



Model 3500D

Machine Serial #	_____
Engine Model #	_____
Engine Specification #	_____
Engine Serial #	_____
Purchase Date	_____
Dealer	_____

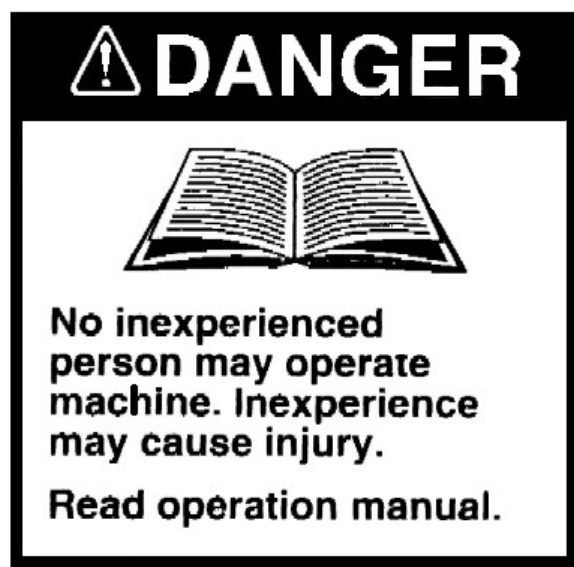
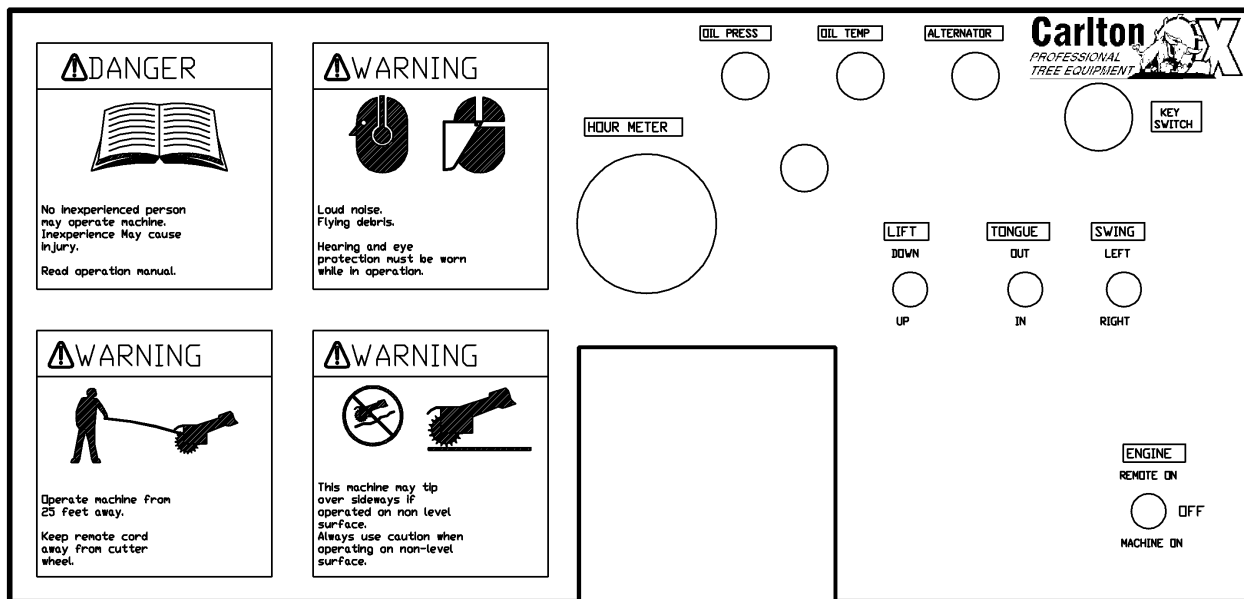
Carlton

J. P. Carlton Company
Div. DAF Inc.
121 John Dodd Road
Spartanburg, SC 29303
Ph. (864) 578-9335
Fax (864) 578-0210
www.stumpcutters.biz

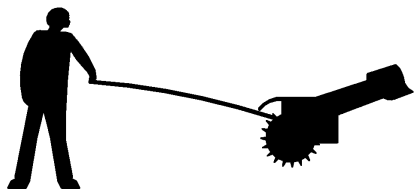
CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproduction harm.



 WARNING



Operate machine from
25 feet away.

Keep remote cord away
from cutter wheel.

 WARNING



This machine may tip over
sideways if operated on
non-level surface.

Always use caution when
operating on non-level
surface.

 DANGER



Pinch Points

Keep body parts away
while in operation.

JPC09

 DANGER



Stay clear while machine
is in operation.

Cutter wheel will cause
severe injury or death.

JPC27



DANGER

DO NOT MOVE,
POSITION, OR
TRANSPORT THIS
MACHINE WHILE
THE CUTTERWHEEL
IS ENGAGED.

JPC80



WARNING (AVISO)
(AVERTISSEMENT)

TO PREVENT SERIOUS INJURY OR DEATH FROM MOVING PARTS:

- * KEEP HANDS, FEET, AND CLOTHING AWAY FROM MOVING PARTS.
- * CLOSE ALL GUARDS AND SHIELDS BEFORE OPERATING MACHINERY.

PARA EVITAR LA LESION O LA MUERTE:

- * MANTENGANSE A DISTANCIA LAS MANOS, LOS PIES Y LA ROPA DE LAS PARTES MOVIMIENTOS DE LA MAQUINA.
- * CIERRAN TODAS LAS PROTECTORAS QUE HAY ANTES QUE HAGAN FUNCIONAR.

AFIN D'ÉVITER TOUTE BLESSURE GRAVE OU LA MORT:

- * NE PAS RAPPROCHER LES MAINS, LES PIEDS OU LES VÊTEMENTS DES PIÈCES MOBILES.
- * S'ASSURER QUE TOUTES LES PIÈCES DE PROTECTION SONT EN PLACE AVANT DE METTRE EN MARCHÉ LA MACHINERIE.



WARNING (AVERTISSEMENT)
(AVISO)



- THREAD FULLY
- TIGHTEN NUT

- ENROSCAR COMPLETAMENTE
- APRETAR TUERCA

- VISSER À FOND
- SERRER L'ÉCROU



WARNING

IF THIS EQUIPMENT
IS TURNED OVER, YOU
WILL CAUSE ENGINE
DAMAGE, HYDRAULIC
DAMAGE, AND
POSSIBLE PERSONAL
INJURY.

JPC38



WARNING

SEVERE ENGINE DAMAGE
WILL OCCUR IF THIS
ENGINE IS OPERATED AT
AN ANGLE GREATER
THAN 25°

PROPER ENGINE OIL LEVEL
MUST BE MAINTAINED TO
ACHIEVE MAXIMUM ANGLE OF
OPERATION OF 25°
(SEE ENGINE OWNER'S MANUAL
FOR PROPER OIL LEVEL)

0700075A

⚠ WARNING



FLAMMABLE FUEL

THIS MACHINE USES DIESEL FUEL AND HYDRAULIC OIL.

NEVER FILL TANK WHILE ENGINE IS HOT, RUNNING, OR IN A CONFINED AREA. DANGER OF FIRE OR EXPLOSION EXIST.

LEAVE ROOM IN THE TANK FOR EXPANSION FROM HEAT - NEVER FILL TANK COMPLETELY FULL.

KEEP MACHINE AWAY FROM FIRE, SPARKS, AND OTHER SOURCES OF IGNITION DURING USE AND STORAGE.

NEVER PUT MACHINE IN STORAGE WITH FUEL IN THE TANK.

ALWAYS STORE FUEL IN APPROVED (RED) CONTAINERS AND AWAY FROM SOURCES OF IGNITION.

0700316

⚠ WARNING



KEEP AWAY FROM PRESSURIZED LEAKS

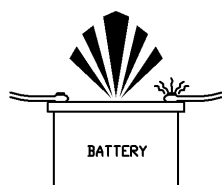
Pressurized leaks are not always visible. Check for pressurized leaks using cardboard or wood. Never use a finger, hand or other body part to check for leaks.

Injuries from pressurized leaks penetrating the skin will lead to serious health problems or death. CONSULT A PHYSICIAN IMMEDIATELY IF PENETRATION OCCURS, SURGICAL REMOVAL REQUIRED.

Release pressure from line before loosening, removing or replacing any hydraulic hoses or equipment.

0700317

⚠ WARNING



USE CAUTION IN EXTREME COLD! FROZEN BATTERY WILL EXPLODE!

NEVER JUMP START A BATTERY IN FREEZING TEMPERATURES. INSPECT BATTERY FOR SIGNS OF FROST BEFORE STARTING IN EXTREME COLD. MOVE EQUIPMENT TO A HEATED, WELL VENTILATED AREA TO ALLOW BATTERY TO THAW BUT NOT NEAR FIRE, SPARKS, OR OTHER SOURCES OF IGNITION.

BATTERY FUMES ARE EXPLOSIVE. NEVER USE JUMPER CABLES OR RECHARGE BATTERY UNLESS IN AN OPEN OR WELL VENTILATED AREA AND AWAY FROM ALL SOURCES OF IGNITION. BATTERY ACID CAN CAUSE SEVERE BURNS. KEEP AWAY FROM EYES, SKIN, AND CLOTHING.

ALWAYS REMOVE BATTERY BEFORE WELDING ON EQUIPMENT. FOLLOW PROCEDURES FOR WELDING AND GROUNDING BEFORE STARTING TO WELD ON THIS MACHINE OR EQUIPMENT DAMAGE AND POSSIBLY SEVERE PERSONAL INJURY WILL OCCUR.

0700314

NOTICE

SERVICING BELTS AND BEARINGS

ALWAYS TURN OFF ENGINE AND
REMOVE KEY BEFORE SERVICING!
ALLOW ALL PARTS TO COME TO A
COMPLETE STOP AND COOL
BEFORE TOUCHING!

- New belts stretch and get loose.
After 2 hours of operation, check
tension and tighten belts.
- Check tension and retighten every
4 hours of operation until tension
stays consistent.
- See manual for instruction and
proper tension.
- Thereafter, check belt tension
every month until belts need
replacing.

AT LEAST ONCE A MONTH:

- CHECK AND TIGHTEN BOLTS AND LOCK
SETSCREWS ON ALL BEARINGS.
- CHECK AND TIGHTEN SCREWS ON ALL
BELT PULLEY BUSHINGS.

REFER TO MAINTENANCE SECTION

0700311

NOTICE

Premature engine
failure could occur
without proper
maintenance of
outboard bearing.
See manual for
further information.

JPC

NOTICE

DECALS SHOULD BE PROPERLY
MAINTAINED AND REPLACED. IT
IS THE DUTY OF THE OWNER OF
THIS EQUIPMENT TO KEEP
DECALS IN GOOD CONDITION.

REPLACEMENT DECALS MAY
BE PURCHASED FROM
J. P. CARLTON CO.

0700309



STUMP GRINDER LIMITED WARRANTY

J.P. Carlton Co. Inc., hereafter referred to as the "Manufacturer", warrants each new Carlton Grinder to be free of defects in workmanship and material for a period of one year.

This warranty takes effect upon delivery to the original retail purchaser. The manufacturer, at its option, will replace or repair, at a point designated by the manufacturer, any parts which appear to have been defective in material or workmanship. The manufacturer is not responsible for consequential damages.

This warranty will not apply if the grinder is not operated in a manner recommended by the manufacturer. The following examples would void warranty:

1. The grinder has been abused.
2. The machine is involved in or damaged by an accident.
3. Repairs or attempted repairs were made without prior written authorization.
4. Including but not limited to repairs made due to normal wear.

The owner is responsible for all regular maintenance as explained in the operators' manual. Neglect in regular maintenance or failure to replace normal wear items such as teeth, pockets, lubrication oils, filters, belts, bearings, etc. may void warranty.

This warranty is expressly in lieu of any other warranties, expressed or implied, including any implied warranty or merchantability of fitness for a particular purpose and of any non-contractual liabilities including product liabilities based upon negligence or strict liability. J.P. Carlton Co. Inc. will not be liable for consequential damages resulting from breach of warranty.

IT IS NECESSARY TO RETURN THE WARRANTY VALIDATION FORM AND NOTIFY J.P. CARLTON CO. INC. IN WRITING WITHIN TEN (10) DAYS FROM DELIVERY DATE TO VALIDATE THIS WARRANTY.

NOTE: This warranty applies only to new and unused equipment or parts thereof manufactured by J.P. Carlton Co. Inc. ANY MACHINES USED FOR LEASE OR RENTAL - WARRANTY IS LIMITED TO 90 DAYS FROM FIRST DAY OF INITIAL SERVICE.

NOTICE: All power units and associated components are NOT warranted by J.P. Carlton Co. Inc. or their dealers. It is the customers' responsibility to return machine to the local engine distributor.

INFORMATION PHONE NUMBERS TO FIND YOUR LOCAL ENGINE & PARTS SERVICE CENTERS:

Honda 1-770-497-6400 (GA-Eastern Time Zone)
Kohler Engines..... 1-800-544-2444 (Toll Free)
Briggs & Stratton Engines 1-800-233-3723 (Toll Free)
Lombardini 1-770-623-3554 (GA-Eastern Time Zone)
Deutz Engines..... 1-800-241-9886 (Toll Free)
John Deere Engines 1-800-533-6446 (Toll Free)
Caterpillar 1-877-636-7658 (Toll Free)
Kubota 1-847-955-2500 (IL-Central Time Zone)
Kawasaki Engines..... 1-616-949-6500 (MI-Eastern Time Zone)
Wisconsin Engines 1-800-932-2858 (Toll Free)
Onan Engine 1-800-888-6626 (Toll Free)

In order to process any warranty claims, it is the owners' responsibility to report claims promptly to us or our authorized dealer from whom the equipment was purchased. It is necessary to include the following information on any and all request for warranty:

1. Dealer from whom purchased
2. Date of delivery
3. Serial number of unit
4. Model number of unit
5. Engine make and serial number
6. Length of time in use
7. Date of failure
8. Nature of failure



EXPLANATION OF LIMITED WARRANTY

The manufacturer will not reimburse the customer or dealer labor cost incurred for installing “bolt-on” or “slip-on” items, such as pumps and motors, bearings, belts, pulleys, etc. The manufacturer will provide replacement parts at no cost to the customer for defective parts during the warranty period. Defective parts must be returned to J.P. Carlton Company. It will be the customers’ responsibility to install the replacement parts unless arrangements are made with the selling dealer.

The manufacturer will not reimburse travel cost to servicing dealer unless prior approval has been obtained from the manufacturer. It is the customers’ responsibility to deliver machine to dealers facility, unless other arrangements have been agreed to between the selling dealer and the customer.

The manufacturer may elect, at its discretion, to reimburse reasonable labor cost to customer or dealer for major defect repairs. Prior approval must be obtained from J.P. Carlton Company Inc.

IMPORTANT NOTICE

- 1. AIR FILTER MAINTENANCE IS CRITICAL ON STUMP GRINDING MACHINES. DIRT INGESTION WILL NOT BE WARRANTED BY THE ENGINE MANUFACTURER OR J.P. CARLTON COMPANY.**
- 2. OIL AND OIL FILTER MAINTENANCE AND STAYING WITHIN THE LIMITS OF THE ANGLE OF OPERATION IS ALSO CRITICAL ON STUMP GRINDING MACHINES. STARVING THE ENGINE FOR OIL WILL NOT BE WARRANTED BY THE ENGINE MANUFACTURER OR J.P. CARLTON COMPANY.**
- 3. FAILURE TO MAINTAIN OUTBOARD BEARING CAN CAUSE ENGINE FAILURE.**

Warranty Validation Form

Congratulations on your purchase of a Carlton Stump Grinder. This product has been designed and manufactured to provide years of profitable service while minimizing maintenance and downtime. Please take the time now to complete this warranty validation form. This information is necessary for Carlton to instate your warranty.

Return Form To: J.P. Carlton Company, Div. D.A.F. Inc.
121 John Dodd Road
Spartanburg, SC 29303
Phone: 1-864-578-9335

Purchaser Information:

Company Name: _____ Street Address: _____
City: _____ State: _____ Zip Code: _____
Telephone: _____ Contact: _____

Machine Information:

Model Number : _____ Engine Model : _____
Serial Number : _____ Serial Number : _____

Dealer Information:

Dealer Name: _____ Street Address: _____
City: _____ State: _____ Zip Code: _____
Contact Name: _____

1. _____ Customer has been instructed on operation and safety aspects of operating the equipment.
2. _____ Customer has been advised not to reach into cutter wheel area.
3. _____ Customer has been advised to stop machine and remove key before performing any type of maintenance.
4. _____ Customer has been warned not to operate the machine without the cutter wheel guard in place.
5. _____ Customer has been furnished with all parts and operators manuals.
6. _____ Customer has been instructed on equipment maintenance schedules and procedures.
7. _____ Customer has been advised that the engine or power unit that is used on this machine is warranted by the engine manufacturer and **NOT J.P. Carlton Company**. All engine warranty issues should be addressed to the local engine dealer.
8. _____ Customer understands the importance of air and oil filter maintenance, and the importance of staying within the angle of operation of the engine. If either of these is not adhered to, the engine warranty is **VOID**.
9. _____ Customer understands to keep locking collars tight and purge bearings with grease.
10. _____ All operation and warning decals are properly displayed on equipment.
11. _____ Customer understands it is his responsibility to train all operators on operator safety.

I have inspected this equipment and find it in good working condition. To the best of my knowledge, the customer and his personnel are aware of the above procedures.

Date: _____ Signed: _____
Dealer Representative

The equipment has been thoroughly checked by the above named dealer representative, and I am satisfied with his instructions.

Date: _____ Signed: _____
Purchaser

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Congratulations on your purchase of a new Carlton® Professional Stump Grinder! Carlton® Stump Grinders have a reputation for superior performance and reliability. Each and every machine has been *over* designed and overbuilt to ensure years and years of trouble-free operation. In this, we take pride.

Read this manual carefully and **TAKE RESPONSIBILITY** for thoroughly familiarizing yourself with the controls and the concepts behind the operation of this machine before attempting to operate it. Slowly experiment with the controls and gradually work yourself up to the full capabilities of this machine. The Carlton® Model 3500D is a durable and profitable professional stump grinder. Read this manual. Use proper safety precautions. Follow the instructions provided and use common sense and your "OX" will perform like its namesake. If getting more work done in a day, with less trouble, is your idea of good business, then you'll *love* your new Carlton® Stump Grinder!

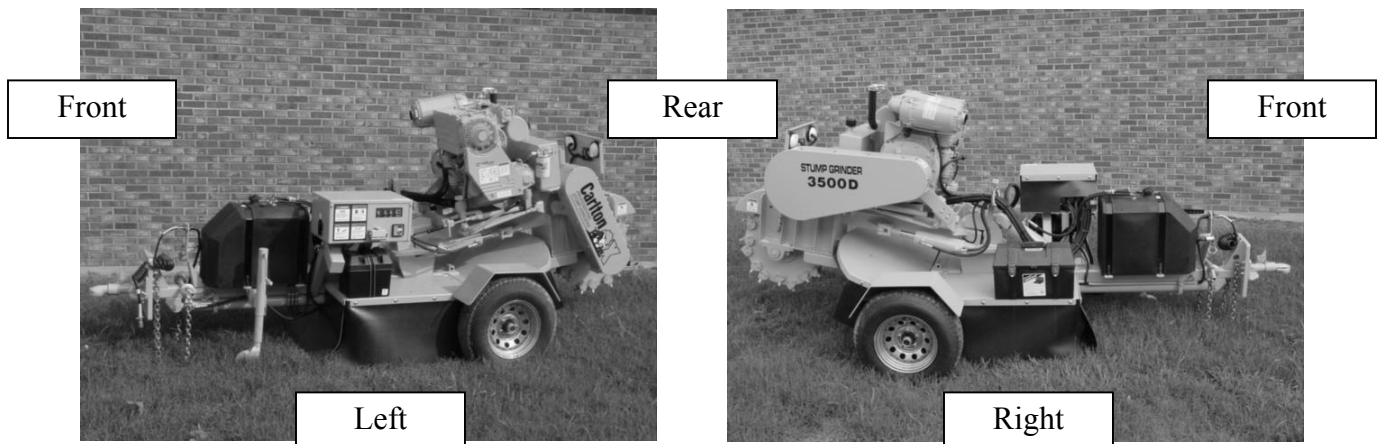
We welcome your suggestions on how we might better build our machines. We solicit any and all questions concerning the operation or proper servicing of your new stump grinder.

Please feel free to write to us with any comments.
We'll enjoy hearing from you!

The J. P. Carlton Company constantly strives to create the best equipment available in the stump cutting industry. Therefore, the material in this manual is correct at the time of publication. Carlton® reserves the right to make improvements, modifications and even discontinue features, as we deem necessary to meet our goal. Carlton® also reserves the right to discontinue models without any prior notification or obligation.

Inspect your new Carlton® Stump Grinder as soon as you receive it. Any damages incurred during shipment are not warranted and therefore not covered repairs. You should have the truck driver verify or acknowledge any damages caused during shipment. If not, contact the truck lines as soon as possible with your complaint.

Any reference made to right, left, front or rear in relationship to the stump cutter is illustrated in the following picture. Please refer to these any time you call your dealer or J. P. Carlton Company for parts or assistance.



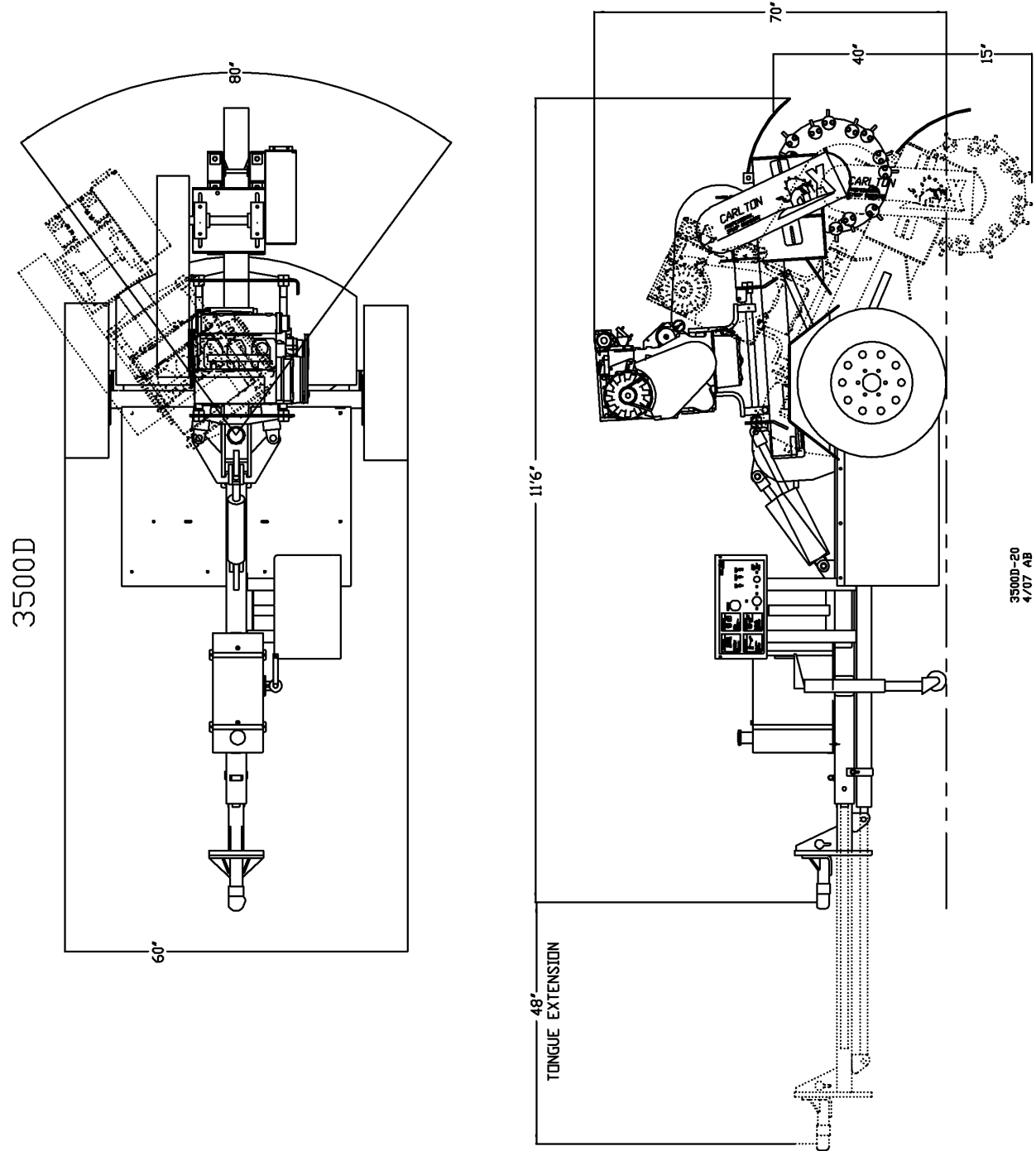


(Remote machine shown here.)

- Direct hydraulic drive pump.
- Low Maintenance drive belts.
- Self-purging roller bearings.
- Counterbalance valves.
- Replaceable rod ends.
- Hardened bushings.
- Blanchard ground 1" thick cutter wheel
- Carbide tipped teeth.
- Center lube spindles.
- Belt Guards.
- Rubber and Metal chip guards.
- Control guards.
- Optional hour meter.
- Optional Key switch.
- High quality epoxy primer.
- Dupont Imron® Finish.
- Optional Remote control.
- Double wire braid hydraulic hose.
- Large fuel tank.
- Large hydraulic oil reservoir.
- High capacity battery.
- Marine Battery Box.
- Heavy plate fenders.
- Premium flotation tires.
- Swivel Jack stand with steel wheel.
- Hitch and safety chains.
- Optional Shake Proof Towing lights with coiled wiring harness.
- Hydraulic or electric brakes (Optional).
- Factory tested.

**We Pride Ourselves
in the strength and quality of each and every machine**

Engine	60 HP Deutz Turbo Diesel
Weight.....	2900 lbs.
Length.....	11' 6"
Tongue Extension	48"
Height	70"
Width	60"
Cutting Depth Below Ground.....	15"
Cutting Height Above Ground.....	40"
Cutter head Swing.....	80" arc
Number of Teeth on Cutter Wheel.....	32
Cutter Wheel Diameter W/Teeth.....	26 1/2"
Cutter Wheel Thickness	1" Blanchard Ground
Jack Shaft Bearings.....	1 11/16"
Cutter Wheel Bearings.....	2"
Tire Size	Good Year 205/75-R14
Engine Belt Size.....	4B82
Poly Chain® Belt Size.....	14M-1568-68
Fuel Tank Capacity.....	25 Gallons
Hydraulic Tank Capacity	4 Gallons



Before operating the stump cutter, read this manual, the engine manual, and all the safety decals on the machine. Know all parts of the machine and their functions, especially the shut down procedures in case of emergency. No inexperienced person may operate machine. Inexperience may cause injury.

SAFETY FIRST ALWAYS!

This is the **Safety-Alert Symbol**. This symbol is placed on the machine and in the manual to alert the operator to the potential for bodily injury or death. The operator should pay close attention to the instructions whenever they see this symbol.



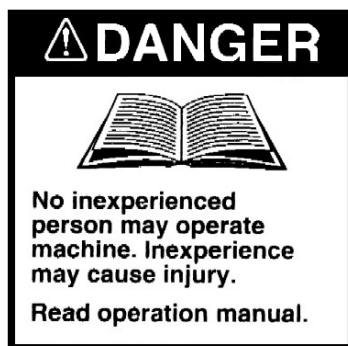
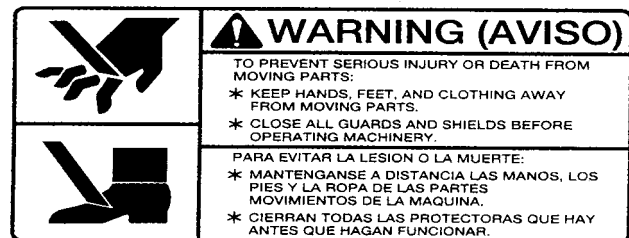
The **Safety-Alert Symbol** will be accompanied by one of the following words:

DANGER, WARNING, or CAUTION

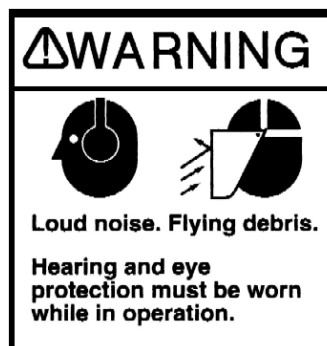
- A **DANGER** symbol means that if the instructions are not followed the possibility of serious personal injury or death is probable.
- A **WARNING** symbol means that if the instructions are not followed there is a possibility of serious personal injury or death.
- A **CAUTION** symbol means there is an unsafe condition or practice that may cause personal injury or property damage.

PERSONAL PROTECTION:

- ❖ Wear face shield and hearing protection
- ❖ Do not wear loose-fitting clothing
- ❖ Tie back long hair
- ❖ Do not wear jewelry
- ❖ Keep clear of cutter wheel
- ❖ Keep away from moving parts
- ❖ Only operate in a well ventilated area because of carbon monoxide



P/N 0700008



P/N 0700010



P/N 0700027

Be Safe and Practice Safe Operation using the following guidelines.



- Any individual operating this machine must first read and understand this manual, the engine manual, all component manuals, and all safety decals on machine.
- DO NOT permit children to operate machinery or to play near machinery during operation.
- Always wear face shield and hearing protection during operation. Loud noise and flying debris may cause severe injury.
- Keep hands, feet, legs, clothing, hair and all other body parts away from cutter wheel and other moving machine parts to eliminate the possibility of injury.
- Shut down machine completely and remove key before removing debris from work area (i.e. clearing rocks, wood chips, etc.).
- DO NOT modify or change any part without written approval from J. P. Carlton Company.
- Do not ride, sit, stand, lay or climb anywhere on this machine during operation, while running, or during transport.
- Do not move, position, or transport this machine while cutter wheel is engaged.
- DO NOT operate any machinery while under the influence of alcohol or drugs (prescription, over the counter, or otherwise).
- Do not refill fuel tank while engine is hot, running, or indoors. Danger of fire or explosion exists.
- Fuel and its vapors are highly flammable and explosive. **Handle with care.** Only use approved (red) fuel containers for storage.
- Do not store fuel containers near any open flames, sparks or other sources of ignition.
- Do not store equipment with fuel in the tank.
- Battery fumes are explosive. Recharge battery in an open area away from fire, sparks, or other sources of ignition.
- Battery acid can cause severe burns. Keep away from eyes, skin, and clothing.
- Always remove battery before welding on equipment.
- Never check for hydraulic leaks using hand or finger, use cardboard or wood. Keep away from pressurized leaks. Pressurized fluid can penetrate the skin and cause injury or even death. Seek immediate medical attention if penetration occurs. Always wear eye protection.



WARNING

- Never allow spectators to stand and watch machine in operation without proper hearing and eye protection and standing at a safe distance. Loud noise and flying debris may cause severe injury.
- Do not operate around water, gas, power or phone lines. Check with property owner or call utilities if not sure.
- Avoid fences and clear away other objects (i.e. sticks, stones, metal, etc.).
- Be aware of the possibility of foreign objects imbedded in or buried around the stump. Do not cut crosswise of roots above ground to prevent roots being thrown.
- If unusual vibration occurs, stop engine immediately and correct problem before continuing operation.
- Keep all guards in place and properly secured during operation.
- Keep all safety devices working properly and all other machine parts in good working condition.
- Never leave the controls unattended while in operation. Be sure machine is not capable of operation when left unattended.



- Stop engine and remove key when repairing or adjusting machine or drive belts.
- Keep engine in good condition, service as instructed in engine manual.
- Do not touch engine while running or hot (serious burns may result).
- Allow all machine parts to cool completely before servicing or making adjustments. Hot machine parts can cause severe burns.

WARNING

- Do not run the machine without a complete number of teeth in the cutter wheel tightened to the correct torque.
- Do not place machine in free wheel without first placing tongue stake in the ground.
- Park machine on level surfaces only. Lower cutter head to the ground and use wheel chocks to prevent unattended movement.

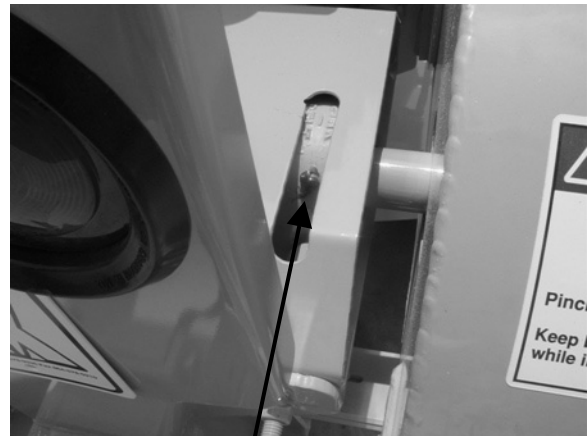
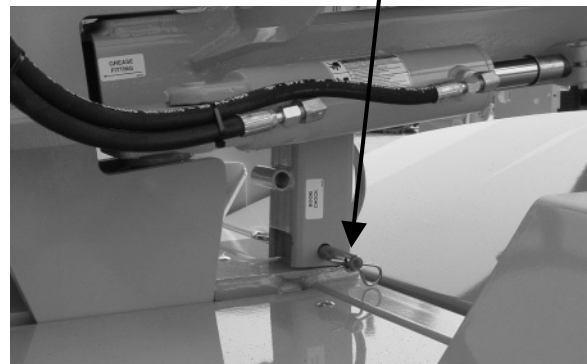
CAUTION

- Do not operate stump cutter in dark, dim lit, or concealed areas.
- Keep machine clean and clear of debris to eliminate fire hazard. It is especially important to clean any oil or fuel spills to prevent the danger of fire.
- Keep cutter wheel skirt guards in good condition to help control chips during grinding.
- Keep safety and instructional decals clean and replace any that are damaged, difficult to read, or missing. Decals may be purchased from J.P. Carlton or an authorized dealer.

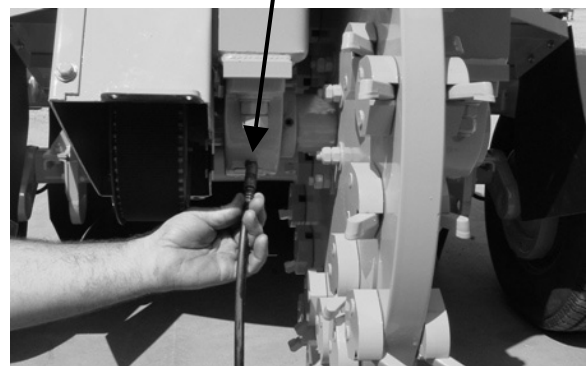
- Make sure safety pins and safety chock are in position before towing. **Always crisscross safety chains when towing.**
- Check engine oil at dipstick. Add to full mark, if required. **Engine must be level (see Machine Maintenance section).**
- Check hydraulic oil level. A sight glass is located on the hydraulic tank. Add oil if required.
- Check air filters. **REPLACE**, if necessary, **WITH FACTORY AIR FILTER ONLY.** Do not blow out or tap on ground. Replace inner safety filter when dirty or when the outer air filter has been changed 3 times. Do not blow out the inner safety filter or tap on ground. (See Engine Assembly section for part numbers.)
- Check condition of tires. Inflate to proper pressure.
- Check wheel lug nuts.
- Inspect towing hitch, safety chains and towing lights.
- Check condition and tightness of engine belts. (See Servicing Belts section) New belts will stretch and become loose as machine runs. Check belt tension often when belts are new.
- Check for any loose, broken, cracked, or missing cutter teeth and pockets. Tighten or replace any loose or damaged teeth or pockets before running stump cutter.
- Inspect bolts, hydraulic fittings, wiring harnesses, and hoses for looseness, wear, or leakage. Replace if necessary.
- Machines are equipped with purgable bearings on the cutter wheel shaft and the jackshaft. Purge with new grease **EVERYDAY.**



PINS



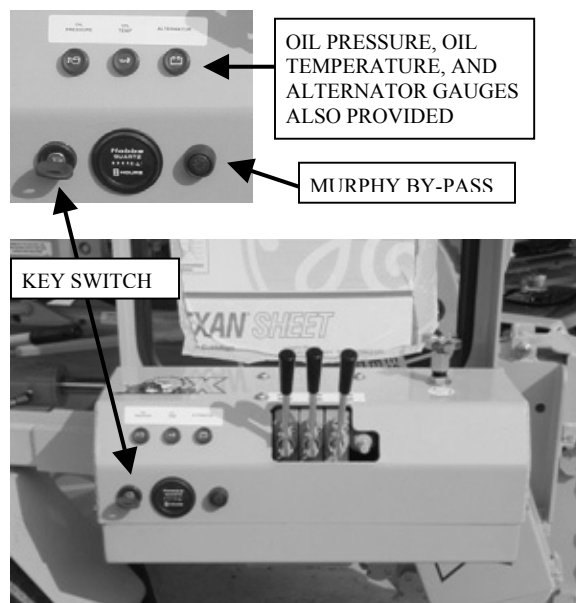
PURGE BEARINGS WITH GREASE DAILY



ENGINE CONTROLS - Refer to engine manufacturers owners' manual for controls, operation, and service.

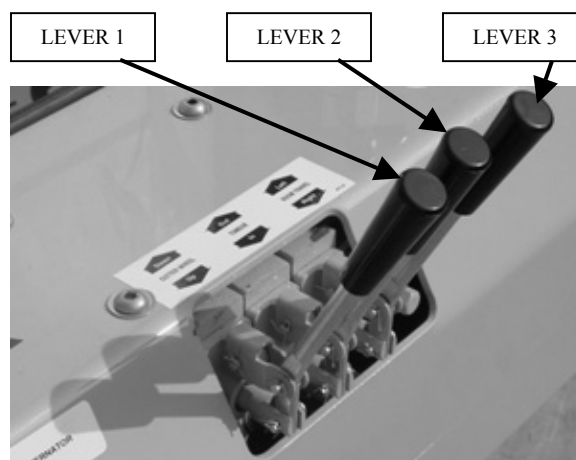
- Start the engine using the key switch located on the lower left hand side of the swing-out control panel. Press and hold the Murphy By-Pass while turning the key switch. Run the engine a few minutes to allow the oil to circulate before starting to operate the functions.

DO NOT OPERATE THE ENGINE AT AN ANGLE GREATER THAN 25° OR SEVERE ENGINE DAMAGE WILL OCCUR. PROPER ENGINE OIL LEVEL MUST BE MAINTAINED TO ACHIEVE MAXIMUM ANGLE OF OPERATION OF 25°. (See Engine Owner's Manual for proper oil level.)



HYDRAULIC CONTROLS

- A series of hydraulic controls are located on the machine and are clearly marked.
- Lever 1 – Cutter Wheel (Lift)**
(Shown as CUTTER HEAD –RIGHT/LEFT on radio transmitter.)
This lever operates the cutter head lift function, which raises and lowers the cutter head.
- Lever 2 – Tongue**
This lever operates the tongue extension function, which moves the machine toward the stump and pulls the machine back away from the stump.
- Lever 3 – Boom Travel (Swing)**
(Shown as CUTTER HEAD –RIGHT/LEFT on radio transmitter.)
This lever operates the cutter head swing function, which swings the boom back and forth in a left-right-left-right-left... motion.



SWING SPEED ADJUSTMENT

- Adjust swing speed for smooth operation. Turn valve counter-clockwise to slow cutter head swing as engine speed increases. Close valve by turning clockwise to allow head to move side to side at low engine RPM.



CUTTER WHEEL ENGAGEMENT

- With the engine RPM at idle, engage the cutter wheel by lifting the engine slide lock and slowly pulling the engagement lever toward the front of the machine. It may be easier to lift the engine slide lock if you first press down on the engagement lever.
- To disengage the cutter wheel, reduce the engine RPM to idle and slowly push the engagement lever back toward the cutter wheel. The engine slide lock should automatically go into place, make sure it is locked in place.



CUTTER WHEEL ENGAGED



ENGINE SLIDE LOCKED

CUTTER WHEEL DISENGAGED

OPTIONAL HYDRAULIC CONTROLS

THROTTLE

- If equipped, the throttle switch increases or decreases engine RPM.

ENGAGER

- If equipped, the engager switch engages or disengages the cutter wheel.



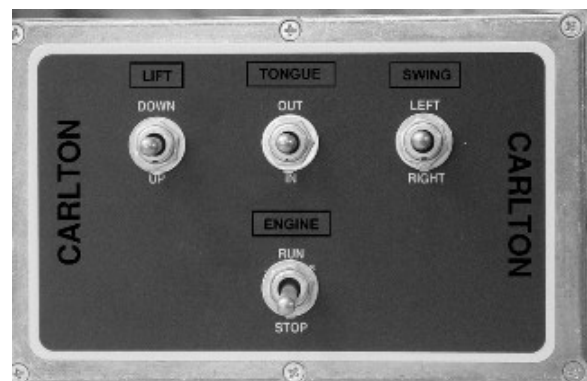
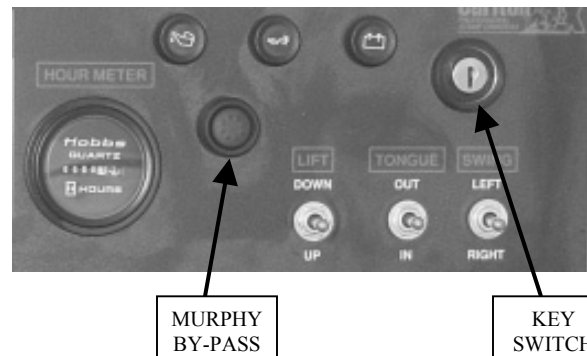
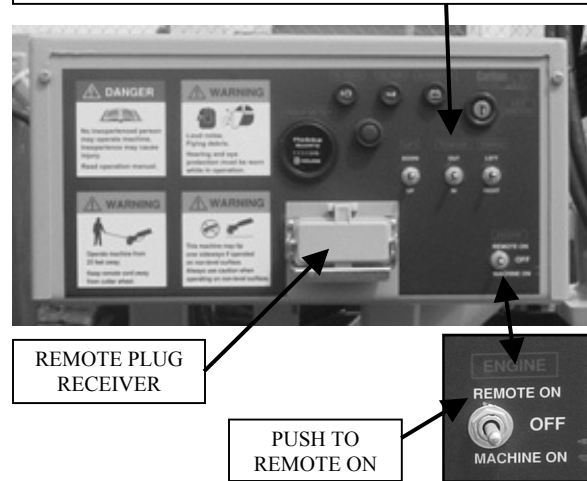
THROTTLE & ENGAGER SWITCHES

OPTIONAL REMOTE CONTROL

OPERATION – WIRED

- The control functions operate the same on a remote control machine as they do on a swing-out machine. Instead of having the machine mounted control levers as described earlier in this section, there are toggle switches on the machine control box and on the remote control unit. The toggle switches on the machine control panel can be used to operate the machine for short-term operation to test the operation of the functions.
- Use the switches on the remote transmitter to operate the machine at the job site. For a remote control machine with a wired remote transmitter, turn the **Machine ON/Remote ON** switch to **Remote On** and turn the **Engine** switch on the transmitter to **RUN**. Start the engine using the key switch located on the upper right hand side of the machine control panel. Press and hold the Murphy By-Pass while turning the key switch. Run the engine a few minutes to allow the oil to circulate before starting to operate the functions. After the engine has been running for a few minutes, test the remote transmitter by testing the functions for correct operation. After testing the functions and everything is operating correctly, begin grinding the stump as described in the Machine Operation section of this manual.
- On a remote machine, the Swing Speed Adjustment control is installed on the side of the machine control box.
- Adjust swing speed for smooth operation. Turn valve counter-clockwise to slow cutter head swing as engine speed increases. Close valve by turning clockwise to allow head to move side to side at low engine RPM.

REMOTE CONTROL MACHINE – TOGGLE SWITCHES



WIRED REMOTE TRANSMITTER WITH 25' CORD



SWING SPEED ADJUSTMENT

SAFETY

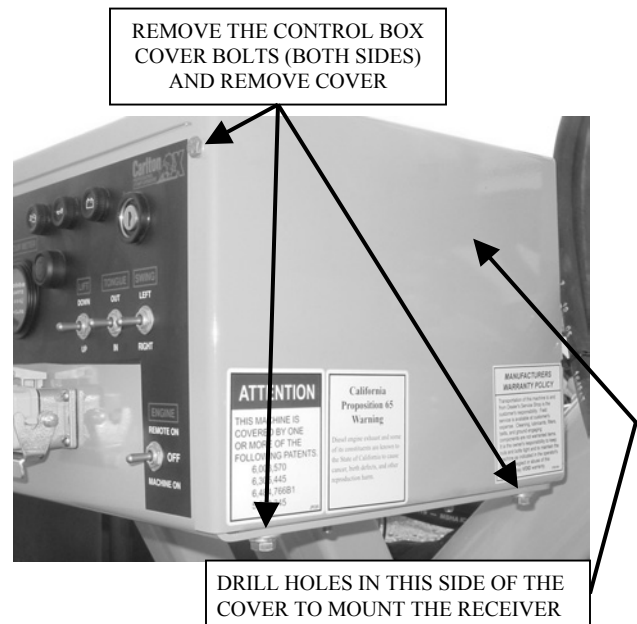
- **NEVER SERVICE A MACHINE WITH THE ENGINE RUNNING, SEVERE PERSONAL INJURY COULD OCCUR. TURN ENGINE OFF THEN REMOVE IGNITION KEY AND DISCONNECT POSITIVE BATTERY CABLE TO AVOID STARTING MACHINE ACCIDENTALLY.**
- **CUTTER WHEEL MUST BE DISENGAGED BEFORE TURNING ENGINE ON/OFF AND BEFORE SERVICING A MACHINE. OTHERWISE SEVERE PERSONAL INJURY COULD OCCUR AS WELL AS MACHINE DAMAGE.**
- **ALL MACHINE PARTS MUST COME TO A COMPLETE STOP AND HAVE TIME TO COOL COMPLETELY BEFORE SERVICING A MACHINE OR SEVERE INJURY COULD OCCUR, POSSIBLY SERIOUS BURNS AND/OR DISMEMBERMENT.**
- **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**

OPTIONAL RADIO CONTROL

CONVERTING FROM WIRED TO RADIO TRANSMITTER

- To change from a wired to a radio (wireless) transmitter, remove the cover on the control box. There are 3 bolts on each side.
- Turn cover over and drill holes in the control box wall for attaching the radio control receiver; make sure the hole locations match the bolt locations on the radio receiver. Attach the radio receiver to the control box and replace the cover.
- Use the wiring and connector diagrams, in the radio control manual included at the back of this manual, to wire directly to the appropriate contacts of the machine electronics. Contact your Carlton dealer if you need assistance not the radio control manufacturer.
- The radio transmitter and receiver will be programmed at the factory when purchased as a set.

THE RADIO CONTROL RECEIVER, SHOWN AT THE RIGHT, MUST BE INSTALLED IN THE CONTROL BOX

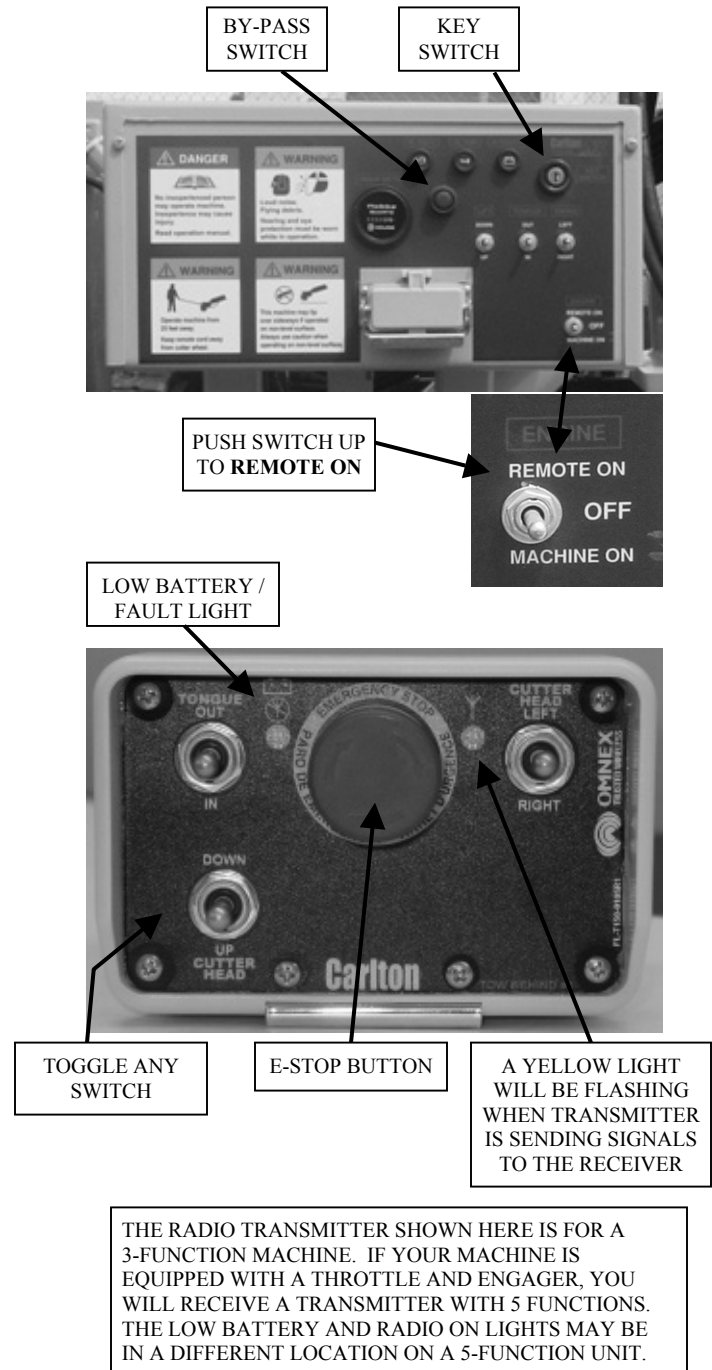


DRILL HOLES IN THE RIGHT SIDE OF THE COVER (SHOWN ABOVE) AND MOUNT THE RADIO CONTROL RECEIVER INSIDE.



OPERATION – WIRELESS

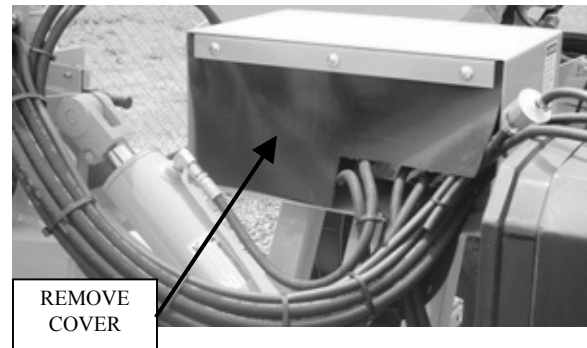
- THE CUTTER WHEEL MUST BE DISENGAGED BEFORE STARTING THE MACHINE.
- To start the engine and radio control transmitter, follow these instructions.
- On the machine, turn the ignition key switch to ON and the engine switch to **Remote On**.
- On the transmitter, press the **E-STOP** button down.
- Toggle any switch on the transmitter.
- Twist the **E-STOP** button clockwise to release. Release the E-STOP button within 10 seconds to power up or the unit will power down. When the transmitter is operating there is a yellow light that will be flashing, the light is indicated in the picture at the right. (Read the radio control manual for more information on the meaning of different lights and colors.) If the transmitter doesn't start, check the transmitter for stuck switches, it will not start with a switch in the ON position.
- Now start the engine, turn the key switch while pressing the by-pass switch to start the machine. If the engine doesn't start right away and you have to restart it, turn the key switch OFF and back ON. Make sure the light on the transmitter is still on, and restart the engine by turning the key and pressing the by-pass switch. If you lose the connection (light off), repeat the procedure from the beginning and perform each step exactly as described. Test controls for proper operation.
- The E-STOP button turns off the transmitter and the machine when it is pressed down.



NEVER WELD ON A MACHINE WITH RADIO CONTROLS WITHOUT FIRST DISCONNECTING THE RECEIVER WIRE HARNESS, OTHERWISE THE RADIO RECEIVER WILL BE DESTROYED.

PROGRAMMING – WIRELESS

- If there is a problem with the receiver or the transmitter and either has to be replaced, you will need to program the new unit to communicate with the existing unit. Or if you have more than one transmitter for this machine, it will need to be programmed to communicate with the existing receiver.
- To program the transmitter and receiver, you have to download the transmitter's unique code into the receiver. There are complete instructions along with colored illustrations in the radio control manual included in the back of this manual.
- To access the receiver, remove the cover from the machine control box.
- Remove the radio receiver panel by unlatching the plastic tabs on either side of the receiver; see the radio control manual included in this manual at the back. The receiver panel will now slide out of the cap.
- Follow the instructions in the radio control manual to download the ID Code. There are specific instructions that need to be followed and corresponding illustrations. The radio control manual is included in the back of this manual.
- Push the receiver panel back up into the cap until the tabs snap back into place.
- Always replace the machine cover when maintenance or troubleshooting is complete. **DO NOT RUN MACHINE WITHOUT ALL GUARDS & COVERS IN PLACE AND SECURED.**



TROUBLESHOOTING

SEE THE RADIO CONTROL MANUAL FOR ANY OPERATING PROBLEMS WITH THE RADIO RECEIVER & TRANSMITTER

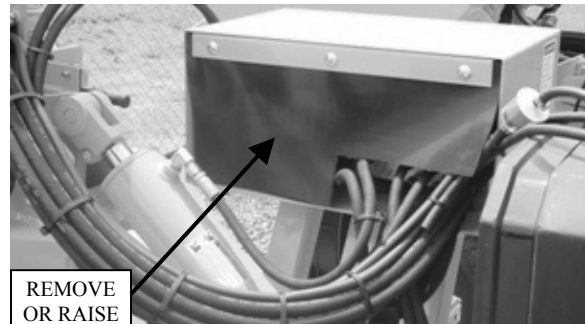
(Included in the back of this manual)

- First check the batteries to make sure they are providing enough power to operate the transmitter.
- There is a low battery light on the transmitter, when it starts flashing you have approximately 10 hours of operation left.
- Remove the back cover on the transmitter. Remove old batteries and replace with new batteries. The transmitter operates using 4 AA alkaline batteries.
- Next, open the cover on the machine control box. You will need to be able to see the lights on the receiver to compare to the trouble indicators on the receiver diagnostic list in the radio control manual. Check the light configuration and compare it to the Receiver Diagnostic list in the radio control manual.
- If status light on radio receiver is flashing red, a fuse is blown. To change a fuse, remove the receiver panel from the cap and change the fuse. Inspect wiring for short circuits (e.g. bare wires). If problem re-occurs, call for service. Push the receiver panel back into the cap until the tabs snap back into place.
- Always replace the machine cover when maintenance or troubleshooting is complete. **DO NOT RUN MACHINE WITHOUT ALL GUARDS & COVERS IN PLACE AND SECURED.**

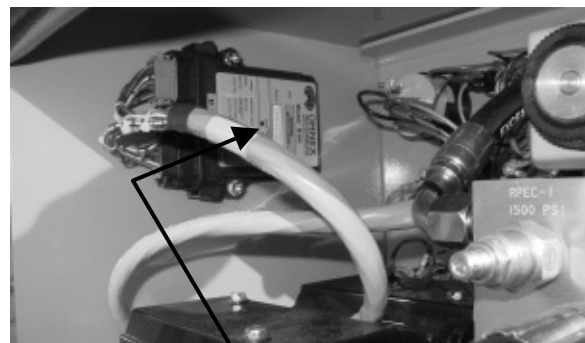
LOW BATTERY LIGHT



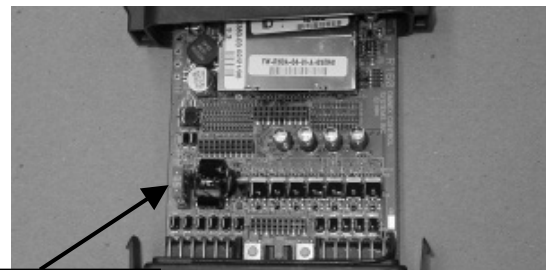
REMOVE THE BACK COVER TO ACCESS THE BATTERIES – THERE ARE 4 SCREWS HOLDING IT IN PLACE. THE BATTERY COMPARTMENT IS LABELED FOR CORRECT BATTERY ORIENTATION.



REMOVE OR RAISE COVER



COMPARE THE LIGHT CONFIGURATION ON THE RECEIVER TO THE DIAGNOSTIC CHART IN THE RADIO CONTROL MANUAL



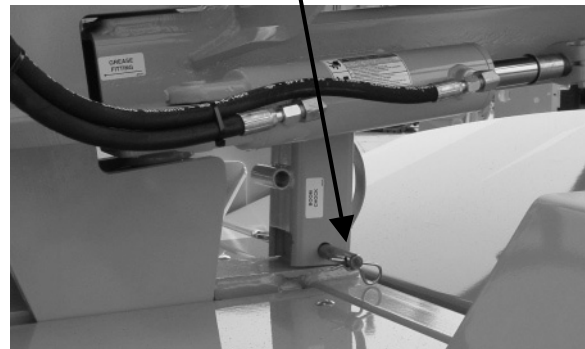
REPLACE FUSE

SAFETY: NEVER ALLOW INEXPERIENCED DRIVERS TO TOW MACHINERY. Always make sure ball size is same size as coupler on equipment.

- Always make sure safety pins and chock block are in place before towing.
- Always make sure towing ball and hitch coupler are the same size and that they are not worn.
- Check hitch for secure installation and make sure safety chains are properly installed. Crisscross safety chains under hitch to provide support in the event of failure. Chains may be twisted to shorten to compensate for excessive length. Should the tongue contact the ground at highway speeds, the machine tongue may dig in and catapult the machine into traffic. **USE YOUR SAFETY CHAINS.**
- When connecting machine to tow vehicle, take care to ensure that the tongue of the stump grinder rides level or slightly down in the front. A proper amount of tongue weight is required to allow machine to tow properly. Too little tongue weight will result in wandering or fishtailing.
- Check towing lights for proper operation.
- Never unhitch machine on anything but level ground and use chocks on wheels to prevent inadvertent movement (no parking brakes).
- Lock jack in traveling position.
- Use a tow vehicle that is rated to tow a machine of this weight. Make sure the hitch is heavy enough and built strong enough.
- Towing will affect handling, allow for extra stopping distances.
- Start and stop gradually.
- Tow at a safe, reasonable speed. Obey posted speed limits.
- Slow down over rough terrain.
- **Never tow with stump cutter motor running.**
- **Never back up to a stump with cutter wheel engaged (Hitting stump with cutter wheel running will break Poly Chain® belt).**



SAFETY PINS



SAFETY CHAINS



TOW WITH MACHINE RIDING LEVEL

STARTING - READ ENGINE MANUFACTURERS OWNERS' MANUAL BEFORE STARTING.

- Check all fluids before starting.
- Drive belts must be disengaged before starting.
- Inspect all connections, teeth, tires, etc. (See Daily Checklist).
- Start engine at half speed and allow sufficient time for oil to circulate before proceeding. (See Machine Control section for starting the machine with a remote or radio control transmitter.)
- Test controls for proper operation.
- Avoid transversing slopes.
- **DO NOT OPERATE THE ENGINE AT AN ANGLE GREATER THAN 25° OR SEVERE ENGINE DAMAGE WILL OCCUR. PROPER ENGINE OIL LEVEL MUST BE MAINTAINED TO ACHIEVE MAXIMUM ANGLE OF OPERATION OF 25°. (See Engine Owner's Manual for proper oil level.)**
- **WEAR FACE SHIELD AND HEARING PROTECTION.**
- **KEEP CLEAR OF CUTTING WHEEL AND MOVING MACHINE PARTS.**
- **KEEP SPECTATORS AWAY.**

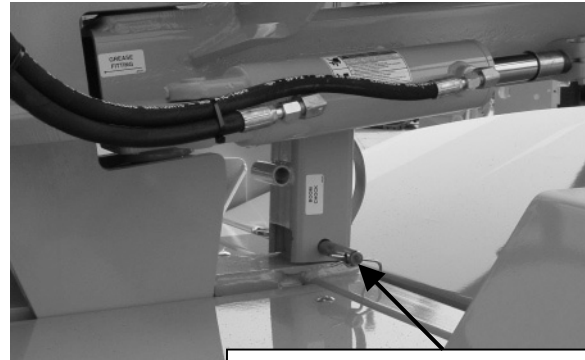
- Position the machine at stump with cutter wheel a slight distance away from stump.



- Remove tongue safety pin before beginning to cut stump.



- Lift boom and remove boom chock block.



REMOVE BOOM CHOCK BLOCK

- Reduce engine RPM to idle.
- Raise cutterhead clear of stump.
- Engage cutterhead drive belts by pushing down on engagement handle to relieve pressure on engine slide stop. Lift slide stop and slowly pull handle back to engage belts.
- Increase engine RPM to full.
- Test controls for proper operation, speed, and unobstructed movement.



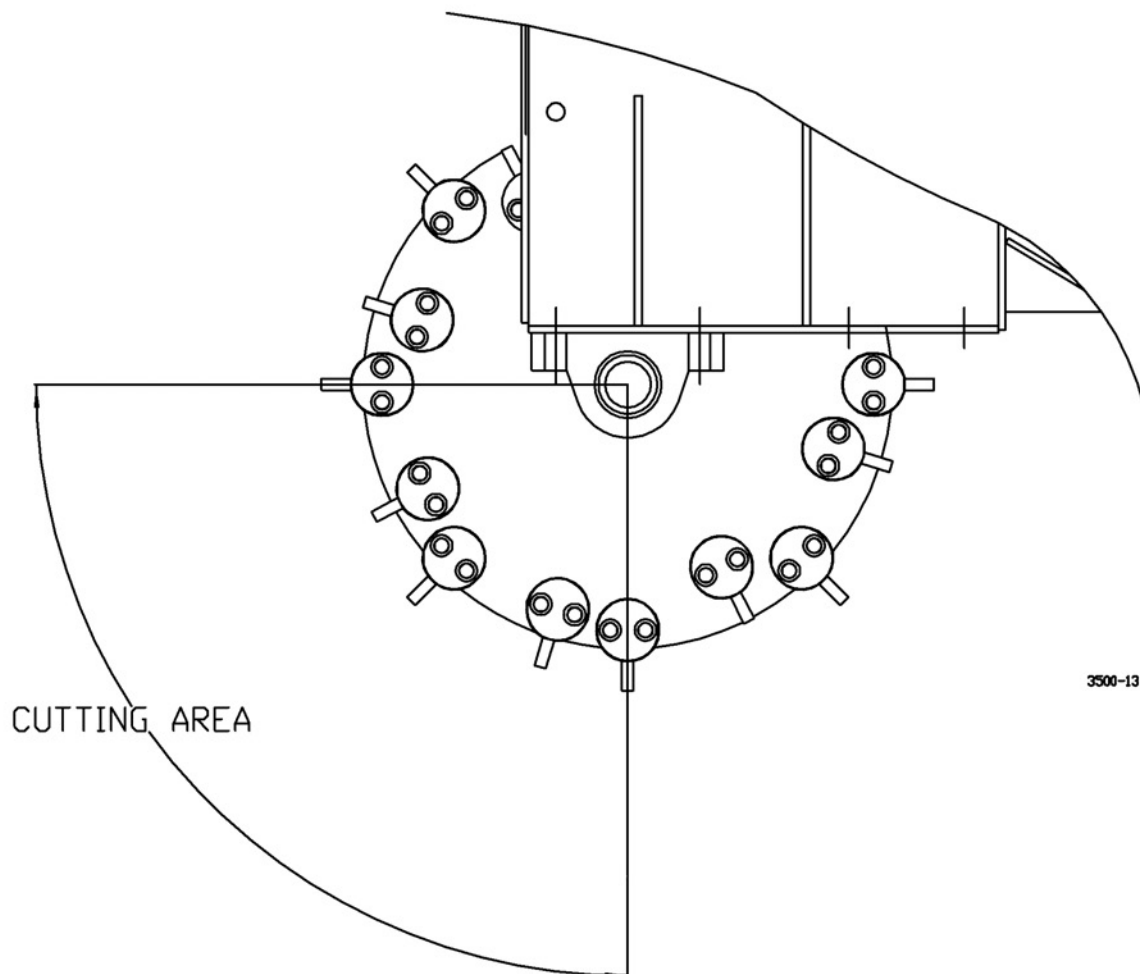
- Cutter head swing speed should be adjusted to a rate that will allow cutter wheel to pass through stump smoothly. If jerking, bouncing or significant drops in engine speed occur, swing rate is too rapid and must be decreased.
- Swing speed should be determined and adjusted with the controls in the full open position.
- A counter-rotating valve is located within the hydraulic system to adjust this speed. Turning the handle counter-clockwise will open the bypass and slow swing action. Turning it clockwise will increase swing rate.



- Lower spinning cutter wheel to stump and make a few light passes at stump to get a feel for the cutting action.
 - Gradually increase cutting action and work away at stump by swinging cutter wheel left-to-right-to-left through stump in a sideways motion. Smooth, effortless cutting lengthens machine life, minimizes downtime and is more profitable in the long run.
 - Continue cutting stump by adjusting cutting wheel progressively lower until stump is cut well below ground level.
-
- Swing cutter wheel clear of stump and extend tongue to position machine closer to stump for next series of passes and continue cutting.
 - Continue in this manner until stump has been removed.
 - Larger stumps may require repositioning machine to work at best advantages.
-
- Raise cutter wheel clear of stump and return to center position.
 - Withdraw tongue extension.
 - Reduce engine speed to idle and disengage drive belts. **DO NOT TURN OFF MOTOR.** Engine must be allowed to cool slowly at idle for 3-5 minutes to avoid damage.
 - **DO NOT DISENGAGE DRIVE BELTS AT A HIGH ENGINE SPEED.** Damage to belts and machine will occur.
 - At low engine RPM cutter wheel swing speed control needs to be closed for cutter head to swing. Turn clockwise to close.
 - Turn off motor.
 - Allow cutter wheel to come to a full stop before inspecting work area.



For optimal performance, the stump should be cut with the portion of the cutter wheel shown. **NEVER UNDERCUT THE STUMP.** Undercutting the stump can cause severe kickback, vibration and component damage. **NEVER CUT THE STUMP FROM THE TOP.** The cutter wheel will throw debris up and toward the operator, instead of down and under the machine.

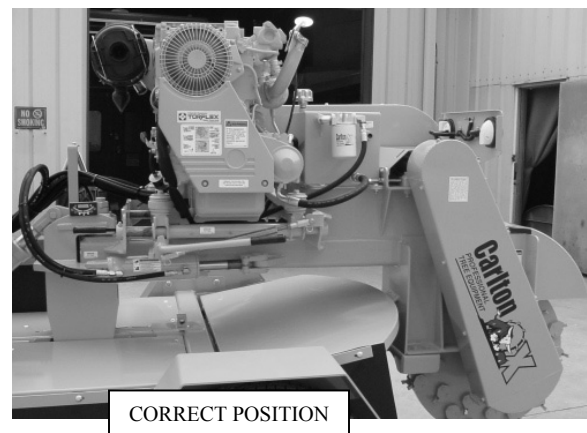
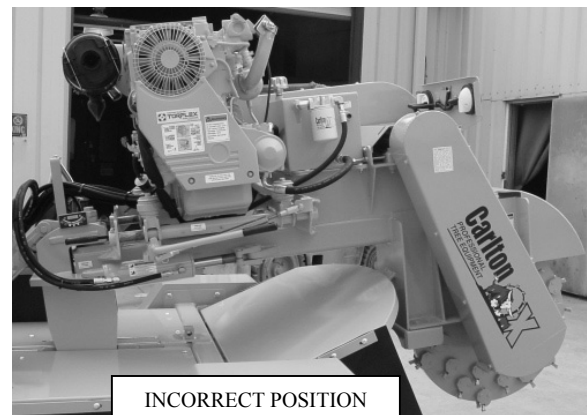


3500-13

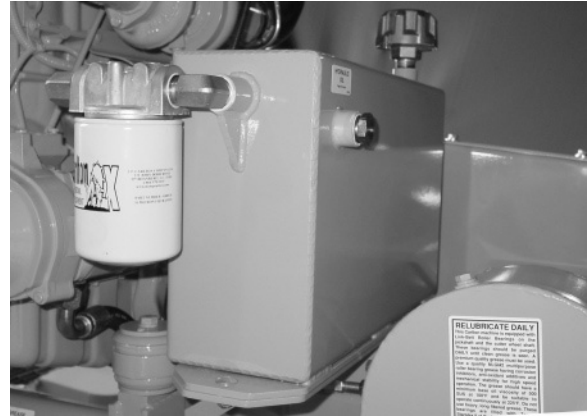
SAFETY

- **NEVER SERVICE A MACHINE WITH THE ENGINE RUNNING, SEVERE PERSONAL INJURY COULD OCCUR. TURN ENGINE OFF THEN REMOVE IGNITION KEY AND DISCONNECT POSITIVE BATTERY CABLE TO AVOID STARTING MACHINE ACCIDENTALLY.**
- **CUTTER WHEEL MUST BE DISENGAGED BEFORE TURNING ENGINE ON/OFF AND BEFORE SERVICING A MACHINE. OTHERWISE SEVERE PERSONAL INJURY COULD OCCUR AS WELL AS MACHINE DAMAGE.**
- **ALL MACHINE PARTS MUST COME TO A COMPLETE STOP AND HAVE TIME TO COOL COMPLETELY BEFORE SERVICING A MACHINE OR SEVERE INJURY COULD OCCUR, POSSIBLY SERIOUS BURNS AND/OR DISMEMBERMENT.**
- **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**

- Check engine oil at dipstick; take reading with engine **sitting level (see photos)**. Add recommended oil and change oil as required. (See engine owners' manual)



- Check hydraulic oil tank. A sight glass is provided on the tank for easy viewing. Keep filled to proper level.
- The machine is equipped with Citgo AW32 hydraulic oil at the time of manufacture.



- To access the jackshaft bearings you will have to remove the jackshaft cover.
- Check setscrews in jackshaft bearings and cutter wheel bearings for tightness (weekly).



- Clean out Poly Chain® guard by removing bottom portion of guard (weekly). **Chip buildup will wear or break Poly Chain® belt.**

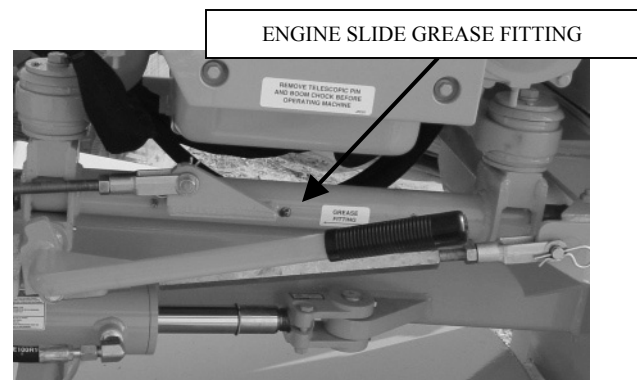


- Check cutter wheel, pockets, and teeth for wear. If any repair is needed, see Servicing Cutter wheel section for further instructions. **DO NOT OPERATE STUMP CUTTER WITHOUT A COMPLETE SET OF TEETH.**

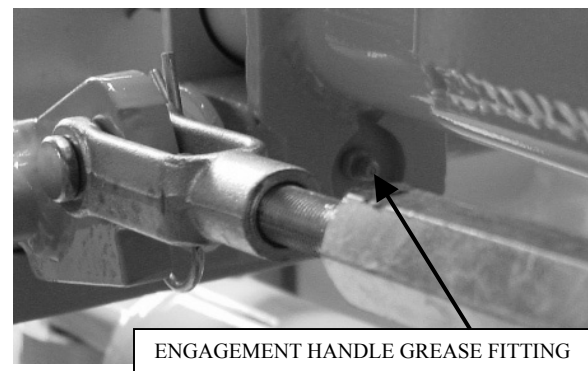


Always clean tip of grease gun fitting and grease fitting on machine before attaching hose to prevent dirt from being forced into machine parts.

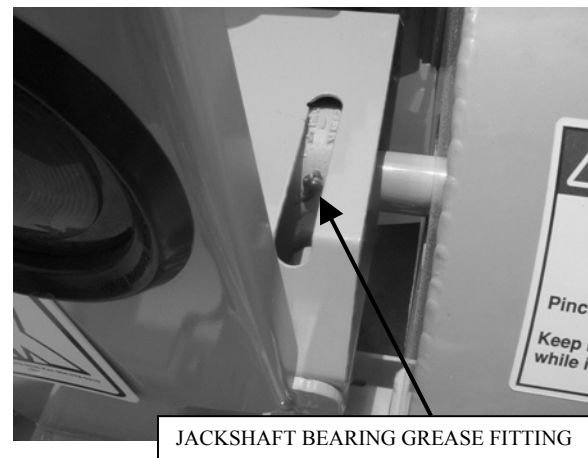
- Grease engine slide assembly daily. Use Texaco® Starplex II grease. Wipe off excess grease. **Excess grease will attract dirt.**



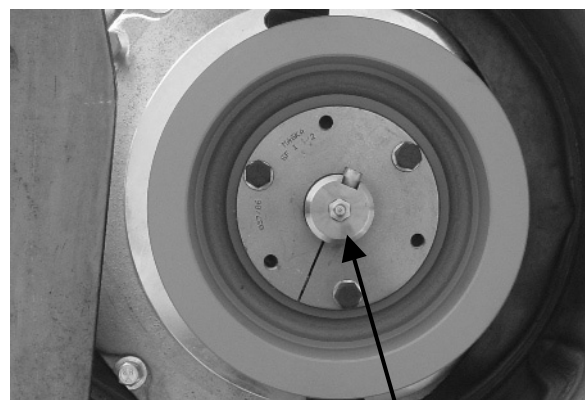
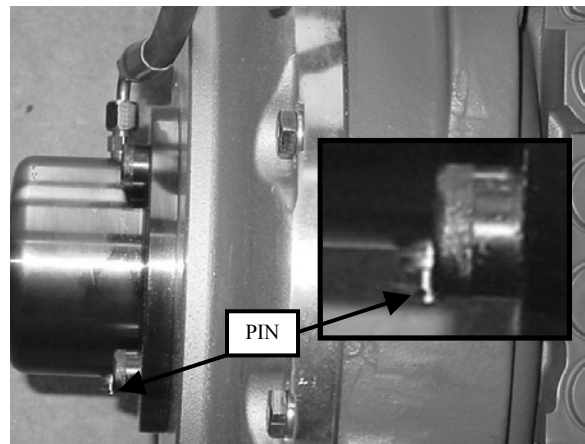
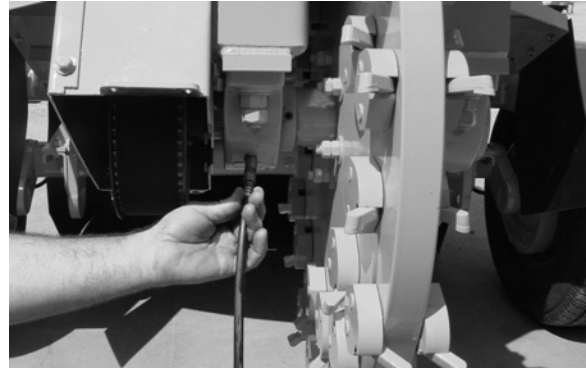
- Grease engagement arm pivot weekly, 2 places. Use Texaco® Starplex II grease. Wipe off excess grease. **Excess grease will attract dirt.**



- Grease jackshaft bearings daily. There is a cover on the jackshaft bearings with slots to access the grease fittings. These bearings should be purged using grease **EVERYDAY**. **Purge until clean grease is seen.** Use Texaco® Starplex II grease. Wipe off excess grease. **Excess grease will attract dirt. Always clean tip of grease gun fitting and grease fitting on machine before attaching hose to prevent dirt from being forced into machine parts.**

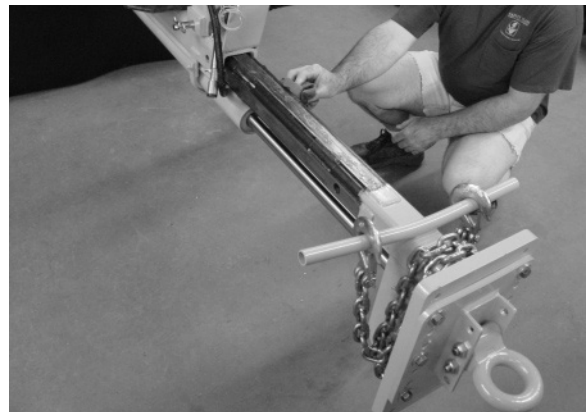


- Grease cutter wheel shaft bearings daily. These bearings should be purged using grease **EVERYDAY**. **Purge until clean grease is seen.** Use Texaco® Starplex II grease. Wipe off excess grease. **Excess grease will attract dirt. Always clean tip of grease gun fitting and grease fitting on machine before attaching hose to prevent dirt from being forced into machine parts.**
- Grease the bearing supported stub shaft every 1000 hours of operation using Texaco® Starplex II grease. The grease fitting is easily accessible behind the V-belt guard. Apply grease using a hand held grease gun until the pin extends from the pressure relief valve (located 180° from grease fitting on the bearing). Wipe off excess grease. **Excess grease will attract dirt.**
- A grease fitting is on the end of the stub shaft to grease the spline coupling. Apply 2 to 3 shots of grease approximately every 1000 hours of operation. Wipe off excess grease. **Excess grease will attract dirt. DO NOT over grease, over greasing could cause a hydraulic type lift on seals.**



GREASE APPROXIMATELY EVERY
1000 HOURS OF OPERATION

- Grease bottom pivot hardened bushings weekly. Use Texaco® Starplex II grease. Wipe off excess grease. **Excess grease will attract dirt.**
- Grease spindles every 2 to 3 months. Spindles are easy lube type. Remove rubber grommet and grease at grease fitting until grease is seen around grease fitting.
- Grease tongue extension every 6 months with a light coating of Texaco Starplex II grease.



- The model 3500D, as well as all of our machines, is built to be a rugged performer. Your new machine is sturdy and our design goals are simplicity and reliability.
- A regularly scheduled maintenance program will pay big dividends in machine life, performance and avoided downtime.

Lubrication Schedule

- **USE TEXACO® STARPLEX II GREASE.**

CARLTON PROFESSIONAL TREE EQUIPMENT - MODEL 3500D	Daily	WEEKLY	2-3 Mon	6 Mon	Special Comments
BEARINGS					
- WHEEL HUBS					Easy Lube Axles
- JACKSHAFT					Purge until clean grease is seen
- CUTTER WHEEL					Purge until clean grease is seen
- PIVOT HEAD LIFT					3 fittings underneath machine
- PIVOT HEAD SWING					Adjust as required
- BEARING SUPPORTED STUB SHAFT					Every 1000 hrs of operation apply grease until the pin on the opposite side of the stub shaft extends
- STUB SHAFT END FOR COUPLING					Grease approximately every 1000 hrs. of operation 2 - 3 shots of grease
ENGINE SLIDE FRAME					1 - 2 shots
ENGAGEMENT LINKAGE					1 - 2 shots
TONGUE EXTENSION					Light coating
JACKSTAND					As required
ENGINE REFER TO ENGINE MANUFACTURERS' MANUAL FOR PROPER ENGINE SERVICING					

3500D-B_B (04/08/AB)

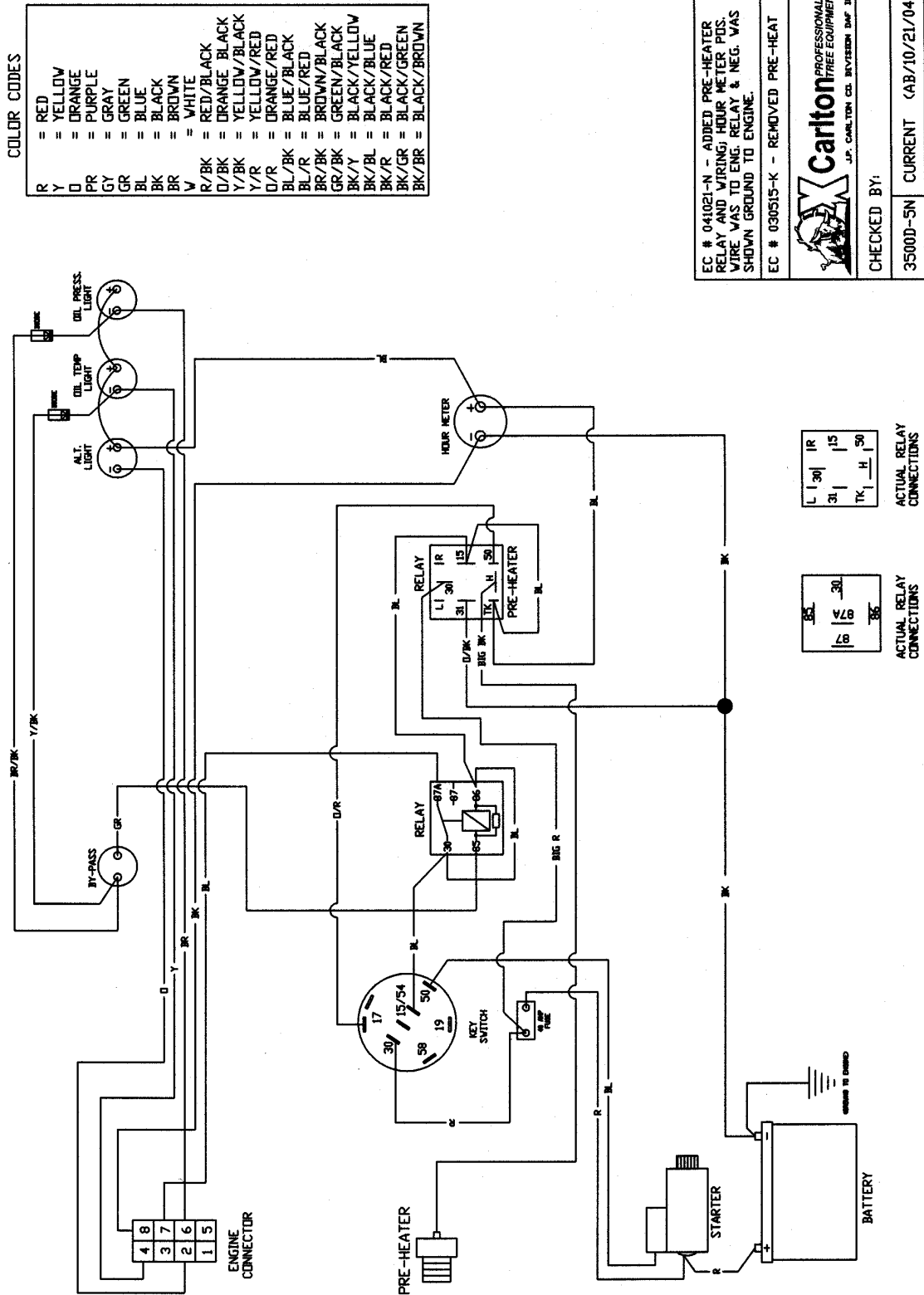
COMPLAINT	CAUSE	CORRECTION
Engine will not start. (See Engine Manufacturers' Manual for further information.)	• Loose ground wire. • Loose hot wire. • Dead battery.	• Clean and tighten. • Clean and tighten. • Recharge or replace.
Hydraulic system loss of power.	• Low oil. • Valve set too low. • Splined pump coupling worn. • Bad cylinder. • Bad Pump.	• Refill with correct oil. • Adjust relief valve. • Remove pump coupler. • Replace cylinder packing. • Replace Pump.
Swing cylinder loss of power.	• Cutterhead speed adjustment screw turned wide open.	• Screw in speed adjustment screw to close bypass. Re-adjust for "no bounce" cutting.
Belt Squeal.	• Belt tension too loose. • Belt out of alignment.	• Tighten. • Align Pulleys.
Belt jumping off.	• Engaging or disengaging belt at high engine RPM. • Belt keeper too far from belt. • Belt worn. • Pulley worn.	• Only engage or disengage belts at low engine speeds. • Adjust keeper closer to belt. • Replace belt. • Replace pulley.
Cutter wheel vibration.	• Tooth missing. • Pocket out of balance. • Improper tooth arrangement.	• Replace missing teeth. • Always replace pockets in pairs across from each other. • Install correctly with like pairs of teeth directly across from each other.
Cutter wheel throwing teeth.	• Bad pocket. • Dirt in pocket. • Cutter wheel worn where tooth sits.	• Replace pocket. • Clean pocket and replace missing teeth. • Replace cutter wheel.
Cutter wheel breaking teeth.	• Teeth set too far out of pocket.	• Use gauge to set teeth correctly.

COMPLAINT	CAUSE	CORRECTION
Cutter wheel stops turning.	• Belt not engaged. • Belt loose. • Engine belt broke. • Poly Chain® belt broken. • Sheared key in shaft. • Broke cutter wheel shaft.	• Adjust yoke assembly. • Tighten belt. • Replace belt. • Replace belt. • Replace key. • Replace shaft.
Roar in machine when cutter wheel is engaged.	• Belt guards rubbing on jack shaft or cutter wheel shaft. • Jackshaft or cutter wheel bearings going bad. • Stub shaft bearing bad.	• Re-position guards off of shafts. • Replace bearings. • Replace bearing.
Bearing will not take grease.	• Grease fitting clogged.	• Replace fitting
Cutter head swings faster one way than the other.	• Counter-balance valve is out of adjustment. • Cylinder bad.	• Adjust counter-balance valve to equalize swing speed. • Replace cylinder.
Machine will not run with remote hooked up.	• 3-position switch on machine control panel is in off position. • 6 pin connector pins are touching and grounding machine out. • Y-Connection in remote cable pulled apart.	• Position switch on machine to remote and remote kill switch to on. • Spread pins apart on inside of connector. • Reconnect wires in splice in remote cable.

For all Radio Transmitter or Receiver problems, see the Radio Control Manual included at the back of this manual.

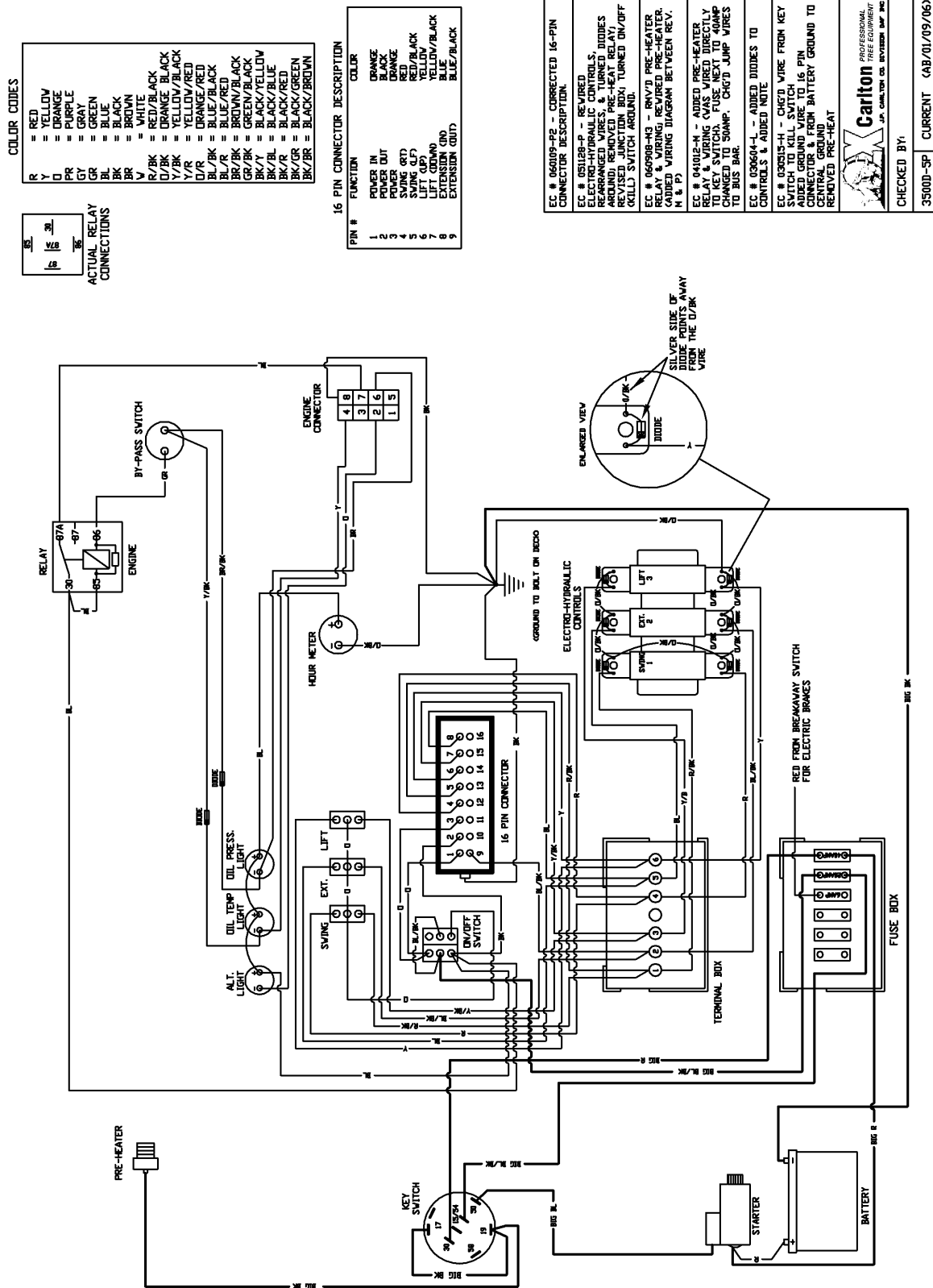
STANDARD WIRING DIAGRAM

3500D MACHINE STANDARD WIRING DIAGRAM
W/KEY SWITCH & BY-PASS



REMOTE WIRING DIAGRAM

3500D MACHINE REMOTE WIRING DIAGRAM W/KEY SWITCH, 16-PIN CONNECTOR, & BY-PASS



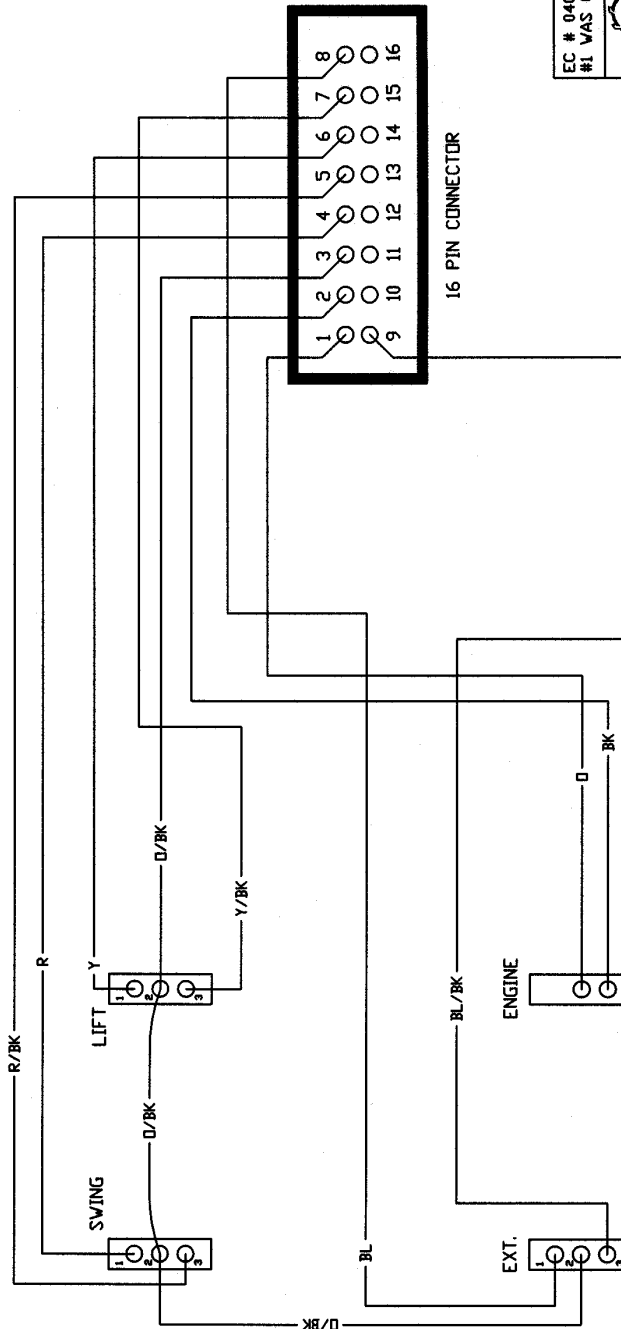
REMOTE BOX WIRING

16 PIN CONNECTOR DESCRIPTION		PIN #
POWER IN	ORANGE	1
POWER OUT	BLACK	2
GROUND	ORANGE/BLACK	3
SWING (R)	RED	4
SWING (L)	RED/BLACK	5
LIFT (UP)	YELLOW	6
LIFT (DOWN)	YELLOW/BLACK	7
EXTENSION (IN)	BLUE	8
EXTENSION (OUT)	BLUE/BLACK	9

COLOR CODES
R = RED
Y = YELLOW
OR = ORANGE
PR = PURPLE
GY = GRAY
GR = GREEN
BL = BLUE
BK = BLACK
BR = BROWN
W = WHITE
R/BK = RED/BLACK
D/BK = ORANGE/BLACK
Y/BK = YELLOW/BLACK
Y/R = YELLOW/RED
D/R = ORANGE/RED
BL/BK = BLUE/BLACK
BL/R = BLUE/RED
BR/BK = BROWN/BLACK
BK/Y = BLACK/YELLOW
BK/BL = BLACK/BLUE
BK/R = BLACK/RED

EC # 040329-B - 16-PIN FUNCTION FOR #1 WAS GROUND & #2 WAS POWER
Carlton PROFESSIONAL TREE EQUIPMENT
J.P. CARLTON CO. DIVISION B&F INC.
CHECKED BY:
4400-12B CURRENT (AB/3/29/04)

3500D/4400 TOW BEHIND REMOTE CONTROL CORD WIRING DIAGRAM 3 FUNCTION W/16-PIN CONNECTOR



R160 CONNECTOR DIAGRAM

PIN#	COLOR	FUNCTION	PIN#	COLOR	FUNCTION
A1	BLUE/BLACK	SPARE	B1	WHITE/RED/BLACK	FLUID HIGH
A2	BLACK/WHITE	SPARE	B2	RED/BLACK/WHITE	GEAR HIGH
A3	BLACK/WHITE	SPARE	B3	GREEN/BLACK/WHITE	L. TRACK FORWARD
A4	GREEN/BLACK/RED	SPARE	B4	WHITE	L. TRACK REVERSED
A5	BLACK/WHITE/RED	SWITCHES TO POWER VALVE	B5	DRANGE	R. TRACK FORWARD
A6	RED/BLACK/WHITE	POWER VALVE	B6		R. TRACK REVERSED
A7	RED/BLACK/WHITE	LEFT LIFT	B7		FACTORY CONT. ONLY
A8	RED/BLACK/WHITE	RIGHT LIFT	B8	RED/WHITE	SPARE
A9	WHITE/BLACK	SWING CL. OUT	B9	BLACK/WHITE	SPARE
A10	BLACK/WHITE	SWING CL. IN	B10	BLACK/RED	SPARE
A11	BLUE/RED	SWING CL. OUT	B11		
A12	DRANGE/RED	TRACKS OUT	B12		

PIN #	FUNCTION	COLOR
1	POWER IN	ORANGE
2	POWER OUT	BLACK
3	POWER	ORANGE
4	SWING (RT)	RED
5	SWING (LT)	RED/BLACK
6	LIFT (UP)	YELLOW
7	LIFT (DOWN)	YELLOW/BLACK
8	EXTENSION (IN)	BLUE
9	EXTENSION (OUT)	BLUE/BLACK

EC # 06016-Q - AUDED OMNEX
CONNECTOR AND WIRING.
EC # 06010-P2 - CORRECTED 16-PIN
CONNECTION DESCRIPTION.

EC # 050188-P - REVISED
ELECTRO-HYDRAULIC CONTROLS.
AUGMENTED PRE-HEAT RELAY
AROUND REMOVED PRE-HEAT RELAY.
TURNED ON/OFF
CIRCUIT SWITCH AROUND.

EC # 060090-B - REV'D TO PRE-HEATER
RELAY & WIRING DIAGRAM BETWEEN REV.
8 & 17.

EC # 040102-H - AUDED PRE-HEATER
RELAY & WIRING. FUSE NEXT TO 4AMP
TO KEY SWITCH.
CHANGED TO 2AMP.
CHGT JUMP WIRES
TO BUS BAR.

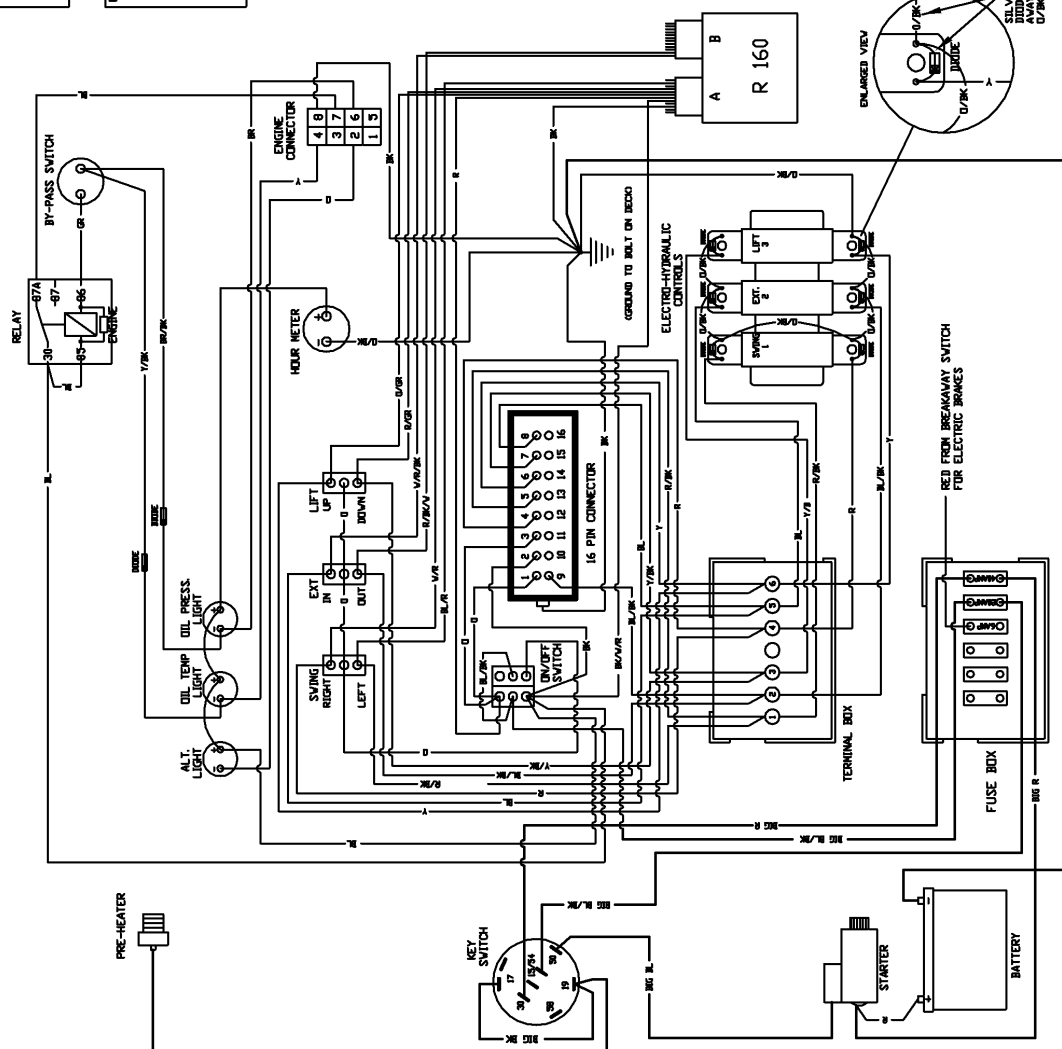
EC # 030604-A - AUDED DIODES TO
CONTROLS & AUDED NOTE

EC # 030515-H - CHGT WIRE FROM KEY
SWITCH TO KILL SWITCH
AUDED GROUND WIRE TO 16 PIN
GROUND
CENTRAL GROUND
REMOVED PRE-HEAT

 **Carlton** PROFESSIONAL
FREE EQUIPMENT
JAP. CARLTON CO. DIVISION 3407 INC

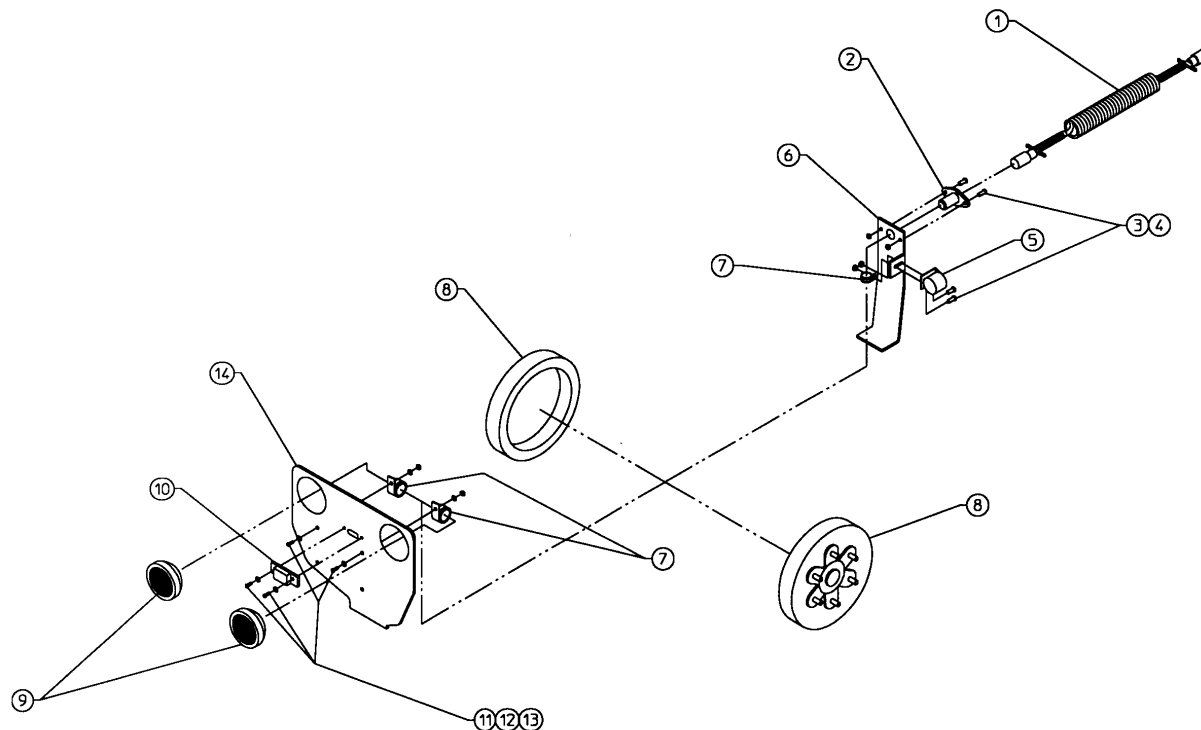
CHECKED BY: 35000-50 CURRENT (4/8/10/16/06)

	ACTUAL RELAY CONNECTIONS	COLOR CODES
1	R	= RED
2	Y	= YELLOW
3	O	= ORANGE
4	P	= PURPLE
5	G	= GRAY
6	GR	= GREEN
7	GY	= BLUE
8	BK	= BLACK
9	BR	= BROWN
10	W	= WHITE
11	VBK	= RED/BLACK
12	YBK	= ORANGE/BLACK
13	PBK	= YELLOW/BLACK
14	YR	= YELLOW/RED
15	D/R	= ORANGE/RED
16	BLK	= BLUE/BLACK
17	BLR	= BLUE/RED
18	BRBK	= BROWN/BLACK
19	GRBK	= GREEN/BLACK
20	GRBL	= GREEN/BLUE
21	GRW	= GREEN/WHITE
22	BK/R	= BLACK/RED
23	BR/R	= BROWN/RED
24	GR/R	= GREEN/RED
25	BRN	= BLACK/BROWN



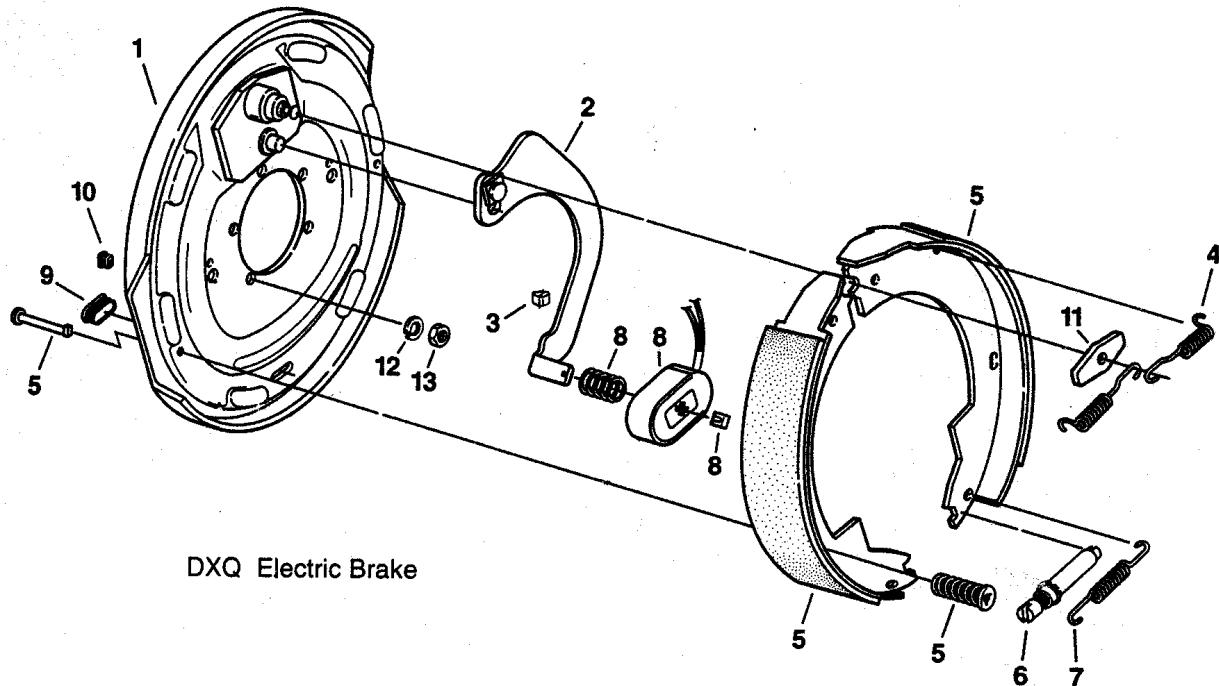
SEE RADIO CONTROL
MANUAL, INCLUDED IN
THIS MANUAL, FOR MORE

LIGHT ASSEMBLY



ITEM NO	PART NO	DESCRIPTION	QTY
1	0350008	Coiled Connector Assembly	1
2	0350004	Connector Socket	1
3	0150140	1/4-20 x 3/4 HCS	4
4	0150218	1/4-20 Lock Nut	4
5	0350046	Breakaway Switch	1
6	3500163	Light Connector Bracket	1
7	0350050	1" Loom Clamp	3
8	0550211	Brake Drum w/studs & races	2
9	0350044	Tail Light Kit	2
10	0350045	Tag Light	1
11	0150141	#10 x 3/4 Machine Screw	4
12	0150301	#10 Flat Washer	8
13	0150221	#10 Lock Nut	4
14	3500267	Tail Light Bracket	1

ELECTRIC BRAKE ASSEMBLY



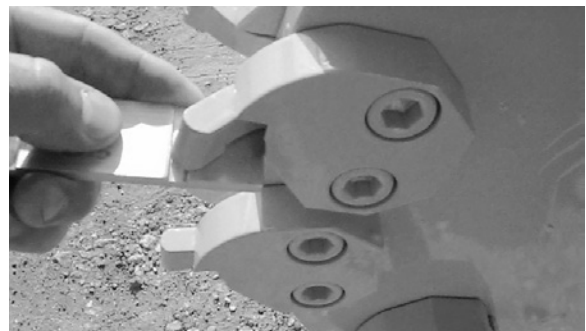
ITEM NO	PART NO	DESCRIPTION	QTY
1	0550220	Backing plate assembly	1
2a	0550221	Left hand actuating lever	1
2b	0550222	Right hand actuating lever	1
3	0550223	Anchor post washer	1
4	0550224	Wire clip	3
5	0550225	Retractor spring	2
6	0550226	Shoe & lining kit	1
7	0550227	Adjuster assembly	1
8	0550228	Adjuster shoe spring	1
9	0550229	Magnet kit	1
10	0550230	Plug	1
11	0550231	Wire grommet	1
12	0550232	Brake mounting bolt	4
13	0550233	Brake mounting nut	4

[illegible]

- A - AUXILLARY
GD - GROUND
TM - TAG MARKER
LT - LEFT TURN
RT - RIGHT TURN
S - STOP

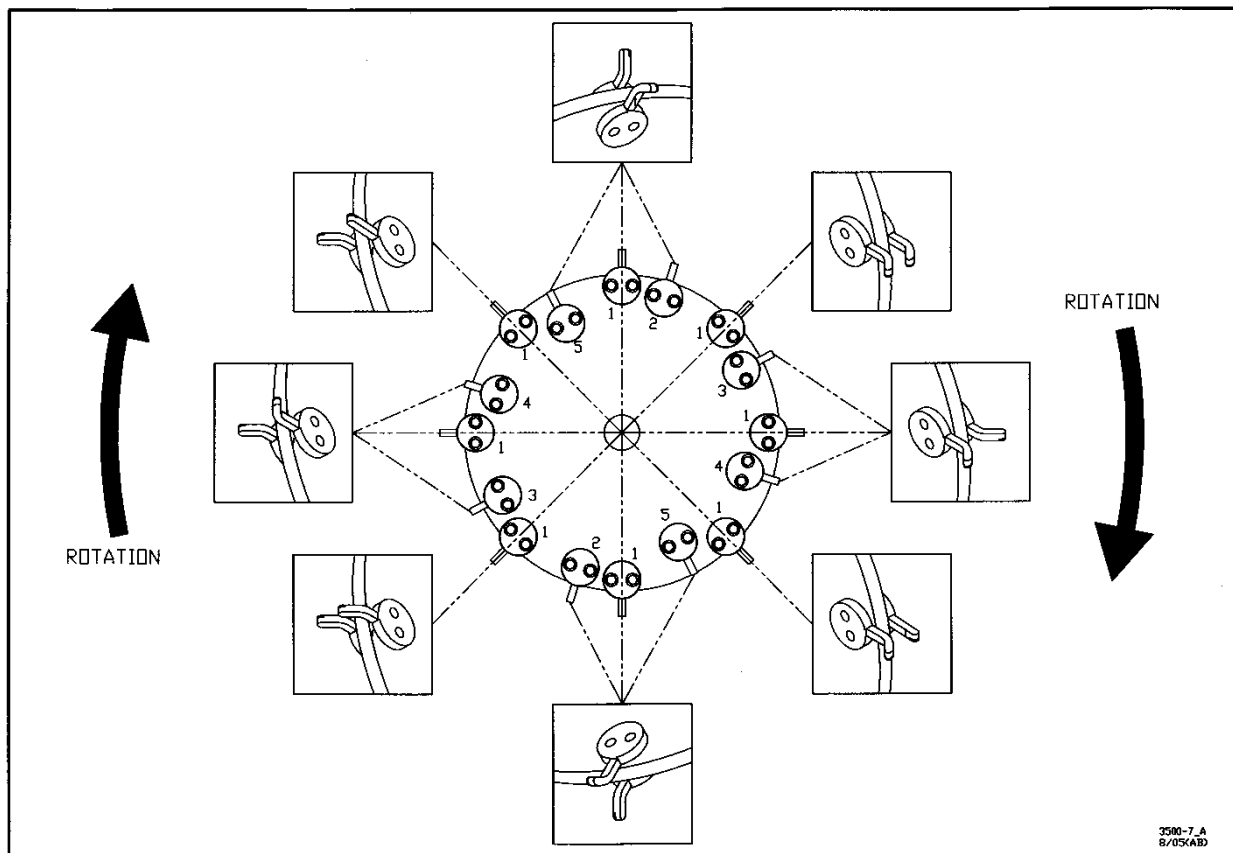
SAFETY

- **NEVER SERVICE A MACHINE WITH THE ENGINE RUNNING, SEVERE PERSONAL INJURY COULD OCCUR. TURN ENGINE OFF THEN REMOVE IGNITION KEY AND DISCONNECT POSITIVE BATTERY CABLE TO AVOID STARTING MACHINE ACCIDENTALLY.**
 - **CUTTER WHEEL MUST BE DISENGAGED BEFORE TURNING ENGINE ON/OFF AND BEFORE SERVICING A MACHINE. OTHERWISE SEVERE PERSONAL INJURY COULD OCCUR AS WELL AS MACHINE DAMAGE.**
 - **ALL MACHINE PARTS MUST COME TO A COMPLETE STOP AND HAVE TIME TO COOL COMPLETELY BEFORE SERVICING A MACHINE OR SEVERE INJURY COULD OCCUR, POSSIBLY SERIOUS BURNS AND/OR DISMEMBERMENT.**
 - **DO NOT OPERATE A MACHINE WITHOUT A COMPLETE SET OF TEETH PROPERLY INSTALLED. EXCESSIVE MACHINE VIBRATION WILL OCCUR CAUSING PREMATURE BEARING FAILURE AND OTHER EQUIPMENT DAMAGE.**
 - **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**
-
- There are thirty-two (32) teeth to a complete set on the model 3500D. Two (2) straight teeth, fifteen (15) left 45° teeth and fifteen (15) right 45° teeth.
-
- A locking pin is provided to hold cutter wheel in position during tooth removal and re-installation.
 - Locking pin will only lock on outer teeth. **NEVER PLACE HAND ON CUTTER WHEEL TO HOLD IN PLACE WHILE CHANGING TEETH. BE SURE TO REMOVE PIN BEFORE OPERATING.**
-
- A Tooth Setting Gauge (P/N - 0450111) is provided with each machine for proper tooth installation. Line all teeth up with the inside edge of the groove in the gauge. Set **ALL** teeth to this edge with gauge against pocket, not against cutter wheel.



TOOTH ARRANGEMENT

- Inspect pockets, teeth and bolts for damage and replace as required.
- When replacing pockets, always replace new pockets across from each other in order to prevent vibration.
- Replacement teeth must be carbide tipped and have like design as provided with the machine.
- Use anti-seize on threads to prevent bolts from “freezing up” in cutter wheel pockets.
- When replacing complete set of teeth, be sure to duplicate original factory tooth arrangement.
- Torque bolts to 150 ft/lbs.



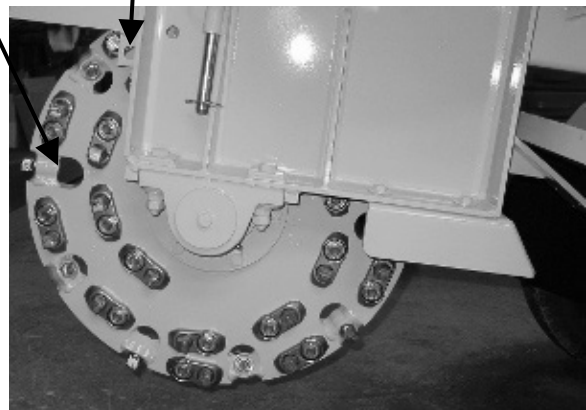
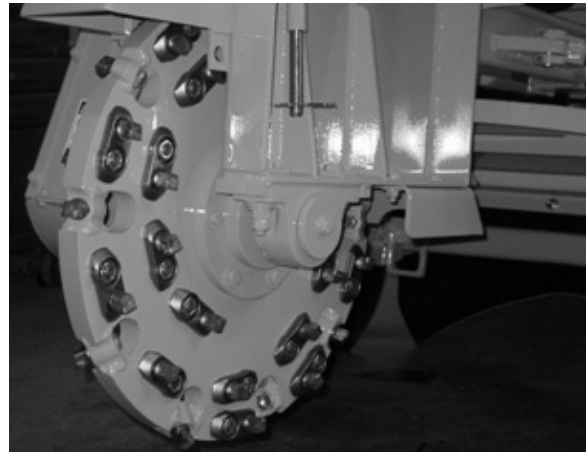
opposing outside pockets carry like arrangements of teeth to cancel vibration

- Straight teeth are mounted in **TWO OPPOSING OUTSIDE POCKETS.**
- A straight tooth must have a 45° tooth accompanying it in the same pocket set. The opposite pocket sets should have this same combination of straight and 45° teeth, except with positions reversed. Mounting these teeth opposite each other on the cutter wheel cancels damaging vibration.
- Two Remaining Outside Pockets must have 45° teeth overlapping centerline of wheel to make plunge cuts possible. Mount two left 45° teeth opposite two right 45° teeth.
- Inside pockets require 45° teeth mounted away from the wheel.
- The second pocket in each group gradually goes back into the cutter wheel for half a rotation and then repeats.

OPTIONAL:

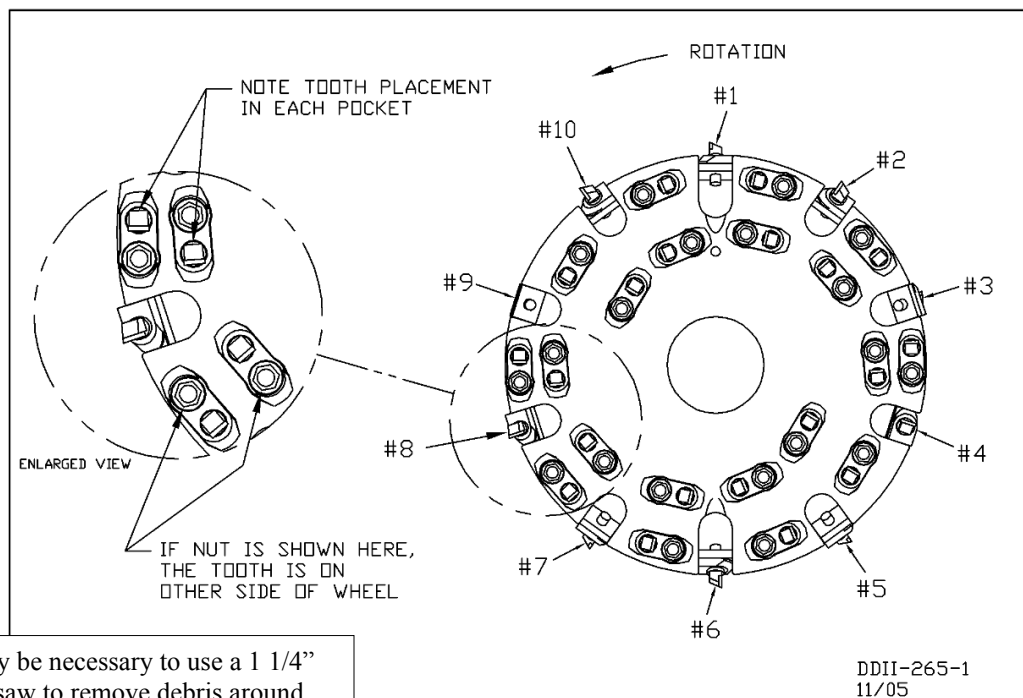
Sandvik® Dura Disk II Cutter Wheel

- If the machine is supplied with the optional Dura Disk II cutter wheel, there are fifty (50) teeth to a complete set. There are ten (10) Short Plow Bolt Bits (Carlton part #0450121) and forty (40) Plow Bolt Bits (Carlton part #0450120).
- **DO NOT OPERATE A MACHINE WITHOUT A COMPLETE NUMBER OF TEETH IN THE CUTTER WHEEL PROPERLY INSTALLED. EXCESSIVE MACHINE VIBRATION WILL OCCUR CAUSING PREMATURE BEARING FAILURE AND EQUIPMENT DAMAGE.**
- A locking pin is provided to hold cutter wheel in position during tooth removal and re-installation.
- The locking pin will only lock in the deep slots of the outer teeth. Line the slot up with the locking pin slot and insert the pin to lock position. The pin will need to be removed and reinserted as wheel is rotated to change remaining teeth.
- **NEVER PLACE YOUR HAND ON THE CUTTER WHEEL TO HOLD IT IN PLACE WHILE CHANGING TEETH.**
- **BE SURE TO REMOVE THE PIN BEFORE OPERATING THE STUMP CUTTER.**
- The teeth do not require a setting gauge. The only requirement is to be installed in the proper direction and tightened to the proper torque as discussed in the next section.
- **When replacing a cutter wheel tooth, replace the tooth and nut as a set and use anti-seize on the threads.**

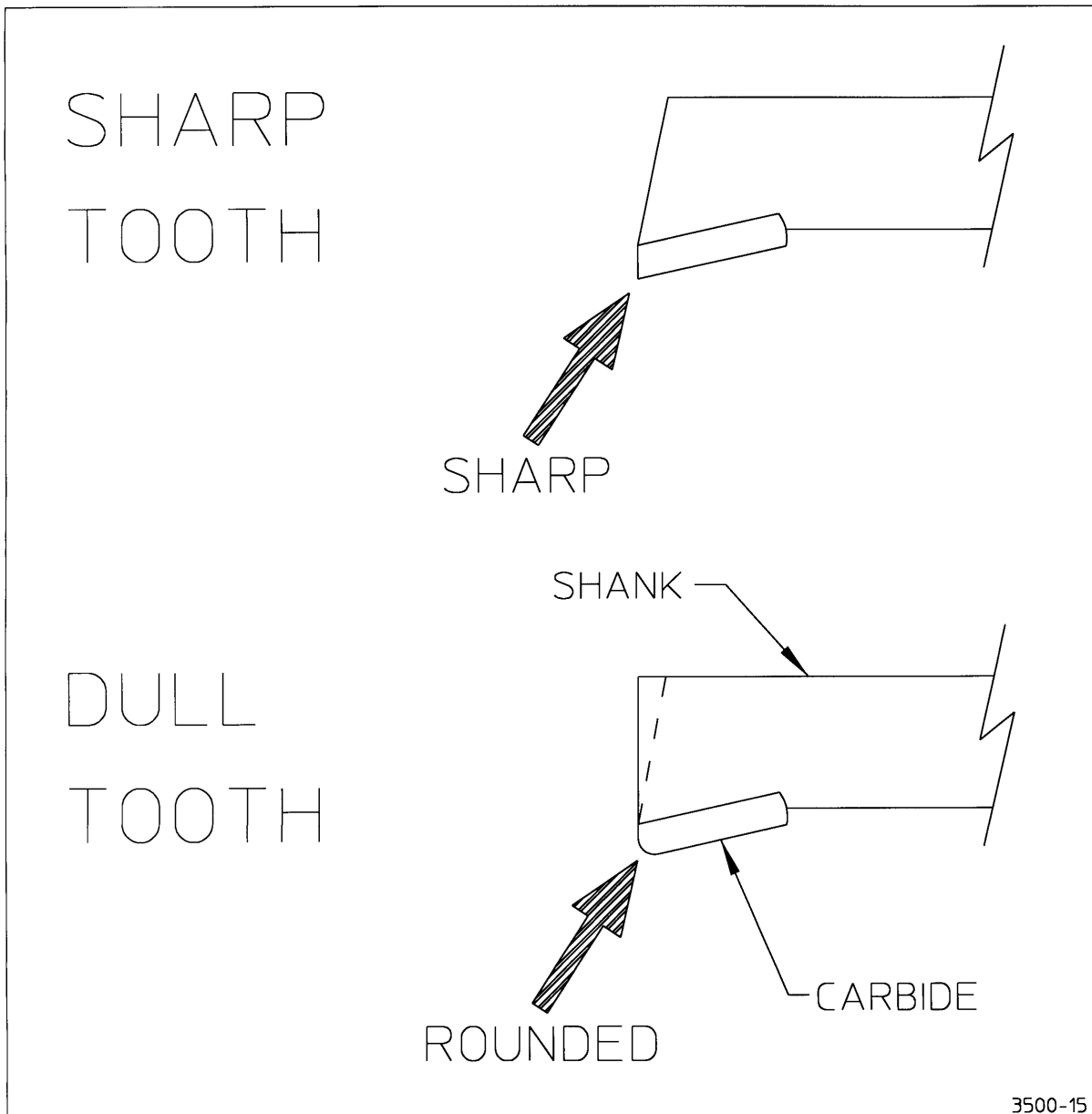


TOOTH ARRANGEMENT

- Inspect pockets, teeth and nuts for damage and replace as required.
- When replacing a cutter wheel tooth, replace the tooth and nut as a set and use anti-seize on the threads.
- When replacing teeth and pockets, also replace the teeth and pockets across from each other diagonally in order to maintain wheel balance and prevent vibration.
- All teeth and pockets are of a specific design and must be replaced with original manufacturer's replacement parts. Replacement teeth must be carbide tipped.
- When replacing complete set of teeth, be sure to duplicate original factory tooth arrangement. SEE DIAGRAM BELOW.
- The seating surfaces of the tooth and pocket are formed, but make sure the tooth is inserted with the carbide facing the direction of rotation.
- The pictured view is the engraved side of the wheel. The wheel is engraved with outside pocket numbers, outside pocket angle/direction (20 R or 20 L), and wheel rotation. (The engraved side of wheel is marked left side of wheel; this is for manufacturing purposes only. It does not refer to the left side of the machine as described in the General Information section.)
- Outside pocket teeth are Short Plow Bolt Bits. These pockets are angled and welded in place. You can switch teeth from one outside pocket to a pocket that is the opposite direction to prolong tooth life, such as switching a tooth from a 20 R with a tooth from a 20 L pocket. The cutting edge is the corner and this will turn the opposite corner out for use.
- These teeth are tightened with a Stover Lock Nut. Torque on Stover locking nuts is not to exceed 270 ft/lbs.
- All teeth on cutter wheel sides are Plow Bolt Bits. When changing these teeth you must remove both teeth in the same pocket, one on each side of the wheel. When the nuts are torqued, the pocket is jammed and the teeth can only be removed this way.
- These teeth are tightened with a Locking Jam Nut. Torque on locking jam nuts is not to exceed 128 ft/lbs.
- The pocket will receive wear when cutting and can be switched from one side of the cutter wheel to the other to prolong life. Remember the teeth must be replaced in the original position on each side of the wheel.



TOOTH SHARPENING



Begin by chamfering shank back past edge of carbide. You do this because if it is not back far enough the shank will hit the stump and not the carbide, thus causing a lot of vibration. Once the shank is angled far enough back, then begin sharpening carbide.

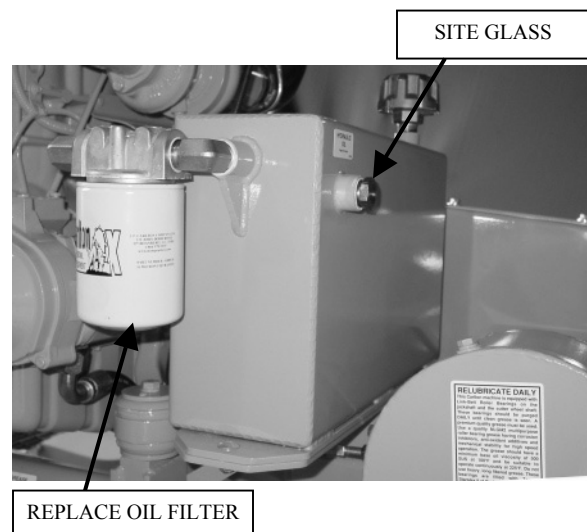
- **Cut shank with a standard rock and cut carbide with a silicone carbide or diamond rock.**
CAUTION: GRINDING CARBIDE CAN BE A HEALTH HAZARD. Use facemask to prevent breathing in harmful material while grinding.

SAFETY

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- **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**
- **RELEASE HYDRAULIC PRESSURE BEFORE PERFORMING ANY SERVICE TO HYDRAULIC LINES OR OTHER COMPONENTS.**
- **FLUID UNDER PRESSURE CAN PENETRATE THE SKIN AND CAUSE SEVERE INJURY. SEEK IMMEDIATE MEDICAL ATTENTION IF SKIN IS PENETRATED. CHECK HOSES AND FITTINGS USING A BOARD OR CARDBOARD; DO NOT USE HAND OR FINGER. ALWAYS WEAR EYE PROTECTION.**

HYDRAULIC OIL & FILTER

- Check hydraulic oil level **daily**, with engine off and cool, and replenish as necessary. A site glass is provided for easy viewing. If oil can be seen in glass, there is enough oil in the tank. Do not fill the tank more than 7/8 full; operating at high temperature will cause oil to expand and spill over if tank is full. Tank capacity is 4 gallons. Remember to replace and tighten the cap.
- The machine is equipped with Citgo AW32 hydraulic oil at time of manufacture; use same or equivalent.
- Drain and replace hydraulic oil at least once a year, more often if oil is very dark or smells burnt. Discard used oil properly.
- Replace hydraulic filter every three to four months of normal use. More often if used under severe conditions. Use a 10-micron filter, available at most locations.
- Unscrew old filter and discard properly. Clean filter housing and install new filter, making sure old O-ring has been removed and new filter has a new O-ring in place. Screw in new filter hand tight only. Recheck oil level and refill if needed, as described above.



REPLACING ROD ENDS

- Should a rod end need replacing, loosen through bolt clamping rod end to cylinder rod and unscrew rod end.
- Reverse process to install new rod end. Tighten through bolt and use new cotter pins, and cylinder pins.



REPLACING BUSHINGS

- Hardened bushings have been incorporated into the machine to protect the main frame from wear and damage.
- Should a bushing need replacing, disconnect rod end from mainframe and swing cylinder out of the way.
- Position new bushing directly above old bushing and gently tap new bushing down into position, displacing old bushing in the process.
- Swing cylinder back into position. Re-install rod end to mainframe, using new pin assemblies.



REPLACING HYDRAULIC PUMP

- Engine must be shut off.
- Remove key & disconnect battery cable.
- Make sure that hydraulic oil is cool and that pressure is relieved from the lines.
- Disconnect hydraulic lines from pump and cap them.
- Remove bolts holding pump to engine.
- Replace pump and tighten bolts.
- Recheck oil supply in reservoir.



REPLACING HYDRAULIC HOSES

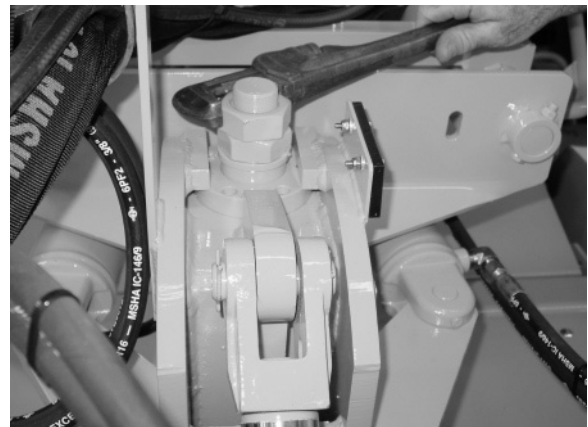
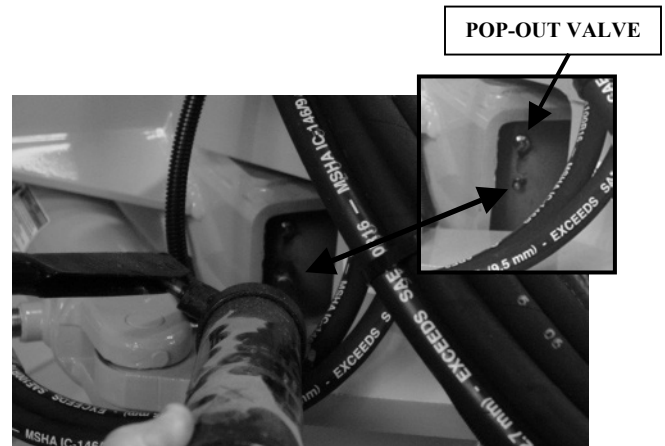
- It is not necessary to drain the hydraulic system to replace hoses.
- Loosen fitting and drain oil into suitable container for disposal. Remove old hose and replace with new one.
- Tighten fittings.
- Check for adequate supply of oil in tank before operating machine.



SAFETY

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- **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**

- Swing boom to the left to get to the boom pivot grease fitting. Grease boom pivot monthly. **Do Not Over Grease.** There is a Pop-Out Valve above the grease fitting, if the pin pops out enough grease has been applied. Wipe off excess grease. **Excess grease will attract dirt.**
- The boom pivot is equipped with a hardened shaft and Timken roller bearings. If the boom becomes loose you will need to apply pressure to the bearings to tighten it. To apply more pressure to the bearings, hold the bottom nut where the cotter pin is. Remove the top nut and tighten the second nut, which will apply pressure to the roller bearings and the boom swing. You can place cutter wheel on ground and put slight pressure on cutter wheel to adjust pivot bearings.



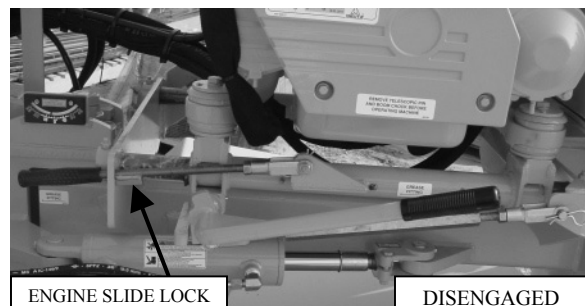
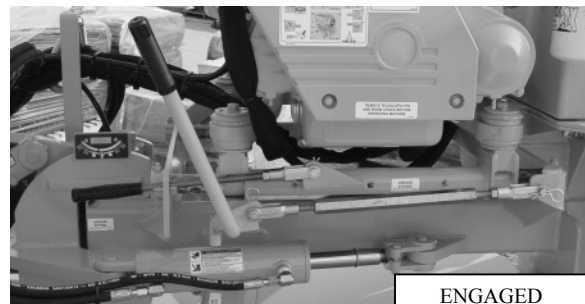
If for some reason you need to replace the main pivot bearings, you will have to remove the top pin and slide the main pivot out and install the new bearings.

- **Boom must be placed in a fixture to hold steady when you remove the pivot pin. (SEE PIVOT ASSEMBLY FOR BREAKDOWN)**

Replacing V-Belt

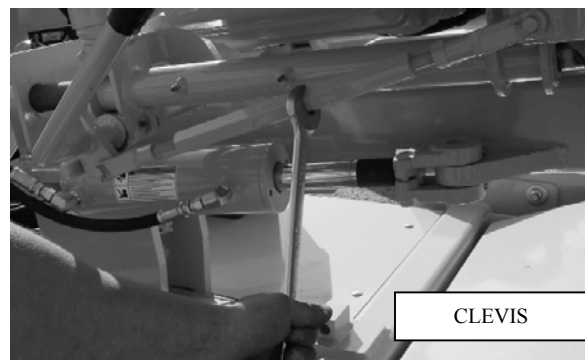
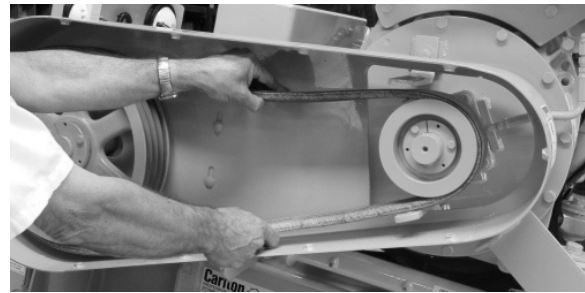
SAFETY

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 - **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**
-
- Remove front cover of engine belt guard, which is held on with ten bolts.
-
-
-
-
-
-
-
-
-
-
- Move engine back toward cutter wheel as far as it will go by disengaging cutter wheel as shown at right. This will remove tension from the belt and allow you to remove and replace the engine belt.
 - The engine slide lock should automatically move into position when the engine is disengaged, make sure that it is locked.



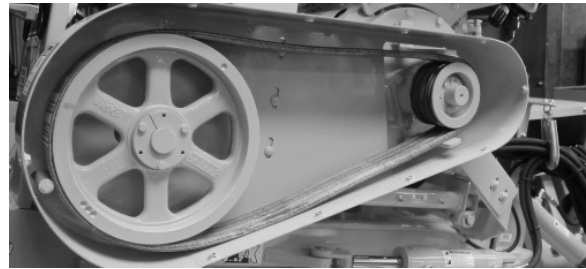
Replacing V-Belt

- Remove the belt keeper at the jackshaft pulley for easier belt removal.
- Remove and replace the engine belt.
- If you have difficulty replacing the new belt, you may need to relieve some of the tension that was applied to the old belt. Read the information on adjusting tension below and loosen the belt tension.
- After replacing the V- belt, check the tension. Engage the belt by sliding the engine forward (reference engaged position on previous page). **The belt should deflect 3/8" with 25 lbs. of force applied to the center of the belt between the sheaves.** New belts will stretch and become loose as machine runs. Check and adjust belt tension often when belts are new.
- If any adjustment is required, there is a linkage assembly below the engagement handle on the operator side. Loosen jam nut and adjust clevis with wrench turning up toward machine. This will make engine slide further and will tighten the belt. Make only slight adjustments at a time and recheck tension; repeat as necessary until tension is correct. Once proper tension is achieved, tighten jam nut back onto clevis.
- Use this same procedure to tighten loose belts.
- **DO NOT OVER TIGHTEN BELT; OVERLY TIGHT BELTS WILL CAUSE BEARING AND ENGINE DAMAGE.** Turn the clevis in the opposite direction to loosen belt tension.
- Replace belts when worn or when repeated adjustments are necessary. Belts should never get so loose that all of the adjustment capability is used.



Replacing V-Belt

- Replace the belt keeper at the jackshaft pulley.
- When adjusting engine belt tension, you will also have to adjust engine slide stop. Shorten engine slide handle as you lengthen the linkage assembly.
- Loosen the jam nut and turn the handle one turn and check to see if the engine is locked in the disengaged position. Make more adjustments, if necessary, until the engine is locked in the disengaged position. Then retighten the jam nut.
- Replace V-belt guard cover and tighten the bolts. **DO NOT RUN MACHINE WITHOUT ALL GUARDS IN PLACE AND SECURED.**



GENERAL TENSIONING OF V-BELT DRIVES

Tensioning of belts on a V-belt drive is usually not critical. A few simple rules about tensioning will satisfy most of your requirements:

1. The best tension for the V-belt drive is the lowest tension at which the belts will not slip under the highest load condition.
2. Check the tension on a new drive frequently during the first day of operation.
3. Thereafter, check the drive tension periodically.
4. Too much tension shortens belt and bearing life.
5. Keep belts and sheaves free from any foreign material that may cause slippage.

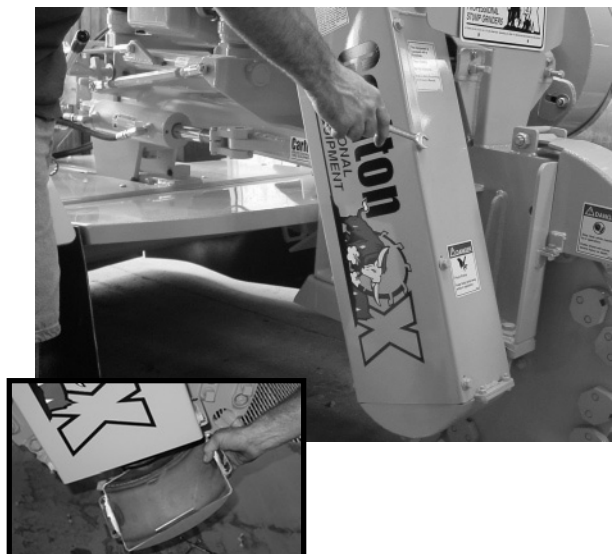
Replacing Poly Chain® Belt

SAFETY

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- **CUTTER WHEEL MUST BE DISENGAGED BEFORE TURNING ENGINE ON/OFF AND BEFORE SERVICING A MACHINE. OTHERWISE SEVERE PERSONAL INJURY COULD OCCUR AS WELL AS MACHINE DAMAGE.**
- **ALL MACHINE PARTS MUST COME TO A COMPLETE STOP AND HAVE TIME TO COOL COMPLETELY BEFORE SERVICING A MACHINE OR SEVERE INJURY COULD OCCUR, POSSIBLY SERIOUS BURNS AND/OR DISMEMBERMENT.**
- **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**
- **DO NOT OPERATE A MACHINE WITHOUT A COMPLETE SET OF TEETH PROPERLY INSTALLED. EXCESSIVE MACHINE VIBRATION WILL OCCUR CAUSING PREMATURE BEARING FAILURE AND OTHER EQUIPMENT DAMAGE.**

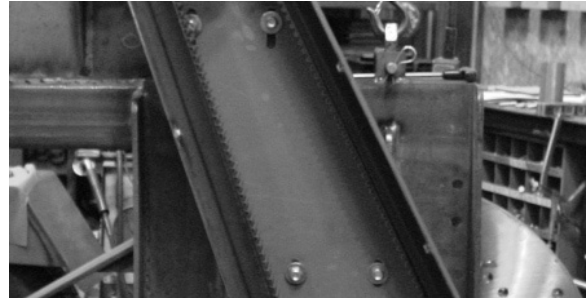
Special care needs to be taken with your Poly Chain® belt. Alignment, tension, and cleanliness of this belt are very important. The Poly Chain® belt needs to be checked for tension approximately every 70 to 100 hours of use. The Poly Chain® belt must be running true. If you adjust one bearing more than the other, the belt will run on an angle and will cause belt failure. If a belt is broken straight across, this is the result of a shock load. Lost teeth on the belt are an indication that the belt was loose. When replacing the Poly Chain® belt, do not try to pry belt on over sprocket, this can break the fibers in the Poly Chain® belt. After you have installed or re-tensioned the Poly Chain® belt, you will have to re-adjust the engine belt for proper tension

- Remove the Poly Chain® guard cover and bottom cover. The cutter wheel must be disengaged. (See the information in the Replacing V-Belt part of this section to disengage the belt.)

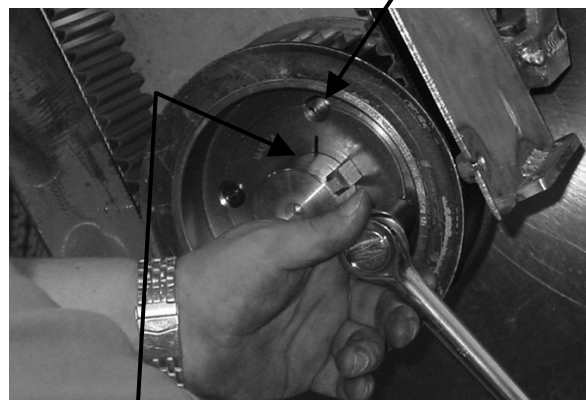


Replacing Poly Chain® Belt

- Loosen, do not remove, the nuts on the bolts that are holding the belt guard to the machine.
- Loosen Poly Chain® belt by moving jackshaft bearings back toward rear of machine. **MARK THEM SO THAT YOU KNOW HOW THEY ARE POSITIONED ON THE JACKSHAFT PLATE.** Loosen, do not remove, the four bolts that hold the jackshaft bearings down.
- Loosen the jam bolts in the back and move the bearings toward cutter wheel.
- **Place a mark on the cutter wheel shaft next to the cutter wheel bushing for replacing the bushing and sprocket.**
- When the belt has been loosened, remove the cutter wheel sprocket. Remove the three screws in the bushing and then screw two of the screws into the two threaded holes to push the bushing out of the sprocket. Turn one screw a small amount and then turn the other screw the same amount to keep from damaging the bushing or sprocket, work back and forth until the sprocket is loose.
- You may have to strike the sprocket rim with a dead blow hammer or leather mallet, **NOT A STEEL HAMMER**, while applying tension with the two screws to break sprocket loose.



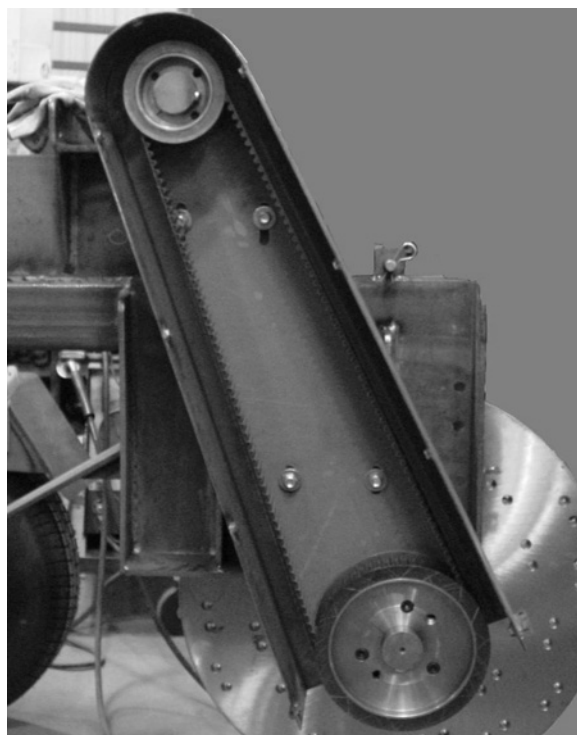
REPLACE SCREWS IN THREADED HOLES TO
REMOVE BUSHING



MAKE A MARK ON THE CUTTER WHEEL SHAFT
TO REPLACE THE BUSHING AND SPROCKET

Replacing Poly Chain® Belt

- Remove old belt and replace with new one.
- Replace the belt over the jackshaft sprocket first. Put the cutter wheel sprocket and the Poly Chain® belt on the cutter wheel shaft at the same time, with the sprocket inside the belt.
- Put the cutter wheel tapered bushing on the cutter wheel shaft and inside the sprocket. Push the bushing as close to the position you marked earlier as possible. Replace and tighten the screws. Torque screws to 67 ft. lbs.

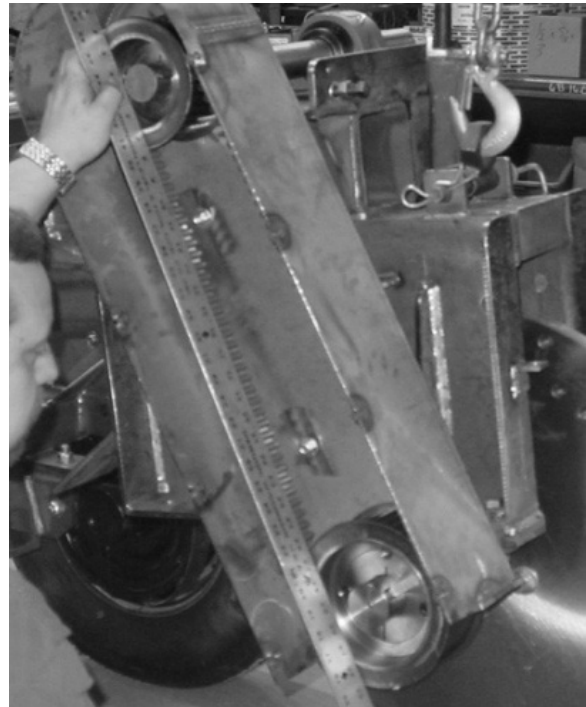


- Tighten the belt by sliding the jackshaft bearings back into the place that you had marked on the jackshaft plate earlier. If the old Poly Chain® belt had the tension adjusted, you may not be able to get the bearing to move back to the position marked earlier. Don't try to force the bearings back into that position or you may damage the new belt.
- Tighten the jam bolts.



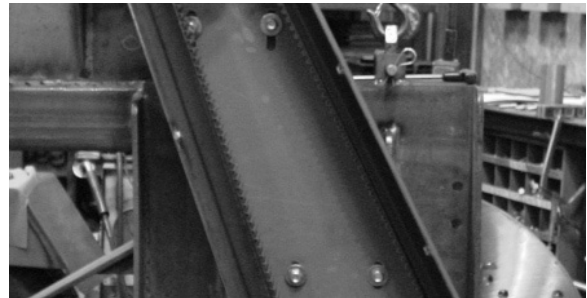
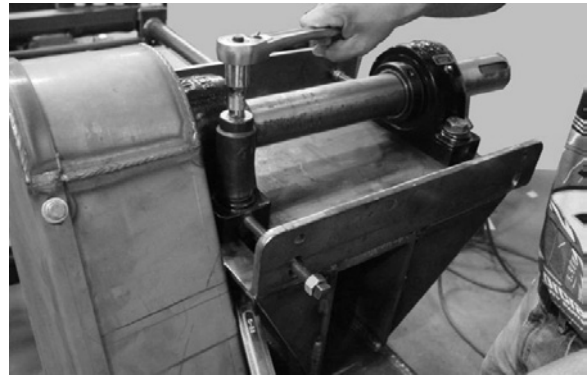
Replacing Poly Chain® Belt

- Check belt alignment using a straight edge. Adjust belt alignment by loosening one jackshaft bearing jam bolt and tightening the other bearings jam bolt. Make only slight adjustments and recheck alignment. **The alignment and tension of the V-belt will also need to be checked after changing and adjusting the Poly Chain® belt.**
- To tighten the belt more if needed, loosen the front bolts and tighten each of the back jam bolts the same number of revolutions, to keep the alignment true. Make only slight adjustments at a time and recheck tension; repeat as necessary until tension is correct. Then once the belt is adjusted, tighten the front bolts against the bearing. Recheck belt alignment after tightening all bolts and nuts to make sure the belt is still aligned.
- Use this same procedure to tighten loose belts.
- **DO NOT OVER TIGHTEN BELT; OVERLY TIGHT BELTS WILL CAUSE BEARING AND ENGINE DAMAGE.** To loosen the tension on a belt, loosen the jam bolt and tighten the bolt on the other side of the bearing. Always make slight, equal adjustments on both bearings and recheck tension.
- Replace belts when worn or when repeated adjustments are necessary. Belts should never get so loose that all of the adjustment capability is used.



Replacing Poly Chain® Belt

- Retighten the bolts in the jackshaft bearings when the tension is adjusted properly.
- Retighten the nuts on the bolts that are holding the belt guard to the machine.
- Replace belt guard cover and bottom. Tighten the bolts. **DO NOT RUN MACHINE WITHOUT ALL GUARDS IN PLACE AND SECURED.**



Replacing Poly Chain® Belt

Tensioning Procedure for Gates Poly Chain® GT® Belts

Gates Poly Chain GT belt's high performance characteristics dictate a need for correct installation tension. The following tables provide the required minimum and maximum deflection forces based on the belt pitch, pitch length, width and center distance. Deflection values are simplified based on full rated horsepower capacity per belt width. For drives not covered by the simplified tables, or drives not using full rated horsepower capacity, refer to Page 67 in Gates Poly Chain GT Drives Manual #17595.

Step 1: Based on belt pitch and width, locate the correct table.

Step 2: Locate the RPM of your faster shaft (smaller sprocket) in the first column.

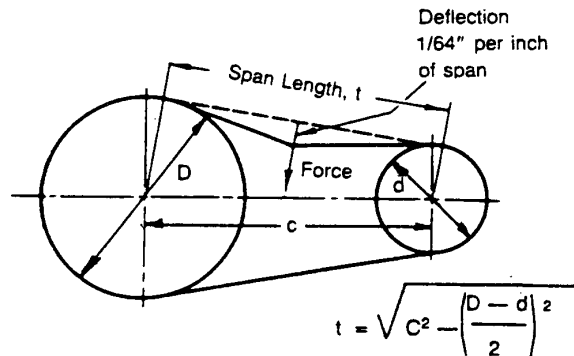
Step 3: Locate the number of grooves on your small sprocket in the second column.

Step 4: Locate the correct column for your belt length (belt lengths shown at the top of each column).

Step 5: Under the correct belt length column, locate the center distance for your drive (center of driveR shaft to center of driveN shaft in inches).

Step 6: Read down to the intersection for the recommended minimum and maximum deflection force (pounds) for your drive.

Step 7: Apply that deflection force range for the appropriate deflection (1/64" per inch of span length). See sketch.



14M-68 Minimum and Maximum Deflection Force (lbs) for 68 mm Wide Poly Chain GT Belts

RPM of Faster Shaft	Number of Grooves on Small Sprocket	Center Distance (inches) for Belt Designation																							
		14M-994, 14M-1120				14M-1190, 14M-1260				14M-1400				14M-1568, 14M-1750				14M-1960, 14M-2100				14M-2380, 14M-2520			
		CD <= 11.4		CD > 11.4		CD <= 13.7		CD > 13.7		CD <= 15.1		CD > 15.1		CD <= 22.2		CD > 22.2		CD <= 27.6		CD > 27.6		CD <= 40.0		CD > 40.0	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
3200 & Over	28 to 30	43.8	46.7	45.5	46.8	48.1	50.6	49.2	52.0	52.1	53.3	54.5	57.1	57.7	59.3	59.9	63.2	61.7	64.4	64.2	68.0	66.9	70.4	69.6	73.3
	32 to 43	46.1	49.4	47.4	48.7	50.3	54.8	51.7	55.0	54.9	57.5	56.9	60.4	60.8	65.0	62.5	66.8	64.6	68.3	67.0	71.9	70.4	74.7	72.6	77.3
Under 3200 to 2400	28 to 30	44.1	47.2	46.0	47.2	48.7	51.5	49.9	52.9	53.0	54.3	55.4	58.2	59.0	60.7	61.2	64.6	63.2	66.0	65.8	69.7	68.8	72.3	71.5	75.3
	32 to 56	46.2	49.0	47.3	48.0	51.0	55.7	52.3	55.4	56.7	60.8	57.9	61.7	62.9	67.6	64.0	68.5	66.9	72.3	68.9	74.0	73.0	77.7	75.0	79.8
Under 2400 to 1800	28 to 30	45.1	48.3	47.1	48.3	50.0	52.8	51.2	54.2	54.6	55.7	57.0	59.8	60.9	62.5	63.0	66.5	65.3	68.0	67.9	71.8	71.3	74.6	73.9	77.6
	32 to 75	46.8	49.2	48.2	48.8	51.7	55.5	53.2	55.4	58.2	62.3	59.1	61.9	64.9	69.6	65.5	69.6	69.4	74.3	70.7	75.6	75.7	81.1	77.2	81.8
Under 1800 to 1400	28 to 30	46.2	49.5	48.2	49.6	51.2	54.2	52.5	55.6	56.0	57.2	58.5	61.4	62.5	64.4	64.7	68.3	67.1	69.9	69.7	73.8	73.3	76.8	76.0	79.8
	32 to 80	47.7	50.1	49.2	49.9	52.6	56.3	54.3	56.4	59.0	62.3	60.2	62.7	66.0	69.9	66.8	70.2	70.9	75.1	72.3	76.2	77.4	82.1	79.0	82.7
Under 1400 to 1000	28 to 30	47.8	51.3	49.9	51.4	53.0	56.3	54.3	57.7	58.0	59.4	60.5	63.7	64.8	67.0	67.0	70.9	69.6	72.7	72.2	76.6	76.1	79.9	78.8	82.9
	32 to 80	49.1	51.8	50.8	51.6	54.2	58.1	56.0	58.2	60.6	63.9	62.0	64.7	67.7	71.4	68.9	72.3	72.8	76.9	74.5	78.6	79.8	84.1	81.5	85.2
Under 1000 to 800	28 to 30	49.1	52.6	51.4	52.7	54.5	57.7	55.9	59.1	59.8	60.9	62.3	65.3	66.8	68.7	69.0	72.7	71.8	74.6	74.4	78.5	78.5	82.0	81.2	85.0
	32 to 80	50.5	53.0	52.2	52.9	55.6	59.4	57.5	59.6	62.1	65.3	63.7	66.2	69.4	72.8	70.8	74.0	74.6	78.6	76.5	80.4	81.9	85.9	83.7	87.2
Under 800 to 600	28 to 30	50.6	54.3	52.9	54.4	56.2	59.6	57.6	61.0	61.7	62.9	64.2	67.4	68.9	71.1	71.1	75.0	74.1	77.1	76.7	81.1	81.0	84.8	83.7	87.8
	32 to 80	52.0	54.7	53.7	54.5	57.2	61.3	59.2	61.4	63.9	67.2	65.6	68.2	71.3	75.0	72.9	76.3	76.7	80.9	78.7	82.8	84.3	88.4	86.2	89.9
Under 600 to 400	28 to 30	52.8	56.8	55.2	56.8	58.5	62.4	60.0	63.7	64.3	65.8	66.9	70.4	71.8	74.4	74.1	78.4	77.3	80.7	79.9	84.7	84.5	88.7	87.2	91.7
	32 to 80	54.1	57.1	56.0	57.0	59.5	63.9	61.6	64.1	66.4	70.0	68.2	71.1	74.1	78.3	75.8	79.6	79.8	84.4	81.9	86.4	87.7	92.1	89.7	93.8
Under 400 to 200	28 to 30	56.3	61.0	58.8	61.1	62.4	67.1	63.9	68.4	68.6	70.9	71.3	75.5	76.7	80.2	79.0	84.1	82.5	86.8	85.2	91.0	90.3	95.5	93.0	98.5
	32 to 80	57.6	61.3	59.6	61.2	63.4	68.6	65.6	68.8	70.7	75.1	72.6	76.3	78.9	84.0	80.6	85.3	84.9	90.6	87.1	92.6	93.4	98.8	95.4	101
Under 200 to 60	28 to 30	63.0	68.4	65.8	68.5	69.9	75.3	71.5	76.7	77.0	79.9	79.8	84.6	86.0	90.3	88.3	94.2	92.6	97.5	95.3	102	101	107	104	110
	32 to 80	64.5	68.7	66.7	68.6	70.9	76.9	73.4	77.1	79.0	84.2	81.1	85.3	88.1	94.0	90.0	95.4	94.9	101	97.3	103	104	111	106	112

Replacing Jackshaft Bearings

SAFETY

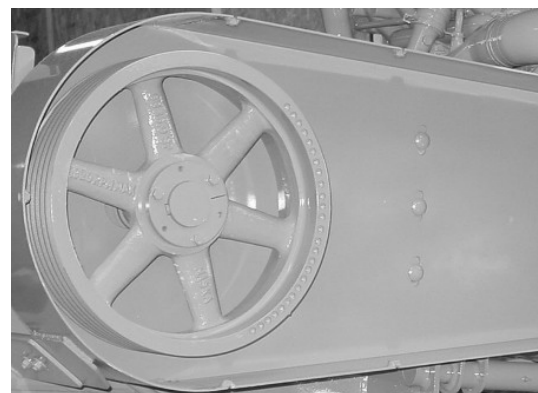
- **NEVER SERVICE A MACHINE WITH THE ENGINE RUNNING, SEVERE PERSONAL INJURY COULD OCCUR. TURN ENGINE OFF THEN REMOVE IGNITION KEY AND DISCONNECT POSITIVE BATTERY CABLE TO AVOID STARTING MACHINE ACCIDENTALLY.**
- **CUTTER WHEEL MUST BE DISENGAGED BEFORE TURNING ENGINE ON/OFF AND BEFORE SERVICING A MACHINE. OTHERWISE SEVERE PERSONAL INJURY COULD OCCUR AS WELL AS MACHINE DAMAGE.**
- **ALL MACHINE PARTS MUST COME TO A COMPLETE STOP AND HAVE TIME TO COOL COMPLETELY BEFORE SERVICING A MACHINE OR SEVERE INJURY COULD OCCUR, POSSIBLY SERIOUS BURNS AND/OR DISMEMBERMENT.**
- **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**

In all Carlton® model Stump Grinders, you will find link belt bearings that are made to be purged with grease. It is necessary to purge these bearings everyday until clean grease is seen. CAUTION should be taken not to allow grease to build up inside the belt guards.

- Remove the V-belt guard cover. Follow instructions in the Servicing Belts section for removing the engine belt.

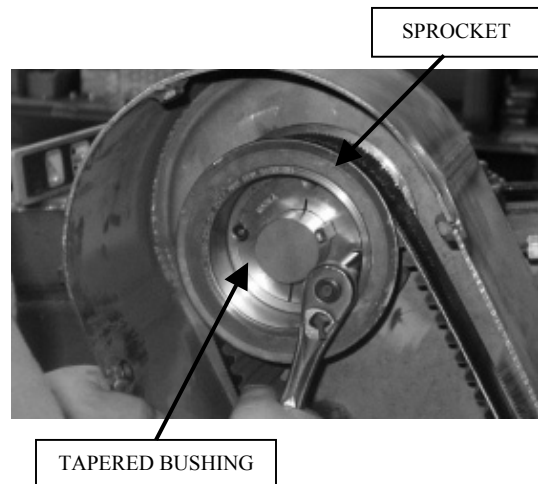


- Remove the jackshaft pulley. Remove the bolts from the bushing and use them to screw into the threaded holes in the bushing. Turn one bolt only a slight amount and then turn the next bolt the same amount. Work back and forth turning the bolts in equal amounts until the bushing is pushed out of the jackshaft pulley.



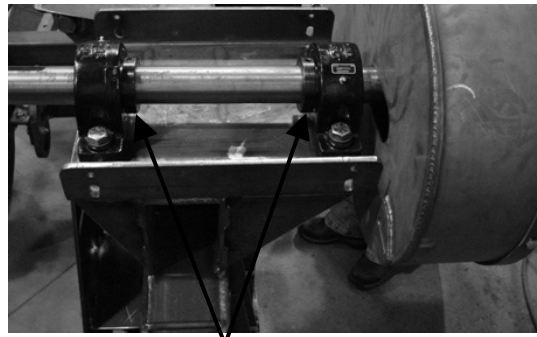
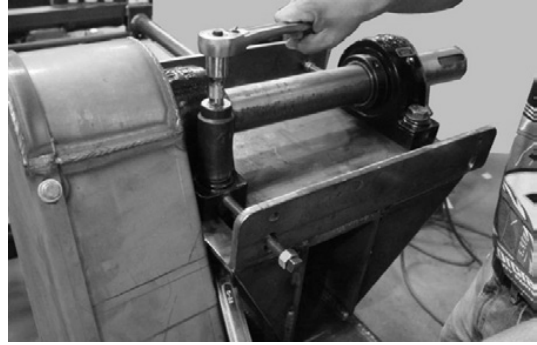
Replacing Jackshaft Bearings

- Remove the Poly Chain® guard cover and bottom cover. Follow the instructions in the Servicing Belts section to remove the Poly Chain® belt.
- Measure the distance from the jackshaft end to the bushing to place the bushing in the same place on the new shaft. Write this measurement down.
- After the belts have been removed, remove the jackshaft sprocket. Remove the two screws in the bushing and then screw one of the screws into the threaded hole to push the bushing out of the sprocket.
- You may have to strike the sprocket rim with a dead blow hammer or leather mallet, NOT A STEEL HAMMER, while applying tension with the screw to break sprocket loose.
- Remove the Poly Chain® guard. The guard is held onto the boom with four carriage bolts, washers, and nuts.



Replacing Jackshaft Bearings

- Remove the four bolts holding the jackshaft bearings in place. Remove old bearings and shaft.
- Replace with new bearings and shaft. Be sure to turn the end of the jackshaft with the longest keyway pocket toward the Poly Chain® belt side of the boom and make sure that the locking collars on the bearings are facing inward.
- Bolt the new bearings and jackshaft back into place. Just snug bolts down, do not tighten all the way down, you will need to move them later to adjust belt tension.
- Replace the Poly Chain® guard and replace the bolts, washers, and nuts that were removed earlier. Tighten the bolts just enough to hold the belt guard in place. The guard will need to slide with adjustment of the jackshaft. You will tighten these later.
- Place the jackshaft sprocket and tapered bushing back onto the jackshaft. Measure the distance from the end of the jackshaft and position the bushing the distance measured earlier. Replace the screws and tighten. Recheck the measurement and torque the screws to 36 ft. lbs.

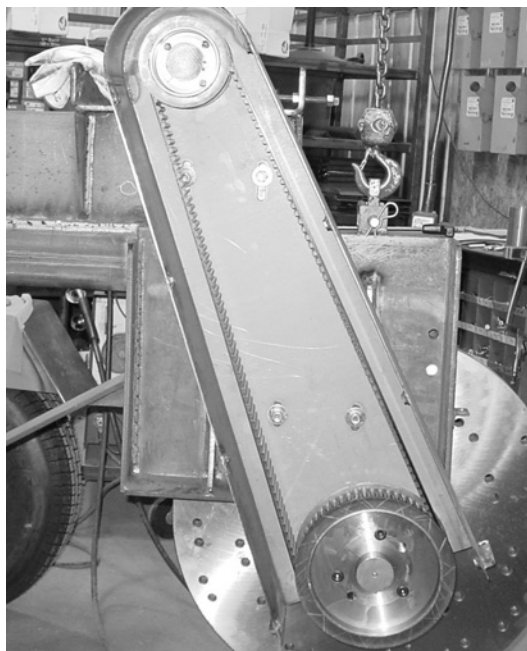


BEARING COLLARS FACING INWARD

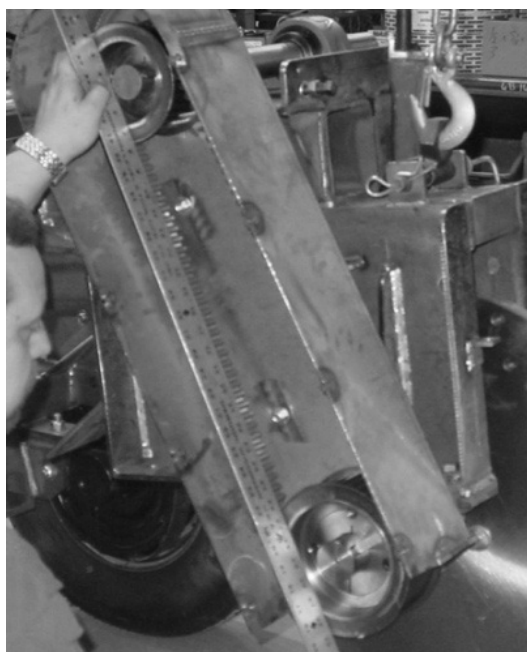


Replacing Jackshaft Bearings

- Replace the Poly Chain® belt. Follow the instructions in the Servicing Belts section for replacing the Poly Chain® belt. **DO NOT ADJUST THE BELT TENSION AT THIS TIME.**
- The cutter wheel sprocket will be replaced when replacing the belt.



- Line up Poly Chain® sprockets using a straight edge.
- Slide shaft through bearings to adjust in or out to line sprockets up.

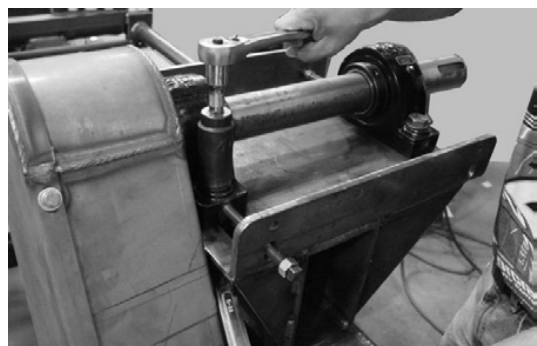
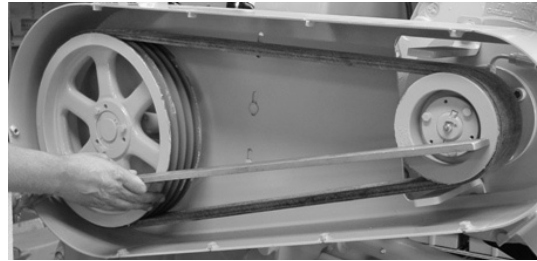


- Replace the pulley on the jackshaft. Replace screws, turning them just enough to start them in the pulley.



Replacing Jackshaft Bearings

- Line the jackshaft pulley up with the engine pulley using a straight edge.
- When the pulleys are aligned, tighten the screws in the jackshaft pulley. Recheck the alignment to be sure nothing changed. Torque the screws in the jackshaft pulley to 30 ft. lbs
- Once the sprockets are lined up, tighten Poly Chain® belt by adjusting jam bolts on the jackshaft bearings. Remember at this point everything is lined up, so when you adjust one bearing forward, adjust the other bearing the same amount.
- Make only slight adjustments at a time and recheck tension; repeat as necessary until tension is correct. Then once the belt is adjusted, retighten the bolts on the other side of the bearings. Recheck belt alignment after tightening all bolts and nuts to make sure the belt is still aligned.
- **DO NOT OVER TIGHTEN BELT; OVERLY TIGHT BELTS WILL CAUSE BEARING AND ENGINE DAMAGE.** To loosen the tension on a belt, loosen the jam bolts and tighten the bolts on the other side of the bearing. Always make slight adjustments and recheck tension. Also make equal adjustments on both bearings.
- Replace belts when worn or when repeated adjustments are necessary. Belts should never get so loose that all of the adjustment capability is used.
- Tighten bearings down and recheck Poly Chain® sprocket alignment and tension. Use two wrenches to tighten the bolts in the bearings as shown in the picture to the right.



Replacing Jackshaft Bearings

- There are two setscrews in each bearing lock collar. Tighten one setscrew in each collar and remove the other setscrew. Punch a start point in the shaft and drill 3/8" diameter hole in jackshaft just deep enough for setscrew to enter shaft. **Take care not to damage the screw threads.** Replace setscrew with LocTite 242 and tighten. Do this for all four setscrews. This will help prevent shaft from spinning and walking inside of bearing.
- Finish tightening the nuts on the carriage bolts holding the Poly Chain® belt guard in place.
- Replace Poly Chain® belt guard cover and bottom cover. Tighten the bolts. **DO NOT RUN MACHINE WITHOUT ALL GUARDS IN PLACE AND SECURED PROPERLY.**
- Replace V-belt and check tension. Reference Servicing Belts section for information on checking and adjusting V-belt tension.
- Replace engine belt guard cover. Tighten the bolts. **DO NOT RUN MACHINE WITHOUT ALL GUARDS IN PLACE AND SECURED PROPERLY.**



Replacing Cutter Wheel Bearings

SAFETY

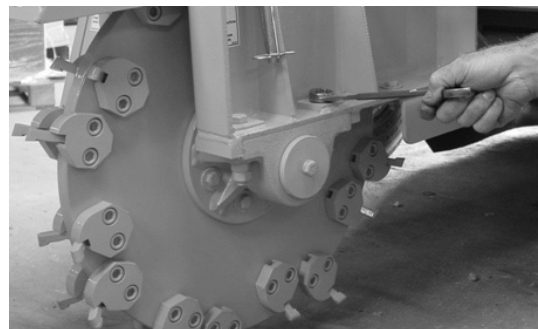
- **NEVER SERVICE A MACHINE WITH THE ENGINE RUNNING, SEVERE PERSONAL INJURY COULD OCCUR. TURN ENGINE OFF THEN REMOVE IGNITION KEY AND DISCONNECT POSITIVE BATTERY CABLE TO AVOID STARTING MACHINE ACCIDENTALLY.**
- **CUTTER WHEEL MUST BE DISENGAGED BEFORE TURNING ENGINE ON/OFF AND BEFORE SERVICING A MACHINE. OTHERWISE SEVERE PERSONAL INJURY COULD OCCUR AS WELL AS MACHINE DAMAGE.**
- **ALL MACHINE PARTS MUST COME TO A COMPLETE STOP AND HAVE TIME TO COOL COMPLETELY BEFORE SERVICING A MACHINE OR SEVERE INJURY COULD OCCUR, POSSIBLY SERIOUS BURNS AND/OR DISMEMBERMENT.**
- **DO NOT OPERATE A MACHINE WITHOUT A COMPLETE SET OF TEETH PROPERLY INSTALLED. EXCESSIVE MACHINE VIBRATION WILL OCCUR CAUSING PREMATURE BEARING FAILURE AND OTHER EQUIPMENT DAMAGE.**
- **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**

In all Carlton® model Stump Grinders, you will find link belt bearings that are made to be purged. It is necessary to purge these bearings everyday until clean grease is seen. **CAUTION** should be taken not to allow grease to build up inside the belt guards.

- Remove the Poly Chain® belt guard cover and bottom cover. See the Servicing Belts section to remove the Poly Chain® belt and cutter wheel sprocket.

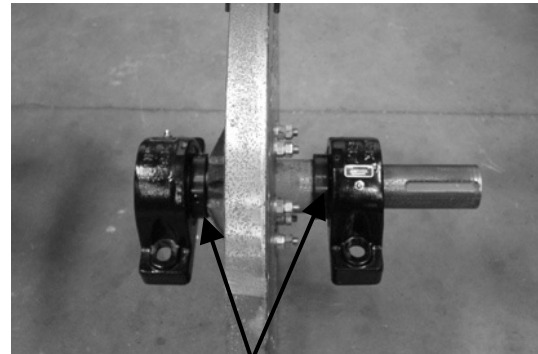


- Remove the four bolts on the cutter wheel bearings. The cutter wheel will be free from the machine at this point. With the Poly Chain® belt removed, you can start the machine and raise the boom up.

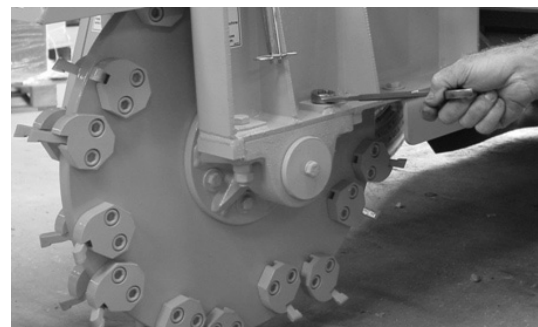
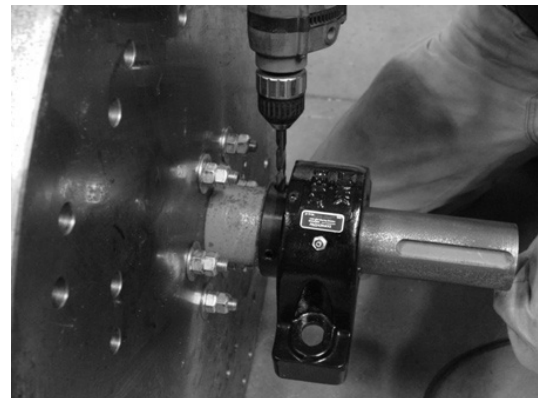


Replacing Cutter Wheel Bearings

- Loosen the setscrews in the locking collars of the bearings. You may need to heat bearing collar to loosen the LocTite that was used during assembly.
- To remove the bearings from the cutter wheel shaft, use a steel hammer to strike the bearing housing until it cracks and breaks apart. Then use a torch to cut the bearing race off the shaft. Be very careful not to cut into the cutter wheel shaft with the torch. **Allow the shaft to cool completely before starting to reassemble the new bearings.**
- Replace new bearings making sure the lock collars on the bearings are facing inward toward the cutter wheel.
- There are two setscrews in each bearing lock collar. Tighten one setscrew in each collar and remove the other setscrew. Punch a start point in the shaft and drill 3/8" diameter hole in cutter wheel shaft just deep enough for setscrew to enter shaft. **Take care not to damage the screw threads.** Replace setscrew with LocTite 242 and tighten. Do this for all four setscrews. This will help prevent shaft from spinning and walking inside of bearing.
- Note: if you are only replacing the bearings and not the cutter wheel shaft, you do not have to drill the points into the shaft. Just make sure to line the holes in the collar up with the holes in the cutter wheel shaft.
- Bolt bearings and cutter wheel back to boom box. Tighten the bolts. There are two nuts on each bolt.

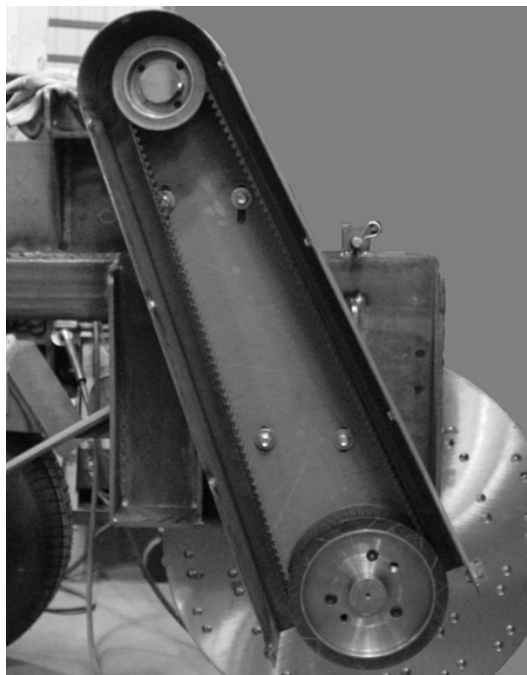


BEARING COLLARS FACING IN



Replacing Cutter Wheel Bearings

Replace the Poly Chain® belt. Follow the instructions in the Servicing Belts section for replacing and tensioning the Poly Chain® belt.



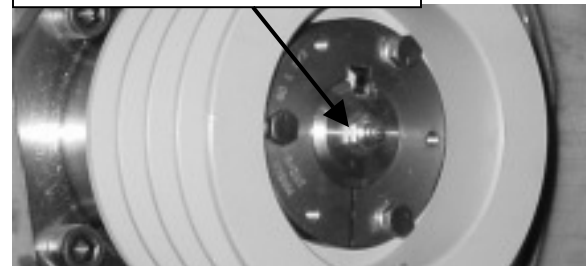
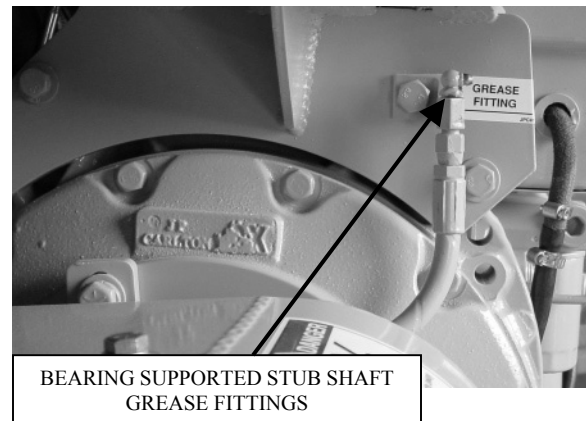
NOTE: Refer to **SERVICING BELTS** section for proper installation and tensioning of all belts. (Alignment and tension of Poly Chain® belt is very important. See information on alignment using straight edge in Replacing Jackshaft Bearings section of manual.)

- After belt has been replaced and properly adjusted, replace guard cover and end. Tighten the bolts. **DO NOT RUN MACHINE WITHOUT ALL GUARDS IN PLACE AND SECURED PROPERLY.**

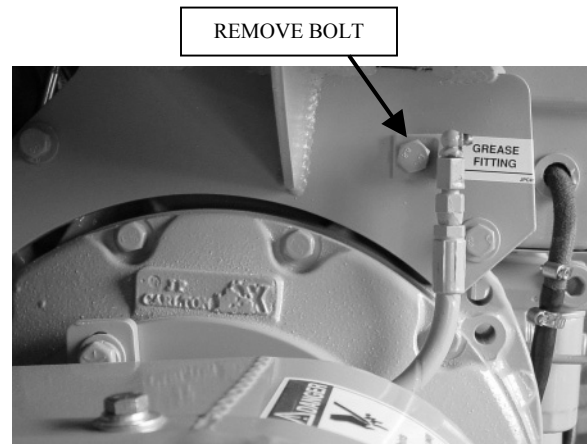
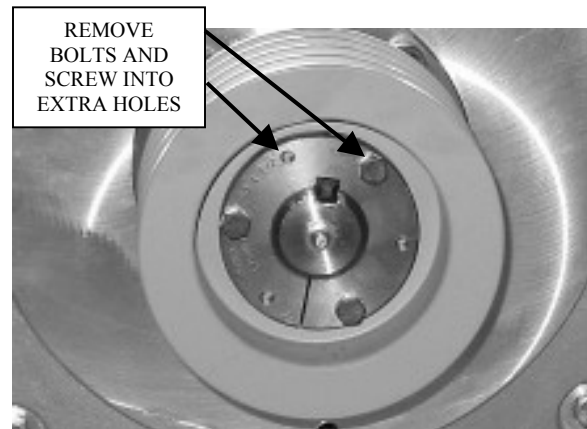
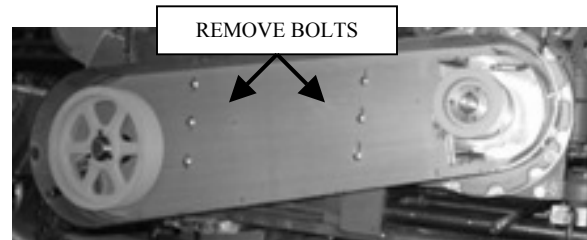
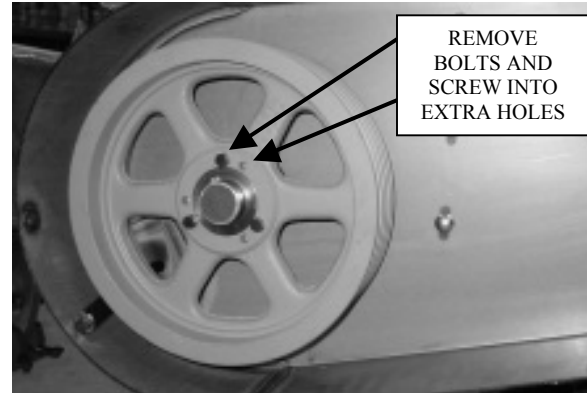


SAFETY

- **NEVER SERVICE A MACHINE WITH THE ENGINE RUNNING, SEVERE PERSONAL INJURY COULD OCCUR. TURN ENGINE OFF THEN REMOVE IGNITION KEY AND DISCONNECT POSITIVE BATTERY CABLE TO AVOID STARTING MACHINE ACCIDENTALLY.**
 - **CUTTER WHEEL MUST BE DISENGAGED BEFORE TURNING ENGINE ON/OFF AND BEFORE SERVICING A MACHINE. OTHERWISE SEVERE PERSONAL INJURY COULD OCCUR AS WELL AS MACHINE DAMAGE.**
 - **ALL MACHINE PARTS MUST COME TO A COMPLETE STOP AND HAVE TIME TO COOL COMPLETELY BEFORE SERVICING A MACHINE OR SEVERE INJURY COULD OCCUR, POSSIBLY SERIOUS BURNS AND/OR DISMEMBERMENT.**
 - **PLACE THE CUTTER WHEEL ON THE GROUND WHEN PERFORMING SERVICE ON A MACHINE.**
-
- The most service you should have to do for the **bearing supported stub shaft** is to grease it properly. The bearing grease fitting is easily accessible behind the v-belt guard. Another grease fitting is on the end of the stub shaft to grease the splines in the coupling. Follow the instructions in the Machine Maintenance section for frequency and application of grease. Also see the Lubrication Chart.
-
- If the bearing supported stub shaft should fail for any reason, these are the procedures for replacement. First remove the v-belt following the instructions in the Servicing Belt Section of the manual. Remove the engine belt keepers instead of just loosening the bolts and lay aside to put on new stub shaft plate assembly.



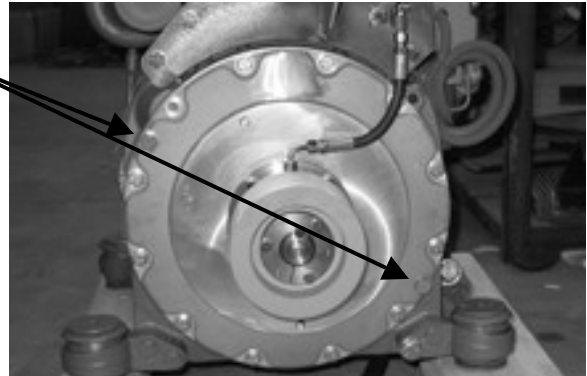
- Next you will need to remove the jackshaft sheave. Remove the bolts in the jackshaft sheave and screw them back into the empty threaded holes to push the sheave off the bushing and remove the bushing and sheave. Make sure to keep all machine parts and hardware together to make reassembly easier.
- Remove the bolts holding the belt guard onto the machine and remove the belt guard.
- Then remove the engine sheave. Remove the bolts in the engine sheave bushing and screw them into the extra threaded holes to push the bushing out of the sheave and remove the bushing and sheave.
- Remove the bolt holding the extended grease fitting to the air filter bracket and remove the extension from the stub shaft.



- You can now remove the bearing supported stub shaft plate. Remove the bolts holding the shaft plate to the engine. There are eleven 10MM bolts to remove. Pull the plate straight off.



- There are two threaded holes that can be used to push the shaft plate off the engine mount. Insert two of the bolts that were removed from the stub shaft plate and slowly screw them in until the plate breaks loose. Leaving a couple of bolts screwed in slightly may help to keep the assembly from dropping when separated from the engine.



- Remove the coupling plate. There are eight 10MM bolts holding this plate to the flywheel. These bolts had LocTite® blue applied before installation.



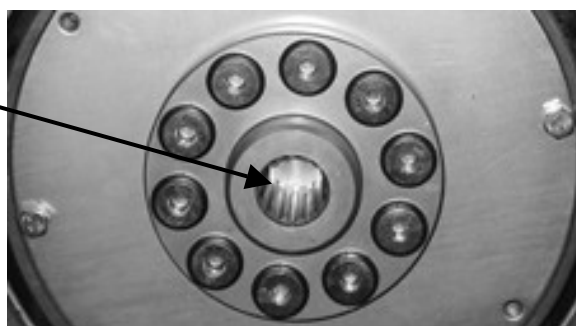
- When parts have been removed, clean the engine flywheel with a cleaning solvent and check for burrs around the holes and on the surface of the flywheel. Use a very fine sand paper to remove any burrs.



- Replace any parts found defective or worn. Put stub shaft coupling plate onto the flywheel. The plate is attached using eight 10MM-1.5 x 20MM bolts with a lock washer. Put LocTite® 242 (blue) on the end of the bolt and lightly tighten all bolts. When all bolts have been inserted and lightly tightened, torque all bolts to 35 ft. lbs.



- Put anti-seize (coupling lubricant) on the inside of the coupling. Line up external splines with the coupling ID and slide the stub shaft plate into place.



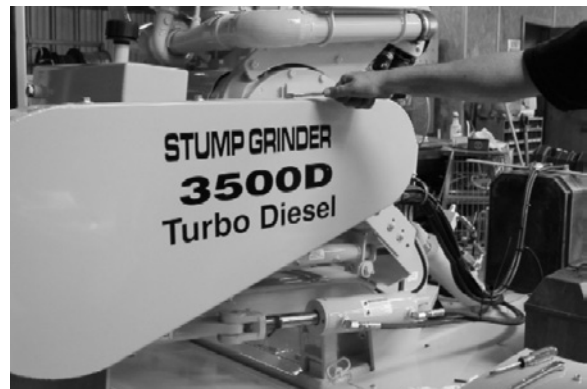
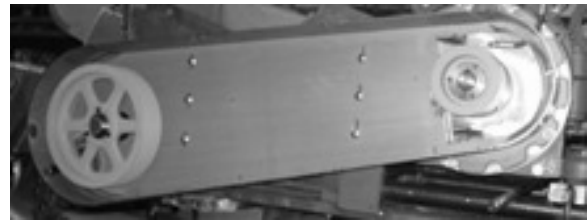
- Make sure the grease fitting is on the top of the assembly. Replace the 10MM-1.5 x 30MM bolts and torque to 35 ft. lbs. There are eleven bolts holding the plate to the engine.



- Remove the grease fitting and replace with the grease fitting extension supplied with the machine.



- Bolt grease fitting to the air filter bracket.
- Before starting the engine, apply grease to the grease fitting until the pin on the opposite side of the stub shaft pops out (see Machine Maintenance section for more information).
- Start replacing parts in the opposite order in which they were removed. Replace the v-belt guard and then replace the engine and jackshaft sheaves. Torque the bolts in the sheaves to 30 ft. lbs. Be sure to bolt the belt keepers onto the stub shaft plate before you put the engine sheave on, it will be easier that way.
- Replace the v-belt and align the sheaves as instructed in the Servicing Belt Section of the manual. Adjust sheaves as necessary to get the proper belt alignment. Check belt tension and set as described in Servicing Belt section. Belt alignment and tension are very important for long bearing life. **Always replace belt guard cover before running the machine.**

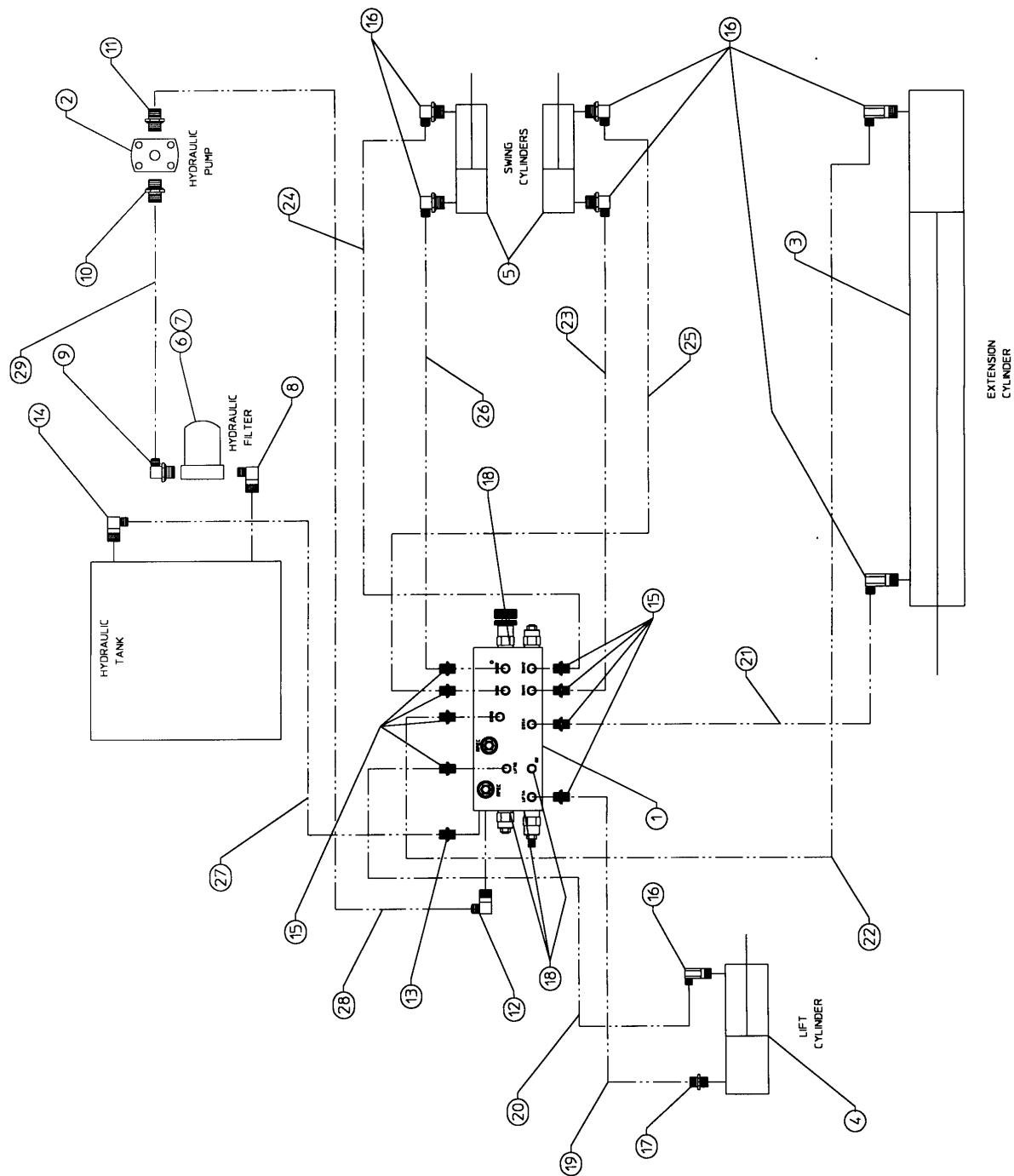


DO NOT RUN MACHINE WITHOUT ALL GUARDS IN PLACE AND SECURED PROPERLY.

REMOTE CONTROL HYDRAULIC ASSEMBLY

ITEM NO	PART NO	DESCRIPTION	QTY
1	0300150A	Valve Manifold Assembly	1
2	0300142	Hydraulic Pump	1
3	0300105G	Tongue Cylinder - 3 x 48	1
4	0300105E	Lift Cylinder - 3 x 10	1
5	0300105D	Swing Cylinder - 3 x 8	2
6	0300135C	Filter Head	1
7	0300135	Filter Element - 10 Micron	1
8	0300220	3/4 mp-mp 90	1
9	0300218	3/4 mp-jic 90	1
10	0300234	3/4 jic-orb	1
11	0300245	1/2 mp-5/8 orb 90	1
12	0300205	3/8 orb-jic 90	1
13	0300236	1/2 orb-jic	1
14	0300217	1/2 jic-3/4 mp 90	1
15	0300237	3/8 orb-jic	8
16	0300215	3/8 jic-1/2 mp 90	7
17	0300238	3/8 jic-1/2 mp	1
18	0300239	1/4 orb plug	5
19		Hose Assembly - 3/8 x 22"	1
20		Hose Assembly - 3/8 x 31"	1
21		Hose Assembly - 3/8 x 53"	2
22		Hose Assembly - 3/8 x 80"	2
23		Hose Assembly - 3/8 x 90"	1
24		Hose Assembly - 3/8 x 73"	1
25		Hose Assembly - 1/2 x 86"	1
26		Hose Assembly - 1/2 x 98"	1
27		Hose Assembly - 3/4 x 21"	1

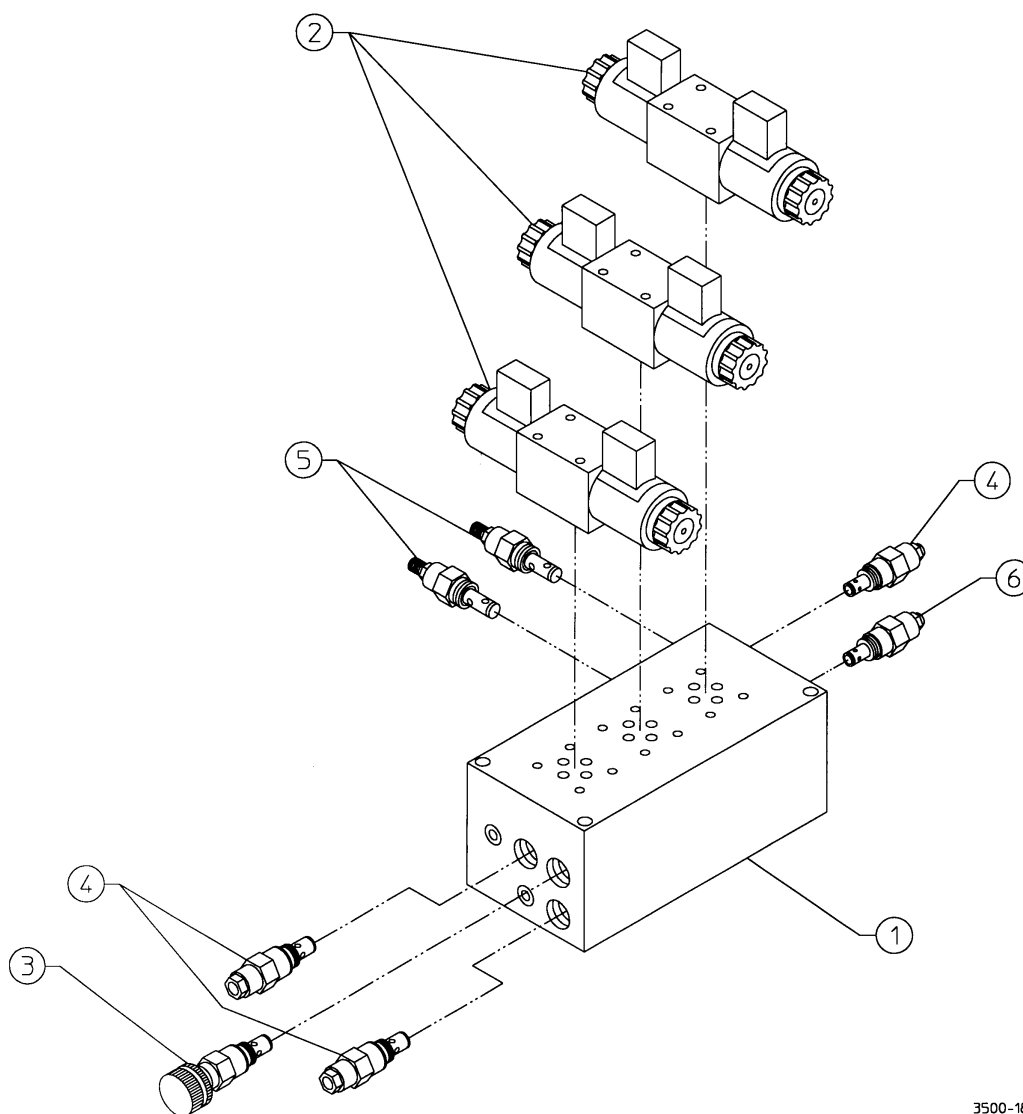
REMOTE CONTROL HYDRAULIC ASSEMBLY



7500-1

REMOTE MANIFOLD ASSEMBLY

ITEM NO	PART NO	DESCRIPTION	QTY
1	0300150A	Aluminum Manifold Block	1
2	0300150AB	Solenoid Valve - DO3	3
3	0300150AA	Swing Speed Control Cartridge	1
4	0300120A	Counter Balance Cartridge Valve – LKN	3
5		Relief Cartridge Valve – Sun	2
6		Lift Speed Adjustment - NCCB-KAN	1



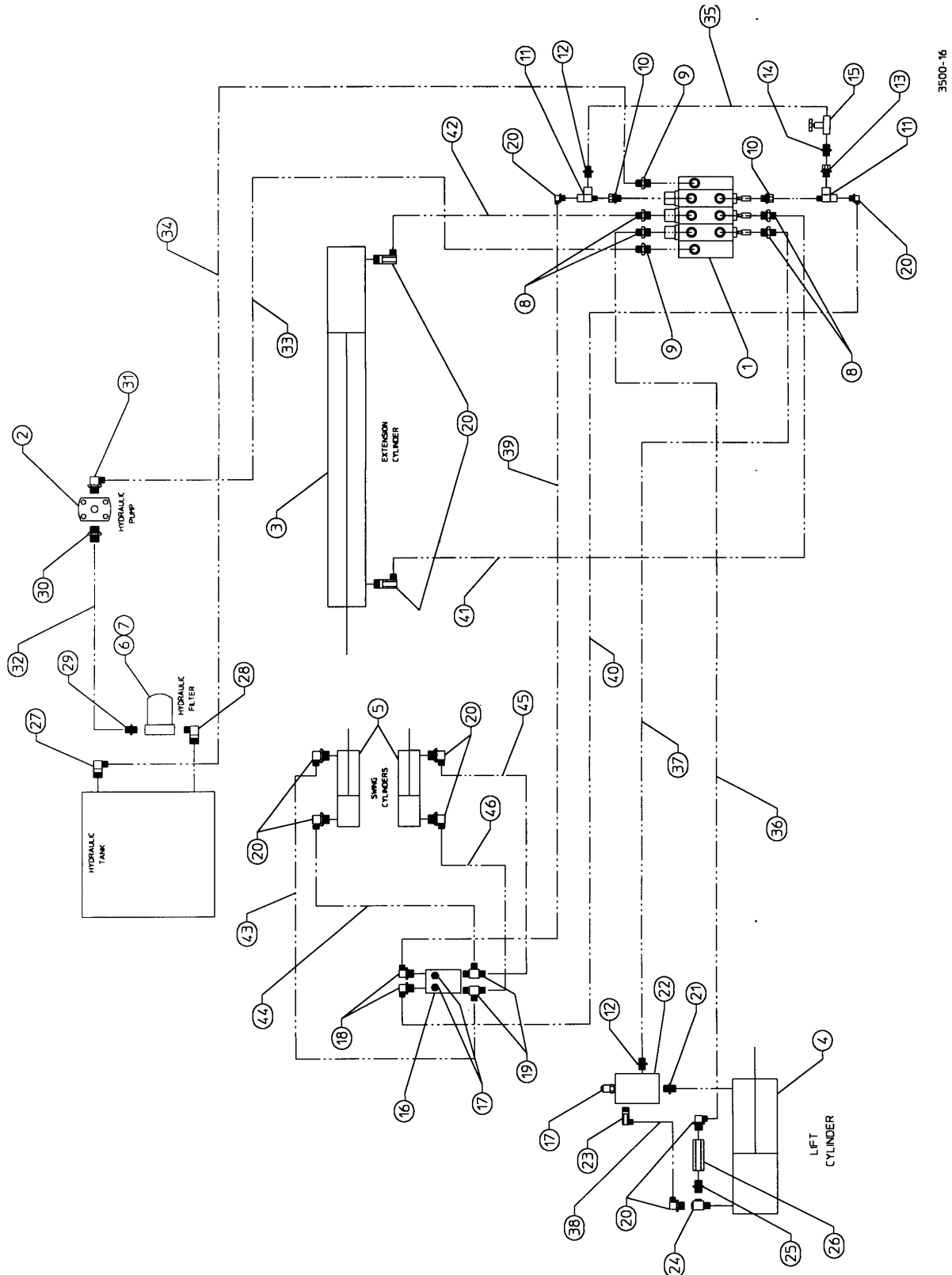
3500-18



SWING OUT CONTROLS HYDRAULIC ASSEMBLY

ITEM NO	PART NO	DESCRIPTION	QTY
1	0300130	Hydraulic Control Valve	1
2	0300142	Hydraulic Pump	1
3	0300105G	Tongue Cylinder - 3 x 48	1
4	0300105E	Lift Cylinder - 3 x 10	1
5	0300105D	Swing Cylinder - 3 x 8	2
6	0300135C	Filter Head	1
7	0300135	Filter Element - 10 Micron	1
8	0300257	1/2 orb-3/8 jic	4
9	0300236	1/2 orb-jic	2
10	0300258	1/2 orb-3/8 fp sw	2
11	0300223	3/8 mp-fp-fp tee	2
12	0300210	3/8 mp-jic	2
13	0300225	3/8 mp-fpsw	1
14	0300240	3/8 mp-mp nipple	1
15	0300137	Needle Valve	1
16	0300122A	Valve Body - XEB	1
17	0300120	Cartridge Valve - LHN	3
18	0300214	3/8 mp-jic 90	4
19	0300259	3/8 mp-jic-jic tee	2
20	0300215	3/8 jic-1/2 mp 90	6
21	0300231	1/2 mp-3/8 mp	1
22	0300122	Valve Body - ECB	1
23	0300213	1/4 mp-3/8 jic 90	1
24	0300224	1/2 mp-fp-fp tee	1
25	0300209	1/2 mp-mp nipple	1
26	0300260	Orifice - .187	1
27	0300217	1/2 jic-3/4 mp 90	1
28	0300220	3/4 mp-mp 90	1
29	0300218	3/4 mp-jic 90	1
30	0300234	3/4 orb-jic	1
31	0300235	5/8 orb-1/2 jic 90	1
32		Hose Assembly - 3/4 x 17"	1
33		Hose Assembly - 1/2 x 139"	1
34		Hose Assembly - 1/2 x 124"	1
35		Hose Assembly - 3/8 x 11"	1
36		Hose Assembly - 3/8 x 89"	1
37		Hose Assembly - 3/8 x 85"	1
38		Hose Assembly - 3/8 x 8"	1
39		Hose Assembly - 3/8 x 88"	1
40		Hose Assembly - 3/8 x 86"	1
41		Hose Assembly - 3/8 x 111"	1
42		Hose Assembly - 3/8 x 127"	1
43		Hose Assembly - 3/8 x 80"	1
44		Hose Assembly - 3/8 x 73"	1
45		Hose Assembly - 3/8 x 32"	1
46		Hose Assembly - 3/8 x 24"	1

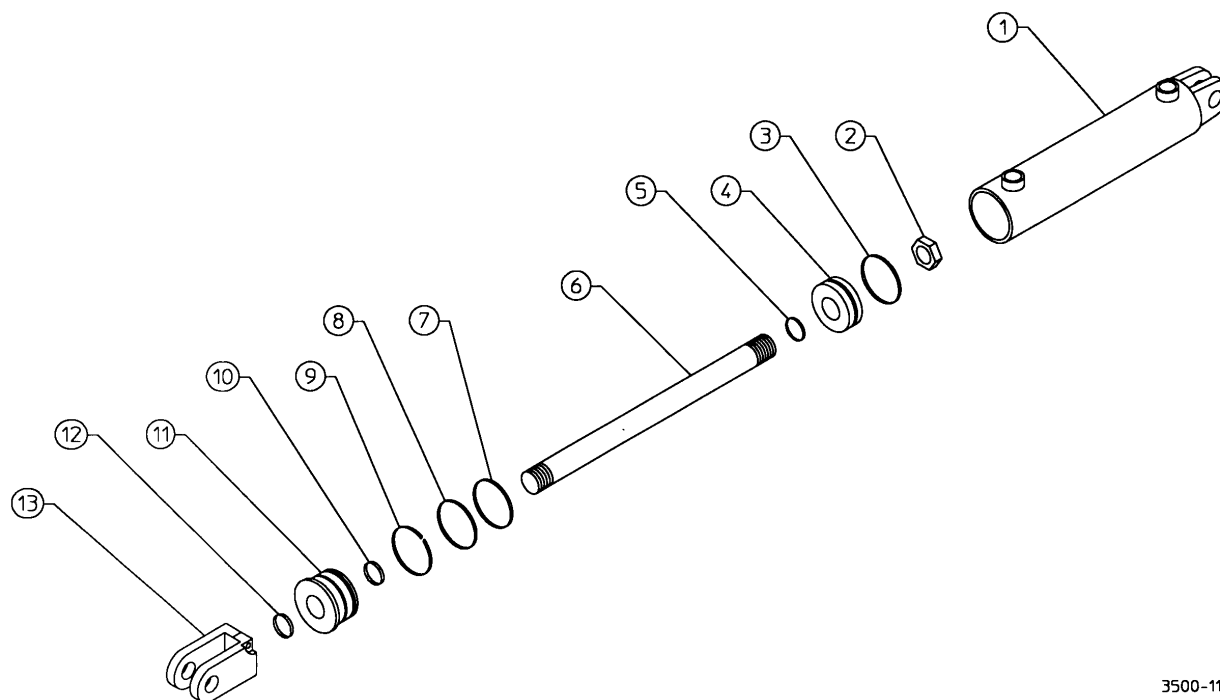
SWING OUT CONTROLS HYDRAULIC ASSEMBLY



3500-16

LIFT CYLINDER ASSEMBLY – 3 X 10

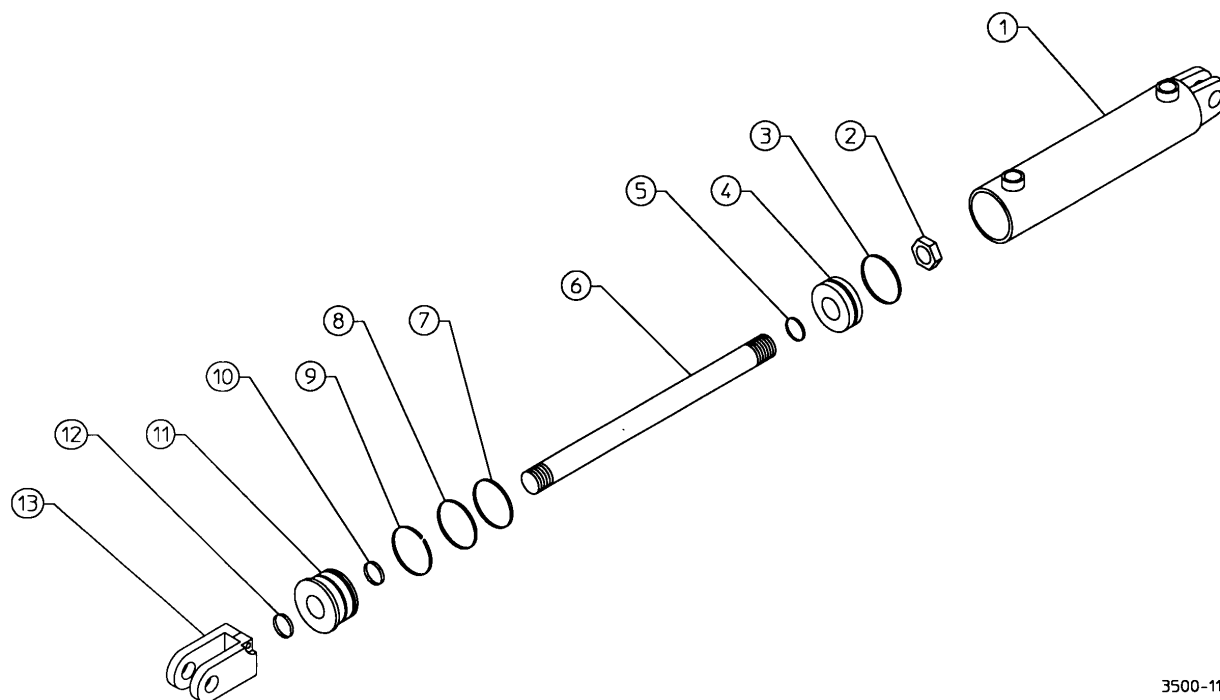
(Assembly Part # 0300105E)



3500-11

ITEM NO	PART NO	DESCRIPTION	QTY
1		Body Assembly	1
2		Lock Nut 1 1/4"-12	1
*3		Crown Seal	1
4		Piston	1
*5		O-Ring	1
6		Piston Rod	1
*7		O-Ring	1
*8		Bu-Washer	1
*9		Square Retaining Ring	1
*10		U-Cup	1
11		End Cap	1
*12		Rod Wiper	1
13	0300195	Clevis	1
**	0300110D	Packing Kit (includes all * items)	

SWING CYLINDER ASSEMBLY – 3 X 8
(Assembly Part # 0300105D)

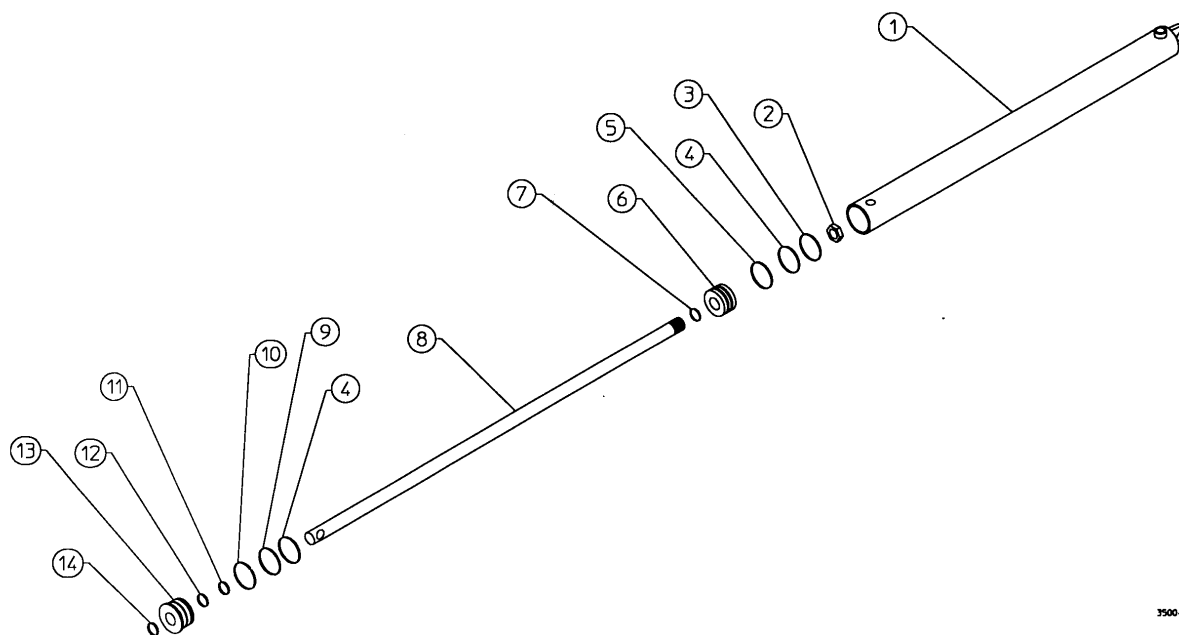


3500-11

ITEM NO	PART NO	DESCRIPTION	QTY
1		Body Assembly	1
2		Lock Nut 1"-14	1
*3		Crown Seal	1
4		Piston	1
*5		O-Ring	1
6		Piston Rod	1
*7		O-Ring	1
*8		Bu-Washer	1
*9		Square Retaining Ring	1
*10		U-Cup	1
11		End Cap	1
*12		Rod Wiper	1
13	0300195	Clevis	1
**	0300110D	Packing Kit (includes all * items)	

TONGUE CYLINDER ASSEMBLY – 3 X 48

(Assembly Part # 0300105G)



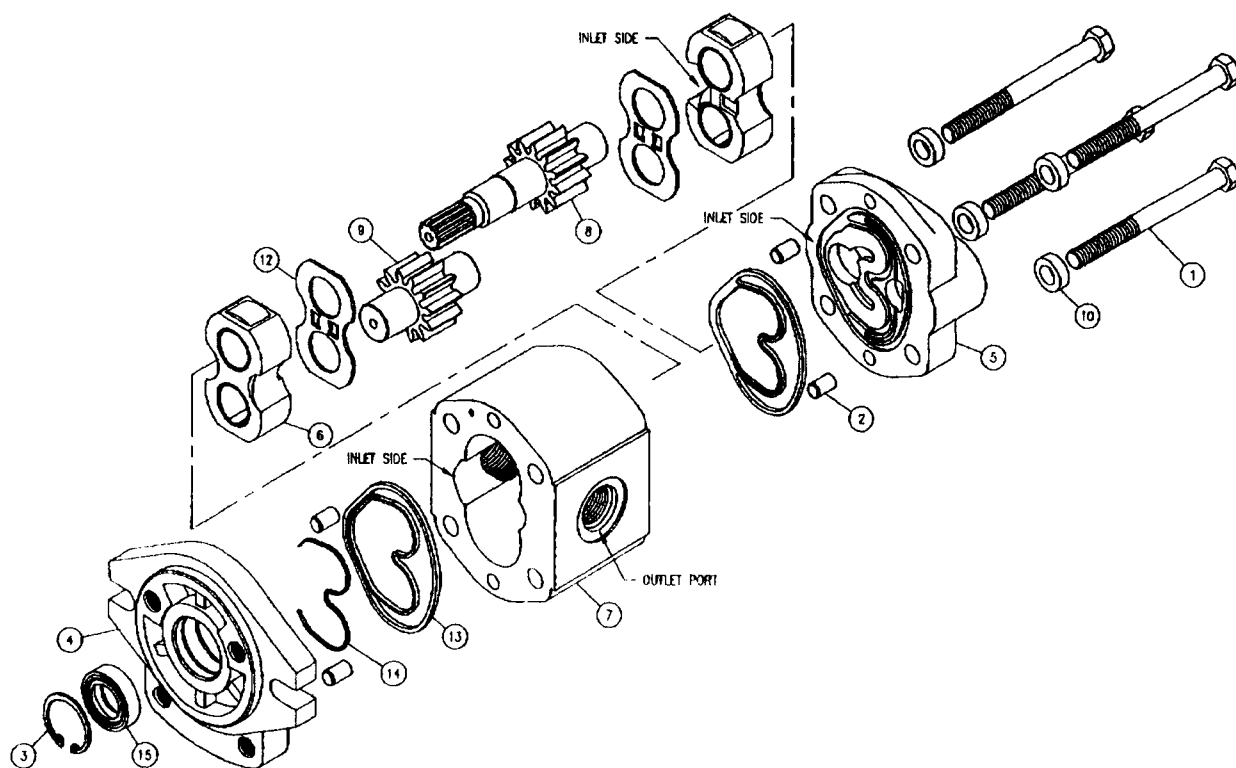
3500-12

ITEM NO	PART NO	DESCRIPTION	QTY
1	0300089	Body Assembly	1
2	0150222	Lock Nut 1"-14	1
*3	0300164	Piston Ring	1
*4	0300151	O-Ring	2
*5	0300166	Bu-Washer	1
6	0300161	Piston	1
*7	0300149	O-Ring	1
8	0300090	Piston Rod	1
9	0300169	Bu-Washer	1
*10	0300163	Snap Ring	1
*11	0300165	Quad Ring	1
*12	0300167	Bu-Washer	1
13	0300162	End Cap/Gland	1
*14	0300168	Rod Wiper	1
**	0300110F	Packing Kit (includes all * items)	

HYDRAULIC PUMP ASSEMBLY

(Part # 0300142)

ITEM NO	PART NO	DESCRIPTION	QTY
1	0300170	Bolts	4
2	0300171	Dowel Pins	4
3	0300172	Snap Ring	1
4	0300173	Front Plate	1
5	0300174	Back Plate	1
6	0300175	Bearing Case Assembly	1
7	0300176	Pump Body	1
8	0300177	Drive Gear	1
9	0300178	Idler Gear	1
10	0300179	Washer	4
11			
12	0300180	Wear Plate	2
13	0300181	Seal	2
14	0300182	Back-Up Strip	2
15	0300183	Shaft Seal	1
**	03001421	Pump Rebuild Kit (includes items 3, 14 & 15)	

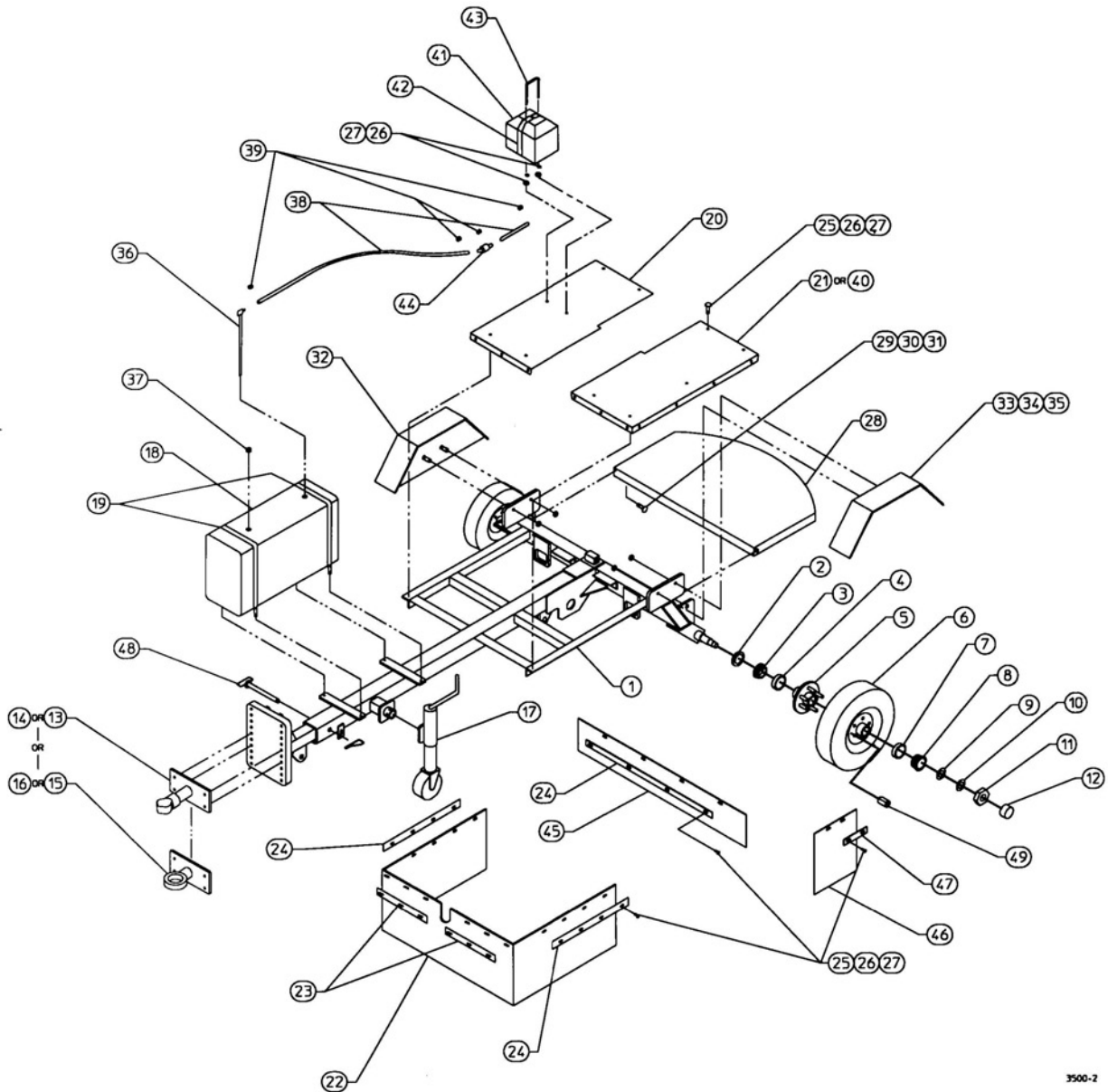




BASE FRAME ASSEMBLY

ITEM NO	PART NO	DESCRIPTION	QTY
1	3500145	Frame Weldment	1
2	0550208	Grease Seal	2
3	0550209	Inner Bearing Cone	2
4	0550210	Inner Bearing Cup	2
5	0550212	Hub	2
6	0550010	Tire Assembly	2
7	0550213	Bearing Cup	2
8	0550214	Bearing Cone	2
9	0550215	Spindle Washer	2
10	0550217	Tang Washer	2
11	0550216	Spindle Nut	2
12	0550218	Grease Cap	2
13	3500142	2" BullDog Hitch	1
14	3500143	2 5/16" BullDog Hitch	1
15	3500144	3" Pintle Hitch	1
16	3500145	2 1/2" Pintle Hitch	1
17	0550004	Trailer Jack	1
18	0200001	Fuel Tank - 16 gal.	1
19	0200002	Tank Strap	2
20	3500165	Deck Plate - R/H	1
21	3500166	Deck Plate - L/H - Remote	1
22	3500177	Front Chip Guard	1
23	3500191	Chip Guard Front Bracket	2
24	3500192	Chip Guard Side Bracket	3
25	0150117	3/8-16 x 1 Carriage Bolt	32
26	0150303	3/8 Flat Washer	34
27	0150207	3/8 Lock Nut	34
28	3500114	Pan Guard	1
29	0150133	3/4-10 x 2 HCS	2
30	0150307	3/4 Flat Washer	2
31	0150211	3/4-10 Lock Nut	2
32	3500216	Fender - R/H	1
33	3500217	Fender - L/H	1
34	0150304	1/2 Flat Washer	4
35	0150206	1/2-13 Lock Nut	4
36	3500259	Fuel Pick-up Tube - 16 Gal	1
37	0300249	3/8 MP Plug	1
38	0300302	5/16" Fuel Line	94"
39	0150707	5/16" Clamp	4
40	3500262	Deck Plate - L/H - Swing Out	1
41	0350034	Battery Box	1
42	0350035	Battery Box Strap	1
43	0150508	Battery Bracket	1
44	0200138	In-Line Fuel Filter	1
45	3500178	Front Pan Chip Guard	1
46	3500179	Side Pan Chip Guard	2
47	3500265	Pan Chip Guard Bracket	2
48	0150605	Hitch Pin - 3/4 x 7	1
49	0550102	Lug Nut	10

BASE FRAME ASSEMBLY

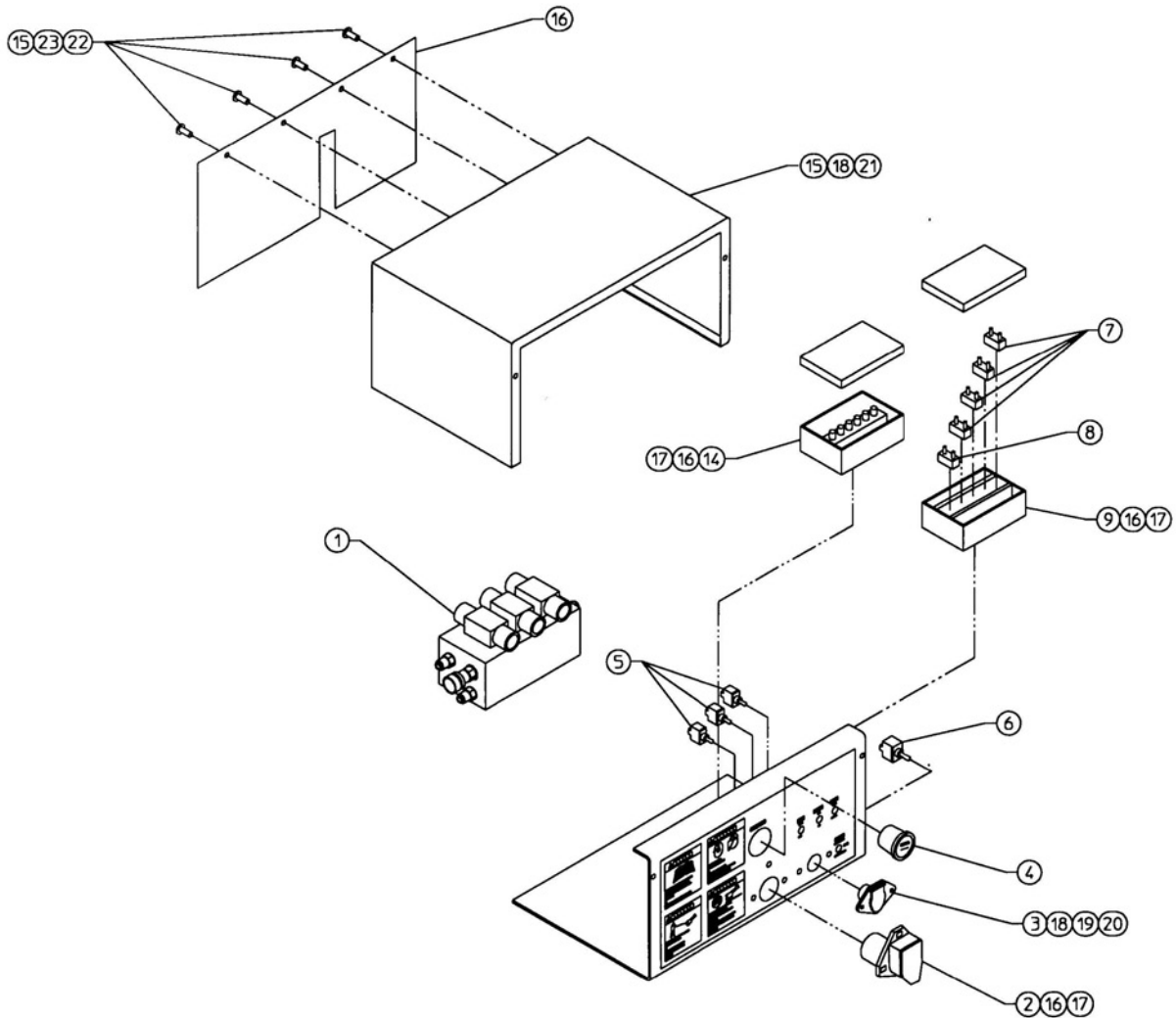


3500-2

REMOTE BOX ASSEMBLY

ITEM NO	PART NO	DESCRIPTION	QTY
1	0300141	Remote Manifold Assembly	1
2	0350002	7 Pin Socket	1
3	0350004	6 Pin Socket	1
4	0350031	Hour Meter	1
5	0350013	Momentary Switch	3
6	0350011	Switch - 2 Position	1
7	0350027	Circuit Breaker - 20 Amp	4
8	0350028	Circuit breaker - 40 Amp	1
9	0350029	Junction Box - Fused	1
10	0350030	Junction Box - Terminal	1
11	3500232	Control Box Cover	1
12	3500280	Control Box Flap	1
13	0150145	3/8-16 x 6 HCS	3
14	0150404	3/8 Lock Washer	3
15	0150207	3/8 Lock Nut	7
16	0150116	5/16-18 x 1 HCS	6
17	0150212	5/16-18 Lock Nut	6
18	0150102	1/4-20 x 1 HCS	3
19	0150140	1/4-20 x 3/4 HCS	1
20	0150218	1/4-20 Lock Nut	2
21	0150402	1/4 Lock Washer	2
22	0150117	3/8-16 x 1 Carriage Bolt	4
23	0150303	3/8 Flat Washer	4

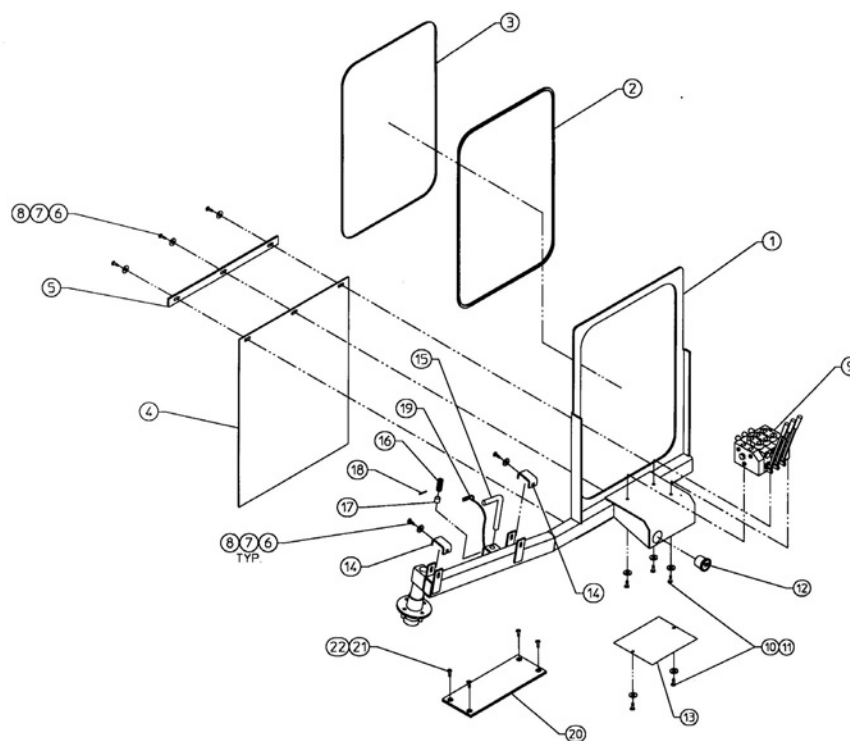
REMOTE BOX ASSEMBLY



3500-17

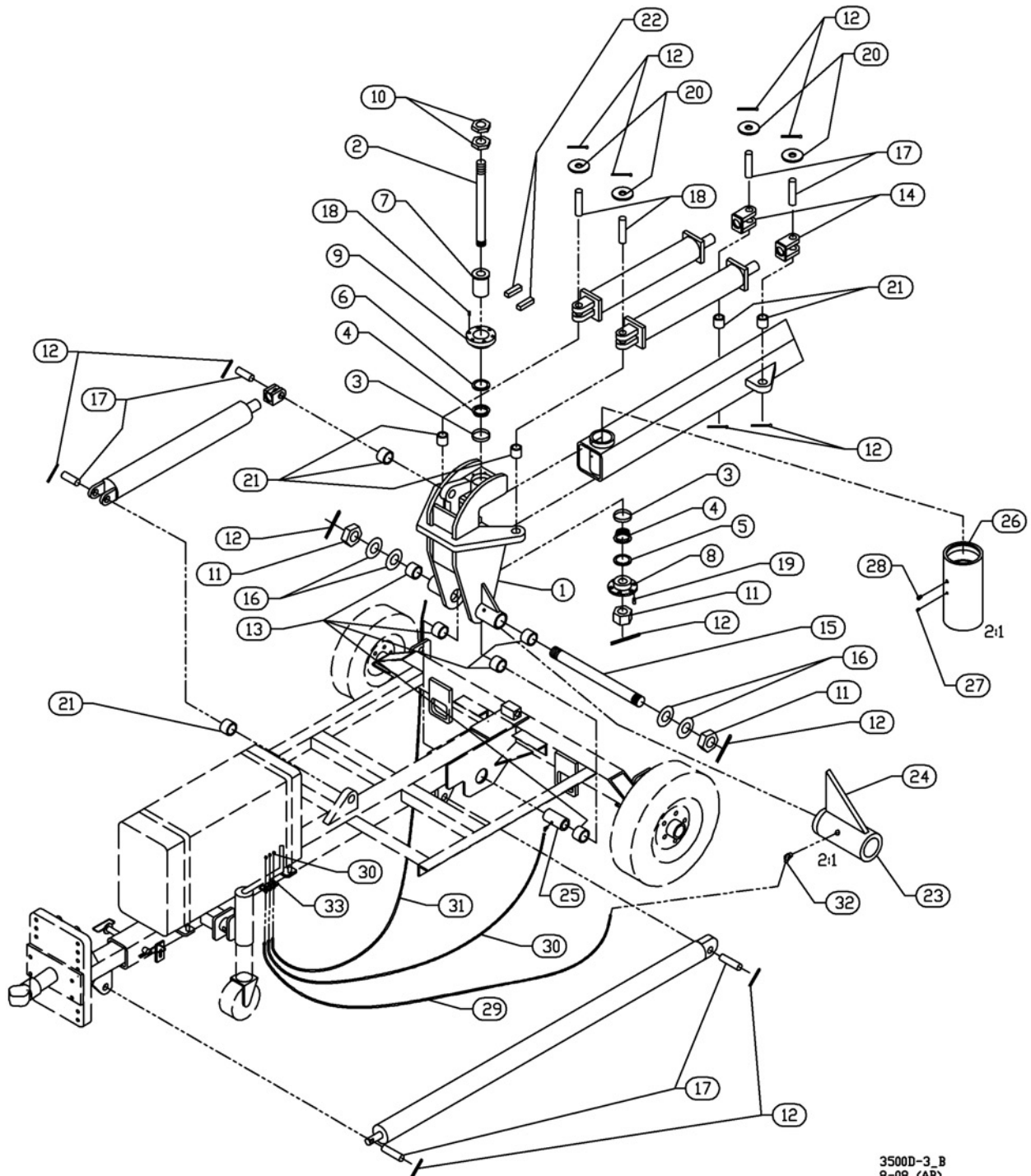
SWING OUT BOOM ASSEMBLY

ITEM NO	PART NO	DESCRIPTION	QTY
1	3500245	Swing Out Boom Weldment	1
2	0400210	Window Molding	9 ft
3	0400300	Lexan Shield	1
4	3500273	Swing Out Boom Skirt	1
5	3500272	Skirt Bracket	1
6	0150117	3/8-16 x 1 Carriage Bolt	7
7	0150303	3/8 Flat Washer	7
8	0150207	3/8-16 Lock Nut	7
9	0300130	Control Valve	1
10	0150103	3/8-16 x 1 HCS	5
11	0150404	3/8 Lock Washer	5
12	0350031	Hour Meter - Datcon	1
13	3500276	Control Box Bottom Plate	1
14	3500274	Hose Top Bracket	2
15	3500275	Swing Out Locking Pin	1
16	0150608	Spring	1
17	A150T08	Spacer	1
18	0150503	Roll Pin	1
19	0150502	Cotter Pin	1
20	3500247	Swing Out Wear Pad	1
21	0150144	7/16-14 x 1 1/2 FHSCS	4
22	0150225	7/16-14 Lock Nut	4

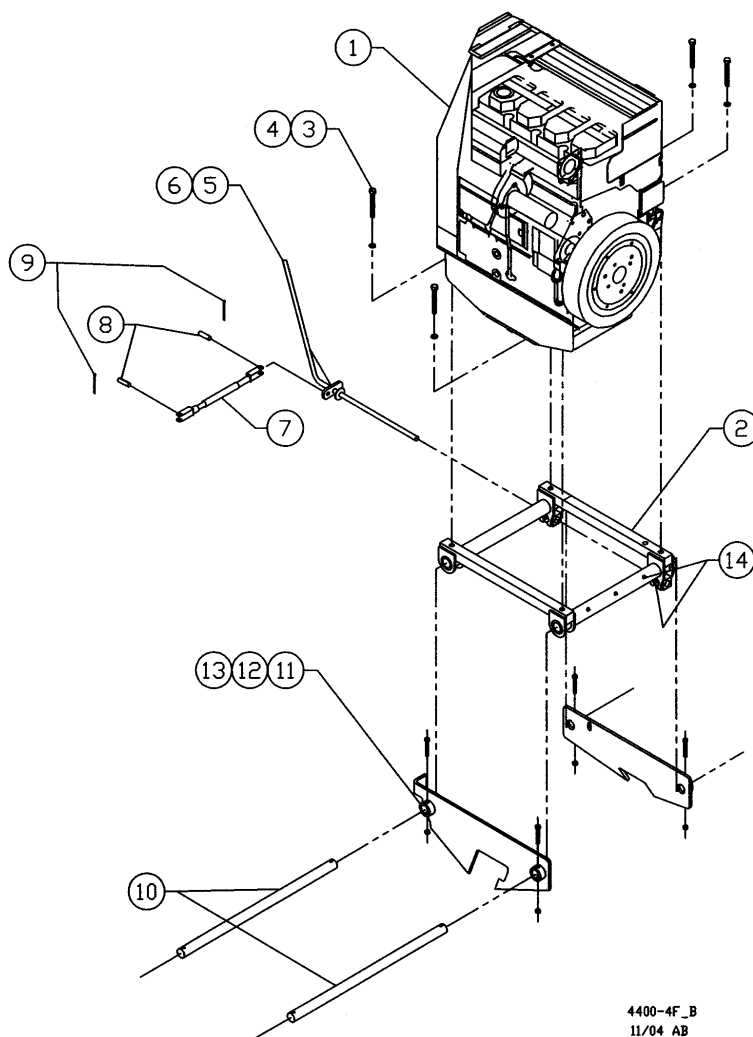


ITEM NO	PART NO	DESCRIPTION	QTY
1	3500120	Pivot	1
2	3500159	Hardened Swing Pivot Shaft	1
3	0500202	Bearing Cup	2
4	0500122	Bearing Cone	2
5	0500403	Seal, Bottom	1
6	0500404	Seal, Top	1
7	3500121	Top Pivot Inner Bushing	1
8	3500122	Bottom Pivot Bushing	1
9	3500123	Top Pivot Bushing	1
10	0150214	1 1/4-12 Jam Nut	2
◆ 11	0150215	1 1/4-12 Hex Castle Nut	3
12	0150501	Cotter Pin - .188 x 2	19
◆ 13	0150802	Hardened Bushing - 1 1/4"	6
14	0300140	Cylinder Clevis	3
◆ 15	3500189	Lift Pivot Shaft	1
◆ 16	0150310	1 1/4" Flat Washer	4
17	0300138	Cylinder Pin - 1"	8
18	0150123	5/16-18 x 3/4 SHCP	6
19	0150124	5/16-18 x 3/4 FHSCP	6
20	0150308	1" Flat Washer	4
21	0150801	Hardened Bushing - 1"	6
22	A160T07	Key - 3/4 x 3/4 x 3	2
◆ 23	3500162	Side Pivot Tube	2
◆ 24	3500280	Side Pivot Gusset	2
◆ 25	3500125	Middle Pivot Tube	1
◆ 26	3500107	Pivot Tube	1
27	0150600	Grease Fitting – 1/4" NPT	4
28		Pop-Out Valve	1
29	H752012	Grease Hose Assembly – 44"	1
30	H752013	Grease Hose Assembly – 43.5"	1
31	H752014	Grease Hose Assembly – 45"	1
32	0300528	1/8 MP–1/4 JIC 45 – 2503-4-2	3
33	7200330	Grease Hose Coupling Weldment	1

- ◆ PARTS # 23 & 24 ARE WELDED ON THE PIVOT ASSEMBLY AFTER THE BOOM IS LEVEL
- ◆ #25 IS WELDED IN THE FRAME ASSEMBLY.
- ◆ PART #26 IS WELDED IN THE PIVOT ASSEMBLY
- ◆ CONSULT THE FACTORY BEFORE ORDERING THESE PARTS

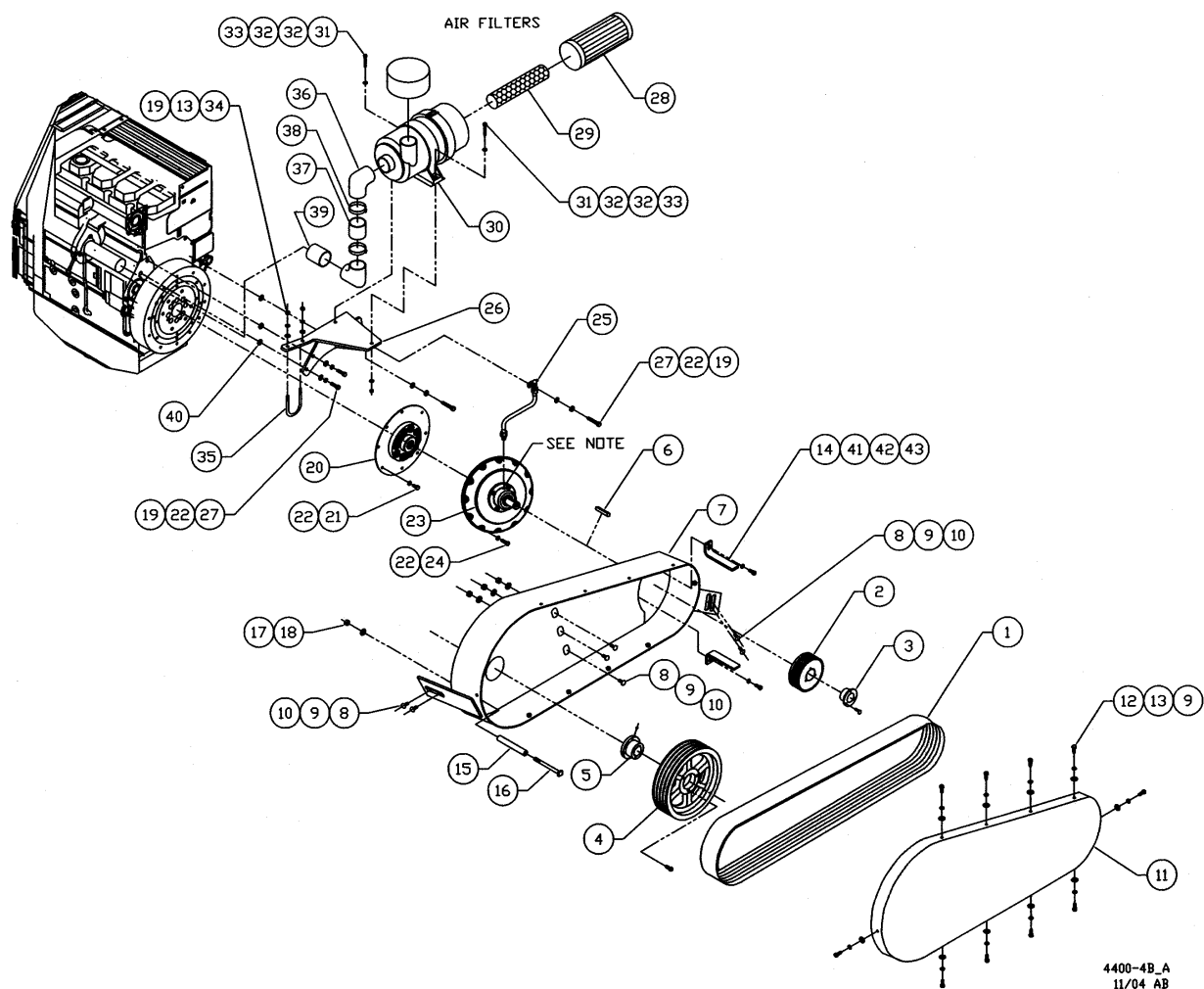


ITEM NO	PART NO	DESCRIPTION	QTY
1	02001051	Engine - 60 HP Deutz Turbo Diesel	1
2	4100346	Engine Slide Assembly	1
3		1/2"-13 x 4" HCS	4
4		1/2" Lock Washer	4
5	4100120	Belt Engagement Handle	1
6	0150501	Cotter Pin – 3/16" x 2"	1
7	4100154	Linkage Assembly	1
8	0150603	Clevis Pin – 1/2" x 1 3/8"	2
9		Cotter Pin – 1/8" x 1 3/8"	2
10	4404110	Engine Slide Rod	2
11	3504109	Slide Rod Collar	4
12	0150104	3/8"-16 x 2 1/2" HCS	4
13	0150207	3/8"-16 Lock Nut	4
14	0150625	Grease Fitting – 1/8" Straight	8



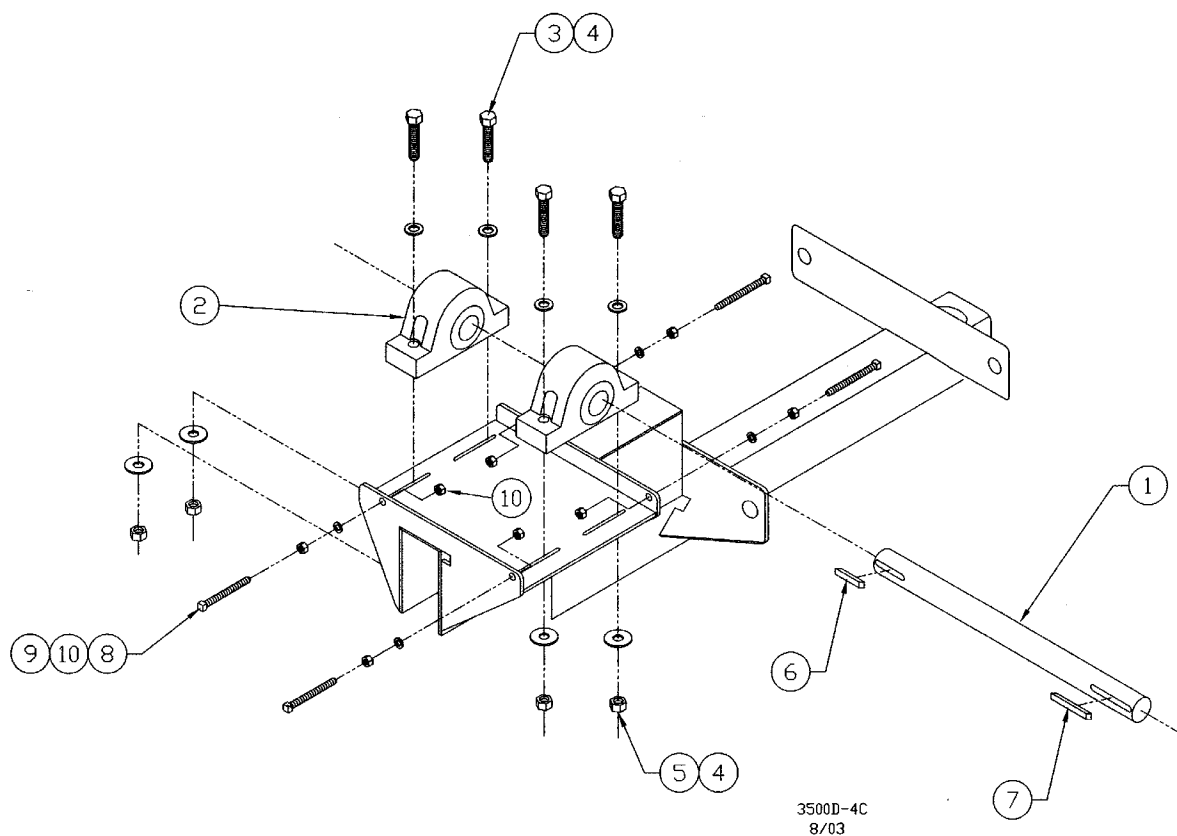


ITEM NO	PART NO	DESCRIPTION	QTY
1	0400104	Engine Belt – 4B82	1
2	0250105	Sheave - 4B5.4	1
3	0250179	Bushing - SD 1 1/2"	1
4	0250106	Sheave - 4B13.6	1
5	0250122	Bushing - SK 1 11/16"	1
6	A160T013	Key - 3/8" Sq. x 1 7/8"	1
7		Engine Belt Guard	1
8	0150117	3/8"-16 x 1" Carriage Bolt	7
9		3/8" USS Flat Washer	17
10	0150207	3/8"-16 Lock Nut	7
11		Engine Belt Guard Cover	1
12	0150118	3/8"-16 x 1" HH Bolt	10
13	0150404	3/8" Lock Washer	12
14		V-Belt Keeper – Engine	2
15	—	Round Tubing - 7/8" OD x 1/2" ID x 4 3/4" Long	1
16		1/2"-13 x 6" SQHD	1
17	0150206	1/2"-13 Lock Nut	1
18		1/2" USS Flat Washer	1
19	0150303	3/8" SAE Flat Washer	6
20	050062	Stub Shaft Coupling Plate	1
21		10 MM-1.5 x 20 MM HHCS	8
22		10 MM Lock Washer	23
23	050061	Bearing Supported Stub Shaft	1
24		10 MM-1.5 x 30 MM HHCS	11
25		Grease Fitting Extension Unit	1
26	4404156	Air Filter Bracket Weldment	1
27		10 MM-1.5 x 35 MM HHCS	4
28	0200105F	Air Filter - Primary	1
29	0200105G	Air Filter - Safety	1
30	0200105H	Air Filter - Assembly	1
31	0150116A	5/16"-18 x 2" HH Bolt	2
32	0150303A	5/16" SAE Flat Washer	4
33	0150212	5/16"-18 Lock Nut	2
34	0150119B	3/8"-16 Hex Nut	2
35		3/8"-16 x 3" U-Bolt	1
36	0200192	2 1/2" Elbow Pipe	2
37		Pipe –2 1/2" ID x 2 1/2" Long	1
38		Clamp – 2 1/2"	2
39		Pipe –2 1/2" ID x 3" Long	1
40		Spacer	3
41		1/2"-13 X 1 1/4" HH Bolt	2
42		1/2" Lock Washer	2
43	0150304	1/2" SAE Flat Washer	2

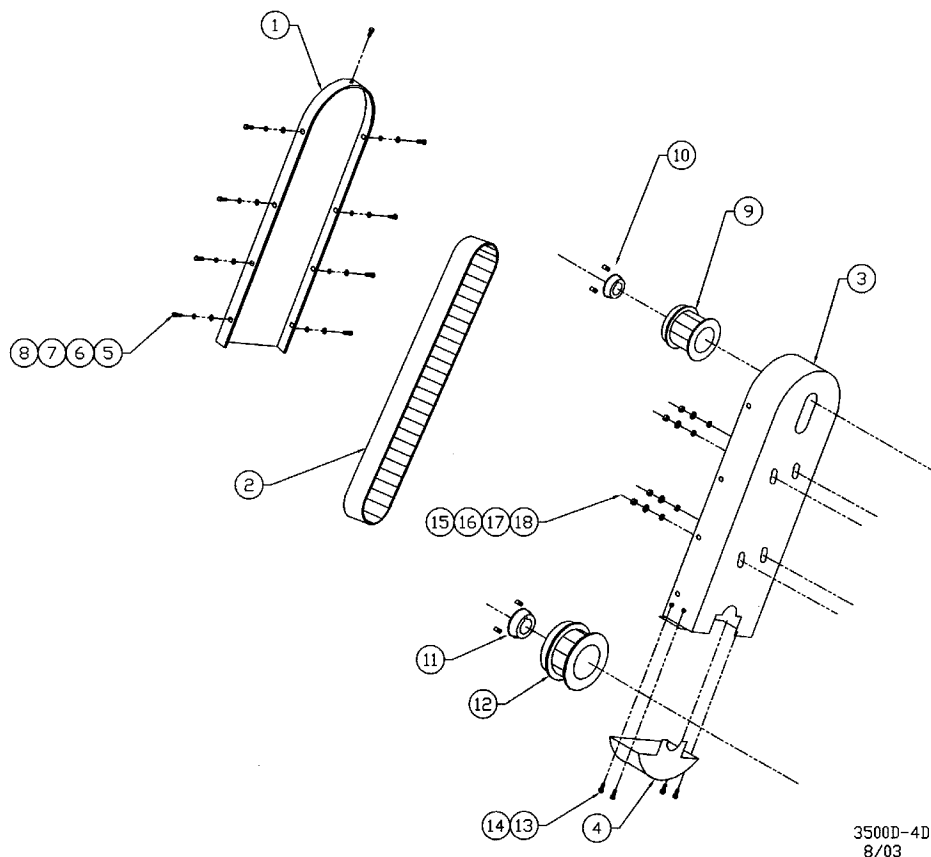


NOTE: Make sure the grease fitting is on top of the stub shaft assembly before bolting the stub shaft plate into place, as illustrated in the Servicing Stub Shaft Section of the manual. Remove the grease fitting on the new stub shaft and replace with the Grease Fitting Extension Unit (#25).

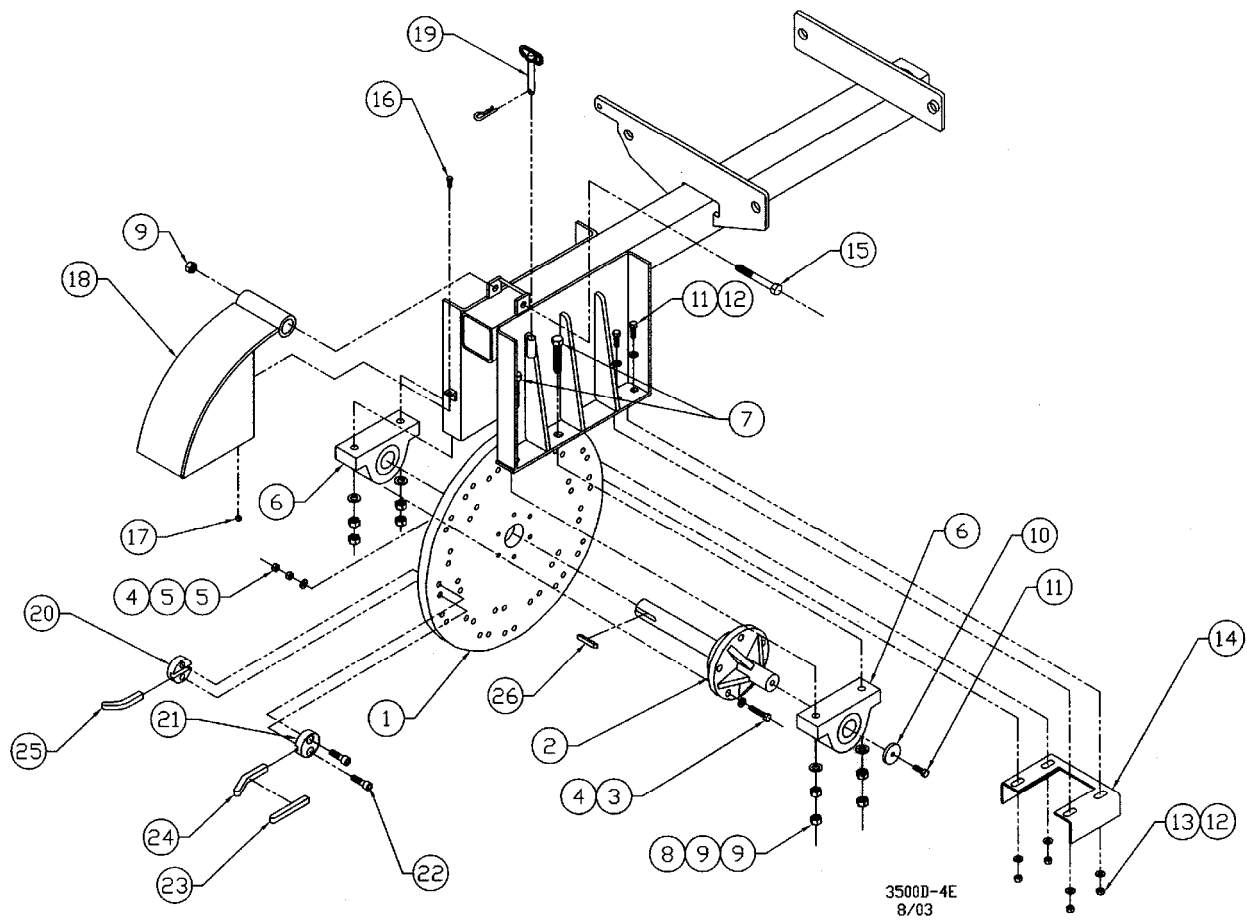
ITEM NO	PART NO	DESCRIPTION	QTY
1	3500185A	Jackshaft – 1 11/16"	1
2	0500113	Link Belt Bearing - 1 11/16"	2
3		5/8"-11 x 3" HCS	4
4	0150305	5/8" Flat Washer	8
5	0150216	5/8"-11 Lock Nut	4
6	-	Key – 3/8" Square x 2 5/8"	1
7	-	Key – 3/8" Square x 3 3/4"	1
8		1/2"-13 x 5" SQHD	4
9		1/2" Lock Washer	4
10	0150205	1/2"-13 Hex Nut	8



ITEM NO	PART NO	DESCRIPTION	QTY
1	3500204	Poly Chain® Guard Cover	1
2	0400113	Poly Chain® Belt	1
3	3500196	Poly Chain® Guard	1
4	3500208	Poly Chain® Guard Bottom	1
5	0150118	3/8"-16 x 1" HCS	9
6	0150303	3/8" Flat Washer	9
7	0150404	3/8" Lock Washer	9
8	0150207	3/8"-16 Lock Nut	9
9	0250115B	Jack Shaft Sprocket – Taper Lock	1
10	0250115G	Taper Lock Bushing –1 11/16"	1
11	0250115M	Taper Lock Bushing – 2"	1
12	0250115C	Cutter Wheel Sprocket – Taper Lock	1
13	0150212	5/16"-18 Lock Nut	4
14	0150116	5/16"-18 x 1 HCS	4
15		1/2"-13 x 1 1/2" Carriage Bolt	4
16	0150304	1/2" Flat Washers	4
17		1/2" Lock Washers	4
18	0150205	1/2"-13 Lock Nut	4



ITEM NO	PART NO	DESCRIPTION	QTY
1	3500186	Cutter Wheel	1
2	3500184	Cutter Wheel Shaft – 2”	1
3	0150132	1/2”-13 x 2 1/2” HCS	6
4		1/2” Hardened Flat Washer	12
5	0150205	1/2” Hex Nut	12
6	0500114	Pillow Block Bearing - 2”	2
7		5/8”-11 x 3” lg. HCS	4
8	0150305	5/8” Flat Washers	4
9	0150216	5/8”-11 Lock Nut	9
10	3500197	Shaft Washer	1
11	0150106A	1/2”-13 x 1 1/2” HCS	4
12	0150304	1/2” Flat Washer	8
13	0150206	1/2”-13 Lock Nut	4
14	3500236	Boom Chip Guard	1
15		3/4” -10 x 6” HCS	1
16	0150118	3/8”-16 x 1” HCS	1
17	0150207	3/8”-16 Lock Nut	1
18	3500264A	Cutter Wheel Guard	1
19	0150605	Hitch Pin	1
20	0450105	Smart Pocket - Thd.	16
21	0450104	Smart Pocket - C/S	16
22	0450108	5/8” x 1 3/4” Bolt	32
23	0450101	Straight Tooth	2
24	0450102	Tooth - Right 45°	15
25	0450103	Tooth - Left 45°	15
26	A160T02	Key – 5/8” x 3 1/2”	1
OPTIONAL:			
	04501311	JP Sandvik- Short w Long Head	16
	0450130	JP Sandvik Plow Bolt Tooth	56
	0450126	JP Sandvik Plow Bolt Holder	16
	0450125	Sandvik Stover Jam Nut	56



MODEL	TYPE	ENGINE	HP	FUEL	CUTTING DEPTH	CUTTING HEIGHT	CUT SWING	NO. TEETH	WHEEL DIA.	WHEEL THICKNESS	TONGUE EXTENSION	WEIGHT (lbs.)
900H	Walk-Behind	Honda	13	Gas	9"	21"	N/A	12	12.25"	.5"	N/A	220
SP2000	Walk-Behind	Kohler	27	Gas	24"	27"	N/A	16	19"	.5"	N/A	695
SP4012	Self-Propelled	Kohler	27	Gas	13"	34"	40" arc	20	21"	1"	30"	1,550
	Self-Propelled	Briggs-Vanguard	35	Gas	13"	34"	40" arc	20	21"	1"	30"	1,650
	Self-Propelled	Lombardini	28.7	Diesel	13"	34"	40" arc	20	21"	1"	30"	1,650
SP7015	Self-Propelled	Deutz Turbo	60	Diesel	15"	43"	70" arc	32	26.5"	1"	N/A	3,500
SP7015TRX	Track-Mounted	Deutz Turbo	60	Diesel	15"	43"	70" arc	32	26.5"	1"	N/A	4,300
SP8018 TRX	Track-Mounted	Deutz Turbo	78	Diesel	18"	43"	80" arc	32	26.5"	1"	N/A	5,420
HURRICANE RS	Track-Mounted	John Deere Turbo	140	Diesel	25"	53"	360°	48	31"	1.5"	N/A	8,500
HURRICANE TRX	Track-Mounted	John Deere Turbo	140	Diesel	25"	72"	360°	64	36"	1.5"	N/A	12,000
	Track-Mounted	John Deere Turbo	175	Diesel	25"	72"	360°	64	36"	1.5"	N/A	12,000
	Track-Mounted	John Deere Turbo	250	Diesel	25"	72"	360°	64	36"	1.5"	N/A	12,000
3500D	Tow-Behind	Deutz Turbo	60	Diesel	15"	40"	80" arc	32	26.5"	1"	48"	2,900
7500	Tow-Behind	Deutz Turbo	78	Diesel	24"	46"	92" arc	48	31"	1.5"	60"	4,400

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Revised: 08/2008



OMNEX
TRUSTED WIRELESS

JP Carlton Tow Behind

Installation / Configuration Manual

**T151 Transmitter
R160 Receiver**

October 21, 2005

DM-R160-0164A

Revision 1

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NOTE: These instructions are intended only for installing and operating the remote control equipment described here. This is not a complete Operator's Manual. For complete operating instructions, please read the Operator's Manual appropriate for your particular machine.

Safety Precautions

READ ALL INSTRUCTIONS

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Failure to follow the SAFETY PRECAUTIONS may result in radio equipment failure and serious personal injury

Installation

PROVIDE A SAFETY CUTOFF SWITCH. If maintenance is required, the radio must be disconnected from power
USE PROPER WIRING. Loose or frayed wires can cause system failure, intermittent operation, machine damage, etc.
DO NOT INSTALL IN HOT AREAS. This apparatus can be damaged by heat in excess of 158° F (70° C)

Personal Safety

MAKE SURE MACHINERY AND SURROUNDING AREA IS CLEAR BEFORE OPERATING. Do not activate the remote system unless it is safe to do so.

TURN OFF THE RECEIVER POWER BEFORE WORKING ON MACHINERY. Always disconnect the remote system before doing any maintenance to prevent accidental operation of the machine

Care

KEEP DRY. Do not clean the transmitter / receiver under high pressure. If water or other liquids get inside the transmitter battery or receiver compartment, immediately dry the unit. Remove the case and let the unit air dry

CLEAN THE UNIT AFTER OPERATION. Remove any mud, dirt, concrete, etc. from the unit to prevent clogging of buttons, switches, etc. by using a damp cloth.

Maintenance / Welding

DISCONNECT THE RADIO RECEIVER BEFORE WELDING on this machine. Failure to disconnect will result in the destruction of the radio receiver.

System Overview

The **ORIGA T151 / R160** is a portable, long range, programmable radio remote control system. Designed as a compact and easy-to-use product, this member of the **ORIGA** family puts complete control of your crane where it's needed most, with the operator. It's robust, easy to install and has complete self-diagnostics. This system can be a simple cable replacement or add intelligence to make it a total crane control package. It's a radio, a PLC and a valve driver all in one.

The **ORIGA T151 / R160** system uses Frequency Hopping Spread Spectrum (FHSS) technology. FHSS devices concentrate their full power into a very narrow signal that randomly hops from frequency to frequency within a designated band. This transmission pattern, along with CRC-16 error-checking techniques, enables signals to overcome interference that commonly affects licensed radios.

The **R160 receiver** is designed to be powered from a 12VDC or 24VDC system. It features 19 solid state, high-side driver input / output controls and a reliable E-Stop control.

The **T151 transmitter** comes with 4 to 7 switches. It uses standard, long lasting AA batteries. Each T151 transmitter uses a unique ID code to ensure that no two systems will conflict at a job site.

Features

- FCC, ISC, CE approved
- License free
- 1200 foot range @ 900 MHz (900 ft. @ 2.4 GHz)
- Hand held / weatherproof / ergonomic
- Simple "wire-and-use" installation
- Resilient to impact and shock
- Available in both 900 MHz and 2.4 GHz
- Available with E-Stop for ensured operator safety
- Factory configurable for all custom applications.

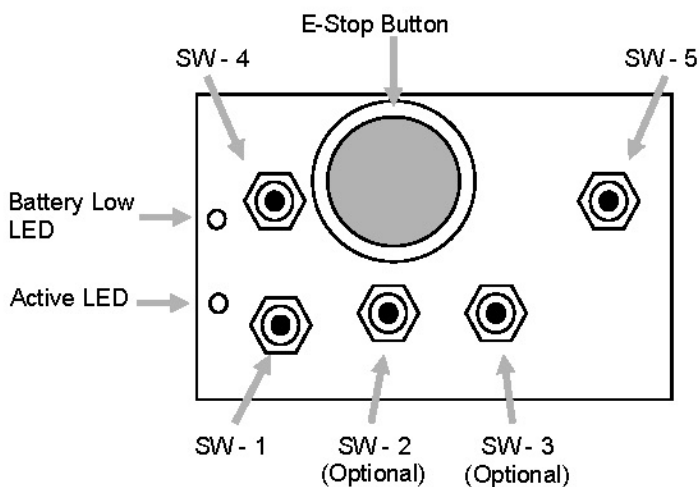
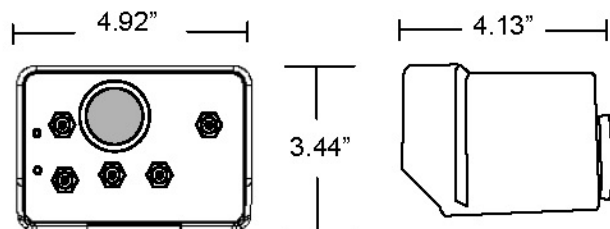


R160 Receiver



T151 Transmitter

T151 Dimensions and Controls

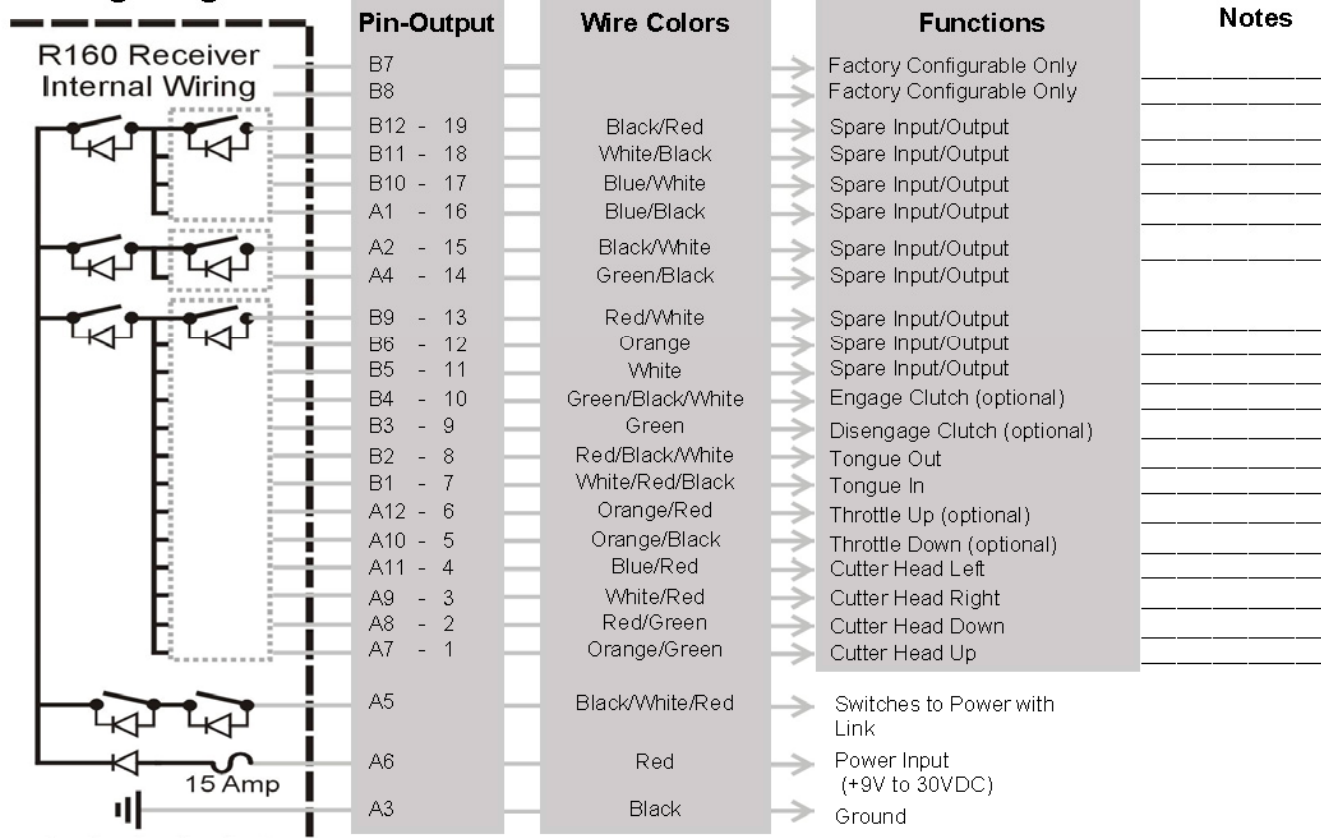


NOTE: The 5-switch transmitter faceplate is displayed throughout this manual. On 3-switch transmitters, the orientation of the Battery Low LED and Active LED are different; the LED indicator lights are located on either side of the E-Stop Button.

Installing the Receiver

Use the **Wiring Diagram** and the **Connector Diagram** below to connect the receiver pins directly to the appropriate contacts of the machine electronics. R160 Output Cables can be provided with every system to simplify the wiring process. The Wire Color column below only applies to the OMNEX Output Cable configuration. Tips on mounting, power connections and filtering are also provided under **Installation Considerations**.

Wiring Diagram

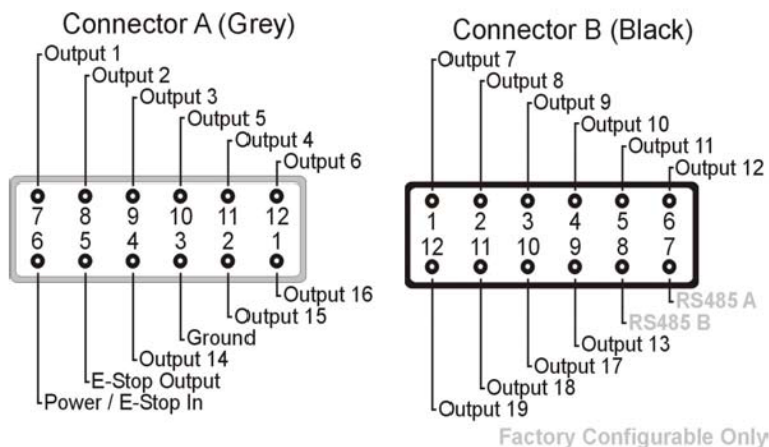


Outputs: 19 solid state, high-side driver outputs, 5A max. each, total combined current 15A

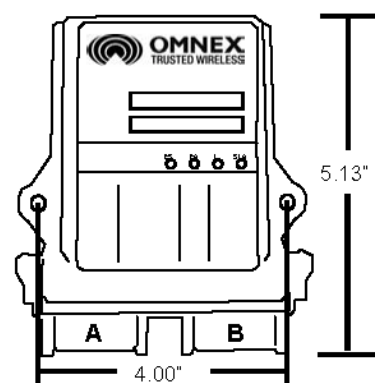
Inputs: All output pins can be factory configured as inputs.

Connector Pin Assignments

Connectors as seen from under the receiver



R160 Dimensions



Special Functions

Receiver outputs turn on momentarily while the corresponding transmitter switches are toggled and the transmitter has established link with the receiver. Pressing E-Stop will turn off the transmitter and immediately turn off (unlatch) all outputs.

Installation Considerations

Mounting and Installation

The receiver can be mounted by fastening two ¼" bolts through the two mounting holes in the unit's enclosure. When mounting, ensure that the receiver is oriented so that the text is reading right.

When selecting a mounting point for the receiver, it is recommended that the location require only a minimal length of wiring to connect it to the control panel, that it will be in a visible area where it has good exposure to the operator and that it is mounted on a surface that is protected from the weather and sustains minimal vibration. It is also recommended that the receiver have the best possible line of sight with the transmitter

Power Connections and Wiring

Whenever a power connection is made to an electronic device, it is a good practice to make both the Power (+) and Ground (-) connections directly to the Battery and avoid connecting the power from the charging side of existing wiring or making use of existing "ACC" or other peripheral connection points.

Make sure that wire of sufficient gauge and insulator type is used when connecting the outputs of the receiver to the control panel. Observe any component manufacturer's instructions and recommendations for proper integration of their product. This includes the power ratings and requirements of such components as relays, valves, solenoids, etc.

Be sure to test each of the outputs with a multi-meter prior to connecting the outputs to your end devices. This will ensure that each output has been programmed to operate in the manner required by each end device.

Filtering and Noise Suppression

Whenever a solenoid or electromagnetic switch is controlled by the receiver, it is a good practice to install a Diode across its terminals to ensure that surges and spikes do not continue back into the circuit. Appropriate 36V Bi-directional Diodes kits can be ordered under the OMNEX part number "AKIT-2492-01".

Power the Transmitter

When the receiver has been installed, install batteries into the transmitter and turn it on as explained below.

1. Install Batteries

Remove the battery cover on the back of the transmitter using a slotted screwdriver and insert 4 "AA" alkaline batteries. Orientation of the batteries is embossed inside the battery housing.

NOTE: For operation at temperatures below -10°C to -40°C , lithium batteries are recommended. Low temperatures reduce battery performance for both alkaline and lithium types. Refer to the battery manufacturer's specifications for detailed information on low temperature performance.



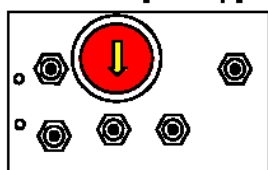
T151 Battery

2. Turn on the Transmitter

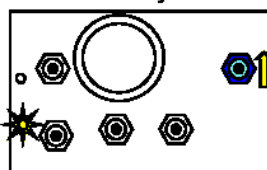
Refer to the **Light Legend** below for diagram details.

WARNING: do not install batteries backwards, charge, put in fire, or mix with other battery types. May explode or leak causing injury. Replace all batteries at the same time as a fresh set and do not mix and match battery types.

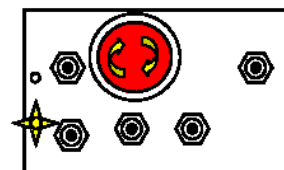
1. Press [E-Stop]



2. Press any switch



3. Twist Clockwise & Release [E-Stop]



If the transmitter's (Active) light does not flash, check the battery orientation.

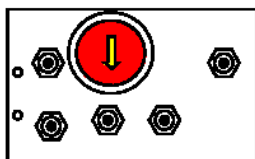
To turn off the transmitter, press the [E-Stop] button.

Test the Transmitter / Receiver Link

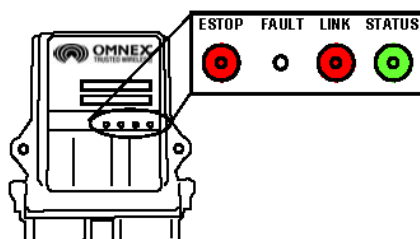
Follow these steps to ensure that there is a radio link between the transmitter and receiver.

Refer to the **Light Legend** below for diagram details

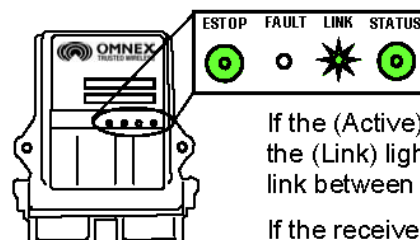
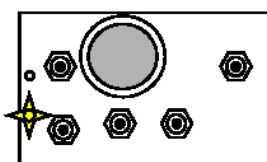
1. Press [E-Stop]



2. Power the R160



3. Power the T151



If the (Active) light on the transmitter is flashing and the (Link) light on the receiver is flashing GREEN, a link between the two exists.

If the receiver's (Link) light does not flash GREEN, follow the steps under **Download ID Code** below.

The ORIGA system is now ready for use.

Light Legend	Solid	Slow Flash	Fast Flash	Red Light	Green Light	Yellow Light	Alternating Red & Green Light

Download ID Code (Use in case of Link Test failure)

Follow these steps to download the transmitter's unique ID Code into the receiver. This will allow the receiver to establish a radio link with a specific transmitter or up to four transmitters (used individually). When downloading the first transmitters ID use step 4.1. and not 4.2.; for the remaining three transmitters use step 4.2. and not 4.1.

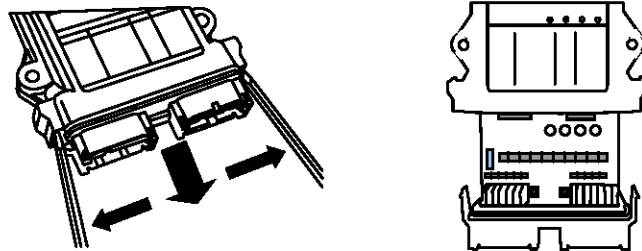
NOTE: It is necessary to download the ID Code when replacing either the transmitter or the receiver.

NOTE: The 5-switch transmitter faceplate is displayed throughout this manual. On 3-switch transmitters, the orientation of the Battery Low LED and Active LED are different; the LED indicator lights are located on either side of the E-Stop Button.

1. Opening the Receiver Case

The cap is held on by two plastic tabs at opposing sides, which can be unlatched as shown using a screwdriver. Once the cap is free, the R160 can slide open.

Use a small slotted screwdriver to press the Side Tabs inward.

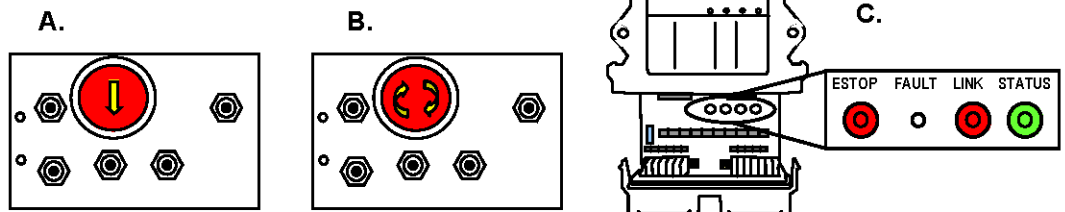


2. Prepare T151, Power R160

A. Press [E-Stop]

B. Twist clockwise & release [E-Stop]

C. Supply power to the receiver



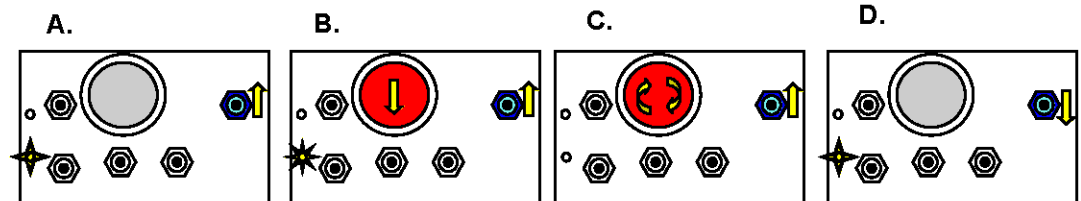
3. Power T151 into Configuration Mode

A. Hold [SW-5] switch UP

B. Press [E-Stop]

C. Twist clockwise & release [E-Stop]

D. Release [SW-5] Switch



Light Legend

Solid



Slow Flash



Fast Flash



Red Light



Green Light



Yellow Light



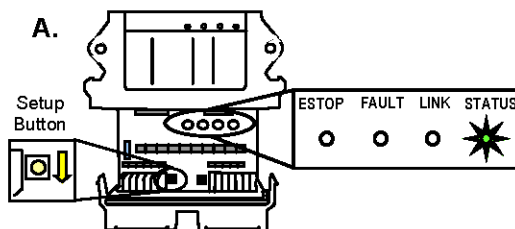
Alternating Red & Green Light



Download ID Code (Con't)

4.1. Put Receiver into Setup Mode for Primary ID

- A. Press & hold [Setup] button until (Status) light goes from slow flash to fast flash
- B. Release [Setup] button. (Status) light goes to solid



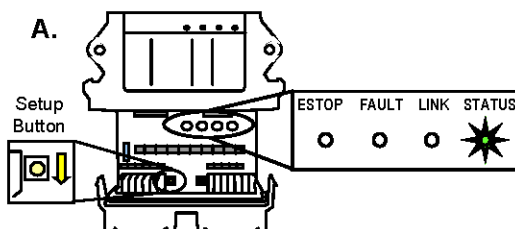
NOTE 1: Programming the Primary ID will clear all other ID's already programmed into the receiver.

NOTE 2: If left idle in Setup Mode for over 30 seconds, the receiver will time out. The (Link) light and (Status) light will flash RED rapidly. To return to Setup Mode, repeat step 4.

OR

4.2. Put Receiver into Setup Mode for Secondary ID's

- A. Press & hold [Setup] button until (Status) light goes from slow flash to fast flash to medium flash (approx. 10 Sec.)
- B. Release [Setup] button. (Status) light goes to solid GREEN, (Link) light turns off

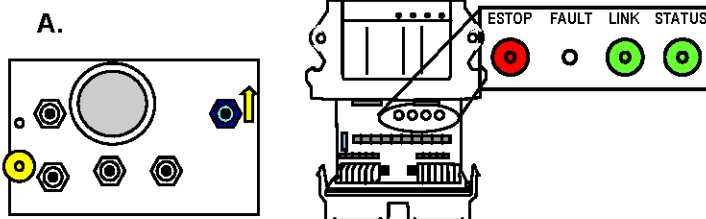


NOTE 1: The Receiver will hold up to 4 Transmitter ID's. When the 5th Transmitter ID is downloaded, it's ID will replace the ID of the least recently used transmitter (i.e. The receiver will retain the ID's of the three transmitters that have been most recently linked).

NOTE 2: If left idle in Setup Mode for over 30 seconds, the receiver will time out. The (Link) light and (Status) light will flash RED rapidly. To return to Setup Mode, repeat step 4.

5. Send Code

- A. Hold [SW-5] switch UP to send code



Once the ID Code has been downloaded, the RED (Battery) light and the YEL-LOW (Active) light on the transmitter will go out. The (Link) light on the receiver will change from GREEN to RED.

6. For multiple ID Downloading

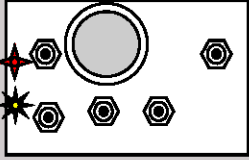
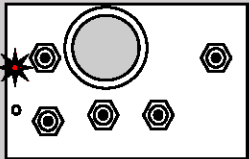
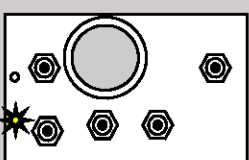
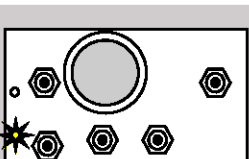
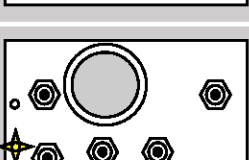
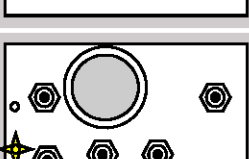
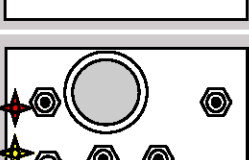
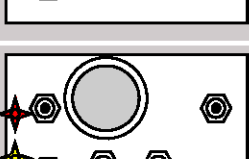
- A. Repeat steps 3-5, **using step 4.2. instead of 4.1.** for all remaining Transmitters. Then check the link of all Transmitters one at a time by following the instructions on page 7, Test the Transmitter/Receiver Link.

Light Legend



Diagnostics—T151 Transmitter

NOTE: The 5-switch transmitter faceplate is displayed throughout this manual. On 3-switch transmitters, the orientation of the Battery Low LED and Active LED are different; the LED indicator lights are located on either side of the E-Stop Button.

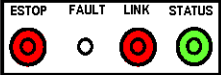
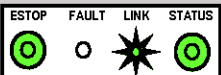
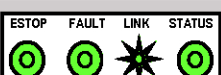
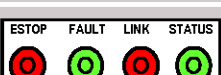
	Low battery. Unit will run approximately 10 hours after Battery light starts flashing.
	Flashing rapidly for 10 seconds indicates a transmitter failure.
	Normal Operation The Active light will flash several times per second, indicating that the transmitter is sending signals to the receiver. The Active light will remain on momentarily whenever a function changes
	On Power Up Release the E-Stop button within 10 seconds to power up the transmitter, or the unit will power down.
	Normal Operation The transmitter is in Download Mode.
	On Power Up Press and release the E-Stop button within 10 seconds to power up the transmitter, or the unit will power down.
	Stuck switch detected. Ensure that all switches are in a centered position. The transmitter will not power up when a function is ON.
	On Power Down Unit is still powered. Check for stuck switches, as the transmitter will not power down when a function is ON. Alternating flash means that the transmitter is in Calibration Mode.

Light Legend

Solid		Slow Flash		Fast Flash		Red Light		Green Light		Yellow Light		Alternating Red & Green Light	
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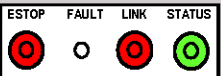
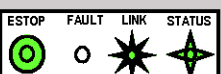
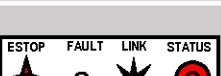
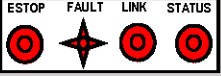
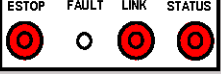
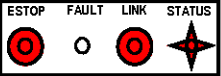
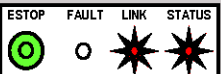
Diagnostics - R160 Receiver

Normal Operation

	Transmitter is OFF If the transmitter is off, the receiver is operating properly.
	Transmitter is ON When the transmitter is turned on, the Link light (fast flashing) and E-Stop (GREEN) indicates the receiver is operating properly
	Transmitter is in Operation When a function is activated on the transmitter, the Fault light will turn on GREEN. This indicates the receiver is operating properly
	Transmitter is OFF When a latched function is activated then the transmitter is turned off, the Fault light will stay on GREEN. If the system was intentionally designed this way, the receiver is operating properly, if not call for service.

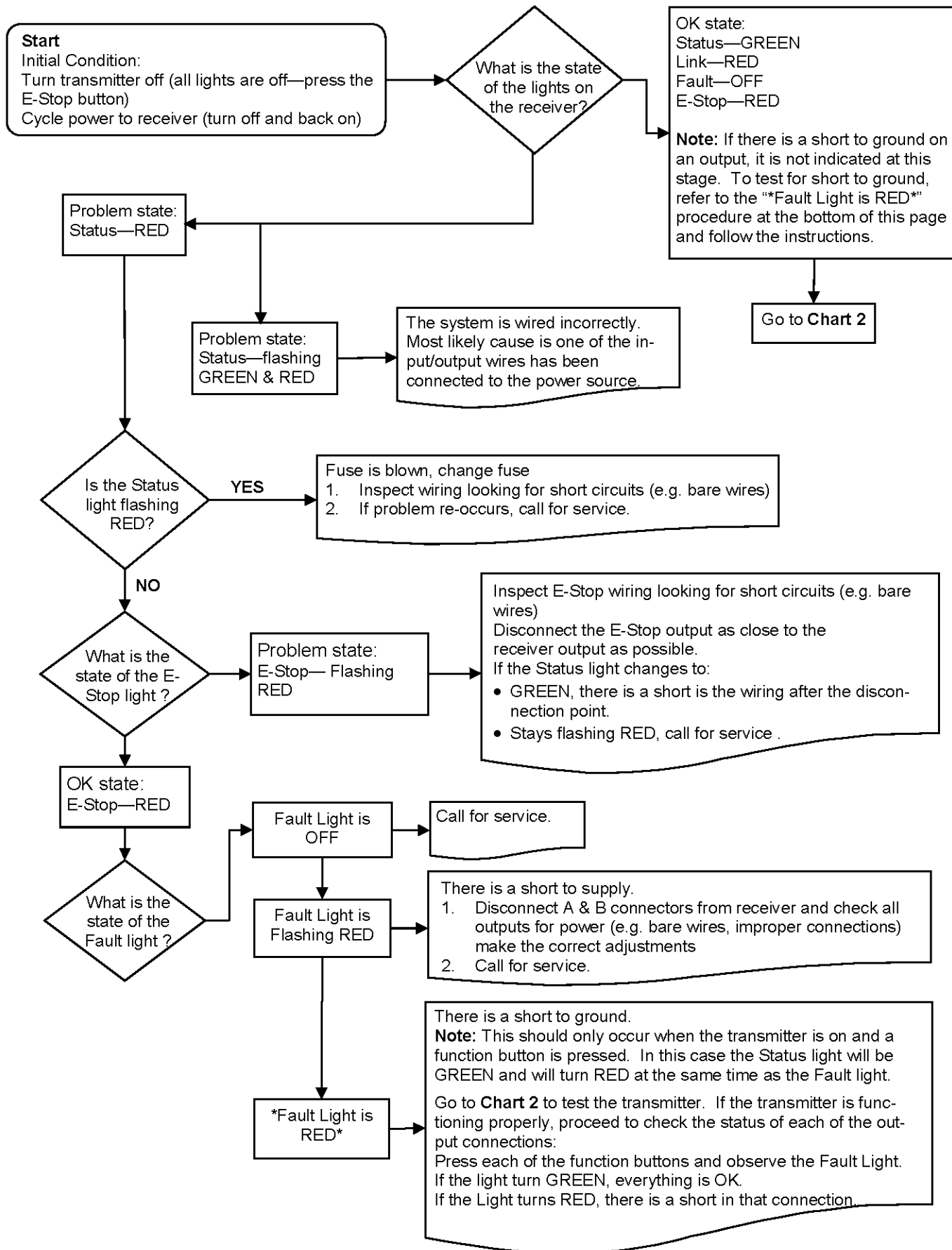
Trouble Indicators

Note: In some cases, the indicator lights will be different depending on whether the transmitter is on or off. Please note the transmitter status in the "Description" column for each case.

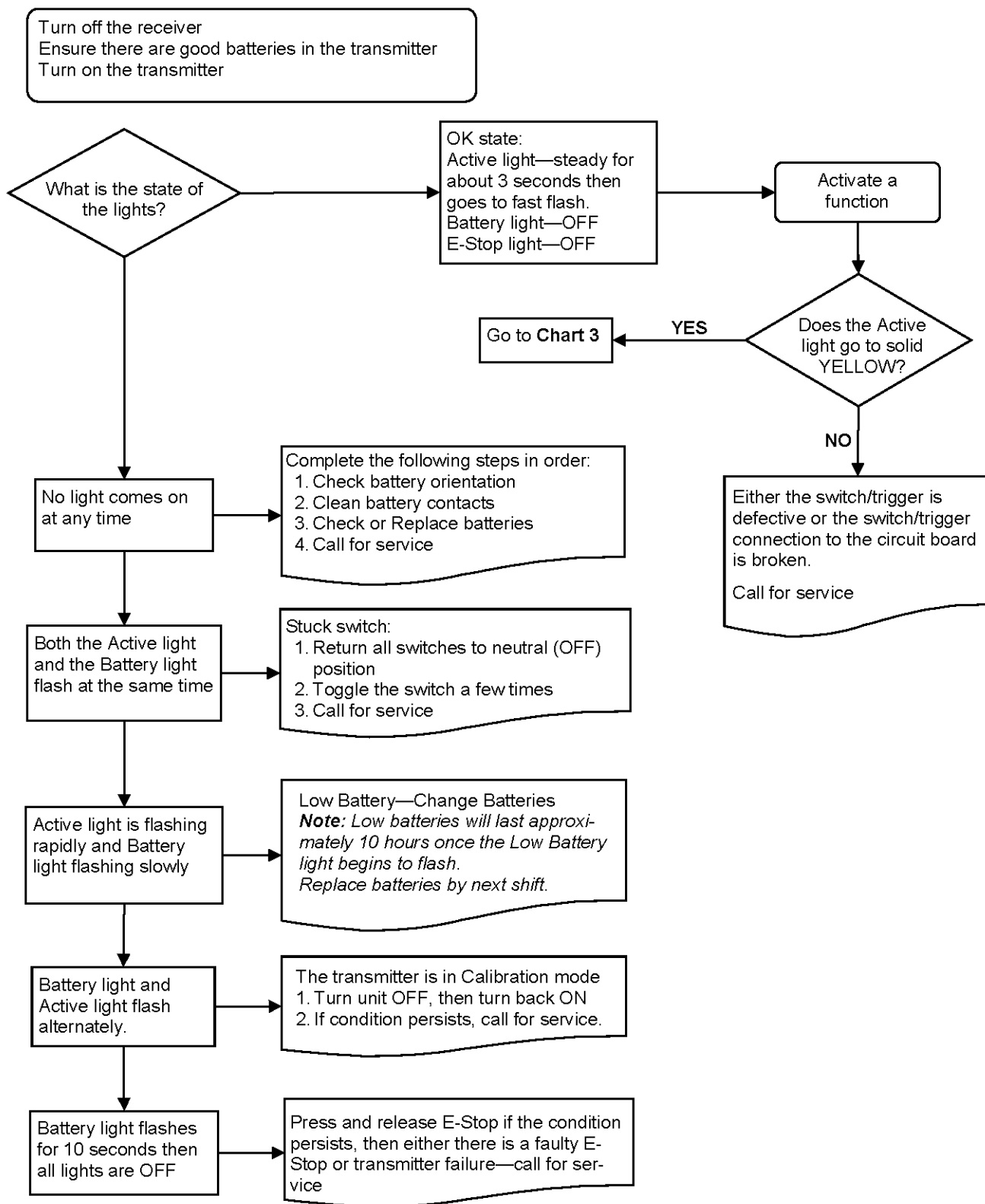
Indicator Lights	Description	Solution
	Transmitter is ON The reason is the transmitter is not communicating with the receiver.	Refer to Trouble Shooting Chart #3 for solutions
	Transmitter is ON A low battery condition has been detected.	To detect intermittent conditions caused by poor or corroded ground or power circuits, the GREEN light will continue to flash for 30 seconds after the condition has been removed.
	Transmitter is ON An internal fault with the E-Stop has been detected.	Inspect E-Stop wiring for short circuit. Disconnect E-Stop wire as close to the receiver output as possible. If the Status light changes to: - GREEN, a short occurs after disconnection point. - Stays flashing RED, send it in for service .
	Transmitter is ON A short to ground or excessive current draw on an output. It is most likely caused by a wiring fault.	Ensure transmitter is functioning properly, check status of each output connection: Press each function button and observe Fault Light. - If GREEN, everything is OK. - If RED, there is a short in that connection.
	Transmitter is ON The E-Stop output has been connected with one of the other outputs	Follow the wire and check for connections with other wires, disconnect to see if condition clears. If not, call for service.
	Transmitter is OFF A wiring short to the battery has been detected.	Refer to Trouble Shooting Chart #1 for solutions
	Transmitter is OFF The receiver has detected an internal fault.	Refer to Trouble Shooting Chart #1 for solutions
	Transmitter is OFF Blown fuse detected.	Refer to Page 8 for instructions on how to open the receiver case to access fuse. Check wiring for shorts or bare spots. If fuses continue to blow, call for service.
	Transmitter is ON A setup failure has occurred.	Either hold the Setup button for 5 seconds to return to Setup mode or cycle power to return to the normal operating mode.
	Transmitter is OFF The receiver is powered incorrectly.	Most likely cause of this condition is that an output wire or the E-Stop wire has been connected to the power supply while the power wire is disconnected from the power supply.

Light Legend	Solid 	Slow Flash 	Fast Flash 	Red Light 	Green Light 	Yellow Light 	Alternating Red & Green Light 
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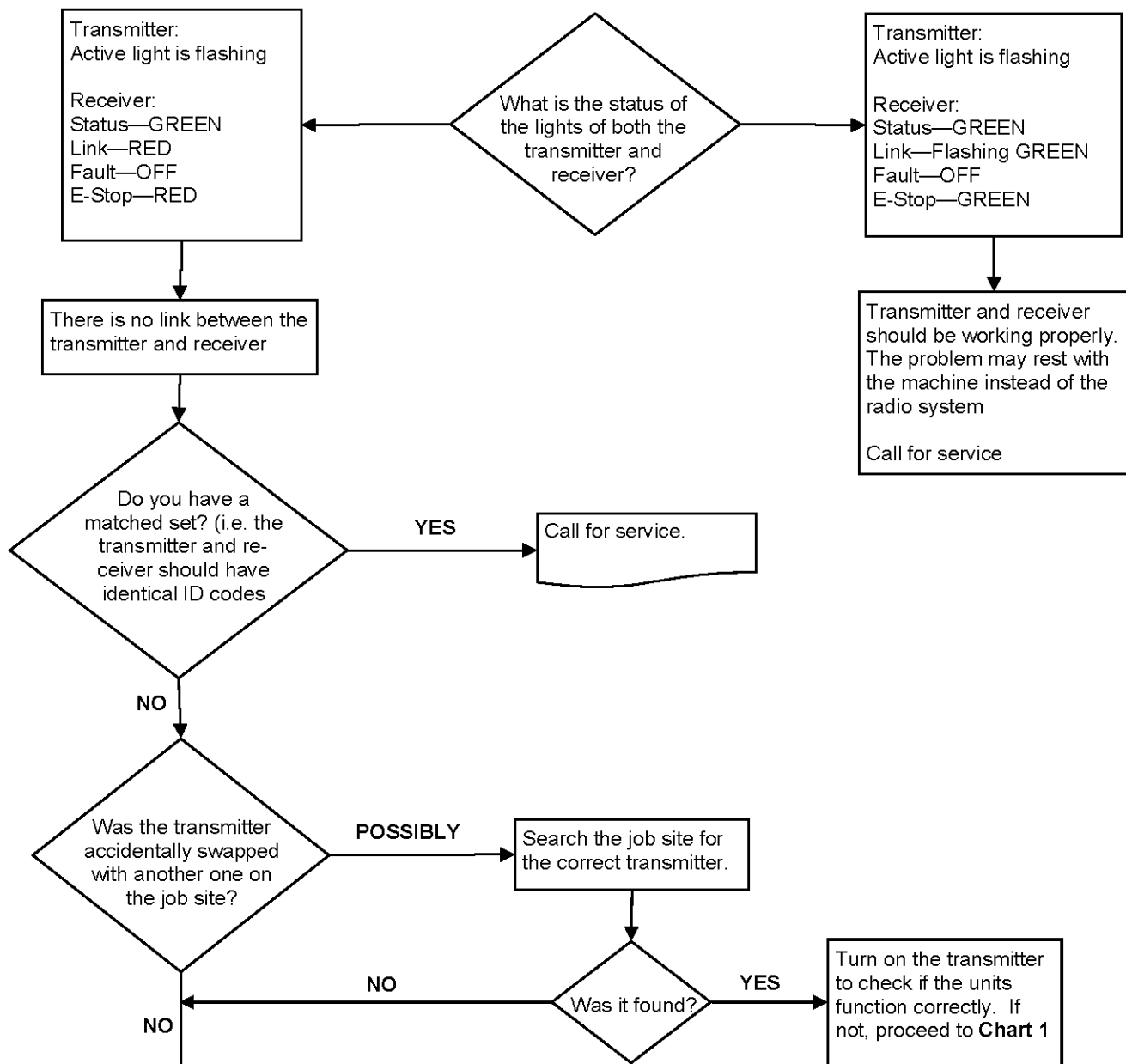
Test the Receiver—R160



Test the Transmitter—T151



Testing the Transmitter / Receiver Communication



!!Caution!!

Note: Before you proceed with the Download ID procedure located on **Page 8**, great care and caution must be adhered to. Also, refer to **Chart #4** for Tips and Considerations.

If by accident, the transmitters have been switched with another unit, by downloading the ID code to a new receiver, it is possible for the transmitter to operate 2 units at the same time (if the original receiver unit is still on the job site). Therefore it must be certain that the transmitter / receiver pair are the correct set.

Secondly, once the download procedure is completed, ensure all other units on the job site are stopped. Test the operation of the newly configured set to ensure no other machines on the site work with the same transmitter.

Once you are certain that the transmitter / receiver pair are a unique set, continue normal operations.

Considerations when Downloading the ID

Potential downloading issues

If testing of the receiver and transmitter both show the system as working (Chart 1 & 2), then the transmitter and receiver will both go into Download/Configuration mode.

Possible issues could arise during Step 4, the download phase of reprogramming. In this case there are 2 symptoms to look for:

1. The Link light on the receiver will not turn GREEN when the power switch is toggled on the transmitter to download
2. The receiver will "time out" indicating that it didn't receive a signal from the transmitter within the 30 seconds from the time the receiver was put into Setup Mode.

If all indications appear normal during the download phase, test the link by turning on the transmitter (note: the transmitter shuts off after transmitting the ID code in Step 4)

1. If the Link light on the receiver doesn't turn GREEN, the receiver didn't receive all of the information that was sent from the transmitter.

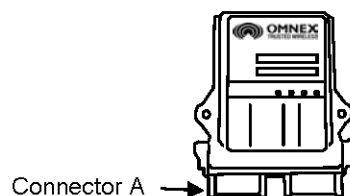
Possible Solutions

1. Try the Downloading steps again
2. If this doesn't correct the problem, send both the transmitter and receiver in for service.

Note: you could try to determine whether the fault lies with the transmitter or receiver by completing the downloading procedure with a different transmitter. If this step works, then the fault lies with the original transmitter. If not, the fault may lie with the receiver.

!!Caution!!

Note: Before attempting downloading with another transmitter, understand that reprogramming the receiver with another transmitter, could result in two receivers on the job site responding to the one transmitter. If the original transmitter was sent in for repair, Disconnect the receiver (disconnect connector A) to continue using the machine without remote capability and without fear of inadvertently operating the machine with the other transmitter.



Reprogramming Tips:

1. Use a pointy instrument to depress the Setup button on the receiver (i.e. a pen) as the button is relatively small
2. Follow each step as laid out in the procedure
3. Never lay the receiver circuit board down on anything metallic (there are contact points on the back which could contact the metal and damage the receiver)

Parts & Accessories

Part	Part Number	Description
Batteries	B0010	4 x AA alkaline
R160 Output Cables	ACAB 2493-01	Generic Output Cable- see illustration
Toggle Switch	AKIT-1504-04	Honeywell 1TL1-7
E-Stop Button	AKIT-1821-02	RAFIX16, 25mm, C&K 1.30074.2810300 See illustration
Magnet Back	AKIT-2498-02	see illustration
Bipolar Diode Kit	AKIT-2492-01	36V, Bi-directional, Motorols P6KE36CA
Fuse	F0039	Bussman ATC-15
Socket Connectors	J0418	Grey, 12-pin, Deutsch DTM06-12SA
Socket Connectors	J0419	Black, 12-pin, Deutsch DTM06-12SB
	J0420	12 pos., Deutsch WM12S
Pin	J0417	Female, Size 20, Deutsch 0462-201-20141
Sealing Plug	J0421	Size 20, Deutsch 0413-204-2005
R160 Connector Kit	AKIT-2337-01	Includes Deutsch socket connectors, wedges, pins and sealing plugs.



R160 Output Cable



E-Stop



Magnet Back

Specifications

	R160 Receiver	T151 Transmitter
Size	5.1" x 4.7" x 1.4" (130mm x 119mm x 36mm)	3.44" x 4.9" x 4.13" (87mm x 124mm x 105mm)
Weight	0.65lbs (0.295kg)	1.8lbs (0.817kg)
Construction	High impact plastic, weatherproof	High impact, low temperature plastic, weatherproof
Input Power	+9V to 30VDC	4AA alkaline batteries
Battery Life	N/A	160 hours (continuous use)
Operating Temperature Range	-40F to 158F (-40C to 70C)	-40F to 158F (-40C to 70C)
Outputs	3A (max) each (sourcing), 10A (max) each (combined)	N/A
Antenna	Internal	Internal
Approvals	USA- FCC part 15.247 Canada- ISC RSS 2210 Europe- EN 440 Australia- C-Tick	

FCC Rules and Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Part 15.247
ISC RSS 210

Warranty

OMNEX Control Systems Inc. warrants to the original purchaser that the OMNEX products are free from defects in materials and workmanship under normal use and service for a period of ONE YEAR, parts (EXCLUDING: SWITCHES, CRYSTALS, OR PARTS SUBJECT TO UNAUTHORIZED REPAIR OR MODIFICATION) and labor from the date of delivery as evidenced by a copy of the receipt. OMNEX's entire liability and your exclusive remedy shall be, at OMNEX's option, either the (a) repair or (b) replacement of the OMNEX product which is returned within the warranty period to OMNEX freight collect by the OMNEX APPROVED carrier with a copy of the purchase receipt and with the return authorization of OMNEX. If failure has resulted from accident, abuse or misapplication, OMNEX shall have no responsibility to repair or replace the product under warranty. In no event shall OMNEX be responsible for incidental or consequential damage caused by defects in its products, whether such damage occurs or is discovered before or after replacement or repair and whether or not such damage is caused by the negligence of OMNEX Control Systems Inc.

OMNEX Control Systems Inc.