

**BRB-1500
MACHINE MANUAL**

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MACHINE MANUAL
SPECIFICATIONS

BRB-1500

SECTION 1.1: APPLICATIONS

SECTION 1.2: SPECIFICATIONS

SECTION 1.3: MANUFACTURER



SECTION 1.1: APPLICATIONS

The BRB-1500 is specifically designed to remove coatings and coverings from horizontal surfaces. Coatings may include glue, epoxies and cementitious overlays. Coverings may include carpet, ceramic tile, and VCT.

A wide variety of tools are available from Blastpro® for your specific application.

In general, the BRB-1500 uses sharpened spring steel blades along with the weight of the machine itself to perform the scraping function. The variable angle of attack allows for a great deal of flexibility when dealing with different floor coatings.

SECTION 1.2: SPECIFICATIONS

Dimensions (L x W x H)	30.25" x 31.75" x 52"
Weight	1580 lbs
Charge capacity	Up to 8 hour run time
Electrical System	48 VDC, 48 VAC and 12 VDC
Blade Actuation	Electric-over-hydraulic
Steering	Electric
Ground Drive	Electric
Blade Widths	2" through 24"

SECTION 1.3: MANUFACTURER

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SECTION 2.1: GENERAL

SECTION 2.2: MAINTENANCE AND WEAR PARTS REPLACEMENT MODES

SECTION 2.3: WORK SITE ASSESSMENT AND INSPECTION

SECTION 2.4: PERSONAL PROTECTIVE EQUIPMENT

SECTION 2.5: OPERATIONAL SAFETY



SECTION 2.1: GENERAL

Read and understand this Machine Manual prior to operating or performing maintenance on the BRB-1500.

This Machine Manual has been developed as a guideline for machine operation. It is not a substitute for proper organizational training and management.

All machine operators and maintenance personnel should be properly trained in operation and safety features of the BRB-1500.

Make these operating instructions accessible to all operating and maintenance personnel.

Never weld, modify, cut or grind components of the BRB-1500 without prior written consent from the manufacturer.

Never use aggressive cleaning chemicals to clean the machine.

SECTION 2.2: MAINTENANCE AND WEAR PART REPLACEMENT MODES

Maintenance mode is defined as placing the machine in a configuration, which minimizes potential electric, hydraulic or stored energy hazards.

In general, the machine should be placed in Maintenance Mode prior to performing any maintenance and/or troubleshooting activities.

MAINTENANCE MODE:

1. Move the machine to a level surface.
2. Lower blade.
3. Move brake switch to "ON" position.
4. Depress E-stop button.
5. Block wheels to prevent the machine from moving.
6. Allow all components to cool prior to carrying out any maintenance work.



In general, the machine should be placed in Wear Parts Replacement Mode prior to changing the blade(s).

WEAR PARTS REPLACEMENT MODE:

1. Move the machine to a level surface.
2. Raise the blade holder so the blade is off of the ground.
3. Move brake switch to "ON" position.
4. Depress E-stop button
5. Loosen appropriate bolts and replace blade(s).

After performing any maintenance or repair work verify that all safety labels, guards, lids and bolted connections are properly and securely installed on the machine.

SECTION 2.3: WORK SITE ASSESSMENT AND INSPECTION

Before starting scraping operations, a site assessment must be performed. During the site assessment verify the following:

- Work area is flat, clean, and dry, free of debris, frost-free, and has no flammable liquids nearby. Also, make sure that the machine will be able to clear all obstructions. **NEVER SCRAPE OVER BOLTS, NUTS, SCREWS, NAILS, OR OTHER DEBRIS AS THIS MAY RESULT IN SIGNIFICANT DAMAGE TO THE MACHINE AND SERIOUS INJURY TO THE OPERATOR.**
- **FLOORS HAVE BEEN THOROUGHLY INSPECTED. SOME FLOOR OR DECK SURFACES MAY BE COATED WITH, OR CONTAMINATED BY, DANGEROUS MATERIALS SUCH AS:**
 - PCBs
 - LEAD
 - ASBESTOS
 - PESTICIDES
 - SOLVENTS
 - CLEANING FLUIDS
 - AND/OR OTHER HARMFUL CHEMICALS

DISTURBING SUCH SURFACES CAN CREATE A SERIOUS HEALTH THREAT TO THOSE WHO INHALE OR COME INTO CONTACT WITH THE DUST. THE WORK AREA MUST BE CHECKED FOR THESE MATERIALS BEFORE WORK CAN BEGIN. BLASTPRO MANUFACTURING, INC. DOES NOT WARRANT ITS EQUIPMENT TO BE SUITABLE FOR, OR APPROVED FOR, REMOVING DANGEROUS



MATERIALS. IT IS THEREFORE THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE SAFETY OF THE WORK AREA AND THE EQUIPMENT WITH THE PROPER AUTHORITIES. IT IS ALSO THE RESPONSIBILITY OF THE CONTRACTOR TO WARN ALL STAFF MEMBERS OF ALL THE POTENTIAL SHORT-TERM AND LONG-TERM HEALTH RISKS ASSOCIATED WITH INHALING AND COMING INTO CONTACT WITH DANGEROUS MATERIALS. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL WORKERS FROM BEING EXPOSED TO DANGEROUS MATERIALS.

- Operator and any other personnel in the work area are wearing safety glasses with side shields, dust masks, ear plugs, hard hats, steel toed work boots, long sleeved shirts, tight fitting clothing, and gloves. It is also imperative for staff to tie back long hair and to remove all jewelry.
- Work area has been blocked off to pedestrians, unprotected personnel, and untrained personnel. In the event pedestrians, unprotected personnel, or untrained personnel enter the work area, scraping operations are to be stopped immediately.
- Fire extinguishers are nearby. Also, take note of the location and the contact information of fire departments close to the work site.
- All guards are properly installed and in good working order prior to using the machine.
- All glass and equipment, including vehicles, are protected from debris. This can be done by loosely hanging a sheet of visqueen or other protective material in front of the glass or equipment in a curtain-like fashion.
- The operator must be aware of their surroundings and use common sense. **THE OPERATOR IS NOT TO OPERATE THE EQUIPMENT IF HE IS TIRED, DISTRACTED, OR UNDER THE INFLUENCE OF DRUGS, ALCOHOL, OR MEDICATION THAT DECREASES AWARENESS.**



SECTION 2.4: PERSONAL PROTECTIVE EQUIPMENT (PPE)

All personnel working with, or in the vicinity of the BRB-1500 should, at a minimum, utilize the following PPE:

- Protective boots or shoes
- Eye protection with side shields
- Hearing protection
- Protective leather gloves for handling blades

All personnel should observe PPE requirements particular to each job site.

SECTION 2.5: OPERATIONAL SAFETY

- Support personnel must keep a safe distance from the machine while it is in operation. Do not stand in front of, or behind, the machine while in operation.
- The blade should only be actuated up and down with the operator properly seated on the machine.
- Do not drive the machine with the scraper blade more than ½" off of the floor.
- The operator must be aware of their surroundings. No personnel should operate or perform maintenance on the machine if they are tired, distracted or under the influence of drugs, alcohol or medication that decreases awareness.
- Verify that all protective guards and covers are properly installed and secured.
- Verify that there is sufficient light for the operator to view the work surface. The machine is equipped with headlights to provide additional lighting.



SECTION 3.1: START-UP

SECTION 3.2: SHUT DOWN

SECTION 3.3: BLADE SELECTION

SECTION 3.4: TRANSPORT



SECTION 3.1: START-UP

Only trained, authorized personnel should be allowed to run the BRB-1500. If training is needed, please consult with your Blastpro Manufacturing representative or authorized distributor.

Prior to start-up, the work surface should be inspected for hidden studs, electrical boxes, or any other hidden obstructions. These items should be removed or clearly marked so they can be avoided.

To move machine:

1. Operator should be firmly seated in the operator's seat.
2. Verify that the left and right control levers are in the center position.
3. Pull e-stop button up to energize the motor controller.
4. Flip the brake switch to the "OFF" position.
5. Push rocker switch on the right control lever to raise the blade.
6. Push levers forward to move forward; pull backward to reverse. Varying positions of the left and right control levers will turn the BRB-1500 left and right.
7. Move machine to desired location.

Normal Operation:

1. Insert selected blade into blade holder (see SECTION 3.3: BLADE SELECTION). Always wear leather gloves and use caution when handling the blades.
2. Operator should be firmly seated in the operator's seat.
3. Verify that the left and right control levers are in the center position.
4. Pull e-stop button up to energize the motor controller.
5. Flip brake switch to "OFF" position.
6. Push rocker switch on right control lever to adjust the blade angle. Some materials may require more pressure on blade for removal. This can be accomplished with a higher angle on the blade holder.
7. Move control levers forward to start removal. It is recommended to make a single pass in one direction to expose an edge of the material to be removed. Subsequent passes should be made perpendicular to the initial pass. See FIGURE 3.1.1.

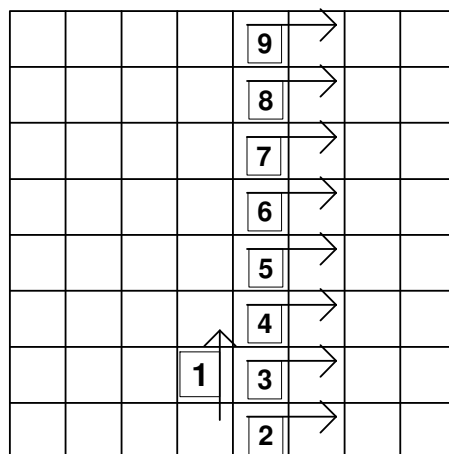


FIGURE 3.1.1

SECTION 3.2: SHUT DOWN

At end of shift or work day:

1. Move machine to level ground for storage.
2. Use the rocker switch in the left control lever to lower the cylinder until the front caster lifts off of the ground.
3. Flip the brake switch to “ON” position.
4. Depress E-stop.
5. Plug extension cord into machine charging unit.

For long term storage:

1. Move machine to level ground in a secure location for storage.
2. Lift blade to upper-most position.
3. Flip brake switch to “ON” position.
4. Depress E-stop.
5. Remove the blade and/or the blade holder from the front of the machine.
6. Operator should be firmly seated in operator’s seat.
7. Pull E-stop out.
8. Use the rocker switch in the right control lever to lower the cylinders until the front caster lifts off of the ground.
9. Depress E-stop.
10. Cover the BRB-1500 to protect it from dust and moisture.

CAUTION: Many of the components on the BRB-1500 are not meant to be exposed to high levels of moisture. It is critical, especially if the machine is stored in a location exposed to the elements, that it be protected from rain, splashing or other high levels of water.



SECTION 3.3: BLADE SELECTION

Selecting the proper blade for the application will have a dramatic effect on machine efficiency. If a blade is too wide for the application, there may not be enough pressure on the blade to stay under the material to be removed. If the blade is too narrow, the machine may not be removing the maximum material it is capable of in a single pass.

Based on information about a particular job, start with the widest blade that may be appropriate for removal. Make a test pass to determine if the blade will stay under the material. If so, continue with this selected blade. If removal of the material is relatively easy, consider moving to a larger blade. If it is difficult to stay under the material, move to a narrower blade.

Always wear leather gloves and use caution when handling blades.

In general, flat blades should be used for scraping glues, mastics, epoxies and thinsets. SEE FIGURE 3.3.1.



FIGURE 3.3.1

For carpet, rubberized and elastomeric coatings, a carpet blade should be utilized. The 90° wings on each end of the blade will help keep the removed material manageable. SEE FIGURE 3.3.2.



FIGURE 3.3.2



Blastpro offers a carbide tipped tool for tile removal. This can be inserted into the 3-hole tool adapter on the blade holder. SEE FIGURE 3.3.3



FIGURE 3.3.3

SECTION 3.4: TRANSPORT

Only use factory installed tie-down/lifting lugs when transporting or moving the equipment. These are located at the front of the machine, near the blade, and at the rear of the machine, SEE FIGURE 3.4.1.

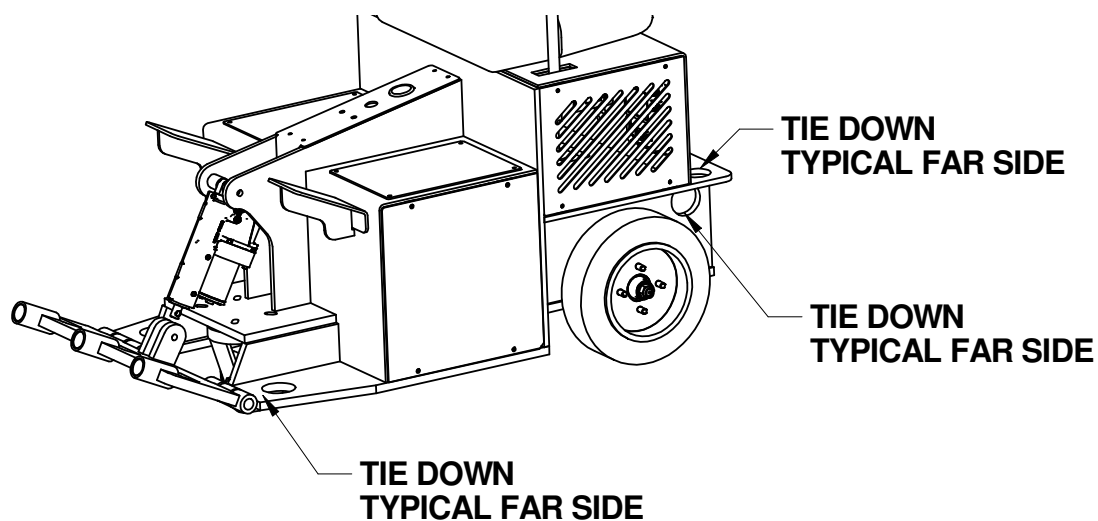


FIGURE 3.4.1



Never secure the machine with straps or chains across the hydraulic cylinder. This can result in damage to the cylinder or premature wear.

Verify that lifting straps or chains are rated for the weight of the machine.

Verify that trailer or truck bed is rated for the weight of the machine.

Remove scraper blade and/or pivoting blade holder prior to securing for transport.

Verify that the blade holder is lowered and that the front swivel caster is off of the truck or trailer bed.

Never allow personnel to stand under the machine when it is being lifted.



SECTION 4.1: MAINTENANCE INTERVALS

SECTION 4.2: TROUBLESHOOTING

SECTION 4.3: MOTOR CONTROLLER FAULT CODES

SECTION 4.4: BATTERY CHARGING

SECTION 4.5: RECOMMENDED SPARE PARTS

SECTION 4.6: RECOMMENDED TOOLS

SECTION 4.7: PARTS LIST AND DRAWINGS



SECTION 4.1: MAINTENANCE INTERVALS

Daily, or at the beginning of each shift

If additional assistance is required consult your Blastpro representative, authorized Blastpro distributor, or qualified electric systems professional.

Always wear leather gloves and use caution when handling blades.

1. Inspect bolted connection for tightness.
2. Inspect wires for damage and abrasion.
3. Inspect blades for excessive wear.
4. Inspect drive wheels for wear.
5. Inspect battery charger outlet for damage and debris.

Every 25 Hours

1. Inspect electrical connections.
2. Grease all blade and cylinder pivot pins.
3. Inspect battery terminals for corrosion.

Every 50 Hours

1. Tighten rear wheel nuts
2. Grease front caster and inspect for wear or damage.
3. Inspect transaxle oil levels

*Perform these maintenance activities more frequently under extremely dusty, dirty conditions.



SECTION 4.2: TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Electric motor will not start	E-stop is depressed Fuse is blown Batteries are dead Motor controller fault	Turn motor switch to "OFF", pull out E-stop button, and try to start motor. Replace 10 A fuse Charge batteries Remove rear cowling to retrieve fault code on controller, and consult Blastpro Representative or authorized distributor. SEE SECTION 4.3 "FAULT CODES"
Slow coating removal	Blade is dull Blade is too wide Incorrect blade angle	Flip or replace blade Replace with narrower blade Adjust blade angle up or down with hydraulic cylinders
Battery charger LED does not come on when the power is applied to the battery charger	Not plugged into a live circuit Extension cord is damaged Leads connecting the charger to the battery terminals are damaged or corroded	Verify that the circuit you are plugged into is live Replace extension cord Repair/replace/clean the leads
Battery charger LED never blinks	Indication of shorted cells in a battery	Replace damaged battery
No power is present across the leads from charger to battery terminal when disconnected	The charger will not turn on until the leads are connected	Connect leads to battery terminal with proper polarity
Batteries do not receive a full charge	Extension cord is too long or too small	Use a shorter or bigger extension cord. Always use the shortest possible cord.



SECTION 4.3: MOTOR CONTROLLER FAULT CODES

LED FLASH CODE	DIGITAL DASH DISPLAY CODE	SYMPTOM	PROBABLE CAUSE OF SYMPTOM	SYMPTOM CORRECTION
6-2	02A62	Machine will not move.	Control arm not in neutral position during machine start up.	Place Control arms in neutral position and cycle e-stop
6-5	02A65/04A65		Brake switch not engaged during machine start up.	Engage brake switch and cycle e-stop.
3-3	02A33/04A33		Brake switch engaged after machine start up.	Disengage the brake switch.
4-8	02A48/0\$A48	Machine will not move after battery charge.	Improperly charged battery.	Charge battery or replace defective battery.
2-9	02A29	Reduced ground drive speed.	Excessively low battery.	Charge battery.



SECTION 4.4: BATTERY CHARGING

To extend the life of the batteries, the machine should only be used until the charge meter reads 20%. Fully discharging the batteries on a regular basis will dramatically decrease the life of the battery, or cause polarity reversal resulting in complete battery failure. After the battery reaches 10% of charge remaining, the discharge rate increases dramatically.

Warning: It is normal for the charger to become hot when charging. Do not obstruct the flow of air around the charger. Do not allow clothing, blankets or other material to cover the charger. Do not use near fuels, grain, dust, solvents or other flammables.

The battery charger must be grounded to reduce the risk of electric shock. The charger is equipped with a ground type plug, and it must be plugged into a nominal 115 volt, 60 Hz circuit.

Warning: Improper connection of the charger grounding conductor can result in a risk of an electric shot. DO NOT USE THIS CHARGER ON A TWO POLE UNGROUNDED OUTLET OR ATTEMPT TO BREAK OFF THE GROUND PRONG FOR USE ON A RECEPTACLE OR EXTENSION CORD NOT HAVING A GROUND.

Warning: To reduce the risk of fire, only charge this machine on circuits provided with a maximum of 20 ampere branch circuit protection (circuit breaker or fuse, in accordance with the National Electric Code, and all local codes and ordinances.

1. Plug the female end of the extension cord into the charging outlet on the rear of the machine.
2. Plug the male end of the extension cord into a properly rated AC outlet.
3. The charger is equipped with an electronic timer. When the battery reaches the gassing threshold (2.3 V/cell) the timer will activate and run for three hours. During this period the batteries are in gassing mode. After three hours the charger will drop the batteries into float mode (2.26 V/cell), indicated by a blinking LED.
4. To discontinue charging, unplug the extension cord from the power outlet and the machine.

Note: Even after relatively short periods of charging, about 2-3 hours, the battery indicator may initially read 100% charge. This is an indication of the surface charge of the battery, and will decrease quickly to the actual percentage of



charge while running the machine. This is normal. To achieve a deeper charge percentage the machine should be left charging for longer periods of time.

Note: Four batteries wired in series some cells become uneven during charge/discharge cycles. At least once a month, perform two charge cycles back-to-back. This will bring up cells that are lagging behind fully charged cells. This is important for overall battery performance.

SECTION 4.5: RECOMMENDED SPARE PARTS

It is recommended that the machine owner/operator keep a minimum of spare parts with the machine while it is working. Down time due to part failure or lack of wear parts can far exceed the cost of the parts.

PART NUMBER	DESCRIPTION	QUANTITY
BTP000451	6" CARPET REMOVAL BLADE	Depends on size of job
BTP000553	8" CARPET REMOVAL BLADE	Depends on size of job
BTP000554	10" CARPET REMOVAL BLADE	Depends on size of job
BTP000555	12" CARPET REMOVAL BLADE	Depends on size of job
BTP000853	6" TILE BLADE	Depends on size of job
BTP000854	8" TILE BLADE	Depends on size of job
BTP000855	12" TILE BLADE W/ BEVEL	Depends on size of job
BTP000886	10" TILE BLADE W/ BEVEL	Depends on size of job

SECTION 4.6: RECOMMENDED TOOLS

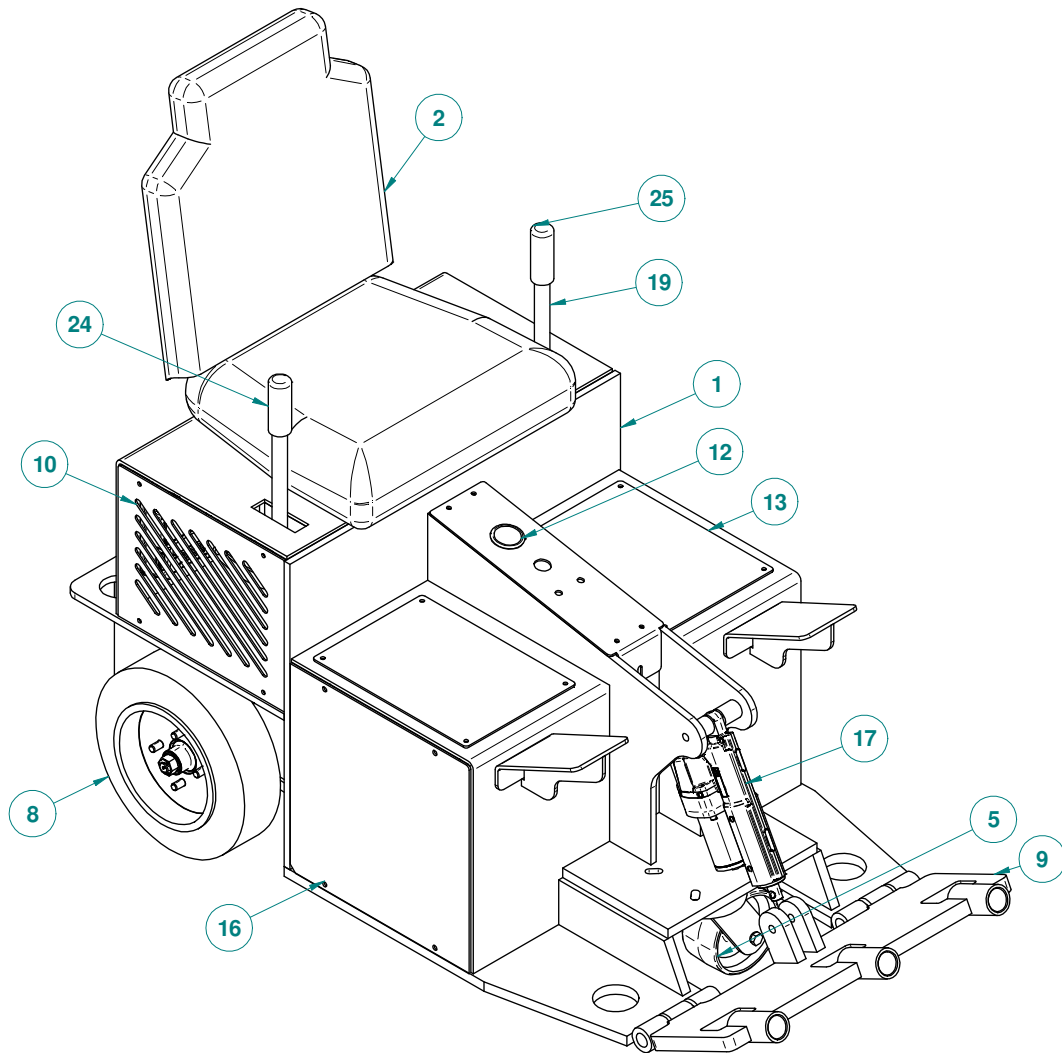
"Recommended Tools" is a list of the minimum tools necessary to maintain and/or operate the BRB-1500 during normal operation. This list is not meant to be exhaustive or to indicate the tools required for more intensive maintenance.

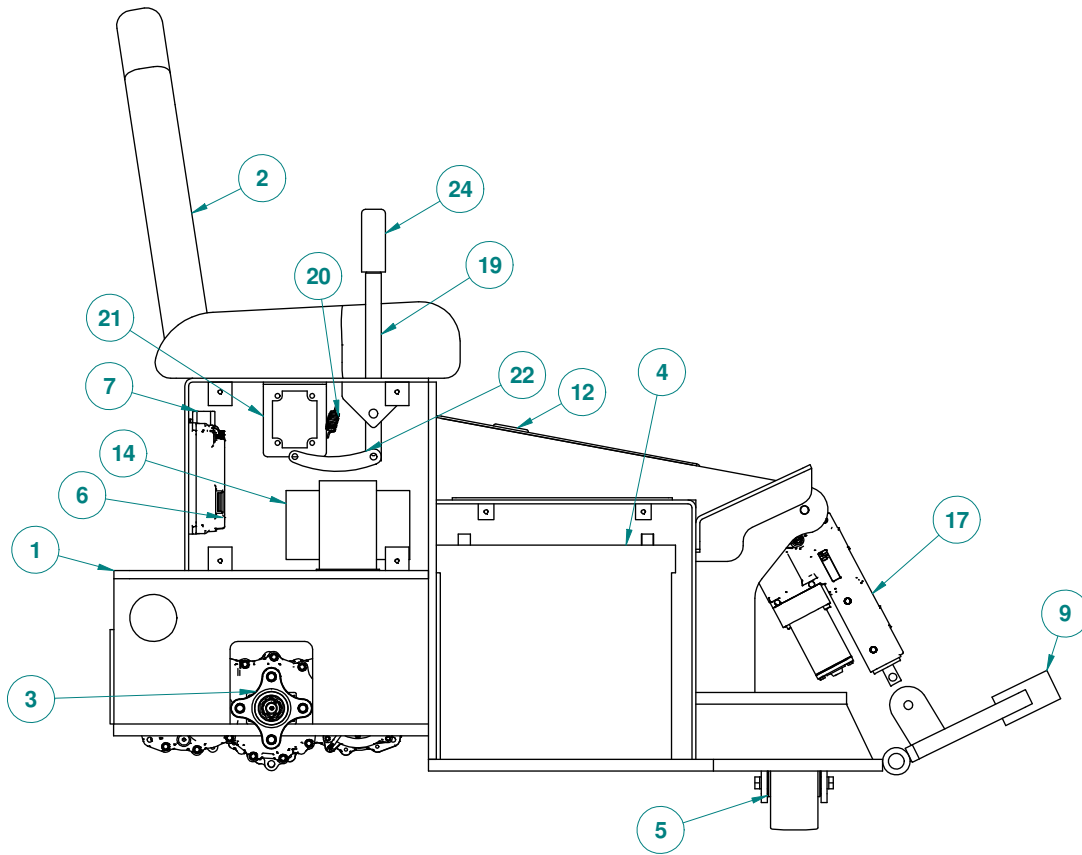
- Ratchet
- Sockets: 7/16", 1/2", 9/16" and 3/4"
- Combination wrench: 7/16", 1/2", 9/16" and 3/4"
- Utility knife
- Rubber mallet or dead blow hammer
- Leather gloves
- Multi meter with DC and AC capabilities



SECTION 4.7: PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	BP87000506	CHASSIS WELDMENT
2	1	SCR0020	HIGH BACK SEAT
3	2	BP92000010	INTEGRATED ELECTRIC TRANSAXLE
4	4	BP85000517	BATTERY DRY CELL AGM
5	1	BTP000257	CASTER/SWIVEL
6	2	BP920000	ZT TRACTION CONTROLLER
7	1	BP920000	ZT DOUBLE POLE CONTACTOR
8	2	BP92000022	REAR DRIVE WHEEL
9	1	BP92000012	SCRAPER BLADE WELDMENT
10	2	BP92000015	SIDE CONTROL BOX COVER
11	1	BP92000013	CENTER CONSOLE COVER
12	1	BP92000005	DIGITAL DISPLAY
13	2	BP92000016	TOP BATTERY COVER
14	1	BP87000500	ON BOARD BATTERY CHARGER
15	1	BP92000014	REAR TRANSAXLE COVER
16	2	BP92000017	SIDE BATTERY COVER
17	1	BP92000020	HYDRAULIC CYLINDER
19	2	BP92000023	STEERING SHAFT
20	1	BP9200008	RTN ASSEMBLY
21	2	BP92000026	RTN BRACKET
22	2	BP92000019	HANDLE LINKAGE
23	1	BP9200008	RTN ASSEMBLY
24	1	BP85000012	JOYSTICK 3-POSITION SWITCH
25	1	BP85000011	JOYSTICK STANDARD
26	1	BP92000011	ZT WIRING HARNESS





Code 02 = Right Side	Code 04 = Left Side	LED Flash Code	Symptom	Smartec Interface Tool	(Why)	How to repair.
02A11	04A11	1-1	No Drive	Watchdog	Internal diagnostic malfunction.	Cycle key, if alarm persists traction controller will need to be replaced
02A12	04A12	1-2	No Drive	EEPROM KO	Internal diagnostic malfunction.	Cycle key, if alarm persists traction controller will need to be replaced
02A13	04A13	1-3	No Drive	AUX OUTPUT KO	Output did not respond to command because of damage to the wires or brake/ or the E-stop is activated	Verify connection of fail safe brake, repair or replace connection as needed. Replace if persists. Turn the E-stop off.
02A14	04A14	1-4	No Drive	LOGIC FAILURE #3	Internal diagnostic malfunction.	Cycle key, if alarm persists traction controller will need to be replaced
02A15	04A15	1-5	No Drive	LOGIC FAILURE #2	Internal diagnostic malfunction.	Verify connection of fail safe brake, repair or replace connection as needed. Replace if persists. Turn the E-stop off.
02A16	NA	1-6	No Drive contactor will not close	LOGIC FAILURE #1	Low battery charge, loose or shorted connection at key switch. Excessive battery charge, loose or shorted connection at key switch. Shorted Accelerator	Charge battery(s) and replace as needed. Verify, repair or replace connection at key switch persists traction controller will need to be replaced. Verify correctly charged battery(s). If alarm persists traction controller will need to be replaced. On ZT machine one side of the machine will program VACC and the other will not program and or 04A57 code also
02A17	04A17	1-7	No Drive	VMM LOW	Low battery charge, loose or shorted connection at drive motor or traction controller.	Charge battery(s). Verify, repair or replace connections at drive motor and traction controller persists traction controller will need to be replaced.
02A18	04A18	1-8	No Drive	VMM HIGH	Excessive battery charge, loose or shorted connection at drive motor or traction controller.	Charge battery(s). Verify, repair or replace connections at drive motor and traction controller persists traction controller will need to be replaced.
02A19	None	1-9	No Drive	Contactor Closed	Contactor has been manually shorted, Short between contactor and positive battery connection.	Verify, repair or replace connection between contactor and positive battery connection. Verify, repair or replace connections at drive motor and traction controller will need to be replaced.
02A21	None	2-1	No Drive	Contactor Open	Low battery charge, short between contactor and positive battery connection.	Charge battery(s) and verify, repair or replace connection between contactor and positive battery connection. Verify, repair or replace connections at drive motor and traction controller will need to be replaced.
02A21	None	2-1	No Drive	Contactor Open	Defective traction controller, causing a voltage drop of 4 volts measured across the contactor from BATT+ input to Batt+ output Note if the Batt+ input and output are shorted across the terminals you will get this fault also	Remove the short across the wire terminals. IE increase the gap between the terminals. If voltage drop is present replace traction controller.
02A22	04A22	2-2	Reduced Drive Speed	Ebrake KO	Brake has malfunctioned during start sequence.	Replace Fail Safe Brake.
02A22	04A22	2-2	No Drive	Ebrake not ok	Fail safe brake has malfunctioned during start sequence.	Replace Fail Safe Brake.
02A23	04A23	2-3	No Drive	F=0 EVER	Power connection is loose on the contactor, drive motors or traction controller. Internal diagnostic malfunction.	Check that all power connections are tightened to correct torque. Cycle key, if alarm persists traction controller will need to be replaced.
02A24	04A24	2-4	No Drive	STBY HIGH	Internal diagnostic malfunction.	Cycle key, if alarm persists traction controller will need to be replaced
02A25	None	2-5	No Drive	EMERGENCY	The e-stop button is engaged, wiring harness has been damaged	Turn off e-stop Cycle key, if alarm persists wiring harness will need to be replaced
02A26	04A26	2-6	No Drive	CAPACITOR CHARGE	External device or shorted connection drawing power from positive battery connection or key switch.	Remove any unapproved device drawing power from system, verify, repair or replace connection and key switch as needed. If alarm still persists replace traction controller
02A27	04A27	2-7	Reduced Drive Speed	High Temperature	Debris not allowing traction controller(s) to cool properly.	Remove debris build up from traction controller and/or heatsink base. Replace traction controller
02A27	04A27	2-7	No Drive	High Temperature	Lack of conductive grease between traction controller and heatsink not allowing adequate heat transfer.	Verify conductive grease between traction controller and base. Replace traction controller
02A27	04A27	2-7	No Drive	High Temperature	Debris not allowing traction controller(s) to cool properly.	Remove debris build up from traction controller and base. Replace traction controller
02A28	04A28	2-8	No Drive	Motor Temperature	Debris not allowing drive motor to cool properly.	Remove debris build up from drive motor. Replace drive motor if alarm persists
02A28	04A28	2-8	Reduced Drive Speed, Reduced Drive Speed	Motor Temperature	Note, U, V and W may be connected differently depending on the orientation of the transaxle. A machine for example may have the axle mounted in the reverse direction intentionally, consult owners manual or wire diagram for proper wiring configuration.	Replace drive motor.
02A29	None	2-9	Reduced Drive Speed	Battery Low	Battery(s) not charged or won't hold charge.	Attempt to recharge and replace battery(s) if needed.
02A29	None	2-9	No Drive	Battery Low	Battery(s) not charged or won't hold charge.	Attempt to recharge and replace batteries if needed.
02A31	04A31	3-1	Reduced Drive Speed	Encoder Locked	Speed feedback below minimum allowable.	Reconnect or replace speed sensor.
02A31	04A31	3-1	No Drive	Encoder Locked	Wheel blocked from spinning.	Remove source of blockage.
02A31	04A31	3-1	No Drive	Encoder Locked	Speed feedback below minimum allowable. Nonfunctioning brake can cause this code also.	Reconnect or replace speed sensor if alarm persists.
02A32	04A32	3-2	No Drive	Encoder Error	High speed free wheel condition, encoder has quit working.	Cycle key, refer to owners manual for proper mower use, if alarm persists speed sensor will need to be replaced
02A33	04A33	3-3	No Drive	BRAKE	Brake switch input is high, disconnected brake switch, brake pedal not disengaging.	Verify, repair or replace wiring connections as needed, verify pedal is disengaged. Replace if persists.
02A33	04A33	3-3	No Drive	ALARM BRAKE	No brake switch used, must have a wire from B2 to A15 brake input	The brake input must see a high voltage.
02A34	04A34	3-4	No Drive	THERMIC SENS KO	Internal diagnostic malfunction.	Cycle key, if alarm persists traction controller will need to be replaced
02A35	04A35	3-5	No Drive	DRIVER SHORTED	Voltage low at input.	Verify contactor connection to positive battery for short or loose connection repair or replace

02A43	04A43	4-3	No Drive	MANUAL BRAKE REL	Manually released fail safe brake, malfunctioning manual brake release switch, loose or shorted connection.	Verify brake is not manually released, verify, repair or replace connections as needed. Release switch if alarm persists.
02A44	None	4-4	No Drive	No seat in run	operator came out of seat while machine is moving/ seat switch making intermittent contact	Verify seat/ replace seat switch
02A45	04A45	4-5	No Drive	PEDAL WIRE KO	Disconnected or shorted accelerator connection. This code can be caused by a unprogrammed accelerator also.	Reconnect, repair or replace accelerator connection as needed. Check for debris in connector. Synchronize accelerator with Smartec Interface tool
02A46	04A46	4-6	No Drive	Deck CAN bus KO	Something has interfered with the communications. Wiring has become damaged, Deck controller has become damaged. Note, this fault can show up on a machine with no deck controller.	Cycle key, check wiring and deck controller for proper operation, if problem persists, Replace controller as needed.
02A47	04A47	4-7	No Drive	PROG VACC Not OK	Accelerator inputs not set.	Synchronize accelerator with hand held tool
02A48	None	4-8	No Drive	WRONG SET BATTERY	Incorrect or improperly charged battery(s)	Charge or replace battery(s) per manufacturer's recommendation.
02A51	04A51	5-1	No Drive	INPUT ERROR1 (PAL KO)	Internal diagnostic malfunction.	Cycle key, if alarm/persists traction controller will need to be replaced
02A52	04A52	5-2	No Drive	00 RELOAD HMI MDI	Traction controller or MDI has just been changed.	Machine will default hours after one minute. Cycle key.
02A53	02A53	5-3		Check up needed		
02A54	None	5-4	No Deck Operation	PTO time out	Software power saving settings	Not in use at this time
02A55	04A55	5-5	No Drive	VACC OUT OF RANGE	Malfunctioning accelerator, disconnected or shorted accelerator connection.	Verify, repair or replace accelerator connection as needed. Replace accelerator if
02A56	None	5-6	No Drive	Display CAN BUS KO	Disconnected or shorted can bus connection.	Verify, repair or replace connection as needed.
02A57	04A57	5-7	No Drive	CAN bus KO	CAN communication, interrupted Detective Accelerator can cause this error also, can be diagnosed by a accelerator that will not program in VACC.	Cycle key, Check CAN wiring for opens or shorts, check the car's shield wire is connected replace Digital Display or Traction Controllers
02A57	04A57	5-7	No Drive	Waiting on Mode	Smartec Interface Tool is connected to the incorrect traction controller, CAN communication, interrupted	Switch the interface tool to the other traction controller, Cycle key. Check CAN wiring for opens or shorts, check the car's shield wire is connected to the vehicle chassis, replace Digital Display or Traction Controller
02A61	None	6-1	No Drive	NO SEAT START	Malfunctioning seat switch, disconnected or shorted connection.	Verify, repair or replace seat switch connection as needed. Replace seat switch if
02A62	None	6-2	No Drive	NO NEUT START	Pedal stuck in forward or reverse, cruise control on, malfunctioning neutral switch, disconnected or shorted connection. If occurs while running check the connection at the key switch.	Verify pedal position, Verify cruise control is off, Verify, repair or replace neutral switch connection as needed. Replace neutral switch if alarm persists.
02A63	None	6-3	No Drive	PTO ON AT START	PTO switch is on during start up, malfunctioning PTO switch, disconnected or shorted connection.	Verify PTO switch is off, Verify, repair or replace PTO switch connection as needed. Replace
02A64	None	6-4	No Drive	ROS ON AT START	Note on a ZT machine the PTO is only controlled by the Slave traction controller.	Verify ROS switch is off, Verify, repair or replace ROS switch connection as needed. Replace
02A65	04A65	6-5	No Drive	NO BRAKE START	Brake switch is on during start up, malfunctioning brake switch, disconnected or shorted connection.	Verify brake switch is on, Verify, repair or replace brake switch connection as needed. Replace
16A08	None	NA	Digital Display	None	Digital Display communication issue	Check CAN wiring for opens or shorts, check the can shield wire is connected to the vehicle Display or Traction Controllers