

# HP Error Reduction Tools

January 24, 2020

***CALCULATE***

***[COLLABORATE]***

***CREATE***

- TRC's Human Performance (HP) program is an operational philosophy guided by the Five Principles of Human Performance:
  1. People are fallible, even the best people make mistakes.
  2. Error likely situations are predictable, manageable, and preventable.
  3. Individual behavior is influenced by organizational processes and values.
  4. People achieve high levels of performance because of the encouragement and reinforcement received from leaders, peers, and subordinates.
  5. Events can be avoided through an understanding of the reasons mistakes occur and lessons learned from past events.

# Overview (Cont.)



- This module provides an overview of the tools and techniques adopted by TRC for identifying risks and error likely situations, and more importantly, eliminating or mitigating the errors that contribute to serious incidents.
- These tools and techniques are based on the first two of the five human performance principles.
  1. Human beings make errors regardless of their age, experience, and education. Put another way, even the best employees on their best day can make mistakes.
  2. While it is impossible to predict the exact error or the timing of an error, the error traps and the situations that are more likely to contribute to errors can be predicted and therefore prevented, or at least minimized.

# Learning Objectives



- At the end of this course participants will be able to:
  - Identify TRC's HP error reduction tools.
  - Explain how TRC HP error reduction tools help mitigate risks associated with project tasks.
  - Name the items included in the Physical/Visual Tool Kit.
  - Apply Physical/Visual Tool Kit items to work situations.

# HP Error Reduction Tools

- HP error reduction tools are intended to make the human mind slow down to evaluate situations more thoroughly. TRC's HP error reduction tools are categorized into the following categories:

## 1. PROCEDURAL

- The 17000 documents assist with the planning and execution of a project.

## 2. PHYSICAL/VISUAL

- The tool kit provides tools that help minimize errors and avoid outcomes causing serious harm.

# HP Error Reduction Tools (Cont.)



- Procedural: 17000 Documents
  - Planning is the first step to ensuring a successful outcome, in the context of safety and operations. The procedural tools provoke a questioning attitude and prompt thorough planning regarding in-service equipment, outage boundaries, and common hazards; thus, increasing situational awareness.
  - Some examples include:
    - Commissioning Plan
    - Risk Assessment
    - Isolation Plan
    - Daily Pre-Job Brief/High Risk Task Plan
    - Lifted Wire/Temporary Jumper Logs
    - Equipment Test Certification Sheets
    - Daily/Weekly Progress Reports
    - Pre-Energization Walkdown Checklists

# HP Error Reduction Tools (Cont.)



## Document/Procedure

## Purpose

### Commissioning Plan

The *primary planning* document where the complete scope of work, outage schedule, outage sequence, and project responsibilities are defined and documented.

### Risk Assessment

The document where the risks to an event-free execution and necessary plans to mitigate the risks are identified and documented.

### Isolation Plan

The document where all secondary isolation points from the schematics are identified and documented.

### Daily Pre-Job Brief/High Risk Task Plan

The document where all the tasks for the day, safety and operational risks, and plans to eliminate or mitigate the risks are identified and documented.



# HP Error Reduction Tools (Cont.)



## Document/Procedure

## Purpose

### Lifted Wire/Temporary Jumper Logs

The document where any temporary jumpers that are going to remain in place for a period of time or wires that will be lifted are logged.

### Equipment Test Certification Sheets

The checklist where each test or inspection point performed on each equipment is signed off on the day that it is completed.

### Daily/Weekly Progress Reports

The progress report where all work completed in a day along with any difficulties that could delay the project are recorded.

### Pre-Energization Walkdown Checklists

The checklist where all completed work for each equipment is verified as a final review of the project when all work is complete.

# HP Error Reduction Tools (Cont.)



- The physical/visual tool kit includes, *but is not limited to*, the following items:
  - Control Switch Handle Cover
  - Tape
  - TRC Magnets
  - Single Terminal Point Cover
  - Double Terminal Point Cover
  - Caution Tape
  - Verbiage Communication Magnets
  - Wire Clips
  - Wire Caps
  - Hanging Tags
  - TRC Hanging HP Barrier
  - Switch Guard
  - Test Jack Isolator Paddles
  - Serial Port Covers
  - Screw Terminal to Banana Jack Adaptor

---

## **Control Switch Handle Cover**

- Use to prevent unintended operations of control equipment.
- Use to cover and protect almost any make and model of control switch handle.

---

## **Tape**

- Use to insulate exposed parts from accidental contact.
  - Use to block and barricade terminals and terminal blocks.
  - Use to color-code terminal components.
-

---

## **TRC Magnets**

- Use to hang drawings in the control house or on panels for ease of access and reading.
- Use to hang forms or signs.

---

## **Single Terminal Point Coverup**

- Use to cover a single terminal point to protect against accidental shorting.

---

## **Double Terminal Point Coverup**

- Use to cover two terminal points to protect against accidental shorting.
-

---

## Caution Tape

- Use to bring awareness and restrict access to hazardous work-areas in the control house and substation yard.
  - Use to provide visual barrier to in-service relay panels.
  - Use to tape off front of back of in-service relay panels to provide a visual barrier or as a demarcation line between in-service and out-of-service panels.

---

## Verbiage Communication Magnets

- Use to establish a work-area.
  - Use to identify and barricade in-door and out-door equipment during testing (i.e. danger, equipment in-service, equipment out-of-service, panel under-construction, etc.).
-

---

## Wire Clips

- Use to identify wires and cables for removal.
- Use to indicate points of test connections.

---

## Wire Caps

- Use as a temporary insulator to keep lifted wires from contacting other terminals or wires.
  - Use as a temporary insulator to identify wires during testing.
-

---

## **Hanging Tags**

- Use to identify work-areas or panels that should not be accessed during testing.

---

## **TRC Hanging HP Barrier**

- Use to barricade in-service relays, panel sections, or entire panels to provide a clear visual barrier.

---

## **Switch Guard**

- Use to protect a standard AB FT-1 test switch from being unintentionally closed or shorted.
-

---

## **Test Jack Isolator Paddle**

- Use to isolate current test switches.

---

## **Serial Port Covers**

- Use to cover female serial ports from connection, physical damage, dirt, and dust.

---

## **Screw Terminal to Banana Jack Adaptor**

---



***Thank You***

# HUMAN ERROR DEFENSE KIT NARRATION SCRIPT

## Overview Video

TRC Field Operations' Human Performance (HP) program is an operational philosophy guided by the Five Principles of Human Performance. **These principles are:**

- People are fallible, even the best people make mistakes.
- Error likely situations are predictable, manageable, and preventable.
- Individual behavior is influenced by organizational processes and values.
- People achieve high levels of performance because of the encouragement and reinforcement received from leaders, peers, and subordinates.
- **And**
- Events can be avoided through an understanding of the reasons mistakes occur and lessons learned from past events.

The purpose of this course is to provide an overview of the physical and visual tools adopted by TRC Field Operations for identifying risks and error likely situations, and more importantly, eliminating or mitigating the errors that contribute to serious incidents.

**The physical and visual tools adopted by TRC Field Operations are based on the first two of the five human performance principles. Always be mindful that:**

- Human beings make errors regardless of their age, experience, and education. Put another way, even the best employees on their best day can make mistakes.
- **And**
- While it is impossible to predict the exact error or the timing of an error, the error traps and the situations that are more likely to contribute to errors can be predicted and therefore prevented, or at least minimized.

**The purpose of these tools is to construct defenses to protect field personnel and equipment.**

---

The Human Error Defense Kit **includes** physical and visual tools which provide defenses against human error to maximize safe and event-free completion of tasks on the job site.

### **Keep in mind:**

- The first step in achieving a successful outcome is **planning**.
- Planning begins as soon as the **testing and commissioning** team starts to evaluate the project scope and outage boundaries and continues **every day** until the end of the project.
- The planning process consists of evaluating the equipment and systems that will be installed, modified, or removed to:
  - Identify safety and operational hazards associated with each task.
  - Review installed defenses.
  - **And**
  - Apply or modify defenses as necessary to ensure the highest level of protection as possible.
- The Human Error Defense Kit is used by the **team** to identify and bring awareness to the risks and hazards associated with project tasks and to remain consistent through distractions and stressful or dangerous situations.

## HUMAN ERROR DEFENSE KIT NARRATION SCRIPT

Below are narration WAV files need for the WBT.

### Course Information Slide

- This course takes approximately 15 minutes to complete.
- There is a quiz at the end of the course.
- The narration of this training can be viewed in the **Notes** section.
- Click Next to continue.

### Learning Objectives Slide

At the end of this course participants will be able to:

- Explain how TRC Field Operations' Human Error Defense Kit helps mitigate risks associated with project tasks.
- Name the **tools** included in the Human Error Defense Kit.  
**And**
- Apply Human Error Defense Kit **tools** to work situations.

### Branching Slide (used for the 14 tools)

The Human Error Defense Kit includes the following physical and visual tools.

**Click the name of each tool, in order, to learn more.** **NOTE:** Some clients may require the use of alternative or additional physical and visual tools.

### Summary Slide

You should now have a better understanding of **how** the Human Error Defense Kit and Its Application.

Let's test your knowledge!

Click Start the Quiz to continue or Click Revisit Content to review the information presented.

## HUMAN ERROR DEFENSE KIT NARRATION SCRIPT

### Control Switch Handle Covers

Use control switch handle covers to barricade control switches and lockout relay handles to prevent accidental operation.

**Note:** TRC provides different colors of control switch handle covers to support various client standards.

### Electrical Tape

Use electrical tape to barricade terminals and equipment, to insulate exposed parts and wires from accidental contact, and use as an equipment identifier when labeling with a permanent marker.

**Note:** TRC provides different colors of electrical tape to support various client color-code standards.

### TRC Magnets

Use TRC magnets to hang drawings, forms, or barriers in the control house or on panels for ease of access and reading.

### Single & Double Terminal Point Covers

Use single and double terminal point covers to barricade single and double terminal block points to prevent access and contact.

And

Install terminal point covers as a barrier to identify adjacent terminals that are off-limits or energized.

### Caution Tape

Use caution tape to bring awareness and restrict access to hazardous work areas in the control house.

And

Use to tape off the front or back of in-service relay panels to provide a visual barrier or as a demarcation line between in-service and out-of-service panels.

### Hanging Tags (Small & Large)

Use hanging tags to identify control switches or lockout relays that are part of construction or testing.

Hang small tags on the handles at the front of the control panels and large tags on the switch contact deck at the rear of control panels.

**Note:** Small and large tags are included in sets of ten. Each tag needs to be numbered one through ten and include the owner's name. Using numbers ensures the owner has a complete set upon task completion.

## HUMAN ERROR DEFENSE KIT NARRATION SCRIPT

### **Verbiage Communication Magnets**

Use verbiage communication magnets to establish a work area or to identify indoor and outdoor equipment during testing.

**Note:** The “Panel Under Construction” magnet shall include the owner’s contact information such as name and phone number.

### **Wire Clips**

Use wire clips to provide a visual aid in identifying wires and cables for installation, termination, and modification or removal.

Install small clips to identify wires, switches, or terminal points and large clips to identify cables.

**Note:** Peer verification shall be performed for identification and confirmation.

### **Wire Caps**

Use wire caps to temporarily cover exposed ends of loose unterminated conductors from contacting other wires, terminals, and personnel.

Install small caps on un-lugged conductors and large caps on lug conductors.

**Note:** Wire caps shall be taped in place to prevent sliding.

### **Test Switch Guards**

Use test switch guards to barricade and prevent open test switches from operation and to guard against contact with energized test switch blades.

**Note:** TRC provides different color test switch guards to support various client standards.

### **Serial Port Covers**

Use serial port covers to barricade serial ports from incorrect or accidental connection.

## HUMAN ERROR DEFENSE KIT NARRATION SCRIPT

### Test Jack Isolator Paddles

Use a test jack isolator paddle to disconnect the relay side of the test switch from the field side when isolating current test switches. The paddle will allow testing to be performed on the relay side without affecting the in-service current circuit.



**Before installing test jack isolator paddles into an in-service current circuit, ensure proper procedures are followed to prevent an open current transformer.**

For more detailed information refer to the manufacturer's installation guidelines.

The manufacturer's installation guidelines can be found in document **PD0030300B** on [www.arbiter.com](http://www.arbiter.com).

### TRC Hanging HP Barriers

Use TRC hanging HP barriers to provide a visual barricade for equipment in the front or rear panel sections.

**Note:** Keep in mind, TRC hanging HP barriers are **NOT** voltage-rated.

### Screw Terminal to Banana Jack Adapters

Install screw terminal to banana jack adapters on terminal points to allow for an easier and safer connection with banana test leads.

**Note:** TRC provides the screw terminal to banana jack adapter instead of alligator clips as they allow for a safer connection.

### Transition Outro (Example)

Each task performed by a substation and protection technician or engineer creates opportunities for human error. It is imperative for all personnel to effectively utilize the Human Error Defense Kit tools when performing daily tasks to prevent and reduce the likelihood of unsafe and unintended events.