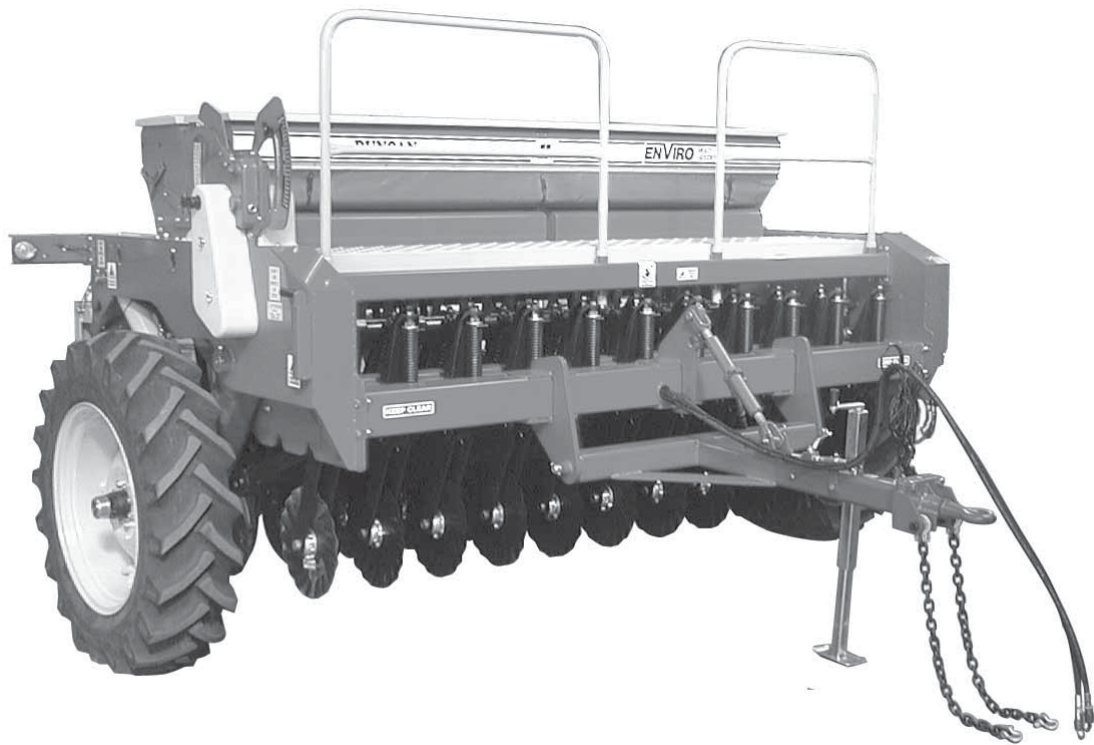


Owners Manual



'Enviro' Seed Drill Model 740



Built to work.

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Introduction

Acquisition & Warranty

On delivery of your new Duncan Enviro Seed Drill please check that the machine is not damaged. In cases of shipping damage, please ask your dealer to arrange for the appropriate claim to be lodged immediately. Assemble any parts supplied loose and inspect your machine with the aid of this manual to familiarise yourself with its features. If you have any queries ask your dealer straight away. The machine is covered by our 12 month warranty on faulty parts, subject to normal use.

Record below the serial number of your machine and keep it in a secure place to help trace the machine and assist us when you order parts.



<p>Model:</p> <p>Serial No:</p> <p>Owner:</p> <p>.....</p> <p>.....</p> <p>Delivery Date:</p> <p>Dealer:</p> <p>.....</p> <p>.....</p>

The Owner's Manual

Your new Duncan Enviro Seed Drill will give long and efficient service if given normal care and operated properly.

This owner's manual is provided so that you can become thoroughly familiar with the design of the machine and to furnish information on correct operation, adjustment and maintenance. **Only persons well acquainted with these guidelines should be allowed to use the equipment.**

A separate illustrated parts section has been provided so that if any parts are required your dealer will be able to supply them by reference to part numbers.

The manual is considered as part of your machine and must remain with the machine when it is sold.

Right and left hand references in this manual are determined by standing behind the machine and facing in the direction of travel.

Disclaimer

Every effort has been made to ensure that the information in this manual was accurate and up to date at the time of going to press. Clough Agriculture reserves the right to make subsequent changes to the machine, where necessary, without notification.

The Company will not be responsible for any damage or consequential loss arising out of misinterpretation or failure to follow recommended procedures. Nor will it be liable for any damage caused by or arising out of modification or misuse of its product.

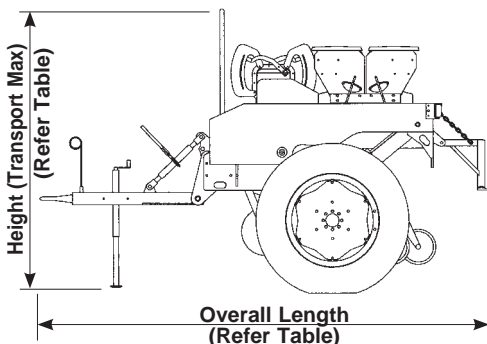
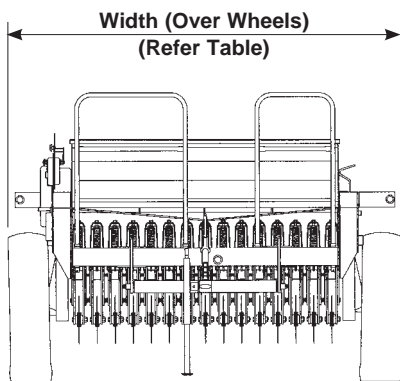
The owner has a responsibility to protect himself and others by observing all safety information and by ensuring all operators are well acquainted with the safety information, trained in the correct use of the machine and applying safe work practices.



Description of Machine

The Duncan 'Enviro' is a triple disc direct drill. It has two boxes for either seed combinations or traditional seed fertiliser mixes. The boxes are mounted on a heavy duty frame accommodating large end wheels which are hydraulically operated allowing adjustable sowing pressure and good transport clearance. Both disc opener and double disc are independently sprung allowing good contour following ability. Sowing depth is controlled by adjustable rubber tyred depth

wheels. The quality European type peg roller seeder system handles all seeds from turnip and rape through to peas and maize. The seeder drive is via a clutch and variable speed gearbox from the drive wheels. For transport the drive is easily disconnected using a freewheeling type hub fitted to the drive wheel.



Working Principle

The gearbox, pegged seed rollers and seeder flaps are set to give the desired seed rate. The front disc pre-cuts the surface followed by the double disc creating the seed bed. Seed/fertiliser flows down the flexible convolute tubes between seeder and double disc units dropping into the prepared seed bed. A suitably profiled depth wheel maintains the double discs at a predetermined depth and closes and compacts the soil over the deposited seed.

Dimensions & Capacities

	15 Run	17 Run	19 Run	21 Run	23 Run	26 Run
Width (Over Wheels)	3280	3280	3880	3880	4644	4644
Overall Length	3770	3770	3770	3770	3770	3770
Height (Transport Max)	2290	2290	2290	2290	2290	2290
Weight (Unladen) *	2730kg	3080kg	3485kg	3850kg	4200kg	4725kg
Tyre Size						
12.4/11 x 28 x 12 ply	2	2	2	2	2	2
Maximum Speed	30kph	30kph	30kph	30kph	30kph	30kph
Tyre Pressure	1.8bar(25psi)	1.8bar(25psi)	1.8bar(25psi)	1.8bar(25psi)	1.8bar(25psi)	1.8bar(25psi)
Row Spacing	150	130	150	130	150	130
Press Wheel Options	2", 3" or 4"	2" or 3"	2", 3" or 4"	2" or 3"	2", 3" or 4"	2" or 3"
Sowing Width	2.25m	2.21m	2.85m	2.84m	3.45m	3.38m
Box Capacity (Per box)	348 litres	348 litres	443 litres	443 litres	537 litres	537 litres

* Weights are approximate only



ATTENTION

On the machine important safety information is indicated by these symbols. These highlight general safety aspects in regard to the machine rather than specific hazards.



Do not ride or allow passengers on the machine.

Under no circumstances are passengers to be permitted on the machine while it is in operation or being transported. Any footboards and/or footsteps are provided solely for the purpose of preparing the machine for use.



Keep clothing and body extremities well clear of pinch points while the machine is operating (seeding or calibrating). Keep well clear of moving parts at all times.

These signs typically occur wherever trapping points exist. These include drive chains, sprockets, shafts, wheels, discs, pivot points, etc. Guards are provided with the machine for safety reasons (where practical without compromising machine performance). Ensure these are always fitted during operation.



Always exercise extreme caution in the vicinity of sharp edges and points.

Where possible guards are provided with the machine for safety reasons (where practical without compromising machine performance). Ensure these are always fitted during operation.



Footboards, footsteps, drawbars and other machine surfaces may be slippery when wet.

Apply extra caution in wet conditions and in the early morning when surfaces are wet.

KEEP CLEAR

Keep Clear. (It is dangerous to be in this area when the machine is operating.)

SAFETY - General

N.B. Throughout this manual important safety information is indicated by these symbols in the margin:



NO RIDE

A prohibition should be observed under all circumstances.



WARNING

A warning indicates a hazard that could cause death or injury if the warning is ignored.



CAUTION

A caution indicates a hazard that may cause damage to property if the caution is ignored.

This section of the manual offers general guidelines for the safe operation of machinery. It does not replace local safety regulations. These guidelines were current at the time of publication, but may be superseded by later regulations.

Clough Agriculture has made every effort to highlight all risks to personnel or property. Owners and operators have a responsibility to exercise care and safe work practices at all times in the vicinity of the machine.

Owners are advised to keep up to date on safety issues and to communicate these to all users of the machine.

Contact the Occupational Safety and Health Service (OSH) for further information about general safety aspects. If you have safety concerns specifically related to this machine, contact your dealer immediately.

Operator Safety

Read this manual carefully before operating new equipment. Learn how to use this machine safely. Be thoroughly familiar with the controls and the proper use of the equipment before using it.



Take careful note of all safety instructions both in this manual and on the machine itself. Failure to comply with instructions could result in personal injury and/or damage to the machine.

Replace missing or damaged safety signs on the machine and ensure that these remain clearly visible.

It is the owner's responsibility to ensure that anyone who operates, adjusts, lubricates, maintains, cleans or uses the machine in any way has had suitable instruction and is familiar with the information in this manual (particularly with regard to safety aspects).

Operators and other users of the machine should be aware of potential hazards and operating limitations.



Be Prepared for Emergencies

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance, hospital and fire department near your telephone.



SAFETY - General (Continued)



Appropriate Dress

Wear close fitting clothing and avoid rings or other forms of jewellery which could become caught in the machinery.

People with long hair must have it securely fixed and confined close to the head.

Refer to local safety standards for protective clothing and recommended safety equipment.



Transport This Machine Safely

Ensure that all linkage pins and security clips are fitted correctly. With trailing machines tow with the drawbar only, as this is the only safe towing point on the machine.

Always check that bystanders (especially children) are well clear (front and rear) before starting and moving the tractor and the machine.

Plan safe routes of travel, and be aware of power lines and other roadside hazards. Take particular care when towing implements on hillsides.

Do not ride or allow passengers on the machine.

This machine is not designed to carry passengers, and no riders are permitted.



Road transport

On public roads,

- A speed of 30km/h must not be exceeded.
- Do not operate during the hours of darkness unless standard lights are fitted and clearly visible. (This also applies when visibility is limited, e.g., in foggy conditions.)

See the guidelines in the *Vehicle Dimensions and Mass Rule*, issued by the Land & Transport Safety Authority.

Avoid tip-overs

Avoid holes, ditches and obstructions which may cause the machine to tip over, especially on hillsides. Never drive near the edge of a gully or steep embankment - it might cave in. Slow down for hillsides, rough ground and sharp turns.



SAFETY - General (Continued)



Handle Agricultural Chemicals Safely

All farm chemicals should be stored, used, handled and disposed of safely and in accordance with the supplier's/manufacturer's recommendations.



Read the product label before using, noting any warnings or special cautions, including any protective clothing or equipment that may be required, ie. respirator.

Do not eat or smoke while handling sprays, fertilisers, coated seeds, etc. Afterwards, always wash your hands and face before you eat, drink, smoke, or use the toilet.



Store sprays, fertilisers, coated seeds, etc. out of reach of children and pets, and away from food and animal feeds.

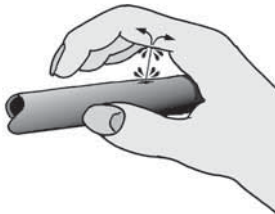
Any symptoms of illness during or after using chemicals should be treated according to the supplier's/manufacturer's recommendations. If severe, **call a physician or get the patient to hospital immediately**. Keep the container and/or label for reference.

Avoid High Pressure Fluids

Avoid any contact with fluids leaking under pressure, because the fluids can penetrate the skin surface.



Any fluid which penetrates the skin, will need to be **removed immediately by a medical expert**. Seek specialist advice on this type of injury.



Relieve the pressure before disconnecting any hydraulic or other lines. Make all repairs and tighten all fittings before re-connection to pressurised fluid.

Keep your hands and body away from any pinholes or high pressure jets. Search for leaks with a piece of cardboard instead of using your hand directly.

Safe Work Practices

All farm machinery is potentially dangerous and should be treated with caution and respect.



Before starting the machine, ensure that all controls are placed in neutral and that bystanders are well clear. Check that the guards have been securely fitted and that any adjustments have been made correctly.

Where possible, disconnect or isolate the drive mechanism to the implement. Lower the machine onto the ground when not in use.

SAFETY - General (Continued)



WARNING

Practise Safe Maintenance

Keep the machine in safe working condition. Routine maintenance and regular servicing will help reduce risks and prolong the life of the machine.

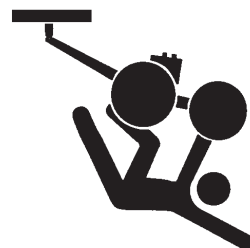
General Maintenance

Accidents occur most frequently during servicing and repair. The following general rules must be followed when maintaining or working with machinery:

- All operating and maintenance manuals must be read before and referred to while using or servicing any piece of equipment.
- Turn off all machinery power sources and isolate the machine before making adjustments, doing lubrication, repairs or any other maintenance on the machine.
- Ensure that the machine hydraulics are disconnected from the power source.
- Wear gloves when handling components with cutting edges, such as any ground cutting components.
- Beware of hazards created by springs under tension or compression when dismantling or maintaining the machine.
- It is recommended that you clean the machine with a water blaster or similar apparatus before commencing maintenance.

Make Sure the Machine is Well Supported

When machinery is fitted with hydraulics, do not rely on the hydraulics to support the machine. During maintenance or while making adjustments under the machine, always lock the hydraulics and support the machine securely. Place blocks or other stable supports under elevated parts before working on these.



Electrical Maintenance

Disconnect the electrical supply from the tractor before doing any electrical maintenance.



CAUTION

Welding

With electronic equipment in modern tractors it is advisable to disconnect the machine from the tractor, or at least disconnect the alternator and battery before attempting any welding.



CAUTION

Use Only Genuine Spare Parts

Unauthorised modifications or non-genuine spare parts may be hazardous and impair the safe operation and working life of the machine.

Excess lubricants must be disposed of safely so as not to become a hazard.

SAFETY - Machine Specific

This section of the manual gives specific guidelines for the safe operation of the Duncan Enviro.

These guidelines were current at the time of publication, but may be superseded by later circumstances. They do not necessarily cover every possible hazard and must be read in conjunction with the **SAFETY - General** section (Page 4 - 8).

Hazard Points on the Duncan Enviro

The lists below are not all-inclusive and serve only to highlight the more obvious areas of risk.



The decals attached to the machine are a general reminder that there are hazardous areas on the machine, rather than specifically highlighting all possible hazards.

For decal locations on machine, refer Page 11.



No Ride

Passengers are not permitted anywhere on the machine.



Pinch Points/Moving Parts

Hazardous areas include:

- Drive chains.
- Sprockets between the drive wheel, the clutch shaft and the gearbox (RH side).
- Sprockets between the gearbox and the box shafts (RH side).
- Agitator drive units (LH side) provided with top cover plates.
- Agitator shaft inside the boxes.
- Seeder units, box shaft and shaft connectors.
- Adjacent dragbars and coulter arms.
- Between double discs and other sub-assembly parts.
- Wheel legs and side frame assemblies.
- Dragbar springs, spring rods and pressure bar.
- Press wheel assemblies.



**Slippery
When
Wet**

Slippery When Wet

Hazardous areas include:

- Footboards and footstep.
- All smooth surfaces on the frame structure.

KEEP CLEAR

Keep Clear

Hazardous areas include:

- Between the tractor and Duncan Enviro.
- Immediately adjacent to the Duncan Enviro side.

SAFETY - Machine Specific (Continued)



Hazard Points on the Duncan Enviro (Continued)

Chain Guards & Access Covers

To prevent hands, etc. getting caught in the gearbox drive chain, a guard is provided to cover sprockets, chain and chain tensioner mounted on the side of the mainframe side plate. A guard is also provided to cover the seedbox drive chains at the rear of the gearbox. The metal access plates on the side frames and the wheel legs must only be removed during servicing. All these guards must be fitted while using the machine.

Warning: Access to pinch points is still possible from underneath the machine.

For guard locations on machine, refer Page 11.

Calibrating

Be particularly careful when calibrating the seeding rate. At this time, the calibration trays have been removed and are no longer covering the rotating seeder units. See **Pinch Points/ Moving Parts** (Page 9) for hazardous areas.

Transport

The two large wheels located at the sides of the machine are for the purpose of controlling maximum loading on dragbars and coulters and gearbox input drive (RH wheel). These are also used to support the machine weight during transport (while linked to the tractor).



Important - Refer to safety cautions in the **Transport** section, Page 13 of the manual.

Ensure that all linkage pins and security clips are fitted correctly.

Maintenance

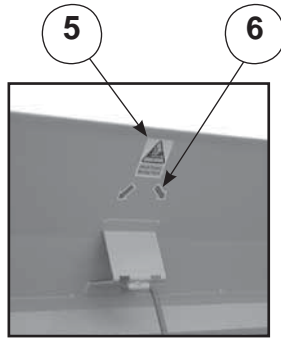
Refer Page 26 - 30 for the **Care and Maintenance** section of the manual.

Lubrication

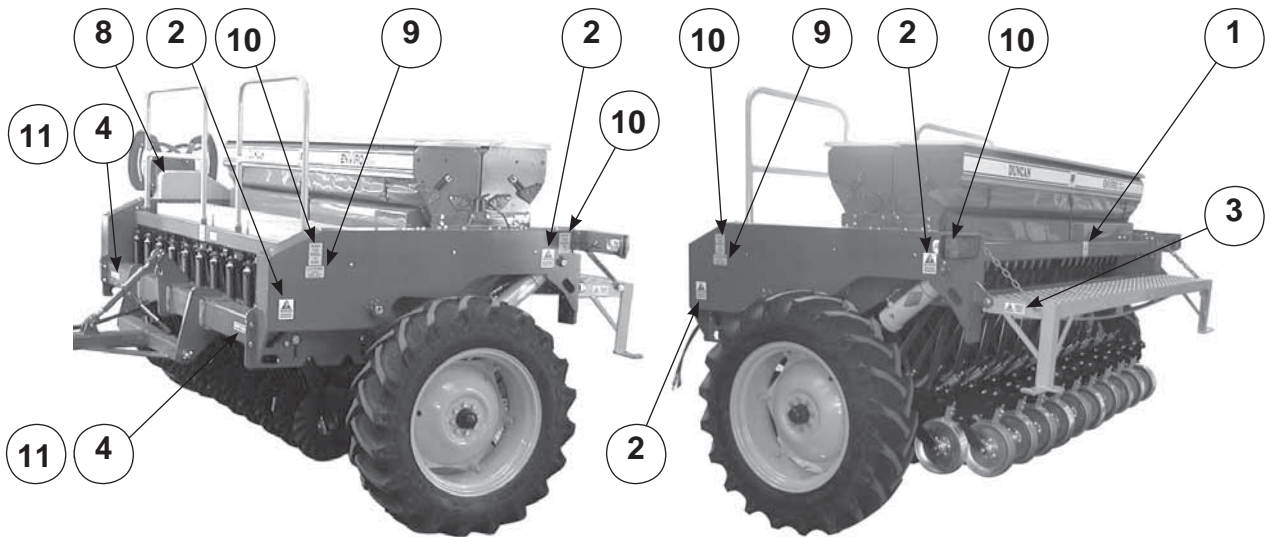
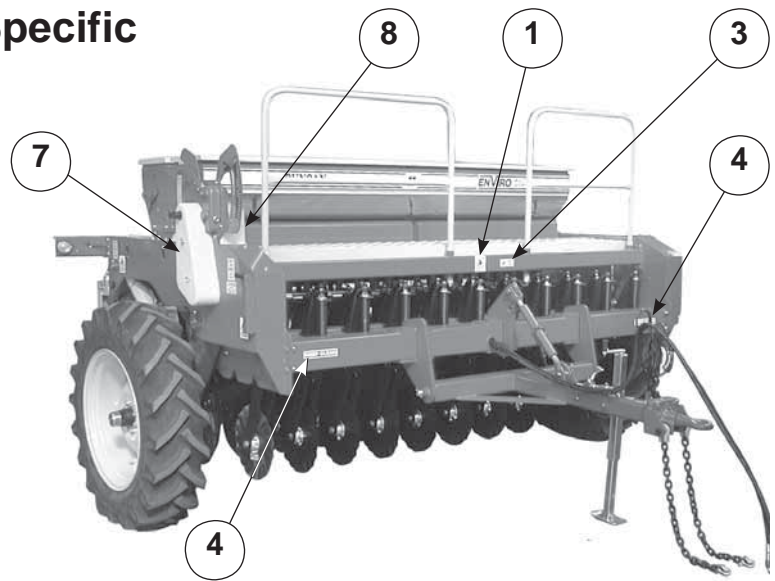
Refer Page 27 for the **Lubrication** section of the manual.

SAFETY - Machine Specific (Continued)

Safety Decals & Safety Guards



Inside Box Lid



Item	Decal/Guard	Cross Reference	Pt No	Qty.
1	'No Ride' (75x99)	Refer Page 9	43906	2
2	'Pinch Point/Moving Parts' (75x99)	Refer Page 9	43907	4
3	'Slippery When Wet' (100x45)	Refer Page 9	43902	3
4	'Keep Clear' (38x192)	Refer Page 9	43909	2
5	'Pinch Point/Moving Parts' (50x66)	Refer Page 9	43901	2
6	Arrows		43905	4
7	Plastic Guard (Clutch to Gearbox)	Refer Page 10	22743	1
8	Fibreglass Guard (Gearbox to Seedbox)	Refer Page 10	22527	1
9	Attention: Check Wheel Nuts Regularly		43708	2
10	Don't Use Wheel As Step		43709	4
11	'30 km/hr'		43914	2

Table 2

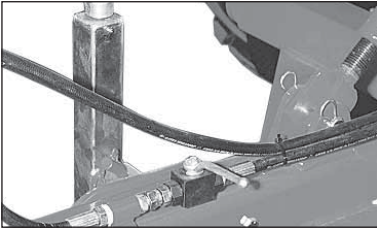


fig 1

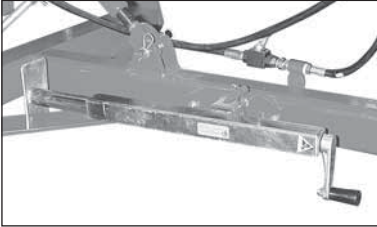


fig 2

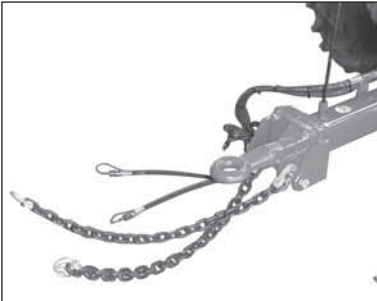


fig 3

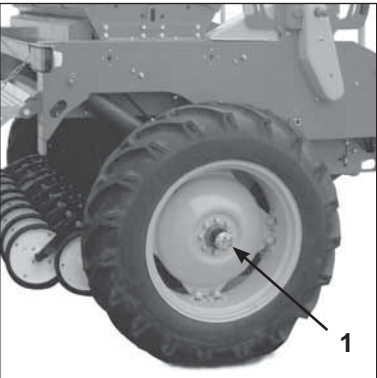


fig 4

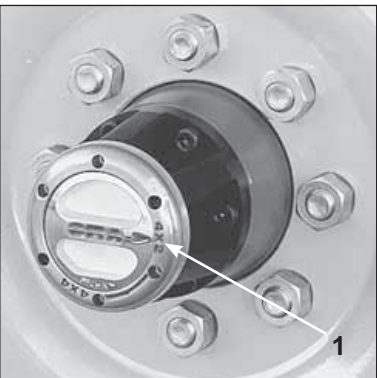


fig 5

Transport

1 Raise the drill into the transport position and hold at the full extent of the rams for a few seconds to allow cylinders to rephase/equalise.



2 **Important** - To avoid machine damage due to drill lowering during transport, always close the hydraulic valve on the drawbar. Move the handle to a position at 90° to the hydraulic line as shown in Fig 1.

3 Locate jack stand in transport position. Refer Fig 2.

4 Ensure lighting and oversize warning requirements meet recommendations published by the local Land Transport Authority or equivalent.



5 **Maximum towing speed 30 km/hr.**
For countries other than New Zealand greater speed restrictions may apply, please refer to your local transport authority.

Ensure towing vehicle requirements are adequate for the towed vehicle e.g. mass, brakes. Refer to recommendations published by the local Land Transport Authority or equivalent.

Braking when towing can cause the load to jackknife. Use extra care when towing in adverse conditions such as mud, inclines and sharp bends.

Lower towing speeds are recommended on farm roads/tracks and where one wheel is on or over a road verge.



6 **Attach safety chains to tractor.** Refer Fig 3. Safety chains must be crossed over underneath the coupling and attached to the towing vehicle. The attachment points must be as close as practical to the towing coupling and one each side. The towbar on the towing vehicle must be rated for the towed mass. **Do not remove or replace the safety chains provided with any other than those specified in the parts manual.** **Note:** The safety chains are provided with sufficient length to cater for all towing vehicles. Safety chains must be shortened by cutting off excess length so that if the coupling fails the drawbar will not hit the ground.

7 If the machine is fitted with row markers or other vertical extensions check clearance under power lines en route.



8 **Important** - Before commencing towing on the road check that the freewheeling hub positioned at the gearbox end of the drill (Fig 4) is set to 4 x 2, not 4 x 4 which is only for sowing. Refer Fig 5. Failure to set the freewheeling hub on 4 x 2 will result in unnecessary wear on seeder drive components and possibly damage.

Operation

General Operation Guidelines

- 1 Use a sufficiently powerful tractor which is heavy enough to tow the drill safely.
- 2 Operate the drill at a speed of 6-12 km/hr (4-8 mph). In stoney and uneven ground conditions a lower speed is more appropriate
- 3 Check that the drill is level during calibration and while seeding.
- 4 Adjust the individual depth wheels to the required sowing depth.
- 5 Check tyre pressure before seeding. Refer P 3.
- 6 Double check seed rates before seeding.
- 7 Raise the drill out of the ground when making any turns.
- 8 Raise the drill out of the ground before backing up.
- 9 After prolonged storage, check to see that all drive mechanisms and hydraulic equipment are functioning correctly. Check that the seed tubes are not perished or blocked.

Sowing Speed

Typical travel speeds when sowing range from 6-12 km/hr in good conditions. In stoney and uneven ground conditions a lower speed is recommended to minimise rapid part deterioration. Sowing too fast can result in:

- 1 Poor contour following and uneven sowing depth.
- 2 Impact damage to:
 - a Ground engaging components.
 - b Bearings, housings & axles.
 - c Fasteners & structural components.
- 3 More extreme conditions will result in greater vibration & uneven seed flow at low seeding rates.



Front Coulter & Dragbar Loading

The height of the drill when in the drilling position is determined by the number and size of the depth collars (1) and the threaded depth stop (2) on the LH wheel arm cylinder shaft. This in turn determines the pressure on the discs. Refer Fig 6.

In hard or tight conditions pressure may have to be backed off (by adding spacers) to allow positive ground wheel drive or in very soft conditions where downward pressure may alter seed depth. This may be a compromise between downward pressure, good wheel drive contact and total contour following abilities.

Caution: The actual length of the depth collars used must be maximised to ensure that the threaded depth stop is not damaged due to over extension.

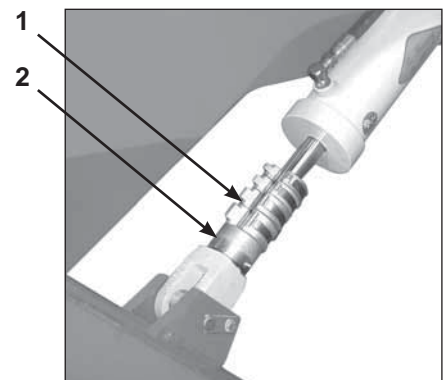


fig 6

Transport Position

When in the transport position the hydraulic cylinders are fully extended. In this position the cylinders fully equalise by allowing oil to bypass the master cylinder piston. It is recommended to raise the drill into the transport position when turning at headlands or regularly to counteract the effects of oil leakage past the piston and ensure cylinder rods are equally extended and minimise variations in sowing depth.

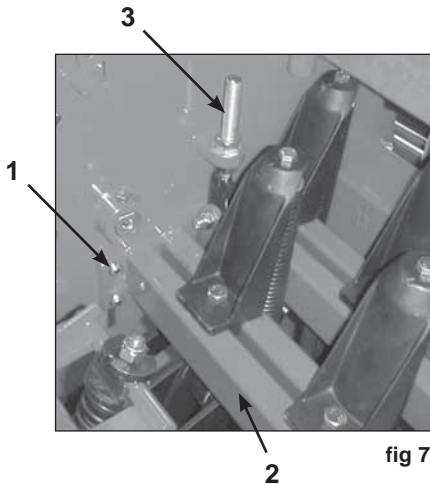


fig 7

Coulter Penetration Depth

To create the ideal seed bed the front coulter should cut approximately 20mm below the double discs. If more undercut is required or the ground is particularly hard and better penetration is required, the carrier beam can be lowered by releasing the four M16 bolts (1) at each end of the carrier beam (2) and adjusting the coulter adjustment rod assembly (3) See fig 7. Also refer to the maintenance section. The carrier beam is factory set in its upper most position.

Note: The front coulter will sharpen with initial use and therefore penetration ability will improve.

Double Disc / Sowing Depth

The penetration depth of the double discs is dependant on two aspects.

- 1 The weight applied from the machine's mass.
- 2 The press wheel adjustment.

If the ground is hard and the double discs are not penetrating to the desired depth the press wheels will not be in contact with the ground. To increase the weight applied refer to "Front Coulter & Dragbar Loading". Where the loading applied to the double discs exceeds the ground resistance the remaining load is transferred to the press wheels. The running height of the press wheel in relation to the double discs controls the sowing depth. See "Press Wheel Adjustment".

Note: Ground penetration ability will increase as the double discs sharpen and the paint wears off.

Press Wheel Adjustment

Press wheels are used to control the seeding depth and compact the soil after sowing to give good seed/soil contact. To adjust the press wheel setting press down the press wheel (1) and reposition the jaw lock pin (2) in the desired notch. Refer fig 8.

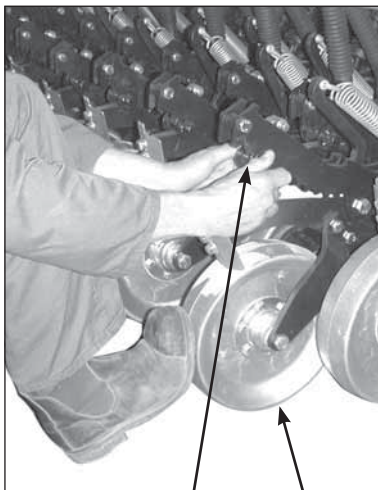


fig 8

Double Disc Scrapers

Scrapers are fitted to the rear of the double disc casting and prevent soil buildup on the inside face of the disc. The scrapers will need to be adjusted as the discs wear (reduce in diameter). If not adjusted the scrapers will overhang the disc edge and wear unevenly. Scrapers are factory set in the correct initial operating position and don't require adjustment before drill use.

Press Wheel Scrapers

A minimum clearance of 2mm is recommended between the scraper and the press wheel. Check the scraper clearance on full circumference regularly as press wheels can be eccentric. Best scraper performance may be dependent on the ground conditions.

Level Drill

Use the drawbar turnbuckle to tilt the drill so it is sitting level. An adjustment may be required after a short period of use because the paint wears off the discs and the discs sharpen which in turn improves the penetration abilities.

‘Enviro’ Seed Drill Sowing Chart

15, 19, 23 Run (Row Spacing 150mm)

Test Seed Type/ Thousand Seed Wgt., TSW*(gm)	Gear Ratio*	Shutter Slide*	Bottom Flap*	Metering Wheel*	Seed Rate (kg/ha)										Hints	
					Gearbox Setting Position											
					H/L	Position	Type	15	20	30	40	50	60	70		80
Wheat (41.2)	H	3/4	3	N					80.11	101.0	119.5	141.2	163.3	183.8		
Oats (37.2)	H	Full	3	N					77.63	96.45	114.8	134.7	154.5	172.2		
Barley (45.7)	H	Full	3	N					92.28	113.7	138.3	161.1	185.1	208.8		
Ryecorn (25.8)	H	3/4	3	N					93.3	116.1	140.0	162.6	188.9	212.5		
White Peas (302)	H	3/4	3	N				87.82	127.0	167.4	193.4	239.3	281.3	311.7	358.6	Agitator Stopped
Green Peas (240)	H	3/4	3	N				69.86	106.1	140.4	173.4	210.0	250.8	285.1	319.7	
Peren. Grass (2.27)	H	Full	3	N	5.12	10.77	21.51	32.08	42.24	52.73	63.93					
Annual Grass (4.4)	H	Full	3	N	6.32	12.80	24.90	36.32	47.58	60.14						
Pasture Mix* (-)	H	Full	3	N		10.92	21.64	32.40	42.68	52.85	64.04					
Lucerne (3.17)	H	3/4	1	F			7.27	10.84	14.09	17.59	20.69					Agitator Stopped
Turnip (2.17)	L	3/4	1	F	1.23	2.24	4.10	5.90	7.66							Agitator Stopped
Kale (3.20)	L	3/4	1	F		2.16	4.10	5.94	7.68							Agitator Stopped
Swedes (3.25)	L	3/4	1	F	1.20	2.11										Agitator Stopped
Rape (3.50)	L	3/4	1	F		2.07	3.83	5.66	7.37							Agitator Stopped
White Clover (1.11)	L	3/4	1	F	1.04	2.00	3.90	5.70	7.20							Agitator Stopped
Red Clover (2.23)	L	3/4	1	F		2.42	4.54	6.44	8.49	10.42	12.44					Agitator Stopped
Super Phosphate	H	Full	3	N			71.77	109.9	145.3	184.6	224.8	270.2	311.5	358.4		
DAP Granules	H	Full	3	N					136.5	168.0	201.3	236.6	271.7	300.3		
Super Phosphate	L	Full	3	N				68.5	90.57	115.1	140.1	168.4	194.2	233.4		
DAP Granules	L	Full	3	N								147.5	169.4	187.2		

Gear Ratio*: H, High = 19t on Clutch Output Shaft,
15t on Gearbox Input Shaft.
L, Low = 15t on Clutch Output Shaft,
19t on Gearbox Input Shaft.

Shutter Slide*: For Grain, changing the Shutter Slide from 3/4 to Full gives
10% to 15% more flow.

Pasture Mix*: Test Mixture = 72% Perennial Grass, 8% White Clover,
8% Cocksfoot, 8% Concord, 4% Red Clover

Bottom Flap*: The values shown were the optimum test settings,
decreasing the gap may cause seed damage, too large a gap will give
intermittent flow rates. (Flaps are spring loaded to cope with small
variations in seed/granule size).

Metering Wheel*: N = Normal Metering Wheel
F = Fine Seed Metering Wheel

TSW*:
$$\frac{\text{TSW(gm)} \times \text{Desired Plants/m}^2}{\text{Germination \%}} = \text{Sowing Rate (Kg/Ha)}$$

fig 9

‘Enviro’ Seed Drill Sowing Chart

17, 21, 26 Run (Row Spacing 130mm Nominal)

Test Seed Type/ Thousand Seed Wgt., TSW*(gm)	Gear Ratio*	Shutter Slide*	Bottom Flap*	Metering Wheel*	Seed Rate (kg/ha)										Hints	
					Gearbox Setting Position											
					H/L	Position	Type	15	20	30	40	50	60	70		80
Wheat (41.2)	H	3/4	3	N					92.6	115.9	139.3	163.4	188.5	217.0		
Oats (37.2)	H	Full	3	N					87.93	109.2	130.0	152.6	175.0	195.0		
Barley (45.7)	H	Full	3	N					80.73	105.5	128.4	154.4	180.8	207.0	237.8	
Ryecorn (25.8)	H	3/4	3	N					80.6	107.3	134.3	160.1	187.3	214.2	237.6	
White Peas (302)	H	3/4	3	N				97.38	145.1	188.0	236.0	282.1	308.3			Agitator Stopped
Green Peas (240)	H	3/4	3	N				69.86	106.1	140.4	173.4	210.0	250.8	285.0	320.6	
Peren. Grass (2.27)	H	Full	3	N	5.80	12.2	24.36	36.44	47.84	59.72	72.4					
Annual Grass (4.4)	H	Full	3	N	6.98	14.8	28.4	41.1	54.2							
Pasture Mix* (-)	H	Full	3	N	5.92	12.88	25.4	38.4	50.24	60.84						
Lucerne (3.17)	H	3/4	1	F			8.46	12.27	16.09	19.98	23.43					Agitator Stopped
Turnip (2.17)	L	3/4	1	F	1.40	2.54	4.64	6.68	8.67							Agitator Stopped
Kale (3.20)	L	3/4	1	F	1.34	2.50	4.66	6.74	8.70							Agitator Stopped
Swedes (3.25)	L	3/4	1	F	1.31	2.32										Agitator Stopped
Rape (3.50)	L	3/4	1	F		2.34	4.34	6.40	8.35							Agitator Stopped
White Clover (1.11)	L	3/4	1	F	1.10	1.70	4.40	6.35								Agitator Stopped
Red Clover (2.23)	L	3/4	1	F		2.76	5.12	7.32	9.58	11.92						Agitator Stopped
Super Phosphate	H	Full	3	N			81.28	124.4	164.6	209.0	254.6	306.0	352.8	405.9		
DAP Granules	H	Full	3	N					118.8	154.6	190.3	228.0	268.0	307.8	340.1	
Super Phosphate	L	Full	3	N					77.54	102.6	130.3	158.7	190.7	219.0	253.0	
DAP Granules	L	Full	3	N								142.1	167.0	191.1	212.0	

fig 10

Basic Calibration Procedure

Gearbox Setting Lever

To set the seed rate at the gearbox, slacken the star knob by turning counter-clockwise and push from below into the position indicated in the Sowing Chart. Retighten the star knob firmly. Refer Fig 11.

Caution

The settings shown in the Sowing Charts (kg/ha) can only serve as reference values. Deviations may occur caused by differences in the size, shape, density of the grain and by the dressing agent. **Therefore prior to any sowing, always carry out calibration trials to accurately determine the actual seed rate.**

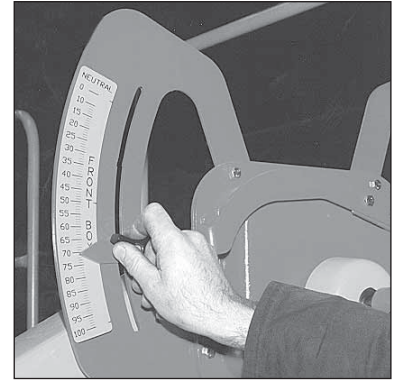


fig 11

Using the stepless variable speed gearbox, the speed of the metering shaft and thus the seed rate is set steplessly. The higher the figure indicated on the scale (Fig 11) by the setting lever the greater the seed rate.

Selecting the Gear Ratio

When required to operate at high seed rates the clutch output sprocket is set at 19 tooth and the the gearbox input at 15 tooth **This is the standard setting as supplied ex the factory.** (Referred to as the **High Speed Setting**). Refer Fig 12 and to P22, Fig 23.

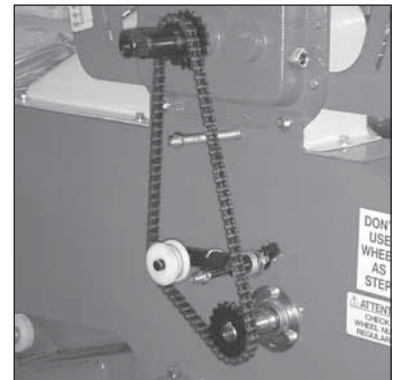


fig 12

The alternative setting for lower seed rates is to reverse these two sprockets so that the clutch output is 15 tooth and the gearbox input is 19 tooth. (Referred to as the **Low Speed Setting**). Refer to P22, Fig 24.

Setting Seeder Shutter Slides

The varying flow properties of seeds require different shutter slide positions which may be found in the Sowing Chart for the individual type of seed. This corresponds to one of the three settings in Fig 13.

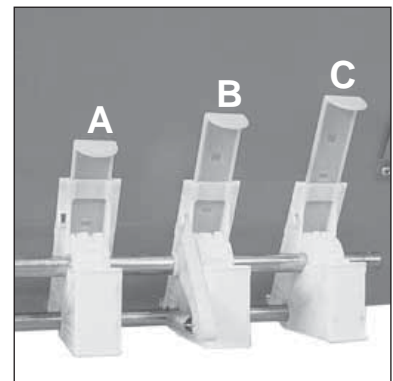


fig 13

Fig25/A	Fig25/B	Fig25/C
Closed	3/4 Open	Fully Open

Bottom Flap Settings

The various seed sizes require matching bottom flap clearances below the metering wheel. The adjusting plate allows for 10 different settings. The required position for the seed type may be found in the Sowing Chart. The control levers are located on the LH end of the seedbox, (opposite end to the gearbox).

Number "1" corresponds to the minimum (closed) position and "10" the maximum gap. Refer Fig 14.

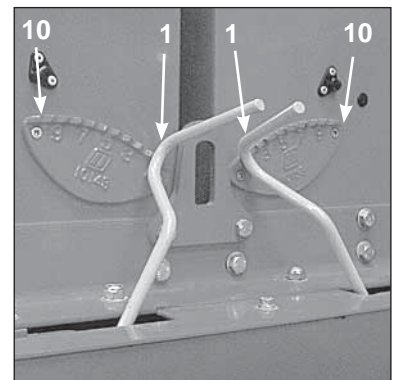


fig 14

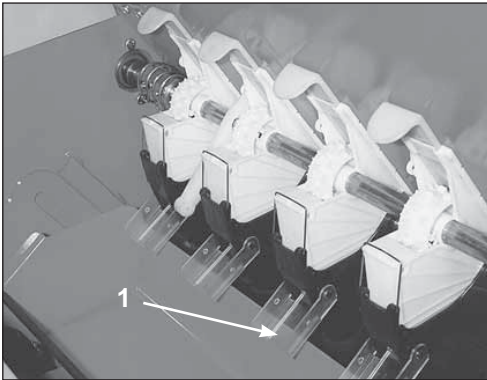


fig 15

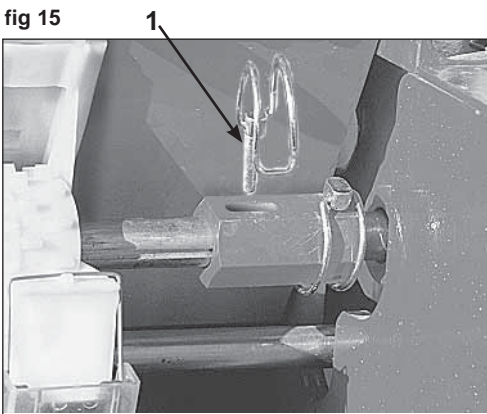


fig 16

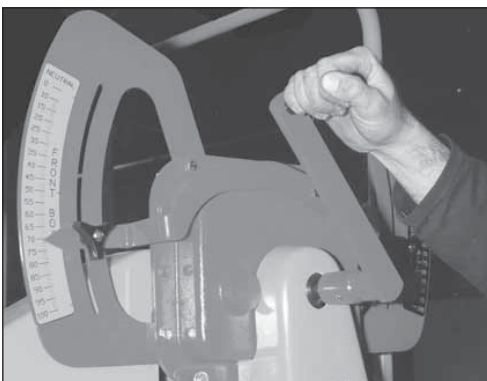


fig 17



fig 18

Seed Calibration

The calibration test should be done to confirm the required seed rate and is done with the drill stationary and level.

Seed Calibration Procedures

- 1 Remove the calibration tray from the brackets on the seedbox. Place the tray (or trays) on the support members below the seeders.
- 2 Position all the clear plastic seed diverters to redirect the seed into the calibration trays as in Fig 15/1.
- 3 Make sure **all the shutters** are open and set to the position indicated in the seed charts for your particular seed. Refer P16, Fig 9,10 & P17, Fig 13.
- 4 Agitator Shaft - Check the seed chart for hints on whether to connect or disconnect this shaft during seeding. Refer P16, Fig 9, 10 & Fig 16/1.
- 5 For the test, half fill the box with seed. If this is not possible make sure the seed is evenly distributed within the box.
- 6 Now the 3 basic settings must be made using the figures from the Sowing Charts P 16, Fig 9, 10. For setting method refer...

P 17. Gearbox Setting Lever.

P 17. Selecting the Gear Ratio.

P 17. Setting Seeder Shutter Slides.

P 17. Bottom Flap settings.

Note For seeds which are not covered in the Sowing Chart, use the figures for a seed of comparable size and shape.

- 7 Place the crank handle over the hexagonal drive dog on the gearbox input shaft and turn clockwise until the seed flows consistently from the seeders. To ensure complete filling of the seed unit continue turning the crank until the calibration tray is approximately half full then empty into the seedbox. The drill is now ready for calibration. Refer Fig 17.
- 8 Turn the crank handle the required number of revolutions as in the table fig 19 on P 19.

Note The Calibration is usually done for 1/40th hectare. For very small seed rates or when using inaccurate scales (i.e. unable to measure to the nearest gram) the calculation based on 1/10th hectare should be used.

Important - Before commencing sowing check that the freewheeling hub positioned at the gearbox end of the drill is set to 4 x 4, not 4 x 2 which is only for transport. Refer Fig 18/1.

Scales must be accurate to 2 grams as any error can be multiplied by up to 40 giving inaccurate calibration results.



Number of Hand Crank Turns for Seed Rate Calibration

Machine Width (m)	Row	Sowing	Turns for 1/40 Hectare	Turns for 1/10 Hectare	Speed Setting (Refer Above)
15 Run	150	2.25	49	197	High Speed
17 Run	130	2.21	50	200.5	High Speed
15 Run	150	2.25	30.5	122.5	Low Speed
17 Run	130	2.21	31	125	Low Speed
19 Run	150	2.85	39	155.5	High Speed
21 Run	135	2.84	39	156	High Speed
19 Run	150	2.85	24	97	Low Speed
21 Run	135	2.84	24.5	97	Low Speed
23 Run	150	3.45	32	128.5	High Speed
26 Run	130	3.38	32	129	High Speed
23 Run	150	3.45	20	80	Low Speed
26 Run	130	3.38	20	80	Low Speed

Speed Setting	Gearbox Sprocket	Clutch Sprocket
High Speed (Standard)	15 Tooth	19 Tooth
Low Speed	19 Tooth	15 Tooth

fig 19

- 9 Weigh the seed collected during the test in kilograms.
- 10 Calculate the seed rate by multiplying the kgs previously collected x 40 (1/40th ha method) or x 10 (1/10th ha method) depending on requirement. If the resultant calculation does not produce the desired seed rate use the enclosed seed rate calculator disc to determine the correct gearbox setting. Refer **Use of Seed Rate Calculator** P 20.

For 1/40 Hectare (250 m²) Calibration
Seed Rate = Actual Seed Collected (kg) x 40

For 1/10 Hectare (1000 m²) Calibration
Seed Rate = Actual Seed Collected (kg) x 10

Suggestion To be on the safe side and until confidence has been gained with the method of calibration it is advisable to conduct a second test at the newly determined gearbox setting.

- 11 Where a coated seed is used it is advisable to check the calibration after 1 hectare as dressings can tend to create a coating on the seed metering wheels thus changing the the flowing properties of the seed which in turn alters the seed rate.

Calculating Number of Hand Crank Turns for Other Working Widths

- 1 For clutch output sprocket of 19 tooth and gearbox input sprocket of 15 tooth (standard **High Speed Setting**)...
Constant = 0.443
- 2 For clutch output sprocket of 15 tooth and gearbox input sprocket of 19 tooth.(**Low Speed Setting**)...
Constant = 0.276

$$\text{Crank Turns} = \frac{\text{Area in Metre}^2}{\text{Working Width}} \times \text{Constant}$$

Recalculating the Constant

It is especially important in arable situations to check the rolling circumference of the tyre when in the cultivated area to be sown, and if necessary, recalculate the constant and hence the number of crank turns.

If there is a significant difference at that time from the figure used for calculations in this manual (Fig 20), the constant should be recalculated and hence the crank turns for those particular conditions.

Note - If a significant difference is found in the rolling circumference the H1 setting should be adjusted on the hectaremeter. Refer P 24.

- 1 To recalculate the constant due to altered conditions or specific requirements use the formulae in Fig 20.
- 2 **To obtain the rolling circumference of the tyre** 1/2 fill the seed/fertiliser boxes or simulate this loading.

Mark the tyre of the drill at 90° to the ground and the point of contact with a mark on the ground. Move the drill forward 3 revolutions until the mark on the tyre is again at 90° to the ground. Measure the distance along the ground and divide by 3 to give the rolling circumference of the tyre.



$$\text{High Speed Constant} = \frac{1.667}{\text{Rolling Circumference of Tyre}}$$

$$\text{Low Speed Constant} = \frac{1.038}{\text{Rolling Circumference of Tyre}}$$

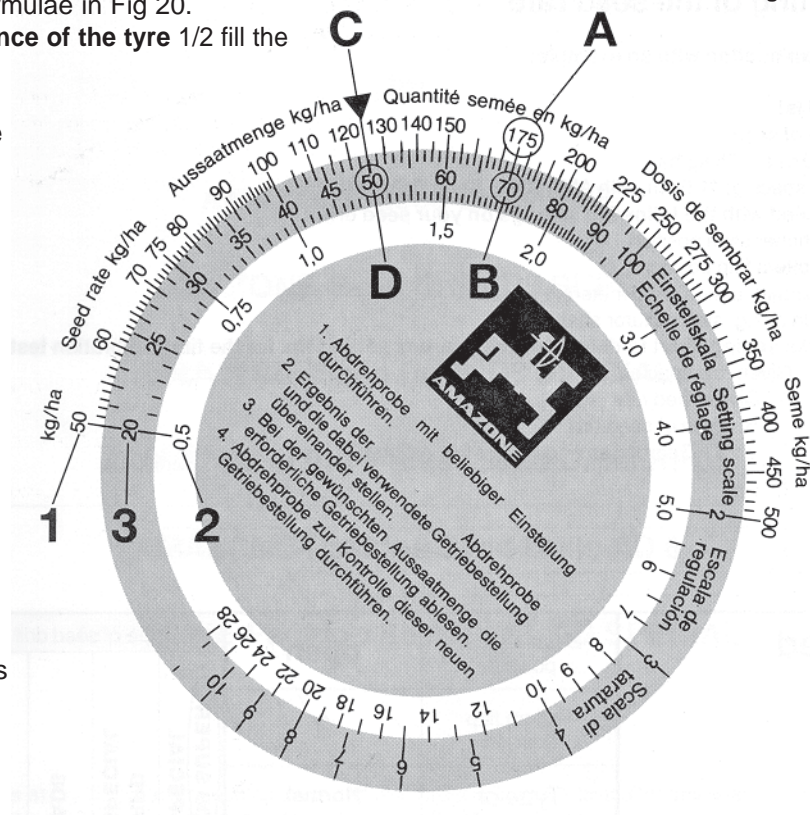
Rolling Circumference used for calibration was... 3.76metres (10 ply tyre)

fig 20

Use of Seed Rate Calculator

Determining the gear box scale setting using the calculator.

Usually the first calibration test yields a different seed rate. However with the value determined from the first test it is possible to determine the correct gearbox setting with the aid of the enclosed disc calculator, Fig 21. The disc calculator consists of 3 scales. An outer white scale (Fig



Setting Example (Desired seed Rate 125kg/ha)

- 1 From the calibration procedure (described on P 17-19) at a gearbox lever setting of "70" a seed rate of 175 kg/ha was obtained.
- 2 Turn the inner disc until the measured seed rate of 175kg/ha (Fig 21/A) is in line with the related actual gearbox setting of "70".(Fig 21/B)
- 3 Read off from the disc rule the necessary gearbox setting for the required seed rate of 125kg/ha (Fig 21/C) In this example the correct setting is "50" (Fig 21/D)
- 4 To be on the safe side the new gearbox setting can be checked by another calibration test.

Calibration Deviations

Deviations Between the Calibration Test and the Actual Seed Rate

The most frequent cause for changes between the calibration test and the seed rate lies in the flowing properties of seed during sowing. These changes in properties generally result from reactions of the dressing agents to temperature, humidity or abrasion. These changes will become even more obvious when the bottom flaps are incorrectly set. If the setting of these flaps leaves too large a gap an uncontrollable additional flow of seed can occur during seeding; especially when assisted by the drill bouncing, a condition not simulated while conducting the calibration tests. For this reason the basic setting of the bottom flaps should be checked at regular intervals. For more details refer P 30, Fig 39.

Residues from the seed dressing on the bottom flaps and metering wheels can also influence the flowing properties of the seed and thus the seed rate. In such cases a balance will occur only after a period of time and it is recommended to repeat the calibration test to confirm the seed rate after 2-3 seedbox fillings, nominally when the seed box is half empty. Only then will a balance occur and the seed rate will stabilise.

Wheel Slip Deviations

It is always possible with rubber tyred drills in extreme ground conditions to get wheel slip. Not normally a problem with cleated type tyres in good condition, but more so in the arable situation with the less aggressive tread patterns normally found on this type of machine. The result; large differences between the calibration test and the actual sowing rate, obviously less seed deposited than required. The number of crank turns indicated in the table on P19 is correct in most circumstances other than those mentioned above; however soft seed beds and a fully laden machine can affect the rolling circumference of the tyre.

Should you require to check this due to some unforeseen circumstances proceed as follows...

Measure an area of 250 m² (1/40 Hectare) - this corresponds to a machine travel of... Refer Fig 22.

Machine Size	Row Spacing	Sowing Width (m)	Travel Distance
15 Run	150	2.25	111m
17 Run	130	2.21	113m
19 Run	150	2.85	87.5m
21 Run	133	2.84	88m
23 Run	150	3.45	72.5m
26 Run	130	3.38	72.5m

fig 22

For this calibration test place the crank handle over the hexagonal drive dog on the gearbox input shaft. Now move the machine slowly forward over the measured distance, counting the number of turns of the crank handle as you go. Using this number of crank turns repeat the calibration.

Hints for Sowing with Variable Speed Gearbox

This gearbox allows for stepless changes in the speed of the metering shaft and thus the seed rates. Due to the variations in seed type and application rates there are 2 speed ranges available.

By changing from High Speed to Low Speed the range of settings and control is dramatically increased. The machines are supplied ex the factory set to the high speed configuration. Change to the Low Speed when the gearbox setting is down to 10 on the scale and the desired seed rate cannot be obtained. To change the speed setting from high to low, remove the wing nut and chain cover.

Release the tension on the chain (fig 23,1) by forcing back the chain tensioner (fig 23,2) and hold in place with the crank handle. Remove the chain from the 19 tooth output sprocket to the 15 tooth sprocket, then remove the chain from the 15 tooth gearbox sprocket to the 19 tooth. Check the chain is correctly aligned then release the chain tensioner. Ensure the tension roller is correctly aligned with the chain. Replace guard and calibrate as required. Low speed set-up shown in fig 24.

To Determine the Gearbox Setting after a Speed Change

For determining the correct gearbox setting after the speed change, conduct the first test at 50. With the weight of seed collected find your correct setting with the aid of the disc calculator refer P 20, Fig 21.

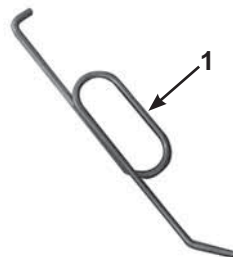
Sowing of Fine Seeds

For sowing fine seeds the Enviro Drill is equipped as standard with a combined normal and fine seed "Elite" metering wheel (Fig 25/1).

During grain sowing and other larger varieties of seed both the normal and fine seed metering wheels are coupled and both rotate. In order to convert the seed drill to sow fine seed insert the crank handle to rotate clockwise until the holes (Fig 25/2) of the fine seed wheel are visible. Using the tool supplied (Fig 26/1) disengage the the pin inside the hole so that the normal metering wheel rotates freely on the metering shaft.

At this time it would be advisable to close any shutter slides not required for the fine seed sowing.

When seed is to be sown again using the normal metering wheel press the pin, from the normal metering wheel side (opposite direction to before), using the tool, back into the hole of the fine seed wheel thus reconnecting the drive between the two.



High Speed

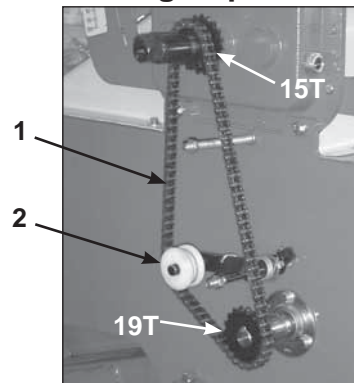


fig 23

Low Speed

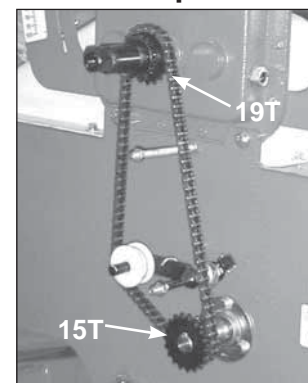


fig 24

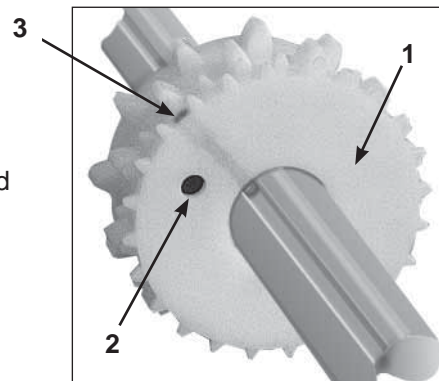


fig 25

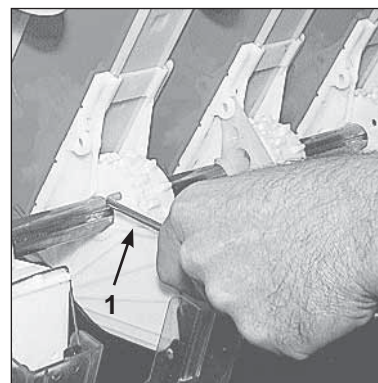


fig 26

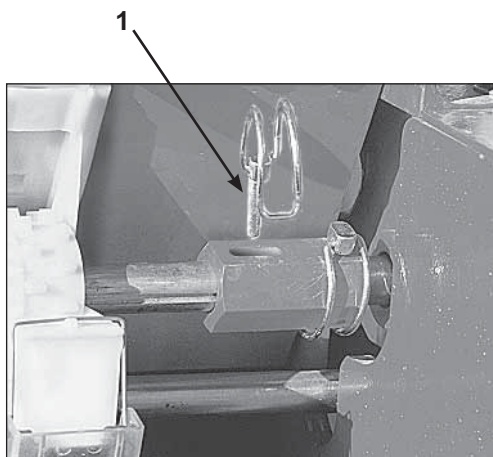


fig 27

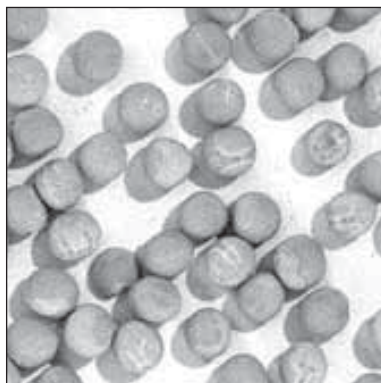


fig 28

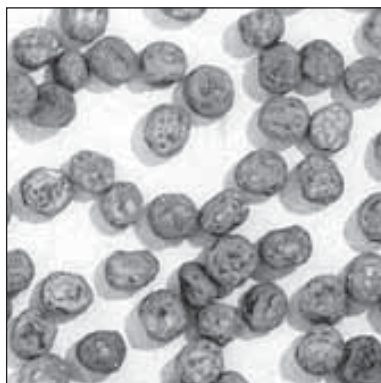


fig 29

Small Seed Calibration with Disconnected Agitator Shaft

The fine seed metering wheel used in Clough Drills is especially well suited for sowing small seeds such as rape. Due to the intensive action caused by the agitator the seeds can adhere to each other, or be damaged, causing irregular sowing/germination. **Therefore it is recommended that when sowing small seeds, especially oil seeds and thin shelled seeds, the drive to the agitator is disconnected.** To do this remove the lynch pin as shown in Fig 27/1.

Deviations between the calibrated and actual seed rate can occur when residual dressing agent sticks to the bottom flaps and thus slows the flow of seed. Before beginning the actual calibration test fill the calibration trays by turning the crank handle at a high speed around the 90 setting on the gearbox scale. This will cause an immediate buildup of the dressing agent on the flaps. Return the contents of the calibration trays to the seed box and proceed with the actual calibration. Due to the residue buildup on the flaps your calibration will now reflect accurately the required seed rate. It is advisable with small seeds to use the 1/10 hectare method for your calibration, thus cutting down on weighing errors.

Note - Remember to reconnect the agitator shaft as required for other seeds otherwise the consistency of seed rate will be affected.

Sowing Peas

Peas having the size and shape as illustrated in Fig 28 (e.g. White Field Peas), can be sown without problems with all Clough Drills with this type of metering wheel.

The flap should be set to a gap of at least "3" on the flap setting lever. Refer Page 17, Fig 14.

With these peas it should not be necessary to run the agitator shaft.

Peas having the size and shape as illustrated in Fig 29 (e.g. Green or Garden Peas), tend to bridge inside the seedbox and do not flow freely.

This multi-faceted pea requires agitation for sowing.



Caution - When resetting the metering wheels on the seeder shaft

Care should be taken when tightening the grub screws (Fig 25/3) on the fine seed wheel. Adjust the grub screw until the movement of the metering wheel just stops, then tighten no more than 1/8 of a turn.

Do not overtighten as this can result in breakages while operating and may render the warranty on these units void.

Farmscan Jackal v3 Settings Setup

Refer to the manual supplied with your Farmscan Jackal kit for information and operation.

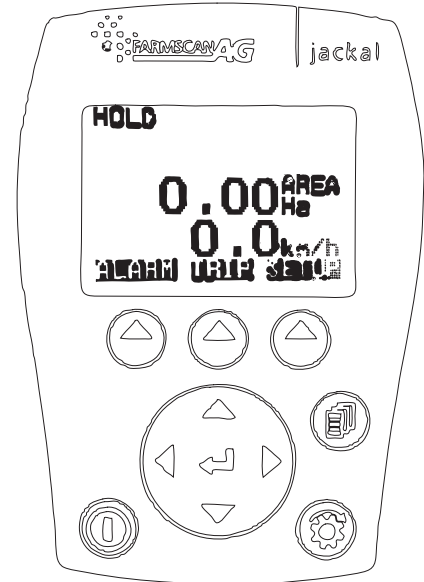
Farmscan Jackal v3 Factory Setup for Enviro 740

Refer to pages 6,9,11 of the Farmscan Jackal v3 manual.

Input 2 -Two wire 'reed' sensor for 'Area/Speed Wheel' measurement taken from shaft on drive pedestal.
The white 'signal' lead is connected to input A2.

Input 2 Edit	
m/pulse	
Auto Set:	
Target:0.000m	
Meas.pulses:	0
Manual Ratio:	
	2.817000
NEXT	EDIT

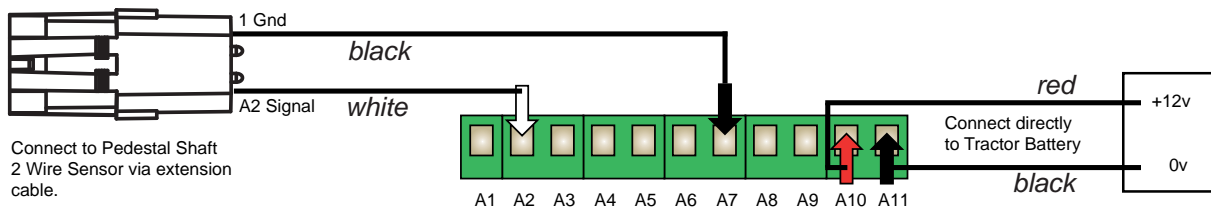
Other Settings	
Implement Width:	x.xxx m
Extern.Run/Hold:	Disabled
Alarm Beep:2	
NEXT	EDIT



Rolling Circumference of 12 ply Tyre = 3.708m
See page 20 for directions on how to obtain an accurate measurement for the tyre fitted to your machine.
The 'drive ratio' is always 1.316

$$\begin{aligned} \text{Manual Ratio} &= \frac{\text{Circumference of Tyre}}{\text{Drive Ratio}} \\ &= \frac{3.708 \text{ m}}{1.316} \\ &= 2.817\text{m} \end{aligned}$$

Machine Size	Row Spacing (mm)	Sowing Width (m)
15 Run	150	2.25
17 Run	130	2.21
19 Run	150	2.85
21 Run	135	2.84
23 Run	150	3.45
26 Run	130	3.38



Connect to Pedestal Shaft
2 Wire Sensor via extension
cable.

Refer to the Farmscan manual if you want to make additional sensor connections.

It is advisable, as with all things electronic, to have a backup of your totals. We suggest you record these on a daily basis in a notebook or diary.

Maintenance & Care

General Safety and Accident Prevention Advice



- 1 Make sure that if the tractor remains attached to the drill that the ignition key is removed.
- 2 During maintenance the drill should be supported in such a manner that if hydraulic failure was to occur the machine would still be adequately supported.
- 3 Wear gloves when handling components with cutting edges such as worn discs etc..
- 4 Disconnect the electrical supply from the tractor before doing any electrical maintenance.
- 5 Refer to safety sections for more safety information.

General Cautionary Maintenance Advice

- 1 **Electric Welding** - With the electronic equipment in modern tractors it is advisable to completely disconnect the implement from the tractor, or at the very least disconnect the alternator before attempting any welding.
- 2 **Hydraulics** - Ensure hydraulic couplings (male & female) are clean before connecting. Dirty couplings will result in hydraulic oil contamination and hydraulic cylinder seal damage and bore scores. This in turn will result in oil leakage past the piston seals.
No filter is fitted to the hydraulic system. If hydraulic fittings and oil supply are not going to be kept clean it is recommended that a filter be fitted to prevent hydraulic cylinder damage.
- 3 **Water Blasting** - Water blasting, steam cleaning or other pressurised cleaning processes can force dirt etc. into undesirable places that may cause damage or rapid part wear to items such as bearings, seals, chains, bushes etc. Caution must be exercised.
- 4 Box set lifting eye profile - these profiles are provided for easy removal of the dual boxes from the side frames.
Do not use when boxes are loaded nor to lift machine.



Maintenance

Your new Duncan 'Enviro' Drill will give long and efficient service if given normal care and maintained properly

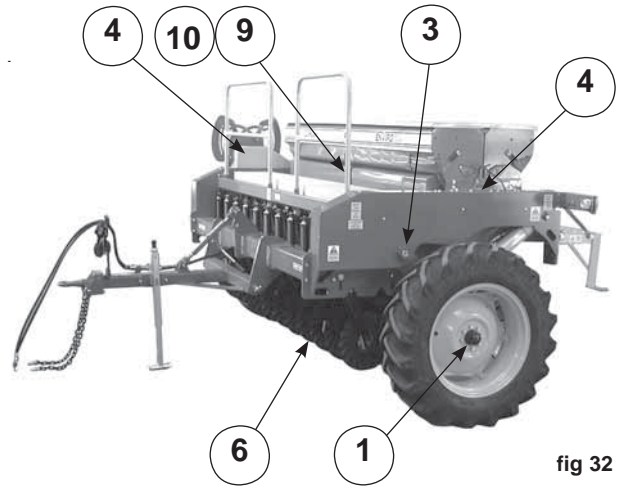
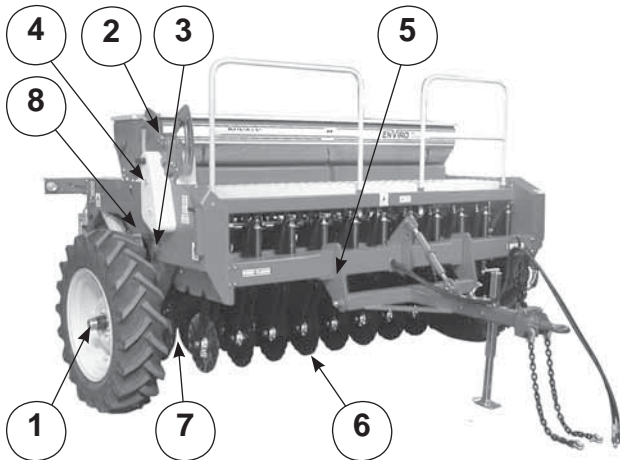


fig 32

Precautions with Grease

Greases should not be mixed as the structure may be weakened by the mixing of different types of thickener which may cause softening and loss of grease from bearings by running out.

Lubrication Chart

Item	Components	Lubricant	*Frequency
1	Wheel Bearings	Castrol LMX Grease	Annually
2	Gearbox	Castrol Hyspin AWH 32/68 Oil (1.25 Litres)	Maintain Level
3	Wheel Arm Pivots	S.K.F. LGEM2 Grease or Equivalent	Weekly
4	Drive Chains	Suitable Roller Chain Lubricant	6 Monthly
5	Coulter Pivot Pins	S.K.F. LGEM2 Grease or Equivalent	Weekly
6	Front Disc Bearings	(Pre-packed & Sealed)	Not Required
7	Double Disc Bearings	(Pre-packed & Sealed)	Not Required
8	Drive Shafts (Side Frame)	(Pre-packed & Sealed)	Not Required
9	Agitator Shaft	Nylon Bushes	Not Required
10	Seeder Shafts	Nylon Supports	Not Required

* The lubrication frequencies are only a guide. Actual frequency will be dependent on extent of use and ground conditions.

Maintenance Schedule

Components	Daily (or after 20Ha)	Weekly (or after 100Ha)	Pre Season (or 1000 Ha)
Coulters & Double Discs	•	•	•
Press Wheels	•	•	•
Seeders/Agitators/Bottom Flaps	•	•	•
Wheel Nuts		•	•
Pivot Pin Fasteners		•	•
Coupling & Safety Chains		•	•
Roller Chains		•	•
Gearbox/Clutch		•	•
Hydraulics (Oil Leaks)		•	•
Tyre Pressures (25psi / 1.8bar)		•	•
Bolted Connections			•

Maintenance Schedule (Refer also to Summary Chart P27)

1 Bolted Connections

All bolted connections on the machine should be checked after the first 30 hours of operation and retightened if necessary thereafter at regular intervals. (1000 hectares or annually whichever occurs first).

2 Gearbox

The oil level in the gearbox can be seen in the oil gauge window. Changing the gearbox oil is normally not necessary. For refilling the oil remove the 1/2" BSP plug on the top face of the gearbox, hydraulic oil Castrol Hyspin AWH 32-68 should be used. The total filling capacity is 1.25 litres. Refer Fig 33/1. **DO NOT OVERFILL.**

3 Clutch

The clutch which is located inside the RH side frame should be removed, flushed dried and re-assembled annually. Use **NO LUBRICANT** such as CRC. For assembly diagram refer P60 in the parts section of this manual.

4 Roller Chains

All drive chains should first be checked after 20 hours of operation and thereafter weekly or after 100Ha of operation as follows:-

The metering wheels of the seed drill are driven via roller chains from the drive wheel.

The roller chain concealed in the wheel arm has a spring loaded tensioner, but should still be checked periodically by removing the cover on the inside face of the wheel arm. This tensioner must be free to pivot. Refer Fig 34/1.

All other drive chains, apart from the drive from the front gearbox output shaft to the front seedbox, have spring loaded tensioners, but should still be checked at regular intervals as previously mentioned. Refer P 27, Fig 32.

Removing the guard from the outside of the gearbox gives access to the tensioner on the input drive.

All other tensioners on the output end of the gearbox are accessed by removing both the fibreglass cover around the gearbox output sprockets and the rear top cover plate.

To tension the drive chain from the gearbox output shaft to the front seedbox, loosen the bolts retaining the gearbox to the side plate and adjust as required.

Cleaning of the roller chains is recommended after long periods of operation. Remove the chain, wash in kerosene and then dip them in heated grease or oil or spray them with a suitable commercial roller chain lubricant.

5 Pivot Bearing Grease Nipples (Refer Lubrication Chart P27)

Grease at regular intervals (weekly or after 100Ha). There is one grease nipple per run on the front coulter pivot. (Fig 36/1) and in the ends of the wheel arm pivot pins (Fig 34/2 & Fig 35/1)

Grease nipples and the grease gun should be carefully cleaned before use and dirty grease should be fully discharged from the bushes. Wipe off excess grease and dispose of safely.

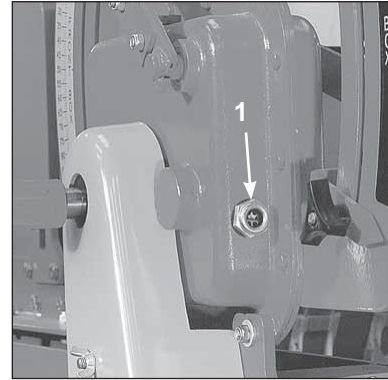


fig 33

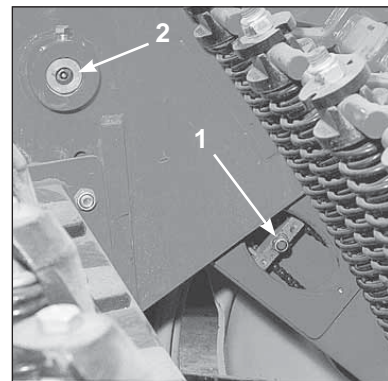


fig 34

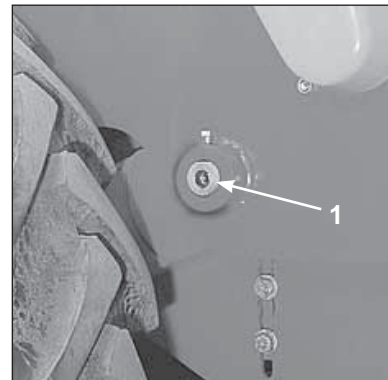


fig 35

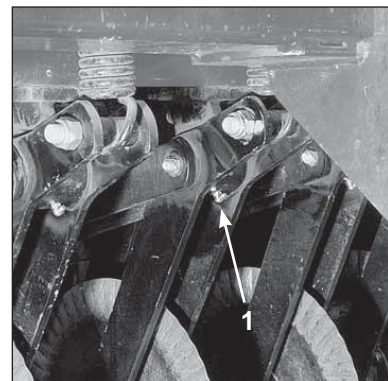


fig 36

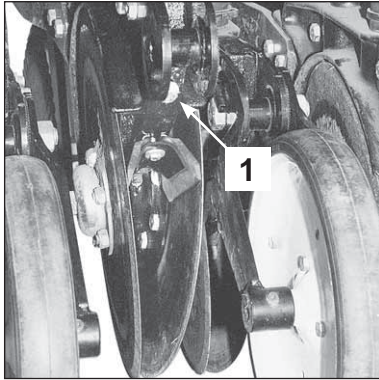


fig 37

6 Coulter Bearings

Front coulter bearings are sealed and do not require lubrication. Check discs for any lateral movement (wobble) on a regular basis. Replace bearings if there is any noticeable wobble.

7 Double Disc Scrapers

The double disc coulter is equipped with two scrapers to remove sticking soil. These scrapers have been set by the factory in such a way so that they lightly touch the discs without having a noticeable braking effect. After extensive use of the drill a certain amount of wear may be evident on the scrapers. The scrapers should be reset using the adjusting bolt so they just touch the discs as described above.

Refer Fig 37/1.

In some cases if a notch has formed on either of the blades by the abrasive action of the coulter disc you may need to re-grind the leading edge to give optimum cleaning action or replace.

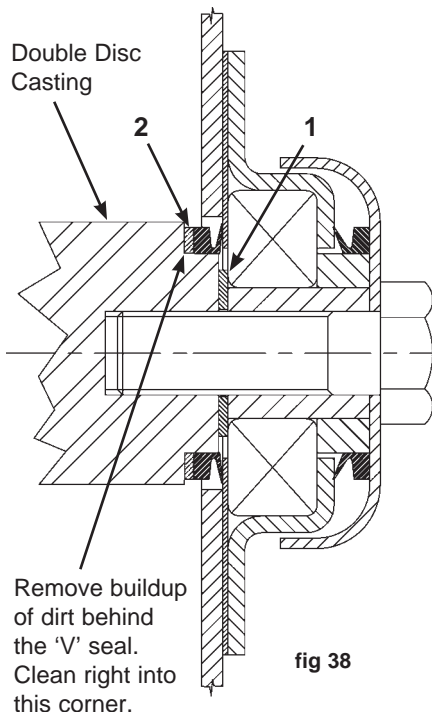


fig 38

8 Double Disc Bearings & Seals

Check that the discs are free from wobble and the bearings run smoothly. Replace any worn bearings. Check for dirt buildup behind the rubber 'V' seals on the double disc castings. Clean right into the corner as in Fig 38 and check that the "V" seal bearing surface is not damaged and is free from rust.

It is recommended to replace the inner "V" seals when the bearings are replaced.

9 Compensating for Disc Wear

When discs wear in diameter (to 13") remove the M16 light flat washer (38/1) so the discs meet. Also remove the nylon washer (38/2).

10 Rubbing Blocks

Check the plastic rubbing blocks on each side of the front coulter arms for wear and replace if necessary.

11 Front Disc Pressure Adjustment

Check fasteners regularly on front discs and also on spring coulters.

12 Depth Control

Grease threaded depth stop.

Check for dirt buildup around the rod seals at the piston head to ensure seal damage does not occur.

13 Press Wheels

Scrapers will wear. The rate being dependent on the ground conditions. The minimum clearance is 2mm. In some conditions a greater clearance may give better performance.

14 Tyre Pressure

The recommended tyre pressure is 1.8 bar (25psi). Check tyre pressure regularly to ensure correct pressure is maintained. Weekly checks are recommended.

15 Length of Seed/Fertiliser Tubes

These tubes can stretch over a period of time and require checking at approximately 6 monthly intervals. Check tubes at the operating depth. Shorten if necessary to avoid bends which will restrict the flow of seed/fertiliser.

16 Bottom Flaps

The required seed rate is controlled by both the metering wheels and the bottom flaps. The seed flows from the seed box into the metering wheel housings. Inside the metering wheel housing (Fig 39/1) the seed is caught between the metering wheel (Fig 39/2) and the bottom flap (Fig 39/3). The metered amount of seed is transported by the metering wheel to the edge of the bottom flap where it drops off into the seed guide tube which leads to the coulter. Varying grain sizes require the matching of the flap clearance to the different grain sizes. This matching is done by raising or lowering the bottom flaps by using the flap adjusting lever on the LH end of the seed box. If larger foreign particles, e.g. stones get between the metering wheel and the bottom flap, the bottom flap can give way downwards. A strong return spring (Fig 39/4) brings the bottom flap immediately back into the working position.

The metering system should be checked every 1/2 year or before any sowing period with an empty seed box and empty metering housings.

Use the following procedure:

Put the bottom flap setting levers (located on the LH end of the seed boxes) in position "1" for the front box and position "1" for the rear box. Refer Fig 40.

By turning the metering wheel shaft by hand check the flaps are all set to a gap of 0.1 to 0.5mm (refer Fig 39).

To adjust individual flaps use the spring tensioning screw (Fig 39/5)

Note: Re Maintenance Schedule (P27)

Where the frequency is given in terms of time of use (e.g. weekly) or area covered (e.g. 100 Ha) perform the maintenance task based on whichever occurs first.

Storage

Preparing the Machine for Storage.

Locate a dry level surface. The machine should be stored wherever possible with the rams retracted. The drive chains should be lubricated with suitable roller chain lubricant before prolonged periods of storage.

For longer term storage remove seed/fertiliser tubes from the coulters and allow to hang without deformation.

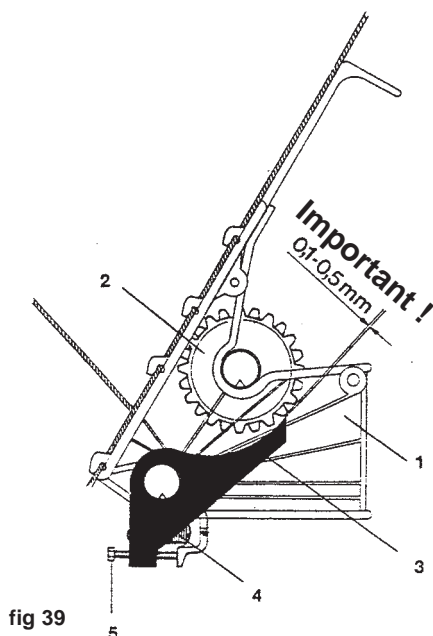


fig 39

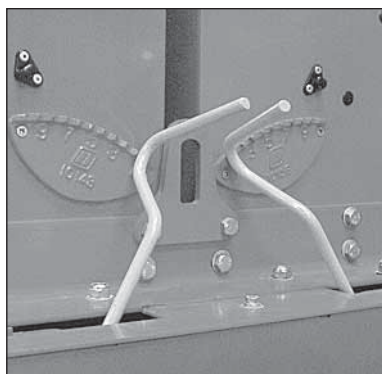


fig 40

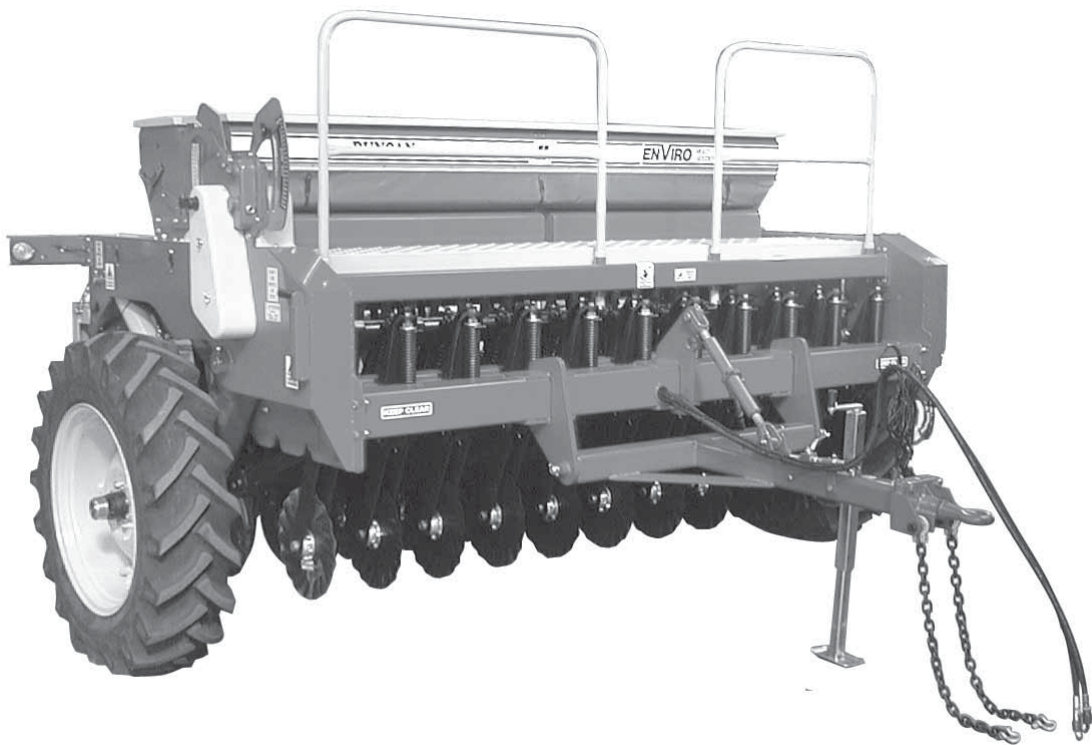


Parts List



'Enviro' Seed Drill Model 740

From Serial Number

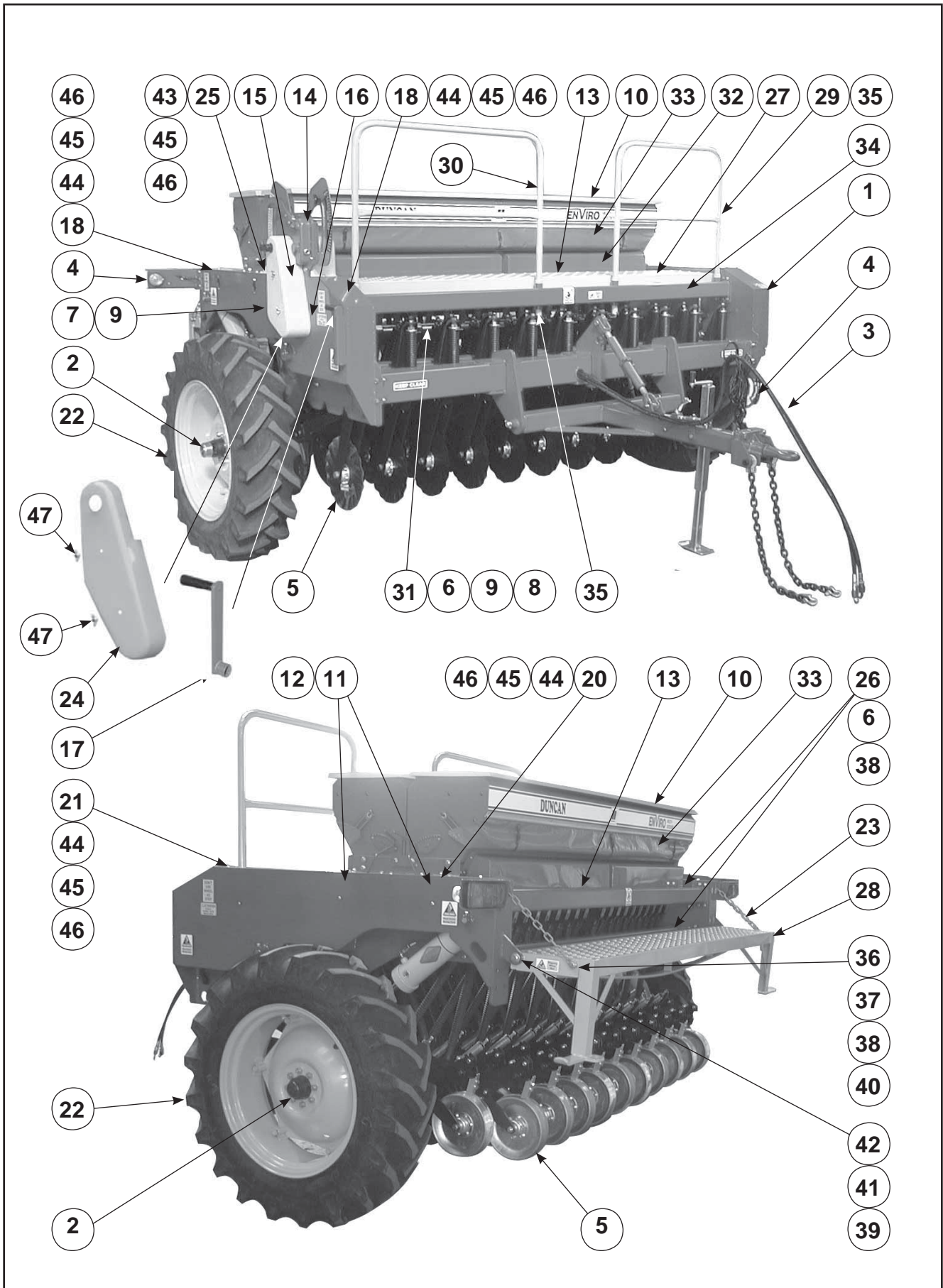


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Pt. No. 67304
Issue 1217

'Enviro' Seed Drill Complete Assembly



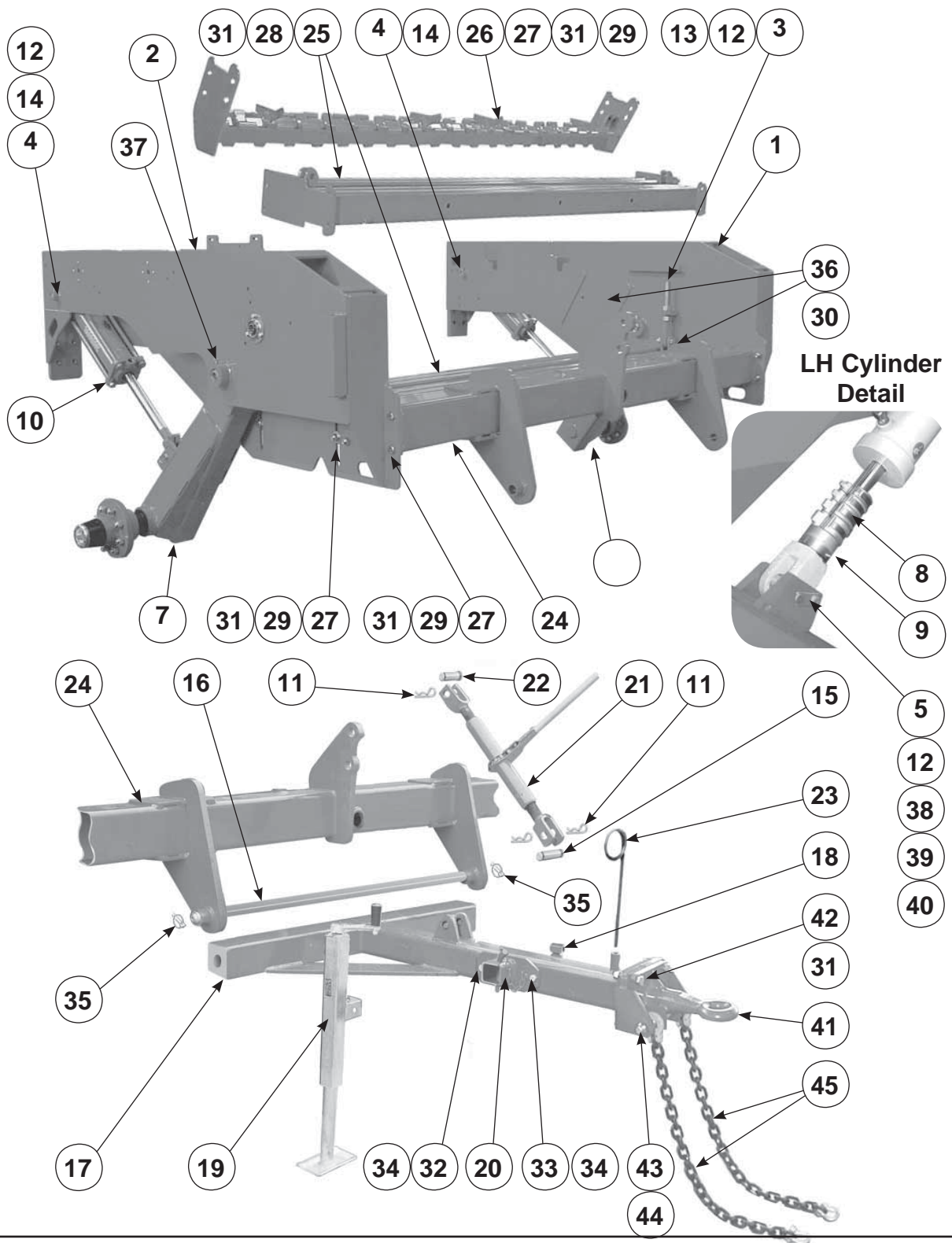
'Enviro' Seed Drill Complete Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	Refer Page 36/37	Mainframe & Drawbar	1
2	Refer Page 38/39	Wheel Arms	1
3	Refer Page 40/41	Hydraulics	1
4	Refer Page 42/43	Wiring & Lighting Kit	1
5	Refer Page 44/45	Coulter Assembly Complete	*N
6	45019	M12 x 30 Class 8.8 Zinc Plated Bolt	24
7	Refer Page 54	Clutch Shaft Assembly	1
8	45140	M16 Nylock Nut	24
9	Refer Page 58/59	Box Drive Shafts	1
10	Refer Page 62/63	Seedbox Assembly	1
11	Refer Page 64	Agitator Drives	1
12	Refer Page 65	Agitator Shaft Assembly	2
13	Refer Page 66/67	Seeder Assembly	*N
14	Refer Page 61	Gearbox Final Assembly Pt No 22054	1
15	Refer P 53,56.57	Drive Chains	1
16	Refer Page 60	Clutch Assembly	1
17	22051	Crank Arm & Handle Assembly	1
18	22198	RH Cover Plate	1
19	22199	RH Front Cover Plate	1
20	22200	LH Rear Cover Plate	1
21	22201	LH Front Cover Plate	1
22	17905	12.4/11 x 28 x 10ply Wheel Assembly	2
23	22584	Latch Chain (12 links)	2
24	22743	Plastic Guard (Clutch to Gearbox)	1
25	22527	Fibreglass Guard (Gearbox to Seedboxes)	1
26	Refer Below	Frame Rear Beam Assembly	2
27	Refer Below	Front Footboard Assembly	1
28	Refer Below	Rear Footboard Assembly	1
29	Refer Below	Guard Rail Assembly (Short)	1
30	Refer Below	Guard Rail Assembly (Long)	1
31	Refer Below	Pressure Bar Assembly	1
32	Refer Below	Calibration Tray Assembly	1
33	Refer Below	Ripstop Weather Skirt	2
34	Refer Below	Front Spreader Beam Assembly	1
35	45292	7/16" x 1 1/2" Lynch Pin	2
36	45023S	M12 x 50 Class 8.8 Zinc Plated Set Screw	2
37	45131	M12 Class 8.8 Zinc Plated Hex Nut	2
38	45139	M12 Nylock Nut	18
39	45141	M20 Nylock Nut	2
40	45159	M12 Heavy Duty Zinc Plated Flat Washer	20
41	45161	M20 Heavy Duty Zinc Plated Flat Washer	2
42	45063	M20 x 55 Class 8.8 Zinc Plated Bolt	2
43	44991s	M8 x 16 Class 8.8 Zinc Plated Set Screw	2
44	44992s	M8 x 20 Class 8.8 Zinc Plated Set Screw	10
45	45157	M8 Heavy Duty Zinc Plated Flat Washer	12
46	45165	M8 Zinc Plated Spring Washer	12
47	45341	M10 Zinc Plated Wing Nut	2

*N Where N = number of coulters fitted. e.g. 19 for 19 Run Machine (see table below for part number).

Part numbers for different width machines						
Item	15 Run	17 Run	19 Run	21 Run	23 Run	26 Run
26	22218	22218	22220	22220	22222	22222
27	22593	22593	22646	22646	22648	22648
28	22586	22586	22636	22636	22638	22638
29	22604	22604	22614	22614	22626	22626
30	22605	22605	22615	22615	22627	22627
31	22388	22389	22392	22393	22396	22400
32	22561	22561	22563(LH)	Plus 22571(RH)	22564	22564
33	22915	22915	22917	22917	22919	22919
34	22219	22219	22221	22221	22223	22223

'Enviro' Seed Drill Mainframe & Drawbar



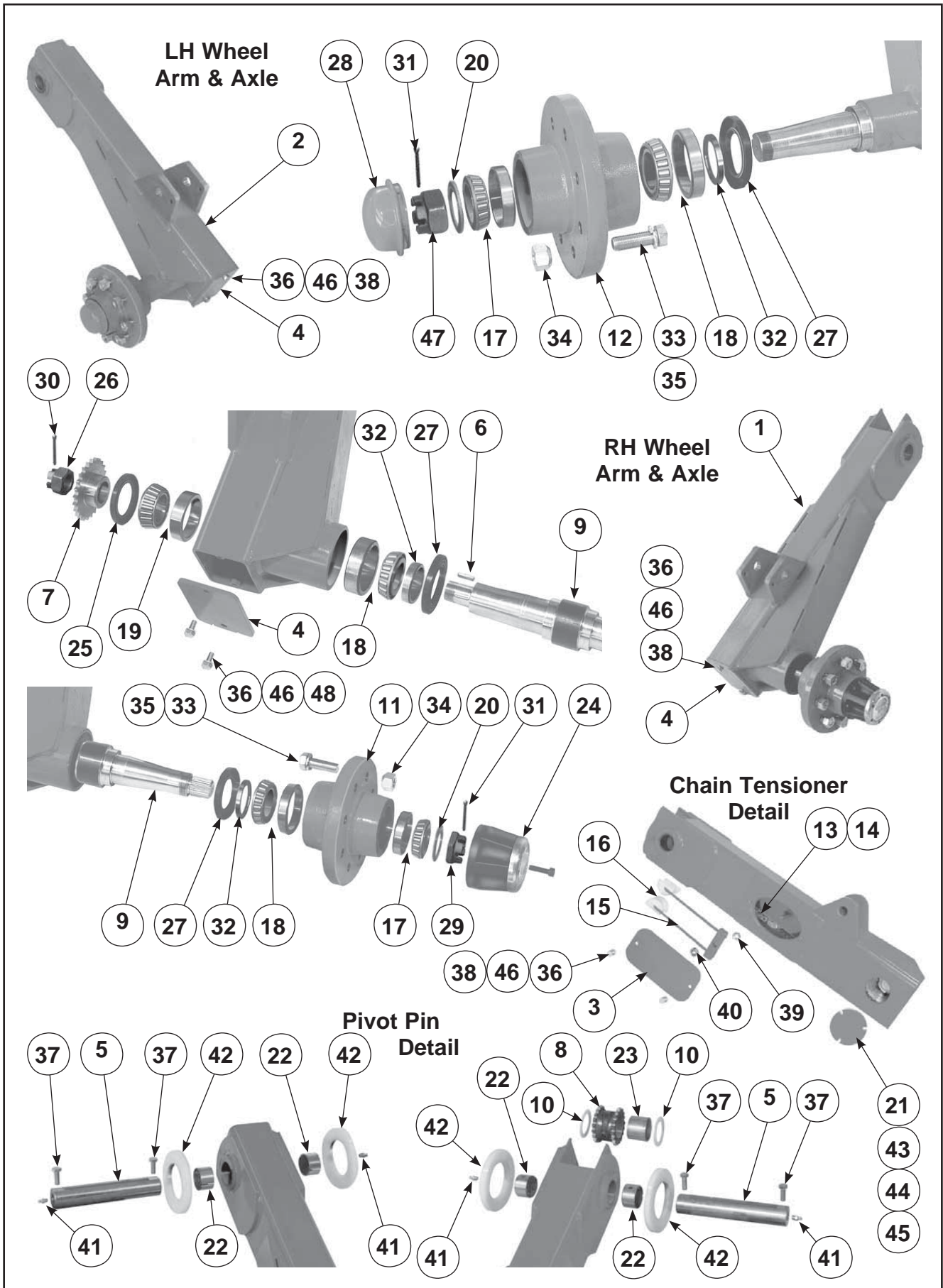
Part numbers for different width machines

Item	15 Run	17 Run	19 Run	21 Run	23 Run	26 Run
24	22240	22240	22242	22242	22244	22244
25	22256	22256	22258	22258	22260	22260
26	22388	22389	22392	22393	22396	22400

‘Enviro’ Seed Drill Mainframe & Drawbar

ITEM	PART No.	DESCRIPTION	QTY
1	22194	LH Endplate Assembly	1
2	22195	RH Endplate Assembly	1
3	22208	Coulter Adjustment Rod Assembly	2
4	22293	Ram Anchor Pin	2
5	22262	Clevis Pin (Wheel Arm, Tabbed)	2
6	22752	LH Wheel Arm Welded Assembly (refer page 36/37)	1
7	22753	RH Wheel Arm Welded Assembly (refer page 36/37)	1
8	43499	Stop Collar Set	1
9	43935	4" x 12" Master Rephasing Ram	1
10	43936	3.75" x 12" Slave Rephasing Ram	1
11	45272	R Clip (S12) or (AG7)	4
12	22270	Clevis Spacer	4
13	45134	M24 Class 8.8 Zinc Plated Hex Nut	4
14	45001s	M10 x 20 Class 8.8 Zinc Plated Set Screw	4
15	22310	Draw Bar Clevis Pin	1
16	22318	Draw Bar Axle	1
17	22322	Draw Bar Final Assembly	1
18	22449	Hydraulic Valve Support Assembly	1
19	31478	1 Tonne Jack & Stub Assembly	1
20	31483	Jack Support Bracket Assembly	1
21	43395	Heavy Duty Ratchet Ram/Turnbuckle	1
22	-	Turnbuckle Pin (Supplied with turnbuckle)	1
23	4800315	Hose Support	1
24	Refer Below	Frame Front Beam Assembly	1
25	Refer Below	Carrier Beam Assembly	1
26	Refer Below	Pressure Bar Assembly	1
27	45038	M16 x 40 Class 8.8 Zinc Plated Bolt	24
28	45052	M16 x 140 Class 8.8 Zinc Plated Bolt (Carrier Bar Ties)	6
29	45160	M16 Heavy Duty Zinc Plated Flat Washer	12
30	45141	M20 Nylock Nut	5
31	45140	M16 Nylock Nut	22
32	45034	M12 x 130 Class 8.8 Zinc Plated Bolt	1
33	45035	M12 x 140 Class 8.8 Zinc Plated Bolt	1
34	45139	M12 Nylock Nut	2
35	45292	7/16" x 1 1/2" Lynch Pin	2
36	45067	M20 x 75 Class 8.8 Zinc Plated Bolt	2
37	45018S	M12 x 25 Class 8.8 Zinc Plated Setscrew	4
38	45418S	M10 x 25 Zinc Plated Setscrew	2
39	45158	M10 H/D Zinc Plated Flat Washer	2
40	45166	M10 Zinc Plated Spring Washer	2
41	22305	Swivel Towhitch	1
42	45042	M16 x 60 Class 8.8 Zinc Plated Bolt	4
43	45084	M20 x 240 Class 8.8 Zinc Plated Bolt	1
44	45141	M20 Nylock Nut	1
45	43032	Chains No.3	2

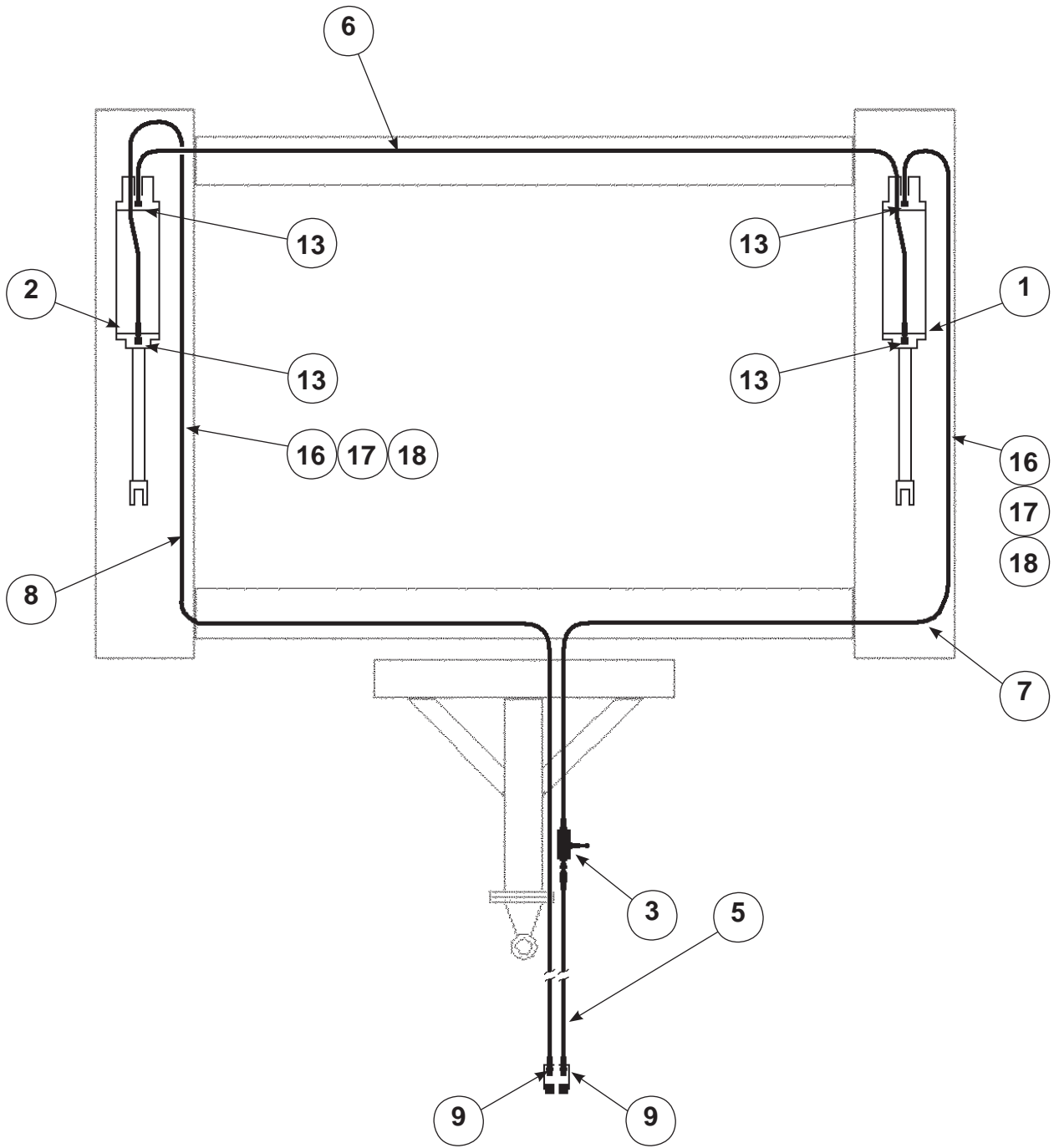
'Enviro' Seed Drill Wheel Arms



‘Enviro’ Seed Drill Wheel Arms

ITEM	PART No.	DESCRIPTION	QTY
1	22753	RH Wheel Arm Welded Assembly	1
2	22752	LH Wheel Arm Welded Assembly	1
3	22271P#	Cover Plate	1
4	22282P	End Cap	2
5	22292	Wheel Arm Pivot Pin	2
6	22032	6 Square x 22 Long Key	1
7	22295	25T x 1/2" Pitch Primary Sprocket	1
8	22297	19T x 1/2" Pitch Transfer Double Sprocket	1
9	22769	Drive Axle	1
10	22303	2.5mm Nylon Spacer	2
11	22767	Drive Hub	1
12	22768	Plain Wheel Hub	1
13	22465	1/2" x 131 Link BS Chain	1
14	43388	1/2" Pitch Joiner Link	1
15	31285	Chain Tensioner & Shoe Assembly	1
16	30273	Chain Tensioner Nylon Shoe Only (Spares)	2
17	43030	32009 Bearing	2
18	43033	32012 Bearing	3
19	43031	32010 Bearing	1
20	22264	Axle Washer 36mm Bore	2
21	22328P	Cover Plate	1
22	43426	Glacier Bush (45mm Bore)	4
23	43427	Glycodur Bush (45mm Bore)	1
24	43644	Freewheel Hub Assembly	1
25	43439	(CC 55 85 08) Oil Seal	1
26	47610	M30 x 1.5 Castle Nut	1
27	43040	(TC 8010010) Oil Seal	3
28	43431	3" Diameter Dust Cap	1
29	22766	M36 x 2 Castle Nut	1
30	45313	M5 x 50 Split Pin	1
31	45317	6.3 x 75 Split Pin	2
32	22765	Bearing Spacer	3
33	45040S	M16 x 50 Class 8.8 Zinc Plated Set Screw	16
34	45148	M16 Wheel Nut	16
35	45168	M16 Zinc Plated Spring Washer	16
36	45001s	M10 x 20 Class 8.8 Zinc Plated Set Screw	6
37	45018s	M12 x 25 Class 4.6 Zinc Plated Set Screw	4
38	45166	M10 Zinc Plated Spring Washer	6
39	45131	M12 Class 8.8 Zinc Plated Hex Nut	1
40	45139	M12 Nyloc Nut	1
41	43118	M8 x 1.25 Pitch Straight Grease Nipple	4
42	22285	Nylon Spacer Washer	4
43	44951s	M6 x 16 Class 4.6 Zinc Plated Set Screw	3
44	45164	M6 Zinc Plated Spring Washer	3
45	45150	M6 Light Flat Washer	3
46	45158	M10 Heavy Duty Zinc Plated Flat Washer	6
47	47611	M36 x 4 Castle Nut	1

'Enviro' Seed Drill Hydraulics

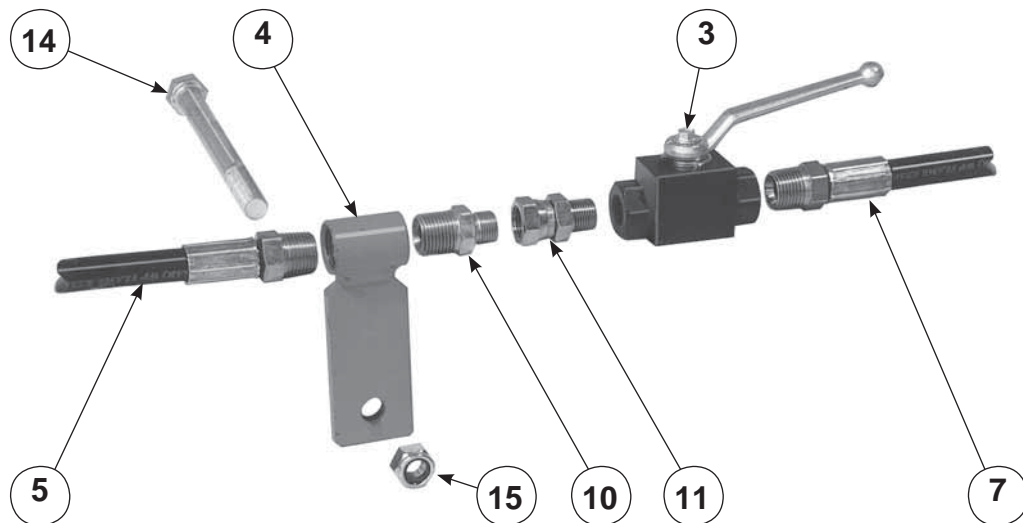


Seal kit for item 1 = part No 43414
Seal kit for item 2 = part No 43413

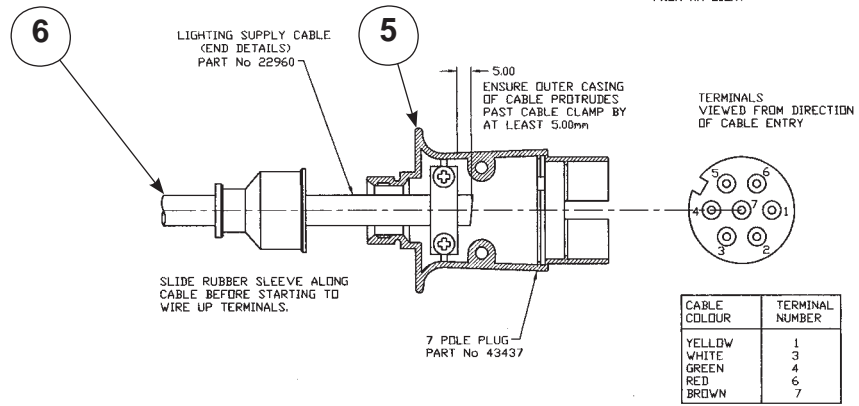
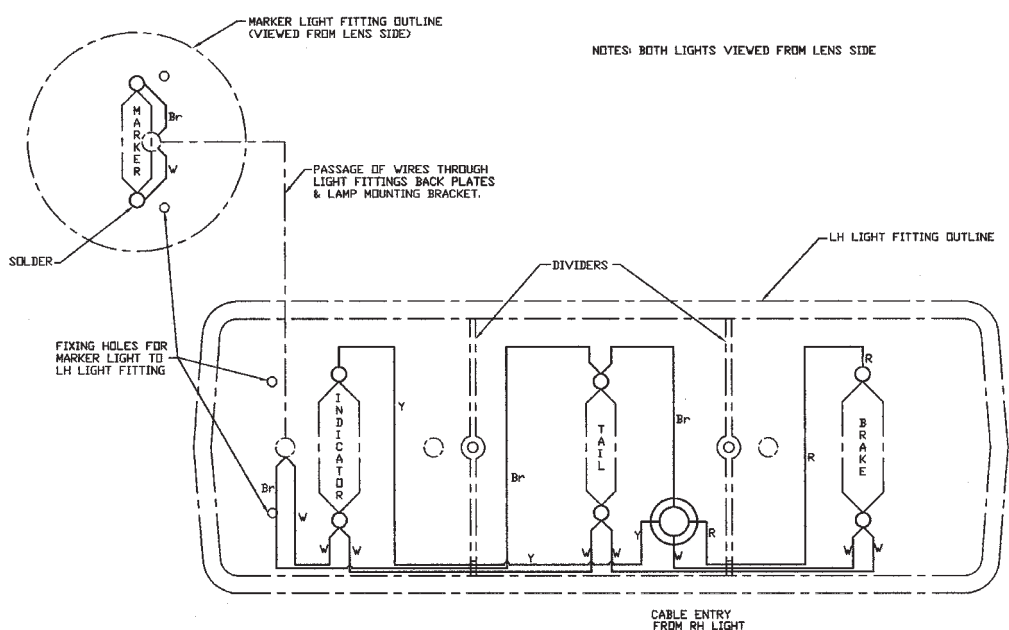
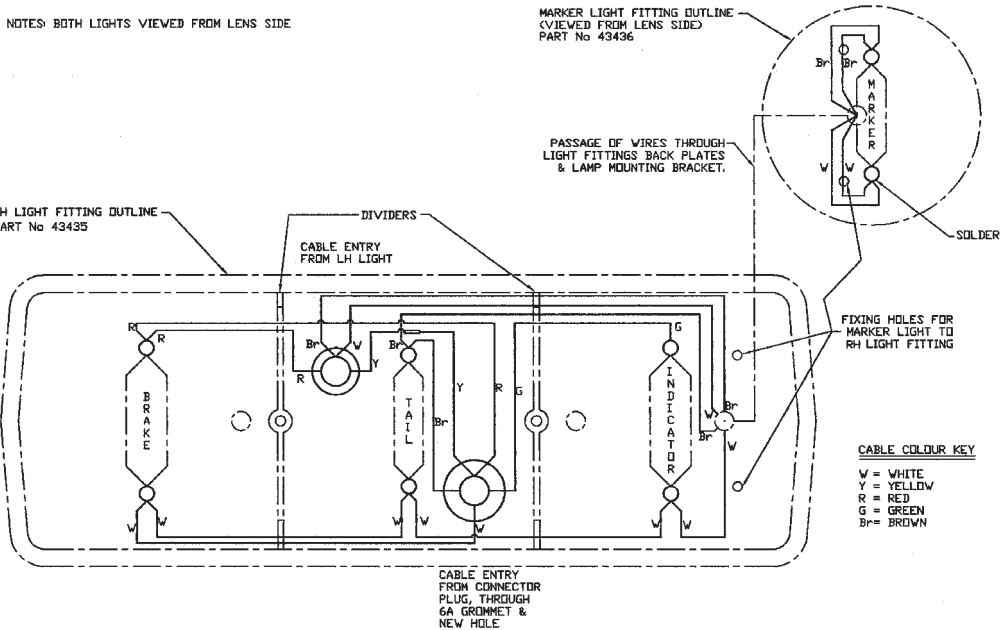
'Enviro' Seed Drill Hydraulics

ITEM	PART No.	DESCRIPTION	QTY
1	43935	4" x 12" Master Rephasing Ram	1
2	43936	3.75" x 12" Slave Rephasing Ram	1
3	43393	Stainless Steel Ball Valve 3/8" BSP	1
4	22449	Hydraulic Valve Support Assembly	1
5	22447	Hydraulic Hose 1.70m	1
6	Refer Below	Hydraulic hose	1
7	Refer Below	Hydraulic hose	1
8	Refer Below	Hydraulic hose	1
9	43147	1/2" BSP Male Quick Release Coupling	2
10	43445	1/2" BSPP to 3/8" BSPP Nipple	1
11	43399	3/8" BSPP Male/Female Swivel	1
12	43617	Male Probe Dust Cover	2
13	43496	3/4" UN'O' to 3/8" BSPT Elbow	4
14	45035	M12 x140 Class 8.8 Zinc Plated Bolt	1
15	45139	M12 Nylock Nut	1
16	43434	Hydraulic Hose Clamp	6
17	45412S	M8 x 25 Class 4.6 Zinc Plated Set Screw	6
18	45137	M8 Nylock Nut	6

ITEM	PART No.	HOSE LENGTH					
		15 Run	17 Run	19 Run	21 Run	23 Run	26 Run
6	22454	3.15m	3.15m	-	-	-	-
"	22460	-	-	3.75m	3.75m	-	-
"	22482	-	-	-	-	4.35m	4.35m
7	22453	4.20m	4.20m	-	-	-	-
"	22459	-	-	4.50m	4.50m	-	-
"	22481	-	-	-	-	4.80m	4.80m
8	22455	6.20m	6.20m	-	-	-	-
"	22461	-	-	6.50m	6.50m	-	-
"	22483	-	-	-	-	6.80m	6.80m



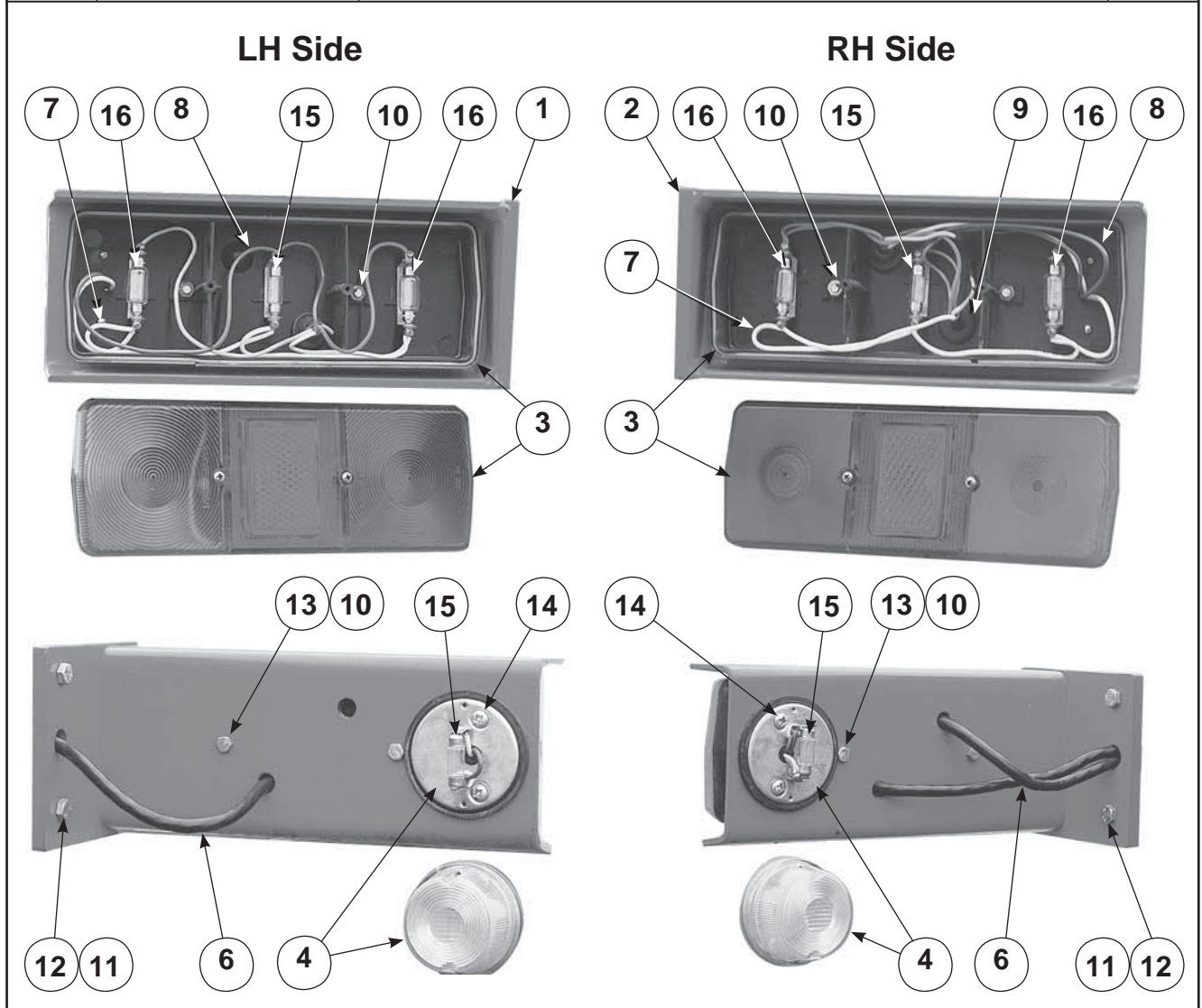
'Enviro' Seed Drill Wiring & Lighting Kit



NOTE: TERMINAL Nos 2 & 5 NOT USED

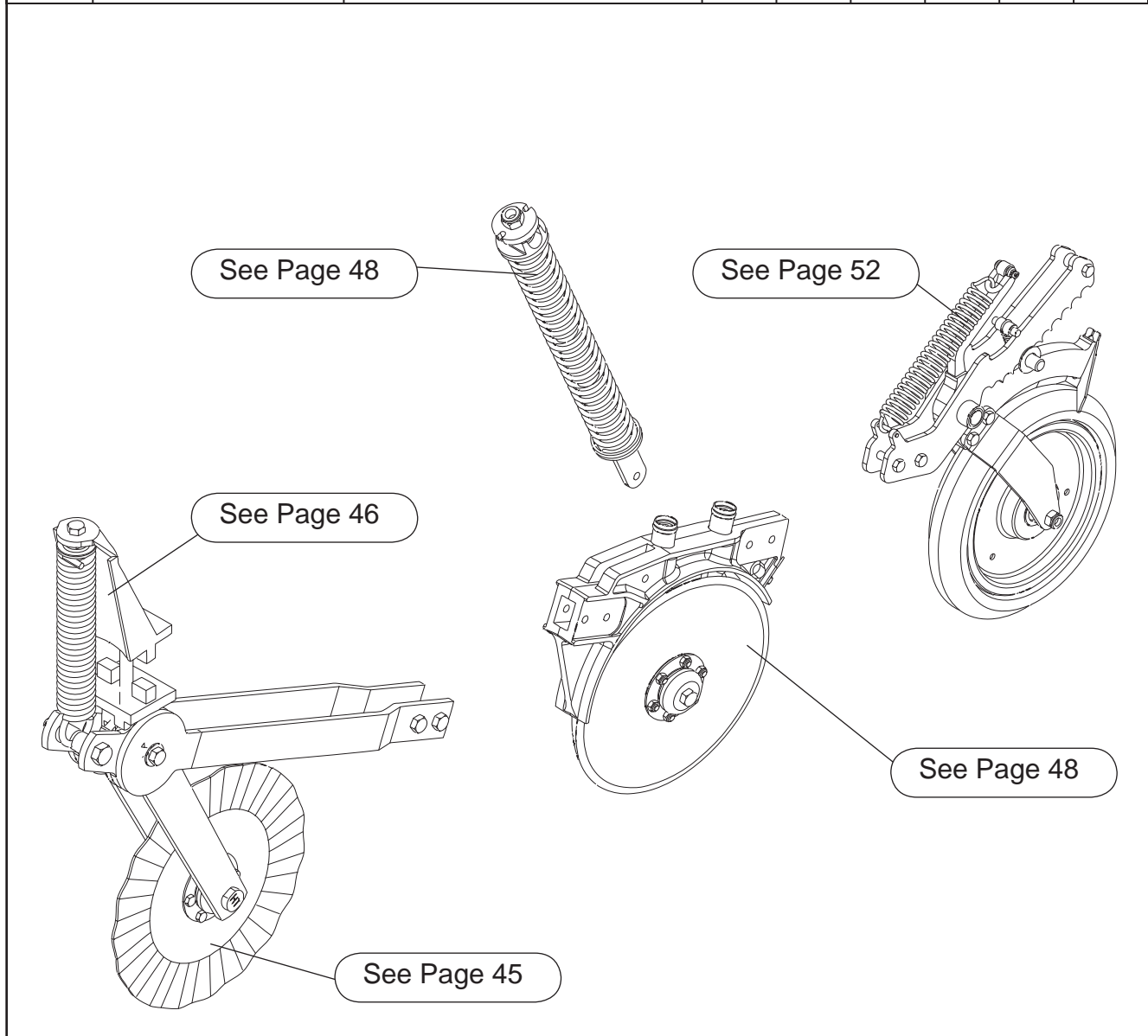
'Enviro' Seed Drill Wiring & Lighting Kit

ITEM	PART No.	DESCRIPTION	QTY
1	22346	LH Lamp Bracket Assembly	1
2	22347	RH Lamp Bracket Assembly	1
3	43435	Combination Rear Lamp	2
4	43436	Marker Lamp	2
5	43437	Trailer Round Connector Plug	1
6	43438	5 Core Trailer Flex (15 to 21 Run x 12m, 23/25 Run x 13m)	1
7	43443	White 1mm Appliance Wire x 1m	1
8	43444	Brown 1mm Appliance Wire x 1m	1
9	43448	No. 6 Rubber Grommet	1
10	45122	M6 Class 8.8 Zinc Plated Hex Nut	1
11	45137	M8 Nylock Nut	4
12	44962	M8 x 30 Class 8.8 Zinc Plated Bolt	4
13	44951s	M6 x 16 Class 8.8 Zinc Plated Set Screw	4
14	45860	No. 12 x 3/4" Pan PZ Zinc Plated Self Tapping Screw	4
15	-	5W Festoon Bulb 15 x 44mm	4
16	-	21W Festoon Bulb 15 x 44mm	4



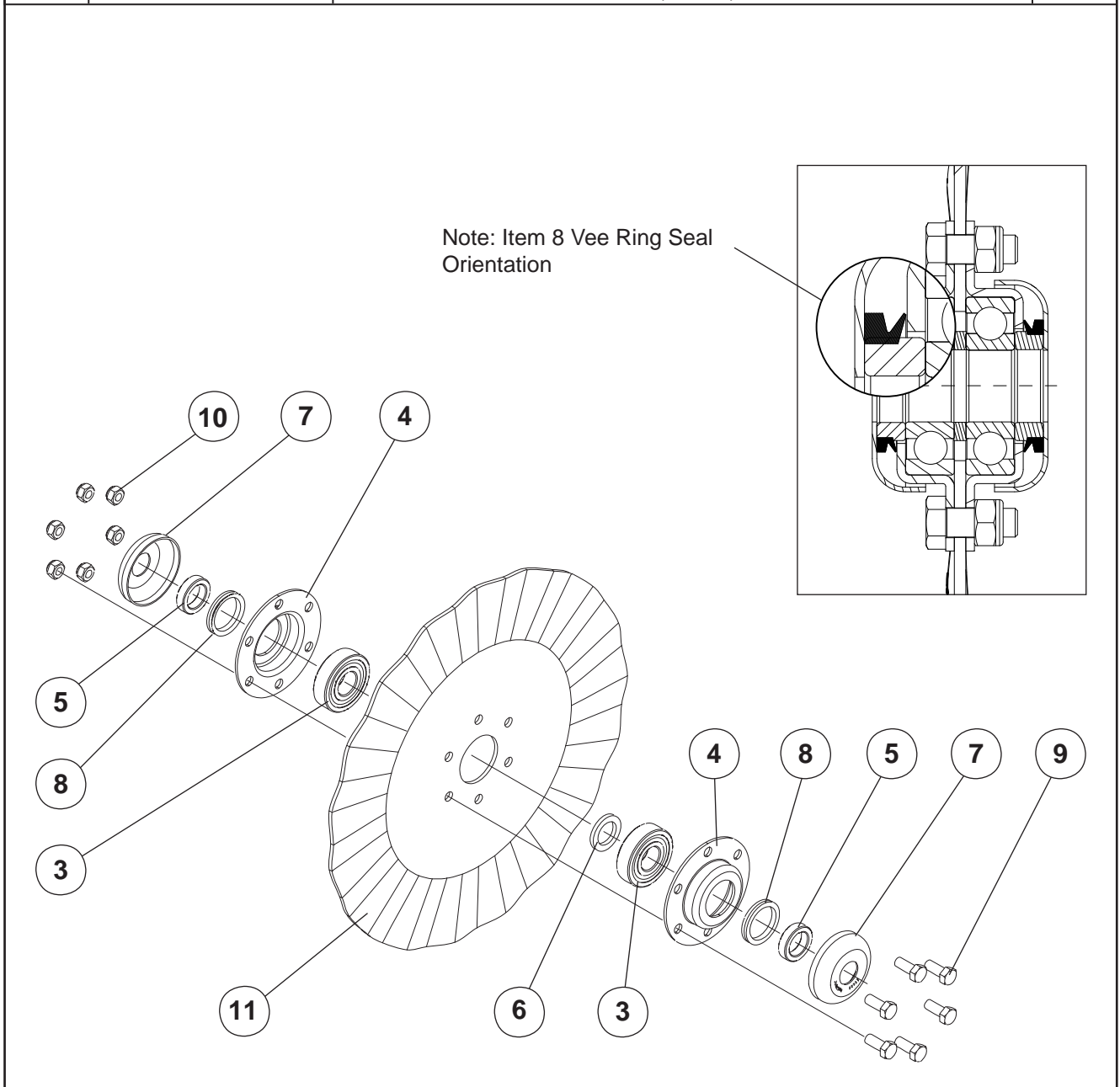
'Enviro' Seed Drill Coulter Assembly

ITEM	PART No.	DESCRIPTION	QUANTITIES					
			15R	17R	19R	21R	23R	26R
1	Refer P 46/47	Front Disc & Springs Assembly	15	17	19	21	23	26
2	Refer P 48/49	Double Disc Assembly	15	17	19	21	23	26
3	Refer P 50/51	Press Wheel Assembly	15	17	19	21	23	26
4	Refer P 52	Optional Press Wheels	As Required					
5	22057	LH Mounting Bracket	7	8	9	10	11	13
6	22058	RH Mounting Bracket	7	8	9	10	11	12
7	22060	Rubbing Block 150 mm Spacing	14	-	18	-	22	-
8	22067	Rubbing Block 135 mm Spacing	-	-	-	20	-	-
9	22068	Rubbing Block 130 mm Spacing	-	16	-	-	-	25
10	45031	M12 x 100 Class 8.8 Z/P Bolt	4	4	4	4	4	4
11	45032	M12 x 110 Class 8.8 Z/P Bolt	12	14	16	18	20	24
12	45139	M12 Nyloc Nut	16	18	20	22	24	28
13	45910	M6 x 25 Pan Hd Posidrive Screw	28	32	36	40	44	50

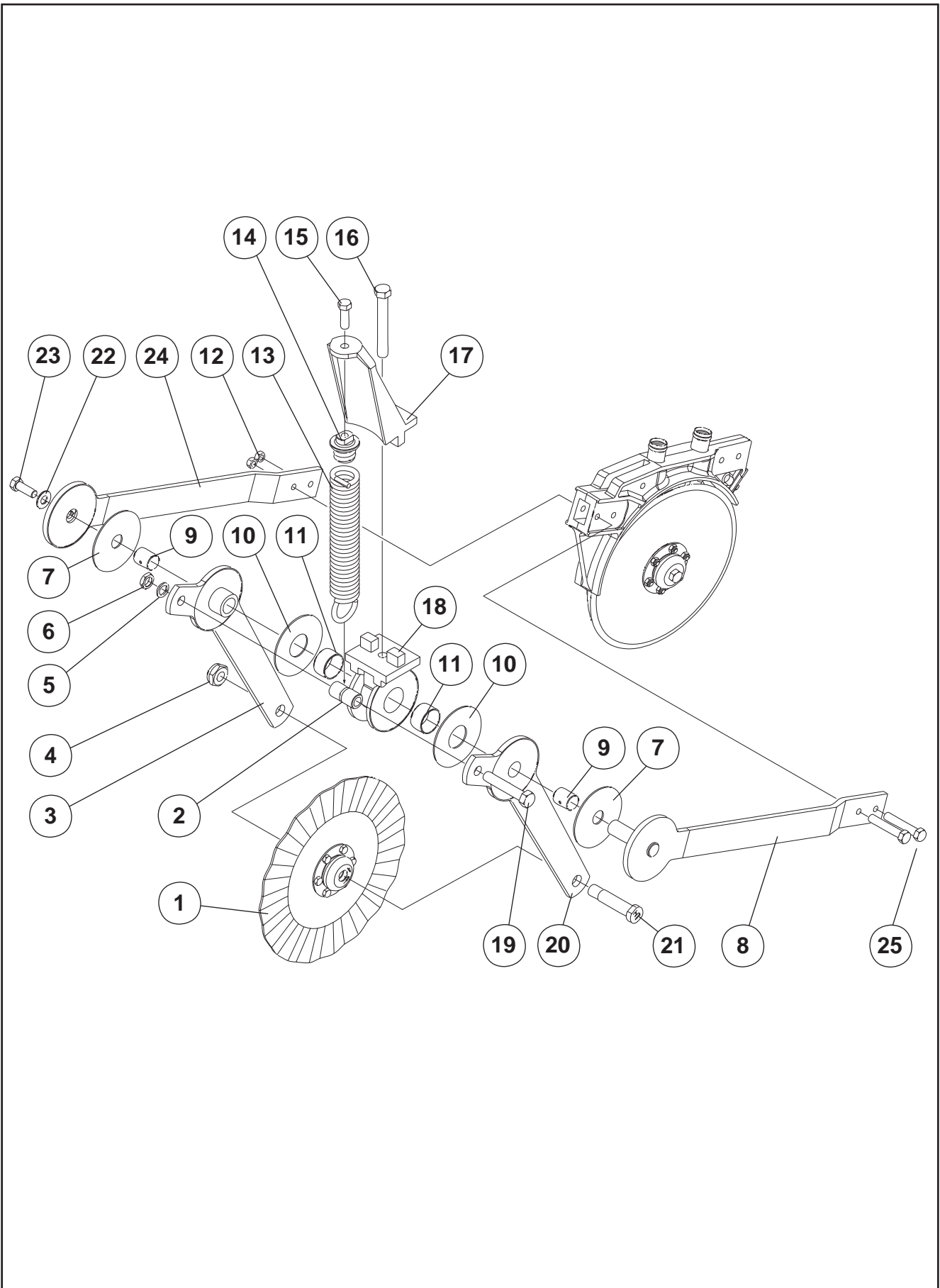


'Enviro' Seed Drill Front Disc Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	22000	406 x 4 Plain Disc 6 Hole	1
2	22001	406 x 4 Fluted Disc 6 Hole	1
3	11351	Bearing 6305-2RS1	2
4	17537	6 Hole Single Bearing Housing	2
5	22078	Seal Collar	2
6	22102	Bearing Spacer	1
7	22080	25mm Bore Dust Cap	2
8	43352	Vee Ring Seal V-40A	2
9	45002s	M10 x 25 Class 8.8 Zinc Plated Set Screw	6
10	45138	M10 Nylock Nut	6
11	22003	Action 2000 Fluted Disc 406 x 4 (6 Hole)	1



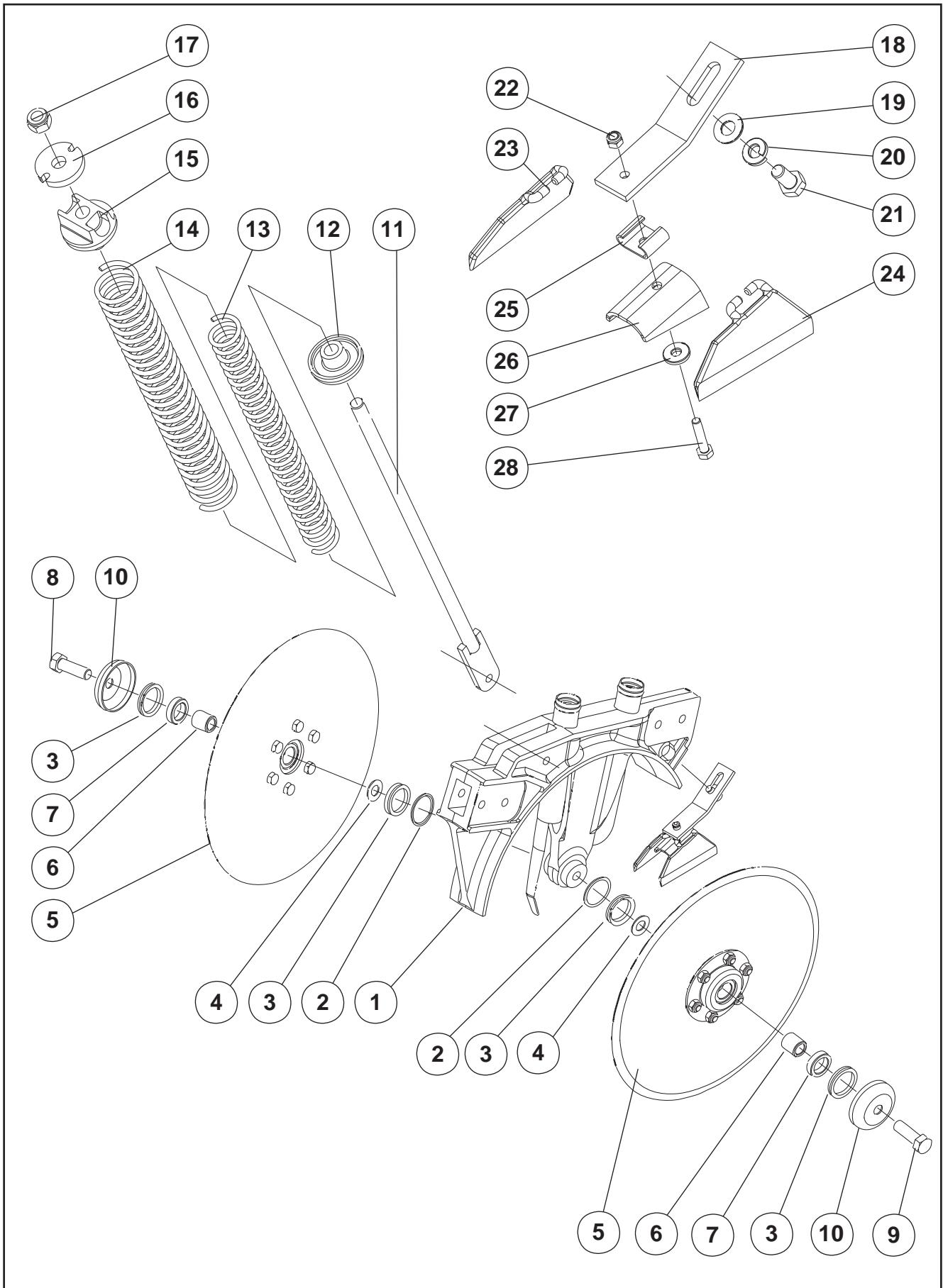
'Enviro' Seed Drill Front Coulter Assembly



‘Enviro’ Seed Drill Front Coulter Assembly

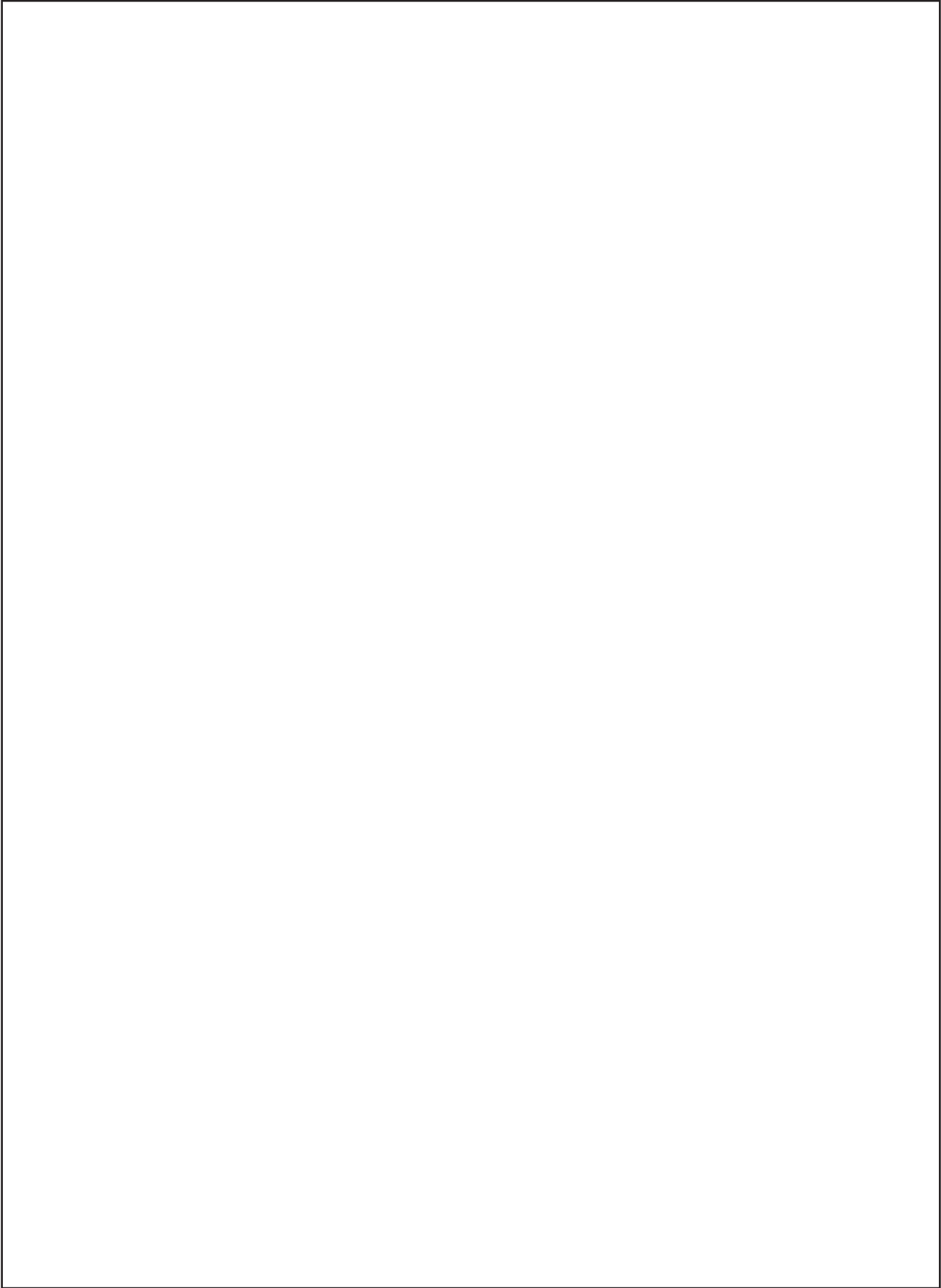
ITEM	PART No.	DESCRIPTION	QTY
1	Refer Page 45	Front Disc Assembly	1
2	22116	Front Coulter Spring Sleeve	1
3	61005	RH Front Coulter Arm Assembly	1
4	45143	M24 Nyloc Nut	1
5	45169	M20 Spring Washer Z/P	1
6	45120	M20 Half Nut Grade 8.8 Z/P	1
7	61013	Thrust Washer 30 Bore	2
8	61006	LH Dragbar Assembly	1
9	43510	Glacier Bush 30mm Bore	2
10	61014	Thrust Washer 50 Bore	2
11	43515	Glacier Bush 50mm Bore	2
12	45139	M12 Nyloc Nut	2
13	22115	Front Coulter Tension Spring	1
14	22117	Front Coulter Spring Anchor	1
15	45040s	M16 x 50 Set Screw Grade 8.8 Z/P	1
16	44944	M20 x 150 Bolt Grade 10.9 Z/P	1
17	22099	Coulter Spring Support	1
18	61012	Coulter Arm Support	1
19	45071	M20 x 110 Bolt Grade 8.8 Z/P	1
20	61001	LH Front Coulter Arm Assembly	1
21	22101	Coulter Axle Bolt	1
22	45160	M16 H/D Flat Washer Z/P	1
23	45038s	M16 x 40 Set Screw Grade 8.8 Z/P	1
24	61010	RH Dragbar Assembly	1
25	45030	M12 x 90 Bolt Grade 8.8	2
26	43118	Grease nipple M8 Straight	1

'Enviro' Seed Drill Double Disc Assembly



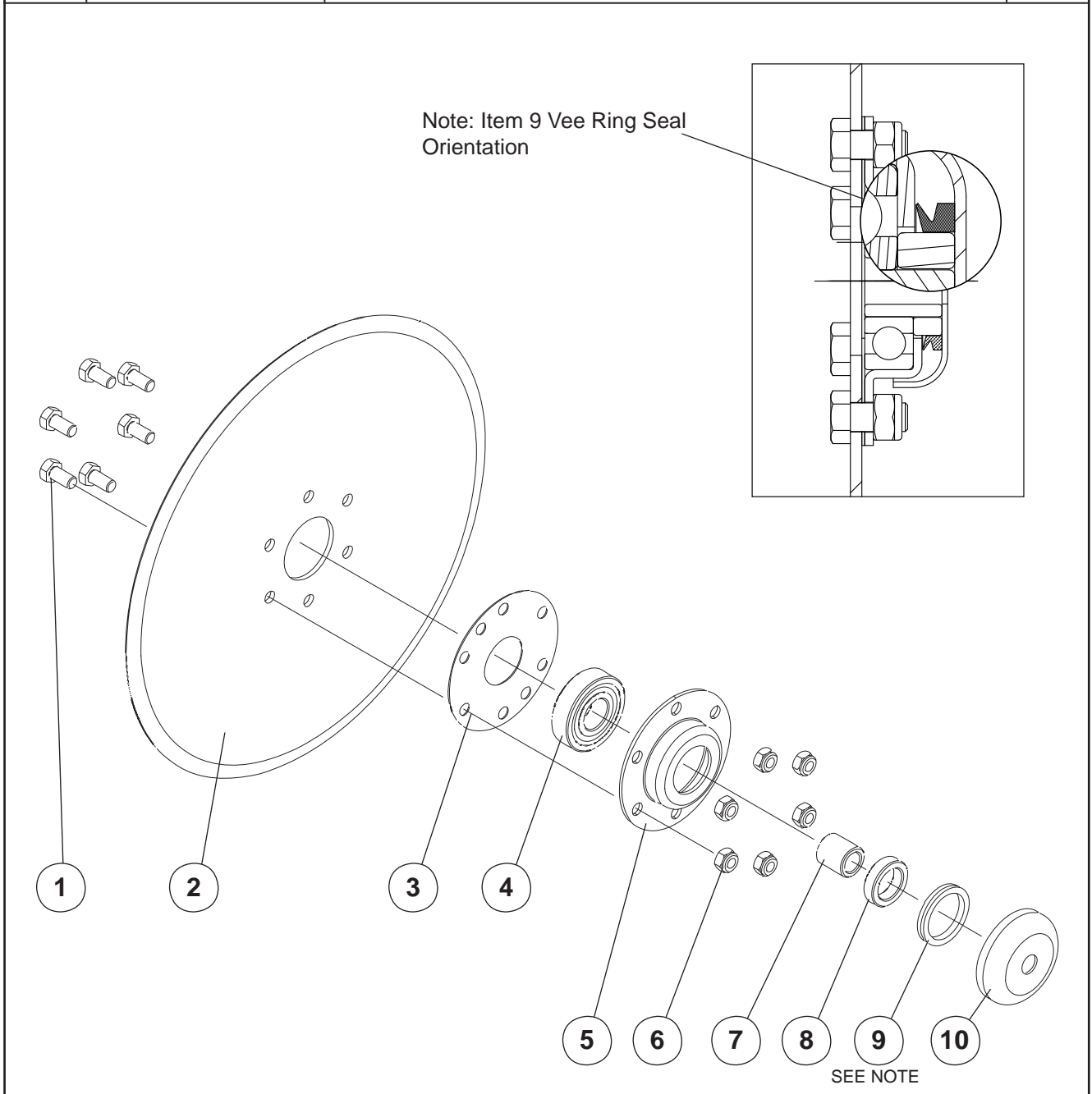
‘Enviro’ Seed Drill Double Disc Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	22203	Double Disc Casting Welded Assy (Mk2)	1
2	22136	Plastic Spacer	2
3	43352	Vee Ring Seal V-40A	2
4	45154	M16 Light Flat Washer Z/P	2
5	Refer Page 50	Disc Sub Assembly	2
6	22079	Bearing Sleeve	2
7	22078	Seal Collar	2
8	45040	M16 x 50 Bolt Grade 8.8 Z/P	1
9	22082	Disc Retaining Bolt (Left Hand Thread)	1
10	22077	Dust Cap 16mm Bore	2
11	22114	Spring Rod Assy	1
12	22109	Bottom Spring Retainer	1
13	17753	Inner Spring	1
14	17752	Outer Spring	1
15	17750	Top Spring Cap	1
16	22110	Spring Rod Cap	1
17	45141	M20 Nyloc Nut	1
18	22069	D/Disc Scraper Mounting Strap	1
19	45152	M10 Light Flat Washer Z/P	1
20	45166	M10 Spring Washer Z/P	1
21	45001s	M10 x 20 Set Screw Grade 8.8 Z/P	1
22	45136	M6 Nyloc Nut	1
23	22086C	R/H Scraper Casting	1
24	22087C	L/H Scraper Casting	1
25	22088	Scraper Hinge Stainless	1
26	22070	Double Disc Scraper Tensioner	1
27	45156	M6 HD Flat Washer Z/P	1
28	44955	M6 x 30 Bolt Grade 8.8 Z/P	1
29	45139	M12 Nyloc Nut	1
30	45023	M12 x 50 Bolt Grade 8.8 Z/P	1

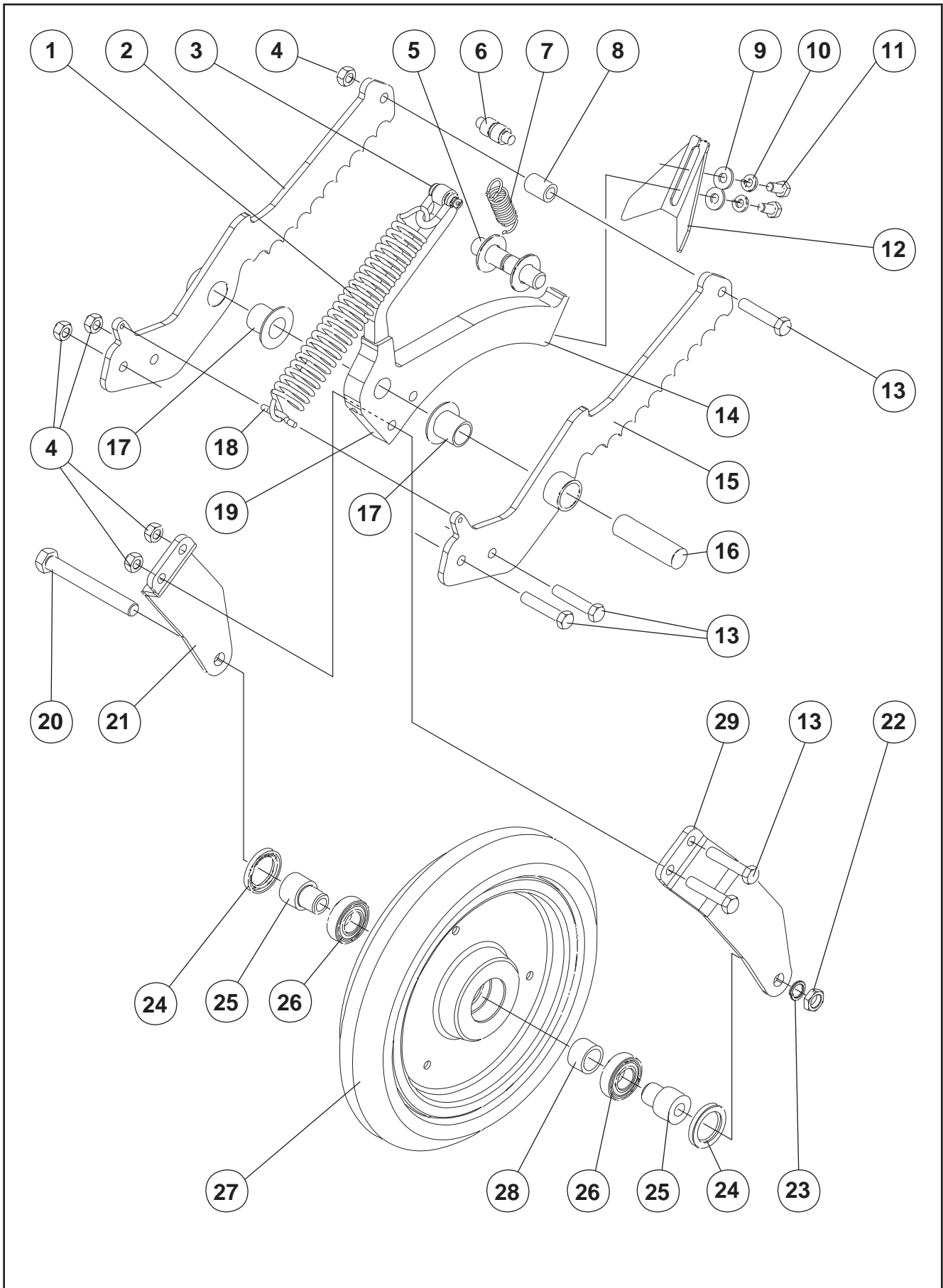


'Enviro' Seed Drill Disc Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	45001s	M10 x 20 Set Screw Grade 8.8 Z/P	6
2	22002	380 x 4mm Plain Disc x 6 Hole	1
3	22081	Seal Face Ring	1
4	11351	Bearing 6305	1
5	17537	Bearing Housing 6 hole	1
6	45138	M10 Nyloc Nut	6
7	22079	Bearing Sleeve	1
8	22078	Seal Collar	1
9	43352	Vee Ring Seal V-40A	1
10	22077	Dust Cap (16mm Bore)	1

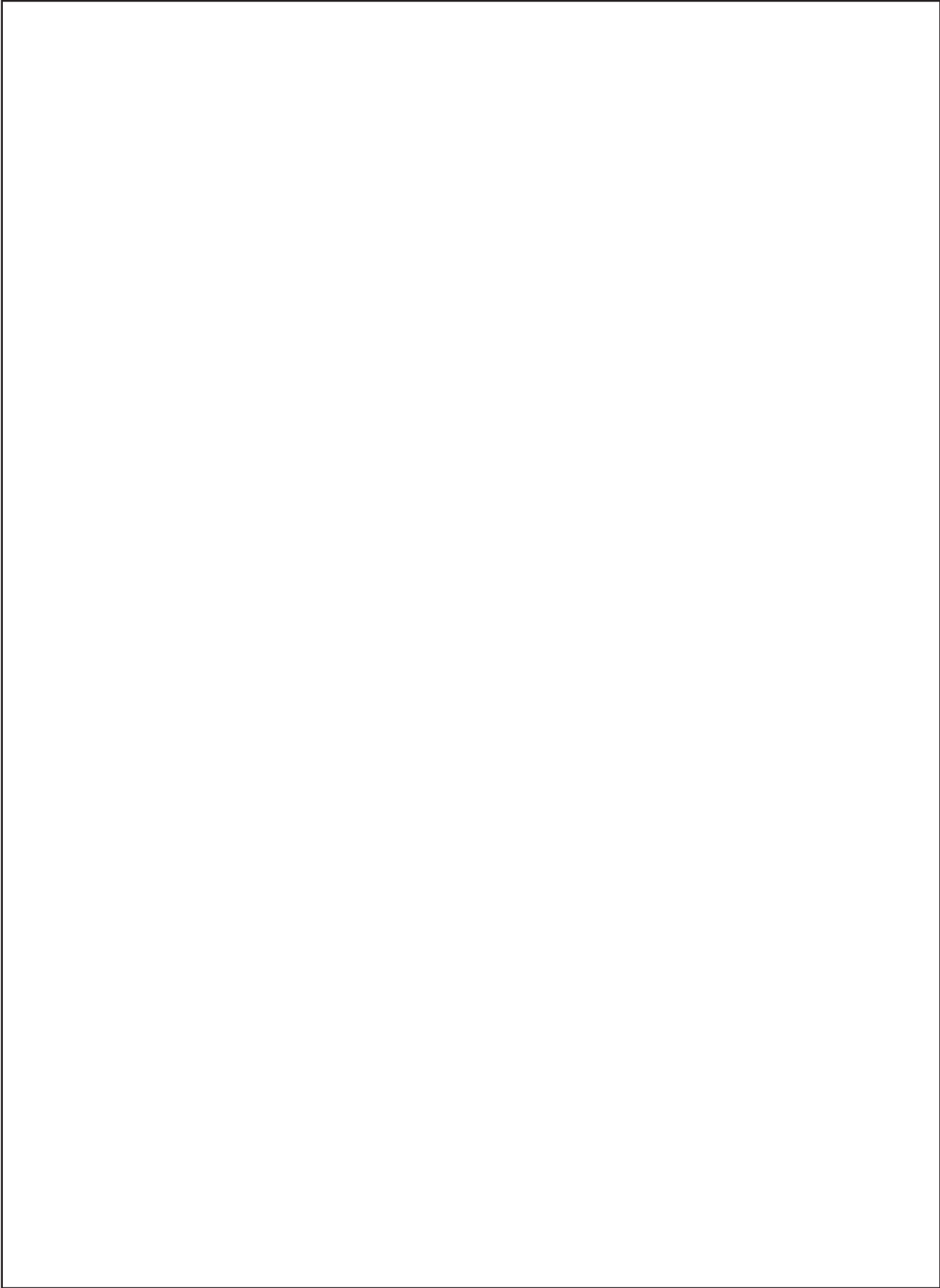


'Enviro' Seed Drill Press Wheel Assembly

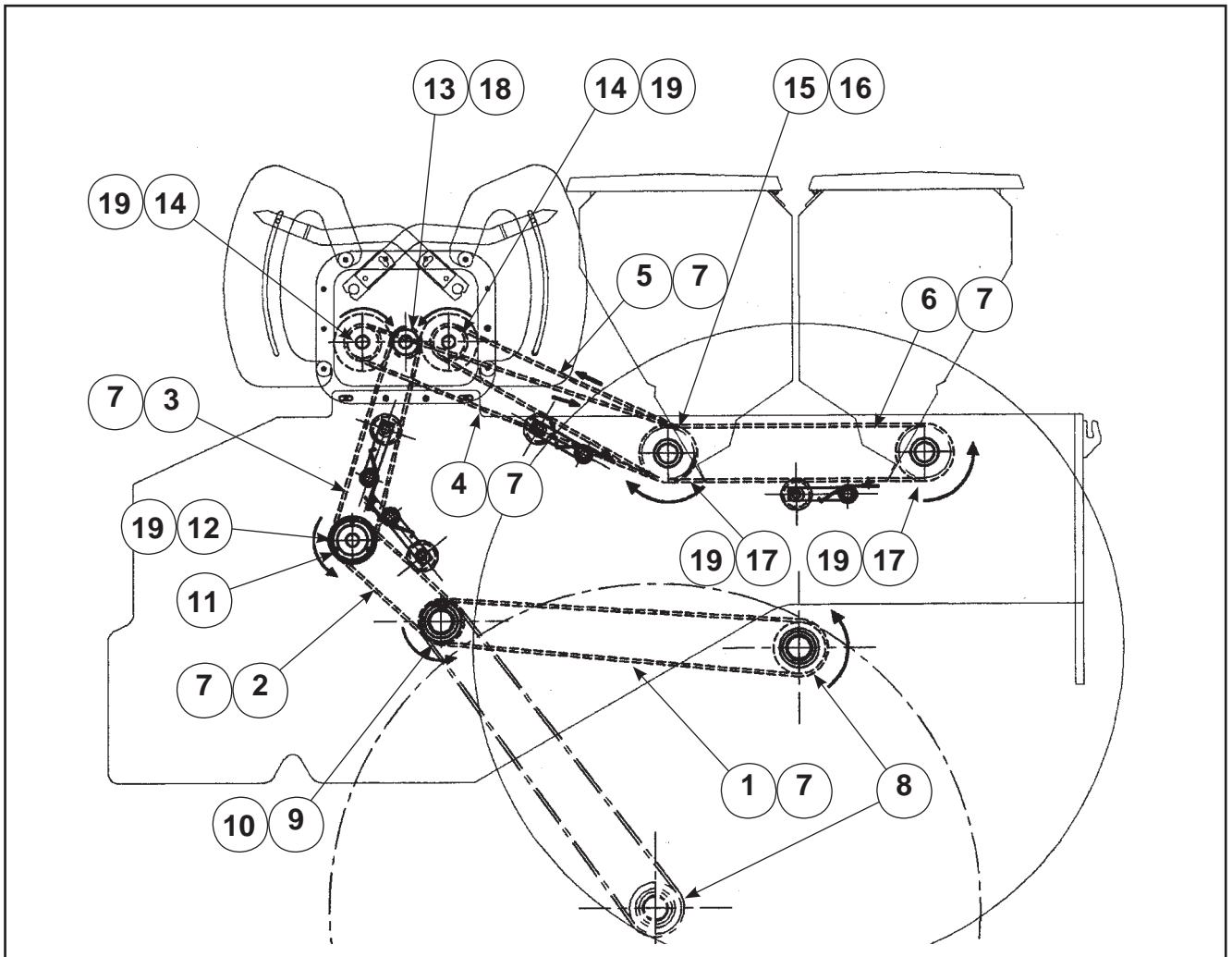


‘Enviro’ Seed Drill Press Wheel Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	23536	Tension Spring 7.5kN/m	1
2	24451	Upper Jaw Assy RH	1
3	45321	D Shackle 5/16"	1
4	45139	M12 Nyloc Nut	5
5	23510	Jaw Lock Pin Assembly	1
6	23506	Spring Slide	1
7	23525	Tension Spring	1
8	23504	Upper Jaw Spacer	1
9	45158	M10 Heavy Duty Flat Washer Z/P	2
10	45166	M10 Spring Washer Z/P	2
11	45001s	M10 x 20 Grade 8.8 Z/P S/Screw	2
12	29267	Scraper for 15" x 80mm Wedge Press Wheel	1
13	45025	M12 x 60 Grade 8.8 Z/P Bolt	5
14	23515	Lower Jaw Assembly	1
15	24450	Upper Jaw Assy LH	1
16	24452	Jaw Pivot Pin	1
17	24456	Bush Top Hat 25x30x32	2
18	23503	Spring Retainer	1
19	45187	M10 x 16 Socket Head Grubscrew	1
20	45051	M16 x 130 Grade 8.8 Bolt	1
21	23551	RH Press Wheel Arm	2
22	45119	M16 Grade 8.8 Hex Half-Nut	1
23	45168	M16 Spring Washer Z/P	1
24	10283	Oil Seal	2
25	61022	Bearing Mount	2
26	11351	Bearing 6305	2
27	43573	Press Wheel Solid Vee Wedge	1
28	61021	Spacer	1
29	23550	LH Press Wheel Arm	1

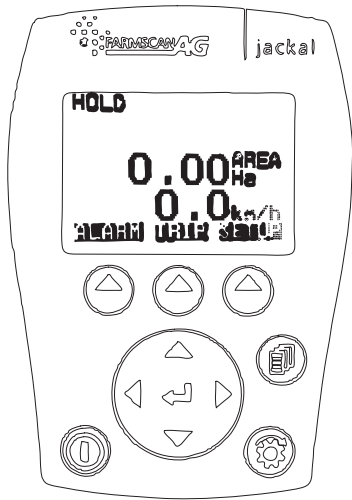


'Enviro' Seed Drill Drive Chains

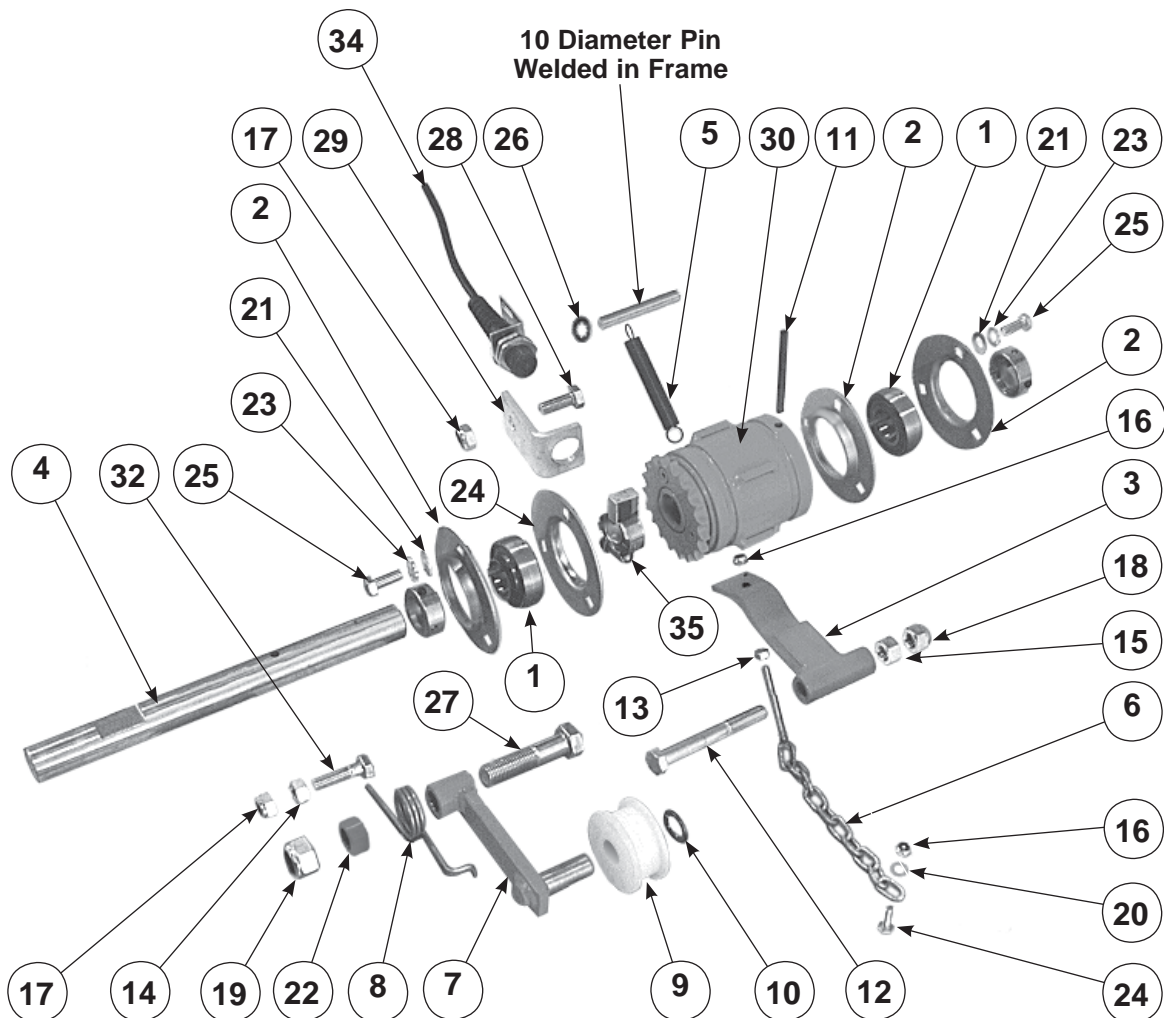


ITEM	PART No.	DESCRIPTION	QTY
1	22465	1/2" x 131 Link BS Chain (Wheel Hub to Arm Pivot Pin)	1
2	22466	1/2" x 55 Link BS Chain (Arm Pivot Pin to Clutch)	1
3	22467	1/2" x 79 Link BS Chain (Clutch to Gearbox Input)	1
4	22468	1/2" x 119 Link BS Chain (Gearbox to Front Seed Box)	1
5	22469	1/2" x 95 Link BS Chain (Gearbox to Rear Box Idler)	1
6	22470	1/2" x 103 Link BS Chain (Rear Box Idler to Rear Seed Box)	1
7	43388	1/2" Pitch Joiner Link	6
8	22295	25T x 1/2" Pitch Primary Sprocket (Hub Shaft)	1
9	22297	19T x 1/2" Pitch Transfer Double Sprocket (Arm Pivot Pin)	1
10	43427	Glycodur Bush (45mm Bore)	1
11	22161	Clutch Final Assembly Refer Page 28	1
12	22157	19 Tooth 1/2" Pitch 25mm Bore Sprocket (Clutch Output Shaft)	1
13	22043	15 Tooth 1/2" Pitch 25mm Bore Sprocket (Gearbox Input Shaft)	1
14	22044	15 Tooth 1/2" Pitch 20mm Bore Sprocket (Gearbox Output)	2
15	22521	25T x 1/2" Pitch Transfer Double Sprocket	1
16	43364	Glacier DU Bush (MB-2030-DU)	1
17	22537	25 Tooth 1/2" Pitch 20mm Bore Sprocket (Box Shafts)	2
18	22023	6 x 6 x 85 Long Key (Gearbox Input Drive Adapter)	1
19	22538	6 x 6 x 25 Long Key (Drive Sprockets)	6

'Enviro' Seed Drill Clutch Shaft Assembly



31 Jackal v3 kit

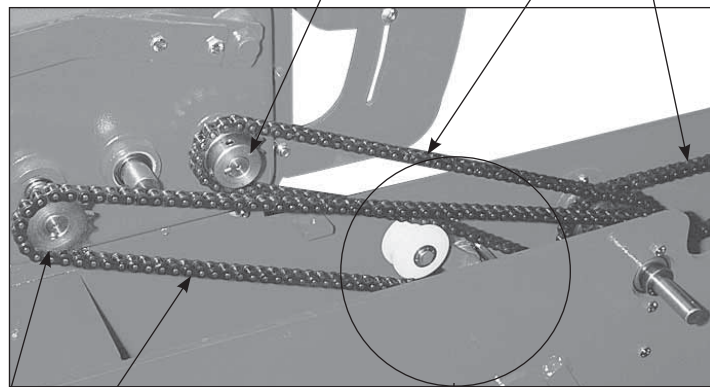
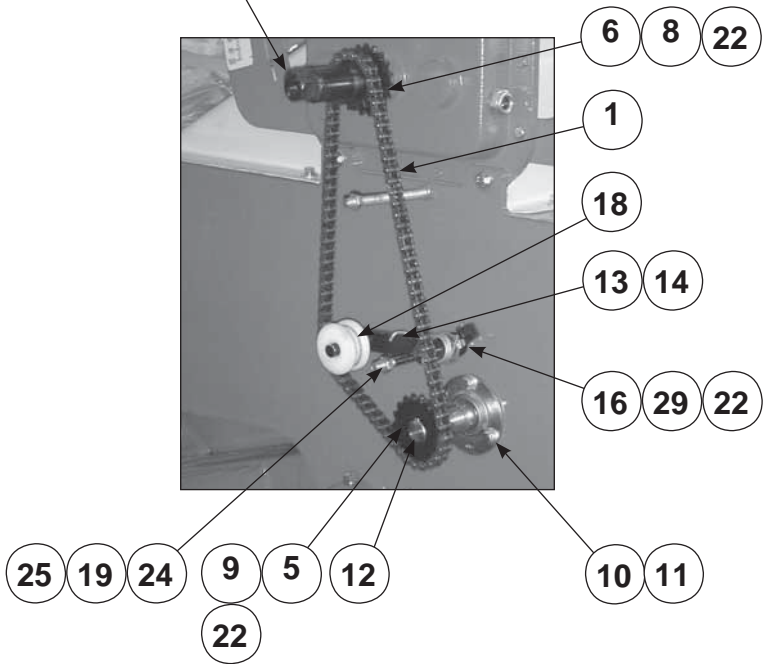


'Enviro' Seed Drill Clutch Shaft Assembly

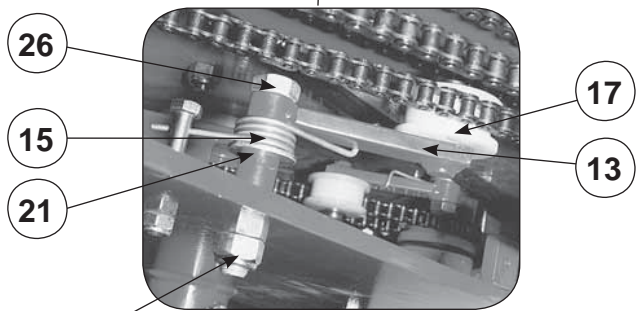
ITEM	PART No.	DESCRIPTION	QTY
1	43386	"Y" Bearing YET205 (25mm)	2
2	30359	Pressed Steel 3 Bolt Bearing Housing PF52 (2 Flanges)	2
3	22158	Clutch Actuating Arm Assembly	1
4	22144	Clutch Shaft (25mm) Quick Change	1
5	22159	Clutch Arm Return Spring	1
6	22165	Clutch Chain Assembly	1
7	22480	Chain Tensioner Arm Assembly	1
8	22522	Tensioner Torsion Spring LH	1
9	22535	Chain Tension Nylon Roller	1
10	45370	M16 Starlock Fixing Washer	1
11	45276	6mm Roll Pin x 60 long	1
12	45030	M12 x 90 Class 8.8 Zinc Plated Bolt	1
13	45122	M6 Class 8.8 Zinc Plated Hex Nut	3
14	45130	M10 Class 8.8 Zinc Plated Hex Nut	1
15	45131	M12 Class 8.8 Zinc Plated Hex Nut	1
16	45136	M6 Nylock Nut	9
17	45138	M10 Nylock Nut	4
18	45139	M12 Nylock Nut	1
19	45140	M16 Nylock Nut	1
20	45150	M6 Zinc Plated Light Flat Washer	1
21	45151	M8 Zinc Plated Light Flat Washer	6
22	22474	Chain Tensioner Spacer (6mm)	1
23	45165	M8 Zinc Plated Spring Washer	6
24	44952s	M6 x 20 Class 8.8 Zinc Plated Set Screw	1
25	44991s	M8 x 16 Class 8.8 Zinc Plated Set Screw	6
26	45368	M10 Starlock Fixing Washer	1
27	45041	M16 x 55 Class 8.8 Zinc Plated Bolt	2
28	45002s	M10 x 25 Class 8.8 Zinc Plated Set Screw	1
29	22162	Hectaremeter Sensor Mounting Bracket	1
30	22161	Clutch Final Assembly Refer P 28	1
31	44571K	Jackal v3 Hectaremeter Kit. Contains items 32 - 39	-
32	44572	Jackal v3 Speed & Area Meter	1
33	44573	Owner's Manual Jackal v3	1
34	43403	Hectaremeter Sensor w/o Nuts AA-110P/5	1
35	43404	Hectaremeter Clamp & Magnet AA-117	1
36	43154	Hectaremeter Sensor Brass Nut	2
37	44028	Window Mount AH-407	1
38	44031	7.5m Cable (2 way) AC-088	1
39	44574	Power Cable Assy Jackal v3 (complete: comprises items 39-42 below)	1
40	44029	Power Cable AC-105	1
41	44575	Cable S/Assy Jackal v3 (short 2way)	1
42	44146	11 way Terminal Block P321 Green	1

'Enviro' Seed Drill Box Drive Chain Details

**Clutch to Gearbox
Drive Detail**



**Gearbox to Boxshaft
Drive Detail**

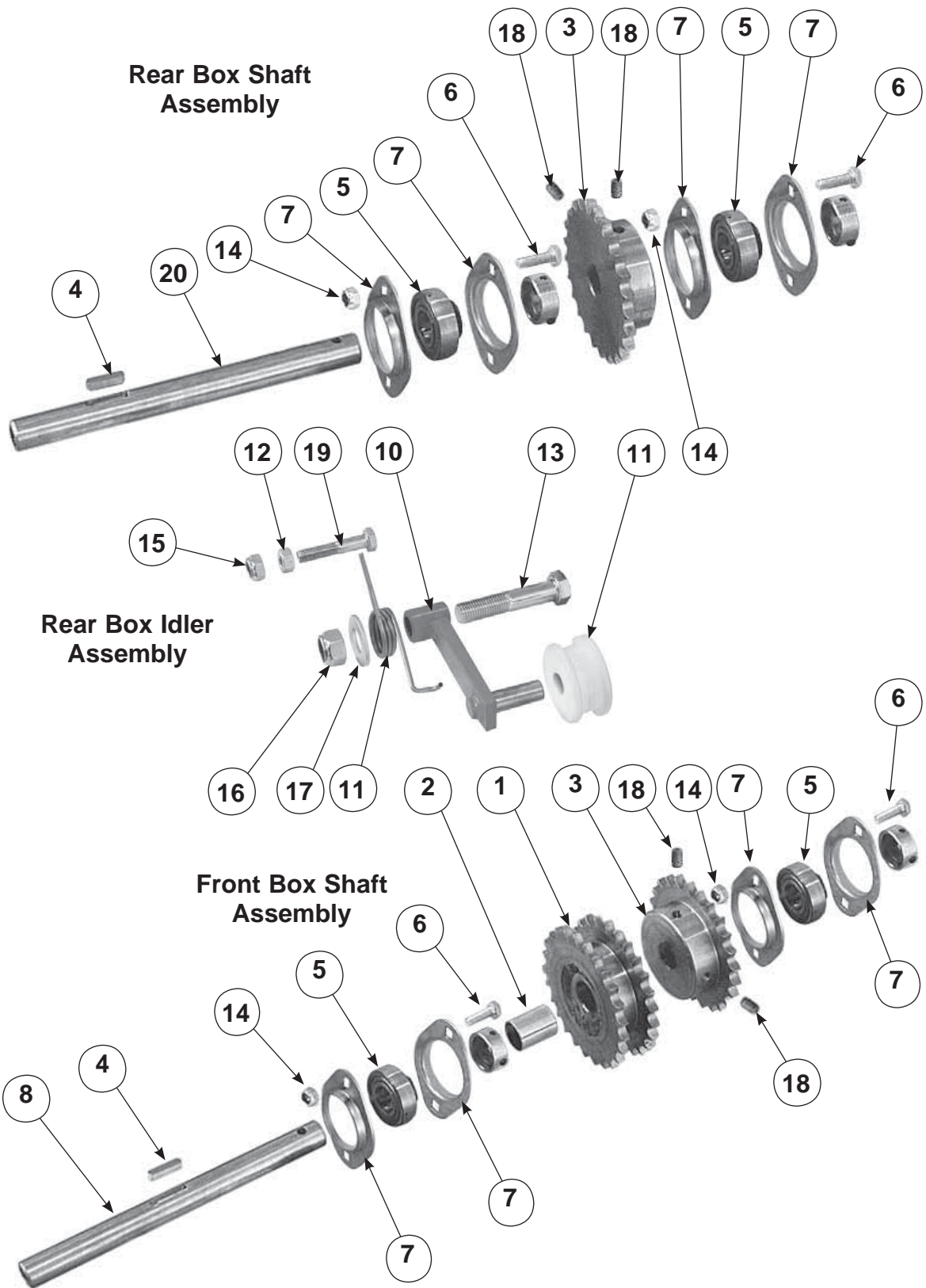


Idler Detail

‘Enviro’ Seed Drill Box Drive Chain Details

ITEM	PART No.	DESCRIPTION	QTY
1	22471	1/2" x 81 Link BS Chain (Clutch to Gearbox Input)	1
2	22468	1/2" x 119 Link BS Chain (Gearbox to Front Seed Box)	1
3	22469	1/2" x 95 Link BS Chain (Gearbox to Rear Box Idler)	1
4	22470	1/2" x 103 Link BS Chain (Rear Box Idler to Rear Seed Box)	1
5	25982	15/19 Tooth 1/2" Pitch 25mm Bore Change Sprocket	1
6	25982	15/19 Tooth 1/2" Pitch 25mm Bore Change Sprocket	1
7	22044	15 Tooth 1/2" Pitch 20mm Bore Sprocket (Gearbox Output)	2
8	22023	6 x 6 x 85 Long Key (Gearbox Input Drive Adapter)	1
9	22538	6 x 6 x 25 Long Key (Drive Sprockets)	6
10	43386	"Y" Bearing YET205 (25mm)	2
11	30359	Pressed Steel 3 Bolt Bearing Housing PF52 (2 Flanges)	2
12	22144	Clutch Shaft (25mm) Quick Change	1
13	22480	Chain Tensioner Arm Assembly	2
14	22522	Tensioner Torsion Spring LH	1
15	22523	Tensioner Torsion Spring RH	1
16	22475	Chain Tensioner Spacer (20mm)	1
17	22535	Chain Tension Nylon Roller	2
18	22050	Crank Adaptor	1
19	45130	M10 Class 8.8 Zinc Plated Hex Nut	6
20	45140	M16 Nylock Nut	2
21	45160	M16 Zinc Plated Heavy Duty Flat Washer	1
22	45181	M8 x 12 Socket Head Grubscrew	6
23	45180	M8 x 10 Socket Head Grubscrew	2
24	22197	M10 Retaining Stud	2
25	45166	M10 Zinc Plated Spring Washer	2
26	45045	M16 x 75 Class 8.8 Zinc Plated Bolt	1

'Enviro' Seed Drill Box Drive Shafts

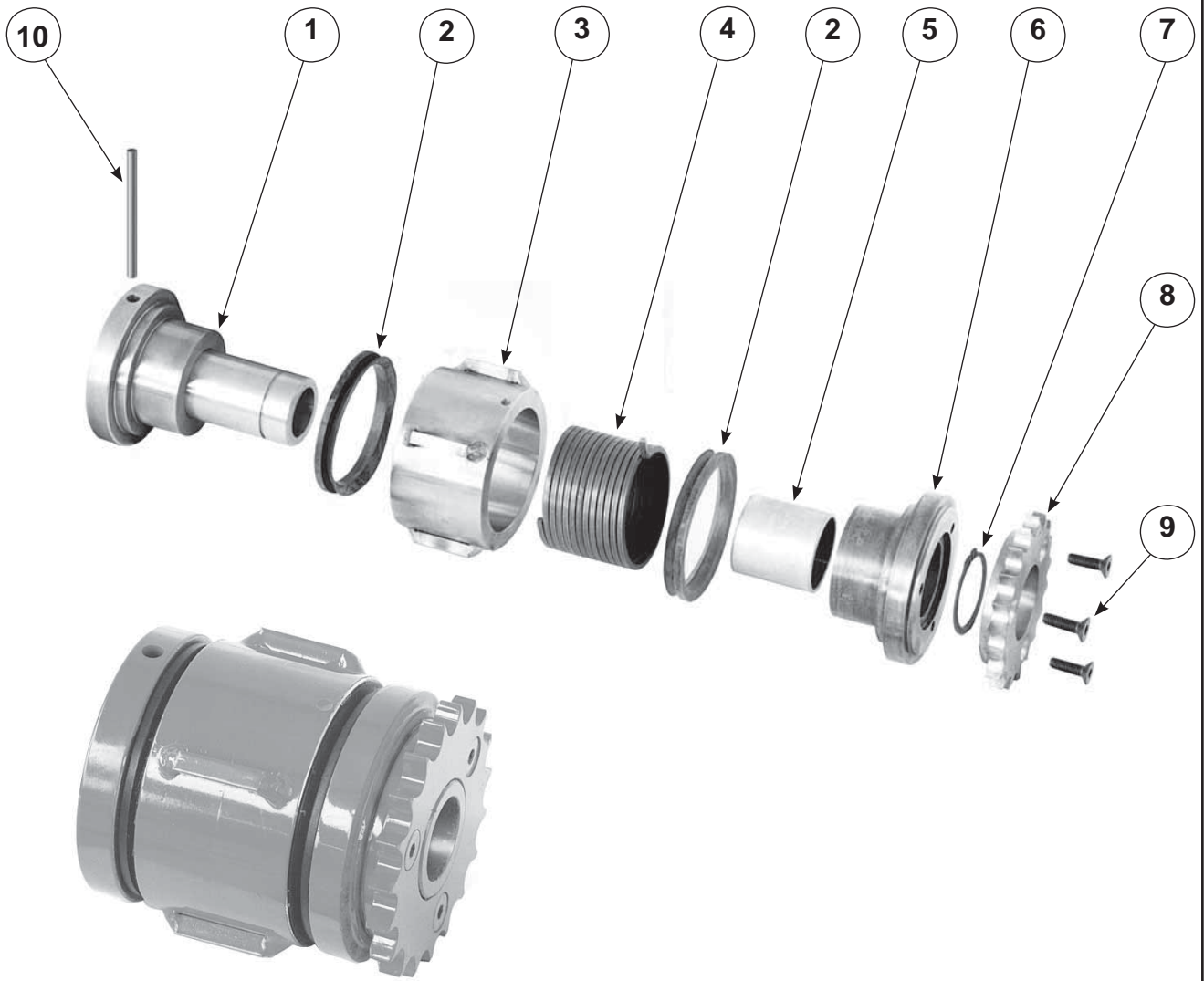


‘Enviro’ Seed Drill Box Drive Shafts

ITEM	PART No.	DESCRIPTION	QTY
1	22521	25T x 1/2" Pitch Transfer Double Sprocket	1
2	43364	Glacier DU Bush (MB-2030-DU)	1
3	22537	25 Tooth 1/2" Pitch 20mm Bore Sprocket (Box Shafts)	2
4	22538	6 x 6 x 25 Long Key (Drive Sprockets)	6
5	43385	"Y" Bearing YET204 (20mm)	4
6	44993s	M8 x 25 Class 8.8 Zinc Plated Set Screw	8
7	43387	Pressed Steel 2 Bolt Bearing Housing PFT47 (2 Flanges)	4
8	22516	Front Box Drive Shaft (20mm)	1
9	22480	Chain Tensioner Arm Assembly	1
10	22523	Tensioner Torsion Spring RH	1
11	22535	Chain Tension Nylon Roller	1
12	45130	M10 Class 8.8 Zinc Plated Hex Nut	6
13	45041	M16 x 55 Class 8.8 Zinc Plated Bolt	1
14	45137	M8 Nylock Nut	8
15	45138	M10 Nylock Nut	1
16	45140	M16 Nylock Nut	1
17	45160	M16 Zinc Plated Heavy Duty Flat Washer	1
18	45181	M8 x 12 Socket Head Grubscrew	4
19	45007s	M10 x 50 Class 8.8 Zinc Plated Set Screw	1
20	22517	Rear Box Drive Shaft (20mm)	1

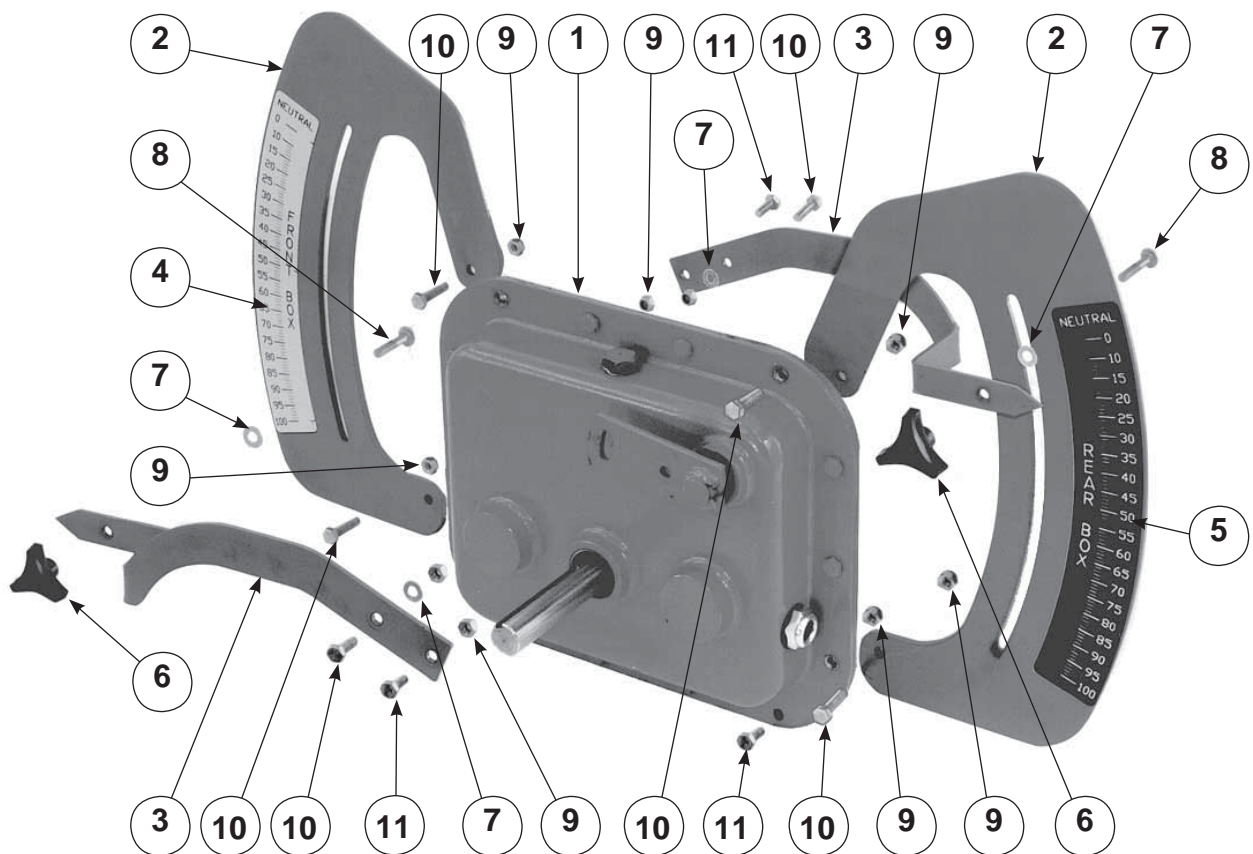
'Enviro' Seed Drill Clutch Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	22151	Clutch Output Hub Assembly	1
2	43353	Vee Ring Seal V-65A (Forsheda)	2
3	22149	Clutch Sleeve Assembly	1
4	22152	Clutch Spring (R.H.)	1
5	43357	Glycodur Bush (35mm Bore)	1
6	22145	Clutch Input Hub	1
7	43358	A35 Seeger Tru-Arc Circlip	1
8	22153	19T 1/2" Input Sprocket	1
9	47022	M6 x 20 Socket Head Countersunk Screw	3
10	45280	6mm Roll Pin x 60 long	1

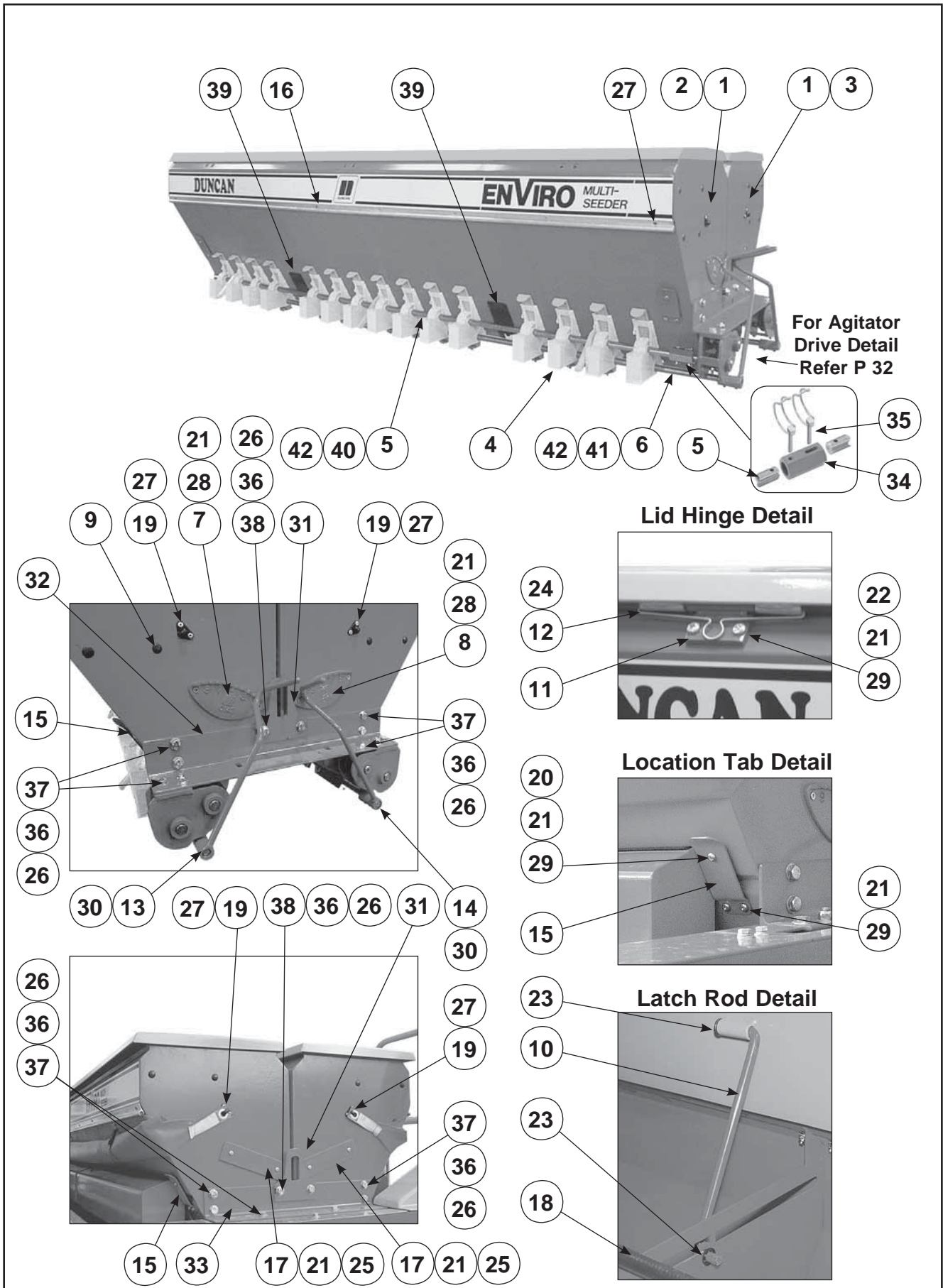


'Enviro' Seed Drill Gearbox Final Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	22053	Gearbox Sub-Assembly	1
2	22036	Speed Adjusting Quadrant	2
3	22038	Speed Adjustment Lever	2
4	22041	Speed Indicator Label Anticlockwise	1
5	22042	Speed Indicator Label Clockwise	1
6	43366	Tri-Knob with M8 Tapped Centre	2
7	45157	M8 Heavy Duty Zinc Plated Flat Washer	4
8	47031	M8 x 40 Cup Head Class 4.6 Zinc Plated Coach Bolt	2
9	45137	M8 Nylock Nut	18
10	44962	M8 x 30 Class 8.8 Zinc Plated Bolt	6
11	44992s	M8 x 20 Class 8.8 Zinc Plated Set Screw	12



'Enviro' Seed Drill Seedbox Assembly



‘Enviro’ Seed Drill Seedbox Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	Refer Below	Standard Combi Box & Lid (Bare Box Painted Only)	2
2	Refer Below	Front Box Complete (Includes Seeders & Shafts)	2
3	Refer Below	Rear Box Complete (Includes Seeders & Shafts)	2
4	Refer P 34/35	Seeder Assembly	*N
5	Refer Below	Box Shaft (20mm) (2 Reqd. per 23/26 Run Box)	2
6	Refer Below	Flap Shaft (18mm) (1 of each Reqd. per 23/26 Run Box)	2
7	10143	Front Box Quadrant Plate	1
8	10158	Rear Box Reverse Quadrant Plate	1
9	14442	Rubber Body Plug R187	28
10	22487	Latch Rod Assembly	2
11	22490	Hinge Assembly	6
12	22491	Hinge Pin	6
13	22498	Front Flap Handle Assembly	1
14	22499	Rear Flap Handle Assembly	1
15	22568	Location Tab (Calibration Tray)	4
16	Refer Below	Weather Skirt Holder	2
17	22855	Agitator Access Blanking Plate	2
18	43373	Black Edge Trim (Refer Below for Length per Box)	2
19	43430	Plastic Lashing Hooks	4
20	45122	M6 Class 8.8 Zinc Plated Hex Nut	4
21	45136	M6 Nylock Nut	32
22	45150	M6 Zinc Plated Light Flat Washer	12
23	45368	M10 Starlock Fixing Washer	4
24	27599	Hinge Pin Spring Clip	6
25	44951s	M6 x 16 Class 8.8 Zinc Plated Set Screw	4
26	45139	M12 Nyloc Nut	20
27	45702	4.8 x 9.5 Monel Pop Rivet	24
28	45758	M6 x 16 Zinc Plated Contersunk Posidrive Screw	4
29	45908	M6 x 16 Zinc Plated Pan Head Machine Screw	24
30	45181	M8 x 12 Socket Head Grubscrew	4
31	22485P	Box Set Lifting Eye Profile	2
32	22484	Box Set Mounting Bracket LH	1
33	22495	Box Set Mounting Bracket RH	1
34	22419	Box Shaft Connecting Sleeve	2
35	47615	6 x 40 Pipe Lynch Pin	4
36	45153	M12 Zinc Plated Light Flat Washer	40
37	45019s	M12 x 30 Class 8.8 Zinc Plated Set Screw	16
38	45021	M12 x 40 Class 8.8 Zinc Plated Bolt	4
39	43381	Metering Housing Outlet Cover (15, 19 & 23 Run Machines Only)	4
40	22421	Box Shaft Joining Collar (23/25 Run Boxes Only)	2
41	22496	Flap Shaft Joining Collar (23/25 Run Boxes Only)	2
42	45185SS	M10 x 10 Stainless Socket Head Grubscrew (23/25 Run Boxes Only)	8

*N Where N = number of coulters fitted. e.g. 19 for 19 Run Machine (see table below for part number).

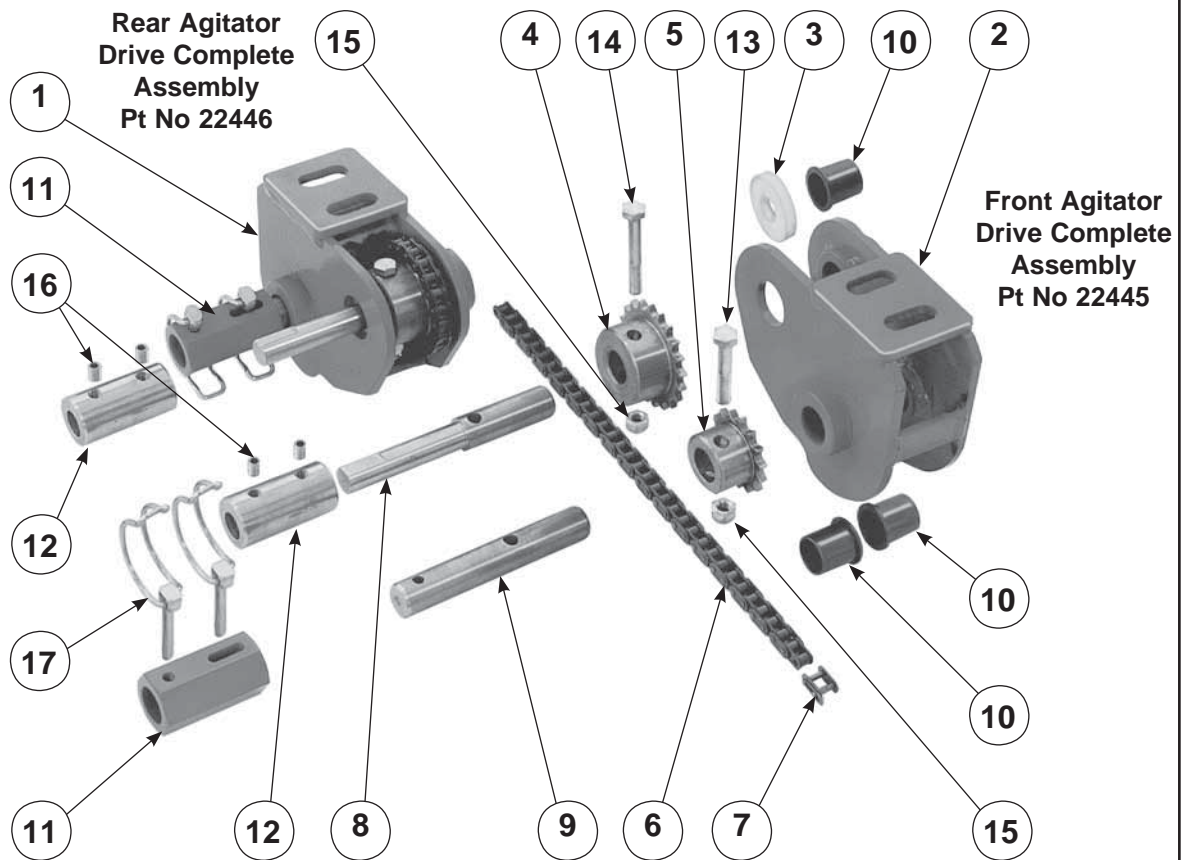
Part numbers for different width machines *						
Item	15 Run	17 Run	19 Run	21 Run	23 Run	26 Run
1	22860	22860	22862	22862	22864	22864
2	22870	22900	22872	22902	22874	22904
3	22877	22901	22879	22903	22881	22905
5	22541	22541	22543	22543	22545	22545
6	22493	22493	22531	22531	22533/22534*	22533/22534*
16	22845	22845	22847	22847	22849	22849
18	5 metre	5 metre	6.2 metre	6.2 metre	8.4 metre	8.4 metre

* Note: For Stainless Steel Boxes add SS to the end of the relevant part number above.
e.g. 22860SS for 15 Run Stainless Steel Box.

22533* = 1798 long
22534* = 1618 long

'Enviro' Seed Drill Agitator Drives

ITEM	PART No.	DESCRIPTION	QTY
1	22414	Agitator Drive Front Housing	1
2	22415	Agitator Drive Rear Housing	1
3	22416	Agitator Drive Spacer	2
4	22418	3/8" Pitch x 20mm Bore 21T Sprocket	2
5	22422	3/8" Pitch x 20mm Bore 15T Sprocket	2
6	22417	3/8" Pitch x 33 Link BS Chain	2
7	43396	3/8" Pitch Joiner Link	2
8	22425	Agitator Shaft Extension	2
9	22426	Seed Shaft Extension	2
10	43428	Nylon Bush	6
11	22419	Box Shaft Connecting Sleeve	2
12	22420	Agitator Shaft Joining Collar	2
13	44965	M8 x 45 Class 8.8 Zinc Plated Bolt	2
14	44968	M8 x 60 Class 8.8 Zinc Plated Bolt	2
15	45137	M8 Nylock Nut	4
16	45180SS	M8 x 10 Stainless Steel Socket Head Grub Screw	4
17	47615	6 x 40 Pipe Lynch Pin	4



Front Assembly Only Shown Exploded

'Enviro' Seed Drill Agitator Shaft Assembly

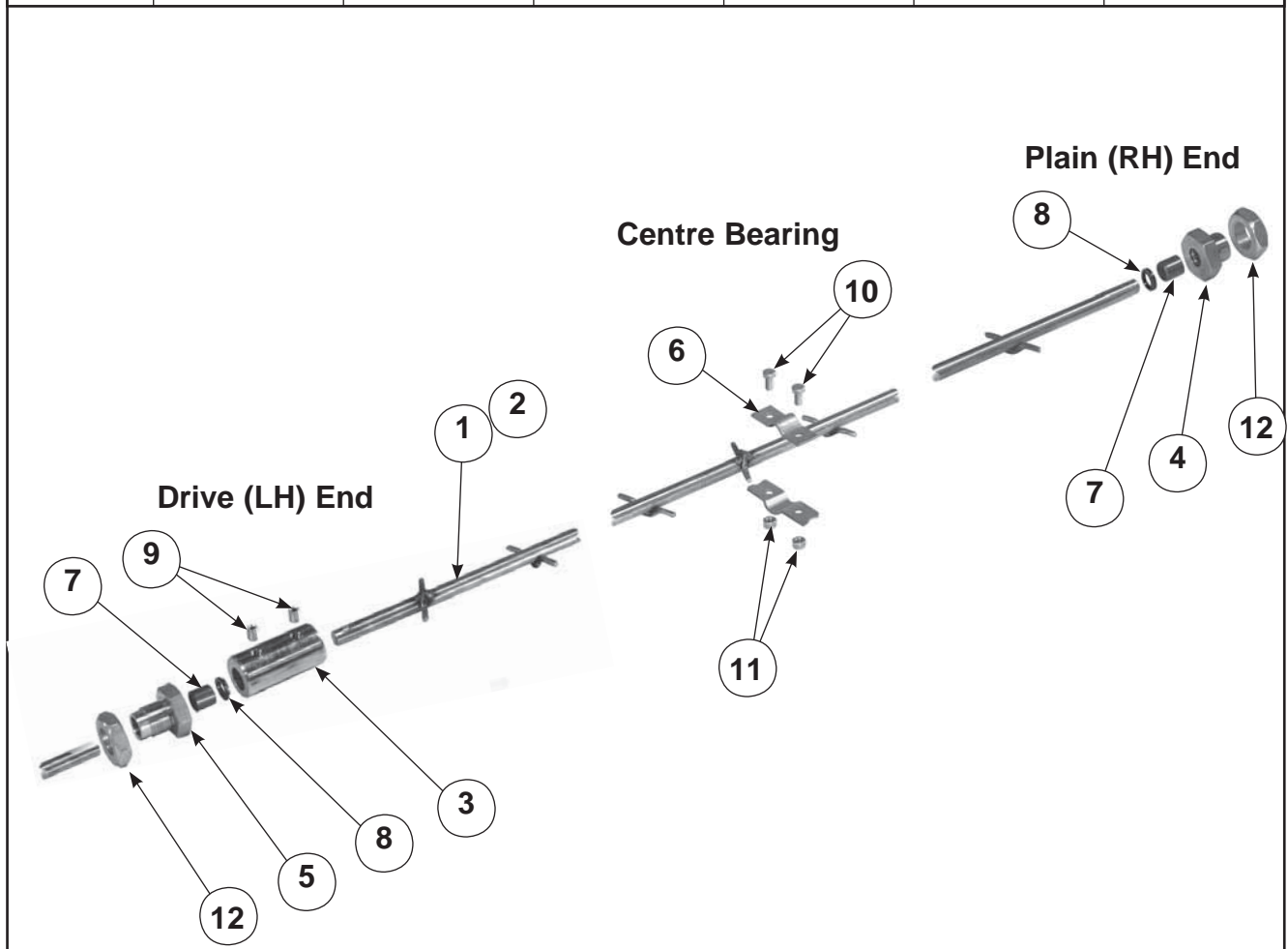
ITEM	PART No.	DESCRIPTION	QTY
1	Refer Below	Agitator Shaft Assembly (Front Box)	1
2	Refer Below	Agitator Shaft Assembly (Rear Box)	1
3	22420	16mm Agitator Joining Collar	2
4	22423	Agitator Shaft Support RH (Short)	2
5	22424	Agitator Shaft Support LH (Long)	2
6	22428	Agitator Shaft Support Cap	*2
7	43415	Acetal Bush (A.E.C. Pt. P210M) See Note 1 Below	4
8	43442	5/8" Lurethane Wiper Seal	4
9	45185SS	M10 x 10 Stainless Steel Socket Head Grubscrew	2
10	45410SSS	M8 x 16 Grade 316 Stainless Steel Set Screw	*4
11	45137SS	M8 Grade 316 Stainless Steel Nylock Nut	*4
12	47600	M30 ISO Fine Zinc Plated Hex Lock Nut	2

*2 One only on 15/17 Run Machine
 *4 Two only on 15/17 Run Machine

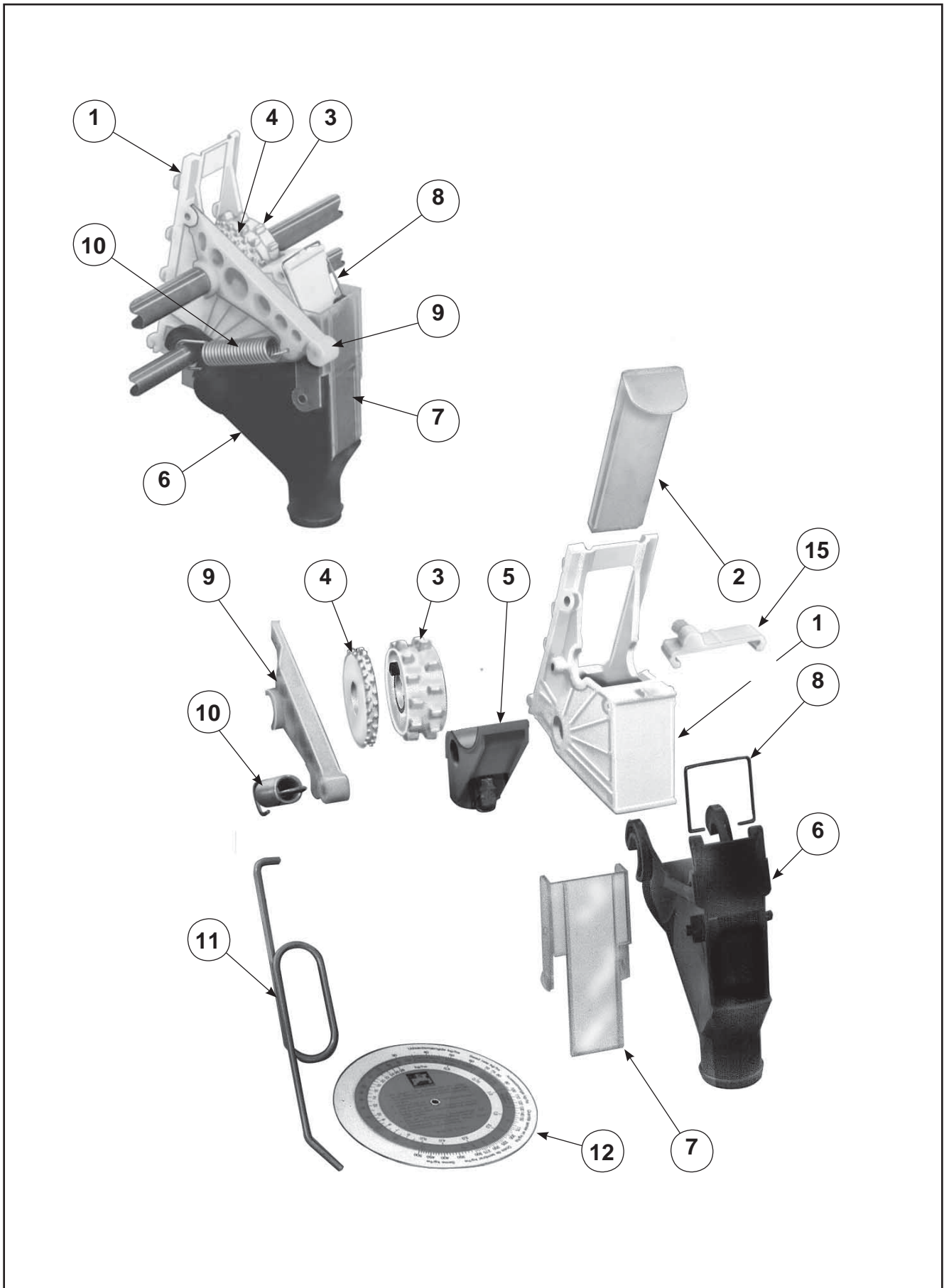
Note 1: Bushes not required if machine fitted with oil filled nylon Shaft Supports (Items 4 & 5)

Part numbers for different width machines

Item	15 Run	17 Run	19 Run	21 Run	23 Run	26 Run
1	22439	22439	22441	22441	22443	22443
2	22439	22439	22442	22442	22444	22444



'Enviro' Seed Drill Seeder Assembly



'Enviro' Seed Drill Seeder Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	43375	Metering Housing	1
2	43376	Shutter Slide	1
3	43377	Seed Metering Wheel Assembly	1
4	43374	Fine Seed Wheel	1
5	43378	Bottom Flap & Bolt Assembly	1
6	22550	Seeder Extension Funnel	1
7	22551	Seed Diverter	1
8	22548	Seeder Extension Spring Clip	1
9	43379	Seed Shaft Guide Bearing	1
10	43380	Guide Bearing Tension Spring	1
11	43382	Metering Wheel Clutch Hook	1
12	43383	Seed Rate Disc Calculator	1
13	22547	Seed/Fertiliser Conductor Tube	1
14	11102	No. 42 Cray Clip	2
15	43362	Fine Seed Wheel Brush (Optional)	1



'Enviro' Seed Drill Operator Notes

A large rectangular box containing 30 horizontal lines for writing notes.