SaskPower	Megger Thumper Operation	Standard Operating Procedure

Table of Contents

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1.0 Purpose

This SOP provides:

- Information required to operate the Megger thumper, Model #SPG 32-1750 / 32-3500 / Surgeflex 32 and TDR Model Series - T3090

2.0 Roles and Prerequisites

Role(s)	Quantity Required	Prerequisites
SaskPower PLT's	2 or more	1. Know and understand the SOP - Field Care for Live Line Tools 2. Review and follow this SOP and User Manual job aids 3. Understanding of how to use agreed upon communication method 4. Standard Protection Code course

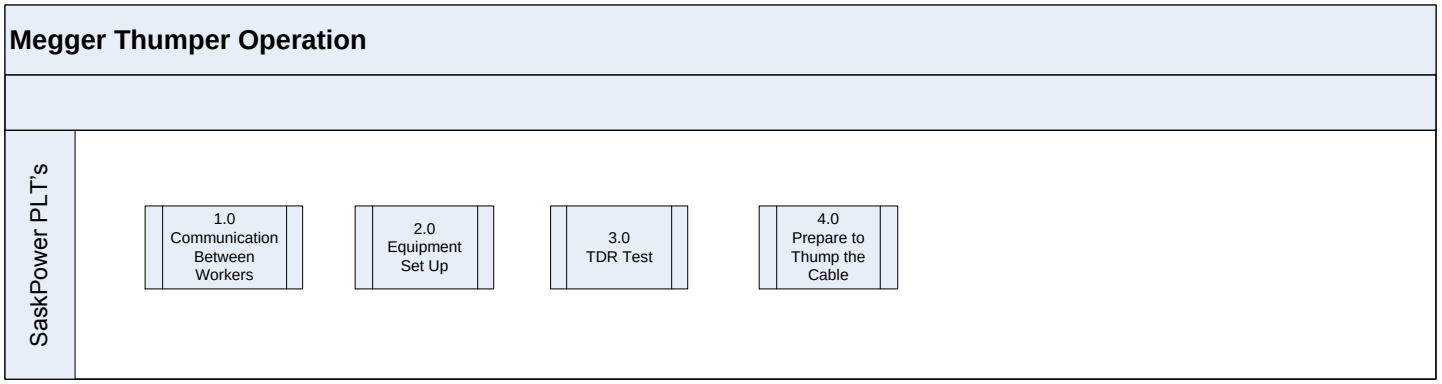
3.0 Tools and Equipment

Minimum Tools and Equipment Required:

- Megger thumper
- Grip all hotstick
- Elbow puller
- Potential tester
- Measuring wheel
- Class 2 rubber gloves
- Appropriate grounds for location

4.0 Procedure

High Level Flowchart



NOTE: Class 2 rubber gloves are to be worn at all times while making all test lead connections to and disconnecting from electrical apparatus and machine, as well as during the use of live line tools

The Procedure

The following requirements shall be met prior to the start of the procedure:

- Complete Hazard/Aspect and Risk Assessment
- Applicable Personal Protective Equipment (PPE) is available and in good condition
- Ensure test dates on equipment and tools are current and rubber gloves are inspected prior to use
- Ensure appropriate Standard Protection Code Permits are in place
- Ensure all applicable grounds are in place
- Ensure concentric neutrals are grounded at both ends (if applicable)
- Consider Environment Best Management Practices for any excavation required

1.0 Communication between Workers

1.1 Worker Communication

1.1.1 Communication shall be done in accordance with the Standard Protection Code

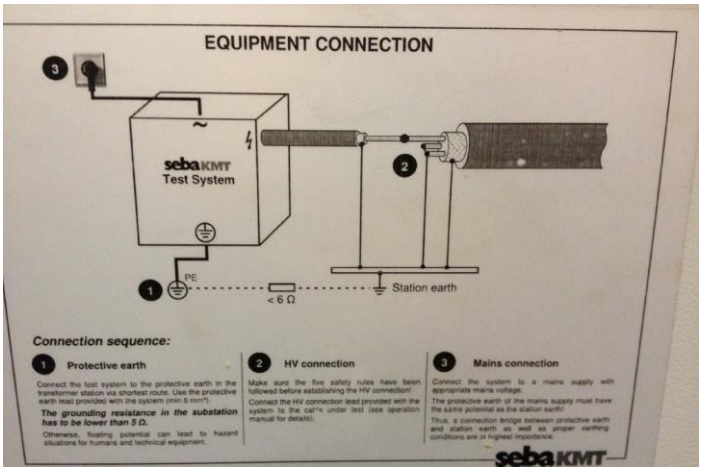
- *When Instructions are given by radio or telephone, each person will be satisfied as to the identity and authority of the other person before carrying out instructions. All such instructions will be repeated in full by the recipient*

2.0 Equipment Set Up

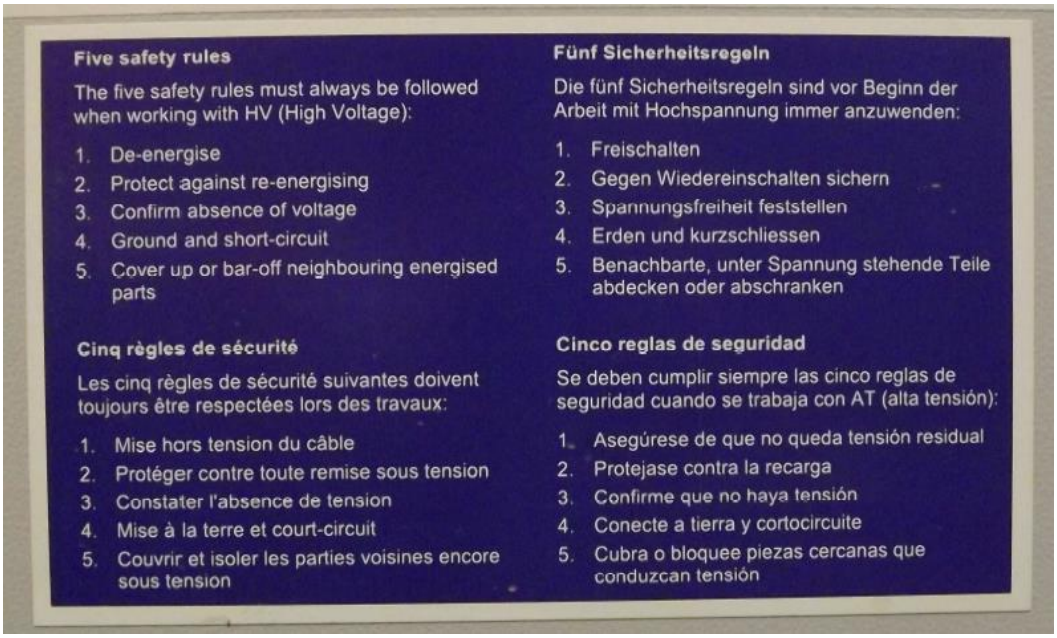
2.1 Set Up Equipment

2.1.1 Specific instructions listed below

- *Position test equipment in the best location according to the Hazard Aspect and Risk Assessment*
- *Install equipment ground lead to an approved grounding point at the test location and connect ground lead in truck at the reel stand*
- *Remove ground from the cable to be tested at the thumper location. Cables not being tested shall remain grounded*
- *Install the test leads on permitted cable at the thumper location and make connections in the truck to the test equipment*
- *Disconnect/remove ground from cable to be tested at the other grounding location*
- *Using approved method of communication (As per the Standard Protection Code) communicate that it is safe to proceed with test. If possible, close apparatus at far end or have personnel remain on site while performing tests for public safety*



***Above** - Equipment Connection Diagram*

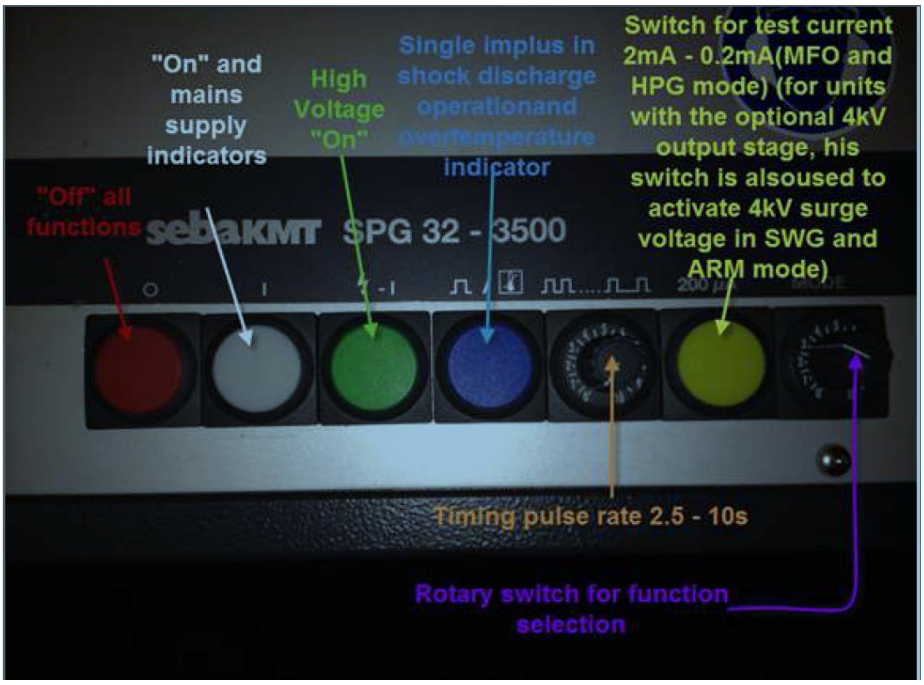


***Above** - Safety Rules*

2.2 Operation of Megger Thumper

2.2.1 Specific instructions for operation of Megger Thumper

- *Ensure all personnel are clear of the equipment being tested before proceeding with high voltage testing*



Above: *Picture of Controls*

- *Turn power on to unit*
- *Set equipment mode to 32kV Hipot, voltage knob to Zero, capacitor setting on 32kV*
- *Press white button, then press green button to allow voltage*
- *Turn voltage up and watch meters for cable fault conditions*
- *Upon completing the Hipot test, set voltage to Zero, engage equipment ground (red button)*
- *If ground fault is indicated, proceed to section 3.0 (TDR)*
- *If no further testing is required (fault condition found), communicate using approved method to proceed with draining capacitance*
- *Proceed with installing a ground lead with proper methods to drain any remaining capacitance to confirm that the cable and test leads are at ground potential*
- *Remove test leads using class 2 rubber gloves and connect high voltage lead and return lead together*
- *Disconnect ground lead*
- *Disconnect leads from equipment in the truck.*

Note: At this point the high voltage test lead and the return lead can be separated

- *Reel up and store all cables*

3.0 TDR Test

3.1 Perform TDR Test

3.1.1 SaskPower PLTs shall ensure the following:

- *NOTE: SaskPower PLTs shall, if Hipot shows a faulted cable, ensure to identify the distance to fault location by completing the following using the TDR*

TDR

- *Set up equipment to ARM mode, power on the TDR, follow onscreen instructions in quick steps*
- *Set capacitor tp range determined by fault breakdown during Hipot test when prompted for "single shot", press green button to allow voltage, increase voltage dial until you've reached sufficient voltage for fault breakdown*
- *Return voltage knob to Zero, depress blue button to release single shot of voltage.*
- *Record the distance to fault*
- *Depress the red button engaging equipment ground*
- *Send personnel to suspected fault location with digiphone to pinpoint fault location*
- *Note: One person must stay at the thumper location for operation of equipment*
- *When personnel are in location to begin pinpointing fault, communication will begin to commence thumping the cable*

4.0 Prepare to Thump the Cable

4.1 Prepare to Thump the Cable

4.1.1 The following are specific instructions to thump the cable

- *Set equipment to thump mode, voltage set to Zero, capacitor setting previously determined by Hipot test and what voltage was required to provide fault breakdown*
- *Set time duration of thump sequence to allow sufficient charge time for capacitors ie: 4 seconds*
- *Bring voltage up to desired setting that allows a sufficient discharge*
- *Fault can now be pinpointed, marked with flagging and/or red marking paint*
- *Once fault is pinpointed, communication is made to personnel to turn off equipment*
- *Dial down voltage, depress the red button to drain capacitance*
- *Communicate using approved method, that it is safe to proceed with installing a ground lead using proper methods to drain any remaining capacitance to confirm the cable and test leads are at ground potential*
- *Remove test leads with class 2 rubber gloves and applicable live line tools*
- *Connect high voltage test lead and return lead together*
- *Remove ground lead from test apparatus*
- *Disconnect test leads from equipment in the truck*

Note: At this point the high voltage test lead and the return lead can be separated

- *Reel up and store all cables*
- *Return all electrical apparatus and grounding to previous condition when the Standard Protection Code permit was received*

5.0 Components

The following is a list of components for this SOP which can be accessed through the SOP System:

Component Name	Component Type	Component Description	Location of Component
Megger Thumper Operation Flowchart	Flowchart	A high level flowchart for this procedures	SOP Online - SOP Bundle: Megger Thumper Operation

6.0 Acronyms, Definitions and Symbols

Acronyms and Abbreviations

TDR - Digital time domain reflection

Definitions

N/A

Symbols

N/A

7.0 Policies and Regulatory Requirements

This SOP is a result of the following regulations, policies, industry standards, and corporate directives and standards:

Regulatory Requirement(s)

- Occupational Health and Safety Regulations, Sections 450 - 467(1)

Policies

- Personal Protective Equipment Policy
- Hazard/Aspect and Risk Assessment Policy

Other

- Testing for absence of potential SOP
- Standard Protection Code sections 4.3.7, 4.4.5 and 4.5.4
- SaskPower Safety & Environment Rulebook

8.0 References

References
Owners manual - Found in the job aids for the SOP on SOP Online