OPERATION, PREVENTIVE MAINTENANCE, TROUBLESHOOTING AND SERVICE GUIDE

MODEL VT636-2 LONGWALL SHIELD MOVER

VERSATRAC®

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

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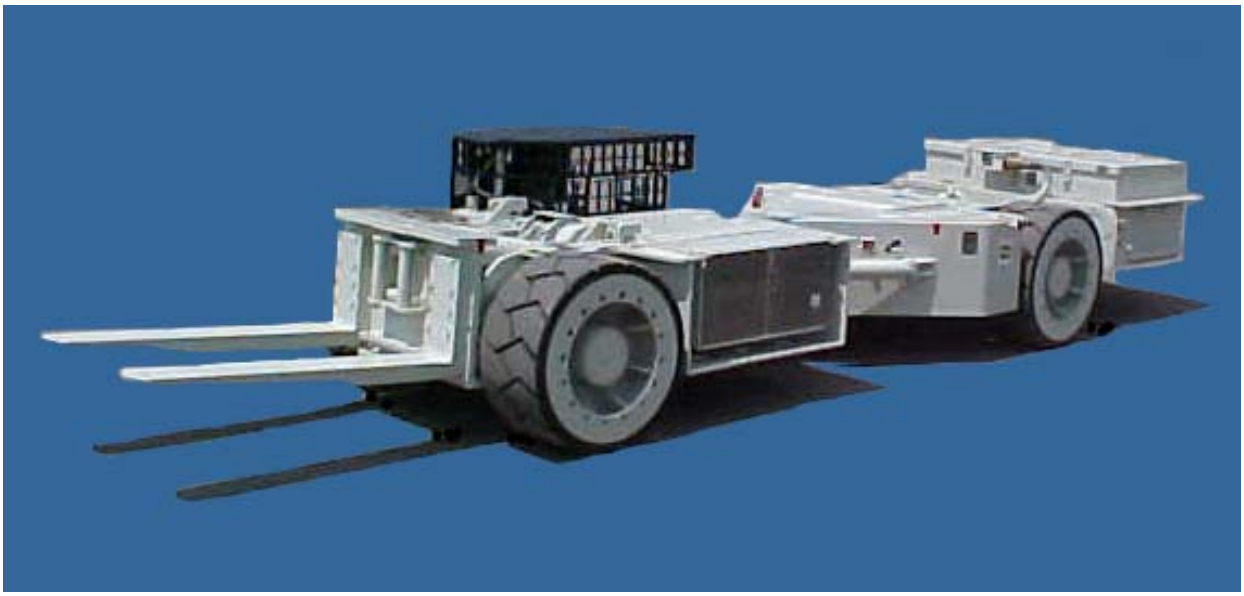
INTRODUCTION

FIGURE 1 – MODEL VT636-2 VERSATRAC®



The Bucyrus America Model VT636-2 VERSATRAC® can be one of the most useful and safe machines found underground today, IF IT IS OPERATED CORRECTLY BY A PROPERLY TRAINED OPERATOR.

Before operating the Model VT636-2 VERSATRAC®, study the illustration (Figure 2, page 9) to become familiar with the controls and read the description of each control. If a word is in quotation marks and capital letters, such as "OFF" or "ON," that word is found as a label on the VERSATRAC®.

DIF-LOK ACTUATOR (OPERATOR SELECT)

The operator controlled “DIF-LOK” actuator is a hand operated hydraulic push-button located to the right of the operator’s seat (Figure 2, page 9). When actuated, pushed in with the hand, the differential locks are engaged in both the front and rear axles. Releasing the push-button deactivates the differential lock.

THE DIF-LOK (OPERATOR SELECT) SHOULD NOT BE ENGAGED DURING SPIN-OUT OR WHILE IN A TURN OR DAMAGE TO THE AXLE CAN OCCUR.

AUTOMATIC EMERGENCY/PARK BRAKE RELEASE HAND PUMP

The automatic emergency/park brake release hand pump is located to the operator's right (Figure 2, page 9). The release pump allows the automatic emergency/park brakes to be released for towing purposes when the machine is deenergized and normal brake release is not possible (see Towing Procedure, page 27).

To **release** the automatic emergency/park brake with the machine de-energized:

A. Turn the selector valve handle to "PUMP TO RELEASE".
B. Remove the pump handle retaining pin.
C. Pump the hand pump until the “EMERGENCY BRAKE" gauge reads the minimum l500 PSI.

To **reset** the emergency/park brake:

A. Turn the selector valve handle on the "EMERGENCY BRAKE RELEASE HAND PUMP" to the "NORMAL RE-APPLY" position.
B. Push the hand pump handle down and reinstall the retainer pin.

IF MACHINE IS EQUIPPED WITH OPTIONAL WET DISC AUTOMATIC PARK BRAKE, EMERGENCY BRAKE PRESSURE GAUGE INCREASES TO APPROXIMATELY 500 PSI.

IF MACHINE IS EQUIPED WITH OPTIONAL WET DISC AUTOMATIC PARK BRAKE, THE "EMERGENCY BRAKE" PRESSURE GAUGE SHOULD NOT BE ALLOWED TO EXCEED 800 PSI OR DAMAGE TO WET DISC BRAKE CAN OCCUR. SHUTDOWN THE MODEL VT636-2 IMMEDIATELY (SEE SHUTDOWN PROCEDURE, PAGE 29) AND CALL A MAINTENANCE PERSON.

WARNING GONG

The warning gong (Figure 2, page 9), is located to the operator's right. It is sounded by striking the knob in the center of the gong. This warning gong should be used in accordance with the safety standards at the mine where the VERSATRAC® will be used.

THIS COMPLETES CONTROLS AND INDICATORS

FOR LONG DISTANCE TOWING, DISCONNECT AND REMOVE FRONT AND REAR DRIVE LINES.

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 turning the valve handle on the hand-pump to “NORMAL RE-APPLY”.

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

MAINTENANCE CAPACITIES AND SPECIFICATIONS

Drive System

Drive Motors:
Totally-enclosed, explosion-proof 128-volt, dual field, series wound, DC electric motor, coupled to a speed-reducing gear box.
Rating: 30 horsepower continuous
50 horsepower 1-hour rating

Motor Controller:
Solid state, stepless, speed control.
Rating: 1200 amps per motor
Current Limit is factory set and should be adjusted any time a drive motor, solid state panel, or logic card is changed.

Drive Axles:
Rigidly mounted planetary axles equipped with hydraulically power-applied, shaft speed, wet-disc brakes and optional operator selected differential lock.
Weight: 2085 lbs dry
2157 lbs wet

Drivelines:
72N Series

Hydraulic System

Pump Motor:
128-volt, totally-enclosed, fan-cooled, explosion-proof motor.
Rating: 10 horsepower continuous
15.8 horsepower 1 - hour rating

Hydraulic Pump:
Single section gear pump 1 1/2" gear width
Rating: 20 GPM
Maximum System Pressure: 2500 PSI

Filtration:
Suction to Pump: 100-mesh strainer inside hydraulic oil tank.
Pressure Filter (Between pump and relief valve) 25 micron cartridge-type.
Return Line Filter (Located in top of oil tank) 25 micron cartridge-type.
Strainer screens inside brake solenoid valve and accumulator charging valve.

Hydraulic System Pressures:

Main Hydraulic System Relief	2250 PSI (Max)
Steering Relief (dual, each direction)	1600 PSI (Max)

ONCE PER MONTH

1. Check the oil level in the two (2) axles (Figures 34, 35, 36 and 37) (for oil specifications, see page 40).

THE AXLE HOUSING, PLANETARY WHEEL ENDS, AND BRAKE ASSEMBLIES DO NOT HAVE A COMMON OIL/COOLANT LEVEL. THE BEST MEANS TO FILL WITH OIL IS ACCOMPLISHED BY FILLING THROUGH EACH WHEEL END, (FIGURES 35 AND 37), EACH BRAKE ASSEMBLY (FIGURE 38), AND THE HOUSING OR DRIVE UNIT (FIGURES 34 AND 37).

MAKE SURE THE LEVEL AND FILL HOLES IN THE PLANETARY WHEEL END COVERS ARE IN THE PROPER POSITION. REFER TO THE INFORMATION CAST INTO THE COVERS AND ROTATE THE WHEEL END AS REQUIRED.

WHEN FILLING THE AXLE HOUSING, PLANETARY WHEEL ENDS OR BRAKES ALLOW ENOUGH TIME FOR THE LUBRICANT TO FLOW THROUGH THE VARIOUS CAVITIES AND AROUND COMPONENT PARTS IN EACH ASSEMBLY.

FIGURE 34 – AXLE HOUSING (REAR AXLE)

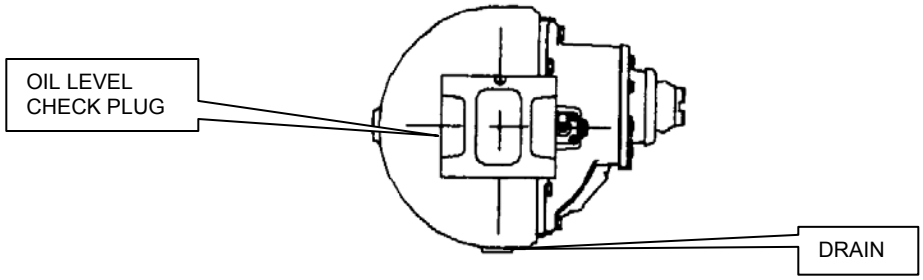


FIGURE 35 – WHEEL END (REAR AXLE)

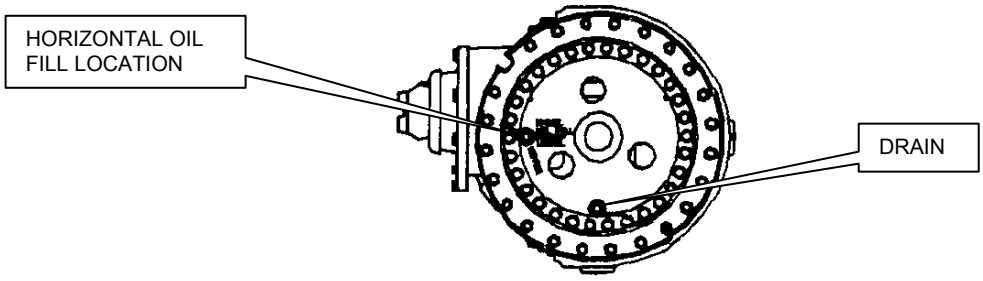
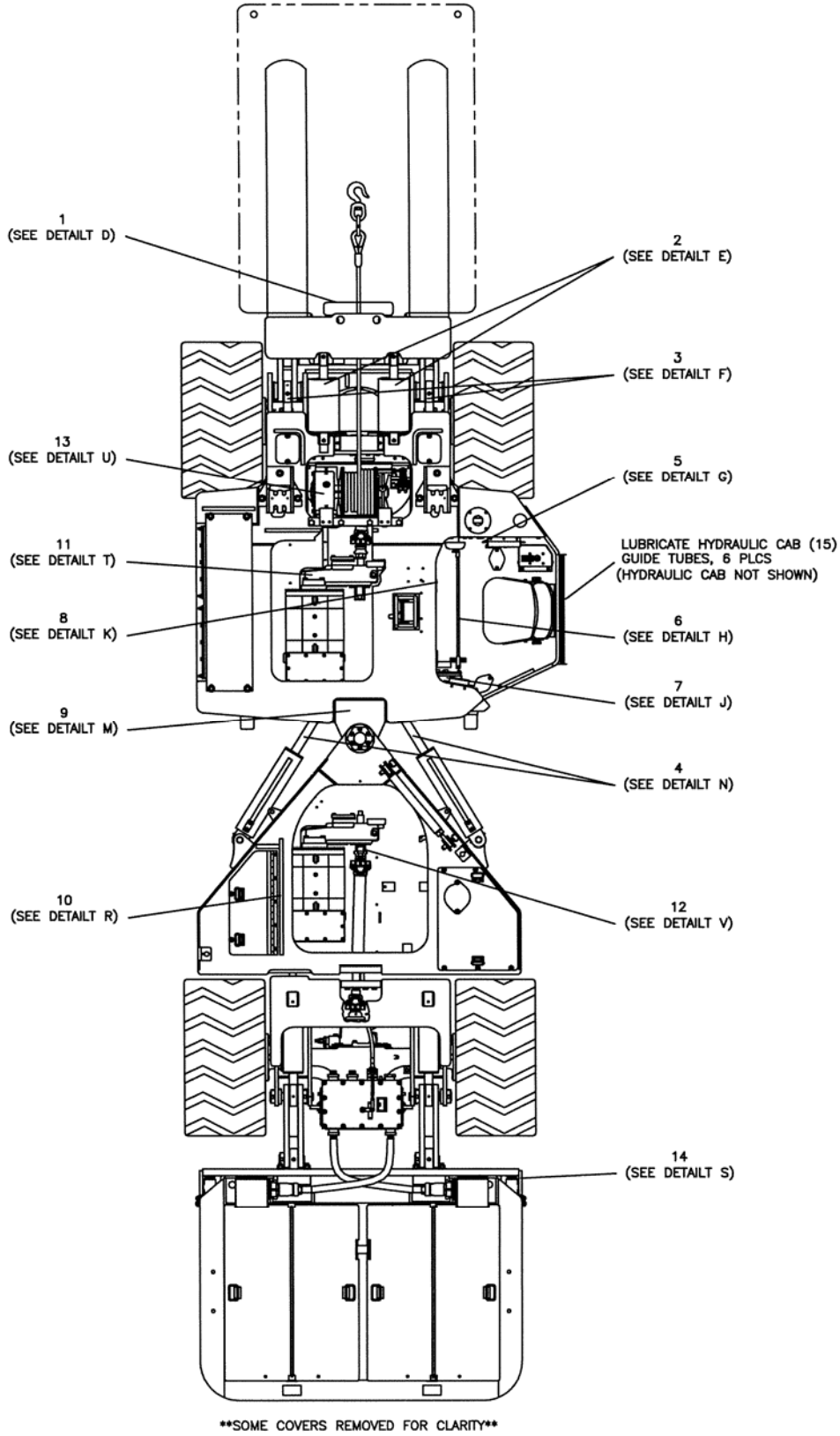


FIGURE 44 – LUBRICATION CHART (SHEET 1)



TROUBLE, SYMPTOM OR CONDITION	PROBABLE CAUSE	TEST, CHECK AND/OR REMEDY
ACCUMULATOR CHARGING TIME TOO LONG	1. No oil or low oil level in tank. 2. Relief valve setting too low. 3. Pump worn or defective and not delivering full flow or pressure. 4. Defective charging valve.	1. Check oil level. 2. Check valve setting. 3. Check pump. 4. Remove charging valve.
ACCUMULATOR FAILS TO START CHARGING	1. No oil or low oil level in tank. 2. Worn or defective pump. 3. Defective relief valve. 4. Defective charging valve.	1. Check oil level. 2. Check pump pressure and flow. 3. Check relief valve setting. 4. Replace charging valve.
VERY RAPID CYCLING OF CHARGING VALVE	1. Accumulator gas charge too low. 2. Accumulator gas charge too high. 3. No gas charge in accumulator. 4. Defective charging valve.	1. Check gas charge. 2. Check gas charge. 3. Check gas charge. 4. Replace charging valve.

CONTACTOR TIP REPLACEMENT

WARNING

BEFORE REMOVING THE CONTROLLER COVER, REMOVE POWER FROM THE SYSTEM BY UNPLUGGING THE BATTERY. WHEN THE COVER IS REMOVED, WAIT ONE MINUTE FOR THE CAPACITORS TO FULLY DISCHARGE BEFORE WORKING INSIDE THE CONTROLLER.

1. Insure electrical power is off and capacitors are discharged (See page 65).

2. Change the stationary contactor tips (Figure 48 below):

   A. Remove the bolt that holds the old tip in place and remove the old tip.
   B. Position the new tip in place and replace the bolt. Check the placement of the tip to insure that it is correctly positioned and the bolt is tight.
   C. Repeat for all stationary tips.

NOTICE

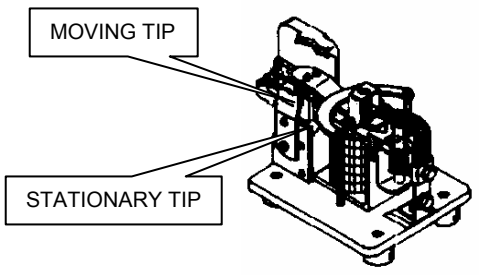
THE BOLTS USED TO FASTEN THE STATIONARY CONTACTOR TIPS IN PLACE ARE SPECIALLY SIZED TO PREVENT THE CONTACTOR TIP FROM GROUNDING TO THE CONTACTOR COIL. IF REPLACEMENT BECOMES NECESSARY, IT IS IMPORTANT TO USE BOLTS AND WASHERS IDENTICAL TO THE ORIGINAL ONES. ALL CONNECTIONS MUST BE TIGHT BEFORE THE UNIT IS PUT BACK INTO SERVICE.

3. Check for grounding between the stationary tips and either terminal of the contactor coil by using a volt/ohm meter set on R x 1. Correct any shorts if found.

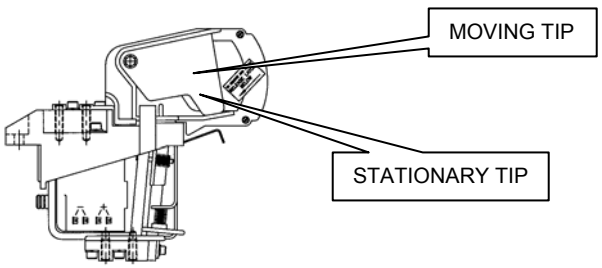
4. Change the moving contactor tips (Figure 48 below).

   A. Remove the two (2) nuts that secure the tip and remove the old tip.
   B. Position the new tip and secure with new nuts. Check the placement of the tip to insure that it is correctly positioned and the nuts are tight.
   C. Repeat for all moving tips.

FIGURE 48 – CONTACTOR TIP INSPECTION AND REPLACEMENT



PUMP CONTACTOR



MAIN CONTACTOR

to the cell. The positive and negative terminal posts, which are part of the element, fit through openings in the cover. Prior to being connected together, cells are placed so that the positive terminal of one cell is adjacent to the negative terminal of the next. This arrangement permits a conveniently made series connection.

a. Element - The element of the cell consists of one group each of positive and negative plates meshed together. The plates are insulated from each other by separators which are inserted between all plates. A plastic element protector is positioned on top of the separators. This prevents mechanical damage to the element and aids in preventing electrical shorts which occur when particles of active material bridge the space between plates. Terminal posts are welded to each group and are used to electrically connect one cell to another.

b. Group - This is an assembly of plates of like polarity connected in parallel by welding to a common strap or busbar. A cell must contain one positive and one negative group. The negative group always has one more plate than the positive group. One or more terminal posts are welded to each.

c. Plates - The plates (also called "electrodes") are either positive or negative and consist of a cast lead alloy grid and active material. The grid provides support to the active material and becomes the primary electrical conductor. The active materials result from the addition of chemicals to lead oxides which are converted, by electrochemical processing, to lead dioxide in the positive and to sponge lead in the negative.

(1) Pasted type - The grid of the pasted plate consists of horizontal and vertical or diagonal cast lead conducting members within a rectangular cast frame. A slurry of active material is pasted or squeezed into the voids, and the surfaces are then covered by porous glass and plastic retainers to prevent the loss of active material.

d. Electrolyte - The element within the jar is immersed in an electrolyte, which is a solution of sulfuric acid and "pure" water. This permits the necessary chemical reaction to occur and provides a conducting medium in which the flow of electric current takes place. The electrolyte in a fully charged cell normally has a specific gravity of between 1.280 and 1.295 at 77 degrees F. As a cell discharges, the specific gravity decreases. Measurement of this specific gravity, by means of a hydrometer, indicates the state of charge of a cell. To save time in determining- this state of charge for the battery, a pilot cell or cells may be chosen; a pilot cell is a selected cell(s) whose condition is assumed to be representative of the condition of the entire battery.

e. Separators - Separators are made from microporous plastic, which is resistant to heat and acid. Separators provide mechanical and electrical insulation between positive and negative plates, but are porous enough to permit passage of electrolyte. The grooved or ribbed side of the separator is placed toward the positive plate to allow a free flow of electrolyte to the active material. The flat side faces the negative plate to contain the sponge lead.

f. Positive Plate Retainers - Pasted type plate retainers are added, after pasting, typically by wrapping the plate first with fibrous-type glass tape or mats and then by a perforated plastic envelope complete with bottom boot or by other suitable filtering systems. All types of retainers act to prevent the escape of positive active material during normal use. Retainers are not needed on negative plates.

Check the height of the electrolyte at least weekly and if water is needed, add just enough to bring the electrolyte to proper level. Do not overfill. Batteries should be watered only when discharged and only cover plastic plate with holes - never any higher.

Add water often enough to prevent the electrolyte level from dropping below the perforated separator protector. Ideally, a watering schedule should be established. This schedule should assure adequate watering while taking into consideration those factors which control water consumption, such as (1) frequency of charging, (2) water storage capacity of the specific cell type, and (3) age and condition of the battery.

2-16. Taking Hydrometer Readings

1. With the tip of the hydrometer immersed in the electrolyte, squeeze the syringe bulb and then slowly release it, drawing into the cylinder or barrel just enough electrolyte to permit the hydrometer float to ride free. The float stem must not touch the side of the cylinder nor the top of the syringe. If the float stem touches the upper area of the syringe, too much electrolyte has been drawn up; if the float still rests on the bottom, too little electrolyte has been drawn up. (See Figure 3.)

2. Read the hydrometer float scale with your eye at the same level as the electrolyte. The reading should be taken at the surface of the liquid, disregarding any slight curvature. This reading will be the specific gravity uncorrected for temperature. (See Table 3 for correction factors.)

3. Return all electrolyte to cell.

2-17. Record Keeping

Facilities with more than just a few batteries will find that records of battery cycles, maintenance, and repair are indispensable for an effective battery maintenance program. In addition to those monthly records which require the posting of data each time a battery is charged, the following procedure will be helpful:

1. Establish a battery identification system giving each battery a code number. A multiple-digit system is suggested.

2. Record specific gravity of the pilot cell or cells before and after each charge. Pilot cells should be selected from those nearest the center of the battery and identified by differently colored vent caps. They should be representative of the balance of the cells in the battery.

3. Record the number of cycles on a cumulative basis plus maintenance and repair information. Note any irregularities. The use of a "Battery Cycle and Maintenance Record" form is recommended. If variations in specific gravity readings exceed 20 points (.020) and on-charge voltage, after an equalizing charge, varies by more than .15 volts, contact your DBT AMERICA INC. service representative.

4. When the battery is new, and on at least an annual basis thereafter, read and record the specific gravity and open circuit voltage for all cells of the battery.

a. Sealing Compound and Lead Bushing Design - Probably the most commonly used system, an asphalt type compound is applied to seal the cover to both rubber and plastic jars. Lead bushings, molded into the cover as inserts, are welded or "burned" to the terminal posts to prevent electrolyte leakage around the posts. When replacing a cover of this type, first cut the compound with a warm putty knife. Cut the full depth of the cover adjacent to the jar wall from corner to corner on each of the four sides. Since reuse of covers which have been removed from the element is not recommended, use a post trimmer to cut off the post extensions above the cover. Break the lead bond between post and lead insert by driving the cover down approximately 1/32". The lead insert mold placed over the post and tapped with a hammer serves this purpose. Insert a hook through the vent opening and lift the cover off. Remove all sealing compound adhering to jar wall and neutralize these surfaces and upper portion of all terminal posts, using a cloth moistened with a soda solution. Thoroughly dry all of the neutralized surfaces. Install the new cover, complete cover-to-jar seal, and reburn cell connectors as described in Paragraph 3-10.

b. Epoxy Seal and Seal Nut Design - This is one of the newer systems which employs an epoxy or permanent, hard seal between cover and jar. To disassemble a cell of this design requires that the jar be cut and that both jar and cover be replaced. When reassembling with a new jar and cover, it is very important to adhere to the following procedure to obtain an effective seal:

1. Epoxy can be used only on rubber jars and covers.

2. Thoroughly clean cover and jar sealing areas first with xylol (xylene), then with isopropyl alcohol; use a separate cleaning cloth for each.

3. Caulk bottom of seal groove with glass cord. Tamp corners in. Make overlap small. Do not use warm compound with epoxy.

4. Use special epoxy sealant as recommended by the battery manufacturer. Follow instructions provided.

5. Apply epoxy in two pours. Make second pour within two hours after first pour. Fill to top of jar. Do not overfill.

6. Pressure test seal after three hours or more from time of final pouring. Pressure test to 1.5 psi for 10 seconds.

d. Heat Bonded Plastic Cover-to-Jar Seal and Lead Bushing Design - This is the newest of the sealing systems used with motive power batteries. To disassemble a cell of this design also requires that the jar be cut and both jar and cover be replaced. The seal between jar and cover is, in effect, a plastic weld. It can only be used with jars and covers made from identical plastic molding material.

Since special techniques must be used when resealing these covers, the battery manufacturer recommends that these cover-to-jar seals not be repaired in the field. Manufacturers' instructions request that such repairs be made in their service stations only.

3-12. Adjusting Specific Gravity of Electrolyte

Fully charged cells usually operate at a specific gravity between 1.280 and 1.295. Normally it should never be necessary to adjust the gravity, but upsets, jar breakage, additions of too much water, and careless use of hydrometer can result in electrolyte loss and possible reductions of battery capacity. Lost electrolyte must be replaced but only after it has been determined that charging will not restore the gravity to normal when at the recommended level.

MAJOR HAZARDS

AREA WHERE HAZARD CAN OCCUR	HAZARD WHAT CAN HAPPEN IF PRECAUTIONS AND SAFEGUARDS ARE NOT OBEYED	SAFEGUARDS HOW TO AVOID THE HAZARD
ELECTRICAL (A.C. Input, Charger, Battery)	Electrical shock could cause irreparable injury or death.	All electrical systems should be maintained by certified electricians. The a.c. input and charger plug should be disconnected before servicing the charger.
	Charging a battery of a size different than that shown on the charger nameplate could cause the battery to burst, or cause damage to the battery or charger.	Chargers should be matched to the size batteries in use at each particular mine.
BATTERY	The battery produces lethal amounts of power whether connected to the machine or charger, or not.	The battery should be maintained by qualified personnel. (Refer to Bucyrus America, Inc. "INSTALLATION, USE, MAINTENANCE, AND REPAIR OF MINE POWER STORAGE BATTERIES," PART NUMBER A6474X26, for complete instructions).
	Battery covers could fall crushing hands or arms.	Be sure cover supports are in place when working on battery.
	Battery hold-down clamps could crush fingers.	Keep fingers away from hold-down clamps.
	Batteries produce explosive gases that could be ignited causing burns or explosions.	Batteries should be well vented before servicing particularly if welding or burning on the battery. Batteries should be maintained by qualified personnel.
	Batteries contain strong acid that could cause severe burns if spilled or splashed on body parts or in the eyes.	Protective clothing, gloves, and eyewear must be worn when working on batteries. Batteries should be maintained by qualified personnel.

RATINGS AND SPECIFICATIONS

Output Ratings

D.C. Voltage

The LA Series Mine Chargers are factory set to finish at approximately 2.5 volts/per cell for lead acid batteries. The chargers are available in 32 cell (64 volt) or 64 cell (128 volt) output.

Output Current

(Refer to table 1).

Regulation

The charge rate is dependent on the state of charge of the battery. Automatic a.c. line voltage compensation regulates the d.c. output and maintains the charging curve.

INPUT CURRENT AND BATTERY CAPACITIES

CHARGER MODEL	APPROX. AC CURRENT DRAW (3-PHASE) 480VAC / 575VAC	BATTERY AMPERE-HOUR CHARGING CAPACITY	OUTPUT RATING
LA5	26 - 22	550	90 AMPS
LA6	32 - 27	680	110 AMPS
LA8	41 - 34	800	140 AMPS
LA10	52 - 44	1050	180 AMPS
LA12	61 - 51	1200	210 AMPS
LA 14	70 - 59	1400	240 AMPS

TABLE 1

Input Ratings

A.C. VOLTAGE

Taps are provided for three phase a.c. input voltages of 480 or 575 Vac with an a.c. input voltage range of +/-10% of nominal.

Input Frequency Range

57 to 63 Hz. (60 HZ nominal).

Input Current & Battery Capacities

(Refer to TABLE 1)

Typical Electrical Specifications

(Refer to TABLE 1)

During shipping, an a.c. wire may rub against the d.c. lugs, terminals, etc. and cause a short. These problems may be eliminated by very carefully inspecting the wiring to make certain the a.c. wires are not touching the d.c. wiring. If no wires are touching, then it is possible that the primary and secondary of the transformer is shorted. Disconnect the secondary of the transformer from the diodes. Measure with ohmmeter from input terminal to one of the isolated secondary leads. If there is an ohmmeter indication, there is an insulation breakdown between primary and secondary windings. The transformer should be replaced.

4. Check the input terminals to ground and check the output terminals ground. If the meter indicates full scale deflection, a wire is touching a metal part of the unit. Look for wires that are near any metal part and inspect for possible breakdown caused by shipping. The heatsink of the diodes and the control unit are insulated from ground through the mounting legs.

Troubleshooting and Replacing Power Silicon Diodes

If a portable multimeter is used, set the switches on "ohms", "d.c.", and " Rx1 " scale.

1. Isolate one end of the diode by disconnecting the wires attached to the nipple (or pigtail) end of the diode (only one end of the diode must be disconnected).
2. Clip one lead of the ohmmeter to the anode lead of the diode. Clip the other ohmmeter lead to the cathode.
3. Note the ohmmeter reading. Then reverse the leads to the diode. Again, note the ohmmeter reading. If the diode is good, the meter will indicate a high resistance in one direction, and a low resistance with the leads reversed. If the diode is shorted, the meter will read full scale, or zero ("O") resistance with the leads in either direction. If the diode is "open", the ohmmeter needle will not indicate or it will show infinite resistance in either direction, indicating an open circuit.
4 All diodes must be checked in the event that more than one diode is defective.
5. If the diode is defective, remove it from the heatsink. Clean and smooth the heatsink surface, then using an electrically conductive grease, apply to the new diode and replace it in the heatsink.

Checking Capacitors

When checking capacitors, be sure all power is turned off and the battery is disconnected. Momentarily short circuit the capacitor leads to assure complete discharge. Connect the meter test leads to the capacitor leads or terminals and observe indicated resistance.

A good capacitor will indicate an initial low resistance and gradually increase as the capacitor charges. The final resistance of a good capacitor is usually several hundred thousand ohms approaching a megohm.

Initial high resistance approaching infinity indicates an open capacitor. Initial and continued low resistance readings indicate a shorted capacitor.

When ordering replacement parts, drawings, or schematics, always give model number, serial number and a.c. input voltage.

491868X12 LA-8 Battery Charger 480/575 Volt, 60 HZ

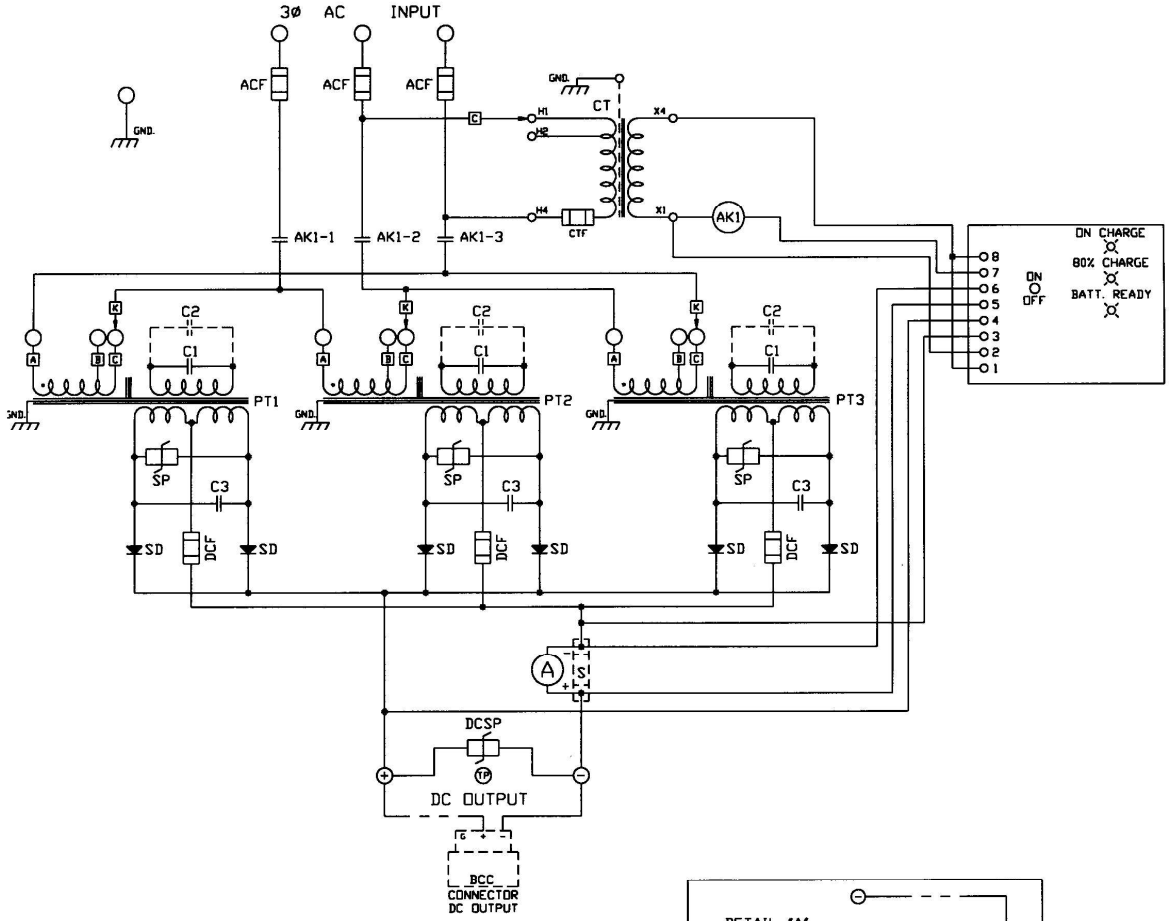
REFERENCE	QUANTITY	PART NUMBER	DESCRIPTION
1	2	491868X560	HEATSINK MTG. BRKT. (TOP LEFT)
2	2	491868X541	HEATSINK MTG. BRKT. (TOP RIGHT)
3	2	491868X559	HEATSINK MTG. BRKT. (BOTTOM)
4	1	491868X503	GLAND PLATE
5	1	491868X504	WIRE HARNESS, TIMER BOARD
6	1	491868X505	CONTROL TRANSFORMER (CT)
7	1	491868X506	AUTOMATIC TIMER BOARD
*8	6	491868X507	SPACER, 0.25-30 X 0.875 HEX
*9	1	491868X508	POS. DC OUTPUT TERM. (BLK)
10			
11	6	491868X510	CAPACITOR BRACKET, 5.75” HIGH
12	1	491868X511	SECONDARY FUSE BLOCK
*13	1	491868X512	TERMINATION BASE COMPONENT
*14	4	491868X513	THREADED INSULATOR
15	3	491868X574	POWER TRANSFORMER ASSY. LA8 (PT)
*16	4	491868X515	SURGE PROTECTOR ASSY. (SP)
17	1	491868X563	HEATSINK PLATE, 25 X 8 X 1/8
18	3	491868X564	EXTRUDED ALUM HEATSINK
19	1	491868X580	FUSE BLOCK, THREE POLE (AC)
20	1	491868X519	FUSE (C), 3 AMP - 600V (CTF)
21	3	491868X575	FUSE (B), 60 AMP - 600V (ACF)
22	3	491868X576	FUSE (AT), 100 AMP - 130V (DCF)
23	6	491868X522	CAPACITOR BRKT., 1.91 X 2.91
*24	1	491868X523	ACF BLACK MOUNT BRKT. 26F - AG
25	3	491868X524	CAPACITOR, 660V - 30MFD (C3)
26	6	491868X577	CAPACITOR, 660V - 8MFD (C2)
*27	1	491868X578	AMMETER SHUNT, 200 AMP - 100MV (S)
28	1	491868X579	DC AMMETER, 0 - 200 AMP (A)
29	6	491868X528	SILICONE DIODE, 150 AMP - 1KV (SD)
*30	1	491868X529	CONTACTOR, 3P - 115VAC (AK)
31	1	491868X530	COPPER BUSS, (DC FUSE BLOCK)
*32	1	491868X531	CONTACTOR COIL
33	1	491868X532	CHARGER BASE
34	1	491868X533	CHARGER DOOR LEFT
35	1	491868X534	CHARGER DOOR RIGHT
*36	1	491868X535	PLEXIGLASS
37	1	491868X536	DISPLAY GUARD
38	1	491868X537	GUARD BRACKET
39	1	491868X538	TOP COVER
40	1	491868X562	WIRING HARNESS

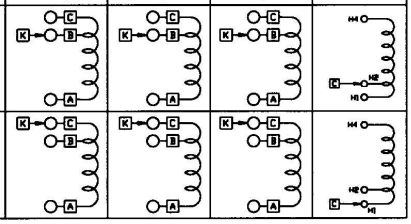
* INDICATES PARTS NOT SHOWN.

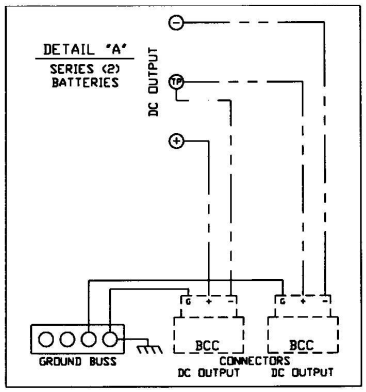
WIRING DIAGRAM 491736

NOTE: SEE FORM NO. E-004 FOR ASSEMBLY DRAWING.

FIGURE 4 – WIRING DIAGRAM (491736)



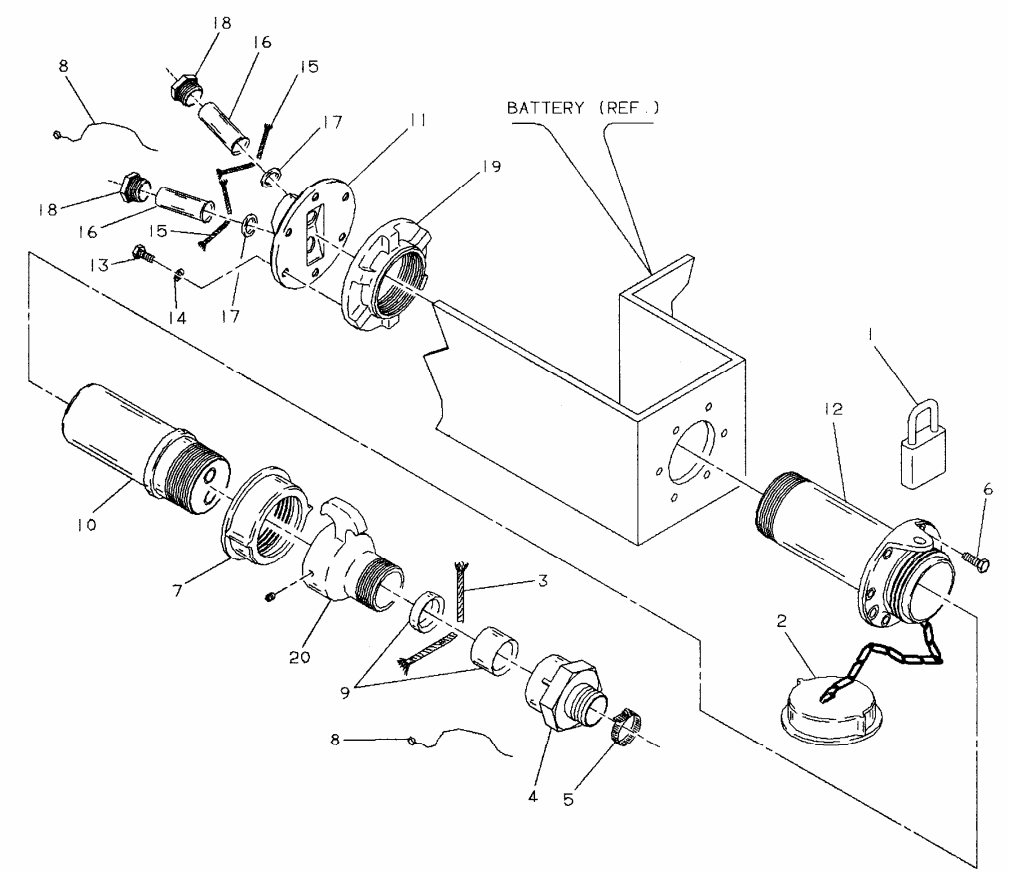
MULTI VOLTAGE TRANSFORMER PRIMARY JUMPER CONNECTIONS				
AC INPUT VOLTAGE	POWER TRANSFORMERS PT1	PT2	PT3	CONTROL TRANSFORMER
480				
575				



CTF	CONTROL TRANSFORMER FUSE
BCC	BATTERY CHARGE CONNECTOR
TP	TIE POINT
DCSP	DC SURGE PROTECTOR
SP	SURGE PROTECTOR
PT	POWER TRANSFORMER
C	CAPACITOR
CT	CONTROL TRANSFORMER
AK	AC CONTACTOR
ACF	AC FUSE
DCF	DC FUSE
SD	SILICON DIODE
A	DC AMMETER
S	SHUNT

NOMENCLATURE

FIGURE 10 – PLUG AND RECEPTACLE ASSEMBLY (C3195)



REFERENCE	QUANTITY	PART NUMBER	DESCRIPTION
1	1	A3220	PADLOCK
2	1	A5928-3	COVER
3	A/R	9-750500-069	PACKING
4	1	C544X2	NUT
5	1	A3190X5	CLAMP
6	6	A8001-031	HEX HEAD BOLT
7	1	B3195-2	RING
8	2	A3688	WIRE SEAL
9	1	A2973X6	BUSHING (1-5/16” ID)
	1	A2973X9	BUSHING (1- 1/2” ID)
	1	A2973X10	BUSHING (1-9/16” ID)
	1	A2973X11	BUSHING (1- 5/8” ID)
10	1	C3195	PLUG (1-5/8” ID)
11	1	B3196-4	END COVER
12	1	C3196-1	RECEPTACLE
		C3196	RECEPTACLE (COMPLETE)
			(REQUIRED FOR PA.)
13	6	A8001-060	HEX HEAD CAP SCREW
14	6	A8006-605	LOCKWASHER
15	A/R	9-750500-068	PACKING
16	2	A646	TUBE
17	2	A2620	BUSHING
18	2	A645	NUT
19	1	B3196-3	FLANGE
20	1	B3195-6	ADAPTOR

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

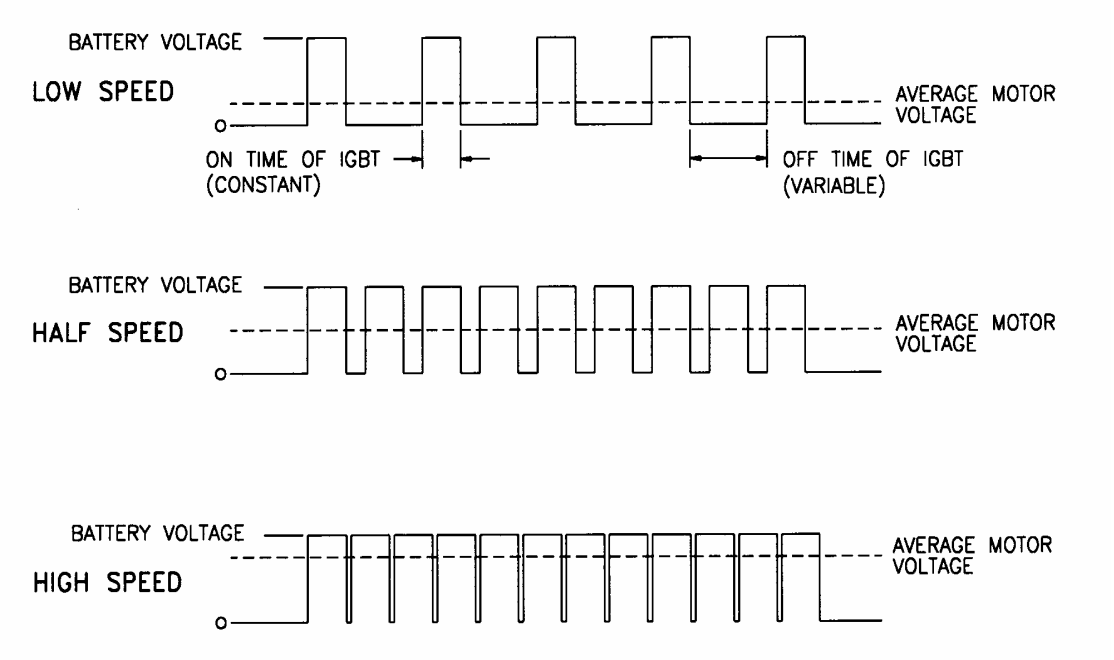
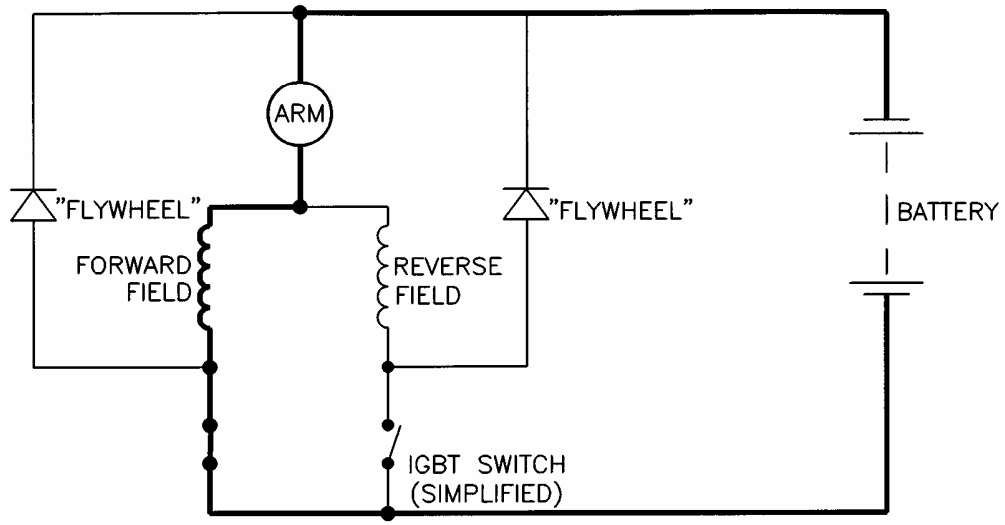


FIGURE 3



Optional Hand Held Diagnostics/Calibrator Unit

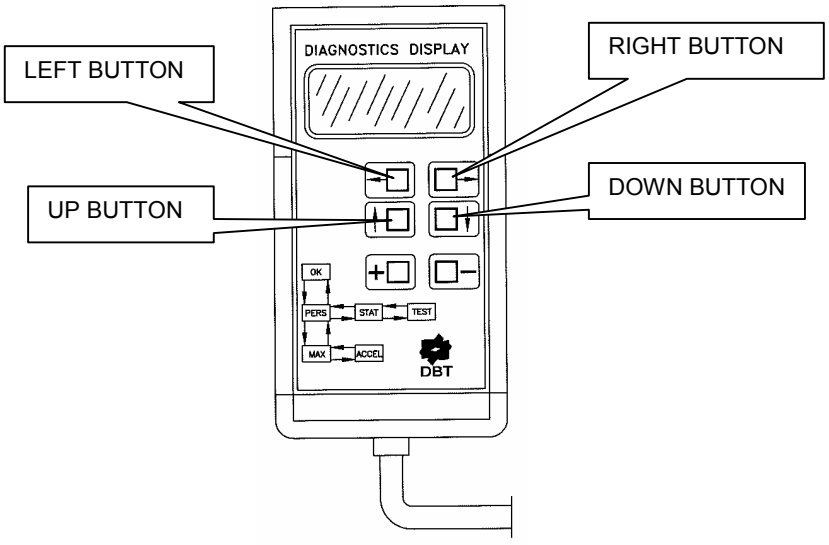
Security Levels:

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

NOTICE

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