D650

PARTS LIST

GENERAL SAFETY PRECAUTIONS

1. Read and familiarise yourself with the operating instruction book.
2. Do not allow children to operate the machine. Do not allow adults to operate the machine without proper instructions.
3. Clear the work area of objects which might be picked up and thrown.
4. Before attempting to start the machine ensure the gear lever is in neutral and the rotor drive disengaged.
5. Never tamper with the reverse gear mechanism, this is a safety device.
6. Disengage the rotor drive before reversing or turning the machine.
7. Work up and down the face of steep slopes, never across them.
8. Handle petrol with care —
   Use an approved petrol container.
   Never remove the cap of the fuel tank or add petrol to a running or hot engine, or fill the tank indoors. Wipe up spilled petrol.
9. Open doors if the engine is run in the garage — exhaust fumes are dangerous.
10. Keep all nuts, bolts and screws tight and be sure that the equipment is regularly lubricated to keep it in a safe working condition.
11. Keep all safety guards in place.
12. Never touch the rotor with the engine running — switch off first.
13. Always wear substantial footwear to provide as much protection as possible.
14. The warning transfer (part number 27409) illustrated below should always be in position on your machine. If, for any reason it is missing a replacement will be supplied free of charge.

WARNING

beware of rotating blades see there is no one in the direction of driving

⚠ SAFETY PRECAUTIONS ⚠

1) Read and familiarise yourself with the operating instruction book.

2) Take all possible precautions when leaving the tractor unattended, such as lowering the attachment(s), shifting into neutral, setting the parking brake, stopping the tractor engine and removing the key.

3) Keep all nuts, bolts and screws tight and be sure that the equipment is regularly lubricated to keep it in safe working condition.

4) Ensure all guards and covers are in working order and in position before starting work.

5) Only use the machine for the tasks mentioned in this book.

6) Never operate the machine with persons on or near it.

7) Consult the Tractor Manufacturer's Manual for instructions on mounting implements and safe working methods.

8) Observe all safe driving procedures such as reducing speed on slopes and sharp turns.

9) Avoid working on ground where there is a risk of the tractor overturning.

10) Do not cultivate across the face of slopes.

11) Always wear substantial or safety footwear.

12) Always avoid loose clothing which may be caught in moving parts.

13) Always wear gloves when handling machines or parts with sharp edges.

14) Never allow children or untrained persons to operate the machine.

15) Never carry out repairs or adjustments to a mounted machine unless the tractor engine is stopped and the machine firmly supported or lowered to the ground.

Operating Instructions

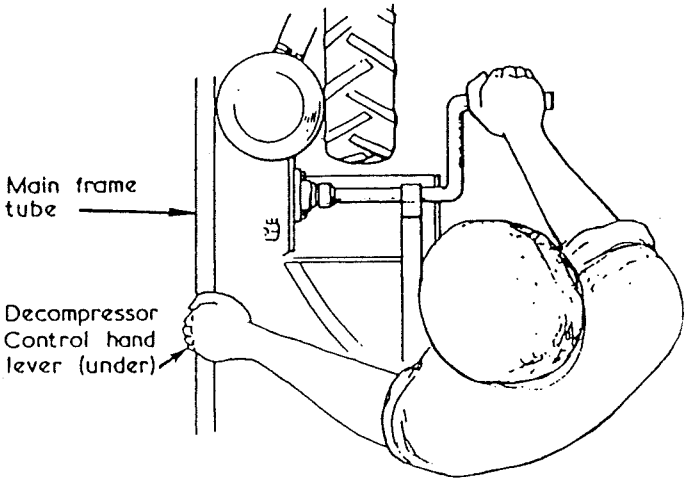
(FOR MACHINES FITTED WITH THE RUGGERINI RF120)
(12 HP DIESEL ENGINE)

STARTING THE RUGGERINI RF120 DIESEL ENGINE

The starting methods described in the engine manufacturer's handbook have been discarded in the Gem installation in favour of a gearbox mounted starting handle. This maximises OPERATOR SAFETY in terms of the Health & Safety at Work etc. Act 1974 and provides a safe and convenient means of engine starting by using the following procedure:-

Check that the machine Gear Lever is in the 'Neutral' position and the Rotor Engagement Lever is in the 'Out' position.

1. Check the level of fuel in the tank. (There is a risk of introducing air into the injection circuit if fuel level is too low).
2. Open the engine throttle hand Control Lever on the handlebar half way.
3. Release the gearbox mounted Starting Handle from its storage position; engage the end of the starting dog and grasp the handle with the right hand.
4. With the left hand lift the Decompressor Control Hand Lever (under the main frame tube) as shown in the diagram. Turn the starting handle vigorously and release the Decompressor Control Hand Lever when a good speed is attained. Repeat if the engine fails to start first time.



NOTE: In severe climatic conditions it may be necessary to oil prime the engine as described on page 24 of the engine manufacturer's handbook before repeating step 4.

5. When the engine has started withdraw the Starting Handle and fold back into the storage position.
6. Allow the engine to warm up for about 5 minutes before commencing work.

To stop the engine close the throttle Hand Control Level, let the engine idle for a few minutes, then press the handlebar mounted 'Stop' lever until the engine has stopped. Do not use the Decompressor Control.

Supplement to publication Form No. L.424D.

Printed May 1984

DOWDESWELL (Norfolk) Ltd.
MENDHAM LANE
HARLESTON
NORFOLK IP20 9DP

SPECIFICATIONS

ENGINE

STANDARD

Kohler K301T 4-stroke petrol producing 11 hp (max.) at 2800 rpm governed engine speed. 22 lb-ft (30 Nm) torque at 2200 rpm or
Hatz E780 4-stroke diesel producing 9 hp (max.) at 3000 rpm governed engine speed. 19 lb-ft (25.75 Nm) torque at 2100 rpm.

SUPER

Kohler K341T 4-stroke petrol producing 15 hp (max.) at 2800 rpm governed engine speed. 28 lb-ft (38 Nm) torque at 2600 rpm or
Hatz E785 4-stroke diesel producing 11 hp (max.) at 3000 rpm governed engine speed. 23 lb-ft (31 Nm) torque at 2100 rpm.

FUEL CAPACITY

9 litres (2 gallons).

TRANSMISSION

Three forward speeds, one reverse. Transmission by hardened gears running in oil. All shafts mounted on ball-bearings. Full differential for easy turning, with automatic locking when rotor is engaged. Safety clutch with slip action when under shock load.

CLUTCH

Heavy duty two-plate dry type.

CONTROLS

1. Rod-operated clutch lever with safety reverse interlock.
2. Engine governor control by Bowden cable.
3. Rod-operated gear lever.
4. Rod-operated rotor engagement lever.
5. Handlebars adjustable for height and sideswing.
6. Depth setting lever.

WHEELS

4.00 – 12 2-ply traction tread pneumatic tyres. Tyre pressure 1.4 kg/cm^2 (20 lb/in^2).

ROTOR

Rotor speed 188 rpm at 2800 rpm engine speed.
Rotor widths 51 cm (20 in) Standard
61 cm (24 in) Standard and Super
76 cm (30 in) Super (diesel) only.

DEPTH OF CUT

Adjustable to 23 cm (9 in) maximum.

LANDSPEEDS (at 2800 rpm)

1st gear 1.54 km/h (0.96 mile/h).
2nd gear 2.3 km/h (1.46 mile/h).
3rd gear 4.9 km/h (3.05 mile/h).
Reverse 2.9 km/h (1.85 mile/h).

OIL CAPACITY

Gearbox – 3.4 litres (6 pints)
Chaincase – .25 litre ($\frac{3}{8}$ pint)
Engine – see Engine handbook

DIMENSIONS

Length: 203 cm (80 in) petrol: 208 cm (82 in) diesel:
Height to top of handlebar: 104 cm (41 in).
Width: 63 cm (25 in) - 51 cm (20 in) rotor.
74 cm (29 in) - 61 cm (24 in) rotor.
89 cm (35 in) - 76 cm (30 in) rotor.

WEIGHT (Approx.)

Standard - Kohler engine.
292 kg (644 lb) - 50 cm (20 in) rotor.
305 kg (672 lb) - 61 cm (24 in) rotor.

Standard - Hatz engine.
296 kg (652 lb) - 50 cm (20 in) rotor.
306 kg (674 lb) - 61 cm (24 in) rotor.

Super - Kohler engine.
312 kg (688 lb) - 61 cm (24 in) rotor.

Super - Hatz engine.
338 kg (746 lb) - 61 cm (24 in) rotor.
391 kg (862 lb) - 76 cm (30 in) rotor.

EXTRA EQUIPMENT

Depth Control Wheel; Furrower; Pictine Rotor. Front-end Weights.

RECOMMENDED LUBRICANTS

SAE 90 – Gearbox and chaincase.
Engine Oil – Rotor Dog Clutch; rotor stub axle; depth control wheel (if fitted).

SERIAL NUMBER

The serial number of the 650 is stamped on the plate fixed to the left-hand top side of the front shield, and on the main frame top side near the handlebar pivot.
For future reference, record the serial number in the space below:
Serial No.....
Date Purchased.....

YOUR NEW MACHINE

On receipt of your new 650 first read and study the instruction manuals for both engine and machine. Satisfactory performance and a long working life for your 650 will depend upon your following the instructions given. Be certain to keep the manuals in a safe, convenient place ready for quick reference.

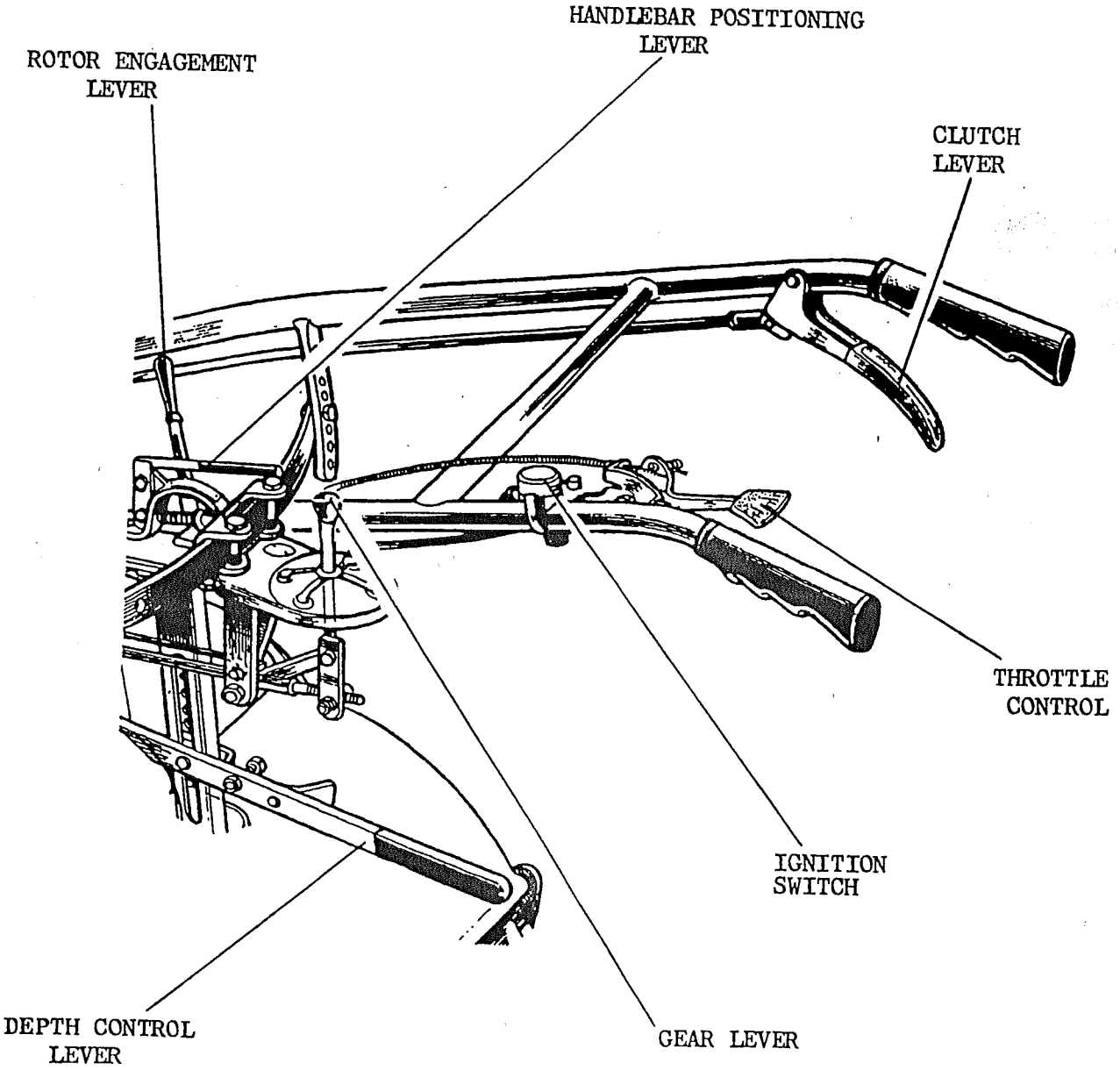
When in need of spare parts or service, contact your dealer. He has genuine replacement parts, and trained, experienced staff to service your machine correctly.

Before starting to use your 650, first fill the fuel tan check the gearbox and chaincase oil levels, and th lubrication points. Check that all nuts and bolts ar tight.

Run the machine lightly at first, and gradually increas the loads during the first 25 hours work. NEVER allov the engine to labour during this running-in period.

After the first five hours of operation, check all nuts an bolts for tightness, including the two wheel hub centr nuts.

CONTROLS



WORKING THE MACHINE

Start the engine according to the engine instruction book. Lift the clutch lever and engage the required gear. DO NOT FORCE THE GEARS INTO MESH. If they do not immediately engage, release the clutch lever momentarily.

The slight noise which may be heard when the clutch is engaged is due to the positive action of the twin clutch plates.

When in a position to begin Rotavating, lift the clutch lever again, and move the rotor engagement lever to the "IN" position. Increase the engine speed and gently release the clutch, allowing the machine to pull itself into the work.

The rotor engagement lever also operates the differential lock. The lever must therefore be put into the "OUT" position for turning.

The depth is controlled by pressing the depth control lever to the right. This releases the skid in the socket, allowing it to be repositioned as required. The skid itself has two alternative holes, the lower one of which permits a greater depth to be obtained.

Choose the depth to suit the crop being planted. If this is deeper than can be obtained in one pass without the engine labouring, several passes should be made at progressively increasing depths.

First gear should be used for heavy work, and where a fine tilth is required. Second gear should be used for average conditions, and top gear for light hoeing and road work.

Where a coarse tilth is required, the rotor shield should be raised as high as possible with the trailing board folded back. The rotor should always be disengaged when reversing as well as when turning at headlands.

To stop the machine, raise the clutch lever, and move the gear lever to the centre (neutral) position. Move the rotor engagement lever to the "OUT" position and then release the clutch.

REVERSING

To reverse, pull up the clutch lever, move the gear lever to Reverse (this simultaneously operates the safety interlock) and release the clutch lever. No movement occurs until the clutch lever is pushed down. Removal of pressure automatically stops the machine. To disengage levers, pull up the clutch lever and move the lever to neutral.

NEVER, UNDER ANY CIRCUMSTANCES, TAMPER WITH THE REVERSE GEAR LINKAGE. THE INTERLOCK MECHANISM IS A SAFETY DEVICE AND MUST NOT BE INTERFERED WITH OR REMOVED.

TURNING

It is often found that the machine is most easily turned in reverse gear, especially when ground conditions are very wet and sticky, with a considerable amount of earth adhering to the underside of the shield. Provided the rotor is disengaged and the blades are lifted clear of the ground, the machine can be turned quite easily, either in forward or reverse gear. If turning appears to be difficult, check that the differential lock is fully disengaged when the rotor lever is pulled back. Adjustment can be made on the differential lock control rod, should this not be the case.

HANDLEBAR ADJUSTMENT

The height of the handlebars can be adjusted to suit the operator, by means of the alternative holes in the handlebar lugs.

The handlebars can also be offset to one side or the other, by pressing down the handlebar positioning lever to its full extent, and swinging the handlebars to whichever side is required. A hole is provided at each end of the handlebar slide for positive locking in the required position.

HINTS FOR TOP PERFORMANCE

1. The importance of correct and regular lubrication cannot be over-stated. Study the lubrication chart on pages 6 and 7.

2. Do not neglect air cleaner maintenance.

3. Always shut the throttle to the idling position when lifting the clutch lever for engaging or disengaging gears.

4. Do not allow the engine to idle at slow speeds for long periods.

5. Do not press the handles down should the machine jump if hitting a stump or similar obstacle; lightly resist the movement and let the machine right itself. This applies particularly when working on hillsides in badly cleared land.

6. When taking sharp corners, put the rotor out of gear, lifting the handlebars to help in turning.

7. Never run the "Gem" with the engine labouring. Selection of the right gear, and correct depth of work ensures a constant reserve of engine power.

8. Always use the clutch in the same way as in a car, that is, for changing gear only. DO NOT "slip the clutch" to obtain extra engine speed.

9. For the first 25 hours, attempt only fairly light work, to allow the working parts to "bed down".

LUBRICATION AND MAINTENANCE

The simple, sturdy construction of the 650 enables it to withstand the toughest conditions of work and use. The small amount of maintenance and lubrication detailed below, will, if done regularly, extend its working life and maintain its high efficiency.

BEFORE OILING, ADJUSTING OR SERVICING THE MACHINE SWITCH OFF THE ENGINE

OILS

Use only good quality oils. SAE 90 grade should be used in the gearbox and chaincase; engine oil for all other lubrication points.

AIR CLEANER

The air cleaner is of the oil-bath type, and its maintenance must not be neglected. Never allow sediment to build up in the air cleaner base. In dusty conditions, change the air cleaner oil twice a day; if not changed promptly, the accumulated dust in the oil-bath will raise the level of the oil to a point where dirt-laden oil will be sucked into the engine, to cause immediate and costly damage.

FIRST MAINTENANCE

(If machine not already serviced by dealer):
1. Check engine oil level.
2. Check the air cleaner oil level.
3. Check tightness of all nuts and bolts.
4. Check the gearbox oil level (with the dipstick attached to the square-headed plug screwed into the gearbox top).
5. Check the chaincase oil level; with the blades touching the ground, oil should just seep out of the level hole at the lower rear of the chaincase, with the oil level plug removed.
6. Check the tension of the drive chain; total up and down movement should be no more than $\frac{3}{8}$ in. (9.5 mm.) to $\frac{1}{2}$ in. (12.7 mm.). See Adjustments Section, page 8.
7. Lubricate the rotor stub axle with an oilcan (the oilway screw is located on the rotor tube just inside the right-hand flange).
8. Oil the rotor dogs; remove the small square-headed plug from the top side of the rotor dog clutch housing and lubricate with several strokes from an oilcan.
9. Lightly oil the throttle cable, the gear, clutch, and rotor control pivots, handlebar swivel and slide, shield hinges and depth control adjustment.
10. Check that the engine clutch is adjusted to give $\frac{1}{4}$ in. (6 mm.) free movement at the handlebar lever. Adjustment should be taken up at the front clutch control arm by means of the wing nut.
11. Check tyre pressures (20 p.s.i. – 1.4 kg./sq.cm.).
12. Check that the weed cutter blades just clear the outside blades of the rotor.

EVERY 10 HOURS OR DAILY

1. Check the engine oil level.
2. Check the level and condition of the air cleaner oil; wash out with petrol and replenish with fresh oil if necessary (twice daily if very dusty conditions).
3. Check tightness of blade bolts, and straighten any bent blades, using the blade setting bar.
4. Watch for signs of excessive rotor clutch slip. Adjust if necessary, on the four spring-loaded clutch nuts on the rotor left-hand end. For normal setting, tighten the nuts to fully compress the springs, then slacken back each nut half a turn.

EVERY 25 HOURS OR WEEKLY

(additional to 10 Hours maintenance)
1. Service the engine (see engine instruction book).
2. Check gearbox oil level.
3. Check chaincase oil level.
4. Check chain tension.
5. Oil rotor dogs.
6. Oil the rotor stub axle bearing.
7. Oil all pivot points, hinges, and other oiling points (see First Maintenance, para. 9 above).
8. Check the engine clutch adjustment and reset if necessary.
9. Remove and clean out the sediment bowl on the fuel tank.
10. Check all nuts and bolts for tightness.
11. Check tyre pressures.
12. Adjust weed cutter blades if necessary.

EVERY 250 HOURS OR 3 MONTHLY

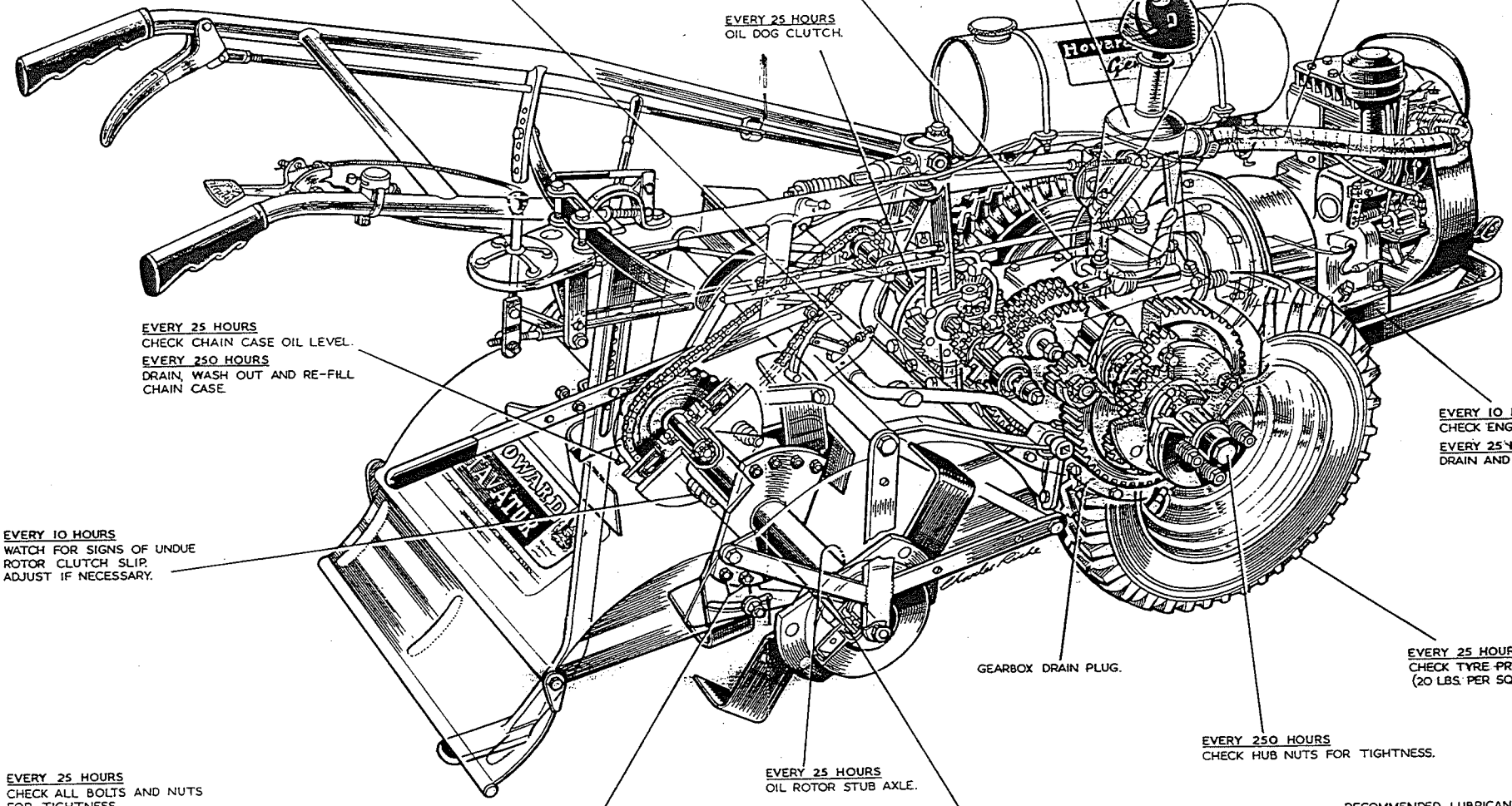
(additional to 10 Hours and 25 Hours maintenance)
1. Drain the gearbox, flush out and refill with 6 pints (3.4 litres) SAE 90 gear oil. (See Adjustments section, page 8).
2. Remove the chaincase, and wash the chain and the case with petrol. Replace and refill with $\frac{3}{8}$ pint (.25 litre) SAE 90 gear oil. (See Adjustments section, page 8).
3. Check the tightness of the hub nuts, i.e. the large nuts which hold the hubs on to the taper splined shafts.
4. Remove air cleaner complete, and flush out with paraffin or kerosene. (See Adjustments section, page 8).

NUTS AND BOLTS

All nuts and bolts must be kept tight, and as a guide, the following chart may help.

Nut Size	Torque lb./ft.	Torque kg./m.
$\frac{1}{4}$ BSW	8.5	1.2
$\frac{5}{16}$ BSW	17.5	2.4
$\frac{3}{8}$ BSW & UNC	31	4.2
$\frac{7}{16}$ BSW & UNC	49.6	6.8
$\frac{1}{2}$ BSW & UNC	73.2	10
$\frac{5}{8}$ BSW	131.9	18.1
$\frac{1}{4}$ BSF	9.5	1.3
$\frac{5}{16}$ BSF	19	2.6
$\frac{7}{16}$ BSF	54.7	7.5
$\frac{1}{2}$ BSF	81.2	11.1
$\frac{5}{8}$ BSF	163	22.3
$\frac{3}{4}$ BSF	283	38.8
Blade Bolt Nut	90.2	12.4

LUBRICATION AND MAINTENANCE CHART



EVERY 25 HOURS
LUBRICATE THROTTLE CABLE, GEAR CLUTCH AND ROTOR CONTROL PIVOTS, HANDLEBAR SWIVEL AND SLIDE SHIELD HINGES. DEPTH CONTROL MECHANISM

EVERY 25 HOURS
CHECK CLUTCH (¼" PLAY AT LEVER)
ADJUST AT CLUTCH ARM.

EVERY 10 HOURS (OR TWICE DAILY IN VERY DUSTY CONDITIONS)
CHECK AIR CLEANER OIL.

EVERY 25 HOURS
CLEAN OUT SEDIMENT BOWL.

EVERY 25 HOURS
CHECK CHAIN TENSION.

EVERY 25 HOURS
CHECK GEARBOX OIL LEVEL.

EVERY 250 HOURS
DRAIN AND RE-FILL GEARBOX.

EVERY 25 HOURS
OIL DOG CLUTCH.

EVERY 25 HOURS
CHECK CHAIN CASE OIL LEVEL.

EVERY 250 HOURS
DRAIN, WASH OUT AND RE-FILL CHAIN CASE.

EVERY 10 HOURS
CHECK ENGINE OIL LEVEL.

EVERY 25 HOURS
DRAIN AND RE-FILL ENGINE SUMP.

EVERY 10 HOURS
WATCH FOR SIGNS OF UNDUE ROTOR CLUTCH SLIP. ADJUST IF NECESSARY.

GEARBOX DRAIN PLUG.

EVERY 25 HOURS
CHECK TYRE PRESSURE (20 LBS. PER SQ. INCH.)

EVERY 250 HOURS
CHECK HUB NUTS FOR TIGHTNESS.

EVERY 25 HOURS
CHECK ALL BOLTS AND NUTS FOR TIGHTNESS.

EVERY 25 HOURS
OIL ROTOR STUB AXLE.

EVERY 10 HOURS
CHECK FOR BENT BLADES AND BLADE BOLT TIGHTNESS.

EVERY 25 HOURS
CHECK WEED CUTTER BLADES, ADJUST IF NECESSARY.

RECOMMENDED LUBRICANTS.

GEARBOX AND CHAIN CASE	S.A.E. 90.
ROTOR DOG CLUTCH ROTOR STUB AXLE DEPTH CONTROL WHEEL (IF FITTED)	USE ENGINE OIL.

ADJUSTMENTS

ROAD WHEELS

Each road wheel is mounted on its hub by a friction clutch device. These are adjusted so that the wheels have sufficient grip to pull the machine, but will slip if they become jammed with an obstruction between the wheels and the frame.

For normal adjustment, tighten each of the four nuts to fully compress the springs, then slacken back each nut half a turn.

Should the wheels appear not be driving, check that the adjustment is correct.

DRIVE CHAIN

Correct drive chain tension is as important as correct lubrication. Total up and down movement should be no more than $\frac{3}{8}$ in. (9.5 mm.) to $\frac{1}{2}$ in. (12.5 mm.). Check with a suitable screwdriver inserted through the oil filler hole on the top side of the chaincase. Turn the screwdriver to grip the chain between the links. Loosen the locknut on the external adjuster on the bottom front of the chaincase, and screw in the adjusting screw to increase chain tension. Re-tighten the locknut.

CLEANING CHAINCASE

After 250 hours of work, the chaincase should be cleaned out. Unscrew all the bolts securing the chaincase to the backplate, allowing the chaincase oil to drain out from the joint; no drain plug is fitted. Remove the cover, ensuring that the gasket is not damaged, and wash out the inside of the case and the chain with petrol or kerosene. Re-assemble, and fill with $\frac{3}{8}$ pint (.25 litre) SAE 90 gear oil.

CLEANING GEARBOX

The gearbox must also be cleaned out after 250 hours work. Unscrew the drain plug on the bottom right-hand inner side of the gearbox and drain the box immediately after a period of running. The oil will be warm and free-running and any sediment will be in suspension in the oil. Replace the drain plug and refill the gearbox with about 6 pints (3.4 litres) of flushing oil. Run the machine for about 3 minutes with the rotor well clear of the ground, then drain the flushing oil. Refill the gearbox with 6 pints (3.4 litres) of good quality SAE 90 gear oil.

ROTOR FRICTION DRIVE

The rotor to which the blades are bolted is driven direct from the main gearbox through a friction clutch. This clutch should only operate when the rotor blades strike an obstacle; when despatched from the factory the clutch is adjusted so that no slip occurs under normal working conditions. If the clutch appears to slip too easily, it can be adjusted by tightening the four clutch nuts to fully compress the springs, then slackening back each nut half a turn.

AIR CLEANER

The air cleaner oilbath oil level must be checked every 10 hours, or every 5 hours in very dusty conditions. Every 250 hours, the air cleaner interior must be cleaned out. Undo the two nuts *behind* the air cleaner, to separate the air cleaner from the support bracket on the main frame, and undo the jubilee clip on the end of the air cleaner hose to disconnect the cleaner completely. Remove the black, domed pre-cleaner from the top of the air cleaner, and flush out the interior of the air cleaner with paraffin or kerosene, to remove all dirt and dust from the wire gauze elements inside.

When clean, refit the pre-cleaner and secure the air cleaner on the support bracket. Re-connect the hose.

MAINTENANCE OF BLADES

Only the cutting edges of the blades should rub in the soil; the backs of the blades should be clear.

The blades are so designed that use in average soils should keep them sharp. If the ground is very stony however, it is recommended that two sets of hoe blades be used alternately, so that one set may be kept sharpened.

The efficiency of the machine is determined largely by the condition of the blades. If they are left bent or distorted through striking solid obstacles in the ground, they will require double the power to drive, the quality of the work will be poor and the blades will wear much more quickly. Trouble will also arise with clogging under the shield. Blades must therefore be examined daily and any bent ones replaced immediately.

ROTOR FLANGE WEEDCUTTERS

Two weedcutter blades are provided, one at each side of the machine, to prevent long grass or weeds binding around the end rotor flanges. The blades are slotted and secured by two setscrews each, and should be adjusted so that they just clear the rotor flanges when the rotor is turned BY HAND. Severe power losses will occur in weedy conditions unless these blades are correctly adjusted.

ROTORS AND BLADES

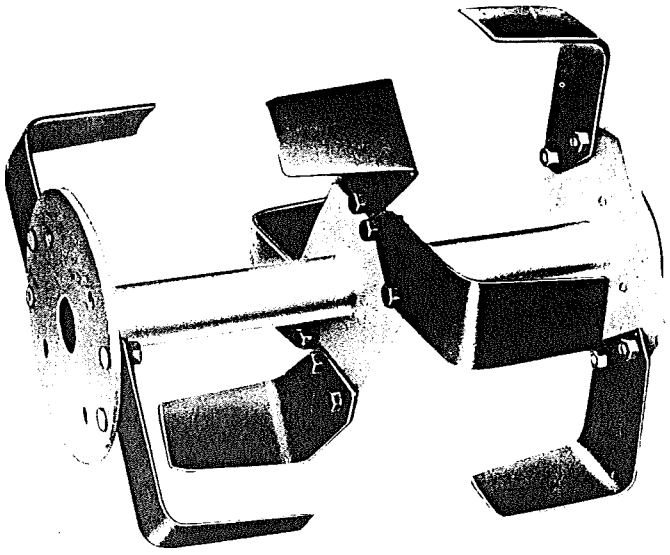
═DES

650 is normally delivered with the ═s already fitted. If it is necessary to fit your own ═s, this is done as follows:

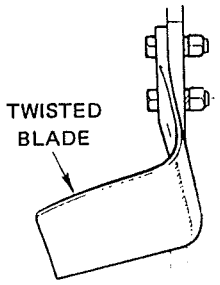
- ═ntify left-hand and right-hand blades.
- ÷ left-hand end flange carries two right-hand ═s: the right-hand end carries two left-hand blades.
- ÷ centre flange (or flanges, depending on the ═me width), carries two left-hand and two right-═lades leading. The blades should be fitted to the ═and side of the centre flange(s), with the heads ═ bolts against the blades and spring washers and ═against the flange.

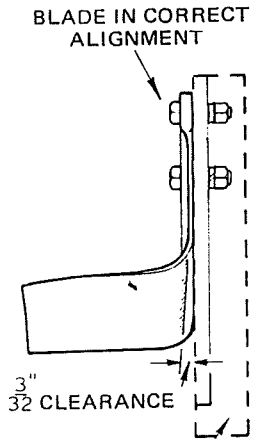
═TINE ROTOR

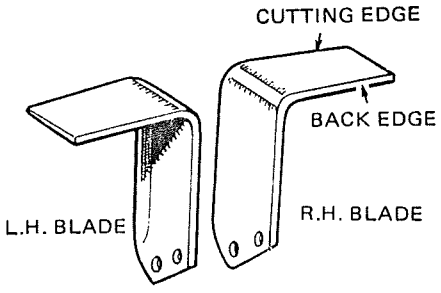
═ition, a Pictine rotor, with flanges closer-spaced ═ne standard rotor, is available for use with pic-═r pasture renovating (lucerne) tines, for very hard ═onditions, or for pasture renovation. (See Attach-═ section, page 10).



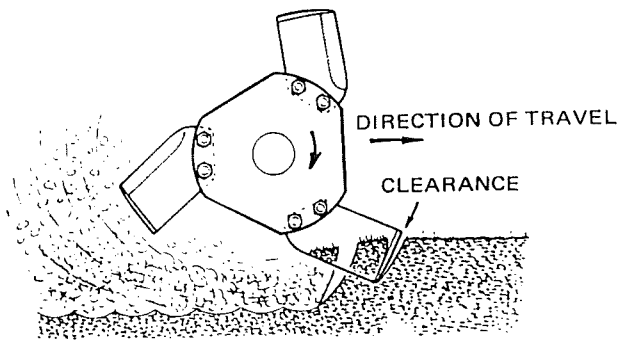
Rotor (20 in. model), 24 in. and 30 in. rotors have two centre flanges





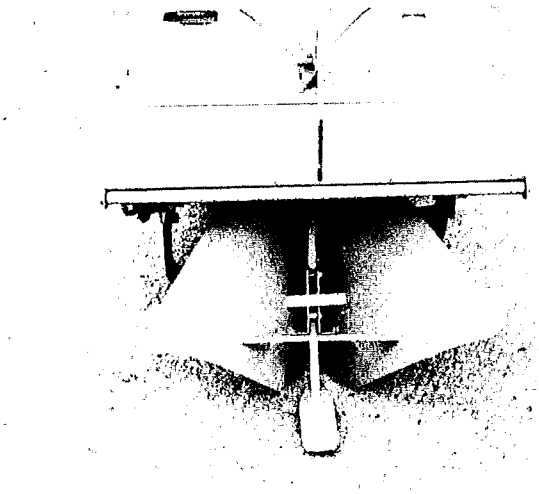


How to identify right and left-hand blades.



Correct blade setting showing clearance at back of blade.

ATTACHMENTS



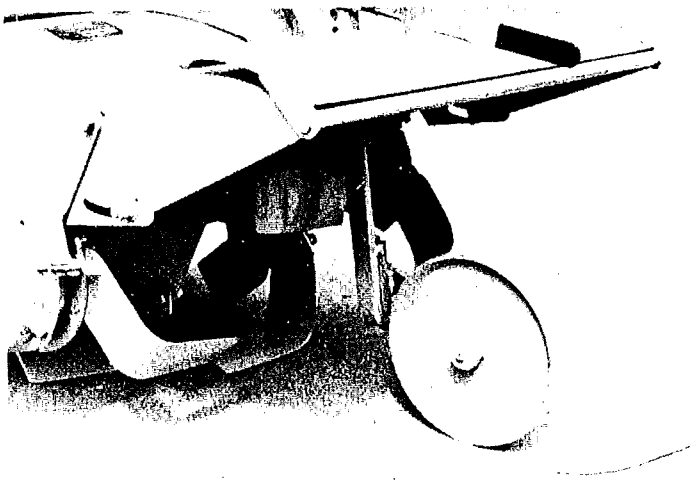
FURROWER

The Furrower is fitted on the depth control skid. Pivot the depth control lever clip and move the lever sideways to withdraw the skid engagement pin. Pull out the skid from the socket under the rotor shield.

Assemble the furrower on the skid leaving the furrower bottom $\frac{1}{2}$ in. (1.25 cm.) above the foot of the skid, or as required for the crop to be planted, then tighten the locking nut. Fit the assembly into the socket and connect to the depth control lever.

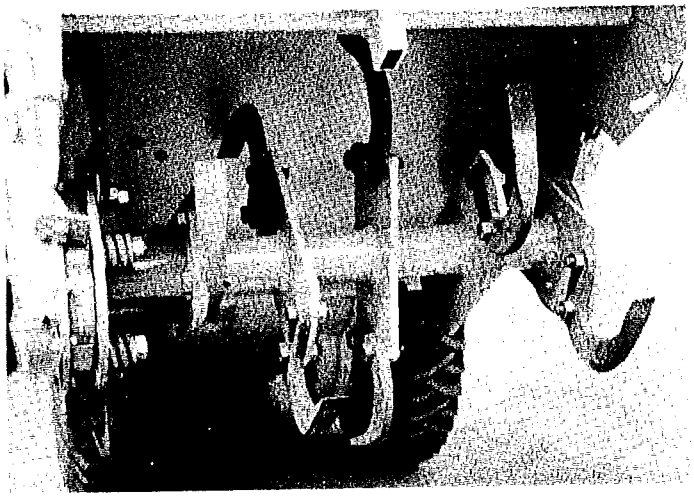
For machines fitted with a depth control wheel instead of a skid, order a skid in addition to the furrower.

When using the furrower, the rotor is put into gear so that cultivating and furrowing are done simultaneously.



DEPTH CONTROL WHEEL

A Depth Control Wheel is standard with 24 in. and 30 in. models, but optional, in place of the skid, on the 20 in. "Gem".



PICTINE ROTOR

The Pictine Rotor with flanges spaced closer than on the standard rotor can be fitted with pic tines or pasture renovating (lucerne) tines.

The pictines have a horizontal chisel point, and are used for breaking up very hard ground, old tracks, etc. The pasture renovating tines have a vertical knife edge, and are used to tear up and aerate old matted turf, to encourage fresh growth of young grasses.

To fit the pictine rotor, slacken off all the nuts and bolts holding the support bracket which carries the stub axle, staytube and rotor shield. Remove the four rotor clutch nuts and springs. Spring the bracket off the stub axle, using a suitable bar, and slide the rotor sideways to remove. Then reverse the sequence to fit the pictine rotor, ensuring that all nuts are correctly tightened and rotor clutch adjusted.

NOT ILLUSTRATED:— FRONT-END WEIGHTS

MAKING THE MOST OF YOUR 650

GENERAL

As the scope of operation is so wide, and, as soil tillage methods differ so greatly according to crop, climate and soil condition, it is not possible to deal more than superficially with this aspect. However, it is hoped that the following hints will help the user to obtain the best results from the machine.

The 650 will cultivate to a maximum depth of 9 in. (23 cm.). On certain, especially the heavier, types of soil, this depth will not be obtained in a single pass. Where cultivation in depth is needed, a first pass should be made at 3–4 in. (7–10 cm.), followed by a further pass at full depth.

The low gear must be used when cultivating ground which is very hard or covered with heavy growths. Second gear is used for all ordinary cultivation, and top gear for light cultivation. Always work in the highest gear that will produce the quality of tilth necessary. Always use top gear for running the machine between jobs. A depth control skid or a wheel, is fitted, and by moving this up and down the depth of work can be controlled in $\frac{3}{4}$ in. (19 mm.) stages down to 9 in. (23 cm.) deep.

If the surface of the ground is very hard or baked, the depth control should be adjusted so that the machine just bites the surface. Further passes should then be made until the required depth is reached.

On heavy land which is to be laid up for the winter, the surface should be left rough. By using the ridging or furrowing attachment during this final or late autumn cultivation, the land can be left in ridges to promote better drainage and to expose a greater surface area to the weather.

If heavy land is Rotavated too finely and left bare to the winter rains, the soil may pack together, making spring cultivations difficult.

When cultivating a ploughed field, the 650 should be run across the furrows, not along them. This will ensure complete cultivation.

On hilly ground always run the machine around the contour, working from the top to the bottom of the hill. After the first cut, one road wheel can be run in the soil just worked, so that any tendency to slip will be countered by the wheel coming against a wall of uncut soil.

On light soils, two courses are open. The ground may either be left rough, or it may be Rotavated to medium depth and sown to a green crop, e.g. rye. The green crop will prevent the leaching out of the nitrogen in the soil. In the early part of the year the crop is then Rotavated. After a week or ten days, the spring seed bed may be prepared. This Rotavation should be shallower than that used to work-in the green crop.

SEED BEDS

In ground which has been cultivated properly, seed beds should seldom exceed 2 in. (5 cm.) in depth, except for certain crops. Seeds require a well-aerated soil with a firm bottom. Some small seeds require a seed bed to be lightly consolidated. This is particularly important on light soil, where consolidation will bring moisture nearer to the seedling plant.

Competition from weeds is most critical when the crop is at the seedling stage. To obtain weed-free seed beds, the ground should be prepared a few weeks ahead of the sowing dates. Rotavation should be carried out at a depth of 4 in. (10 cm.); this causes any weed seeds to germinate. These weeds may be turned in by a second Rotavation, which will prepare the seed bed at the same time. It is most important that this second Rotavation is shallower than the first. Remember that the ground is now more open, so that the machine will tend to dig more deeply. When the seed bed has been prepared, it should ideally be allowed to settle for 24 hours before sowing.

WEED CONTROL

Rotavation produces a well-aerated warm seed bed in which germination takes place readily. Inevitably, such conditions also favour weed seeds.

Weeds are eliminated by preventing them seeding or by progressive weakening of the deep tap roots or rhizomes. Weeds are killed most easily and inexpensively by Rotavating them directly they show green. Annuals will be killed outright and perennials will be reduced until they too, die out. This is true even of such persistent weeds as couch or twitch.

ROW-CROP WORK

Work will be easier if rows are made as long as possible. At least 3 ft. (1 m.) should be allowed at each end for turning.

Weeds between rows may be controlled by Rotavation. Ideally, this should be done when the weeds are small, but even a heavy growth can be turned in.

This will not prevent weeds growing in the rows themselves; such weeds must be controlled by hand-hoeing when small. Should land become weed-infested because these weeds have been allowed to seed, the

following crop should be a cleaning crop, e.g. roots or potatoes, which will give a period of several weeks in the early part of the year when the weed seeds will shoot and can be killed by Rotavation.

In planning your crops to make the best use of the "Gem", allow 2 or 3 in. (5 or 7 cm.) over the effective width on each side of the machine.

GREEN MANURING

Land not immediately required may be sown down to such crops as mustard or rye grass during spring and summer, or rye during the winter. These crops should be allowed to mature if they are to be used as green manures – they will then have the best effect on the soil. A winter cover crop will preserve plant foods which would otherwise be leached away, so it need not allowed to mature.

LAND RECLAMATION

The 650 may also be used to bring derelict land ba into cultivation. Virgin ground or soil tightly bound wi roots or grass is best cultivated by first working at on a shallow depth, to break up the surface. Depth c then be gradually increased by subsequent passes ma at intervals of about a week or ten days.

CONCLUSION

Never overtax the power of the machine. Far bet results will be obtained from working in easy stage rather than by forcing the machine to do work in exce of its horsepower.

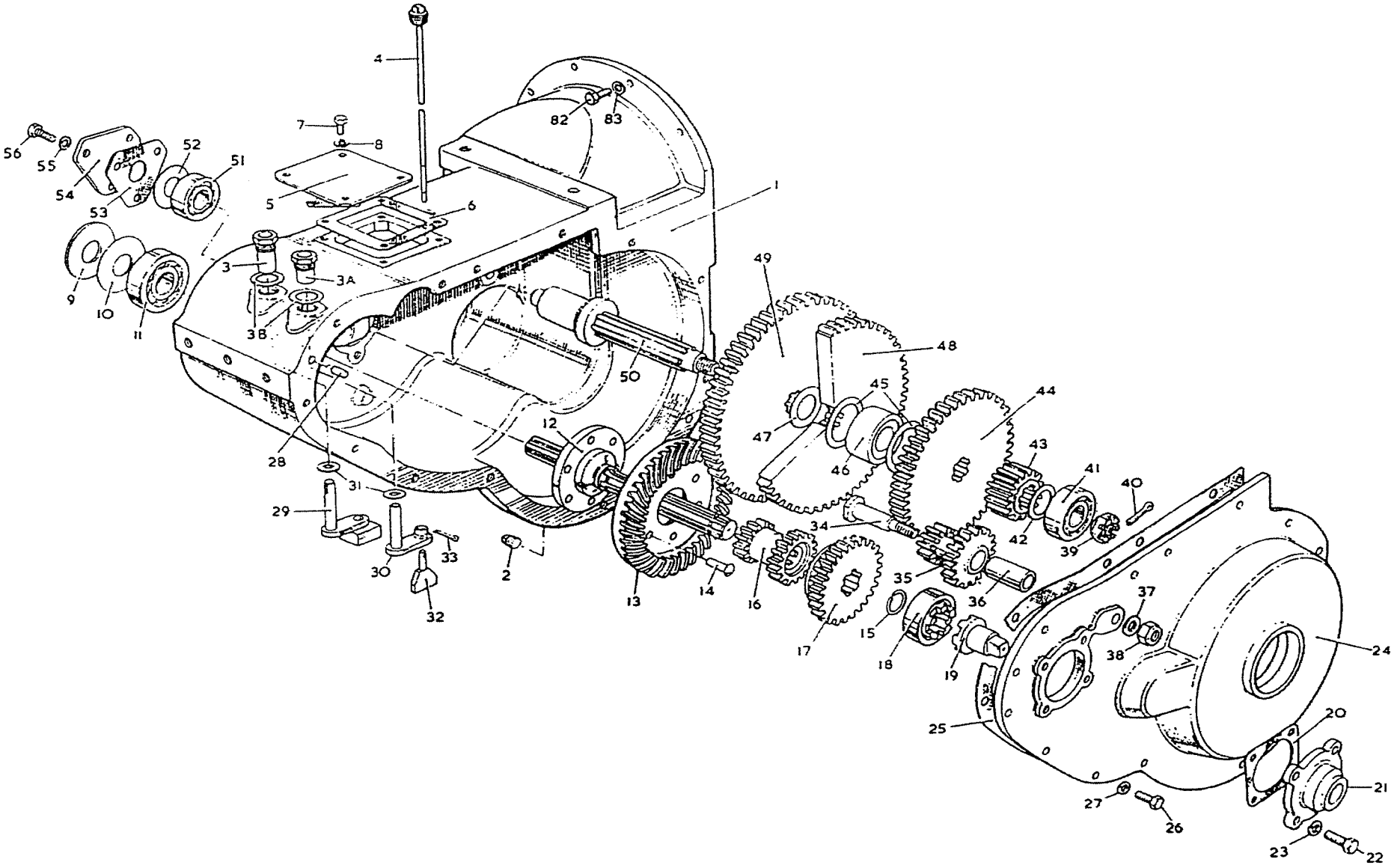
The right to alter and/or amend all designs, specifications and/or prices without prior notice is strictly reserved.

D650

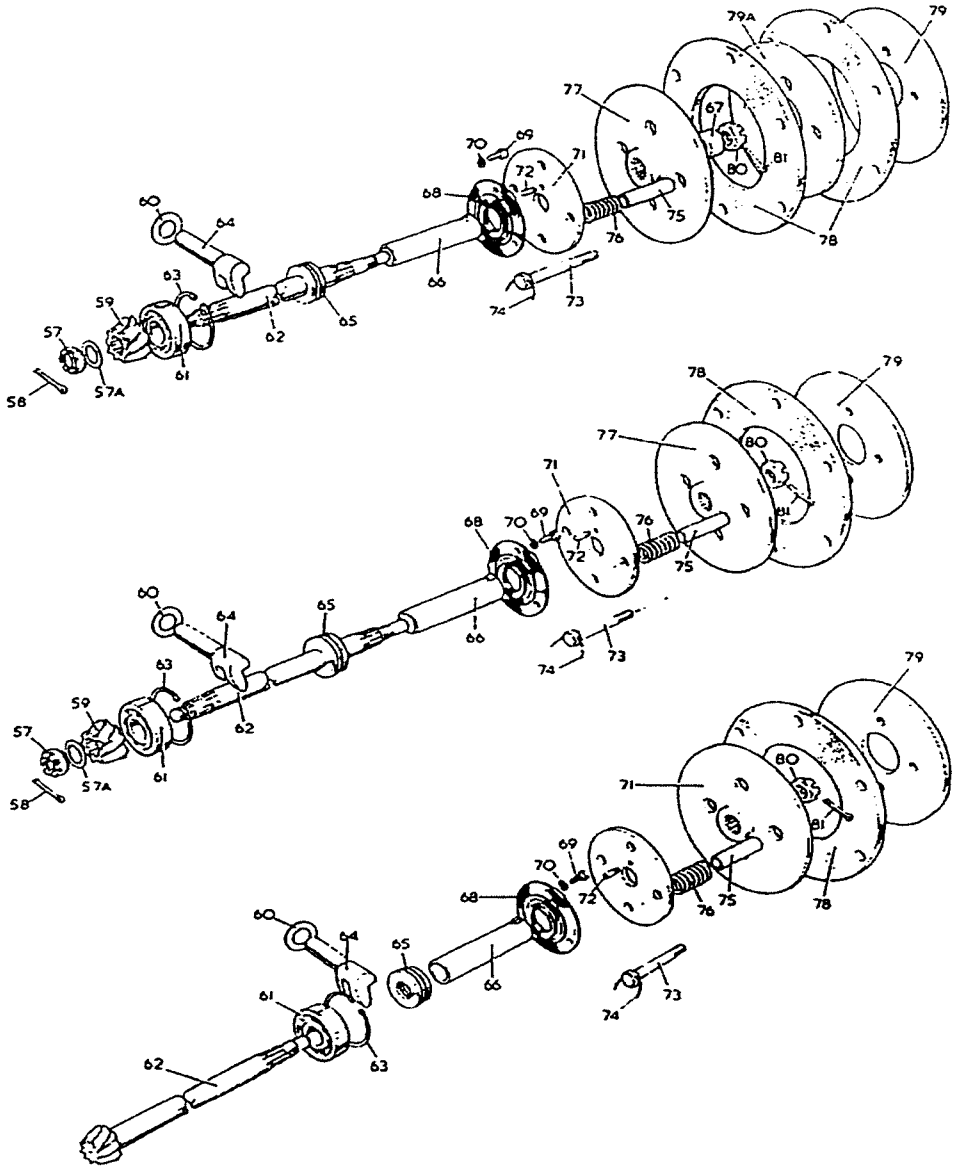
PARTS LIST

Parts List

693	B	9.78	2



Illus. No	Part No.	Description	No. off	Bulletin	Bin No.
		GEARBOX			
1	62907	Gearbox casing	1		
2	203031170	Drain plug ¼" BSP sq. head, taper plug	1		
3	481	Selector bush	1		
3A	62913	Selector bush	1		
3B	25758	Shim	As required		
4	476	Dipstick	1		
5	26908	Inspection cover	1		
6	25185	Inspection cover gasket	1		
7	101804040	Setscrew ¼" BSW x ½" long, hex. head	4		
8	108040840	Spring washer ¼" dia.	4		
9	25530	Jackshaft bearing shim .062"	As required		
10	461	Jackshaft bearing shim .010"	As required		
11	251025071	Ballbearing 1" i.d. x 2½" o.d. x ¾" w. BRM 1	1		
12	25029	Jackshaft	1		
	UP TO MACHINE SERIAL NUMBER 250A 1020				
13	*25008	Spiral bevel gear	1		
14	*208021160	Rivet $\frac{5}{16}$" dia. x ⅜" long. pan head	6		
	FROM MACHINE SERIAL NUMBER 250A 1021				
13	*27367	Spiral bevel gear	1		
14	*208023040	Rivet $\frac{5}{16}$" dia. x $\frac{7}{8}$" long. pan head	6		
	* Not interchangeable and must be used with their respective pinions 25007 and 27368 (clutch shaft with integral pinion).				
15	208002620	Special circlip.	1		
16	25005	Double pinion	1		
17	62914	Single pinion	1		
18	437	Starting dog bearing	1		
19	373	Starting dog	1		
20	402	Starter dog bearing housing gasket	1		
21	374	Starter dog bearing housing	1		
22	101806070	Setscrew $\frac{3}{8}$" BSW x $\frac{7}{8}$" long. hex. head	4		
23	108061140	Spring washer $\frac{3}{8}$" dia.	4		
24	62908	Gearbox cover	1		
25	25050	Cover gasket	1		
26	101805070	Setscrew $\frac{5}{16}$" BSW x $\frac{7}{8}$" long hex. head	14		
27	108050940	Spring washer $\frac{5}{16}$" dia.	14		
28	208009265	Mills pin $\frac{5}{16}$" dia. x $\frac{2}{8}$" long. GP2	2		
29	25115	Speed change selector	1		
30	62910	Reverse selector	1		
31	25648	Washer	As required		
32	25072	Reverse selector block	1		
33	208010060	Split pin $\frac{1}{16}$" dia. x ¾" long	1		
34	25026	Reverse idler pin	1		
35	62915	Reverse idler gear	1		
36	25034	Reverse idler bush	1		
37	108081610	Washer ½" dia.	1		
38	107508030	Nut ½" BSF self locking	1		
39	25038	Special nut	1		
40	208010280	Split pin $\frac{3}{32}$" dia. x 1 $\frac{1}{8}$" long	1		
41	251022061	Ballbearing 1" i.d. x 2¼" o.d. x $\frac{5}{8}$" w. BRL. 1	1		
42	25054	Shim .005"	As required		
43	25025	Bull pinion	1		
44	62916	Layshaft small gear	1		
45	25757	Shim .030"	As required		
46	25015	Spacer	1		
47	554	Shim .028"	As required		
48	25012	Medium gear	1		
49	25011	Large gear	1		
50	25037	Layshaft	1		
51	250719061	Ballbearing ¾" i.d. x 1 $\frac{7}{8}$" o.d. x $\frac{9}{16}$" w. BRL ¾"	1		
52	25684	Layshaft shim .005"	As required		
53	355	Gasket	1		
54	354	Layshaft bearing stop	1		
55	108050940	Spring washer $\frac{5}{16}$" dia.	3		
56	101805050	Setscrew $\frac{5}{16}$" BSW x $\frac{5}{8}$" long, hex. head	3		
57 to 81	See Page 7				
82	101804060	Setscrew, engine to gearbox ¼" BSW x ⅜" long, hex head	8		
83	108040840	Spring washer ¼" dia.	8		



0 Twin Plate Clutch Assembly

+ Single Plate Clutch Assembly

* Single plate clutch assembly with integral pinion

Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.

CLUTCH USAGE

+ Up to Machine Serial Number 2571945 — when Kohler engine is fitted
o Up to Machine Serial Number 2571945 — not when Kohler engine is fitted
+ From Machine Serial Number 2571946 to 2571954
o From Machine Serial Number 2571955 to 2571966 — fitted with Hatz Engine
+ From Machine Serial Number 2571967 to 250A1020 — except the following:-

* 2591063, 2591067, 2591069, 2591070, 2591138, 2591139, 2591181 to 2591191, 2591394, 2591451, 2592305, 2592306

* From Machine Serial Number 250A1021

CLUTCH ASSY 26169 (+)

57	+25061	Special nut	1		
	o25061	Special nut	1		
57A	25794	Spacer	As required		
58	+208010160	Split pin $\frac{3}{32}$"dia. x 1½" long	1		
	o208010160	Split pin $\frac{3}{32}$"dia. x 1½" long	1		
59	+25007	Spiral bevel pinion	1		
	o25007	Spiral bevel pinion	1		
60	292	Clutch fulcrum shim	As required		
61	250720071	Ball bearing 2" x ¾" x $\frac{11}{16}$" BRM ¾			
62	+25009	Clutch shaft	1		
	o62921	Clutch shaft	1		
	*27368	Clutch shaft — with integral pinion	1		
63	208001130	Circlip 2" dia. internal	1		
64	291	Clutch operating pawl	1		
65	250715061	Thrust race $1\frac{1}{32}$" x ¾" x $\frac{5}{8}$"	1		
66	+288	Thrust sleeve	1		
	o62922	Thrust sleeve	1		
	*288	Thrust sleeve	1		
67	o62919	Thrust sleeve spacer	1		
68	25069	Special oilseal	1		
69	101804040	Setscrew ¼" BSW x ½" long	3		
70	108040840	Spring washer ¼" dia.	3		
	26170	Clutch thrust plate comprising:-	1	(+)	
71	233	Plate	1		
72	234	Pin	1		
73	+250	Special bolt	4		
	o25776	Special bolt	4		
	*250	Special bolt	4	(+)	
74	208052010	Locking wire 16swg x 12" long	1	(+)	
75	+255	Distance piece	4		
	o62063	Distance piece	4		
	*255	Distance piece	4	(+)	
76	260	Spring	4	(+)	
77	26171	Clutch plate fixed	1	(+)	
78	+220	Friction disc	1	(+)	
	o220	Friction disc	2		
	*220	Friction disc	1		
79	231	Clutch plate loose	1	(+)	
79A	o62918	Clutch plate loose	1		
80	25062	Special nut	1	(+)	LOOSE
81	208010140	Split pin $\frac{3}{32}$"dia. x 1" long	1	(+)	LOOSE

Parts List

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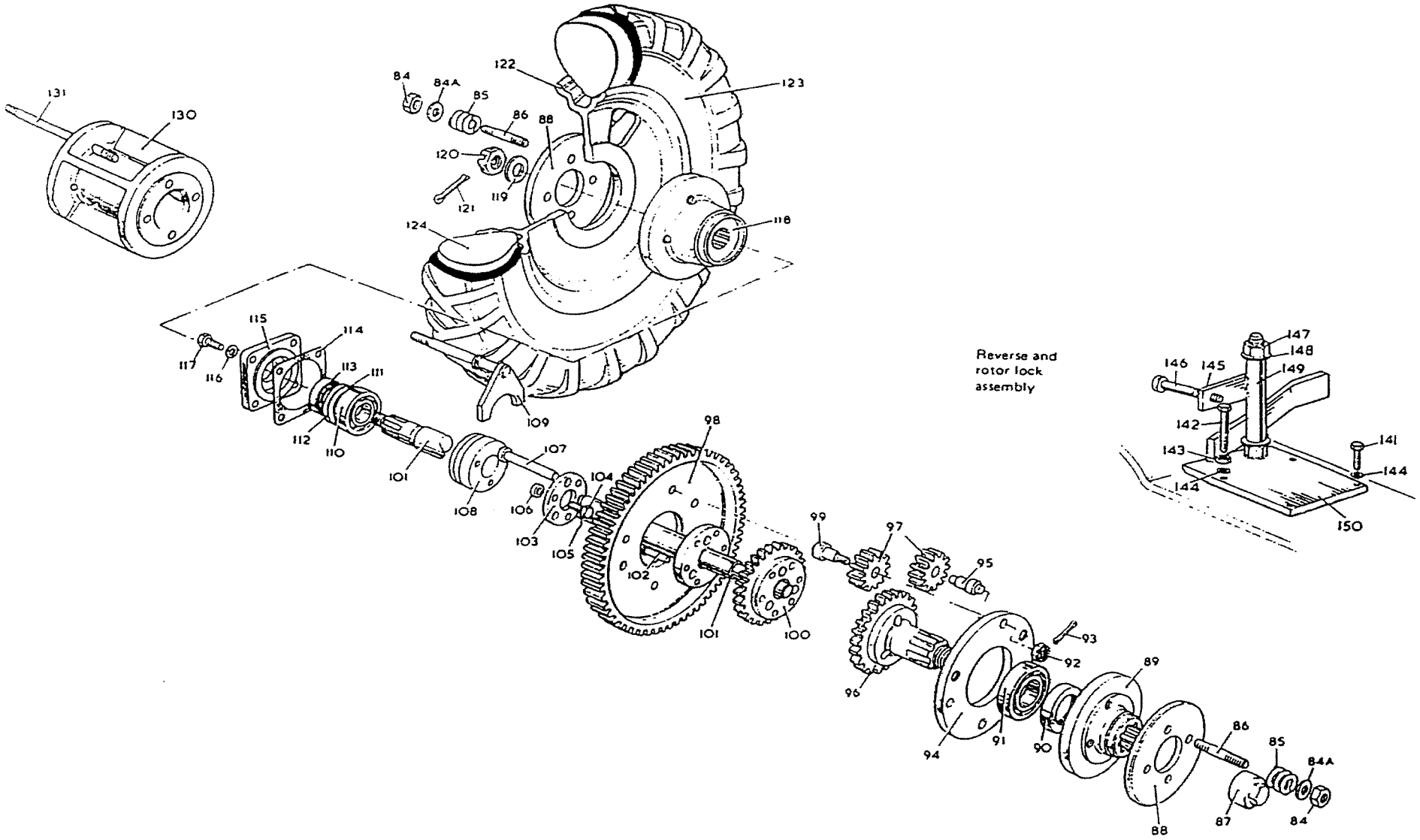

DIFFERENTIAL AND WHEELS

Illus No.	Part No.	Description	No. off	Bulletin	Bin No.
84	107608010	Nut ⅜" BSW	8		
84A	108081610	Washer ⅜" dia. heavy gauge	8		
85	142	Spring	8		
86	141	Stud	8		
87	25878	Hub nut	1		
88	162	Wheel hub disc	2		
89	25051	Wheel hub R.H.	1		
90	262717051	Oilseal 1¾" i.d. x 2¾" o.d. x ⅜" w. 27517550	1		
91	251730061	Ballbearing 1¾" i.d. x 3" o.d. x $\frac{3}{16}$" w. BRX 1¾"	1		
92	25042	Special nut	3		
93	208010160	Split pin $\frac{3}{32}$"dia. x 1½" long	3		
	25044	Differential plate assembly comprising:-	1		
94	25028	Differential plate	1		
95	25023	Differential pinion pin	3		
96	25020	Loose hub gear	1		
97	25022	Differential pinion	6		
	25043	Bullwheel assembly comprising:-	1		
98	25021	Bullwheel	1		
99	25024	Pinion stud	3		
	25045	Roadwheel axle assembly comprising:-	1		
100	25019	Fixed hub gear	1		
101	25046	Roadwheel axle	1		
102	208021170	Rivet $\frac{5}{16}$" dia. x 1¾" long, round head	6		
103	314	Differential lock ring	1		
104	317	Differential lock setscrew	3		
105	208052010	Locking wire 16 SWG x 9" long	1		
106	316	Differential lock spacer	3		
107	25056	Differential lock pin	3		
108	313	Differential lock	1		
109	25359	Differential lock selector	1		
110	251227071	Ballbearing 1¾" i.d. x 2¾" o.d. x $\frac{11}{16}$" w. BRL 1¾"	1		
111	25906	Shim .005" (.125mm)	As required		
	27374	Shim .020"	As required		
	27375	Shim .025"	As required		
112	25058	Oilseal Shim .015"	As required		
113	262012051	Oilseal 1¾" i.d. x 2" o.d. x ⅛" w. 20012551	1		
114	25057	Axle bearing stop gasket	1		
115	25053	Axle bearing stop	1		
116	108061140	Spring washer $\frac{3}{8}$" dia.	4		
117	101806060	Setscrew $\frac{3}{8}$" BSW x ¾" long, hex. head	4		
118	25052	Wheel hub L.H.	1		
119	108122410	Washer ¾" dia. heavy gauge	1		
120	25047	Hub nut	1		
121	208010310	Split pin $\frac{5}{32}$ dia. x 1½" long	1		
122	26923	Roadwheel rim L.H. 20" & 24" models	1		
	26923	† Roadwheel rim L.H. 30" model	3		
	26922	† Roadwheel rim R.H. 20", 24" & 30" models	1		
123	209028200	* Tyre	2		
124	209028210	* Inner tube	2		
125	130	Landwheel 20" & 24" model	2		

† Note. The 30" model is fitted with two L.H. wheels on the left of the machine and one R.H. and one L.H. on the right of the machine.

* 4 off each for 30" model

126 - 129 not allocated

EXTENSION HUBS

Standard Fitment on 30" Model
Optional Extra for 20" & 24" Models

Illus No.	Part No.	Description	No. off	Bulletin	Bin No.
130	25397	Extension hub L.H.	1		
	25396	Extension hub R.H.	1		
131	25394	Stud short L.H.	4		
	25393	Stud long R.H.	4		
132	140 not allocated				
141	101804060	Setscrew ¼" BSW x ¾" long	3		
142	101604180	Bolt ¼" BSW x 2¼" long	1		
143	107604010	Nut ¼" BSW	1		
144	108040840	Spring washer ¼" dia.	4		
145	107205020	Locknut $\frac{5}{16}$" UNC	1		
146	101205160	Bolt $\frac{5}{16}$" UNC x 2" long	1		
147	107208010	Nut ⅜" UNC	1		
148	108081610	Flat washer ⅜" dia.	2		
149	27381	Pivot tube	1		
150	27382	Base plate	1		

Parts List

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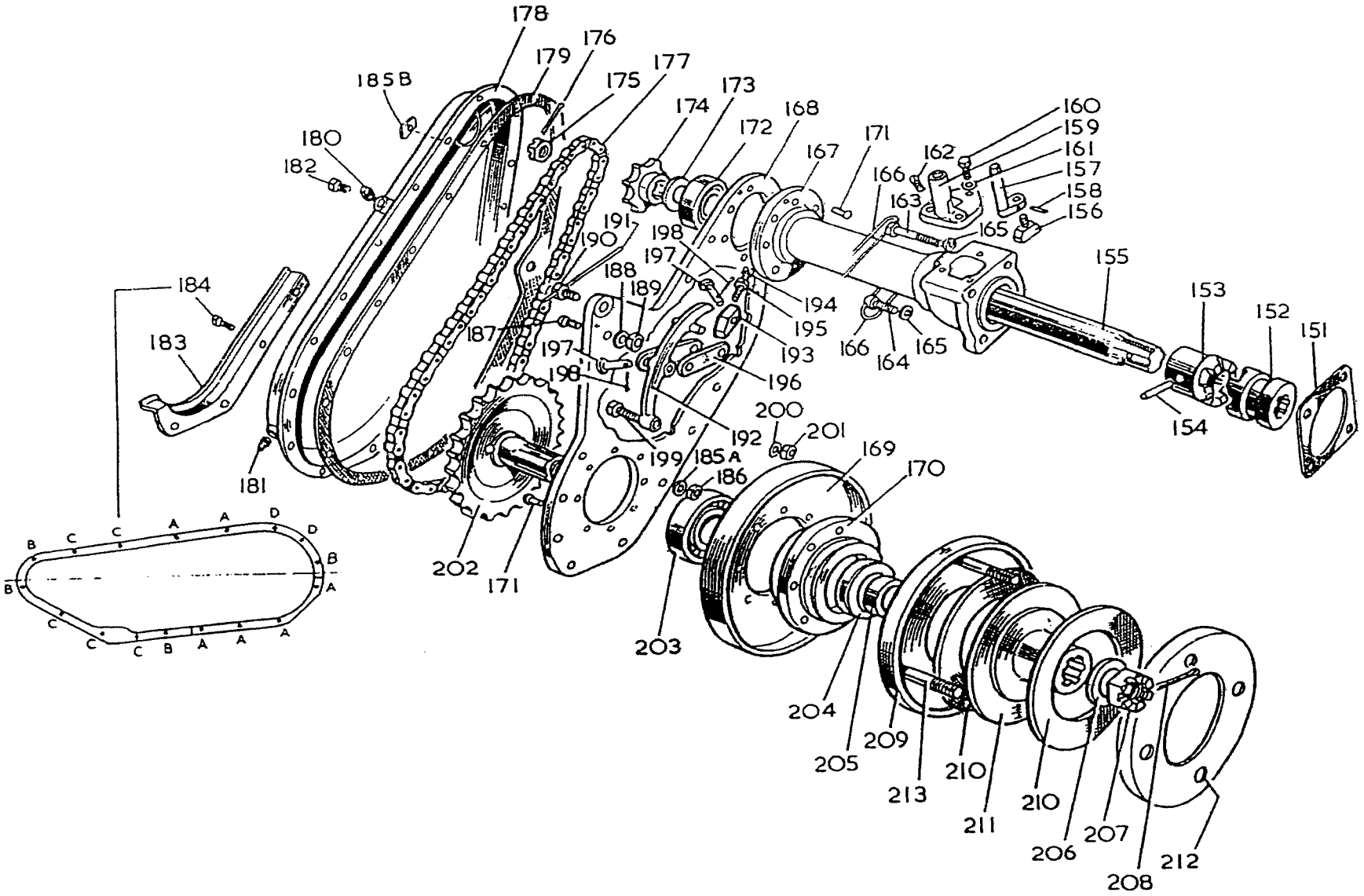

Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
		JACKSHAFT EXTENSION AND BACKPLATE			
151	402	Gasket	1		
152	439	Sliding dog	1		
	452	Extension shaft assembly 20" model	1		
	26045	Extension shaft assembly 24" model	1		
	25738	Extension shaft assembly 30" model	1		
153	26017	Fixed dog	1		
154	26018	Fixed dog pin	1		
155	26014	Extension shaft 20" model	1		
	26011	Extension shaft 24" model	1		
	26012	Extension shaft 30" model	1		
	158	Rotor dog clutch selector sub-assembly comprising:-			
156	156	Selector block	1		
157	153	Selector crank	1		
158	208089310	Selector tension pin	1		
159	456	Rotor dog clutch selector housing	1		
160	101805060	Setscrew 5/16" BSW x 3/4" long, hex. head	3		
161	108050940	Spring washer 5/16" dia.	3		
162	203031160	Oil plug 1/8" BSP taper	1		
163	25776	Special bolt	2		
164	25777	Special setscrew	2		
165	108061140	Spring washer 3/8" dia.	4		
166	208052010	Locking wire	2		
167	453	Jackshaft housing 20" model	1		
	25865	Jackshaft housing 24" model	1		
	25735	Jackshaft housing 30" model	1		
168	530	Backplate	1		
169	545	Bearing dust cover	1		
170	540	Rotor bearing housing	1		
171	208023010	Rivet 1/4" dia. x 5/8" long, pan head	16		
172	251025071	Ballbearing 1" i.d. x 2 1/2" o.d. x 3/4" w. BRM 1	1		
173	462	Shim .028"	As required		
174	460	Jackshaft sprocket	1		
175	455	Special nut	1		
176	208010410	Split pin 1/8" dia. x 1 1/2" long	1		
		CHAINCASE ASSEMBLY			
177	25101	Drive chain	1		
	26152	Outer link Renold 119063 no. 107	26		
	26153	Inner link Renold 119063 no. 4	27		
*	26154	Connecting link Renold 119063 no. 26	1		
178	520	Chaincase	1		
179	26842	Chaincase gasket	1		
180	203031030	Oil plug 1/8" BSP sq. head	1		
181	203031160	Oil level plug 1/8" BSP sq. head	1		
182	590	Frame bolt, chaincase to staytube	1		
183	519	Wearing shoe	1		

Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
	19001	Chaincase bolt set comprises items marked*			
184A	101804060	* Setscrew 1/4" BSW x 3/4" long, hex. head	6		
184B	101804050	* Setscrew 1/4" BSW x 5/8" long, hex. head	4		
184C	101804040	* Setscrew 1/4" BSW x 1/2" long, hex. head	5		
184D	101804070	* Setscrew 1/4" BSW x 7/8" long, Hex. Head	2		
185	108040840	* Spring washer 1/4" dia.	13		
185A	108040830	Shakeproof washer 1/4" dia.	4		
185B	27068	Special washer	2		
186	107604010	* Nut 1/4" BSW	10		
187	101804050	Setscrew, backplate to shield 1/4" BSW x 5/8" long, hex. head	1		
188	108040840	Spring wahser 1/4" dia.	1		
189	107604010	Nut 1/4" BSW	1		
190	591	Frame setscrew, coutersunk head	1		
191	208052010	Locking wire 1/16" dia. x 4" long	1		
192	25917	Chain skid	1		
193	25920	Sliding block	1		
194	25913	Adjusting screw	1		
195	107505010	Nut 5/16" BSF	1		
196	25919	Connecting link	2		
197	25914	Connecting pin	2		
198	208010030	Split pin 1/16" dia. x 5/8" long	2		
199	101605100	Chain skid bolt, 5/16" BSW x 1 1/4" long	1		
200	108051010	Washer 5/16" dia.	2		
201	107605010	Nut 5/16" BSW	1		
		ROTOR DRIVE			
202	69527	Rotor drive shaft	1		
203	253072191	Ballbearing 72mm o.d. x 30mm i.d. x 19mm w. BRM 030	1		
204	262515051	Oilseal 2 1/2" o.d. x 1 1/2" i.d. x 1/2" w. 25015050	1		
205	53404	Spacing sleeve	1		
206	108122410	Washer 1/2" dia.	1		
207	107512050	Nut 1/2" BSF slotted	1		
208	208010210	Split pin 1/8" dia. x 1 1/4" long	1		

also available 26155 Crank link.

Parts List

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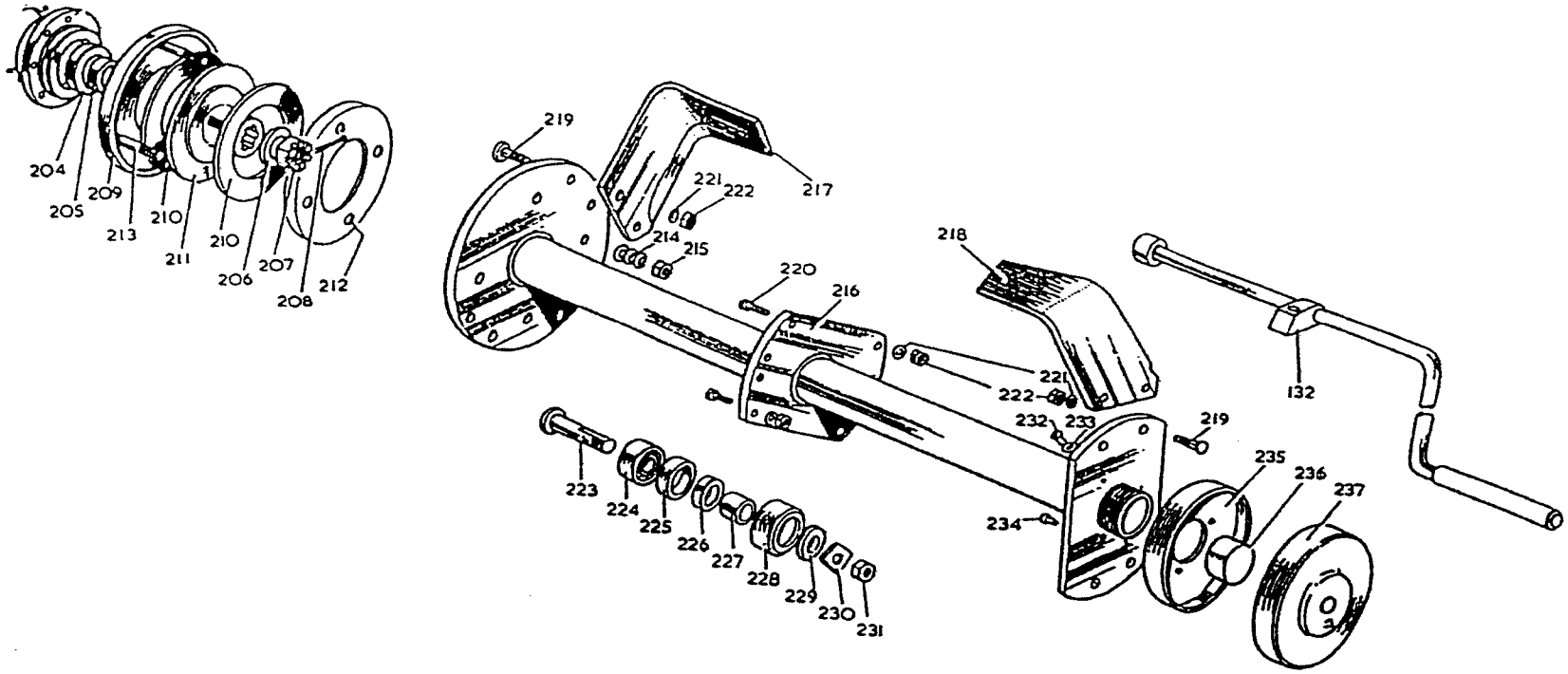

Illus. No.	Part No.	Description	24" & 30"	20"	Alternatives	off	Bulletin	Bin No.
		ROTOR SAFETY CLUTCH						
209	605	Drive plate				1		
	69486	Rotor drive disc assembly comprising:-				1		
210	607	oFriction disc - asbestos			Alternatives must be fitted in pairs	2		
210	27420	+Friction disc - sintered metal				2		
211	606	Rotor drive disc				1		
		oEarly machines						
		+Later machines						
212	544	Wearing plate				1		
213	603	Rotor drive stud				4		
214	650349	Rotor drive spring				4		
215	107608010	Nut ½" BSW				4		
		ROTOR						
216	600A	Rotor 20" model				1		
	25462	Rotor 24" model				1		
	25734	Rotor 30" model				1		
217	9900	Universal blade L.H.	6	4				
218	9901	Universal bladed R.H.	6	4				
	26530	Swept back blade L.H.	6	4	Alternative blades, special order only			
	26531	Swept back blade R.H.	6	4				
	9866	Hardfaced straight Blade L.H.	6	4				
	9867	Hardfaced straight Blade R.H.	6	4				
219	919	Blade bolt, assembly	8	8				
220	69667	Blade bolt, assembly includes:-	16	8				
221	108071240	Spring washer $\frac{7}{16}$" dia.	24	16				
222	61188	Special nut	24	16				
		ROTOR STUB AXLE						
223	630	Rotor stub axle				1		
224	250618061	Ballbearing $\frac{5}{8}$" i.d. x 1 $\frac{13}{16}$" o.d. x $\frac{5}{8}$" w. BRM $\frac{5}{8}$"				1		
225	637	Oilseal holder				1		
226	261509042	Oilseal 1¾" o.d. x $\frac{7}{8}$" i.d. x $\frac{3}{32}$" w. 150-087-40				1		
227	634	Spacing sleeve				1		
228	632	Bearing cap				1		
229	629	Felt dust seal				1		
230	648	Tab washer				1		
231	107510020	Nut $\frac{5}{8}$" BSF locknut				1		
232	103804030	Oiling screw ¼" BSW x $\frac{3}{8}$" long cheese head				1		
233	108040840	Spring washer ¼" dia.				1		
234	208021070	Rivet $\frac{1}{16}$" dia. x ⅛" long. round head				3		
235	639	Inner dust cover				1		
236	635	Back plug				1		
237	640	Outer dust cover				1		

Illus. No.	Part No.	Description	off	Bulletin	Bin No.

Illus. No.	Part No.	Description	off	Bulletin	Bin No.

Parts List

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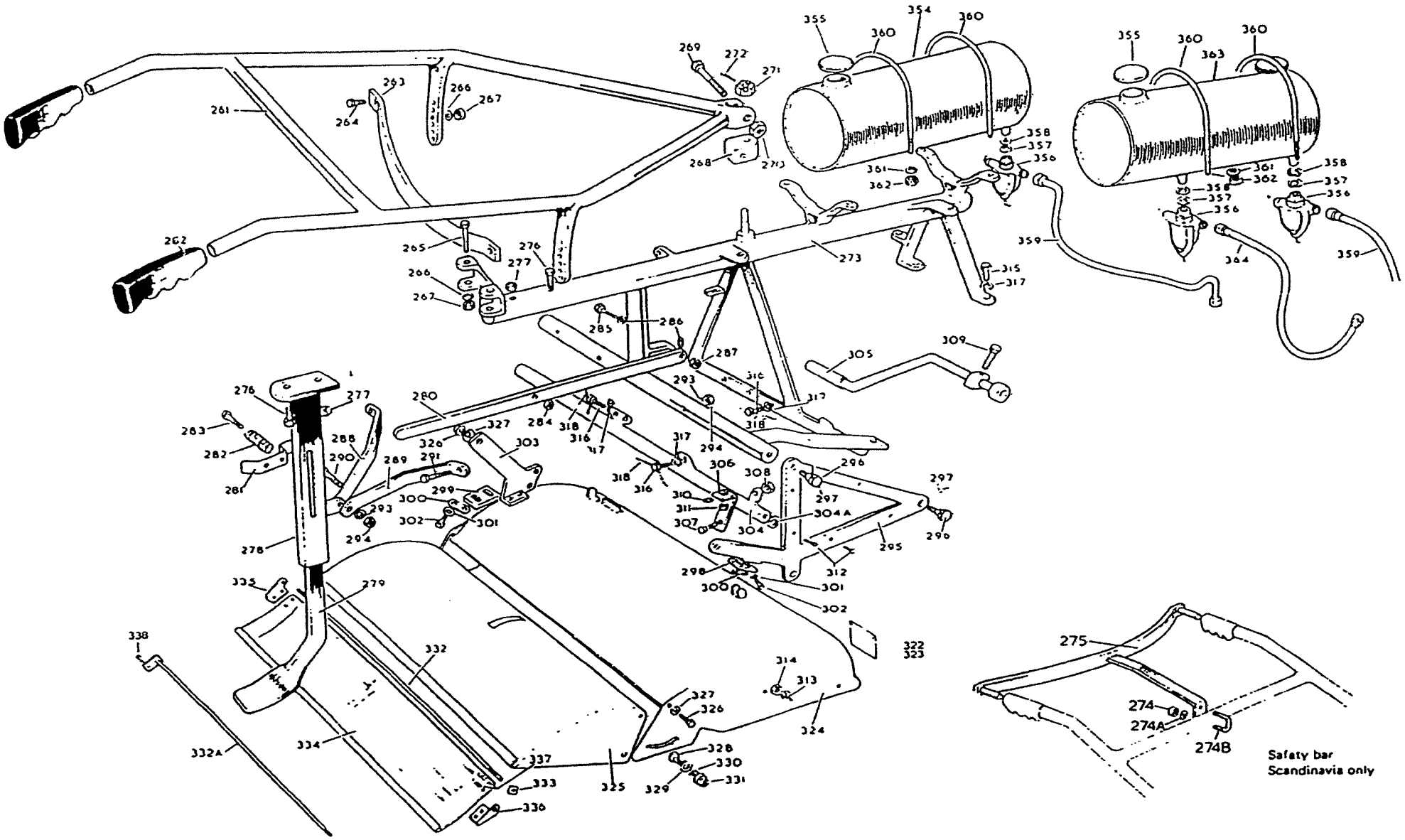

Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
		FRAME AND HANDLEBARS			
261	62948	Handle bar	1		
262	207001210	Handlebar grip	2		
263	123	Handlebar slide	1		
264	101606100	Bolt, slide bar $\frac{3}{8}$" BSW x 1¼" long, hex. head	2		
265	25392	Slide clamp bolt	2		
266	108061140	Spring washer $\frac{3}{8}$" dia.	4		
267	107606010	Nut $\frac{3}{8}$" BSW	4		
268	104	Pivot block	1		
269	101608200	Pivot bolt ½" BSW x 2½" long	1		
270	107608020	Locknut ½" BSW	1		
271	107510050	Nut $\frac{3}{8}$" BSF slotted	1		
272	208010310	Split pin $\frac{5}{32}$"dia. x 1½" long	1		
273	62928	Main frame 20" model	1		
	62943	Main frame 24" model	1		
	62947	Main frame 30" model	1		
274	107204010	Nut ¼" UNC	2		
274a	108040840	Spring washer ¼" dia. (Scandinavia only)	2		
274b	27392	"U" bolt (Scandinavia only)	1		
275	27388	Safety bar (Scandinavia only)	1		
		DEPTH CONTROL SKID			
276	101606200	Socket bolt $\frac{3}{8}$" BSW x 2½" long	2		
277	107606010	Nut $\frac{3}{8}$" BSW	2		
278	25219	Depth control socket	1		
279	950	Depth control skid - (see depth control wheel illus. no. 341 - 353 for 30" model)	1		
280	671	Depth control arm	1		
281	674	Clip	1		
282	675	Spring	1		
283	101604140	Bolt ¼" BSW x 1¾" long	1		
284	107604020	Locknut ¼" BSW	1		
285	101606140	Pivot bolt $\frac{3}{8}$" BSW x 1¾" long	1		
286	209025410	Washer $\frac{3}{8}$" dia.	2		
287	107606020	Locknut $\frac{3}{8}$" BSW	1		
288	668	Support stay L.H.	1		
289	667	Support stay R.H.	1		
290	101604100	Bolt ¼" BSW x 1¼" long	1		
291	101604160	Bolt ¼" BSW x 2" long	2		
292 not allocated					
293	108040840	Spring washer ¼" dia.	3		
294	107604010	Nut ¼" BSW	3		
295	26928	Side frame	1		
296	591	Frame bolt, countersunk head	2		
297	208052010	Locking wire $\frac{1}{16}$" dia. x 4" long	2		
298	821	Weed cutter blade R.H.	1		
299	820	Weed cutter blade L.H.	1		
300	830	Weed cutter keeper plate	2		
301	108040840	Spring washer ¼" dia.	4		
302	101804040	Setscrew ¼" BSW x ½" long	4		
303	26959	Weed cutter bracket	1		

Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
		STAYTUBE AND STARTING HANDLE			
304	589	Staytube 20" model	1		
	25428	Staytube 24" model	1		
	25747	Staytube 30" model	1		
304A	209025440	Washer $\frac{7}{16}$" i.d. x 1" o.d. x 17G	1		
305	380	Starting handle 20" model (Not required with Sach or Kohler engine)	1		
	25466	Starting handle 24" model (Not required with Sach or Kohler engine)	1		
	25750	Starting handle 30" model (Not required with Sach or Kohler engine)	1		
		Note:- For South African machines use 24" starting handle on 20" machine 30" starting handle on 24" machines.			
		STARTING HANDLES for use with Extension Hubs			
	25466	Starting handle for 20" model	1		
	25750	Starting handle for 24" model	1		
306	381	Starting handle support lug	1		
307	101806060	Setscrew, lug to staytube $\frac{3}{8}$" BSW x ¾" long, hex. head (Not required with Sach or Kohler engine)	1		
308	107606020	Locknut $\frac{3}{8}$" BSW (Not required with Sach or Kohler engine)	1		
309	382	Pivot bolt (Not required with Sach or Kohler engine)	1		
310	209025440	Washer $\frac{7}{16}$" dia. special – (Not required with Sach or Kohler engine)	1		
311	107607020	Locknut $\frac{7}{16}$" BSW – (Not required with Sach or Kohler engine)	1		
312	101804060	Setscrew, side frame to shield ¼" BSW x ½" long, hex. head	5		
313	108040840	Spring washer ¼" dia.	5		
314	107604010	Nut ¼" BSW	5		
315	101806080	Setscrew, frame to gearbox $\frac{3}{8}$" BSW x 1" long	2		
316	317	Setscrew, staytube to gearbox and frame to gearbox	7		
317	108061140	Spring washer $\frac{3}{8}$" dia.	9		
318	208052010	Locking wire $\frac{1}{16}$" dia. x 40" long	1		
319 - 321 not allocated					

Parts List

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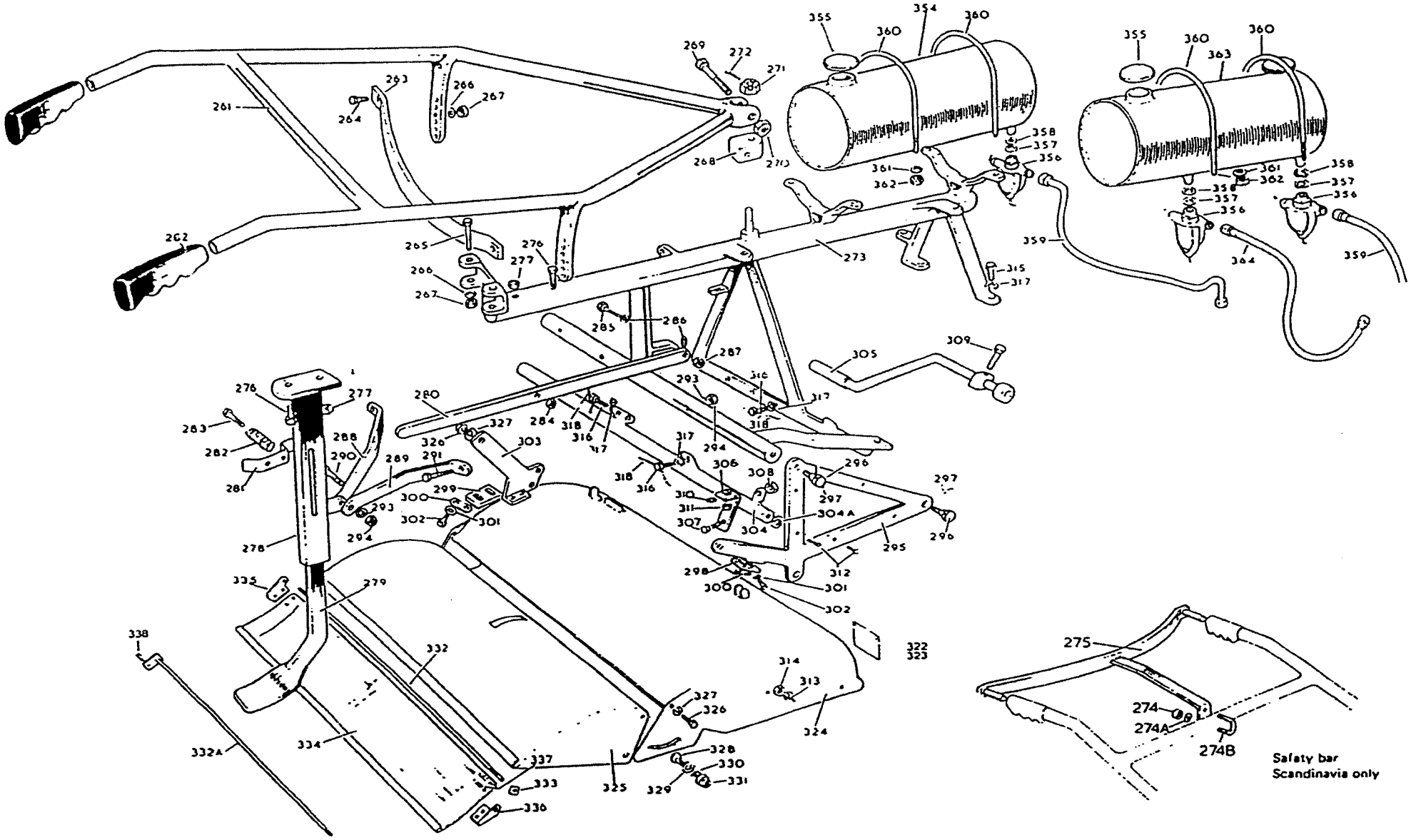

Illus. No	Part No.	Description	No. off	Bulletin	Bin No.
		SHIELDS			
322	58197	Machine number plate	1		
323	208026020	Chobert rivet $\frac{3}{32}$" x $\frac{3}{16}$" long	4		
324	25218	Front shield 20" Gem	1		
	25436	Front shield 24" Gem	1		
	102006	Front shield 24" Super Gem	1		
	25743	Front shield 30" Gem	1		
	102054	Front shield 30" Super Gem	1		
325	642	Rear shield 20" Gem	1		
	25443	Rear shield 24" Gem	1		
	102010	Rear shield 24" Super Gem	1		
	25744	Rear shield 30" Gem	1		
	102057	Rear shield 30" Super Gem	1		
326	101806080	Setscrew $\frac{3}{8}$" BSW x 1" long nex. head	2		
327	108061140	Spring washer $\frac{3}{8}$" dia.	2		
328	644	Clamping bolt	2		
329	209025480	Washer $\frac{7}{16}$" dia. x 1" o.d.	2		
330	108061150	Washer. thackeray $\frac{3}{8}$" dia.	2		
331	107606030	Nut $\frac{3}{8}$" BSW self locking	2		
332	646	Hinge bar 20" Gem	1		
	25479	Hinge bar 24" Gem	1		
	25751	Hinge bar 30" Gem	1		
332A	102018	Hinge bar 24" Super Gem	1		
	102062	Hinge bar 30" Super Gem	1		
333	107605020	Locknut $\frac{5}{16}$" BSW Gem	2		
333	107605020	Locknut $\frac{5}{16}$" BSW Super Gem	1		
334	25575	Trailing board 20" Gem	1		
	25454	Trailing board 24" Gem	1		
	25746	Trailing board 30" Gem	1		
		includes:-			
335	25964	Hinge bracket L.H.	1		
336	647	Hinge bracket R.H.	1		
337	208021050	Rivet $\frac{3}{16}$" dia. x $\frac{3}{8}$" long round head	4		
334	102014	Trailing board 24" Super Gem	1		
	102060	Trailing board 30" Super Gem	1		
		includes:-			
335	649	Hinge bracket L.H.	1		
336	647	Hinge bracket R.H.	1		
337	208021050	Rivet $\frac{3}{16}$" dia. x $\frac{3}{8}$" long	4		
338	208033030	Rivet $\frac{1}{8}$" dia. x .29 long	1		
The Super Gem Shields can be fitted to the Gem					
339	340 not allocated				
325 + 332 to 338	27416	Rear shield and trailing board assy. 20" Gem	1		
	27417	Rear shield and trailing board assy. 24" Gem	1		
	102017	Rear shield and trailing board assy. 24" Super Gem	1		
	27418	Rear shield and trailing board assy. 30" Gem	1		
	102056	Rear shield and trailing board assy. 30" Super Gem	1		

Illus. No	Part No.	Description	No. off	Bulletin	Bin No.
		DEPTH CONTROL WHEEL - 25827			
		Standard Fitment for 30" Model			
		Optional Extra for 20" and 24" Model			
341	664	Pedestal	1		
342	663	Arm	1		
343	208021510	Swivel pin	1		
344	208010200	Split pin $\frac{1}{8}$" dia. x 1" long	1		
345	107610020	Locknut $\frac{3}{8}$" BSW	1		
346	665	Tab washer	1		
347	657	Inner dust cover	1		
348	659	Bush	1		
349	658	Outer dust cover	1		
350	660	Wheel	1		
351	103804030	Oiling screw ¼" BSW x $\frac{3}{8}$" long, cheese head	1		
351A	108040840	Spring washer ¼" dia.	1		
352	661	Axle	1		
353	662	Wheel cap	1		
		FUEL TANK			
		Petrol for Twin Engine, Wisconsin and Kohler			
354	26598	Petrol tank	1		
355	203036150	Tank cap ... N.L.A.	1		
356	203061580	Petrol filter	1		
		includes:-			
	203060170	Bowl	1		
357	202028150	Sealing washer	As required		
358	26899	Fibre washer	As required		
359	26892	Fuel pipe - Twin engine	1		
	26897	Fuel pipe - Wisconsin engine	1		
360	175	Tank strap	2		
361	108040840	Spring washer ¼" dia.	4		
362	107604010	Nut ¼" BSW	4		
		FUEL TANK			
		V.O and Lamp Oil for Twin Engine.			
355	203036150	Tank cap	2		
356	203061580	Filter	2		
357	202028150	Sealing washer	As required		
358	26899	Fibre washer	As required		
359	26892	Fuel pipe - short	1		
360	175	Tank strap	2		
361	108040840	Spring washer ¼" dia.	4		
362	107604010	Nut ¼" BSW	4		
363	26588	Fuel tank	1		
364	26889	Fuel pipe	1		
365	366 not allocated				

28-1.91 FILLER NECK CHANGED TO TANK 203036270 CAP

Howard Gem and Super Gem Parts List

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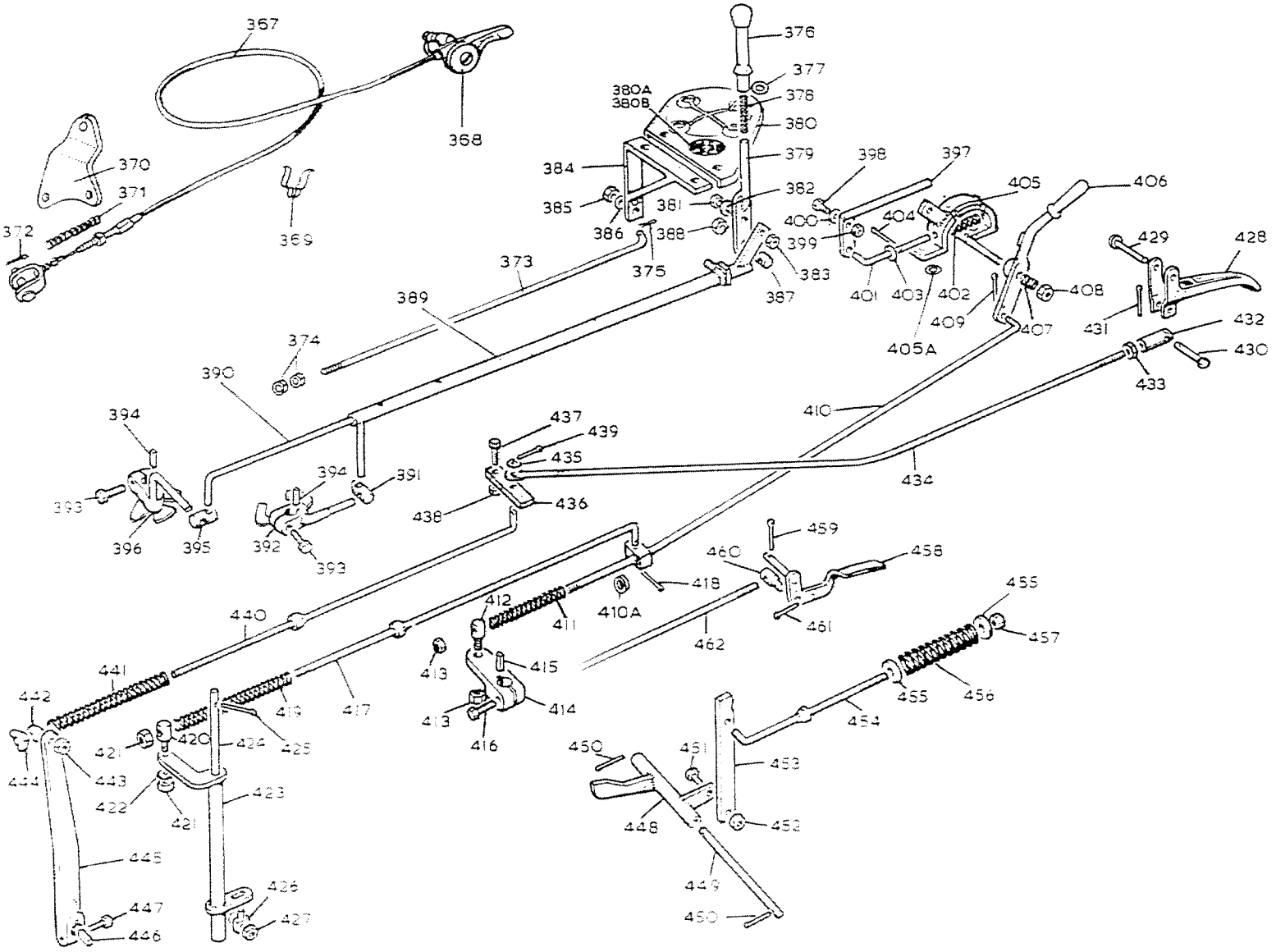

Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
		THROTTLE CONTROL — For Twin Engine			
367	27059	Throttle cable	1		
368	207001080	Hand control	1		
369	208003270	Throttle cable spring clip	1		
370	27076	Support plate	1		
371	27060	Throttle cable spring	1		
372	208010030	Split pin 1/16" dia. x 3/8" long	1		
		TRAVEL GEAR CONTROL			
373	26107	Stay rod	1		
374	107604010	Nut ¼" BSW	2		
375	208010040	Split pin 1/16" dia. x ½" long	1		
376	27404	Gear lever upper	1		
377	108081610	Washer ½" dia.	As required		
378	25161	Hand lever spring	1		
379	25158	Gear lever lower	1		
	25419	Indicator plate and gate comprising:-	1		
380	25173	Gate	1		
380A	25348	Indicator plate	1		
380B	208041090	Hammer drive screw no. 2 x 3/10" long	2		
381	101604060	Pivot bolt ¼" BSW x ¾" long	1		
382	108040910	Washer ¼" dia.	2		
383	107604020	Locknut ¼" BSW	1		
384	25136	Rear support bracket	1		
385	107605010	Nut 5/16" BSW	2		
386	108051010	Washer 5/16" dia.	2		
387	25415	Control rod trunnion	1		
388	107605140	Nut 5/16" BSW self locking	1		
389	25139	Control tube - to 1st and 2nd gears	1		
390	25165	Control rod - to 3rd and reverse gears	1		
391	25172	Universal joint - 1st and 2nd gears	1		
392	26110	Selector arm - 1st and 2nd gears	1		
393	101605080	Bolt, control arms 5/16" BSW x 1" long	2		
394	208008260	Key	2		
395	25166	Universal joint - 3rd and reverse gears	1		
396	26112	Selector arm - reverse and 3rd gears	1		
		ROTOR, DIFFERENTIAL AND HANDLEBAR CONTROL			
397	25320	Handlebar positioning arm	1		
398	101604060	Bolt ¼" BSW x ¾" long	1		
399	107604010	Nut ¼" BSW	1		
400	108040910	Washer ¼" dia.	2		
401	465	Positioning pin	1		
402	466	Spring	1		
403	108051010	Washer 5/16" dia.	1		
404	208010100	Split pin 5/64" dia. x ¾" long	1		

Illus. No	Part No.	Description	No. off	Bulletin	Bin No.
405	25222	Gear control quadrant assembly includes:-	1		
	26105	Indicator plate - rotor and differential	1		
	208032090	Pop rivet 1/8" dia. x .40" long	2		
405A	209025440	Washer 7/16" i.d. x 1" o.d. x 17.G	1		
406	781	Control hand lever	1		
407	792	Spring	1		
408	107605140	Nut 5/16" BSW self locking	1		
409	208010100	Split pin 5/64" dia. x ¾" long	1		
410	793	Rotor control rod	1		
410A	26715	Spacer	As required		
411	25412	Spring	1		
412	773	Eye bolt	1		
413	107605140	Nut 5/16" BSW self locking	2		
414	152	Rotor control arm	1		
415	208008260	Key	1		
416	101805080	Setscrew 5/16" BSW 1" long	1		
417	321	Differential lock control rod	1		
418	208010100	Split pin 5/64" dia. x ¾" long	1		
419	324	Control rod spring	1		
420	773	Eye bolt	1		
421	107605140	Nut 5/16" BSW self locking	2		
422	108051010	Washer 5/16" dia.	2		
423	25356	Differential lock selector quadrant	1		
424	25352	Quadrant pin	1		
425	208010080	Split pin 1/16" dia. x 1" long	1		
426	319	Trunnion	1		
427	107608020	Locknut ½" BSW	2		
		CLUTCH CONTROL			
428	25145	Hand lever	1		
429	208020090	Rivet ¼" dia. x 1½" long, flat head	1		
430	208021080	Link pivot rivet 3/16" dia. x 1 1/8" long, round head	1		
431	208010040	Split pin 1/16" dia. x ½" long	1		
432	25150	Adjusting link	1		
433	107605020	Locknut 5/16" BSW	1		
434	25170	Hand lever to pivot lever rod	1		
435	108040910	Washer ¼" dia.	1		
436	25144	Pivot lever	1		
437	101604060	Bolt ¼" BSW ¾" long	1		
438	107604010	Nut ¼" BSW	1		
439	208010100	Split pin 5/64" dia. x ¾" long	1		
440	25446	Pivot lever to control arm rod	1		
441	25412	Spring	1		
442	25410	Trunnion	1		
443	107605140	Nut 5/16" BSW self locking	1		
444	25411	Wing nut	1		
445	710	Control arm	1		
446	208008360	Key	1		
447	101805080	Setscrew 5/16" BSW x 1" long, hex. head	1		
USE	101204130	Nut ¼ x 1 5/16"			
+	107204130	Nut ¼ UNC.			

Howard Gem and Super Gem Parts List

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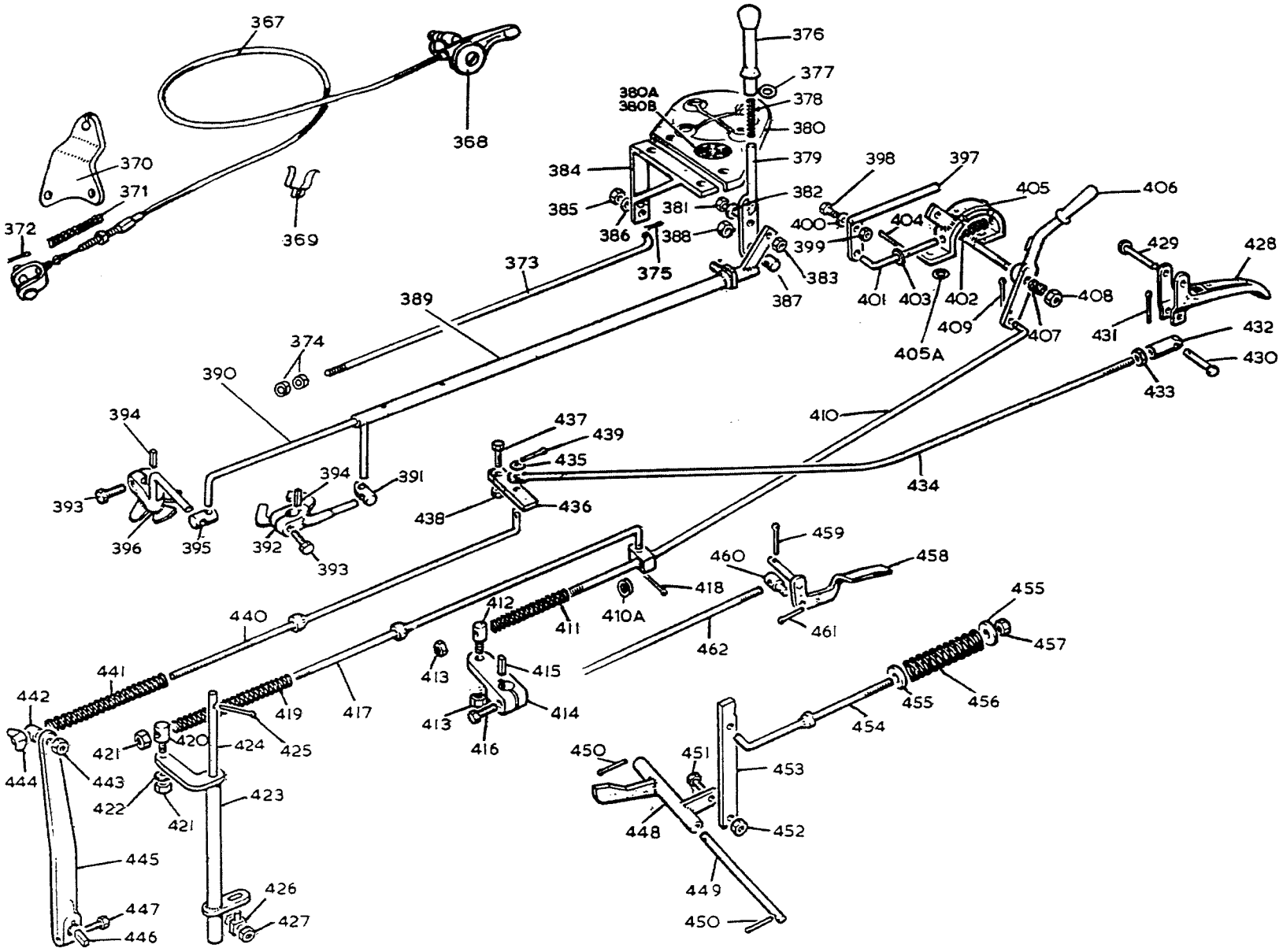
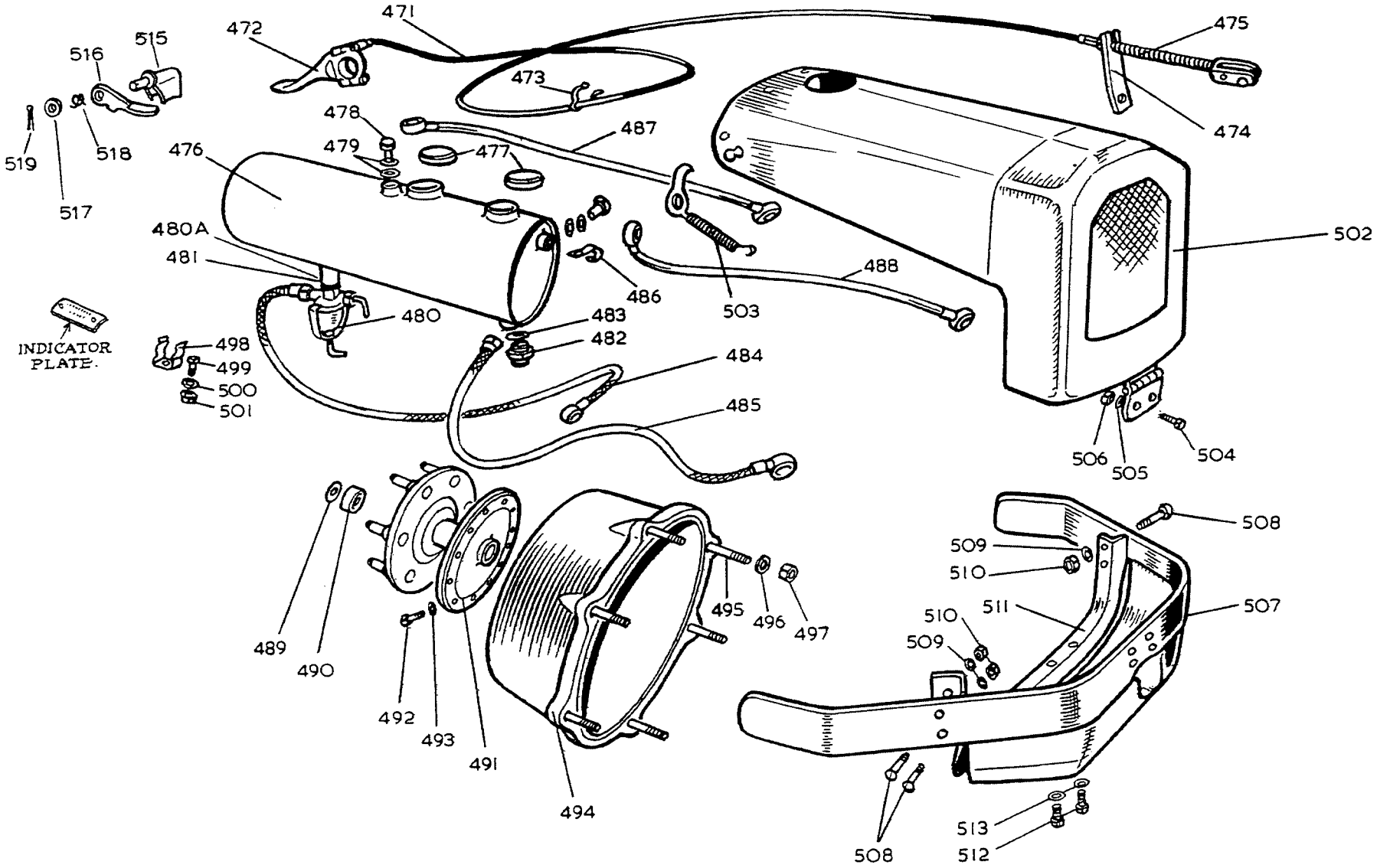


Illus. No	Part No.	Description	No. off	Bulletin	Bin No.
		REVERSE INTERLOCK			
448	25132	Rocker	1		
449	25153	Rocker pin	1		
450	208010030	Split pin $\frac{1}{16}$" dia. x $\frac{3}{8}$" long	2		
451	101604060	Setscrew ¼" BSW x ¾" long, hex. head	1		
452	107604010	Nut ¼" BSW	1		
453	25152	Vertical link	1		
454	25181	Rod	1		
455	25178	Special washer	2		
456	25131	Spring	1		
457	107605010	Nut $\frac{5}{16}$" BSW	1		
		DECOMPRESSOR CONTROL —For Twin Engine only			
458	188	Hand lever	1		
459	208010100	Split pin $\frac{5}{64}$" dia. x ¾" long	1		
460	789	Trunnion	1		
461	208010040	Split pin $\frac{1}{16}$" dia. x ½" long	2		
462	25646	Valve lifter rod	1		
463 - 470 not allocated					

Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.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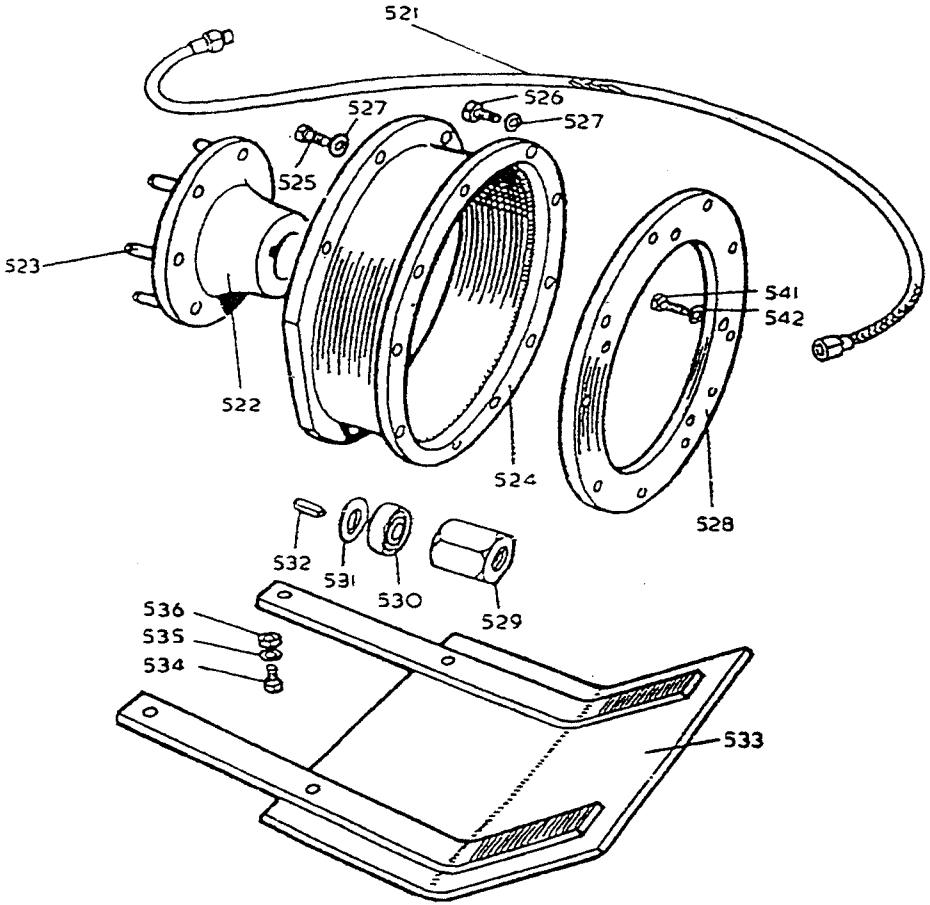
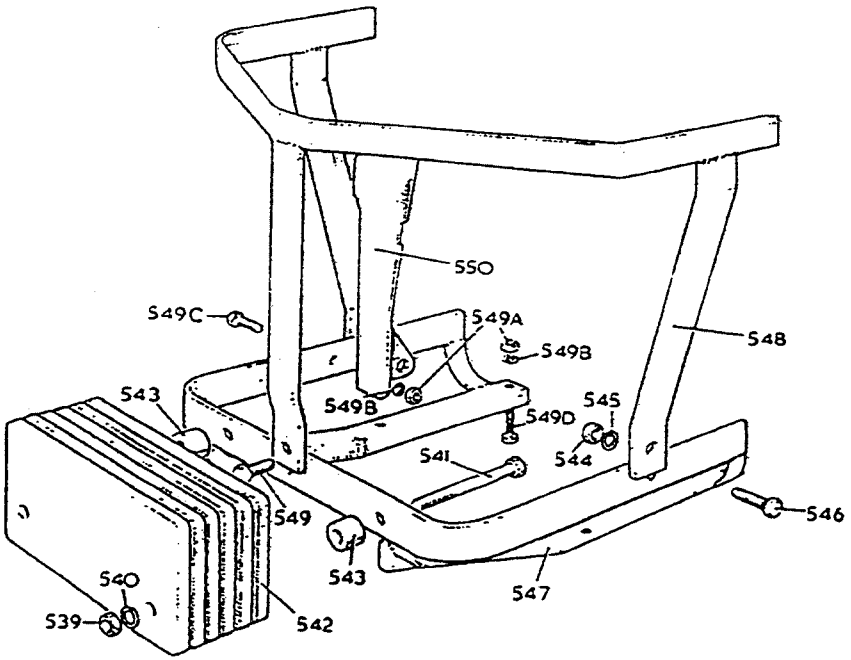
Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
		CONVERSION UNIT FOR SACH 500 and 600 ENGINES			
N.I.	203001210	Engine Sachs Diesel 500	1		
N.I.	203001030	Engine Sachs Diesel 600	1		
471	26337	Throttle cable	1		
472	207001080	Throttle control lever	1		
473	208003270	Throttle cable spring clip	1		
474	27217	Bracket	1		
475	26575	Spring	1		
476	55891	Fuel and oil tank — for 500 engine	1		
	27036	Fuel and oil tank — for 600 engine	1		
477	203036150	Tank cap	2		
478	55961	Banjo bolt (for 500 engine)	1		
479	55962	Fibre washer (for 500 engine)	2		
478	55961	Banjo bolt (for 600 engine)	2		
479	55962	Fibre washer (for 600 engine)	4		
480	203061580	Petrol filter includes:-	1		
	203060170	Bowl	1		
480A	202028150	Sealing washer	As required		
481	26899	Fibre washer	As required		
482	202031030	Union ¼" BSP	1		
483	108081260	Fibre washer ⅜" o.d. x ⅛" i.d. x $\frac{1}{16}$" thick	1		
484	26338	Fuel pipe	1		
485	26336	Oil feed pipe	1		
486	26578	Pipe clip	1		
487	27037	Injector spill pipe (for 600 engine)	1		
488	27038	Pump spill pipe (for 600 engine)	1		
489	8007	Special washer	1		
490	250513045	Ballbearing 1 $\frac{5}{16}$" o.d. x ½" i.d. x $\frac{3}{8}$" w. BRL ½" double sealed	1		
491	26565	Drive adaptor (for 500 engine)	1		
492	301406180	Setscrew, drive adaptor to flywheel 6mm dia. x 18mm long (for 500 engine)	12		
493	108040840	Spring washer ¼" dia. (for 500 engine)	12		
491	26844	Drive adaptor (for 600 engine)	1		
492	301408200	Setscrew, drive adaptor to flywheel 8mm dia. x 20mm long (for 600 engine)	6		
493	108050940	Spring washer $\frac{5}{16}$" dia. (for 600 engine)	6		
494	26745	Bell housing	1		
495	26746	Stud	6		
496	108071410	Washer $\frac{7}{16}$" dia.	6		
497	107607010	Nut $\frac{7}{16}$" BSW	6		
498	26579	Spring clip (for 20" & 24" models)	1		
499	101605080	Bolt $\frac{3}{16}$" BSW x 1" long (for 20" & 24" models)	1		
500	108050940	Spring washer $\frac{5}{16}$" dia. (for 20" & 24" models)	1		
501	107605010	Nut $\frac{5}{16}$" BSW (for 20" & 24" models)	1		
498	26579	Spring clip (for 30" models)	2		
499	101605080	Bolt $\frac{3}{16}$" BSW x 1" long (for 30" models)	2		
500	108050940	Spring washer $\frac{5}{16}$" dia. (for 30" models)	2		
501	107605010	Nut $\frac{5}{16}$" BSW (for 30" models)	2		
		FOR SACH 500 ENGINE ONLY			
502	26724	Bonnet	1		
503	26753	Bonnet fastener	2		
504	101705060	Setscrew $\frac{5}{16}$" BSF x ¾" long, hex. head	2		
505	108050940	Spring washer $\frac{5}{16}$" dia.	2		
506	not allocated				
		FOR SACH 500 and 600 ENGINE			
507	26756	Bumper bar	1		
508	105606180	Coach bolt $\frac{3}{8}$" BSW x 2¼" long, rd. head sq. neck	4		
509	108061140	Spring washer $\frac{3}{8}$" dia.	4		
510	107606010	Nut $\frac{3}{8}$" BSW	4		
511	26741	Angle support	1		
512	26749	Special setscrew	2		
513	209025530	Spring washer ⅜" dia.	2		
514	not allocated				
	27290	Throttle stop control assembly comprising:-	1		
515	27291	Fulcrum bracket	1		
516	27294	Throttle stop catch	1		
571	108040910	Flat washer ¼" dia.	1		
518	108040850	Spring washer ¼" dia. double coil	1		
519	208010040	Split pin $\frac{1}{16}$" dia. x ½" long	1		
	27295	Indicator plate	1		
	208031090	Hammer drive screw, type 'u' no. 2 dia. x $\frac{3}{16}$" long	4		

Parts List

Parts List

693	A	9.78	22



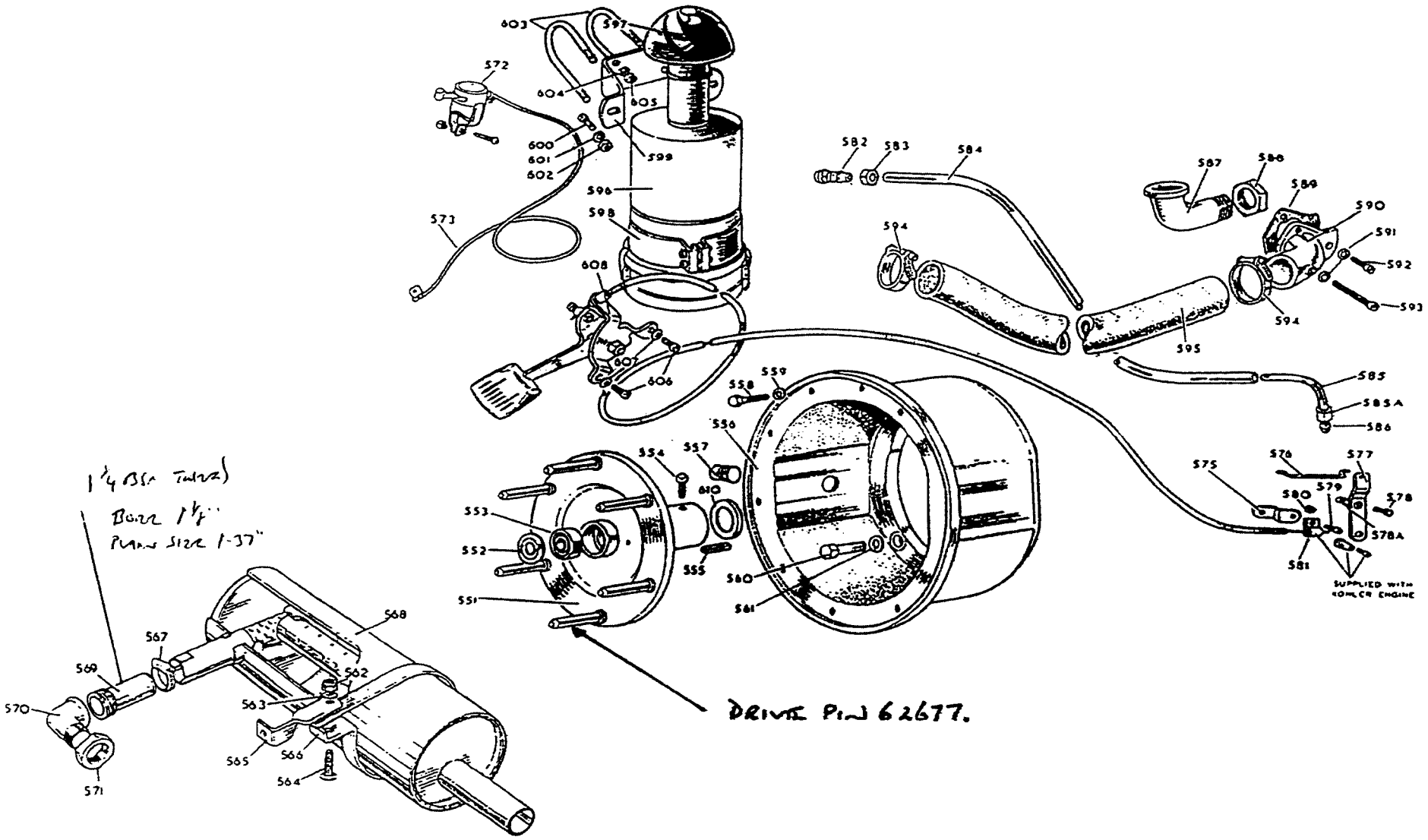


Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
		WISCONSIN AEN ENGINE AND FITTINGS			
	203001230	Engine Wisconsin AEN	1		
521	26897	Petrol supply pipe	1		
	26554	Drive flange rivet assembly comprising:- (Model AEN)			
522	26555	Drive flange	1		
523	62677	Driving pin	6		
524	26430	Adaptor	1		
525	101804060	Bolt ¼" BSW x ¾" long, hex. head	8		
526	101804080	Bolt ¼" BSW x 1" long, hex. head	10		
527	108040840	Spring washer ¼" dia.	18		
528	26552	Adaptor ring (model AEN)	1		
529	26553	Flywheel nut (model AEN)	1		
530	250513041	Ballbearing for flywheel nut	1		
531	8007	Retaining plate	1		
532	26438	Key	1		
533	26556	Cowling guard (Model AEN)	1		
534	101206240	Bolt ⅜" UNC x 3" long (Model AEN)	4		
535	108061140	Spring washer ⅜" dia. (Model AEN)	4		
536	107206010	Nut ⅜" UNC (Model AEN)	4		
537	101407100	Setscrew 7/16" ANC x 1¼" long (Model AEN)	4		
538	108071240	Spring washer 7/16" dia.	4		
	103303030	Setscrew No. 10 UNF x ⅜" long cheese head	2		
	•108030540	Spring washer 5/16" dia.	2		
		KOHLER ENGINE AND FITTINGS		M12	M16
	203001090	Kohler 301T Engine Gem 20" + 24"	1		
	203001420	Kohler K341T Engine Super Gem 24" Spec: No. 71268 A	1		
	68641	Bumper bar and weights assy. comprising:- (Gem)			
	27366	Front weight assembly comprising:- (Gem)			
539	107210010	Nut ⅜" UNC	2		
540	108101740	Spring washer ⅜" dia.	2		
541	101210400	Bolt ⅜" UNC x 5" long	2		
542	27359	Front weight	6		
543	not allocated				
544	107206010	Nut ⅜" UNC	4		
545	108061140	Spring washer ⅜" dia.	4		
546	101406120	Setscrew ⅜" UNC x 1½" long	4		
547	68642	Bumper	1		
548 - 549	not allocated	See Super Gem			
550	27278	Carburettor guard	1		

Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
				M12	M16
	102025	Front guards and weight assy. comprising:- (Super Gem)	1		
539	107210010	Nut ⅜" UNC	2		
540	108101740	Spring washer ⅜" dia.	2		
541	101210520	Bolt ⅜" UNC x 6½" long	2		
542	27359	Front weight	6	— 5 (Max)	
543	102032	Spacer (Super Gem)	2		
544	107210010	Nut ⅜" UNC (Gem)	2		
545	108101740	Spring washer ⅜" dia.	2		
546	101406120	Setscrew ⅜" UNC x 1½" long	2		
547	102030	Bumper	1	102088	102088
548	102026	Front guard	1	102087	102087
549	101310080	Setscrew ⅜" UNF x 1" long	1		
549A	107206010	Nut ⅜" UNC	5	— 4 only	
549B	108061140	Spring washer ⅜" dia.	5	— 4 only	
549C	101406080	Setscrew ⅜" UNC x 1" long	1	— not used	
549D	101206120	Setscrew ⅜" UNC x 1½" long	4		
550	102033	Carburettor guard	1	— not used	

Parts List

693	B	9.78	24



Illus No.	Part No.	Description	No. off	Bulletin	Bin No.
		KOHLER ENGINE AND FITTINGS			
51	59702	Clutch extension	1		
52	8007	Special washer	1		
53	250513045	Ball journal 1 $\frac{5}{16}$" o.d. x $\frac{1}{2}$" i.d. x $\frac{3}{8}$" w. BRL $\frac{1}{2}$"	1		
54	126405040	Setscrew $\frac{5}{16}$" UNC x $\frac{1}{2}$" long, cup point 'UNBRAKO' square head	1		
55	208008350	Key	1		
56	68635	Ball housing	1		
57	203031190	Drain plug $\frac{1}{2}$" BSP square head	1		
58	101404070	Setscrew $\frac{1}{4}$" UNC x $\frac{7}{8}$" long, hex. head	8		
59	108040840	Spring washer $\frac{1}{4}$" dia.	8		
60	101407100	Setscrew $\frac{7}{16}$" UNC x 1$\frac{1}{4}$" long, hex. head	4		
61	108071240	Spring washer $\frac{7}{16}$" dia.	4		
	102024	Exhaust muffler assembly comprising:-	1		
62	107105030	Nut $\frac{5}{16}$" UNF self locking	1		
63	108051010	Flatwasher $\frac{5}{16}$" dia.	1		
64	101305190	Setscrew $\frac{5}{16}$" UNF x 1$\frac{1}{4}$" dia.	1		
65	102038	Support bracket	1		
66	102039	Support strap	1		
67	208003090	Clip 2A	1		
68	203027060	Muffler ... } Alternatives	1		
	27394	Muffler ... }	1		
69	102034	Adaptor	1		
70	202034610	Elbow 1$\frac{1}{4}$" BSP 90° Male/Female	1		
71	202041340	Back nut 1$\frac{1}{4}$" BSP	1		
72	207005090	Stop switch	1		
73	67782	Cable and terminal short	1		
74	101406080	Setscrew $\frac{3}{8}$" UNC x 1" long, hex. head	2		
75	68712	Throttle pivot link	1		
76	68711	Throttle control connector	1		
77	68708	Throttle control lever	1		
78	101403060	Setscrew no. 10 UNC x $\frac{3}{4}$" long, hex. head	1		
78A	107203010	Nut no. 10 - 24 UNC	1		
79	103902040	Setscrew 2BA x $\frac{1}{2}$" long, cheese head slotted	1		
80	107902010	Nut 2BA	1		
81	203210149	Clip - Kohler no. 210149	1		
	68637	Fuel line assembly comprising:-	1		
82	202038110	Nipple	1		
83	202039500	Union nut $\frac{1}{4}$" BSP	1		
84	202026210	Nylon tube 17" long	1		
85	202034120	Elbow 90°	1		
86	202039470	Union nut $\frac{7}{16}$" - 24 BSW	1		
86	202038120	Cone	1		
87	202034320	Elbow 90° 1" A.S.S.P.T. Male/Female	1		
88	202041230	Backnut 1" A.S.S.P.T.	1		
89	69099	Carburettor gasket	1		
590	68636	Induction elbow	1		
591	108030730	Shakeproof washer 2BA dia.	2		
592	103902040	Setscrew 2BA x $\frac{1}{2}$" long, cheese head slotted	2		
593	103902200	Bolt, 2BA x 2$\frac{1}{2}$" long, cheese head slotted	1		
594	208003100	Jubilee clip	2		
595	27026	Air cleaner hose	1		
596	203034010	Air cleaner	1		
597	203034030	Pre-cleaner	1		
598	203034060	Support bracket	1		
599	27027	Air cleaner support bracket	1		
600	101705050	Setscrew $\frac{5}{16}$" BSF x $\frac{5}{8}$" long, hex. head	2		
601	108050940	Spring washer $\frac{5}{16}$" dia.	2		
602	107505010	Nut $\frac{5}{16}$" BSF	2		
603	27028	'U' bolt	2		
604	108040840	Spring washer $\frac{1}{4}$" dia.	4		
605	107504010	Nut $\frac{1}{4}$" BSF	4		
	203034070	Stackpipe	1		
	27029	Clip	1		
	27030	Stay	1		
	27031	Tank bracket	1		
	101504050	Bolt $\frac{1}{4}$" BSF x $\frac{5}{8}$" long	2		
	108040840	Spring washer $\frac{1}{4}$" dia.	2		
	107504010	Nut $\frac{1}{4}$" BSF	2		
606	103902030	Setscrew 2BA x $\frac{3}{8}$" long cheese head	2		
607	108030730	Shakeproof washer $\frac{3}{16}$" dia.	2		
(*) 608	207001240	Throttle cable Inner cable 74½" Outer cable 71½"	1	(A)	
609	not allocated				
610	102040	Spacer Super Gem Only	1		

Optional Fitting

(*) ORIGINAL THROTTLE CONTROL AND ENGINE CUT OUT AS SEPARATE ITEMS

ANNEX 1988 REPLACED BY 102120 LEVER & CABLE + 102123 CUT OUT ASSY

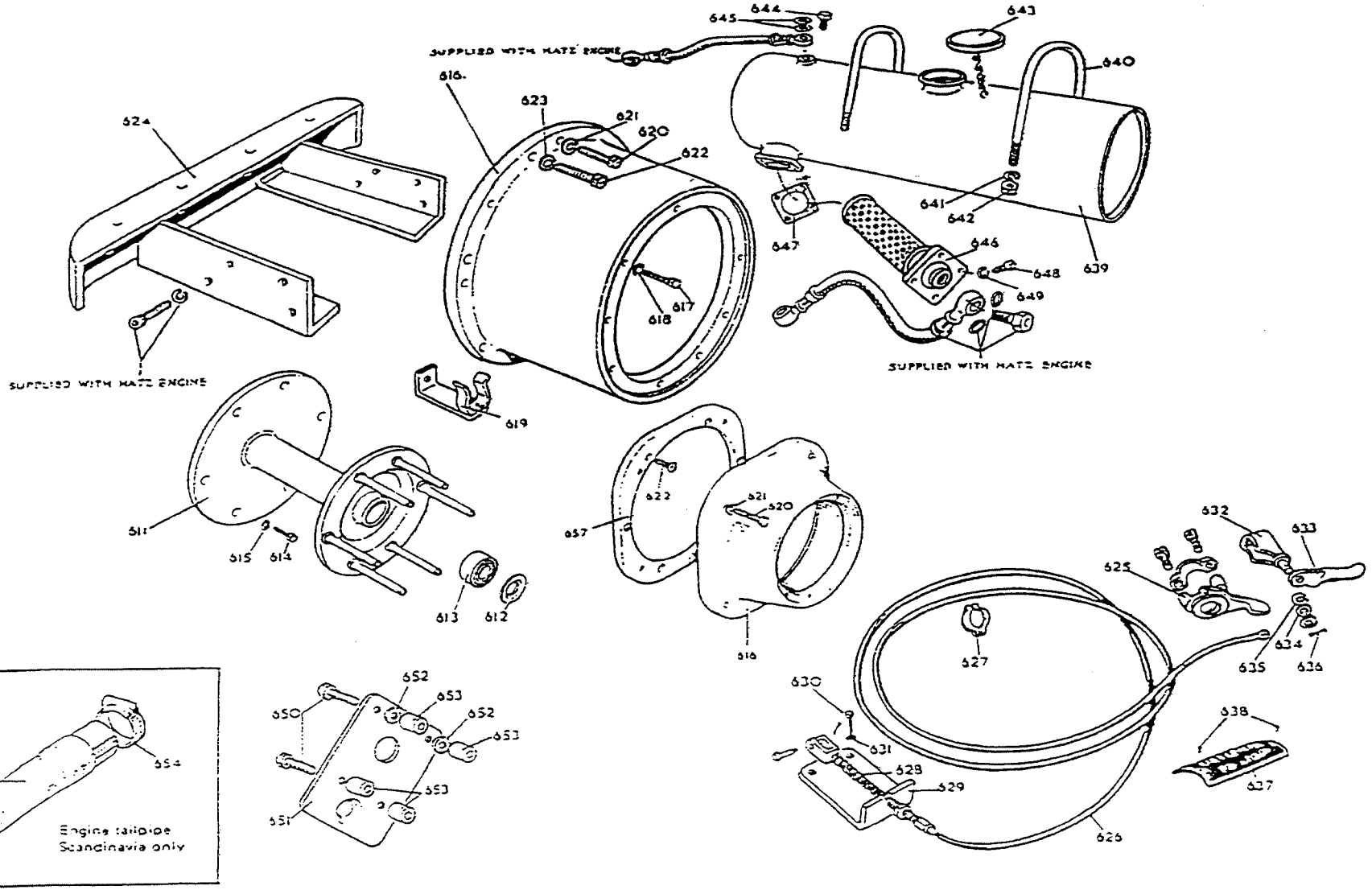
ANNEX 1991 REPLACED BY 102138 THROTTLE LEVER/CABLE & CUT OUT ASSY.

CONSIST OF
1 x 102140 ADAPTOR WIA
1 x 208003100 CLIP
1 x HATZ PRE-CLEANER
39026 7900

(A) NOW SUPPLIED WITH CARBON TIE 13052 (SEPT 91)

Parts List

693	B	9.78	26



HATZ ENGINE AND FITTINGS

Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
		*Gem			
		+Super Gem			
	203001370	*Hatz Engine ES 780U	1		
	203001430	+Hatz Engine E 785U	1	19-10-89	102124
611	27297	Drive adaptor	1		
612	8007	Special washer	1		
613	250513045	Ball journal 1 5/16" o.d. x ½" i.d. x 5/8"	1		
614	301408200	Setscrew 8mm dia. x 20mm long	6		
615	108050940	Spring washer 5/16" dia.	6		
616	27296	*Bell housing	1		
	102021	+Bell housing	1		
617	101404060	Setscrew ¼" UNC x ¾" long	8		
618	108040840	Spring washer ¼" dia.	8		
619	27352	Handle clip rivet assembly	1		
620	301208350	*Bolt 8mm dia. x 35mm long	10		
	301412350	+Bolt 12mm dia. x 35mm long	4		
621	108050940	*Spring washer 5/16" dia.	10		
	308120045	+Spring washer 5/16" dia.	4		
622	301210350	*Bolt 10mm dia. x 35mm long	2		
	302210300	+Screw M10 dia. x 10 H socket csk. hd.	6		
N.I.	208008580	Allen key for 302210300 illus. no. 622	1		
623	108071240	*Spring washer 1/2" dia.	2		
624	27348	Bumper bar	1		
625	207001080	Throttle control lever	1		
626	26337	Throttle cable complete	1		
627	208003270	Throttle cable spring clip	1		
628	26575	Spring	1		
629	27331	*Bracket	1		
	102036	+Bracket	1	16.1.88	FOR HATZ E786 USE 27331
630	301408160	Setscrew 8mm dia. x 16mm long	2		
631	108051030	Shakeproof washer 5/16" dia.	2		
	27290	Throttle stop control assembly comprising:-	1		
632	27291	Fulcrum bracket	1		
633	27294	Throttle stop catch	1		
634	108040910	Flat washer ¼" dia.	1		
635	108040850	Spring washer ¼" dia. double coil	2		
636	208010040	Split Pin 1/16" dia. x ½" long	1		
637	27295	Indicator Plate	1		
638	208032070	Pop rivet	2		
639	27326	Fuel tank	1	28.1.91	FILLER NECK CHANGED TO ACCEPT NEW CAP 203036270
640	175	Tank strap	2		
641	108040840	Spring washer ¼" dia.	4		
642	107604010	Nut ¼" BSW	4		
643	203036150	Tank cap	1	28-1-91	FILLER CAP. NOTE NOT INTERCHANGEABLE WITH WITH NEW TYPE.
644	55961	Banjo bolt small	1		
645	55962	Fibre washer	2		
646	27370	Fuel filter includes:-	1		
	203016050	Element	1		

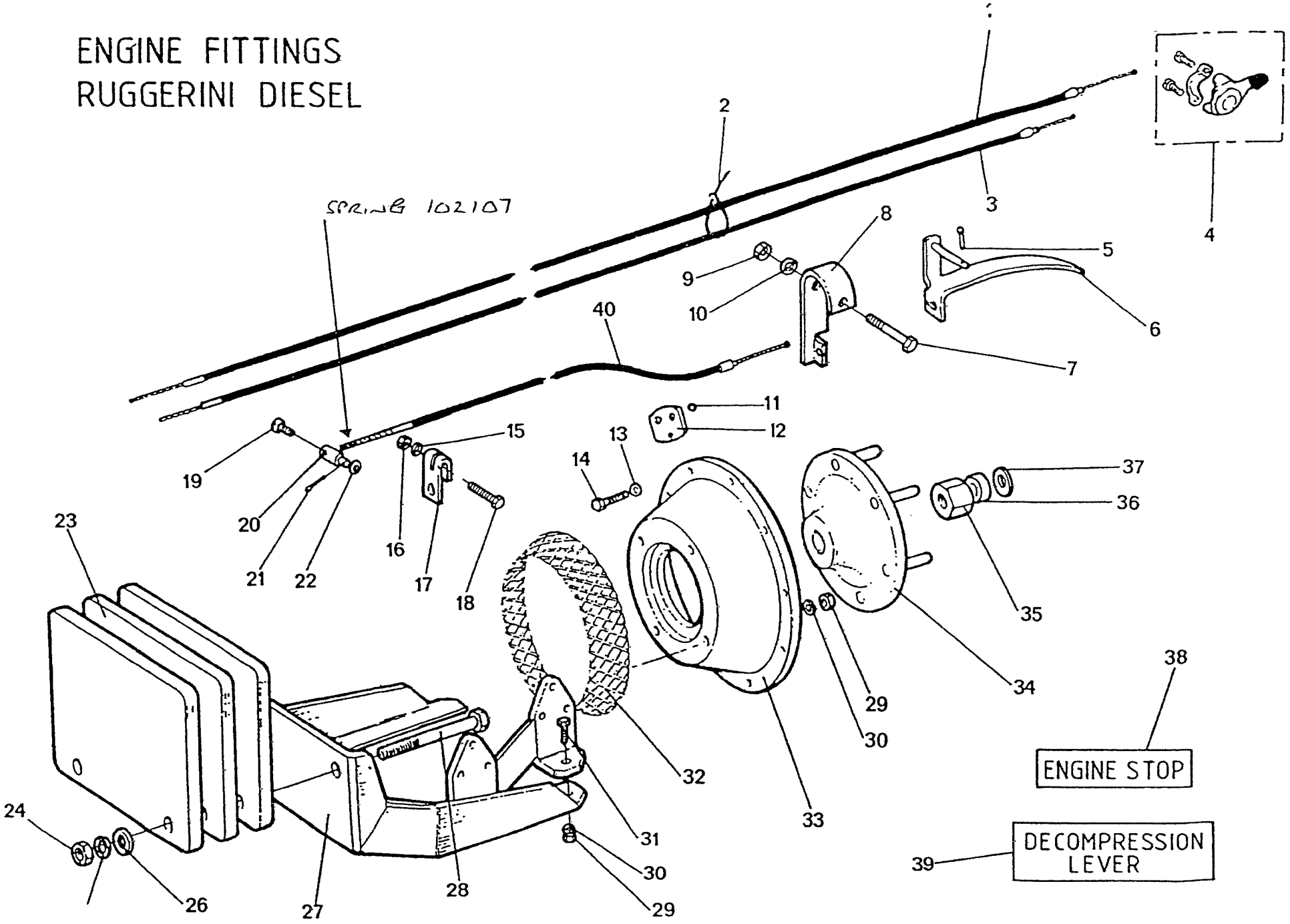
Illus. No.	Part No.	Description	No. off	Bulletin	Bin No.
647	27371	Gasket	1		
648	103404040	Screw ¼" UNC x ½" lg. cheese head slotted	4		
649	108040840	Spring Washer ¼" dia.	4		
N.I.	208008540	Socket screw key 6mm A/F - for 301208350 ill. no. 650	1		
	27378	Cover assembly comprising:-	1		
650	301208350	Setscrew 8mm dia. x 35mm long, hex. head	4		
651	27377	Cover plate	1		
652	108051010	Flat washer 5/16" dia.	2		
653	27376	Spacer	4		
654	208002090	Hose clip type 2A Scandinavia	1		
655	27408	Engine tailpipe only	1		
657	102035	+Adaptor plate	1		

MACHINE TRANSFERS (NOT ILLUSTRATED)

	27409	Warning (English) 1
	27410	Warning (Finland) 1
	27411	Warning (Sweden) 1
	58194	Queen's Award and Royal Warrant 1
	66414	Maintenance instruction 1
	68610	Engine label - to be fitted to top of stop switch PN. 207005090 Illus. 572 1

SEE ASSY 102023

ENGINE FITTINGS
RUGGERINI DIESEL

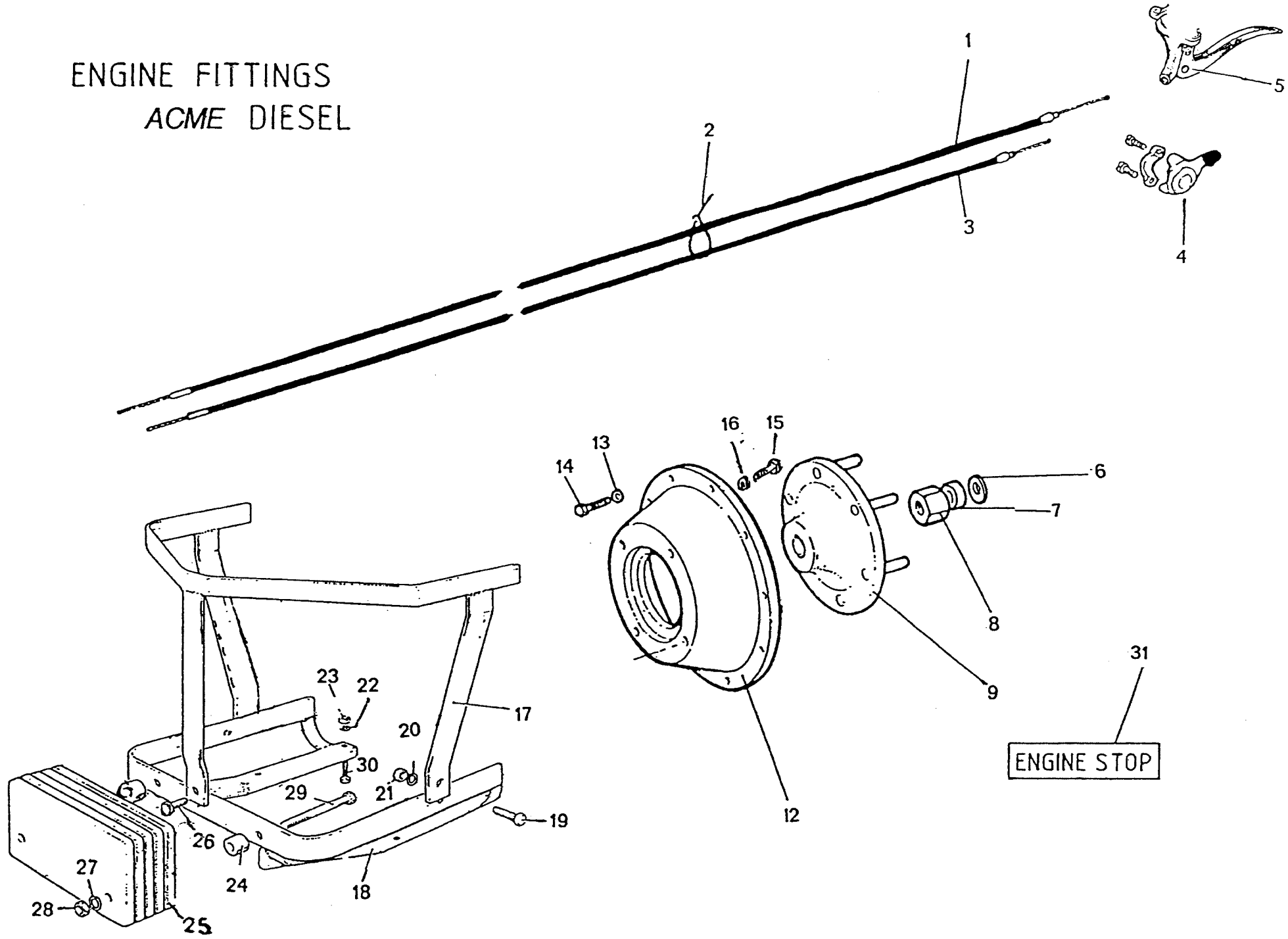


ENGINE FITTINGS
RUGGERINI DIESEL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	Cable — STOP (LONG)	27451
2	4	Cable Tie	207027220
3	1	Cable — THROTTLE (SHORT)	27450
4	2	Hand Control	207001080
5	1	Split Pin	208010130
6	1	Decompression Lever	102100
7	1	Bolt M8 x 60	301208600
8	1	Support Bracket	102102
9	1	Nut M8	307208010
10	1	Spring Washer Ø8	308080040
11	2	Grommet	203035460
12	1	Cable Guide	27468
13	8	Spring Washer	108040840
14	8	Screw	101404075
15	1	Spring Washer Ø6	308060045
16	1	Nut M6	307206015
17	1	Cable Clamp	102104
18	1	Setscrew M6 x 30	301406305
19	1	Cheese Head Screw	103902035
20	1	Trunnion	102105
21	1	Split Pin	208010030
22	1	Washer Ø5	308050015
23	3	Weight D20	27444
-	4	Weight D24	27444
24	2	Nut	307216015
25	2	Spring Washer	308160045
26	2	Flat Washer	308160015
27	1	Bumper	27443
28	2	Bolt D20	301216755
-	2	Bolt D24	301216905
29	8	Nut	307210015
30	8	Spring Washer	308100045
31	4	Screw	301410255
32	1	Guard	27469
33	1	Adaptor Casting	27442
34	1	Drive Adaptor	27448
35	1	Drive Adaptor Nut	27473
36	1	Bearing	250513045
37	1	Washer	8007
38	1	Decal Engine Stop	27475
39	1	Decal Decompression Lever	27477
40	1	Decompression Cable	102103
N.I.	1	" " SPRING	102107

ENGINE FITTINGS

ACME DIESEL



ENGINE FITTINGS

ACME DIESEL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	Cable Throttle	27450
2	4	Cable Tie	207027220
3	1	Cable Cut Out	102131
4	1	Hand Control	207001080
5	1	Hand Lever	207002050
6	1	Washer	8007
7	1	Ball Bearing	250513045
8	1	Drive Adaptor Nut	27473
9	1	Drive Adaptor	27448
10		-	
11		-	
12	1	Adaptor Casting	27442
13	8	Spring washer 1/4" Dia.	108040845
14	8	Setscrew 1/4" UNC x 7/8" LG	101404075
15	4	Setscrew M10 x 20 LG	301410205
16	4	Spring Washer Ø10	308100045
17	1	Front Guard	102087
18	1	Bumper Bar	102132
19	2	Setscrew 5/8" UNC x 1½" LG	101410120
20	2	Spring washer 5/8" Dia	108101740
21	2	Nut 5/8" UNC	107210010
22	4	Spring Washer 3/8" Dia.	108061140
23	4	Nut 3/8" UNC	107206010
24	2	Spacer	102032
25	3(20") 4(24")	Front Weight	27444
26	1	Setscrew 5/8" UNF x 1" LG	101310080
27	2	Spring washer 5/8" Dia.	108101740
28	2	Nut 5/8" UNC	107210010
29	2	Bolt 5/8" UNC x 4 3/4" LG	101210350
30	4	Setscrew 3/8" UNC x 1½" LG	101406120
31	1	Decal Engine Stop	27475

Numerical Parts List

Part No.	Illus. or Page No.	Bin No.
104	268	
123	263	
130	125	
141	86	
142	85	
152	414	
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