OPERATION, PREVENTIVE MAINTENANCE, TROUBLESHOOTING AND SERVICE GUIDE

MODELS 488L and 488-6 WITH CONTROL HANDLE

NOTICE

THIS GUIDE CONTAINS IMPORTANT OPERATION AND SAFETY INFORMATION AND SHOULD BE KEPT AVAILABLE TO THOSE PERSONNEL INSTALLING AND OPERATING THIS EQUIPMENT.

P/N A6474X235
Revision 0, November / 03

SAFETY PRECAUTIONS AND GUIDELINES

OVERVIEW

Before you operate, maintain or in any other way, use this unit -

READ and STUDY this guide. KNOW how to safely use the unit's controls and what you must do for safe maintenance.

ALWAYS wear or use the proper safety items required for your personal protection.

If you have ANY QUESTIONS about the safe use or maintenance of this unit:
ASK YOUR SUPERVISOR - NEVER GUESS - ALWAYS CHECK

PRE-START INSPECTION

Read this entire guide BEFORE attempting to operate this unit. You should be familiar with the controls and their functions before the unit is energized.

INSPECT your machine by doing a pre-operational inspection. Have any malfunctioning, broken or missing parts corrected or replaced before use.

VERIFY that all maintenance has been performed.

VERIFY that all the instruction and safety labels are in place and readable. These are as important as any other equipment on the machine.

CLEAN any foreign material from the operator's compartment.

THIS Model 488 Series UN-A-TRAC® was shipped from the factory equipped with a protective canopy. This canopy MUST be securely in place before operating the unit.

STARTING

DO NOT operate any levers or pedals from outside the operator's compartment to keep the machine from hitting you or other personnel.

FOLLOW the instructions in the STARTING PROCEDURES section of this guide (page 23).

DO NOT operate any levers or pedals if anyone is in the Hazard Zone (page 21).

BE familiar with the operation of the tape switches and be prepared for the sudden stop when the tape switches are struck.

OPERATING

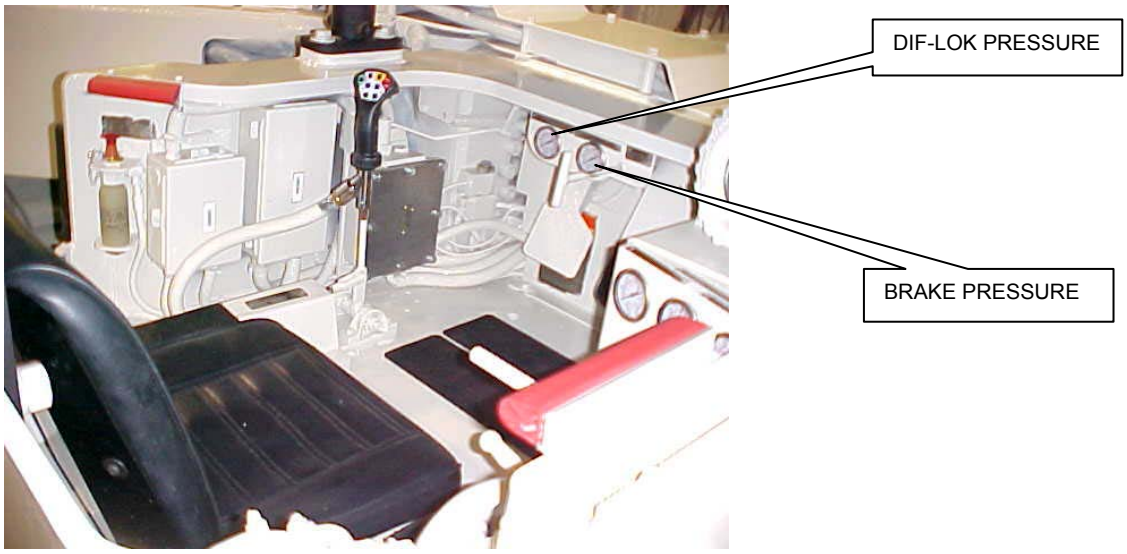
ALWAYS make sure that no person or obstruction is in your line of travel BEFORE starting the unit into motion or in the articulation area when steering the unit.

NEVER climb onto, or climb out of the machine while it is in motion.

DO NOT operate the machine with any part of your body outside of the operator's compartment in order to prevent body parts from being crushed between the machine and objects outside.

USE extreme caution and be observant when working in close quarters or in congested or blind-travel areas. The warning gong should be sounded to alert personnel of your movement.

FIGURE 9 – GAUGE PANEL



GENERAL HYDRAULIC CONTROL SYSTEM INFORMATION

In the operator's compartment located to the right of the operator's seat is a group of control levers and gauges (Figure 10). These levers control the steering, bucket position, ejector blade position, winch operation and battery changer system by means of a hydraulic valve bank located behind the panel to the operator's right. The gauges include emergency brake, accumulator, and system pressure. The hydraulic system pressure relief valve is set at the factory at 2000 psi (138 bar), and should not be changed. Should the "SYSTEM PRESSURE" gauge (Figure 10) read more than 2250 psi (155 bar), SHUTDOWN the Model 488-6 and call a maintenance person (see page 29 for Shutdown Procedure).

HYDRAULIC CONTROL PANEL GAUGES	
GAUGE	**PRESSURE READING**
Emergency Brake	1500 – 1800 psi (103 –124 bar)
Accumulator	1500 – 1875 psi (103 – 129 bar)
System Pressure	2250 psi (155 bar)

WARNING

SHOULD EITHER GAUGE SHOW ABOVE OR BELOW THE PRESSURES LISTED ABOVE, SHUTDOWN THE UN-A-TRAC® AND CALL A MAINTENANCE PERSON (SEE PAGE 29 FOR SHUTDOWN PROCEDURE).

TOWING A DISABLED MACHINE

IT IS NOT POSSIBLE, WITHIN THE SCOPE OF THIS GUIDE, TO ANTICIPATE ALL POSSIBLE ARRANGEMENTS FOR TOWING A DISABLED UNIT. BEFORE ATTEMPTING TO TOW ANY VEHICLE, YOU MUST TAKE ALL POSSIBLE PRECAUTIONS TO PROTECT THE OPERATORS AND ANY ONE AROUND BOTH VEHICLES FROM BEING INJURED BY EITHER THE TOWING VEHICLE, THE TOWING DEVICES OR THE VEHICLE BEING TOWED. THE PRIMARY TOWING DEVICE USED (CABLES, BARS, ETC.) AND THE TOWING VEHICLE (SCOOP, TRACTOR, ETC.) MUST BE STRONG AND HEAVY ENOUGH TO MAINTAIN CONTROL OF BOTH VEHICLES THROUGH ALL BOTTOM CONDITIONS TO BE ENCOUNTERED AT ALL TIMES. SAFETY CHAINS OR OTHER SAFETY DEVICES MUST BE USED IN CASE OF FAILURE OF THE PRIMARY TOWING DEVICE. ALL OPERATORS MUST BE ALERT AT ALL TIMES TO PREVENT EITHER UNIT FROM "RUNNING AWAY" OR RUNNING OUT OF CONTROL DURING TOWING. THE VEHICLE TO BE TOWED MUST BE SECURELY COUPLED TO THE TOWING VEHICLE BEFORE THE BRAKES ARE RELEASED ON THE DISABLED UNIT. THE OPERATOR OF THE TOWING VEHICLE MUST BE IN PLACE IN THE TOWING VEHICLE WITH THE BRAKES APPLIED BEFORE THE BRAKES OF THE DISABLED VEHICLE ARE RELEASED.

1. Couple the towing vehicle securely to the disabled vehicle.

2. Close the valve to tank circuit that is on the hand pump. This isolates the park brake solenoid from the circuit.

3. Begin pumping the hand pump. The building pressure moves the shuttle valve and allows the Automatic (Park) Brake system to be pressurized.

4. The Automatic (Park) Brake is "released" as indicated by the Brake Release gauge.

AT NO TIME DURING TOWING SHOULD ANYONE RIDE IN OR ON THE VEHICLE BEING TOWED OR STAND IN BETWEEN THE TOWING VEHICLE AND THE DISABLED VEHICLE.

5. Begin towing the vehicle.

6. Once the destination is reached, stop both vehicles and set the parking brake on the disabled vehicle before removing the towing devices. The disabled vehicle should be choked in both directions at all four wheels for additional stability. The brake is "set' by opening the valve on the hand-pump.

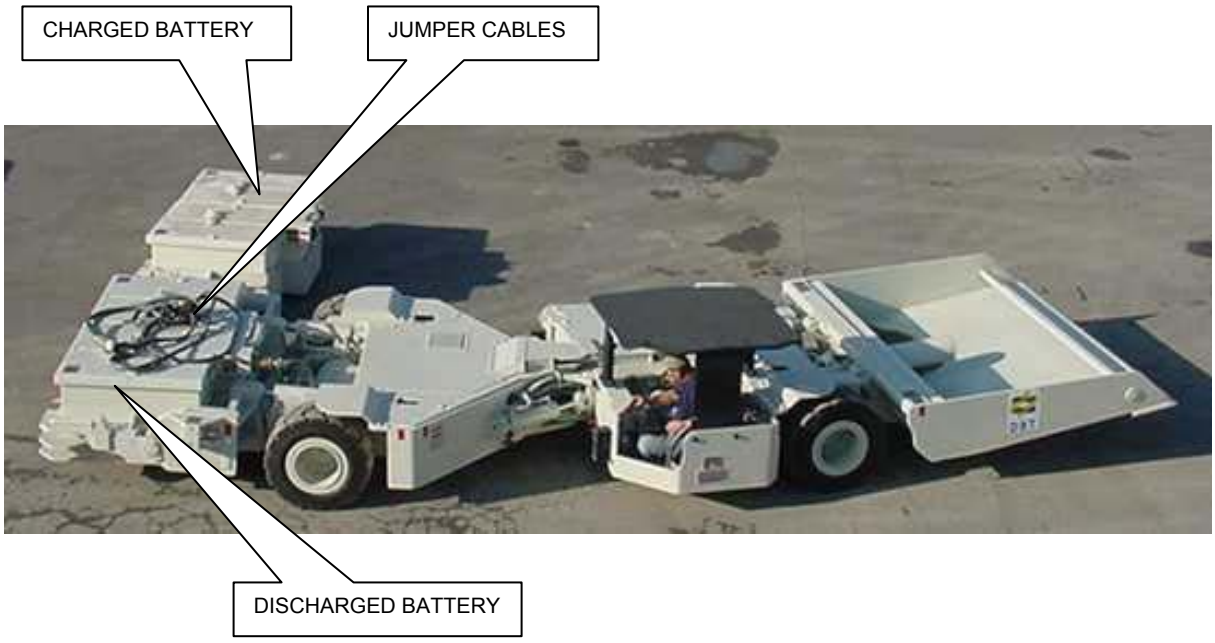
FAILURE TO SET THE PARKING BRAKE ON THE DISABLED VEHICLE BEFORE REMOVING THE TOWING DEVICE COULD ALLOW THE DISABLED VEHICLE TO ROLL AWAY UNCONTROLLED.

BATTERY CHANGE PROCEDURE (GROUND LEVEL)

Two people are needed to change the battery in the UN-A-TRAC®. Since one person may step into the Hazard Zone, the other person (operating the UN-A-TRAC®) must be very careful and look each time before moving any levers or pedals. Take time now to refamiliarize yourself with the Hazard Zone (page 21).

1. Line up the battery end of the UN-A-TRAC® with the place where the battery is to be deposited (Figure 25) (see Starting Procedure, page 23).

FIGURE 25 – BATTERY CHANGE PROCEDURE (GROUND LEVEL)



WARNING

THE "BATTERY" CHANGE CONTROL LEVER SHOULD NEVER BE OPERATED EXCEPT AT A BATTERY CHANGE STATION OR WHEN ITS NECESSARY TO ADJUST THE BATTERY'S TERRAIN CLEARANCE. IF THE "BATTERY" CHANGE CONTROL LEVER IS OPERATED IN A LOW ROOF AREA, THE BATTERY MAY BE DAMAGED.

2. Unlatch both battery latch pins before placing the battery on the ground (Figure 26). If difficulty is encountered in unlatching the latch pins, it may be necessary to gently shake the battery up and down by using the battery "LIFT" control lever.

CRITICAL TORQUE VALUES

Torque values are expressed in lubricated and dry thread values. Lubricated thread torque values should be used any time the bolt threads are covered with oil, grease, anti-seize or thread-locking compounds. Dry thread torque values should be used when threads are completely clean and dry.

CRITICAL BOLT TORQUE VALUES (ft./lbs.) (m-n)				
LOCATION	**BOLT SIZE**	**GRADE**	**DRY**	**LUBRICATED**
Steering Cylinder Pins	7/8 NC	Grade 8	N/A	460
Tire-Wheel Mounting Bolts (John Deere Axle)	3/4-16UNF X 2-1/2"	Grade 8	390 (529 m-n)	300 (407 m-n)
Tire-Wheel Mounting Bolts (Meritor Axle)	9/16 NC X 2-1/4"	Grade 8	160 (217 m-n)	120 (163 m-n)
Drive Motor-to-Gearbox Mounting Bolts	3/4NC X 2-3/4"	Grade 5	285 (387 m-n)	170 (231 m-n)

LUBRICANTS, FLUIDS AND CAPACITIES

LOCATION	TYPE OF LUBRICANT	APPROXIMATE CAPACITY	NOTES
Hydraulic Oil	Texaco Rando HD68	40 Gallons (151.5 l)	1
Speed Reducer (Gearbox)	Texaco Multigear EP 80W-90	As Required	
Axle Housing (Meritor Axle)	Texaco Multigear 80W-90	As Required	2
Planetary Wheel Ends (Meritor Axle)	Texaco Multigear EP 80W-90	As Required Each Wheel end	2
Wet Disc Brakes (Meritor Axle)	Texaco TDH 1893 or Amoco 1000 or Unicol 1006	As Required For Each Brake	2
John Deere Axle	John Deere Hy-Gard Oil	20 Qt. (18.9 l)	5
Winch	API GL-4 or (140) Worm Gear Oil Peragma Grade 8	5 pints (2.36 l)	
SROIB Park Brake	SROIB Oil	2 Qt. (1.89 l)	4
Multi-Purpose Grease	Texaco Multifak EP-1	As Required	3

Notes:

1. With ejector blade completely retracted.
2. The axle housing, brake cooling sumps, and planetary wheel end assemblies do not have a common oil source. Each assembly must be filled separately.

   Make sure the level and fill hole in the planetary wheel end cover is in the proper position. Rotate the wheel end as required to bring the fill hole to either the 3 o'clock or 9 o'clock position.

   When filling the axle housing and planetary wheel ends, allow enough time for the lubricant to fill the various cavities and around component parts in each assembly. Continue adding oil into each assembly until the required oil level is reached
3. Pump grease into fitting until old grease can be observed coming out of component.
4. If the SROIB brake is used as a service brake, sump oil capacity is 4 qt (3.78 l).
5. When bleeding brakes, bleed both ports at the same time.

ONCE PER MONTH

1. Inspect the drive motor (Figure 43).

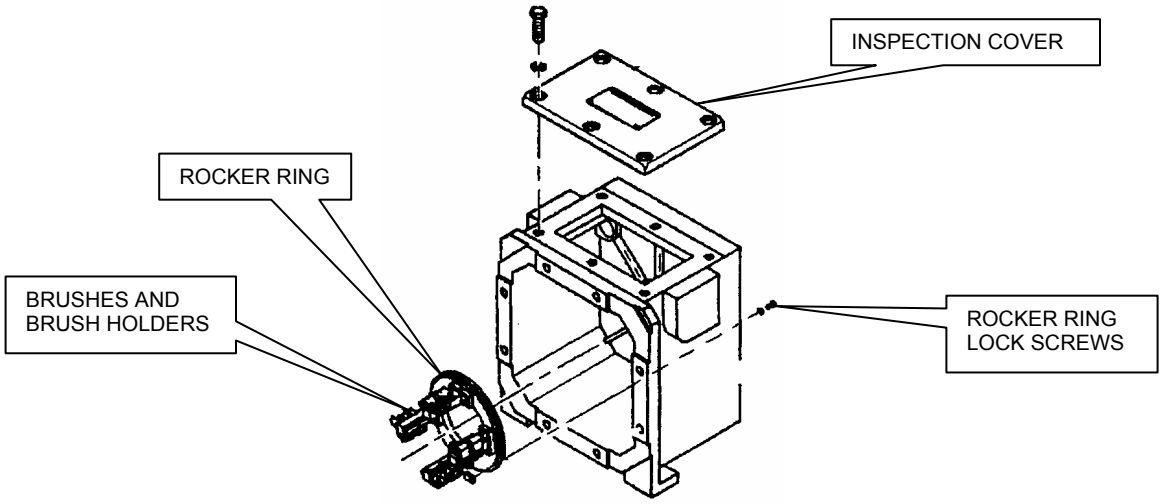
   A. Be sure that the machine circuit breaker lever is in the "OFF" position.
   B. Remove the inspection covers.
   C. Inspect the windings, commutators, brushes, armature, and terminal leads.

      1. Windings should be dry and free of dust, grease, oil, and dirt.
      2. The commutator should be clean and smooth with a medium polish and a light brown color.
      3. Brushes and brush holders should be clean so that the brushes are free to move in the holders and are properly seated. Brushes should be replaced before wear permits the rivets to score the commutator. (See replacement procedure below)
      4. The armature and field leads should be undamaged.
      5. Terminal leads should be tight.

   D. Replace the inspection plate being sure it is securely tightened.

THE DRIVE AND PUMP MOTORS DO NOT REQUIRE PERIODIC LUBRICATION. THE PUMP MOTOR BEARINGS ARE SEALED. THE DRIVE MOTORS HAVE ONE BEARING SEALED AND THE OTHER BEARING RECEIVES LUBRICATION FROM THE GEARCASE OIL.

FIGURE 43 – ROCKER RING AND BRUSHES



2. Drive Motor Brush Replacement (if necessary):

   A. Remove power from the unit by moving the machine or battery circuit breaker lever to "OFF" or by unplugging the battery.
   B. Remove inspection cover (Figure 43).
   C. Mark the brush holder (rocker ring) neutral setting by scratching or painting two aligning marks, one on the brush holder (rocker ring) and one on the motor end bell.
   D. Loosen (BUT DO NOT REMOVE COMPLETELY) the two rocker ring lock screws.
   E. Rotate the rocker ring until one of the brushes comes up on top. Disconnect the brush lead and remove the old brush. Replace the old brush with a new one and reconnect the lead wire.
   F. Repeat this procedure until all the old brushes have been replaced.
   G. Rotate the rocker ring until the neutral marks are aligned.
   H. Retighten the two lock screws.

HYDRAULIC SYSTEM (GENERAL) (CONT.)

TROUBLE, SYMPTOM OR CONDITION	PROBABLE CAUSE	TEST, CHECK AND/OR REMEDY
FOREIGN MATTER SOURCES IN THE CIRCUIT	1. Sealing compound (pipe dope, teflon tape).	1. Clean or replace seals.
	2. Burrs inside piping components.	2. Disassemble piping components and remove any burrs.
	3. Tag ends of packing coming loose.	3. Remove old packing and replace with new.
	4. Lines left unprotected and dirty, repaired components.	4. Drain and replace oil.
	5. Repair parts not properly protected while stored.	5. Clean parts thoroughly before installation.

BRAKES (SERVICE) WET DISC

INSUFFICIENT BRAKING	1. No gas charge in accumulator.	1. Check gas charge.
	2. Defective brakes.	2. Check brakes.
	3. Hydraulic lines or fittings leaking.	3. Check for leaks and repair.
	4. Pedal linkage out of adjustment.	4. Adjust linkage.
	5. Damaged hydraulic brake lines.	5. Check lines for dents that restrict flow.
	6. Air in brake system.	6. Bleed brakes.
	7. Brake seal or o-ring failure.	7. Replace seal or o-ring.
	8. No oil or low oil level in tank.	8. Bring oil up to proper level.

A most common problem with tire/wheel installations is the incorrect tightening of wheel bolts or studs. Threaded fasteners perform there function of holding things together better when torque control is used in their tightening. Using an accurate torque wrench correctly is the best and most practical way of securing fasteners, Although torque value charts are available as a reference guide to proper tightening, OEM specifications should always be followed when tightening fasteners. However, proper torque values are of little benefit if certain other factors are not considered.

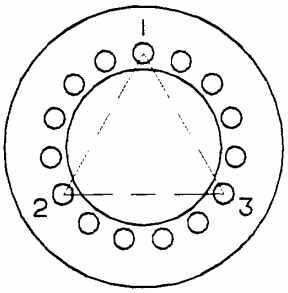
WHEEL MOUNTING TIPS

All fasteners should be examined before use. Any fastener that is worn, bent or has damaged threads should be replaced. Fastener threads should also be lightly coated with a protective substance, such as residual oils, wax or loctite, because any oxidation or rust will upset the torque-to-tension relationship.

Mating surface conditions should also be considered. The tightening surface under the bolt or nut should be carefully inspected. A fastener, when tightened against a softer material, will gall under these conditions, and much of the applied torque may be lost through head friction. It is very important when using higher strength fasteners to have a smooth, even surface under the bolt head. In some cases, hard flat washers and most lockwashers will provide a good tightening surface.

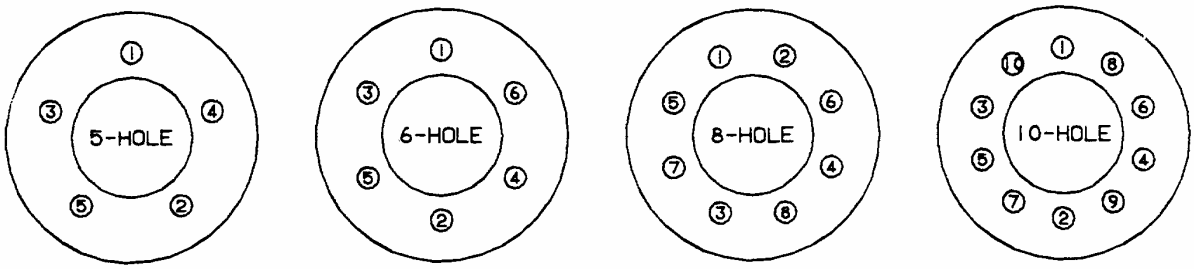
Another area of concern is cleanliness. All mating surfaces should be free of rust, dirt, oil, paint, etc. Also no paint of any kind should exist between a fastener and wheel disc surface. Any form of contamination between these surfaces will most likely lead to serious wheel problems.

FIGURE 48 – WHEEL TORQUING PATTERN



WHEN TORQUING ANY WHEEL BOLT PATTERN, ALWAYS TORQUE IN A TRIANGULAR PATTERN.

FIGURE 49 –TORQUE PATTERNS



Since the windings of the motor are inductive, the current in the motor cannot change quickly. When the IGBT switch is closed, the current builds up slowly and when the switch opens, the inductance wants to keep the current flowing. For this reason, the "flywheel" diode is provided. Figures 3 and 4 illustrate the current paths with the switch closed in both forward (Figure 3) and reverse (Figure 4) modes.

FIGURE 2

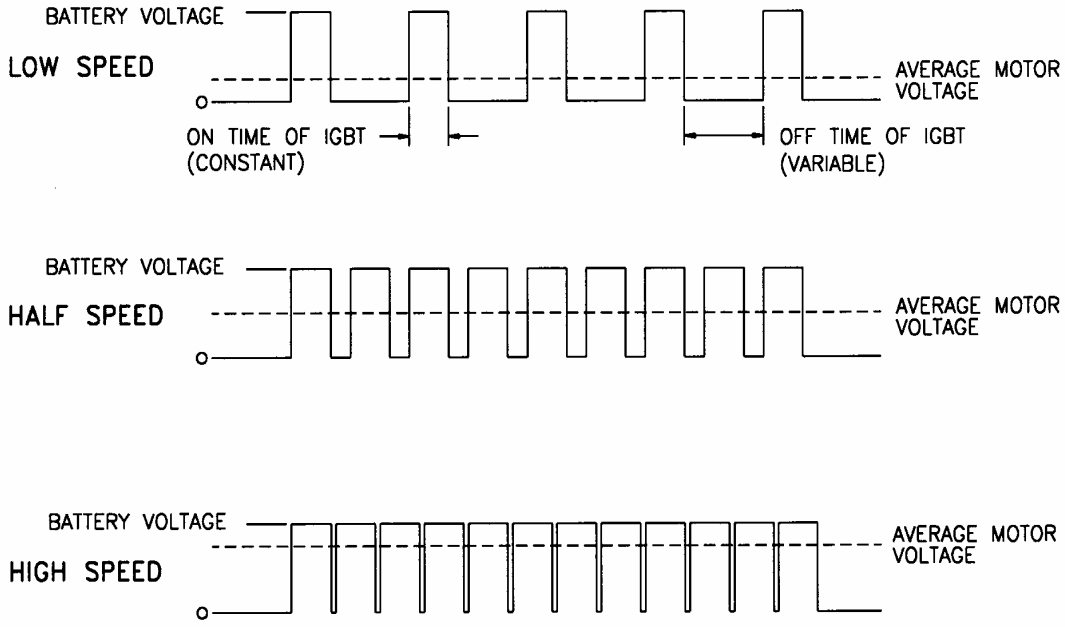
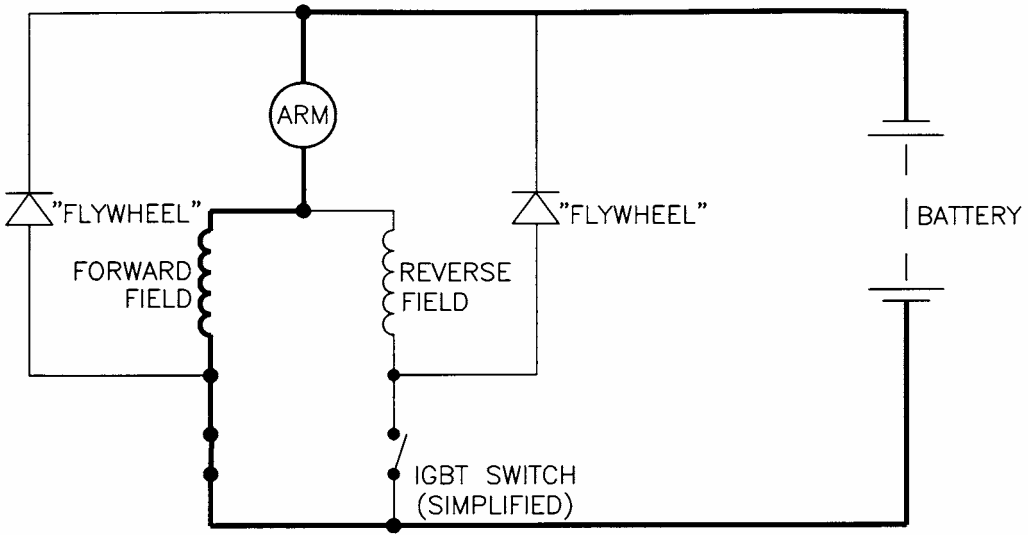


FIGURE 3



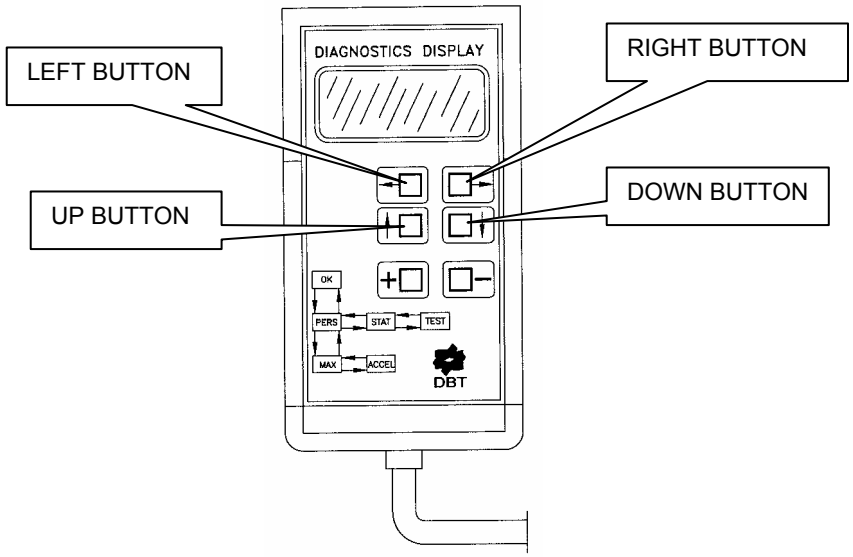
Optional Hand Held Diagnostics/Calibrator Unit

Security Levels:

1. Customer level
2. Service Level
3. Advanced Level
4. Engineering Level

SECURITY LEVELS 2-4 ARE ONLY ACCESSIBLE BY ENTERING THE APPROPRIATE PASSWORDS.

FIGURE 10 – OPTIONAL HAND HELD DIAGNOSTICS/CALIBRATOR UNIT



Connecting for Operation:

1. Turn the machine “OFF”.
2. Turn the main circuit breaker to the “OFF” position to de-energize power on machine.
3. Remove the main controller cover.
4. Connect the hand held diagnostics/calibrator unit to the CAN Communication Input Port of the logic card.
5. Turn the main circuit breaker to the “ON” position.
6. Leave the “Park Brake Set”.

The hand held diagnostics/calibrator unit is now operational.

Operation:

Upon power-up of the hand held diagnostics/calibrator unit, before pressing any buttons, a top level display is visible to provide diagnostic information as follows:

See list on page # 19 and 20

Individual IGBT Measurements

FIGURE 12