

Safety



This safety alert symbol means danger shock hazard, Exercise caution, and follow all instructions.



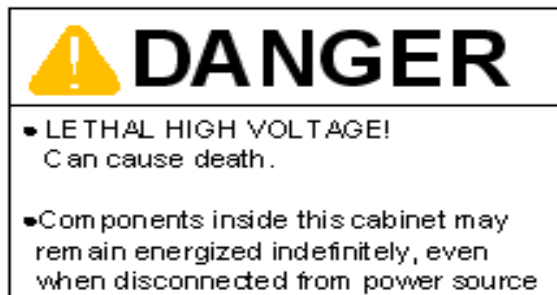
These safety alert symbols mean Caution, Danger, or Warning – Personal safety instruction, Read and understand the instruction because it has to do with safety. Failure to comply with instruction may result in personal injury or equipment damage.

- The Hawkinson NDT[®]-III is the most effective product available for detecting holes and imbedded nails in tires being prepared for retreading. However, because of the high voltages, operators must exercise caution.



Maintenance performed and opening of Hawkinson's NDT[®]-III electrical cabinets should only be by qualified, trained electrical personnel.

- Ensure that warning labels are visible on the NDT[®]-III. Warning labels are in the following areas:



On the door of the electronics cabinet as shown in figure.



This warning sticker is located on the probe arm.



This caution sticker is on the spreader.

- Wear eye protection while operating the NDT[®]-III.
- Wear proper clothing while operating the NDT[®]-III.
- Do not wear loose cloths that can be caught in the rollers.
- Do not wear rings, jewelry, or anything that is conductive, which could cause a shock from arcing.
- Work gloves should be worn.
- A cushioned, rubber mat is recommended to reduce operator's potential to ground and fatigue.

Lockout Tagout

Electrical

A trained and qualified person should perform electrical work. This section does not remove the responsibility of the employer to establish a program and utilize procedures for affixing appropriate lockout devices or tag out devices to energy isolating devices, and to disable the NDT-III or equipment to prevent unexpected energization, start up, or release of stored energy in order to prevent injury to employees.

- ◆ Unplug the NDT from its electrical source. Install and tag a lockout boot over the plug. The plug should remain in the exclusive control of the person performing maintenance on the NDT. Wait 15 seconds for the 24 VDC power supply to dissipate its energy after removing plug from its energy source.

Air

Lockout procedures should include a method for safely removing air pressure as well as electrical potentials. Compressed air can be dangerous if an operator is unfamiliar with it. Trained and experienced operators should perform assembly, handling, or repair of pneumatic systems. Do not service this equipment or attempt to remove components until confirmation of safety.

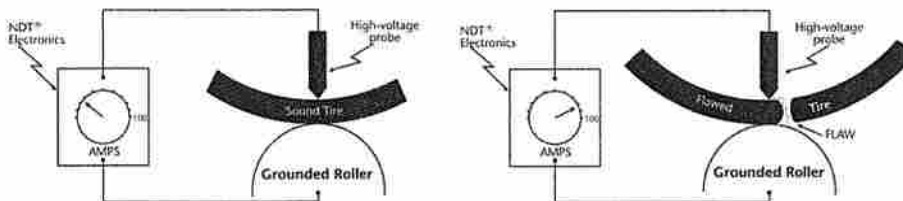
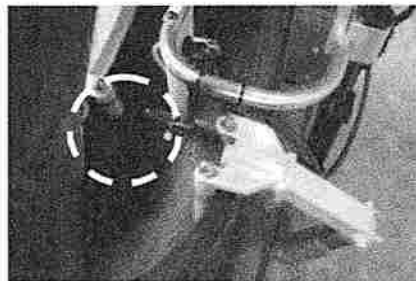
1. Before removing the main air supply, ensure that the probe, table lift, tire lift, and associated valves and solenoids are positioned to prevent dropping of work pieces and run-away of equipment, etc. Install scissor-lift safety lock. The main air supply pressure can be removed. Exhaust all compressed air from the system before performing maintenance work.
2. Before the NDT is restarted, take measures to prevent shooting out of cylinder piston rod etc. Bleed air into the system gradually to create back pressure.

Introduction

All Hawkinson NDT® machines operate on the principle that a small flaw in electrical insulating material (including rubber) can be found using high-voltage electrical fields. For example: Consider an ordinary electrical cord, as long as the cord's insulation is sound electricity is contained and flows in moderate amounts. However, if the insulation is flawed, an arc can develop from the flawed conductor to ground. The current flow in a fully insulated conductor and a flawed conductor arcing are very different. When an arc occurs, a current change is detected by a circuit breaker, which disconnects the flow of electricity.

The digital, pulsing generator on the NDT®-III emits a very specific amount of energy. The energy is transmitted through the high-voltage output wire and probe to the tire. An energy monitor (current transformer) captures the amount of energy traveling through the output wire. The energy monitor transmits the specific energy level to the detector circuit. When a flaw is exposed to the probe, an arc occurs and the detection circuitry triggers a flaw condition. The arc may not be seen, it may only be heard.

The tire acts as resistance as it turns between the probe and a grounded roller. When the energy/arc passes through flaw in the tire to the ground roller, then to the high-voltage generator, it completes a circuit and an arc will be seen or heard. This higher current flow will alert the detection circuitry to trigger a flaw condition.



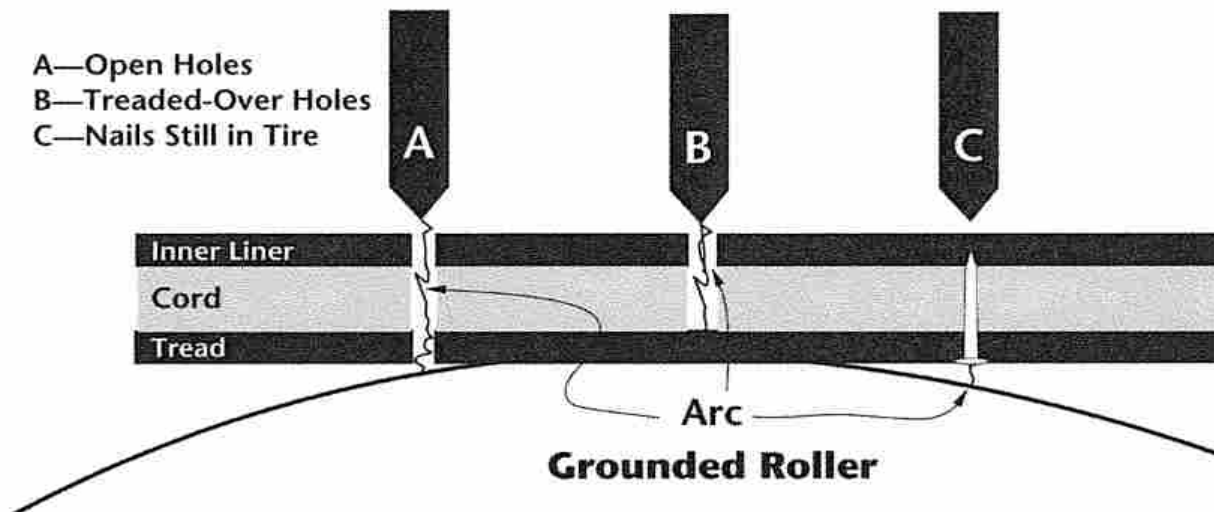
The type of high-voltage pulse the NDT®-III uses is different for fabric and steel tires. Use the correct voltage by selecting either steel or fabric using position selector switch on the operator's console.

Types of Flaws the NDT®-III will Find

The NDT®-III detects the following flaws in fabric and steel tires:

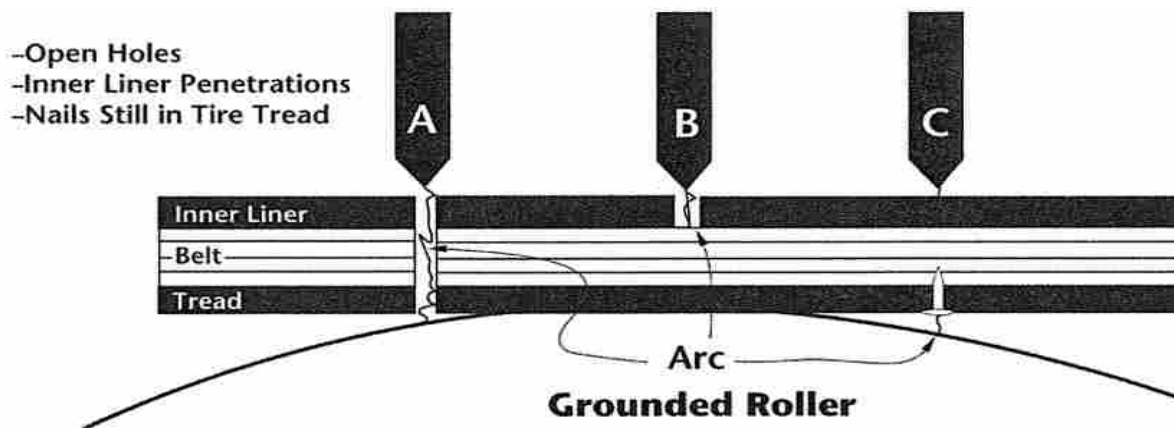
Fabric or Bias Ply Tires

- A – Open holes in the tread area
- B – Treaded-over holes (tread areas)
- C – Nails embedded in the tire (tread area)



Steel Ply Tires

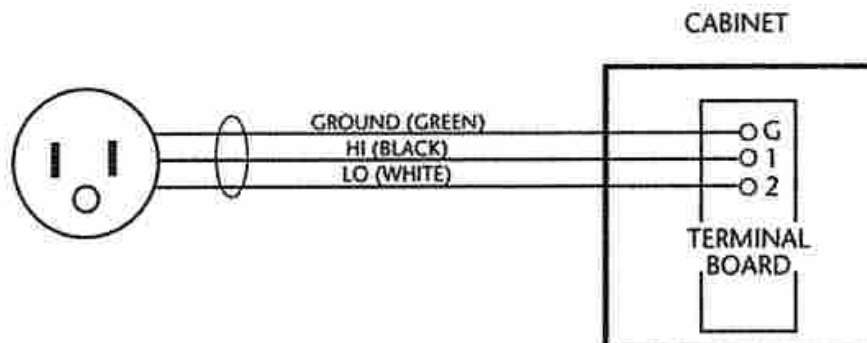
- A – Open holes in the tread area
- B – Inner liner penetrations from non-repairable area to the opposite non-repairable area
- C – Nails embedded in the tire



Pre Installation – Electrical

Your NDT[®] - III will be equipped with an electrical system compatible with the electrical system in your area. **It is Critical that an uninterrupted ground cable be installed from the NDT[®]-III to the grounding electrode of the building's main service.** A good electrical ground is more than following NEC requirements; it must also be a low impedance system. The ground path is the fault path for stray current. If electricity follow the path of least resistance, then the ground circuit must have a lower resistance than an individual to protect them. The rule of thumb for protecting people is to maintain a ground impedance of less than one Ohm. However, it may not be adequate protection for electronic equipment. IEEE recommends a ground impedance to be less than 0.25 Ohms for proper protection. Follow all electrical codes when installing an NDT[®] -III.

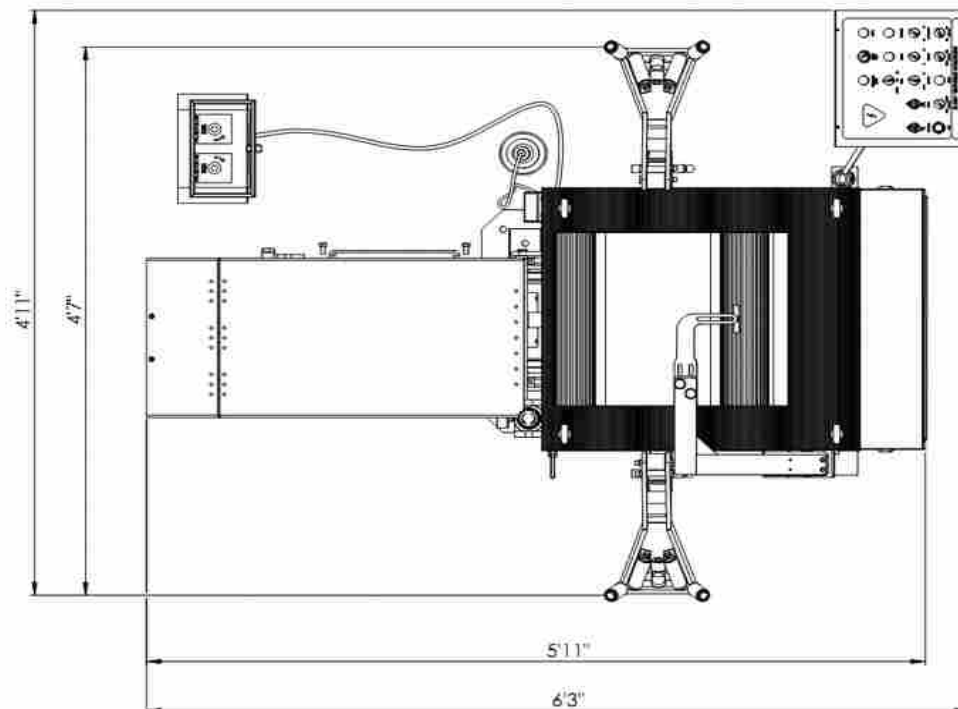
Type 1. Electrical Installation Single Phase 120/240 VAC 50/60 HERTZ



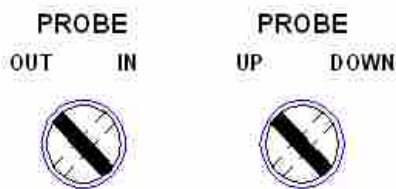
Installation

Step 1 – Unpack the NDT[®] -III and position it where it will be operated.

Step 2 – Position the NDT[®] -III according to the floor plan below. Ensure that the operator has adequate room and that maintenance personnel have access to enclosures and panels as shown in the maintenance section of this manual.



Step 3 – Set the switches on the control cabinet to the following positions.

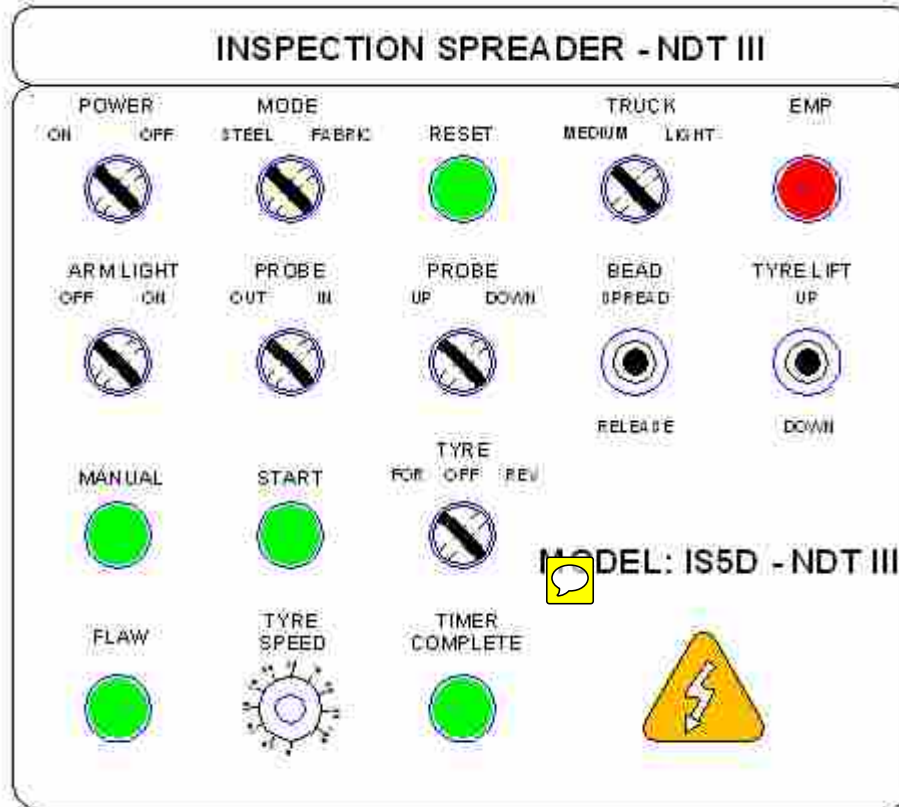


Step 4 – Make the electrical connections.

Step 5 – Connect the air supply. The main air pressure regulator should be set at 150 p.s.i (10.5 bar)

Controls

Acquaint yourself with the NDT® - III control panel. Each of the panel's Components is described in the following pages.



POWER

ON OFF



Power (ON/OFF) – This two-position selector switch must be in the “On” Position to operate the machine.

RESET



Reset Button – When initially powering the NDT® -III, opening of the reset button is necessary for safety reasons to confirm desired response.

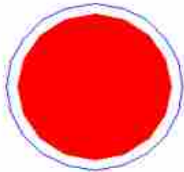
MODE

STEEL FABRIC



Steel / Fabric Ply Selection – This switch indicates the type of high-voltage pulse that will be applied to the tire.

Important: The high-voltage pulse used for fabric- constructed tires makes use of higher voltages than that used for steel-constructed tires. If you use the high-voltage pulse of fabric on a steel ply tire for too long, you may damage the tire.

EMP

Emergency stop – This button is for emergency shutoff of the the NDT® - III. Do not use this button for normal shut down operation. This button must be in the enable (out) position for the machine to operate. Weekly testing of this switch is recommended.

PROBE

OUT IN



Probe In/Out – This switch swings the arm to the center of the tire. You must set this switch to “In” before you can lower the probe into the tire.

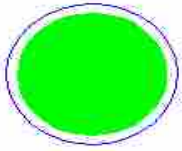
PROBE

UP DOWN



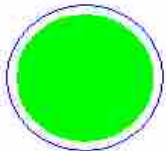
Probe Up/Down – This switch controls the placement of the probe inside the tire.

START



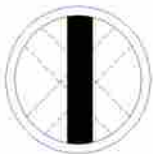
Start- Momentarily pressing the start button begins the test, the computer is in the test mode, and the tire starts rotating. Momentarily pressing the start again will disengage the test mode and stop the tire from rotating. **Note: if the tire continues to rotate after momentarily pressing the start button to discontinue the test, the duration in which the button was held was too long. The button must be pressed and released quickly.** When the NDT[®]-III detects a flaw, press the start button again to continue the test. The motor direction and speed cannot be controlled during automatic testing. Control of the motor speed and direction can be accomplished with the use of the manual button.

MANUAL



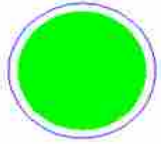
Manual - If a flaw is detected the tire will stop rotating and the blue flaw LED will illuminate. Pressing and holding the manual button will generate the same high-voltage pulse as the start button and cause the motor to turn at the same time. The direction and speed can be controlled while using the manual button.

TYRE FOR OFF REV



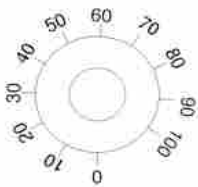
Direction control – This switch changes the direction of the tire rotation and turns off the motor. During tire testing this switch will only stop the motor from turning and, no matter what direction is selected, the tire will only rotate clockwise as seen from the operator's side of the machine. The direction switch should be used to jog the motor back and forth while using the manual button to help pinpoint a flaw.

FLAW

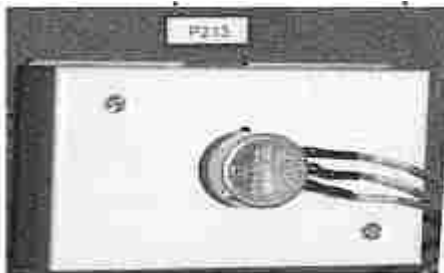


Flaw – This light will illuminate when a flaw is detected if the start button is used to begin the testing. This light will also illuminate when the probe is in the up position or when the start button is used to discontinue tire testing. The flaw light will not illuminate during testing until a flaw is detected. The flaw light will not illuminate while using the manual button to detect a flaw. This light has a press- to -test feature to test the circuit.

TYRE SPEED



Rotation Speed Control – This knob controls the speed of the tire's rotation while using the manual button or foot pedals. Position “0” is the slowest speed, and position “100” is the fastest speed. Moving this control Knob between these two settings will increase or decrease the speed of the tire's rotation. Speeds less than 80 will generate the best test results during electronic inspection. Visual inspection speed is at the discretion of the operator.



Manager's Speed Control – The manager's speed control allows the manager to set the desired speed for automatic testing. Visual and manual electronic inspections are not affected by the manager's speed control. When setting the manager's speed control, use of slower speed will generate the best test results during electronic inspection. Typically, the speed should be set so an 11R24.5, with no spread, takes approximately 15 seconds to make one revolution.

To set the speed of the manager's speed control:

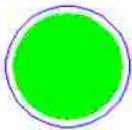
1. Open the operator's console and locate the potentiometer shown above
2. Mount an 11R22.5 on the NDT® -III with minimal spread to hold tire in place
3. Place the probe in the tire by selecting “in and down” with respective controls
4. Mark the tire's starting point to identify one complete revolution



5. Remove the mounting box to gain access to the potentiometer's dial
6. Press the start button and time one revolution.
7. Turn potentiometer clockwise to increase speed, or counterclockwise to decrease speed
8. When desired speed is reached, replace the mounting box and secure the operator's console

Note: to set the manager's speed control use a tire without a flaw.

TIMER COMPLETE



Timer complete – This green light alerts the operator that the timer has caused the test to end. When the start button is pressed testing begins and if there are no flaws after 30 seconds, the computer's timer will discontinue the test. Illumination of the timer complete light does not signify that the tire has been completely inspected. Hawkinston recommends that the tire be marked with a crayon to ensure complete rotation during testing. This light has a press-to-test feature to test the circuit.

TRUCK

MEDIUM LIGHT



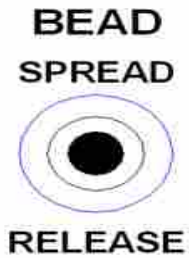
Medium/Light Truck – This two-position switch is designed to allow the probe to fit within the desired tire. When inspecting tires with bead diameters less than 16 inches select the light truck position. Tires with bead diameters 16 inches or greater should be inspected with the switch in the medium truck position.

ARM LIGHT

OFF ON



Spread Arm Light – This two-position switch turns the speed arm lights on or off.



Spread – The hand operated spring-to-center valve, labeled spread, decreases or increases the spread of the bead

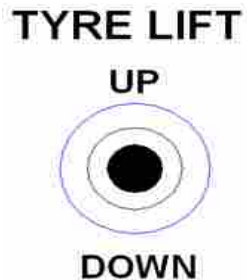


Table Core Lift- This hand operated spring-to-center valve will allow the user to adjust the height of the table core to ergonomically fit the operator. The core spreader lift can extend from its lowest height of 25 inches to a top height of 45 inches. The top height can even pick or place a tire on the monorail.



Motor Direction Foot Pedal- The double, foot-controlled, electronic pedals are mounted on either side of the spreader. One of the double pedals will turn the tire in the clockwise direction while the other pedal will turn the motor in a counterclockwise direction.

Operation

Step 1 Air Supply

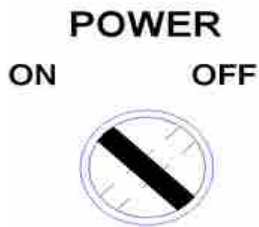
Make sure the air supply to the NDT[®]-III is connected to the filter/regulator and the air supply is clean and dry. Check the supply line each day and set to 150 psi or more. Ensure that the main regulator of the NDT[®]-III is set to 150 psi (10.5 bar)

Step 2 Power Connections

Make sure the NDT[®]-III is connected to the correct electrical power source and that the ground is connected.

Step 3 Power Up

Turn the power switch to on.



Step 4 Emergency Stop Enabled

Ensure the emergency stop is in the enable position.

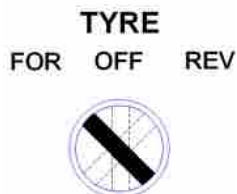
Step 5 Engage Controls

Push the reset button to engage the power to all controls



Step 6 Check Direction Control

Ensure that the Direction Control switch is in the forward position.



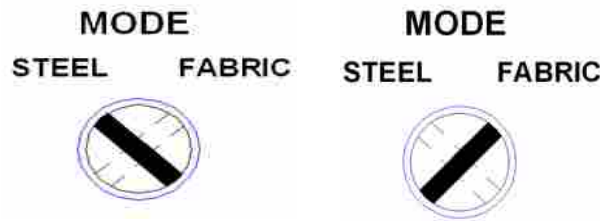
The First six steps are only necessary each time you turn on the machine. It is not necessary to do the first four steps for every tire.

Step 7 Load Tire

Lift a tire onto the spreader using the tire lift and secure the tire using the spread arms.

Step 8 Set Tire Type

Select the correct mode for the tire, either fabric or steel.



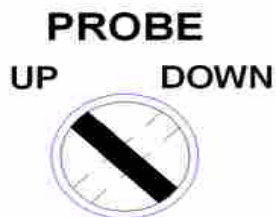
Step 9 Insert Probe

Swing the probe into the tire



Step 10 Lower Probe

Lower the probe in the tire



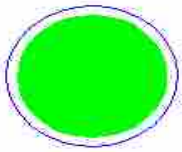
Step 11 Ensure Proper Loading

Relax the spread and rotate the tire to ensure it is erect and secure

Step 12 Start Test

Press the start button

START

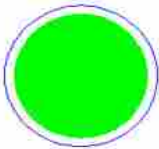


Step 13 Testing

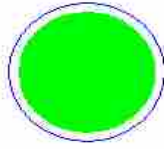
If the tire stops, check the flaw light for illumination

- If the flaw light is on you can press the Manual button to find the flaw by jogging the motor back and forth using the Direction Control switch.

FLAW



MANUAL



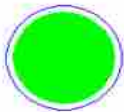
TYRE

FOR OFF REV



- If the timer Complete light is illuminated, the automatic test has timed out.

**TIMER
COMPLETE**



Step 14 Complete Test

If the tire test is over you can:

1. Finish the visual inspection
2. Restart the electronic test
3. Remove the tire
 - a. Spread the tire to allow the head to pass through the bead.
 - b. Turn the up/down switch to up
 - c. Turn the in/out switch to out
 - d. Release and remove the spread arms
 - e. Remove the tire

Important: Do not leave the machine or power on overnight, over the weekend, or for any long period.

Shutting Down the Machine

Turn the Power switch to off



Note: Make sure the probe is not in a position that will cause it stress or damage when the air and electrical power are off. Additionally, ensure that upon power up the probes Up/Down selector switch is in the up position.

Operating Tips

1. The NDT[®] was designed to improve the quality of retreaded tires by finding flaws normally missed by visual inspection. A Well trained operator is required who understands the importance of both watching and listening for an arc. Whenever there is an arc, there is concern, and the operator should investigate the area in which the arc occurred.
2. The NDT[®] - III mirror will help you find flaws that are out of sight
3. Using the motor direction switch, together with the manual button, will help you find defects. Sometimes you will have to rotate the tire back and forth over an area before you can see the flaw. After setting the direction of the motor, you can rotate the tire by pressing the manual button all the way down and holding it. When you want to stop rotation, lift up on the manual button.



4. The machine will only rotate in a clockwise direction and at one specific speed, as viewed from the operator's' point of view, during automatic testing. However, the manual button allows full control of speed and rotation direction.
5. The probe does not conform perfectly to all tires. We have designed it to maximize point-of-contact with most brands of tires. No arc will occur if;the point of contact with a flaw is not complete or if a flaw is embedded (completely encapsulated by non-conductive properties).If no arc occurs there will not be a change in energy.
6. The alignment of the probe is critical. The farther the energy must travel, the less likely the detector will notice a change of energy. The change of energy is a function of the frequency, voltage, and duration of the arc. If the energy is unable to travel through the tire to the ground roller the change in energy is harder to detect.
7. If a flaw occurs (an Arc is seen or heard),which has properties that differ significantly from the parameters designed to trigger a flaw, the detector will not trigger the automatic stopping of the high-voltage generator and motor or illuminate the flaw light. It is very important that the operator of the NDT[®] maintain a vigilant watch for an arc. If an arc occurs and the NDT[®] -III does not trigger a flaw condition the operator should manually stop the automatic test and inspect the area of the tire where the arc occurred.

Hawkinson's 8-Step Visual/Electronic Inspection Technique

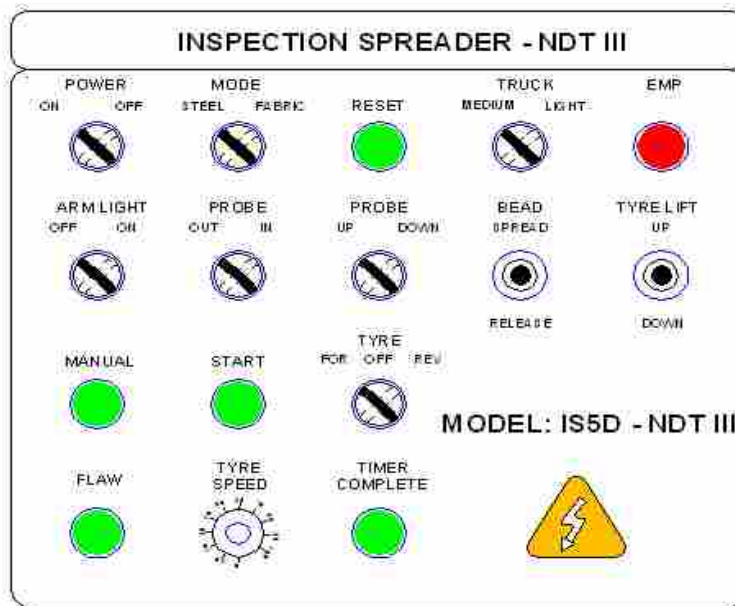
1. Mount and rotate the tire one revolution while maintaining focus on the inside of the tire. Quickly perform a visual scan to identify if the tire should be rejected for damage such as too many patches, lose inner liner, cuts to the inner liner, etc. In addition, checking for large foreign objects that could damage the probe is an important step before electronic inspection. The time for this step is about 15-30 seconds.
2. Inspect the inner crown area and sidewalls.
3. Inspect the right bead.
4. Inspect the left bead.
5. Once the tire is prepared for electronic inspection, position the Hawkinson NDT[®] inspection probe inside of the tire and press the start button. The tire will begin to rotate while electricity is applied to the inner liner. The operator should keep his focus on the inside of the tire. If an arc occurs the machine will stop and the operator can mark the flaw with a crayon. If the machine stops because of an outside flaw, the operator does not need to spend time pinpointing the flaw, he simply needs to mark the tire adjacent to the ground roller. Doing so will reduce the time for visual inspection of the tread area later, because he will know where exactly where to look. One revolution of the electronic scan is all that is necessary. The time for this step can be as little as 14 seconds.
6. Inspect the left sidewall.
7. When conducting the visual inspection of the tread area the inspector should locate the marks from step 5 and scan horizontally across the tire to find the flaw.
8. Inspect the right sidewall.

Following this flow increases the operator's confidence level of inspection decreasing time needed to inspect a tire casing

Maintenance

The Hawkinson NDT® -III is designed to provide years of heavy-duty service with minimal maintenance. Most assistance calls are because the cables from the control cabinet have become loose or worn. This is the first thing you may wish to check if you are experiencing difficulties.

The operator's console was designed to alert the operator if a control has power. When any of the controls on the operator's console are activated, illumination will indicate whether or not electricity is able to flow through the switch.



Electrical

- Replace the out high-voltage wire once per year or if the wire becomes damaged.
- Replace the probe sidewall wires when they lose their form or do not conform to the shape of the tire.

Air

- Using house air, blow down all cylinder rod to prevent internal seal damage.
- Manually drain the high-pressure air filter by depressing the manual drain button
- Replace high-pressure air filter every three months. (part # AF30-N03-8Z-X425)

Daily

- Remove debris from the machine that may have collected during normal operations
- Check the LED's to ensure the machine is operating at its full operational effectiveness.