Western Instruments

Established 1965

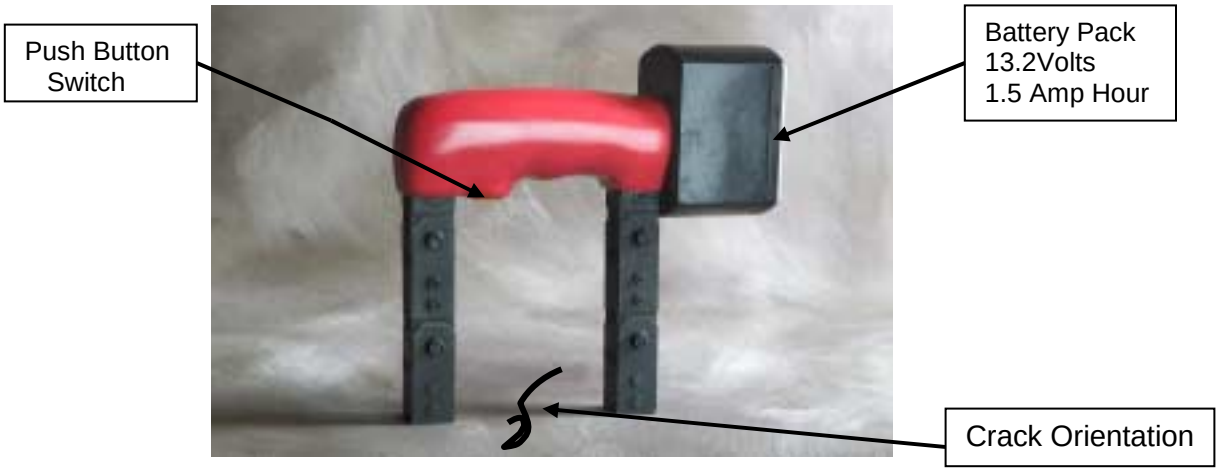
Operating Instructions

June, 2011

WC-9

Cordless DC Yoke

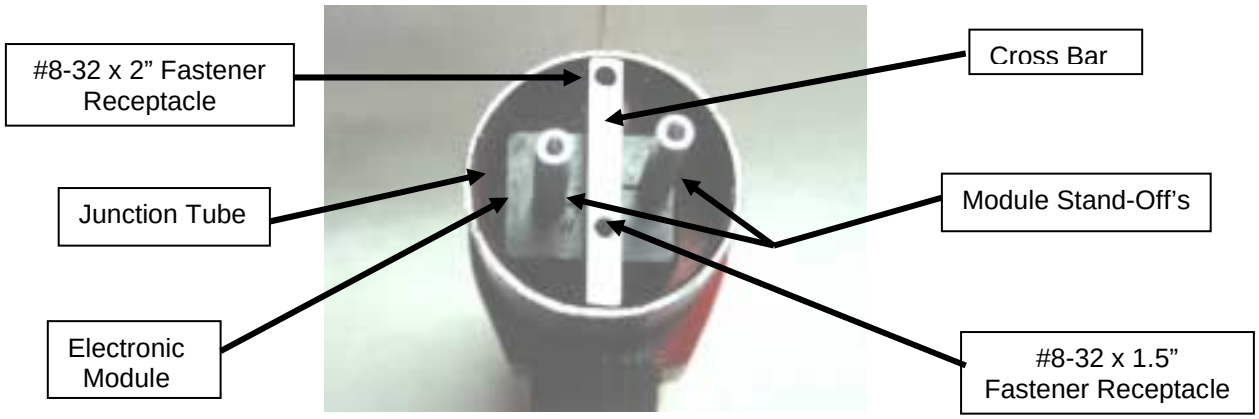
The WC-9 allows the Operator to induce a Pulsing DC inspection field (125Hz) into the ferrous material being tested. The device should be utilized within the parameters set by the operational specifications within this guide.



1. **Push Button Switch –** The Push Button Switch was designed for comfort and safety. While depressed, the switch delivers power (13.2 Volts DC) to the coil encapsulated in the Yoke housing.

   The Push Button Switch provides a ½ Watt control signal to the electronic controls in the Output Module, where semiconductors are used to activate the magnetization field. The overall Solid State design of the unit's controls, removes the hazard of the full 'load' being next to the operators finger, and moves it into the *Junction Tube* of the Yoke. Do not attempt to use the WC-9 with AC Power.

2. **WC-9 Module** The WC-9 Yoke is operated directly from it's integral 13.2 VDC Battery Pack, with the current being controlled by the Push Button Switch. Mounted inside the *Junction Tube*, at the rear of the Yoke, is a solid state Electronic Module that controls the electrical supply, via the Push Button Switch, to the Coil encapsulated inside the Yoke housing. The WC-9 and the WC-8 use a common Module.

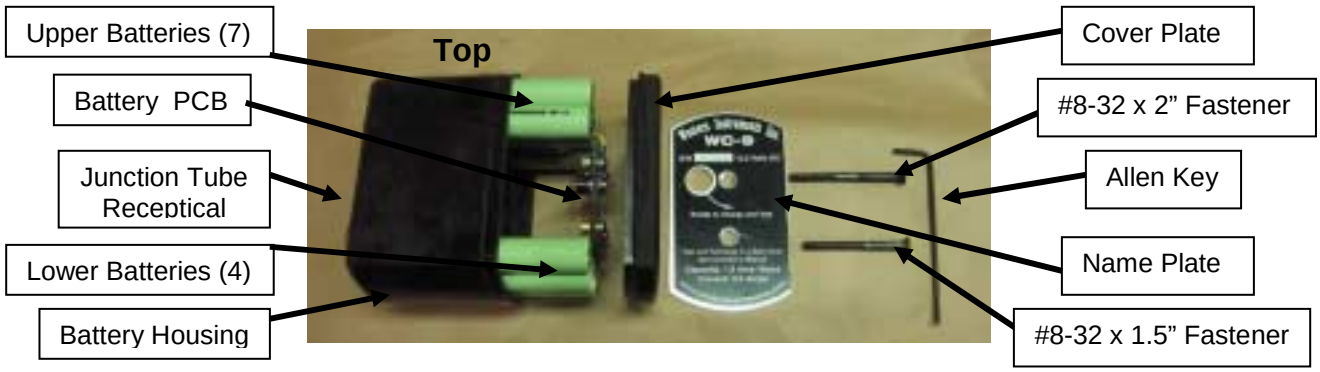


The Module is fitted with 2 Aluminum Stand-Off's that permit the connection of the Battery Assembly to the Module. The Cross Bar is used to secure the Battery Pack Assembly, and has 2 holes, one drilled through (top), and the lower one threaded for an 8-32 fastener.

3. Integral 13.2 Volt Battery Pack The 13.2 VDC Nickel Metal Hydride Battery Pack has been specially manufactured for the WC-9 Yoke, and no attempt should be made to replace or operate this unit with one manufactured by others, as it will void it's Class 1, Division II status. When operating the WC-9 in a Hazardous Environment, the unit should be removed to a *Safe Area*, for battery Testing, Charging, or Cell Replacement. A Safe Area is defined as an environment where no risk of explosion exists (e.g. Facility Offices).

Battery Pack Assembly

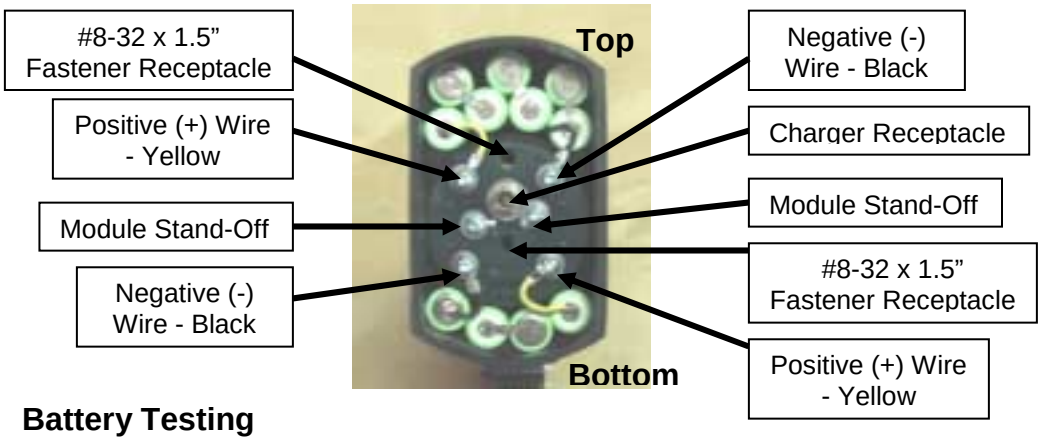
The Battery Pack Assembly is made up of 4 Basic Components; Battery Pack Housing, Battery Pack Cover Plate, Name Plate; and Battery Assembly. The Battery Assembly consists of 11 'AA' Cells, Circuit Board, and the Charger/Test receptacle. The Battery assembly is made up of 2 sets (4 and 7 cells each) of 'AA' Nickel Metal Hydride Batteries of 1.2 Volts with a capacity of over 1500 Milliamp Hours each, for a total Voltage of 13.2 and an overall Capacity of 1.5 Amp Hours.



Installing Battery Pack

1. Slip the Battery Housing onto the Junction Tube, with the 'bay' for the 7 Cells positioned to the top of the Yoke. The Module Stand-Off's may require some 'coaxing' in order for them to line-up with the 2 holes in the Battery Housing. Do not use excessive force to push the Battery Housing onto the Junction Tube.
2. Push the Battery Assembly Cells into their appropriate 'bay' in the Battery Housing. Each set of cells can then be slipped into the Battery Housing. With the batteries installed the Battery PCB can then be connected to the Sets of Cells. Do not cross the cell wires!
3. With the PCB installed, it can now be fastened it onto the Module Stand-Off's, using the #6-32 x 3/8" fasteners. **Do not activate the Push Button Switch until the Module Stand-Off's and the PCB are attached with the fasteners.**

4. With the Batteries and Module connected, the Battery Pack Cover Plate and Name Plate can now be attached to the Battery Pack Assembly. As illustrated, there are two different length fasteners used to attach these components. The longer of the two (#8-32 x 2") is used on the upper fastener receptacle, while the shorter one (#8-32 x 1.5") is used on the lower fastener receptacle. **Do not misuse these fasteners, as the shorter one will not reach the threads in the upper position, and the longer one can cause potential damage to the Module.**



Battery Testing

The Battery Connector is accessed by first removing the lower fastener on the Name Plate, then rotating the Name Plate counterclockwise 90º. When the Battery Connector appears in the access hole, either of the Voltage Indicators can be checked or the Battery Charger connected (see *Battery Charging* for details).

To test the Battery Voltage, insert the Battery Voltage Indicator (Basic LED or Meter). The Basic LED provides a 'Go – No Go' indication that there is enough Voltage left in the Battery to lift 50 pounds (22.7Kg), when the LED glows brightly under load. The Battery Meter provides a general reading of the Voltage, but also provides the operator with a general indication of the Battery Capacity and a general indication of how much longer the unit

Battery Meter

Basic LED

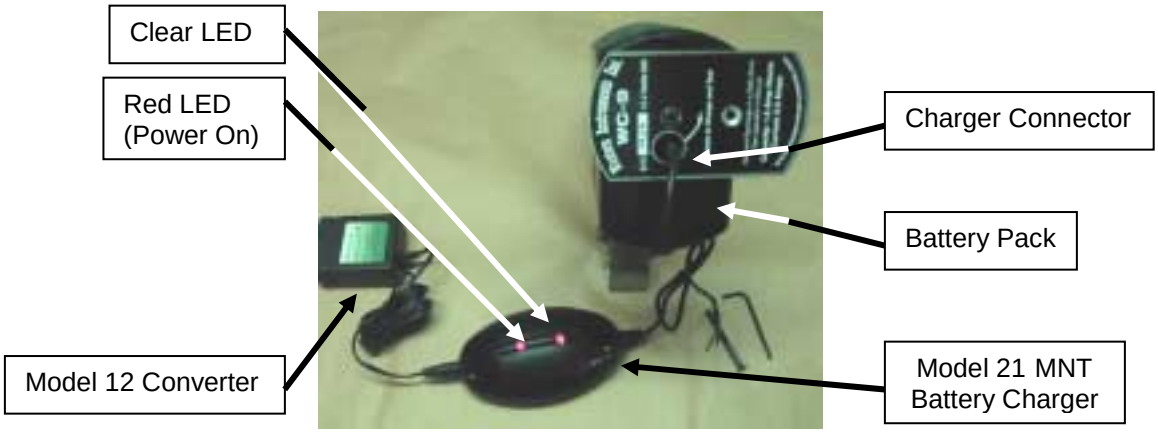
may be used for. The WC-9 will lift 50 pounds with as little as 11 Volts, and is indicated by the Battery Meter and where the Basic LED voltage is set. When using either of the Battery Voltage Indicators, they should be connected, followed by the activation of the Push Button Switch. Simply plugging the Indicator in will show only the voltage, however with a 'load', the operator is assured of the WC-9's lift capability.

Battery Charging

In May of 2011 Western upgraded WC-9 Chargers to the Model 21 MNT which requires the Model 12 Converter. The Model 12 Converter operates universally from Mains Power of 100 to 240VAC, and 50 to 60 Hz. Chargers are universal, in that they should be plugged into the Battery Pack before they are connected to Mains Voltage. After plugging the converter into mains voltage, the clear LED will flash Red 3 times, then glow continuously during the charging cycle.

The WC-9 should only be charged with the Charger supplied by Western Instruments. Batteries should not be left on charge indefinitely, however, Western Instruments' *Smart Charger* will not typically damage a Battery Assembly if it is left charging the Battery for more than the specified time. Batteries should not be stored when at a low charge state, and will be fully charged in under 6 hours. When the Battery Pack is fully charged, the Clear LED will glow Green.

Do not attempt to charge the Battery Pack with any other type of charger. Specifically, any type of 'fast' charger may cause the cells in the pack to emit hydrogen, and will drastically shorten their capacity and life. The charger provided is designed to automatically reduce it's current to a 'trickle' after the pack is fully charged. Furthermore, the *Clear* LED will glow green when the battery pack is fully charged.



Note: WC-9 and WC-9K Yokes are identical, due to the Model 21MNT Charger's universal voltage.

The battery condition can be tested with the WC-9 *Battery Voltage Indicator* (Basic LED or Meter) as outlined above. The WC-9 will lift 50 Pounds (22.7Kg) with as little as 11 Volts of power left in the battery. Battery Duration Tests are routinely performed by Western Instruments to test Product Performance, however are far more demanding than typical field inspections, as units are typically not activated on a continuous basis (see *Operational Parameters*). The lift capabilities of the WC-9 can be easily confirmed with 5 Pull Test Bars, of 10 Pounds (4.54Kg) each, such as Western Instruments W-PT®, fastened together.

Battery Removal
If the Battery Pack needs to be removed, for general maintenance or Cell Replacement, remove both fasteners holding the Name Plate. Remove the Name Plate and the Cover Plate, and the Battery Pack Circuit Board will be exposed. The Battery Pack Circuit Board is attached to the Electronics Module's Standoffs with two #6-32 fasteners. Remove the wire Fasteners one at a time, then cover the wire connectors with tape to insulate them. If wires come in contact, the batteries will be damage due to a catastrophic short circuit. After all 4 fasteners are removed, the Circuit Board and Cells can carefully be removed.

A new Battery Pack Circuit Board can be reinstalled into the Battery Pack Housing, and the Battery Pack reassembled. If the cells need replacement, return the entire Battery Pack (Housing, Battery Pack Circuit Board, Name Plate and Cover Plate) to your distributor or a qualified battery supplier for rebuilding.

Extended Duty Kit
The *Extended Duty Kit*, consists of a; Battery Housing; Battery Assembly; and Nylon Carrying Case, to allow the operator to install fresh Batteries in a Safe Zone. The Nylon Carrying Case can hold the Housing, Assembly and Battery Charger, so the extra Battery can be charging while the operator is using the installed Batteries. Simply follow the above instructions, substituting the extra Battery Housing & fresh Battery Assembly for the ones installed on the WC-9.

4. Operational Parameters – The Operational Parameters or Duty Cycle for the operation is set to avoid damage to the internal coil or the Output Module, and must be observed.

Pulsed DC Operation: It is recommended that the operator does not keep the Yoke on for more than 2 minutes at a time. This activation time should be followed by an equal time off. This 50% duty cycle is set not to protect the Coil or the Electronic Module, but is imposed to avoid rapid draining of the Battery Pack. A fully charged Battery Pack will last 2 hours under continuous activation, which equates to approximately an 8 hour shift of 'maintenance' inspection (as per Western Insturments' Battery Duration Tests). The battery condition can be tested with either of the WC-9's Battery Voltage Indicators as outlined above.

Typical operation is 5 - 15 seconds on, while applying inspection media, followed by 5 - 15 seconds off repositioning the Yoke to the target area. If the Yoke is used for prolonged periods of time such as 2 to 3 hours of continuous cycling, as outline above, the Yoke will get warm. If the WC-9 is used in this manner the operator must provide time for a sufficient cooling period, or components in the Electronic Control Module may fail.

5. Field Characteristics

Pulsing DC Field – The Pulsed DC (125 Hz) Magnetic Field is stronger than an AC Field and tends to penetrate the workpiece more deeply, however DC

is still sensitive to surface defects. Inspection media tends to adhere to the entire target area of the workpiece, due to the reduced particle mobility. Dry Particles may need to be 'blown off' to fully reveal an indication, while Wet method requires more careful application of the bath. The intensity of a DC Field, by it's nature, is fixed but the Yoke does Pulse the field providing some stimulus for the particles to migrate to defects.

It must be noted that there is no demagnetization provision on the WC-9, so parts will have some residual field in them after inspection. The workpiece can be tested with a Magnetic Field Indicator, such as the W-Series W-FI®, to measure the residual magnet field.

6. Operation:

Position the Pole Pieces (Feet) on the work piece. The area between the pole pieces is your target area, which also extends laterally out, approximately 1.5" (38mm), from either edge of the pole pieces. The Field will expose defects that are transverse to the centerline between the Pole Pieces. The Pole Pieces should be positioned so that as much of their contact surfaces as possible, are on the work piece. The Yoke is then energized, by pressing Push Button Switch, and Magnetic particles are applied. Dry Method Particles are dusted between the Pole Pieces and over the target area, while Wet Method Particles are sprayed in a similar manner.

The Target Area is then inspected visually for a collection of Particles around defects. A Black Light is used to aid visual inspection when Fluorescent Particles are used. Indications found with Dry Powder will tend to form immediately, and will take slightly longer with Wet Method Particles. If the typical direction of defects is not known, rotate the Yoke through 90º and repeat the inspection of the target area.

The WC-9 produces a standard amount of Field Blow as other DC Yokes. Field Blow is a collection of Inspection Media between the Pole Pieces, transverse to the centerline between the Pole Pieces, and may cause a masking of indications. Field Blow can be minimized by extending the Pole Pieces farther apart, If work piece configuration does not permit extending Pole Pieces, reduce the contact area of the Pole Pieces on the workpiece. Follow the Operational Parameters outlined in these instructions

7. Maintenance – **While performing maintenance, or cleaning, the Yoke should be disconnected from any power source, with safe industrial practices employed.** After extended use the Yoke should be cleaned with a mild soap solution. The unit should be visually inspected for any damage that could cause harm to the operator, or the material being inspected. Special attention should be paid to the Push Button Switch Cover, to ensure it is fully adhered to the body of the Yoke. Furthermore, the Battery Power Plug, and Charger Power Cord should be in a good state of repair. Any potential problems to these assemblies must be reported to the Distributor or Western Instruments for instructions on corrective action.

The Battery Pack should be inspected and cleaned regularly, with particular attention paid to the Battery Pack and Circuit Board. The fit of the Sealing System should be tight however, it there is a “loose fit”, report the problem to the distributor or Western Instruments for instructions on corrective action. Do not operate the unit in hazardous environments when the Battery Pack in not fully assembled.

Whether industrial specifications are being observed or not, the Yoke should be tested periodically, using certified Pull Test Bar(s) such as the W-Series W-PT®, to ensure it continues to lift the specified amount of weight. If the unit fails such a test, first inspect the Pole Pieces to ensure they fully contact the test weight. If the unit continues to fail, contact the Distributor or Western Instruments for instructions on corrective action.

8. **Warranty –** Western Instruments warrants its products, against defects in materials and workmanship for a period of 1 year from receipt by the end user. If Western Instruments receives notice of such defects during the warranty period, Western Instruments will either, at it’s option, repair, replace, or condemn products that prove to be defective. Consumable items, such as Batteries, are warranted for 30 days from the date of shipment.

   Any warranty is void if the unit has been modified in any way, or if it has been repaired by an unauthorized agency. The end user agrees that any equipment’s disposition, when returned for warranty work, is at the full discretion of Western Instruments as to whether a claim is under warranty or due to misuse. Western Instruments warranty shall overlook normal wear, however does not include operation outside the general specification outlined in these instructions. All warranty work is FOB Western Instruments, and any returned units shall include a written description, **by the end user**, of the fault.

   Western Instruments makes no other warranty, either expressed or implied, with respect to this product. Western Instruments specifically disclaims any liability arising from the use of this equipment. For the correct use of the product, refer to the Operating Instructions, furthermore we recommend instructional training to CGSB, ASNT, or other regulatory authority qualifications**.** Western Instruments highly recommends the use of protective equipment, while operating this or other industrial equipment.

Specifications:

Model: WC-9 or WC-9K CE
Battery Voltage: 13.2VDC
Current Draw: 0.5 Amps @ 13.2 Volts DC
Charger Voltage: 115VAC or 230VAC (K)
Capacity: 50 Pounds (22.7 Kg)
Pole Spacing: 0 – 11” (0 – 280mm)
Weight: 7.8 Pounds (3.5 Kg)

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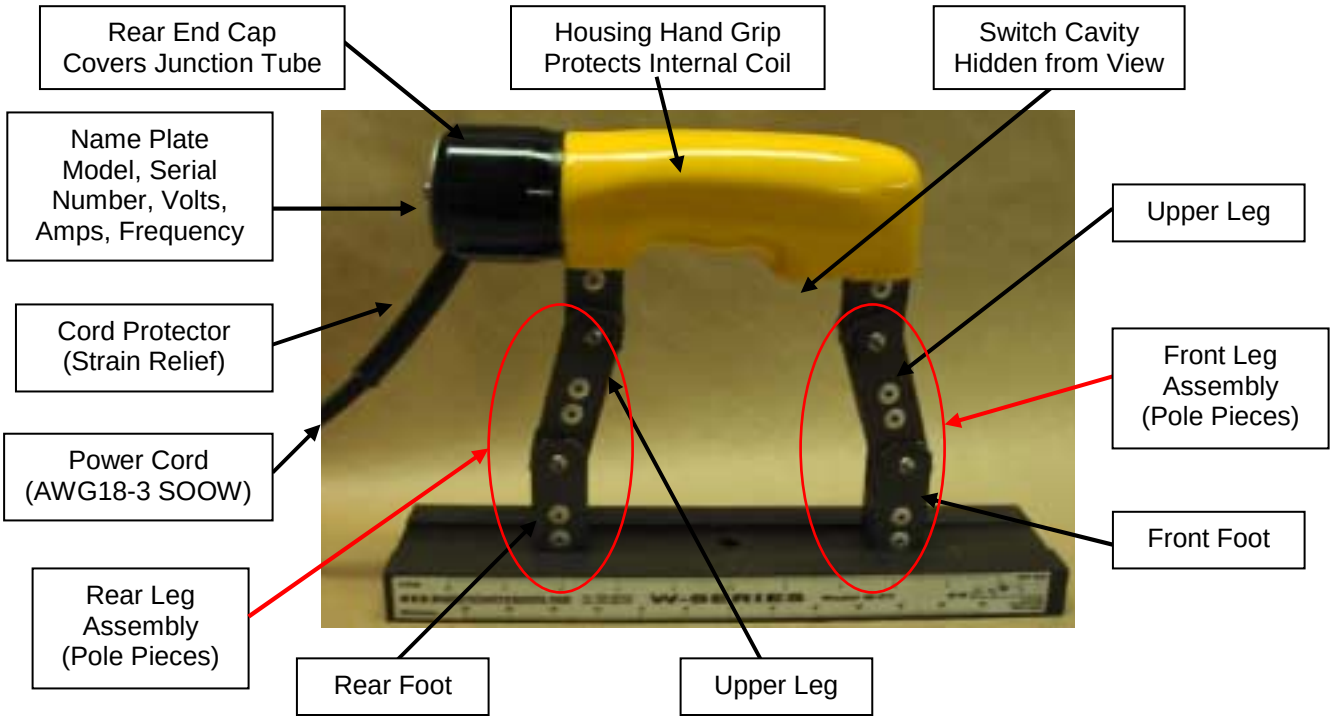
Yoke Nomenclature



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