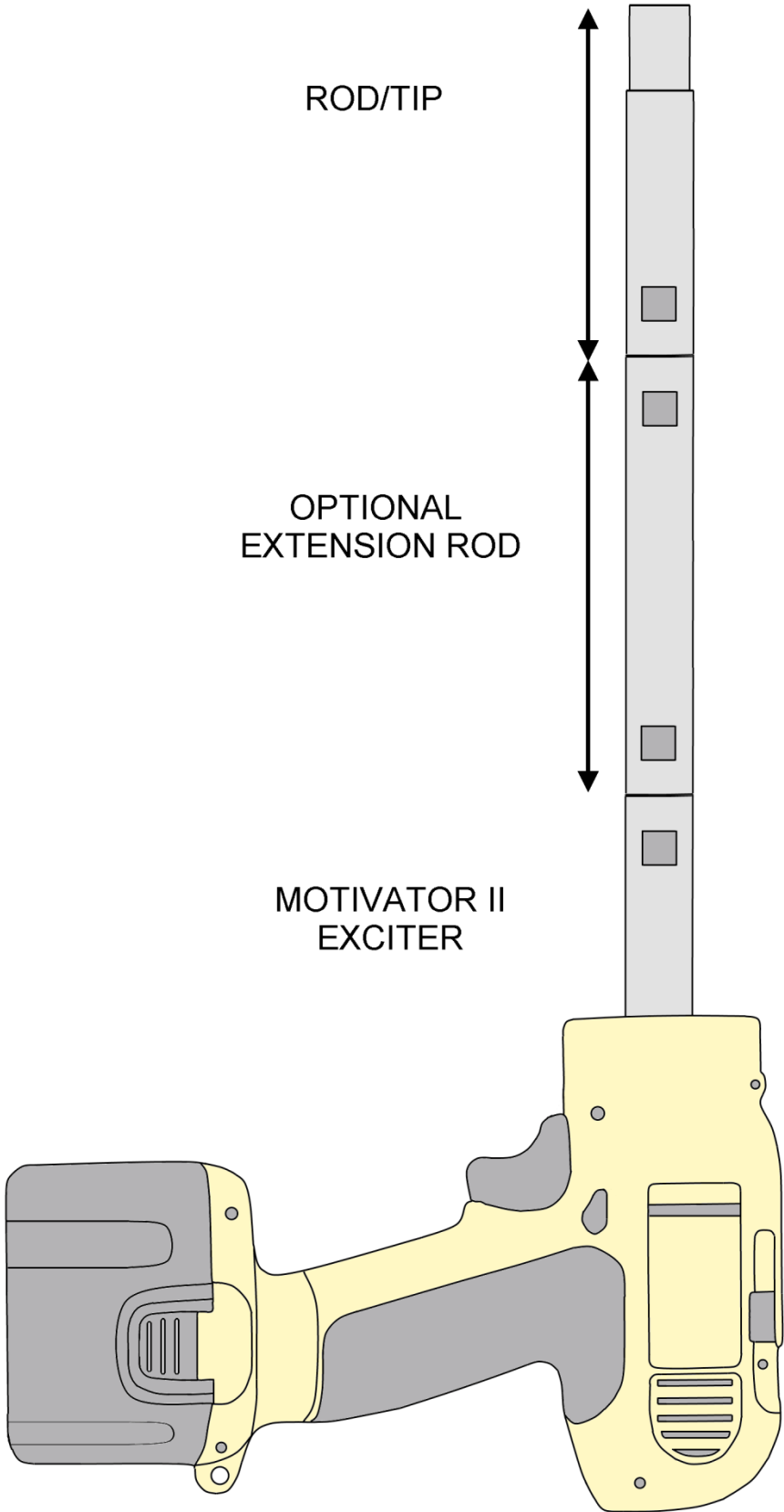
**WARNING**  
**TO MINIMIZE RISK OF ELECTROCUTION, ALWAYS REMOVE BATTERY BEFORE INSTALLING EXCITER.**

### **The Safety Switch is a 3 position toggle switch.**

- A) Unused Setting:**  
Switch pressed fully to LEFT. Trigger is not locked but exciter does NOT operate.
- B) Locked Setting:**  
Switch CENTERED. Trigger is LOCKED from movement.
- C) Operation Setting:**  
Switch pressed fully to the RIGHT. Trigger OPERATES exciter.



# SYSTEM DIAGRAM



## BATTERY AND SPARK INDICATOR LIGHT

The exciter is equipped with a spark diagnostic and low battery indicator light. The exciter monitors spark pulses leaving the enclosure and provides the user with indication of this on the back of the exciter. This is useful in noisy environments when an igniter is inserted into a furnace and it is not possible to see or hear the sparking of the unit. The diagnostic light flashes off every time the igniter detects an outgoing pulse.

Light Function	Meaning
Flashing Blue	Exciter is functioning normally and releasing energy to igniter plug.
Solid Blue	Exciter is firing open circuit. Worn igniter plug or no igniter plug.
Solid Red or Purple	Battery is too low to operate exciter.
Off	Battery is completely dead.

\*Note that in some circumstances the solid purple indicator can seem to look blue. Please recharge the battery if the exciter is displaying a solid blue light and the test igniter tip will not fire to verify the problem is a failed igniter tip and not a dead battery.

## SYSTEM FUNCTION TEST

### **WARNING!**

**KEEP THE FIRING TIP END OF THE IGNITER AWAY FROM ALL PERSONNEL AND FLAMABLE MATERIALS.**

Set the Safety Switch to LOCKED (CENTERED) and remove the battery from the exciter. Connect the ROD/TIP to the EXCITER and reinstall the battery.

**CAUTION: BEFORE POWER IS APPLIED, ANTICIPATE THE LOUD NOISE ASSOCIATED WITH THE SPARK PLUG FIRING. WARN THOSE AROUND YOU OF THE PENDING EVENT TO PREVENT ACCIDENTS ASSOCIATED WITH THE SURPRISE OF A SUDDEN LOUD NOISE.** DO NOT OPERATE OPEN CIRCUIT (WITHOUT AN IGNITER TIP). This condition will force the exciter to dissipate the output power, which can damage the exciter.

**KEEP THE SPARK TIP AT LEAST ONE METER AWAY FROM FLAMMABLE MATERIALS.**

**Set the Safety Switch to Operation Mode. Press the trigger.**

After a slight delay (approximately 1 second), the igniter tip will fire with brilliant bluish-white plasma. A bright, regular, blue/white spark should appear at the tip. **The exciter will continue sparking as long as the trigger is pressed. To stop sparking, release the trigger.**

If any irregularities are noted or if the integrity of the system is in any way questionable, shut down the system immediately by LOCKING THE TRIGGER AND REMOVING THE BATTERY. Perform system inspection again and reinstall.

### **WARNING!**

**DANGEROUS AND POTENTIALLY LETHAL VOLTAGES ARE PRESENT WITHIN THE EXCITER. DO NOT ATTEMPT TO REPAIR OR DISASSEMBLE THE EXCITER.**

## REPAIR

**WARNING! THE INTERNAL EXCITER MODULE IS NOT REPAIRABLE. IT MUST BE RETURNED TO THE MANUFACTURER TO BE REFURBISHED. FAILURE TO DO THIS CAN RESULT IN SEVERE PERSONNEL HAZARD. DANGEROUS AND POTENTIALLY LETHAL VOLTAGES ARE PRESENT.**



# SYSTEM MAINTENANCE

## *Inspection*

**EXCITER** – Visually inspect the inside of the exciter enclosure for any debris that would be indicative of damage. Check to ensure that the battery is firmly mounted. Check the electrical connections to ensure that they are secure.

**EXTENSION ROD** – Check to ensure that the **extension rod** has not been bent or damaged during transport. Use an ohmmeter to check the rod insulation integrity.

MEASUREMENT POINTS	REQUIRED VALUE
Center conductor to center conductor (opposite ends)	Less than one (1) ohm
Center conductor to shell	Greater than ten (10) meg-ohms

**ROD/TIP** – Visually inspect for damaged or cracked ceramics.

## *Cleaning*

### **WARNING!**

**REMOVE THE BATTERY AND LOCK THE TRIGGER. USE PRECAUTION TO PREVENT THE EXCITER FROM BEING ACCIDENTALLY TURNED ON WHEN SOLVENTS OR OTHER FLAMMABLE MATERIALS ARE PRESENT. FAILURE TO DO THIS CAN RESULT IN SEVER PERSONNEL HAZARD.**

**SPARK BASE ROD** – Clean the ceramic well at the Base Rod end of the rod with a cleaning solvent or alcohol and if necessary wipe with a lint free rag.

**EXTENSION ROD** – Clean the ceramic well at the igniter end of the rod with a cleaning solvent or alcohol and if necessary wipe with a lint free rag. Clean the ceramic terminal end with a cleaning solvent or alcohol.

**IGNITER TIP** – Clean the ceramic terminal end with a cleaning solvent or alcohol. Clean the tip to remove oil or other hydrocarbons that may contaminate the ceramic surface. **Do not use a brush.** Clean with a soft lint free cloth dampened with solvent.

## TROUBLESHOOTING

**WARNING! REMOVE THE BATTERY AND LOCK THE TRIGGER WHEN REMOVING OR INSTALLING TIPS/RODS. USE PRECAUTION TO PREVENT THE EXCITER FROM BEING ACCIDENTALLY TURNED ON WHEN SOLVENTS OR OTHER FLAMMABLE MATERIALS ARE PRESENT. FAILURE TO DO THIS CAN RESULT IN SEVERE PERSONNEL HAZARD.**

Trouble Shooting Table (best done when a freshly charged battery has just been installed)			
Indicator Light Symptom	Output Condition	Sound From Exciter (observe in a quiet place)	Diagnosis
Flashing Blue at Full Spark Rate (~5Hz)	Igniter tip sparking	Audible spark at proper rate (~5Hz)	System Normal
Flashing Blue at Full Spark Rate (~5Hz)	Igniter installed, No spark	Audible ticking at spark rate (~5Hz)	Igniter or rod internal break down, replace igniter or rod
Flashing Blue at Full Spark Rate (~5Hz)	No igniter installed	Audible ticking at spark rate (~5Hz)	Exciter internal break down, return for repair
Flashing Blue but rate unstable or intermittent skipping	Unstable spark rate or intermittent spark	Spark sound when it sparks, tick sound in-between interment sparks	Igniter is wearing out, replace Igniter
Solid Blue	No igniter installed	Audible ticking at spark rate (~5Hz)	System Normal (install an igniter!)
Solid Blue	Igniter installed, No spark	Audible ticking at spark rate (~5Hz)	Igniter is worn out, replace Igniter, OR Possible low battery if no ticking sound
Red or possibly Purple/Bluish, flashing slowly	Slow Spark	Audible ticking at slow rate	Battery Low or very cold.
Solid Red or Purple (sometimes Bluish)	No Spark (or no igniter installed)	No sound	Battery too low or cold to operate exciter
Solid Red or Purple or Blue	No Spark (or no igniter installed)	Buzzing	Exciter malfunction, return for repair
Light Off	No Spark	None	Dead Battery
-	Weak Spark	Audible spark at proper rate (~5Hz)	Igniter tip end fouled, clean carefully (NO WIRE BRUSHES) OR Possible partial breakdown in igniter or rod, OR Possible partial breakdown in exciter, OR Possible malfunction of exciter

## COMMON ACCESSORIES & REPLACEMENT PARTS

EXCITER: PN 07070707/07070800

EXTENSION ROD: PN 02000400

IGNITER: PN 01000730

TEST IGNITER: PN 02000500-A1-05