REPAIR MANUAL

95 / 105 / 105

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THOMAS EQUIPMENT LTD

THOMAS

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THE WARRANTY IS A CONDITION OF SALE OF THE PRODUCT TO PURCHASER AND WILL THEREFORE APPLY EVEN IF PURCHASER ALLEGES THAT THERE IS A TOTAL FAILURE OF THE PRODUCT.

*N.B. Read and practice your **Thomas** operating and servicing instructions. Failure to do this may void your warranty.*

Publication Number **46847**

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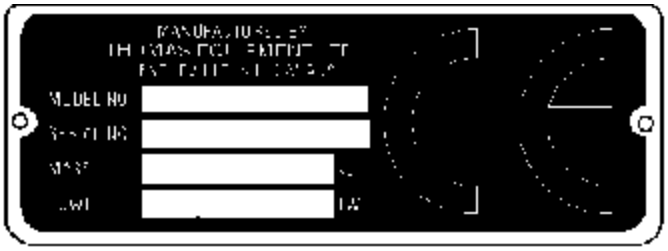
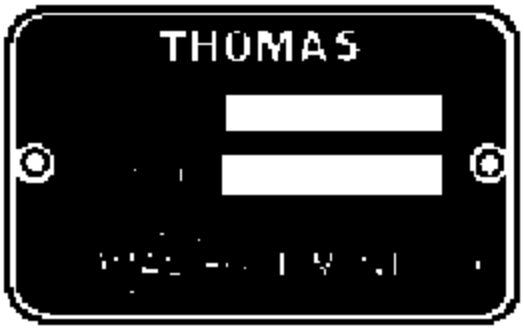
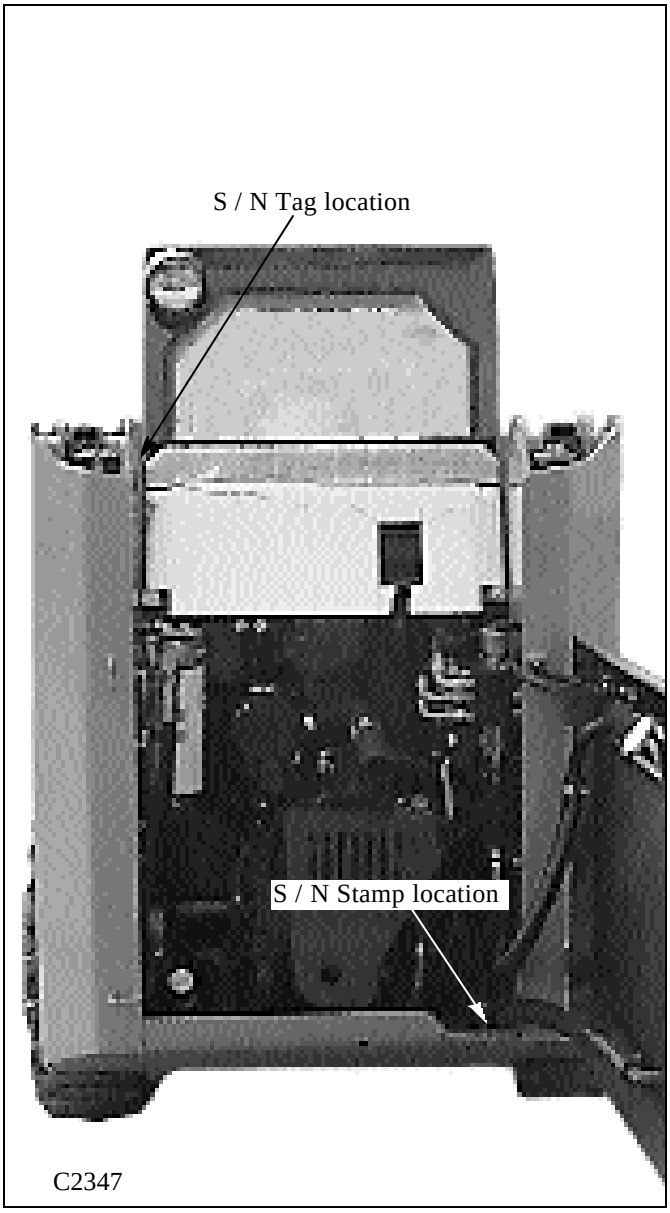
FOREWORD

It is important when ordering replacement parts or making a service inquiry to provide both the model number and serial number of your Thomas loader. The serial number plate is located at the rear of the machine on the right hand side fuel tank. In the event that the serial number plate is missing, the model number and serial number are both stamped into the main frame inside the rear door, next to the hydraulic control valve.







SAFETY PRECAUTIONS

Practically all Service work involves the need to drive the loader. The Owner's / Operator's Manual, supplied with each loader, contains safety precautions relating to driving, operating and servicing that loader. These precautions are as applicable to the service technicians as they are to the operator and should be read, understood and practiced by all personnel.

Prior to undertaking any maintenance, repair, overhaul, dismantling or re-assembly operations, whether within the shop facility or "out in the field", may have an effect upon safety, not only upon the mechanic carrying out the work but also upon bystanders.

PERSONAL CONSIDERATIONS

* CLOTHING
  The wrong clothing or carelessness in dress can cause accidents. Check to see that you are suitably clothed. Some jobs require special protective equipment.

* SKIN PROTECTION
  Used motor oil may cause skin cancer. Follow work practices that minimize the amount of skin exposed and length of time used oil stays on your skin.

* EYE PROTECTION
  The smallest eye injury may cause loss of vision. Injury can be avoided by wearing eye protection when engaged in chiseling, grinding, welding, painting and any other task that involves foreign matter.

* BREATHING PROTECTION
  Fumes, dust and paint spray are unpleasant and harmful. These can be avoided by wearing respiratory protection.

* HEARING PROTECTION
  Loud noise may damage your hearing and the longer the exposure the greater the risks of hearing damage. Always wear hearing protection when working around loud machinery.

* HAND PROTECTION
  It is advisable to use a protective cream before work to prevent irritation and skin contamination. After work, clean your hands with soap and water. Solvents such as white spirits, paraffin, etc. may harm the skin.

* FOOT PROTECTION
  Substantial or protective footwear with reinforced toecaps will protect the feet from falling objects. Additional oil-resistant soles will help to avoid spilling.

* SPECIAL CLOTHING
  For certain work it may be necessary to wear flame or acid resistant clothing.

CAUTION

Avoid injury through incorrect handling of components. Make sure your are capable of lifting the object. If in doubt, get help.

EQUIPMENT CONSIDERATIONS

* MACHINE GUARDS
  Before using any machine, check to ensure that the machine guards are in position and serviceable. These guards not only prevent parts of the body or clothing coming in contact with the moving parts of the machine but also ward off objects that might fly off the machine and cause injury.

* LIFTING APPLIANCES
  Always ensure that lifting equipment, such as chains, slings, lifting brackets, hooks and eyes are thoroughly checked before use. If in doubt, select stronger equipment. Never stand under a suspended load or raised implement.

* COMPRESSED AIR
  The pressure from a compressed air line is often as high as 100 PSI (6.9 Bar). Any misuse may cause injury.

  Never use compressed air to blow dust, filing dirt, etc. away from your work area unless the correct type of nozzle is fitted.

  Compressed air is not a cleaning agent. It will only move dust etc. from one place to another. Look around before using an air hose as bystanders may get grit into their eyes, ears and skin.

SAFETY PRECAUTIONS

* HAND TOOLS

Many cuts, abrasions and injuries are caused by defective tools. Never use the wrong tool for the job as this leads either to some injury or to a poor job done.

Never Use:

A hammer with a loose or split handle.
Spanners or wrenches with splayed or worn jaws.
Wrenches or files as hammers; drills or clevis pins or bolts as punches.

For removing or replacing hardened pins use a copper or brass drift rather than a hammer.

For dismantling, overhaul and assembly of major and sub-components always use the Special Service Tools recommended. These will reduce the work effort, labor time and the repair cost.

Always keep tools clean and in good working order.

* ELECTRICITY

Electricity has become so familiar in day to day usage that it's potentially dangerous properties are often overlooked. Misuse of electrical equipment can endanger life.

Before using any electrical equipment, particularly portable appliances, make a visual check to ensure that the cable is not worn or frayed and that the plugs, sockets etc. are intact. Make sure you know where the nearest isolating switch for your equipment is located.

GENERAL CONSIDERATIONS

* SOLVENTS

Use only cleaning fluids and solvents that are known to be safe. Certain types of fluids can cause damage to components such as seals, etc. and can cause skin irritation. Solvents should be checked that they are suitable not only for the cleaning of components and individual parts but also that they do not affect the personal safety of the user.

* HOUSEKEEPING

Many injuries result from tripping or slipping over, or on, objects or materials left lying around by a careless worker.

Prevent these accidents from occurring. If you notice a hazard, don't ignore it, remove it.

A clean, hazard free place of work improves the surroundings and daily environment for everybody.

* FIRE

Fire has no respect for persons or property. The destruction that a fire can cause is not always fully realized. Everyone must be constantly on guard.

- Extinguish matches, cigars, cigarettes etc. before throwing them away.
- Work cleanly, disposing of waste material into proper containers.
- Locate all the fire extinguishers and ensure all personnel know how to operate them.
- Do not panic, warn those near and sound the alarm.
- Do not allow or use an open flame near the loader fuel tank, battery or component parts.

* FIRST AID

In the type of work that mechanics are engaged in, things such as dirt, grease, fine dust etc. all settle upon the skin and clothing. If a cut, abrasion or burn is disregarded it may be found that a septic condition has formed in a short time. What appears at first to be trivial could become painful and injurious. It only takes a few minutes to have a fresh cut dressed but it will take longer if you neglect it.

* CLEANLINESS

Cleanliness of the loader hydraulic system is essential for optimum performance. When carrying out service and repairs, plug all hose ends and components connections to prevent dirt entry.

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficiency and working life of a component and lead to costly replacement. Use of a high pressure washer or steam cleaner is recommended.

SAFETY PRECAUTIONS

OPERATIONAL CONSIDERATIONS

* Stop the engine, if at all possible, before performing any service.

* Place a warning sign on loaders which, due to service or overhaul, would be dangerous to start. Disconnect the battery leads if leaving such a unit unattended.

* Do not attempt to start the engine while standing beside the loader or attempt to bypass the safety starting system.

* Avoid prolonged running of the engine in a closed building or in an area with inadequate ventilation as exhaust fumes are highly toxic.

* Always turn the radiator cap to the first stop to allow pressure in the system to dissipate when the coolant is hot.

* Never work beneath a loader which is on soft ground. Always take the unit to an area which has a hard working surface, preferably concrete.

* If it is found necessary to raise the loader for ease of maintenance, make sure that safe and stable supports are installed beneath the main frame before commencing work.

* Use footsteps or working platforms when servicing those areas of the loader that are not within easy reach.

* Before loosening any hoses or tubes, switch off the engine, remove all pressure in the lines by operating the foot pedals several times. This will remove the danger of personal injury by oil pressure.

* Prior to pressure testing, make sure all the hoses and connectors on both the loader and on the test machine are in good condition and tightly sealed. Pressure readings must be taken with the gauges specified. The correct procedure should be rigidly observed to prevent damage to the system or the equipment and to eliminate the possibility of personal injury.

* Always lower equipment to the ground when leaving the loader.

* If high lift attachments are installed on a loader, beware of overhead power and telephone lines when travelling. Drop attachment near to ground level to increase stability and minimize risks.

* Do not park or attempt to service a loader on an incline. If unavoidable, take extra care and block the wheels.

* Escaping hydraulic / diesel fluid under pressure can penetrate the skin causing serious injury. Do not use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks. Stop the engine and relieve pressure before connecting or disconnecting lines. Tighten all connections before starting the engine or pressurizing the lines. If any fluid is injected into the skin, obtain medical attention immediately.

* Prior to removing wheels and tires from a loader, check to determine whether additional ballast (liquid or weight) has been added. Seek assistance and use suitable equipment to support the weight of the wheel assembly.

* When inflating tires beware of over inflation.; constantly check the pressure. Over inflation can cause tires to burst and result in personal injury.

* Safety precautions are very seldom the figment of someone’s imagination. They are the result of sad experience where most likely someone has paid dearly through personal injury.

* Heed these precautions and you will protect yourself accordingly. Disregard them and you will duplicate the sad experiences of others.

SAFETY PRECAUTIONS

SERVICE TECHNIQUES

A. SERVICE SAFETY

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles as well as the personal safety of the individual doing the work. This shop manual provides general directions for accomplishing service and repair work with tested effective techniques. Following them will help assure reliability.There are numerous variations in procedures, techniques, tools and parts for servicing vehicles as well as in the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this manual must first establish that he or she compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

B. SERVICE TECHNIQUES

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficient working life of a component and lead to costly replacement.

Use cleaning fluids which are known to be safe. Certain types of fluid can cause damage to O rings and cause skin irritation. Solvents should be checked that they are suitable for the cleaning of components and also that they do not risk the personal safety of the user.

Time spent on the preparation and cleanliness of working surfaces will pay dividends in making the job easier and safer and will result in overhaul components being more reliable and efficient in operation.

Replace O rings, seals or gaskets whenever they are disturbed. Never mix new and old seals and O rings, regardless of condition. Always lubricate new seals and O rings with hydraulic oil before installation.

When replacing component parts use the correct tool for the job.

C. HOSES AND TUBES

Always replace hoses and tubes if the end connections are damaged. Be sure any hose installed is not kinked or twisted.

When installing a new hose, loosely connect each end and make sure the hose takes up the designed position before tightening the connection. Clamps should be tightened sufficiently to hold the hose without crushing and to prevent chafing.

The hoses are the arteries of the unit; be sure they are in good condition when carrying out repairs or maintenance otherwise the machines output and productivity will be affected.
After hose replacement to a moving component, check that the hose does not foul by moving the component through the complete range of travel.

Hose connections which are damaged, dented , crushed or leaking, restrict oil flow and the productivity of the components being served. Connectors which show signs of movement from the original swaged position have failed and will ultimately separate completely.

A hose with a chafed outer cover will allow water entry. Concealed corrosion of the wire reinforcement will subsequently occur along the hose length with resultant hose failure.

Ballooning of the hose indicates an internal leakage due to structural failure. This condition rapidly deteriorates and total hose failure soon occurs.

Kinked, crushed, stretched or deformed hoses generally suffer internal structural damage which results in oil restriction, a reduction in the speed of operation and ultimate hose failure.

Free moving, unsupported hoses must never be allowed to touch each other or related working surfaces. This causes chafing which reduces hose life.

D. PRESSURE TESTING

Prior to pressure testing, be sure all hoses are in good condition and all connections tight. Pressure readings must be taken with gauges of specified pressure readings.

The correct procedure should be rigidly observed to prevent damage to the system or the equipment and to eliminate the possibility of personal injury.

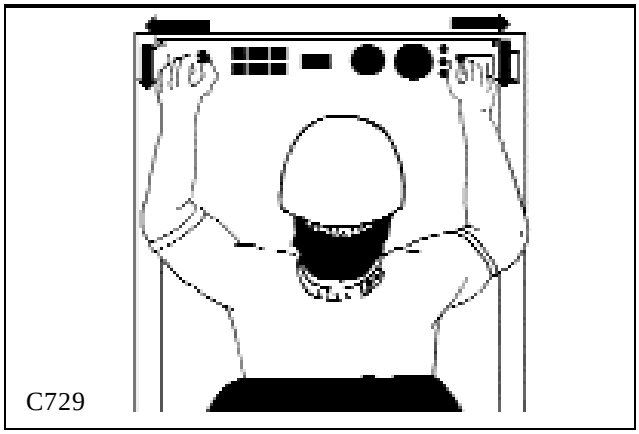
SAFETY PRECAUTIONS

E. BEARINGS

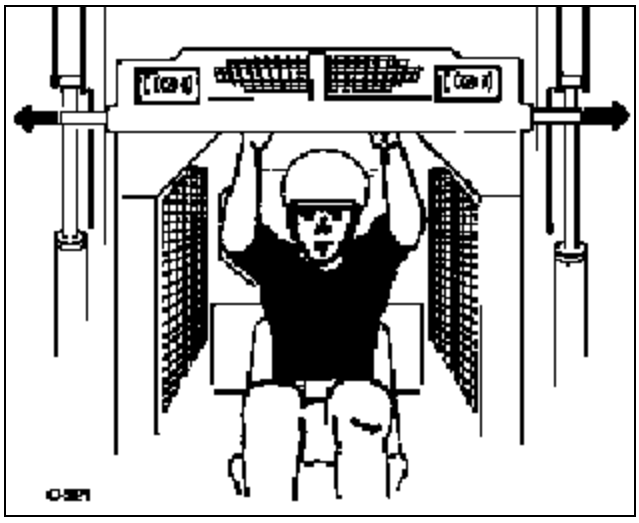
Bearings which are considered suitable for further service should be cleaned in a suitable solvent and immersed in clean lubricating oil until required.

Installation of a bearing can be classified into two (2) ways:
- press fit on rotating parts such as shafts and gears,
- push fit into static locations such as reduction gear houses.

Where possible, always install the bearing onto the rotating components first. Use the correct tools or a press to install a bearing or bushing. In the absence of the correct tools or press, heat the bearing and / or casing in hot oil to assist the installation of the bearing.


C729

When bearings or bushings are removed, always carefully check that the bearing is free from discoloration and signs of overheating. Also check for mechanical damage such as excessive clearance, nicks and scuffing. If in doubt, replace the bearings or bushings.



Bearings should never be removed unless absolutely necessary. Always use the recommended puller to reduce the risk of bearing or related component failure.

These bearings and bushings are subjected, in normal operation, to high working loads and adverse conditions.

Be sure during normal routine servicing, maintenance or repair that bearings are given the right attention and are installed with care.

F. BOOM SUPPORTS

For safety while performing regular service or maintenance work, the loader is equipped with boom supports.

The boom supports, when extended, prevent the boom arms from dropping if hydraulic pressure is relieved or the foot control pedals are accidentally cycled.

To operate the boom supports, first remove any bucket or attachment from the quick - tach; raise the boom arms to full height and shut off the engine. Raise the boom handles up and push out toward the boom arms to extend the boom supports. (fig. C729, C321)

WARNING

To avoid personal injury, service the loader with the boom arms down and the bucket or attachment lowered to the ground. If it is necessary to service the loader with the boom arms raised, be sure to engage the boom supports. Never work under or around a loader with raised boom arms without the boom supports engaged.

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STEERING 4.1

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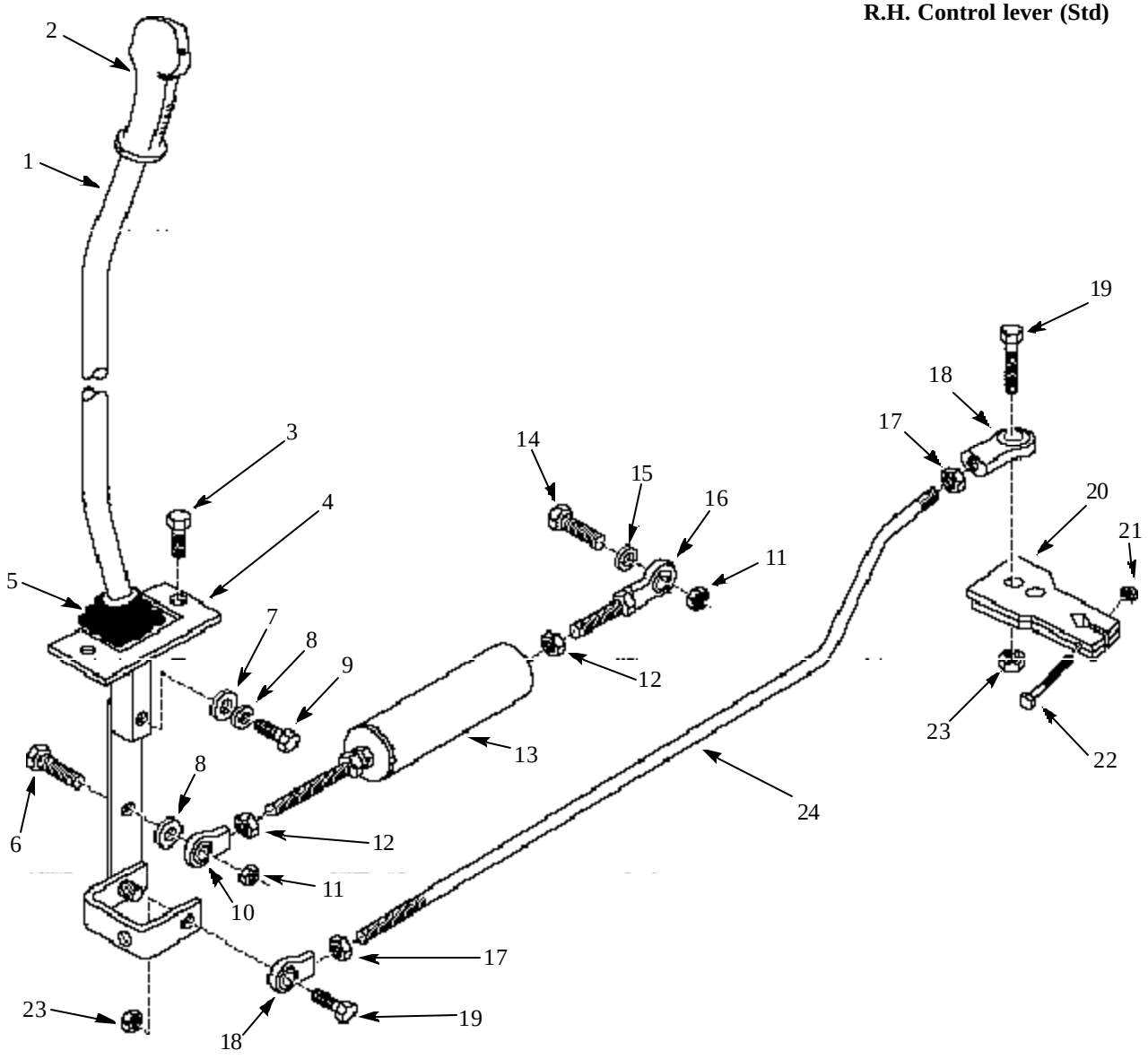
R.H. Control lever (Std)

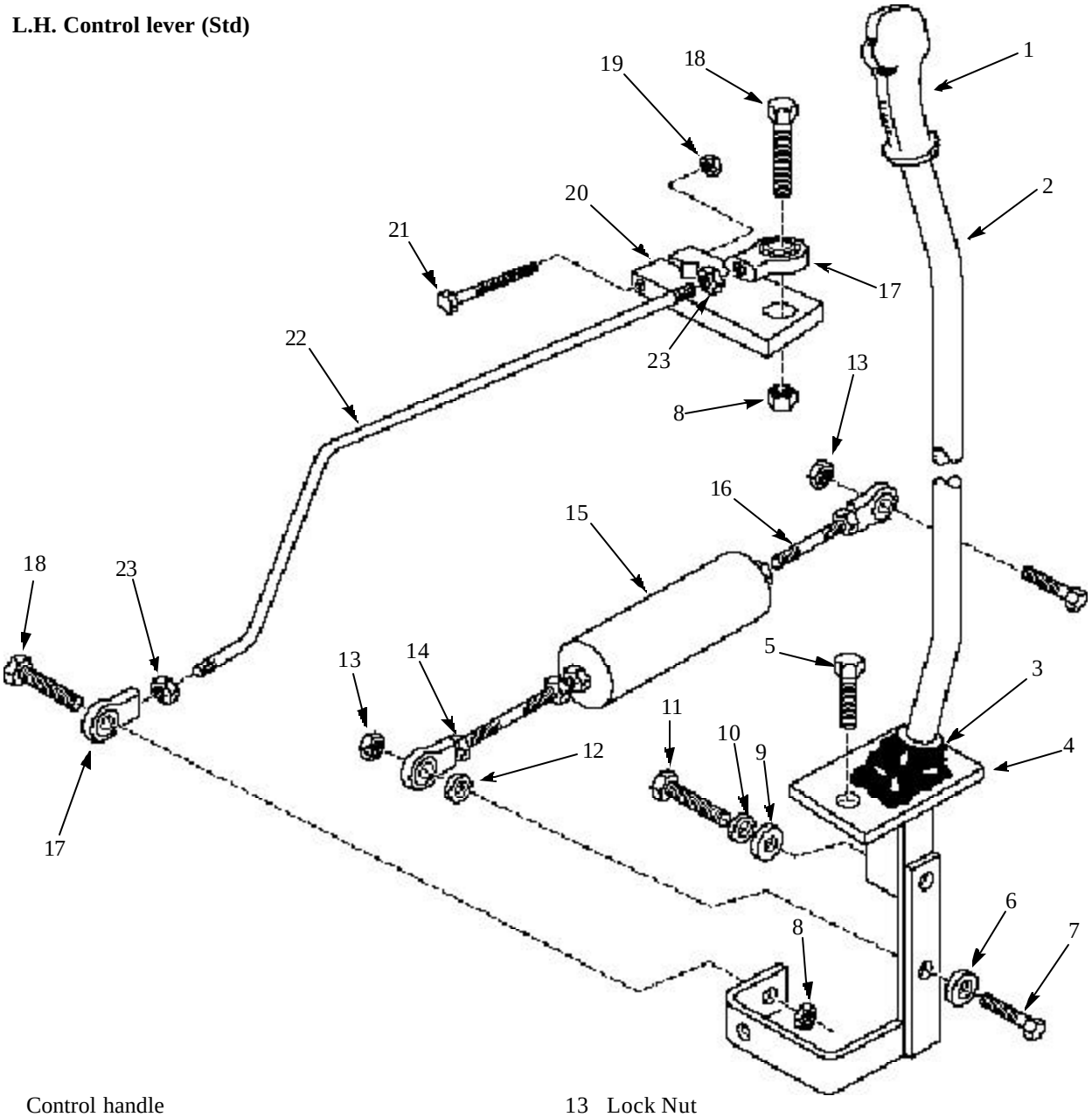


1	Control lever	14	Bolt
2	Control handle	15	Spacer Washer
3	Screw	16	Male Rod end
4	Bellows Cover	17	Nut
5	Bellows	18	Female Rod End
6	Bolt	19	Bolt
7	Flat washer	20	Pintle Lever
8	Lock washer	21	Lock Nut
9	Bolt	22	Bolt
10	Female Rod End	23	Lock Nut
11	Lock Nut	24	Control Linkage
12	Nut	(*)	Includes items 10, 12, 13, & 16
13	Hydroback (*)		

C2944

STEERING 4.1

L.H. Control lever (Std)



1	Control handle	13	Lock Nut
2	Control lever	14	Nut
3	Bellows	15	Hydro back (*)
4	Bellows Cover	16	Male Rod End
5	Screw	17	Female Rod End
6	Washer	18	Bolt
7	Bolt	19	Lock Nut
8	Lock Nut	20	Pintle Lever
9	Flat Washer	21	Bolt
10	Lock Washer	22	Control Rod
11	Bolt	23	Nut
12	Spacer Washer	(*)	Includes items 10, 22, 25 & 26

C2943

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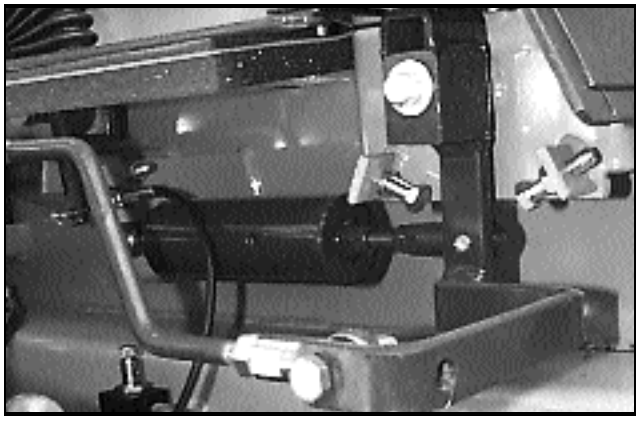
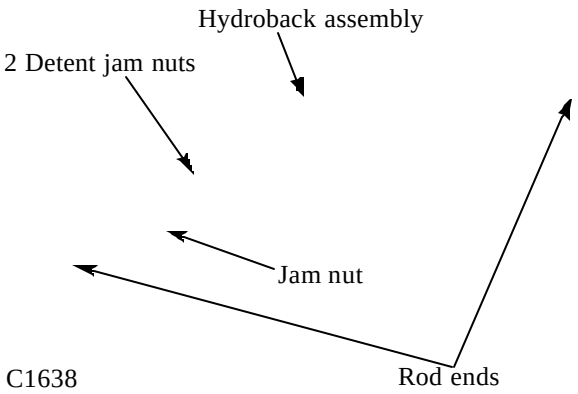
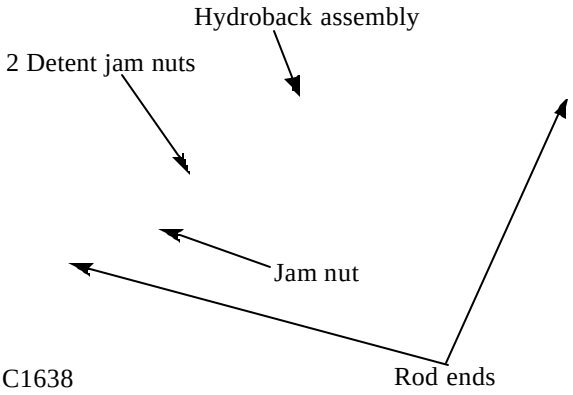




C1638

Detent Adjustment (con't.)

6 Loosen the 2 jam nuts next to the main body. (fig. C1638, C2364)
7 Turn the 2 nuts away from the main body of the hydroback.
8 Cycle the control lever several times.
9 Push the control lever rearward until you feel resis - tance. Stop.
10 Turn the 2 jam nuts back toward the main body of the hydroback until the nut just touches the flat washer.
11 Cycle the control lever again checking for a positive "detent" feel. If you now have a positive neural, tighten the 2 jam nuts together. If the hydroback still does not center, the hydroback has internal damage or wear. Replace the hydroback assembly with a new one.



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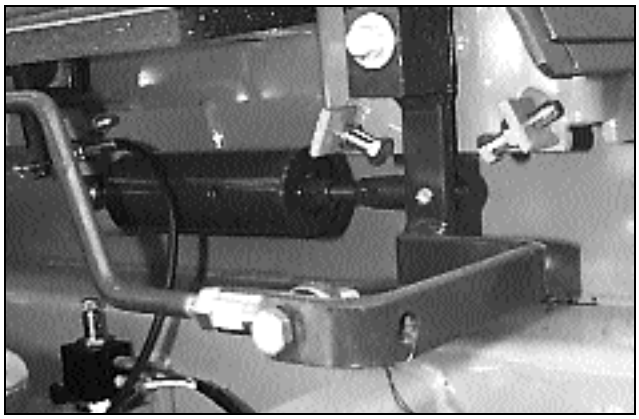

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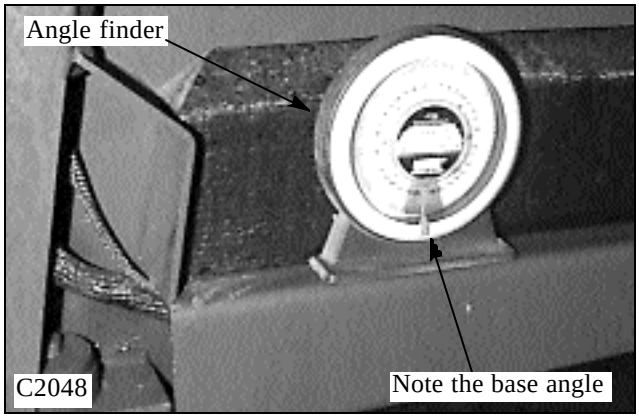
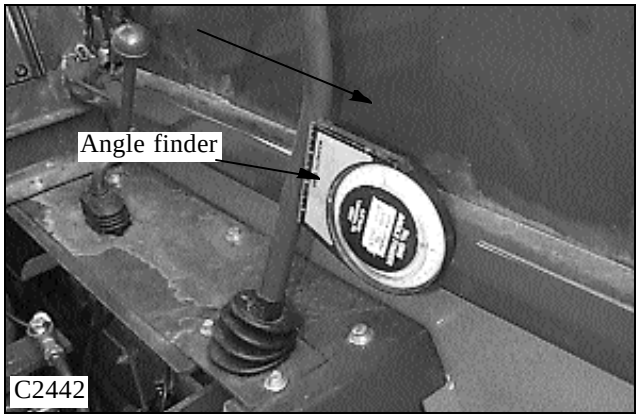
Hydro Back Replacement

Replacing the hydro back changes the steering control lever angle. To correctly set the angle after the hydro - back has been installed:
1 Replace the hydro back by removing the 2 bolts located at either end of the hydro back assembly.
2 Install the hydro back in the reverse order. Check the steering control rod ends and replace them now if they are worn.
3 Use an angle finder to check the base measurement angle the loader is sitting at. (fig. C2048) Note the angle the loader is sitting at. This measurement will have to be added or subtracted to the next measurement to give the most accurate adjustment.
4 Attach an angle finder to the most vertical part of the control lever. (fig. C2442)
5 Turn the hydro back threaded rod (fig. C2364) in or out of the female rod end to move the control lever to a reading of 9º leaning forward. Be sure to allow for angle the loader is sitting at. (Base angle) Jam the nut against the rod end when completed.

Make sure there is a minimum of 3/8'' (6mm) of thread holding the female rod end to the threaded rod.



C2048



C2442

Neutral Adjustment

Before performing the neutral adjustment make sure the neutral detent or hydro back is functioning and adjusted properly. Refer to page 4-4.

IMPORTANT

If you are unfamiliar with the control operations of the loader, read the Owner's / Operator's Manual beforehand.

1 Raise the boom arms, engage the boom support pins and shut off the engine. Raise and block the loader securely off the ground.

WARNING

Never work under the boom arms without the boom supports engaged.

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2 Remove the seat and hydrostatic shield. Note the location of the steering control linkage. (fig. C2443, 2438a)

3 Check the control rod end bushings for wear. If any play is present between the bushings and the bolts replace the rod ends.

4 Check the pintle lever for tightness on the swash plate shaft. Tighten the clamping bolt or replace the pintle lever if required. (fig. C2359)

5 If and when all rod bushings and pivot points have been check for wear or binding, proceed with the neutral adjustment.

6 Loosen the jam nuts on the control rod linkage. (fig. C2438b)

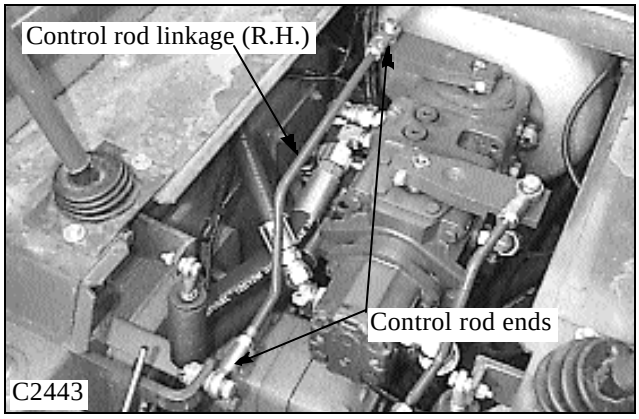
7 Start the engine and release the parking brake. Note the direction the drive wheels are rotating.

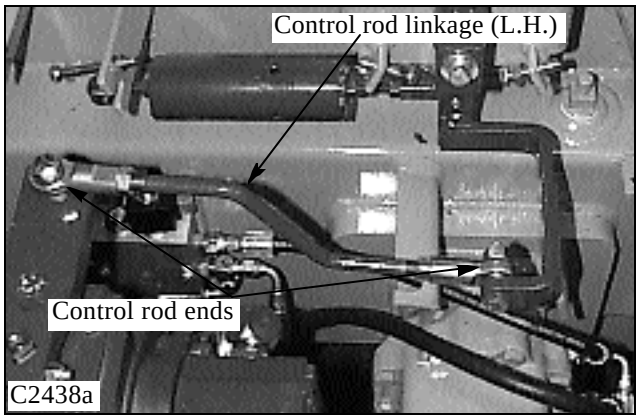
8 Remove the bolt in one of the control rod ends and make adjustments be turning the rod ends and linkage to lengthen or shorten the linkage as required. Replace the bolt and tighten the jam nuts against the rod ends and recheck the neutral adjustment. Repeat if necessary. **Maintain 3/8'' (9mm) thread in rod end.**

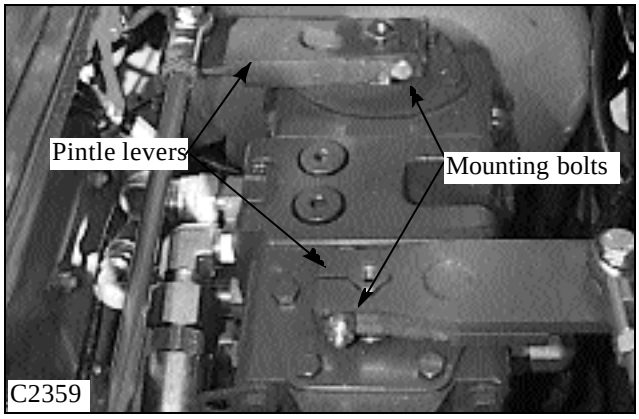
9 Very fine adjustment can be made at the hydro back threaded rod. Adjustment here affects the control lever angle. **Only make minor adjustments using this method. Maintain 3/8'' (9mm) thread in rod end.**

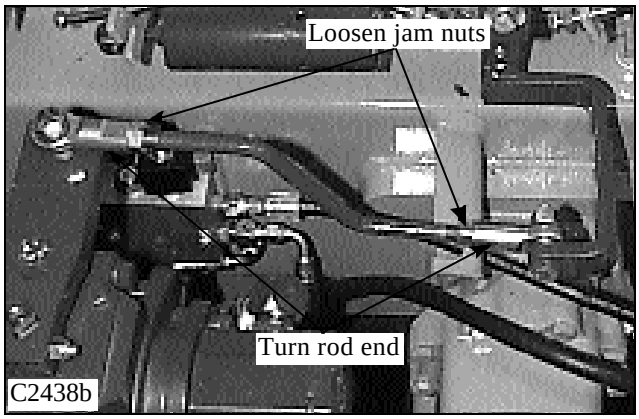
WARNING

Repairs or adjustment to the control lever system may change the loader neutral position. Make sure the loader is raised securely off the ground before restarting the engine, or accelerated loader movement may result.









Tracking Adjustment (Speed)

Tracking adjustment, or wheel speed, is set individually for L.H. and R.H. sides, forward and reverse. If the operator complains the loader does not go in a straight line when the levers are pushed clear forward the limiter stops may need adjustment.

1 Raise the boom arms, engage the boom support pins and shut off the engine. Raise and block the loader securely off the ground.

WARNING

Never work under the boom arms without the boom supports engaged.

2 Remove the seat and hydrostatic shield. Note the location of the steering control limiter bolts located front and rear of each steering control lever, just below the pivot point. (fig. C2364).

3 Make sure the detent and neutral adjustments are adjusted correctly. Refer to pages 4-4 ~ 4-6.

4 If and when all rod bushings and pivot points have been check for wear or binding, proceed with the wheel speed adjustment.

5 Start the engine and release the parking brake. Adjust the engine RPM to the full high idle position. (3000 RPM) Refer to Section 7 to verify engine RPM.

WARNING

Raise the loader securely off the ground before starting the engine or accelerated loader movement may result.

6 Using an RPM surface speed measuring tool (fig. C1837 Thomas P/N 43981), check wheel speed in the forward and reverse direction. Repeat for opposite side. (fig. C2445)

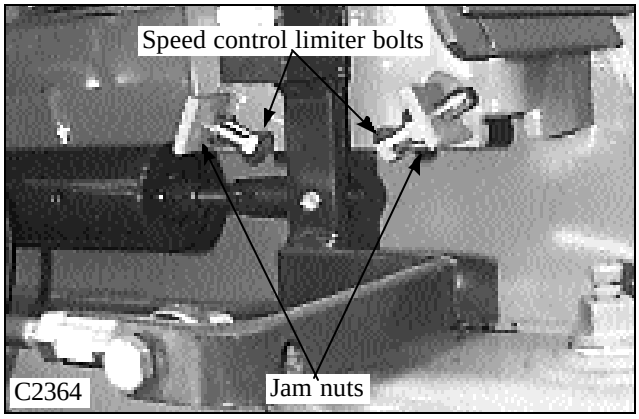
7 Correct wheel speed is set evenly at 82 RPM forward and reverse for both sides.

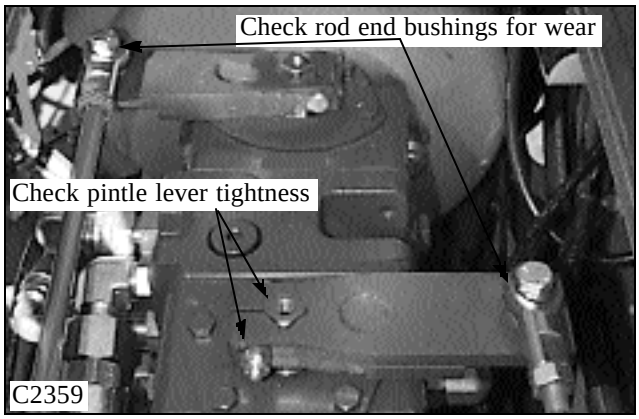
8 If adjustment is necessary, loosen the jam nut (fig. C2025) and turn the limiter bolt in to increase wheel speed or out to slow it down.

9 Tighten the jam nut and retest the speed adjustment. Repeat if necessary.

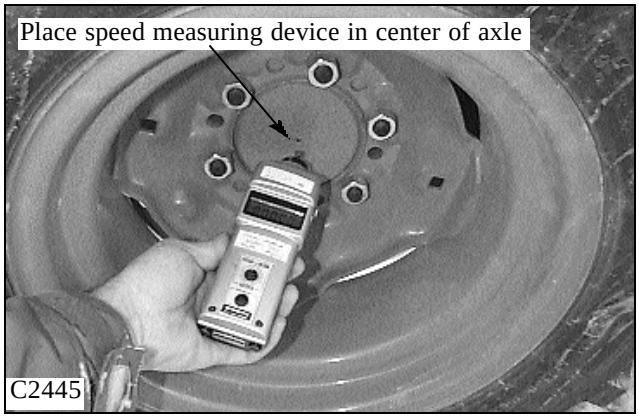
10 Replace the seat and hydrostatic shield.

Note: If the wheel speed does not meet the above specification, check the engine RPM. Refer to Section 7.
If the engine RPM check out good you may need to check for hydrostatic problems such as drive motor seal leakage etc. Refer to Section 2 for testing procedures.





Combination wheel speed and photo - sensor tachometer. Thomas P/N 43981



Control Lever Replacement

1 Raise the boom arms, engage the boom supports and shut off the engine. Raise the loader securely off the ground to prevent accidental engagement of the drive functions upon restarting the engine.

WARNING

Never work under the boom arms without the boom supports engaged.

2 Remove the seat and hydrostatic shield.

3 Remove the control handle by turning counter clock wise. (fig. C2948)

4 Remove the screws holding the bellows cover down. (fig. C2446) Slide the bellows over the top of the lever.

5 Remove the bolt going through the control rod and hydro back linkage. (fig. C2438a)

6 Remove the bolt and washers mounting the control lever to it's pivot point. (fig.C2438b) The control lever is now free to be removed.

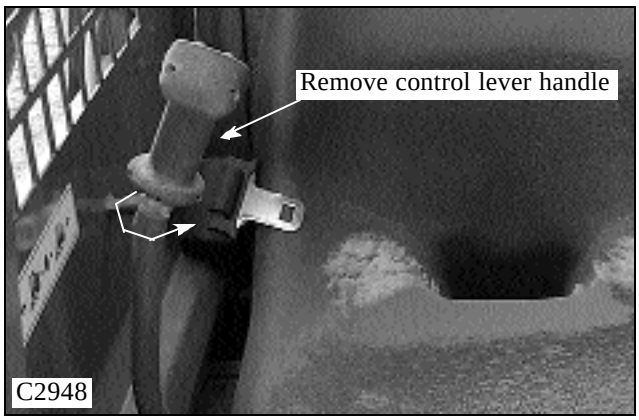
7 Replace the control lever in the reverse order. Lightly lubricate the pivot shaft with white grease when assembling the control lever to the pivot shaft.

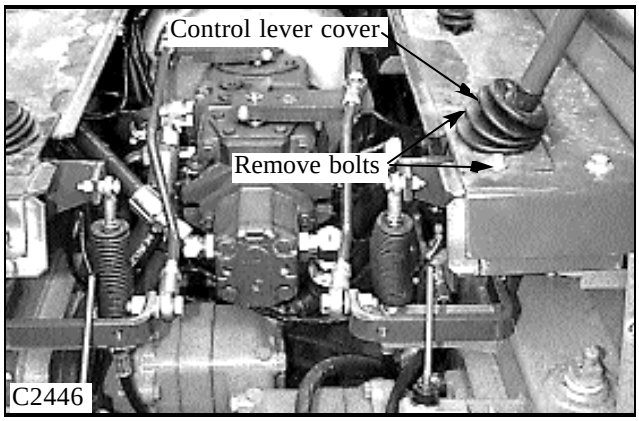
8 If necessary, make adjustments to the neutral centering and wheel speed as required. Refer to pages 4 - 4 ~ 4 - 7.

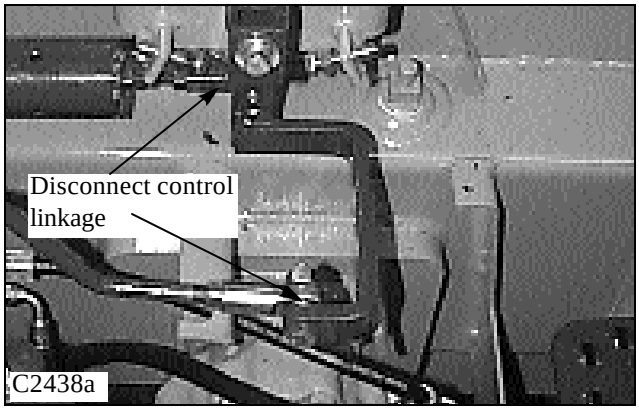
WARNING

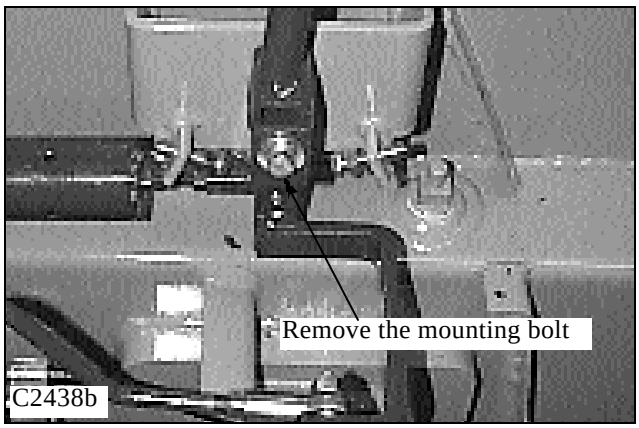
Repairs or adjustment to the control lever system may change the loader neutral position. Make sure the loader is raised securely off the ground before restarting the engine.

Note: If the loader is equipped with optional electrical accessories operated by control handle mounted switches, the control handle switch wiring will need to be disconnected and transferred to the new steering lever.

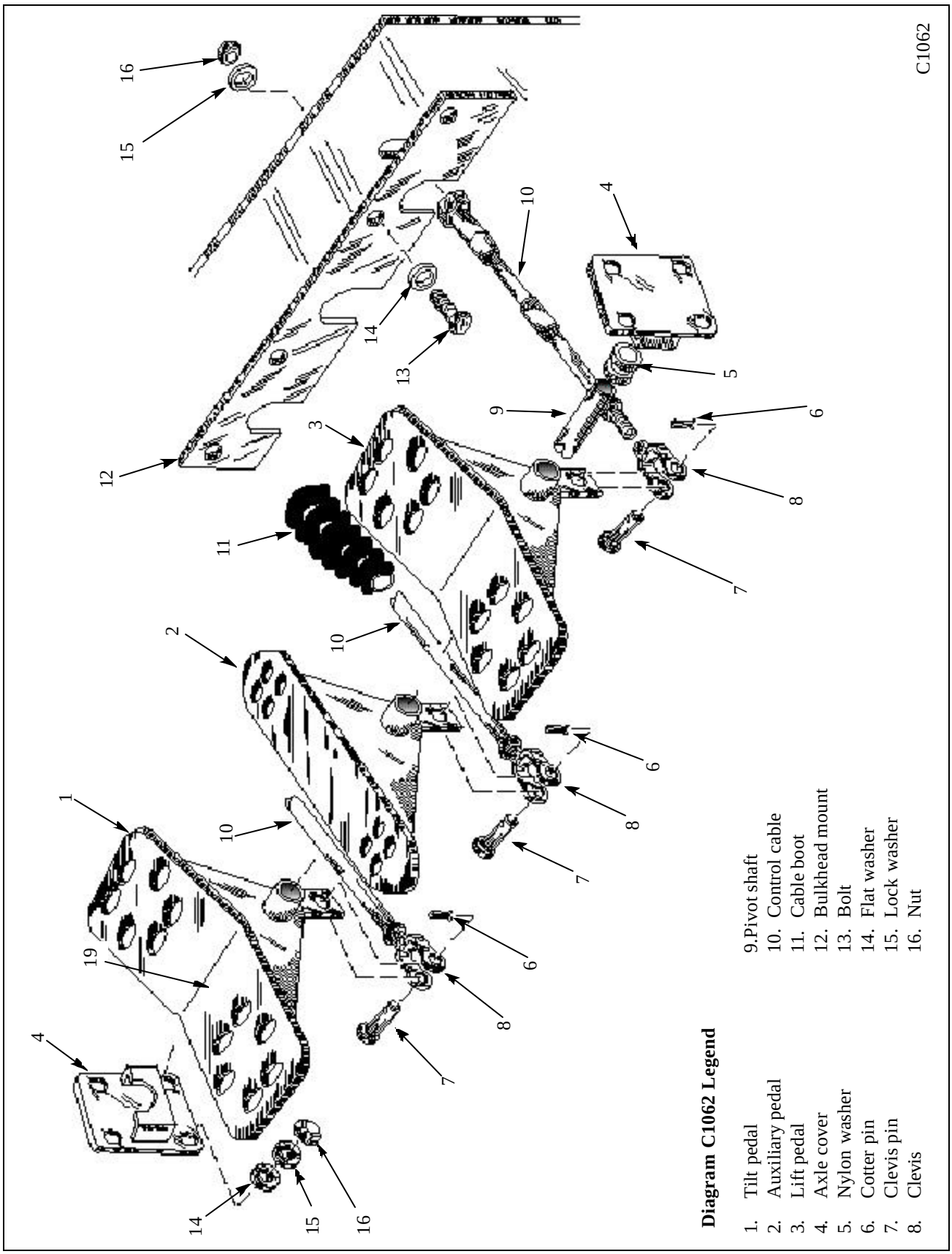








FOOT PEDALS 4.2



FOOT PEDALS 4.2

Cable Replacement

Check cable ends, eyelets or rod ends, and mounting pins for wear before removing the cable. Replace worn parts when replacing new cables. Cable ends should be inspected every 150 hours of operation.

1 Raise the boom arms, engage the boom supports and shut off the engine.

WARNING

Never work under the boom arms without the boom supports engaged.

2 Remove the seat and hydrostatic shield.

3 Loosen the jam nuts on the cable clevis ends. (fig. C2440, C2367)

4 Loosen the cable nuts. (fig. C2439, C2367)

5 Remove the bolts retaining the bulk head mount to the frame plate. (fig. C2439)

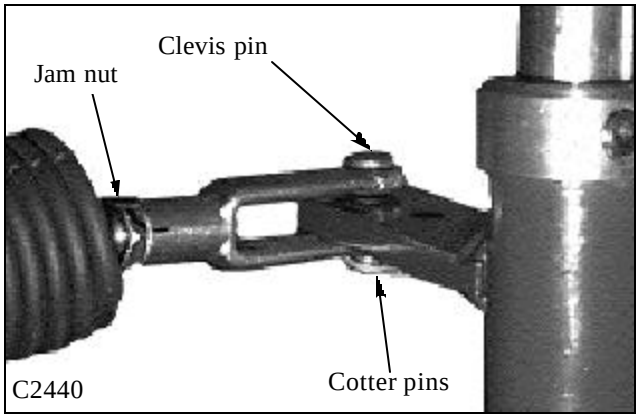
6 Remove the cotter pins from both ends of the cables and remove the clevis pins. (fig. C2440, C2367)

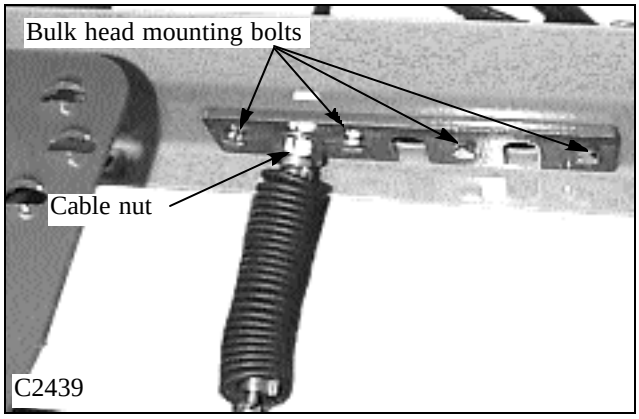
7 Remove the cable.

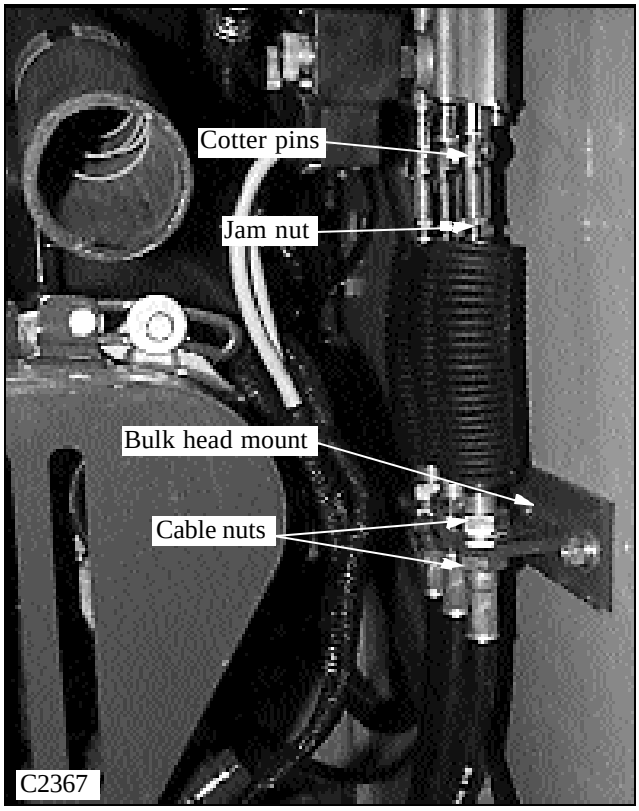
8 Remove the clevis and eyelet ends of the cable and reuse them if still serviceable.

9 Install the new cable in the reverse order above. There must be a minimum of 3/8'' (6mm) of thread engagement into the cable clevis and eyelet ends.

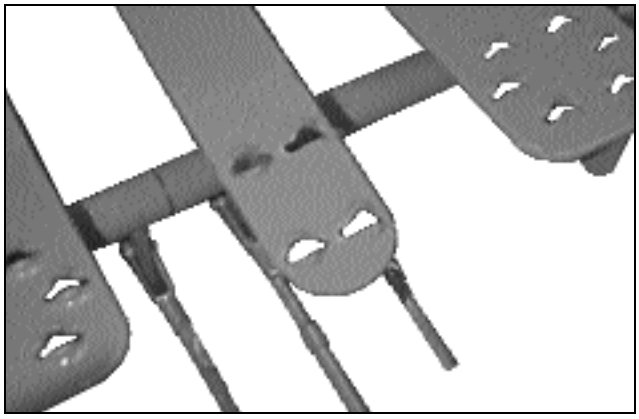
Note: After installation of a new cable, the foot pedal angle will need to be verified and adjusted if necessary. Refer to page 4-11.







FOOT PEDALS 4.2



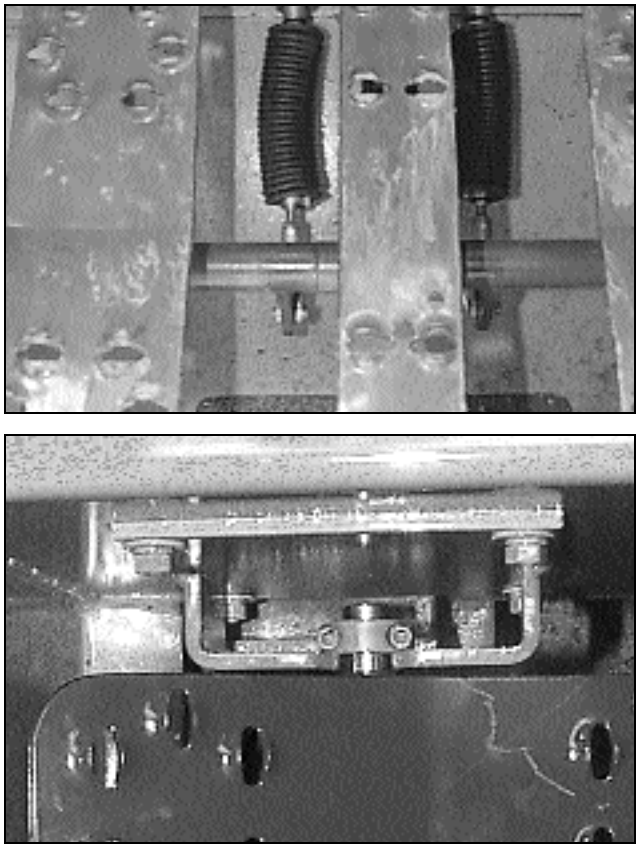
Checking the base angle

4

Angle finder

C2048

FOOT PEDALS 4.2



Pedal removal

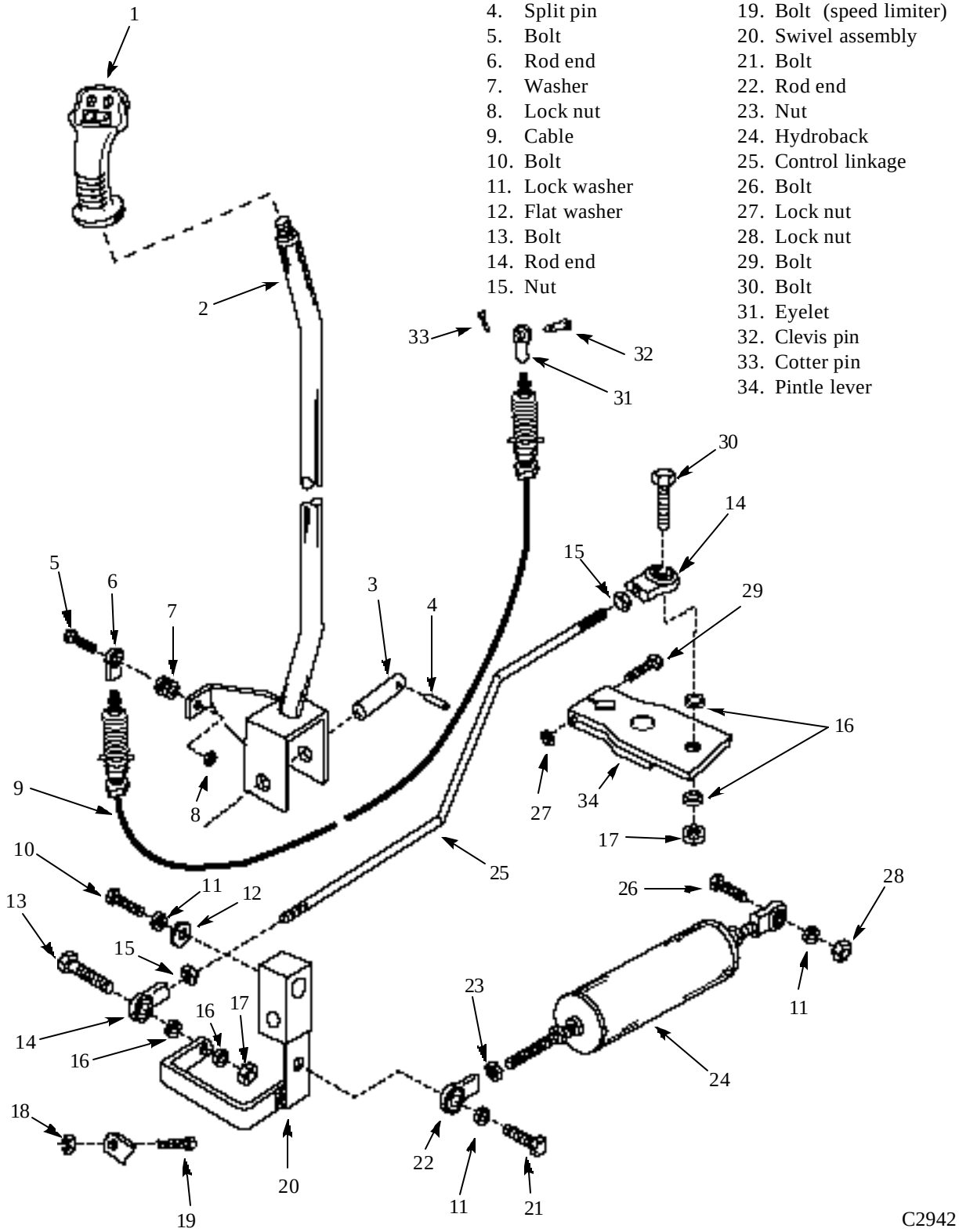
Spacer washers

C2281

HAND CONTROLS 4.3

Hand Operated Control Lever (L.H. Shown)

1. Control handle
2. Control lever
3. Pivot pin
4. Split pin
5. Bolt
6. Rod end
7. Washer
8. Lock nut
9. Cable
10. Bolt
11. Lock washer
12. Flat washer
13. Bolt
14. Rod end
15. Nut
16. Lock washer
17. Nut
18. Nut
19. Bolt (speed limiter)
20. Swivel assembly
21. Bolt
22. Rod end
23. Nut
24. Hydroback
25. Control linkage
26. Bolt
27. Lock nut
28. Lock nut
29. Bolt
30. Bolt
31. Eyelet
32. Clevis pin
33. Cotter pin
34. Pintle lever



Cable Replacement

Check cable ends, eyelets or rod ends, and mounting pins for wear before removing the cable. Replace worn parts when replacing new cables. Cable ends should be inspected every 150 hours of operation.

1 Raise the boom arms, engage the boom supports and shut off the engine.

WARNING

Never work under the boom arms without the boom supports engaged.

2 Remove the seat and hydrostatic shield.

3 Loosen the jam nuts on the cable rod end and eyelet end. (fig. C2020, C2034)

4 Loosen the cable nuts. (fig. C2448, C2367)

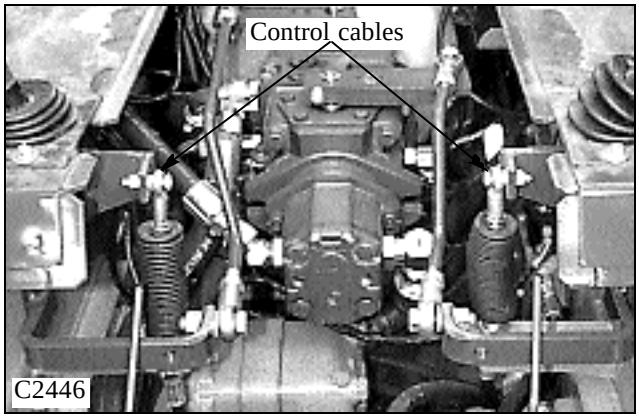
5 Remove the cotter pins from control valve end of the cable and remove the clevis pins. (fig. C2022)

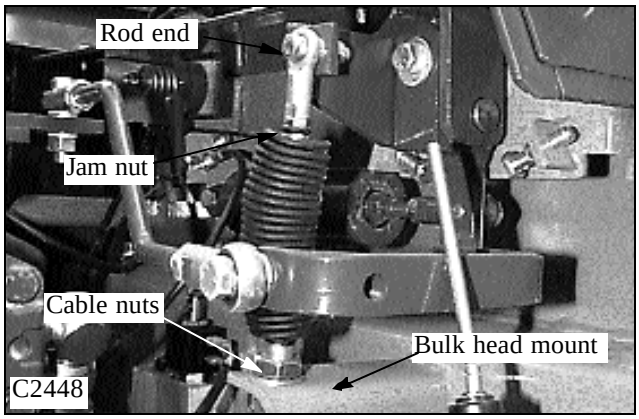
6 Remove the cable.

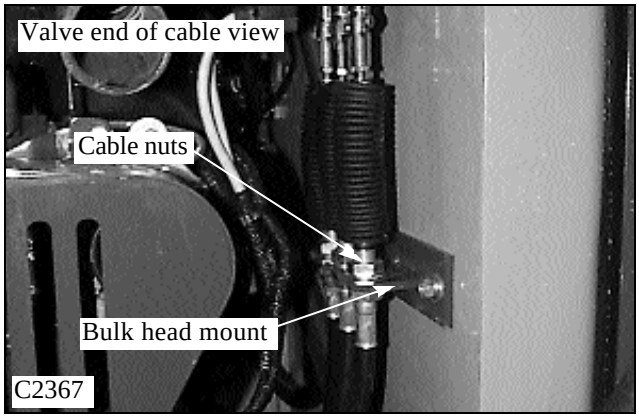
7 Remove the clevis and eyelet ends of the cable and reuse them if still serviceable.

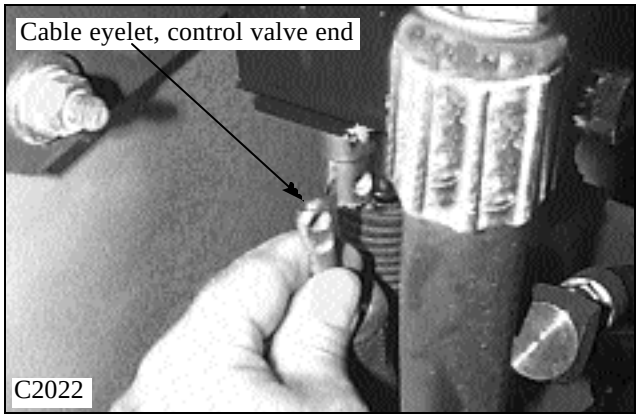
8 Install the new cable in the reverse order above. There must be a minimum of 3/8'' (6mm) of thread engagement into the cable rod end and eyelet ends.

Note: After installation of a new cable, the control lever angle will need to be verified and adjusted if necessary. Refer to page 4-15.







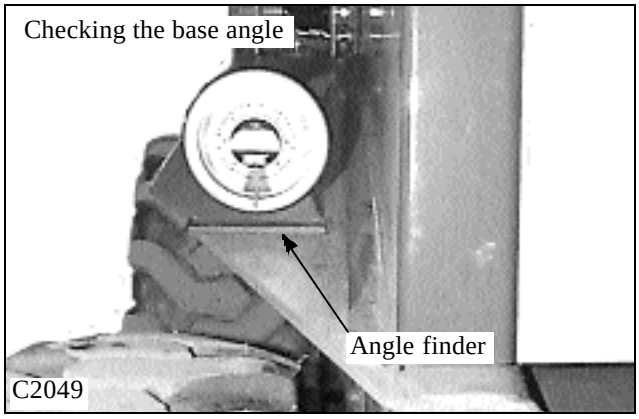


Angle Adjustment

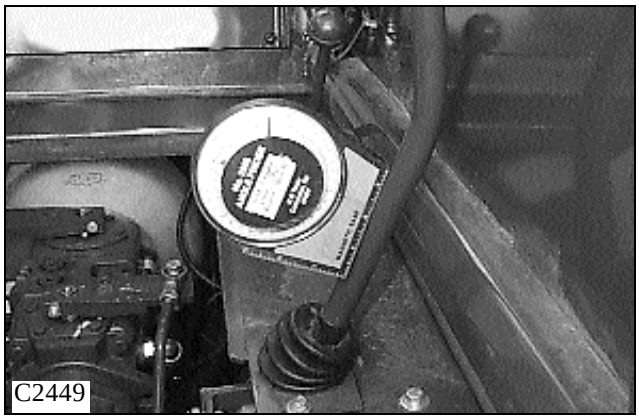
After changing the control cable the control lever angle will need to be verified and / or adjusted to provide operator comfort and proper pedal travel clearance.

1 Make sure the cable ends are screwed onto the cable threads a minimum of 3/8'' (6mm).

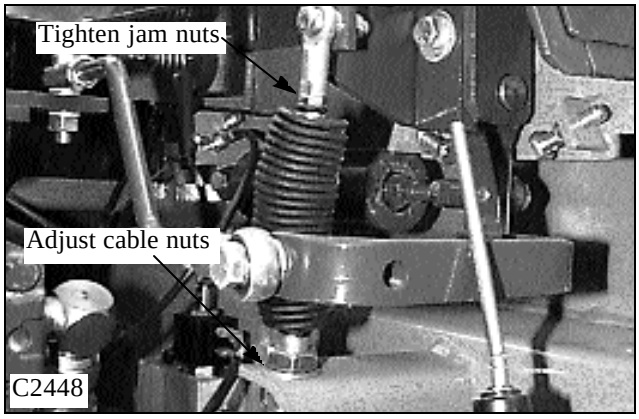
2 Place an angle finder on the fender of the loader to find the base measurement. Note the reading. (fig. C2049)



3 Place the angle finder on the control lever as shown in fig. C2449. Note the reading. The correct angle is 18º + / - 1º.



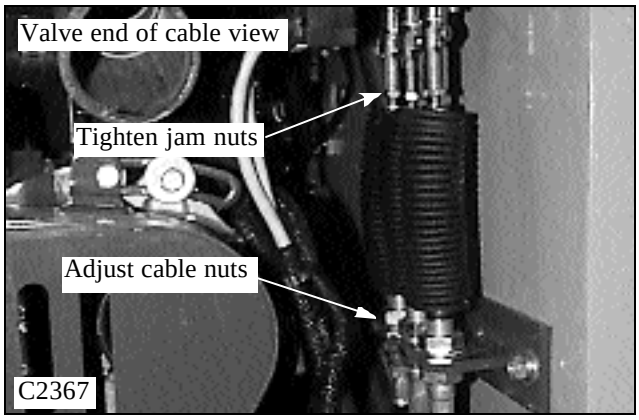
4 Adjust the angle by moving the cable nuts up or down on their mount. Adjustment may be made at the front and / or the rear of the cable. (fig. C2448, C2367) Be sure to allow for the base angle, the angle the loader may be leaning at while measuring. Add or subtract this measurement as necessary.



5 Tighten all cable nuts and jam nuts on the cable ends. (fig. C2448, C2367)

6 Cycle the control levers to check for travel clearance. Be sure controls return freely to the center position and the control locks engage positively.

7 Replace the seat and hydrostatic shields.



Control Lever Replacement

1 Raise the boom arms, engage the boom supports and shut off the engine.

WARNING

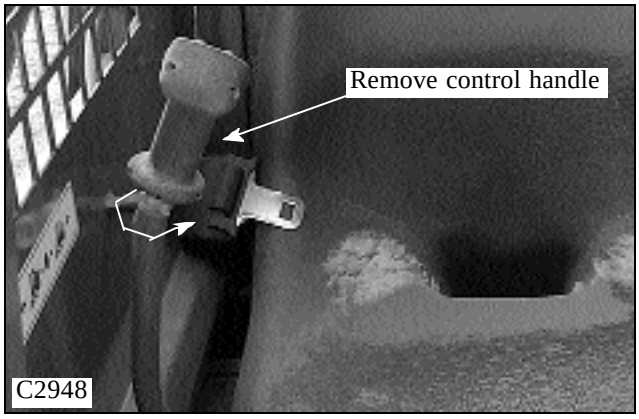
Never work under the boom arms without the boom supports engaged.

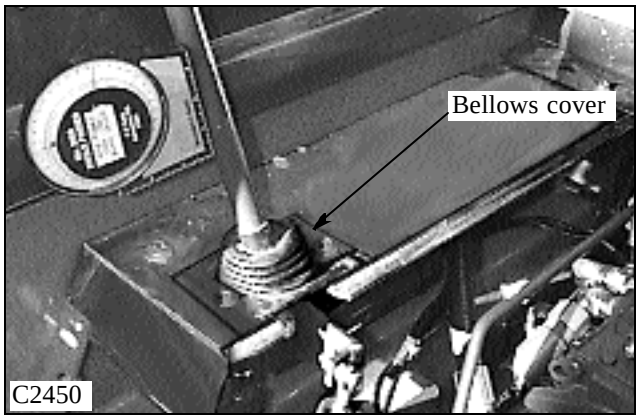
2 Remove the seat and hydrostatic shield.
3 Remove the control handle from the steering lever by turning it counter clockwise. (fig. C2948) The handle may be reused on the new or repaired control lever.
4 Remove the bellows cover screws (fig.C2450) and remove the bellows.
5 Remove the bolt from the control cable to the swivel assembly. (fig. C2447)
6 Remove the bolt from the control rod and hydro back linkage. (fig. C2447)
7 Remove the bolt from the swivel assembly and remove the control lever assembly. (fig. C2047)

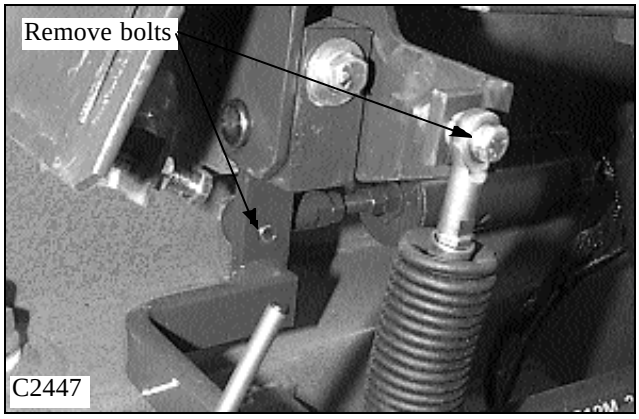
Note: If the loader is equipped with optional electrical accessories operated by control handle mounted switches, the control handle switch wiring will need to be disconnected and transferred to the new steering lever.
If the control lever functions are sloppy due to excessive wear of the swivel bushing, the swivel assembly may be replaced.

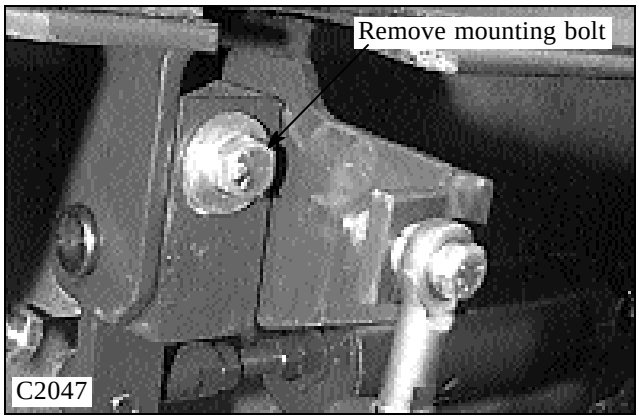
See fig. C1201 page 4-13 for exploded view of control lever assembly.

1 Remove the roll pin in the swivel shaft.
2 Remove the swivel shaft. Use a brass drift punch and hammer if necessary.
3 Save any spacer washers that may have been used.
4 Replace the swivel assembly.
Replace all parts in the reverse order. Use the spacer washers to remove the fore and aft movement of the steering lever on the swivel assembly. Use a new roll pin when installing the swivel shaft.
Install the control lever assembly to the loader in the reverse order of removal.
Cycle the control lever after installation to check for binding and travel clearance.
Check the control lever angles. Pages 4-5 and 4-15.
Check the wheel speed, or tracking, to assure optimum performance. Page 4-7.



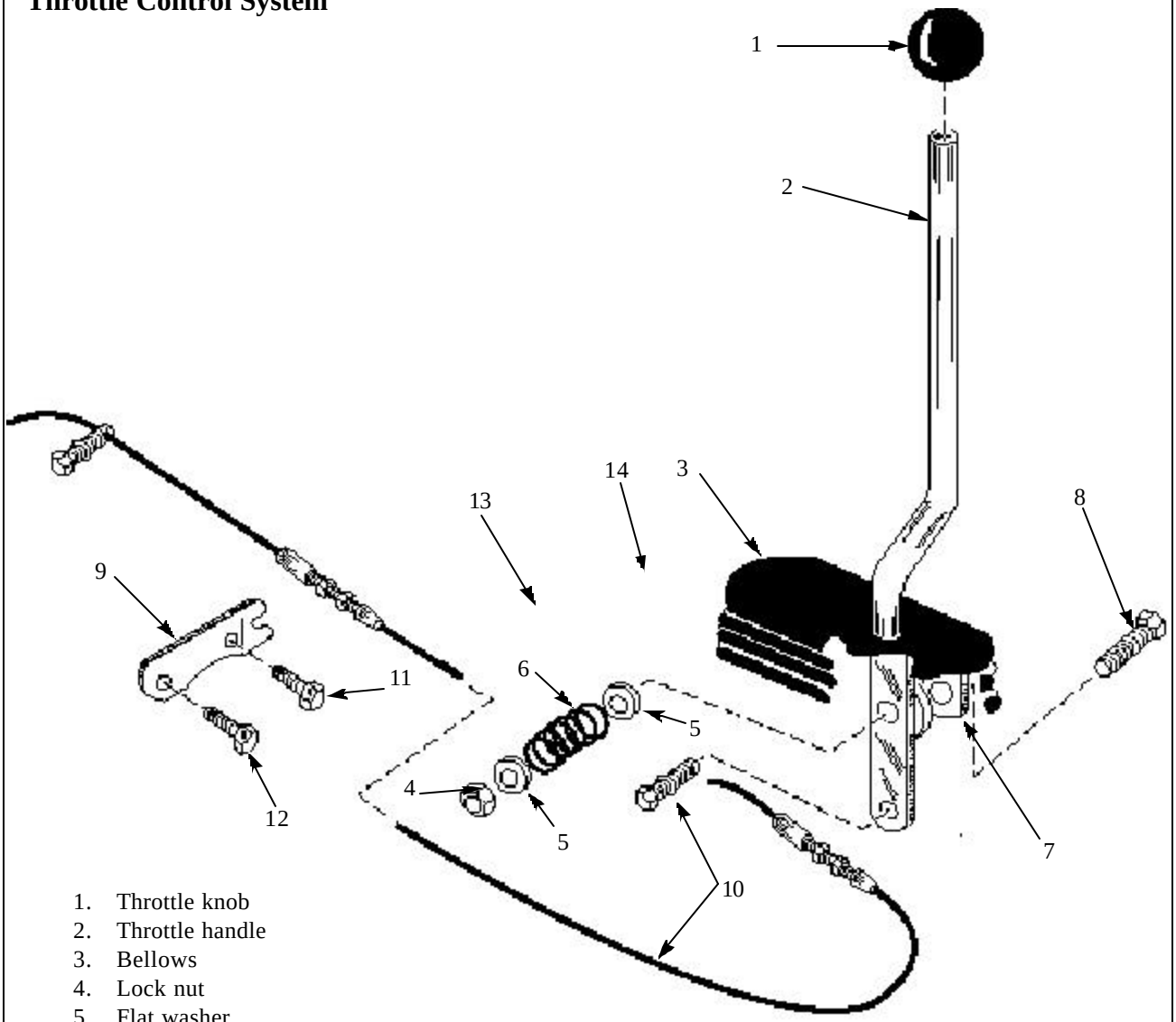






THROTTLE 4.4

Throttle Control System



1. Throttle knob
2. Throttle handle
3. Bellows
4. Lock nut
5. Flat washer
6. Spring
7. Friction pad
8. Bolt
9. Cable mount
10. Throttle cable
11. Bolt
12. Bolt
13. Limiter Bolt
14. Nut

C1121

THROTTLE 4.4

Adjustments

The throttle system can be adjusted for tension and total travel. (stroke)
If the throttle system can not maintain a constant, steady, engine speed then the throttle handle tension spring may need to be adjusted.

1 Raise the boom arms, engage the boom supports and shut off the engine.

WARNING

Never work under the boom arms without the boom supports engaged.

4

2 Remove the seat and hydrostatic shield.

3 Locate the throttle handle pivot and tension spring under the left hand cover plate. (fig. C2359, C2363)

4 Tighten the nut on the tension spring clock wise to increase the spring tension to gain clamping force against the friction pad.

If this fails to repair the problem then the friction pad may need to be replaced.

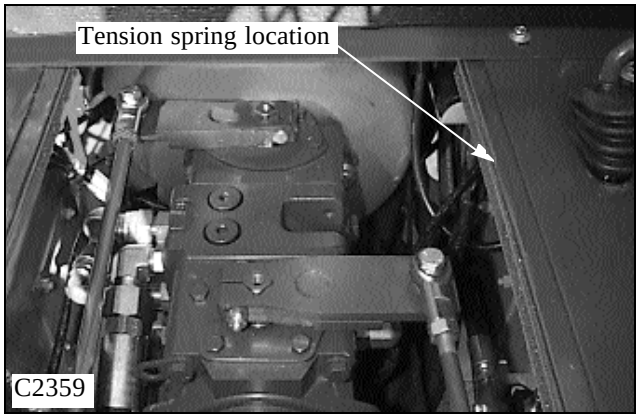
To check the throttle travel:

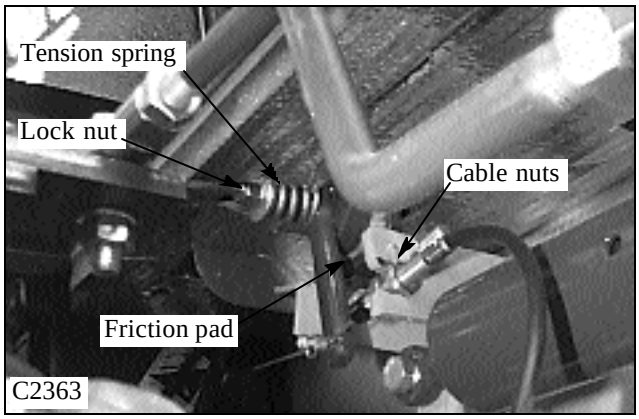
1 Open the rear door and locate the engine lever and throttle control cable.

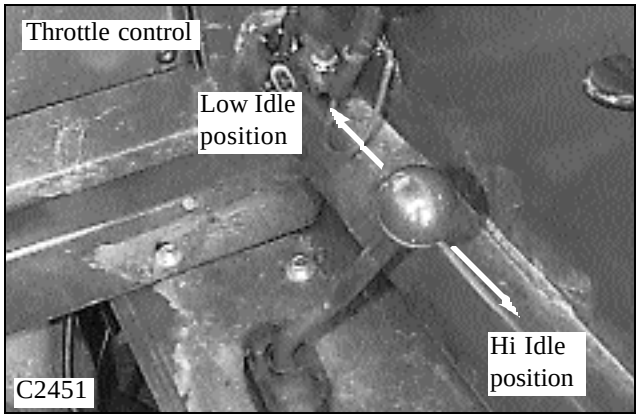
2 Stroke the throttle lever in the full forward position. (C2451) The engine lever must touch the limiter bolt stops to acquire full engine speed. (fig. C2625)

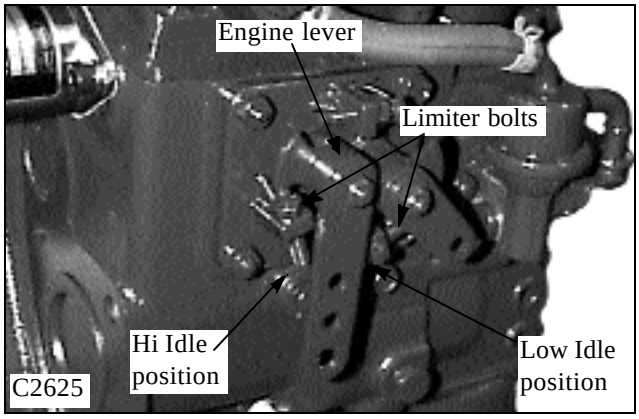
3 Stroke the throttle lever rearward until it stops. The engine lever should touch the limiter bolt to acquire the engines proper low idle speed.

4 Adjust the set collars an either side of the engine lever and throttle linkage to get the full range of required travel for the engine lever to touch the limiter bolts.









NOTES

4

THROTTLE 4.4

Throttle Cable Replacement

1 Raise the boom arms, engage the boom supports and shut off the engine.

WARNING

Never work under the boom arms without the boom supports engaged.

2 Remove the seat and hydrostatic shield. (fig. C806).

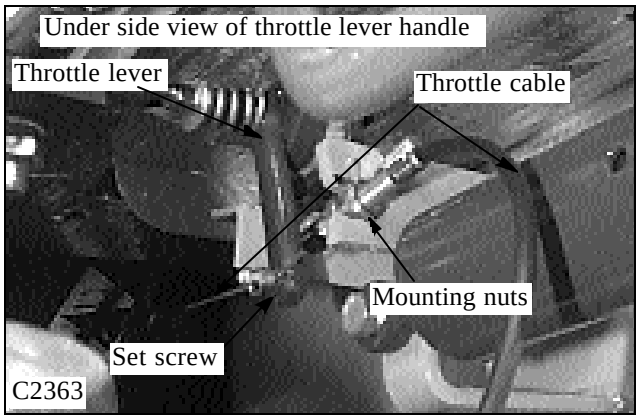
3 Loosen the set screw connecting the throttle cable to the throttle handle. (fig. C2363). Loosen the mounting nuts.

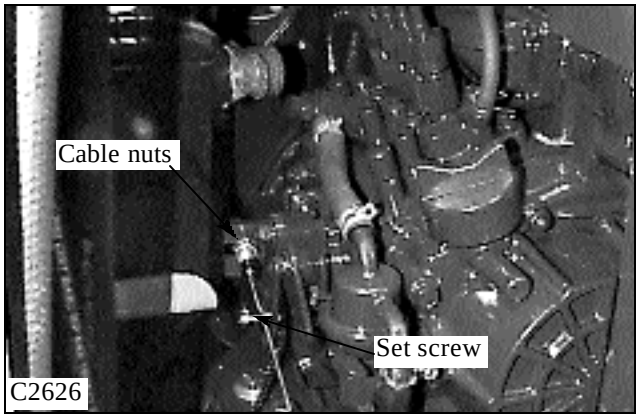
4 Open the rear door and loosen the set screw connecting the throttle cable to the engine lever. (fig. C2626). Loosen the mounting nuts.

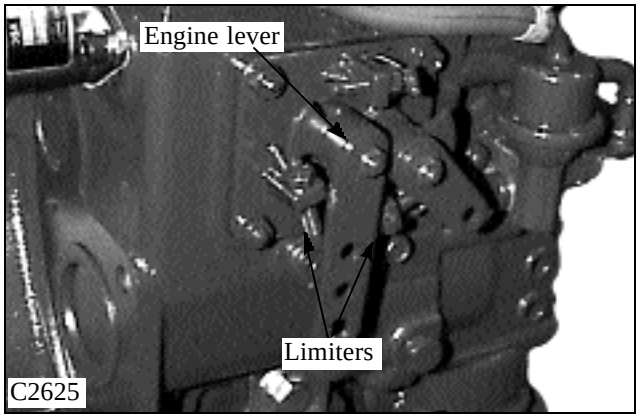
5 Remove the throttle cable.

6 Replace the throttle cable in the reverse order above.

7 Adjust the cable as outlined in section 4.4 so the engine lever bumps the limiter bolts (fig. C2625) when the throttle lever is stroked full ahead (high idle) and full rearward (low idle).

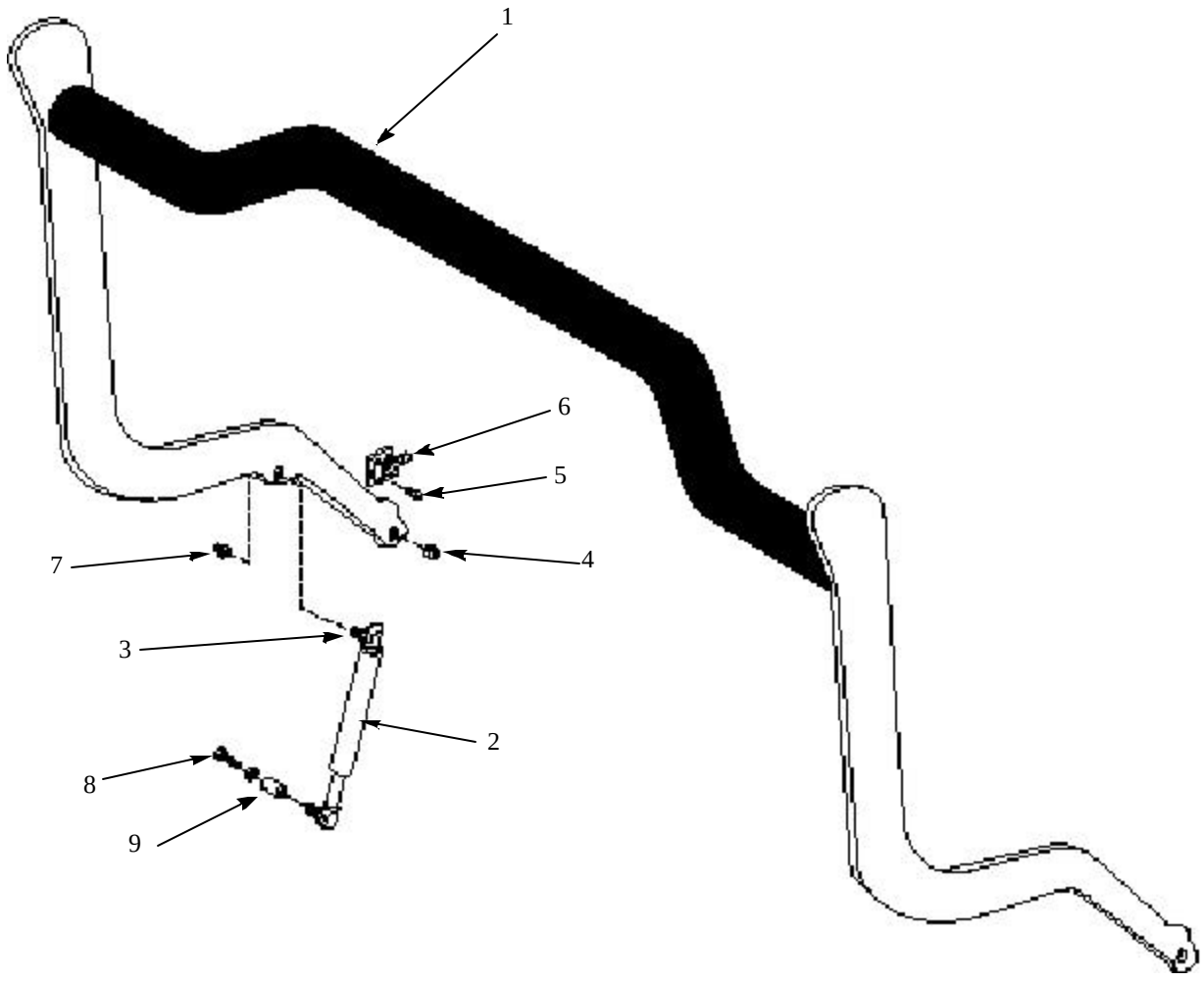






RESTRAINT BAR 4.5

Restraint Bar System



1. Restraint bar assembly
2. Gas spring
3. Ball stud
4. Lock nut
5. Stove bolt
6. Switch
7. Lock nut
8. Bolt
9. Spacer

C1014

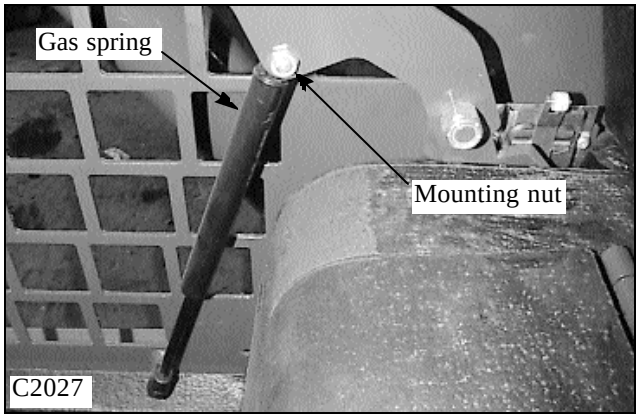
RESTRAINT BAR 4.5

Gas Spring Replacement

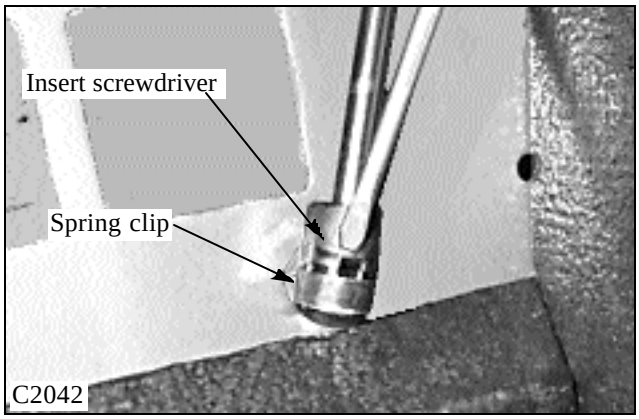
The restraint bar is held up, over head, by means of a gas assist type strut. (gas spring)
If the seal in the strut has deteriorated and failed, or the strut rod has been damaged, the restraint bar will not stay in the upright position due to gas pressure loss.

To replace the gas spring assembly:

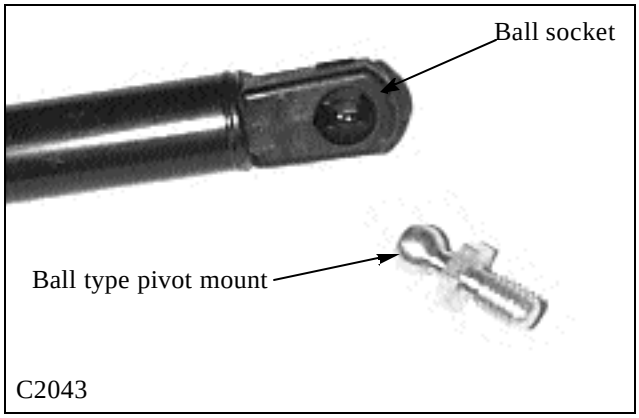
1 Lower the liftarms and park the loader on a level surface. Shut off the engine.



2 Insert a small flat bladed screwdriver behind the spring clips (fig. C2042) on either end of the gas spring. Twist the screw driver while pulling out on the gas spring. Repeat for the opposite end.



3 Check the ball pivot mounts for wear or damage. (fig. C2043) Replace them if necessary.



4 The new gas spring is fully charged and is extended to full length when installed. (fig. C2044)

5 Push one end of the gas spring onto the ball pivot mount.

6 Raise the restraint bar and attach the opposite end.

7 Cycle the restraint bar to verify the new gas spring will hold the restraint bar in the upright position.

RESTRAINT BAR 4.5

Restraint Bar Replacement

1 Lower the liftarms and park the loader on a level surface. Shut off the engine.

2 Remove the nut from the upper gas spring pivot ball. (fig. C2936, C2027) Remove the mount and gas spring together allowing the restraint bar to lower.

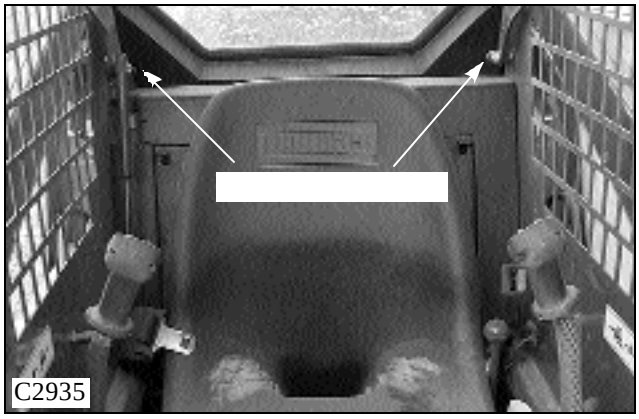
3 Remove the 2 restraint bar mounting nuts. (fig. C2027) There is one on either side of the restraint bar.

4 Squeeze the restraint bar ends inward and remove each side from it's pivot / mounting bolt. Use caution, do not damage the safety switch located to the right rear of the restraint bar.

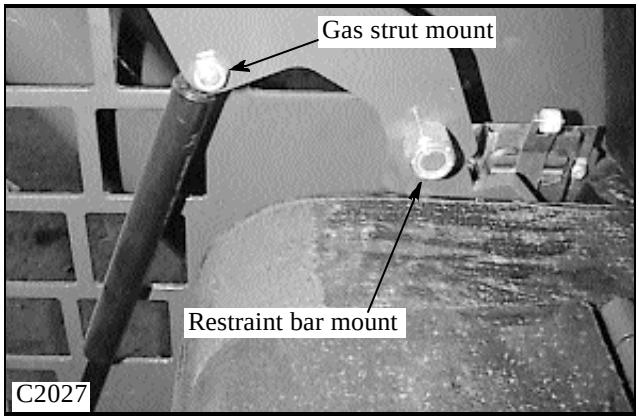
5 Replace the restraint bar in the reverse order. Use new lock nuts on the restraint bar mounts. Tighten to remove slack between the restraint bar and spacer bushings. Do not over tighten. The restraint bar should cycle freely up and down without binding.

6 Re- attach the upper ball pivot mount to the restraint bar. Cycle the restraint bar to check proper operation.

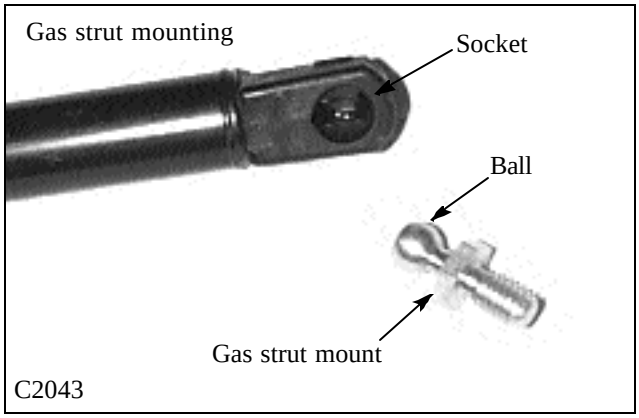
7 Check to make sure the safety switch is contacting the restraint bar, and functioning properly. This safety switch activates the parking brake when the engine is operating, the operator is seated with the seat belt fastened, and the restraint bar is in the raised position. Lower the restraint bar to release the parking brake.


C2935

C2936



C2027



C2043

PARKING BRAKE 4.6

General Information

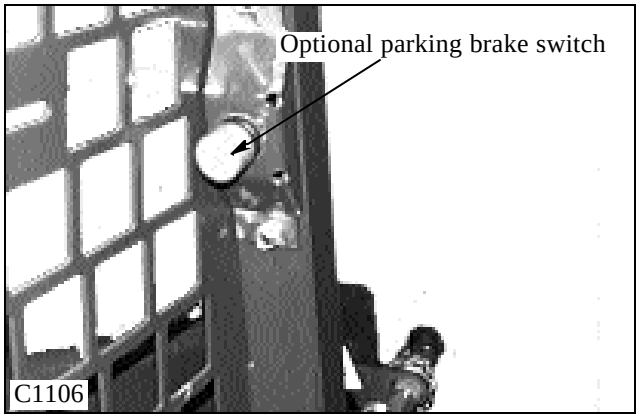
Each drive motor contains a set of clutch pack type friction discs that are spring loaded in the engaged position. The parking brake will only release when the clutch pack receives hydraulic pressure to separate the discs.

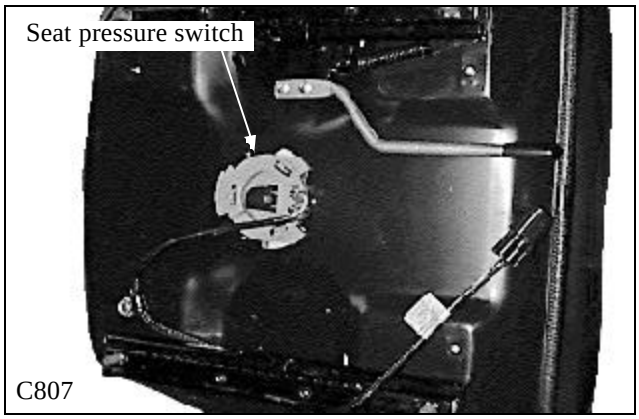
The parking brake system requires 200 psi (13.78 bar) hydraulic pressure to release or separate the clutch packs in the drive motors. The hydraulic pressure is provided by the charge pressure relief valve in the hydrostatic tandem pump.

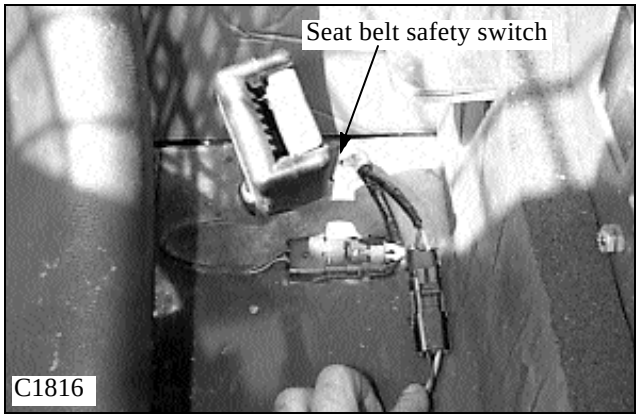
The parking brake is inter locked with various safety switches. (fig. C807, C1816, C2362, C2027) The parking brake will only release when the engine is operating, the operator is seated with the seat belt fastened and the restraint bar is in the lowered position.

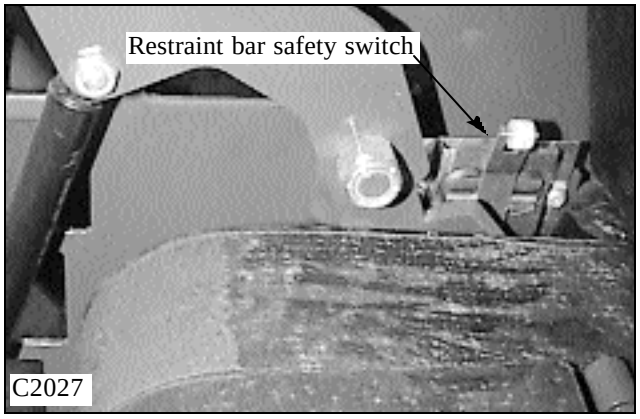
The parking brake may also be equipped with an optional push button switch located on the front left down tube of the ROPS. (fig. C1106)

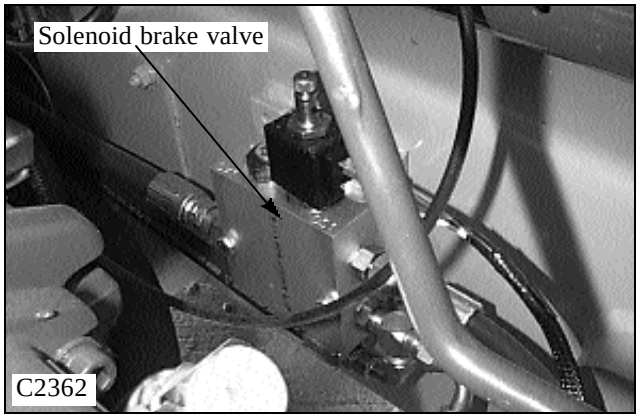
When the engine is operating and all safety switches are functioning and in the closed position, the hydraulic / electric solenoid brake valve (fig. C2362) will allow charge pressure to release the parking brake in the drive motors.











TROUBLE SHOOTING 4.7

Symptom	Cause	Corrective Action	Section
Loader creeps, won't center	Neutral adjustment	Adjust linkage	4.1
	Worn, loose linkage	Replace, tighten parts	4.1
	Binding, dragging parts	Repair, replace	4.1
Steering jerky	Worn, loose linkage	Replace	4.1
	Binding linkage	Repair, replace	4.1
	Linkage adjustment	Adjust	4.1
	Low charge pressure	Repair, replace	2
Loader doesn't track straight	Limiter stops	Adjust	4.1
	Binding linkage	Repair, replace	4.1
	Hydrostatic failure	Repair, replace	2
Boom controls inoperative	Damaged cables, linkage	Replace	4.2, 4.3
	Safety switch (s)	Adjust, replace	5
	Bad electrical ground	Repair	5
	Blown fuse	Replace	5
	Valve lock malfunction	Replace parts	1, 5
	Low hydraulic oil	Replenish	1
	No oil pressure	Test and repair	1
Boom operation slow	Cable linkage	Replace, adjust	4.2, 4.3
	Aux. hydraulics engaged	Disengage	
	Engine RPM low	Adjust	7
	Control valve relief	Adjust, replace	1
	Cylinder seal, damage	Repair, replace	1
Boom controls stiff	Cable wear	Replace	4.2, 4.3
	Pivot wear	Replace parts	4.2, 4.3
	Control valve wear	Repair, replace	1
Auxiliary hyd. inoperative (solenoid control type)	Blown fuse	Replace	5
	Switch (s) failure	Replace	5
	Aux. valve malfunction	Repair, replace	1
	Electrical short	Repair	5
	Bad electrical ground	Repair	5
Brake won't hold	Service plunger on brake valve open	Inspect and service	2
	Brake disc wear or damage	Repair, replace	2
Brake won't release	Blown fuse	Replace	5
	Safety switch malfunction	Adjust, replace	5
	Lack of hydrostatic charge pressure	Test, repair	2
	Brake valve failure	Repair, replace	2

NOTES

SECTION 5 ELECTRICAL

5

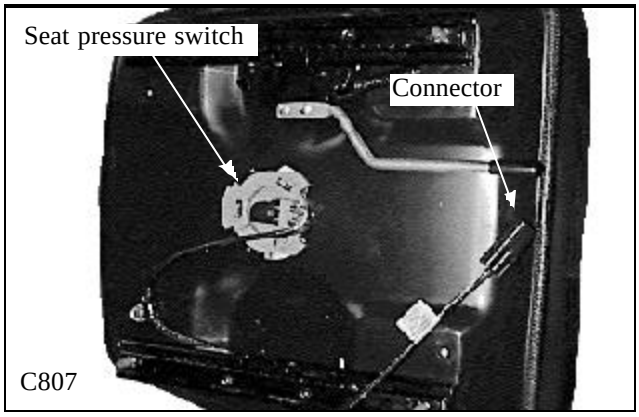
GENERAL INFORMATION 5.1

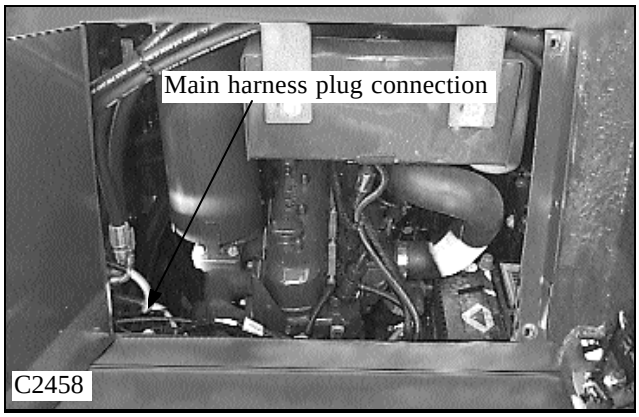
Ignition ..... 12 Volts
Grounding ..... Negative
Alternator Brand ..... Nippondenso
Alternator Rating ..... 60 Amp
Alternator Type ..... Internal Regulator
Battery ..... One (1)
Battery Rating ..... 730 CCA,
..... 125 Reserve Minutes
Battery Type ..... SERV 3478
Starter Brand ..... Nippondenso
Pre - Heater ..... (4) Glow Plugs
Glow Plug Location ..... Cylinder Head
Circuit Breaker ..... (1) 40 Amp,
..... Starter / Ignition Switch
Protection ..... Fuse Block in Engine Compartment
Fuse Rating:
Engine Shut Off Solenoid ..... 15 Amp
Alternator ..... 10 Amp
Safety Circuit ..... 10 Amp
Horn ..... 10 Amp
Aux. Hydraulics ..... 10 Amp
Cab Heater ..... 10 Amp
Back up Alarm ..... 10 Amp
Dome Light ..... 10 Amp
Starter ..... 40 Amp Relay*
Glow Plugs ..... 40 Amp Relay*
Cooling Fans ..... (2) 40 Amp Relay*
* ..... Linked to 10 Amp Fuse in Panel

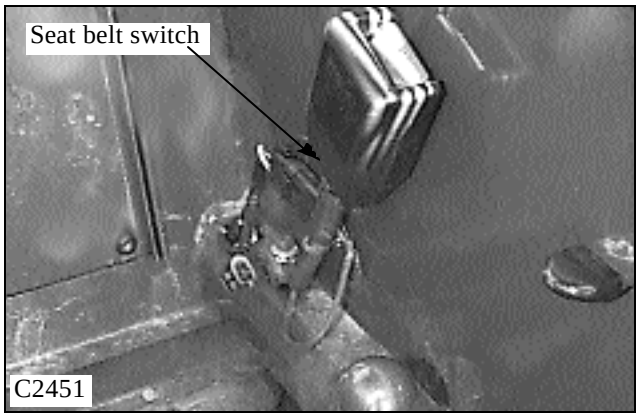
Introduction

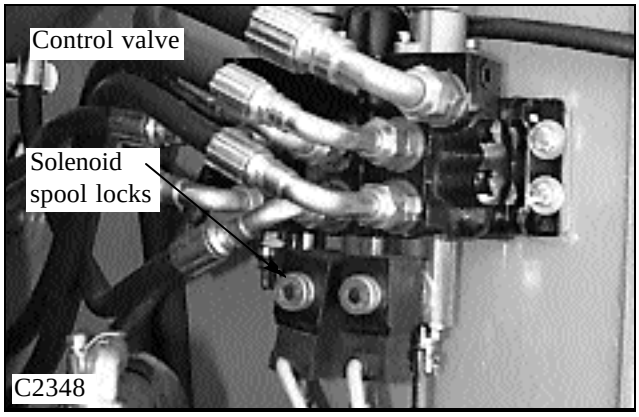
The photographs below and at right show the safety switches and their location. These photographs will assist you when referencing the electrical circuit drawings. The parking brake will not release and the lift and tilt hydraulic functions will not operate when any one of these circuits have failed or malfunctioned.

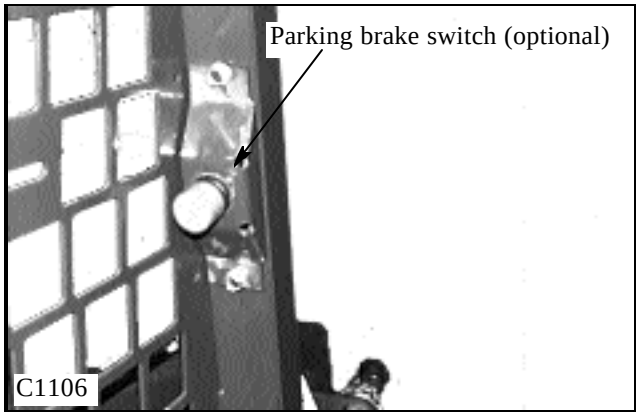
Be sure to disconnect the seat pressure switch connector before removing the seat from the loader and be careful not to pinch the wires upon installation.

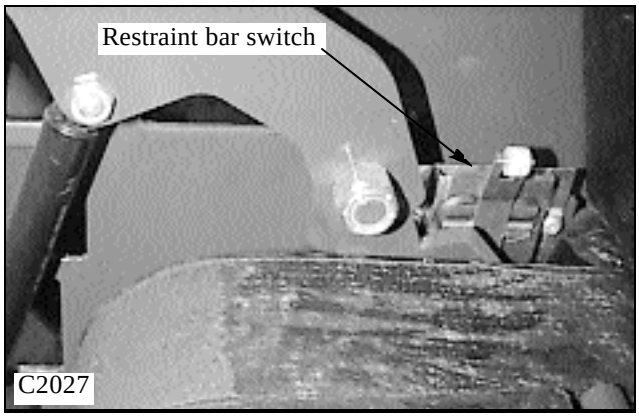


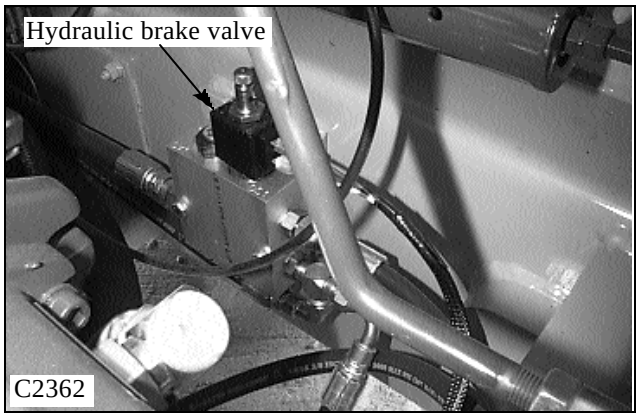












5

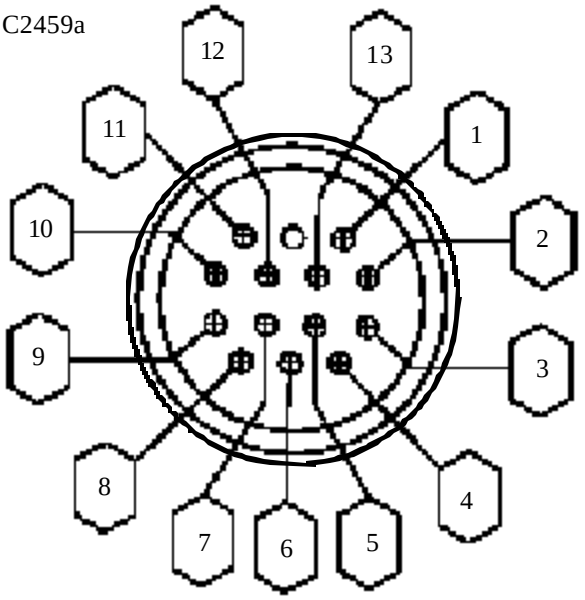
WIRING SCHEMATIC 5.2

Engine Harness Connector

Diagram C2459a Legend. Shown is the wire color and function of each pin terminal in the connector plug.

PIN	WIRE COLOR	FUNCTION
1	Tan	Starter relay
2	Blk / Wht	Fuse block
3	Red / Wht	Glow plug relay
4	White	Circuit breaker
5	Purple	Engine oil pressure
6	Pink	Air filter
7	Pple / Wht	Coolant temperature
8	Wht / Brn	Horn button
9	Brn / Wht	Brake light switch
10	Red / Org	Rear light
11	Org / Blue	Fuel level (+)
12	Blue / Wht	Hydraulic temperature
13	Grey / Wht	Alternator (L)
14	Grey	Seat Belt

C2459a

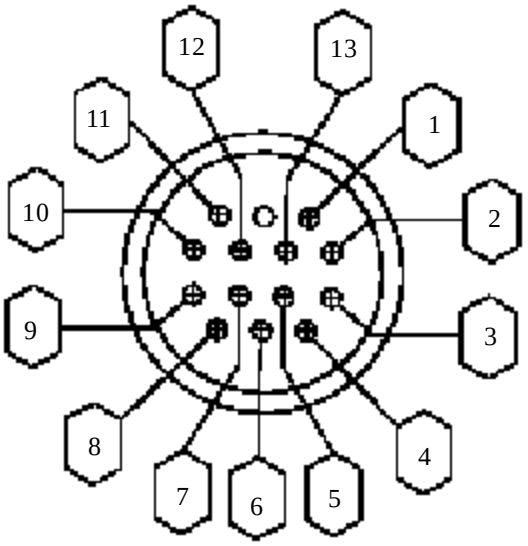


5

ROPS Harness Connector

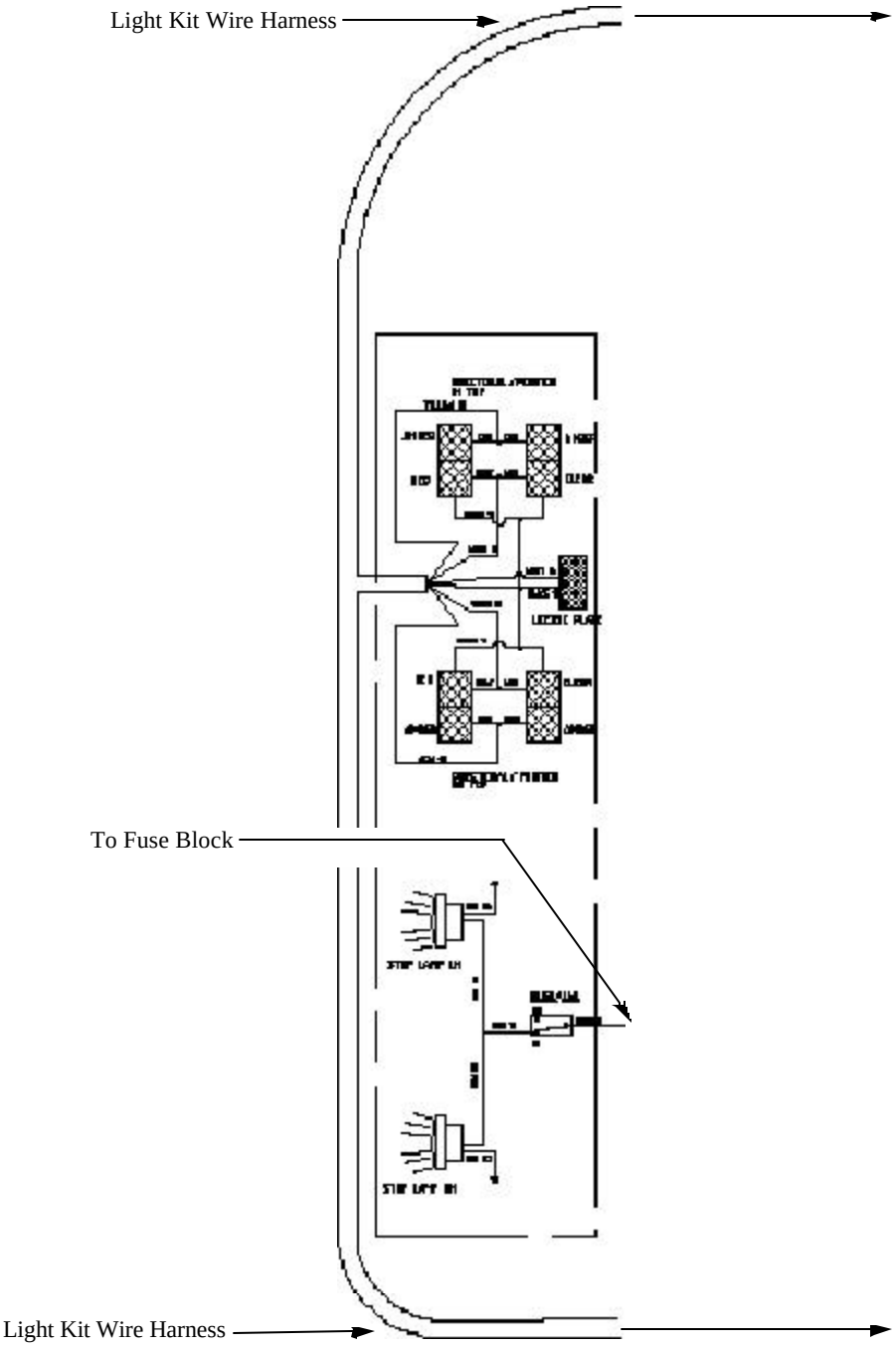
Diagram C2459 Legend. Shown is the wire color and function of each pin terminal in the connector plug.

PIN	WIRE COLOR	FUNCTION
1	Purple	Eng. oil press. indicator
2	Org / Blue	Fuel level (+) gauge
3	Grey	Charge (L) indicator
4	Grey / Wht	Brake light
5	Blue	Hyd. temp. indicator
6	Yl / Red	Spare
7	Wht / Brn	Horn
8	Brown	Aux. indicator
9	White / Pple	Spare
10	Red	Seat belt indicator
11	Tan	Ignition (50)
12	Red / Wht	Ignition (19, 17)
13	Pple / Wht	Coolant temp. indicator



C2459

WIRING SCHEMATIC 5.2



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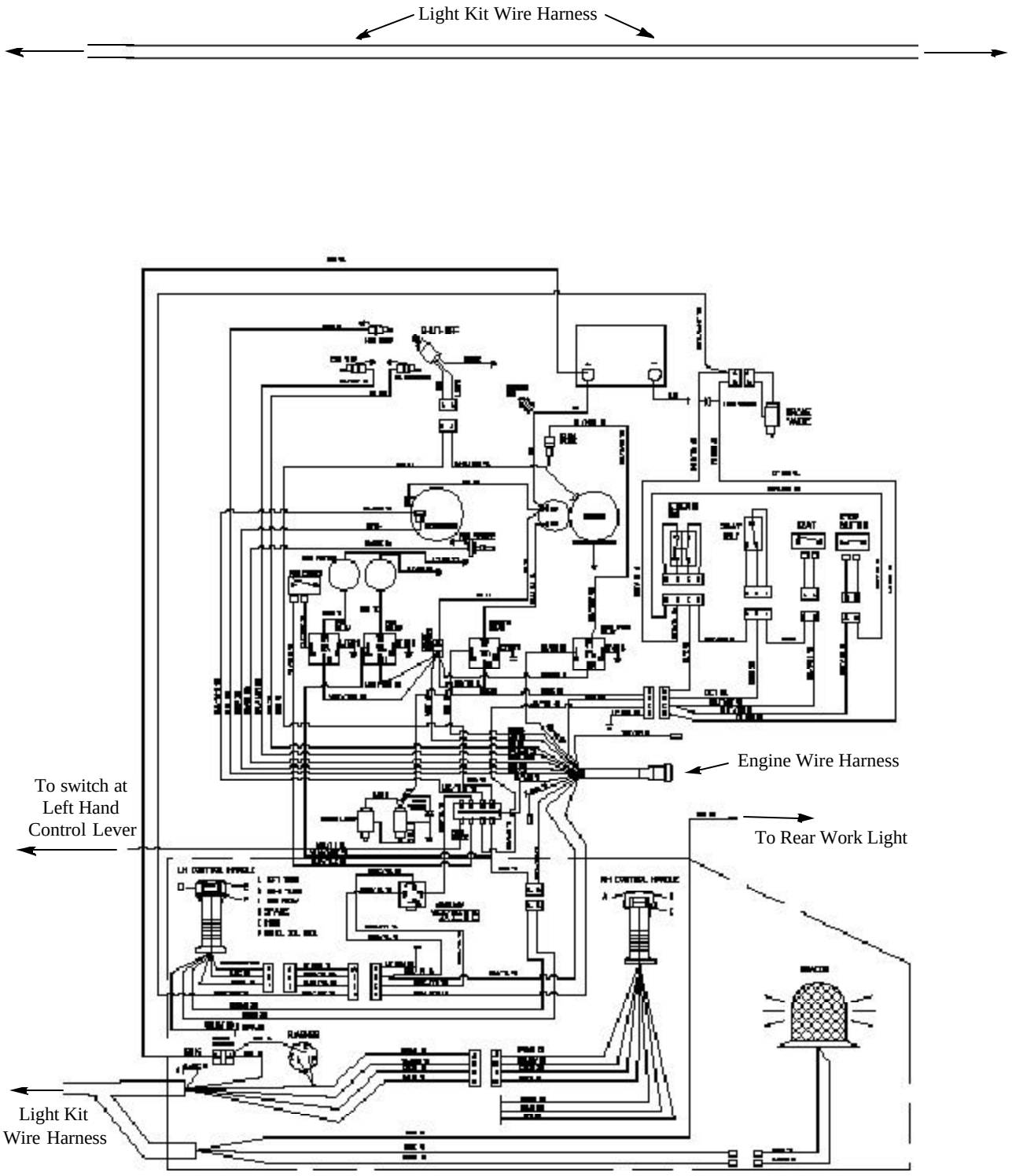
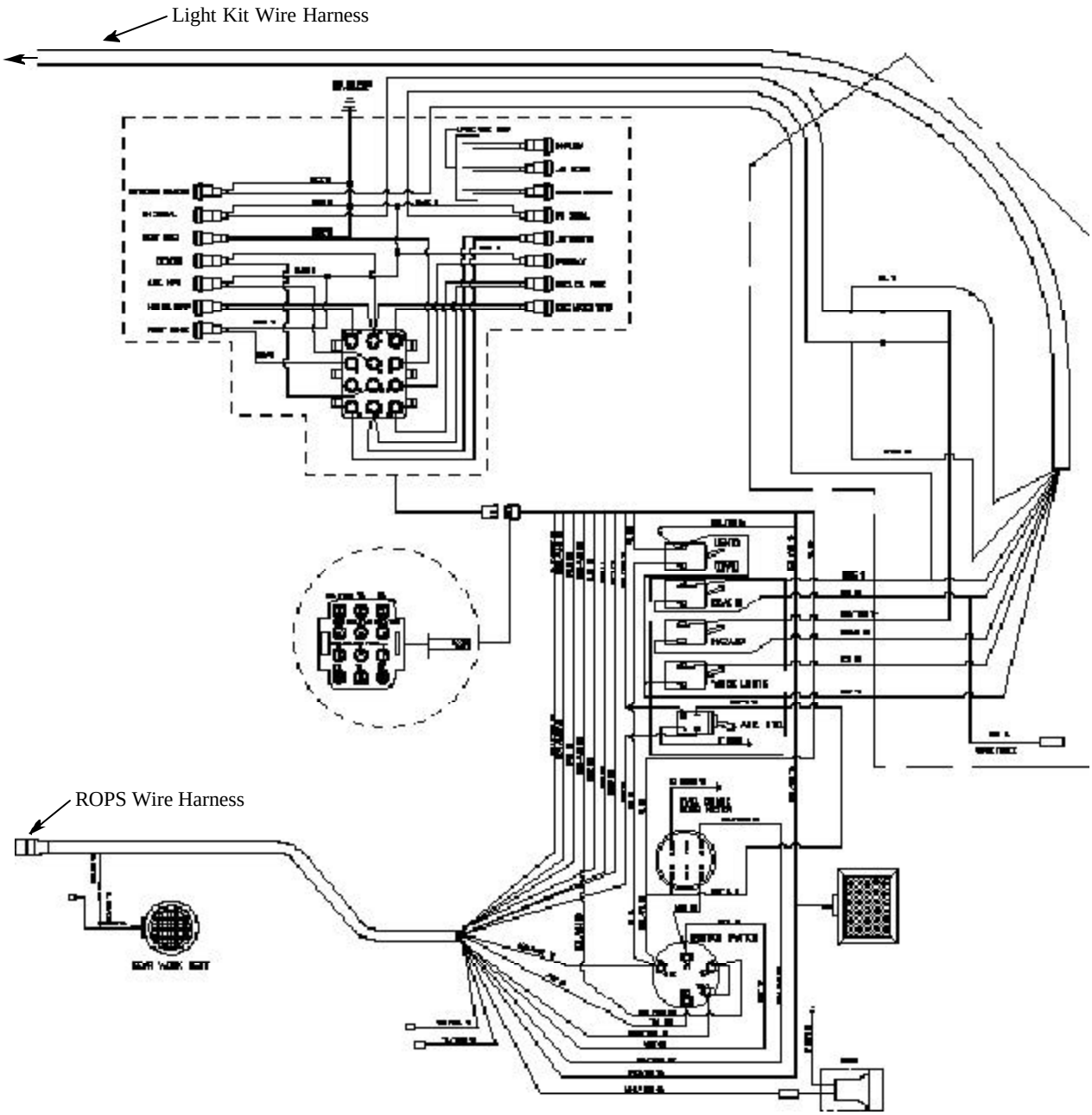
C2960

WIRING SCHEMATIC 5.2



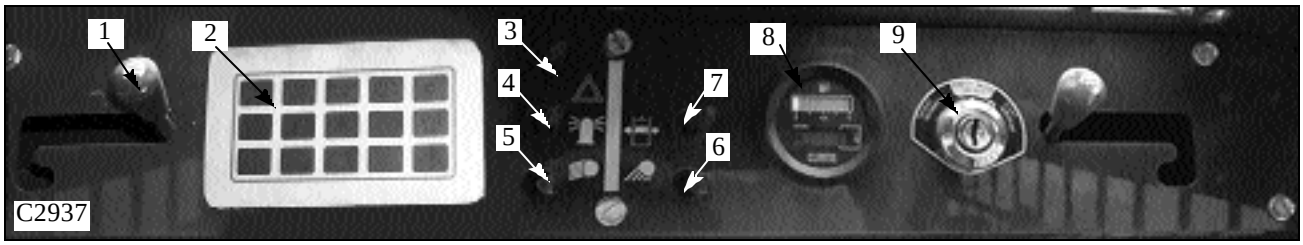
C2961

WIRING SCHEMATIC 5.2



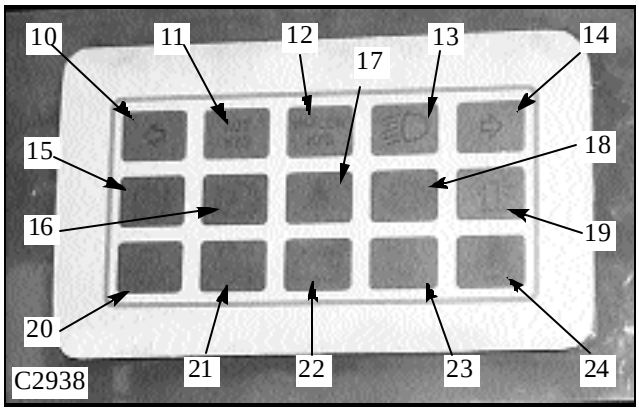
C2962

INSTRUMENTATION 5.3



Index C2937, C2938

1 Boom Support Knob
2 Indicator Panel
3 Hazard
4 Rotary Beacon
5 Dipped Beam Light
6 Work Light
7 Electric Auxiliary
8 Fuel Gauge / Hour Meter
9 Ignition Switch
10 Left Hand Directional Signal
11 Electric Auxiliary
12 ———
13 Dipped Beam Light
14 Right Hand Directional Signal
15 Hydraulic Oil Temperature
16 Parking Brake
17 Seat Belt
18 Low Charge Pressure
19 Rotating Beacon
20 Engine Oil Pressure
21 Engine Coolant Temperature
22 Alternator
23 ———
24 Preheat



Switch & Bulb Replacement

To replace a faulty gauge, meter, switch or indicator bulb dash panel:

1 Remove the boom support knobs and the 6 bolts retaining the dash panel (fig. C2937). Gently pull the dash panel out and down.
2 Remove the wiring from the effected part. Note the wire colors and terminal locations.
3 The fuel gauge is retained by a bracket and 2 mounting nuts. Remove the nuts and the gauge can be replaced.
4 The ignition and head light switch is retained by a knurled nut on the outside of the dash panel. Remove the nut and the switch can be replaced.
5 The hour meter is retained in the dash panel with molded in tabs. Squeeze the tabs together and the hour meter can be replaced.
6 Indicator bulbs can be replaced by twisting the socket and pulling the bulb.

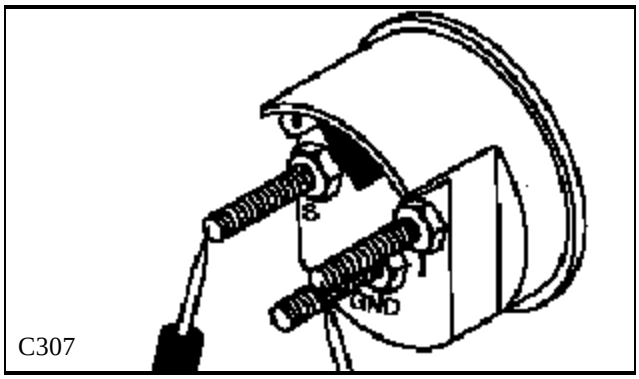
Testing the Fuel Gauge

1 Remove the dash panel to access the fuel gauge. (fig. C2462)
2 With the ignition switch off, connect an ohmmeter between the "S" terminal and the "I" terminal. (fig. C307)
3 An ohmmeter reading of 150 to 250 ohms is normal. A higher or lower reading means the gauge is faulty and needs to be replaced.

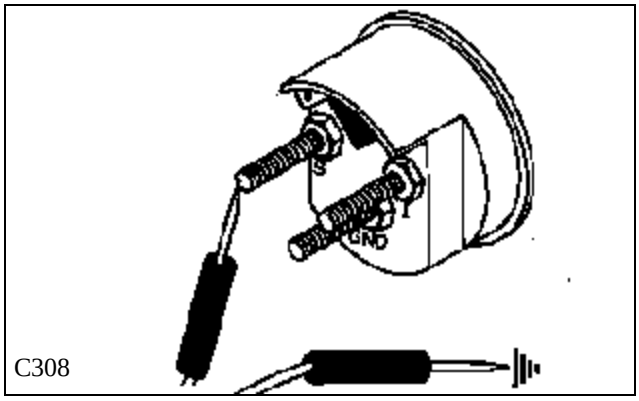
NOTE: If the fuel gauge test results were good and the gauge still fails to function do the following test:

1 With the ignition switch off, connect an ohmmeter between the "S" terminal and the other end to ground.
2 An ohmmeter reading of 50 to 500 ohms is normal. A higher or lower reading means the wire going to the "S" terminal is faulty.

NOTE: If the test is good, check the fuel sending unit in the fuel tank for failure.



C307



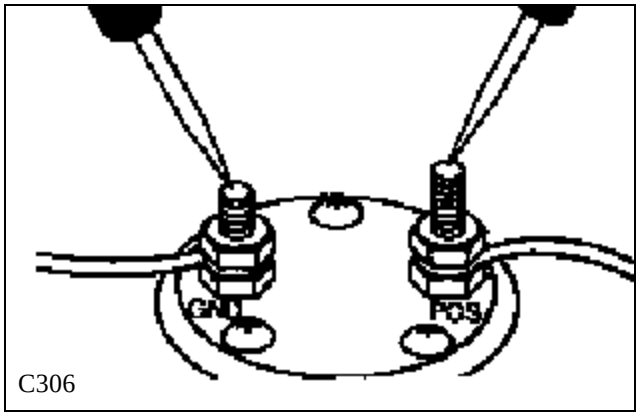
C308

INSTRUMENTATION 5.3

Testing the Fuel Sender

1 With the ignition switch off, connect an ohmmeter between the positive and negative terminals of the fuel sending unit. (fig. C306)

2 An ohmmeter reading of 50 to 500 is normal. A reading higher or lower means a faulty sender and will need replaced.



C306

Replacement

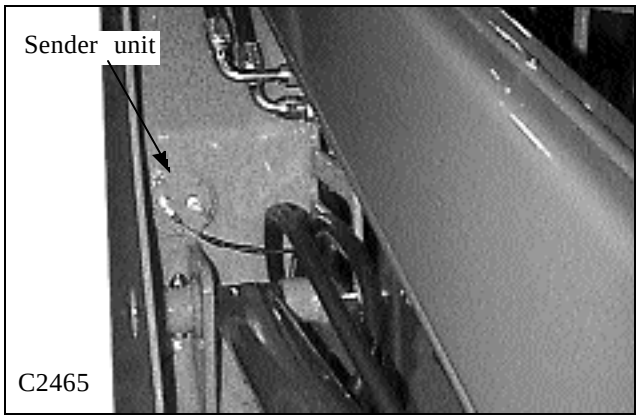
1 Make sure the fuel level is below the point where the sender unit is mounted to the fuel tank, just behind the right lift cylinder (fig. C2465) Drain the fuel tank if necessary (fig. C2467).

2 Remove the 2 wires connected to the fuel sending unit. Be sure the ignition switch is off.

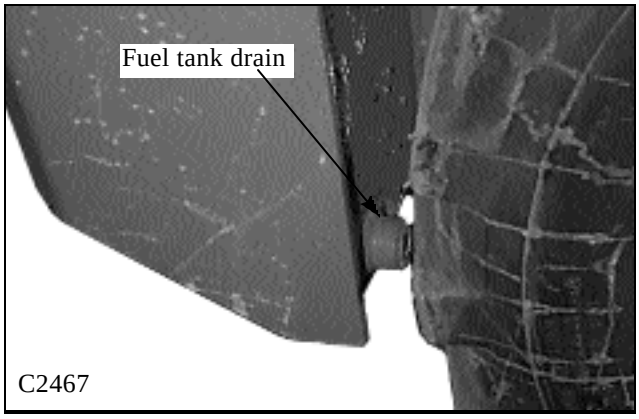
3 Remove the 5 screws retaining the sending unit to the fuel tank and remove the sender noting the orientation to the mounting holes.

5 Install a new sending unit and gasket. Use gasket sealant on both sides of the gasket. Torque the mounting screws no more than 20 inch / lbs.

7 Connect the sender wires taking care not to over tighten the nuts and stripping the studs. Green wire is ground.



C2465



C2467

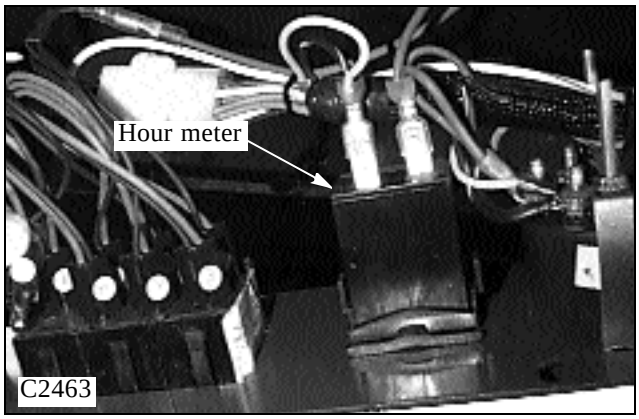
Testing the Hour Meter

The hour meter records the number of engine operating hours.

To check the hour meter, remove the 6 bolts retaining the dash panel.

Using a 12 volt test meter, connect the positive lead to the positive terminal of the hour meter and the ground lead of the tester to a good ground. Turn the ignition switch to the "RUN" position.

A reading of 12 volts means the hour meter is defective. No voltage reading means there could be a problem in the wire running from the "ACC" terminal on the ignition switch to the positive side of the hour meter or a defective ignition switch.



C2463

IGNITION SWITCH 5.4

Testing the Ignition Switch

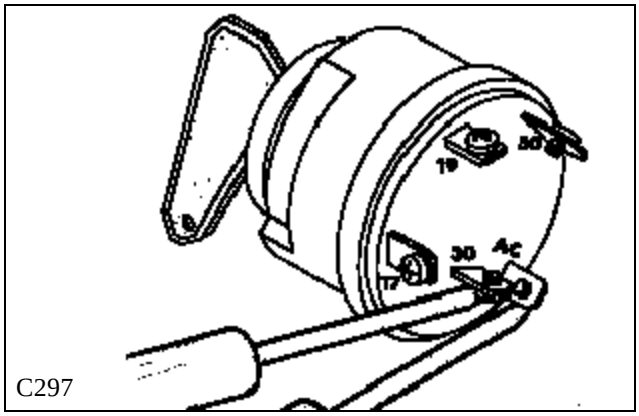
The ignition switch is a 4 position switch. OFF, PREHEAT, RUN and START. Turning the key counterclockwise will engage the PREHEAT. To activate the starter, turn the key clockwise. When the key is released it will return to the RUN position.

Before performing any test to the ignition switch, disconnect the negative or ground wire from the battery terminal. Remove the 3 screws retaining the right hand dash panel to the dash pod to access the ignition switch.

TEST 1: "RUN" POSITION.

Connect an ohmmeter across the terminals marked 30 and ACC. (fig. C297) Turn the ignition switch to the run position.

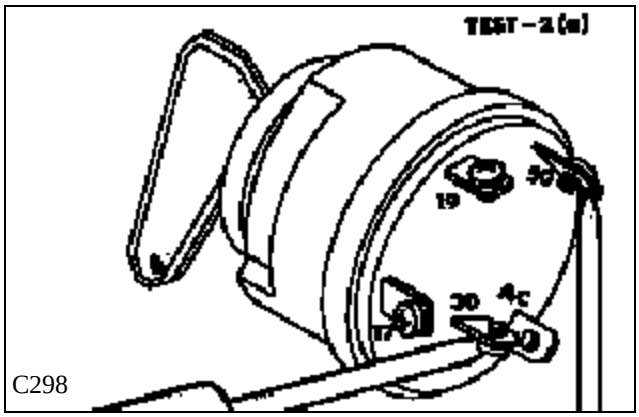
A low resistance reading is normal. High resistance reading means you will have to replace the ignition switch.



C297

TEST 2: "START" POSITION.

(a) Connect an ohmmeter between the terminals marked 30 and 50 on the ignition switch. (fig. C298) Turn the ignition switch to the "START" position and observe the ohm readings.

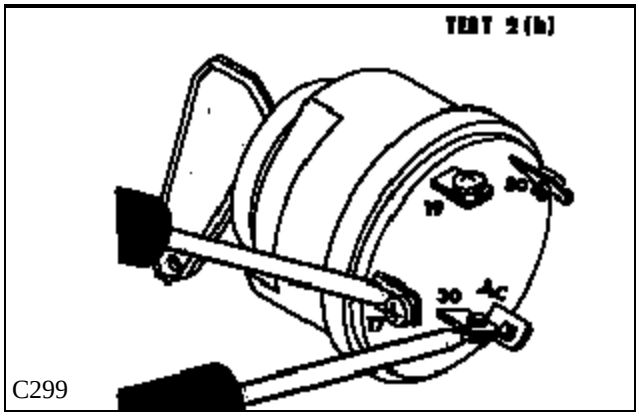


C298

(b) Connect the ohmmeter leads across terminals marked 30 and 17 on the ignition switch. (fig. C299) Turn the ignition switch to the "START" position and observe the ohmmeter reading.

Low resistance reading is normal.

High resistance reading means the ignition switch needs replacement.



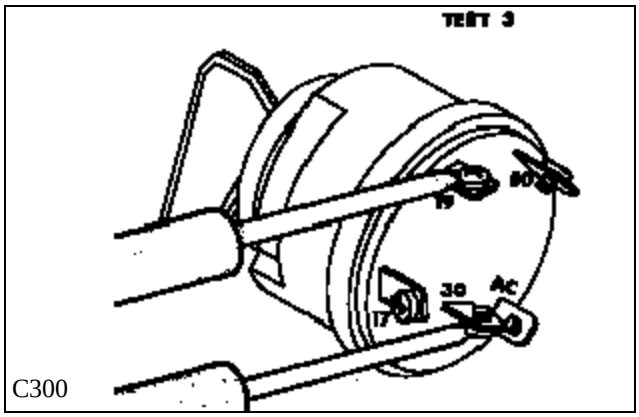
C299

TEST 3: "HEAT" POSITION.

Connect the ohmmeter leads between the terminals marked 30 and 19 on the ignition switch. (fig. C300) Turn the ignition switch to the "HEAT" position and observe the ohmmeter readings.

Low resistance reading normal.

High resistance reading, replace the ignition switch.



C300

5

ENGINE GLOW PLUGS 5.5

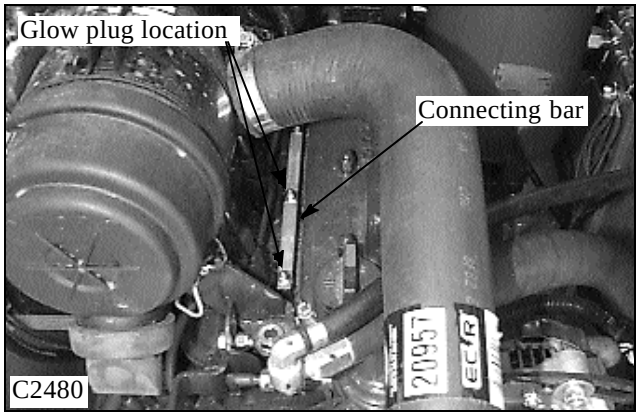
Testing the Glow Plugs

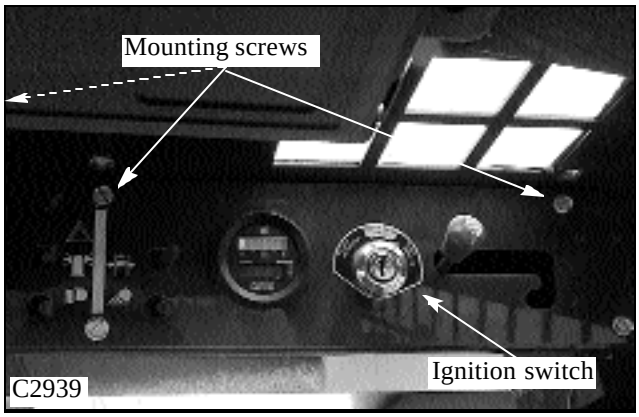
Before performing any test on the glow plugs be sure to disconnect the ground wire from the battery.

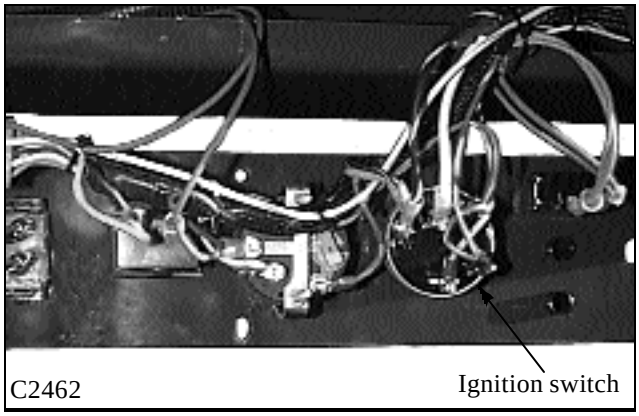
TEST 1: GLOW PLUGS.
NOTE: Each glow plug is to be checked individually. Remove the connecting bar between each glow plug before testing.
With the ignition switch off, connect one end of the ohmmeter lead to the glow plug terminal and the other lead end to a clean ground.
A reading of 0.9 ~ 1.2 ohms is normal.
An infinite or "0" reading means the glow plug is defective and must be replaced.

TEST 2: IGNITION SWITCH to GLOW PLUGS.
Remove the bolts retaining the dash panel. (fig. C2939, C2462) With the ignition switch off, disconnect the red / white wire from ignition terminal 19. Connect one ohmmeter lead to the terminal marked 19 on the ignition switch and the other lead to the red / white wire.
Low to "0" reading means good continuity.
High reading means the red / white wire from the ignition switch to the manifold heater is defective.

TEST 3: IGNITION SWITCH "HEAT" POSITION.
Connect the ohmmeter leads between the terminals marked 30 and 19 on the ignition switch. (fig. C300) Turn the ignition switch to the "HEAT" position and observe the ohmmeter readings.
Low resistance reading normal.
High resistance reading, replace the ignition switch.

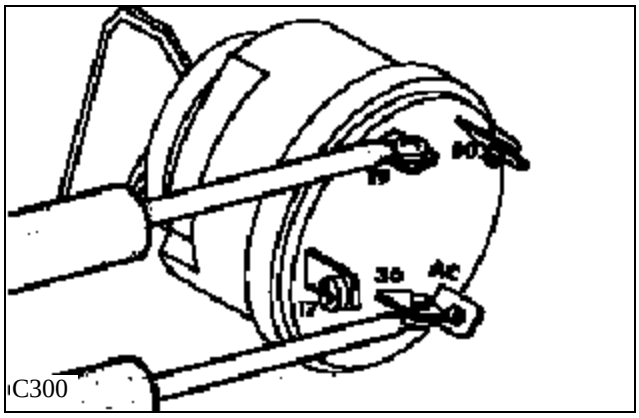






Pre-Heat Indicator

Check the ignition switch terminals 17 and 19 with an ohmmeter. If there is good continuity between the two terminals the bulb or wiring is bad on the pre-heat indicator light.
To change the indicator bulb, remove the bolts retaining the dash panel to the ROPS. Select the proper bulb, twist and pull the socket and bulb assembly bulb from the dash panel. Replace the mini bulb and or the socket assembly.



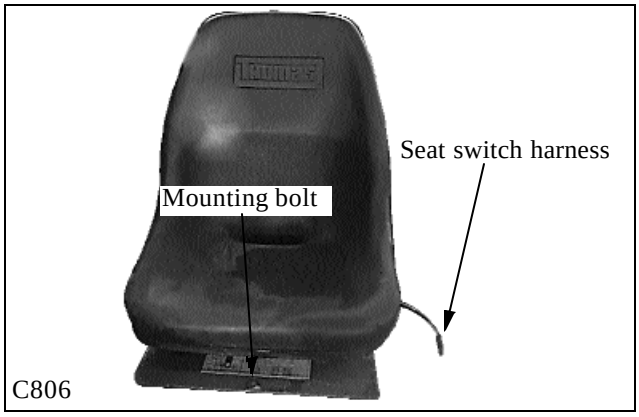
BATTERY 5.6

Removal and Inspection

The battery is located in the ROPS behind the operators seat. To remove the battery:

1 Remove the seat mount retaining bolt and disconnect the seat belt wiring harness connection. (fig. C806)

2 Pull up and toward the front of the loader and remove the seat. Be careful to not catch any electrical wiring while removing.

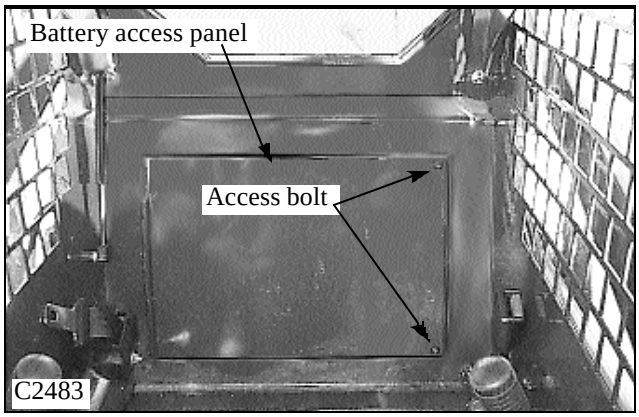


C806

3 Remove the access bolt from the battery compartment cover (fig. C2483) to gain access to the battery (fig. C2458).

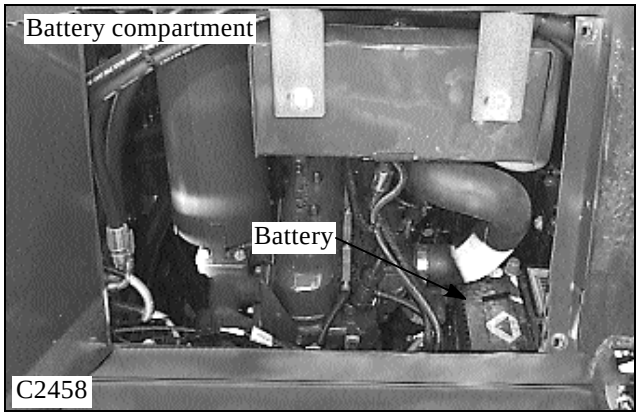
WARNING

Batteries contain sulfuric acid which can harm the eyes and skin on contact. Always wear goggles and protective clothing while servicing the battery. Flush skin or eyes with water upon contact. Consult a physician.



C2483

4 Disconnect both battery ground terminals first. Then disconnect the positive cables from the battery.



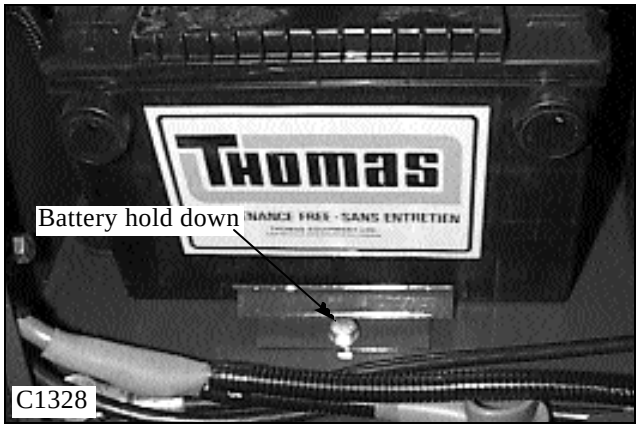
C2458

5 Remove the bolt securing the battery hold down bracket. (fig. C1328)

6 Carefully remove the battery from the compartment.

7 Inspect the battery cables for corrosion and damage. Remove any corrosion using a wire brush and a soda solution. Replace the cables having damaged or deformed ends.

8 Clean the outside of the battery case if the battery is to be reused. Flush the terminal areas with a soda solution taking care not to allow the solution into the battery cells. Remove corrosion from the battery terminals with a wire brush..



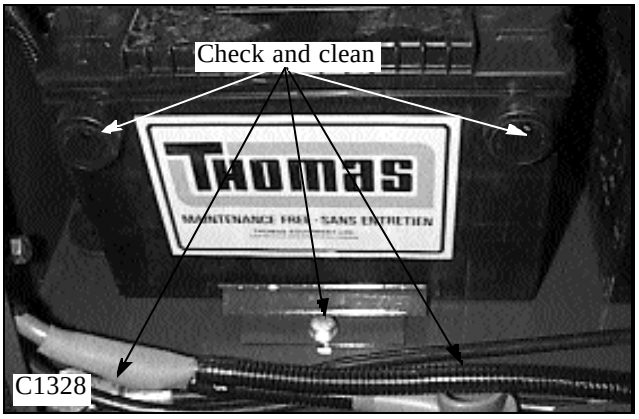
C1328

5

BATTERY 5.6

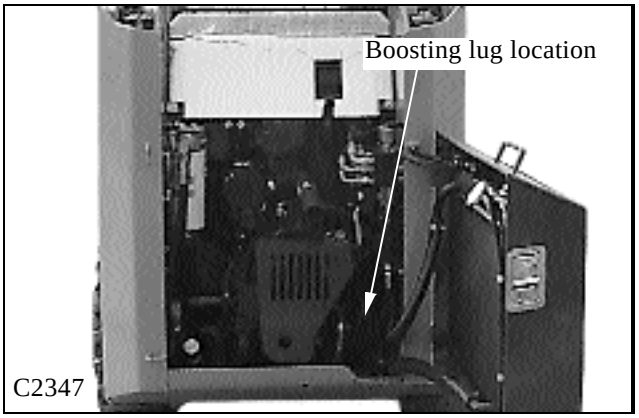
Removal and Inspection

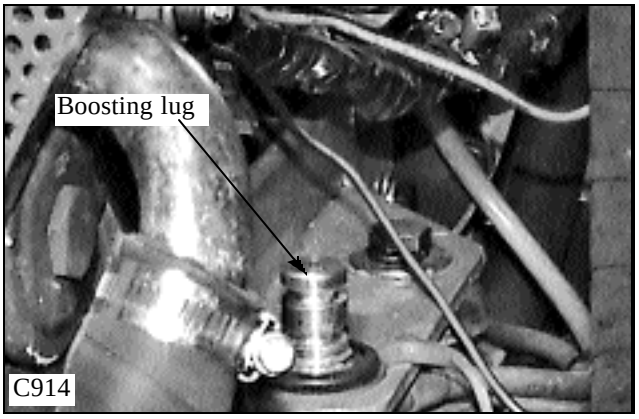
9 Inspect the battery case for cracks that may allow electrolyte to leak into the environment.
Inspect the batteries on a regular basis for damage such as cracks or a broken case.
Inspect the battery cables for tightness and corrosion. Remove any corrosion and coat the terminals with a dielectric grease.
Check the battery hold downs to be sure they are properly retaining the battery in the compartment. (fig. C1328)



Boosting

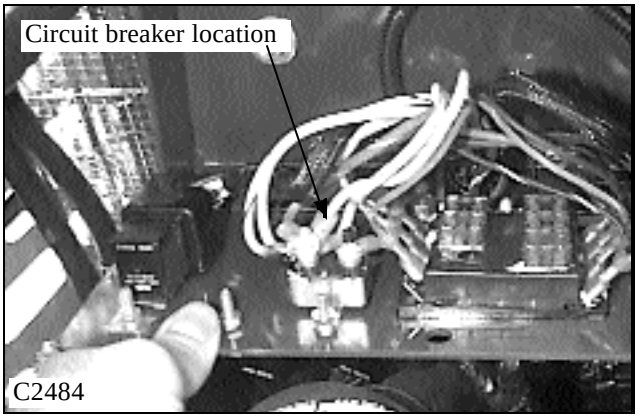
In the event the loader has failed to start and requires boosting, a boosting lug or post is located in the engine compartment. (fig. C2347)
1 Open the rear door and raise the engine compartment cover.
2 Remove the red rubber protective cover from the boosting lug. (fig. C914)
3 The ignition must be in the off position.
4 Connect the positive cable from the 12 volt boosting supply to the boosting lug on the loader.
5 Connect the negative ground cable to the boosting supply first, and then to a clean ground on the loader engine. Keep the cables away from any moving parts.
6 Start the engine.
7 Remove the negative ground cable from the engine first and then the boosting supply. Remove the positive cable from the boosting lug.





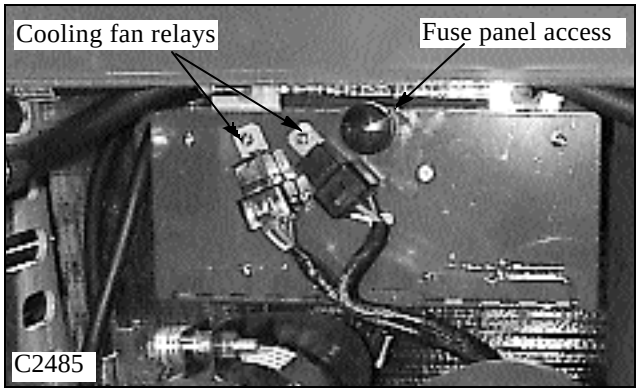
Circuit Breaker

The circuit breaker is in the fuse panel, located in the engine compartment. (fig. C2484). See section 5.7.



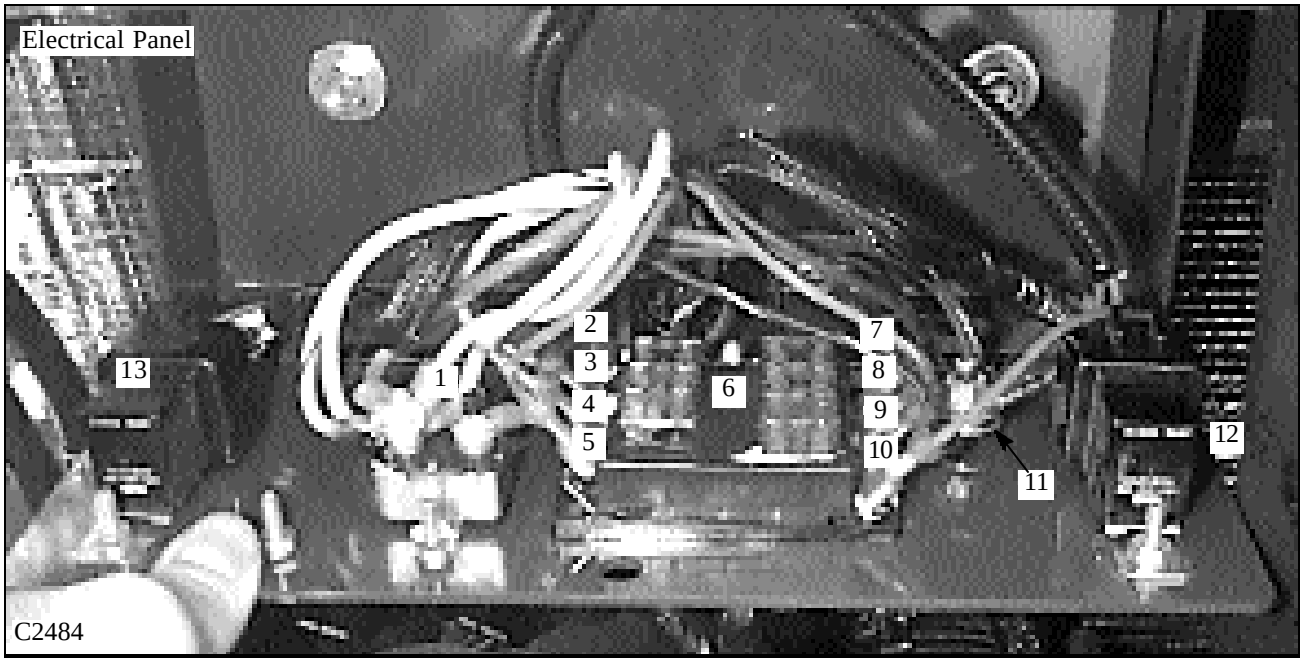
ELECTRICAL PANEL 5.7

The loader is equipped with a 12 volt, negative ground electrical system. The circuit breaker, fuses and relays are in a panel located in the engine compartment, just underneath of the engine cover. (fig. C2485)
To access the electrical panel:
1 Open the rear door and raise the engine cover.
2 Remove the bolt holding the electrical panel cover closed. (fig. C2485)
3 Open the cover and the circuit breaker, fuses and relays will be exposed. (fig. C2484)
Visually check the fuses for burnt contacts.
1 Disconnect the battery grounds before testing or replacing the circuit breaker.
2 Remove the 2 nuts retaining the wires to the circuit breaker. Be sure to note the location of the wires and the terminals they are connected to. There is a battery side and an accessories side to the circuit breaker.
3 Using an ohmmeter, connect a lead to each of the stud terminals and take a reading.
Low resistance is normal.
High resistance means the circuit breaker is defective and must be replaced.



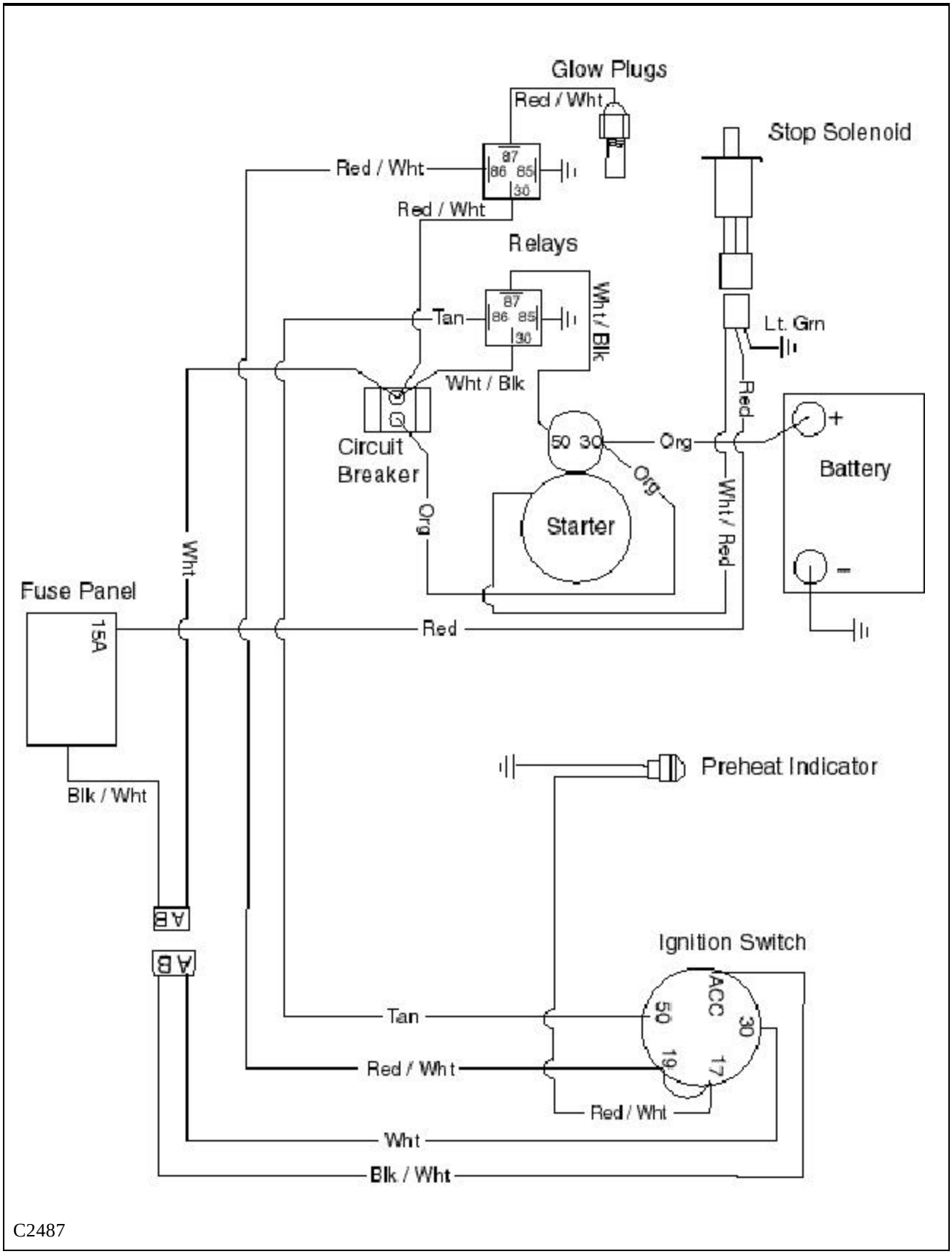
The relays are identical and may be checked by swapping one for the other to trace a malfunction. If changing the relays around does not repair the problem, the problem is either in the wiring, or in the actual electrical component.

The ground bolt should be checked occasionally for corrosion and cleaned if necessary. Use a dielectric grease to protect the ground point from the elements.



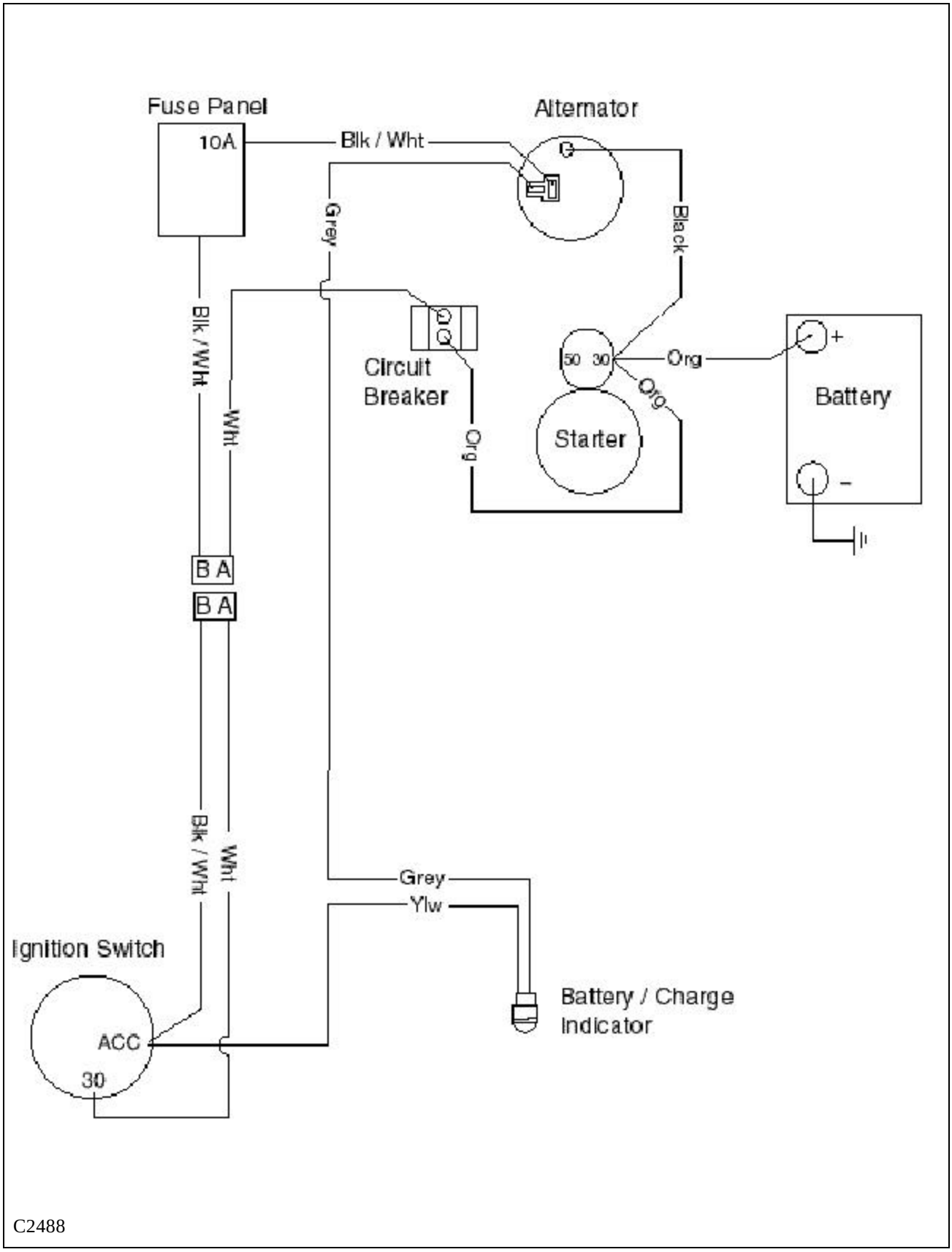
ELECTRICAL PANEL LEGEND.(fig. C2484)
1 Main Circuit Breaker
2 Engine Stop Solenoid (15 Amp, RED)
3 Alternator (10Amp, BLK / WH)
4 Auxiliary Solenoid (10 Amp, RED / YL)
5 Option / Spare
6 Power From Ignition Switch Acc (BLK / WH)
7 Cooling Fan (10 Amp, YL / WH)
8 Safety Switches (15 Amp, OR / WH)
9 Horn / Option (10 Amp, BRN)
10 Option / Spare
11 Grounding Point (LT GRN)
12 Glow Plug Relay (40 Amp)
13 Starter Relay (40 Amp)

STARTING CIRCUIT 5.8



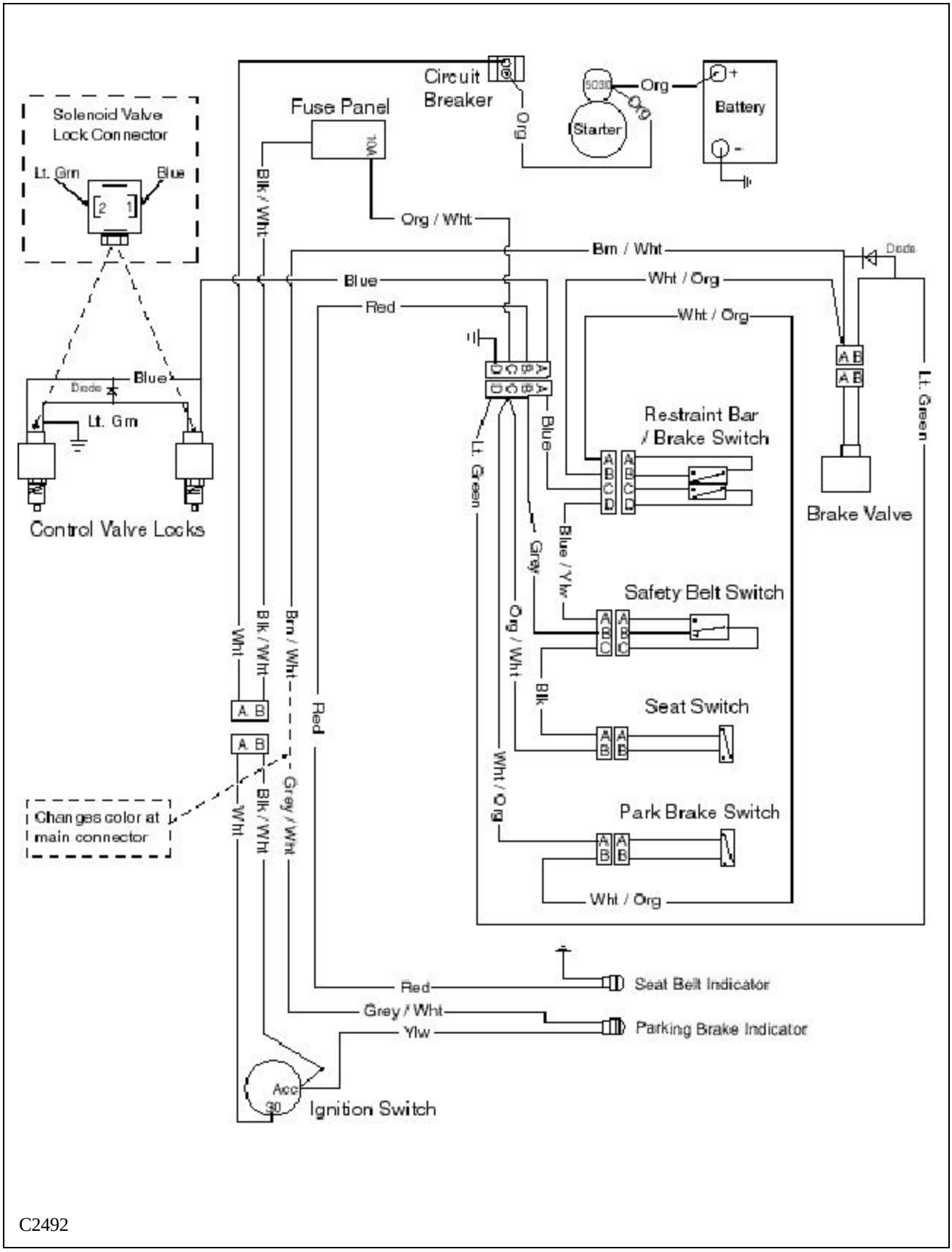
C2487

CHARGING CIRCUIT 5.9



5

SAFETY CIRCUIT 5.10



C2492

SAFETY CIRCUIT 5.10

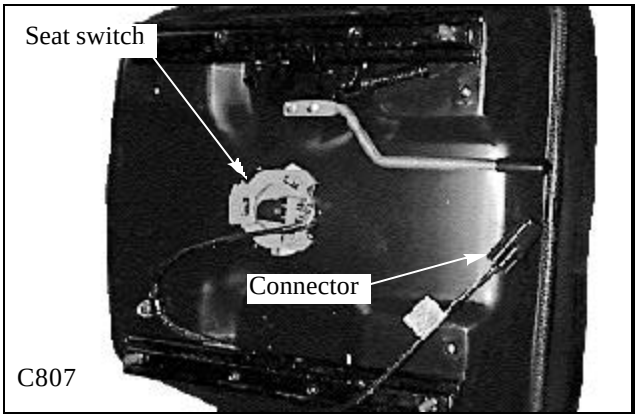
General Information

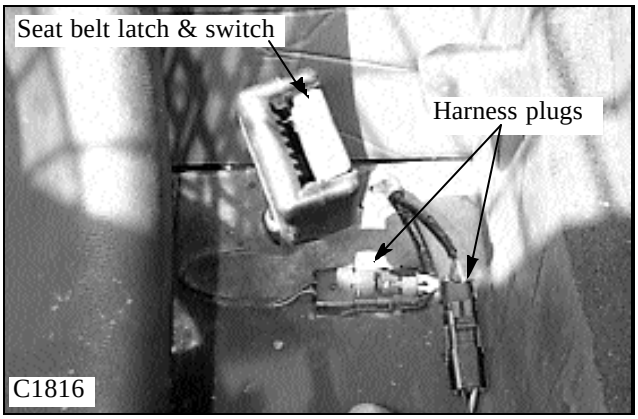
The loader is equipped with 3 inter - connected safety switches. These 3 switches operate 2 electric solenoid controlled lock devices. One (1) solenoid coil on the hydraulic brake valve (fig. C2364), one (1) pair of solenoid coils on the hydraulic control valve (fig. C1514) Failure of any one (1) of these switches will prevent the operation of the solenoid coils and loader functions. All 3 must be hooked up, functioning and, if applicable, adjusted correctly.

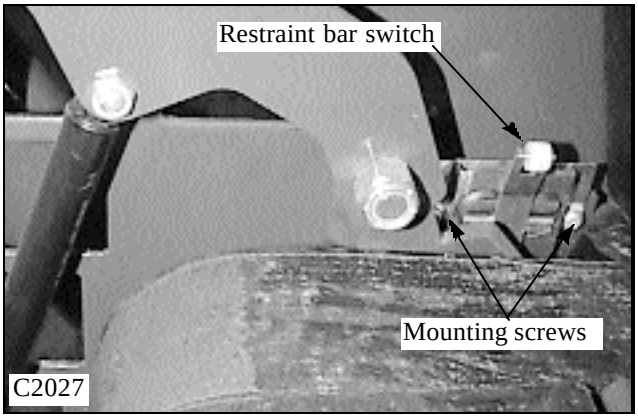
The bottom of the operators seat is equipped with a pressure sensitive switch. The operator must be in the seat to close the switch and release the parking brake and unlock the control valve functions. (fig. C807) No adjustments required. When removing and replacing the seat, be sure to disconnect the wire connector and not to pinch the wires under the seat plate.

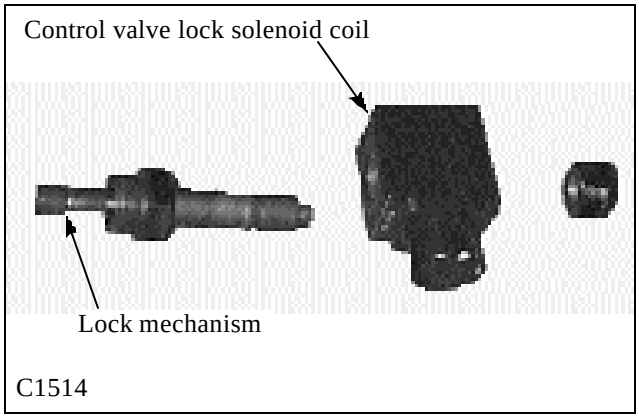
The seat belt assembly is equipped with a safety switch. The operator must have the seat belt fastened around them in order to close the switch and allow the parking brake to release and the control valve to function. (fig. C1816) No adjustments required.

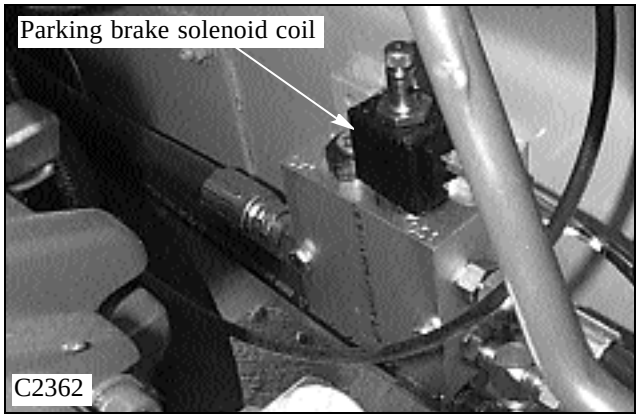
The restraint bar is equipped with a dual function safety switch. (fig. C2027) With the restraint bar in the raised position, the parking brake is activated, the control valve functions are locked and the activation indicator lights are illuminated on the dash panel.
Lowering the restraint bar releases the parking brake by energizing the solenoid coil to release the hydraulic brake valve lock (fig. C2362), turns off the indicator lights in the dash panel and releases the locks in the main control valve by energizing the solenoid coils. (fig. C1514).
The restraint bar must be in the lowered position for the control functions to operate.
The switch must contact the restraint bar when in the lowered position.





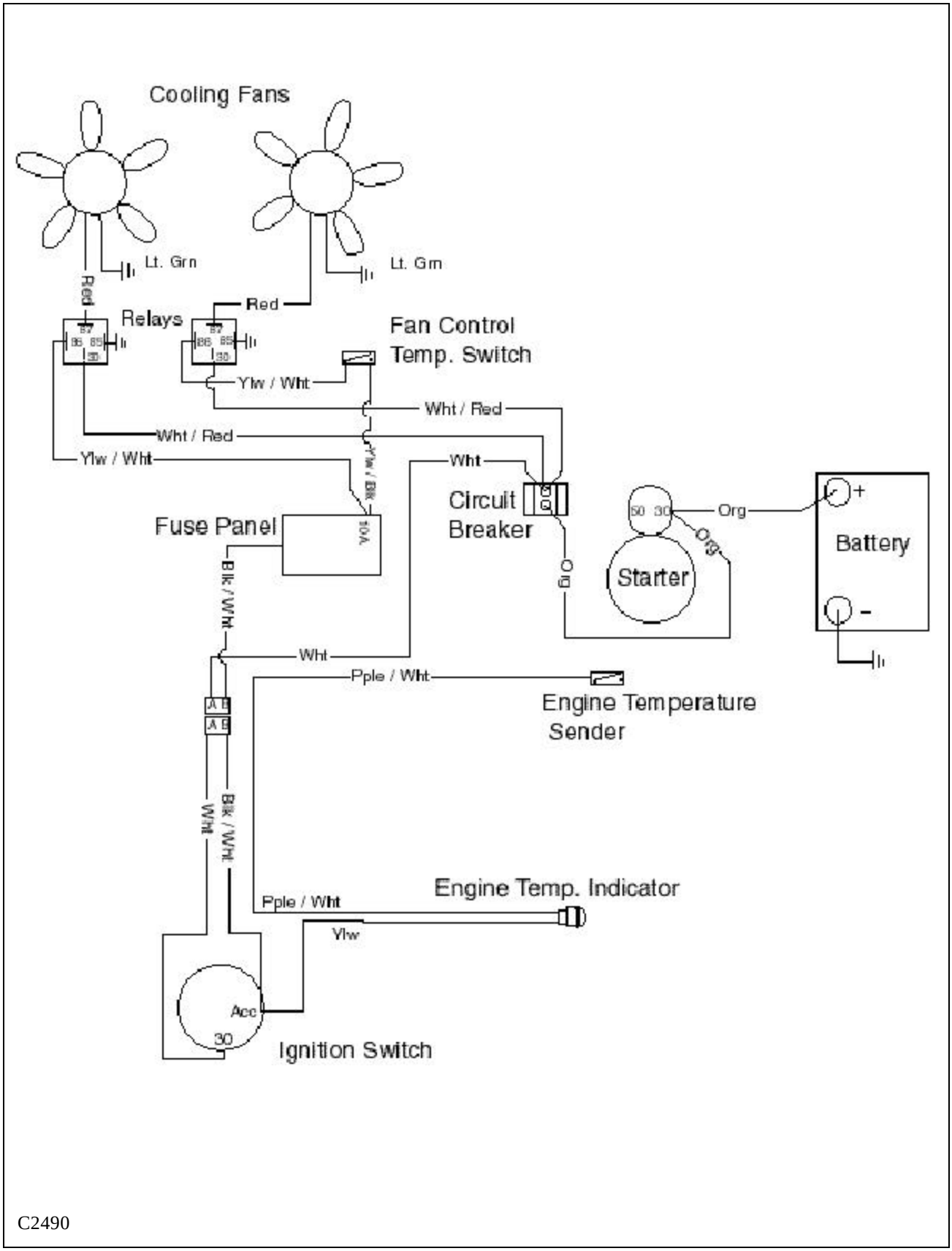






5

COOLING FAN CIRCUIT 5.11



C2490

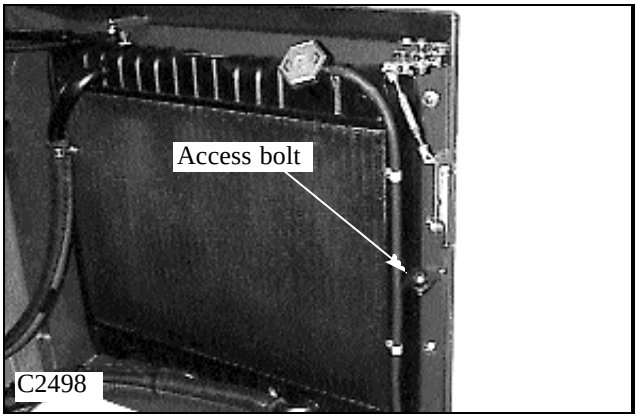
COOLING FAN CIRCUIT 5.11

General Information

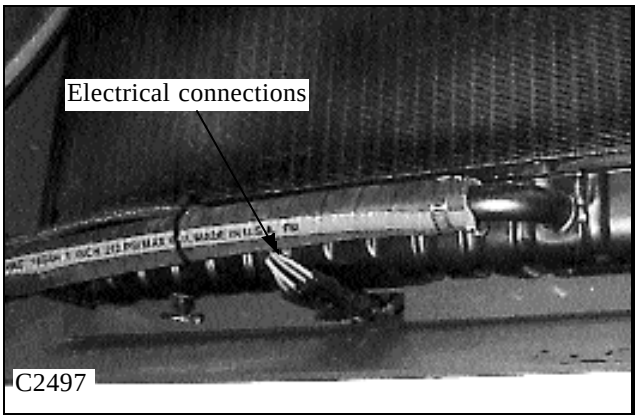
The loader is equipped with dual cooling fans. The fans and motors are contained in a single housing and cannot be replaced individually. (fig. C2601).

The cooling fans may be accessed by opening the rear door and removing the bolt retaining the engine radiator to the mounting bracket. (fig. C2498). The radiator may then be swung open.

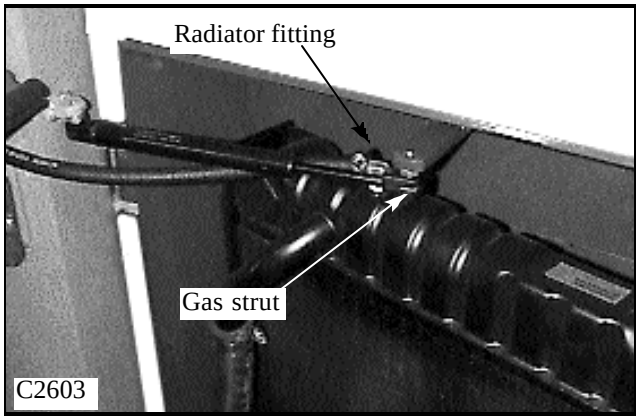
Check the electrical wiring to make sure it will not interfere with the radiator when swung open. (fig. C2497). Also check the gas strut (optional) to radiator clearance before swinging the radiator open. It may be necessary to disconnect the gas strut if so equipped. (fig. C2603).



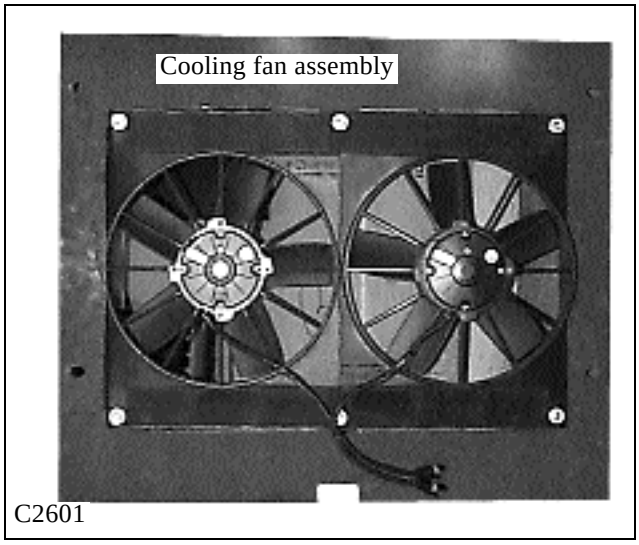
C2498



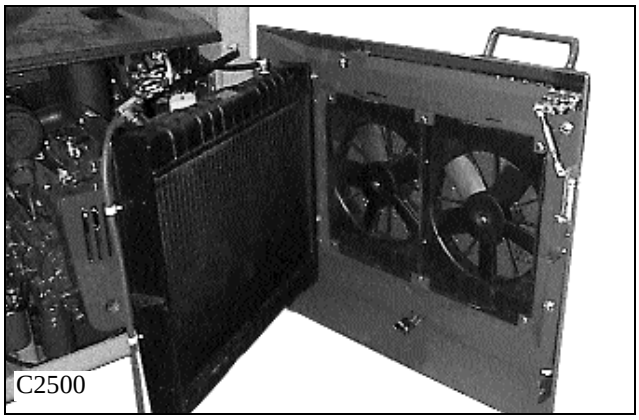
C2497



C2603

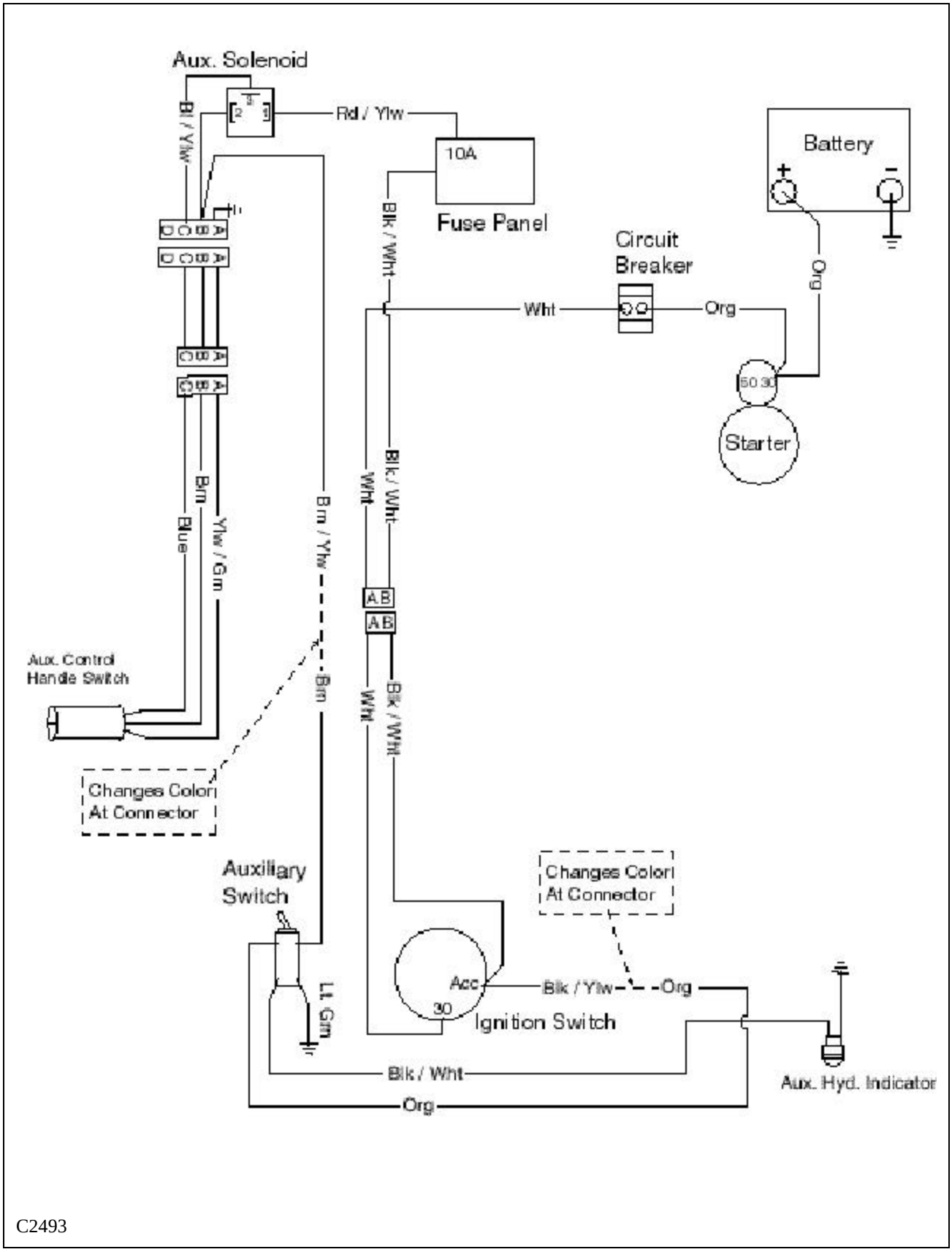


C2601


C2500

5

ELECTRIC AUXILIARY CIRCUIT 5.12



C2493

AUXILIARY CONTROL HANDLE 5.12

The auxiliary handle control contains 2 push buttons and 1 rocker switch. On the left hand control handle, Button A is a spare button, Button B controls the horn and Switch C controls forward and reverse operation of an attachment. On the right hand control handle, Button A operates the left turn signal and Button B operates the right turn signal. (See fig. 2945)

To replace a defective switch :

1 Make sure the ignition key switch is in the “OFF” position.

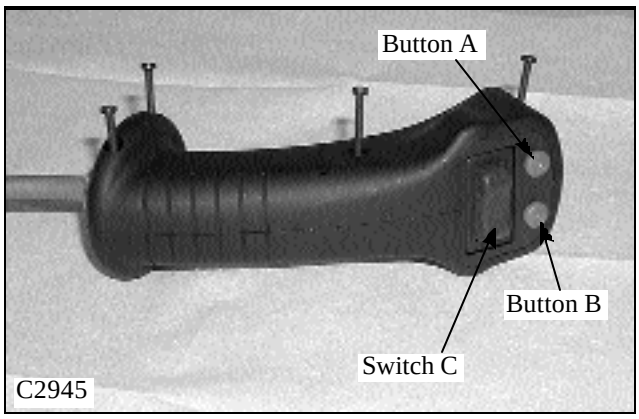
2 Remove the four screws from the side of the handle (fig. C2945).

3 Pull the handle apart, separating from the middle (fig. C2946).

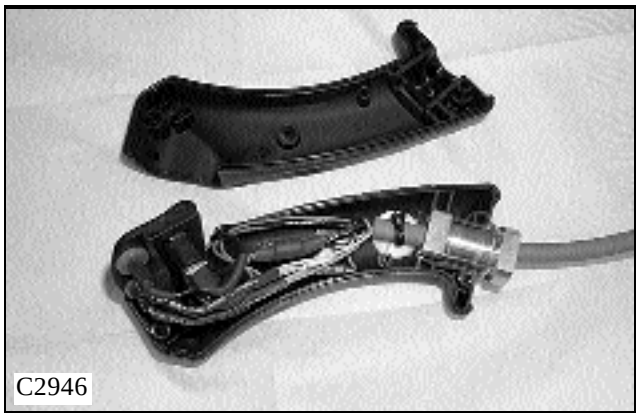
4 Unplug the 3 wires that are connected to the rocker switch (black, red and blue - fig. 2947).

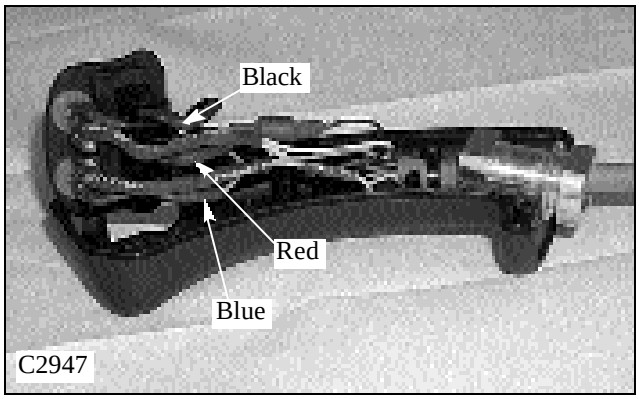
5 Remove the switch from the mounting plate by pressing on the outer ends and pushing the switch through the opening.

6 Replace with the new switch, reconnect the wires, and replace the outer shell.



C2945


C2946



C2947

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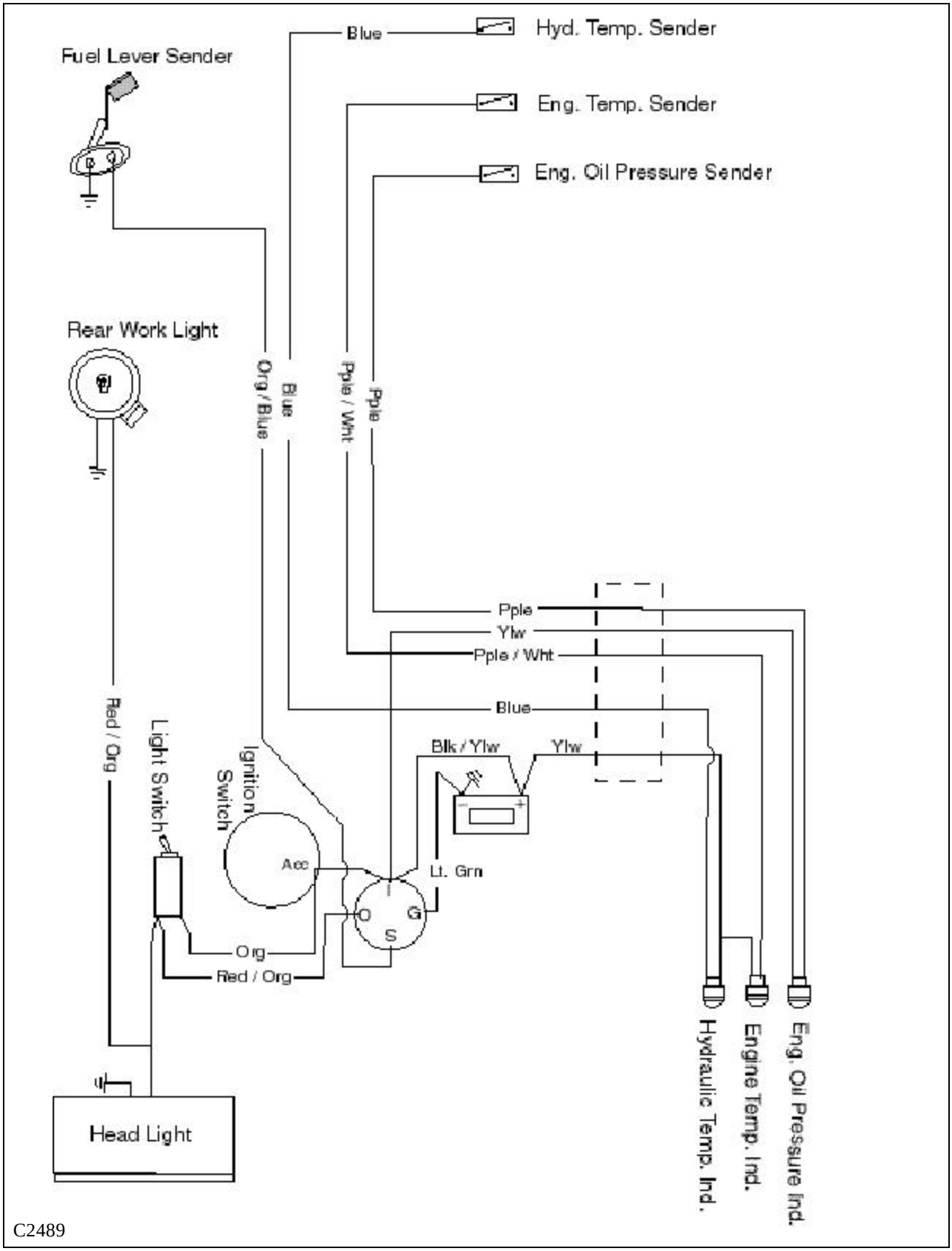
ACCESSORIES CIRCUIT 5.13



C2489

TROUBLE SHOOTING 5.14

STARTING SYSTEM

Problem	Cause	Corrective Action	Section
Starter will not engage.	Battery discharged.	Check the battery and charge or replace.	5.6
	Loose or disconnected wiring.	Verify continuity of starting circuit. Check and repair.	
	Defective ignition switch.	Check the switch and replace if necessary.	5.4
	Defective starter solenoid.	Check and replace if necessary. Kubota repair manual P / N 40916.	Kubota repair manual
	Defective relay.	Check and replace.	5.7
	Defective starter.	Check and replace if necessary.	Kubota repair manual
Starter motor turns but does not engage.	Defective overrunning clutch or low battery charge.	Replace starter or parts. Check the battery and charging system. Kubota repair manual P / N 40916.	Kubota repair manual
Pinion engages but engine does not turn over.	Defective starter.	Check and replace. Kubota repair manual P / N 40916.	Kubota repair manual
	Low battery charge.	Check and repair.	5.6
	Engine seizure.	Check and replace.	7
	Hydrostatic pump failure.	Check and replace.	2
Starter motor rotates a full speed before pinion engages.	Defective pinion spring.	Check and replace. Kubota repair manual P / N 40916.	Kubota repair manual
Starter remains engaged after the engine has started.	Faulty ignition switch.	Check and replace.	5.4
	Defective solenoid.	Check and replace. Kubota repair manual P / N 40916.	Kubota repair manual

SAFETY LOCKING MECHANISM

Problem	Cause	Corrective Action	Section
Control locks will not release.	Blown fuse.	Check fuse and replace with 15 Amp.	5.7
	Safety switch out of adjustment or defective.	Remove the seat, check and adjust or replace.	5.10
	Defective lock solenoid.	Check and replace.	2 / 5.10
	Defective lock mechanism.	Check and replace.	1.4 / 5.10
	Short in wiring harness.	Check for proper grounding, repair or replace harness.	

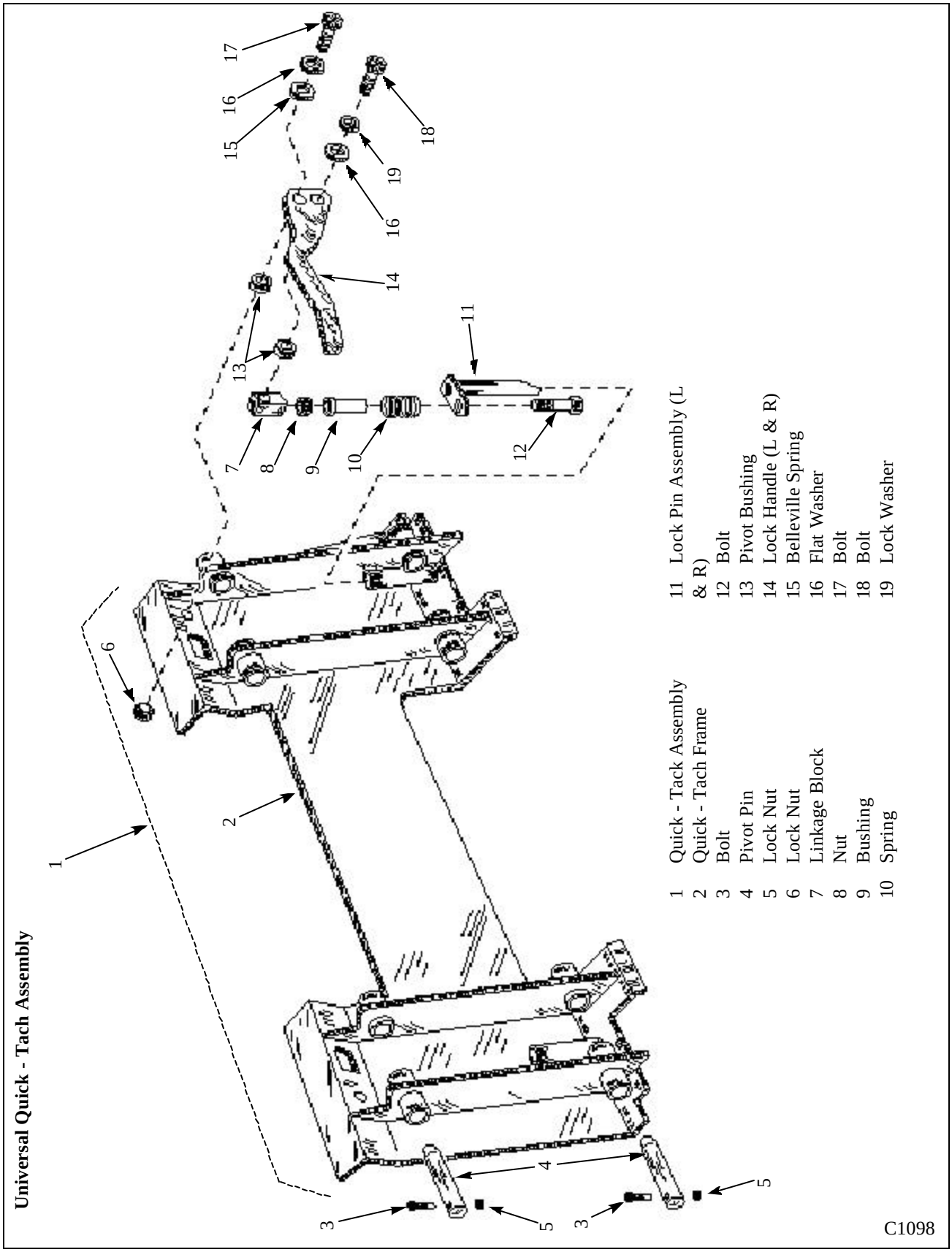
TROUBLE SHOOTING 5.14

CHARGING SYSTEM

Problem	Cause	Corrective Action	Section
Battery low in charge.	Faulty wiring or connections.	Check and repair or replace.	
	Drive belt slipping.	Check and adjust.	7
	Defective battery.	Test battery and replace if necessary.	5.6
	Defective alternator or regulator.	Check charging output. Repair or replace if necessary. (see Kubota manual Thomas p / n 40916)	Kubota repair manual
Alternator overcharging and battery overheats.	Defective battery.	Test battery and replace if necessary.	
	Defective regulator	Check charging output. Replace if necessary. (see Kubota repair manual Thomas p / n 40916)	Kubota repair manual
Low or no output voltage from alternator.	Drive belt slipping.	Check and adjust.	7
	Faulty wiring or connections.	Check and repair or replace.	
	Defective alternator or regulator.	Check charging output. Replace if necessary. (see Kubota repair manual Thomas p / n 40916)	Kubota repair manual
Charge indicator light flickers or runs dim.	Faulty wiring or connections.	Check and repair or replace.	
	Dirty alternator slip rings or brushes.	Check and repair or replace. (see Kubota repair manual Thomas p / n 40916)	Kubota repair manual
Charge indicator goes out but becomes brighter as the engine RPM increases.	Faulty wiring or connections.	Check and repair or replace.	
Charge indicator light is on while the engine is operating.	Drive belt slipping.	Check and adjust.	7
	Defective alternator or regulator.	Check charging output. Replace if necessary. (see Kubota repair manual Thomas p / n 40916)	Kubota repair manual

SECTION 6 MAIN FRAME

QUICK - TACH 6.1



NOTES

6

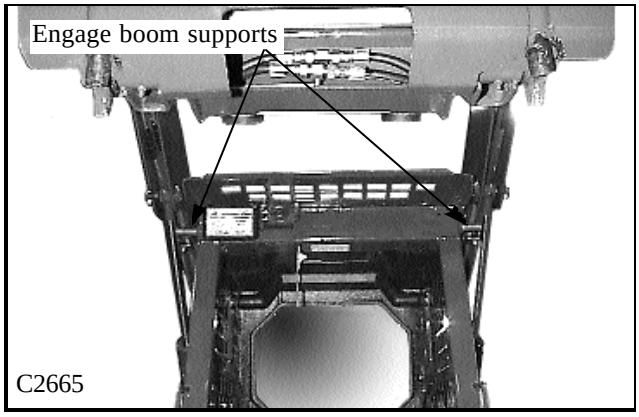
QUICK TACH 6.1

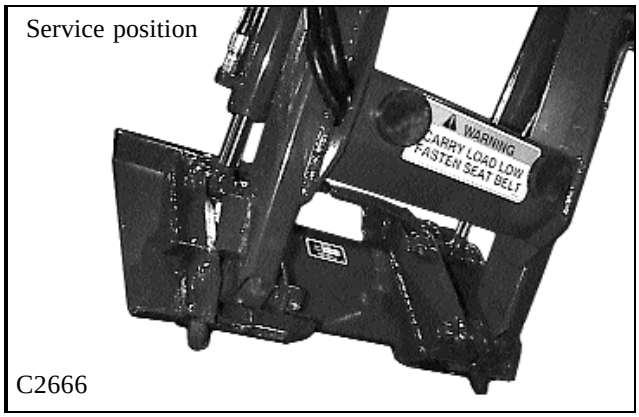
Preventative Maintenance

To keep the quick - tach locking pins and mechanism working freely, and to prevent pin and bushing wear, the quick tack must be lubricated every 8 hours of operations. More often in dirty applications.

Lubricate the quick - tach as follows:

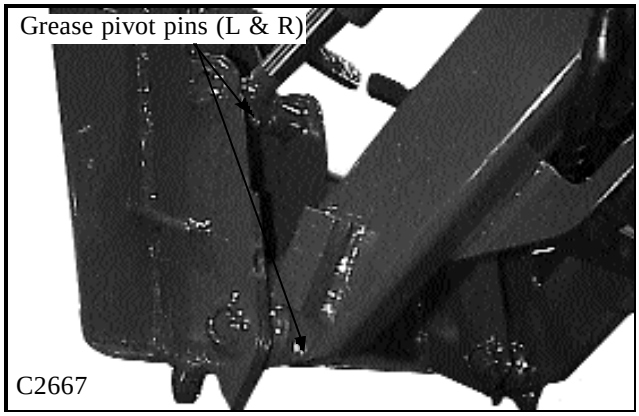
1 Remove any attachment from the loader, raise the boom arms, engage the boom supports, engage the parking brake and shut off the engine. (fig. C2665, C2666).



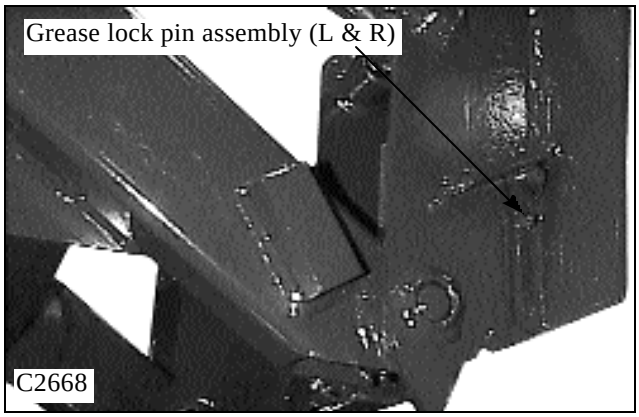


2 Clean any dirt build up around the linkages.

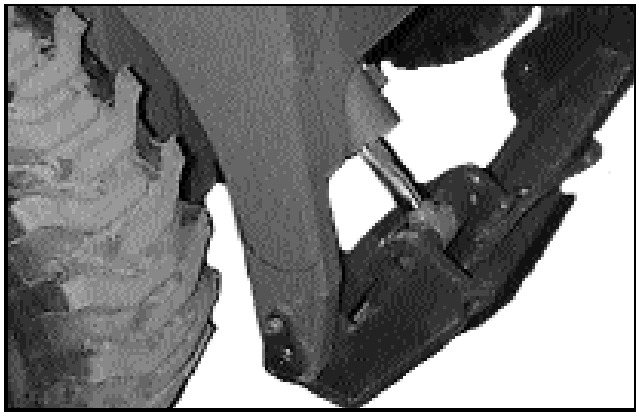
3 Lubricate the grease fittings on each of the pivot pin bushings with a good quality multi purpose lithium based grease until excess shows. (fig. C2667).

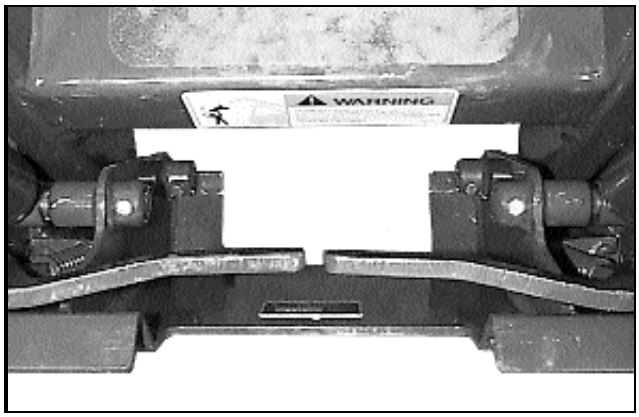


4 Lubricate the attachment locking pins. (fig. C2668).



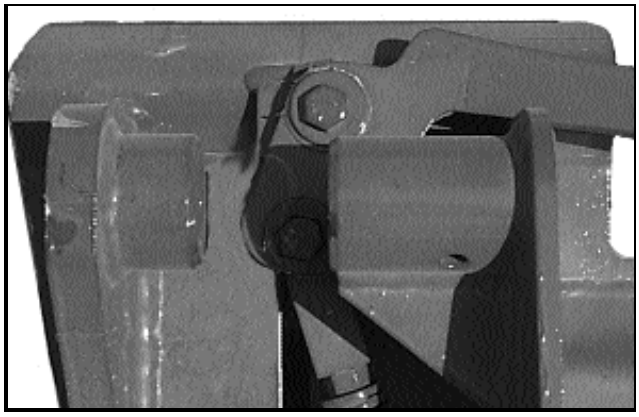
QUICK - TACH 6.1

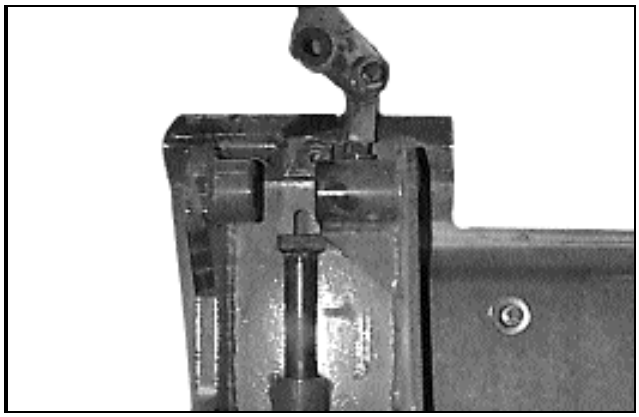


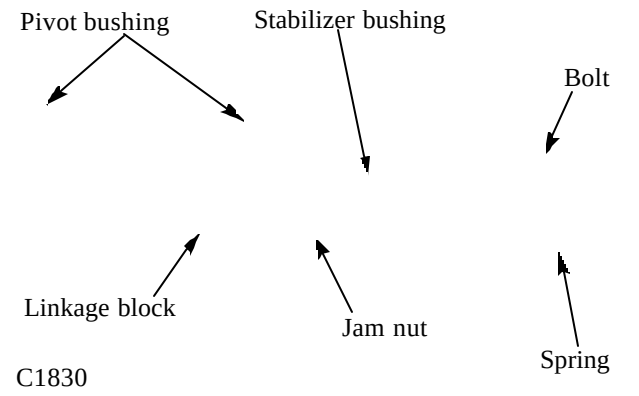


Model not exactly as shown

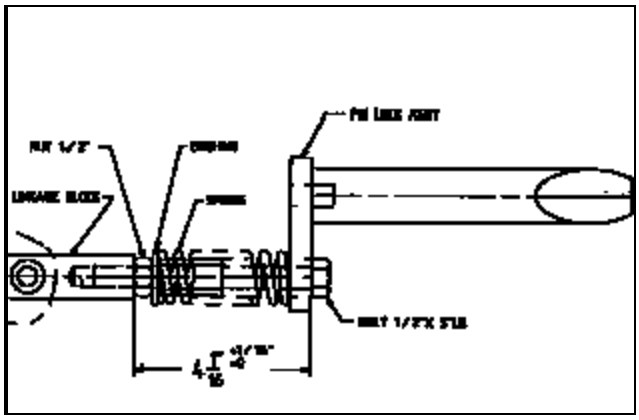
QUICK - TACH 6.1







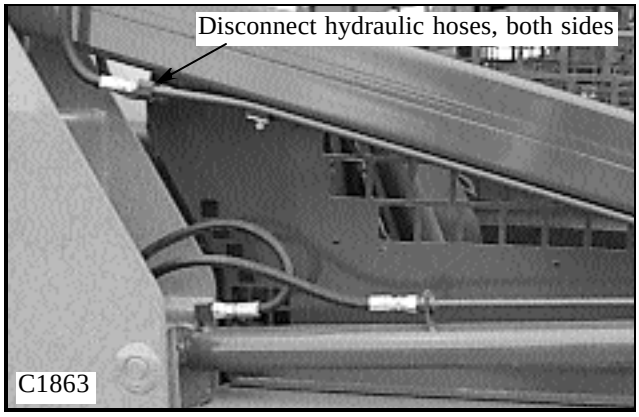
C1830

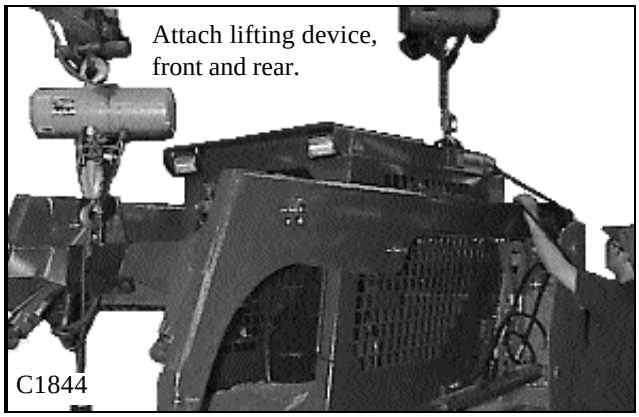


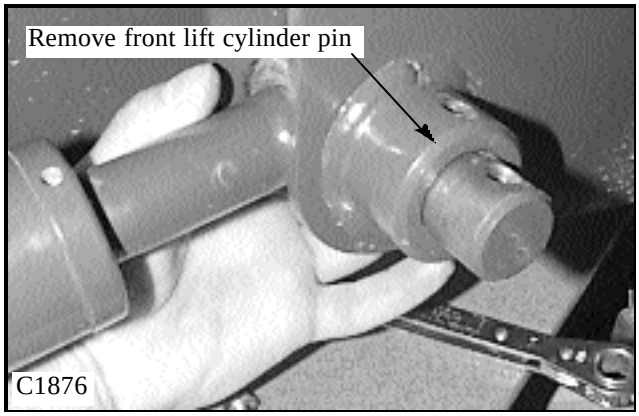
BOOM ARMS 6.2

Removal

1 Lower the boom arms and shut off the engine. Turn the ignition key to the “RUN” position and cycle the boom and tilt controls to relieve hydraulic backpressure. Lock the boom lift control in the float position.
2 Return the key to the “OFF” position and engage the parking brake. (raise the restraint bar).
3 Remove the quick - tach assembly from the boom arms. (See Section 6.1).
4 Disconnect the hydraulic hoses between the boom arm and reservoir tanks. Cap the open hose ends to prevent contamination. (fig. C1863).
5 Fasten chains or lifting straps with an adequate capacity to sustain the weight of the boom arms. Most of the weight is at the front of the boom arms. Attach one set of straps as close as possible to the front, (fig. C1844), and the other set approximately half way toward the rear.
6 Raise the boom arms, with an over head hoist, enough to take the weight of the lift cylinders. Remove the bolts from the pivot pins in the lift cylinders that are mounted in the boom arms. (fig. C1876).
7 Remove the pins by reaching between the ROPS and the boom arm and pushing the pin out toward you. Take care not to let the lift cylinder fall on your hand.
8 Remove the bolts from the upper rear boom arm pivot pins mounted through the main frame. (fig. C1108).
9 Remove the pivot pins using an appropriate drift punch and hammer. Use care, do not broom up the end of the pins.
10 Raise the boom arms enough to free from the loader and remove them.



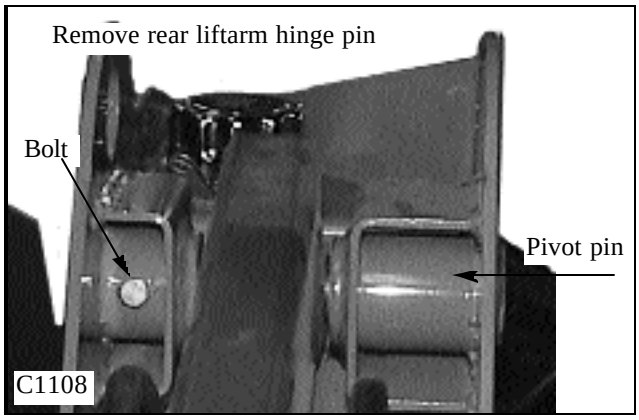




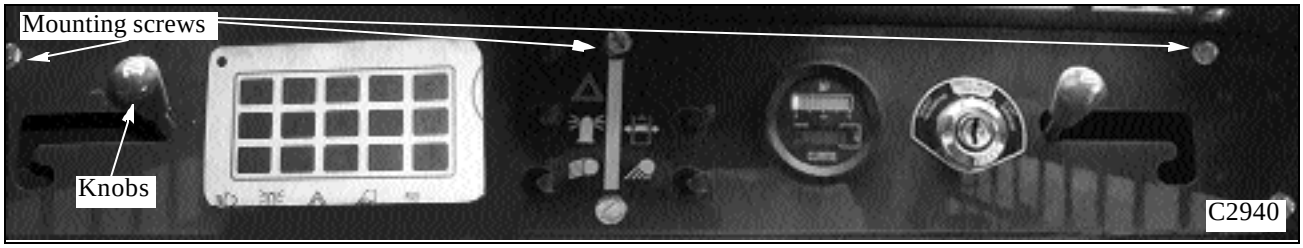
Installation

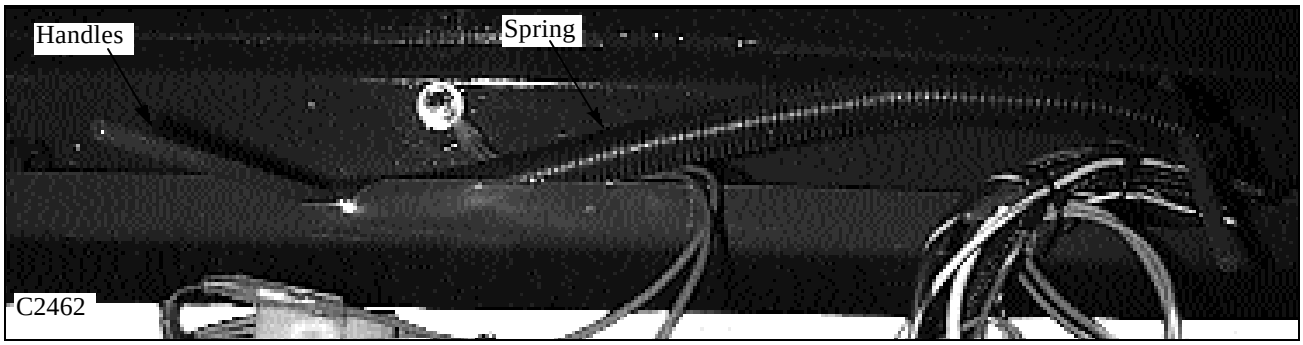
1 Upon installation follow the above procedure in the reverse order.
2 Replace any worn or gouged pins and bushings
3 All stationary bushings should be coated with anti - seize compound to assist ease of future disassembly. Do not get the anti - seize compound on moving or pivoting parts. The compounds contain abrasives that may cause premature wear of pivot pins and bushings.
4 Torque the hydraulic hose fittings as outlined in the Section 8 Hydraulics torque chart.

NOTE: pictures shown are only an example, not exact model.



BOOM SUPPORTS 6.3

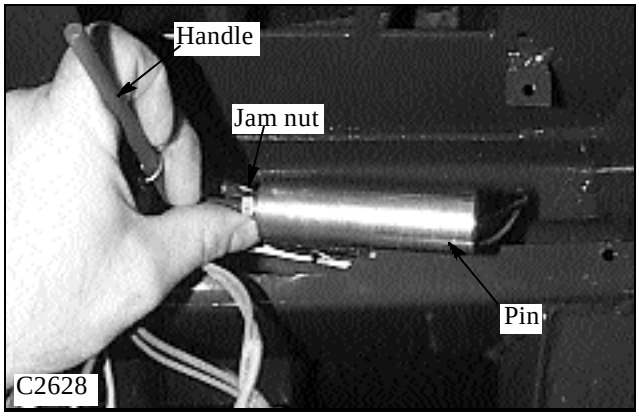


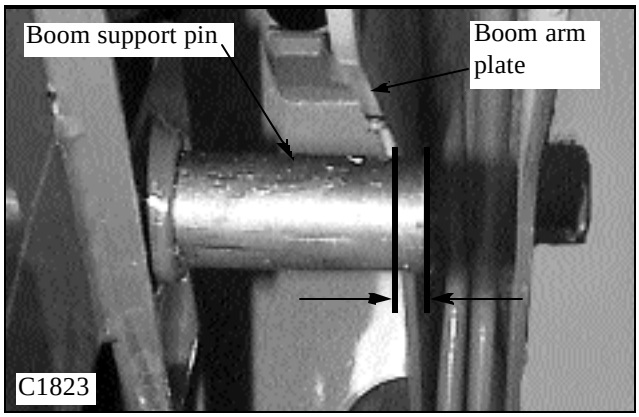


Boom Arm Supports

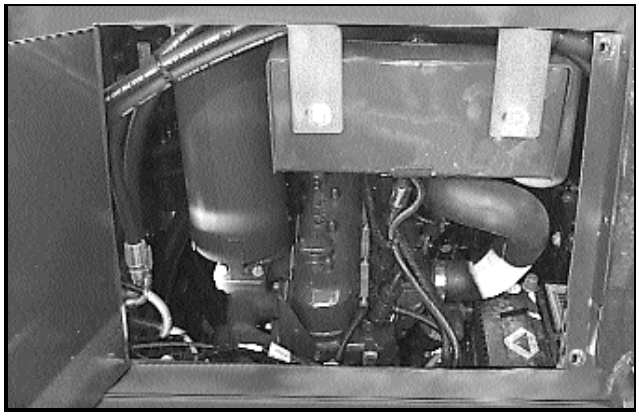
For safety while performing regular service or maintenance work, the loader is equipped with boom supports. The boom supports, when extended, prevent the boom arm from lowering when servicing the loader.
The boom supports should be greased every 8 hours of use and engagement depth should be checked every time the supports are used.

1 Raise the boom arms, extent the boom supports and allow the boom arms to lower onto the supports. Do not pressure the hydraulic system against the boom supports.
2 Shut off the engine and engage the parking brake.
3 Measure the distance the boom support pins are protruding past the inner boom arm plate. Proper adjustment should have the support pin protruding past the inner boom arm plate by **1/4 inch. (6.5mm)**. (fig. C1823).
4 Adjust the engagement depth by removing the 6 bolts on the dash panels to access the support pins and linkage. (fig. C2940, C2462)
5 Loosen the jam nut on the support pin linkage. (fig. C2628)
6 Screw the pin in or out the amount necessary to get the proper adjustment for support pin engagement on the boom arms.
7 Apply 242 Loctite (blue) to the nut and tighten it against the support pin when installing.
8 Lubricate the boom support pins and replace the dash panels.



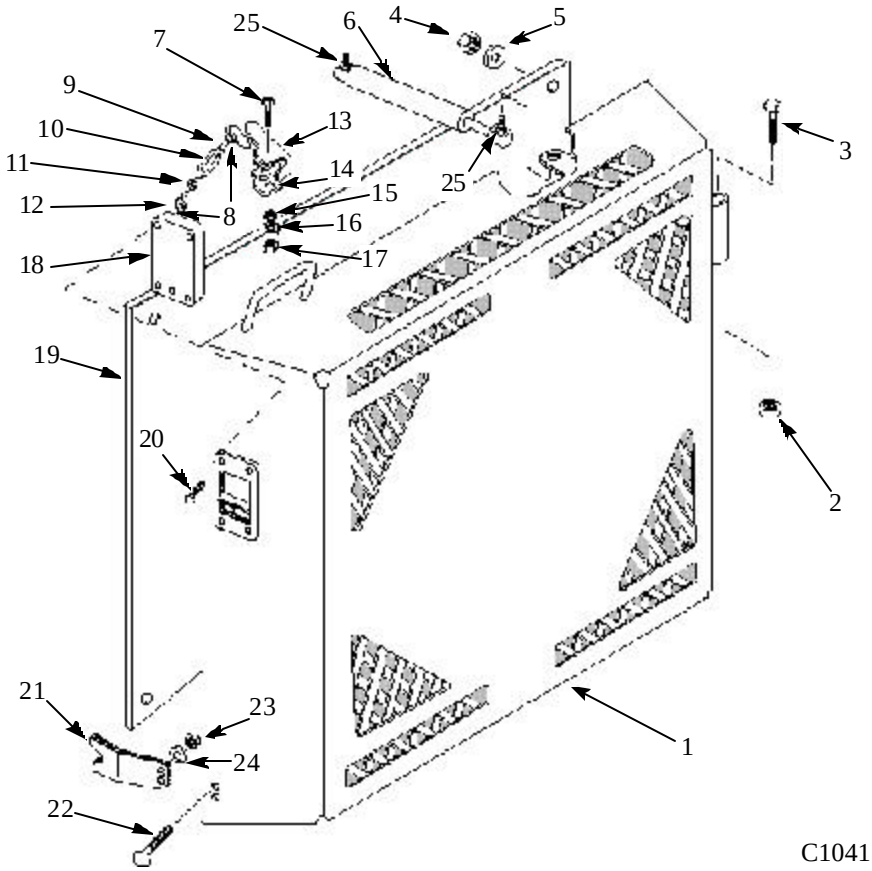


ROPS 6.4



REAR DOOR 6.5

1 Rear door
2 Lock nut
3 Bolt
4 Lock nut
5 Flat washer
6 Gas strut (option)
7 Bolt
8 Rod clip
9 Rod
10 Turnbuckle
11 Nut
12 Rod
13 Rotary latch
14 Latch reinforcement
15 Bearing mount
16 Lock Washer
17 Lock nut
18 Latch
19 Rad baffle
20 Rivet
21 Door guide
22 Bolt
23 Lock nut
24 Flat washer
25 Ball stud

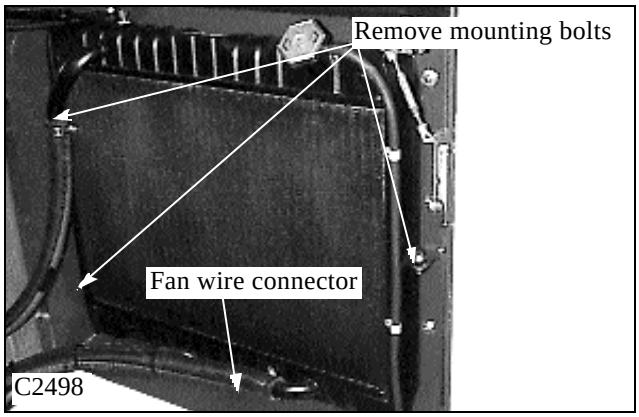


C1041

6

Removal

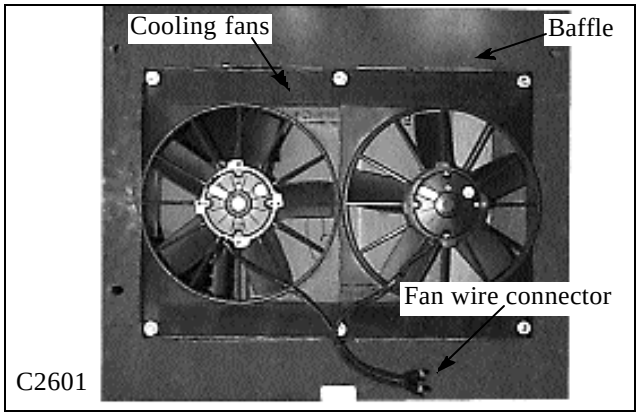
1 Open the rear door and disconnect the wire connector going to the cooling fans.
2 Remove the bolts retaining the radiator to the door. (fig. C2498).
3 Remove the radiator and gently lower to the ground.
4 Attach chains or straps to the rear door.
4 Using a hoist, raise the chains to take the weight of the door and remove the mounting bolts and door.
5 Remove the radiator baffle and cooling fans.



C2498

Installation

1 Replace the door to the frame in the reverse order above.
2 Adjust the door guide plate so the rear door looks level with the engine compartment cover, and the door slides freely into the closed position.
3 Adjust the door latch linkage so the door does not rattle when in the closed position. This is accomplished by turning the turnbuckle on the latch linkage. (fig. C1041).



C2601

SECTION 7 ENGINE

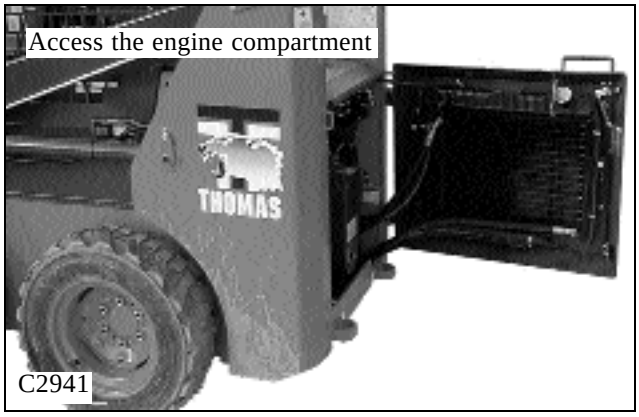
7

ENGINE MAINTENANCE 7.1

Lubrication System

Engine Oil and Filter:
Engine oil and filter changes should be made with the engine warm. Change the engine oil every 75 hours and the oil filter every 150 hours of operation.
Park the loader on a level surface, lower the boom arms, engage the parking brake and shut off the engine.

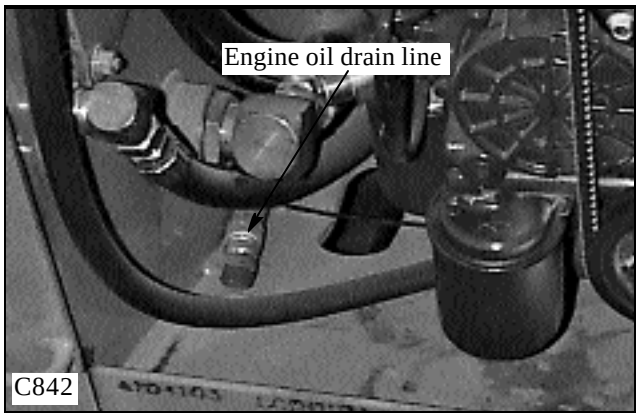
1 Access the engine compartment by opening the rear door and lifting the engine cover. (fig. C2941)



2 Locate the engine oil drain line and loosen the cap. (fig. C842)

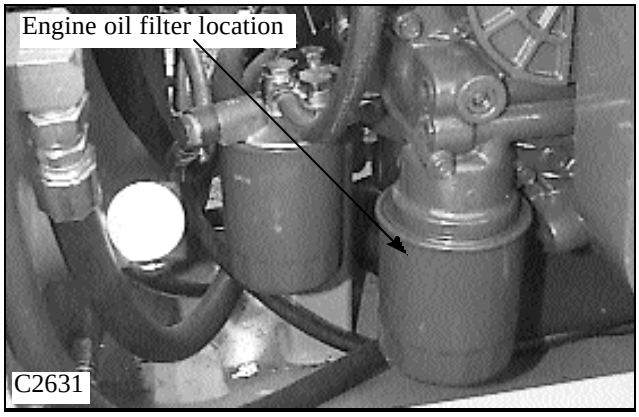
3 Place the line through the hole in the chassis and route to a container that will contain at least 8 liters (1.5gal) of fluid.

4 Remove the cap from the line and allow the oil to drain thoroughly.



5 Remove the oil filter using an appropriate filter wrench. If the oil filter area is excessively dirty, clean around the filter area before removing the oil filter to prevent contaminant's reaching the engine lubricating system. (fig. C2631).

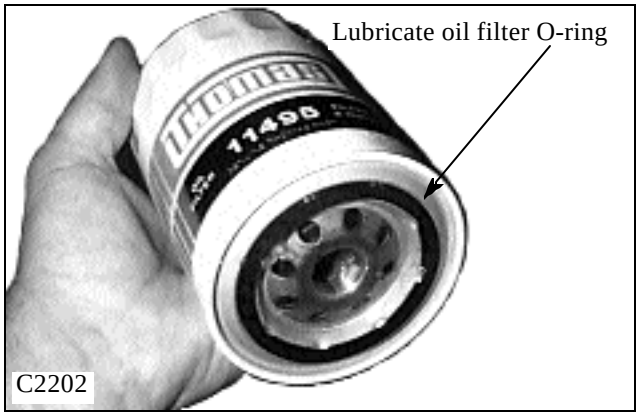
6 Check the oil filter mounting adapter area after removing the oil filter and check for dirt on the sealing surface and to make sure the oil filter O-ring seal has not stuck to the oil filter adapter.



7

7 Lubricate the new oil filter O-ring seal with engine oil and install to the engine hand tightened. (fig. C2202)

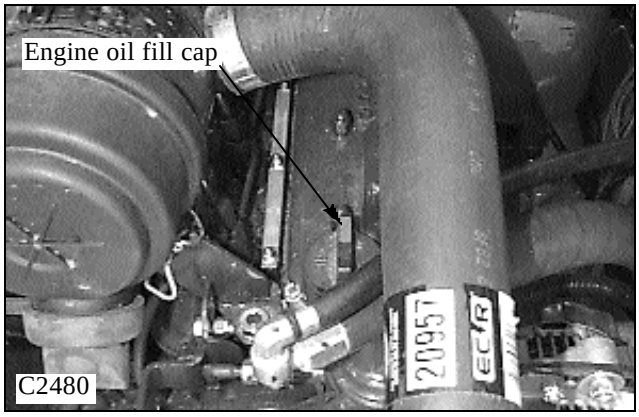
8 Replace the oil line drain cap and place the line back in the engine compartment.



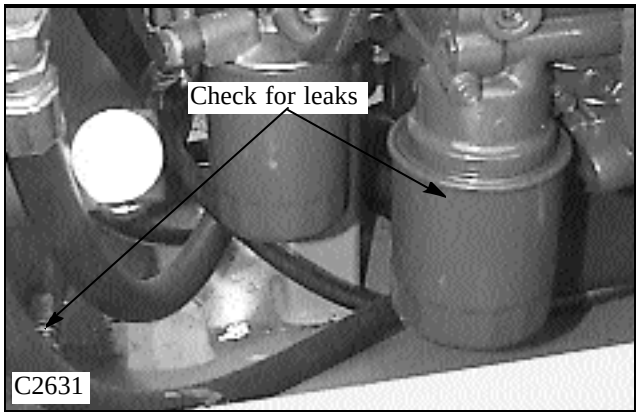
Lubrication System (cont'd)

9 Remove the oil fill cap located in the engine rocker arm cover. (fig. C2480) Add 6.5 liters (7qts) of 10W30 API classification SE / CD engine oil. Replace the fill cap in the rocker arm cover.

NOTE: Oil capacity includes the oil filter. Reduce oil added by 0.5 liters (0.5qts) if the oil filter is not replaced.

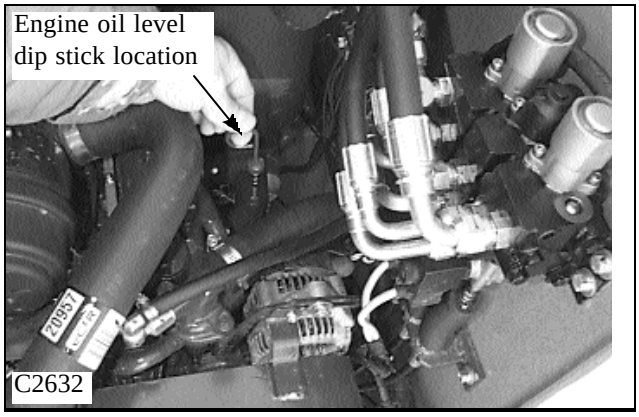


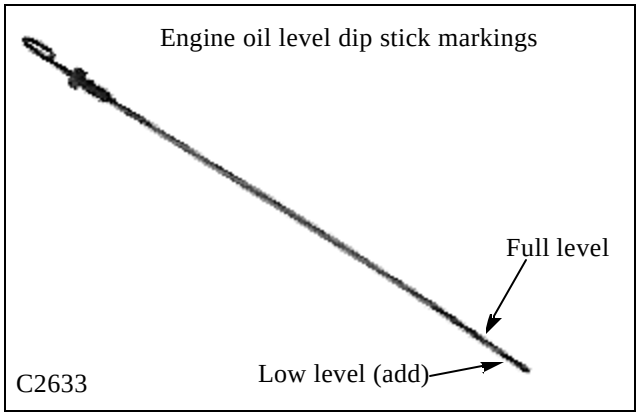
10 Start the engine and check for leaks around the oil filter and oil drain line. (fig. C2631). Allow the engine to operate for approximately 3 ~ 5 minutes and then shut it off.



11 Check the level of the engine oil. (fig. C2632). Add oil as required to bring the oil to the top mark of the engine oil dip stick if required. (fig. C2633). Do not over fill.

Change the engine oil every 75 hours and the engine oil filter every 150 hours.

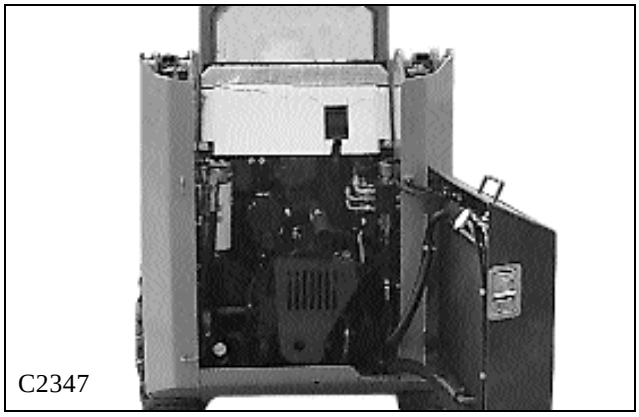




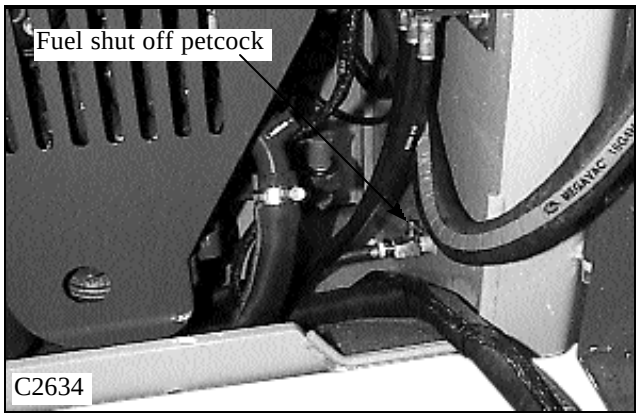
Fuel System

Fuel Filter:
The fuel filter is a spin on type and is located in the engine compartment on the engine mounting bracket. Change the fuel filter every 400 operating hours.
To change the fuel filter: Park the loader on a level surface, lower the boom arms, engage the parking brake, shut off the engine and remove the key.

1 Access the engine compartment by opening the rear door and lifting the engine cover. (fig. C2347)


C2347

2 Close the fuel line shut off petcock located on the lower right hand side of the fuel tank. (fig. C2634) This will prevent fuel loss due to siphoning.



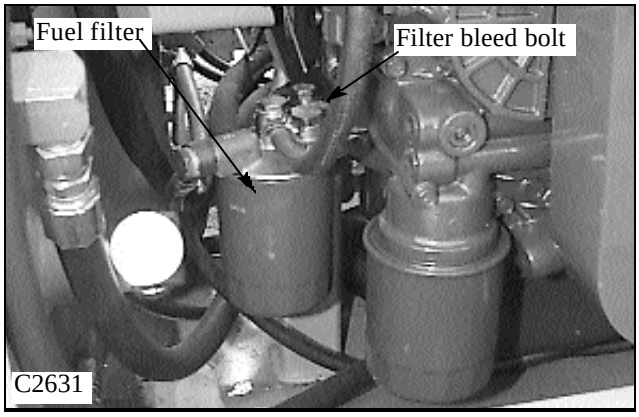
C2634

3 Remove the fuel filter using a filter wrench. (fig. C2631) Check to make sure the fuel filter O-ring seal has not stuck to the filter adapter mount.

4 Lubricate the new fuel filter O-ring seal with light oil. Tighten the filter to the adapter mount hand tight.

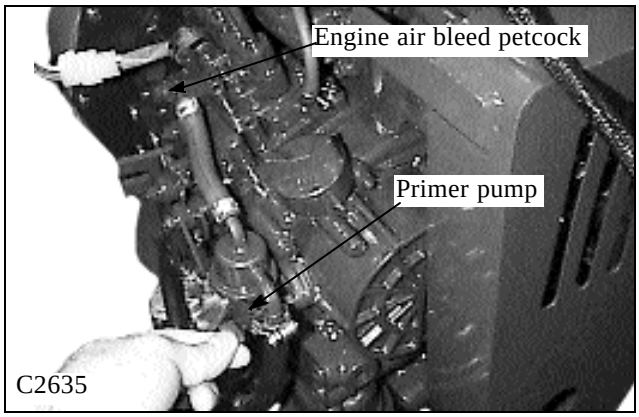
5 Open the fuel line shut off petcock.

6 Open the fuel filter bleed bolt on the filter adapter housing and allow the fuel to dribble out. (fig. C2631) Tighten the bleed bolt.



C2631

7 Open the engine fuel line / air bleed bolt located just to the left of the fuel injection pump. (fig. C2635) Start the engine and set to idle. Close the fuel line / air bleed petcock when fuel starts to spit out. This can be accomplished easier with help from an assistant.



C2635

If the engine fails to continue operating, it may be necessary to bleed the fuel system of air after changing the fuel filter or running out of fuel. See Bleeding the Fuel System, next page.

Fuel System (cont'd)

Bleeding the Fuel System:
If the loader has been run dry of fuel, or the fuel filter has been changed, it may be necessary to bleed the air from the fuel lines.

1 Replenish the fuel reservoir (tank) with a minimum of 10 gallons (45 L) of fuel. This will allow the fuel to siphon through readily.

2 Make sure the fuel line shut off petcock is fully open. (fig. C2634)

3 Loosen the fuel filter bleeder bolt and allow the fuel to siphon through the fuel line and filter. (fig. C2631) Tighten the fuel filter bleeder bolt.

4 Loosen the air bleed bolt located to the left of the fuel injection pump. (fig. C2635).

5 Crank the hand primer pump (fig. C2635) until fuel trickles out the engine air bleed bolt. Tighten the bolt.

6 Pre- heat and the start engine. Allow to operate at idle speed for few minutes. Shut off the engine.

If the engine fails to continue operating it may be necessary to repeat the procedure, or try the following.

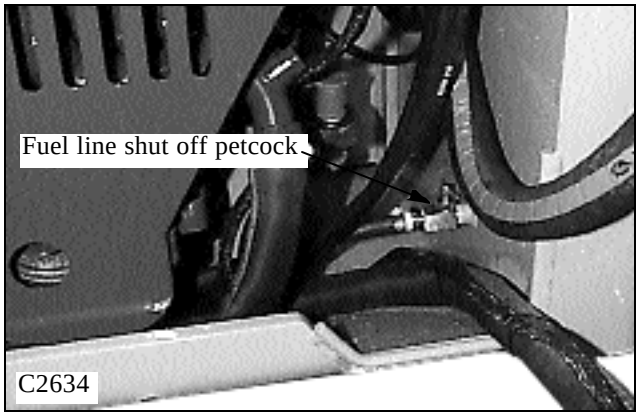
1 Open the engine air bleed bolt.Turn the engine over with the starter until the engine starts to smoke. Close the air bleed bolt. Do not engage the starter for more than 15 second intervals. Allow the starter to cool between starting attempts for 1 (one) minute.

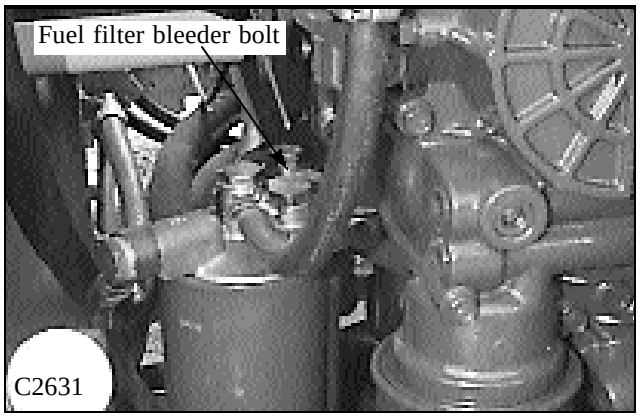
2 Pre- heat and the start engine. Allow to operate at idle speed for few minutes. Shut off the engine.

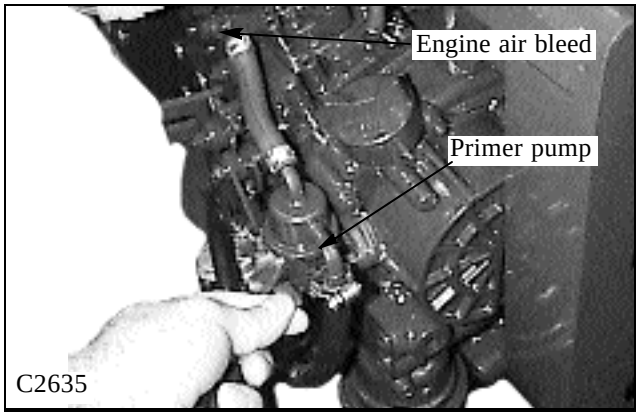
If the engine operates but idles roughly, or knocks (has an air lock in an injector line), it may be necessary to bleed the individual injection lines while the engine is operating.

Loosen the injection lines, one at a time, starting at the injector pump. Tighten the line when fuel spits out then move onto the next injection line if required. Do all the lines on the injector pump first, then move to the injector connection next.

TIP: A quick way to bleed the fuel system if air pressure is readily available is to pressurize the fuel tank via the fuel return line and open the engine air bleed bolt. Do not over pressurize, 5 ~ 10 psi is adequate.







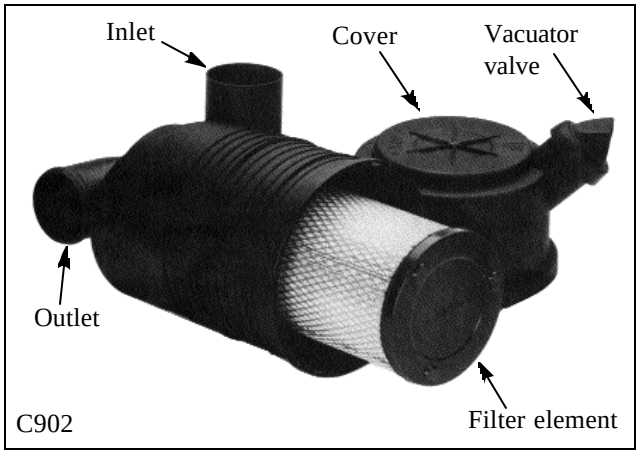
WARNING

Use extreme caution when bleeding air from the injection lines. Fuel is pressurized over 2000 psi and can penetrate the skin causing serious injury.

7

Air Filter

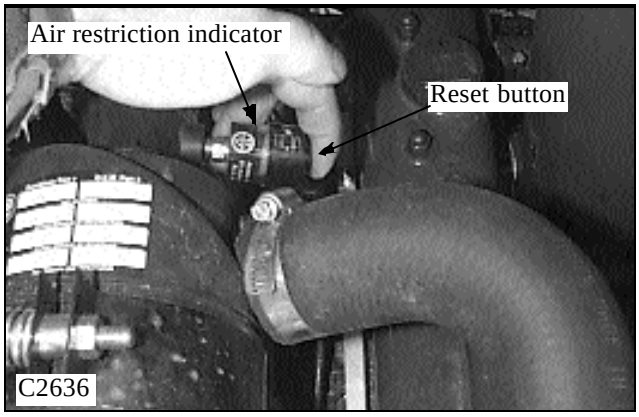
The loader is equipped with a dry cartridge, radial seal type filter element.
The loader is equipped with an air restriction indicator, located inline between the air cleaner and the engine air inlet. When the air filter element requires servicing the indicator will turn red in color.
Over servicing the air filters can damage the seals and pleated filter material if proper care is not taken. Never beat, shake or bend a filter element to clean. Cleaning with pressurized air can damage the pleated material..
Recommended service intervals are as the restriction indicator dictates, then replacement is required. Filters improperly serviced and leading to engine failure are not warrantable by Thomas or the engine manufacturer.
To service the air filter: park the loader on a level surface, lower the boom arms, engage the parking brake shut off the engine and remove the key.



Daily Checks

1 The air inlet restriction indicator should be visually checked daily, and for proper function by pushing in on the reset button. (fig. C2636). If the indicator is showing a red color, then the filter system will need to be serviced.

NOTE: If the indicator fails to reset after servicing, replace the indicator.



2 Air cleaner hoses and clamps should be inspected daily for proper tightness and verify air inlet hose integrity. Replace any worn or cracked inlet hoses immediately. Check the air cleaner mounting hardware for tightness.

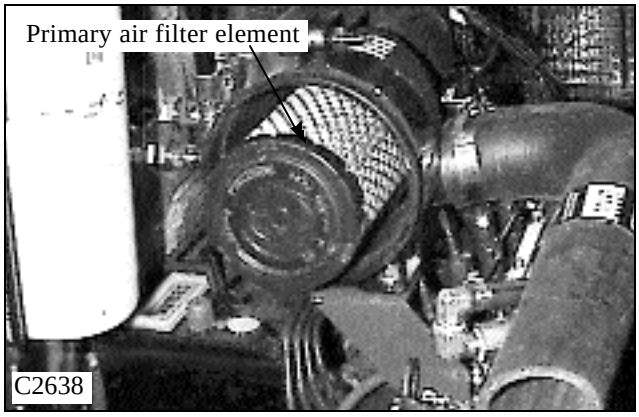
7

IMPORTANT

Air filter service intervals recommended only when the service indicator dictates.

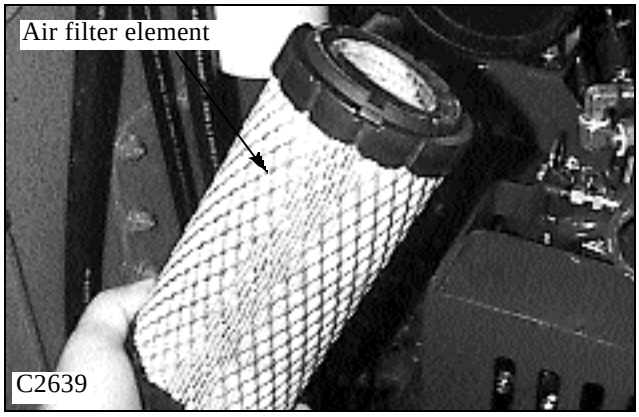
Servicing the Air Filter Elements:
1 Release the latches holding the air cleaner cover to the canister body. (fig. C2637)

2 Pull straight out on the primary element to remove from the air cleaner housing. (fig. C2638) Do not twist or force the filter. This may damage the sealing area around the end of the air filter element.

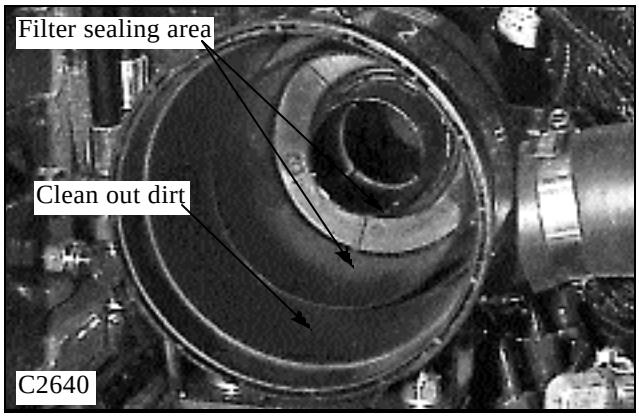


Air Filter (cont'd)

3 After removing the air filter elements, carefully wipe out any excess dirt from the air cleaner housing. (fig. C2640).



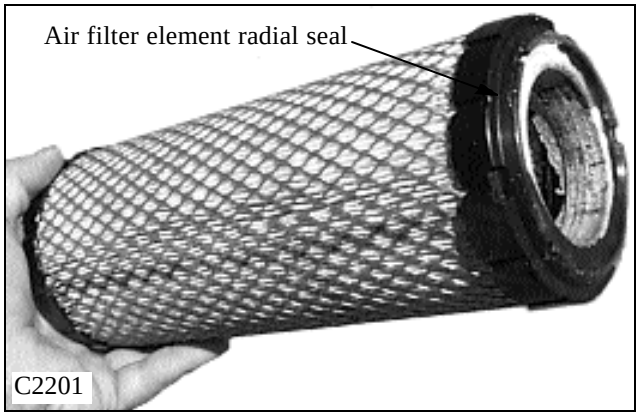
4 Check the air filter element seal before installing to the air cleaner housing. (fig. C2201). Be sure the seal is not damaged, torn or gouged. Do not use a filter with a damaged seal.

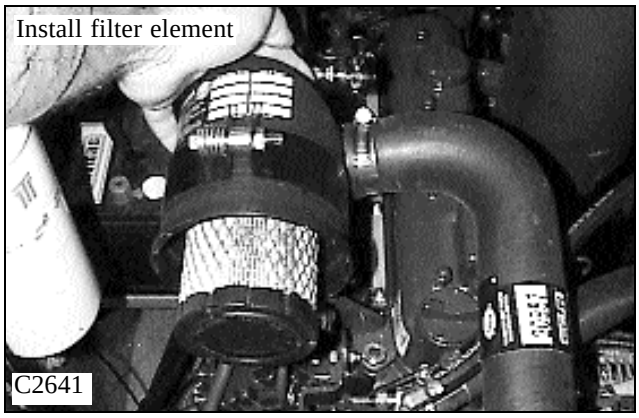


5 When installing the air filter elements to the air cleaner housing, support the back of housing with one hand and push the air filter element into position as gently as possible. (fig. C2641). Make sure it has fully seated to the air cleaner housing.

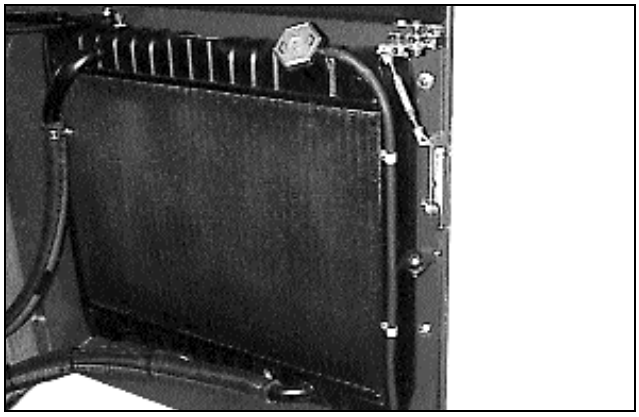
6 Install the air cleaner cover onto the housing. Be sure to align the latch hooks with the notches in the air cleaner housing.

Do not use the covers latches to push the air filter elements into position.





ENGINE MAINTENANCE 7.1



C2499

Cooling System (cont'd)

4 Attach a radiator tester and increase the pressure to 0.9 kg / cm^2 (12.8 psi).(fig. C172) Inspect the radiator, hoses and engine block for external leaks. Repair as required.

5 Attach a radiator tester to the radiator cap. (fig. C173) Apply 0.9 kg / cm^2 (12.8 psi) pressure to the radiator cap. The pressure should not drop more than 0.3kg / cm^2 (4.3 psi) in 10 seconds. Replace the radiator cap if required.

If no external leaks are found, and the radiator cap tests good, there may be an internal problem with the engine such as a gasket, cylinder head or block defect. Consult a Kubota Repair Manual P / N 40916 (Kubota P / N 97897-0109-5) to assist in engine disassembly and inspection.

WARNING

Never remove the radiator cap when the engine is hot.

Coolant Replacement:

The engine coolant should be changed every 1000 hours of operation. To change the coolant:

Park the loader on a level surface, lower the boom arms, engage the parking brake and shut off the engine.

1 Make sure the engine is not hot to touch. Remove the radiator cap.

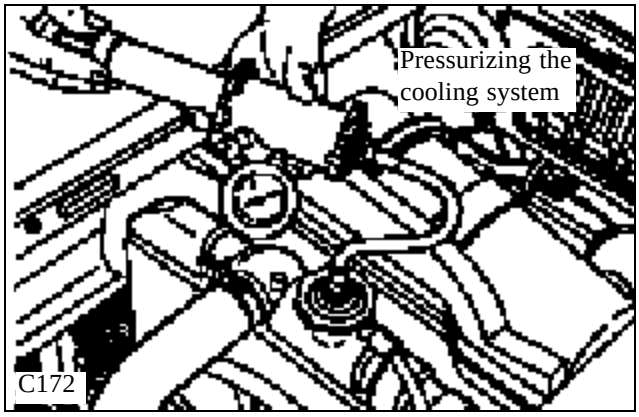
2 Remove the radiator drain plug located lower left corner of radiator. (fig. C2203) Be prepared to contain 7 liters (1.8 gal) of fluid.

3 Open the engine drain petcock located next to the engine fuel pump, just below the engine solenoid shut off. (fig. C1060) Close the drain petcock after the engine is completely drained.

Note: Attaching a piece of 5 / 16" (8mm) hose to the drain petcock and routing to a container, lessens waste fluid clean up. Please dispose of waste fluid in an environmentally friendly manner.

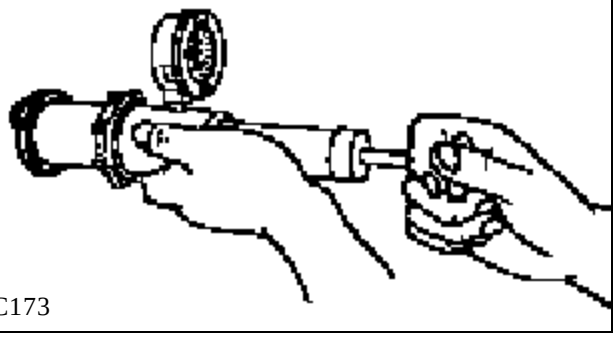
4 Replace the radiator drain plug using teflon tape or equivalent on the threads. Be sure to tighten the drain plug so it does not protrude past the radiators lower mount. This will prevent interference with the hydraulic oil cooler.

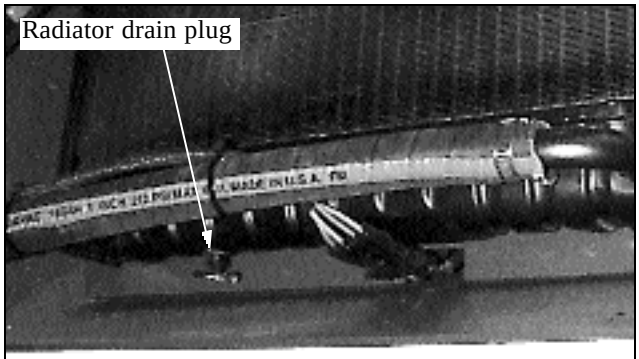
5 Pre - mix the engine coolant, ethylene glycol, to equal parts of water. (50 / 50 ratio) Add the mixed coolant to the engine radiator.The cooling system will hold approximately 7 liters (1.8 gal) of coolant. Never use coolant undiluted. Pure coolant does not absorb and pass heat efficiently. It will also gel in cold weather.



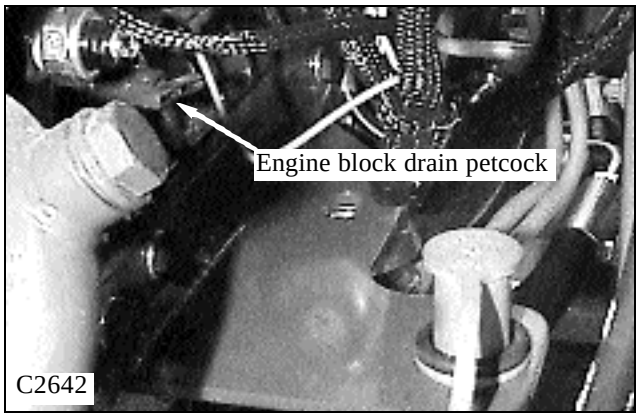
C172

Radiator cap test


C173



C2497



C2642

MAINTENANCE 7.1

Drive Belt Adjustment

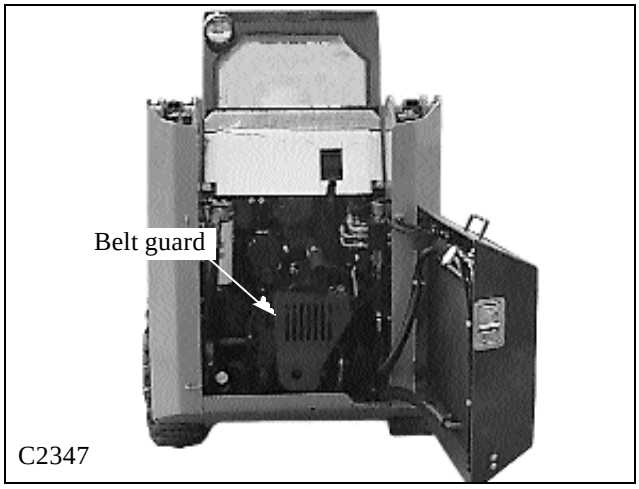
The fan (alternator) drive belt should be checked daily for tension and wear. The drive belt should be replaced promptly when fraying of the belt cords or cracks in the rubber are observed. Failure to replace the drive belt could lead to slippage or complete failure, causing the engine to over heat and lead to extensive repairs.

To Adjust the Drive Belt:

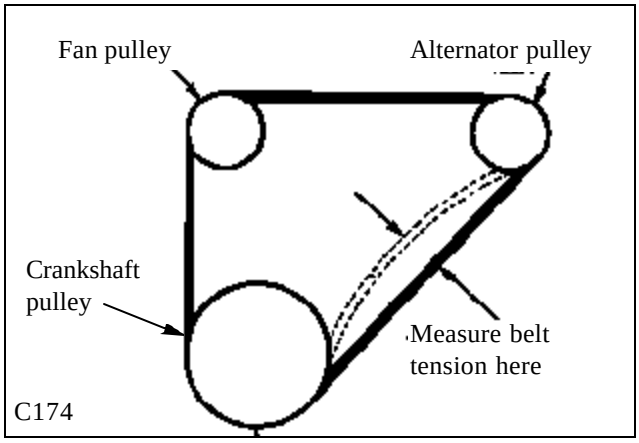
1 Park the loader on a level surface, lower the boom arms, engage the parking brake and shut off the engine.
2 Access the engine compartment by opening the rear door and lifting the engine cover. (fig. C2347)
3 Remove the drive belt / pulley guard to access the drive belt (fig. C2347).
4 Check the drive belt tension midway between the alternator and crankshaft drive pulley. (fig. C174) Correct tension is 10 ~ 12mm deflection @ 98 newtons force. (3 / 8 ~ 1 / 2'' deflection @ 22 lbs force).

Drive Belt Replacement:

1 Remove the bolts retaining the guard to the radiator shroud. (fig.C2347)
2 Loosen the 2 bolts on the alternator and allow the belt tension to loosen off.
3 Pull the drive belt off the alternator pulley, crankshaft pulley and remove.
4 Replace in reverse order and adjust belt tension as described above.



C2347



C174

7

ENGINE MAINTENANCE 7.1

Valve Adjustment

The engine used in this application uses a solid lifter (tappet) design that requires periodic maintenance of the rocker arm to valve clearance. (Valve lash)
Valve clearance should be checked every 500 hours of operation. Always check the valve clearance while the engine is cold. **Correct valve clearance is 0.18 ~ 0.22mm (0.0071 ~ 0.0087in).**

Procedure to Check / Adjust the Valve Clearance:

1 Park the loader on a level surface, lower the boom arms, engage the parking brake and shut off the engine. Remove the ignition key for safety.

2 Allow the engine to cool to room temperature.

IMPORTANT	**Do not adjust the valve clearance while the engine is hot. Clearances provided are for cold engine adjustment only.**

3 Access the engine compartment by opening the rear door and lifting the engine compartment cover.

4 Remove the 4 nuts and washers retaining the valve cover to the engine cylinder head and remove the cover. (fig. C2100)

NOTE: The crankshaft pairs pistons # 1 and # 4, and pistons # 2 and # 3 to rise and fall at the same time. The camshaft valve timing though, has the cylinder pairs on different cycles of operation.

Example: If both pistons on # 1 and # 4 were at top dead center (TDC), one of the cylinders would be on the compression stroke (both valves closed) the other cylinder would be starting the intake stroke. (Intake valve starting to open).

5 Turn the engine over until the intake valve is just starting to opening on number 1 (one) cylinder. (Cylinder closest to radiator) This valve action means that cylinder number 4 (next to flywheel) is on the compression stroke, with both valves closed. This is the proper point to check and / or adjust the intake and exhaust valves on cylinder number 4.

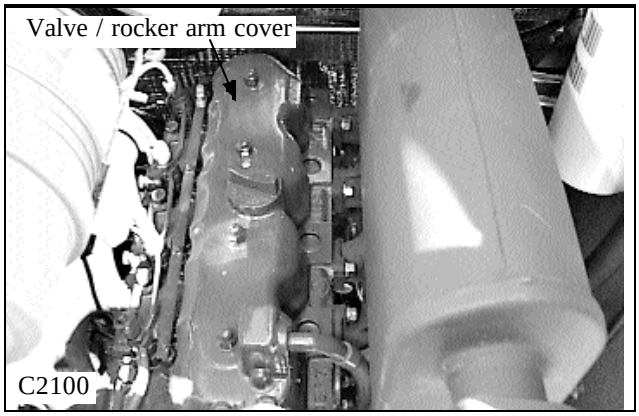
6 Insert a feeler gauge between the rocker arm and the intake or exhaust valve on cylinder number 4. (fig. C551) If necessary, loosen the jam nut on top of the rocker arm and turn the adjustment screw to acquire correct valve clearance. **Correct valve clearance is 0.18 ~ 0.22mm (0.0071 ~ 0.0087in).**

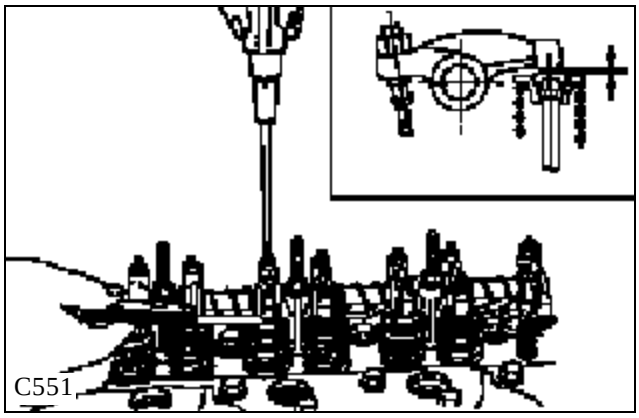
7 Rotate the engine after checking / setting cylinder number 4 valves, until cylinder number 4 intake valve start to open. This position means that cylinder number 1 (one) is on the compression stroke and can have the intake and exhaust valves checked and / or adjusted. **Correct valve clearance is 0.18 ~ 0.22mm (0.0071 ~ 0.0087in).**

8 Repeat the procedure for cylinder pairs 2 and 3. As one of the cylinders intake valves are just starting to open the opposite cylinder is on the compression stroke and can have it's valves adjusted. **Correct valve clearance is 0.18 ~ 0.22mm (0.0071 ~ 0.0087in).**

9 Rotate the engine 2 ~ 3 complete revolutions and recheck the valve clearances by repeating the procedure above.

10 Replace the valve cover. Tighten the mounting nuts to 6.9 ~ 8.8 Nm (5.1 ~ 6.6 ft / lbs).





CYLINDER HEAD 7.2 (notes)

7

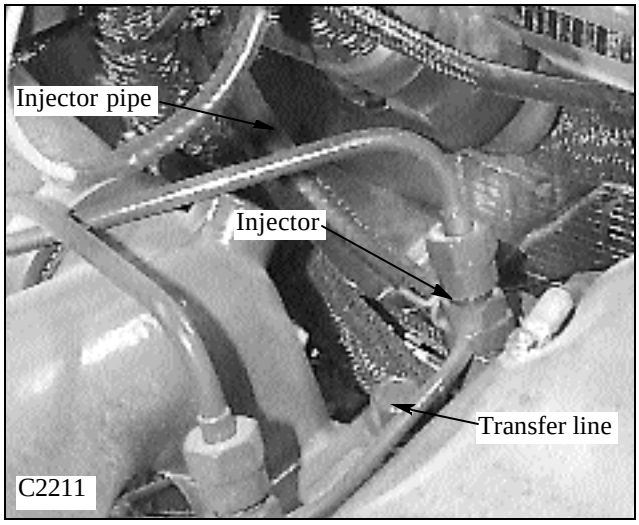
Compression Testing

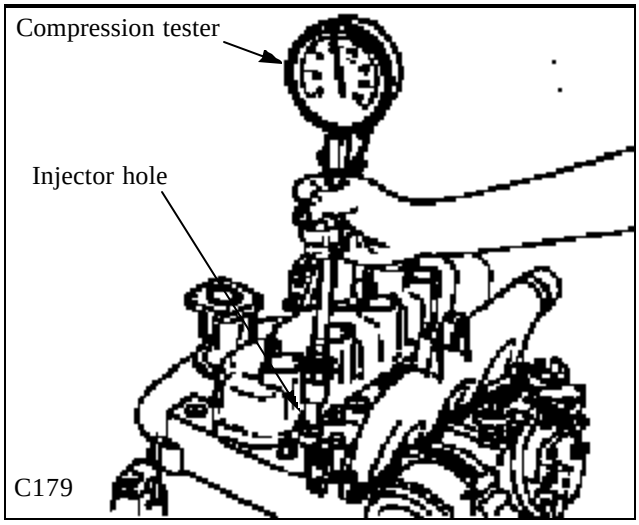
Testing the engine for compression is not a normal part of a scheduled maintenance procedure, but is important when trying to diagnose engine power or unusual performance related problems with the engine.
Before performing a compression test, be sure the battery is fully charged and valve clearances are correctly adjusted. See page 7-12. Be sure the air cleaner and exhaust systems are free of obstructions, to prevent a false or low reading

The engine should warmed up for approximately 5 minutes prior to compression testing.

To Perform Compression Test:
1 Move the loader to a level surface, lower the boom arms. engage the parking brake and shut off the engine. Remove the ignition key for safety.
2 Access the engine by opening the rear door and raising the engine compartment cover.
3 Disconnect the wiring plug connection on the engine stop solenoid. (fig. C) This will prevent fuel flowing to the engine when the engine is turning over.
4 Clean dirt from the top of the engine area to prevent contaminant's entering the engine.
5 Remove the fuel injection pipes from the fuel injectors. (fig. C2211) If the injector pipes are corroded or the pipes twist with the nut when loosening, replace the injection pipe before putting the loader back into service. Cap the open lines and injectors to prevent contamination entering the fuel injection system.
6 Remove the fuel transfer lines from the injectors.
7 Remove the fuel injectors from each cylinder. Use caution. Do not damage the injector while removing from the cylinder head.
8 Connect a compression tester (see Special Tools in Section 8) to the cylinder to be tested. (fig. C179) Be sure to use the correct thread on the adapter screwed into the injector hole.
9 Rotate the engine with the starter (200 ~ 300 RPM) 2 ~ 3 complete revolutions. Note the compression reading on the gauge. Repeat the process again to verify the first test reading.
10 Continue the compression test and the remaining cylinders keeping written notes of all the registered test readings.
11 Compare the compression test readings with the specifications given in Section 7.4, Engine Specifications.

continued...

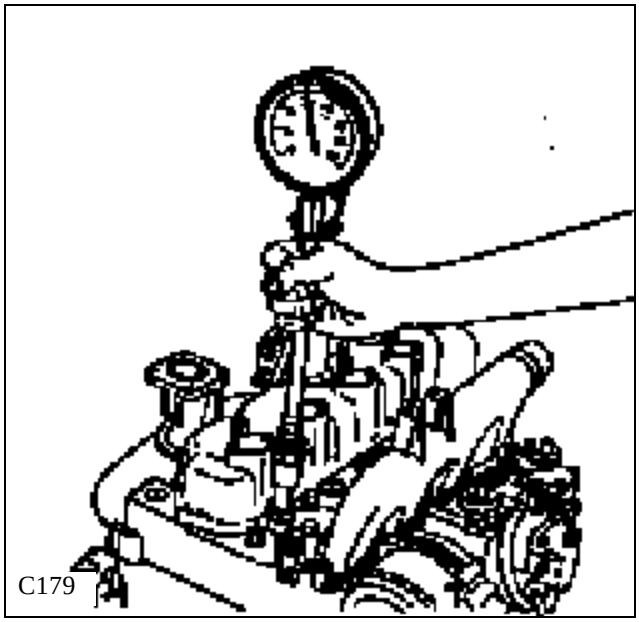




CYLINDER HEAD 7.2

Compression Testing (cont'd)

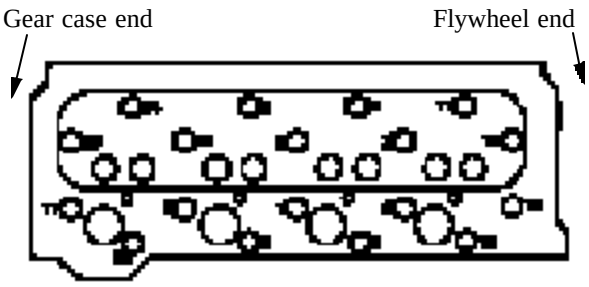
If the compression test reading are low, add a small amount of oil, through the injector hole, to the affected cylinder (s). Recheck the compression test readings. If the readings improve from the first test then the piston rings or cylinder bores are likely worn.
If the compression reading does not improve the problem is likely a cylinder head related problem such as valve train, cylinder head gasket, or a bad piston. The cylinder head should be removed for further inspection. See the Kubota Service / Repair Manual P / N 97897-109-5 or Thomas P / N 40916.


C179

Cylinder Head

After replacement of the engine cylinder head, the proper bolt torquing sequence must be followed. (fig. C578)
Torque the bolts in 3 separate steps, increasing tightness to the specified 63.7 ~ 68.6 Nm (47 ~ 50.6 ft / lbs).
Apply oil to the threads of the bolt and to the heads of the bolt where they contact the cylinder head casting.
Always install a new head gasket and oil gallery O- ring when replacing the cylinder head.
After installation, operate the engine for half an hour to bring to full operating temperature. Allow the engine to fully cool and retorque the cylinder head bolts.

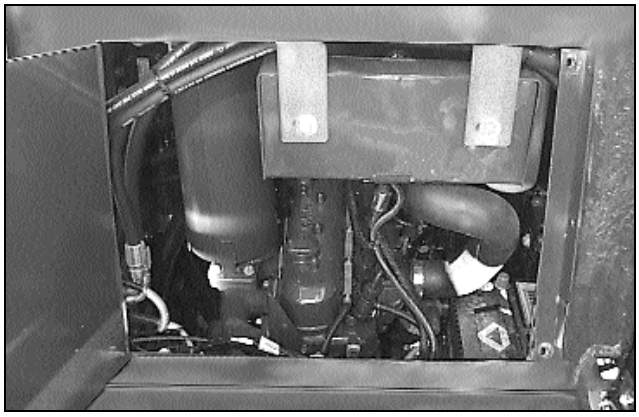
Cylinder head bolt torque sequence

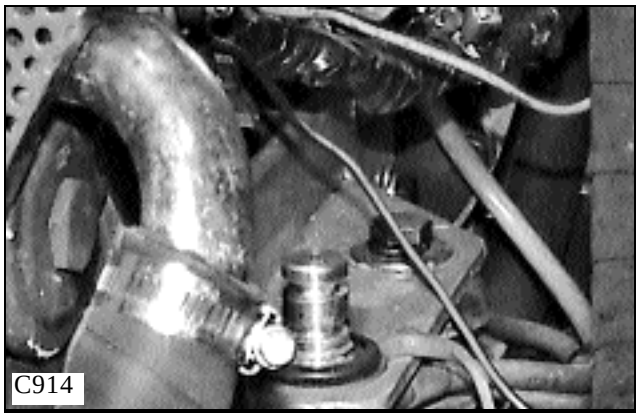


C578

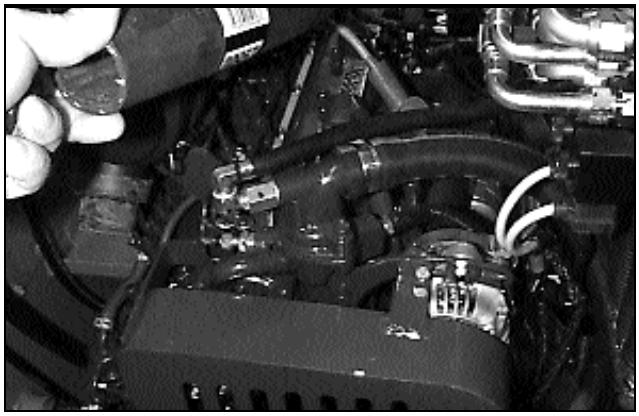
7

ENGINE REPLACEMENT 7.3





C914



Disconnect fan wiring

C2497

ENGINE REPLACEMENT 7.3

Engine Removal (continued)

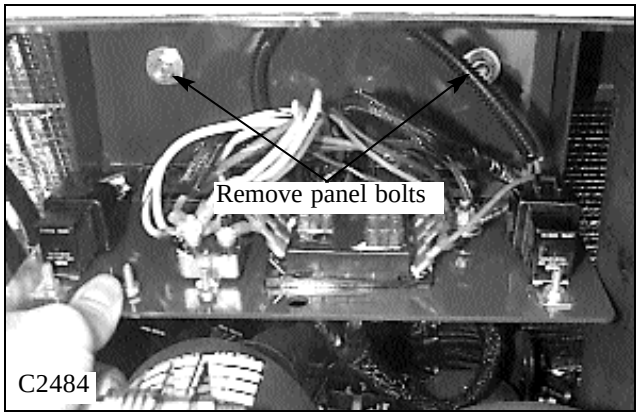
11 Open the fuse panel and remove the bolts retaining to the frame (fig. C2484). The fuse panel and harness may stay with the engine during removal.

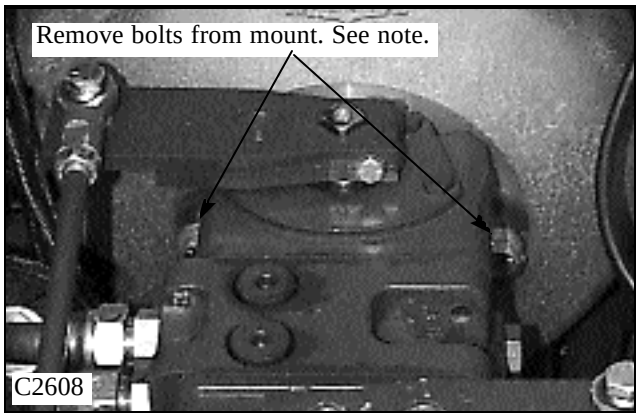
12 Remove the bolts retaining the tandem pump to the bellhousing. (fig. C2608) Support the pump from dropping before proceeding. See note below.

Note: If desired, the hydrostatic tandem pump may be removed with the engine assembly as a single unit. Bypass step 12 if preferred. Drain the hydraulic reservoir, remove and cap all hydraulic hoses as required. See section 1 and 2 for details.

13 The engine rests on three (3) isolator mounts. One (1) on each side of the engine block and one (1) located further forward under the hydrostatic pump (fig. 2779). Remove the mounting bolts retaining the engine to the frame isolator mounts.

14 Attach lifting device to engine to prevent damage to injector lines etc., remove the engine.





Engine Replacement

Transfer the engine mounts, bellhousing, flywheel adapter coupling, air cleaner assembly, electrical harness, sender and switches as required.

Note: The painted surface of the engine block and mounts, where the mounting bolts are used, must have the paint removed to assure adequate grounding for electrical components.

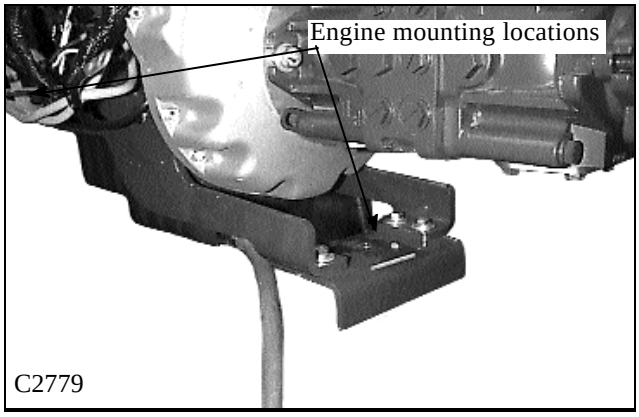
Use loctite 242 (blue) on all engine mount to engine block bolts and torque as outlined.

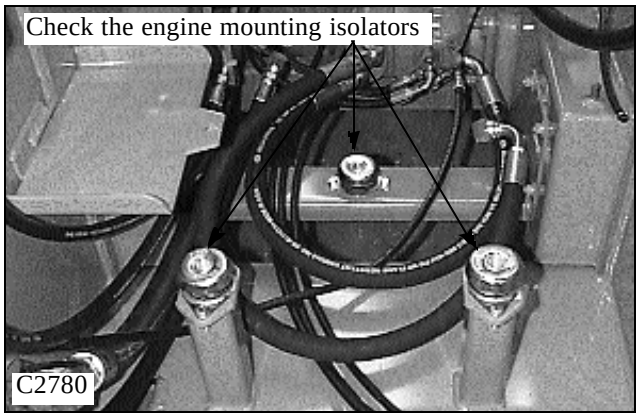
Use teflon sealant on electrical sender and switches.

Check the engine mounting isolators for deterioration and replace as required (fig. C2780).

Torque Specifications:

Engine mounts to engine block ..... 37 ft / lbs (50.3nm)
Engine mounts to frame isolators ..... 60 ft / lbs (81.6nm)
Flywheel adapter coupler..... 20 ft / lbs (27.2nm)
Bellhousing to engine ..... 20 ft / lbs (27.2nm)
Tandem pump to bellhousing ..... 55 ft / lbs (74.8nm)





ENGINE SPECIFICATIONS 7.4

Make and model ..... Kubota V1305E
Type ..... Vertical , In Line, 4 Cycle
Number of cylinders ..... 4 (four)
Displacement ..... 1335cc (81.5 cu. in.)
Cylinder bore ..... 76 mm (2.99 inches)
..... Allowable limit: 76.0 ~ 76.019mm + 0.15mm. (2.9921 ~ 2.9929 + 0.0059 inches)
..... Oversize Cylinder Bore +0.5mm (0.0197 inches)
Ring Gap ..... Allowable Service Limit 1.25mm (0.0492 inches)
Top Compression Ring ..... 0.25 ~ 0.40mm (0.0098 ~ 0.0157 inches)
Second Compression Ring ..... 0.25 ~ 0.40mm (0.0098 ~ 0.0157 inches)
Oil Ring ..... 0.25 ~ 0.40mm (0.0098 ~ 0.0157 inches)
Stroke .....73.6 mm (2.9 inches)
Bearing clearance ..... Main journals: 0.04 ~ 0.118mm (0.0006 ~ 0.0015 in) < 0.2 mm (0.0079 in) allowable limit >
..... Rod journals: 0.025 ~ 0.087 mm (0.0009 ~ 0.0034 in)< 0.2 mm (0.0079 in) allowable limit >
..... Thrust bearing end play: 0.15 ~ 0.31 mm (0.0059 ~ 0.0122 in) < 0.5 mm (0.0197 in) allowable limit
Maximum engine speed (no load) ..... 3000 RPM
Low idle setting ..... 1300 RPM
Cooling system ..... Liquid
Cold starting aid ..... Glow plug in combustion chamber
Power (ISO 9249 Net Power) ..... 22.5Kw (30 hp) @ 3000 RPM
Torque (ISO 9249 Net Power) ..... 6 kg /m. (43.4 lbs / ft.) @ 2400 RPM
Compression ratio 22.0: 1
Engine compression ..... 29 - 33kgf / cm^2 (412 - 469psi)
..... Service limit: 23kgf / cm^3 (327psi) 10 % variance among cylinders
Firing order (viewed from gear case end) ..... 1 - 3 - 4 - 2
Fuel injection pump ..... Bosch MD type mini pump
Fuel injection timing ..... 21º ~ 23° BTDC (0.37 ~ 0.40 Rad)
Injector working pressure ..... 140 - 150 kgf / cm^3 (1990 - 2133 psi)
Direction of rotation (viewed from flywheel end) ..... Counter - clockwise
Location of timing marks ..... N / A
Valve clearance, (cold) ..... 0.145 - 0.185 mm (0.0057 - 0.0072 in)
Valve seat angle ..... Intake 1.047 Rad (60º)
..... Exhaust 0.785 Rad (45º)
Valve seat width ..... Intake 2.12mm (0.0835 in)
..... Exhaust 2.12mm (0.0835 in)
Valve face angle ..... Intake 1.047 Rad (60º)
..... Exhaust 0.785 Rad (45º)
Valve recessing ..... - 0.05mm ~ 0.4mm (0.0020 ~ 0.016in)

ENGINE SPECIFICATIONS 7.4

Fuel type	Diesel No. 2
Fuel filter	Single spin on type
Air cleaner	Single dry cartridge element with restriction indicator
Oil filter	Single spin on type
Engine oil pressure	@ Idle speed 98 Kpa (14 psi) minimum
	@ Rated speed 245 Kpa (36 psi) minimum
Oil pressure switch	Closes @ 49 Kpa (7 psi)
Engine oil capacity with filter	8 l. (8. 5 qts)
Oil type	10W30API SE,CD
Cooling system capacity	14.5 l (3.2 gal.)
Radiator cap pressure setting	88 KPa (12. 8 psi)
Thermostat rating	Fully open 85°C (185°F)

TIGHTENING TORQUES FOR SPECIAL BOLTS AND NUTS

Valve Cover Cap Nuts	6.9 ~ 8.8 nm (5.1 ~ 6.5lbs / ft)
Head Bolts	63.7 ~ 68.6nm (47 ~ 50.6lbs / ft)
Bearing Case Bolts (8mm)	29.4 ~ 34.3nm (21.7 ~ 25.3lbs / ft)
Bearing Case Bolts (9mm)	49 ~ 53.9nm (36.2 ~ 39.8lbs / ft)
Flywheel Bolts (10mm)	53.9 ~ 58.8nm (39.8 ~ 43.4lbs / ft)
Connecting Rod Bolts (8mm)	41.2 ~ 46.1nm (30.4 ~ 34lbs / ft)
Rocker Arm Bracket Nuts (7mm)	21.6 ~ 26.5nm (15.9 ~ 19.5lbs / ft)
Idle Gear Shaft Bolts (6mm)	9.8 ~ 11.3nm (7.2 ~ 8.3lbs / ft)
Glow Plugs (S / N ~ 488290 [10mm])	19.6 ~ 24.5nm (14.5 ~ 18.1lbs / ft)
(S / N 488291 ~ [8mm])	7.8 ~ 14.7nm (5.8 ~ 10.8lbs / ft)
Nozzle Holder Assembly (Injector, 20mm)	49 ~ 68.6nm (36.2 ~ 50.6lbs / ft)
Injector Pipe Nuts (12mm)	24.5 ~ 34.3nm (18.1 ~ 25.3lbs / ft)

Engine mounts to engine block	50.3nm (37 ft / lbs)
Engine mounts to frame isolators	81.6nm (60 ft / lbs)
Flywheel adapter coupler	27.2nm (20 ft / lbs)
Bellhousing to engine	27.2nm (20 ft / lbs)
Tandem pump to bellhousing	74.8nm (55 ft / lbs)

ENGINE TROUBLE SHOOTING 7.5

SYMPTOM	PROBABLE CAUSE	SOLUTION
Excessive lubricant oil consumption	Piston rings gap facing the same direction	Shift gap direction
	Oil ring worn or stuck	Replace
	Piston ring groove worn	Replace
	Valve stem and guide worn	Replace
	Crankshaft bearing and crank pin bearing worn	Replace
Fuel mixed into lubricant oil	Injection pump's plunger worn	Replace pump element or pump
	Injection pump broken	Replace
Water mixed into lubricant oil	Head gasket defective	Replace
	Cylinder block or cylinder head flawed	Replace
Low oil pressure	Engine oil insufficient	Replenish
	Oil strainer clogged	Clean
	Relief valve stuck with dirt	Clean
	Relief valve spring weakened or broken	Replace
	Excessive oil clearance of crankshaft bearing	Replace
	Excessive oil clearance of crank pin bearing	Replace
	Excessive oil clearance of rocker arm bearing	Replace
	Oil passage clogged	Clean
	Oil pump defective	Replace
	Different type of oil	Use the specified oil type
High oil pressure	Relief valve defective	Replace
	Engine oil insufficient	Replenish
Engine overheated	Fan belt broken or elongated	Change or adjust
	Cooling water insufficient	Replenish
	Radiator net and radiator fin clogged with dust	Clean
	Inside of radiator corroded	Clean or replace
	Cooling water flow route corroded	Clean or replace
	Radiator cap defective	Replace
	Overload running	Loosen the load
	Head gasket defective	Replace
	Incorrect injection timing	Adjust
Deficient output	Unsuitable fuel used	Use the specified fuel
	Incorrect injection timing	Adjust
	Engine's moving parts seem to be seizing	Repair or replace
	Uneven fuel injection	Repair or replace injection pump
	Deficient nozzle injection	Repair or replace nozzle
	Compression leak	Replace head gasket, tighten cylinder head bolt, glow plug and nozzle holder
Battery quickly discharges	Battery electrolyte insufficient	Replenish distilled water
	Fan belt slips	Adjust belt tension or change
	Wiring disconnected	Connect
	Rectifier defective	Replace
	Alternator defective	Replace
	Battery defective	Change

ENGINE TROUBLE SHOOTING 7.5

Symptom	Cause	Remedy
Engine does not start	No fuel	Replenish fuel
	Air in the fuel	Vent air
	Water in the fuel	Change fuel and repair or replace fuel system
	Fuel pipe clogged	Clean
	Fuel filter clogged	Clean or change
	Excessively high viscosity of fuel or engine oil at low temperature	Use the specified fuel or engine oil
	Fuel with low octane number	Use the specified fuel
	Fuel leak due to loose injection pipe retaining nut	Tighten nut
	Incorrect injection timing	Adjust
	Fuel cam shaft worn	Replace
	Injection nozzle clogged	Clean
	Injection pump malfunctioning	Repair or replace
	Seizure of crankshaft, camshaft, piston, cylinder liner or bearing	Repair or replace
	Compression leak from cylinder	Replace head gasket, tighten cylinder head bolt, glow plug and nozzle holder
	Improper valve timing	Correct or replace timing gear
	Piston ring and liner worn	Replace
	Excessive valve clearance	Adjust
Starter does not run	Battery discharged	Charge
	Starter malfunctioning	Repair or replace
	Key switch malfunctioning	Repair or replace
	Wiring disconnected	Connect
Engine revolution is not smooth	Fuel filter clogged or dirty	Clean or change
	Air cleaner clogged	Clean or change
	Fuel leak due to loose injection pipe retaining nut	Tighten nut
	Injection pump malfunctioning	Repair or replace
	Incorrect nozzle opening pressure	Adjust
	Injection nozzle stuck or clogged	Repair or replace
	Fuel overflow pipe clogged	Clean
	Governor malfunctioning	Repair
Either white or blue exhaust gas is observed	Excessive engine oil	Reduce to the specified level
	Low grade fuel used	Repair or replace
	Fuel filter clogged	Adjust
	Air cleaner clogged	Adjust top clearance
Either black or dark gray exhaust gas is observed	Overload	Lessen the load
	Low grade fuel used	Use the specified fuel
	fuel filter clogged	Clean or change
	Air cleaner clogged	Clean or change

NOTES

7

SECTION 8
MAINTENANCE & SPECIFICATIONS

MAINTENANCE 8.1

8.1 Preventative Maintenance Service Schedule

ITEM	SERVICE REQUIRED	8 HOURS	50 HOURS	150 HOURS	400 HOURS	1000 HOURS
Engine Oil	Check level. If necessary add 10W30 API Classification SE / CD oil.	■				
Radiator (Water cooled only)	Check level. If necessary fill with 50 / 50 mixture of ethylene glycol and water. Check for leaks, dirt build up and bent cooling fins. If necessary, straighten cooling fins and clean radiator with compressed air (40psi [27Kpa] max) or flush with water.	■				
Hydraulic Oil	Check level. If necessary add 10W30 API Classification SE / CD oil.	■				
Oil Cooler	Check cooling fins for obstruction. Clean with compressed air or water.	■				
Air Cleaner	Check air restriction indicator. Replace filter element(s) as required when the air restriction indicator dictates.	■				
Tires and Wheels	Check tires for pressure and damage. Inflate standard tires to 50 psi (345 Kpa), flotation tires to 40 ~ 45 psi (276 ~ 310 Kpa). Torque wheel nuts to 100 ~ 110 lbs / ft (136 ~ 149 Nm).	■				
Safety Equipment	Check the following safety equipment for proper operation and condition: Seat belt. restraint bar, hydraulic control locks, parking brake, boom supports, quick-tach locks, side screens, glass, shields and safety treads. Repair or replace as needed.	■				
Decals	Check for damaged or missing safety and instruction decals. See the Owner's / Operator's manual. Replace decals as required.	■				
Lubrication	Grease all hinge pin fittings until excess shows.	■				
50 Hour Service	Perform complete 50 hour service. See Section 8.1.4.		■			
Preventative Maintenance	It is recommended as a preventative maintenance that the 50 hour service be repeated every 150 hours after the initial 50 hour service. See 8.1.4.			■		
Engine Fuel Filter	Replace the engine fuel filter. See Section 7.1.				■	
Hydraulic Reservoir	Change the hydraulic oil and replace the suction element. Replenish reservoir with 10W30 API Classification SE / CD oil. See Section 1.					■
Final Drive	Change the final drive lubricating oil. See Section 3					■
Engine Cooling System	Drain, flush and replenish the engine coolant. See Section 7.					■

Note: For complete engine service details refer to Section 7 of this manual. If further information is required refer to the engine manufacturers service manual.

WARNING

To avoid personal injury, service repairs must be performed by an authorized Thomas dealer.

8.1.2 SERVICE ACCESS

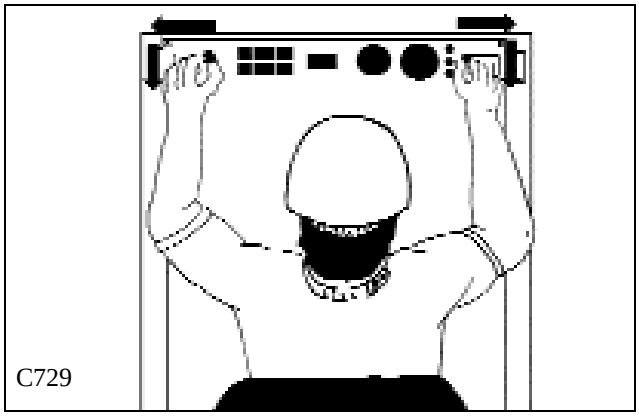
1. 2A Boom Support

For safety while performing regular service or maintenance work, the loader is equipped with boom support pins. The boom support pins when extended prevent the boom arms from dropping if hydraulic pressure is relieved or the hydraulic controls are accidentally cycled.

IMPORTANT

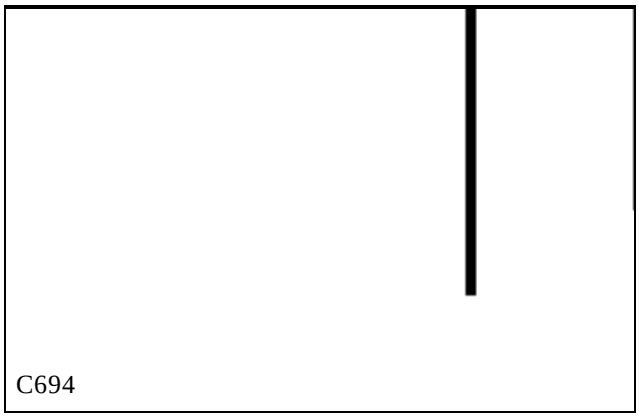
Fully retract boom support pins before raising or lowering boom arms.

To operate the boom support, first remove any bucket or attachment from the quick - tach; raise the boom arms to full height. Raise the boom support handle (fig. C729) up and push out toward boom arms to extend the boom support pins (fig. C694) Slowly lower the boom arms down on to the pins.


C729

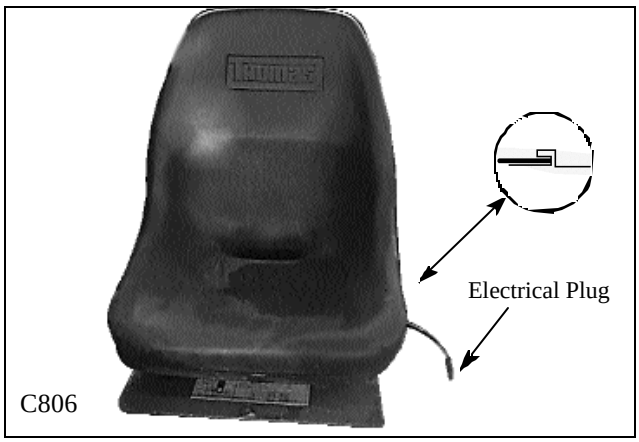
WARNING

To avoid personal injury: Do not leave boom arms up unless the boom supports are engaged.


C694

1. 2B Seat Removal

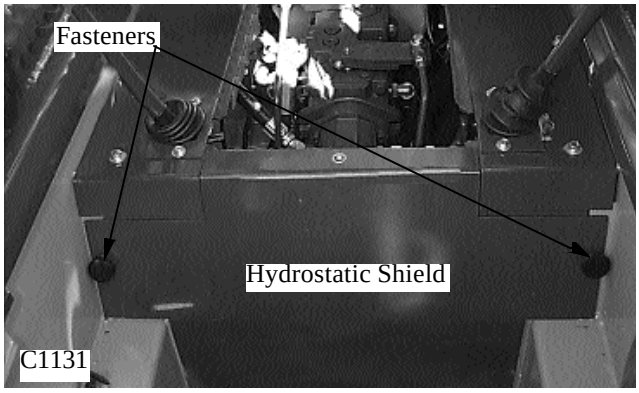
The seat and seat plate can be removed to provide access to the controls, hydraulic and hydrostatic components. To remove the seat assembly, remove the fasteners located at the front of the seat.**BE SURE TO DISCONNECT THE ELECTRICAL PLUG!** Lift the seat assembly out of the machine. When installing the seat, be sure the seat plate is locked in place at the rear (fig. C806).



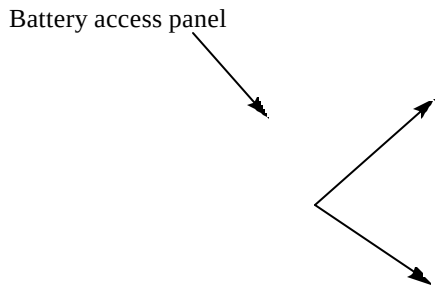
C806

1. 2C Hydrostatic Shield

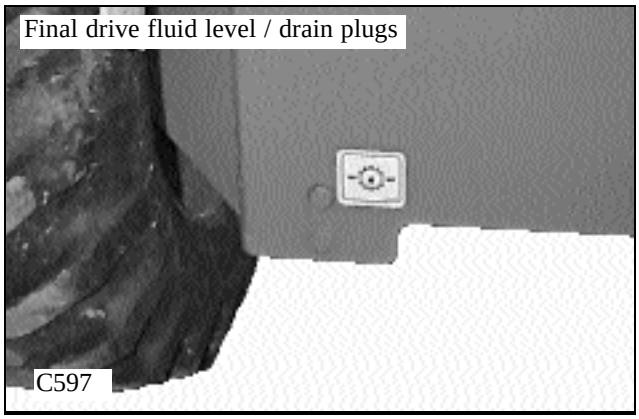
The hydrostatic shield can be by removing the two (2) fasteners (fig.C2358).

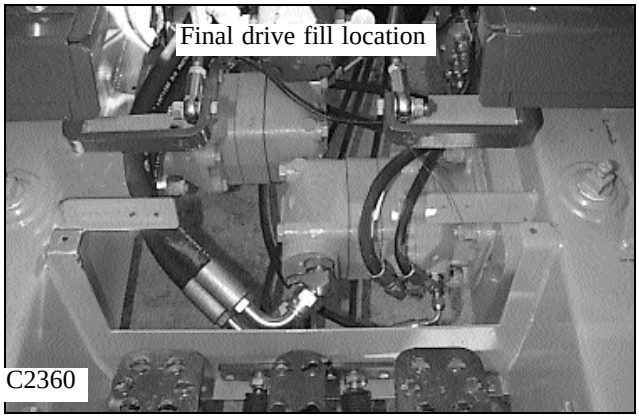


C1131

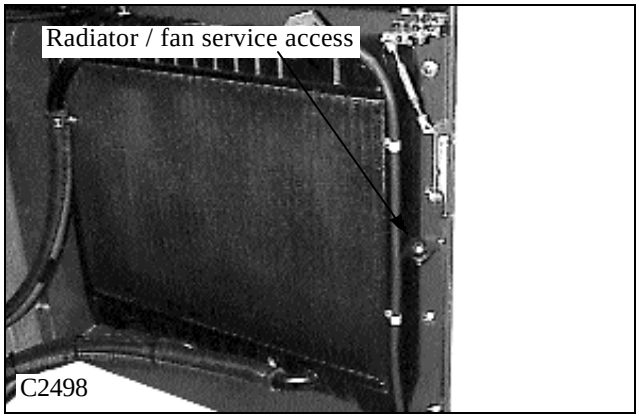

Battery access panel

C2483


Final drive fluid level / drain plugs
C597

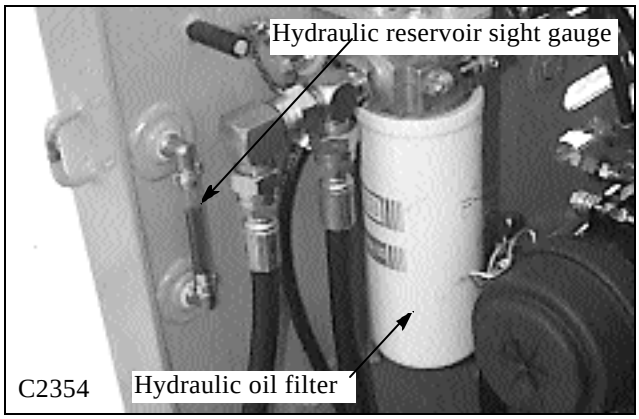

Final drive fill location
C2360

8.1.2 Service Access



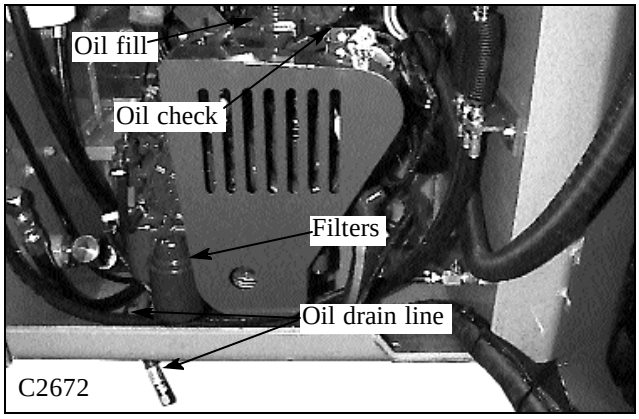
1. 2H Radiator / Cooling Fan

Access to the back side of the radiator and the engine cooling fans is gained by opening the rear door, removing the retaining bolt and swinging the radiator open, away from the door. (fig. C2498). Be sure to check for possible electrical and cooling hose clearance while swinging the radiator from the door.



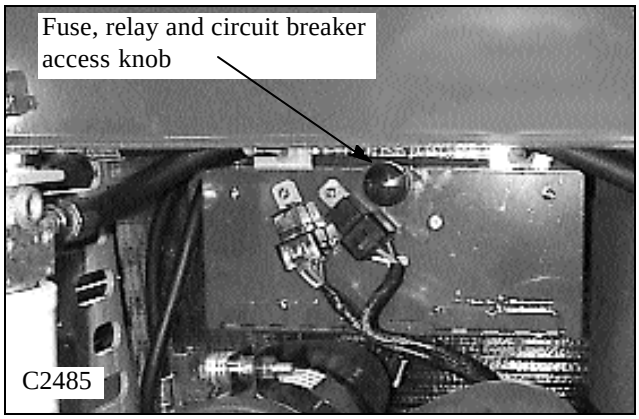
1. 2J Oil Reservoir

The oil reservoir is located at the rear, left side of the loader. It is part of the mainframe structure. The reservoir level is accessed by opening the rear door and visually checking the sight gauge. (fig. C2354). The reservoir fill is located at the top of the reservoir. The hydraulic filter is also located here.



1. 2K Engine

The engine is accessed by opening the rear door and raising the engine compartment cover. (fig. C2672). The oil level dipstick is located next to the alternator assembly. Oil fill is located on top of the engine rocker arm cover. The engine is equipped with a remote line for draining the engine oil. The oil filter and fuel filter are located to the lower left of the engine assembly.



1. 2L Fuse panel

The fuse panel is located in the engine compartment. Open the rear door and raise the engine compartment cover. Open the panel by removing the retaining bolt or knob. A decal is located inside the panel showing proper fuse size and use.

MAINTENANCE 8.1

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8.1.3 DAILY SERVICE CHECK

1.3A Radiator Service

With the engine cool remove the radiator cap and check the coolant level. If adding coolant is required fill with a 50% mixture of ethylene glycol and water for cold weather protection.

The radiator cooling fins must be kept free of debris otherwise overheating of the engine will occur. Inspect the radiator cooling fins for damage or buildup of debris. Repair any damage and if necessary flush the radiator with compressed air to remove debris.

1.3B Hydraulic Oil Level

Check the oil level with the machine on a level surface with the lift arms down and the bucket flat on the ground. Open the rear door and check the oil level sight glass (See Section 1). If oil is apparent the oil level is satisfactory.

If necessary to add oil, remove the reservoir cap located at the top of the oil reservoir and add oil until oil appears in the oil level sight glass.

Use a good quality 10W30 oil which meets the API classification SE/CD only.

1.3C Air Cleaner

The loader is equipped with an air restriction service indicator.

Should the indicator window color change from green to red, the air cleaner system is restricted or clogged. Service the air cleaner system immediately.

Check that all hose clamps are tight and the hose is undamaged. Check the vacuator valve for damage.

1.3D Tires and Wheel Nuts

Inspect tires for wear or damage. Check and inflate tires to correct pressure:

8.50 X 15 . . . . 30 -35 P.SI. (207 - 241 KPa)
10.50 x 15 . . . 30 -35 P.SI. (207 - 241 KPa)

To prevent shearing of the wheel studs and rim damage check wheel nuts for proper torque 100 -110 lbs. ft. (136 - 149 N.M.) daily. After changing a rim, check wheel nuts hourly, until the reading stabilizes.

1.3E Safety Equipment

Check all safety equipment for proper operation and condition; seat belt, boom support, seat bar, foot pedal lock, parking brake, quick tach lock, shields and safety treads. Lubricate all linkages, springs and pivot points with a silicone based lubricant. Repair or replace if necessary.

1.3F Decals

Check the condition of all safety and instruction decals. Replace any damaged or missing decals. Refer to the parts book or owners manual for decal locations, description and part numbers.

1.3G Lubrication

There are sixteen grease fittings located in the loader that require lubrication every eight hours. (See Section 6) Lubricate with a good quality multi-purpose lithium based grease. apply grease until excess shows.

Refer to the service schedule for complete service details. the sixteen lubrication points are:

Rear Boom Pivots (2)
Boom Cylinder Bushings (4)
Bucket Cylinder Bushings (4)
Boom Supports (2)
Quick - Tach Pivot and Lock Pins (4)

1.3H Engine Oil Level

To check the oil level, stop the engine with the loader on level ground, open the rear door and remove the dipstick.

Keep the oil level between the full and low mark on the dipstick (See Section 7). Do not fill above the full mark.

8.1.4 50 HOUR SERVICE CHECK

The following service check is to be performed by your dealer after the first 50 hours of operation.

1 Engine

1.1 Oil Filter:

Change the engine oil filter. Use only original replacement parts. Refer to section 7 for installation details. Change the oil filter every 150 hours thereafter.

1.2 Engine Oil:

Change the engine oil. Use only 10W30 API classification SE/CD oil. Refer to section 7 for procedure. Change engine oil every 150 hours thereafter.

1.3 Coolant Level:

Check that the coolant is to the proper level. The cooling system is filled with a 50% mixture of ethylene glycol and water.

1.4 Radiator for Leakage and Dirt:

If necessary flush the radiator with compressed air and / or water. (40 psi [27 Kpa] max) Dirt buildup on the radiator cooling fins can cause both engine and hydraulic system overheating. Check rubber gasket on radiator to door baffle.

1.5 Fan Belt Tension and Condition:

Check fan belt for cuts or wear, if necessary replace. Check tension and adjust as shown in section 7.

1.6 Fuel System for Leaks:

Make a visual inspection of fuel system for leaks and potential hazards such as fuel line(s) touching exhaust manifold, flywheel, etc. Replace fuel filter every 400 hours.

1.7 Air Intake and Cleaner System:

Follow the manufacturers inspection procedures. Check that the filter indicator is not indicating that filter service is required. Check all hose clamps and check the air inlet outlet hoses for cracks or chaffing.

1.8 Exhaust System:

Visually inspect the exhaust system and ensure all clamps are secure and the manifold bolts/nuts are tight. Check muffler for carbon and soot build up and plugging. If necessary clean or replace.

1.9 Engine Speed:

Check and if necessary adjust engine R.P.M. Maximum no load high idle: 3000 RPM.

2 Hydraulic/Hydrostatic

2.1 Hydraulic Oil Filter:

Change the hydraulic oil filter. Change the hydraulic filter every 150 hours after the initial change. Lubricate the filter cartridge seal with system fluid.

2.2 Hydraulic Oil Level:

If oil is visible in the oil level sight glass the level is satisfactory.

If additional oil is required use only 10W30 API classification SE/CD oil. Fill to the line marked next to the sight gauge.

2.3 Hoses and Pipes:

Make a visual inspection of all hydraulic lines and fittings for leaks, chaffing and tightness. Check that steel lines do not touch one another and clamps are tight.

2.4 Cylinders:

Inspect cylinders for leaks. Extend cylinders and check for rod damage. Check pivot pins and bushings for wear.

2.5 Hydraulic Functions:

Check that the following operate properly: control valve float position, auxiliary hydraulic detent, hydraulic cylinders.

2.6 Pumps & Motors:

Inspect pumps and motors for leaks.

WARNING

To avoid personal injury: never work under raised boom arms without the boom supports properly engaged. Shut off the engine and remove the key to prevent accidental engagement of the engine. Never repair or tighten hydraulic hoses or fittings with the engine running or the system under pressure.

MAINTENANCE 8.1

3 Final Drive

3.1 Oil Level:

Check lubricating oil level. If necessary add 10W30 API classification SE/CD oil.

3.2 Drive Chain Condition:

Check drive chains for any sign of wear or damage. Check lubrication oil in housing for signs of contamination.

3.3 Hydrostatic Motor Mounting Bolts:

Check torque 80 ft. lbs. (108.2 N.M.)

3.4 Axle Bearing End Play:

Axle bearings are pre - loaded and must have no end play. Inspect and adjust if necessary.

4 Controls and Safety Equipment

4.1 Control Levers, Operation and Linkage:

Check that the steering levers operate freely without binding, they return to neutral when released and the machine travels in a straight line with both levers in forward position. Replace worn rod end as required.

4.2 Hydraulic Controls, Operation and Linkage:

Check that the hydraulic controls operate freely without binding. Before leaving the operator's seat, ensure the controls are locked, raise the safety bar and unbuckle the seat belt. Lubricate or replace linkage as required.

4.3 Engine Throttle Control:

Check that the throttle control operates freely without binding or slackening off due to vibration. Check throttle travel to ensure full engagement of high and low engine idle settings.

4.4 Parking Brake:

Check that the parking brake engages and completely disengages. The park brake automatically engages with seat bar up.

4.5 Boom Supports:

Check that the boom supports operate without binding.

4.6 Quick - Tach, Operation & Linkage:

Ensure the quick - tach linkage operates smoothly without binding and the safety locks engage the attachments completely. Check the springs for broken coils.

4.7 Seat Belt:

Check seat belt condition. If necessary replace.

For your safety, the loader is equipped with electrically activated safety devices through the seat and seat belt. See Section 5.

5 Electrical

5.1 Battery:

Maintenance Free.

5.2 Battery Terminals:

Check battery terminals for corrosion. If necessary, clean.

5.3 Operation of Starter:

Engage and disengage the starter several times to ensure it's working properly. To prevent starter damage do not engage for more than 15 seconds. Allow 1 minute between starting attempts for cooling the starter.

5.4 Operation of Electrical Equipment:

Make a complete check of all electrical equipment, gauges, warning devices, pre-heat indicator, work lights, seat switch and belt and all optional equipment to ensure they are operating correctly.

6 Grease / Lubrication

Lubricate the following points with a good quality grease. Numbers marked ( ) indicate the number of fittings at each location.

Rear Boom Pivots (2)
Boom Cylinder Bushings (4)
Bucket Cylinder Bushings (4)
Boom Supports (2)
Quick - Tach Pivot and Lock Pin (4)

7 General

7.1 Tire Pressure:

Check the tire pressure and if necessary inflate to the following pressures: 8.50 x 15 @ 30 - 35 PSI (207 - 241 KPa), 10.50 x 15 @ 30 - 35 PSI (207 - 241 KPa).

7.2 Wheel Nut Torque:

Check and torque wheel nuts to 100 - 110 ft. lbs. (136 - 149 N.M.).

7.3 Condition of ROPS (Cab):

Inspect the condition of the ROPS mounting isolators. Replace isolators if deteriorated. Inspect both the seat and seat belt. Ensure all safety and instruction decals are in place. Inspect sound insulation, side windows and door operation for machines equipped with cab enclosure kits.

7.4 Condition of Shields and Safety Equipment:

Inspect and ensure all shields are in place and securely fastened. Inspect and ensure all safety equipment is working properly. Ensure owners and operators manual, safety manual and all safety and instruction decals are in place. If necessary, replace. If the safety controls are malfunctioning or require adjustment consult your **Thomas** Equipment Dealer for service.

7.5 General Condition:

Make a general inspection of the machine looking for loose or missing parts, oil leaks, etc.

TROUBLESHOOTING 8.2

8. 2A Hydrostatic Drive

Symptom	Cause	Remedy
No power on one side (both directions)	Reservoir low on oil	Replenish with 10W30 API SE/CD oil. Check for hose or fitting leak.
	Disconnected control linkage	Reconnect and adjust linkage.
	Groove pin sheared on pump pintle lever	Replace. Check pintle lever for loose bolt or excessive play.
	High pressure line failure	Replace line. Ensure new line fits without being forced. If necessary stress relieve.
	Drive chain failure Adjust tightener tension.	Replace chain or connection link.
	Motor shaft or key failure Check mounting bolts.	Inspect and repair defective parts. motor
	Excessive internal leakage in and/or motor pump	Inspect and repair defective unit. Flush al lines and tank. Replace filter. Check on type of fluid used and engine RPM.
No power on one side (one direction only)	Defective relief valve	Replace defective valve.
	Damaged ball check	Disassemble and repair.
No power on both sides (also loss of hydraulic power)	Reservoir low on oil	Replenish with 10W30 API SE/CD Check for hose or fitting leaks
	Universal Joint failure between engine and pump	Inspect and repair damaged parts Flush all lines and tank, change filter. Check on type of fluid used and engine RPM
	Damaged ball check	Disassemble and repair
Gradual loss of power as machine warms up	Excessive internal leakage in pump and/or motor	Consult dealer or **Thoma**s Service Dept.

8.2A Hydrostatic Drive

Symptom	Cause	Remedy
System erratic and/or noisy	Air in system due to low oil level in reservoir	Replenish with 10W30 API SE/CD oil.
	Air in system due to leak at suction fitting	Check fittings and tighten.
	Internal pump or motor wear caused by overspeeding	Consult your dealer or **Thomas** Service Dept.
	Excessive play in linkage or pintle lever	Adjust linkage and tighten or replace pintle lever.
Machine will not travel in a straight line in high range	Control levers binding	Check that shields are not stopping lever from full travel.
		Check for linkage binding at spring mount. Adjust tracking.

8.2B Final Drive Transmission

Symptom	Cause	Remedy
Final drive transmission noisy	No lubricating oil	Check and bring oil to the proper level. Use 10W30 SE/CD engine oil
	Parking brake damaged or out of adjustment	Inspect and adjust or replace damaged parts
	Axles have too much end play	Pre-load axle bearings removing all end play
	Chain loose	Replace the chain

8.2C Park Brake

Symptom	Cause	Remedy
Brake will not hold machine	Brake valve will not release pressure	Verify position of override
	Brake parts damaged or worn	Consult your Dealer or **Thomas** Service Dept.
	Brakes are disengaged	Engage parking brake
Brake will not release machine	No power to brake valve solenoid	Check fuse, If fine, consult Dealer or **Thomas** Service Dept.
	No pressure in supply line to brake valve	Consult your Dealer or **Thomas** service Dept.
	Brakes are engaged	Release brake

8

TROUBLESHOOTING 8.2

8.2D Hydraulic System

Symptom	Cause	Remedy
Hydraulic action jerky	Reservoir low on oil	Replenish with 10W30 API or 20W50 SE/CD oil.
	Air in hydraulic system	Check for leak between reservoir and pump. Bleed System by extending and retracting lift cylinders several times.
	Anti-cavitation check valve not functioning	Inspect and repair or replace
Boom raises slowly at full engine rpm	Reservoir low on oil	Replenish with 10W30 or 20W50 API SE/CD oil
	Foot pedal linkage binding	Inspect and adjust
	Auxiliary foot pedal engaged	Disengage
	Engine RPM too slow	Check RPM and reset
	Anti-cavitation check valve spring broken	Replace
	Pressure relief valve in control valve faulty	Check pressure if necessary - adjust
	Internal leakage in pump due to wear	Check pump flow and repair or replace as necessary
	Oil bypassing one or both lift cylinder piston seals	Install new piston seal kits
Lift or tilt cylinders will not support a load	External leak between or at control valve and cylinders	Check for leaks and correct
	Control valve spool not centering	Check for sticking foot pedal linkage
		Check for broken or stuck return spring on valve spool
	Oil leaking by one or both cylinder piston seals	Install new piston seal kits
Hydraulic oil overheating	Reservoir low on fluid	Replenish with 10W30 or 20W50 API SE/CD oil
	Oil cooler plugged or dirty (also check engine radiator)	Clean cooling fins

8.2D Hydraulic System

Symptom	Cause	Remedy
Loss of hydraulic power (no flow from gear pump)	Reservoir low on fluid hose or fitting leak.	Replenish with 10W30 or 20W50 API SE/CD oil. Check for leaks.
	Universal Joint between engine and pump failure	Inspect and replace damaged parts. Check for misalignment between engine and pumps.
	Spline coupling failure between front and rear hydrostatic pump	Inspect coupling for sheared splines. Also check pump shaft bearings.
	Hydraulic gear pump not functioning	Inspect and repair.
	Reservoir low on fluid	Replenish with 10W30 or 20W50 API SE/CD oil
Loss of hydraulic power (flow from gear pump)	Foot pedal linkage disconnected or binding	Inspect and adjust.
	Auxiliary foot pedal engaged	Disengage
	Relief valve failure in control valve	Check pressure and adjust.
Hydraulic oil overheating	Auxiliary foot pedal engaged	Disengage
	Engine RPM too slow	Check RPM and adjust
	Incorrect temperature sensor	Replace
Foot pedals do not operate smoothly	Foot pedal linkage out of adjustment	Adjust foot pedal linkages
	Foot pedal linkages need lubrication	Lubricate with a silicone based lubricant
	Cable Binding	Check routing for kinks etc.

TROUBLESHOOTING 8.2

8.2E Control Levers

Symptom	Cause	Remedy
Control levers will not center	Linkage out of adjustment	Adjust, check for wear at rod ends, loose counter nuts
	Linkage disconnected	Reconnect, check for wear at rod ends, loose counter nuts
	Centering spring broken	Replace
	Linkage binding	Binding of spring bushing in spring box. Align spring box with linkage. Control levers binding with safety shields or sound insulation Adjust Control lever bearings binding in lever assy. Inspect replace or clean as required
Machine operates erratically	Control lever linkage loose	Inspect linkage for wear at rod ends, loose counter nuts
	Bolt in pintle lever loose or broken	Replace bolt. Ensure bolt clamping lever to pump shaft is tight
		See troubleshooting hydrostatic system
Machine loses power while turning		See troubleshooting hydrostatic system
Machine will not travel in straight line	Linkage binding	Adjust
	Control lever travel out of adjustment	Adjust
Control levers do not operate smoothly	Internal pump and / or motor leakage Control lever linkage out of adjustment	See troubleshooting hydrostatic system Adjust control lever linkages
	Control lever linkages need lubrication	Lubricate

8.2F Electrical

Symptom	Cause	Remedy
Engine will not crank over	Battery failure	Check battery, charge or replace
	Battery cable failure	Check for loose or corroded connectors. tighten and clean as required. Use di-electric grease to prevent corrosion. Check continuity of cables and replace if defective
	Starter failure	Repair or replace
	Fuse burnt	Check and replace
	Defective relay	Check relay continuity if defective, replace
	Ignition switch failure	Check continuity and if defective, replace
Engine cranks over, but will not start	Auxiliary hydraulics engaged	Engine will smoke but not run unassisted by starter. Disengage aux. hydraulics
	Defective glow plug relay	Check continuity and if defective, replace
	Defective glow plugs	Check continuity and if defective, replace
	Broken connection or defective wire	Check continuity of the circuit not functioning properly in both engine and ROPS harness.
	No fuel	Check fuel levels and system
Loader starts, but hyd. controls will not release	Electro solenoid not releasing valve spools	Defective solenoid or binding solenoid lock.
		Check continuity of connectors and wire.
Engine will not stop when the key is turned OFF	Defective ignition switch Mechanical damage of the governor	Check and replace Check and repair or replace

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TROUBLESHOOTING 8.2

8.2G Diesel Engine

Symptom	Cause	Remedy
Engine does not start	No fuel	Replenish fuel
	Air in the fuel	Vent air
	Water in the fuel	Change fuel and repair or replace fuel system
	Fuel pipe clogged	Clean
	Fuel filter clogged	Clean or change
	Excessively high viscosity of fuel or engine oil at low temperature	Use the specified fuel or engine oil
	Fuel with low octane number	Use the specified fuel
	Fuel leak due to loose injection pipe retaining nut	Tighten nut
	Incorrect injection timing	Adjust
	Fuel cam shaft worn	Replace
	Injection nozzle clogged	Clean
	Injection pump malfunctioning	Repair or replace
	Seizure of crankshaft, camshaft, piston, cylinder liner or bearing	Repair or replace
	Compression leak from cylinder	Replace head gasket, tighten cylinder head bolt, glow plug and nozzle holder
	Improper valve timing	Correct or replace timing gear
	Piston ring and liner worn	Replace
	Excessive valve clearance	Adjust
Starter does not run	Battery discharged	Charge
	Starter malfunctioning	Repair or replace
	Key switch malfunctioning	Repair or replace
	Wiring disconnected	Connect
Engine revolution is not smooth	Fuel filter clogged or dirty	Clean or change
	Air cleaner clogged	Clean or change
	Fuel leak due to loose injection pipe retaining nut	Tighten nut
	Injection pump malfunctioning	Repair or replace
	Incorrect nozzle opening pressure	Adjust
	Injection nozzle stuck or clogged	Repair or replace
	Fuel overflow pipe clogged	Clean
	Governor malfunctioning	Repair
Either white or blue exhaust gas is observed	Excessive engine oil	Reduce to the specified level
	Low grade fuel used	Repair or replace
	Fuel filter clogged	Adjust
	Air cleaner clogged	Adjust top clearance
Either black or dark gray exhaust gas is observed	Overload	Lessen the load
	Low grade fuel used	Use the specified fuel
	fuel filter clogged	Clean or change
	Air cleaner clogged	Clean or change

TROUBLESHOOTING 8.2

8.2G Diesel Engine

Symptom	Cause	Remedy
Excessive lubricant oil consumption	Piston rings gap facing the same direction	Shift gap direction
	Oil ring worn or stuck	Replace
	Piston ring groove worn	Replace
	Valve stem and guide worn	Replace
	Crankshaft bearing and crank pin bearing worn	Replace
Fuel mixed into lubricant oil	Injection pump plunger worn	Replace pump element or pump
	Injection pump broken	Replace
Water mixed into lubricant oil	Head gasket defective	Replace
	Cylinder block or cylinder head flawed	Replace
Low oil pressure	Engine oil insufficient	Replenish
	Oil strainer clogged	Clean
	Relief valve stuck with dirt	Clean
	Relief valve spring weakened or broken	Replace
	Excessive oil clearance of crankshaft bearing	Replace
	Excessive oil clearance of crank pin bearing	Replace
	Excessive oil clearance of rocker arm bearing	Replace
	Oil passage clogged	Clean
	Oil pump defective	Replace
	Different type of oil	Use the specified oil type
High oil pressure	Relief valve defective	Replace
	Engine oil insufficient	Replenish
Engine overheated	Fan belt broken or elongated	Change or adjust
	Cooling water insufficient	Replenish
	Radiator net and radiator fin clogged with dust	Clean
	Inside of radiator corroded	Clean or replace
	Cooling water flow route corroded	Clean or replace
	Radiator cap defective	Replace
	Overload running	Loosen the load
	Head gasket defective	Replace
	Incorrect injection timing	Adjust
Deficient output	Unsuitable fuel used	Use the specified fuel
	Incorrect injection timing	Adjust
	Engine's moving parts seem to be seizing	Repair or replace
	Uneven fuel injection	Repair or replace injection pump
	Deficient nozzle injection	Repair or replace nozzle
	Compression leak	Replace head gasket, tighten cylinder head bolt, glow plug and nozzle holder
Battery quickly discharges	Battery electrolyte insufficient	Replenish distilled water
	Fan belt slips	Adjust belt tension or change
	Wiring disconnected	Connect
	Rectifier defective	Replace
	Alternator defective	Replace
	Battery defective	Change

SPECIAL TOOLS 8.3

P / N	Illustration	Description	Model
955280		AXLE INSTALLATION TOOL - To install axle in final drive housing.	T103 T135 T133'S'
962201* 955281		SEAL INSTALLATION TOOL - To install axle seal in final drive housing. Quantity - 3 required	*T103S* T103 T135 T133'S'
955283* 957372		AXLE EXTRACTOR TOOLS - To remove axle from final drive housing.	*T103* *T135* T173HL T173HLS' T173HL'S'II T203HD T233HD T243HDS
960986* 955287		SEAL INSTALLATION TOOL - To install axle seal in final drive housing. Quantity - 1	*T83 / 95S* T173 T233
958674		SEAL INSTALLATION TOOL - To install axle seal in final drive housing. Quantity - 2 required.	T173HL T173HLS' T173HL'S'II T203HD T233HD T243HD'S
960997		CHAIN TENSION TOOL - To test chain tension.	T103 T135 T133'S'
U-1288	Universal Tool Kit	1 each. Combination wrench 7/16", 1/2", 9/16",11/16" 3/4", 1 1/16",1 1/4". Sockets, 1", 1/2" drive, 7/8", 1/2" drive, tool pouch, allen wrench 5/32" and 1/8"	ALL MODELS

SPECIAL TOOLS 8.3

P / N	Illustration	Description	Model
916-30042-01 25197		DRY LINER PULLER - Used for removing and installing the dry liner of the engine. Consists of: 304742 (64mm); 304743 (68mm); 30744 (75mm) 304745 (76mm); 304746 (82mm); 304747 (105mm); Removing Plates; 304748 Installing Plate	Kubota
07909-30202-01 25198		DIESEL ENGINE COMPRESSION TESTER - Used to measure diesel engine compression and diagnosis of need for major overhaul.	Kubota
07916-30820-01 25199		CRANKSHAFT NUT SOCKET - Used to take off and fix the crankshaft nut. (46 mm).	Kubota
07916-30840-01 25200		NOZZLE REMOVER SOCKET - Used to unfasten the screw type nozzle holders.	Kubota
70090-01125-01 25201		NOZZLE DISASSEMBLY SOCKET - Used in place of a vice for disassembly and repair of nozzles.	Kubota
960456		HYDRAULIC FLOW AND PRESSURE GAUGE ASSEMBLY.	All Loaders

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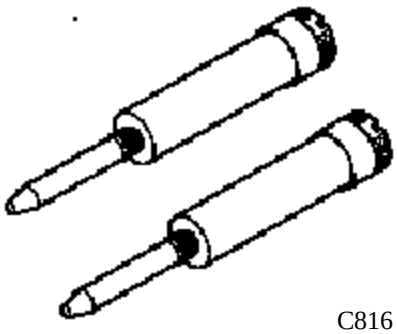
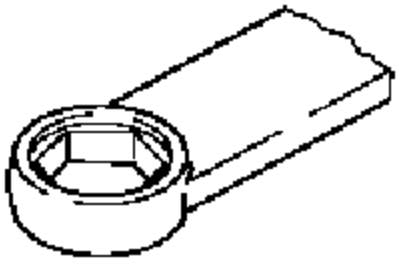
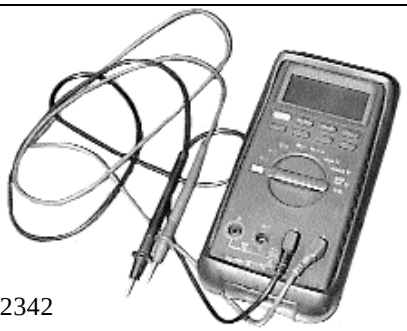
SPECIAL TOOLS 8.3

P / N	Illustration	Description	Model
42530	C754	TOOTHED BELT TENSION GAUGE For adjusting the timing belt to proper tension.	DEUTZ T243HDS T245HDS
42531	 C816	LOCATING PINS For locating crankshaft and camshaft when changing / adjusting timing belt.	DEUTZ T243HDS T245HDS
42535	 C1843	CAMSHAFT DOLLY Used to assist tightening of camshaft pulley bolt.	DEUTZ T243HDS T245HDS

SPECIAL TOOLS 8.3

P/N	Illustration	Description	Model
43979	 C1840	CHAIN PULLER	ALL MODELS
43980	 C1841	SPANNER WRENCH 2'' - 4 3/4'' To repair hydraulic cylinders	ALL MODELS
43981	 C1837	PHOTO SENSOR / WHEEL SPEED TACHOMETER (Dual Function)	ALL MODELS
	 C1839	FORCE GAUGE, PUSH PULL For measuring restraint bar brake cable adjustment. Special order only	T173HLS T173HLS II T243HDS T245HDS
	 C2342	MULTI METER For measuring continuity, voltage, etc.	ALL MODELS
	 C2343	ANGLE FINDER For measuring control angles, U-joint and chassis angles etc.	ALL MODELS

8

NOTES

THOMAS

SPECIFICATIONS 8.4

C-291

Dimensions: With Standard Tires and Dirt Bucket

A. Overall operating height	134.5” (3416)
B. Height to hinge pin	102.5” (2604)
C. Overall vehicle height	71” (1803)
D. Overall length with bucket	1115” (2621)
E. Dump angle	30°
F. Dump height	81.5” (2070)
G. Reach — fully raised	22.75” (578)
H. Height at 45Þ dump angle	54.75” (1391)
I. Reach at 45Þ dump angle	27” (686)
J. Maximum roll back at ground	32°
K. Maximum roll back fully raised	97°
M. Wheel base	33.18” (843)
N. Overall length less bucket	91” (2311)
O. Ground clearance	6.75” (171)
P. Maximum grading angle – bucket	80°
Q. Angle of departure	23°
R. Bucket width	48” (1219)
S. Clearance circle – front – less bucket	41” (1041)
T. Clearance circle – front – with bucket	62.25” (1683)
U. Clearance circle – rear	54” (1372)
V. Overall width – less bucket	47.75” (1213)
W. Tread	38.5”(978)

Operational:

Rated operating capacity	1000 lbs. (454 kg)
Tipping capacity	2100 lbs. (953 kg)
Operating weight	3650 lbs. (1656 kg)
Shipping weigh t	3150 lbs. (1429 kg)
Travel speed	3000 RPM @
	5.8 mph (9.3 km/hr)

SPECIFICATIONS 8.4

Engine

Make and model	Kubota V1305E
Type	Vertical , In Line, 4 Cycle
Number of cylinders	4
Cylinder bore	76 mm (2.99 inches)
Stroke	73.6 mm (2.90 inches)
Displacement	1332cc .(81.5cu. in)
Maximum engine speed (no load)	3000 RPM
Low idle setting	1300 RPM
Cooling system	Liquid
Power (ISO 9249 Net Power)	22.4Kw (30.0 hp) @ 3000 RPM
Torque (ISO 9249 Net Power)	60.0 N.m. (43.4 lbs / ft.) @ 2000 RPM
Compression ratio	22.0: 1
Firing order (viewed from gear case end)	1 - 3 - 4 - 2
Fuel injection timing	18° - 20º BTDC.
Injector working pressure	1990 - 2133 PSI (140 - 150 Kgf / cm^3)
Direction of rotation (viewed from flywheel end)	Counter - clockwise
Valve clearance, (cold)	0071 - .0087 in (0 - .18 - 0.22 mm)
Fuel type	Diesel No. 2
Air cleaner	Replaceable dry cartridge with restriction indicator
Engine oil capacity with filter	8. 5 qts. (8 l)
Oil type	10W30API SE,CD
Cooling system capacity	3.2 gal. (12 l)
Radiator cap pressure setting	12. 8 PSI (88 KPa)
Thermostat rating	Fully open 185°F (85°C)

Hydraulic System

Pump type	Gear, 0.61 cu. in. (11cc)	
Capacity (theoretical)	8.7 GPM (33 L/m)	
Rated RPM	3000	
Rated pressure	2150 (Zero Flow) PSI (148 bar)	
Filtration	10 Micron	
Hydraulic fluid	10W30 API Class, SE/CD	
Control valve (to S / N LC001080)	Parallel type with float on lift and detent on auxiliary	
Control valve (S / N LC001081 onward)	Series type with float on lift and detent on auxiliary	
Cylinders.	Lift	Tilt
Type	Double acting	Double acting
Qty per loader	2	2
Bore diameter	2.0 in.	2.0 in.
Rod diameter	1.125 in.	1.125 in.
Stroke	26.00 in.	14.875 in.

SPECIFICATIONS 8.4

Hydrostatic Transmission & Final Drive

Pump type	Two in line, axial piston pumps
Pump displacement	1.5 cu. in. (25 cm^3)
Motor type	Geroler
Motor displacement	19.9 cu. in. (326.3 cm^3)
System relief setting	3625 PSI (250 bar)
Final drive	Roller chain running in oil bath to each axle
Drive chain size	ASA 60 HT

Electrical

Alternator	60 amp
Battery	730 C.C.A
Starter	12 volt
Circuit breaker rating	40 amp

Tires

Standard	8.50 x 15 @ 30 - 35 PSI (207 - 241 Kpa)
Flotation	10.50 x 15 @ 30 - 35 PSI (207 - 241 KPa)

Fluid Capacities

Fuel tank	43 L (11.3 gal)	Diesel No. 2
Engine lubrication	8 L (8.5 qts.)	10W30 API SE, CD
Final drive transmissions (each)	7 L (1.8 gal.)	10W30 API SE, CD
Hydraulic reservoir	34 L (9 gal.)	10W30 API SE, CD
Engine cooling system	12 L (3.2 gal)	50 / 50 water & ethylene

SOUND POWER LEVEL

LPA Sound level at operators ear.	83 DbA
LWA Adjusted sound level at 10m (32.8ft).	96 DbA

SPECIFICATIONS 8.4

Torque Specifications

Loader

Wheel nuts (24) . . . . . 100 - 110 ft lbs. (136 - 139 Nm)
Motor mount isolators (3) . . . . . .60 ft / lbs (81.6 Nm)

FOR NON-CRITICAL AND NOT OTHERWISE MENTIONED APPLICATIONS. THE FOLLOWING GENERAL ASSEMBLY TORQUES WILL APPLY:

Bolts & Nuts	***Torque ft. lbs (Nm.)***		
1/4 - 20	5 - 7 (6. 7 - 9. 5)	7/16 - 20	40 - 45 (54 - 61)
5/16 - 18	12 - 15 (16 - 20)	1/2 - 13	45 - 50 (61 - 68)
5/16 - 24	12 - 15 (16 - 20)	1/2 - 20	50 - 60 (68 - 81)
3/8 - 16	17 - 22 (23 - 30)	9/16 - 12	60 - 70 (81 - 95)
3/8 - 24	22 - 27 (30 - 37)	9/16 - 18	65 - 75 (88 - 102)
7/16 - 14	30 - 35 (41 - 47)	5/8 - 11	75 - 85 (102 - 115)
		5/8 - 18	100 - 110 (136 - 150)

Hydraulic Fittings: Specifications listed in ft / lbs. Multiply by 1.36 for Nm.

HOSE SIZE	37º JIC FITTINGS	HOSE SIZE	ORB FITTINGS
1/4	9 to 10	1/4	14 to 16
5/16	15 to 16	5/16	18 to 20
3/8	20 to 22	3/8	24 to 26
1/2	30 to 33	1/2	50 to 60
5/8	40 to 44	5/8	72 to 80
3/4	70 to 77	3/4	125 to 135
7/8	82 to 90	7/8	160 to 180
1	55 to 60	1	200 to 220
1 1/4	120 to 132	1 1/4	210 to 280
1 1/2	131 to 144	1 1/2	270 to 360
2	300 to 330		

The following torque specifications are for steel ORB fittings into aluminum.

HOSE SIZE	ORB FITTINGS	HOSE SIZE	ORB FITTINGS
1/4	5 to 7	3/4	40 to 45
5/16	8 to 10	7/8	50 to 55
3/8	10 to 12	1	90 to 99
1/2	21 to 24	1 1/4	80to 90
5/8	27 to 30		

Tandem Pump		
Description	**Qty.**	**Specification**
Front Support	1	50 (+/- 2)
Rear Mounting	2	55 (+/- 2)
Trunion Seal Carrier	4	20 (+/- 2)
Trunion Seal Cover	4	20 (+/- 2)
Relief Valve	4	40 (+/- 10)
Charge Relief Cap	1	40 ~ 100
Tandem Section	4	40 (+/- 5)
Gear Pump	2	25 (+/- 2)

Torque Motor		
Description	**Qty.**	**Specification**
Valve Housing	4	130
Bearing Housing	8	46.5
Front Cover	8	10.7
Bearing Nut	1	45
Mounting	4	80

Note: Torque specification are in ft /lbs. Multiply by 1.36 for newton meters.

CONVERSION CHART 8.5

Metric to U.S. Formula			
	MULTIPLY	BY	TO OBTAIN
Area:	sq. meter hectare	10.763 91 2.471 05	square foot acre
Force:	newton newton	3.596 942 0.224 809	ounce force pound force
Length:	millimeter meter kilometer	0.039 370 3.280 840 0.621 371	inch feet mile
Mass:	kilogram	2.204 622	pound
Mass/Area:	kilogram/hectare	0.000 496	ton/acre
Mass/Energy:	gr/kW/hr.	0.001 644	lbs/hp/hr.
Mass/Volume:	kg/cubic meter	1.685 555	lb/cubic yd.
Power:	kilowatt	1.341 02	horsepower
Pressure:	kilopascal bar	0.145 038 14.50385	lb/sq. inch lb/sq. inch
Temperature:	degree C	1.8 x C +32	degree F
Torque:	newton meter newton meter	8.850 748 0.737 562	lb/inch lb/foot
Velocity:	kilometer/hr.	0.621 371	miles/hr.
Volume:	cubic centimeter cubic meter cubic meter milliliter litre litre litre litre	0.061 024 35.314 66 1.307 950 0.033 814 1.056 814 0.879 877 0.264 172 0.219 969	cubic inch cubic foot cubic yd. ounce (US fluid) quart (US liquid) quart (Imperial) gallon (US liquid) gallon (Imperial)
Volume/Time:	litre/min. litre/min.	0.264 172 0.219 969	gallon/min. (US liquid) gallon/min. (Imperial)

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CONVERSION CHART 8.5

U.S. to Metric Formula			
	MULTIPLY	BY	TO OBTAIN
Area:	square foot acre	0.092 903 0.404 686	square meter hectare
Force:	ounce force pound force	0.278 014 4.448 222	newton newton
Length:	inch foot mile	25.4 * 0.304 8 * 1.609 344 *	millimeter meter kilometer
Mass:	pound ounce	0.453 592 28.35	kilogram gram
Mass/Area:	ton/acre	2241 702	kilogram/hectare
Mass/Energy:	lb/hp/hr	608.277 4	g/kW/hr
Mass/Volume:	lb/cubic yd.	0.593 276	kg/cubic meter
Power:	horsepower	0.745 700	kilowatt
Pressure:	lbs/sq. in. lbs/sq. in. lbs/sq. in.	6.894 757 0.069 0.070 308	kilopascal bar kg/sq. cm
Temperature:	degree F	1.8 F - 32	degree C
Torque:	pound/inch pound/foot	0.112 985 1.355 818	newton meter newton meter
Velocity:	miles/hr.	1.609 344 *	kilometer/hr.
Volume:	cubic inch cubic foot cubic yard ounce (US fluid) quart (US liquid) quart (Imperial) gallon (US) gallons (Imperial)	16,387 06 0.025 317 0,764.556 29.573 53 0.946 353 1.136 523 3.785 412 4.546 092	cubic centimeter cubic meter cubic meter milliliter litre litre litre litre
Volume/Time:	gallon/min.	3.785 412	litre/min.

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