

Norlett Cultivator Tiller Rotavator

Manual – Operating & Maintenance
Instructions- Spare Parts List

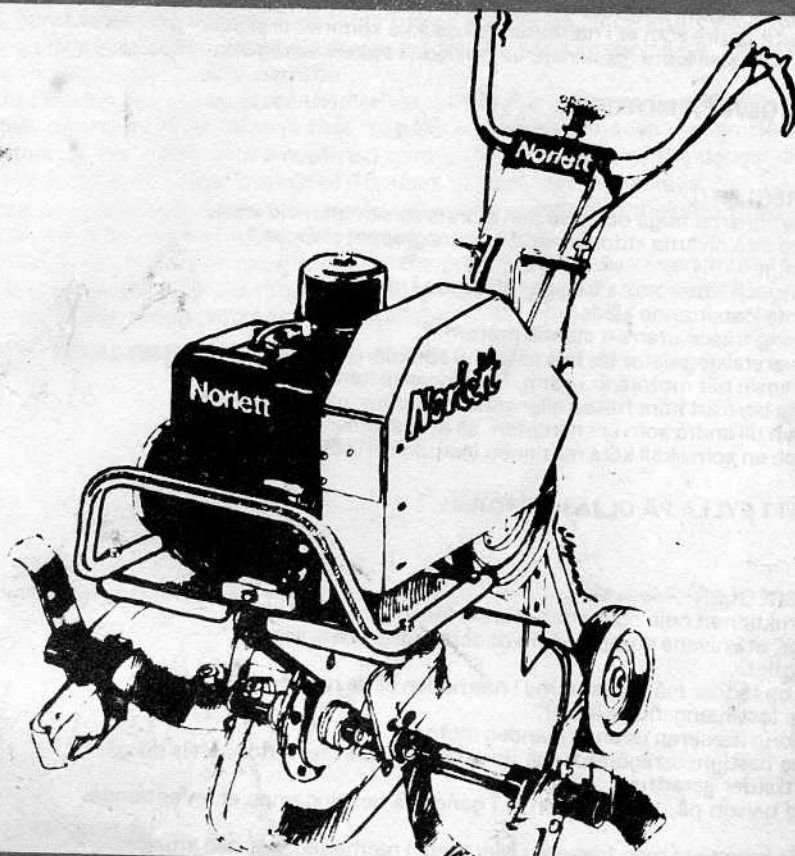
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Håndbok
Handbok
Håndbog
Käsikirja

Handbook
Handbuch
Manuel
Handboek

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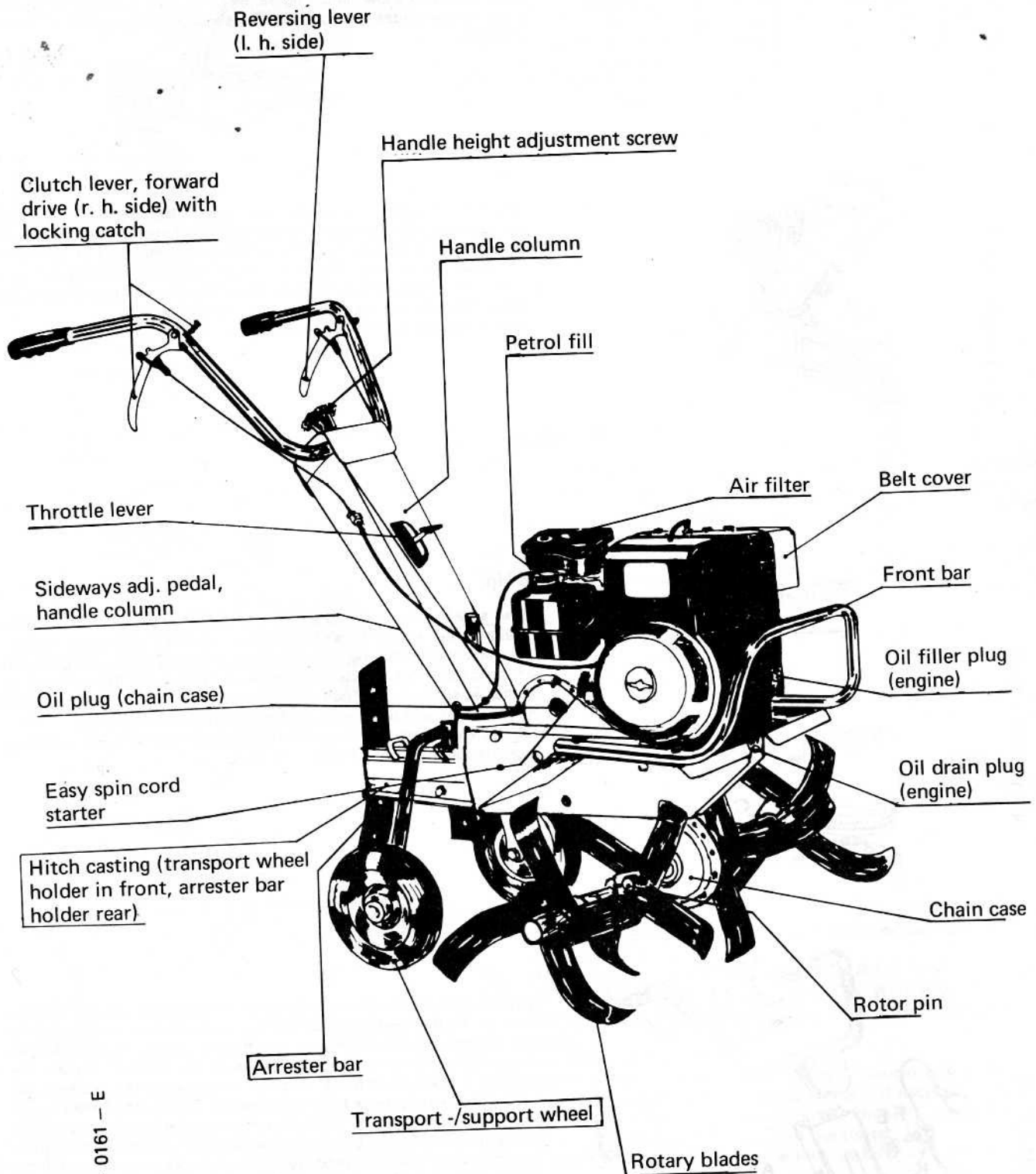


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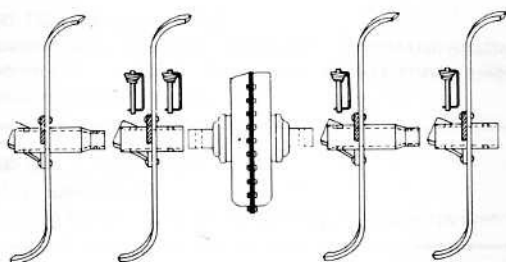
Norlett

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ENGLISH



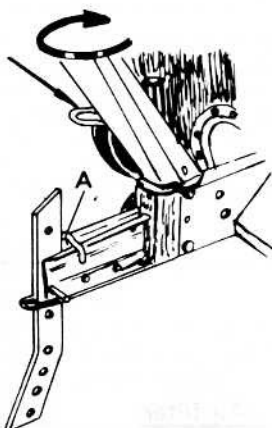
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In order to reduce packing and transport costs, some minor parts which can easily be assembled are enclosed. Please carry out the preparatory procedures in the order mentioned below.

Firstly, mount the rotary blades in order to steady the cultivator. When mounting, note the following: The rotary blades consist of 2 different pairs. Mount as shown in the figure, and in such a way that the cutting edges of the blades cut down into the soil when they pull the cultivator forward.

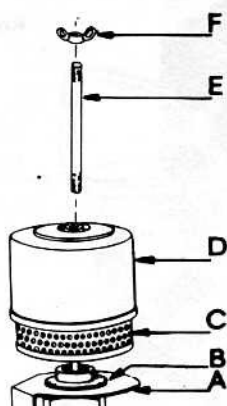
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The handle column is twisted into place. The pedal for sideways adjustment is held down until the correct position is reached. The throttle lever box is pressed into place in the slot on the front of the handle column. Check the movement of the lever. Make sure there are no sharp kinks in the cable and try the lever to see that it moves evenly and easily. Mount the arrester bar using the arrester bar bolt (A).

(The transport wheel bar has already been fitted at the factory.)

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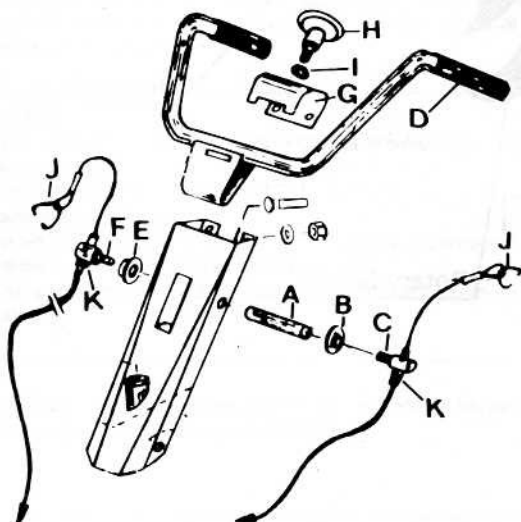


5 Hp

Make sure that there are no scraps of paper from the container or other foreign matter among the air filter parts or around the carburettor intake. Assemble the air filter by first placing the bottom plate (A) and gasket (B) on the carburettor. The air filter insert (C) and cover (D) are fitted together as shown and placed on the carburettor. The screw (E) is tightened by hand, and the wing-nut (F) then screwed into position.

When cleaning the filter (see «MAINTENANCE»), the wing-nut and screw must be removed before taking off the cover/filter.

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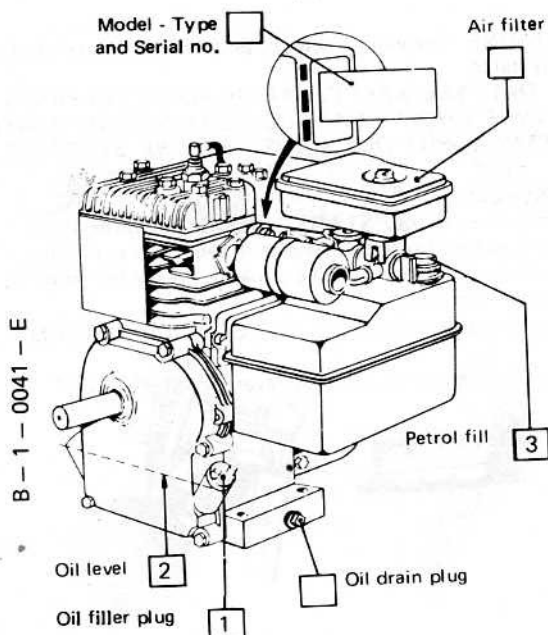


Screw in the axle (A) with flanged washer (B) on cable holder (C) as far as it will go. Fit the handlebars (D) into the handle column, and thread the axle (A) through the handlebars and handle column. Put the flanged washer (E) onto the axle (A), and screw on the cable holder (F). The securing bracket (G) is fitted into place with lock screws, washers and nuts, — the nuts to the outside of the handle column. The handle height adjustment screw (H) with washer (I) is then screwed tightly into place on the handle (put a few drops of oil on the thread first). Remove the clips (J) from the control levers, thread them through the loops at the end of the cables and attach them to the clutch/reversing levers.

Pull in the forward drive lever and press down the locking catch. The lever should now remain in the engaged position. Pull the lever right in and the locking catch should spring out again. Release the lever. The cable adjustment screws (K) are screwed right in.

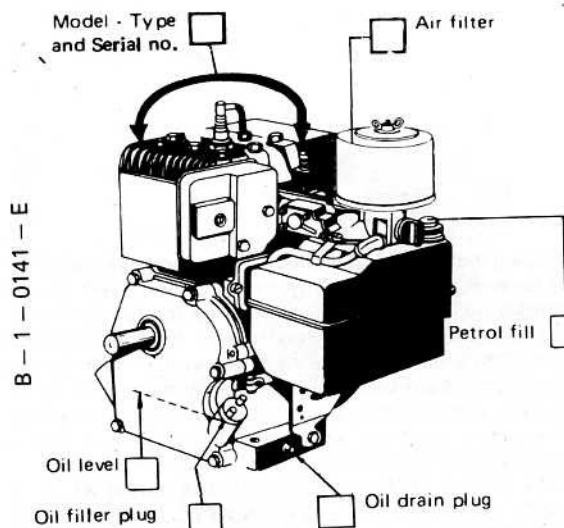


THE ENGINE MUST BE FILLED WITH OIL BEFORE STARTING — THE CHAIN CASE HAS BEEN FILLED WITH OIL AT THE FACTORY. SEE «BEFORE STARTING».



3 Hp

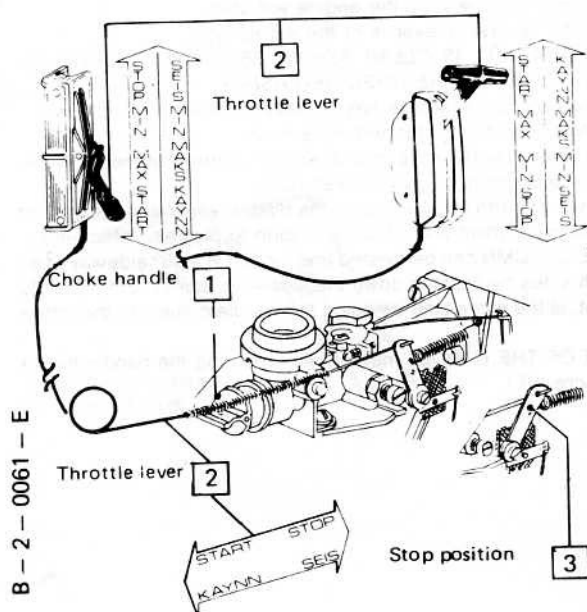
- 1 FILL CRANKCASE WITH OIL. Use only high quality proprietary brand oil. Use SAE 30 oil. SAE 10 W - 30 may also be used.
 - 1/2 FILLING OIL. Place engine level. Use screwdriver or the like to remove oil filler plug. Fill oil to point of overflowing. POUR SLOWLY. Capacity approx. 0,6 litres (1 pint). Replace filler plug.
 - 3 FILL PETROLTANK. Use clean, low octane (regular) grade petrol. Fill tank completely.
- ⚠ DO NOT MIX OIL WITH PETROL !



5 Hp

- 1 FILL CRANKCASE WITH OIL. Use only high quality proprietary brand oil. Use SAE 30 oil. SAE 10 W - 30 may also be used. When operating at temperatures below 5 °C (40 °F), use SAE 10 oil or SAE 5 W - 20.
 - 1/2 FILLING OIL. Place engine level. Use screwdriver or the like to remove oil filler plug. Fill oil to point of overflowing. POUR SLOWLY. Capacity approx. 0,6 litres (1 pint). Replace filler plug.
 - 3 FILL PETROLTANK. Use clean, low octane (regular) grade petrol. Fill tank completely.
- ⚠ DO NOT MIX OIL WITH PETROL !

ENGINE START AND STOP

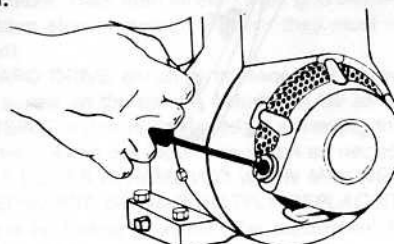


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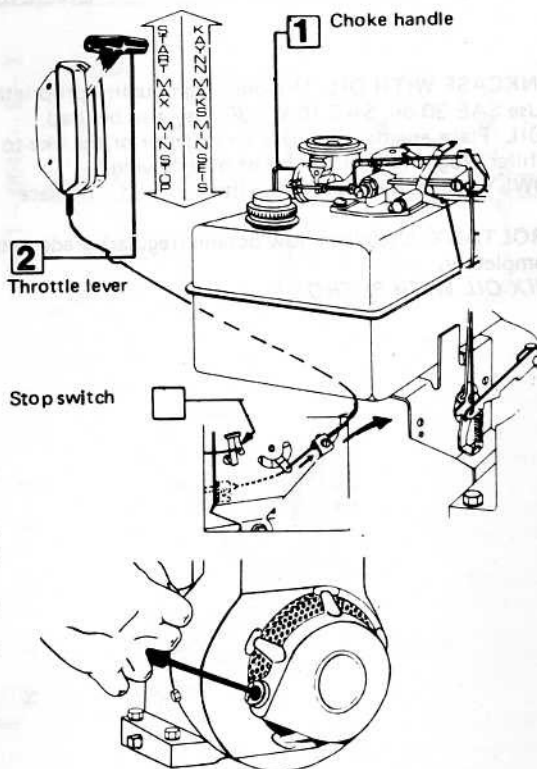
STARTING ENGINE. The engine is equipped with a manual choke and recoil cord starter.

⚠ MAKE SURE THAT YOU KEEP CLEAR OF ROTATING PARTS OF THE MACHINE. CHECK THAT THE WORKING UNIT POWER DRIVE IS DISENGAGED ("OUT - AUS") BEFORE STARTING ENGINE.

- 1 Pull choke handle out.
- 2 Place the throttle lever in the "START" position. Grip the starter handle as shown, and pull smartly. Repeat if necessary with a little less choke. A warm engine need not be choked ; place the throttle lever in about mid - position, pull the starter.
- 2/3 STOPPING ENGINE. Move the throttle lever into the "STOP" position.



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STARTING ENGINE. The engine is equipped with a manual choke and recoil cord starter.



MAKE SURE THAT YOU KEEP CLEAR OF ROTATING PARTS OF THE MACHINE. CHECK THAT THE WORKING UNIT POWER DRIVE IS DISENGAGED ("OUT - AUS") BEFORE STARTING ENGINE.



1 Pull choke handle out.

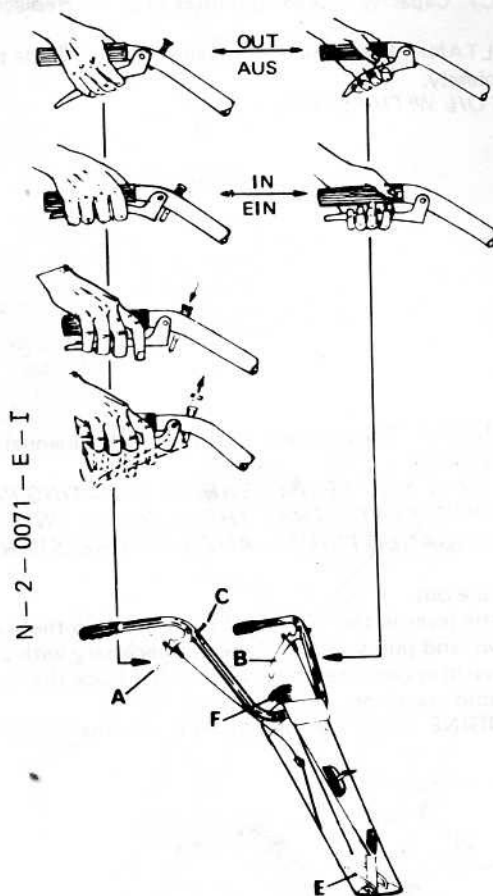
2 Place the throttle lever in the "START" position. Grip the starter handle as shown, and pull smartly. Repeat if necessary with a little less choke. A warm engine need not be choked; place the throttle lever in about mid-position, pull the starter.



When starting at low air temperatures, see "GENERAL INFORMATION".

STOPPING ENGINE. Move the throttle lever into the "STOP" position.

STARTING AND STOPPING THE MACHINE/CONTROLS



N-2-0071-E-I



Starting and stopping the engine is described in a separate section. Forward drive and reverse are controlled by means of two levers on the handle — forward drive on the right (A), reverse on the left (B). These clutch levers are of the "deadman's" (safety) type i.e. the machine stops moving immediately the levers are released. However forward drive can be locked in the engaged position by pressing down the locking catch (C) and releasing the lever. Handling and controlling the machine is thus made easier. The locked position is released by pulling the lever right in — this causes the locking catch to spring out. Release the lever.



WHEN WORKING UNDER DIFFICULT CONDITIONS SUCH AS IN A CONFINED SPACE OR ON SLOPING GROUND ETC., THE LOCKING CATCH MUST BE USED WITH THE GREATEST CARE.

REVERSING. The machine can be reversed independently of the position of the gear lever. The forward drive lever must be released before engaging reverse or otherwise the engine will stall.

Even though the reversing lever is of the safety type: **MAKE SURE THAT ALL IS CLEAR BEHIND BEFORE ENGAGING REVERSE. ALWAYS TAKE CARE WHEN REVERSING.**

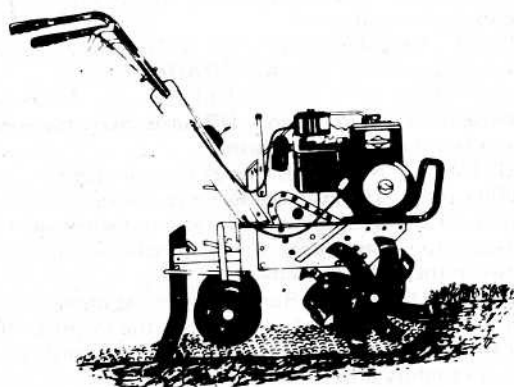
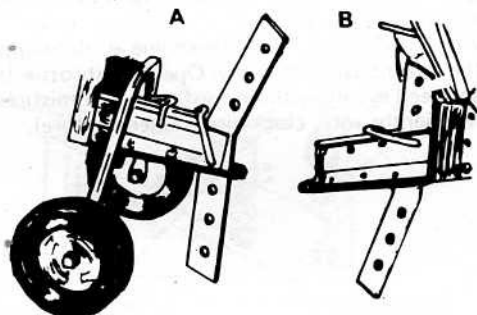
Reverse drive provides effective help in several situations such as:

1. Turning. With or without attached implements.
2. When the rotary blades have dug down too deeply, momentarily reversing will allow them to gain a fresh hold.
3. When a layer of earth has built up on the blades, slight engagement of reverse will clear them and allow cultivation to proceed efficiently.

THE HANDLE COLUMN can be twisted and locked in a 45° sideways position on both sides by pushing down the sideways adjustment pedal (E) with your foot, at the same time swinging the handle column to the left or right.

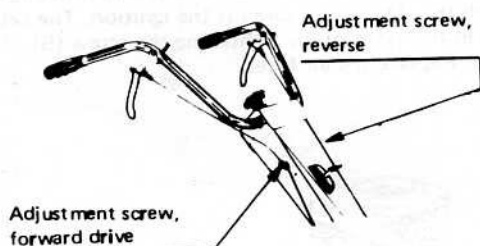
THE HEIGHT OF THE HANDLE may be altered using the handle height adjustment screw (F).

USING THE EQUIPMENT



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ADJUSTMENTS



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ENGLISH

These operating instructions apply to the standard version of the cultivator fitted with standard equipment. When attachments and accessories are to be used, the appropriate assembly operating instructions will be found either in the «ATTACHMENTS AND ACCESSORIES» section or in the «GENERAL INFORMATION» section further back in the instruction manual. Separate instructions for use are enclosed with the more advanced accessories. See also other points mentioned in the «GENERAL INFORMATION» section.

Thought should be given to the basic adjustment of the machine each time a change is made in the type of work carried out. Poor or faulty basic adjustment often leads to only moderate results being achieved and nearly always in the operator being worn out after having had to «carry» the machine around the area being worked. The following directions are for the machine as used as a cultivator and in the most common situations which confront the operator.

BASIC ADJUSTMENT means the correct adjustment of the arrester bar (depth regulator), the supporting wheels (sideways balance) and the height of the handles (working position). This is done after you have decided how deep to cultivate. Note how deep the rotary blades go and cultivate at this depth for about a good yard so that the arrester bar can be set at the correct depth i.e. the cultivator should almost be able to pull itself along, while the operator steers by raising the handles very slightly. The cultivator should now be parallel to the ground. Adjust the supporting wheels down to ground level, and adjust the height of the handles. This position can be called the «ideal position». And so for the deviations: **LOOSE SOIL (A)** is usually cultivated as described under basic adjustment. The arrester bar is set to act as a skid and the supporting wheels play a bigger part.

HARD SOIL (B). The arrester bar is set to act as a brake, and it is often advantageous to remove the wheels. Cultivating in layers i.e. cultivating the same area several times, going deeper each time, is beneficial to the soil as a more even structure is obtained. A more crumbly structure is produced, not the larger clods which later may become very hard. Stones may be present in hard packed soil. If these are not too big, the cultivator will dig them nicely up, though the rotary blades must be run as slowly as possible.

Give a thought to **ENGINE SPEED** now and again. If the plot to be worked is in a residential area, consideration should be given to this fact, when deciding when to cultivate. Generally speaking, engine speed is sufficient with the throttle $\frac{2}{3}$ open, though if conditions are heavy, full throttle must be applied. However, you should consider the possibility of changing the number of rotors.

GENERAL POINTS. When starting to cultivate, it may be difficult to decide how many rotary blades to fit under the various conditions. Experiment a bit in this respect and vary the number — after a while you will become acquainted with the cultivator and will find out which combinations best suit your local conditions.

When cultivating sloping ground, it is preferable to cultivate along the slope. Plant guards (accessory equipment) will provide better stability under such conditions if fitted to the cultivator.

Stones, roots etc. may get jammed between the rotary blades and the chain case. If so, declutch immediately to avoid damage to the belts. Jammed stones etc. can be removed either by engaging reverse, or, if this fails, by knocking them out with a hammer.

Power transfer is by means of V-belt transmission, engaged and disengaged by belt tensioners (clutch) operated by clutch levers on the handles, via a chaincase with power take-off at the bottom providing a rotor speed of 112 r.p.m. at max. engine speed 3.600 r.p.m.

The clutch cable should be tight enough to prevent the belts slipping during operation. New belts should be re-adjusted after a relatively short while until they «settle».

For heavy work, the clutch cable has to be very tight, and it may be necessary to use the locking catch. For lighter work e.g. with a sickle mower, it is an advantage to have the clutch slack enough to allow the clutch lever to be held by hand — you can then slip the clutch if speed becomes too great. Note also that it is an advantage to have the belts as slack as possible. They then stretch less, grip better, and yet slip easier when a sudden stop is made. However they must not be so slack that they jump off.

The **FORWARD DRIVE** clutch is tightened by screwing out (down) the adjustment screw on the handle column as far as necessary.

The **REVERSING** clutch is tightened by screwing the adjustment screw on the handle column out (down) as much as necessary.



IF THE BELT COVER IS REMOVED WHEN MAKING ADJUSTMENTS, IT MUST AFTERWARDS BE IMMEDIATELY REPLACED.

When there is no further possibility for adjustment, belts must be replaced, see «MAINTENANCE».

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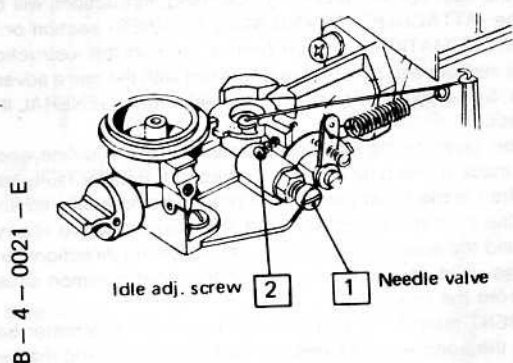
CARBURETTOR ADJUSTMENT. Every engine is tested and adjusted at the factory. However different conditions may require the carburettor to be readjusted.

NOTE: ADJUST THE CARBURETTOR WITH THE PETROL TANK HALF FULL OF REGULAR GRADE PETROL.

PRE - ADJUSTMENT OF THE NEEDLE VALVE. Turn needle valve clockwise until closed. Open 1 1/2 turns. Start the engine and let it run for a few minutes until warm.

FINE ADJUSTMENT. Run the engine at normal operating speed (approx. 3000 r.p.m.). Turn the needle valve clockwise until engine revs begin to decrease. Open the needle valve outwards again until the engine begins to run unevenly. Screw in again to a point about midway between these two extremes.

IDLE SCREW ADJUSTMENT. Run the engine at minimum revs. Adjust using the idle adjustment screw. Open the throttle the engine should increase speed evenly without misfiring. If it misfires - turn the needle valve slightly anti - clockwise (richer mixture).



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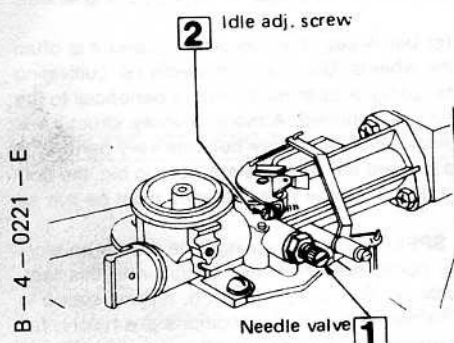
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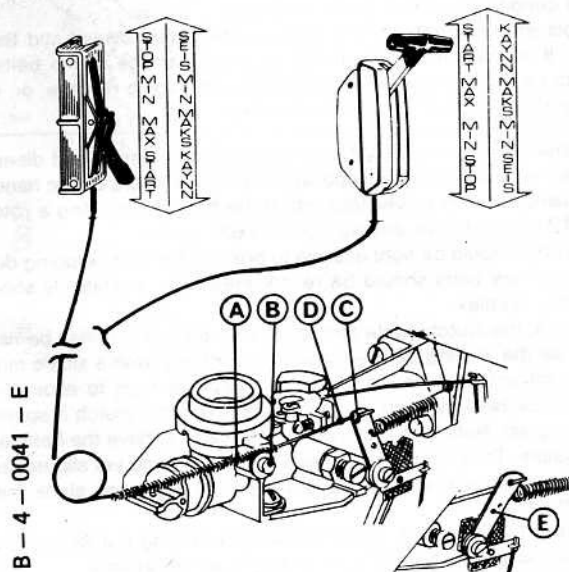
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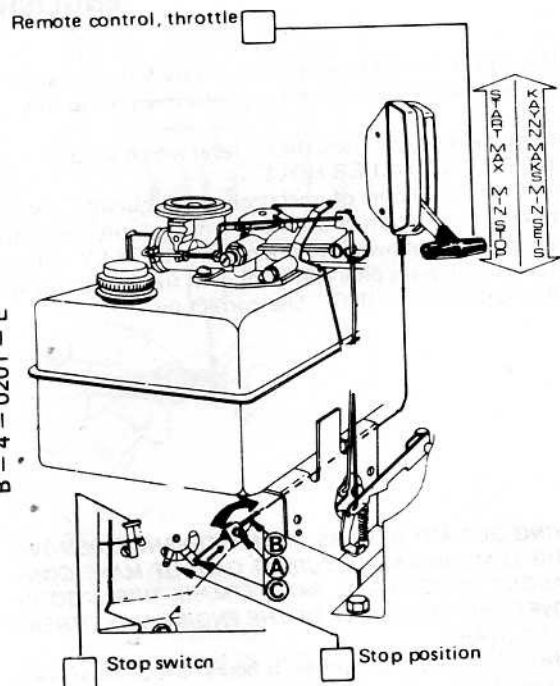


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ASSEMBLY/ADJUSTMENT OF REMOTE THROTTLE CONTROL.

Proper stop - switch action depends on correct adjustment of the remote throttle control. Remove the air filter. Loosen the cable clamp screw (B) on the carburettor. Insert the wire (D) into the uppermost hole in the throttle arm (C). Place the cable sleeve (A) in the carburettor groove behind the washer at (B). Put the throttle lever in the "STOP" - position. Push the cable sleeve (A) with wire (D) and throttle arm (C) forwards so that the throttle arm is in firm contact with the stop switch (E). This short circuits the ignition. The cable sleeve (A) is fixed in this position by tightening the screw (B). Check stop - switch action. Replace the air filter.



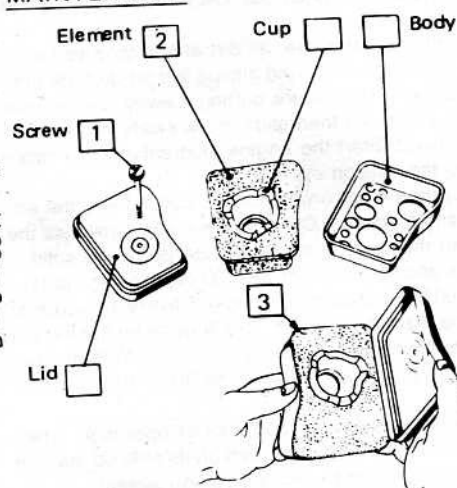


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ADJUSTMENT OF REMOTE THROTTLE CONTROL. Proper stop switch action depends on correct adjustment of the remote throttle control.

Place the throttle lever in the "STOP" position. Loosen the cable clamp screw (A). Move both the cable sleeve (B) and the wire for - wards or backwards until the throttle arm (C) just touches the stop switch. (Check that the throttle lever is still in the "STOP" position). Tighten the cable clamp screw. Check that remote control action is satisfactory.

MAINTENANCE



3 Hp

CLEAN AIR FILTER. The air filter is cleaned after every 25 hours of operation. In especially dusty conditions this should be carried out more frequently, about every 5 th. operating hour.

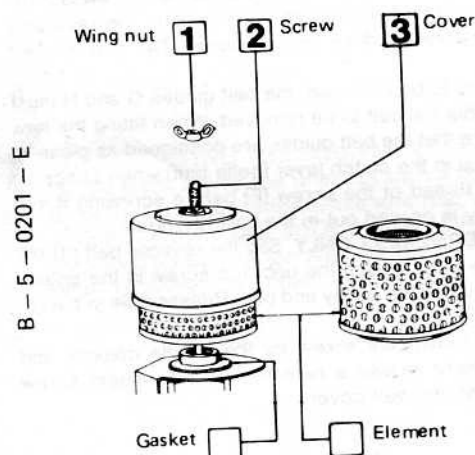
- 1 Remove the screw.
Remove air filter making sure that no dirt enters the carburettor!
- 2 Dismantle the filter.
Wash the filter element in paraffin or soapy water. Rinse clean. Wrap the element in a cloth and squeeze dry. Then impregnate the element with about 3 tablespoons of clean engine oil. The oil is distributed uniformly by squeezing the element to remove excess oil.
- 3 Re - assemble the filter in such a way that the lips of the element extend over the edge of the body to form a seal. Replace the assembled filter on the engine and screw firmly into position.

5 Hp

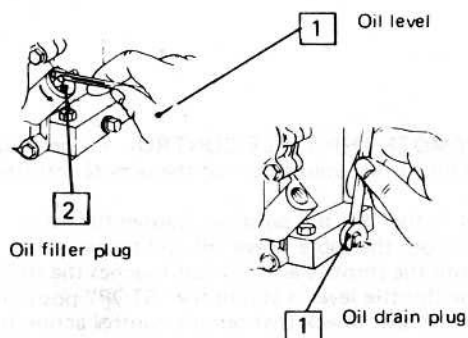
DRY ELEMENT TYPE AIR FILTER. Cleaning must be carried out every 2 hours of operation, or more frequently in dusty conditions.

- 1 Remove the wing nut.
- 2 Remove screw.
- 3 Lift the element and cover from the carburettor, making sure that no dirt enters the carburettor. Take the element out of the cover. Tap lightly on both flat ends of the element, or wash in slightly foaming soapy water, Rinse gently from the inside until the water remains completely clear. After washing, the element must be thoroughly air dried before use. Assemble in the correct order.

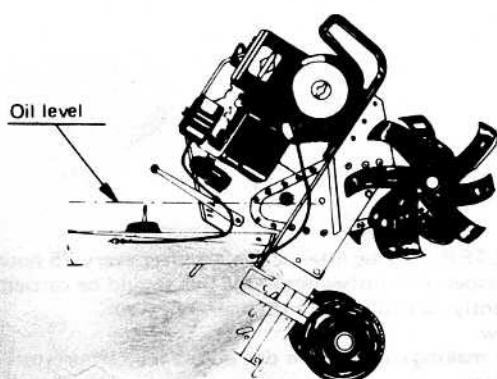
⚠ DO NOT IMPREGNATE THE FILTER WITH OIL!



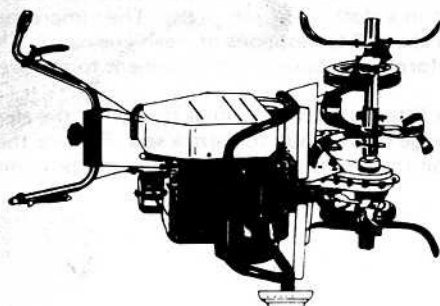
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- 1** CHECK OIL LEVEL. Check the oil level regularly every 5 th operating hour. Clean any dirt from around the filler plug before removing this to check oil level.
- 2** Make sure that the engine is level. Check the oil level which should be at the TOP EDGE OF THE FILLER HOLE.
- 1** CHANGE OIL after the first 5 hours of operation. Subsequently, change oil after every 25 hours of operation. Start the engine and run it warm. Remove the oil drain plug and allow oil to drain COMPLETELY into a collecting vessel. Replace oil drain plug and refill with fresh clean oil as described under "BEFORE STARTING". Use correct oil.



N - 5 - 0171 - E - I



⚠ BEFORE CARRYING OUT ANY REPAIRS OR MAINTENANCE, REMOVE THE SPARK PLUG LEAD AND MAKE SURE IT CANNOT MAKE CONTACT. FOR REASONS OF PERSONAL SAFETY, MAKE THIS A GOOD HABIT. AN INADVERTENT MOVEMENT OF THE ENGINE MAY OTHERWISE CAUSE IT TO START.

⚠ AFTER THE RUNNING IN PERIOD, approx, 5 hours, check all screws and nuts, and tighten if necessary. Afterwards check annually.

⚠ IF THE ENGINE IS TIPPED ONTO ITS SIDE, EITHER THE SILENCER OR SPARK PLUG MUST BE AT THE HIGHEST POINT, OTHERWISE ENGINE OIL MAY RUN OUT THROUGH THE VACUUM VALVE ON THE CRANK CASE.

CLEAN the machine immediately after use, as dirt etc. is then easier to remove. Hose down and brush off, but avoid aiming the jet directly onto the engine. Allow the machine to dry before putting it away, and grease shiny working surfaces as these will then glide more easily into the soil when the machine is next used. Start the engine momentarily to ensure that no water has entered the ignition system.

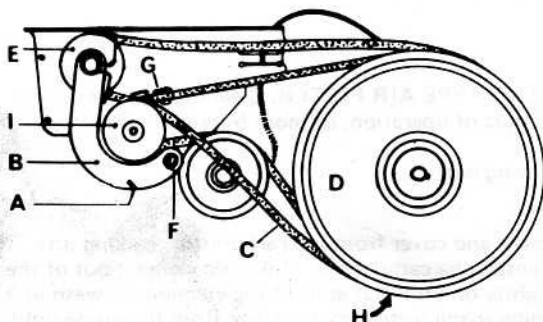
LUBRICATION. Put a few drops of oil on the clutch cables near the adjustment screws on the handle column. Oil before washing down, as the oil will then protect against the water and prevent parts rusting solid.

THE CHAINCASE contains about 0,5 liter of SAE 30 oil, filled at the factory before delivery. The oil level should be checked every 10 hours of operation, og each time the machine is used. This is done by tipping the machine backwards so that the handle column is horizontal: With the machine resting in this position, the oil level should be JUST BELOW THE FILLER HOLE.

CHANGE THE OIL in the chaincase every 50 hours of operation, when engine oil is also changed. The cultivator is placed on its side so that the oil can run out through the oil plug hole into a collecting vessel.

ALL OIL CHANGES ARE MADE WITH THE ENGINE WARM.

N - 5 - 0171 - E - II



CHANGING BELTS. Take off the belt cover (4 screws). Disengage the spring (A) by inserting a screw driver behind the reversing arm (B), and then pressing the spring downwards and inwards. Slip the reverse belt (C) off the large pulley (D) and also off the belt tensioner (E) without removing the clutch cable. Unscrew the screw (F) holding the reversing arm, the spring and the forward drive belt tensioner. The reverse belt can now be removed.

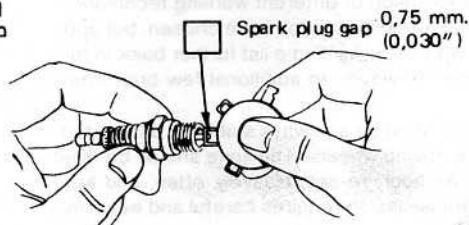
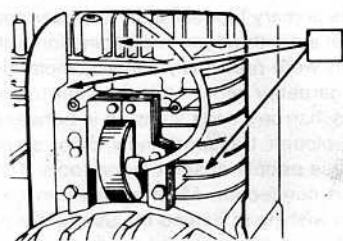
If the forward drive belt is to be replaced, the belt guides G and H must first be loosened to enable the belt to be removed. When fitting the new belt into place, make sure that the belt guides are positioned as close to the belts as possible. Pull in the clutch lever (belts taut) when checking this. Always grease the thread of the screw (F) before screwing it into place again. Reassembly is carried out in the reverse order.


CHANGING FORWARD DRIVE BELT ONLY. Slip the reverse belt off the pulley D. Loosen belt guide H, loosen the unbraco screw in the engine belt pulley I (4 mm key). Pull off the pulley and belt. Reassemble in the reverse order.

Again screw in (up) the adjustment screw by the handle column, and readjust if necessary. There is also a reverse belt adjustment screw down by the engine. Fit on the belt cover.

ENGLISH

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- ☐ **CLEAN COOLING SYSTEM.** After a period of use, grass, dirt and the like will clog the cooling fins on the flywheel fan, and on the head and sides of the cylinder. To avoid overheating and possible damage to the engine, the fan housing should be dismantled occasionally and the engine cleaned.
 - ☐ **THE SPARK PLUG** should be cleaned and adjusted after every 100 hours of use. Reset the gap to 0,75 mm. (0,030'').
 -  **WARNING! DO NOT BLAST CLEAN THE SPARK PLUG WITH ABRASIVE SAND. CLEAN BY SCRAPING OR BRUSHING WITH A WIRE BRUSH. THEN WASH IN PETROL OR OTHER SOLVENT.**
- A. C. Autolite Champion Bosch
- Spark plug type: GC 46 A 7 N J - 8 W 175 T 3 or equivalent.

GENERAL INFORMATION

FAULT FINDING:

The engine fails to start:

- Is there any petrol in the tank ?
- Is the air hole in the lid of the petrol tank open ?
- Is the choke working ?
- Is the spark plug lead intact and connected ?
- Wet spark plug ? Remove the plug, and pull the starter a few times to air the cylinder. Replace the plug.

The engine overheats:

Insufficient cooling. See maintenance directions.

The engine pulls poorly:

- Check the spark plug. See maintenance directions.
- The engine speed regulator isn't working? See cleaning of cooling system.
- The remote throttle control does not give maximum engine revs ? See adjustment of remote throttle control.
- The spark plug is sooted or has wrong gap setting ? See maintenance directions. Replace plug if necessary.

If these simple measures fail to solve the problem, you are advised to contact your nearest service centre.

ENGINE STORAGE INSTRUCTIONS

Petrol must be drained from engines which are to be stored for more than 30 days.

- a. Empty the petrol tank. Start the engine and allow it to run until it stops through lack of fuel. Remove any petrol left in the tank with a clean dry cloth.
- b. While the engine is still warm, drain oil from the crankcase, and refill with fresh clean engine oil.
- c. Remove the spark plug and pour 2 - 3 tablespoons of SAE 30 oil into spark plug hole. Pull slowly on the starter cord a few times to spread the oil. Replace the spark plug.
- d. Clean the cooling system as well as the outside of the rest of the engine.

TRANSPORTING THE EQUIPMENT. For longer transports ; remove the ignition cable from the spark plug, carry the tiller by the front bar (if the tiller has such a feature) or by the rotary bladecover and the handle. Use working gloves. By private transportation: Make sure that the tiller remains level, and use a bit of a rope to prevent it from bumping around. **THE PETROL TANK SHOULD BE EMPTY!** By public transportation: ALL PETROL AND OIL MUST BE DRAINED before dispatching the tiller. When receiving the tiller from service etc., ALWAYS CHECK OIL LEVEL BEFORE STARTING THE ENGINE.

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N - 6 - 0380 - E

A cultivator of this type can best be described as an advanced power-driven hoe or digger. Its primary function is to turn over and break up the soil. However, in recent years, the cultivator has been developed into a technical aid with which, in combination with a number of special accessories, tasks can now be performed for which equipment and tools were previously either completely lacking or unsuitable for the job. The users of the cultivator range from the domestic kitchen gardener and allotment holder to the small holder, nurseryman and market gardener. The standard version of the cultivator ploughs, harrows and cleans up in between rows, while special accessories are available which level, harrow, earth up and clean rows, plough, transport, mow, clear snow etc. in an effective and pleasant manner. Many people enjoy carrying out such work, and these people deserve good tools. The cultivator is versatile, offering many possibilities, and a few points should be mentioned in this connection. Most people can manage to operate a cultivator, it is really basically a question of «practice makes perfect». When wishing to extend the use range of your cultivator, you should realise that different pieces of equipment will require the application of different working techniques, and that they will have both advantages and limitations. This is nothing unique for the type of cultivator you have chosen, but applies generally and is a consequence of the way in which cultivators are designed and work. You will find a list further back in this manual describing the accessory equipment which can be mounted onto the cultivator. However an additional few brief comments concerning accessory equipment and its use are given below.

The simplest equipment such as the furrower, diverse rotary blades, finger rotors, transport truck etc. require, as all other equipment, **THOROUGH CLEANING IMMEDIATELY AFTER USE**. Shiny working surfaces rust immediately. Therefore apply a little grease to prevent rust, and cutting surfaces will dig more easily into the soil when used again.

Ploughs, row cleaning equipment, mowers, snow clearing equipment etc. depend on slow forward speed, clearing during use, and somewhat individual adjustment before and during working operations. This is mainly due to the great variation in the conditions under which the equipment is operated.

- Sickle mower. Must be sideways stable (fit axle extensions for the driving wheels). The knife should be oiled 2—3 times an hour, re-set relatively often, and kept sharp. The transmission requires careful and exact initial adjustment.
- The rotary brush must be set so that the brush just touches the ground.
- The snow blowing unit must not be allowed to ice-up during use, and should be stored so that moving parts do not freeze solid.

Common for all these accessories is that they must be connected to the cultivator's transmission system as they all perform work which requires movement in addition to forward drive.

TILLING THE SOIL. Whether a piece of land is to be prepared to make a seed bed for a lawn or the cultivation of crops, the type of soil and its preparation are of the greatest importance for the plants which are to grow on it. A soil with the right structure, the proper content of minerals and fertilizer, and suitably porous to retain sufficient air and moisture, will provide a good basis for an abundant crop. The ideal soil having all these properties will seldom be found in nature, and one must therefore try, by artificial means, to come as near this ideal as possible. The first thing to do is to have the soil analysed in order to find out the type of soil you are faced with. Contact the local agricultural authorities and find out how to take a soil sample and where to send it for analysis. Analytical equipment may also sometimes be available from suppliers of gardening/horticultural equipment.

Soil composition may vary greatly. However there are considered to be three basic types:

1. Sandy soil. This is easy to work, retains heat well, but not moisture. Substances which improve soil structure must often be mixed in, primarily to improve moisture retaining properties. In addition, it must be fertilized well and watered frequently during dry spells. Preparation of this type of soil can be started early in the spring.
2. Clay soil — this is heavy to work and is relatively cold. Spring preparation of the soil is more delayed than in the case of sandy soil. However clay soil is often rich in plant nutrients and retains moisture well. It can be made more easy to work by mixing in coarse sand, compost, manure or other soil improvers.
3. Peat soil. Lime must often be added to this type of soil for cultivation purposes. This is also, to a large extent, the case with clay soils. However, lime should not be added until after a soil analysis has been carried out, and then only in amounts recommended by experts. Clay soil can be mixed in with peat soil to provide a firmer hold for the plant roots. Fertilizer containing phosphorus and calcium (perhaps compound fertilizer) is added.

A soil analysis will provide exact information concerning these factors, and of correct soil treatment.

The thickness of the **TOP SOIL** or **SEED BED** can vary greatly. A lawn requires a layer about 15—20 cm (6"—8") thick, while fruit trees subject to strong sunshine and great moisture loss (transpiration) require 50—60 cm (2'—2½'). Vegetables require about 25—35 cm (12"—16").

DRAINAGE. All plants need air and moisture. In order to achieve a proper balance between the supply and demand for moisture, proper drainage has to be provided. The need for drainage is often greatest in clay soils, and also in wet, boggy peat soils. Surface water must be led away, and drainage pipes laid if necessary.

TURNING OVER THE SOIL or PLOUGHING is carried out with advantage in the autumn. Use the rotary blades or plough in such a way that the soil really is turned without being crumbled up too much. Soil structure improvers and possibly also lime and other fertilizer are mixed in at the same time. It is seldom necessary to work very deep, about 20 cm (8") will suffice in most circumstances, as enough loose soil will usually result when subsequently sowing in drills or furrows which are then earthed over. Clay soil must not be turned if it is too wet. This is because it will become even more hard packed, the end result being perhaps worse than the starting point. Work should be done during the late autumn in order to prevent weeds shooting before the winter. In districts with winter frost, the frost will break up the soil, making it porous and fertile.

SPRING WORK. The time at which work can be started in the spring varies somewhat according to the type of soil. Generally speaking, you should wait until the soil is suitably dry and crumbles easily. Sandy soils warm up fairly quickly and work can be started early. With clay soils, however, you must wait until it is no longer possible to make «mud pies» with the soil at the working depth. If too early a start is made, problems may arise in connection with excessively large clods, which lead to greater loss of moisture and drying out of the soil, as well as providing a poor hold for young roots. No matter whether the whole ploughed area is to be sown at once or part of it left for later, the whole plot should be lightly cultivated to a depth of 5—10 cm (2"—4"). This has the same effect as the use of the levelling plank, — the dry, uneven surface is broken down and levelled, and loss of moisture minimised. If the job is to be completed straight away, fertilizer is mixed in and the area cultivated once more — this time across the previous working direction. The soil is now ready for you to make drills or furrows as the case may be — by all means keeping the rotary blades on for this as well. Try to make the rows nice and straight, and allow sufficient space between rows so that plants are not damaged when row cleaning and earthing up is subsequently carried out. For example, for potatoes, the distance between rows should be 65—70 cm (26"—28").

ROW CLEANING. During the late spring and summer, crops must be kept free from weeds. Moreover, the soil must be kept «open» to allow satisfactory air exchange. Cleaning up between rows can be carried out by running a pair of rotary blades between the rows. If a more pronounced effect is desired, a harrow can be fitted behind the cultivator. Plant guards should be fitted onto the cultivator when working between young small plants. Weeds among the plants should be removed by hand or with a hand cultivator. Earthing up can be done at the same time as row cleaning by fitting a ridger (furrower) at the back instead of a harrow.