

## INTRODUCTION

Continuous and extensive research into farmers' problems and requirements throughout the world lies behind the development of the FE-35 and its introduction once again moves the Ferguson Tractor a march-ahead. Many new important features are embodied and it is the purpose of this publication to ensure that you—the operator—are fully conversant not only with the controls at your disposal, but also with the proper method of handling and maintaining this Tractor. Instructions which, if carefully followed, will contribute towards years of prosperous farming in the true Ferguson tradition.

The installation procedure ensures that these instructions are understood ; we require you therefore to observe carefully our recommendations and to make daily maintenance a routine—the hours in service should be recorded—the tools are supplied—the responsibility is yours.

Moreover, we do not discuss herein extensive service problems and adjustments. These are considered to be the responsibility of the wide-spread network of Ferguson Distributors and Dealers specially trained and equipped for the purpose and backed by the Technical Staff of our Service Department.

When replacements are required, insist on genuine Ferguson Service Parts. All Distributors/Dealers have agreed not to sell Service Parts other than those which are manufactured or recommended by the Company, and, as extensive damage is liable to result from parts of inferior quality being used, users are advised to buy Service Parts only from an authorised Ferguson Distributor/Dealer.

In the event of your requiring information as to the name and address of the Ferguson Distributor/Dealer in any particular district, apply to Massey-Harris-Ferguson, Service Department, Coventry, England.

# IMPORTANT

Keep a new tractor on light work for fifty hours.

Do not attempt to turn sharply using one brake when travelling at high speed.

Drive slowly in difficult going.

Do not carry anything on the implement.

Keep all nuts and bolts tight. This precaution is a general practice with all good operators, who have found that it prolongs the life of the tractor by keeping all parts in perfect alignment.

Use an adequate shield to protect the power take-off universal joints.

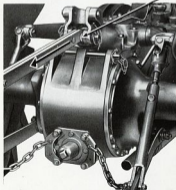
Do not use the drawbar without the drawbar stays. Keep drawbar adjusted to maintain sufficient weight on front wheels to ensure steering stability.

Allow ten seconds to elapse before re-engaging starter if previous attempt at starting has failed.

When operating tractor in ground speed P.T.O., disengage the P.T.O. drive before attempting to back tractor, otherwise the implement mechanism may be reversed.

Avoid spilling fuel over the engine.

**IT IS HIGHLY DANGEROUS TO PULL ANYTHING FROM THE TOP LINK CONNECTION.**



**YOU HAVE BEEN WARNED**

# INSTRUMENTS AND CONTROLS

## PETROL ENGINE TRACTOR



Fig. 1. Instrument Panel.

- |  |  |
|--|--|
| A. COMBINED IGNITION AND STARTER SWITCH. | G. THROTTLE LEVER.                     |
| B. CHOKE.                                | H. OIL PRESSURE GAUGE.                 |
|  | J. TRACTOMETER (DE LUXE TRACTOR ONLY). |

### Ignition Switch (A Fig. 1)

The combined ignition and starter switch is mounted on the instrument panel. First position of the switch turns on the ignition, second position operates the starter (when Dual Range Selector Lever is in the 'S' position).

### Choke (B Fig. 1)

Pull button type located on the lower right of the instrument panel. Pulling the choke out from the panel provides a rich fuel mixture for easier starting from cold.

# VAPORISING OIL AND LAMP OIL ENGINE TRACTOR



Fig. 2. Instrument Panel.

- |   |   |
|---|---|
| A. COMBINED IGNITION AND<br>STARTER SWITCH. | G. THROTTLE LEVER.                        |
| B. CHOKE.                                   | H. OIL PRESSURE GAUGE.                    |
| C. TEMPERATURE GAUGE.                       | J. TRACTOMETER (DE LUXE<br>TRACTOR ONLY). |

## Ignition Switch (A Fig. 2)

The combined ignition and starter switch is mounted on the instrument panel. First position of the switch turns on the ignition, second position operates the starter (when Dual Range Selector Lever is in the 'S' position).

## Choke (B Fig. 2)

Pull button type located on the lower right of the instrument panel. Pulling the choke out from the panel provides a rich fuel mixture for easier starting from cold.

## Temperature Gauge (C Fig. 2)

These engines are started and warmed on petrol and the temperature gauge is marked to indicate temperatures at which change-over to V.O. or L.O. should be effected. That is, when the indicator needle enters the GREEN zone.

## DIESEL ENGINE TRACTOR

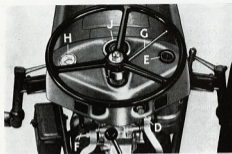


Fig. 3. Instrument Panel.

- |                             |  |
|-----------------------------|--|
| D. COMBINED STARTER SWITCH. | G. THROTTLE LEVER.                     |
| E. AMMETER.                 | H. OIL PRESSURE GAUGE.                 |
| F. FUEL CUT-OFF CONTROL.    | J. TRACTOMETER (DE LUXE TRACTOR ONLY). |

### Starter Switch (D Fig. 3)

The Starter Switch is mounted on the R.H. side of the instrument panel. It will operate only when the Dual Range Selector Lever is in the 'S.' position.

First position clockwise operates starter for normal starting, first and second positions anti-clockwise operate heater and starter respectively for cold starting—temperatures below 32°F (0°C).

### Ammeter (E Fig. 3)

The rate of charge depends on the state of the batteries.

### Fuel Cut-off Control (F Fig. 3)

This is pulled out to stop engine.

## **PETROL, V.O., L.O. AND DIESEL ENGINE TRACTORS**

### **Throttle Lever (G Figs. 1, 2 and 3)**

This is located between the steering wheel and the instrument panel at the upper right of the steering column. Pulling the throttle downward (clockwise) increases the engine speed.

### **Oil Pressure Gauge (H Figs. 1, 2 and 3)**

Located on the upper right hand side of the instrument panel, the gauge indicates oil pressure and not the amount of oil in the system.

Normal working pressure 40—60 lb./sq. in. (2.8—4.2 Kg./sq. cm.), i.e., when indicator is in GREEN range.

### **Tractometer [De Luxe Tractor only] (J Figs. 1, 2 and 3)**

Located in the centre of the instrument panel, the instrument is a combination tachometer, speedometer and equivalent hour meter.

The six scales at the top of the dial indicate forward miles or kilometres per hour, corresponding to the gear engaged, the outer scale indicates engine r.p.m. in hundreds and the window at the centre of the dial indicates the total accumulated hours of operation : one unit being recorded for the equivalent of one hour's work at 1,500 r.p.m. (i.e. 90,000 engine revs.).

Engine speeds lower than this will register clock hours more slowly, and higher engine speeds will register clock hours more quickly. In practice this is an efficient method of assessing engine service. The normal pulley operating speed and P.T.O. speeds are also shown on the dial face.

### **Gear Shift Lever (A Fig. 4)**

The gear shift lever is located in front of the tractor seat on the top centre of the transmission housing. The three forward and one reverse gears are indicated by raised characters on the transmission housing.

Used in conjunction with the Dual Range Selector Lever in low range for first, second, third and low reverse gears : in high range the same lever positions give fourth (1), fifth (2), and sixth (3) and high reverse gears.

### Dual Range Selector Lever (8 Fig. 4)

This lever is located in front of the tractor seat on the transmission housing to the right of the gear shift lever. The high and low ranges are indicated by a raised 'H' and 'L' on the transmission housing. The raised 'S' indicates the neutral or start position and, for starting, the lever must be in this position in order to close the starter motor circuit. Low or high range must be engaged before the tractor will move off.

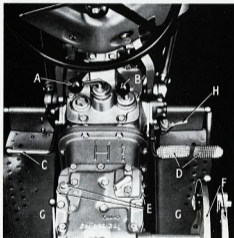


Fig. 4. Controls.

- |                               |  |
|-------------------------------|--|
| A. GEAR SHIFT LEVER.          | E. HYDRAULIC TAKE-OFF POINTS.            |
| B. DUAL RANGE SELECTOR LEVER. | F. CONTROL LEVERS<br>(HYDRAULIC SYSTEM). |
| C. CLUTCH PEDAL.              | G. STEP ASSEMBLIES (De Luxe Tractor).    |
| D. INDEPENDENT BRAKE PEDALS.  | H. INTERLOCKING LATCH<br>(MASTER BRAKE)  |

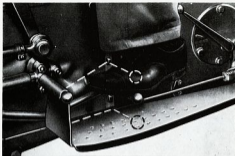


Fig. 5. De Luxe Clutch, showing two pedal stages.

#### Clutch Pedal (C Fig. 4)

This pedal, shown in Fig. 4, is used on the 'Basic' model tractor simply to disengage the transmission from the engine drive in the conventional manner.

On the De Luxe Model, the pedal travels through two stages as shown in Fig. 5: the initial movement—the extent of which is made apparent by a distinct increase in pedal pressure—disengages the transmission; additional downward movement disconnects the hydraulic pump, P.T.O. shaft, and transmission at the same time. A clutch stop which can be set to limit the travel of the clutch pedal to the first stage is an available accessory. (See page 51).

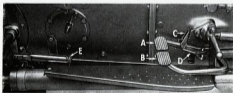


Fig. 6. Brake Assembly.

- |                            |  |
|----------------------------|--|
| A. LEFT HAND BRAKE PEDAL.  | D. INTERLOCKING LATCH<br>(MASTER BRAKE). |
| B. RIGHT HAND BRAKE PEDAL. | E. COMPENSATING SPRING.                  |
| C. PARKING BRAKE LATCH.    |  |



**Independent Brake Pedals (D Fig. 4 and A and B Fig. 6)**

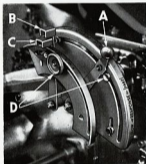
Located to the right of the transmission housing, the right or left pedal, when depressed, brakes the respective right or left rear wheel to assist turning.

**Master Brake (D Fig. 6)**

The independent brake pedals are adjacent and close enough for the operator to depress them both to brake the tractor's forward travel. An interlocking latch is provided to lock the independent pedals together to provide a master pedal, for highway use, compensating springs (E, Fig. 6) being fitted to provide a measure of equalisation between R.H. and L.H. brakes.

**Parking Latch (C Fig. 6)**

The left brake carries a parking latch which can be pre-set to lock both brakes and prevent accidental movement of the tractor. When set, it is operative on the next movement of the pedal.



- A. OPERATIONAL LEVER.
- B. DRAFT (DRAUGHT) CONTROL LEVER.
- C. ADJUSTABLE SECTOR.
- D. KNURLED NUTS.

Fig. 7. Control Levers—Hydraulic System.

**Control Levers—Hydraulic System (Fig. 7)**

Located on the right of the tractor seat within easy reach of the operator, the two levers provide manual control of the hydraulic system. With the lever on the outer quadrant (draft [draught] control lever) the desired working depth of the implement is selected. The lever on the inner quadrant (operational lever) in its upper range provides position control of the lower link height, i.e. the lower links will rise or fall to a static position predetermined by the setting of this lever—the rate of fall being approximately equal to the speed with which the lever is moved; in the lower range the same lever adjusts the rate at which the working implement drops, i.e. the speed of response.

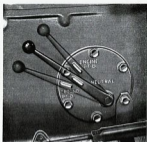


Fig. 8. Power Take-off Lever.

#### **Power Take-Off Lever (Fig. 8)**

This lever, located on the left side of the tractor centre housing, engages the P.T.O. shaft to revolve either at a speed proportional to that of the engine or proportional to the ground speed of the tractor, or, alternatively, disengages the shaft to provide a neutral position. Each position is indicated in Fig. 8.

#### **Double Hinge Seat (Fig. 9)**

The seat can be tilted back to enable the operator to stand and can be swung back upside down to keep it dry. The seat bracket can be adjusted forward or backward.



Fig. 9. Double Hinge Seat.

#### **Step Assemblies (De Luxe Tractor) (G Fig. 4)**

Step Assemblies, which are designed to give an alternative leg position to reduce fatigue and to enable the driver to stand up while manoeuvring, are fitted to the De Luxe Tractor and are an available accessory for the standard version.

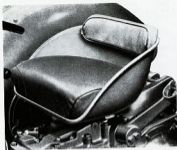


Fig. 10.

#### **Double Hinge Cushion Seat (De Luxe Tractor)**

A foam latex cushioned seat and back rest upholstered in a weather resistant, plasticised fabric is fitted to the De Luxe Tractor and is an available accessory for the standard version. The cushion seat is inserted in a steel, bucket type seat pan and is similarly adjusted as the standard seat.

# OPERATING SECTION

## STARTING THE ENGINE



Fig. 11.

**WARNING.** — Before starting the engine, always see that the P.T.O. lever is in the neutral position, as otherwise a P.T.O. driven implement will start to operate immediately the engine fires.

Further, on the FE.35, disengaging the P.T.O. lever does not disconnect the hydraulic pump, which is constant running. External hydraulic equipment will operate immediately, even when the P.T.O. lever is in neutral, if the valves on the implement have been left 'open'.

## PETROL ENGINE TRACTOR

### Procedure

1. Ensure that there is ample fuel in the tank for the work to be undertaken, and that the brakes are on and the parking latch engaged.
2. Open fuel valve, turning it two full turns to the left from the closed position.
3. Turn ignition key clockwise to 'first' position.
4. Depress clutch pedal fully.
5. Move Dual Range Selector Lever in to the 'S' position, to close the transmission neutral safety switch.
6. Fully close hand throttle lever (move anti-clockwise to close).
7. Pull out choke control and hold in position with the right hand. This action closes the carburettor choke flap and automatically provides sufficient throttle opening for easy starting.
8. Turn ignition key to 'second' position to operate starter and release immediately when engine starts.  
Do not operate starter for longer than 5 seconds at one time. If the engine fails to start wait 10 seconds before re-engaging the starter.
9. Release clutch pedal and, as soon as the engine will run smoothly, release the choke control. Over-choking causes neat fuel to be

drawn into the cylinders, washing away lubricating oil from the cylinder walls, resulting in unnecessary wear.

10. Do not 'race' the engine immediately after starting from cold—but warm-up at a fast 'idling' speed.
11. Before starting work check the engine oil pressure.

To stop the engine turn the ignition key anti-clockwise.

**NOTE.**—In extremely cold weather, engine starting and operating is assisted by temporarily blanking off the lower part of the radiator grille. If anti-freeze solution is not used avoid leaving the tractor standing in an exposed position for long intervals during working hours, as partial freezing of the cooling system may occur. In extremely hot climates, engine overheating can be averted by temporarily removing the hood grille.

# STARTING THE ENGINE

## V.O. & L.O. ENGINE TRACTORS

### Procedure

1. Ensure that there is ample fuel in both tanks for the work to be undertaken, and that the brakes are on and the parking latch engaged.
2. When cold, start the engine on petrol. Ensure that the fuel system is fully primed with petrol by :—
  - (a) turning over to petrol two minutes before finishing work. This saves fuel and will clear the system of vaporising oil/lamp oil for easy re-starting.
  - or
  - (b) if tractor has been stopped on vaporising oil/lamp oil, set fuel tap to PETROL. Drain about half cup of fuel from the carburettor drain tap. The fuel drained off can be returned to vaporising oil/lamp oil tank.
3. Turn ignition key clockwise to 'first' position.
4. Depress clutch pedal fully.
5. Move Dual Range Selector Lever in to the 'S' position, to close the transmission neutral safety switch.
6. Fully close hand throttle lever (move anti-clockwise to close).
7. Pull out choke control and hold in position with the right hand. This action closes the carburettor choke flap and automatically provides sufficient throttle opening for easy starting.
8. Turn ignition key to 'second' position to operate starter and release immediately when engine starts.  
Do not operate starter for longer than 5 seconds at one time. If the engine fails to start wait 10 seconds before re-engaging the starter.
9. Release clutch pedal and, as soon as the engine will run smoothly, release the choke control. Over-choking causes neat fuel to be drawn into the cylinders, washing away lubricating oil from the cylinder walls, resulting in unnecessary wear.
10. Do not 'race' the engine immediately after starting from cold—but warm-up at a fast 'idling' speed.
11. Before starting work check the engine oil pressure.
12. When thermometer on dashboard indicates GREEN, i.e. over 75°C. turn to vaporising oil/lamp oil. Do NOT warm engine on vaporising oil/lamp oil, using choke to prevent stalling. This will cause oil dilution and rapid engine wear.

To stop the engine turn the ignition key anti-clockwise.

**NOTE.**—In extremely cold weather, engine starting and operating is assisted by temporarily blanking off the lower part of the radiator grille. If anti-freeze solution is not used avoid leaving the tractor standing in an exposed position for long intervals during working hours, as partial freezing of the cooling system may occur. In extremely hot climates, engine overheating can be averted by temporarily removing the hood grille.

### Use of Fuel

Although petrol or vaporising oil/lamp oil may be used efficiently, best results for economy and engine life will be obtained as follows.

1. For continuous operation use vaporising oil/lamp oil only.
2. On very light work, involving numerous engine stops, use petrol only. For best results when operating on petrol only, remove induction manifold shield, which is retained by two bolts only. Never operate without shield when using vaporising oil/lamp oil.

# STARTING THE ENGINE

## DIESEL ENGINE TRACTOR

Before attempting to start the engine, ensure that :—

- (a) There is sufficient fuel in the tank.
- (b) That the fuel line cocks are open, and fuel cut-off (stop) control is in starting position.
- (c) The brake is on and parking latch engaged.

**NOTE.**—If the engine does not run after using the following procedure, the fuel system should be de-aerated as described in the Diesel Engine Instruction Book. Should it still fail, consult your Distributor Dealer.

### Temperatures above 32°F (0°C)

1. Set the hand throttle lever in the ' half-open ' position.
2. Depress clutch pedal fully.
3. Move Dual Range Selector Lever in to the ' S ' position, to close the transmission neutral safety switch.
4. Move starter switch key clockwise to operate starter. When engine fires release switch key which will return to the ' Off ' position.

Do not race engine while starter motor is in operation.

To stop the engine pull the fuel cut-off control under left-hand side of the instrument panel.

### Temperatures below 32°F (0°C)

1. Set the hand throttle lever in the ' half-open ' position.
2. Depress clutch pedal fully.
3. Move Dual Range Selector Lever in to the ' S ' position, to close the transmission neutral safety switch.
4. Turn starter switch key ANTI-CLOCKWISE for 10 seconds to operate heater.
5. Move starter switch key to second position ANTI-CLOCKWISE to operate starter motor. Release switch when engine fires. If no sign of a start occurs after 15 seconds, return switch to heat position for 5 seconds. Then re-engage starter motor.

Do not race engine whilst starter motor is in operation.

To stop the engine pull the fuel cut-off control under left-hand side of the instrument panel.



## **DRIVING THE TRACTOR**

1. Make sure the brakes are released.
2. Depress clutch pedal fully and move dual range selector lever to either 'high' or 'low' range and gear shift lever to the desired gear. On the De Luxe Model (dual clutch) tractors, the clutch pedal need only be depressed through the primary range.
3. Increase engine speed slowly and release clutch pedal slowly.
4. Remove foot from clutch pedal and slowly increase throttle setting until desired speed is obtained. Do NOT rest foot on or ride the clutch pedal, as this may cause the clutch to slip.

**Note.**—When changing gear the tractor must be brought to a complete stop; the dual range selector lever may, however, be shifted whilst the tractor is in motion provided the clutch pedal is depressed.

## **IMPORTANT**

Never coast down steep slopes with the tractor in gear and the clutch disengaged.

In low range transmission this would result in the free clutch disc being driven at a speed sufficient to cause the clutch facing to be cracked and damaged by centrifugal force.

Should the tractor be towed, the P.T.O. shift lever, the dual range selector lever and the gear lever must be in neutral and 20 m.p.h. (32 k.p.h.) must not be exceeded.

### **Towing to start the Engine**

Adopt the following procedure :—

1. P.T.O. shift lever in neutral.
2. Dual range selector lever in high range.
3. Gear shift lever in third gear.
4. Towing speed should not exceed 20 m.p.h. (32 k.p.h.).

## **SELECTING THE CORRECT GEAR**

The selection of the correct working gear is the responsibility of the operator. The main points to be considered are the type of implement being used, the field conditions and the ground speed required. If the load on the engine is too great for the gear in use, always stop and select a lower gear. Never slip the clutch in order to increase the engine speed.

## WARNING AGAINST OVERLOADING

A high gear ratio should not be used with any implement which operates underneath the ground. Speeds in excess of  $3\frac{1}{2}$  m.p.h. (5.6 k.p.h.) are too fast for normal implement work and implements such as ploughs and cultivators, which operate underneath the ground and are liable to catch on obstructions, are not designed to stand stresses produced above this speed. It is a fallacy to think that operating in high gear will save the tractor and save fuel for normal work. Such treatment would cause overloading, and overloading is disastrous to the life of the tractor.

High gear ratios are meant to be used for light work only, and for implements which operate above the ground, such as a light roller. The hydraulic system is designed to operate perfectly at speeds below  $3\frac{1}{2}$  m.p.h. (5.6 k.p.h.), but will not operate perfectly at higher speeds.

## A TEST FOR OVERLOADING

With the tractor in motion, set the throttle half way open then quickly pull the throttle fully open. If the tractor speeds up rapidly, the engine is not overloaded. If the engine picks up speed slowly, the tractor is overloaded and should be stopped and a change made to a lower gear.

When operating on a steep hill, the above test might indicate overloading. This is not harmful as it is compensated for when coming downhill. It is continuous overloading which must be avoided.

## RUNNING-IN

Follow these instructions carefully.

1. Keep your tractor on light work for the first 50 hour period. However, on the Diesel Tractor, after each 10 hour interval during this period, operate tractor under full load for 5 or 10 minutes.
2. Use a low gear when pulling heavy loads.
3. Change engine oil after first 30 hours of operation.
4. Change transmission oil after first 120 hours of operation.
5. Check tightness of all nuts, bolts and screws frequently during break-in period.
6. Book your first Free Voucher Service early and the remainder well before they fall due.

## HANDLING NOTES

### CLUTCH

A choice of two different clutches is available to the customer : a conventional type with a single dry disc on the engine flywheel as fitted to the 'Basic' Model Tractor or a 'Dual' clutch of unique design as fitted on the 'De Luxe' model.

With the 'Dual' clutch, as previously explained on page 8, initial movement of the clutch pedal simply disconnects the engine drive from the transmission without interrupting the P.T.O. shaft and hydraulic pump which will continue to operate until the pedal is fully depressed. This provides a 'live' P.T.O. shaft and pump drive. The advantages of this important feature are discussed under "POWER TAKE-OFF".

### BRAKES

The independent brake pedals, which are for assisting reduction of the turning circle and operate the brake on the appropriate wheel only, should never be applied when travelling at high speed, as this can be dangerous.

Always keep the brakes in a good state of adjustment, see page 36. Unbalanced or slackly adjusted brakes can be dangerous, and, if binding, will cause rapid lining wear and excessive fuel consumption.

## HYDRAULIC SYSTEM

The well known Ferguson System which combines tractor and implement into one unit, with the implement hydraulically controlled, is embodied in this tractor and the range of control is extended to include :—

- (a) Draft (depth) Control,
- (b) Response Control,
- (c) Position Control,
- (d) Overload Release.

These services—apart from "Overload Release" which is automatic—are selected from the operator's seat by means of two levers conveniently situated as shown in Fig. 7.



Fig. 12. Control Levers—Hydraulic System.

Positioning and securing small adjustable sector in line with draft control lever setting.

Operational lever lowered through position control range.

## DRAFT CONTROL

A soil engaging implement fitted and raised to the transport position, is lowered to the working position by moving the **operational lever** downwards through the position-control range. See Fig. 12. The depth at which the implement is required to operate is then selected as the tractor moves forward, by the **draft control lever** situated in the outer quadrant and the lower the lever is set down the quadrant the deeper will the implement be allowed to penetrate under the influence of its weight and the 'suck' designed into the soil engaging parts. Once the selected depth is reached it will be maintained, uninfluenced by the rise or fall of the ground contour and the pitching of the tractor.



Fig. 13. Control Levers—Hydraulic System.

Raising Operational Lever to transport position to lift an implement.  
Draft Control Lever left at chosen setting.

When the **draft control lever** position has been established, the finger grip of the small adjustable sector on the quadrant must then be positioned in line with the lever setting and locked in this position by the knurled nut. The finger grip marks for the operator his selected position and the small sector defines a working range on each side, within which field adjustments may have to be made when changes in soil texture alter the draft and, therefore, the depth of the implement.

**Raising and lowering the implement at the end of a furrow.**

The **draft control lever** must **not** be used for this purpose, but should be left at the chosen setting and the **operational lever** used to override 'draft control' and raise the implement to the transport position.

If the **draft control lever** is fully raised, and the tension load on the top link is less than 1,000 lbs. (453.6 Kg.), the implement will be lifted beyond transport shut-off position and the safety relief valve will discharge. See page 28. The small adjustable sector, when locked in position, therefore, serves also to prevent the operator from using the **draft control lever** inadvertently.

## CONTROL SPRING

An internal control spring, see E, Fig. 16, measures the draft reaction on the implement through the top link and the expansion or contraction of the spring translates the changes to the hydraulic system, for appropriate adjustment to maintain the selected depth.

The spring is double-acting, implements with heavy overhung weight or implements having extremely light draft therefore receive the full benefit of draft control. Furthermore, in transport position, the overhung weight of the implement floats on the control spring which cushions shock loads over rough ground. Due to the double acting feature it will be found that when heavy implements are operated under light draft, the **draft control lever** position will vary between the sector marks and top of quadrant.

The spring is enclosed above the hydraulic lift cover to exclude dust and moisture.

## RESPONSE SELECTION

Assuming the selected depth has been obtained by use of the **draft control lever**, the rate at which heavy implements respond to the depth adjustments dictated by the hydraulic system is often too fast, while that of light implements too slow for optimum control. The speed of response is therefore made variable to suit the implement, and the rate is established by the position of the **operational lever** in its lower range, which is suitably marked as shown in Fig. 13.

If "bobbing or bouncing" of the implement is apparent the **operational lever** should be moved closer to "Slow" response. In undulating ground or where conditions are extremely stony the implement will have to respond quickly to maintain the selected depth and the **operational lever** will have to be nearer to "Fast" response. A good position to start from is at or slightly below half way down the response range of the quadrant. The final selection is dependent upon the operator's feel of the tractor or implement and the **operational lever** stop, which is provided with a knurled nut, should afterwards be locked in position to mark the setting, as the **operational lever** is used to raise the implement at the end of the furrow.



Fig. 14. Control Levers—Hydraulic System.

Selecting Operational Lever setting to maintain a fixed implement position.

Draft Control Lever fully lowered for maximum draft.

## POSITION CONTROL

As previously noted, the **operational lever** at the lower end of its quadrant varies the speed of response.

At the upper end of its quadrant the **operational lever** raises and lowers the implement and also provides an infinite number of positions for the lower link height, which correspond approximately to the lever position.

The operator may select and automatically maintain a fixed height or depth of an implement. The position will be independent of forces applied at the control spring—if the implement is soil-engaging—except when the reaction against the top link reaches a force equivalent to the draft control lever setting, when it will be governed accordingly.

Appropriately, therefore, 'Position Control' also is subject to 'overload release'. See below.

The adjustable stop is provided on the quadrant so that the implement, after being raised, may always be returned to its previously selected position.

### **Advantages**

'Position Control' is useful for earth moving implements with steep entry angles which are coupled closely enough to be unaffected by the pitching of the tractor. It is of assistance when hitching an implement and is definitely advantageous for devices that are not soil engaging, such as the crane; or partly so, such as the scraper blade or soil scoop.

**WARNING.**—Do not move the *Operational* lever from *Position Control* to *Fast Response* when the tractor is standing on a hard surface, e.g. a concrete floor, as the implement will 'crash' down and may be damaged.

## **OVERLOAD RELEASE**

If the implement strikes a hidden obstruction, an excessive forward thrust occurs against the control spring and the hydraulic control valve is moved to jettison the oil from the hydraulic lift cylinder. This immediately releases the implement weight from the rear of the tractor. As this weight, plus the soil suck of the implement and the weight of the soil have been providing draught weight at the back wheels to give traction, the tractor stops with rear wheels spinning without damage to the implement. At the same time a very powerful force is directed forward and down on the front end of the tractor and prevents it from rearing. The tractor can then be reversed, the implement raised and the tractor moved forward before lowering the implement at a point beyond the obstruction.



## EXAMPLES OF CONTROL LEVER SETTINGS

—Fig. 15

### A. Transport Position.



Raise operational lever to top of its quadrant.

When transporting implement for a distance, draft control lever should be at bottom of its quadrant. To lift implement at end of furrow, when ploughing, leave draft control lever at chosen setting. See Fig. 12.

### B. Normal Ploughing and Cultivating



Operational lever in response sector according to response required.

Draft control lever below sector marks in bottom half of its quadrant according to depth required.

### C. Shallow Cultivating—Heavy Implement



Operational lever in response sector according to response required.

Draft control lever above sector marks, in upper half of its quadrant, according to depth required.

- D. To operate External Hydraulic Equipment, or to discharge Safety Relief Valve (without holding down lower links)



Operational lever in response sector as required.

Draft control lever above 'sector marks' will effect blowing of relief valve or provide oil flow for operating external equipment. Movement of lever below sector marks will allow oil return from external equipment.

- E. Position Control—Soil Engaging Implements



Operational lever in position control range according to depth at which implement is required to operate.

Draft control lever at the bottom of its quadrant in maximum draft position.

- F. Position Control—Non-Soil Engaging Implements



Operational lever in position control range according to height at which implement is required to operate.

Draft control lever at or anywhere below sector marks.

## LINKAGE

### TOP LINK CONNECTION

Do not in any circumstances attempt to pull or tow directly from the top link connection.

Adjustment of the upper link assembly is obtained by locating the centre bolt in different pairs of holes in the two members, by this means the length can be extended between 24½" (622 mm.) and 26½" (672 mm.). The shortest adjustment should only be used with certain implements, and in such cases a precise recommendation will be made.

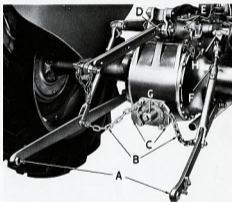


Fig. 16. Linkage.

- |                         |                     |
|-------------------------|---------------------|
| A. LOWER LINKS.         | E. CONTROL SPRING.  |
| B. CHECK CHAINS.        | F. CIRCULAR GROOVE. |
| C. CHECK ANCHORS.       | G. P.T.O. CAP.      |
| D. TOP LINK CONNECTION. | H. LEVELLING LEVER. |

### LOWER LINKS

Remember, when coupling implements to the lower links, always fit the left side first and use the levelling lever to assist in fitting the right side. The check chains prevent the implement from swinging sideways into the rear wheels. It is particularly important that the chains are not twisted and that the chain anchors are assembled correctly with the chain attached above the centre as shown in Fig. 16. The right-hand lift rod is marked by a circular groove, which, when level with the top of the fork into which it threads, indicates that both the lower links are level.

The maximum recommended lift load for normal work is 1,250 lbs. (567.5 kg.) at the point of implement attachment on the lower links and this figure should not be exceeded.

### SAFETY RELIEF VALVE

Avoid, where possible, using the tractor hydraulic system in any way which causes the safety relief valve, which is internal, to discharge continually. This can be caused by attempting to raise a load at the lower links greater than that which the system is capable of lifting, or by using the draft control lever to lift the implement at the end of a furrow. Although this will not actually damage the system, it may result in a slight reduction in the maximum operating pressure.

### EXTERNAL HYDRAULIC EQUIPMENT

There are three external oil pressure delivery points in the hydraulic lift cover, for use with implements which incorporate remote pressure operated hydraulic systems, such as the Ferguson High Lift Loader.



Fig. 17.  
Lift Cover showing Hydraulic  
Take-off points.

Oil can be supplied to auxiliary cylinders without holding the lower links down, by moving the draft control lever fully up, when there is little or no tension load on the control spring. See Fig. 15 D.

The pump is connected to the internal lift cylinder through an external plate, see Fig. 17, which can be removed for the installation of external valves.

## **STANDARD DRAWBAR**

The drawbar is supplied for use with trailed implements. Lateral adjustment of 17" (432 mm.) is secured by the nine holes in the drawbar, and adjustable stays give a height range between 11" (279 mm.) and 24" (610 mm.) above ground.

Raising the drawbar increases traction with trailed machinery, lowering the drawbar will tend to keep the front end of the tractor down, with some loss of traction. Care should be taken to keep the drawbar low enough to ensure that sufficient weight remains on the front wheels for steering and safety.

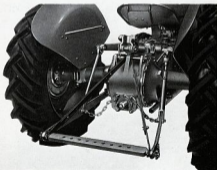


Fig. 18. Drawbar and P.T.O. Shaft.

## ATTACHING THE DRAWBAR

Lower and level the lower links.

Place drawbar on ground and attach the stay links to the drawbar ends. Lift and set the assembly on the tractor lower links.

Secure stay links to centre housing with hitch pin and linch pin.

Place ends of drawbar in ball ends of lower links and fasten linch pins. Adjust drawbar height by lengthening or shortening stay links as required. For standard height of 19½" (502 mm.) line up notches on stays, tighten bolts securely.

The operational and draught control levers must be in the lower position when the drawbar and stay links are used. If either lever is raised, the lift arms are restricted from raising and consequently the safety relief valve will continue to discharge.

**WARNING.**—Never pull from the upper link connection or use the drawbar without stay links.

*When the drawbar is in continuous use, the working parts of the hydraulic system may become stiff through lack of use. To avoid this, disconnect the drawbar each day and, by operating the hydraulic control lever, raise and lower the linkage several times.*

## POWER TAKE-OFF

The P.T.O. shaft projects from the rear of the tractor centre housing, it has a 1½" (British Standard) (34.9 mm.) splined shaft with an annular groove for positive fixing of implement couplings. A removable cap protects the splines when the shaft is not in use. As explained on page 10, the P.T.O. shaft is engaged by a lever mounted on the left-hand inspection cover of the axle centre housing, which selects either proportional engine speed or proportional ground speed; in neutral position the lever disengages the P.T.O. shaft drive.

When engaging or disengaging the P.T.O. drive from the engine, depress the clutch pedal fully—on the 'De Luxe' model depress the pedal through the complete range. The tractor must be stationary when the proportional ground speed drive is shifted into or out of engagement.

Avoid running with the drive engaged when the P.T.O. shaft is not being used.

### **PROPORTIONAL ENGINE SPEED**

This drive operates at  $\frac{1}{20}$  of the engine r.p.m., a speed at which most P.T.O. driven equipment is designed to operate.

### **PROPORTIONAL GROUND SPEED**

Ground P.T.O. produces one revolution of the shaft for approximately each 30 inches (508 mm.) of forward travel, irrespective of the gear in which the tractor is operating. It is particularly suitable for raking, planting and fertilising.

**WARNING :** When backing the tractor, the P.T.O. lever must be shifted from 'ground P.T.O.' to 'Neutral'. Failure to do this may result in serious damage as the implement mechanism will be reversed.

### **LIVE P.T.O. SHAFT—DE LUXE MODELS ONLY**

This important feature, established for operators of a De Luxe Model Tractor by the Dual clutch, allows such machines as the Baler or Mower to operate continuously without being affected by the tractor stopping and starting. Moreover, since the P.T.O. drive shaft rotates the hydraulic pump, the operator, when using a manure loader, will be able to have continuous control over the fork height without having to select neutral gear to maintain the drive to the pump.



Fig. 19. Power Take-off Shaft.

## REFERENCE SECTION

This section gives in greater detail the information necessary to enable you to carry out the instructions contained in the Maintenance Section. It is recommended that any adjustment not detailed should be made by mechanics of your Ferguson Distributor/Dealer.

### ENGINE

See appropriate Engine Instruction Book

## ELECTRICAL EQUIPMENT

### BATTERIES



Fig. 20. Battery.

The battery on the carburettor engine tractors is conveniently located in front of the bulkhead and is readily accessible. It should be inspected regularly and all traces of dirt and moisture removed from its top surface. Terminal posts should be greased with petroleum jelly and refitted securely to prevent corrosion. The electrolyte should be maintained level with the tops of the separators, and no higher, using distilled water only. A pronounced difference in level in any particular cell should be reported to your Distributor/Dealer.

To top up electrolyte level in cells, lift hood to uncover battery and screw out vent plugs to allow liquid to be poured in. See Fig. 20.





Fig. 21. Diesel Tractor showing Batteries.

Two batteries are supplied on Diesel Engine Tractors and located, one in front of the bulkhead and the other on the left hand side of the driver's seat. They should be inspected regularly and all traces of dirt and moisture removed from the top surfaces. Terminal posts should be greased with petroleum jelly and refitted securely to prevent corrosion. The electrolyte should be maintained level with the tops of the separators, and no higher, using distilled water only. A pronounced difference in level in any particular cell should be reported to your Distributor/Dealer.

To top up electrolyte level in cells, lift hood or battery cover to uncover battery and screw out vent plugs to allow liquid to be poured in. See Fig. 20.

## **CLUTCH**

The clutch requires no attention between tractor overhaul periods, other than occasional adjustment, which should be carried out by an authorised service mechanic.

## **TRANSMISSION AND REAR AXLE**

The transmission is a three-speed forward and one reverse sliding spur gear-type, compounded by a planetary reduction gear assembly. This combination produces a total of six forward and two reverse speeds.

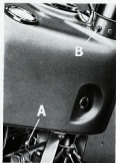
A common oil filler hole, which serves the transmission, hydraulic system and rear axle assemblies, is situated on the transmission cover-plate adjacent to the gear change lever. (See Fig. 26). There are two magnetic drain plugs beneath the rear axle and transmission housings respectively; both plugs must be removed, when changing the oil, and cleaned before being replaced and the fingertip control levers should be in the 'lower' position to drain ram cylinder. When filling, sufficient time should elapse before a dipstick reading is taken, in order that a common level is attained in both transmission and centre housing.

### **Caution**

It is essential that only a straight mineral oil—perfectly clean—be used in the transmission and rear axle as this oil is also used in the hydraulic system.

Rear axle hub bearings are grease packed, and should be repacked annually. See Maintenance Section.

Owner service to the transmission and rear axle should be confined strictly to the schedule recommended in the Maintenance Section.



**A. STEERING BOX FILLER PLUG.**

**B. GREASE NIPPLE**

Fig. 22. Steering Filler Plug and Grease Nipple.

## **FRONT AXLE AND STEERING MECHANISM. Fig. 22.**

The steering gear is a screw and recirculating ball-nut type designed for use with the three section front axle. The oil in the steering gear-box should be maintained at the level of the plug A which is located directly in front of the steering column. A grease nipple B is fitted on the steering column for the lubrication of the top bearing. The ball joints at the end of the steering drag links should be regularly lubricated at the intervals recommended in the Maintenance Section.

The front axle outer sections are fitted with nipples for the lubrication of swivel pins, while the hub bearings are grease packed. Once a year the hubs and bearings should be removed, washed in paraffin and the bearings and seal repacked and the hub cavity one third filled with clean grease. When refitting the hub tighten the castellated nut, loosening by one segment before fitting split pin. Failure to observe this recommendation may result in excessive bearing wear. In case of difficulty consult your Distributor/Dealer.

Approximately twice yearly an oil can should be introduced through the starting handle hole below the radiator, and a few drops of oil deposited at the bottom of the front axle centre pivot pin.

## BRAKE ADJUSTMENTS

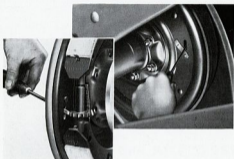


Fig. 23. Adjusting Brakes.

In order to make running adjustments to the brakes, first jack the rear wheels clear of the ground. Make sure that all shafts and pins work freely and that when brakes are 'off' the brake pedals are against their stops.

Insert a screw-driver or other suitable instrument through small hole as shown and lever clicker adjuster to expand shoes in the drum until the wheel is locked (pushing screw-driver handle towards axle housing). Slacken off adjuster until wheel just rotates freely. To test the brakes for even balance engage fourth gear, and driving at slow speed, apply the master brake firmly. Any tendency to veer off course should be counteracted by slackening off the clicker adjuster on the side towards which veering takes place.

## HYDRAULIC SYSTEM AND LINKAGE

All adjustments to the Hydraulic System should be carried out by authorised mechanics; the only necessary owner service is recommended in the Maintenance Section. The location of filling and draining points for the hydraulic oil are described on page 41. It is most important that no lubricant is applied to any of the linkage pivots or joints except the levelling gearbox and screw thread on the right-hand lift rod, which should receive a regular supply of grease through the lubricating nipples.

## TRACK WIDTHS

### FRONT WHEELS

The front wheel track is adjustable in 4" steps from 48" to 80" (1219 mm.—2032 mm.). The settings between 48" and 72" (1219 mm.—1828 mm.) are obtained as follows:—

Jack up the tractor and remove two bolts securing each front axle arm to centre axle and spread axle arms to obtain desired track width. No change in steering connections is necessary. Replace bolts, leaving at least one bolt hole between the two bolts to give additional support.

When the wheels are extended to the 72" (1828 mm.) tread, an 80" (2032 mm.) tread width is obtainable by reversing the wheel discs on the wheel hubs.

### Caution

The front wheel bearings are subjected to greater strain and load at the 76" (1930 mm.) or 80" (2032 mm.) track setting. These track settings should be used only when absolutely necessary, and never with front mounted equipment such as loaders.

### REAR WHEELS

The rear wheel track is adjustable by assembling the disc and rim in different positions as shown in Figs. 25 and 26. At the same time interchanging the wheels may be necessary in order to maintain maximum traction.

When changing settings 48", 52", 64" or 68" (1219, 1320, 1625 or 1727 mm.) to or from settings 56", 60", 72" or 76" (1422, 1524, 1828 or 1930 mm.) interchange wheels.

Confirm that the wheels are on their correct side by checking that the arrow on the side of the tyre points in the direction of forward rotation.

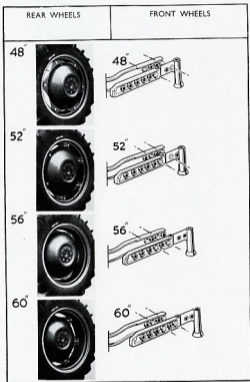


Fig. 24. Track Widths.


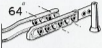

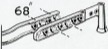



REAR WHEELS	FRONT WHEELS
<p>64"</p> 	<p>64"</p> 
<p>68"</p> 	<p>68"</p> 
<p>72"</p> 	<p>72"</p> 
<p>76"</p> 	<p>The front axle assembled to 72" but with wheels reversed will give a wheel track setting of 80". Similarly, the wheels still reversed but with 68" axle assembly give a track setting of 76".</p>

Fig. 25. Track Widths.

# MAINTENANCE SECTION

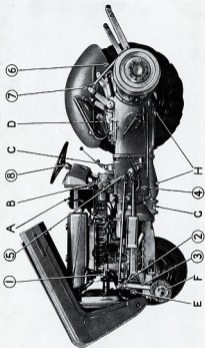


Fig. 26. Tractor showing Filling Points and Drain Taps.

CARBURETTOR ENGINE TRACTOR ILLUSTRATED



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