

**DAVID BROWN**  
**990, 995 & 996**  
**Tractors**  
**Instruction Book**



**David Brown Tractors Ltd**

A Tenneco Company

Affiliate of J. I. Case





## WARNING!



Improper operation of this machine may result in injury or death. Before operating this machine study the SAFETY POINTS starting on page 2 and read this book thoroughly.



Look for this symbol which points out important safety precautions. It means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

David Brown policy is one of continuous development and improvement and therefore the specification details may have been altered since this book went to press.

Moreover, as the David Brown tractor is offered in a variety of forms to cover a large number of markets and applications, this handbook may contain details of items not applicable to the particular tractor for which it has been supplied.



## DAVID BROWN<sup>®</sup> Instruction Book

### 990, 995 and 996 Tractors

David Brown Tractors Limited  
Meltham · Huddersfield · England · HD7 3AR

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## SAFETY POINTS



**Always** lock the two foot brake pedals together when running on the highway.

**Always** ensure the PTO is set to low ratio for implements designed to run at 540 rev/min. Running them faster may cause a dangerous mechanical failure.

**Always** ensure the PTO (and Belt Pulley when fitted) is adequately guarded.

**Always** remove loose clothing when working near moving parts of the tractor, engine and implements, or ensure that it is adequately fastened or tied up.

**Always** remove the ignition/starter key from the tractor when leaving it unattended, especially where children have access.

**Always** operate the steering and driving controls with care, for example:—

Don't swerve or turn sharply at speed.

Don't let the clutch in suddenly going up hill or the tractor may rear up.

Don't brake fiercely, especially going backwards down hill.

**Always** take extra care on steeply sloping ground. Move cautiously, as the sudden swing of a heavy implement, or pull of a trailer, may cause trouble.

**Always** make sure before turning that there is room for any mounted implement which will swing *outwards* at the rear.

**Always** hitch trailers to the approved drawbar or pick-up hitch which is below the centre line of the rear axle. Do not hitch above the centre line.

**Always** tow the tractor carefully. When towing by rope with a dead engine, power steering will be inoperative and the steering will be difficult to turn.



## IMPORTANT DONT'S



**Do Not** carry passengers on the linkages or on the tractor, except in an approved passenger seat.

**Do Not** drill into the safety frame.

**NOTE:** Any damaged parts should be replaced immediately with new parts. Bent parts should not be straightened but replaced and no welding should be attempted on the safety frame. Bolts when replaced, must be of the correct tensile strength. After any accident to a safety frame it is advisable to report this to your local safety officer.

**Do Not** lift the tractor by the cab lifting hooks. These are designed only for removing a cab from the tractor.

## INTRODUCTION

Even the most experienced tractor user should read Sections 1, 2, 3 and 4 *before* commencing operations with his new tractor.

A great deal of care goes into the building of every David Brown tractor. The engine is part run-in, the completed tractor is road tested and at each stage of assembly it is checked by a team of Quality Control Inspectors. The user can help to maintain this in-built quality by carrying out the simple tasks outlined in the Regular Maintenance chapter — Section 4. Neglect can lead eventually to major repairs which are expensive as well as time wasting.

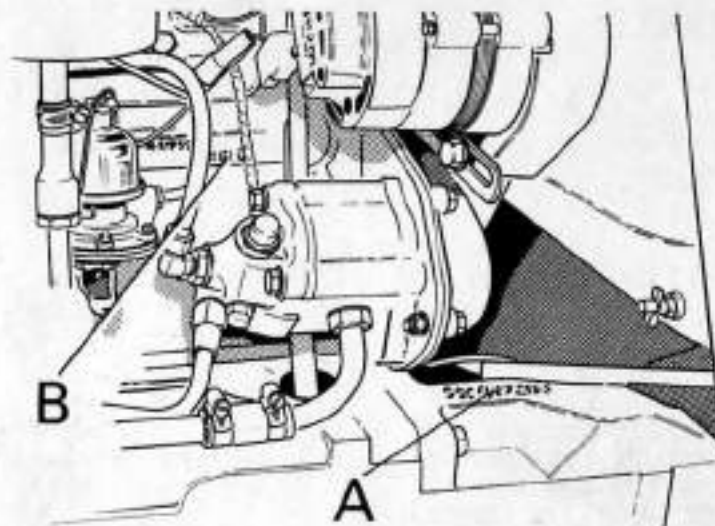
Most difficulties are experienced through incorrect methods of operation. Sections 1, 2 and 3 detail the easiest, quickest and most efficient ways of operating the tractor, especially the many design features which are special to the David Brown Tractor.

Coupled with the above is the question of safety. A tractor can be a dangerous machine if handled without due caution and knowledge gained beforehand from this book can prevent accidents.

Three models of tractor are covered in this book, the 990, 995 and the 996 (which is known in some countries as the 995 with independent PTO).\* The main differences between these models is that the 995 and 996 have a longer stroke and higher powered engine than the 990, and the 996 has fully independent PTO controlled by a separate hand lever.

All three incorporate the Selectamatic Hydraulic system, first introduced by David Brown in 1965, and which has proved exceptionally reliable and simple to operate. Small refinements since then have further improved the system. The two versions of the David Brown 4-cylinder diesel engine used in these tractors are carefully matched to the transmission and maintain the David Brown reputation for low fuel consumption and ease of starting.

\*NOTE: Those tractors fitted with independent PTO and stamped with serial numbers commencing 995/6/1/980001 are referred to throughout this book as 996. This should be particularly noted in countries where the tractor is known as a "995 with independent PTO". (References to 995 in this book are confined to tractors stamped with serial numbers commencing 995/1/920001).



Tractor Number/Engine Number

When ordering parts or with any query always quote the full prefix and serial numbers as follows:

**Tractor letters and numbers** as stamped on right-hand edge of the chassis front extension at A and on the identification plate, e.g. 990/1/850001.

**Engine Numbers** as stamped on the flat vertical surface on the right-hand side of the cylinder block at B and on the identification plate, e.g. 449001/36588.

Tractor Serial No. 990/A/806310

Engine Serial No. 449001/6427

Tractor Registration No. \_\_\_\_\_

The final drive reduction ratio is stamped in the centre of the rear wheel hub.

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## TAKE SPECIAL CARE OF YOUR NEW TRACTOR

Although every engine is tested and run-in at the factory, care should be taken during the first 25 to 50 hours' use. Avoid excessive speeds or loading. Do not allow the engine to labour unduly, instead change to a lower gear. Use the middle range of engine speeds from 1200 to 1800 rev/min. Prolonged light load should also be avoided as this might lead to cylinder wall glazing with consequent high oil consumption. Best running-in is achieved by alternating between low/medium and high (not maximum) loading.

### FIRST SERVICE (50/100 HOURS)

The first service should be done by a David Brown dealer who will carry out a full check on the tractor. The main essentials in this service are :—

1. Change the fuel filter element.
2. Change the engine oil and filter element.
3. The transmission gearbox should be flushed and the wire mesh and magnetic filter cleaned. A new paper filter element should be fitted and the gearbox refilled with new oil.
4. Change the oil in the final drive reduction housings.
5. Check the tightness of cylinder head bolts and the valve clearances, and the tightness of main external nuts and bolts especially rear wheel nuts.

**NOTE:** To remove any contaminants which may build up in the oil due to initial bedding in, it is essential to drain the transmission oil and refill with new oil at the 50/100 hour service (see pages 74 to 77).

## SECTION 1. DESCRIPTION AND OPERATION — GENERAL

### INSTRUMENT PANEL

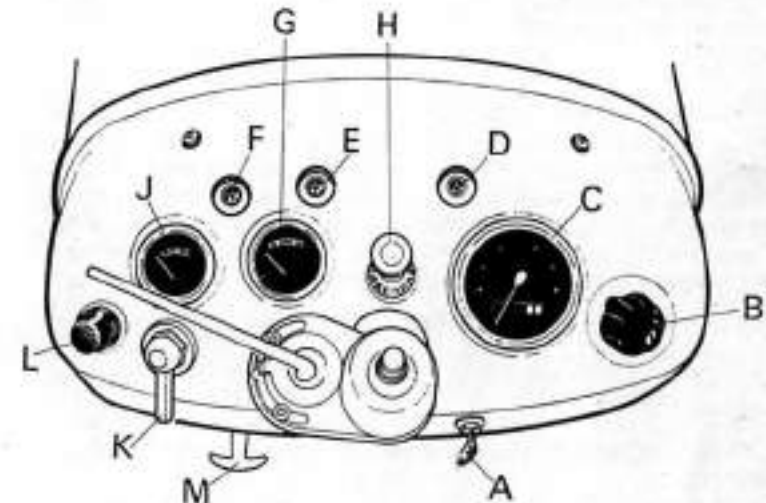


FIGURE 1/1. INSTRUMENT PANEL

- |  |   |
|--|---|
| A. Ignition — starter switch               | F. Transmission filter warning light (yellow) |
| B. Lighting switch                         | G. Water temperature                          |
| C. Engine speed indicator (or speedometer) | H. Hazard warning switch                      |
| D. Charge warning light (red)              | J. Fuel gauge                                 |
| E. Engine oil warning light (green)        | K. Direction indicator switch                 |
|  | L. Horn push button                           |
|  | M. Engine stop control/choke                  |

### Engine stop control

This cuts off the fuel supply to the injectors. Never stop the engine by letting the tank run dry. This allows air to enter the system and is very difficult to get rid of.

Before starting the engine pull out the stop control and lower into the retaining slot. To stop; lift the knob and allow it to move forward.

### Engine oil warning light

The green light is illuminated when oil pressure is too low. Ensure that it lights when the isolating switch is turned on and goes out when the engine runs.

### Charge warning light

The red light is illuminated when the isolating switch is turned on but should extinguish as soon as the dynamo or alternator commences to charge.

### Transmission filter warning light

When the fall in pressure across the full flow filter element in the hydraulic system is high enough to open the filter by-pass valve and allow oil to by-pass the filter element, the yellow warning lamp illuminates. This may occur (a) when the filter element is blocked with dirt and requires changing for a new one or (b) when the oil is cold and engine speed is high.

It is also arranged to light when the isolating switch is turned on and the driver should check that the bulb is intact each time before starting the engine. A faulty bulb should be replaced as soon as it fails.

If the bulb glows or flickers at idling speeds, this should be ignored.

The warning lamp may illuminate at less than full engine speeds when the oil is cold. The engine speed should be adjusted so that the light is not kept on for more than a few minutes otherwise proper filtering of the oil will not take place.

As the filter element becomes blocked with dirt, the warning light will come on at progressively lower engine speeds so that, even when the oil is warm, full working speed may not be achieved without causing the bulb to light.

#### NOTE

When the bulb lights at 1800 rev/min after a warming up period of 30 minutes the full flow filter element must be changed for a new one at the first opportunity.

### Direction indicator switch

Move the switch to the left to operate the left-hand flashers and vice versa. Do not forget to return the switch to centre position after use.

### Hazard warning switch (if fitted)

When the switch is pulled out all four flashers work together. This is useful when working on the highway at very slow speeds. Make sure it is switched off before proceeding normally on the road.

### Light switch

This has 4 positions:

1. Off
2. Side and tail
3. Side, tail and head (low beam)
4. Side, tail and head (high beam)

The rear plough lamp is controlled by its own switch, mounted on the lamp housing. The lamp can be switched on when the main light switch on the instrument panel is in any of the positions 2, 3 or 4.

### Engine speed indicator

The engine speed indicator (rev counter) fitted to the instrument panel, shows the engine revolutions per minute and should be used in conjunction with the chart attached to the bonnet (hood) in order to determine the travel speed of the tractor (see Fig. 1/2)

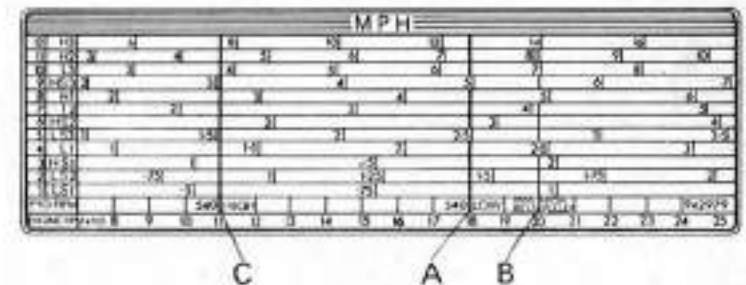


FIGURE 1/2. GEAR/SPEED CHART

- A. Blue line at 540 rev/min PTO in low ratio  
B. Red line at 1000 rev/min PTO in high ratio  
C. Red line at 540 rev/min PTO in high ratio

Alternative charts are available showing speeds in mile/h or km/h and to suit different wheel sizes and final drive ratios.



The engine speed is marked along the bottom edge of the chart. An imaginary vertical line projected upwards will cross the various horizontal gear bands at the appropriate speed. The travel speed in any gear can, therefore, be obtained by first reading the engine speed indicator and transferring to the chart.

Alternatively, any required travel speed in an appropriate gear can be projected downwards and the necessary engine speed determined. The throttle can then be set to give the required engine speed as observed on the engine speed indicator.

Use of the chart for PTO work is facilitated by the provision of two red vertical lines corresponding to the high PTO ratio and a blue line for the low PTO ratio. Each line is marked immediately above the engine speed with the ratio (high or low) and the PTO speed (540 or 1000). Therefore, having decided which PTO speed and ratio is required for the type of work in hand, it is only necessary to inspect the appropriate vertical coloured line and note which horizontal band bears the nearest desired travel speed and choose the gear ratio shown at the left-hand edge.

The speed chart gives accurate speeds for the tyres fitted to the tractor when new. If it is desired to fit tyres of a different size, it is only necessary to obtain a new chart from your dealer for fixing to the bonnet top.

The belt pulley should be used at a PTO speed of 1000 rev/min, B, Fig. 1/2.

## LEVERS AND PEDALS

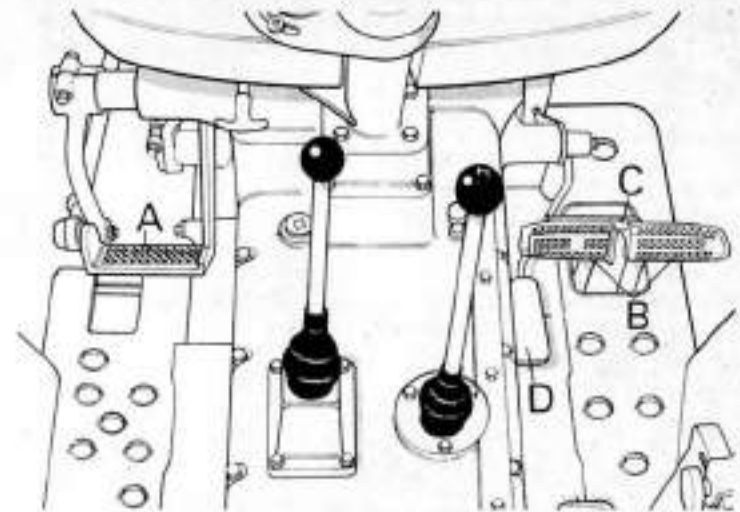


FIGURE 1/3. PEDALS

- |                 |                  |
|-----------------|------------------|
| A. Clutch pedal | C. Locking bar   |
| B. Brake pedals | D. Foot throttle |

### Use of throttles

The rated speed of the engine is 1800 rev/min giving a PTO speed of 540 rev/min in low ratio. This is a convenient and economical speed for normal farm work, but where necessary the engine may be operated under heavy loads at any speed between 1400 rev/min and its maximum governed speed. The speed may be set by observing the engine speed indicator C, Fig. 1/1.

The foot throttle will be found particularly convenient for road work and for jobs involving frequent gear changing, e.g. loader work.

### Foot throttle

To obtain the full range of engine speeds from the foot throttle, the hand throttle should be set to the idling position.

### Brakes

Twin foot pedals at the right-hand side give independent control of the brakes to assist steering in confined spaces. However, to ensure full braking power on the road and at higher speeds, the locking bar, C, Fig. 1/3 should be used.

The balance of the braking system should be checked each week and also whenever the tractor is to be taken on the road or driven at higher speeds. This is particularly necessary when one brake has been used much more than the other for turning at headlands etc. If this precaution is not taken, an unexpected and dangerous swerve may occur.

**Four-wheel brakes** — Highway tractors are fitted with hydraulic brakes on the front wheels with a single pedal (see Fig. 1/4) actuating both these and the mechanical rear wheel brakes together. Note that independent rear wheel braking is not available with four wheel brakes.

Four-wheel brakes can be factory fitted on the agricultural tractors where this safety feature is required.

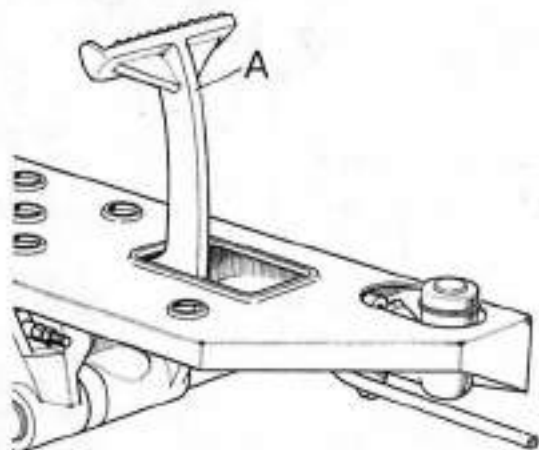


FIGURE 1/4.  
FOUR-WHEEL BRAKES

A. Pedal

**Exhaust brake** (Optional fitting, not available for 996)

When stopping with a heavily loaded trailer or controlling the speed on a steep descent, the exhaust brake should be used to provide additional retardation from the engine. To obtain maximum effect and prevent excessive internal pressures in the engine, the throttle must be closed before pressing the exhaust brake pedal.

**Parking brake** — The handle A, Fig. 1/5 should be pulled upwards with the hand grip turned to the right, away from the driver. Application is easier if the foot brake is pressed at the same time. To release, turn the hand grip to the left towards the driver and lower as shown at B.

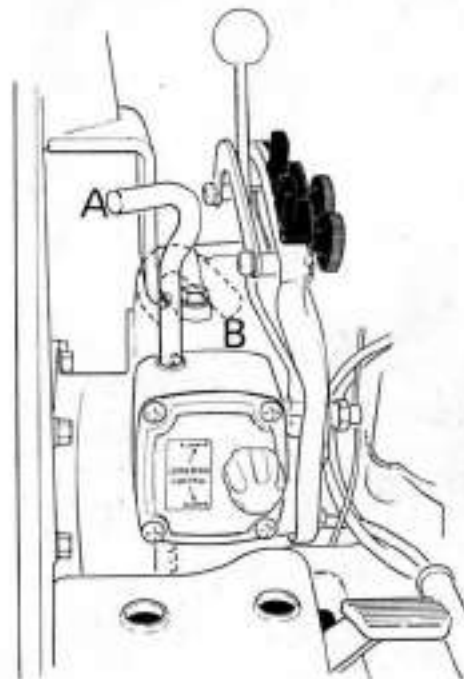


FIGURE 1/5.  
PARKING BRAKE  
AND DIFF-LOCK

A. Parking brake on

B. Parking brake off

**Transmission clutch (996 only)**

Pushing the clutch pedal down interrupts the drive to the gearbox without affecting the drive to the power take-off (PTO).

The pedal should always be pushed down past the point at which the transmission is freed. 'Easing' of the clutch to reduce forward speed, when baling etc., to allow the implement to clear a heavy patch, is detrimental to clutch life.

When moving off with a loaded trailer, engine speed should be kept as low as possible. Full engagement of the clutch should be obtained as quickly as is possible without stalling, then, the throttle opened. The clutch should not be operated at full engine speed or excessive wear will result.

### PTO clutch (996 only)

Drive to the power take-off shaft is controlled by the hand lever on the left of the operator, A, Fig. 1/6. When fully forward, the clutch is engaged and the PTO will be driven independently of the drive to the tractor rear wheels. To disengage the PTO at the ends of rows, to change PTO speed, or for other short term uses, the lever should be pulled rearwards into the latched position.

#### NOTE:

The PTO hand clutch lever must not be retained for long periods in the latched position. Instead, the PTO speed change lever should be placed in neutral and the hand lever released to re-engage the clutch.



FIGURE 1/6.  
PTO CLUTCH

A. PTO clutch  
release lever

### LIVEDRIVE CLUTCH (not 996)

There are two main stages of pedal movement. Stage 1 — Complete disengagement of the transmission clutch is denoted by an increase in pedal pressure at point A, Fig. 1/3A. In practice the pedal should always be pressed to this point. 'Easing' of the clutch to reduce forward speed, when baling etc., to allow the implement to clear a heavy patch, is detrimental to the life of the clutch plates. When moving off with a loaded trailer on road haulage, engine speed should be kept as low as possible. Full engagement of the clutch should be obtained as quickly as possible, then, the throttle opened.

The clutch should not be operated at full engine speed or excessive wear will result.

Stage 2 — Fully depressing the clutch pedal also disengages the PTO (B, Fig. 1/7). Between stages 1 and 2 there is a short buffer stage of constant pressure to prevent accidental slipping of the PTO clutch when using the transmission clutch. If the PTO clutch is not used frequently, the pedal should be fully

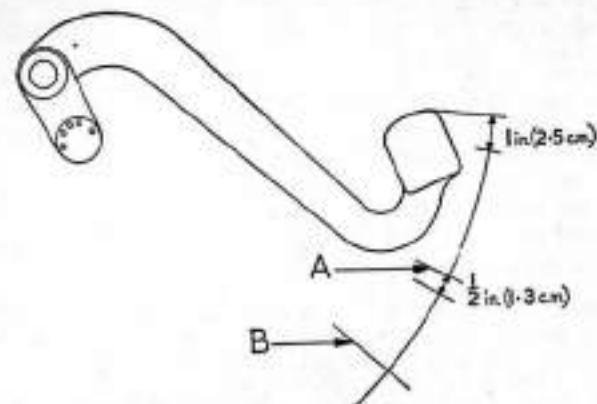


FIGURE 1/7. LIVEDRIVE CLUTCH (not 996)

A. Transmission disengaged  
B. Transmission and PTO disengaged

operated once a week and the PTO 'freed' to prevent binding of the plates.

### Differential lock

The pedal A, Fig. 1/8 locks the drive so that both rear wheels turn at the same speed, thus one wheel cannot slip unless the other one does.

On greasy surfaces differential lock should be used. Do not delay engagement until slip has got out of hand and the wheels are beginning to 'dig in'. If this does happen, de-clutch immediately. Think ahead and try to anticipate the possibility of slipping.

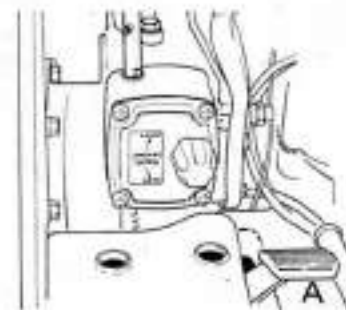


FIGURE 1/8.  
DIFFERENTIAL LOCK  
A. Operating pedal

**Engaging** — To engage differential lock, press the pedal firmly with the right heel. Do not attempt to engage if slip is occurring. Close the throttle until both wheels are turning at the same speed, or de-clutch if one wheel is stationary, before pressing the differential lock pedal. Re-engage the clutch gradually. Maintain a firm pressure on the pedal until the differential lock fully engages (pedal pressed down the full amount). Retain the lock in engagement by resting the heel on the pedal.

**Disengaging** — The differential lock is spring loaded to push it out of engagement but any tendency to slip will create a binding action which will prevent it from disengaging. To disengage, it is only necessary to momentarily relieve the load or reverse the load. This is done by pressing quickly first on one brake pedal, then on the other. When ploughing, it is often only necessary to press on the landwheel brake.

If differential lock is used for trailer work, when the brakes should be locked together with the locking bar, disengagement can be obtained by steering first to one side, then to the other.

If the tractor is stopped and the differential lock remains in engagement, it may be released by momentarily reversing the tractor.

**WARNING** — the differential lock must *not* be used in the higher gears, at high speeds, or on the highway.

### Synchromesh transmission

**Operation** — Twelve forward and four reverse speeds are obtainable by combined settings of the gear shift lever and range lever.

The main section of the gearbox is controlled by the right-hand lever which has 3 forward and 1 reverse speeds as indicated in Figure 1/9.

The range section of the gearbox is controlled by the left-hand range lever which has a high and low ratio with a slow (creep) ratio associated with each, HS and LS, obtained by moving the lever to the left and then forward. A neutral position is available half-way between H and L which should be used when the tractor is stationary for belt pulley or PTO work. This ensures that gearbox parts splash lubricated only when the tractor is in motion, are stationary.

On-the-move synchromesh gear changes can be made into 2nd and 3rd gear in any of the ranges.

Travel speeds at different engine speeds are given in the data section at the back of the book.

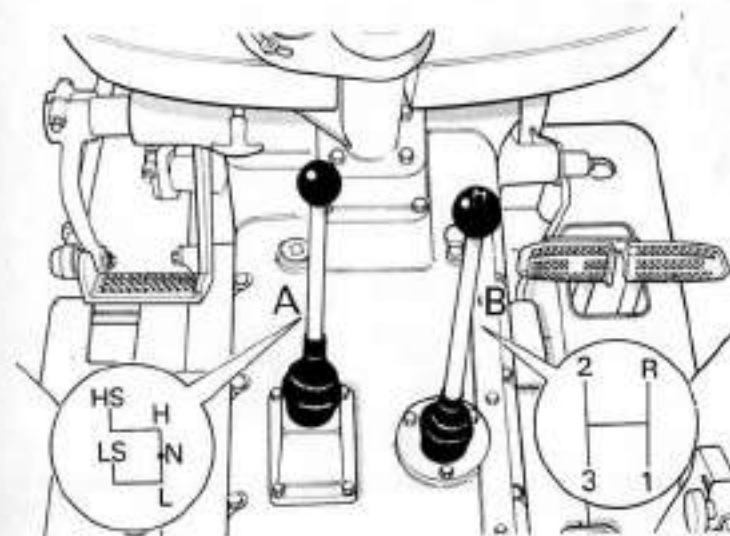


FIGURE 1/9. GEAR LEVERS

A. Range lever B. Gear lever

## Gear selection

Synchromesh gear changing, a reverse gear in each range, and foot throttle, make driving easy.

Choose the appropriate range for the task in hand before moving off. Changing range while the tractor is moving should not be attempted and in any case should not be necessary.

Within each range, synchromesh on the 2nd and 3rd gears permits on-the-move changing upwards from 1st to 2nd and from 2nd to 3rd, and downwards from 3rd to 2nd. Care should be taken not to overspeed the engine when changing down.

The 1st and reverse gear lever positions are placed directly opposite each other to facilitate forward and reverse manoeuvring, e.g. on front loader operations.

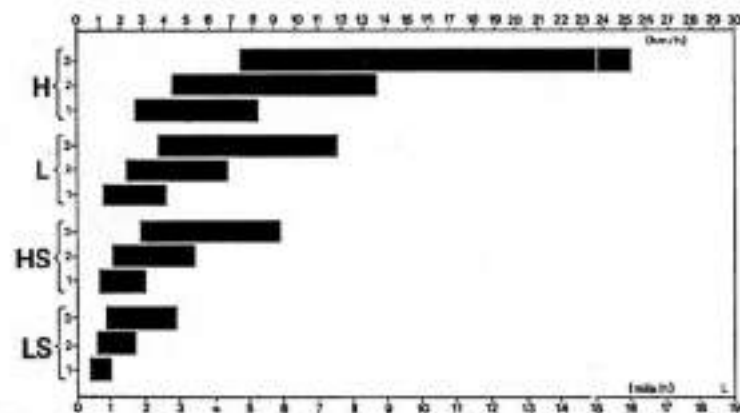


FIGURE 1/10. TRAVEL SPEEDS

With 10/49 reductions and 12-4/11-36, 13-6/12-36 and 16-9/14-30 tyres (speeds with 11/49 reductions will be 10% higher).

Some examples of the use of various gear combinations follow:—

**Road travel with heavy trailers:** usually performed in the high range (H). With heavy trailers you may use 1st gear to move off easily and smoothly, subsequently engaging the 2nd and 3rd gears on the move. Doing this by convenient stages will

ensure smooth progression to top speed. Downward changing on the move from 3rd to 2nd facilitates climbing gradients or to give increased engine braking for the downgrades, for slowing down near road intersections and to bring the tractor smoothly to rest.

**Field tasks:** most often performed in either of the intermediate ranges, HS and L. Both these ranges provide reasonably high speeds in 3rd gear, which can be engaged on the move at the headlands for faster turnabout, e.g. on ploughing and PTO tasks.

With mounted implements which do not engage the ground and with PTO-powered implements which roll freely, it is of course possible to change synchromesh gears on the move during actual operation.

Very low ground speeds, e.g. for precision cultivation tasks, are obtainable in both LS and HS ranges.

**Front loader operation:** quick forward-and-reverse shifting is facilitated by direct opposite placing of the 1st and reverse gear positions. The range lever is used only for the initial selection of, say, High range for fast loading operations.

## STARTING AND STOPPING THE ENGINE

### Starting

1. With fuel in the tank, pull the stop control knob to the running position and drop into the retaining slot.
2. Pull the throttle lever towards the driver, approximately one quarter of the way (when cold — pull to full throttle position).
3. The gear lever must be in neutral.\* In any other position an isolating switch prevents the starter motor from being energised.
4. Turn the starter key one click to the right and check that the three warning lights glow. If not, check for a faulty or defective bulb.
- 4a. Ensure that the PTO range lever is in neutral and on 996 tractors the PTO hand lever is in the engaged position.
5. Turn the starter key further to the right against the spring to operate the starter. Release as soon as the engine runs.
6. Close the throttle to give about 1000 rev/min to warm up.
7. Check that the warning lights have gone out.

**Starting in cold weather** — Screw in the wing nut underneath the injection pump before starting the engine. To prevent black exhaust smoke, unscrew the wing nut immediately the engine starts.

#### NOTE:

- A. If the engine does not start within 25 seconds, release the starter switch and wait 20 seconds before trying again, otherwise the battery will be overheated and damaged.
- B. If the engine oil warning light (green) stays on or comes on while the engine is running, stop the engine and investigate for loss of oil pressure, insufficient oil in the sump, or a fault in the oil switch.
- C. If the charge warning light (red) stays on above 800 rev/min, investigate for an electrical fault.
- D. If the transmission filter warning light (yellow) stays on while the oil is cold, reduce engine speed until it goes out.

\*Tractors manufactured before April 1973 have the isolating switch on the range lever which must be placed mid-way between H and L before the starter can be energised.

As the transmission oil warms up, gradually increase speed keeping it just below that at which the warning lamp lights. If, after running for 30 minutes, the warning lamp lights at 1800 rev/min or less, the filter element must be renewed even though it may not have completed 500 hours' service.

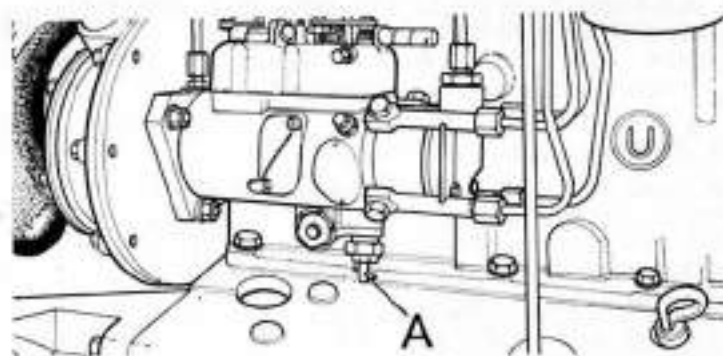


FIGURE 1/11. FUEL INJECTION PUMP

A. Cold start wing nut

**Starting in extreme cold** — To assist starting in climates where winter temperatures are substantially below freezing for long periods, a Thermostart will be required. Alternatively, a cylinder block water heater should be used. Consult your David Brown dealer for local availability of these.

The Thermostart which should be used in conjunction with the cold start wing nut, operates by burning fuel in the inlet manifold to heat the ingoing air.

The unit is actuated by a three-position ignition switch. The first position or click to the right illuminates the three warning lights positioned in the instrument panel (if not, check for a fault or defective bulb before starting the engine). Turning the key further to the right and holding against the spring switches the Thermostart to the pre-heat position. Do not hold in the pre-heat position for more than 25 seconds. Further turning to the right against the spring engages the starter. When the engine starts release the key. The warning lights should not glow or illuminate. (See notes on page 24.)

Unscrew the wing nut immediately the engine starts.

### Stopping the engine

Close the throttle to reduce engine speed, lift the fuel cut-off and allow it to move forward to the stop position. Switch off and remove starter key.

## STOPPING THE TRACTOR

Reduce speed by closing the throttle and applying the brakes. Change down from third to second to help reduce speed. Just before the tractor comes to rest, disengage the clutch and stop the engine.

Apply the hand brake and place the gear lever (shift) in first or reverse and the range lever in any range. As an additional precaution, check that the starter/ignition switch has been left in the stop position and the key removed.

## SUPER COMFORT SUSPENSION SEAT

This seat, with hydraulic damper, has adjustment for the driver's weight by means of the hand screw at the back. A scale with pointer allows re-setting to any predetermined position when more than one driver is involved.

To allow for length of the driver's legs, the whole seat may be moved up or down the support bracket after slackening the four securing setscrews.

To allow driving in a standing position, the seat may be pushed backward after lifting the back of the seat out of its slide. A small spring-loaded bolt just under the front left hand of the cushion secures the seat when in this position.

## DE-LUXE SEAT

This seat is an upholstered tip-up pan seat with a foam rubber cushion and an adjustable back rest. Fore and aft adjustment with simultaneous height variation to suit various leg lengths has four positions.

# SECTION 2. DESCRIPTION AND OPERATION

## THE SELECTAMATIC HYDRAULIC SYSTEM

### INTRODUCTION

The David Brown Selectamatic hydraulic system embodies the following advantages.

1. *Simple control* — Lift, hold, drop, height position, depth position, TCU (weight transfer) and certain external hydraulic equipment are all controlled by a single hand lever.
2. *Simple change of system* — Selection is by a 3-position pointer.
3. *Easy control* — Depth and height settings are not affected by variations in engine speed. Finger guides are provided for repeat settings.
4. *Reliability* — A full-flow paper element suction filter, supplemented by magnetic filters, removes particles of dirt which could interfere with the working of high pressure hydraulic valves.
5. *Easy service* — The control valve assembly is a single unit which can be bench tested before fitting. Only 3 simple adjustments are required after fitting to the tractor, only one of which requires the engine to be run.
6. *Variable drop* — The rate can be set by a handwheel and is not affected by the load. An override dump valve allows an extra fast drop when required.

## SELECTAMATIC CONTROLS

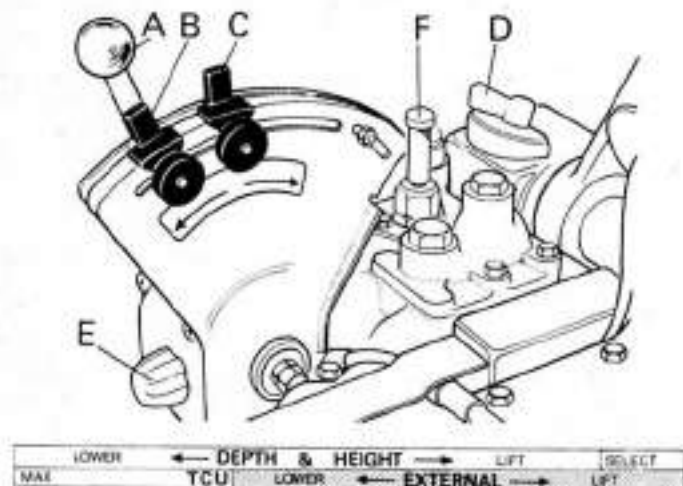


FIGURE 2/1. SELECTAMATIC CONTROLS

- |                       |                             |
|-----------------------|-----------------------------|
| A. Hand lever         | D. Selector dial            |
| B. Front finger guide | E. Rate of lowering control |
| C. Rear finger guide  | F. Dump valve               |

**Selector Dial Pointer** — Mounted on the rear axle case at right of the seat, has three positions to select the mode of operation required — 'Depth', 'Height' or 'External/TCU'. Hold the hand lever rearwards in the 'select' position while turning the pointer.

The 'External/TCU' position should be used for linkage-mounted or semi-mounted implements supported by a depth wheel (gauge wheel). TCU can then be applied to transfer weight to the tractor rear wheels.

**Hand Lever** — This operates in a quadrant and, once the selector dial has been set, is used to control the hydraulic system according to the chosen mode.

**Sensing Unit** — The top (upper) link is attached to a spring loaded sensing unit which is connected to the control valve by a cable. Variations in draught forces vary the compression of the spring and cause the cable to move. This movement opens or closes the control valve in such a manner that the depth is kept sensibly constant. The hand lever overrides the sensing unit to determine the draught at which the control valve works, thus the depth can be set by the operator.

The selective sensing unit, which is an optional fitting, allows the spring rate to be varied in 3 stages by hand lever to cover a wide range of implement weights.

**Finger Guides** — Two finger guides are provided which can be clamped to the quadrant by thumb screws in any suitable position so that the hand lever may be returned to the same place when required, e.g. when using TCU, set one to full drop and the other to the requisite amount of TCU. When only one guide is required push the other right to the front and lock.

**Lowering Control** — The rate of lowering may be adjusted by turning the knob, E, Fig. 2/1. Once set, the speed is independent of the load on the system. It is useful for protecting shares and points on heavy implements.

**Dump Valve** — This greatly reduces the restriction to oil returning from implements using the 3-way valve or from the ram cylinder. Thus it gives rapid lowering of a tipping trailer or loader after discharge, for example.

It must not be used with mounted implements although it may be used to lower the pick-up hitch quickly when empty ready for coupling.

**Operation** — The dump valve knob is on the right-hand of the rear axle case, F, Fig. 2/1.

1. Push the hand lever to the lower position.
2. Press down the dump valve knob and turn through 90° (either direction) and pull upwards.
3. When the implement is fully lowered, push the knob down and twist about 90° until it locates in the retention indent.



## Lift Latch

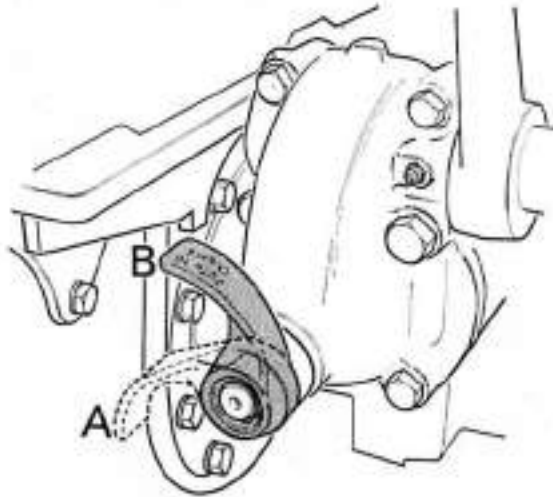


FIGURE 2/2. LIFT LATCH

A. Engaged    B. Disengaged

A latch is provided for stowing the links in the top position when not in use or as a safety measure when parked with a raised implement. It should not be used to support a heavy implement while driving the tractor.

*To engage* — push the lever downwards and raise the links to their full height by hand or pulling the hand lever fully rearwards to the 'select' position, when the latch will spring in.

*To disengage* — raise the links to the full height as above, and lift the latch.

**⚠** **WARNING** — Never pass the hand under the lift rod and ramshaft arm to release the lift latch. Serious injury will occur if the links should fall.

## TRAILED IMPLEMENTS

The operation of the hydraulic systems on the following pages refer to tractor mounted implements or to external hydraulically operated equipment.

Where trailed implements are being used, the selector dial should be set to 'Height' or 'Depth' control and the links raised and secured on the lift latch. The hand lever may then be left in any position (except 'Select') without loading the hydraulic pump.

In certain countries, however, it may be possible to purchase a special hitch from your dealer to enable TCU to be used with trailed implements.

## OPERATING WITH DEPTH CONTROL

Implements without depth wheel (gauge wheel)

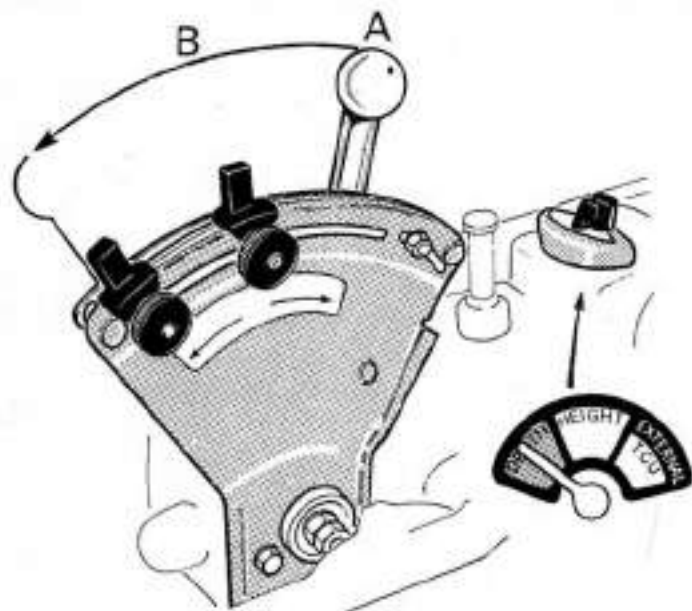


FIGURE 2/3. HYDRAULIC CONTROLS FOR DEPTH CONTROL

A. Lift position    B. Range of depth

### Preparation

First set the tractor controls as follows:—

1. *Selector Dial Pointer* — Pull the hand lever fully rearwards in the red sector to 'select' and while holding it there, turn the selector dial pointer to 'DEPTH'.
2. *Lift Latch* — Disengage the lift latch. (With the engine running pull the hand lever fully rearwards against the spring and pull the lift latch upwards to disengage it.)
3. *Lowering Control* — Initially set to mid-position and adjust later by trial to give the required rate of lowering.
4. *Finger Guides* — Set the front guide fully forward out of the way and lock. Set the other guide temporarily to mid-position.

### Operation

At the beginning of the furrow, push the hand lever forward to the rear finger guide. When the implement has lowered into work, adjust the hand lever, forward to increase depth or rearwards to decrease depth, until the required depth has been found by trial. Set the finger guide in line with the hand lever so that the same depth can be found easily on subsequent furrows. At the headland, pull the lever rearwards to the spring loaded stop to lift the implement.

## OPERATING WITH DEPTH WHEEL (TCU)

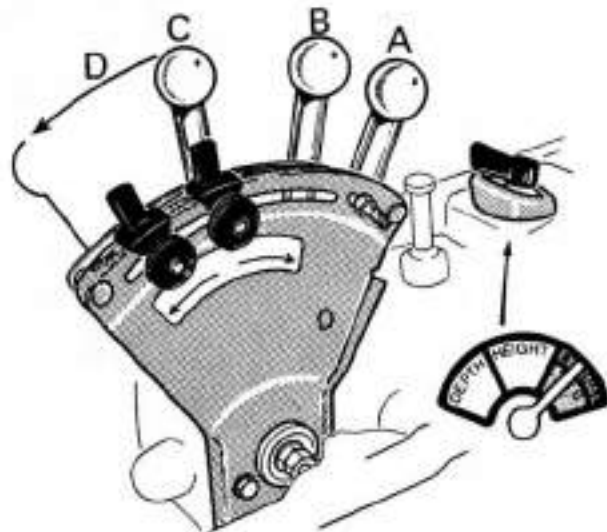


FIGURE 2/4. HYDRAULIC CONTROLS FOR USE WITH DEPTH WHEEL

- A. Lift position  
B. Hold position  
C. Lower position  
D. Range of TCU

### Preparation

First set the tractor controls as follows:—

1. **Selector Dial Pointer** — Pull the hand lever fully rearwards in the red sector to 'select' and while holding it there, turn the selector dial pointer to 'EXTERNAL/TCU'.
2. **Lift Latch** — Disengage the lift latch. (With the engine running, pull the hand lever fully rearwards against the spring and pull the lift latch upwards to disengage it.)
3. **Lowering Control** — Initially set to mid-position and adjust later by trial to give the required rate of lowering.
4. **Finger Guides** — Set the rear guide to the position for fastest lowering. \* Set the other guide approximately 1 inch (25mm) in front of this.

*\*NOTE: Lowering will occur over a range of movement of the hand lever but only one position will give maximum rate of drop with completely free evacuation to the sump. This is most easily found without anything attached to the links and is correct when they offer least resistance to dropping after having been raised hydraulically. Once found in this way, the position should be noted for future reference.*

### Operation

Push the hand lever forward to the lower position. When the implement has reached its full working depth any required amount of TCU (weight transfer) may safely be applied by pushing the hand lever further forward. Maximum TCU is obtained when the hand lever is fully forward. When the correct amount of TCU has been determined, the second finger guide should be re-positioned into line with the hand lever for future reference.

At the headland, pull the hand lever fully rearward past the spring-loaded stop. Release it when the implement has fully lifted. The hand lever will spring back to the hold position.

To avoid variation in depth, TCU should be maintained to the end of the furrow. In order to get proper penetration the hand lever should not be pushed forward to the TCU position until the proper working depth has been reached. On the other hand, application of TCU should not be delayed too long or wheel slip will occur before TCU becomes effective. Once wheel spin has occurred it is difficult to stop. The correct timing and anticipation of the required quantity of TCU is a matter of skill which comes very quickly with a little practice.

### Linkage adjustment when ploughing with TCU

Because of the different forces acting on the plough when using TCU, a slight re-adjustment to the settings may be required.

1. The top (upper) link should be shortened slightly to counteract the tendency of the plough to ride out of the ground. It should, however, be used as long as possible consistent with obtaining the required depth.
2. To correct a tendency of the front furrow to become shallow, lengthen the right-hand levelling lever slightly.
3. On soft ground raise the depth wheel slightly to maintain the correct depth. (TCU takes the weight off the depth wheel and so it will not sink so deeply into soft earth as it would without TCU.)

### TCU with trailers and trailed equipment

In order to be able to apply TCU with implements such as trailed disc harrows, 4-wheel trailers etc. a special hitch may be purchased from your dealer in certain countries. This transfers weight from the drawbar of the implement on to the rear wheels of the tractor.

Large equipment can therefore be used under more adverse conditions.

## OPERATION with EXTERNAL EQUIPMENT

It is advisable to ensure that there is sufficient oil in the sump to feed the external system, approximately half a gallon (2,3 litre) extra will be needed for a trailer or loader. Up to one gallon (4,5 litres) may be added when necessary.

## EXTERNAL EQUIPMENT OPERATED VIA THE 3-WAY VALVE

3-Way Valve (Optional in some countries)

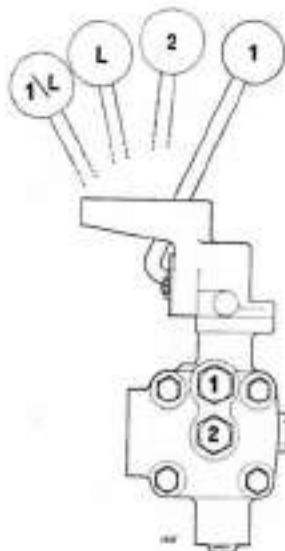


FIGURE 2/5. 3-WAY VALVE

1. Output connection, lever in position 1 or 1/L
2. Output connection, lever in position 2
3. Output connection, live with Selectamatic hand-lever in 'select' position

The 3-way valve situated at the left-hand front of the rear axle case enables external single acting light duty auxiliary units such as loaders, tipping trailers etc. to be controlled from the tractor Selectamatic Hand Lever. It has a quick selection 4-position lever. In some countries No. 1 outlet is fitted with a pipe to the rear of the tractor terminating in an Exactor or quick-release coupling. These are available from your David Brown Dealer if not already fitted.

### Connections

The two external connections are available on the front of the unit and are supplied sealed with 3/4 UNC plugs. The upper connection is designated No. 1 and the lower one No. 2. An additional point at 3, Fig. 2/5 is pressurised when the Selectamatic hand lever is in the 'select' position and may be used for additional rams, e.g. semi-mounted plough.

## Lubrication of the Gearbox and PTO

This is supplied by overflow oil from the hydraulic pump and is illustrated in Fig. 2/6. When using external equipment which uses a large continuous flow of oil (e.g. hydraulic mower), lubrication to the gearbox and PTO will be severely reduced unless the return oil is fed back into the lubrication pipes at point E or F, Fig. 2/6. These points are illustrated in Figs. 2/7 and 2/8.

*Return points* — Use point A, Fig. 2/7 or point A, Fig. 2/8 which-ever is the more convenient. Both are tapped 7/8 UNF.

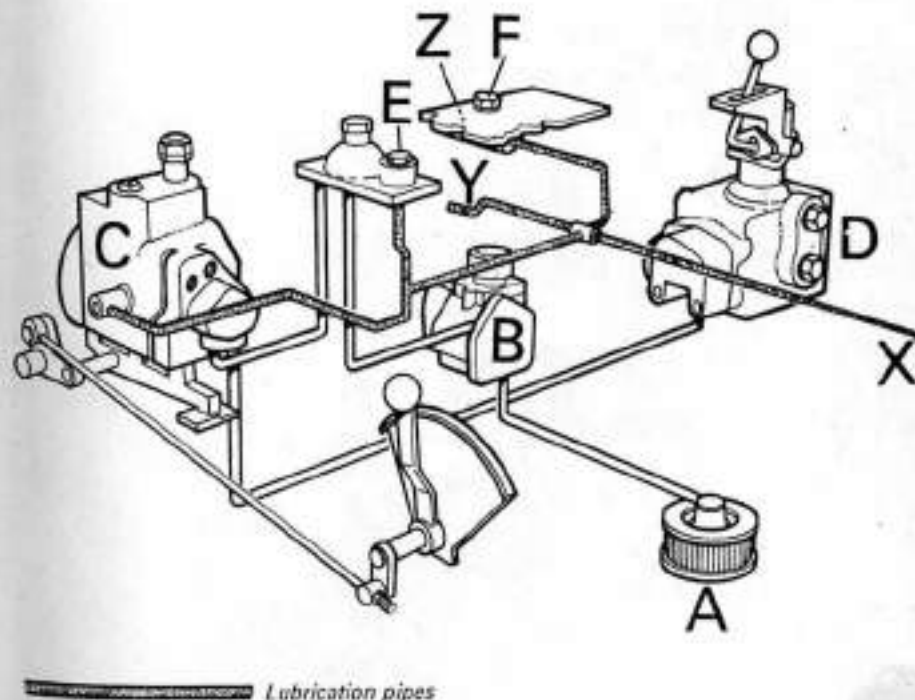


FIGURE 2/6. DIAGRAM OF HYDRAULIC SYSTEM

- |                               |                             |                             |
|-------------------------------|-----------------------------|-----------------------------|
| A. Inlet and full flow filter | D. 3-way valve              | X. Gearbox lubrication      |
| B. Hydraulic pump             | E. Hydraulic return point   | Y. P.T.O. lubrication       |
| C. Hydraulic control valve    | F. Alternative return point | Z. Ram cylinder lubrication |

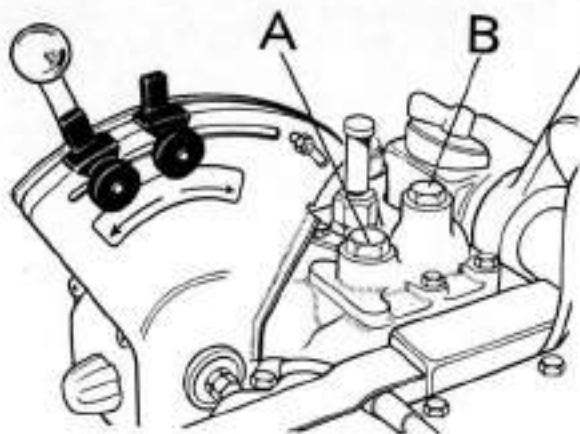


FIGURE 2/7. HYDRAULIC SUPPLY AND RETURN  
 A. Return connection B. Supply connection

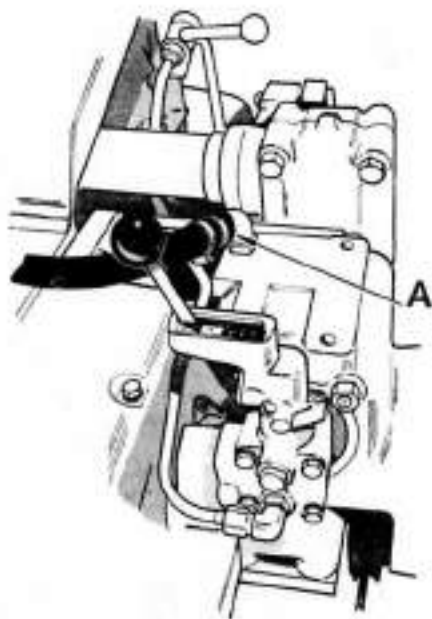


FIGURE 2/8. HYDRAULIC RETURN CONNECTION  
 A. Return pipe

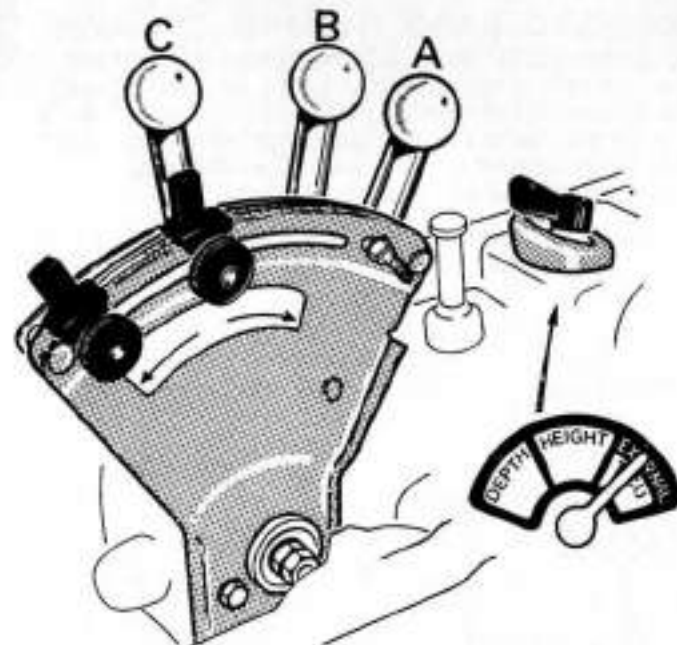


FIGURE 2/9. HYDRAULIC CONTROLS FOR EXTERNAL EQUIPMENT VIA THE 3-WAY VALVE

A. Lift position  
 B. Hold position  
 C. Lower position

### Preparation

First set the tractor controls as follows:—

1. **Selector Dial Pointer** — Pull the hand lever fully rearwards in the red sector to 'select' and while holding it there, turn the selector dial pointer to 'EXTERNAL'.
2. **Lift Latch** — Stow the links on the lift latch (push the lift latch downwards and pull the hand lever fully rearward against the spring until the links rise above the latch).
3. **Three-way Valve** — Set the lever to the external system required.
4. **Lowering Control** — Initially set to mid-position and adjust later by trial to give the required rate of lowering.
5. **Finger Guides** — Push the front guide right to the front of the quadrant and lock out of the way. Set the rear finger guide to the position for fastest lowering. (See \* note on page 34.)

## Operation

To pump oil to the external equipment, pull the hand lever fully rearward past the spring-loaded stop. To stop the flow of oil, release the hand lever which will spring back to the hold position (in this position the pump is unloaded and the oil locked in the external equipment). To return oil to the sump, push the hand lever forward to the finger guide.

Do not go forward beyond the lower position or TCU pressure will be applied and this is sufficient to drive a mower or raise an empty loader.

For external equipment with its own hydraulic controls and requiring continuous pressure, hold the hand lever in the rear position by using the Catch Unit U730, see below.

## Catch Unit

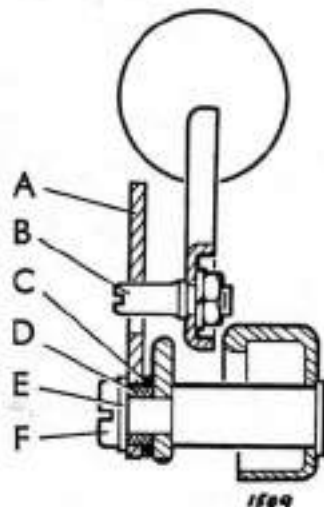


FIGURE 2/10. CATCH UNIT

- A. Catch
- B. Peg
- C. Rubber washer
- D. Sleeve
- E. Washer
- F. Existing screw

When external equipment which includes its own hydraulic control valve is being used with the 3-way valve, a continuous pressure of oil is required from the internal system. In order to hold the hand lever in the constant pumping position against the spring, a Catch Unit U730 is available for fitting to the rear set-screw of the quadrant as shown in Fig. 2/10. The illustration shows how this unit is fitted.

## EXTERNAL EQUIPMENT OPERATED VIA LIVE, DOUBLE-ACTING CONTROL VALVES

Either one (U844) or two (U845) control valves may be mounted above the distribution block. Each has its own independent operating handle.

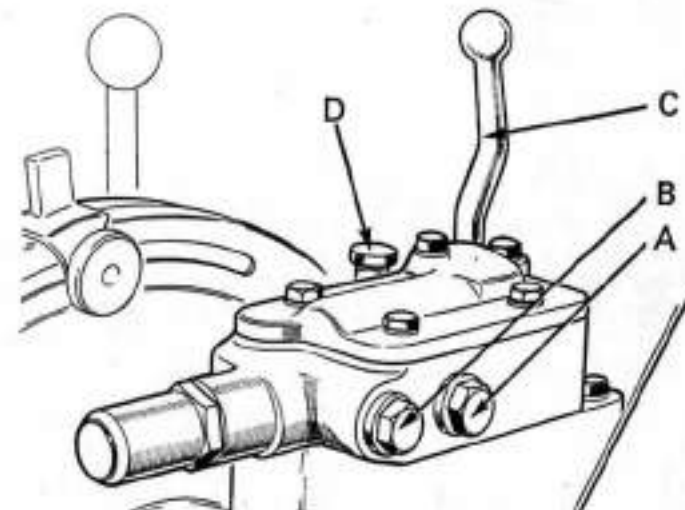


FIGURE 2/11. LIVE, DOUBLE-ACTING, TAKE-OFF VALVE

- A. Output when lever C is forward (return when C is rearward)
- B. Output when lever C is rearward (return when C is forward)
- C. Operating lever
- D. Dump valve

Connections to the double-acting take-off valve are shown at A and B in Fig. 2/11. When the control lever is pushed forward, oil is fed to connection A and returned to the sump via connection B. When the control lever is pulled rearward the oil flow is reversed. Both positions have detent balls so that the lever is retained when pushed to the extreme of its movements. An automatic detent release is incorporated so that the lever is returned to the centre position and cuts off the oil flow when the

external ram reaches the end of its travel and the pressure increases.

**NOTE:** If it is preferred to operate without the detent position on the valve, the detent balls can be removed by your David Brown dealer.

To avoid possible confusion when operating external equipment, always connect the pipes so that when the lever is pulled rearwards the implement raises, and lowers when the lever is pushed forward.

When a second live-valve is fitted, this is identical to the first: connections and operation are similar. It works quite independently.

### Pipe and couplings

Pipes and couplings (swivel quick-release etc.) are available from your David Brown Dealer to fit single or twin live take-off valves. These enable external equipment to be removed quickly without loss of oil. When re-connecting, ensure the mating ends are clean. See Accessories on page 137 for various units.

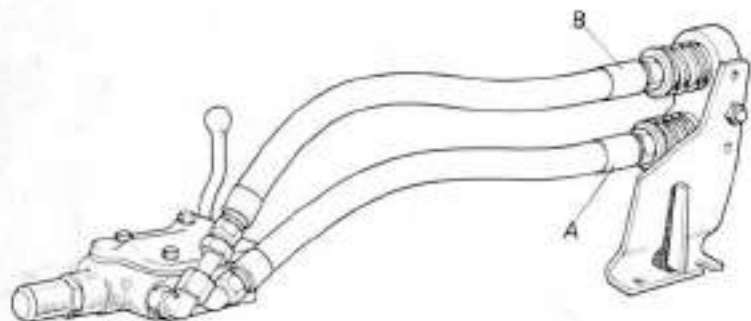


FIGURE 2/12. QUICK RELEASE COUPLINGS

A. Outlet when operating lever forward  
B. Outlet when operating lever rearward

**Single-acting equipment** — It is possible to operate single-acting equipment from a double-acting live valve provided that a pipe is connected between the second outlet on the valve and the return port on the axle case. This allows oil to 'return' through the double-acting valve when lowering the external ram. The second outlet must not be plugged.

## OPERATION with HEIGHT CONTROL

Light draught, or implements working above ground level

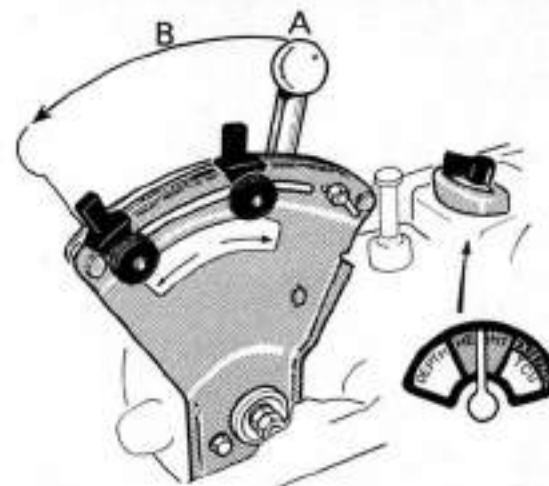


FIGURE 2/13. HYDRAULIC CONTROLS FOR HEIGHT CONTROL

A. Maximum height position  
B. Range of height

### Preparation

1. **Selector Dial Pointer** — Pull the hand lever fully rearwards in the red sector to 'select' and while holding it there, turn the selector dial pointer to 'HEIGHT'.
2. **Lift latch** — Disengage the lift latch (with the engine running, pull the hand lever fully rearwards against the spring and pull the lift latch upwards to disengage it).
3. **Lowering Control** — Initially set to mid-position and adjust later by trial to give the required rate of lowering.
4. **Finger Guides** — Set the rear guide temporarily to mid-position. Push the other fully forward and lock out of the way.

### Operation

Raise the implement by pulling the hand lever rearwards up to the spring loaded stop. Push the lever forward until the implement is lowered to the required height. Set the finger guide into line with the hand lever so that the same height may be found again easily. This setting will not vary with any change in implement weight or change in engine speed.

## LINKAGE SETTINGS

(U1168 Normal length, U1170 Extended)\*

The linkage is designed for use with either category 1 or category 2 implements. Changing from one category to the other is achieved by reversing the lower links and adjusting the length of the check chains (refer to Fig. 3/1 and 3/2). However, the following points should be noted. The lower links have a small ball (category 1) at one end and a large ball (category 2) at the other. A double-ended hitch pin is used to accommodate either size of ball when attaching to the tractor. The lower links are identical but attention should be paid to placing them the correct way up to align the angled ends.

The check chains have an adjustable link to allow them to be lengthened for category 2 implements or shortened for category 1. The link is stamped 990/1 and 990/2 against the appropriate hole through which the clamping bolt should be fitted.

### Lift rods

The lift rods and levelling lever should be adjusted initially to their nominal lengths measured between pivot centres. On no account should they or the top link be extended beyond the maximum length shown below otherwise there will be excessive strain on the remaining thread and damage will be caused.

Nominal length — lift rod and levelling lever 19in (48.3cm)

Maximum lengths — lift rod	21 in (53.4cm)
levelling lever	21 1/2 in (54cm)
top link (U1168)	26 1/2 in (70.5cm)
top link (U1170)	29 1/2 in (75cm)

\*U1168 has lower links 35 1/2 in (90cm) long between ball centres and U1170 has lower links 38 1/2 in (98cm) long. U1170 must be used if 12-38 rear tyres are fitted.

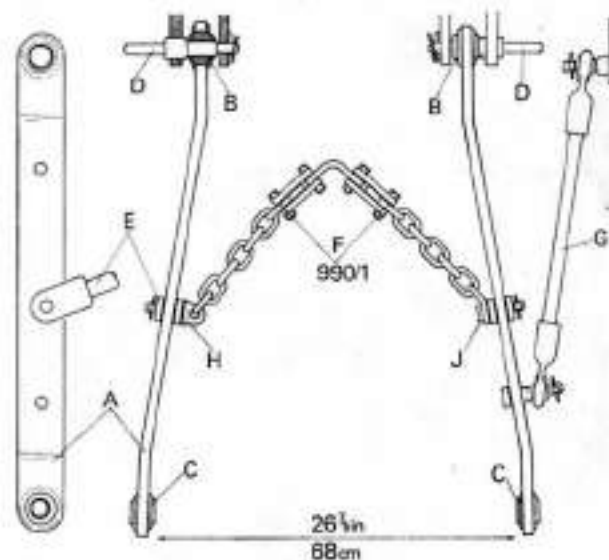


FIGURE 3/1. LINKAGE SET FOR CATEGORY 1

- |  |   |
|--|---|
| A. Lower link                            | F. Check chain bolt through hole marked 990/1 |
| B. Large ball                            | G. Linkage stabiliser bar                     |
| C. Small ball                            | H. Early fitting                              |
| D. Hitch pin with large end through ball | J. Later fitting with loose pin               |
| E. Lift rod                              |   |



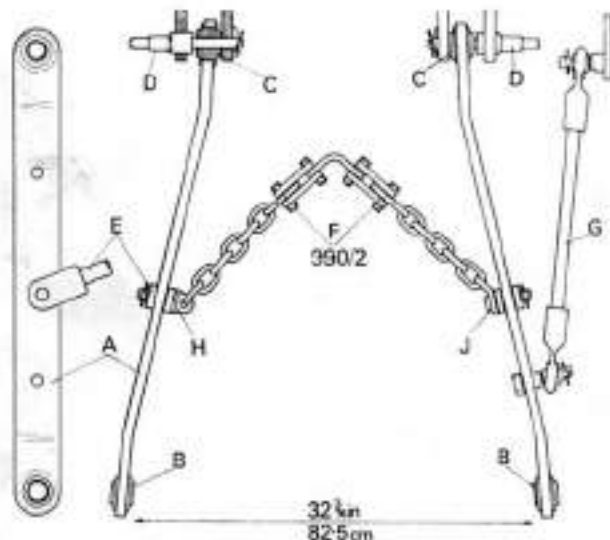


FIGURE 3/2. LINKAGE SET FOR CATEGORY 2

- |  |   |
|--|---|
| A. Lower link                            | F. Check chain bolt through hole marked 990/2 |
| B. Large ball                            | G. Linkage stabiliser bar                     |
| C. Small ball                            | H. Early fitting                              |
| D. Hitch pin with small end through ball | J. Later fitting with loose pin               |
| E. Lift rod                              |   |

### STABILISER BARS

When side movement must be avoided, stabiliser bars can be fitted to the rearmost hole in the lower link. The links are still free to lift up and down.

When fitted the final adjustment should be made by increasing the length of the stabiliser bar to remove free play from the lower link hitch points and to place the bars in compression.

### SLOTTED LIFT RODS

Where rough or undulating ground is being cultivated slotted lift rods are available. These replace the lower half of the lift rods and can be adjusted to give either fixed connection to the lower links or a slotted connection which allows 3in (7.6cm) of vertical free movement.

### DRAWBAR

The drawbar has full lateral adjustment, forward adjustment to three positions and four height positions.

*Stowed position* — The front end of the bar is pushed through the 'U' support bracket on the left-hand side and secured with the towing pin.

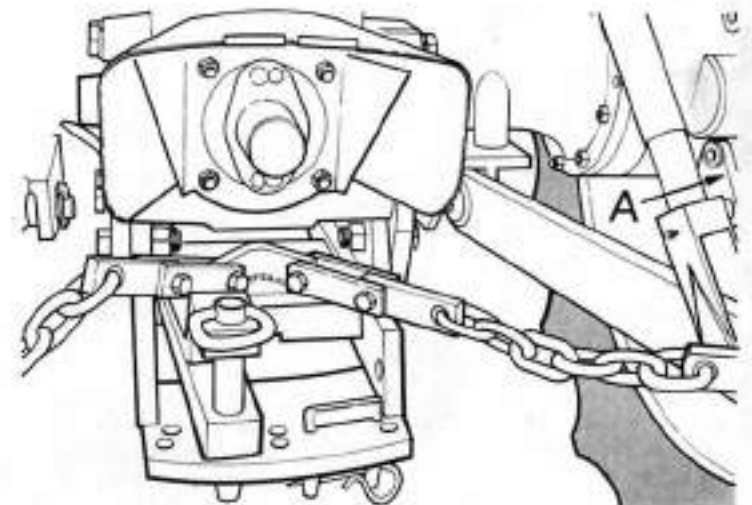


FIGURE 3/3. DRAWBAR STOWED  
A. Mounting pad for linkage stabiliser bracket

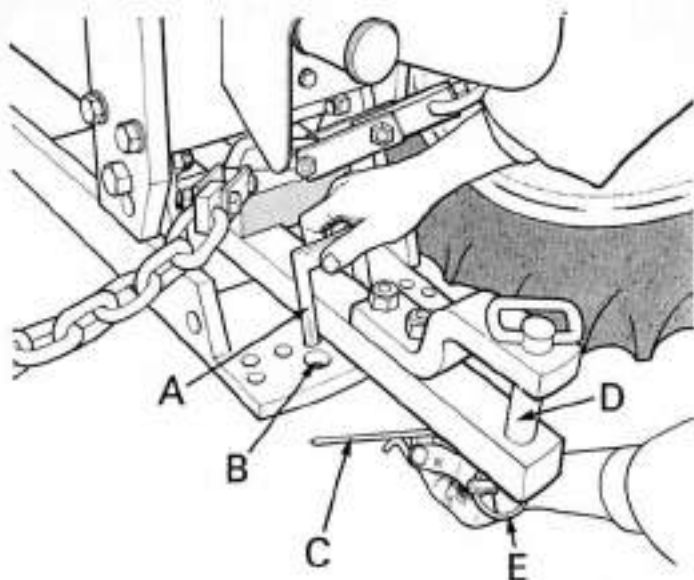


FIGURE 3/4. DRAWBAR IN TRAILER TOWING POSITION

- A. Securing bracket
- B. Hole for D in stowed position
- C. Pin
- D. Drawpin
- E. Linch pin

**Trailer towing positions** — For trailers exerting a downward load at the clevis up to a maximum of 3000 lb (1360kg) the forward position should be used. The drawbar is secured at the 2nd hole from the front by the downward projecting pin under the drawbar frame. The linch pin must be used to fasten the bar.

The rear of the drawbar is held by an inverted 'U' shaped bracket A, Fig. 3/4 and secured by pin C. The bracket can be fitted in several positions, centrally or to either side.

**Fully extended position** — Attachment is similar to the trailer positions as described above except that the front hole of the drawbar is used. This gives a towing position in relation to the PTO shaft which conforms to international standards for PTO driven implements. The maximum downward load at the clevis in this position is 2500 lb (1130kg).

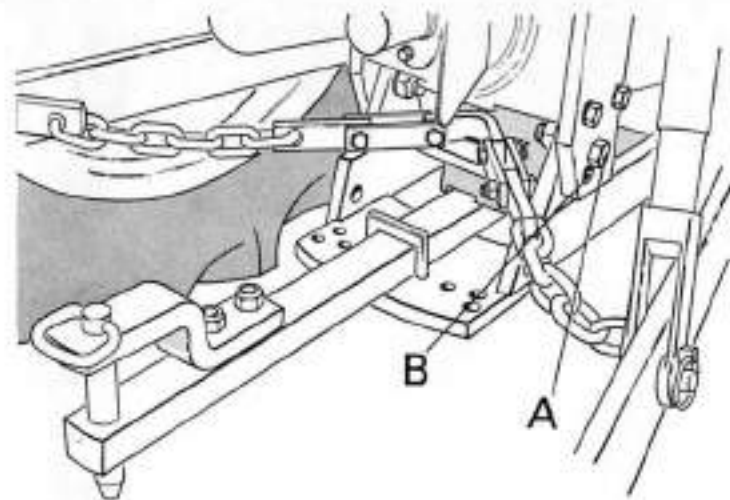


FIGURE 3/5. DRAWBAR IN EXTENDED POSITION

- A. Drawbar secured in upper position
- B. Hole for lower position

**Height adjustment** — The drawbar frame can be bolted at two different positions, position A or B in Fig. 3/5. With the drawbar in the extended position it may be fitted to the frame either way up, thus giving four heights.

**NOTE:** The drawbar frame must be in the top position when using linkage mounted implements otherwise the check chains will prevent full lift being obtained. Furthermore the drawbar itself should be in the stowed position to prevent possible fouling with the implement.

### PICK-UP HITCH

The pick-up hitch uses the drawbar frame as its basic support.

The rear end of the frame is unbolted from the hitch brackets. Two special lift rods are connected between the ram lift arms and the frame so that it can be raised or lowered by the tractor hydraulics. Maximum downward load (static) is 4000 lb (1800kg).

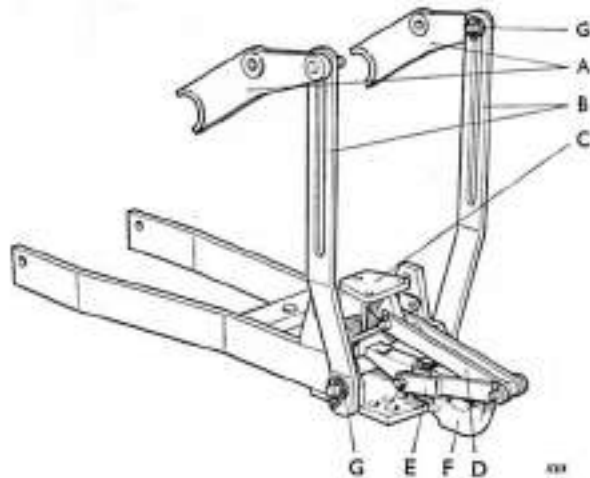


FIGURE 3/6. PICK-UP HITCH

- |                   |              |            |
|-------------------|--------------|------------|
| A. Extension arms | D. Draw link | F. Jaw     |
| B. Lift rods      | E. Jaw plate | G. Washers |
| C. Anchor bracket |              |            |

#### Fitting Instructions

1. Remove the drawbar and bolt the towing hook firmly to the centre of the drawbar frame.
2. Bolt the anchor bracket C to the underside of the PTO housing. Fit the jaw, jaw plate and draw link using the pins and spring clips provided.
3. Bolt the left-hand and right-hand extension arms A to the inside of the ram arms (rockshaft) using the 4½ in (10,8cm) long bolts in place of those through the lift rods. The pins welded to the ends of the lift arms should be on the inside of the arms.
4. Fit the cranked lift rods with the slotted ends uppermost, with a ¾ in (2,2cm) washer between the lift rod and securing linch pin at the top and bottom ends as shown at G, Fig. 3/6.

#### Operation

*To lower —*

1. Pull the selectamatic control lever rearwards into the select position and turn the dial to 'EXTERNAL'.
2. If the lift latch is engaged hold the control lever rearwards and disengage the latch.

3. Push the control lever forward to lower the hook.
4. To obtain a quicker drop with an empty hook, use the dump valve.

*To raise —*

Move the control lever to the lift position. When fully raised the lift latch may be engaged to lock the hitch in the raised position.

## WHEELS AND AXLES

NOTE: All track widths are measured to the centre of the tyre width at a point as near to the ground as possible.

#### FRONT TRACK ADJUSTMENT

The axle extension is secured by two bolts A, Fig. 3/7 which are screwed into threaded holes in the axle. To adjust the track width jack up the axle, remove the two ½ in UNC nuts and bolts from the track rod, remove completely the two bolts A, slide the axle extension to the required position, refit the bolts A with

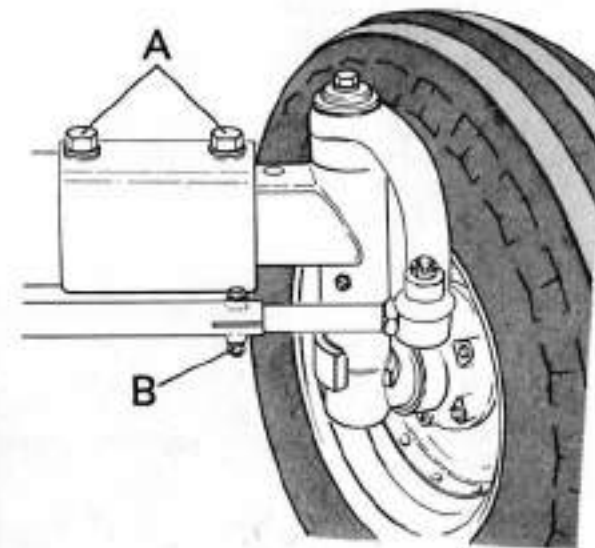


FIGURE 3/7. FRONT AXLE TRACK ADJUSTMENT

- |                        |                            |
|------------------------|----------------------------|
| A. Axle securing bolts | B. Track rod securing bolt |
|------------------------|----------------------------|

their spring washers and tighten each a little at a time until thoroughly secure.

When both ends of the axle have been adjusted, refit the nut and bolt through the track rod to position the wheels parallel when straight ahead. Finally check the toe-in at the rim of the wheel and reset if necessary. Toe-in should be  $\frac{3}{16}$  in (3.2mm). All exposed holes should be plugged with the plastic plugs provided in the tool box.

**NOTE:** Never fit the front wheels with the wheel centre dishes outwards for extra width. This upsets the steering geometry causing poor steering and heavy wear on tyres and pivots.

### REAR TRACK (TREAD) ADJUSTMENT

The rear track width can be varied by 2in (5cm) steps on each side. The dished wheel centres can be fitted to the hub either way round. The lugs on the wheel rim are off-centre so that by fitting the wheel either way round, a variation can be obtained. A further variation is obtained by fitting the wheel rim lugs either side of the dished centre.

The full range of settings are shown in Fig. 3/8. Note, that two different positions of rim and centre both give a track width of 64in (162.5cm).

**NOTE:** When fitting rear wheels observe the correct direction of rotation of pneumatic tyres. The tread pattern must be such that when looking down on top of the tyre, the vee of the tread points forward.

**⚠ DANGER** — Take care to place the jack on firm ground under a solid part of the tractor. Before removing a wheel, place some pieces of stout wood under the tractor frame to support it should the jack become dislodged.

### TRACK SETTINGS FOR PLOUGHING

The front and rear tracks should be adjusted so that the inner walls of the tyres travelling in the furrow bottom are in line.

The actual width is dependent on the plough and furrow width being ploughed but should be such that minimum adjustment to the plough cross-shaft is required for correct plough alignment and minimum draught.

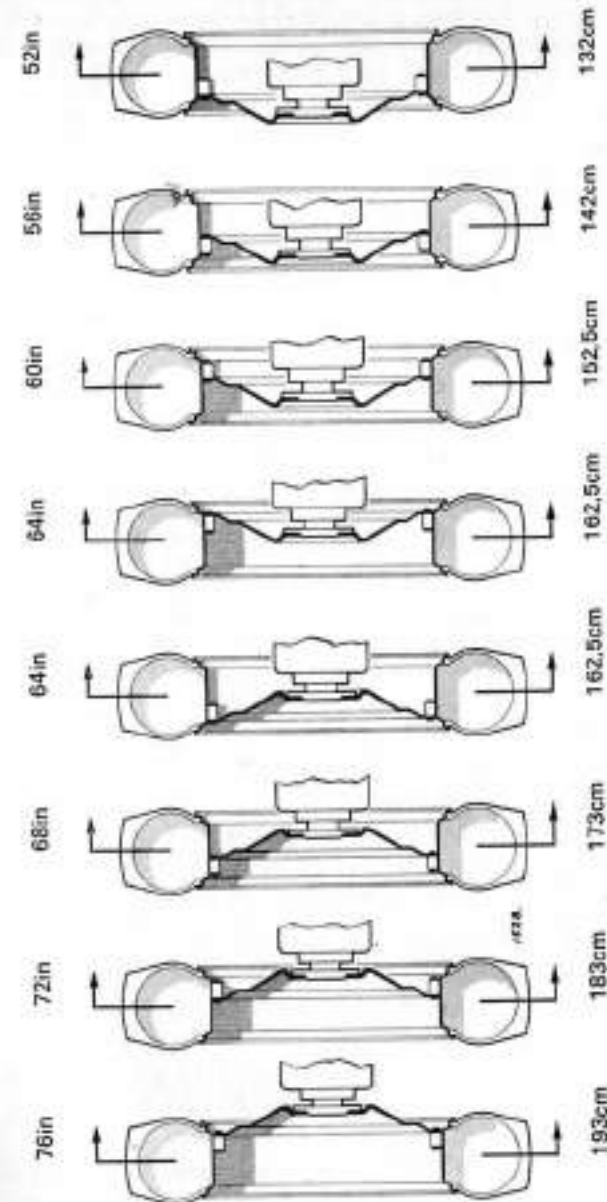


FIGURE 3/8. REAR WHEEL POSITIONS OF RIMS AND CENTRES

The positions shown here are for 12-4/11-36 tyres with shell and non-reinforced full fenders. Some tyre and fender combinations may have limitations to the minimum setting and other rims may have completely different settings — see specifications on page 129.

## TYRE PRESSURES

It pays to check the pressure frequently. Incorrect pressure, either too high or too low, is the chief cause of tyre wear and damage. Check pressure once a week. If water ballasted, the pressures should be checked very frequently.

### Front tyres —

general work	25 lb/in <sup>2</sup> (1,8kg/cm <sup>2</sup> )
with loader 6-00-19 6-ply tyres	45 lb/in <sup>2</sup> (3,2kg/cm <sup>2</sup> )
.. .. 7-50-16 6-ply tyres	36 lb/in <sup>2</sup> (2,5kg/cm <sup>2</sup> )

### Rear tyres —

road work 14-30, 15-30 (6-ply rating)	16 lb/in <sup>2</sup> (1,1kg/cm <sup>2</sup> )
.. .. 11-36, 12-36, 12-38 (6-ply rating)	20 lb/in <sup>2</sup> (1,4kg/cm <sup>2</sup> )
field work	12 lb/in <sup>2</sup> (0,8kg/cm <sup>2</sup> )

## BALLASTING

Wheelslip wears the tyres, reduces traction, slows work down and wastes fuel. It should be counteracted by the use of TCU wherever applicable — see page 34.

If additional traction or extra stability is required, use ballast.

### Water ballasting

Adding water to tractor tyres is an inexpensive method of adding weight which has the advantages of placing the weight over the tread on the ground thus giving greatest traction. It also reduces bounce on rough ground or cross cultivation and therefore improves ride and efficiency.

In cold climates a suitable anti-freeze such as calcium chloride or common salt must be added.

**WARNING** — Care must be used when mixing a calcium chloride solution (always add the chemical to water NEVER add water to calcium chloride). A considerable amount of heat is generated and the solution should be allowed to cool before adding to the tyre. A water adaptor is required for fitting to the valve to fill the tyre to the correct level. For these reasons it is preferable to allow the tyre supplier or your Dealer to carry out the operation.

A 75% to 80% filling is recommended as this can be accomplished without special pumping plant. The additional weight this provides for various tyre sizes is given on page 124.

As the amount of air is less than normal it is essential to check tyre pressures at frequent intervals. A special gauge such as Schrader No. 9350 should be used as calcium chloride or brine corrode ordinary gauges.

## Rear wheel weights

Rear wheel weights U184 add 90 lb (40kg) per weight. Usually two weights are fitted to each wheel. The addition of more than two weights per wheel increases the overall width of the tractor and may be inconvenient.

## Front weights

Where additional weight is required at the front of the tractor, chassis ballast weights are highly recommended. Front chassis ballast U731 comprises a mounting frame, locking bar and six weights of 67 lb (30kg) each. The entire assembly weighs approximately 460 lb (210kg).

**NOTE:** Chassis weights cannot be fitted together with a radiator guard. Where it is essential to have both, a locally made radiator guard should be produced to fit the weight support, bearing in mind that access to the air cleaner and battery must not be restricted.

Front wheel weights can be fitted on the outside of the wheel or both sides of it, according to the type and size of wheel fitted. They weigh 80 lb (35kg) each. U427 for 19in wheels or U475 for 16in wheels.

Note, however, that front wheel weights are not recommended for use on the road because at high speeds they can cause a certain amount of wheel wobble. In any case the front chassis ballast is preferable.

**! Danger** — If the support frame is removed ensure that the spacer bar which passes through the main frame is either removed or secured so that it cannot work out whilst driving. It can foul the steering with dangerous results.

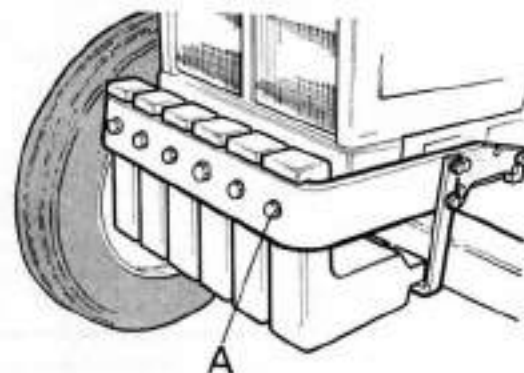


FIGURE 3/9. CHASSIS BALLAST WEIGHTS

A. Retaining bolts

## MULTI-SPEED POWER TAKE-OFF (PTO)

The PTO has a  $1\frac{1}{8}$  in (34,9mm) six spline shaft to British and International standards. See Data section for position of shaft etc.

**⚠ WARNING** — The PTO has two speed ratios selected by the lever which has a central neutral position. For safety reasons the neutral position should be used whenever the PTO is not in use. When engaging or disengaging either ratio, declutch pressing the pedal fully on 990 and 995 tractor or using the independent PTO hand-clutch on the 996 tractor. The clutch lever should be left in the engaged position when the PTO is not in use.

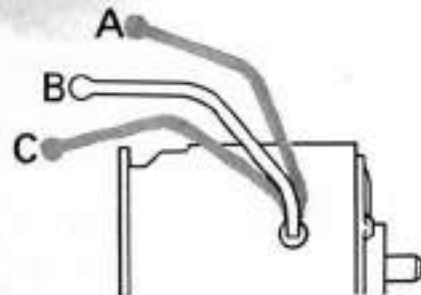


FIGURE 3/10.  
POWER TAKE-OFF

A. Low range  
B. Neutral  
C. High range

See Fig. 3/10 for the two range positions which give the speeds shown in the following chart.

Set engine speed (rev/min)	LOW RANGE	HIGH RANGE	
	1800	1100	2000
PTO Speed (rev/min)	540	540	1000
	Use for medium power implements: manure spreaders, balers etc.	Use for low power implements: fertilizer spreaders, hay turners etc.	Use for high power implements: rotary cultivators, double-chop forage harvesters etc. British standard belt pulley speed

**⚠ WARNING** — Implements designed for use at 540 rev/min must not be run at higher speeds or a dangerous mechanical failure may occur. Especial care must be taken, therefore, when operating in the high range.

## PTO DRIVEN IMPLEMENTS

When using implements which require power to be transmitted via a telescopic drive shaft from the PTO, the following points should be observed.

1. Ensure that the mounting does not involve angles of the drive shaft which exceed the angular ability of the universal joints (usually 20°).
2. Where high shock loading is to be expected, a slip clutch, correctly adjusted, should be incorporated in the drive.
3. Thrust loadings should be kept to a minimum by (a) ensuring that the telescopic drive does not bottom and (b) keeping the torque loading as low as possible. Where high horsepowers are required to be transmitted, use the 1000 rev/min standard speed instead of 540 rev/min.

### NOTE:

Make appropriate adjustment of the drive gear ratio of the implement.

This will reduce the torque to about half and permit easier sliding of the shaft. Keep the shaft well lubricated and where 540 rev/min must be used, a roller type or splined shaft should be used in preference to a square shaft.

## BELT PULLEY

For high power outputs, the high PTO ratio must be used giving 1000 rev/min. This gives a British Standard belt speed of 3140 ft/min (975m/min) at engine speed of 2000 rev/min. This provides maximum belt horsepower with minimum torsional loading. The PTO speed of 540 rev/min should not be used for belt pulley work.

See page 104 for fitting instructions.

## SELECTIVE SENSING UNIT

Owing to the wide variation in such factors as soil condition, depth of work and size of the implements used with these tractors, the forces operating (via the top link) on the hydraulic sensing unit can vary considerably and in extreme cases these forces may be outside the operating limits of the standard sensing unit.

The selective sensing unit caters for a very much wider range of implements and conditions. The unit provides a choice of three spring ratings which are selected by the selector lever (see Fig. 3/11).

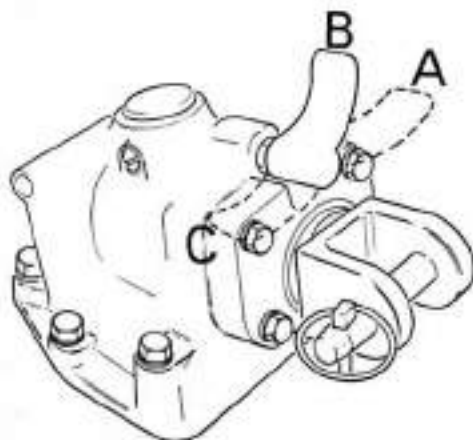


FIGURE 3/11. SELECTIVE SENSING UNIT

- A. Position for heavy draught implements
- B. Position for medium draught implements
- C. Position for low draught implements

*Position A:* Suitable for the heaviest draught implements such as chisel ploughs, subsoilers and the heaviest multi-furrow mouldboard and disc ploughs with top link forces of up to 6000 lb (2700kg) in compression and 3300 lb (1500kg) in tension.

*Position B:* Suitable for medium draught implements such as ploughs and cultivators with top link forces up to 3000 lb (1350kg) in compression and 1600 lb (725kg) in tension.

*Position C:* Suitable for light draught ploughs and cultivators, light hoes and weeders with top link forces up to 2000 lb (900kg) in compression and 1100 lb (500kg) in tension.

Once the appropriate rating has been selected operation of the hydraulic system is as described previously for the standard sensing unit (see page 29).

## HIGH CLEARANCE CONVERSION

Provided that the tractor has been ordered for High Clearance conversion and thus has the final drive units suitably drilled for the breather assembly and dowel locations, the tractor may easily be converted to High Clearance or back to Standard. Observe the following instructions. Reverse the procedure when converting back to Standard Clearance.

**NOTE:** Before converting to High Clearance, check the oil level in the reductions and restore to normal if necessary as this cannot be done after conversion.

The tractor is less stable in the High Clearance position and the widest possible track setting should be used. Front chassis weights are also advisable. High Clearance should not be used for heavy draught work such as ploughing. Traverse irrigation ditches and banks very carefully or front axle damage may occur.

### Rear Axle

1. With the tractor on firm and reasonably level ground, slacken each wheel nut one full turn (front and rear wheels), raise the rear end of the tractor and place packings under the rear axle case.
2. Depress the differential lock pedal until it reaches the limit of its travel and retain it in this position by placing a suitable bolt under the rear end of the pedal lever. Remove rear wheels. Place the handbrake in the 'Off' position and release the brake adjustments to ensure that the brake shoes are not binding on the drums.

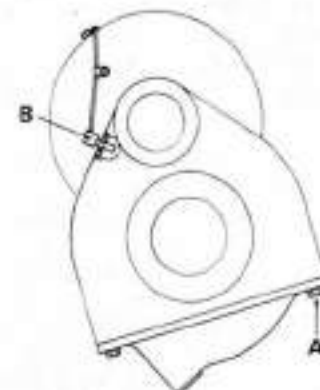


FIGURE 3/12. VIEW OF LEFT-HAND REDUCTION SHOWING BREATHER AND PIPE FITTED

- A. Replace breather bolt with 3/8 UNC bolt

3. Remove the  $\frac{1}{8}$  in BSP plug on top of the reduction housing and fit in its place the small breather unit as supplied with the conversion kit, passing it up the inner face of the mud-guard. Remove the standard breather bolt A, Fig. 3/12 from the reduction cover and fit the  $\frac{3}{8}$  in UNC bolt and plain washer in its place. (Failure to replace the standard breather with the new unit in this alternative position will result in oil leakage at this point.)
4. Remove the reduction securing nuts and set bolts and withdraw the reduction unit until it is clear of the dowels, then turn the reduction downwards by two holes, when the two dowel holes in the reduction casing not previously in use will line up with the dowels. Push the reduction home and refit set bolts and nuts.
5. Refit wheels, release diff-lock pedal and adjust brakes.
6. If linkage stabilisers are fitted, alternative brackets will have to be used (U747).

#### Front Axle

1. Raise the front end of the tractor until the front wheels are approximately 9 in (23cm) above the ground and place suitable packings under the main frame of the tractor. Remove the front wheels.
2. Block the centre beam and disconnect the side steering rod and track rod from the steering levers.
3. Withdraw the standard beam extensions and fit the high clearance extensions, tightening the bolts each a little in turn until secure. If one bolt is tightened first the track setting can be upset.
4. If hydrostatic steering is fitted transfer the steering lever from the standard front axle beams to the high clearance beams unit.
5. Refit the side steering rod and track rod to the steering levers. Replace the wheels.
6. Front wheel alignment should be checked. The wheels should be set so that they have  $\frac{1}{8}$  in to  $\frac{1}{4}$  in 'toe-in' when in the straight ahead position. This setting may be checked by measuring the distance between wheel rims at a point level with the wheel centres and parallel to the centre line of the axle. The distance between the wheel rims at the front should be  $\frac{1}{8}$  in to  $\frac{1}{4}$  in (1.6mm to 3.2mm) less than the distance at the rear and this may be adjusted by removing the track rod clamp bolt and increasing, or decreasing, the length of the rod by turning one of the tubes to screw the ball joint further in or out as required.

## SECTION 4. REGULAR MAINTENANCE

### INTRODUCTION

Your David Brown dealer will have thoroughly checked your tractor before delivery and will advise you of the arrangements for the first service. In the U.K. and some other countries, details are given in the Tractor (Customer) Service Book.

Subsequently, regular routine maintenance is essential. The importance of carrying this out regularly cannot be over emphasised. A properly maintained tractor retains its efficiency longer and remains reliable and ready for use at any time. Failure to carry out the maintenance properly can lead to unnecessary repairs, usually at unexpected and awkward times and in the long run is much more expensive than the cost of the regular attention.

Because of its importance, the David Brown maintenance procedure has been made very simple. To this end the requirements have been divided into a daily inspection and greasing, plus 5 tasks: A, B, C, D and E to be carried out under normal conditions at the times shown in the table (page 62). The tractor hour meter is provided so that these times can be measured.

It is strongly recommended that the required maintenance be carried out at the end of the day on which the hour meter reaches the stipulated time. The oils will then be warm and will drain away easily.

NOTE: Attention to cleanliness is very important. All grease points must be cleaned before applying the grease gun. Sump plugs and filler caps must be wiped clean before removing and any containers used when filling the engine, gearboxes or fuel tank must be kept perfectly clean. The smallest grain of dust in the fuel system can cause faults with loss of power and early replacement. It is recommended that servicing be carried out under cover wherever possible.

If in doubt at any time, consult your David Brown dealer rather than risk damaging your tractor.



## TABLE OF ROUTINE SERVICE TASKS

NOTE: Recommended frequencies are for moderate operating conditions. Under more arduous conditions, such as dry dust or wet mud, the daily greasing and inspection of the air cleaner should be carried out twice a day or even more often as dictated by experience. The other tasks should also be carried out at correspondingly shorter intervals.

In addition to the Daily Inspection and Greasing, carry out the tasks marked X at the times shown.

Hour Meter Reading	Task A	Task B	Task C	Task D	Task E
60	X				
125	X	X			
185	X				
250	X	X	X		
315	X				
375	X	X			
440	X				
500	X	X	X	X	
560	X				
625	X	X			
685	X				
750	X	X	X		
815	X				
875	X	X			
940	X				
1000	X	X	X	X	X

Repeat the above service tasks at similar intervals throughout subsequent 1000 hour periods.

## DAILY INSPECTION

1. **Inspection** — Check for oil, water and fuel leaks.
2. **Engine Oil** — Top up the engine sump if below the safe limit.

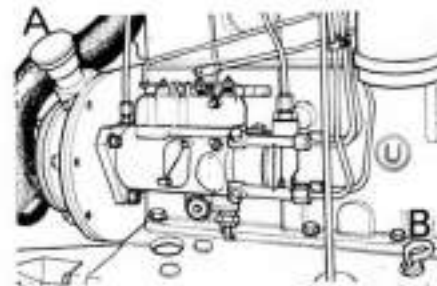


FIGURE 4/1. ENGINE OIL FILLER  
A. Filler cap B. Dip stick

3. **Fuel** — Top up the fuel tank to within  $1\frac{1}{2}$ in (4cm) of the top. This ensures a good supply and reduces condensation in the tank. Visually check the fuel water trap for excessive dirt or water. Clean if necessary (see page 87).
4. **Air Cleaners** — In dusty conditions, service the cleaners every 8 hours or as found necessary by experience (see page 81).



FIGURE 4/2.  
AIR CLEANER



FIGURE 4/3.  
PAPER AIR FILTER

If a paper element pre-filter is fitted, this must be cleaned and replaced. If damaged in any way it must be renewed.

5. **Greasing** — In dusty or wet and muddy conditions apply lubricant to the following points. Clean the grease points (fittings) before applying the gun.

**SAE 140 OIL** { King pins  
Front axle trunnions (2 points)

**GREASE** { Front hubs\*  
Steering box cross-shaft  
(manual only — 3 points)

6. **Wheels** — Tighten the wheel securing nuts each day for the first 50 hours when new or after the nuts have been disturbed. Tighten until no further movement can be detected, indicating that they have fully bedded into the conical seats.

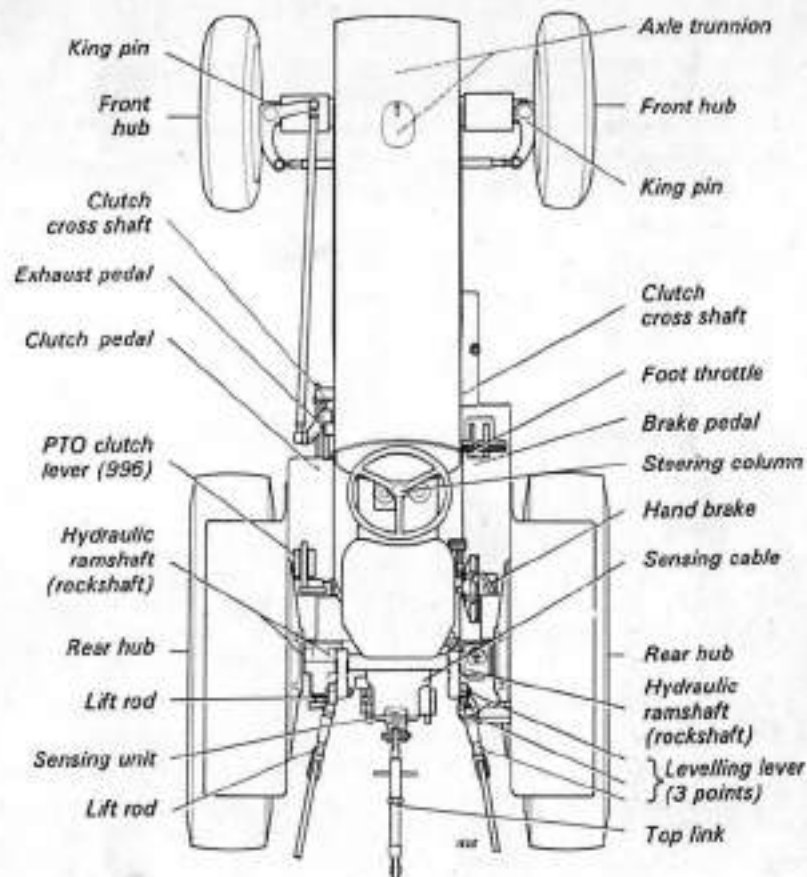


FIGURE 4/4. LUBRICATION CHART

\*Continue until grease exudes from inside of hub. This is not a sign that the hub seal is faulty.

NOTE: The rear hubs should be injected with 2 shots only at 60 hour intervals and the hand brake fitting with one shot only every 500 hours.

## SERVICE TASK A

Every 60 hours under normal conditions — **more often if necessary**. Carry out the Daily Inspection plus the following:

1. **Air Cleaners** — Service the cleaners as detailed on page 81.
2. **Gearbox** — Top up the gearbox oil to within the safe marks on the dip stick if necessary.

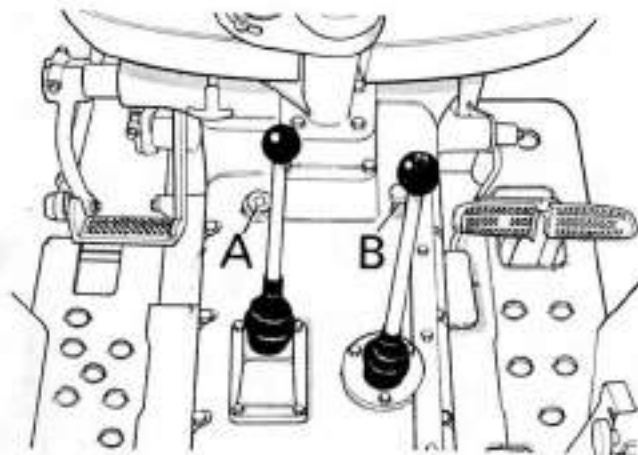


FIGURE 4/5. GEARBOX FILLER

A. Filler plug      B. Dip stick

3. **Lubrication** — Even under the most favourable operating conditions the following lubrication must be carried out. Always clean the grease points (fittings) first.

**SAE 140 OIL** { King pins  
Front axle trunnion (2 points)

**GREASE** { Front hubs  
Steering box cross shaft (3 points)  
Steering column top bearing  
Rear hubs\*  
Clutch pedal  
Brake pedal  
PTO clutch lever  
Sensing unit  
Sensing unit cable  
Hydraulic lift ramshaft (3 points)  
Lift rod and levelling lever (5 points)  
Top link

\*Take care not to over grease. Apply only 2 shots of the grease gun.

4. **Power Steering** — Check the oil level with the wheels in the straight ahead position.
5. **Controls** — Lubricate the controls and pivots with new engine oil. In dry, dusty conditions, however, these points are best left unlubricated.
6. **Brakes** — Check the foot brakes for adjustment and balance with the locking bar connecting the pedals (see page 105).
7. **Clutch** (not 996) — Check free-play and reset to 1 to 1½ in (25 to 38mm) if necessary (see page 106).  
**Transmission Clutch** (996) — Check the free-play at the foot pedal and reset if necessary to 1 in (25mm) (see page 107).  
**PTO Clutch** (996) — Check the free-play at the top of the hand lever and reset if necessary to 2 in (50mm) (see page 107).
8. **Water** — Top up the radiator, if necessary, to within 1 in (25mm) of the neck to allow for expansion. Release the cap slowly as the system is pressurised.
9. **Battery** — Top up the battery with distilled water. Dry off the top of the battery. The battery will require more frequent attention in hot, dry conditions.
10. **Tyres** — Inflate tyres to correct pressures (see page 54).
11. **Fuel Water Trap** — Clean out the fuel water trap and sediment bowl. Bleed at the inlet to the first fuel filter, after refitting the bowl, to get rid of all the air (see page 87).
12. **Wheels** — Check the tightness of all wheel nuts.

### SERVICE TASK B

Every 125 hours under normal conditions — **more often if necessary**. Carry out the Daily Inspection and Task A plus the following:

1. **Engine Oil Change** — Drain the engine sump whilst hot. Refill to within the safe marks on the dipstick with new oil.

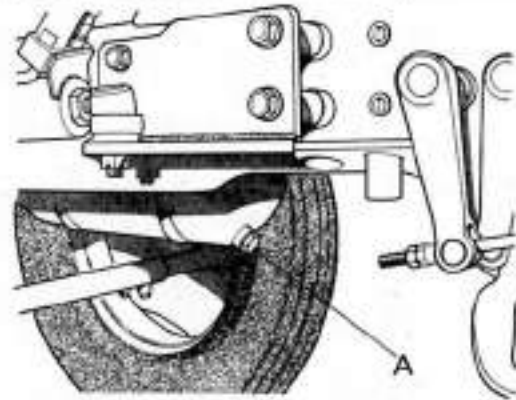


FIGURE 4/6. ENGINE SUMP DRAIN

A. Oil drain plug

2. **Final Drives** — Check the oil level in both units and top up with new oil if necessary. Check that the holes in the vent plugs are clear.

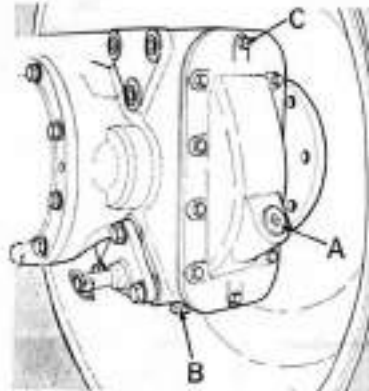


FIGURE 4/7. FINAL DRIVE UNIT

A. Level plug                      C. Vent plug.  
B. Drain plug

### SERVICE TASK C

Every 250 hours under normal conditions — **more often if necessary**. Carry out the Daily Inspection and Tasks A & B plus the following:

1. **Oil Filter Renewal** — While the engine oil is being drained, remove the oil filter and fit a new element (see page 92).

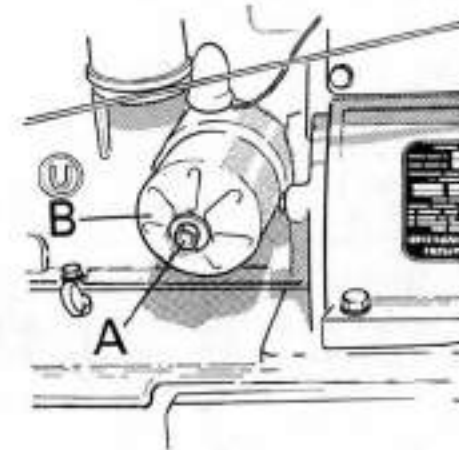


FIGURE 4/8. ENGINE OIL FILTER

A. Securing bolt  
B. Filter bowl

## SERVICE TASK D

Every 500 hours under normal conditions — **more often if necessary**. Carry out the Daily Inspection and tasks A, B & C plus the following:

1. **Transmission and Hydraulic Filters** — Drain the oil while hot and change the hydraulic filter. Clean the wire mesh filter and the magnet. The original oil, except for the last half-gallon (3 litre) can be used for refilling (see page 97).

**NOTE:** It may be necessary to fit a new filter before 500 hours. The filter warning lamp will indicate this, see page 12.

**Nylon filter** — Clean the nylon filter in the by-pass valve plunger situated in the hydraulic control valve assembly (see page 99). Some tractors are fitted with a metering pin which does not require servicing.

**Magnetic plug** — Unless a live-hydraulic take-off valve is fitted, remove the  $\frac{3}{8}$  UNC plug A, Fig. 4/9, clean the magnet attached to it and replace. (Not fitted to earlier tractors.)



FIGURE 4/9. MAGNETIC PLUG

A.  $\frac{3}{8}$  UNC plug and magnet

B. Access to nylon filter

2. **Injectors** — If facilities are available, have the injectors tested for correct operation. Replace if satisfactory using new copper sealing washers. If below standard have them reconditioned by a David Brown or CAV agent.

In the absence of checking facilities, submit the injectors for reconditioning if the tractor shows symptoms of black smoke, power loss or heavy fuel consumption.

3. **Valve Clearance** — Check and reset the valve clearances (see page 93).
4. **Fan Belt** — Check the tension by deflecting midway between the pulleys. Adjust this, if necessary, to be  $\frac{1}{8}$ in (10mm) (see page 84).
5. **Fuel Filters** — Renew the fuel filter elements and vent the system at least once a year (see page 86).
6. **Inspection** — Check over the tightness of external nuts etc.
7. **Hand Brake** — The grease fitting on the housing of the hand brake should be given one shot of SAE 140 oil. Do not grease or over lubricate or the action of the pawl will be affected.
8. **Dynamo** — Apply one or two drops of thin oil to the lubricating pad at the end of the dynamo. Replace the rubber plug (see page 111). Alternators require no lubrication.
- 9a. **Power Steering (combined pump and reservoir)** — At the first 500 hour service, fit a new filter element and top up with new oil. This is best done by your David Brown dealer (see page 102)
- 9b. **Power Steering (separate pump and reservoir)** — Drain the system, fit a new filter, re-fill with new oil and vent the system (see page 103).

## SERVICE TASK E

Every 1000 hours under normal conditions — **more often if necessary**. Carry out the Daily Inspection and Tasks A, B, C & D plus the following:

1. **Transmission and Hydraulic Oil** — When hot, drain the oil from the two plugs (main frame and rear axle). Replenish with new oil (see page 97).
2. **Final Drives** — When hot, drain the oil from the final drive reduction housing and refill to the plug with new oil (see page 97).
3. **Belt Pulley** — Where fitted, drain off the oil and refill to the level of the plug with the same grade of oil as used for the Gearbox and Hydraulic System (see page 108).
4. **Inspection** — Check the front hub, front axle and steering for wear and adjustment (see page 95 and 96).
5. **Brakes and Clutch** — Check the adjustment of the brakes and clutch (see pages 105 and or 106 107).

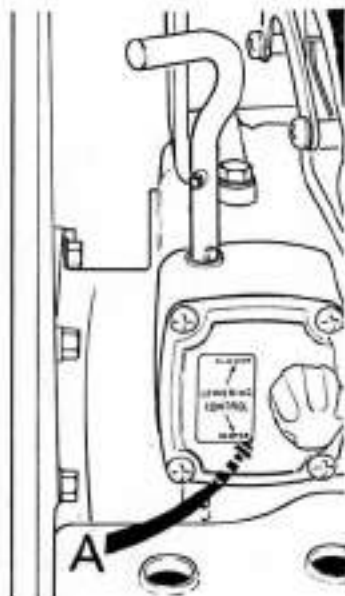


FIGURE 4/9. HAND BRAKE

A. Grease fitting

## FUEL, GREASE AND ANTI-FREEZE SPECIFICATIONS

**CAUTION** — Never fill the fuel tank when the engine is running or when near an open flame. Do not smoke when working near flammable fuels.

### Diesel Fuel — U.K. and Ireland

Farm diesel fuel of high quality (BS 2869 Class A2) is recommended for use in David Brown Engines.

### Diesel Fuel — Except U.K. and Ireland

For temperatures above 0°C (32°F) use No. 2D fuel (ASTMD 975) with a minimum cetane rating of 45.

For temperatures below 0°C (32°F) use No. 1D fuel (ASTMD 975) with a minimum cetane rating of 50.

**NOTE:** For low temperature operation a fuel with a pour point 6°C (10°F) below lowest starting temperature should be specified.

### Grease

A good quality lithium-based or similar multi-purpose grease should be applied to all grease fittings. A high melting point grease may be used for all fittings except those which require oil.

### Anti-Freeze

Use only a brand formulated for use in Diesel engines to British Standard 3151 : 1959 type B, or its equivalent. This specifies an ethylene glycol type anti-freeze with sodium benzoate or sodium nitrite inhibitors. Topping up should be carried out with the same type of anti-freeze in the appropriate strength. It is not recommended that any anti-freeze should be retained longer than 2 years.

## APPROVED LUBRICANTS — UK and IRELAND

APPLICATION	GRADE		B.P.	CASTROL	ESSO	MOBIL	SHELL
	Recommended	Alternative					
Engine & Air Cleaner	Multi-purpose Oil	SAE 20/20W	Tractor Oil Universal	Agricastrol Multi-use	Esso Tractorlube (Universal)	Mobiland Universal	Tractor Oil Universal
Transmission & Hydraulic System, Steering Box and Belt Pulley	Multi-purpose Oil	SAE 80	Tractor Oil Universal	Agricastrol Multi-use	Esso Tractorlube (Universal)	Mobiland Universal	Tractor Oil Universal
Final Drive Reductions King Pins & Front Trunion	SAE 140		BP Gear Oil 140 or Farm Gear Oil Universal	Agricastrol Gear Oil Medium	Esso Gear Oil GP 90/140	Mobilubs CI 40	Farm Gear Oil Universal
Power Assisted Steering and Hydrostatic Steering	Hydraulic Mineral oil of SAE 10W viscosity (Not brake fluid)		Tractor Transmission Fluid or Energol HLP 65	Hyasin AWS32 or Agricastrol ATF	Esso Automatic Transmission Fluid or Nexo H44	Mobil DTE24 or Mobil ATF 200	Tellus 27 or Tractor Transmission Fluid
Alternative Grade Oils	SAE 20/20W		Venellus M 20W or Super TOU	Castrol CRI 20 or Agricastrol 20	Esso HD 20W	Mobil 20W/60 or Delvac 1230	Rotella SX 20/20W or Super TOU
	SAE 80		Tractor Oil 30 or Venellus M 30	Castrol CRI 30 or Agricastrol 30	Esso HD 30	Mobilube C80 or Mobil 20W/60 or Delvac 1230	Tractor Oil 30 or Super TOU

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## APPROVED GREASES — ALL COUNTRIES

AMOCO	B.P.	CASTROL	ESSO	MOBIL	SHELL
Amolith Grease MP	Energolase Universal or Energolase L2	LM Grease	Bascon 2	Mobilgrease MP or Mobilgrease Super	Retinax A or Farm Grease Universal

## APPROVED LUBRICANTS — EXCEPT UK and IRELAND

Application	Air Temp.	GRADE		AMOCO	B.P.	CASTROL	ESSO	MOBIL	SHELL
		Recommended	Alternative						
*Engine and Air Cleaner*	Below -7°C (20°F)	Multi-purpose 10W/30	SAE 10W	AMOCO HD-M Motor Oil 10W/30	Venellus M 10W/30	Agricastrol Multi-use 10W/30	Esso Tractorlube (Universal) 10W/30	Mobil Super	Rotella TX 10W/30
			Multi-purpose 20W/30 or 20W/40	AMOCO HD-M Motor Oil 20W/30	Tractor Oil Universal or Venellus M 20/50	Esso Tractorlube (Universal) 20W/30	Mobil Super	Rotella SX 20W/40	
			Multi-purpose 20W/30 or 20W/40	SAE 30					

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**\*ENGINE OIL**

In climates where the day temperature often exceeds 22°C (70°F) an SAE 30 straight mineral oil may be used in the Air Cleaner, to prevent frost 'pull-over' into the engine. Do not overfill the bowl.

\*Note: If the particular engine oils listed are not available, an oil conforming to API classification 'CB' may be used in the Diesel engine.

continued overleaf

## APPROVED LUBRICANTS — EXCEPT UK and IRELAND — continued

APPLICATION	Air Temp.	GRADE		AMOCO	B.P.	CASTROL	ESSO	MOBIL	SHELL
		Recomm.	Alternative						
Transmission and Hydraulic System, Belt Pulley and Steering Box	Below -7°C (20°F)	Multi-purpose 20W/30 or 20W/40	SAE 80	AMOCO HD-M Motor Oil 20W/30	Tractor Oil Universal or Vanellus M 20/50	Agricastro Multi-use 20W/30	Esso Tracrolube (Universal) 20W/30	Mobil Super	Rotella SX 20W/40
	-7°C to 32°C (20°F to 90°F)	Multi-purpose 20W/30 or 20W/40	SAE 90						
Power-Assisted Steering and Hydrostatic Steering	All temps.	Hydraulic Mineral Oil of SAE 10W viscosity (Not brake fluid)		AMOCO Inbiloil 16	Energy HLP 65	Hyspin HWS 32 or Castrol TC	Esso Automatic Transmission Fluid or Nuto H44	Mobilfluid ATF 200 or DTE 24	Tefus 27
Final Drive Reductions, King Pins and Front Trunion (Pivot)	Below -7°C (20°F)	SAE 90	—	AMOCO Gear Lubricant SAE 90	Gear Oil 90	Castrol ST or Agricastro Gear Oil Light	Esso Gear Oil ST 90	Mobilube C 90	Dentax 90
	-7°C to 32°C (20°F to 90°F)	SAE 140	—	AMOCO Gear Lubricant SAE 140	Gear Oil 140	Castrol D or Agricastro Gear Oil Medium	Esso Gear Oil ST 140	Mobilube C 140	Dentax 140
	Above 32°C (90°F)								

## APPROVED LUBRICANTS — EXCEPT UK and IRELAND — continued

APPLICATION	GRADE	AMOCO	B.P.	CASTROL	ESSO	MOBIL	SHELL
	SAE 20W	AMOCO HD-M Engine Oil 20/20W	Vanellus M 20W	Castrol CRI 20 or Agricastro 20	Esso HD 20W	Mobil Super or Delvac 1220	Rotella SX 20/20W
	SAE 30	AMOCO HD-M Engine Oil 30	Vanellus M 30	Castrol CRI 30 or Agricastro 30	Esso HD 30	Mobil Super or Delvac 1230	Rotella SX 30
	SAE 80	AMOCO Gear Lubricant SAE 80	Gear Oil 80	Castrol ST 80 or CRI 30 or Agricastro 30	Esso HD 30	Mobilube C 80 or Mobil Super or Delvac 1230	Dentax 80
	SAE 90	AMOCO Gear Lubricant SAE 90	Gear Oil 90	Castrol ST 90 or Agricastro Gear Oil Light	Esso Gear Oil ST 90	Mobilube C 90	Dentax 90



## SECTION 5. SERVICE INFORMATION

### INTRODUCTION

Your David Brown Dealer is equipped with special tools for servicing and repairing your tractor and has a great deal of experience backed by information supplied by the factory. If you require service or advice not covered by this book, consult your David Brown Dealer first rather than risking damaging your tractor; he is qualified to help you.

The following pages give sufficient information to enable the operator to carry out the routine servicing and adjustments required to maintain the high efficiency of the tractor.

**Before removing any caps, plugs or covers, all surrounding dirt must be cleaned off. Dust or dirt must not be allowed to enter any part of the tractor at any time.**

Service instructions are given as follows:

Engine .. .. .	pages 81 to 94
Chassis .. .. .	pages 95 to 108
Electrical System .. .. .	pages 109 to 116

## BONNET TOP (HOOD) REMOVAL

Access to the battery and air cleaner is gained by removing the front grille. Access to the radiator filler is gained by lifting the small hatch cover fitted in the bonnet top.

Full access to the engine is gained by removing the bonnet as follows:—

1. Remove the pre-cleaner (or paper filter) and the exhaust silencer (muffler) by lifting upwards.
2. Remove the radiator grille by pulling forward at the top and lifting upwards after releasing the two twist fasteners with a coin.
3. Disconnect the wires to the headlamps by pulling apart the connectors under the right-hand side of the bonnet.
4. Slacken the thumbscrews inside the front of the bonnet at the bottom (one each side).
5. Unhitch the bonnet clip D, by pressing down and forwards.
6. Lift the bonnet clear of the fuel tank filler, then lift and draw forward clear of the tractor. If a radiator guard is fitted removal of the bonnet will be easier if the guard is folded forward and downward out of the way.



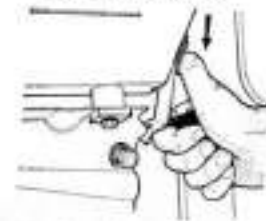
A. Grille removal



B. Thumb screw



C. Headlamp connector



D. Bonnet clip

FIGURE 5/1. BONNET AND GRILLE REMOVAL

## ENGINE

### AIR CLEANER

A 3-stage filter system is used to provide the best possible protection to the engine. The first stage is a centrifugal pre-filter. A pre-filter with a removable paper element can be fitted as an alternative. The second and third stages consist of the oil bath and the detachable wire mesh.

In servicing the cleaner, the aim is to prevent more than  $\frac{1}{4}$  in (6mm) of dirt accumulating in the oil bath and to prevent the detachable wire mesh becoming choked with oily dust. If the dust collected by the cleaner is not removed frequently, it will reach the stage where it will be carried over into the engine. This will cause premature wear and excessive oil consumption.

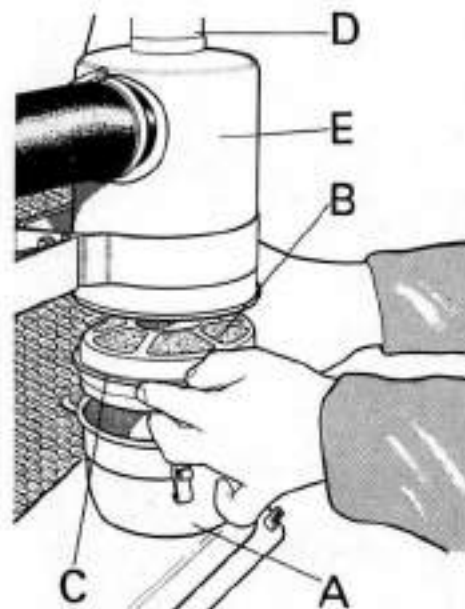


FIGURE 5/2.  
AIR CLEANER

- A. Oil pan
- B. Wire mesh
- C. Rubber seals
- D. Inlet pipe
- E. Cleaner body

In dry and dusty conditions, cleaning and refilling may be required several times a day. In clean and in damp conditions the cleaner will remain efficient for several weeks. Inspect frequently to begin with and clean when there is  $\frac{1}{4}$  in (6mm) of solid sediment, the oil is very dirty, or the detachable wire mesh is thick with oily dust. Let experience then guide future inspection periods. Don't forget to inspect more frequently if conditions become worse.

Clean as follows:

Empty and clean the oil bath bowl (cup) and refill to the bead with clean engine oil. Detach the wire mesh element and clean in kerosene or fuel oil. Clean the pre-filter and centre tube of the oil bath filter. Refit the wire mesh element with its sealing ring and secure the oil bath firmly.

When a paper element pre-filter is fitted, the element should be cleaned by tapping the element gently on its ends so that the dust falls off it. Care should be taken not to damage the paper. If it becomes perforated or it is damp, a new element must be fitted.

NOTE: A sudden increase in dust accumulation in the oil bath indicates a ruptured paper filter element. An increase in black smoke with power loss may indicate a blocked paper element.

## COOLING SYSTEM

Ensure that at all times the hose connections are tight and the system free from leaks.

With or without anti-freeze, the water used in the cooling system must be clean and pure. Where anti-freeze is not required a corrosion inhibiting coolant is recommended. This should be renewed at least every 2 years.

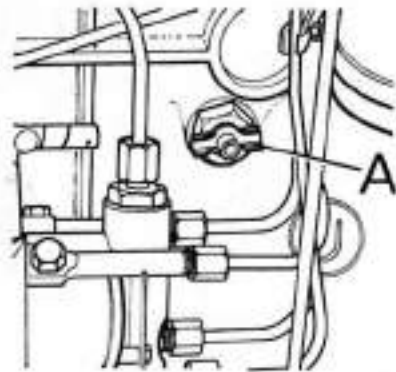


FIGURE 5/3.  
CYLINDER BLOCK DRAIN  
A. Drain tap

### Precautions in freezing weather

If the tractor is to stand for any length of time the radiator and cylinder block must be drained (two points) unless anti-freeze is used. The radiator cap must be removed to ensure complete drainage.

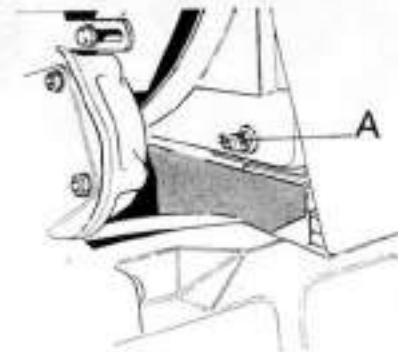


FIGURE 5/4.  
RADIATOR DRAIN  
A. Drain tap

The use of anti-freeze is strongly recommended in climates where freezing occurs. The strength should be such as to withstand the lowest temperature likely to be encountered. The correct ratio to achieve this will be recommended by the manufacturer.

If anti-freeze solution is used in diesel engines there is the possibility of severe corrosion of the cylinder block taking place, with subsequent blockage of the radiator etc., unless the following precautions are taken. (1) Use only a brand having a manufacturer's guarantee that it has been formulated for use in diesel engines. (2) Ensure that the system is free from corrosion by flushing the system with a reliable flushing compound. (3) Use only pure water for making the mixture, i.e. fresh rain water; some forms of tap water are unsuitable. (4) When topping-up, use a mixture of anti-freeze and water. (5) Drain and refill with a new anti-freeze solution at the beginning of the winter season (never use the same mixture for longer than 2 years). If anti-freeze is not used a corrosion inhibiting coolant is recommended instead of plain water. (6) Ensure that the system is free from leaks at hose joints etc. (7) If cylinder head gasket blowing is suspected, attend to the leakage at once, and refill with a brand new anti-freeze mixture.

## FAN BELT ADJUSTMENT

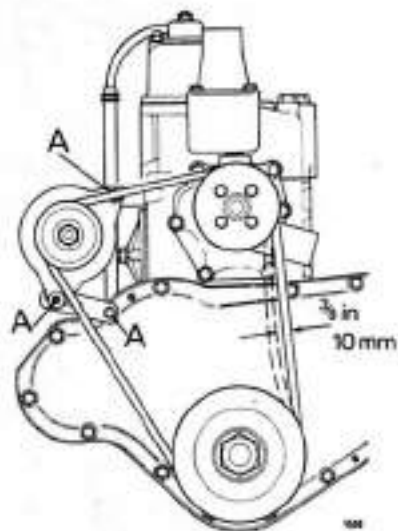


FIGURE 5/5. FAN BELT DRIVE ADJUSTMENT  
A. Securing bolts

Refer to Fig. 5/5. The fan, alternator (or dynamo) and water pump drive belt should never be run taut. The correct adjustment allows  $\frac{3}{8}$  in (10mm) of deflection under finger pressure on the drive side of the alternator pulley. If incorrect, slacken the bolts A, and the rear mounting bolt, and pivot the alternator about the lower bolts to give the correct tension. Retighten all the bolts after adjustment has been made.

NOTE: If the fan belt squeals when the engine is speeded up on machines fitted with an alternator, the fan belt is too slack or is worn excessively.

## DIESEL FUEL STORAGE

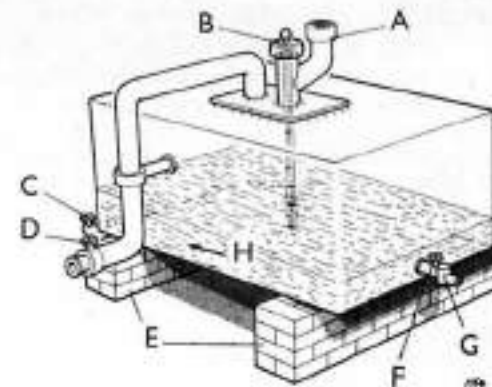
Diesel fuel must be kept clean and free from condensation. Therefore all containers, funnels etc. must be clean and dry and whenever possible refueling of the tractor should be carried out under cover. It is just as important to prevent dirt entering the fuel system of a tractor as is the case with the lubricating and hydraulic systems. Dirt will damage the injection pump and cause sticking of the injectors.

No smoking or naked flames should be allowed near the fuel store or near a tractor when refueling.

When providing a fuel storage tank the following points should be borne in mind:

FIGURE 5/6. DIESEL FUEL STORAGE

- A. Vent pipe
- B. Dipstick
- C. Drain valve
- D. Fill pipe valve
- E. Cradle
- F. Draw-off valve
- G. Filter
- H. Fall



1. The size of the tank should be ample to cover expected requirements but not so large that draining and refilling periods are infrequent.
2. The tank should be high enough to allow gravity feeding direct into the tractor tank and should be under cover, or at least protected from extremes of temperature by surrounding walls.
3. The tank should slope towards the rear with a drain tap at the lowest point.
4. The draw-off tap should be at the front, at least 3in (76mm) above the drain tap.
5. The draw-off should be through a filter with provision for cleaning or changing the element.
6. There should be a vent at the top adequately protected by a fine wire mesh.
7. The filling pipe should be within reasonable access of a bulk delivery tanker and kept scrupulously clean.
8. Sludge and water should be drained from the drain tap every month.

NOTE: Galvanised material should not be allowed to come into contact with diesel fuel or the fuel will be contaminated by the zinc.

## FUEL FILTER ELEMENTS

The David Brown diesel tractor has two paper element fuel filters in series. The filters should be changed at regular intervals. The precise life will be governed by the condition of the fuel used. Fuel supplied from a tank, such as described above, being clean and free from water, should give a life of at least 500 hours. With barrel storage and the attendant contamination, life of the filters will be reduced to perhaps only 100 hours especially where water is present, as this causes the paper to swell and fail to pass fuel.

**NOTE:** The rust inhibitors incorporated in the fuel used at the factory, to ensure satisfactory storage, have been found to restrict the fuel filter elements. It is therefore imperative that the first element be renewed at the first service (50 - 100 hours).

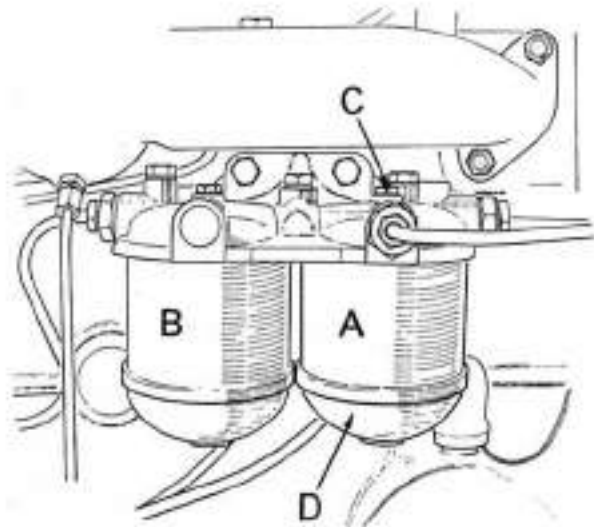


FIGURE 5/7. RENEWING THE FUEL FILTER

- |                  |                  |
|------------------|------------------|
| A. First filter  | C. Securing bolt |
| B. Second filter | D. Base          |

To change the elements proceed as follows; refer to Fig. 5/7

1. Clean the outside of the filter.
2. Unscrew the bolt C, supporting the body with the other hand.
3. Discard the used element A and flush the base D until clean.

4. Fit a new sealing washer under bolt C. Fit the new element, taking care to seat it on the rubber sealing rings in the cover and base.
5. Repeat the above procedure with the other element.
6. Clean out the sediment bowl on the fuel pump before priming the system. Vent as instructed under VENTING THE FUEL SYSTEM on page 89.

## WATER TRAP AND SEDIMENT BOWL

It is advisable to clean the sediment bowl and filter before venting the fuel system. This guards against dirt being carried over into the remainder of the system by the high speed of fuel flow during venting.

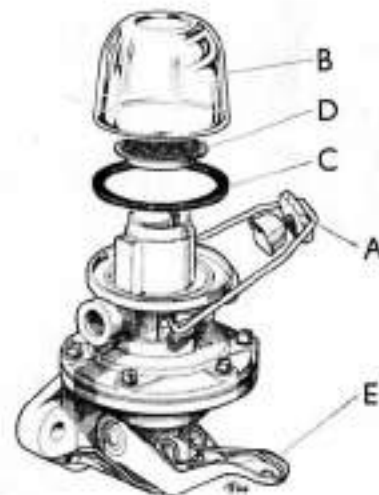


FIGURE 5/8. WATER TRAP AND SEDIMENT BOWL

- |                            |
|----------------------------|
| A. Bowl securing screw     |
| B. Sediment bowl           |
| C. Sealing ring            |
| D. Filter                  |
| E. Fuel pump priming lever |

Remove the bowl and filter (see Fig. 5/8) and clean both items with fuel and a stiff brush. Do not use a cloth because of the risk of including lint. Renew the sealing ring if the old one is damaged.

Loosen the connection to the lift pump and bleed until free of air. If contaminated fuel has been inadvertently allowed into the tank, or excessive condensation has taken place, the fuel should be drained from the plug under the fuel tank.

## INJECTORS

The injectors are a high precision piece of equipment, and upon their condition and treatment depends the engine's performance. They should be treated carefully and protected against dirt. To remove them from the engine, for servicing by an approved dealer or agent, proceed as follows:

1. Thoroughly clean off all external dirt before attempting to carry out any work on the fuel system.
2. Disconnect the leak-off pipe from its connection.
3. Undo the unions on the top of each injector. Remove the pipe and store away from dirt.
4. Disconnect the high pressure pipes at the unions.
5. Slacken the injector holding down nuts — each side of an injector should be slackened in stages to prevent distortion of the injector.
6. Withdraw the injectors carefully: use a bar under the lugs of the injector if stuck in position by carbon. Blank off the inlet union to prevent ingress of dirt, and fit a protection sleeve to the nozzle tip to prevent damage to the fine spray holes.
7. Clean out the inside of the injector port in the head and remove the old copper washer. Plug with clean material to prevent dirt entering the engine until the injectors are replaced.

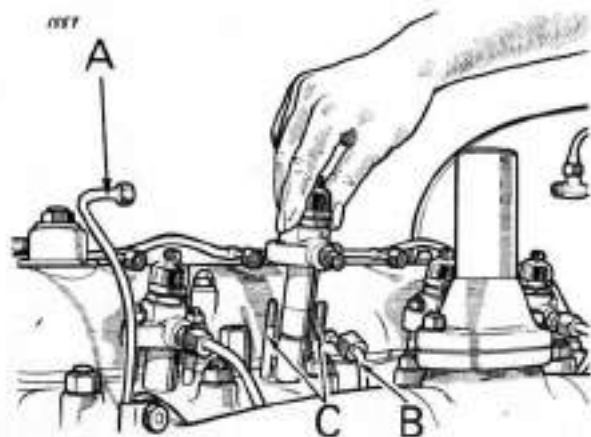


FIGURE 5/9. INJECTOR REMOVAL

- A. Leak-off pipe connector  
B. High pressure fuel pipe  
C. Holding down studs

When replacing the injectors fit the new copper washer and tighten each side down evenly, each nut a part turn alternately. Do not overtighten but make sure that they are firmly seated to seal against engine combustion pressure. Reconnect all pipes in the reverse order to their removal. It is suggested that tightening of the high pressure lines is left till last. Turn on the fuel and turn the engine until fuel appears at each union. This will eject air and dirt. Tighten the unions but not overtight, start up the engine and check for fuel leaks.

## VENTING THE FUEL SYSTEM

It is essential that any air trapped in the system be cleared. If difficulty in starting is experienced, or if any of the fuel system has been disturbed, vent the system in the following way:

1. Fill the tank with a minimum of 2 gallons (9 litres) of fuel.
2. Check the glass bowl and all fuel joints for leaks.

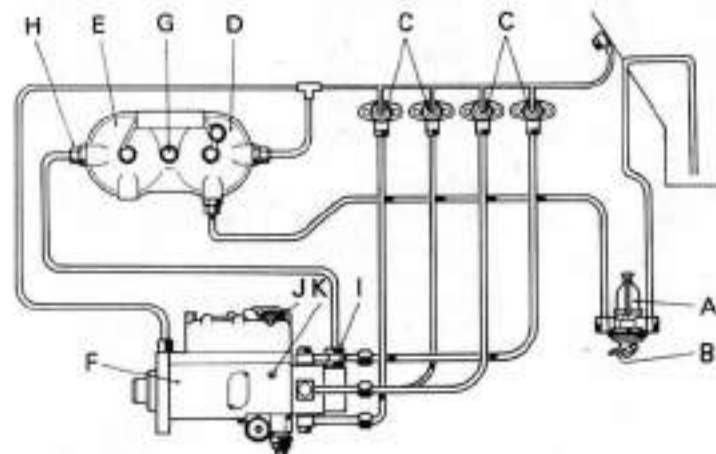


FIGURE 5/10. DIAGRAM OF FUEL SYSTEM

- A. Sediment bowl  
B. Fuel pump priming lever  
C. Injectors  
D. 1st fuel filter  
E. 2nd fuel filter  
F. DPA injection pump  
G. to K. Vent points

3. Clean the outside of the filters. Remove the plug G, Fig. 5/11 and slacken the connection H. Operate the fuel pump and tighten in the order G then H as the fuel appears at each point.

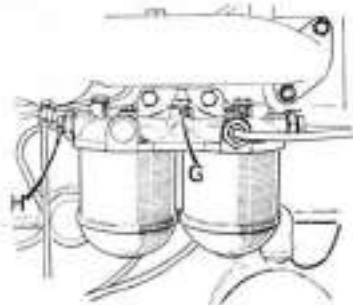


FIGURE 5/11.  
FUEL FILTERS

4. Slacken plug J on the injection pump, prime until all air is expelled, then tighten J. Repeat this operation with plug K.
5. Slacken connection I and prime until free from air, then retighten.

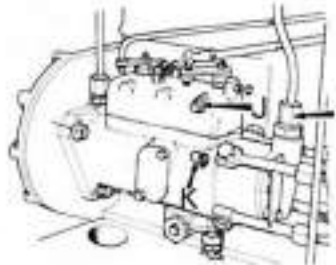


FIGURE 5/12.  
FUEL INJECTION  
PUMP

6. Slacken the high pressure pipes at the nozzle end, then with the fuel cut-off lever in the 'run' position and the throttle fully open, operate the starter until fuel is ejected. Tighten the pipe connections and operate the starter. The engine should then start. Run for a few minutes and check all points for leaks. Dry off all fuel from joints and observe whilst the engine is running.

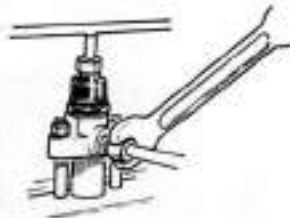


FIGURE 5/13.  
BLEEDING HIGH  
PRESSURE PIPES

## INJECTION PUMP AND GOVERNOR

The fuel injection pump is fitted to the engine timing case and driven via an idler gear from the front of the crankshaft.

The mechanical governor on the diesel engine is contained in the body of the fuel injection pump. It is fully lubricated, being submerged in fuel oil obtained by a controlled leakage from the pumping element. The overflow is taken from the front of the pump, back into the filter. It requires no maintenance.

The only adjustments are the maximum speed and idling speed stops on the speed control lever on the side of the pump. These are set on the tractor before delivery and should not be disturbed.

## ENGINE LUBRICATING OIL

Always drain the sump with the tractor on level ground and while the engine is still hot. Allow about 5 minutes before replacing the sump plug so that oil can drain down the walls. Refill to the safe marks on the dipstick using the recommended oil, see pages 73 to 76. If the oil filter element has been changed, motor the engine on the starter to fill the oil filter housing. It may be found necessary to add a little more oil to compensate for this after filling the sump.

It is important not to allow any dirt to enter the engine. Always clean the filler caps before removing them and also the surrounding surface of the housing. Clean the drain plug before replacing. Keep oil containers clean and wipe the tops and necks before pouring the oil; it is advisable to pour oil through a funnel with a fine mesh strainer, and do it under cover. The oil recommended for engines contains additives to reduce sludge and carbon formation within the engine. After renewing the oil it may be noticed to discolour rapidly. This does not affect the lubricating qualities and is only due to the absorbent nature of the oil.

## OIL FILTER ELEMENT

Remove by unscrewing the bolt A in the end of the unit, Fig. 5/14. Remove and discard the dirty element B and wash the cover in diesel oil using a small brush. A cloth should not be used as any lint will foul the seat of the by-pass valve in the base of the cover.

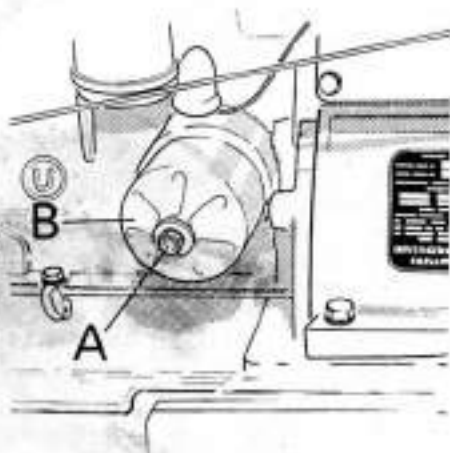


FIGURE 5/14.  
ENGINE OIL FILTER

- A. Securing bolt
- B. Filter element

Fit the new element and ensure that the rubber sealing ring in the cylinder block is satisfactory before refitting the unit.

It is recommended that the securing bolt be tightened to 10 lb ft torque (1,4kg m). Turn the engine with the starter to refill the filter with oil and then top up the sump if necessary. Restart the engine and check the cover for leakage.

## VALVE CLEARANCE

Adjustment is best carried out when the injectors have been removed for servicing. The engine may then be turned by the fan belt. Number the valves from 1 to 8 starting from the front of the engine. Turn the engine until one of the valves is fully open (spring compressed). Note which valve it is and subtract this number from 9. The result is the number of the valve which should be adjusted, e.g. if valve number 7 is fully open  $9 - 7 = 2$ ; valve number 2 should be adjusted. Notice that the valves concerned are an equal number from the back and front of the engine.

- Adjust No. 1 valve with No. 8 valve fully open.
- Adjust No. 6 valve with No. 3 valve fully open.
- Adjust No. 4 valve with No. 5 valve fully open.
- Adjust No. 2 valve with No. 7 valve fully open.
- Adjust No. 8 valve with No. 1 valve fully open.
- Adjust No. 3 valve with No. 6 valve fully open.
- Adjust No. 5 valve with No. 4 valve fully open.
- Adjust No. 7 valve with No. 2 valve fully open.

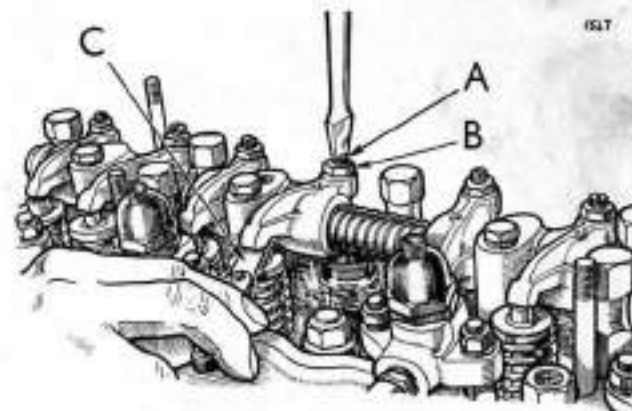


FIGURE 5/15. SETTING THE VALVE CLEARANCE

- A. Adjusting screw
- B. Locknut
- C. Feeler gauge

The valve clearance should be set cold, measured between the tip of the rocker arm and top of the valve stem with a feeler gauge as shown at C, Fig. 5/15. Remove the bonnet (hood) and rocker cover. Adjustment is made by slackening the locknut B and adjusting the screw A in or out until the correct clearance is obtained. (See Section 6 for clearances.) When tightening the locknut, hold the adjustment screw to avoid it turning.



## CYLINDER HEAD TIGHTENING

The sequence of tightening the cylinder head is shown in Fig. 5/16. Use a torque wrench set at 90 lb ft (12,5kg m) to tighten the bolts. The valve clearances should be checked after tightening the head.

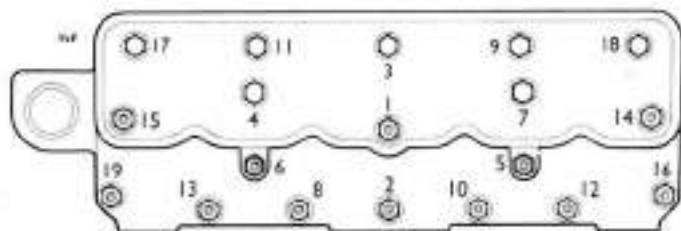


FIGURE 5/16. CYLINDER HEAD TIGHTENING SEQUENCE

## CHASSIS

### LUBRICATION

Oil should be used in a grease gun for the king pins and front axle trunnions. Grease should be used for the remaining points. The positions of the lubrication points are shown on the chart, Fig. 4/4, page 65.

The periods of lubrication given should be used as a guide only. The various points, especially the front hubs, rely in part upon the pressure of grease for their protection against ingress of water and mud under adverse conditions. When conditions are extreme, lubrication should be carried out daily. Make sure that all dirt is wiped off the lubrication points before applying the gun.

The water pump on the engine is packed with grease during manufacture and sealed, and therefore does not require greasing.

### FRONT AXLE

Refer to Figs. 5/17 and 5/18 for the location of the lubrication points. These should be carefully cleaned before application of the oil gun. Jack up the front of the tractor and check the steering king pins and axle trunnion (pivot) bearings.

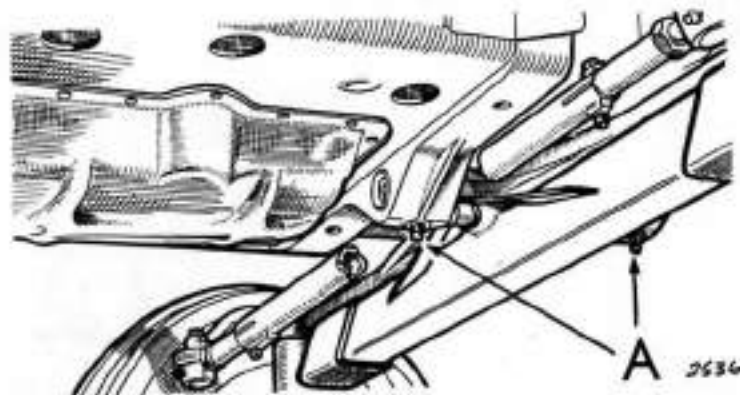


FIGURE 5/17. FRONT TRUNNION (PIVOT) LUBRICATION

A. Lubrication points

If wear is apparent in the trunnion or hub bearings through neglecting to lubricate regularly, your David Brown dealer should be consulted.

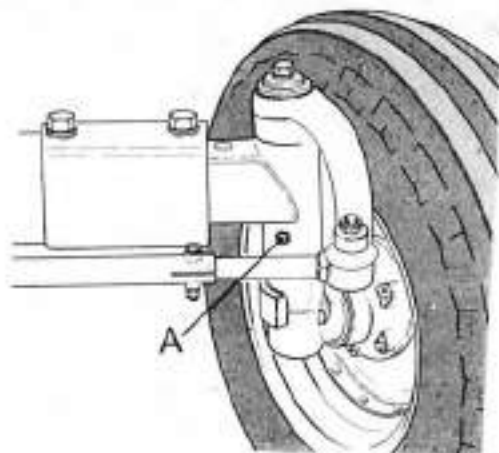


FIGURE 5/18.  
FRONT AXLE  
A. King pin  
lubrication  
point

#### FRONT HUB

Clean the grease points before applying the grease gun. Lubricate until grease is seen at the inner end of the hub. The seal is arranged as a dirt excluder therefore grease at this point does not indicate a faulty hub seal. Besides lubricating, frequent greasing has the added advantage of forcing out any water or dirt which may have found its way in. After greasing, wipe off surplus grease from the hub area to prevent accumulation of dust and in dry, dusty conditions grease less often.

If the hub bearings require adjustment, remove the hub caps and

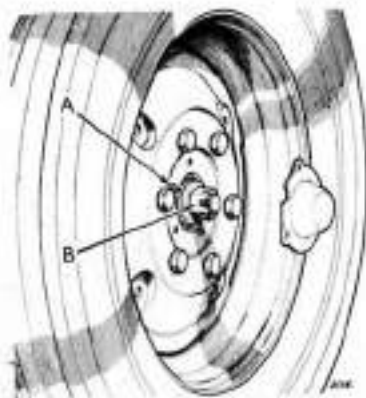


FIGURE 5/19. FRONT HUB  
A. Front hub greasing point  
B. Hub bearing adjustment nut

take the split pins out of the castellated nuts. The nuts should be screwed up until all play is just removed. Fit the split pin at the nearest castellation either tighter or slacker. Notice that there are two split pin holes in the shaft so it should not be necessary to move the nut more than 1/24th of a turn. Caution: this adjustment must be carried out with the wheel jacked clear of the ground. After adjustment, ensure that the wheel rotates freely.

#### FINAL DRIVE REDUCTIONS

The final reductions have separate lubrication. The drain plug is denoted by B, and the filler plug by A, Fig. 5/20.

Refill to the level of the filler plug with the correct oil. Ensure that the vent plug C is not blocked with dirt.

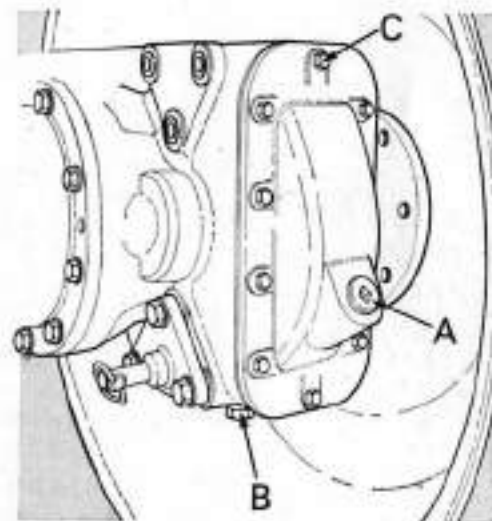


FIGURE 5/20.  
FINAL DRIVE  
REDUCTIONS  
A. Filler plug  
B. Drain plug  
C. Vent plug

#### TRANSMISSION AND HYDRAULIC SYSTEM

The transmission oil is used in the Selectamatic hydraulic system, the valve unit of which operates at pressures up to 2000 lb/in<sup>2</sup> (140kg/cm<sup>2</sup>). It is essential that no dirt or grit is allowed to contaminate the oil. Clean round the plug holes before removing and use only scrupulously clean funnels and containers.

The full flow hydraulic filter should be changed at the first 50/100 hour service and subsequently at least every 500 hours, whether or not the yellow warning lamp indicates that it is blocked. If the

warning lamp remains lit at 1800 rev/min after the oil has been allowed to warm up for 30 minutes, the filter element must be renewed even though it may not have completed 500 hours service.

On no account must any attempt be made to clean the paper element; a new replacement must be used. The edges of the element are exposed and easily split when dry. A damaged element is useless. Examine for damage and handle with care when fitting.

To replace the full flow filter element it is necessary to drain from plug B, Fig. 5/21. To completely drain the rear axle case when renewing the oil, plug C must also be removed.

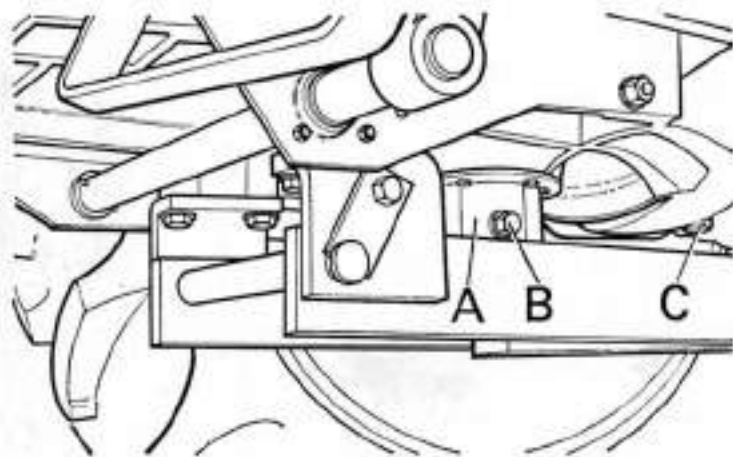


FIGURE 5/21. HYDRAULIC FILTER HOUSING

- A. Hydraulic filter housing      B. Transmission drain plug  
C. Rear axle drain plug

A magnetic filter is also fitted and this should also be cleaned and all adhering particles removed.

When a filter element change only is being carried out, drain into a clean container, keep covered while standing and refill with all except last half-gallon (3 litres) which should be discarded with any sediment. Top up with new oil.

Unscrew the retaining bolts and remove housing A, Fig. 5/21 to gain access to the filter element.

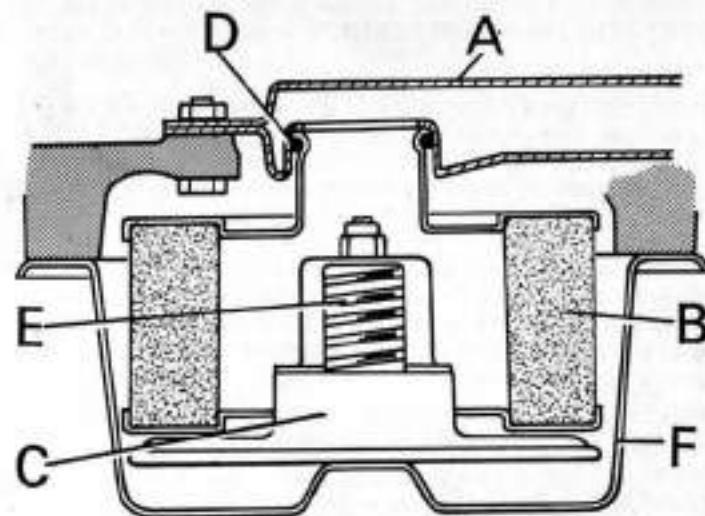


FIGURE 5/22. HYDRAULIC FILTER DIAGRAM

- A. Suction pipe                      D. 'O' Ring  
B. Filter element                  E. Magnet  
C. By-pass valve and screen      F. Housing

Figure 5/22 shows a section through the hydraulic filter and suction pipe. Care should be taken, when re-installing the filter complete with the by-pass valve and wire mesh screen, to ensure that it is retained in the suction pipe A by the 'O' ring D. Failure to do this indicates that the 'O' ring is not sealing in the suction pipe and unfiltered oil will get by. Fit a new 'O' ring and make sure the filter is pushed fully home into the pipe. Although housing F retains the filter in position it should not compress the filter element.

NOTE: When transmission oil is drained off, air will enter the system. After changing the oil run the engine at minimum idling speed for thirty seconds with the hydraulic control lever in the lower position. The system will then automatically bleed itself.

#### Nylon by-pass filter

The Nylon Filter in the by-pass valve plunger situated in the hydraulic control valve assembly should be cleaned every 500 hours. Remove the dump valve or cover plate. Unscrew the right-hand of the two  $\frac{1}{2}$  UNF domed plugs and withdraw the spring and plunger. Take care of the washer under the plug head. Unscrew the plug within the plunger and lift out the restrictor and filter. Clean the filter with a jet of air and re-assemble. Ask your dealer to show you the operation.

## HYDROSTATIC POWER STEERING

### Description

Hydrostatic steering consists of an oil reservoir, engine driven pump, servo valve and double-acting hydraulic ram. Being fully hydraulic there is no mechanical linkage. The pump delivers oil from the reservoir to the servo valve which then directs oil to the appropriate side of the ram and in doing so turns the front wheels. Effort required to turn the steering wheel is small because the steering wheel only turns the servo valve. If for any reason the pump fails to deliver oil (e.g. engine failure) the tractor can be steered manually. Under these circumstances, turning the steering wheel pushes the oil through to the ram and therefore requires greater effort.

**⚠ DANGER** — If towing of the tractor is necessary it should, therefore, be done slowly and carefully.

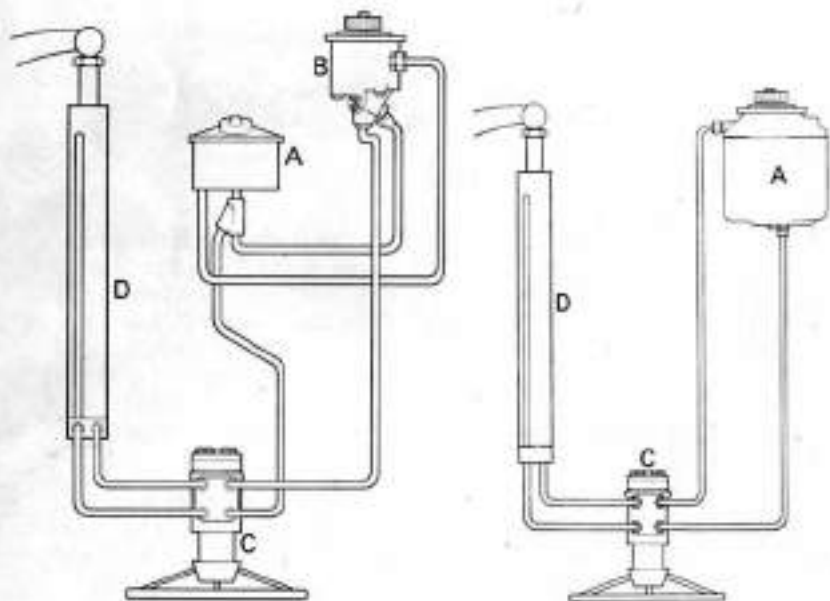


FIGURE 5/23. HYDROSTATIC STEERING (Early Tractors)

A. Oil reservoir B. Pump  
C. Servo valve D. Hydraulic ram

FIGURE 5/24. HYDROSTATIC STEERING (Later Tractors)

A. Pump and reservoir  
B. Servo valve C. Hydraulic ram

### Maintenance

The pump and valve components operate with very small clearances and it is therefore essential that great care is taken to prevent dirt and foreign matter entering the system.

When topping up or filling up the reservoir always clean the cover before removing the filler cap and ensure that all containers, funnels etc. are clean.

The oils recommended for hydrostatic power steering are shown on pages 74 to 77. (Approved lubricants.)

**NOTE:** In areas where none of the brands of oil are available, a low foaming SAE10 mineral oil should be used. Vegetable oils such as brake fluid and shock absorber fluid must not be used.

### Important

Earlier tractors are fitted with a separate oil reservoir, later tractors have a combined reservoir and pump. Slightly different servicing techniques are required for the two types as indicated under appropriate headings below.

#### Every 60 hours or weekly

Clean the outside of the reservoir round the filler and check the oil level as described below. Top up if necessary. Inspect all pipes and connections for signs of oil leakage, paying particular attention to the flexible pipes and ram cylinder. If there is any leakage rectify this immediately.

#### Integral Pump and Reservoir

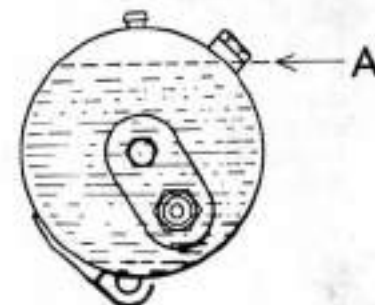
The oil level should be to the neck of the filler plug hole as shown in fig. 5/29.

#### Separate Pump and Reservoir

Remove the filler cap and submerge the floating baffle by pressing it down until it touches the filter element top. Judge the depth of oil *above* the baffle. This should be  $\frac{1}{2}$  in (1.5cm).

FIGURE 5/25. OIL LEVEL (Combined pump and reservoir)

A. Fill to this level



**⚠ WARNING** — Do not use the tractor if there is any sign of oil leakage, the steering will not operate if the oil level falls so low that the pump draws air.

**Every 1000 hours or annually —  
combined pump and reservoir only**

At the first 500 hour service and subsequently every 1000 hours ask your David Brown Dealer to fit a new filter element. In order to fit the new element correctly, it must be done with the pump axis in a vertical position, which means that the pump must be removed from the engine. Failure to fit the element properly will render its filtering inoperative with subsequent rapid damage to the steering system.

The procedure to be adopted is as follows:—

1. Clean the outside of the pump and reservoir. Remove the setscrews securing the fuel lift pump to the engine and, without disconnecting the fuel supply pipes, move the pump out of the way of the steering pump.
2. With the wheels in full right-hand lock, disconnect the two oil pipes to the pump and reservoir. Do not turn the wheel before these pipes are re-connected.
3. Remove the pump and reservoir from the engine after undoing the two nuts which hold it to the back plate. Make sure no dirt or dust enters the engine timing case.  
NOTE: A shortened spanner will be required to undo the nut nearest the cylinder block.
4. Remove the bolt in the centre of the filter housing, hold the unit over an oil tray and remove the cover and filter element.
5. When fitting a new element it is essential to hold the pump with its drive axis vertical with the gear downward. Fit new seals to ensure a good cover to body seal. Place the new element carefully on its locating spigot and, observing the position of the 'tang' inside the cover, fit the cover to the pump so that the 'tang' locates correctly on the lug. Be careful to lower the cover centrally so as not to disturb the filter.  
Secure the cover with its bolt finger tight, then tighten one further complete turn only.
6. Re-fit the pump to the engine, making sure that the gear teeth are engaging properly and are not damaged before tightening the nuts. Refit the lift pump and oil pipes wiping them clean and ensuring that they are not damaged and show no signs of chafing against the main frame or part of the engine. Vibration can soon cause damage with loss of steering if the pipes touch a sharp object.

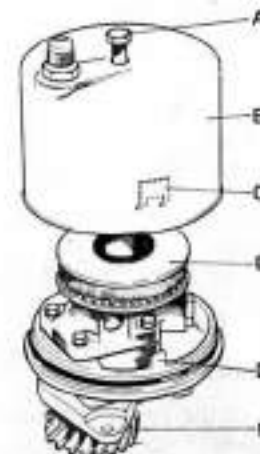
7. Fill the reservoir to the correct level, vent the system and check for leaks.

**Venting the System**

With the reservoir filled to the correct level, and provided the steering wheel has not been turned with the pipes disconnected, run the engine for a few minutes and then check the oil level on full right-hand lock, topping up if necessary.

FIGURE 5/26 STEERING  
PUMP FILTER

- A. Securing bolt
- B. Cover
- C. Tang
- D. Lug
- E. Filter element
- F. Drive gear



**Every 500 hours — separate pump and reservoir only**

Fit a new element as follows:—

1. Clean the outside of the reservoir. Drain the oil by disconnecting the inlet pipe at the pump and turning the pipe outwards to direct oil into a suitable container. Drain the oil,

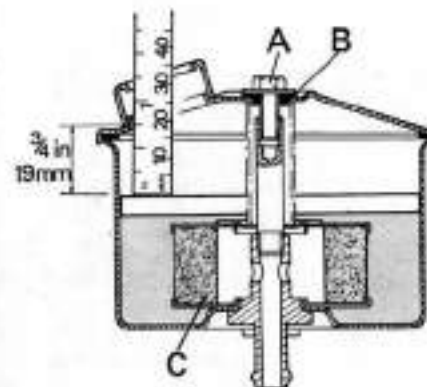


FIGURE 5/27.  
STEERING RESERVOIR LEVEL

- A. Cover bolt
- B. Sealing washer 960 723
- C. Filter element

remove the breather pipe and oil trap, release the two hose clips and remove the bolts attaching the reservoir to the bracket. Remove the reservoir and plug the ends of the pipes. Remove the remaining bolt in the centre of the reservoir cover, lift off the cover, remove the spring, lift out the baffle and remove and discard the filter element. Wash the baffle and the inside of the reservoir with clean diesel fluid. Do not wipe with a cloth.

2. Reassemble with a new element, taking care when tightening the reservoir cover bolt not to over-tighten as this will damage the rubber sealing ring B, Fig. 5/27 and allow water to enter the reservoir.
3. Wipe the pipes clean and inspect for signs of leakage or damage. The flexible pipes must be free from kinks or cracks and steel pipes must not foul on each other or on any other parts.

**WARNING** — Pipe movement caused by engine vibration can rapidly damage a pipe if it is close to a sharp object.

4. Check the tightness of pipe unions, steering column bolts and the bolts attaching the ram anchor bracket to the main frame.
5. Vent the system as described below.

#### Venting the system

1. Fill the reservoir to within  $\frac{3}{8}$ in (10mm) of the filter rim and then replace the filler cap. Jack up the tractor front so that the front wheels are raised clear of the ground. This will allow the system to operate at the lowest possible pressure.
2. With the fuel cut-off control in the Stop position, use the starter to turn the engine for 10-15 seconds to prime the pump. Then check the oil level and top up to the correct level if necessary.
3. Start the engine and run at idling speed. Turn the steering wheel one full turn in each direction several times but do not allow the wheels to reach the full lock position.
4. Check oil level again and top up if necessary. With the engine running at idling speed, turn to full lock in either direction several times but do not hold the wheels in the full lock position for any length of time.
5. Lower the front wheels to the ground. Check the oil level with the wheels straight ahead and top up to the correct level. Drive the tractor at low speed in a figure-of-eight to check steering action. The steering should operate smoothly and without hesitation.

## BRAKES

The independent foot brakes must be adjusted as the brake linings wear. They should be adjusted with the pedals interlocked, using the locking bar B, so that when used together on the highway there is no tendency to swerve. Frequent use of one of the brakes for steering assistance will cause that brake to wear more quickly. Any maladjustment should be corrected as soon as it becomes evident. Make regular checks weekly and also before pulling a trailer.

Jack up both rear wheels and with the pedals interlocked press them approximately  $1\frac{1}{2}$ in (4cm). Pull up the hand brake just sufficient to hold the brakes in this position. At the front end of the brake rods release the locknuts A, Fig. 5/28 and screw each adjusting screw one way or the other until both wheels are equally stiff to turn by hand. Retighten the locknuts and release the hand brake. Ensure that the wheels are free to turn and the brakes not binding. A grease fitting is provided as shown at D, Fig. 5/28.

When the limit of adjustment has been reached it is an indication that the brakes require relining.

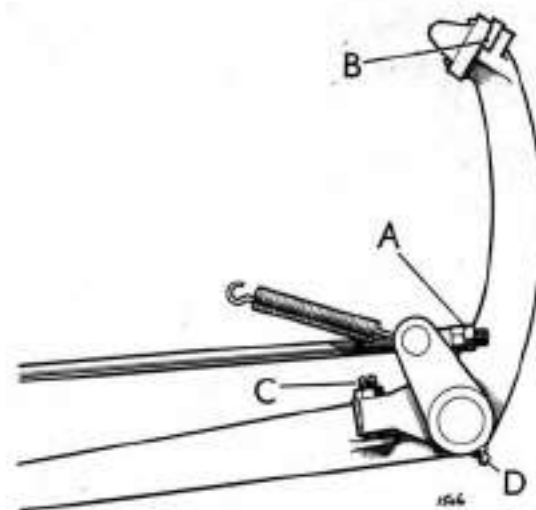


FIGURE 5/28. BRAKE ADJUSTMENT

- A. Locknut
- B. Locking bar
- C. Locking bar adjuster
- D. Greaser

## CLUTCH (not 996)

When it is found with the 2-stage clutch (Livedrive) that the PTO/Belt Pulley cannot be completely disengaged with the pedal fully depressed, new transmission clutch facings are required. If not excessively worn a new period of life may be obtained by adjustment to the three adjustable pegs in the clutch. Adjustment to these should only be carried out by a competent service engineer and your David Brown dealer should be consulted.

Check the free-play frequently, say once a week, when used on work involving frequent use of the clutch as when using a front loader. The play must never be allowed to fall below 1 in (25mm). Adjust if necessary referring to Fig. 5/29.

- When an overload release is fitted, slacken back the locknut on the rod to the hand lever to give  $\frac{1}{4}$  in (6mm) clearance.
- Adjust bolt A, to give  $1\frac{1}{2}$  in (38mm) free movement of the clutch pedal.
- Reset the adjustment on the rod to the hand clutch to give  $\frac{1}{8}$  in (1,6mm) clearance.

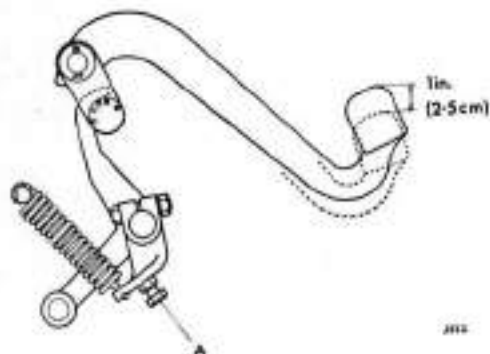


FIGURE 5/29. CLUTCH ADJUSTMENT (not 996)

## TRANSMISSION CLUTCH (996 only)

Check the free play frequently: at least once a week when the tractor is being used on work involving frequent use of the clutch, such as with a front loader. The free play must not be allowed to fall below 1 in (2,5cm). Adjust if necessary as follows, referring to Fig. 5/30. Slacken the locknut and adjust the stop A to give 1 to  $1\frac{1}{2}$  in (2,5cm) minimum free play. Retighten the locknut.

## PTO CLUTCH (996 only)

Free play should be adjusted when necessary by means of nut B, Fig. 5/30 to give  $1\frac{3}{4}$  to  $2\frac{1}{4}$  in (48 to 54mm) movement at the top of the hand lever when in the forward (engaged) position. Re-lock when correct.

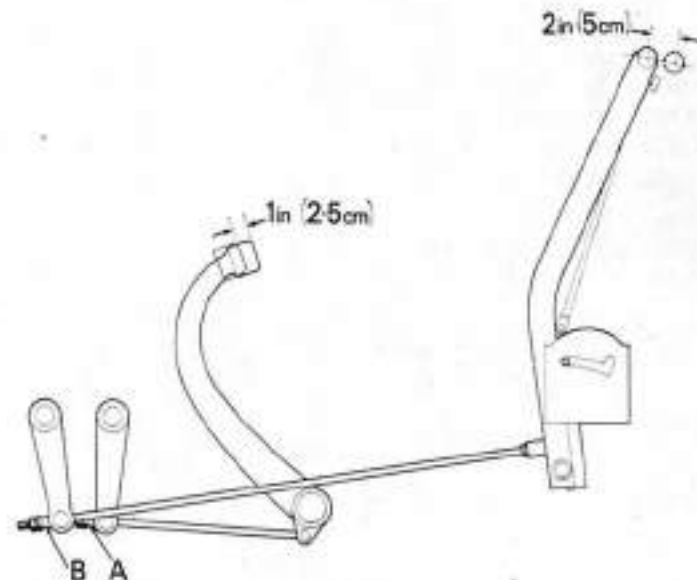


FIGURE 5/30. CLUTCH ADJUSTMENT (996 only)

- A. Transmission adjusting nut  
B. PTO adjusting nut

## BELT PULLEY UNIT

### Lubrication

The pulley should be fitted with the same grade of oil as used in the transmission gearbox to the level of the plug A.

### Mounting instructions

The belt pulley may be mounted on either side according to the direction of rotation required.

Unless the unit is supplied on the tractor, it will be necessary on the first mounting to replace the four cover bolts, which are symmetrically disposed round the PTO shaft, with the special studs B, Fig. 5/31. Replace the studs one at a time. Note that the end of the stud with the longest plain portion is screwed into the PTO housing. Once fitted, these studs should be left in position and when it is desired to fit the belt pulley unit, slide it onto the PTO shaft in the position required and secure with four nuts and spring washers. The bracket for the belt pulley guard fits on the two studs on the side adjacent to the pulley before the washers and nuts are attached. The other support bracket fits on the studs securing the pulley support bearing and necessitates the removal of the pulley rim from its flange.

**⚠ CAUTION** — The PTO gear lever should be in neutral when not in use. Fully depress the clutch before attempting to engage.

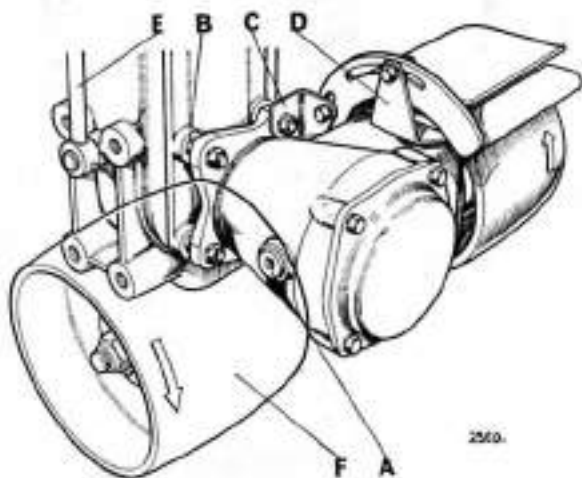


FIGURE 5/31. BELT PULLEY UNIT

- |                                  |                                |
|----------------------------------|--------------------------------|
| A. Filler plug                   | D. Guard bracket               |
| B. Special stud                  | E. Speed change lever          |
| C. Pulley guard mounting bracket | F. Alternative pulley position |

## ELECTRICAL ALTERNATOR

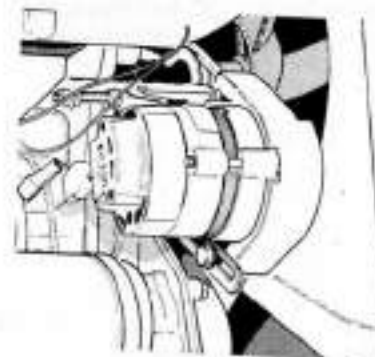


FIGURE 5/32. ALTERNATOR

For some countries or applications an alternator is fitted instead of a dynamo. This incorporates internally a rectifier and regulator. The wiring to the standard regulator is therefore insulated and secured to the harness with tape at points B and C as shown in wiring diagram Fig. 5/32.

No lubrication is required as the bearings are sealed but the following precautions must be observed.

1. The engine must not be run with the battery disconnected unless the alternator socket is removed.
2. Ensure that no part of the charging circuit, including the battery, is connected or disconnected when the engine is running.
3. When connecting an alternator, slave battery, or battery charger to the tractor, always observe correct polarity (positive to positive, negative to negative).
4. If the charge warning light bulb fails (check when the ignition switch is switched on but engine not started), it must be replaced at once, otherwise the alternator will not commence generating current until its speed reaches approximately 3000 rev/min, i.e. approximately 1500 rev/min engine speed.



## AUXILIARY EQUIPMENT

Earlier tractors have a suitable connection point for auxiliary equipment such as a windscreen wiper motor. It consists of a 4-way connector under the left-hand side of the instrument panel. Any of the spare positions can be used to connect an extra item. The connector is shown at 'A' on the wiring diagrams Fig. 5/36, 5/38 and in Fig. 5/33.

Later tractors, with a separate harness to the instrument panel connected by 7-pin and 10 pin plugs and sockets at the right-hand side, have a separate lead to the windscreen wiper. If a wiper is not fitted, the short wire which has a single connector attached will be found under the instrument panel and may be used for any auxiliary item. If it is connected to a wiper motor, the single connector should be removed and a double connector fitted. This will provide additional outlets.

Use of the above connectors ensures that the auxiliary has no electrical supply when the ignition/starter switch is in the 'off' position.

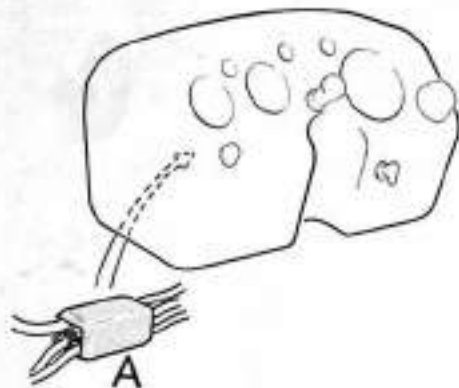


FIGURE 5/33.  
AUXILIARY EQUIPMENT  
CONNECTION  
A. Connector

## BATTERY

To gain access for inspection and topping up, remove the radiator grille.

In hot weather or climates, the electrolyte should be checked frequently. Use only distilled water or soft clean rainwater for filling. The top of the battery should be dried off and cleaned. Smear a little petroleum jelly on each terminal.

*Battery with separate caps* — Remove each cap and add pure water to bring the electrolyte to  $\frac{3}{8}$  in (10mm) above the tops of the separator plates. Never allow the level to fall below the tops of the plates.

*Autofil battery* — Prise off both Autofil covers and if the level of the acid is below the bottoms of the filling tubes, pour pure water into each trough until all tubes are filled. Replace covers immediately.

NOTE: Covers must be in place when charging.

## DYNAMO (GENERATOR) — early tractors

Apply a few drops of lubricating oil to the pad through the hole in the centre of the end cover after removing the rubber plug. Refit the plug afterwards.

After about 2 years use the dynamo (generator) brushes should be checked for wear and replaced if necessary. The interior of the dynamo (generator) should be thoroughly cleaned of dust and the bearings re-lubricated. This work is best carried out by your David Brown Dealer or Lucas Agent.

If for any reason the dynamo has to be renewed, ensure that the correct one for a negative earth system is used.

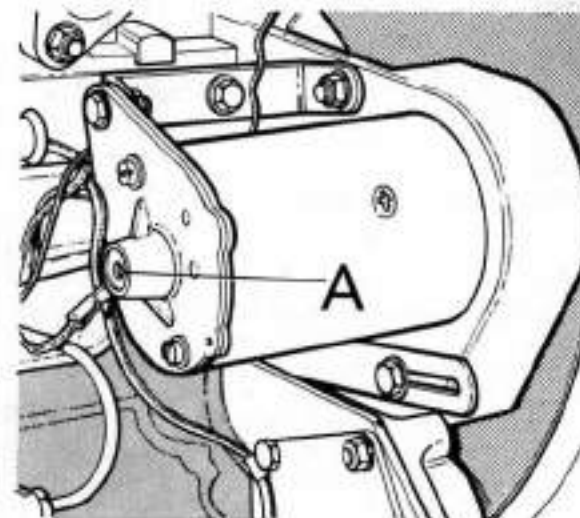


FIGURE 5/34. DYNAMO (GENERATOR) LUBRICATION  
A. Oil hole (replace rubber plug)

## FUSE

Two standard 1½ in (3cm) cartridge fuses of 25 amp. rating are fitted in a bayonet type holder, see Fig. 5/35. These fuses should not be replaced until the cause of blowing has been traced and the fault corrected.

Early tractors fitted with hazard warning indicators have a third similar type fuse of 15 amp. rating.

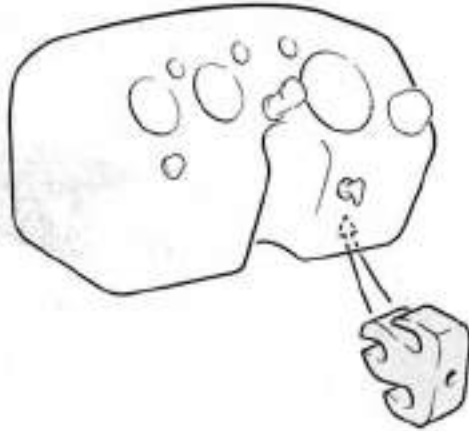


FIGURE 5/35. FUSE HOLDERS

## LIGHT BULBS

See Section 6 for specification, page 121.

## STARTER

This is a 12 volt pre-engaged type incorporating a solenoid relay switch. Maintenance consists of periodical lubrication only. Do not attempt to renew or adjust the brushes or relay mechanism. Failure of the starter motor to operate may be due to the discharged condition of the battery. Check that the fan belt is correctly adjusted and sufficient running is done to re-charge the battery. Although there may be sufficient current for the lights it may not be able to give the very heavy discharge required by the starter. The reasons for failure may be slackness of battery or starter terminals or faulty relay mechanism. If the starter fails to operate do not keep trying or damage may result to starter or battery; consult an authorised agent.

## WIRING

Most connections are made with blade or bullet connectors which pull apart for disconnection of the part concerned. All wires are colour coded for easy identification as shown in the wiring diagram.

Later tractors are fitted with a wiring harness which can be split below the instrument panel on the right-hand side at the 7-pin and 10-pin plugs and sockets. This divides the harness into three sections, the engine and bonnet lights, the instrument panel wiring, and the rear tractor lights and flashers, etc. Except for the connectors, the wiring follows the same layout as is shown in the diagrams.

Maintenance consists only of visual checking for loose or dirty terminals and frayed, burnt or broken wires. A frayed or broken wire, if touching the frame, will run down the battery rapidly and is the principal cause of tractor fires.

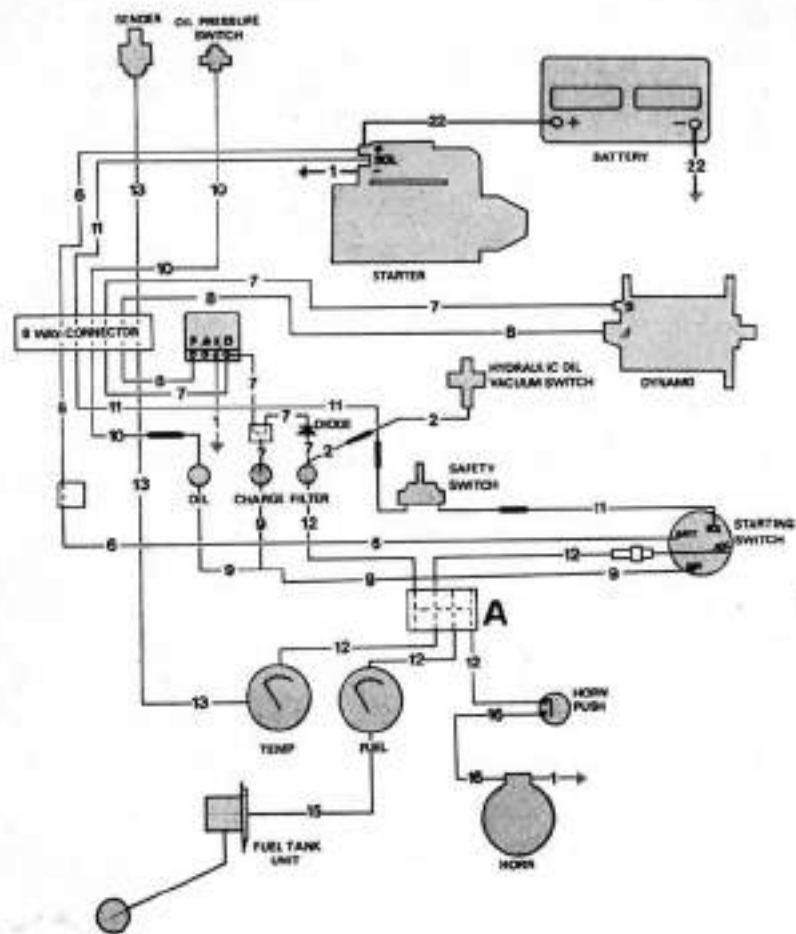


FIGURE 5/36. BASIC WIRING DIAGRAM WITH DYNAMO

A. Auxiliary connector

- |                      |                  |                        |
|----------------------|------------------|------------------------|
| 1. Black             | 9. White         | 17. Green/White        |
| 2. Black/Light Green | 10. White/Brown  | 18. Green/Purple       |
| 3. Red               | 11. White/Red    | 19. Green/Red          |
| 4. Blue/Red          | 12. Green        | 20. Light Green/Brown  |
| 5. Blue/White        | 13. Green/Blue   | 21. Light Green/Purple |
| 6. Brown             | 14. Blue         | 22. Heavy Duty Cable   |
| 7. Brown/Yellow      | 15. Green/Black  |                        |
| 8. Brown/Green       | 16. Purple/Black |                        |

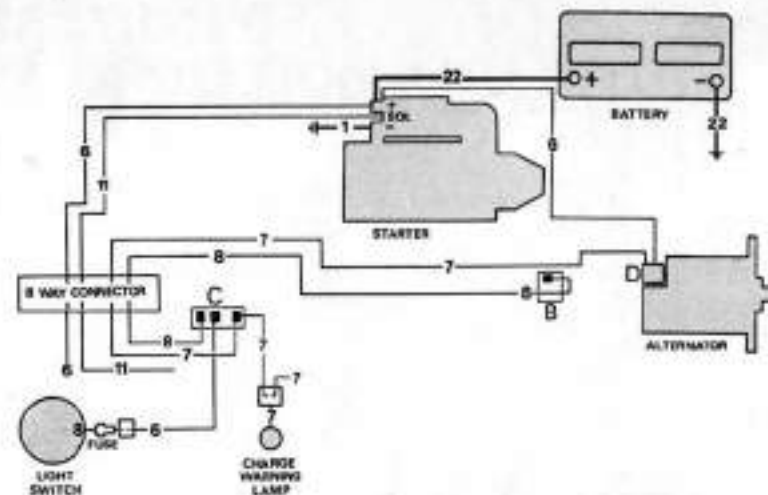


FIGURE 5/37 MODIFIED WIRING DIAGRAM FOR ALTERNATOR

B. & C. Ends insulated and taped back  
 D. Alternator socket

- |          |                 |                      |
|----------|-----------------|----------------------|
| 1. Black | 7. Brown/Yellow | 11. White/Red        |
| 6. Brown | 8. Brown/Green  | 22. Heavy Duty Cable |

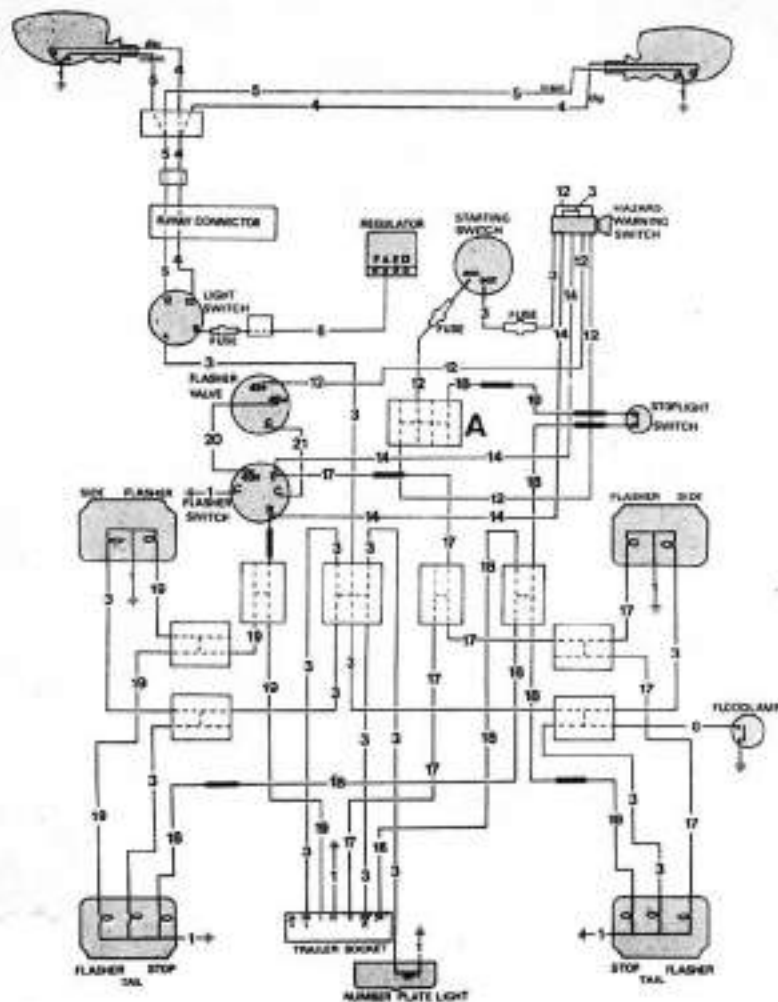


FIGURE 5/38. LIGHTING WIRING DIAGRAM

A. Auxiliary connector

- |                      |                  |                        |
|----------------------|------------------|------------------------|
| 1. Black             | 9. White         | 17. Green/White        |
| 2. Black/Light Green | 10. White/Brown  | 18. Green/Purple       |
| 3. Red               | 11. White/Red    | 19. Green/Red          |
| 4. Blue/Red          | 12. Green        | 20. Light Green/Brown  |
| 5. Blue/White        | 13. Green/Blue   | 21. Light Green/Purple |
| 6. Brown             | 14. Blue         | 22. Heavy Duty Cable   |
| 7. Brown/Yellow      | 15. Green/Black  |                        |
| 8. Brown/Green       | 16. Purple/Black |                        |

## SECTION 6. INFORMATION AND DATA

### GLOSSARY OF ABBREVIATIONS

All abbreviations used in this publication are based on the recommendations of British Standard 1991:1967. Note that the abbreviation remains the same for both singular and plural.

Minute .. .. .	min
Revolutions per minute .. .. .	rev/min
Inch .. .. .	in
Feet .. .. .	ft
Feet per minute .. .. .	ft/min
Cubic inch .. .. .	in <sup>3</sup>
Square inch .. .. .	in <sup>2</sup>
Pounds per square inch .. .. .	lb/in <sup>2</sup>
Atmosphere (pressure) .. .. .	atm
Centimetre .. .. .	cm
Millimetre .. .. .	mm
Brake horse power .. .. .	b.h.p.
Kilogramme .. .. .	kg
Gramme .. .. .	g
Pint .. .. .	pt
Gallon .. .. .	gal
Litre .. .. .	l
Hour .. .. .	h
Miles per hour .. .. .	mile/h
Degree Centigrade .. .. .	°C
Degree Fahrenheit .. .. .	°F
Power take-off .. .. .	PTO
Weight transfer (Traction Control Unit— a David Brown patent) .. .. .	TCU

## ACCESSORIES

The following units are stocked by Parts Department of David Brown Tractors (Sales) Ltd., and may be ordered through your Dealer in the usual way. Ask for full details and prices.

U1160	Air cleaner — paper element pre-filter
U1260	Belt pulley unit
U414	Belt pulley guard
U1386	Battery — heavy duty (128 amp. hour)
U730	Catch unit for power lift lever
U392	Downswept exhaust and silencer
U765	Drawbar — linkage
915004	Driving mirror — right-hand
926980	Driving mirror — left-hand
U1390	Exhaust brake and silencer
U1320	Exhaust brake and silencer (Hydrostatic steering)
U1020	Horn and push button

### Hydraulic Units

U1054	Valve — 3-way hydraulic less pipe and coupling
U1230	Valve — 3-way hydraulic with pipe and Exactor coupling
U1229	Valve — 3-way hydraulic with 'quick-release' coupling
U1122	Universal coupling — 'quick-release' to Exactor coupling
U1123	Universal coupling — 'quick-release' to Dowty coupling
961768	Valve — 3-way hydraulic less Exactor coupling
U1400	Quick release swivel-mounted coupling (single)
U1399	Quick release swivel-mounted coupling (twin)
961768	Valve — 3-way hydraulic less Exactor coupling
U844	Single live hydraulic control valve
U845	Twin live hydraulic control valve
U939	Valve — Dump (Quick drop)

U744	Linkage stabilisers
19814	Licence holder
U1190	Linkage support ram
U1169	Overload release
U1171	Pick up hitch
U659	Power-assisted steering
U1072	Power-assisted steering for heavy duty axle
U378	Power take-off guard
U1432	Radiator blind
ULS18/9	Radiator guard
U1313	Seat rails for full fenders
U1077	Slotted lift rods
U1613	Thermostat
U1119	Tool kit
U1013	Rear number plate light
U184	Wheel weights — rear (11-36, 10-32)
U729	Wheel weights — rear (11-28)
U427	Wheel weights — front (19in wheels)
U476	Wheel weights — front (5-50-16)
U436	Wheel weights — front (4-50-16)
U731	Weights — chassis ballast

## IMPLEMENTS AND EQUIPMENT

Many manufacturers adapt their equipment specially for fitting to your 9 series tractor. The following manufacturers have equipment which meets our approval; ask your David Brown Dealer for details.

### Steel Wheels

F. A. Standen & Sons (Engineering) Ltd., 47-49 Station Road, ELY, Camb, CB7 4BP  
Tel. Ely 2271

### Steerage Hoes

Belton Bros. & Drury Ltd., High Street, Eastoft, SCUNTHORPE, Lincs DN17 4PB  
Tel. Eastoft 233

### Trailers

F. W. Pettit Ltd., High Street, Moulton, SPALDING, Lincs. PE12 6QD  
Tel. Moulton 458

### Rear Graders and Verge Cutters

Bomford and Evershed Ltd., Salford Priors, EVESHAM, Worcs. WR11 5SW  
Tel. 078 988 3383

### Saw Bench and Power Arm

F. W. McConnel Ltd., Temeside Works, LUDLOW, Salop SY8 1JL  
Tel. Ludlow 3131

### Air Compressor (small; for tyres, paint spraying etc.)

Lawrence Edwards & Co. (Engineers) Ltd., Stourport Road, KIDDERMINSTER, Worcs. DY11 7QS  
Tel. Kidderminster 3665

### Linkage-mounted Pump (general purpose water and semi-liquid)

Mono Pumps Ltd., Mono House, Sekfords Street, Clerkenwell Green, LONDON EC1R 0HE  
Tel. 01 253 8911

### Rowcrop Equipment (Narrow cultivators and fruit plough)

James S. Low & Sons, Atholl Street, BLAIRGOWRIE, Perthshire PH10 6DU  
Tel. Blairgowrie 3153

### Planters and Transplanters, Post-hole Diggers

R. A. Lister (Agricultural) Ltd., Post Box No. 1, DURSLEY, Glos. GL11 4HS  
Tel. Dursley 4141

**Mole Drainer and Subsoiler**  
 Harper and Eede Ltd., 44 Cliffe High Street, LEWES, East Sussex BN7  
 2AW Tel. Lewes 4484

**Winches (Tractor Mounted)**  
 T. T. Boughton & Sons Ltd., Bell Lane, AMERSHAM, Bucks. HP6 6PE  
 Tel. Amersham 02 404 4411  
 Tate Pipe Lining Processers Ltd. (Cooke Winch Div.) Green Lane,  
 Failsworth, MANCHESTER M35 0PP  
 Tel. Manchester 061 681 5709

**Sprayers**  
 Evers & Wall Ltd., Lowesden Works, Lambourn Woodlands, NEWBURY  
 Berks. RG16 7RX  
 Tel. Lambourn 444

**Disc Harrows**  
 F. W. Pettit Ltd., High Street, Moulton, SPALDING, Lincs. PE12 6QD  
 Tel. Moulton 456

## LIGHTING EQUIPMENT

A variety of light units and combinations are fitted to David Brown tractors to suit local conditions and regulations. The following chart is to enable you to identify the type and specification of the units fitted to your tractor.

Usage	Rating	Cap.	Diameter mm
Inboard, double filament headlights	12volt 40/40 Watt	Sealed Beam	
Inboard, single filament headlights	12volt 35 Watt	Sealed Beam	
Outboard double filament headlights	12volt 35/35 Watt	Bosch	35
Continental inboard Outboard, double filament headlights	12volt 35/35 Watt	3 Lug P45	40
Rear flood lamp	12volt 36 Watt	British Prefocus Single Contact Axial Filament	28
Side, rear lights	12volt 5 Watt	SBC	18
Side/Flasher	Side : 12volt 5 Watt Flasher : 12volt 21 Watt	SCC ASCC	18 25
Stop/Tail/Flasher	Stop : 12volt 21 Watt Tail : 12volt 5 Watt Flasher : 12volt 21 Watt	ASCC SCC ASCC	25 18 25
Side lamp	12volt 5 Watt	SBC	18
Rear number plate light	12volt 5 Watt	SCC	18
Flasher switch	12volt 2 Watt	BA7S	6,7
Hazard warning switch	12volt 3-4 Watt	MCC	11
Instrument panel warning lights	12volt 2 Watt	BA7S	6,7

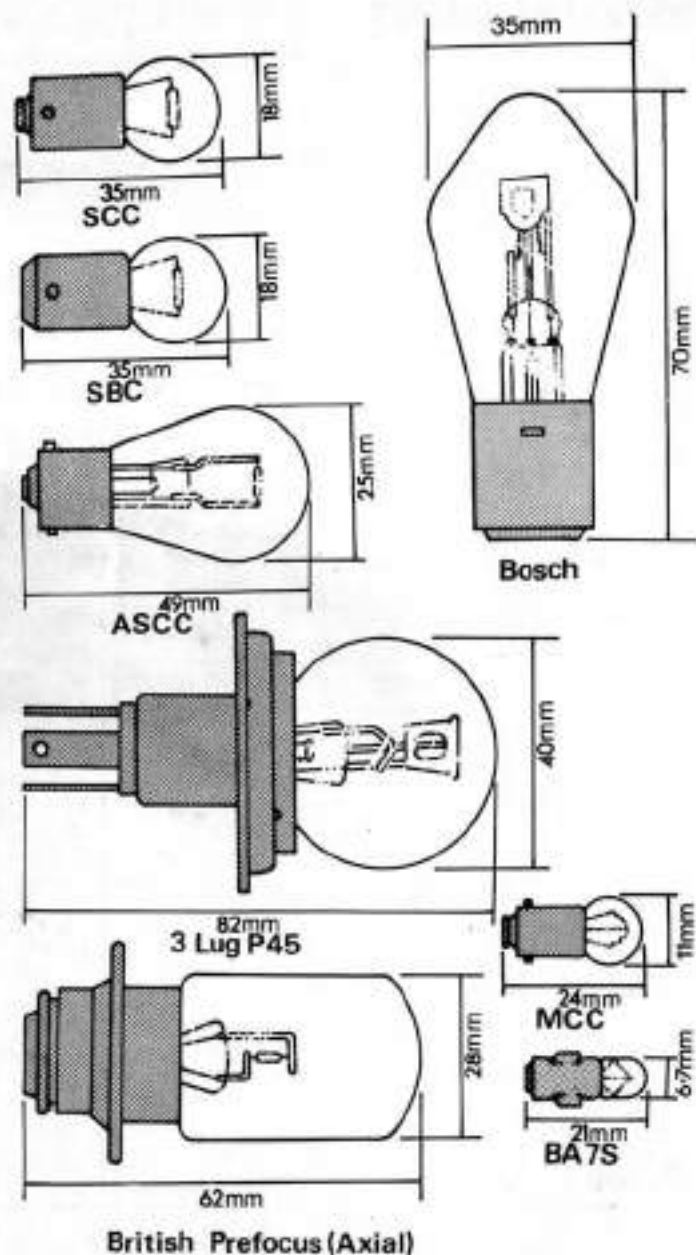


FIGURE 6/1. REPLACEMENT BULBS

## CHASSIS

### BRAKES

- 990 — 8½ in (22cm) dia. × 1½ in (4,45cm) wide, 52 in² (341 cm²) area.
- 995/996 — 8½ in (22cm) dia. × 2½ in (6cm) wide, 72 in² (464 cm²) area.
- \*Heavy Duty — 8½ in (22cm) dia. × 3½ in (8,9cm) wide, 105.1 in² (678 cm²) area.
- \*Only with heavy duty rear axle and reductions.

### CAPACITIES (Approximate initial fill)

	Imperial Measure	US Measure	Metric Measure
Cooling system	3 gal	3,6 gal	13,6 litre
Air cleaner oil bath	1½ pt	¾ qt	0,71 litre
Engine lubricating oil	13 pt	8 qt	7,4 litre
Transmission oil	5 gal	6 gal	22,7 litre
Final drive oil (each)	4 pt	2½ qt	2,3 litre
Belt pulley	1½ pt	1½ pt	0,7 litre
Power steering reservoir	2,2 pt	1,3 qt	1,25 litre
Manual steering box	2 pt	1,2 qt	1,1 litre
Fuel tank	13½ gal	16½ gal	61,4 litre

### 990 DIMENSIONS — on 6-00-19 front, 12-4/11-36 rear tyres.

Overall length	126in (320cm)
Height over exhaust pipe	88in (224cm)
Height over steering wheel	64in (162cm)
Height over Weatherframe or cab	101in (256cm)
Overall width — minimum	67in (170cm)
Wheelbase	79in (200cm)
Ground clearance under front axle	21in (53cm)
Ground clearance under drawbar frame	15in (38cm)

### Weight — with oil, fuel etc. —

	Livedrive	Non-Livedrive
—total	4670 lb (2120kg)	4630 lb (2100kg)
—rear axle	2970 lb (1350kg)	2950 lb (1338kg)
—front axle	1700 lb (770kg)	1680 lb (762kg)

### Turning radius on 52in (132cm) track:

—without brakes	138in (350cm)
—with brakes	126in (320cm)

**990/995/996 DIMENSIONS — on 7-50-16 front, 13-6/12-36 rear tyres.**

Overall length (990/995)	127in	323cm
Overall length (996)	130in	330cm
Wheelbase (990/995)	79in	200cm
Wheelbase (996)	81 1/2in	208cm
Height over Weatherframe or cab	101in	256cm
Height over upswept exhaust	88in	224cm
Height over steering wheel	64in	163cm
Width on minimum track	67in	170cm
*Ground clearance — front axle	21in	53cm
Ground clearance — drawbar frame	16in	41cm
Turning radius on 52in track (minimum) (990/995)		
—without brakes	138in	350cm
—with brakes	126in	320cm
Turning radius on 52in track (minimum) (996)		
—without brakes	142in	361cm
—with brakes	129in	328cm

\*Increased by 7 1/2in (19cm) in High Clearance form.

**WEIGHT — with oil, fuel etc.**

	<b>990/995 Tractors</b>	<b>996 Tractor</b>
—total	4760 lb (2160kg)	4900 lb (2220 kg)
—rear axle	3050 lb (1385kg)	3150 lb (1430kg)
—front axle	1710 lb (775kg)	1750 lb (790kg)

*Extra weight with Weatherframe and Cab*

A 'DB Weatherframe' increases the total weight by 505 lb (229kg).

A 'DB Weatherframe' with metal cladding increases the total weight by 785 lb (356kg).

**ADDITIONAL WEIGHTS**

Water ballasting with 75 – 80% fill adds the following weight per wheel (approx.)

13-6/12-36 tyre	420 lb (190kg)
16-9/14-30 tyre	590 lb (268kg)
14-9/13-28 tyre	440 lb (200kg)
12-4/11-36 tyre	350 lb (160kg)
13-6/12-38 tyre	440 lb (200kg)
12-4/11-32 tyre	310 lb (140kg)

*Rear wheel weights*

Rear wheel weights weigh 90 lb (40kg) each. Usually two weights per wheel are used. With more, the extra width of the tractor may be inconvenient.

*Front wheel weights*

Front wheel weights may be fitted either on both sides of the wheel or just the outside depending on the type of wheel fitted to the tractor. Front wheel weights weigh 80 lb (35kg) each. It should be noted that front wheel weights are not recommended for use on the highway.

*Front chassis weights*

In preference to front wheel weights, the front chassis ballast weights are recommended. They add approximately 450 lb (200kg).

**POWER LIFT**

Recommended maximum working load at the end of the links 2000 lb (900kg).

The hydraulic pump is of the balanced gear type and is mounted in the rear axle case. Pump delivery is 5 gal/min (6 US gal/min) (22.7 litres/min) at 1800 rev/min engine.

Maximum working pressure	2000 lb/in <sup>2</sup> (140kg/cm <sup>2</sup> )
Relief valve setting	2500 lb/in <sup>2</sup> (175kg/cm <sup>2</sup> )



### CLUTCH (not 996)

**Livedrive** — A double dry plate clutch.

Transmission clutch — 11in (27,9cm) dia., surface area 114in<sup>2</sup> (735cm<sup>2</sup>).

PTO clutch — 10in (25,4cm) dia., surface area 94in<sup>2</sup> (606cm<sup>2</sup>).

**Non-Livedrive** — Single dry plate clutch.

11in (27,9cm) dia., surface area 114in<sup>2</sup> (735cm<sup>2</sup>).

### CLUTCH (996)

A double dry plate clutch is fitted having separate operation of each plate, one of which is for the transmission and the other for the PTO drive.

**Transmission** — 11in (27,9cm) diameter, surface area 114in<sup>2</sup> (735cm<sup>2</sup>).

**PTO** — 11in (27,9cm) diameter, surface area 114in<sup>2</sup> (735cm<sup>2</sup>).

### DRAWBAR

This has 2 positions either side of centre with 4 positions of height in the extended position. The towing position can be normal or extended for PTO work.

Clevis height from ground on 12-4/11-36 tyres—  
11, 13, 15 or 17in (28, 33, 38 or 43cm).

Lateral adjustment — 6in (15,2cm) each side of centre.

Maximum vertical downward load at clevis—

Trailer position—3000 lb (1360kg)

Fully extended—2500 lb (1135kg)

### PICK-UP HITCH

This unit is easily fitted when the drawbar is removed. The lift rods are slotted to allow the hook to be stowed and the linkage to be used independently.

### MULTI-SPEED POWER TAKE-OFF

6-Spline shaft to BS 1495 and SAE J718d (SAE 6B shaft)

Diameter 1 $\frac{3}{8}$ in (34,9mm)

Offset  $\frac{3}{8}$ in (9,5mm) to left of centre

Height 27 $\frac{1}{4}$ in (69,2cm) on 12-4/11-36 tyres

Rotation Clockwise viewed from rear.

Speeds See under Belt Pulley.

### Belt Pulley

Width 5 $\frac{1}{8}$ in (13cm)

Diameter 8 $\frac{1}{2}$ in (21,6cm)

Rotation Clockwise viewed from open end.

Unit may be fitted to left- or right-hand side.

PTO Ratio	Engine Speed rev/min	PTO Speed rev/min	Belt Pulley		
			rev/min	ft/min	metres/min
Low	1800	532	Not applicable		
High	1100	550	776	1727	526
High	2000	1000	1412	3140*	957

\*British Standard belt speed.

Speed Ratio

Engine to PTO—Low 3-383 : 1

High 2 : 1

PTO to Belt Pulley 1 : 1-412

### SEATING

A super comfort suspension seat with hydraulic damper is available as an optional fitment. Adjustment is provided to suit the weight of the operator.

The seat is an upholstered tip-up pan seat with a foam rubber cushion and an adjustable backrest. The seat support gives fore and aft adjustment with simultaneous height variation giving optimum seating position for varying leg lengths. Adjustment is easily carried out while seated.

### STEERING

Recirculating ball and nut type, with an 18in (45cm) diameter wheel.

Full hydrostatic power steering, powered by an engine mounted pump, is available (factory fitted only) on all models.

## TRACK ADJUSTMENT

**Front** — Adjustable by means of telescopic extensions from 52 to 72in (132 to 183cm) with standard axle or 56 to 80in (142 to 203cm) with wide front axle by 4in (10cm) steps.

**Rear** — With shell or non-reinforced full fenders, 11-36, 12-36, 11-38, 12-38 and 13-28 tyres track settings can be adjusted from 52 to 76in (132 to 193cm) by 4in (10cm) steps by means of dished wheel centres and off-set rim lugs.

With reinforced full fenders, with or without a Weatherframe or cab, the minimum setting is 56in (142cm).

14-30 tyres on W14 rims with a fixed centre give track settings of 60 or 68in (152,5 or 173cm) only.

14-30 tyres on DW12 rims with adjustable dished centre, give track settings of 56, 60, 68 or 72in (142, 152,5, 173 or 183cm).

14-30 tyres on WD12 adjustable rims (power-shift), settings of 60 to 84in (152,5 to 213cm) by 4in (10cm) steps are available.

## UNIVERSAL LINKAGE

Three-point linkage (BS 1841) enables Category 1 (narrow) or Category 2 (wide) implements to be fitted.

	Category 1	Category 2
Nominal diameter of lower pins	$\frac{7}{8}$ in (2,22cm)	$1\frac{1}{8}$ in (2,86cm)
Nominal diameter of top pin	$\frac{3}{4}$ in (1,90cm)	1in (2,54cm)
Recommended length of implement cross shaft (distance between shoulders of pins)	$26\frac{7}{8}$ in (68cm)	$32\frac{1}{2}$ in (82,5cm)
Recommended height between upper and lower hitch points	22 to 25in (53,4 to 63,5cm)	22 to 25in (53,4 to 63,5cm)

## WHEEL EQUIPMENT

The alternatives vary according to market but the front/rear combination should be according to the following two groups.

**Front**  
6-00-19 (4 or 6-ply rating)  
7-50-16 (6-ply rating)

**with Rear**  
12-4/11-36  
(4 or 6-ply rating)  
16-9/14-30 (6-ply rating)  
12-4/11-38 (6-ply rating)  
13-6/12-36 (6-ply rating)  
13-6/12-38 (6-ply rating)

**Front**  
6-00-16  
(4 or 6-ply rating)

**with Rear**  
12-4/11-32  
(4 or 6-ply rating)  
14-9/13-28 (6-ply rating)

## DIESEL ENGINE

990 — 449001 and 449002

995 — 455051

996 — 455071

The 4-cylinder direct injection engine is a robust power unit applying the cross flow head technique for economy coupled with high performance. The crankshaft, flywheel, pistons and conrods are balanced and matched in weight to ensure rugged dependability and smooth running.

### Displacement—4 cylinders

990 .. ..	195in <sup>3</sup> (3195cm <sup>3</sup> )
995, 996 .. ..	219in <sup>3</sup> (3594cm <sup>3</sup> )
Bore .. ..	3 <sup>1</sup> / <sub>4</sub> in (100,01mm)
Stroke	
990 .. ..	4in (101,6mm)
995, 996 .. ..	4 <sup>1</sup> / <sub>2</sub> in (114,3mm)
Rated speed .. ..	1800 rev/min
Maximum full load speed	2200 rev/min
Maximum no load speed ..	2350 rev/min
Compression Ratio ..	17:1
Firing order .. ..	1, 2, 4, 3

### Valve clearances — SET COLD

inlet and exhaust 0-010in (0,25mm)

**Cooling system** — The thermostat is set to commence opening at 82°C (180°F) and to be fully open at 94°C (200°F). It controls the flow of coolant through the cylinder head from the water pump. Circulation through the block is by thermo-syphon. A 7-blade fan is fitted to the water pump drive pulley. The radiator coolant is pressurised by means of a relief valve fitted in the radiator cap.

**Fuel equipment** — A distributor type injection pump, having a mechanical governor, is driven, via an idler gear, from the front of the crankshaft. A built-in automatic retard device ensures easy starting, with manual lock for very cold weather and an ether pad in the manifold for sub-zero conditions.

In some countries a Thermostart cold starting system is available.

A diaphragm type lift pump, operated by push rod from the camshaft, has a water trap built in.

The injectors spray fuel direct into the cylinders through four holes. A combustion chamber is machined in the top of the piston. The pressure setting of the injectors is 175 atmospheres (180 kg/cm<sup>2</sup>).

Filtration is by means of 2 paper-element units in series.

**Lubrication system** — A gear type pump, driven from the camshaft, incorporates a main relief valve set to commence opening at 40 lb/in<sup>2</sup> (2,8 kg/cm<sup>2</sup>). Filtration is by means of a paper element full-flow filter with a low pressure valve to by-pass oil if the element is allowed to become blocked. The overhead valve gear is supplied by intermittent restricted feed from the rear camshaft bearing.

**Air intake** — The air intake is through a 2-stage 7in (17,8cm) diameter oil bath air cleaner plus a centrifugal type pre-filter. A paper element pre-filter may be fitted for very dusty conditions.

TRAVEL SPEEDS With 10/45 Ratio Final Drives  
on 12-4/11-36, 13-6/11-36 or 16-9/14-30 Rear Tyres (Mean rolling radius 26.8in)

GEAR LEVER POSITIONS	ENGINE SPEED											
	700 rev/min		1100 rev/min		1800 rev/min		2000 rev/min		2200 rev/min			
	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h		
LS1	0.33	0.53	0.51	0.83	0.84	1.4	0.93	1.5	1.0	1.7		
LS2	0.54	0.87	0.85	1.4	1.4	2.2	1.5	2.5	1.7	2.7		
HS1	0.65	1.0	1.0	1.6	1.7	2.7	1.9	3.0	2.0	3.3		
L1	0.83	1.3	1.3	2.1	2.1	3.4	2.4	3.8	2.6	4.2		
LS3	0.94	1.6	1.5	2.4	2.4	3.9	2.7	4.3	2.9	4.7		
HS2	1.1	1.7	1.7	2.7	2.8	4.5	3.1	5.0	3.4	5.5		
L2	1.4	2.2	2.2	3.5	3.6	5.7	3.9	6.4	4.3	7.0		
H1	1.7	2.7	2.8	4.2	4.3	6.9	4.7	7.6	5.2	8.4		
HS3	1.9	3.0	2.9	4.7	4.8	7.7	5.3	8.6	5.9	9.4		
L3	2.4	3.8	3.7	6.0	6.1	9.9	6.8	10.7	7.5	12.1		
H2	2.8	4.4	4.3	7.0	7.1	11.4	7.9	12.7	8.7	13.9		
H3	4.6	7.7	7.5	12.0	12.2	19.7	13.6	21.9	16.0	24.1		
LS Rev	0.64	0.87	0.88	1.4	1.4	2.2	1.5	2.5	1.7	2.7		
HS Rev	1.1	1.7	1.7	2.7	2.8	4.4	3.1	4.9	3.4	5.4		
L Rev	1.4	2.2	2.2	3.5	3.5	5.7	4.0	6.3	4.3	6.9		
H Rev	2.7	4.4	4.3	6.9	7.0	11.3	7.8	12.6	8.6	13.8		

Maximum speed at light running, i.e. H3 at 2350 rev/min — 16.0 mile/h (25.7 km/h)

TRAVEL SPEEDS With 10/45 Ratio Final Drives  
on 14-9/13-28 or 12-4/11-32 Rear Tyres (Mean rolling radius 24.8in)

GEAR LEVER POSITIONS	ENGINE SPEED											
	700 rev/min		1100 rev/min		1800 rev/min		2000 rev/min		2200 rev/min			
	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h		
LS1	0.30	0.49	0.48	0.76	0.78	1.3	0.88	1.4	0.95	1.5		
LS2	0.50	0.81	0.79	1.3	1.3	2.1	1.4	2.3	1.6	2.5		
HS1	0.60	0.97	0.95	1.5	1.6	2.5	1.7	2.8	1.9	3.0		
L1	0.77	1.2	1.2	1.9	2.0	3.2	2.2	3.6	2.4	3.9		
LS3	0.87	1.4	1.4	2.2	2.2	3.6	2.5	4.0	2.7	4.4		
HS2	1.0	1.6	1.6	2.5	2.6	4.1	2.9	4.6	3.1	5.1		
L2	1.3	2.1	2.0	3.2	3.3	5.3	3.7	5.9	4.0	6.5		
H1	1.5	2.5	2.4	3.9	4.0	6.4	4.4	7.1	4.8	7.8		
HS3	1.7	2.8	2.7	4.4	4.4	7.1	4.9	7.9	5.4	8.7		
L3	2.2	3.6	3.5	5.6	6.7	9.1	6.3	10.1	6.9	11.2		
H2	2.5	4.1	4.0	6.4	6.6	10.6	7.3	11.7	8.0	12.9		
H3	4.4	7.1	6.9	11.1	11.3	18.2	12.6	20.2	13.8	22.3		
LS Rev	0.60	0.80	0.78	1.3	1.3	2.1	1.4	2.3	1.6	2.5		
HS Rev	0.88	1.6	1.6	2.5	2.6	4.1	2.8	4.6	3.1	5.0		
L Rev	1.3	2.0	2.0	3.2	3.3	5.3	3.6	5.8	4.0	6.4		
H Rev	2.6	4.1	4.0	6.4	6.5	10.5	7.2	11.6	8.0	12.8		

Maximum speed at light running, i.e. H3 at 2350 rev/min — 14.8 mile/h (23.8 km/h)

**TRAVEL SPEEDS With 10/49 Ratio Final Drives  
on 13.6/12-38 Rear Tyres (Mean rolling radius 28.6in)**

GEAR LEVER POSITIONS	OVERALL GEAR RATIO	ENGINE SPEED									
		700 rev/min		1100 rev/min		1800 rev/min		2000 rev/min		2200 rev/min	
		mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h
L51	341:8	0.35	0.56	0.55	0.88	0.89	1.4	1.0	1.6	1.1	1.8
L52	206:1	0.58	0.93	0.91	1.6	1.0	2.4	1.6	2.6	1.8	2.9
H51	171:4	0.69	1.1	1.1	1.8	1.8	2.7	2.0	3.2	2.2	3.5
L1	134:1	0.89	1.4	1.4	2.2	2.3	3.7	2.5	4.1	2.8	4.6
L53	119:4	0.99	1.6	1.8	2.6	2.6	4.1	2.8	4.6	3.1	5.0
H52	103:3	1.1	1.8	1.8	2.9	3.0	4.8	3.3	5.3	3.6	5.8
L2	80:8	1.5	2.4	2.3	3.7	3.8	6.1	4.2	6.8	4.6	7.4
H1	67:2	1.8	2.8	2.8	4.5	4.5	7.3	5.0	8.1	5.6	8.9
H53	59:8	2.0	3.2	3.1	5.0	5.1	8.2	5.7	9.1	6.2	10.0
L3	46:8	2.5	4.1	4.0	6.4	6.5	10.5	7.2	11.7	8.0	12.8
H2	40:5	2.9	4.7	4.6	7.4	7.5	12.1	8.4	13.5	9.2	14.8
H3	23:9	5.1	8.1	7.9	12.8	13.0	20.9	14.5	23.3	15.9	25.6
L5 Rev	207:6	0.57	0.92	0.90	1.4	1.5	2.4	1.6	2.6	1.9	2.9
H5 Rev	104:1	1.1	1.8	1.8	2.9	2.9	4.7	3.3	5.2	3.6	5.8
L Rev	81:4	1.5	2.3	2.3	3.7	3.8	6.0	4.2	6.7	4.6	7.4
H Rev	40:8	2.9	4.7	4.6	7.4	7.5	12.0	8.3	13.4	9.1	14.7

Maximum speed at light running. i.e. H3 at 2360 rev/min — 17.0 mile/h (27.3 km/h)

**TRAVEL SPEEDS With 11/49 Ratio Final Drives  
on 12.4/11-36, 13.6/12-36, 16.9/14-30 Rear Tyres (Mean rolling radius 26.8in)**

GEAR LEVER POSITIONS	OVERALL GEAR RATIO	ENGINE SPEED									
		700 rev/min		1100 rev/min		1800 rev/min		2000 rev/min		2200 rev/min	
		mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h
L51	310:8	0.36	0.67	0.66	0.90	0.92	1.5	1.0	1.7	1.1	1.8
L52	187:4	0.59	1.0	0.93	1.5	1.5	2.5	1.7	2.7	1.9	3.0
H51	155:8	0.71	1.2	1.1	1.8	1.8	3.0	2.0	3.3	2.3	3.6
L1	121:9	0.81	1.5	1.4	2.3	2.4	3.8	2.6	4.2	2.9	4.6
L53	108:5	1.0	1.7	1.6	2.6	2.6	4.3	2.9	4.7	3.2	5.2
H52	93:9	1.2	1.9	1.9	3.0	3.1	4.9	3.4	5.5	3.7	6.0
L2	73:9	1.5	2.4	2.4	3.8	3.9	6.3	4.3	7.0	4.8	7.7
H1	61:1	1.8	2.9	2.9	4.6	4.7	7.6	5.2	8.4	5.7	9.2
H53	54:4	2.1	3.3	3.2	5.2	5.3	8.5	5.8	9.4	6.5	10.4
L3	42:6	2.6	4.2	4.1	6.6	6.7	10.9	7.5	12.1	8.2	13.3
H2	36:8	3.0	4.9	4.8	7.7	7.8	12.5	8.7	13.9	9.5	15.3
H3	21:3	5.2	8.4	8.2	13.2	13.5	21.7	15.0	24.1	16.4	26.5
L5 Rev	168:7	0.59	1.0	0.93	1.5	1.5	2.5	1.7	2.7	1.9	3.0
H5 Rev	94:6	1.2	1.9	1.9	3.0	3.0	4.9	3.4	5.4	3.7	6.0
L Rev	74:0	1.5	2.4	2.4	3.8	3.8	6.2	4.3	6.9	4.7	7.6
H Rev	37:1	3.0	4.8	4.7	7.6	7.7	12.5	8.6	13.8	9.5	15.2

Maximum speed at light running. i.e. H3 at 2350 rev/min — 17.6 mile/h (28.3 km/h)

**TRAVEL SPEEDS With 11/49 Ratio Final Drives**  
on 12-4/11-32 or 14-9/13-28 Rear Tyres (Mean rolling radius 24.8 in)

GEAR LEVER POSITIONS	OVERALL GEAR RATIO	ENGINE SPEED											
		700 rev/min		1100 rev/min		1800 rev/min		2000 rev/min		2200 rev/min			
		mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h
L51	310.8	0.33	0.53	0.52	0.84	0.85	1.4	0.94	1.6	1.0	1.7	0.94	1.6
L52	187.4	0.55	0.88	0.66	1.4	1.4	2.3	1.6	2.5	1.7	2.8	1.6	2.5
HS1	155.8	0.66	1.1	1.0	1.7	1.7	2.7	1.9	3.0	2.1	3.4	1.9	3.0
L1	121.9	0.84	1.4	1.3	2.1	2.2	3.5	2.4	3.9	2.7	4.3	2.4	3.9
L53	108.6	1.0	1.5	1.5	2.4	2.4	3.9	2.7	4.4	3.0	4.8	2.7	4.4
HS2	83.9	1.1	1.8	1.7	2.8	2.8	4.6	3.1	5.1	3.5	5.6	3.1	5.1
L2	73.5	1.4	2.3	2.2	3.6	3.6	5.8	4.0	6.6	4.4	7.1	4.0	6.6
H1	61.1	1.7	2.7	2.7	4.3	4.3	7.0	4.8	7.8	5.3	8.0	4.8	7.8
HS3	54.4	1.9	3.1	3.0	4.8	4.8	7.9	5.4	8.7	6.0	8.6	5.4	8.7
L3	42.6	2.4	3.9	3.8	6.1	6.2	10.0	6.9	11.1	7.6	12.3	6.9	11.1
H2	36.8	2.8	4.5	4.4	7.1	7.2	11.6	8.0	12.9	8.8	14.2	8.0	12.9
H3	21.3	4.8	7.8	7.6	12.2	12.5	20.0	13.8	22.2	15.2	24.6	13.8	22.2
L5 Rev	188.7	0.54	0.89	0.66	1.4	1.4	2.3	1.6	2.5	1.7	2.8	1.6	2.5
HS Rev	94.6	1.1	1.8	1.7	2.8	2.8	4.5	3.1	5.0	3.4	5.5	3.1	5.0
L Rev	74.0	1.4	2.3	2.2	3.5	3.6	5.8	4.0	6.4	4.4	7.1	4.0	6.4
H Rev	37.1	2.8	4.5	4.4	7.0	7.2	11.5	8.0	12.8	8.8	14.1	8.0	12.8

Maximum speed at light running, i.e. H3 at 2350 rev/min — 16.3 mile/h (26.2 km/h)

**TRAVEL SPEEDS With 11/49 Ratio Final Drives**  
on 13-6/12-38 Rear Tyres (Mean rolling radius 25.6 in)

GEAR LEVER POSITIONS	OVERALL GEAR RATIO	ENGINE SPEED											
		700 rev/min		1100 rev/min		1800 rev/min		2000 rev/min		2200 rev/min			
		mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h
L51	310.80	0.38	0.61	0.60	1.0	1.0	1.6	1.1	1.8	1.2	1.9	1.1	1.8
L52	187.4	0.63	1.0	1.0	1.6	1.6	2.6	1.8	2.9	2.0	3.2	1.8	2.9
HS1	155.8	0.76	1.2	1.2	1.9	2.0	3.2	2.2	3.5	2.4	3.8	2.2	3.5
L1	121.9	1.0	1.6	1.5	2.5	2.5	4.0	2.8	4.5	3.1	4.9	2.8	4.5
L53	108.6	1.1	1.8	1.7	2.8	2.8	4.5	3.1	5.0	3.4	5.6	3.1	5.0
HS2	83.9	1.3	2.0	2.0	3.2	3.3	5.2	3.6	5.8	4.0	6.4	3.6	5.8
L2	73.5	1.6	2.6	2.5	4.1	4.2	6.7	4.6	7.4	5.1	8.2	4.6	7.4
H1	61.1	1.9	3.1	3.1	4.9	5.0	8.0	5.6	8.9	6.1	9.8	5.6	8.9
HS3	54.4	2.2	3.5	3.4	5.5	5.6	9.0	6.2	10.0	6.9	11.0	6.2	10.0
L3	42.6	2.8	4.5	4.4	7.1	7.2	11.5	8.0	12.8	8.8	14.1	8.0	12.8
H2	36.8	3.2	5.2	5.1	8.1	8.3	13.3	9.2	14.8	10.1	16.3	9.2	14.8
H3	21.3	5.6	9.0	8.7	14.1	14.3	23.0	15.9	25.6	17.5	28.1	15.9	25.6
L5 Rev	188.7	0.62	1.0	1.0	1.6	1.6	2.6	1.8	2.9	2.0	3.2	1.8	2.9
HS Rev	94.6	1.3	2.0	2.0	3.2	3.2	5.2	3.6	5.8	4.0	6.4	3.6	5.8
L Rev	74.0	1.6	2.6	2.5	4.1	4.1	6.4	4.6	7.4	5.0	8.1	4.6	7.4
H Rev	37.1	3.2	5.1	5.0	8.1	8.2	13.2	9.1	14.7	10.1	16.2	9.1	14.7

Maximum speed at light running, i.e. H3 at 2350 rev/min — 18.7 mile/h (30.1 km/h)

**TRAVEL SPEEDS With 9/50 Ratio Final Drives**  
 on 12-4/11-36, 13-6/12-36 or 15-9/14-30 Rear Tyres (Mean rolling radius 26.8in)

GEAR LEVER POSITIONS	OVERALL GEAR RATIO	ENGINE SPEED									
		700 rev/min		1100 rev/min		1800 rev/min		2000 rev/min		2200 rev/min	
		mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h
LS1	387.6	0.28	0.46	0.45	0.72	0.74	1.2	0.82	1.3	0.90	1.5
LS2	233.7	0.47	0.76	0.75	1.2	1.2	2.0	1.4	2.2	1.5	2.4
HS1	194.3	0.57	0.92	0.90	1.5	1.5	2.4	1.6	2.6	1.8	2.9
L1	152.0	0.73	1.2	1.2	1.9	1.9	3.0	2.1	3.4	2.3	3.7
LS3	135.4	0.82	1.3	1.3	2.1	2.1	3.4	2.4	3.8	2.6	4.2
HS2	117.2	1.0	1.6	1.5	2.4	2.5	3.9	2.7	4.4	3.0	4.8
L2	91.6	1.2	2.0	1.9	3.1	3.1	5.0	3.5	5.6	3.8	6.2
H1	76.2	1.5	2.3	2.3	3.7	3.8	6.0	4.2	6.7	4.6	7.4
HS3	67.4	1.6	2.6	2.6	4.2	4.2	6.8	4.7	7.6	5.2	8.3
L3	53.1	2.1	3.4	3.3	5.3	5.4	8.7	6.0	9.7	6.6	10.6
H2	45.9	2.4	3.9	3.8	6.1	6.2	10.1	6.9	11.2	7.6	12.3
H3	26.6	4.2	6.8	6.6	10.6	10.8	17.4	12.0	19.3	13.2	21.2
LS Rev	235.3	0.47	0.76	0.74	1.2	1.2	2.0	1.4	2.2	1.5	2.4
HS Rev	118.0	0.94	1.5	1.5	2.4	2.4	3.9	2.7	4.4	3.0	4.8
L Rev	92.3	1.2	1.9	1.9	3.1	3.1	5.0	3.5	5.6	3.8	6.1
H Rev	46.3	2.4	3.9	3.8	6.1	6.2	10.0	6.9	11.1	7.6	12.2

Maximum speed at light running, i.e. H3 at 2350 rev/min — 14.1 mile/h (22.7 km/h)

**TRAVEL SPEEDS With 9/50 Ratio Final Drives**  
 on 12-4/11-32 or 14-5/13-28 Rear Tyres (Mean rolling radius 24.8in)

GEAR LEVER POSITIONS	OVERALL GEAR RATIO	ENGINE SPEED									
		700 rev/min		1100 rev/min		1800 rev/min		2000 rev/min		2200 rev/min	
		mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h
LS1	387.6	0.26	0.42	0.41	0.67	0.68	1.1	0.76	1.2	0.83	1.3
LS2	233.7	0.44	0.71	0.69	1.1	1.1	1.8	1.3	2.0	1.4	2.2
HS1	194.3	0.53	0.85	0.83	1.3	1.4	2.2	1.6	2.4	1.7	2.7
L1	152.0	0.67	1.1	1.1	1.7	1.7	2.8	1.9	3.1	2.1	3.4
LS3	135.4	0.76	1.2	1.2	1.9	2.0	3.2	2.2	3.5	2.4	3.9
HS2	117.2	0.88	1.4	1.4	2.2	2.3	3.6	2.5	4.1	2.8	4.5
L2	91.6	1.1	1.8	1.8	2.9	2.9	4.7	3.2	5.2	3.5	5.7
H1	76.2	1.4	2.2	2.1	3.4	3.5	5.6	3.9	6.2	4.3	6.9
HS3	67.9	1.5	2.4	2.4	3.8	3.9	6.3	4.3	7.0	4.6	7.7
L3	53.1	1.9	3.1	3.1	4.9	5.0	8.1	5.6	8.9	6.1	9.8
H2	45.9	2.2	3.6	3.5	5.7	5.8	9.3	6.4	10.3	7.1	11.4
H3	26.6	3.9	6.2	6.1	9.8	10.0	16.1	11.1	17.9	12.2	19.6
LS Rev	235.3	0.43	0.70	0.69	1.1	1.1	1.8	1.3	2.0	1.4	2.2
HS Rev	118.0	0.87	1.4	1.4	2.2	2.3	3.6	2.5	4.0	2.8	4.4
L Rev	92.3	1.1	1.8	1.8	2.8	2.9	4.6	3.2	5.1	3.5	5.7
H Rev	46.3	2.2	3.6	3.5	5.6	5.7	9.2	6.4	10.3	7.0	11.3

Maximum speed at light running, i.e. H3 at 2350 rev/min — 13.0 mile/h (21.0 km/h)

TRAVEL SPEEDS With 9/50 Ratio Final Drives  
on 13.6/12-38 Rear Tyre (Mean rolling radius 28.6in)

GEAR LEVER POSITIONS	OVERALL GEAR RATIO	ENGINE SPEED									
		700 rev/min		1100 rev/min		1800 rev/min		2000 rev/min		2200 rev/min	
		mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h	mile/h	km/h
L51	307.6	0.30	0.49	0.48	0.77	0.78	1.3	0.87	1.4	1.0	1.5
L52	233.7	0.50	0.81	0.79	1.3	1.3	2.1	1.5	2.3	1.6	2.6
H51	194.3	0.61	1.0	0.96	1.5	1.6	2.6	1.7	2.8	1.9	3.1
L1	152.0	0.78	1.3	1.2	2.0	2.0	3.2	2.2	3.6	2.6	3.9
L53	135.4	0.87	1.4	1.4	2.2	2.3	3.8	2.5	4.0	2.8	4.4
H52	117.2	1.0	1.6	1.6	2.6	2.6	4.2	2.9	4.7	3.2	5.1
L2	91.6	1.3	2.1	2.0	3.3	3.3	5.4	3.7	6.0	4.1	6.6
H1	76.2	1.6	2.6	2.4	3.8	4.0	6.4	4.5	7.2	4.9	7.8
H53	67.9	1.7	2.8	2.7	4.4	4.5	7.2	5.0	8.0	5.5	8.8
L3	53.1	2.2	3.6	3.6	5.7	5.8	9.3	6.4	10.3	7.0	11.3
H2	45.9	2.6	4.2	4.1	6.5	6.6	10.7	7.4	11.8	8.1	12.1
H3	28.6	4.5	7.2	7.0	11.3	11.5	18.5	12.7	20.6	14.0	22.6
L5 Rev	235.3	0.50	0.81	0.79	1.3	1.3	2.1	1.4	2.3	1.6	2.6
H5 Rev	118.0	1.0	1.6	1.6	2.6	2.6	4.2	2.9	4.6	3.2	5.1
L Rev	82.3	1.3	2.1	2.0	3.3	3.3	5.3	3.7	5.8	4.0	6.5
H Rev	46.3	2.6	4.1	4.0	6.5	6.6	10.6	7.3	11.8	8.1	13.0

Maximum speed at light running, i.e. H3 at 2350 rev/min — 15.0 mile/h (24.1 km/h)





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