



Rejuvenation Instructions

#210 – Impulse Phaser Device (IPD)



This NRI covers the following:

- How the Timco Instruments Impulse Phaser Device (IPD) integrates with the 10 Commitments.
- When to fill in fields of the IPD Checklist.
- How to test the IPD for correct functionality.
- How to correctly connect the IPD to underground power cables
- How to use the IPD to safely identify power cables.
- What diagnostic results should be seen during cable identification.
- Basic troubleshooting methods.

Patents:

<http://www.novinium.com/patents/>



WARNING: It is dangerous working around energized high-voltage systems, pressurized systems, and chemicals. Always work in accordance to the Novinium Field Operations Safety Handbook (FOSH) or other local governing safety standards.

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Introduction

When correctly operated, the IPD transmitter produces a DC pulse that’s transmitted through the red lead to the cable’s conductor. It continues through the shorted grounds and neutral wires, returning through the yellow lead back to the transmitter.

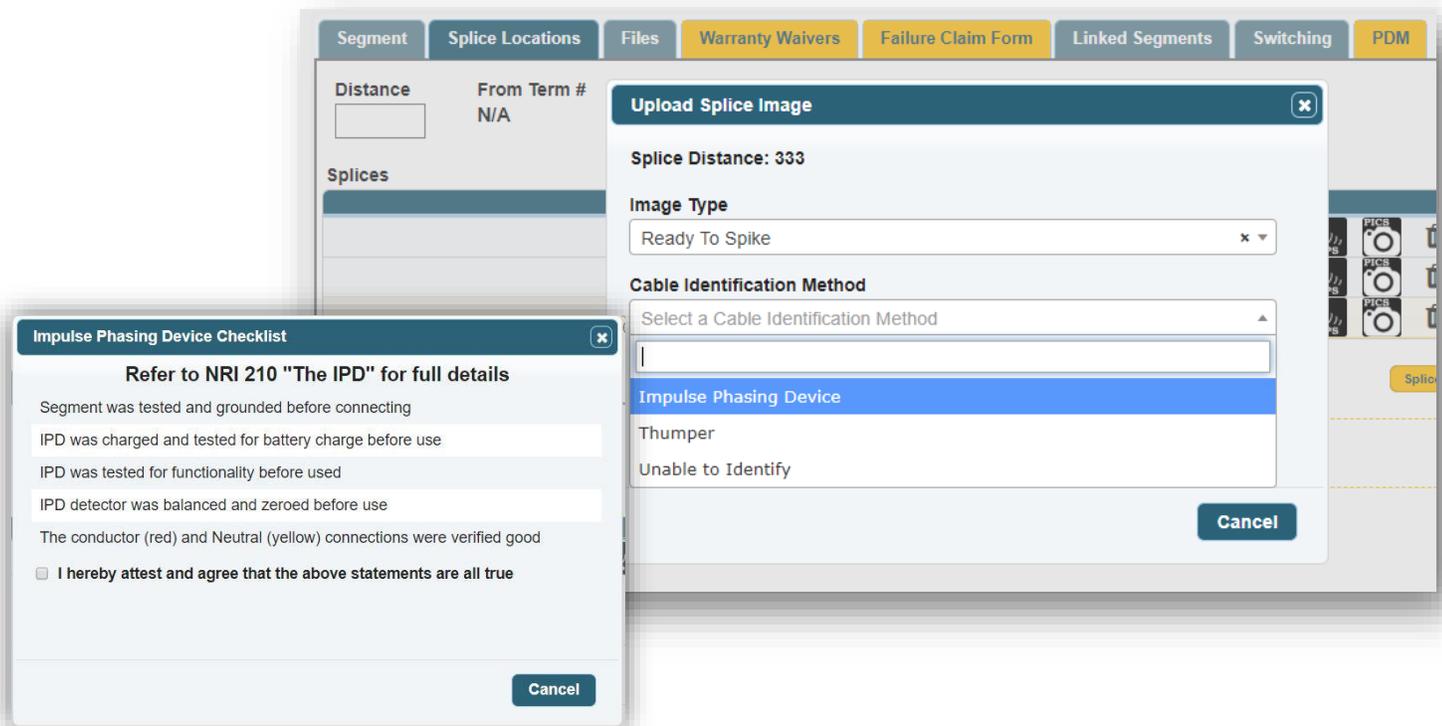
The direction of the IPD transmitter’s outgoing pulse in relation to the direction the detector clamp-on is facing is the basis for identifying cables and phases.

Knowing and understanding the pulse’s path is critical to successfully identifying cables. The IPD serves as a safety pre-step for **Commitment 10**, which is to remotely spike cables before cutting.

The IPD (Impulse Phaser Device)

1. Complete the IPD checklist online or print

- Fill out IPD checklist on Knomentous
 - i. In the splice locations tab, click the image button, select ‘Ready to Spike’ and ‘Impulse Phasing Device (IPD)’.
 - ii. Acknowledge that the IPD checklist was completed
- Otherwise, print out IPD checklist at the end of this NRI



2. Test for functionality.

Click the image below to view the “IPD Testing” video that explains how to test and connect the IPD to the cable, in line with the following steps.



Video 1: Testing and connecting the IPD to the cable.

- a. With the leads not connected, flip the IPD transmitter’s switch to the “ON” position.
- b. The red light should become solid if functioning properly.



Figure 1: The solid red light indicates high resistance or an open circuit.

If one of the following occurs, follow the directions outlined:

- **The transmitter does nothing.**
The battery may be discharged. Plug the IPD transmitter into an electrical outlet and restart the functionality test.
If the transmitter continues to do nothing after restarting, contact the Training or Engineering departments for help.
- **The amber light blinks.**
If the amber light begins blinking, make sure the leads are electrically disconnected and restart the

functionality test.

If the amber light continues to blink, contact the Training or Engineering departments for help.

- c. After verifying a solid red light, flip the IPD transmitter’s switch to the “OFF” position.
- d. Clamp the red and yellow leads to each other.



Figure 2: The red and yellow leads clamped together for testing.

- e. Flip the IPD transmitter’s switch to the “ON” position.

The amber light should begin blinking, signaling a proper electrical connection between the leads.



Figure 3: A blinking yellow light indicates an electrical connection between the red and yellow leads.

If one of the following occurs, follow the directions outlined.

- **The transmitter does nothing.**
The battery may be discharged. Plug the IPD transmitter into an electrical outlet and restart the functionality test.
If the transmitter continues to do nothing after restarting, contact the Training or Engineering departments for help.
- **The red light is solid.**
If the red light is solid, make sure the leads have a good connection and restart the functionality test.
A persisting red light the transmitter leads aren’t connected.

If the red light continues to be solid, contact the Training or Engineering departments for help.

- f. Record that the IPD has been tested before use on the IPD checklist.

3. Setting up the IPD Transmitter

Recall that the IPD must be connected to a continuous circuit for the transmitter to send an impulse from the red lead which can return on the yellow lead.

Both ends of the cable should be grounded following the FOSH.

- a. On one end, remove the conductor from ground.
- b. Attach the red lead to the conductor (Figure 4, left)
- c. If using a feedthrough, remove the grounding elbow clamp from ground and attach the red lead to the clamp.
- d. The yellow lead can be attached anywhere to the system ground. This includes a grounded adjacent conductor or the concentric neutrals of the cable.
 - Wire brushing helps ensure a good electrical connection.



Figure 4: Attaching the red and yellow leads of the transmitter.

Click the image below to view the “IPD Use” video explaining the steps to using the IPD, in line with the following steps. In the video, note that the clamp-on should have been placed inside of the concentric neutrals on the splice body, if possible.



Video 2: How to use the IPD

- e. Flip the IPD transmitter's switch to the "ON" position.
- f. The amber light should begin blinking, signaling a proper electrical connection between the leads.
If one of the following occur, follow the directions outlined.

- **The transmitter does nothing.**

The battery may be discharged. Plug the IPD transmitter into an electrical outlet and restart the process.

If the transmitter continues to do nothing after restarting, contact the Training or Engineering departments for help.

- **The red light is solid.**

If the red light is solid, make sure the leads have a good connection and restart the functionality test.

The solid red light indicates a high resistance circuit such as a fault or high neutral corrosion.

If the red light continues to be solid, contact the Training or Engineering departments for help.

4. Setting up the IPD Clamp and Receiver

Note: clamping around both the cable body and neutral wires can reduce the signal strength from the return current partially cancelling the signal from the red lead.

To minimize signal cancellation, ensure the cable's neutrals are securely connected to the system ground at both ends. Also, whenever possible, place the clamp inside of the concentric neutrals. See Figure 5 for how this can be done when clamping at a splice location.

Face the labeled side of the IPD detector clamp toward the cable end with the transmitter connected.



Figure 5: The clamp-on’s label faces toward the IPD transmitter and, whenever possible, does not clamp around neutral wires

- g. With the IPD transmitter on and the IPD detector clamp-on around the cable body, press the detector’s “ON” button completely down.

The detector should begin registering the IPD’s signal down the cable by moving the needle.



Figure 6: Pressing and holding the “ON” button will cause the needle to deflect.

- h. Release the “ON” button.
- i. Turn the “SENS” knob all the way down to ZERO.



Figure 7: Turn the sensitivity of the detector down.

- j. While pressing the detector’s “ON” button completely, turn the “BAL” knob to balance the needle by centering it between the red and yellow zones when the pulse is off.
 - The detector may need to be rebalanced for each cable.
 - The IPD pulse is off when the amber light goes dark.
 - The IPD pulse is on when the amber light is on and an audible tick occurs.



Figure 8: Hold the “ON” button and use the “BAL” knob to center the starting needle point.

- k. While pressing the detector’s “ON” button completely down, adjust the “SENS” knob until the needle has visible deflection, one way or the other.
 - The needle does not need to peg out on the meter.



Figure 9: Hold the “ON” button and adjust the “SENS” knob to increase the detector’s sensitivity.

- l. Record the balancing and zeroing out on the IPD checklist.

5. Using the IPD to identify cables.

- a. After calibrating with the IPD detector clamp-on, press the detector’s “ON” button completely down.
- b. The detector may need to be rebalanced at this time.
- c. The needle in the detector should deflect to either the red or yellow zones or not deflect at all.
 - **The needle will deflect to the red zone if the clamp-on is on the same cable as the IPD transmitter.**



Figure 10: A clear deflection to the red zone signifies the correct cable.

- The needle will deflect to the yellow zone if the clamp-on is facing the incorrect direction, or when the IPD detector clamp-on is on a different cable.
 - If the needle does not deflect to the red, the clamp-on likely on a different cable.
- d. Record the deflection result on the IPD checklist.
 - e. If cable deflects to the red zone, skip step e.
 - f. If the needle does not reflect to the red zone, repeat the identification process until the cable deflecting to the red zone is found.
 - If no deflection to the red zone is found, contact the Training or Engineering departments for help.
 - Underground cable loops are a common reason for the above situation.
 - g. As a second visual confirmation, mark the cable with the deflection to the red zone.



Figure 11: Marking the cable with the red zone deflection is a second visual confirmation.

- h. After identification the cable can now be spiked or cut in accordance with the FOSH
 - Errors may occur during the identifying process. **DO NOT** cut any cable until following **Commitment 10** to verify that the cable has been de-energized by using the remote spiking tool.

Job ID: _____ Date: _____

Knomentous Segment #: _____ Number of Splices at the Location: _____

Termination #1 ID: _____ Termination #2 ID: _____

Splice and Clamp-on Location: _____

Include e footage, pit, vault, manhole, switchgear, xfmr

Cable Phase(s): _____ IPD Location: _____

Was the segment tested & grounded before connecting the IPD? Y N

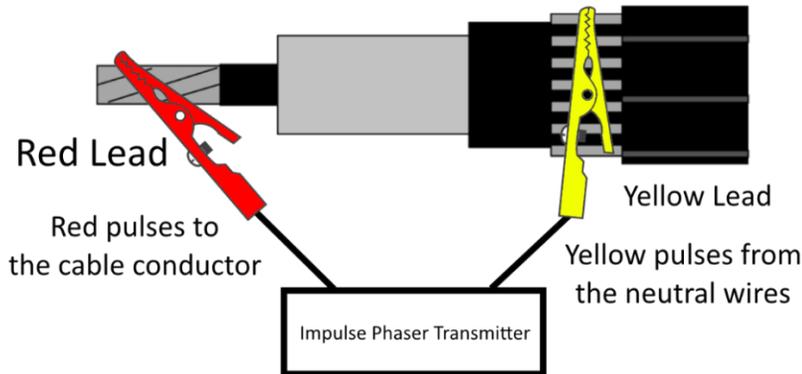
Was the IPD charged and tested for battery charge before use? Y N

Was the IPD tested for functionality, according to **NRI 210**, before used? Y N

Was the IPD detector balanced and zeroed, according to **NRI 210**, before use? Y N

Were the red - conductor and yellow – neutral connections verified good? Y N

Note: Only fill out cable deflection table until red deflection is found.



IPD Identification Reading:	Cable 1 Deflects		Cable 2 Deflects		Cable 3 Deflects	
	RED	YELLOW	RED	YELLOW	RED	YELLOW
Clamp-on label facing transmitter and around the cable		NONE		NONE		NONE

Time of confirmation: _____

Person at the IPD: (Print) _____ (Sign) _____

Person at Clamp-on: (Print) _____ (Sign) _____

Qualified Novinium Employee