Ingersoll

TIMELY TIPS
1974 - 1979
Service Manual 9-51610

QUALITY IN THE AMERICAN TRADITION

Ingersoll Equipment Co., Inc. Winneconne, Wisconsin 54986-9576

INDEX

TRACTORS - ELECTRICAL

TRACTORS - ENGINES

Printed in U.S.A.

8-91-RP-500-247

PRE-SALE AVAILABILITY OF WRITTEN WARRANTY TERMS (38-1)

This will serve as a reminder that our Written Warranty Terms, shipped with every compact tractor and rear engine rider, must either be posted in the dealer's showroom or made available to the prospective customer in a binder with your other consumer product Warranties Terms to meet the requirements of the Magnuson-Moss Warranty Act.

All consumer product dealers are subject to inspection by Federal Trade Commission Representatives. It is very important that unless you are already making our Written Warranty Terms available to your prospective purchasers prior to retail sale and delivery, that you begin doing so immediately.

SERIAL NUMBER TAG CLARIFICATION (20-6)

The ''-75'' following the serial number on tractor serial number tags indicates the Calendar Year and not the Model Year in which the tractor was built. This information was added to all serial number tags because laws in Canada and several states so dictated.

Please make this clear to your customers if they question the ''-75'' appearing on 1976 model year tractors.

This procedure is no longer used.

PARTS CATALOG BINDER (1-3)

A 4 inch (102 mm), 3 post binder (same size as our OPE Service Manual) is available through your Case Service Parts Dept. This binder is ideal for storing Case OPE Parts Catalogs, Operator's Manuals, etc. The part number is M20669.

DAVIS D-100 BACKHOE SERIAL NUMBER REFERENCES IN PARTS CATALOG (30-2)

Davis D-100 Backhoe serial numbers are issued in an Alpha-numeric sequence. The letter prefix must be used whenever the serial number is recorded or used.

Therefore, in the D-100 parts catalog, the reference, ''Backhoe S/N P152030 and after'' would include D-100 Backhoes with serial numbers beginning with an ''S'' letter prefix.

SHIPMENT OF FLAMMABLE AND CORROSIVE MATERIAL FROM SPS (27-2)

As a result of recent changes in the Department of Transportation regulations, flammable and corrosive material can now only be shipped by truck freight.

The following products are affected:

1. Paints and Thinners
2. Battery Acid
3. Fuel Conditioner
4. Starting Fluid
5. Chain and Cable Lubricant
6. Penetrating Oil
7. Rust Preventive
8. Anti-Seize
9. Battery Saver
10. Formula 77

To avoid excessive freight charges to you, be sure to order the above listed materials on your **Bi-Weekly Stock Order** which qualifies for **prepaid freight.**

INFORMATION PROVIDED ON ENGINE SERVICE ADJUSTMENT REQUESTS (13-1)

The following information MUST be provided on all Engine Service Adjustment Requests.

1. Engine serial number for Onan or Kohler
2. Engine model, type and code numbers for Briggs & Stratton
3. A detailed, but concise description of the reason for failure

Claims submitted without this information will be denied and returned to have the information added.

WARRANTY RETURN PARTS (39-1)

Warranty parts that are requested to be returned must be received at their destination within (30) days. If warranty parts are requested returned and not received, the credits issued will be charged back to the dealer.

Dealers must keep record of parts shipped and date and UPS or Parcel Post receipt. If parts are not received at destination, proof of shipment is then required.

Ship back **only those parts requested.**

Small items are to be returned prepaid by Parcel Post or UPS. Add charges to any subsequent claim along with supporting receipt attached.

Small items returned truck freight will be refused and returned to the dealer.

Parts should be returned to
INGERSOLL EQUIPMENT CO., INC.
WARRANTY RETURN GOODS
119 South First Street
Winneconne, Wisconsin 54986

REPORTING OF SHORTAGES ON MACHINERY ITEMS (64-4)

Shortages on Machinery Items received in broken boxes must be reported to the carrier.

Shortages on Machinery Items received in undamaged boxes must be reported to your Branch Machinery Department. Shortages will be corrected by the replacement of missing parts. Request for parts credit will not be considered.

Machinery shortages are **NOT** warranty. Service Adjustment Requests submitted for machinery shortages will be denied.

MISCELLANEOUS

SAFE LOADING AND UNLOADING OF COMPACT TRACTORS ON TRUCKS OR TRAILERS FOR TRANSPORT (18-1)

Safe practices dictate that when compact tractors are being loaded onto tilt bed trailers or via loading ramps that they be backed up the incline and when unloading driven forward down the incline. If the incline is severe, a winch should be employed rather than attempting to use the tractor's self power.

If the procedure is reversed, an unsafe condition could be created since a sudden stop may cause any tractor to upset.

Please instruct all of your customers and employees accordingly. Post this notice in a prominent, highly visible place in your facilities.

Also, refer to the appropriate section in the operator's manual for instruction on proper methods of operating tractors on inclines. These directions should be followed diligently and covered with your customers and employees thoroughly.

APPLICATION OF SAFETY DECALS TO REPAINTED TRACTORS OR ATTACHMENTS (18-6)

New replacement decals containing safety messages must be applied to repainted tractors or attachments in the same location as the ones removed. This will insure subsequent operators the benefit of the information contained in the decals.

Lack of safety decals on repainted equipment could increase dealer liability in event of misuse or accident.

USED COMPACT TRACTORS (19-1)

It is very important when selling used tractors, to provide the new owner with the proper Instruction Manuals.

We further recommend a new Owner Warranty Registration be completed with the new owner, having him sign for receipt of the proper Instruction Manuals. The signed Owner Warranty Registration need not be forwarded to Racine or your Branch, but should be retained by you for liability protection in the event of subsequent operator misuse or neglect.

NON CURRENT ATTACHMENT LOG (24-5)

A non current attachment log is being maintained by the OPE Division Distribution Department. This log is kept to aid dealers in locating non current attachments when needed. Full dealer cooperation will enable the system to work.

Any dealer with a non current attachment (machinery item) that he wishes to sell should notify OPE Distribution Department, 119 South First Street, Winneconne, Wisconsin 54986, by letter only, giving model and serial number.

Any dealer requiring a non current attachment should request same via letter. If the attachment is available, requesting dealer will be notified of its location. If not available, requesting dealer will be so notified.

SHOWROOM TRACTOR PREPARATION (36-2)

An eye catching shine on showroom tractors can be obtained by using a silicone spray, such as Siloo 48A, sold by NAPA. Spray all tractor parts including tires, then wipe off with a soft cloth.

TACTFUL MESSAGE FOR SHOWROOM USE (45-2)

Keeping kids off tractor seats can be a loosing battle. This dealer places empty gasoline cans (for sale) on the seats. A sign on the can bears this tactful reminder:

''PLEASE, This is the only can we want on this seat''

HOBBS HOURMETER, PART NUMBER L49907 (16-4)

A rectangular shaped hourmeter, Case Part Number L49907 is available from your Service Parts Supply source. The hourmeter should be connected to the ''I'' terminal of the ignition switch to record operating hours.

TAIL LIGHT ACCESSORY, MODEL 644, 646 AND 648 LOADERS (1-2)

A clearance lamp for Case Model 644, 646, and 648 Loaders, Yankee 79R 12V, is available from Yankee Metal Products, Norwalk, Connecticut 06856.

IGNITION SYSTEM PRESERVATIVES (34-3)

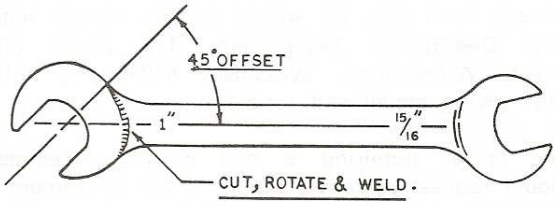
The following ignition system preservatives are available from your regular Case parts source.

PART NUMBER	DESCRIPTION
B17399	Urethane spray sealant (Seal-coat) 16 oz. (473 ml) can
B17400	Cleaner and degreaser for electrical wires, top of ignition coil, etc. (Cleaner) - 16 oz. (473 ml) can
B17401	Tube of electrial conducting grease (Compound) - 8 oz. (237 ml) tube

TOOLS

SUGGESTED SERVICE TOOL (1-4)

When vibration isolation mounts were added to 10, 12 and 14 H.P. compact tractors, we changed the steel tube between the pump and travel control valve to a wire braid hose. The hose does not permit the use of a tube wrench and the hose swivel at the valve inlet fitting is not easily accessible with a standard open end wrench.



By modifying a standard 1'' open end wrench as illustrated, you can R & R this hose at the valve without interference from the tractor frame rail.

MAC Tool and Snap On Tools also have 1'' angle head wrenches.

REPAIR OF SCHROEDER BROS. HYDRA SLEUTH (6-1)

Hook up the Hydra Sleuth **only** in the way outlined in The Hydraulic Test Procedures section of your service manual. Schroeder Bros. **will not** honor warranty on Hydra Sleuths damaged as a result of improper hook up.

Safety blow out plugs are available from Schroeder under the following part numbers:

1200 PSI ''Low Pressure Plug'' HS-101B

3750 PSI ''High Pressure Plug'' HS-8-3500

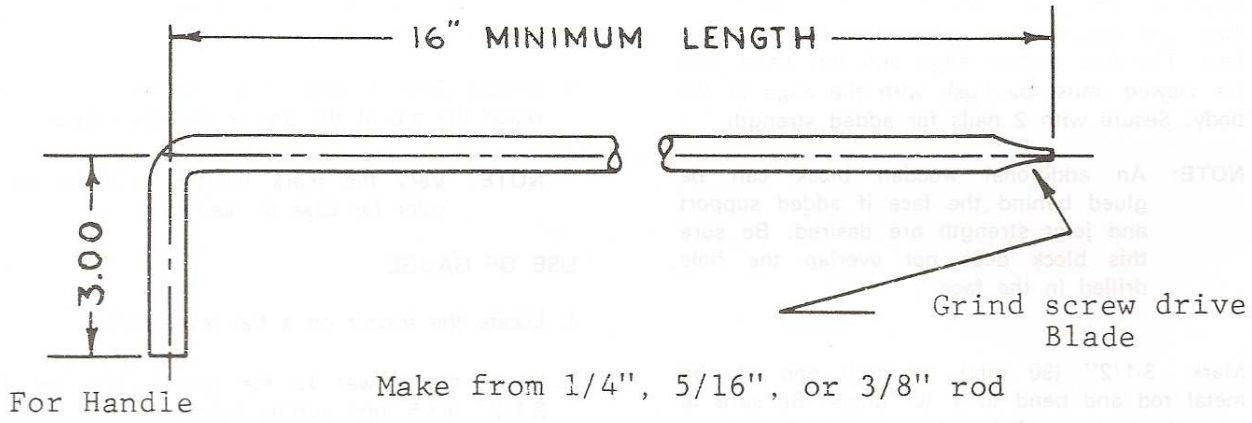
Order these direct from Schroeder.

For all other parts, send your flowmeter direct to Schroeder, it will be repaired and recalibrated and you will be billed by Schroeder.

SPECIAL SERVICE TOOL

Access to the main travel relief valve on 644, 646, and 648 loaders can be made thru the bolt hole in the left rear of the tractor frame (remove bolt if weight box or 3-Pt. hitch is attached). Use the tool described below.

Verify setting with pressure gauge.



MOWER LEVELING GAUGE (33-1)

SUGGESTED MATERIALS REQUIRED

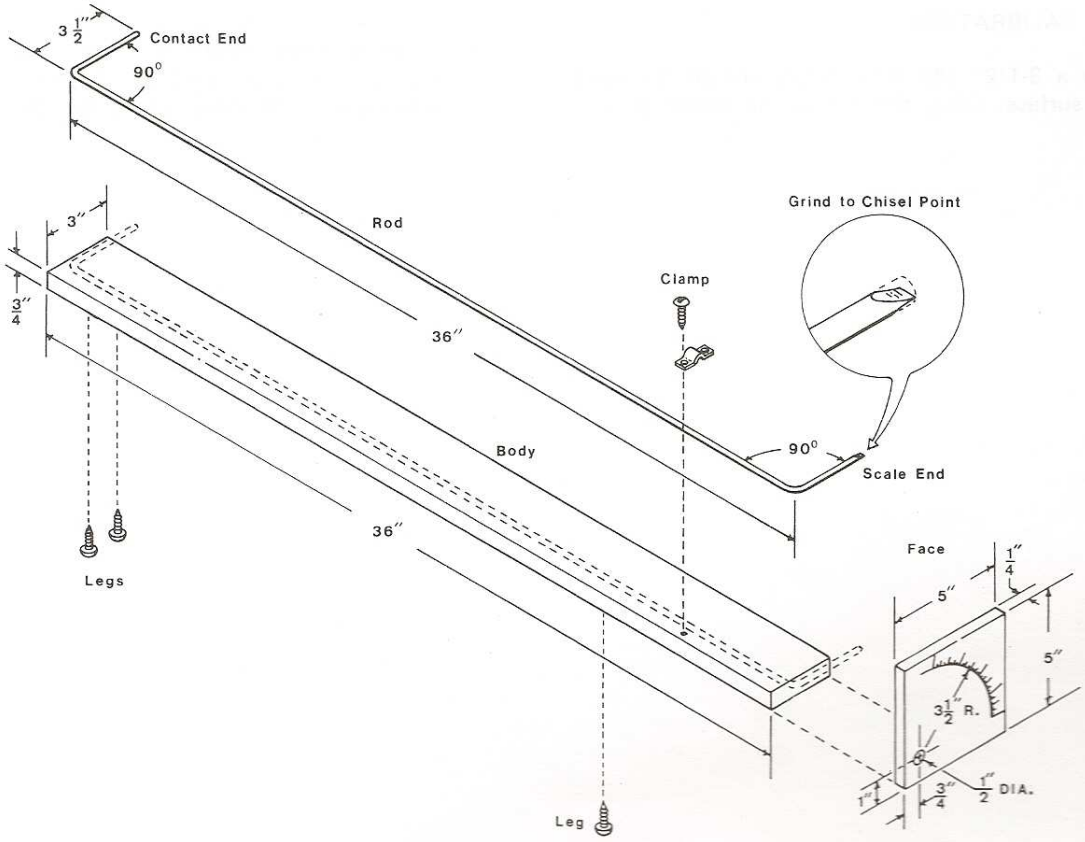
Body..... Hardwood Board 36" x 3" x 3/4" (910 x 75 x 20 mm)

Scale Face.... Plywood 5" x 5" x 1/4" (120 x 120 x 6 mm)

Clamps..... 3 Plastic wire clips

Legs.....3 round head screws or nails

Contact Rod...Steel rod 43" x 1/4" (1090 x 6 mm)



CONSTRUCTION AND ASSEMBLY

1. Position the 3 screws on the bottom of the body to form a tripod leg arrangement.

2. Drill a 1/2'' (13 mm) hole in the gauge face as illustrated.

3. Apply a wood glue to the right hand end of the body and position the gauge face on this surface. The face bottom edge and left hand side (as viewed) must be flush with the edge of the body. Secure with 2 nails for added strength.

   NOTE: An additional wooden block can be glued behind the face if added support and joint strength are desired. Be sure this block does not overlap the hole drilled in the face.

4. Mark 3-1/2'' (90 mm) on each end of the metal rod and bend to a 90° angle. Be sure to keep the ends parallel and even to each other.

5. Grind a flat chisel point on one end of the rod parallel to the rod length. (See illustration.) This will provide a more accurate calibration of the gauge.

6. Thread the rod through the 1/2'' (13 mm) hole on the gauge face in the direction illustrated. Place the rod parallel to the body edge and secure with the 3 clamps evenly spaced.

SCALE CALIBRATION

1. Draw a 3-1/2'' (90 mm) radius arc on the scale face surface, using the rod as the center point.

2. Lay the gauge on a flat surface.

3. Position a ruler at the contact end perpendicular to the rod and resting on the flat surface (a small adjustable square is best for this purpose).

4. Set the contact end of the rod at the 1'' (25.4 mm) mark on the ruler. Make a mark on the scale face at the point indicated by the scale end of the rod.

5. Repeat Step 4 each 1/8'' (3 mm) until you reach the top of the arc on the scale face.

   NOTE: Vary the mark lengths, such as on a ruler for ease of reading.

USE OF GAUGE

1. Locate the tractor on a flat level surface.

2. Lower the mower to the ground and set for 2-1/2'' (63.5 mm) cutting height.

3. Slide gauge under the deck so the contact end of the rod rests against the flat of the mower blade. Maximum results will be acquired by positioning the contact point as close to the blade tip as possible.

   CAUTION: Be sure PTO drive is off before handling blades.

4. Measure blade height in front to back position and side to side position. Adjust mower deck leveling bolts as indicated by the gauge scale.

1980 ATTACHMENT MATCHING CHART (68-5)

ATTACHMENT NAME	1979 200 SERIES	1979 400 SERIES	1980 200 SERIES	1980 400 SERIES
Hydraulic PTO	J-17	J-17	J-17	L-17
Flow Control Valve	L-19 or M-19	L-19 or M-19	M-19	M-19
Sleeve Hitch	J-22 or K-22	J-24 or K-24	J-22 or K-22	K-24
3-Point Hitch	N/A	H-26 or J-26	N/A	J-26
Holding Valve	L-7	L-9	L-7	M-9
Cab	J-1 or K-1	J-2 or K-2	K-1	K-2

REDUCED MOWER CLEARANCE ON 1980 MODEL 210 TRACTORS (70-1)

1980 model year 210 tractors (P.I.N. 9760975 and after) have the redesigned jackshaft assembly. This eliminates the bearing locking collars and slightly lowers the input pulley to permit R & R of the primary drive belt without loosening the jackshaft supports. As a result it is possible that the mower mounting frame rear cross member wil come in contact with the tractor primary drive belt in the 3-1/2'' (90 mm) cutting height position.

Accordingly, the 3-1/2'' (90 mm) cutting height adjusting hole should either be plugged or customers be advised it is not to be used on Model 210 tractors, P.I.N. 9760975 and after. A supplement instruction sheet with this information has been included with the tractor manual package effective with December 3, 1979 production.

The 3-1/2'' (90 mm) cutting height is generally not recommended for all 200 series compact tractors except on level terrain due to the limited deck flotation clearance which remains at this setting.

This interference can exist with J-Series mowers but does not exist with K-series mowers.

NEW MOWER GAUGE WHEELS (70-3)

Effective with the following serial numbers the mower gauge wheels were changed from rubber on metal to solid phenolic material with a center bushing.

K41 - S/N E51545
J40 - S/N A58089
J44 - S/N C63173
J46 - S/N D61713

The new gauge wheels eliminate the possibility of damaging or scrubbing off the tires on turns. The new wheel for Model K41, J40 and J44 mowers is available from SPS under part number C25139 and the Model J46 under part number C25140. The old type rubber on metal wheels have been discontinued both in production and SPS.

IMPROVED VEE IDLER PULLEY FOR MOWERS AND SNOW CASTERS (70-2)

Effective with the following serial numbers the vee idler pulley, Part Number C10463, was changed to Part Number C25370:

J40 - S/N A59542
J44 - S/N C65190
J46 - S/N D63972

J40, J44 AND J46 MOWER IDLER TENSIONING SPRING (14-1)

An improved drive belt idler tensioning spring has been adopted with the following serial numbers

J40 - A45655
J44 - C47621
J46 - D46376

The new spring, part number C21942

The new tensioning instruction decal, part number C21960

The new kit part number, spring and decal C21961

The new spring, which is somewhat shorter in appearance, will retrofit to all H and J series mowers prior to the above listed serial numbers.

The spring should be adjusted until there is a 1/8 inch (3 mm) gap (the thickness of two nickels) between the coils.

We recommend use of this spring for all replacements and for units where drive belt life is shorter than expected. Please mark your parts books accordingly.

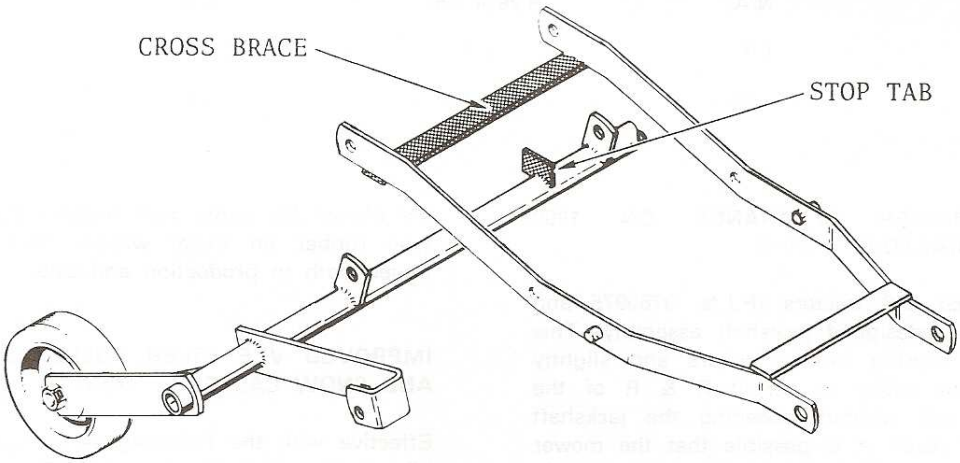
J40, J44, J46 MOWER DECK LEVELING PROCEDURE (53-4)

Mower deck level adjustments are normally done at the 2-1/2'' (63.5 mm) height setting. When properly leveled at the 2-1/2'' (63.5 mm) setting, the deck will remain very near level throughout the total height selection range.

If the deck does not remain level when put in the 2'' (51 mm) and 1-1/2'' (38 mm) settings, check for contact between the stop tab on the gauge wheel axle and the flat cross brace on the mounting frame. Remove or reduce the tab, if required, to prevent any contact.

If the tab is not contacting the cross brace, make leveling adjustments at the ''J'' bolts as described in the mower operator's manual.

Mowers currently leaving the factory are being double checked in this area. The cross brace is now located between rather than below the two longitudinal members.



J40, J44, J46 MOWER BLADE CUTTING EDGES (16-1)

Model J40, J44 and J46 mowers shipped between October 1974 and May 30, 1976, have blades which do not have a full 2-1/2'' (63.5 mm) cutting edge since the inner ends of the grinding operations are tapered. It is possible at higher ground speeds to have inadequate cutting due to the shorter cutting edge related to ground speed.

Model J40, J44 and J46 mowers which were shipped from the factory during this period can be identified during set up and have a full 2-1/2'' (63.5 mm) cutting edge ground in if higher cutting speeds are anticipated.

J46 AND K46 MOWER BLADE LENGTH (51.4)

This 48'' Mower uses two size blades. The center blade is 16'' (400 mm) long. The outboard blades are 17'' (430 mm) long.

The blades must be installed in the proper location to prevent contact and subsequent damage.

Always rotate the blades after installation (of blades) to insure clearance throughout 360° of travel.

Please inform your customers of this requirement during tractor deliveries.

V-BELT TROUBLE SHOOTING REMINDER (50-3)

Detailed trouble shooting and failure analysis of V-Belt Drives are provided on pages 8, 9, 10, 11 and 12 Service Manual Section 9-50622, Servicing V-Belt Drives.

Some common problems to watch for when remounting mowers in the spring are:

1. Rusty, dirty pulleys. This will cause rapid wear of V-Belt. Clean dirty pulleys. Sand rusty areas in pulley grooves.

2. Bent or damaged pulley or bearing can cause excessive drive vibration. A belt with a wide spot can cause it to ride up and down in the pulley groove causing drive vibration.

3. Improperly stored V-Belt. Inspect belt carefully for cracks, rot, etc. Do not install the belt if it is in a deteriorated condition.

4. Be sure to tension belt properly after installation. Drive belt tensioning information is provided on decals on the mower and in the operator's manual.

K41 MOWER DRIVE BELTS PRIOR TO SERIAL NUMBER E51606 (62-1, 66-1, 68-1)

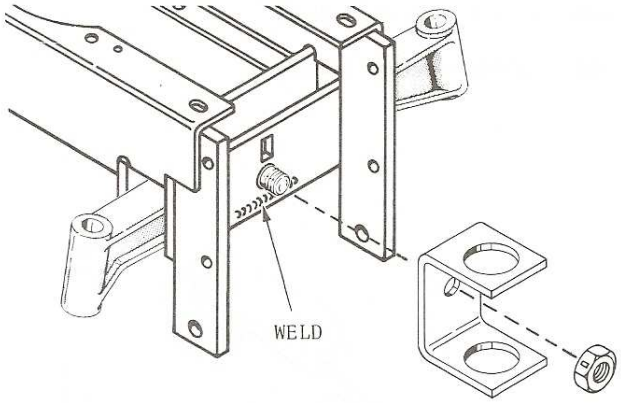
The drive belt on some Model K41 mowers can ome off during operation. The belt may be loose and/or misaligned. The following checks are recommended when predelivering or performing routine service on Model K41 mowers.

Inspect the mower deck pulleys for damage and alignment. Correct problems that are found.

Inspect the power take off shaft assembly. The shaft must be veritical.

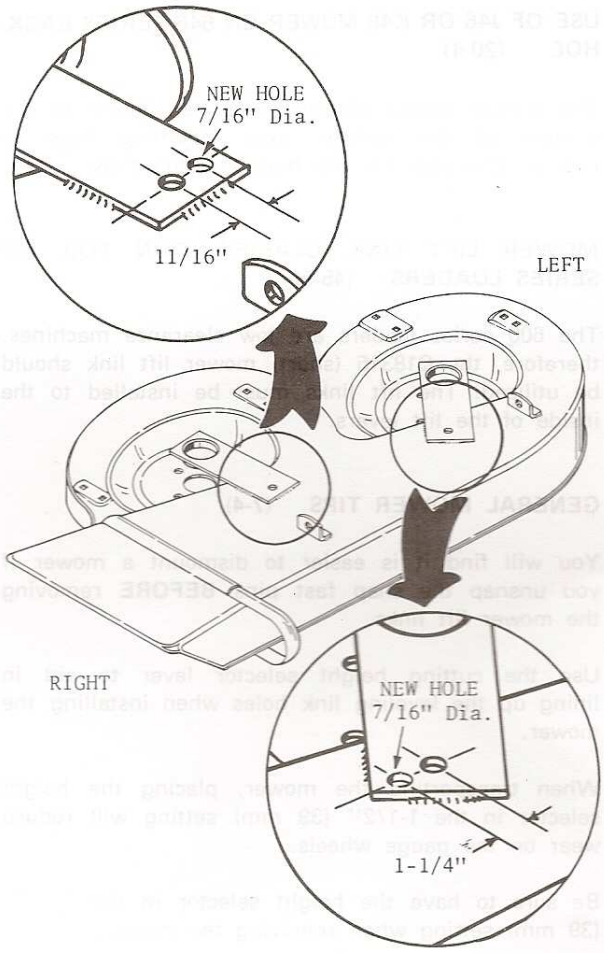
If the bottom of the shaft is canted toward the rear, the angle between the belt and pulley will be wrong and can result in the belt coming off the pulley.

Remove the PTO housing and place a weld bead or weld the appropriate size key stock across the lower front face of the front axle support to correct this condition. The weld bead must be just high enough to ''shim'' the PTO housing to a vertical position. The PTO housing must be vertical front-to-rear and side-to-side after it is reinstalled. See Figure below.



If the belt tension is still inadequate, the following modification can be made. See Figure below.

1. Remove the mower from the tractor.
2. Remove the idler pulley from the left side.
3. Remove the idler arm assembly from the right side.
4. Drill new holes in the mower according to the diagram, 13/32'' Dia.
5. Install the idler pulley and idler arm assembly. Replace the round head bolt removed with a hex head bolt, 3/8'' x 2'' long, when reinstalling the idler. Check alignments between the pulleys and shim with plain washers if required.



6. Install the mower on the tractor.

NOTE: Model K41 mowers serial number E51595, E51600, E51601, E51606 and above have the fixed idler and spring loaded idler arm relocated in production according to the diagram.

The belt tension must be inspected during the set up and predelivery of the tractor and mower.

If there is too much tension, it must be reduced. Reduce the tension by moving the spring loaded idler arm back to its original mounting hole. The fixed idler may be left in the new position.

Clearance between the mower drive belt and the lift link must be checked on mowers which have the fixed idler and the spring loaded idler arm relocated to increase the belt tension. Also, make certain the lift link is installed through the right hand side of the tractor lift lever as illustrated in Figure 8 of the operator's manual 9-50622.

If necessary, washers may be added to the lift link between the lift lever and the safety pin. This will stabilize the link and improve belt clearance.

USE OF J46 OR K46 MOWER ON 646 SERIES BACK-HOE (20-4)

The mower gauge wheels must be moved to the outside of the mower axle mounting lugs to provide clearance for the high flotation tires.

MOWER LIFT LINK CLARIFICATION FOR 600 SERIES LOADERS (45-5)

The 600 series loaders are low clearance machines, therefore, the C18315 (short) mower lift link should be utilized. The lift links must be installed to the inside of the lift levers.

GENERAL MOWER TIPS (7-4)

You will find it is easier to dismount a mower if you unsnap the snap fast pins **BEFORE** removing the mower lift links.

Use the cutting height selector lever to aid in lining up the leveling link holes when installing the mower.

When transporting the mower, placing the height selector in the 1-1/2'' (39 mm) setting will reduce wear on the gauge wheels.

Be sure to have the height selector in the 1-1/2'' (39 mm) setting when removing the mower.

Remember, the easier your demonstration appears, the more impressed your potential customer will be.

L84 SNOW CASTER - 446 - POSSIBLE INTERFERENCE (57-2)

Check for possible interference between the L84 snow caster chute crank support on the lift arm and engine air baffles when mounting to a Model 446 tractor.

If interference exists, use common washers as spacers to move the lift arm out slightly. The chute crank support has been relocated on current production.

This inspection should be made during set-up and predelivery.

L80, L84 SNOW CASTER COTTER PIN CHANGE (57-1)

L80 Snow casters, S/N A10501 and after and L84 Snow Casters, S/N S11201 and after are being built with special hardened cotter pins (**P/N 132-300**) to secure the chute control coil to the chute control rod.

During set-up and predelivery of ''L'' model snow casters prior to the above listed serial numbers, discard the original cotter pin and install a P/N 132-300 pin.

Whenever replacing this cotter pin for service, be sure to use the special hardened pin, P/N 132-300.

J80 - J84 SNOW CASTER MOUNTING BRACKET INSTALLATION (21-2)

There is a possibility that on snow casters within the serial number ranges listed below difficulty could be encountered engaging the snap-fast pins after the bracket is positioned on the anchor pins.

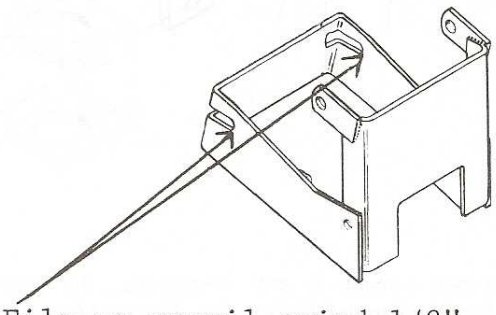
If this problem is encountered it can be corrected by elongating the anchor pin mounting slots 1/8 inch (3 mm) on each side as shown in the diagram.

All units within the S/N ranges listed below should be checked for proper fit before assembling the mounting bracket to the auger housing assembly.

Shipments after November 10, 1975 have been checked and corrected if necessary at the factory.

J80 - F42200 through F42387

J84 - J43700 through J44146

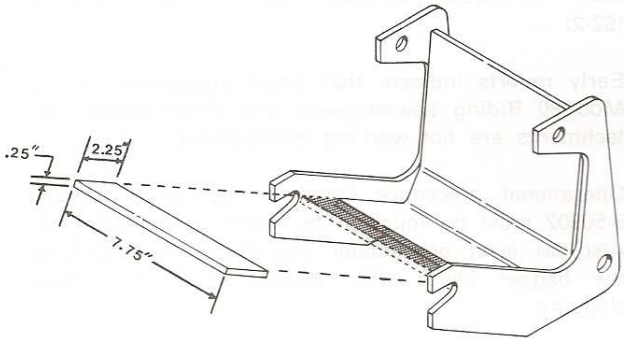


EXHAUST EXTENSION KIT FOR 446 TRACTOR - J2 CAB COMBINATION (46-1)

Model 446 tractors prior to S/N 9728157 (prior to Muffler Under The Hood) require P/N C22755 Exhaust Extension Kits when a J2 Cab is installed. Modification 9-M-75.

REINFORCEMENT FOR J50 AND J54 UTILITY BLADE MOUNTING BRACKET, PART NUMBER C23696 (35-1)

A reinforcement has been added to the C23696 mounting bracket on Model J50 Blade effective with S/N J10550 and J54 with S/N K10708. See Illustration. Also all blades in the factory inventory prior to these serial numbers which were shipped after January 14, 1977 include this reinforcement.



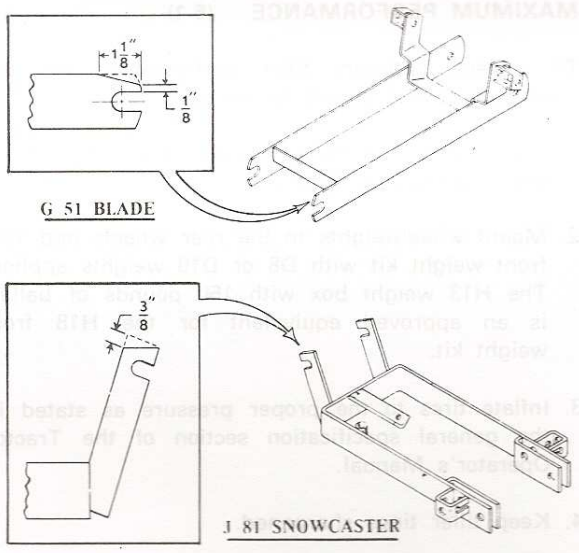
All J50 and J54 Utility Blades prior to the above serial numbers in dealer inventory or sold retail, which were shipped from the factory on or before January 14, 1977 must have the 1/4'' x 2-1/4'' x 7-3/4'' (6 x 57 x 196 mm) reinforcement added per illustration. Weld both sides full length and butt weld at the top of existing center plate with three 1 inch (25 mm) (minimum) long welds and on the bottom side with one - 1 inch (25 mm) long weld.

MOUNTING G51 UTILITY BLADE AND J81 SNOW CASTERS ON 1975 MODEL 108 TRACTORS (10-1)

On 1975 Model 108 tractors, which begin with Serial Number 9684071, the R. H. top corner of the mounting bracket for the blade and snowcaster comes in contact with the traction clutching idler holding it in the disengaged position.

G51 Utility Blades beginning with Serial Number L30542 and J81 Snow casters beginning with Serial Numer H40104 have the top R. H. corner of the mounting brackets cut off as illustrated to eliminate this interference. There are blades and snow casters in factory inventory with staggered serial numbers below those listed above. As of this date, these units will also be updated prior to shipment.

When mounting G51 Blades, G81 or J81 Snow casters, below these serial numbers or which were shipped from the factory prior to November 22, 1974, or 1975 Model 108 tractors, the mounting bracket must be cut or ground off as illustrated. Also remove sharp edges and check for adequate pulley and belt clearance following installation.



G51 UTILITY BLADE LIFT ROD - HOOD INTERFERENCE (10-5)

There have been occasional reports of interference between the C15497 lift rod and the tractor hood when mounted on Model 108 and 118 tractors. Reforming the rod slightly outward in the area of interference will correct the problem. Units currently leaving the plant have been corrected.

THIRTEEN TOOTH SPROCKET FOR MODEL H70 ROTARY TILLER (14-3)

The tine speed of the Model H70 Rotary Tiller may be increased from about 120 RPM to approximately 155 RPM. Install a C22613 thirteen tooth sprocket to the hydraulic motor output shaft in place of the C12523 eleven tooth sprocket. The H70 chain should be lengthened by adding one offset link P/N B12506 to accommodate the larger sprocket and one connecting link P/N B12505 to replace the link damaged in opening the endless chain.

J, K AND L17 PTO HANDLE BRACKET SCREWS (37-4)

Loosening of the P/N 71-410 screws securing the C19422 handle bracket can be stopped by applying loctite to the screw threads.

Torque the screws to 5 lb. ft. (6.8 Nm).

NOTE: Loose PTO valve handle bracket screws can cause the spool to miss ''neutral'' with resulting high back pressure causing engine lug down or inability to crank engine.

HYDRAULIC TILLER OPERATING TIPS FOR MAXIMUM PERFORMANCE (5-1)

To achieve optimum tiller performance, the following guidelines should be followed:

1. Read your Operator's Manual first and follow these instructions carefully.

2. Mount wheelweights to the rear wheels and H18 front weight kit with D8 or D10 weights applied. The H13 weight box with 150 pounds of ballast is an approved equivalent for the H18 front weight kit.

3. Inflate tires to the proper pressure as stated in the general specification section of the Tractor Operator's Manual.

4. Keep tiller tines sharpened.

5. Set engine high idle at 3600 RPM per Tractor Operator's Manual.

6. Remove 9'' extension in severe conditions (hard ground, turning under sod, etc.).

7. Till in successively deeper passes. Do not attempt to make a finished seedbed in one pass.

8. Set Retard Chisel as stated on page 6 of Tiller Manual 9-99753.

9. Use of Tire Chains will improve traction.

10. Closely observe the rotating speed of the tiller tines. Should soil conditions slow the tine speed, reduce tractor ground speed appropriately.

LAWN SWEEPER ADJUSTMENTS (8-4)

1. Lawn height must be even. Always mow just prior to sweeping. Leaves will actually pick up easier and cleaner if they are first partially mulched by a mower. Leaves that have imbedded in the turf are very difficult to pick up.

2. Before sweeping, pick up all tree branches, etc. too large to be picked up by the sweeper as they can lodge in the brush mechanism and cause wheel slippage.

3. Adjust height equally on both sides so the first stage brushes are in ''light'' contact with the turf. A suggested technique is to first equally set the height low enough to encounter slight or occasional wheel slippage, then raise both adjusting levers one notch.

4. Ideal ground speed will vary depending on the amount of debris and type of turf. Different speeds should be tried until one is found which results in maximum efficiency.

5. Should wheel slippage occur suddenly while sweeping, stop immediately. Check the brushes for a lodged twig and check the shroud point where the first and second stage brushes intersect for a lodged clump of grass or leaves. If a clump of leaves or grass is found in this area, it can be easily removed by manually turning the brushes in the reverse direction.

M91 BAGGER ATTACHMENT INSTRUCTIONS (52-2)

Early reports indicate that some improperly set up Mod 80 Riding Lawnmowers with M-91 Bagger attachments are not working satisfactorily.

Operational procedure listed in Operator's Manual 9-50902 must be followed to insure proper bagging. Also, at least one dealer has found that spraying the bagger chute with silicone helps to reduce clogging.

MOWING AND BAGGING GRASS

The bagging of grass clippings is dependent on high air movement from the mower thru the chute to the hopper. The clippings are airborne from the mower to the bag hopper. To achieve proper bagging, the following guidelines must be observed.

1. Install special ''High Lift'' blade: A special high lift blade is included with your bagger attachment. This blade creates greater air movement and must be installed to propel grass clippings to the bagger. Make certain the cutting edge is a full 3-1/2'' (90 mm) long to assure cleanest cutting, reduced mulching and optimum bagging efficiency.

2. Cut and bag dry grass only: Grass wet from dew or rain is more apt to stick to the bagger chute and mower deck causing a clog.

3. Cut and bag grass before it grows too tall or dense: If necessary to cut heavy grass, set mower at highest setting and reduce width of cut until plugging is reduced. Keep engine at maximum speed. Take several passes lowering the height adjust lever one notch after each pass.

4. Cut and bag grass with height adjust lever in a higher cutting position: This allows more air to enter under the mower deck to propel clippings into the hopper.

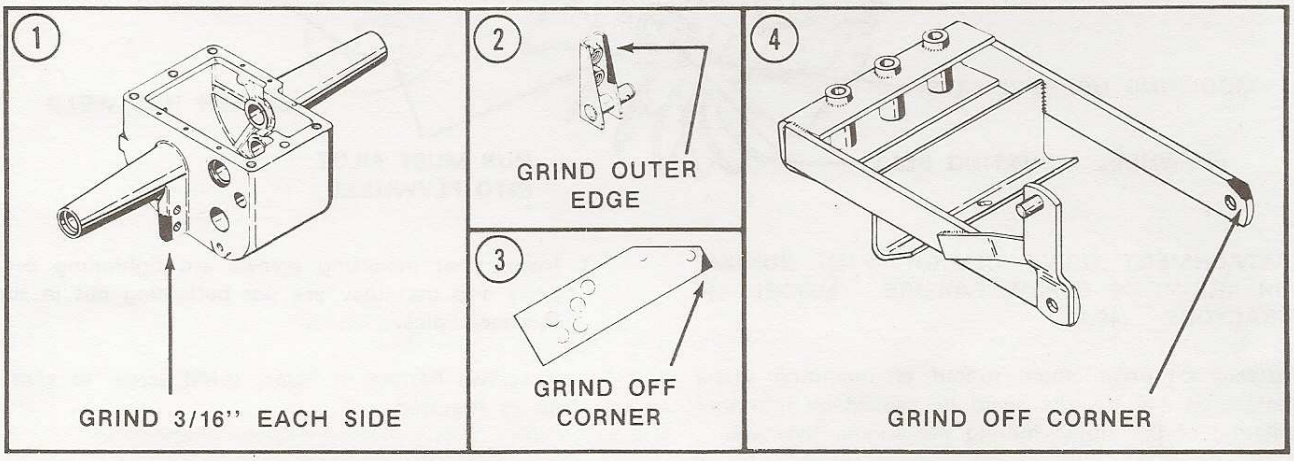
5. Cut and bag grass at maximum engine speed: This provides maximum blade tip speed to cut and propel clippings efficiently.

6. Cut and bag grass with clean deck, chute and bag: Air must be expelled from the hopper thru the fabric mesh, therefore, keep the hopper fabric clean of accumulated clippings.

   This will allow collected clippings to be moved with least resistance, and minimize change for plugging.

7. Do not overfill grass hopper: As hopper is filled, air discharge is reduced, thereby, increasing the chance of plugging.

8. Level mower deck properly: Follow mower deck leveling procedure as described in mower operator's manual. An incorrectly leveled mower deck will not bag grass properly due to excess mulching of the cut grass.



MODEL H22 AND H24 SLEEVE HITCH INTERFERENCE (12-4)

A. There is a condition where the sleeve hitch arms can interfere with the transaxle housing mounting bosses on a limited number of recently produced 200 and 400 series compact tractors. Where this condition exists, there will also be inadequate clearance between the hydraulic drive motor and the axle housing for the L. H. hitch mounting bracket. These conditions are the result of a recently established second foundry source for the transaxle housing.

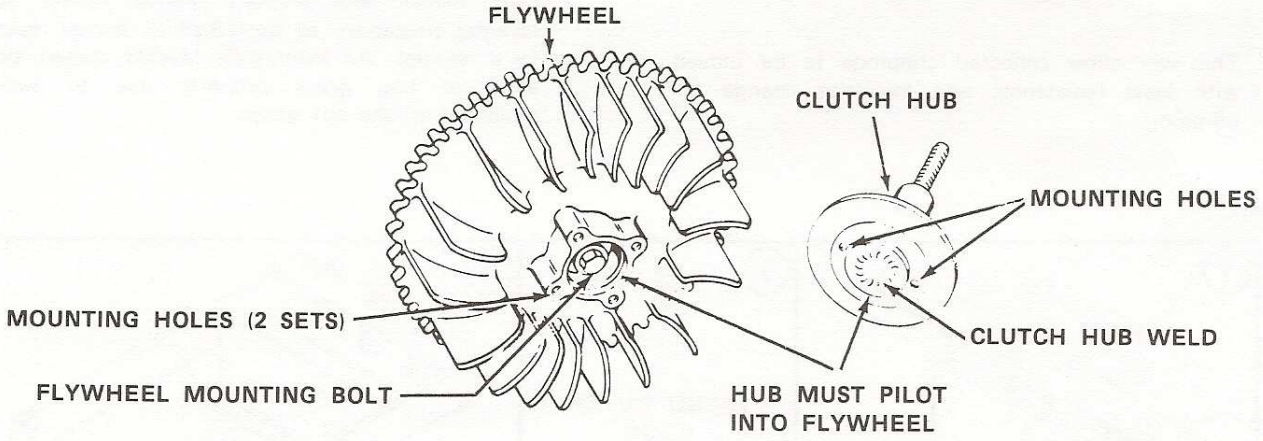
   The necessary casting pattern equipment changes have been made and affected transaxle housings in inventory are machined to provide clearance for the hitch arms effective with the following serial numbers. Model 220 S/N 9702362, 222 S/N 9705923, 224 S/N 9708048, 444 S/N 9710137, and 446 S/N 9713513. Affected housings on tractors prior to these serial numbers can be identified by the letter ''M'' cast onto the bottom side.

   Where this interference is encountered, grind 3/16'' (5 mm) from the outside of each boss, Figure 1, to a point approximately midway between the mounting holes or just high enough to prevent hitch arm interference in the highest transport position. Also grind 1/8'' (3 mm) off the outer front edge of the L. H. mounting bracket, Figure 2, to clear the hydraulic drive motor.

B. Check for clearance between the upper front corner of the hitch lift lever plate, Figure 3, and the engine mounting pad. Should interference exist, grind off corner, Figure 3, to relieve.

   On Model H22 Hitch only, interference can exist between the upper front corner of the hitch arm, Figure 4, and the hydraulic drive motor. Grind 1/4'' (6 mm) off this corner before installing the hitch.

   The potential interference points of both the lift lever plate and the H22 hitch arm have been relieved on all Sleeve Hitches shipped from the factory beginning the week of January 20, 1975.



ATTACHMENT DRIVE CLUTCH (PTO) RUNOUT OR MOUNTING SCREW FAILURE - MODEL 446 TRACTORS (49-1)

Attachment drive clutch runout or mounting screw failure on 446 tractors could be caused by improper piloting of the clutch hub to the engine flywheel.

The tractors affected are those Model 446 tractors equipped with the Onan B43M engine beginning with tractor S/N 9742677. Tractors S/N 9755115 and after have been rechecked before being shipped from the factory.

The following checks should be made during repair procedures if subject failure occurs:

1. Insure that clutch hub pilots into flywheel properly before installing mounting screws.

   Interference may exist between the clutch hub and engine air screen or the clutch hub weld and flywheel mounting bolt preventing proper piloting.

   If interference exists with the air screen, push in on hub during installation to insure clutch pilot engages with flywheel before installing mounting screws.

2. Insure perfect alignment of tapered (counter sunk) holes in clutch plate and tapped holes in flywheel.

   Check holes for alignment when holding clutch hub in position. If one set of mounting holes is out of alignment, check the second set. If both sets of mounting holes misalign with clutch hub, the flywheel must be replaced.

   Check engine after hub installation to confirm that runout has been eliminated before completing clutch assembly.

3. Insure that mounting screws are tightening properly and that they are not bottoming out in the flywheel holes.

   If screws bottom in holes, grind screw to shorten as required.

INCREASING SERVICE LIFE OF ATTACHMENT DRIVE CLUTCH WHEN NOT IN USE ON ALL 200, 400 AND 600 SERIES TRACTORS (20-3)

It has been found at several dealerships that when a tractor is used extensively for purposes not requiring the use of a mower or snow caster, that attachment drive clutch life can be extended by keeping it in the engaged position (except for starting).

The mower or snow caster must be removed from the tractor for this to apply. Keeping the clutch engaged as described above will increase the drive pulley bearing and hub wear life.

SERVICING ATTACHMENT DRIVE CLUTCHES ON TRACTORS PRIOR TO MUFFLER UNDER THE HOOD (23-4)

Hood removal is not required to service attachment drive clutches on tractors prior to Muffler Under The Hood if the following procedure is used:

1. Remove the four (4) oil cooler support bracket bolts.

2. Move the oil cooler while tipping hood forward to allow hood stop tab(s) to pass.

3. Continue to tip the hood forward. Position a cardboard box or other support for hood to rest on.

PTO CLUTCH DISASSEMBLY SUGGESTION (SNAP RING STYLE) (9-1)

When disassembling the PTO clutch on all 200, 400 and 600 series compact tractors, hold a vise grip on the spacer hub just behind the fan. This provides the leverage necessary to loosen the left hand threaded bolt. Clamping the starter-generator pulley, on models so equipped, is **not** recommended since pulley or belt damage can result.

USE OF CONTACT CEMENT TO BOND PTO FRICTION DISC TO PULLEY (28-2)

Dealer reports indicate that locally purchased contact cement such as:

Weldwood Contact Cement
Weldwood Products
Kalamazoo, Michigan

is effective in bonding the friction disc to the pulley. The surfaces should be carefully cleaned with mineral spirits to assure a good bond.

Baking is not required when this method of bonding is used.

E-Z ADJUST PTO CLUTCH ADJUSTMENT (67-3)

Care must be used when adjusting the PTO clutch to prevent breakage of the adjusting nut guide (part number C23627).

Use the clutch adjusting wrench, Part Number CAS-1449 available from Service Tools (Jobborn in Canada).

Do not use channel lock or locking pliers. The use of pliers causes stress on the adjusting nut guide and subsequent failure.

Please make this correction in your Service manual. OPE Service Manual 9-99891, 2 or 3 - Attachment Drive Clutch Section 9-51081, Page 4.

ADJUST DISC CLEARANCE

STEP 2: Use the 1-3/4'' open end wrench (Part Number CAS 1449) to turn the adjusting nut guide.

Failures caused by the use of improper tools will not receive consideration for warranty.

MODEL 210 MAIN DRIVE BELT TENSIONING IDLER (C18969) HITTING AGAINST FRAME FLOOR (5-3)

If the above situation exists when a new belt is installed, gluing a large tire patch to the floor in the area of contact will eliminate the noise.

210 JACKSHAFT REPAIRS (61-4)

The application of loctite between the jackshaft and inside bearing race is recommended for longer lasting repairs. This will prevent the shaft from turning in the bearing race and will eliminate corrosion between the shaft and bearing race.

Use Number 35 retaining compound - high strength, Part Number B17197 and Safety solvent, Part Number M20863.

MODEL 210 DRIVE JACKSHAFT ROLL PIN INSPECTION BETWEEN TRACTOR S/N 9686461 AND S/N 9701376

The part number 138-2028 roll pin (3/16'' x 1-1/4'') securing the C21678 driven pulley to the C21675 jackshaft assembly should be inspected for protrusion through the shaft and into the pulley hub. If protrusion is not achieved, the pulley may work loose and wobble causing belt failure.

Roll pin, part number 138-2055 (3/16'' x 1-1/2'') is currently being used in production and should be installed if the above described condition exists.

MODEL 210 JACKSHAFT MODIFICATION PROGRAM #9-A-76 CASE AGRICULTURAL DIVISION SERVICE BULLETIN G-1-76 (25-2)

This is a reminder that subject Modification Program has an expiration date of April 30, 1976.

If you do not have a copy of Service Bulletin G-1-76 or have any questions about it, consult with your Field Service Representative as soon as possible.

REAR AXLE SEAL INSTALLATION PROCEDURE (6-3)

1. Check axle seal area for roughness. Polish seal area with #300 emery cloth until smooth sealing area is obtained.

2. Inspect new seal for wire (spring-like) garter. Make sure it is in place.

3. Drive new seal in carefully just **FLUSH** with the outside of the axle bore. Be certain the seal lip does not contact the bushing.

4. Apply grease to the seal area and insert the axle shaft carefully.

REAR AXLE REMOVAL TIP (13-6)

Place a magnet over thrust washers and shim washers before removing rear axles for any reason.

The washers will be held in place by the magnet, making reinstallation much easier, and will prevent washers from falling to the bottom of the transaxle case.

TIME SAVING METHOD OF REFILLING THE TWO-SPEED TRANSAXLE WITH OIL ON MODELS 220 THROUGH 446 (26-4)

The transaxle may be refilled with oil in the following manner:

1. Remove the right hand bolt from the rear seat support. This will be the fill hole.
2. Remove the pipe plug from the rear of the transaxle. This will be the oil level check hole.
3. Using a suitable funnel, fill the transaxle through the right hand bolt hole until oil level is even with the check hole.
4. Replace the seat support bolt and pipe plug.

DIFFERENTIAL ASSEMBLY NUT PART NUMBER (58-3)

The proper nut for the differentials in 200-400-600 series two speed transaxles is Part Number **131-1232**. This is a Grade 8 nut and must be torqued to 50 pound foot (67 Nm) when reassembled. Refer to Two Speed Transaxle Service Manual Section 9-99584.

FUEL TANK CAP 644 AND 646 LOADERS (12-3)

The fuel tank caps on some 644 and 646 loaders contain a composition insert. This insert, if present, should be removed and replaced with Part Number C11545 plastic insert. Contamination of the fuel system can result due to deterioration of the composition insert.

FUEL TANK REMOVAL TIP (47-3)

This dealer found fuel tank removal and replacement easier by disconnecting fuel line at engine fuel pump first. This provides the slack necessary to connect fuel line at tank outlet fitting.

Be certain that the fuel line is routed properly and not pinched when reconnecting to the fuel pump.

FUEL FILTER IN TANK OUTLET FITTING (66-3)

Do not overlook the fuel filter screen in the tank outlet fitting when troubleshooting "running out of fuel" or "vapor lock" symptoms. Some reports of filters plugged with plastic particles have been received.

Drain the fuel tank and sight through the tank filler with a flashlight to check this filter.

Older tractors may have accumulations of dirt or varnish around this filter.

Clean the filter and tank if required.

FLEXIBLE FUEL LINE INSPECTION (61-6)

It is recommended that flexible fuel lines be checked whenever service is performed on a unit. Look for leaks or potential leaks, such as, loose clamps or aging of materials (worn, checked, cracked, etc.) and replace as required.

WATER FREEZING IN CHOKE AND THROTTLE CABLES (59-1)

When snow caster discharge is allowed to blow back over the tractor, ice may form on the choke and throttle cables making them inoperative.

Always direct snow caster discharge away from and down wind from the tractor.

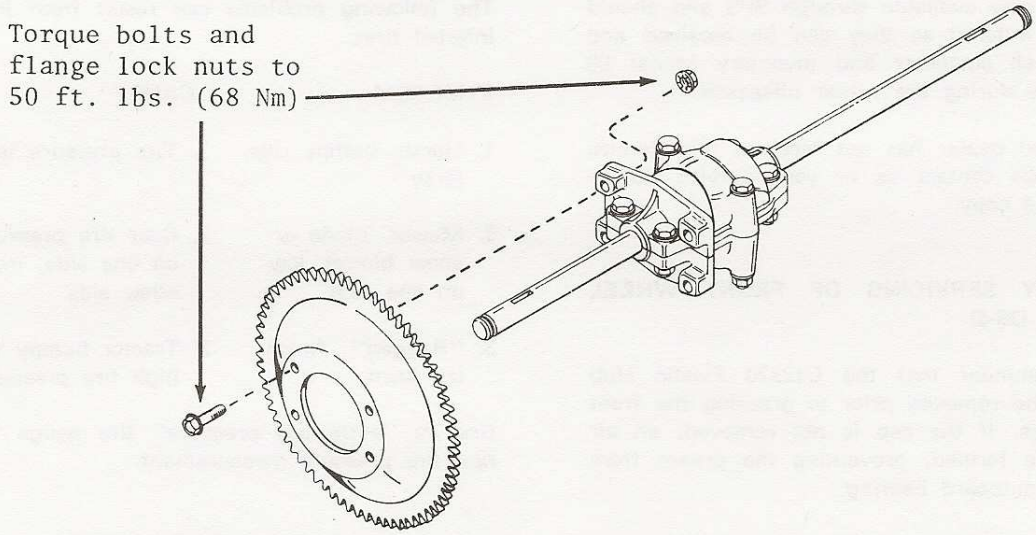
The following procedure may be used to prevent the freezing of choke and throttle cables.

1. If cables are frozen they should be thawed and dried. Also, gas line anti-freeze may be used to remove water.
2. Cables should then be saturated with penetrating oil and light machine oil.
3. Keep cables dry and oil frequently to prevent reoccuring freeze up.

HOOD LATCH LUBRICATION (31-3)

Tractor hoods will open more readily when a small amount of lubricant is applied to the instrument tower at the spot where hood latches engage the tower on each side.

Avoid loosening the latch settings as that may result in the hood becoming unlatched by itself.



MODEL 80 FINAL DRIVE SPROCKET BOLT TORQUE SPECIFICATION CHANGE (69-1)

There have been reports indicating the four, P/N 131-911, flange lock nuts on the Model 80 riding mower final drive sprocket have worked loose. Our supplier for this special 5/16'' bolt and lock nut specifies a much higher torque specification than is normally given for this size bolt. The correct torque specification for this special bolt and nut is 50 foot pounds (68 Nm).

Beginning with P.I.N. 9772896 these four bolts and nuts have been torqued to the new specification in production. All Model 80 riding mowers prior to this P.I.N. should have these bolts retorqued either during predelivery or when they are in for routine service. Also, please advise your Model 80 riding mower customers of the new torque specification, and, if they are unable to do so, to bring their mower in to you for the proper bolt tightening. It is important that these bolts and nuts on all Model 80 riding mowers prior to P.I.N. 9772896 are re-torqued to the new specification before they receive further use.

MODEL 80 RIDING MOWER HIGH-LIFT BLADE, P/N C24686 (69-2)

The ''High-Lift'' blade, Part Number C24686, is no longer supplied with the Model M91 Bagger Attachment beginning with factory shipments after November 15, 1979. This blade is now installed on all Case Model 80 riding mowers beginning with Product Identification Number **9772959**. Therefore, if a bagger attachment shipped from the factory after November 15, 1979, is installed on a Model 80 riding mower with a lower number, the ''High-Lift'' blade, Part Number C24686, must be ordered through your Case Parts Depot.

A ''Supplement'' with this information is also attached to the M91 Bagger Attachment Operator's Manual beginning with the first one that the blade was not incuded with.

MOD 80 TRAVEL CONTROL LEVER ENGAGEMENT TO INSURE SMOOTH STARTS (53-1)

The travel control lever usage found in Mod 80 Operator's Manual 9-3862, Page 4, Step 5, has been superceded by the following information.

Shifting from neutral to forward and reverse can be done without use of the clutch-brake pedal. Smoother starts may be obtained by slowly and gradually moving the travel control lever from neutral into either forward or reverse. Preventing jerky starts will eliminate shock loads and possible damage to drive chain, differential and rear axle pillow block bearings.

If desired to start motion using the clutch-brake pedal, position the travel control lever in the SLOWEST position, release the pedal slowly and then increase forward speed slowly using the travel lever only. (There is only a single reverse speed.)

A third method for smooth starts is to place the engine throttle at 1/2 speed and then advance the throttle after drive engagement. Smoother starts will also lead to better demonstrations and customer satisfaction.

MODIFICATION PROGRAM - MODEL 80 RIDING MOWER (58-1)

All Compact Dealers should now have received their copy of Service Bulletin No. G1-78 (A30-78) dated December 4, 1978, announcing the Model 80 Riding Mower Kit, P/N C25124 - Modification Program #9-G-78.

The kits are now available through SPS and should be promptly ordered so they can be received and installed on all customer and inventory Model 80 riding mowers during the winter offseason.

If any affected dealer has not received this Service Bulletin, please contact us or your Service Representative for a copy.

PREDELIVERY SERVICING OF FRONT WHEEL BEARINGS (26-5)

This is a reminder that the C12370 Plastic Hub Caps should be removed prior to greasing the front wheel bearings. If the cap is not removed, an air pocket will be formed, preventing the grease from reaching the outboard bearing.

An alternate solution would be to pierce the hub cap with the sharp point of a scribe or similar object. The hole is to allow air to escape only and should be kept as small as possible.

HARD STEERING - 200, 400 SERIES TRACTORS (10-4)

Several units with comparatively hard steering have been reported from the field. Factors contributing to steering effort are:

1. Front tire pressure.
2. Presence of front weight kit or front mounted attachment.
3. Stiff or binding spindles.

After the above areas have been examined and corrected if necessary, check for the following.

Hard steering could also be caused by the lower support part number C18992 being on an angle. This imposes a side load on the steering shaft when the plastic bushing is installed at the top of the steering shaft support tube. Confirm this by disconnecting the steering drag link. If difficult steering persists with the drag link removed, proceed as follows: The steering wheel and nylon bushing should be removed so that the steering shaft is free to take its natural position within the steering tube. Then loosen the four cap screws holding the lower support plate in order to center the steering shaft in the support tube.

TIRE PRESSURE IS IMPORTANT (67-1)

Adjusting the tire pressure as specified in the tractor operator's manual is an important predelivery procedure.

The following problems can result from improperly inflated tires:

SYMPTOM	CAUSE
1. Harsh, bumpy ride, jerky	1. Tire pressure too high
2. Mower, blade or snow blower low on one side	2. Rear tire pressure high on one side, low on the other side
3. "Ragged" finish cut lawn	3. Tractor bumpy from high tire pressure

Use an "extra low pressure" tire gauge for accurate tire pressure measurement.

TIRE PRESSURE CHART

MODEL	FRONT	REAR
80	8 PSI	8 PSI
108	12 PSI	6 PSI
210, 220, 222, 224	8 PSI**	8 PSI*
444, 446	8 PSI**	8 PSI***
644, 646	45 PSI	12 PSI***

* Up to 10 PSI when rear attachments are mounted

** Up to 14 PSI when snow caster or front weights are mounted

*** UP to 14 PSI when rear attachments are mounted

LOADER FRONT AXLE PIVOT PIN CHECK (38-3)

Check the position of the P/N C19018 pivot pin for the front axle during predelivery inspection or other service. The pin should protrude through or be flush with the rear section of the front axle support. Replace the pin if it does not meet the above requirements.

Service Parts Supply stock has been cleared and all P/N C19018 pins presently on hand are 3/16" (4.5 mm) longer than early production.

All units after the serial numbers listed below have 3/16" (4.5 mm) longer pins installed.

644 - 77 S/N 9744718 and after
646 - 77 S/N 9744844 and after

STEERING WHEEL INSTALLATION PROCEDURE (37-2)

Steering wheel removal for service is made easier by applying grease or anti-seize compound to the steering shaft prior to installation at setup time.

Installing shims under the steering wheel, instead of inside the wheel, will also make subsequent removal easier.

RUNNING MUH MODEL TRACTORS WITH HOOD RAISED FOR SERVICE (27-4)

Exhaust gases will discolor the left side hood and grille protrusion if the engine is run for service with the hood in the raised position.

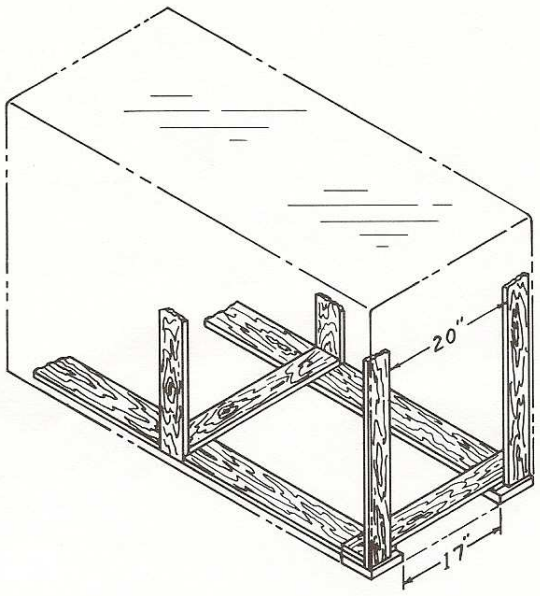
To prevent this, place a suitable piece of flexible exhaust hose over the exhaust pipe outlet to lead the hot gases away from painted surfaces.

TIRE CHAIN INSTALLATION TIP (60-1)

It is important that tire chains be installed properly to prevent damage to fenders.

One method is to reduce tire pressure, install chains tightly and then increase tire pressure to the specified amount. Be sure that any extra links are wired down.

To gain the most clearance between tire and fender, loosen the four (4) fender mounting bolts, pull fender upward and retighten the bolts.



SEAT HINGE WELDS - 200, 400 AND 600 SERIES (8-2)

There is a possibility of interference between the welds on the front of the seat hinges and the notches in the tool tray. 200, 400 and 600 series tractors manufactured in July, August and early September, 1974 are affected. This prevents the seat from being fully raised for filling the fuel tank. If encountered, either grind down the welds or file the tool tray notches slightly deeper to eliminate the interference. These welds were found unnecessary and have been eliminated.

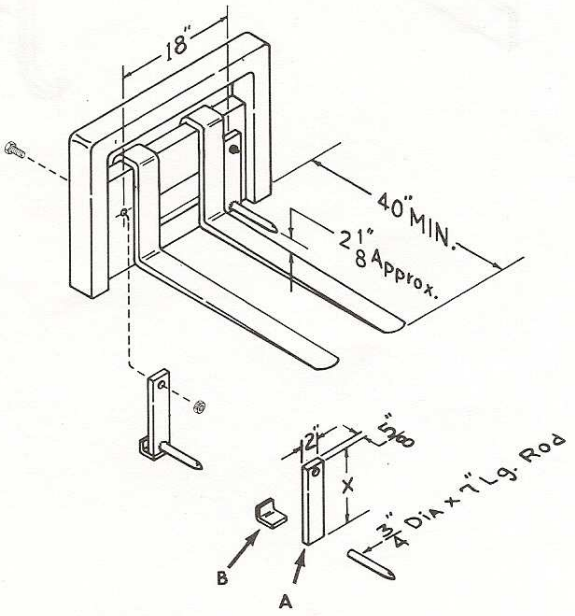
FORK LIFT HANDLING OF CARTONNED TRACTORS (7-1)

Compact tractor cartons may be lifted from the end with a standard forklift by adding holding pegs to the forks per the accompanying diagram. The 3/4'' (19 mm) diameter by 7'' (180 mm) long pointed rod serves to hold the bottom wooden slat firmly between it and the standard fork. This prevents the carton from tipping and allows fast, convenient movement of the cartons.

The dimension ''X'' on the rod bracket (A) will vary depending on the mast construction of your particular forklift. The size of bracket (B) will also vary depending on the thickness of the mast. These dimensions should be obtained by you from your forklift. All other applicable dimensions are given in the diagram.

Never lift the carton from the end marked ''TRUCK FROM OTHER END OR SIDES'' as damage to the tractor may result.

The preceding method of handling does not apply to loader tractors. These cartons must be lifted from the side or 6 foot forklift extensions used.



1980 MODEL 220 AND 222 BRAKE ROD (66-2)

1980 Model 220 and 222 tractors with mechanical lift are being shipped with the brake rod disconnected at the brake pedal cross shaft. This is done to permit the lift lever to be tipped rearward in the crate.

The brake rod must be connected during dealer set up and before operating the tractor. Follow Predelivery Check Sheet to insure proper brake adjustment.

Install the rod through the arm on the brake pedal cross shaft from the inside. Fasten with the cotter pin.

TRACTOR LIFTING SLING (59-3)

The tractor lifting sling illustrated hooks into the lower hood latch slots and enables the tractor to be lifted with a chain fall. The tractor balances when lifted at this point.

It is used during set up to lift tractor off skid and to hold tractor up while installing front spindles and rear wheels.

Be sure to use proper blocking and jackstands when working under the tractor.

TIRE MANUFACTURERS (46-2)

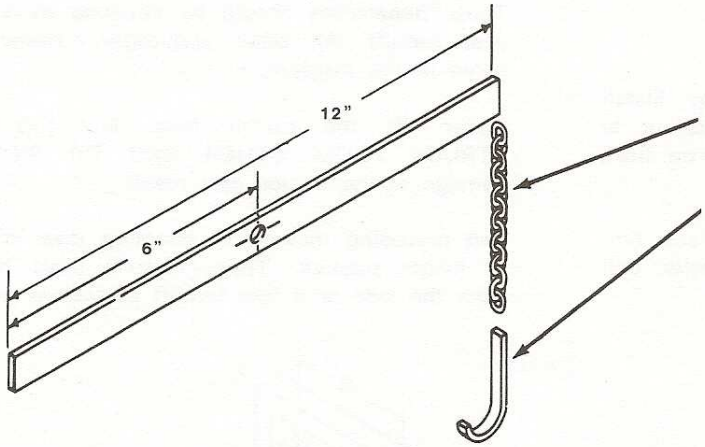
The following information is provided to aid you in locating replacement tires or tire warranty consideration.

GOODYEAR... Best results are usually obtained by working with a Goodyear Company Store.

ARMSTRONG..(ARCO) A hot line to Des Moines, Iowa, is available to help locate the nearest Armstrong Tire Dealer. Phone Number is 1-800-247-1763 — Ask for Mr. Jack Pitkin.

CARLISLE..... Carlisle Tire & Rubber Co., Industrial Tire Dept., Carlisle, Pennsylvania. Phone Number is 1-717-249-1000.

Be prepared with exact tire size and description. Identify yourself as a J I Case Company Lawn and Garden Tractor Dealer.



DRAINING THE TRACTOR HYDRAULIC SYSTEM (8-1)

The hydraulic system on Models 220 through 646 may be drained for service in the following manner:

1. Remove spark plug(s) from engine.
2. Move travel lever to full forward or reverse. On 600 series also clamp down travel pedal.
3. Place drain pan of at least three gallon capacity under tractor.

   Remove hex drain plug from control valve.
4. Engage tractor starter for brief periods until system is drained or until the solid stream of oil becomes a spray.

IMPORTANT: Under no circumstances should the engine be started and run to accomplish the above. Running the hydraulic pump without oil for even a brief instant could cause serious damage to the pump.

MINIMIZE HYDRAULIC OIL LOSS WHEN DISCONNECTING TUBES OR HOSES FOR SERVICE ON ALL HYDRAULIC DRIVE TRACTORS AND LOADERS (15-1)

1. When connecting a J17, LT16, LK17 Hydraulic PTO or Flowmeter only, stroke the travel spool in the full forward or full reverse position. The spool in this position will prevent drainage of oil.
2. When disconnecting other hydraulic tubes or hoses as in installing a 3-point hitch or servicing the attachment drive clutch on loader tractors, the loss of oil will be minimized by lining the reservoir cap with plastic or wax paper. This serves to block the vent in the cap and the inability of air to enter the reservoir retains the oil.

VERY IMPORTANT: Be sure to remove the plastic or wax paper before starting and operating the tractor.

USE OF PROPER OIL FOR COMPACT TRACTOR HYDRAULIC SYSTEMS (30-3)

All 200-400-600 series Case compact tractor hydraulic systems must use:

SAE 20W-40 Motor Oil in Summer (32°F (0°) and above)

SAE 5W-20 Motor Oil in Winter (below 32°F (0°C))

API Engine Service Classification SE or CC

This information is contained in operator's manuals and on a decal at the reservoir fill cap for your reference.

Compact tractor hydraulic systems are designed to operate a geroller hydraulic motor under continuous duty. To insure maximum efficiency and component life, the oil types listed above must be used. In areas where 20W-40 Motor Oil is not available, 10W-40 is a suitable alternative.

Under no circumstances should "Hydraulic Fluid", "Automatic Transmission Fluid", or Case TCH Fluid be used in compact tractor hydraulic systems.

Exception to the above should be noted for the Models 117 and 118 using the Eaton Marshall hydrostatic transmission. For these **TWO MODELS ONLY** Case TCH fluid is recommended.

FINDING OIL LEAKS (62-2)

Special attention must be used to find the exact location of an oil leak.

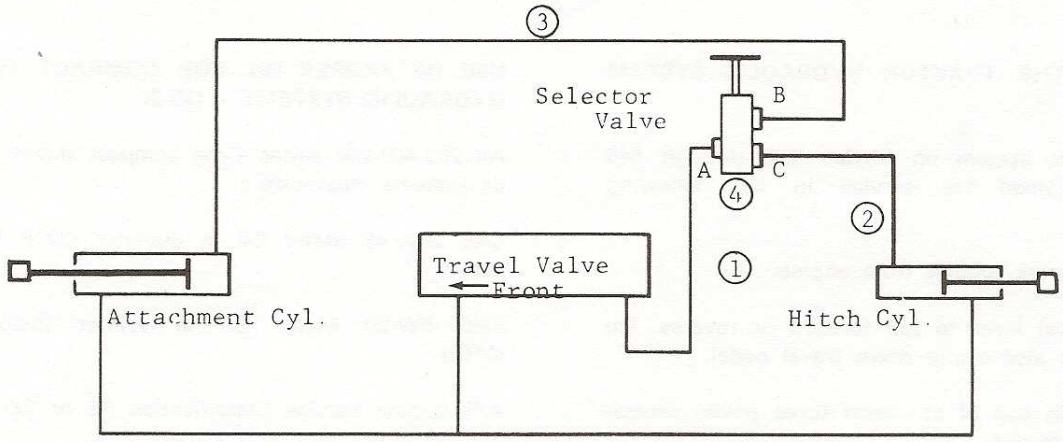
Oil on the hydraulic pump does not always indicate that the hydraulic pump has a leak.

Oil on the hydraulic pump can be coming from a small hole in the hydraulic reservoir.

Make sure the pump has a leak before replacing it.

If you are not sure, test the reservoir for leaks. Use this procedure:

1. Remove and wash the reservoir.
2. Close the inlet and outlet tubes on the reservoir.
3. Fill the reservoir with kerosene.
4. Inspect the reservoir for leaks.



HYDRAULIC LIFT SELECTOR VALVE INSTALLATION (3-5)

In certain applications, it is desirable to have the attachment lift cylinder and the three point hitch cylinder operate independently.

This may be done by ordering the following Case Parts and installing them according to the accompanying diagram.

QTY.	PART NO.	DESCRIPTION
1	C18154	Hose - Travel Valve to Selector Valve (Route appropriately)
1	C17189	Hose - Selector Valve to 3-Pt. Hitch Cyl. (Route appropriately)
1	C18155	Hose - Selector Valve to Attachment Cyl. (Route appropriately)
1	T10894	Valve, Selector (install under left foot pad with knob forward)
1	221-1413	3/8'' NPT Street Elbow (install at point A)
3	221-1086	3/8'' NPT to 1/4'' NPT Reducing Bushing (install at points A, B and C respectively)
2	218-1052	5/16'' J.I.C. 37° Flare to 1/4'' NPT Elbow (install at points B and C)
2	121-106	Screw 5/16'' x 1/2'' Long Whizlock

Install selector valve under left foot pad or on right side tower at manual lift lever holes using two whizlock screws so the knob points forward. Position elbow fittings in valve so hose bends are kept to a minimum. Secure hoses on the underside of tractor to minimize the chance of having them catch on ground obstructions.

The two hoses that come with the tractor and 3-point hitch may be returned to your dealer stock.

Due to the limited number of requests, the above is **not** being put into a kit, but must be ordered as individual parts from your normal parts supply.

HOLDING VALVE INSTALLATION (57-5)

Interference may exist with Holding Valve Kits installed on tractors with J17 PTO Kits with tubes extending below the rear axle.

The tube closest to frame rail (PTO valve outlet to travel valve inlet) should be replaced with Part Number C23888 tube which passes above the rear axle.

JAMMED TRAVEL CONTROL VALVE OR LIFT SPOOL (43-2)

On occasion when new or after service a valve spool will jam tightly. This could be caused by the attachment lift relief valve ball dropping into the valve casting passages during assembly or disassembly.

The valve may be salvaged if you encounter this symptom by following this procedure:

1. **DO NOT** apply any force to the spool that is stuck. Applying force will damage the valve and spool beyond repair.

2. Remove valve from tractor and remove valve spool that **is not** jammed.

3. Apply slight rotating motion simultaneously pushing and pulling on stuck spool to release ball.

4. Once ball is released, turn and shake valve body to remove ball from open valve spool bore.

5. If damage is severe, the valve assembly must be replaced. If no damage is evident, polish spool slightly with crocus cloth and reassemble.

When assembling attachment lift relief valve, hold valve with **work ports down** to prevent ball from falling into oil passages. Consult your service manual.

PUMP TO VALVE HOSE, PART NUMBER C 18797, INTERFERENCE WITH TRACTOR FRAME, STEERING GEAR AND TRAVEL LEVER TAB: ALL HYDRAULIC DRIVE TRACTORS (16-6)

It is urged that the position of the pump to valve hose should be examined during predelivery inspection. It must not contact any metal part of the tractor, such as, the frame, steering gear or travel lever spring tab. Check for tab interference by moving travel lever into full forward and reverse position. Contact of this nature will cause chafing and eventual failure of this high pressure hose.

The hose may be repositioned by loosening the swivel hose end at the travel control valve inlet fitting. Use a one inch angle head wrench. Twist the hose to a clear position. Retighten the swivel end.

MODEL 446 DRIVE COUPLING FAILURE (4-5) (7-2)

We have received reports of premature C20060 pump drive coupling failure on the Model 446. In certain instances it was found that the coupling was assembled with inadequate clearance at the center section. All 446's between S/N 9682135 and 9695875 should have the clearance between the coupling halves verified **before operating the tractor.**

To do this:

1. Remove one coupling side shield.

2. If clearance between the coupling halves is less than 1/8'' (3 mm), loosen the setscrew on either and move the coupling to obtain the 1/8'' (3 mm) clearance.

3. Retighten setscrew(s) and replace the coupling side shield.

Also, check the coupling alignment. If the coupling halves are angled in the center section, shim the appropriate pump support bracket bolt with common washers until the coupling runs true.

If the coupling halves appear to be offset, elongate or ream the pump support bracket bolt holes in the appropriate direction.

The pump drive coupling must be positioned so the set screw tightens on the flat provided on the pump shaft. To insure this, position the pump half of the coupling 1/8'' (3 mm) away from the wire retaining ring located on the pump shaft. Tighten set screw securely.

Relocate the engine half of the coupling until both halves are in light contact with the molded bosses on the flexible center section. This will space the coupling halves about 1/8'' (3 mm) apart. Tighten set screw securely.

Install a second set screw on top of the first one in the pump half as an extra locking device.

SURGING OR HESITATION; PUMP WHINE - ALL MUH MODELS (27-1)

Early production 446 MUH tractors may be subject to suction line restriction caused by collapsing of the suction hose. This condition will be evident by surging, hesitation, loss of ground speed under no load and accompanied by pump whine.

Corrective action taken at the plant includes installing a spring into the hose to prevent collapse. Althought there are no confirmed cases occurring in 220 through 444 tractors, springs have been installed in the suction hose across the board effective with the following serial numbers:

446 - 76 S/N 9728612

444 - 76 S/N 9726123

224 - 76 S/N 9724870

222 - 76 S/N 9723606

220 - 76 S/N 9721757

To resolve the above listed symptoms, the following procedure should be used:

1. Order the appropriate hose and spring assembly from your normal parts supply source.

   446 P/N C23981 Hose and Spring Assembly

   220-444 P/N C24040 Hose and Spring Assembly

2. Remove the spring from the assembly being careful not to stretch it out of shape. Place the hose in your parts stock.

3. Drain the hydraulic reservoir.

4. Loosen clamp and remove suction hose from reservoir end only.

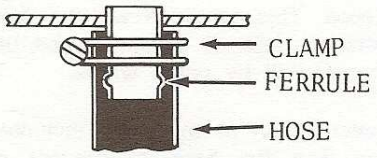
5. Slide spring into suction hose with slight twisting motion.

6. Reconnect hose and refill reservoir to proper level.

RESERVOIR TO PUMP (SUCTION) HOSE INSTALLATION ALL MUH 220 THRU 446 TRACTORS (38-2)

This molded rubber hose may be cut if clamps are installed improperly or if the wrong style clamps are used.

The Part Number C23326 clamp, as illustrated in parts catalogs, is the only style clamp permissible for use.



Correct position of Hose and Clamp for both Reservoir Outlet Tube and Pump Inlet Tube

IMPORTANT: **DO NOT** use a worm-drive clamp under any circumstances.

The hose must be inserted over the reservoir outlet tube far enough to allow both wires of the clamp to engage the hose between the ferrule and the tank.

The hose must be inserted over the pump inlet tube far enough to allow both wires of the clamp to engage the hose between the ferrule and the pump body.

Carefully following this procedure will avoid the possibility of damaging the suction hose resulting in oil leakage or aeration.

RESERVOIR TO PUMP (SUCTION) HOSE INSTALLATION - ALL MUH 220 THROUGH 446 TRACTORS (42-2)

Appying several turns of friction tape to the hose ends before installing clamps reduces the chance of the clamps cutting the hose.

This procedure has been adopted in production effective with the following serial numbers:

220 S/N 9734677

222 S/N 9736777

224 S/N 9739467

446 S/N 9742386

Use only the P/N C23326 clamp as illustrated in the parts catalog. Position the clamp so it is completely beyond the ferrule before tightening.

HOLDING VALVE DECELERATION ORIFICES (68-3)

Holding valves are equipped with orifices between the motor ports to cushion the stop when the travel control valve is returned to neutral.

These orifices should be inspected if the tractor stops abruptly after a holding valve is installed.

To inspect the orifices:

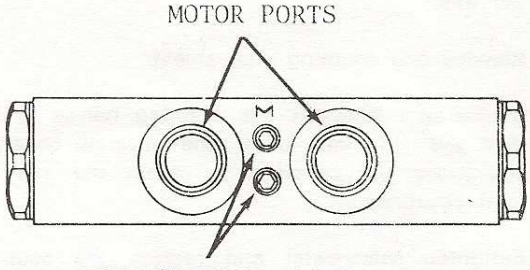
1. Remove the large hex plugs from the ends of the holding valve body.

2. Remove the spool.

3. Remove the pipe plugs illustrated. Sight through the orifices.

The orifices should be drilled through into the valve bore. If one or both orifices are not drilled through, drill them to .067 inch (1.7 mm) diameter.

Carefully clean and reassemble the valve.



DECELERATION ORIFICES

HYDRAULIC RESERVOIR OIL LEVEL ON 1976-1977 MUH MODEL TRACTORS (28-4)

Maintaining the correct oil level is very important for proper operation. High oil level may cause oil to overflow. Low oil level may cause pump cavitation and surging of the drive system.

The oil level must be maintained at the mark on the dipstick provided with each tractor. This mark coincides with a point 1/4'' (6 mm) below the base of the filler neck of the reservoir.

HYDRAULIC OIL DIPSTICK NO LONGER PROVIDED (65-3)

A hydraulic oil dipstick is not required for 1978 and later Model 200 and 400 series tractors (with polyethylene reservoirs). Oil level, although always important, is not as demanding with the new reservoir design. One full inch (25 mm) of oil level fluctuation is allowed.

Oil level should be maintained between 5'' or 6'' (125 mm and 150 mm) from the top of the filler neck.

HYDRAULIC MOTOR OUTPUT SHAFT SEAL LEAKAGE (53-2)

The hydraulic motor output shaft outboard needle bearing in the new style (Part Number C24843) transaxle housing is consealed.

The condition of this bearing must be inspected if hydraulic motor output shaft seal leakage occurs. Inspection may be made through the motor mounting hole with the motor removed.

J17 HYDRAULIC PTO VALVE RELIEF VALVE PRESSURE SETTING (39-4)

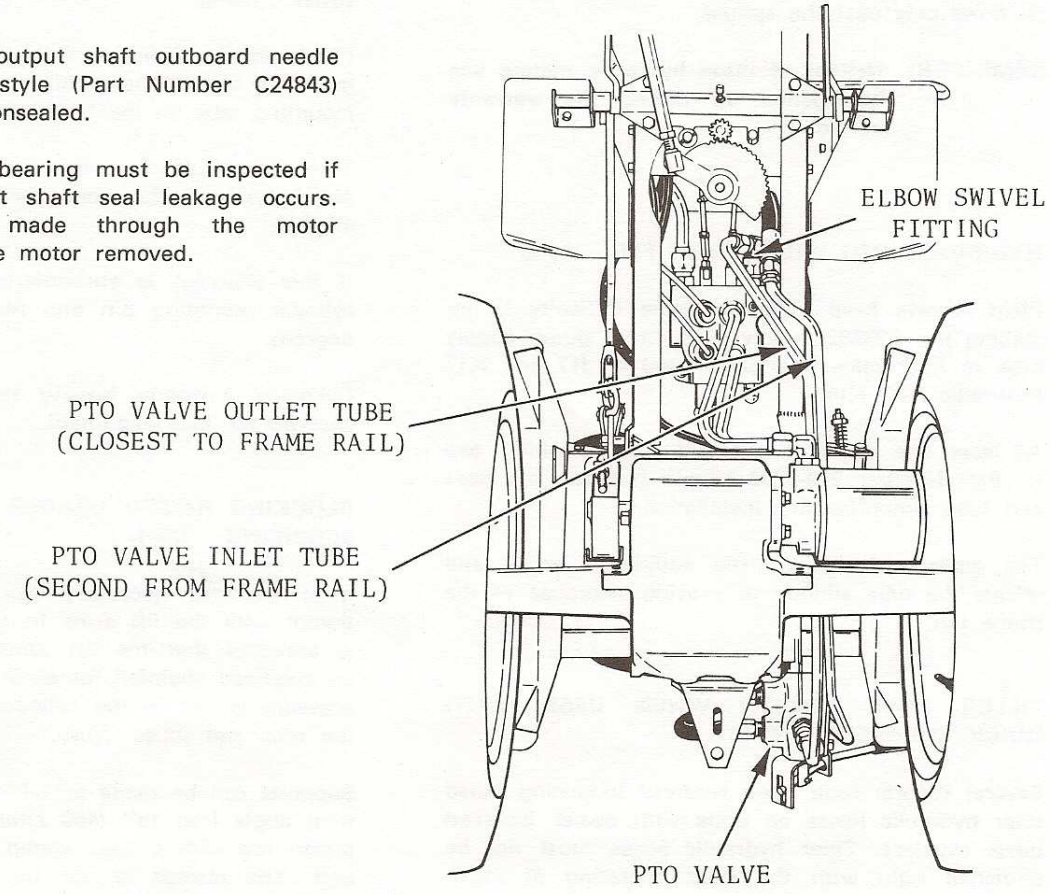
Specification:
Full Open...2500 PSI (17,000 kPa)
Cracking....2250 PSI (15,500 kPa)

Maintaining the correct relief valve pressure setting is very important. A setting too high will cause equipment damage, too low will cause overheating of the hydraulic system.

J17 HYDRAULIC PTO TUBING CHANGE (36-6)

To increase tractor ground clearance, a running change has been made to the J17 hydraulic PTO tubes. The new tubes (to and from the J17 PTO valve) are now routed above the axle and hydraulic motor and between the two speed transaxle shift lever and shift rod.

The PTO supply tube is positioned second from the frame rail. The PTO return tube is positioned next to the frame rail.



LOCTITE HYDRAULIC SEALANT - PART NUMBER B17426 (20-1)

Applying Loctite Hydraulic Sealant as directed will help insure leak-free fitting connections after service work or hydraulic kit installations.

This Sealant is available from your part supply source under Part Number B17426, 50 cc bottle.

HYDRAULIC MOTOR DRIVE LINKS, PART NO. D59699 AND C14828 (9-2)

Several reports have been submitted stating the original drive link in C14655 and C16697 hydraulic motors is hollow and the replacement service part received is solid.

All recent production C14655 and C16697 hydraulic motors have solid drive links and recent replacement drive links are also solid. The hollow or solid drive links are directly interchangeable which is why there was no part number change, although the earlier C18109 drive link was subbed over to D59699 which was already in the Case system as an identical part.

With the hollow drive link the oil flows through the hollow center and past the splines. The solid drive link has increased spline clearance and the oil flows only past the splines.

REMINDER: Neither of these hydraulic motors can be opened up during the warranty period.

HYDRAULIC PTO VALVE TUBE FIT (54-2)

Field reports have indicated some difficulty in installing the C23962 supply tube (from pump supply hose to PTO valve inlet port) used in J17 and K17 Hydraulic PTO Kits.

At least one dealer has found that installing two (2) Part Number 218-5232 elbows between the hose and tube simplifies this installation.

The elbows provide a little additional length and offsets the tube slightly to provide clearance at the frame rail.

TILLER HOSE LENGTH WHEN USED WITH QUICK COUPLERS (51-3)

Several reports have been received indicating failed tiller hydraulic hoses on units with dealer installed quick couplers. Tiller hydraulic hoses must not be stretched tight with the tiller operating at maximum tilling depth.

Hoses as much as 4'' (100 mm) longer must be used with quick couplers to relieve tension and prevent failure. Hose, P/N T52319, is available from your Case Parts Depot which will meet this requirement. Original hoses, P/N C14676, which fail as a result of being stretched, pulled apart, due to quick coplers are not to be submitted for warranty consideration.

SWIVEL TEE FITTING FOR 3-POINT HITCH INSTALLATION (57-3)

Part Number 218-5479 swivel tee fitting is now used with H26 and LT26 3-Point hitch attachments. This tee fitting is also available from your regular Service Part Supply source.

This swivel tee fitting connects directly to the straight fittings installed in the hydraulic lift circuit valve work ports. This eliminates the need to remove the straight fittings and greatly reduces hitch installation time.

Note that some slight reforming of the center mounted attachment lift cylinder tubes may be required to achieve alignment when used with the new swivel tee fittings.

3-POINT HITCH CYLINDER HOSE POSITION (ROD END) (58-6)

Field reports indicate that the rod end cylinder hose on some 3-point hitches interferes with the mounting tabs on the hitch rockshaft.

This can result from the lower cylinder mounting pin holes and the hose port being slightly misaligned.

If this situation is encountered, remove the lower cylinder mounting pin and rotate the cylinder 180 degrees.

Cylinders currently leaving the factory are being checked for hole alignment.

BLOCKING RAISED LOADER LIFT ARMS WHEN SERVICING (25-1)

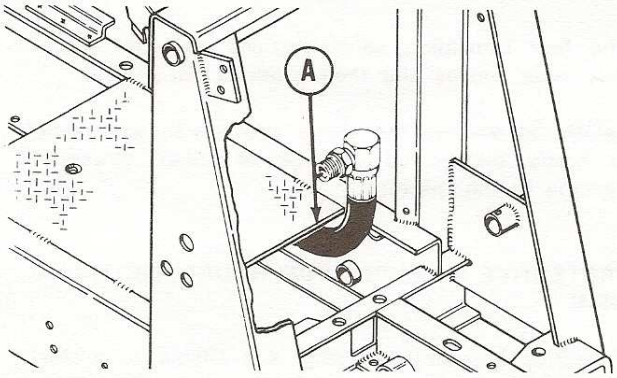
If it becomes necessary to work on the loader tractor with the lift arms in the raised position, it is essential that the lift arms are supported. Use an overhead chainfall, or block the cylinders. If the pressure is lost in the cylinders, the lift arms will not drop and cause injury.

Supports can be made of 1-1/4'' x 1-1/4'' (32 x 32 mm) angle iron 18'' (460 mm) long. Secure to the piston rod with a hose clamp about 2'' from each end. The clamps should be padded with rubber hose to keep them from scoring the piston rods.

POSSIBLE INTERFERENCE BETWEEN C18797 PUMP TO VALVE HOSE AND FLOOR PLATE ON 1975 PRODUCTION MODEL 644 LOADERS (17-2)

All 1975 production Model 644 loaders should be checked for possible interference between the pump to valve hose and the forward edge of the floor plate.

To check this area, remove the dash panel. If contact exists, place a 3 to 4 inch long cushion, such as, a piece of heavy garden hose slit open (or similar length of current instrument panel liner, part number C18153) on the floor plate edge (at point A on the above diagram) to prevent abrasion of the high pressure pump to valve hose. Units, S/N 9718377 and after have been corrected in production.



C19900 MOTION CONTROL PEDAL STICKING ON MODEL 644 AND 646 LOADERS (16-3)

Dealer Predelivery of Loader Tractors should include checking for free movement of the C19900 motion control pedal. This pedal is spring-returned and must move freely to insure proper operation. The C19902 control (guide) bracket and C17553 control pin should be coated with grease as indicated in Operator's Manual 9-4322, Figure 33, to insure pedal return.

In addition, all other pivot points should received a few drops of light motor oil.

LK21 CHECK VALVE KIT FOR LT20 FORK LIFT ATTACHMENT (20-2)

The Model LK21 Check Valve Kit is available from your machinery department. The Check Valve Kit will prevent the forks from sagging slightly before rolling back when "feathering" the Control Valve in this direction. The Kit connects easily to the rollback cylinder lines at the cylinder and requires about 30 minutes to install.

The LK20 fork lift attachment which supercedes the LT20, includes the Check Valve Kit.

NEW LL20 FORKLIFT AND LL21 CHECK VALVE KIT (65-1)

A recent improvement in the hydraulic lines to the loader lift and bucket tilt circuits has been made.

This has caused a fitting size change in the check valve kit. The new check valve kit is Model LL21. The Forklift containing this kit is Model LL20. These are machinery items and must be ordered from your Branch Machinery Department.

LK21 Check Valve Kits can be updated to LL21 Check Valve Kits by ordering the following parts from your Service Parts Supply Depot.

QUANTITY	PART NUMBER	DESCRIPTION
1	218-483	Elbow
1	218-993	Adapter
1	218-1054	Elbow
1	218-5222	Tee
1	C25168	Hose

Loaders requiring the new kits are:

644 P.I.N. 9771567 and after

646 P.I.N. 9771784 and after

648 All

HOLDING VALVE STANDARD EQUIPMENT ON 600 SERIES TRACTORS (61-1)

Beginning with the below listed product identification numbers, the LL9 Full Speed Range Holding Valve is standard equipment on 600 series tractors and loader-backhoes.

Model 644 P.I.N. 9771567

Model 646 P.I.N. 9771784

Model 648 All

OPERATION OF BACKHOE AND LOADER HYDRAULIC CIRCUITS PRIOR TO SERIES B (18-2)

To prevent the possibility of high pressure buildups in the loader-backhoe hydraulic system the following precautionary statement should be followed:

DO NOT Operate Backhoe circuits concurrent with either the Loader Travel or Bucket circuits. Failure to observe this procedure could result in damage to the Backhoe hydraulic system and/or hydraulic pump.

D100 BACKHOE USAGE AND BOOM DOWN SECONDARY RELIEF VALVE (57-4)

Proper backhoe operation occurs when the backhoe bucket is filled at every pass without pulling the loader rearward. To achieve this, several requirements must be met. The first is proper munipulation of the backhoe controls. The second is, the backhoe stabilizers must remain firmly on the ground to anchor the machine and prevent it from being pulled rearward.

As the dipper is crowded in during the digging cycle, a lifting effort is exerted against the boom.

This lifting effort is overcome by featering the boom lever toward the boom raise position.

If the boom lever is not used, this lifting effort will lift the stabilizers from the ground and the loader will be pulled rearward as the dipper is crowded in.

In order to eliminate the need for the operator to manipulate the boom lever toward the boom raise position while crowding the dipper in, a low pressure boom down secondary relief valve is now available on backhoes leaving the factory and from your Service Parts Supply Depot.

This low pressure secondary relief valve will allow the boom to drift upward while the dipper is crowded in, therefore, preventing lifting of the stabilizers form the ground.

Boom down pressure is sufficient to lift the rear of the loader for repositioning, however, when the loader bucket is raised and the dipper is positioned vertically under the boom.

Boom down Secondary Relief Valve, P/N H-644450, is factory installed on the Loader-Backhoes beginning with Serial Number 9758399.

This secondary relief valve is installed under the lower work port of the ''Boom'' valve section.

IMPORTANT NOTE: To protect the structural integrity of the front loader bucket and loader arms, **THE FRONT LOADER BUCKET MUST BE POSITIONED FLAT ON THE GROUND WHEN USING THE BACKHOE.**

DO NOT place the bucket on the ground in the full dump position.

118 SLIPPING BACK TO NEUTRAL (2-5)

Improved parts C19641 friction button (**one only** installed in rear hole) and C19624 speed control lever may be installed to prevent above condition.

ALTERING OF MODEL D100 BACKHOE CONTROLS (32-2)

On occasion, a customer will request that his backhoe controls be changes to accommodate a physical handicap or his personal preference.

This may be done but special attention must be given to the boom and dipper (crowd) circuits. Secondary relief valve protection is provided in both work ports of the boom section and the upper work port of the dipper (crowd) section. The relief valve opening is plugged in the lower work port of the dipper (crowd) section.

To change position of the boom and dipper controls, the **valve sections** must be moved within the valve bank assembly so that boom and dipper cylinders are always operated by the proper valve section.

The four remaining valve sections have no secondary relief valves and their order is not critical.

Failure to observe the above procedures will result in costly piston rod damage or other structural damage to the machine.

PROTECTIVE SLEEVING FOR HYDRAULIC HOSES (65-4)

Protective (Cordura) sleeving is available to protect hydraulic hoses in areas of high wear or scuffing. This sleeving will fit any hydraulic hose with a fitting diameter of 1.5'' (38 mm) or less. The sleeving is held in place by a tie at each end.

Sleeving and ties can be obtained from your normal parts ordering source.

L79101 Sleeving - 25 foot roll L18331 Tie

SERVICING THE EATON MARSHALL HYDROSTATIC TRANSMISSION USED ON MODEL 118 TRACTORS (34-2)

The Model 118 hydrostatic transmission **is not field servicable** except as described in the Outdoor Power Equipment Division Service Manual.

Regular maintenance should include maintaining the oil level, in the plastic expansion tank, at approximately 1/3 full.

The tube from the transmission should be mounted flush with the bottom of the surge tank and must not protrude above the oil level. Air entry and erratic operation will occur if this tube protrudes above the oil level.

If these symptoms occur, the transmission should be bled of air and refilled with oil as described in the service manual.

LABELING OF BATTERIES - SAFETY! (6-2)

Effective July 10, 1974, a warning label tag is included with each tractor shipped. The tag is installed over a battery post and will read as follows:

THE TAG MUST REMAIN IN PLACE WHEN THE UNIT IS DELIVERED TO THE END USER. REMOVAL OF THE TAG COULD BE A VIOLATION OF ONE OR MORE UNITED STATES FEDERAL REGULATIONS.

BATTERY WINTER STORAGE RECOMMENDATIONS (69-5)

Activated batteries in Model 80 riding mowers and compact tractors which will be in storage over the winter months should be removed from the units and stored in fully charged condition in a cool, dry location.

Preferred storage is on a dry wooden surface. Do **NOT** store a live battery on a concrete floor.

Please advise your customers that following this practice will assure them of maximum battery service life.

USE OF WING NUTS ON BATTERY TERMINAL BOLTS (66-4)

Terminal bolts with **wing nuts must not be used** on batteries installed in Case compact tractors.

The size and position of the wing nut is such that it can contact other surfaces on the tractor or the current plastic coated battery hold down clamp. A wing nut can wear through this plastic coating.

If the wing nut on the positive terminal touches a metal surface, a short circuit will result. This will cause arcing and possible explosion.

Only genuine Case replacement batteries should be used.

MODEL 446 TRACTOR BATTERY DRAIN (1-1)

The rectifier-regulator in the 446 (prior to P/N 9713369) electrical system does permit a slight (25 MA) drain. This can cause the battery to discharge if the tractor is idle for prolonged periods. The leakage can be eliminated by making a slight change in the wiring harness. Refer to wiring diagram, page 33, Tractor Operator's Manual No. 9-4392.

1. Remove the Red Rectifier Wire #10 from the ammeter.

2. Using solder, or a Scotch Splicing Clip, join the Red Wire #10 to the black and white (or black and yellow) coil wire #2 at the ignition switch.

MODEL 446 TRACTOR ELECTRICAL TEST PROCEDURE (58-7)

On 446 tractors that have had the wiring change made to correct the battery drain problem and now show a no charge condition, be sure to check the area where the red rectifier wire was spliced to the coil wire. If this splice is corroded, an electrical check will indicate a faulty rectifier-regulator. Proceed by unplugging the rectifier-regulator plug and testing for 12 VDC (ie Battery Voltage) at the plug B+ lead (red). 12 VDC should be present when the key switch is in the "RUN" position.

If battery voltage is not present, an open circuit exists between the plug and the battery positive terminal. Check the splice and other connections and repair as required.

If battery voltage is present, proceed with the rectifier ground check and stator output check as described in Service Manual Section 9-51171.

SERVICING BATTERIES ON MUH MODEL TRACTORS (28-3)

As with previous models, and even more important with MUH Models, **the battery must be removed for initial servicing.** Improper or over-filling of the battery can cause it to overflow resulting in corrosion of electrical components, hydraulic reservoir, and chassis.

ACTIVATING A DRY CHARGE BATTERY

1. Remove battery from vehicle.

2. Remove vent caps and carefully fill each cell with electrolyte to the top of the plates. Allow the battery to stand for a few minutes and recheck the level of the electrolyte in each cell. If necessary, add additional electrolyte. **(CAUTION: Do not overfill beyond covering plates as electrolyte expands during the charging cycle and could overflow.)** Examine the caps to make sure the vents are open.

3. For best results, it is recommended to boost charge a freshly activated battery **(CAUTION: Do not exceed 3 amps)** to insure that it is fully charged.

4. After boost charging, allow the battery to stand for a few minutes. Recheck the electrolyte level in each cell. Fill each cell to the level indicator with additional electrolyte...**NOT WATER.**

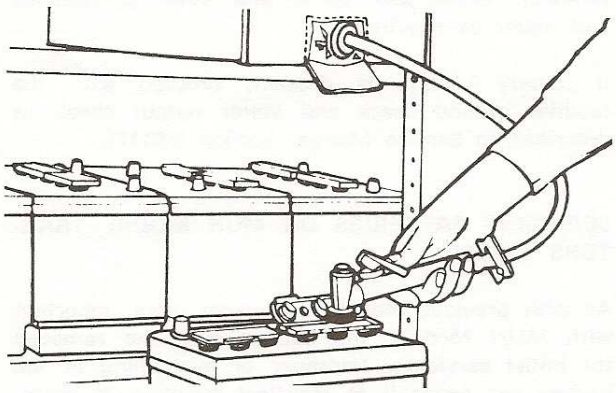
5. After the battery is activated, keep it serviced and charged just as you would a conventional wet charged battery.

WATER

After a battery has been activated and placed into service, add only water that has a minimum mineral content. Minerals are detrimental to service life of a battery. Under no circumstances should battery electrolyte be added after the battery has been activated and put in service. Fill to level indicator only - **DO NOT OVERFILL.**

BATTERY FILLING DEVICE (60-2)

A battery filling device, such as the one pictured, will speed up battery servicing and eliminate acid spills.



IMPORTANT: Batteries still must be removed from the tractors for servicing.

This one is the Thexton Activator, Part Number 604 Dry Charged Battery Filler. Cost is approximately $10.00. It is available from Thexton Manufacturing Co., P. O. Box 35008, 7685 Park Lawn Avenue, Minneapolis, Minn. 55435, Phone: 612-831-4171.

1975 PRODUCTION MODEL 644 LOADER BATTERY - TIGHT FIT (17-1)

It may be difficult to install the battery in some 1975 Model 644 loaders with the C16239 battery hold down clip in place. Elongating the left hand hole in the C17598 battery tray an additional 3/16" (5 mm) will allow the hold down clip to be installed after the battery has been put in place. Units, S/N 9718410 and after have been corrected in production.

MOD 80 BATTERY CHARGING PROCEDURES (68-2)

Batteries that have been abused and allowed to go dead before being recharged can be sulphated.

A one-amp charging rate applied for a minimum of 72 hours from the P/N C24346 charger supplied with the Mod 80 is required to charge a sulphated battery.

Charging at a higher rate increases the risk of internal cell damage.

BATTERY CHARGING SAFETY TIP (55-1)

CAUTION: Always turn ignition switch off, or disconnect the battery cables while charging the battery. A switch left on with the battery connected can cause the ignition coil to overheat and possibly explode.

If the switch is left on and the breaker points are closed during charging, the increased voltage from the charger will cause the ignition coil to overheat and eventually fail. In the case of oil filled coils, the can may bulge from the pressure of the heated oil. In some instances the heated oil may leak from the can. This leaking oil is hot and can burn the skin.

Pitch filled coils present a similar hazard when they are overheated. The pressure from the heated pitch will bulge the can. If the coil gets hot enough, it may actually explode. This explosion can spray hot pitch and possibly other coil parts into the surrounding area, producing a dangerous situation.

ENGINE WILL NOT SHUT OFF. ALL MODELS 210 THROUGH 446 WITH FLYWHEEL ALTERNATOR (54-1)

Examination of the electrical wiring diagram in Service Manual Section 9-51171 shows that the positive charging lead from the rectifier regulator to the battery is routed through the ignition terminal of the key switch.

If the engine keeps running (with ignition) after keyswitch is turned to the "OFF" position, the following troubleshooting procedure should be followed:

1. While engine is still running, disconnect battery negative (-) cable.

   a. if engine stops, faulty keyswitch is indicated.

   b. if engine does not stop proceed to Step 2.

2. While engine is still running, disconnect rectifier-regulator from system (remove 3 - prong plug

or remove ground connection).

a. if engine stops, faulty rectifier-regulator is indicated.

NOTE: NEVER PULL HIGH TENSION LEAD FROM SPARK PLUG TO STOP ENGINE. THIS WILL CAUSE DAMAGE TO THE IGNITION COIL. Ground coil negative (-) post with a jumper wire to stop engine if necessary.

PROPER GROUNDING OF VOLTAGE REGULATOR OR RECTIFIER REGULATOR (39-2)

Just a reminder that Voltage Regulators and Rectifier Regulators must be properly grounded to the tractor chassis in order to charge.

Dirt, corrosion, or oil accumulations can prevent this ground resulting in low or no charge symptom. Inspect this area, along with all plugs and connections before replacing charging system components.

VOLTAGE REGULATOR CLARIFICATION, ALL STARTER-GENERATOR EQUIPPED MODELS (41-4)

The current production Prestolite Regulator, P/N C24221, is electrically interchangeable with the Delco Regulator, P/N A70221, but is smaller in size.

Muffler Under the Hood model tractors require the smaller, P/N C24221 Prestolite Regulator.

SPS is shipping only P/N C24221 Regulators.

Use P/N A70221 Regulators you may have in parts stock on tractors prior to MUH.

PRESTOLITE VOLTAGE REGULATOR MOUNTING TABS TWISTED (46-3)

All Muffler Under the Hood tractors using starter generator and Prestolite Voltage Regulators should be checked for twisted voltage regulator mounting tabs.

If tabs are twisted:

a. Use large Phillips screwdriver to loosen tab

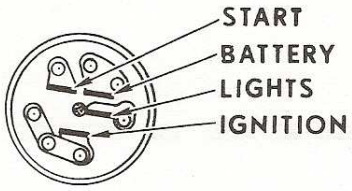
b. Straighten tab

c. Hold tab when retightening

Operating the tractor with the tab twisted could result in a broken voltage regulator grounding wire and a no-charge symptom.

P/N C23010 INDAK IGNITION SWITCH TERMINAL IDENTIFICATION (27-5)

The Indak ignition switch terminals are not marked for identification. Use the diagram below if switch replacement is necessary.



INDAK IGNITION SWITCH PART NUMBER CLARIFICATION (32-4)

The part number for the Indak brand ignition switch adopted with 1976 production tractors is C23010 (Switch only).

To service prior model tractors with this improved switch, a part number C23839 Kit, which includes adapter plate and instructions, should be ordered.

HEAD LIGHT WIRE CHECK (46-4)

Several units have been reported having the headlight wire stretched tight when clipped to the oil cooler support. This could cause the insulation to wear through and ground this wire. This will cause the fuse to blow when key-switch is moved through the "Lights" position.

Check this wire during pre-delivery inspection.

Provide a small amount of slack in this wire if found tightly stretched.

PROPER CONNECTION FOR ELECTRICAL ACCESSORIES (STARTER-GENERATOR EQUIPPED TRACTORS) (13-5)

Optional electrical accessories, such as, additional lights, radio, etc., **must** be connected to the "L" (load) terminal of the voltage regulator. Connecting the accessories directly to the battery or the "B" (Battery) terminal of the voltage regulator will prevent the voltage regulator from properly charging the battery resulting in a discharged battery and short battery life.

CONNECTING ACCESSORY ELECTRICAL LOADS TO MODELS WITH RECTIFIER REGULATORS (16-5)

The solid state rectifier regulators used on Models equipped with flywheel alternators do not have a separate "L" or load terminal. Accessory loads meant to be operated with the engine running only should be connected to the "I" terminal of the ignition switch. Other accessory loads should be connected at the "B" terminal of the ignition switch.

MODELS 80 AND 108 WELDING PRECAUTIONS (58-2)

Before performing any welding on the Model 80 Riding Mower or the Model 108 tractor, disconnect the battery ground cable and throttle cable from the engine to prevent the possibility of damage to the magneto.

Always connect welder ground as close as possible to weld area.

1/4 OHM RESISTER FOR ELECTRICAL TESTING (35-3)

The 1/4 Ohm resister suggested for voltage regulator tests in Service Manual 9-99882, Electrical System 644, 200, 400 Tractors, is available from Snap-On. The Snap-On part number is MT-358C and costs approximately $36.00.

STARTER-GENERATOR MOUNTING AREA CHECKS - ALL KOHLER EQUIPPED TRACTORS (47-1)

Several changes were made in the installation procedure for the starter-generator to increase reliability in this area effective with the following model and serial numbers:

MODEL	SERIAL NUMBER
210	9733442
220	9734677
222	9736777
224	9738160
444	9739467
644	9744743

1. Two adjusting straps, Part Number C14599, are used for additional support.

2. Grade 8, 5/16 x 1" N.C. bolts, Part Number 113-185, are used to connect the adjusting straps to the starter-generator and the starter-generator to the support bracket. These bolts must be torqued to between 24 and 29 foot pounds (33 and 39 Nm).

3. Clearance between the starter end plates and support bracket is reduced to .005" maximum by using shims to prevent stress. Shim washers .005", Part Number C24836, and .010", Part Number C24837, are now available in Service Parts Supply for this purpose. Install them between the rear starter end plate and support bracket.

4. Check the starter and engine pulleys for belt alignment. Re-adjust the support bracket if necessary.

5. The two 3/8" grade 5 bolts connecting the starter-generator support bracket to the engine are checked for proper torque. Correct torque value for these bolts is 35 to 40 foot pounds (48 to 54 Nm).

6. Snubber washers were not installed under the engine isolation mounts on the starter-generator side of some Model 220 through 444 tractors. Tractors between the following serial numbers should be checked and the washers installed if necessary.

   Model 220 from S/N 9722422 to 9734691

   Model 222 from S/N 9724053 to 9736806

   Model 224 from S/N 9725192 to 9738168

   Model 444 from S/N 9726789 to 9739482

It is recommended that tractors built prior to (or between) the serial numbers listed above be checked and updated as necessary during predelivery or when the tractor is in your shop for servicing.

SPRINGTIME REMINDER (26-3)

12 and 14 HP Kohler Engine Modification Program #9AA-75

Case Agricultural Division Service Bulletin #G2-75 Dated 8/18/75

Be reminded that units within the serial number ranges listed in subject bulletin that have not already been modified should be done prior to the busy spring season.

Units that need to be checked to see if they are affected might be ones left from last year's stock or transferred units from another dealer.

If you do not have a copy of Service Bulletin #G2-75 or have any question about it, please consult with your Field Service Representative during his next call.

SUMMER REMINDER TO CLEAN COOLING AIR INTAKE SCREENS AND ENGINE AIR CLEANER (41-2)

The hydraulic oil cooler and engine cooling air intake screen **must** be kept free of debris to insure the proper flow of cooling air for hydraulic system and engine.

Restrictions to the flow of cooling air from accumulations of dust, dry grass clippings, cottonwood or dandelion lint, etc., can cause overheating and expensive repairs if not removed frequently. Please make a special effort to point this out to your customers. Review the maintenance area in his owner's manual. Commercial users or customers where heavy concentrations of cottonwood or dandelions exist will have to clean air intake areas more frequently than the daily period specified in the owner's manual.

Similarly, frequent cleaning of the engine air cleaner is also required to prevent dirt entry and excessive wear. Precleaners, Part Number KO 237421 for Kohler, and C20405 for Onan (Model 446), are available and recommended when operating under severe conditions.

PREVENTIVE MAINTENANCE FOR ENGINES (63-3)

Our customers must be frequently reminded to perform preventive maintenance on the engines in their tractors. Since most customers do not bring their tractors to your dealership for preventive maintenance, they soon forget when the engine was last serviced.

Normally, an approximation of operating time rounded off in the engine's favor can be made very easily.

An hourmeter (P/N L49907) can be installed to all tractors with battery ignition if the customer desires.

Regardless of the method of determining engine hours of use, it must be done reasonably. Maintenance service must be done consistently to prevent premature engine failures.

OILING PRECLEANERS (64-5)

After extensive laboratory testing, Kohler Company is recommending that when precleaners are used with air cleaners, the precleaners be oiled. The test results show that oiled precleaners trap and hold many times more dirt than non-oiled precleaners.

PRECLEANER SERVICE PROCEDURE

Precleaners should be cleaned and re-oiled every 25 operating hours, or more often under extremely dusty or dirty conditions, as follows:

1. Wash precleaner in water using a detergent.
2. Rinse thoroughly until all traces of detergent are eliminated.
3. Squeeze away excess water and air dry. (Do not wring precleaner.)
4. Soak in fresh, clean engine oil and squeeze to remove excess oil.
5. Reinstall precleaner over air filter element.

Follow this procedure when servicing precleaners, and also caution engine owners to service accordingly.

CARBURETOR ADJUSTMENT TIP (68-4)

A better carburetor adjustment can be made if the carburetor is cleaned first.

Remove the air cleaner cover. Use a good carburetor cleaner, according to the instructions on the container, to remove dirt and varnish around the jets and controls.

ENGINE FAILURE ANALYSIS (64-2)

Correct analysis of engine failure is a requirement for submission of warranty or justification for retail repair.

An analysis of the cause of the engine failure made to the best of your ability must be provided on each Service Adjustment Request that is submitted. Keep in mind that all engine parts replaced under warranty are subject to recall on request. Where factory inspection determines incorrect problem analysis or lack of maintenance, such as, low or dirty oil, dirt entry through air cleaner or overheating due to foreign material blocking air intake screen or cooling fins, the Service Adjustment Request will be charged back to the dealer.

Engine failures caused by lack of maintenance or abuse must not be submitted for warranty consideration.

AIR CLEANER BASE PLATE MOUNTING SCREWS LOOSENING AND ENTERING ENGINE (32-1)

Several reports have been received of air cleaner base plate mounting screws loosening and entering the engine on Kohler engines. Remove the air cleaner element and check screws for tightness during pre-delivery and whenever tractor is in for service. Tighten if necessary.

Advise your customers as part of routine preventative maintenance that the screws should be checked whenever the air cleaner element is serviced. Also check the base plate for cracks around the screw holes.

It is very important that the air cleaner base remains tight to prevent unfiltered air from entering and damaging the engine.

CYLINDER HEAD BOLT (STUD) REPLACEMENT (47-2)

Cylinder head bolts (or studs) must be replaced if engine has overheated causing burning or melting of head or head gasket.

Overheating will cause the head bolts (or studs) to lose their tensile strength. They will torque properly during reassembly but loosen when warmed during subsequent engine operation. This will result in repeat head gasket failure.

Be sure to replace head bolts and torque in proper sequence and to the proper value as indicated in your Outdoor Power Equipment Service Manual.

FLYWHEEL INSTALLATION PRECAUTIONS (31-4)

Improper procedures for removal and reinstallation of flywheels can lead to cracked flywheels and broken crankshafts. This not only results in extensive damage to an engine but presents a serious threat to the safety of persons close to the engine. Flywheel failure at rated engine RPM's - 3600 - will cause flying shrapnel. As a safety reminder, some important **do's** and **don'ts** are presented in the following:

DON'TS

DO NOT strike end of the crankshaft to remove the flywheel. This practice can seriously weaken the threaded end of the shaft. When thus weakened, the end of the shaft along with the retaining nut could later break off while the engine is running allowing the flywheel to come off the shaft.

DO NOT use impact wrenches to install the flywheel retaining nut as this may overstress the nut and crack the flywheel hub.

DO NOT apply grease, oil or any other lubricant to the taper of the crankshaft or hub of the flywheel as this will cause excessive stress and possible cracking of the flywheel while tightening.

DO NOT allow the key to be pushed inward on the keyway while installing the flywheel. If the key rides up on the rounded surface at the end of the keyway it will act as a wedge and crack the flywheel hub.

DO NOT reuse a flywheel if it has been dropped or damaged in any way.

DO'S

DO position key properly in keyway. Carefully guide key slot in flywheel hub over the key while installing to avoid pushing the key inward.

DO use a flywheel puller to remove the flywheel rather than bumping the end of the crankshaft.

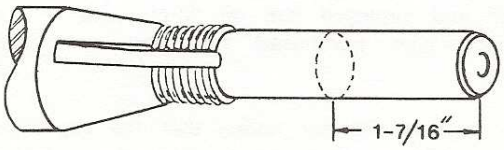
DO make sure the flywheel hub and taper of the crankshaft are clean, dry and completely free of any lubricant before installing flywheel.

DO use a torque wrench and tighten the flywheel retaining nut to the torque value specified for the engine model involved. Correct torque values are: B & S - 67 ft. lb., Kohler 10, 12 and 14 HP - 50 to 60 ft.lb., Onan BF 16 HP - 35 - 40 ft. lb., and Onan CCKA 16-1/2 HP - 30 - 35 ft. lb.

DO make a thorough visual inspection of the flywheel and crankshaft before installation to make sure they are in good condition and free of cracks.

BRIGGS & STRATTON PART NUMBER BR261038 CRANKSHAFT (43-3)

The part number BR261038 crankshaft for 8 HP Briggs & Stratton engine is a standard replacement part. To use this crankshaft in our specification engine, a slight modification must be performed.



1-7/16 inch (36.5 mm) should be cut off the flywheel end of the shaft as shown in the diagram.

446 TRACTOR FUEL LINE CONNECTION AT FUEL PUMP (64-1)

All 446 tractors prior to Serial Number 9769214 must be inspected for correct fuel line connection at the fuel pump. This inspection should be made during pre-delivery.

The fuel line clamp must be positioned near the end of the fuel line and over the nipple on the fuel pump. Some clamps may not be over the fuel pump nipple. This will allow air to enter the fuel pump and cause the engine to stall.

Tractors after the above serial number have been checked at the factory.

ONAN ENGINE CARBURETOR FLOAT SWELL (65-2)

The carburetor float in the Onan engine is made of styrofoam. Alcohol reacts with styrofoam and can cause the float to swell and stick in the carburetor bowl.

For this reason, Gasohol should not be used in Onan engines. Also, fuel de-icers must be used in a ratio of at least 40 parts fuel to 1 part de-icer.

GASOLINE IN ENGINE CRANKCASE - TWIN CYLINDER ENGINES (59-4)

While operating twin cylinder engines at light loads and usually in low temperature conditions, it is possible to foul out a spark plug. Under light load conditions this could go undetected (running one one cylinder) for some time. In turn, this may cause gasoline to enter the crankcase by way fo the piston rings on the cylinder which is not firing. Under this condition, the oil level may raise due to fuel entering the oil. Also, the following items may be observed:

1. Air filter becoming oil and fuel soaked.
2. Engine exhausting - black smoke.
3. Engine leaking oil.

This condition does not necessarily mean that the carburetor, piston rings, ignition coil-wires-points, or gaskets are defective.

Proper servicing should include:

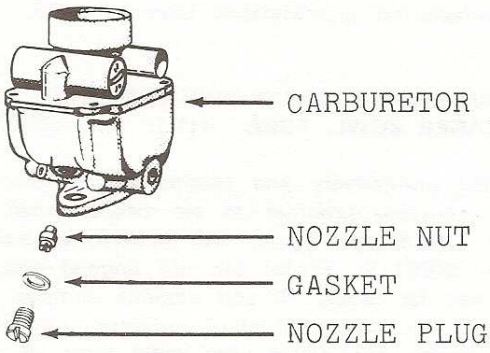
1. Change both spark plugs.
2. Check air filter element; replace if necessary.
3. Change oil and install proper grade.
4. Advise the customer that running the engine under light loads at low temperatures may cause this condition. The following items, if done, will minimize this condition from happening again:

- Replace spark plugs annually/or 50 hours, whichever occurs first.
- Avoid overchoking when starting and when engine is running.

MODEL 646 LOADER CARBURETOR BOWL DRAINAGE (ONAN CCKA ENGINE) (23-1)

Hard starting as a result of carburetor bowl drainage has been reported on the Model 646 Loaders. The nozzle plug located on the lower rear area of the carburetor has been found to be loose allowing leakage. If the above symptom is encountered the plug should be checked and tightened if necessary. **See Illustration Below.**

All 646's - S/N 9732015 and after have been checked at the plant.

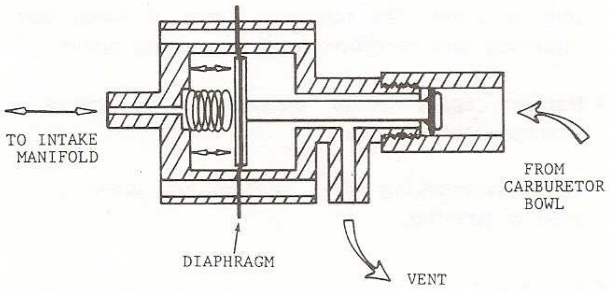


PART NUMBER C22421 VENT ASSEMBLY CLARIFICATION (43-1)

The C22421 vent assembly is used on Model 646 loaders to reduce the possibility of vapor-lock when the engine is shut off hot. This is achieved by venting the carburetor bowl to the atmosphere when not running.

When the engine is running, intake manifold vacuum draws the diaphragm to the left closing the passage from the carburetor bowl to the outside vent.

When the engine is not running, the spring pushes the diaphragm to the right, opening the passage from the carburetor bowl to the outside vent.



1975 MODEL 646 S/N 9698983 AND ABOVE AIR INTAKE HOSE INSTALLATION (14-4)

The correct installation of P/N C21498 air intake hose and P/N C21976 air intake sleeve into the air cleaner should be verified during pre-delivery inspection. Failure to install the hose could result in vapor lock.

Also check to make certain the clamp securing the air cleaner base to the carburetor is properly tightened.

Special attention was given to these areas in manufacturing approximately March 1, 1975.

ONAN ENGINE, CRANKCASE BREATHER TO AIR CLEANER BOWL, TUBE (11-1)

During pre-delivery and routine service thereafter, the crankcase breather to air cleaner bowl, tube P/N C19169 for Model 646 (CCKA engine) and P/N C20261 for Model 446 (BF engine) should be checked for proper fit and possible damage. Leakage at this point will allow unfiltered air to enter the engine and cause very rapid wear of engine parts. It should be repaired immediately.

IMPORTANCE OF USING "ORIGINAL EQUIPMENT" OIL FILTERS ON MODEL 646 (ONAN) ENGINE (70-4)

An expensive engine repair resulted when a dealer's customer changed engine oil in his Model 646 tractor and replaced the oil filter with a "non-original" type purchased from an auto supply store.

The customer did not notice that the replacement filter was longer than the original. As a result it was worn through due to contact with the R. H. lift cylinder causing loss of oil and subsequent engine seizure. Another good reason to encourage your customer to always insist on original equipment manufactured replacement parts.

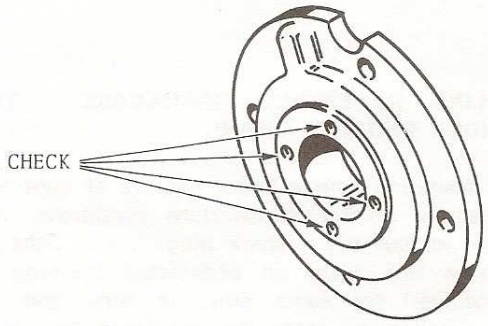
ENGINE OIL LEAK AT REAR OF CRANKSHAFT MODEL 446 TRACTOR (61-5)

The four small screw holes in the rear main bearing carrier should be inspected for oil leaks before replacing the rear main seal.

Several units have been reported to have the screw hole drilled too deep and into an oil passage.

To stop the leak, apply thread sealer to a 1/2 inch long No. 10-32 screw and install the screw in the leaking hole.

No disassembly of the engine is required.



EXCESSIVE ENGINE OIL CARRY-OVER MODEL 446 TRACTORS (60-3)

If excessive amounts of engine oil are carried over into the carburetor through the crankcase breather, a lack of crankcase vacuum is indicated.

The following steps should be followed:

1. Check for correct oil level.
2. Check for dirty or malfunctioning breather reed valve.
3. Check for worn oil seals or damaged gaskets that would allow air to enter the crankcase.
4. Check for blow-by or leaking valve guides.

Another cause of this problem found in the Onan Model BF or B43 (both used in Model 446 tractors) may be the absence of the oil by-pass plug.

This plug is a 1/4'' (6.4 mm) diameter steel ball. It prevents by-pass oil from spilling into the gearcase cover where it can be picked up by the breather. The by-pass plug insures that by-pass oil is directed into the cylinder block.

This ball must be driven flush to the block surface. If driven too deep it will hold the oil pressure valve open causing low oil pressure. If not driven deep enough the gearcase cover will not seal properly. Use a hammer to properly seat the ball.

The hole location for this ball is at the 3 o'clock position from the cam opening. See illustration below.

INSPECTION OF OIL PUMPS IN ONAN ENGINES (64-6)

When doing an overhaul on an Onan engine, inspect the suction tube and screen for the oil pump. Foreign material must be removed before assembly.

The suction tube and screen assembly cannot be taken apart.

The suction tube has a small diameter and is bent. You can not see through the suction tube.

Wash the suction tube and screen assembly in solvent. Apply low pressure air through the suction tube and screen assembly.

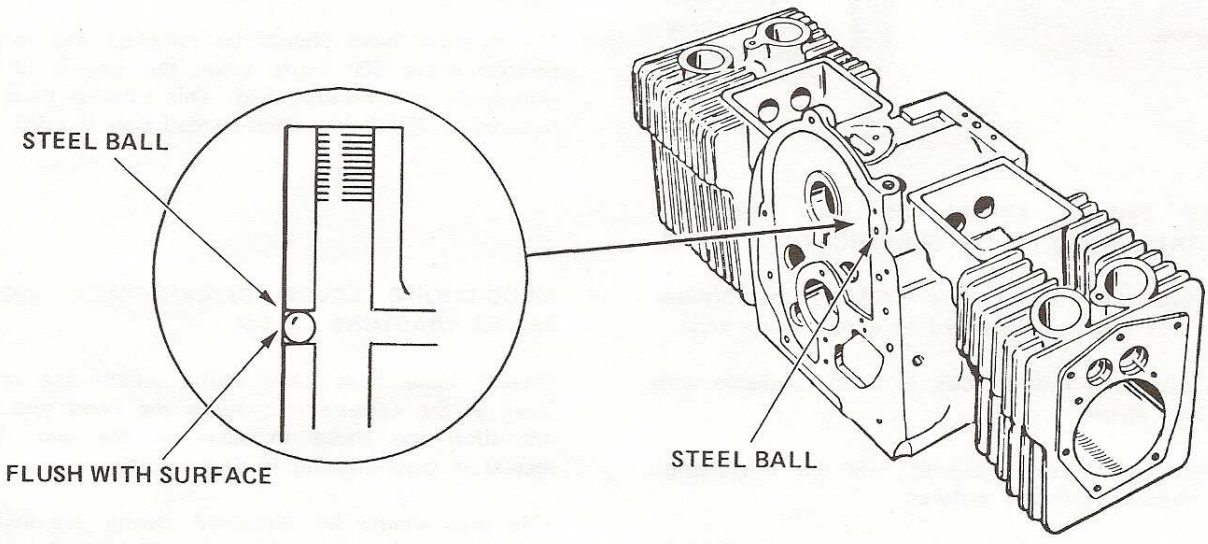
Make sure all foreign material is removed from the suction tube and screen assembly.

MODEL 446 CHOKE CONTROL SLIPPING IN C20407 CLIP (31-2)

Occasionally an operator with a heavy thumb can cause the choke control cable to slip in the C 20407 choke cable clip.

The cable can be prevented from slipping without replacing the clip by installing a #8 screw, secured with a nut, through the hole in the clip under the cable.

The nut and screw should be tightened lightly to prevent the cable from binding.



446 AND 448 THROTTLE CABLE CLIP REMEDY (45-6)

One dealer reports the 446 and 446 throttle cable may be anchored to the C20370 governor mounting bracket by using Briggs & Stratton fasteners Part Number BR221535 throttle cable clamp and BR 93496 screw.

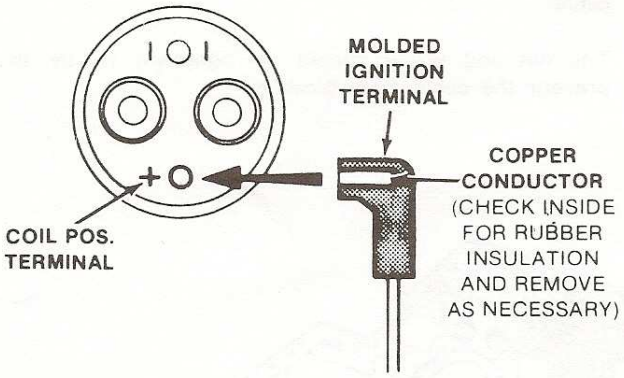
These parts are used on the 108 tractor (B & S Engine) and are available from your regular Service Parts Supply Depot.

IGNITION FAILURE OR ROUGH RUNNNING ON ONAN ENGINES (51-2)

There has been an increase in warranty claims recently for Onan engine ignition coils P/N C20349. When these coils are returned to Onan and tested; they check OK.

The push-on connector for the positive and/or negative coil terminal should be checked to be certain they are free of any insulation on the inside of the connector and that they fit tight on the coil terminals.

The molding process of this connector may allow insulation to flow inside the connector creating the symptom of a defective coil. See illustration for details.



ONAN ENGINE MODEL BF (446 TRACTOR) BREAKER POINT PARTS CLARIFICATION (40-3)

Effective with tractor S/N 9728278, the breaker point box has been changed to a top adjust style.

This assembly, P/N C23853, is interchangeable with previous styles.

Internal components, however, will not interchange and must be correctly ordered.

The breaker point box used prior to S/N 9728278 may be identified by its removable rear cover.

STEEL BREAKER POINT PUSH RODS (PART NUMBER V34831) FOR KOHLER ENGINES (20-1)

The steel breaker point push rod is recommended for use in all Kohler Engine applications to insure proper ignition timing under the full range of engine operating temperatures.

The steel push rod is available from your normal parts source under Part Number V34831.

All Case 1976 and later model tractors with Kohler engines have the steel breaker rod.

CAM SHAFT BEARING (P/N C20270) FOR ONAN BF ENGINE (30-5)

Be advised that the replacement part C20270 cam bearing for the Onan BF engine is only 5/16 inch (8 mm) wide. the original equipment bearing is 11/16 inch (17 mm) wide. Don't be confused or mislead by the difference as this is correct. The 5/16 inch (8 mm) bearing is a universal part servicing other engines as well.

The replacement part cam bushing for the CCKA engine, however, is full width.

KOHLER ENGINE FUEL RECOMMENDATIONS (58-4)

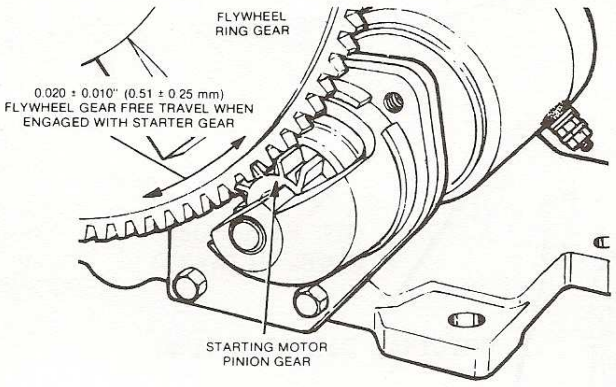
Kohler Company is now recommending unleaded fuel for use in its engines. Unleaded fuel reduces combustion chamber deposits.

The cylinder head should be removed and carbon scraped every 500 hours when the engine is run exclusively on unleaded fuel. This interval must be reduced to 250 hours when leaded fuel is used.

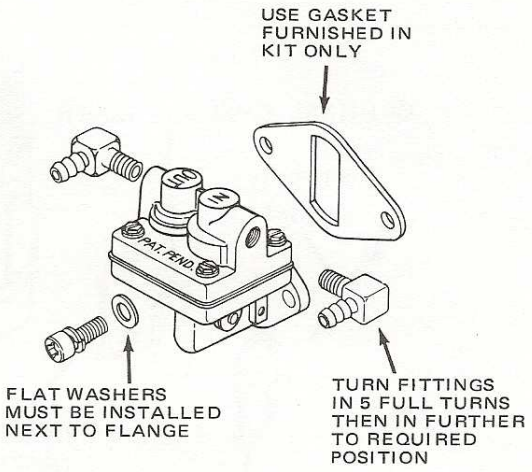
HOOD-CHOKE LEVER INTERFERENCE 200-400 SERIES TRACTORS (14-5)

Several units have been found where the choke lever at the carburetor contacts the hood and will not allow the choke to close all the way. This results in hard starting in cold weather.

This area should be inspected during pre-delivery and normal after-delivery service. Reform the lever slightly to provide adequate clearance.



CHECKING STARTER GEAR LASH



SETTING STARTER GEAR LASH ON TWIN CYLINDER ENGINES (63-5)

All Onan twin cylinder engines allow for repositioning of the starter motor to assure proper gear lash between the starter pinion gear and the flywheel ring gear. If a starter binds or slips during cranking, or is excessively noisy, the gear lash may be incorrect and should be checked. Gear lash should also be checked anytime the starter has been loosened or removed.

Use the following procedure for checking and adjusting the starter gear lash:

1. Install the starter motor and tighten its mounting bolts just enough to hold the starter in place.

2. Remove the spark plugs from the engine to allow free movement of the flywheel. Or, if the flywheel is off of the engine, temporarily mount it on the engine with no key in the crankshaft keyway.

3. Pull the starter pinion gear outward on its shaft so that its teeth mesh fully with those on the flywheel.

4. Measure the amount of free travel, or lash, between the pinion gear teeth and the ring gear teeth, as shown in the figure below. The proper lash is 0.020 ± 0.010 (0.51 ± 0.25 mm). Loosen and adjust the starter motor as necessary to obtain the correct setting.

5. Tighten the starter mounting bolts and install the spark plugs.

INSTALLATION PROCEDURE - PLASTIC BODY FUEL PUMPS FOR KOHLER ENGINE (41-3)

As a product improvement, plastic bodied fuel pumps are being installed on Kohler engines instead of the all metal pumps. The plastic pumps are interchangeable with the metal pumps. Plastic effectively insulates and prevents the fuel from vaporizing inside the pump.

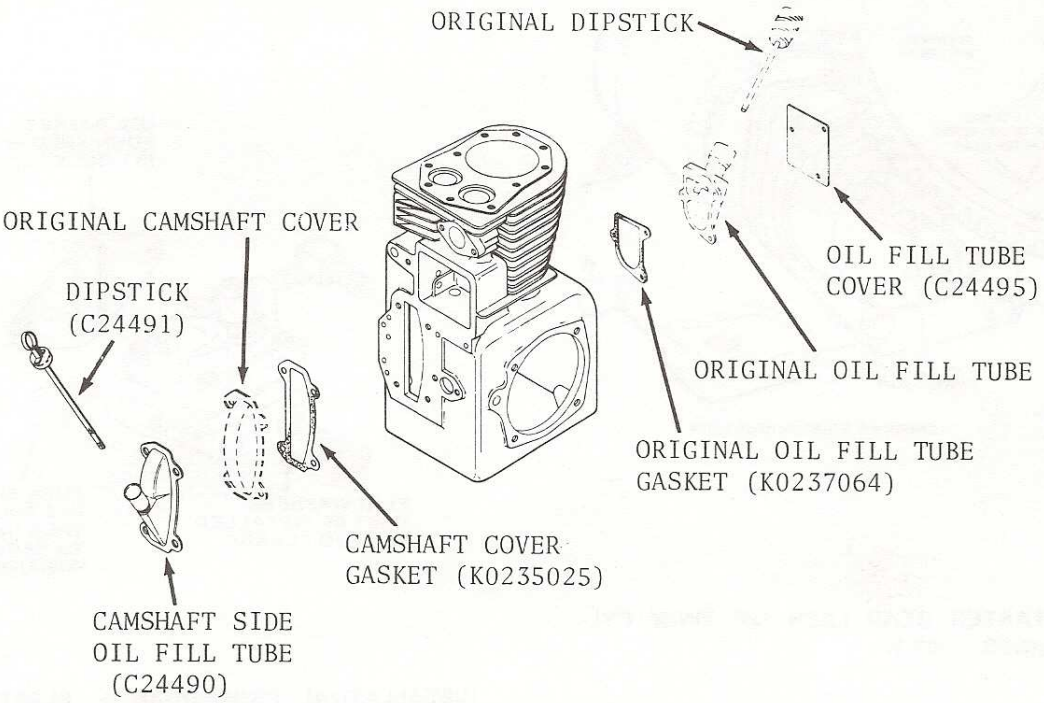
Some important points regarding the plastic bodied pumps are as follows:

1. **FUEL FITTINGS:** Only P/N 217-292 metal fittings are to be used in both the "In" and "Out" ports of the plastic fuel pump. Turn fittings into pump 5 full turns then continue in same direction until required position is attained.

   NOTE: Check all engines in stock and all customer engines. Make sure the fittings are properly tightened if they have the plastic bodied fuel pumps.

2. Use **only** the gasket provided in the kit. If a thick insulating gasket was used with the metal pump, discard it. It is not only unnecessary but could cause distortion of the plastic flange while tightening the mounting screws.

3. Make sure the flat washers provided in the kits are installed next to the flange to prevent the lockwasher from damaging the plastic. The lockwashers and mounting screws from the old pump can be reused with the plastic pump but make sure the screws are tightened to **70 inch lbs.** (7.8 Nm) -- overtightening can damage the plastic flange.



CAM GEAR COVER DIPSTICK ASSEMBLY AVAILABLE FRO 224, 444 AND 644 MODELS WITH MUH (38-4)

A new style cam gear cover dipstick (illustrated above) is available for the following 14 HP models.

224 S/N 9708665 and after

444 S/N 9711027 and after

644 S/N 9731697 and after

The new style dipstick assembly will not fit on units with outside mufflers because of interference with the exhaust pipe.

PROPER CONNECTION OF IGNITION CONDENSER (34-4)

The lead from ignition points and condenser must be connected to the coil negative ''-'' primary post. Proper connection of condenser should be checked first if erratic engine operation or poor or no spark symptoms are present.

Also, the condenser must be firmly grounded in its mounting clip to perform properly

RESISTOR TYPE SPARK PLUG FOR KOHLER 10, 12 AND 14 HP ENGINES (19-4)

Where radio or television interference is objectionable a resistor-type spark plug, Champion XH-10 will reduce it to a minimum.

KOHLER ENGINE SPARK KNOCK (48-1)

The illusive knocking sound reported by several dealers has been identified by Kohler Company as a spark knock. To help overcome this, Kohler Company has revised the spark plug gap from .025'' (.64 mm) to .035'' (.89 mm).

If the knock occurs on prior model 10, 12 and 14 HP Kohler engines, the spark plugs should be re-gapped to .035'' (.89 mm).

All spark plugs in newly shipped Kohler engines are gapped to the new specification.

NOTE: Resistor spark plugs (standard equipment for Canadian tractors) should still be gapped at .025'' (.64 mm).

TIMING SIGHT HOLE FOR KOHLER ENGINES WITH STARTER-GENERATOR (60-4)

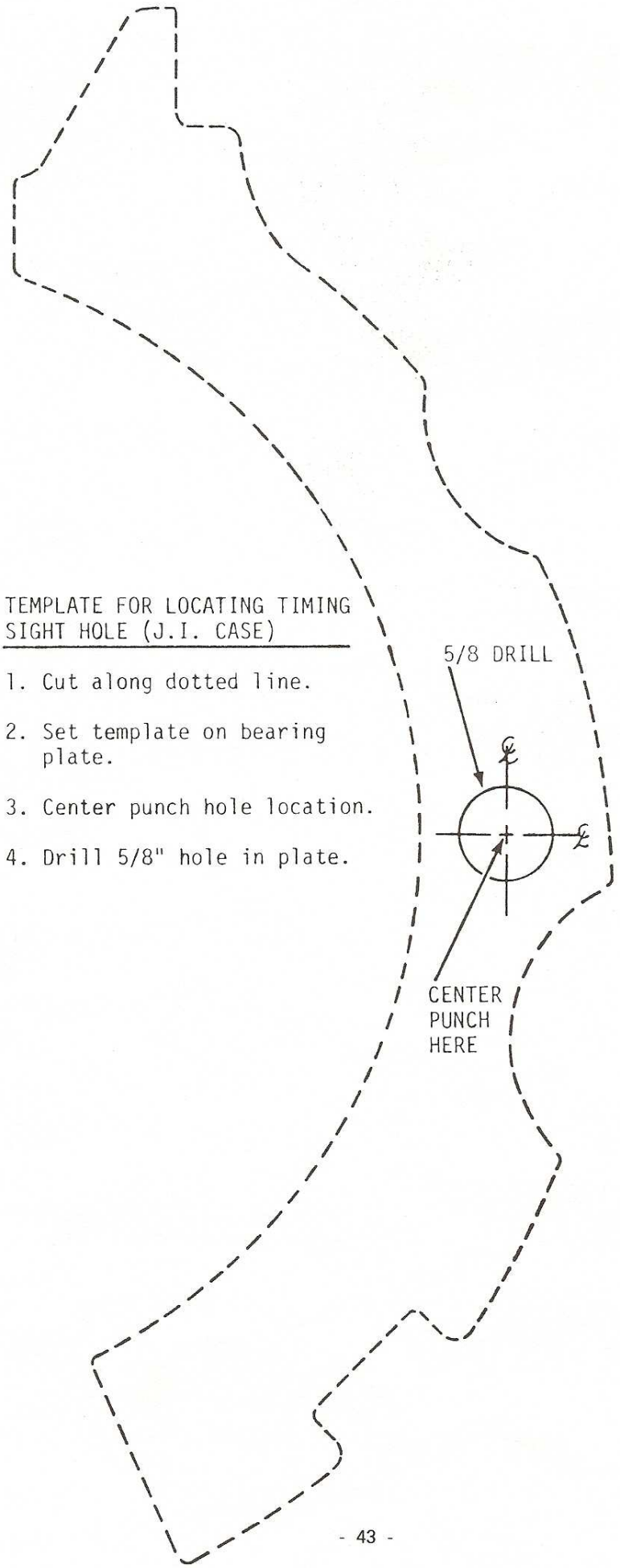
The timing sight hole for Kohler engines to be used with a starter-generator must be on the left edge of the front bearing plate.

Reports indicate that some short blocks do not have this hole.

The attached template will allow you to locate and make this hole BEFORE assembling the short block.

TEMPLATE FOR LOCATING TIMING SIGHT HOLE (J.I. CASE)

1. Cut along dotted line.
2. Set template on bearing plate.
3. Center punch hole location.
4. Drill 5/8" hole in plate.



BLANK

TIMING KOHLER ENGINES (9-5)

It is easier to time the Kohler engines by moving the flywheel by hand until the timing mark is in the proper position in the timing hole. With the timing mark positioned, scribe a mark on the **right side** of the air intake screen attached to the flywheel and scribe a mark on the engine shroud adjacent to the one on the screen. The timing marks are then on the same side of the engine as the breaker point box. Using these marks, one man can then easily set the timing with a timing light. This technique is especially helpful on earlier models where there is no hole in the starter-generator bracket to see the timing marks.

POSSIBLE GROUNDING OF SPARK PLUG TO HOOD - ALL KOHLER ENGINE APPLICATIONS (22-1)

Two situations may result in grounding of the spark plug against the hood. They are:

a. Clearance between the high tension lead spark plug boot and hood is minimal.

b. A pin prick hole in the boot (applied by Kohler for ignition timing) reduces the insulating value and grounding occurs. Kohler has discontinued this practice.

A sure indicator of this problem is if the tractor won't start with the hood closed, but will with it open.

Two solutions have been found to be successful:

1. Replace the original spark plug with a "mini" plug of the same heat range. A Champion CJ-8 for example.

2. Replace the high tension lead with Part Number C23401.

KOHLER ENGINE PERFORMANCE CHECKS (Between Issues 20 and 21)

The following preliminary information is released to aid in troubleshooting Kohler Engines for the following problems when checking the usual areas don't relieve the symptoms.

LOW POWER AND OVERHEATING

1. Ignition Timing

   a. Remove breaker point cover and, using a power timing light, adjust point gap until the timing mark is centered in the timing sight hole.

   b. Stop engine and check breaker point gap opening. It should be between .017" and .024" (.43 and .61 mm). If the gap is over .024" (.61 mm), replace the breaker point push rod with Part Number V34831 and repeat step one.

   If symptoms still exist, worn or incorrect camshaft lobes are indicated. Confirm by checking valve lift specifications as follows:

2. Valve Lift

   a. Check valve clearance with engine cold and adjust if necessary. Exhaust clearance should be .017" - .020" (.43 - .51 mm). Intake clearance should be .008" - .010" (.20 - .25 mm).

   b. Remove cylinder head and check valve lift with a dial indicator. If the lift is .250" (6.3 mm) or less, the lobes are worn or incorrect and the camshaft must be replaced.

   c. New higher compression cylinder head for K-241 (10 HP) engine only.

      The depth of the cylinder head has been reduced to .022" to .032" (.56 to .81 mm) in the area lying directly over the piston. All new KO236675 heads received from SPS will be of the new style. There is no part number change.

HARD COLD WEATHER STARTING

The following cold weather starting method is suggested:

The choke plate must be fully closed and the throttle in the **idle position** during cranking. The engine will not start with the throttle plate wide open.

If hard starting persists after checking engine timing, valve condition, etc., the following should be checked:

1. Choke plate Modification:

   The choke action has been changed on the latest carburetors to reduce the chances of over choking. On the carburetors now used on the K321, both relief holes in the choke plate have been enlarged to 11/32" (8.7 mm) while on the K241 and K301, one relief hole is now 11/32" (8.7 mm) and the other is 3/16" (4.8 mm). If you find that the relief holes are smaller than this, enlarge them to the latest dimensions.

   CAUTION: When redrilling the holes, take necessary precautions to prevent chips from entering the engine.

AUTOMATIC COMPRESSION RELEASE (ACR) CHANGES - KOHLER ENGINES (54-3)

NEW ACR TABS

Engines with serial no. 9006118 and after have hardened and ground steel ACR tabs on the camshaft assemblies. These new assemblies are manufactured with improved techniques, which permanently set the ACR mechanism, making adjustments to the mechanism unnecessary and impossible.

NOTE: Do not attempt to bend these hardened steel ACR tabs. These tabs will break if bent.

PROCEDURE FOR CHECKING AND ADJUSTING ACR ON ENGINES PRIOR TO SERIAL NO. 9006118

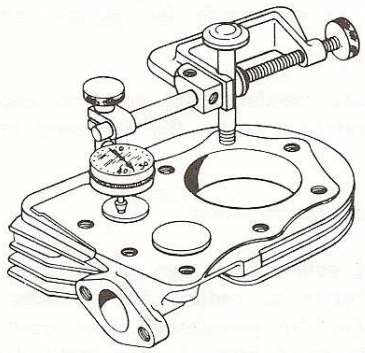
On engines manufactured before serial no. 9006118 the ACR can still be checked and re-set using the procedure described below.

ACR is set according to the amount of valve lift on the exhaust valve. The correct amount of lift is established by the height of the lifting tab in relation to the camshaft. If improper lift is suspected, the setting can be checked and adjusted as follows:

1. Check valve tappet clearances and adjust as necessary to specification.

2. Remove cylinder head and turn the engine over by hand until you reach BDC of the intake stroke (intake valve will be closing).

3. Mount a dial indicator on the top of the exhaust valve and set at O.



4. Slowly turn the flywheel clockwise and watch the dial indicator. When the piston is about 2/3 of the way up the cylinder, the exhaust valve should open for ACR. Exhaust valve opening as indicated on the dial indicator should be .031'' (.79 mm) - .042'' (1.06 mm).

If the exhaust valve does not open to the specified amount, adjust the ACR according to STEP 5.

NOTE: **Caution must be exercised** in the bending of the tab as it is hardened and may crack or break if bent back and forth more than 3 or 4 times.

5. If the valve lift was above .042'' (1.06 mm), hold a wooden dowel on the top of the valve and tap it down carefully to within the .031'' (.79 mm) - .042'' (1.06 mm) range. If the valve lift was below .031'' (.79 mm), remove the camshaft cover on the side of the engine exposing the cam gear. Bend the ACR tab carefully upward until the valve lift is within the specified range.

KOHLER ENGINE FLYWHEEL PULLER (49-2)

The new E-Z adjust attachment drive clutch used on Kohler engine equipped Models doubles as a flywheel puller.

Disassemble clutch as required for flywheel removal. Remove flywheel nut. Remove bolt (1) from hub (2) and thread back into hub from fan end.

Bolt hub to flywheel and turn in bolt to remove.

KOHLER ENGINE FLYWHEEL RETAINING NUT ALL MODELS (40-5)

The correct part number for the special Marsden Flywheel Retaining Nut for all 10, 12 and 14 HP Kohler engines is 131-301 (5/8''). This number **is** correctly listed in current parts catalogs but is incorrectly listed in some earlier catalogs.

OVERSIZE PISTON RINGS FOR KOHLER ENGINES (53-3)

The oil control ring supplied with oversize piston ring sets may have an end gap which exceeds the specification shown in the service manual. This occurs because this ring is a universal service part and is used in several applications.

The end gap of both upper rings must, however, fall within the specification shown in the service manual.

KOHLER ENGINE REPLACEMENT PART PISTONS (40-7)

Kohler Engine pistons received from parts stock without an alignment mark may be installed either way. Connecting rod match marks, however, must face the engine flywheel.

COMPRESSION SPECIFICATIONS - KOHLER 10 HP ENGINE MODEL K241A (7-3)

Kohler Company has confirmed that 90 to 95 pounds compression is within their minimum specifications for the 10 HP Model K241A engine. There has also been a confirmation from the field that refacing the valves increased the compression from 90-95 pounds to 110-115 pounds.

REAR ENGINE AIR DEFLECTOR - PART NUMBER C22684 (22-2)

Operator comments of heat flow toward right foot on Models 210 through 444 resulting from engine cooling air being deflected to the right foot rest, may be alleviated by installing a C22684 engine air deflector. KO235054 cylinder baffle must also be removed and replaced with P/N C23171 (1976 style) cylinder baffle.

The C22684 deflector is used on 1976 Model 210 through 444. It allows engine cooling air to be discharged straight out both sides of the engine and not down over the right foot.

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END OF TIMELY TIPS 1974- 1979