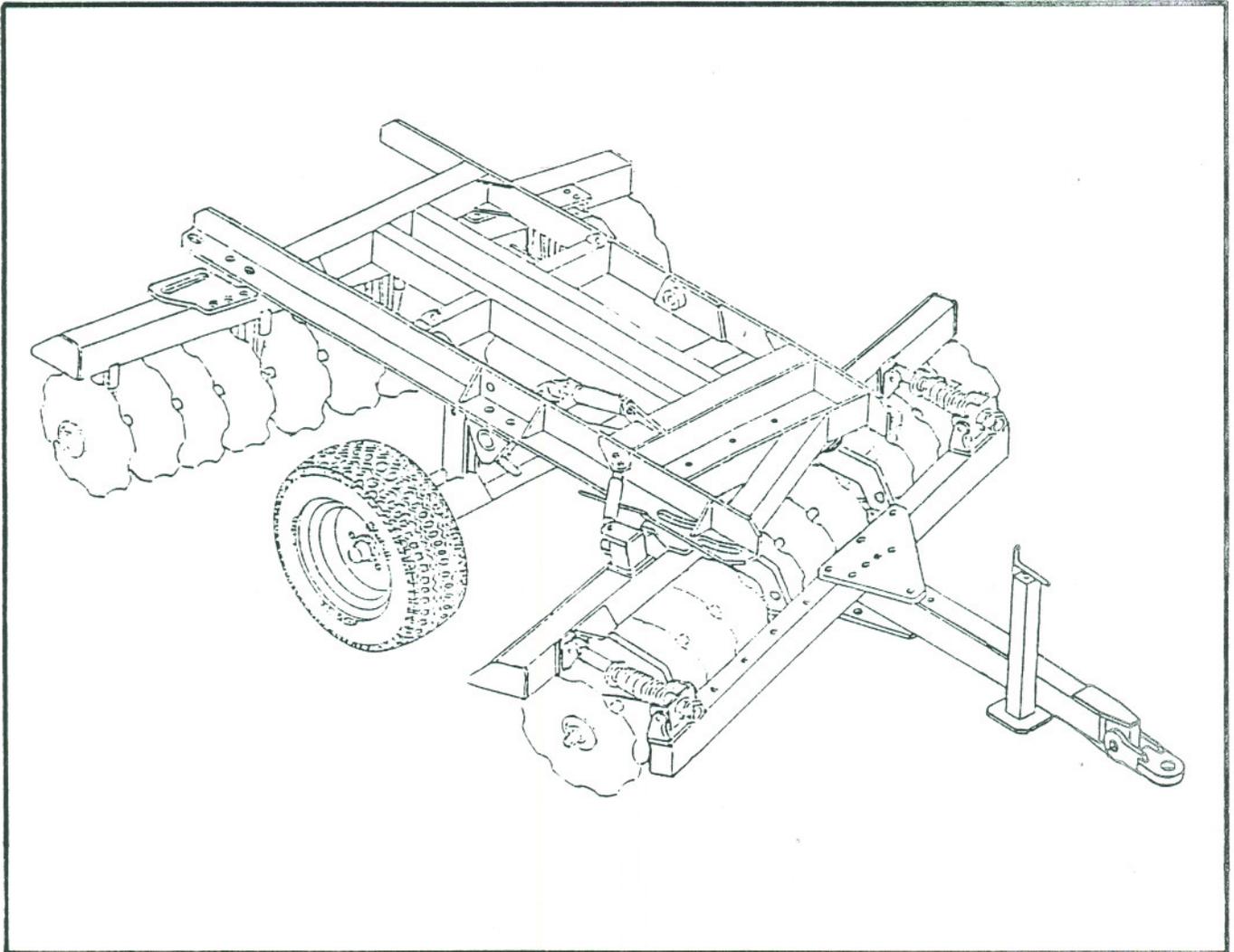


**12C Rigid
Disc Harrow**



RIGID DISC HARROW



OPERATORS MANUAL
&
SPARE PARTS BOOK



Please fill in the general details below (Where applicable)

MODEL	
WIDTH	
SPECIAL	

Please fill in Serial plate details: Serial plate is located on the rear of the disc mainframe.



MODEL NO.	
SERIAL NO.	



DECLARATION OF CONFORMITY

Simba International Limited hereby declare that the Product described in this Operators Manual, and defined by the Serial Number Plate attached to the Chassis of the Machine (a part copy of which is detailed overleaf and must be completed indicating the relevant machine details), conforms with the following Directives and Regulations, and has been certified accordingly.

EC Machinery Directive 89/392/EEC, as amended by 91/3688/EEC, 93/44/EEC, and 93/688/EEC.

In order to fulfill the requirements of health and safety described in the EC Directive, the following standards and technical specifications have been taken into account:

**EN 292 - 1
EN 292 - 2**

THE MANUFACTURER

Simba International Limited
Woodbridge Road
SLEAFORD
NG34 7EW
Lincolnshire
NG34 7EW
England.

Telephone 01529 304654.

CERTIFIED ON BEHALF OF SIMBA INTERNATIONAL LIMITED.

Philip J. Wright. BSc (Hons) C Eng. MI Agr.E
Technical Director.



WARRANTY
TERMS AND CONDITIONS
2004

In this warranty Simba International Ltd., is referred to as "the Company".

1. Subject to the provisions of this warranty the Company warrants each new machine sold by it to be sold free from any defect in material or workmanship for a period of 12 months from date of receipt by the end-user.

Some specific items have additional warranty over and above the standard 12 months. Details of these can be obtained upon request directly from the distributor or Simba International Ltd.

2. If the machine or part thereof supplied by the Company is not in accordance with the warranty given in clause 1 the Company will at its option:

- (a) make good the machine at the Company's expense, or
- (b) make an allowance to the purchaser against the purchase price, or
- (c) accept the return of the machine and at the buyers option either:
 - I) repay or allow the buyer the invoice price thereof, or
 - II) replace the machine as is reasonably practical.

3. This warranty shall not oblige the Company to make any payment in respect of loss of profit or other consequential loss or contingent liability of the Purchaser alleged to arise from any defect in the machine or impose any liability on the Company other than that contained in clause 2.

4. Any claim under this warranty must be notified to the Company in writing specifying the matters complained of within 12 months from the date of receipt by the Purchaser or his nominee of the machine.

5. Any claim under this warranty must be made by the original purchaser of the machine and is not assignable to any third party.

6. If the purchaser hires out the machine to any third party the warranty shall apply only to matters notified to the Company in writing within 90 days of the date of delivery and clause 4 shall be read as if the period of 90 days were substituted for the period of 12 months.

7. The warranty will cease to apply if:

- (a) any parts not made, supplied or approved in writing by the Company are fitted to the machine or
- (b) any repair is carried out to the machine other than by or with the express written approval of the Company or
- (c) any alterations not expressly authorized by the Company in writing are made to the machine or
- (d) the machine is damaged by accident or
- (e) the machine is abused or overloaded or used for a purpose or load beyond its design capabilities, or used in conjunction with a tractor whose power output capability exceeds the stated implement power requirement by more than 40%.
- (f) the machine is operated as part of a 'cultivation train' where more than one implement is being towed, without the express written approval of Simba International Ltd.
- (g) any maintenance is not carried out in accordance with the service schedules in the operator's manual.
- (h) the Installation and Warranty Registration Certificate is not received by Simba International Ltd., Service Dept., Woodbridge Road, Sleaford, Lincs. England. NG34 7EW, **within 7 days** of installing a new machine.

SIMBA INTERNATIONAL LTD

12C SERIES RIGID DISC HARROW

OPERATORS MANUAL AND SPARE PARTS

<u>CONTENTS</u>	<u>PAGE NUMBER</u>
1. INTRODUCTION	1
2. DISC HARROW PRE OPERATION / SETUP / ADJUSTMENT	1
A) TRACTOR	1
B) DRAWBAR HEIGHT ADJUSTMENT	2
C) GANG ADJUSTMENT	2
D) DEPTH CONTROL	4
E) PITCH ADJUSTMENT	4
F) DRAWBAR - LATERAL ADJUSTMENT	6
G) TORQUE TUBE	7
3. OPERATIONAL ADJUSTMENTS AND TROUBLE SHOOTING	8
4. TRANSPORT	12
5. MAINTENANCE	12
NEW MACHINES	12
DAILY SERVICE	13
WEEKLY SERVICE	13
END OF SEASON SERVICE	15
WEARING PARTS	15
6. ASSEMBLY AND SPARE PARTS ILLUSTRATIONS	16
FRONT DRAWBAR ASSEMBLY	19
TOPFRAME AND LIFT AXLE	20
REAR DRAWBAR	21
DISC GANG BEARING ASSEMBLY	22
FRONT DISC GANG ASSEMBLY	23
REAR DISC GANG ASSEMBLY	24
HYDRAULICS	25

1. INTRODUCTION

Offset Disc Harrows will achieve excellent results if they are set up and operated correctly. It is important to note that a little time setting the machine up initially will greatly increase performance and efficiency.

The Offset Disc Harrow may be used for either primary or secondary cultivations, for example straw incorporation or use following the plough. A Press Roll used in conjunction with the Disc Harrow will firm the surface, retain moisture and provide ideal conditions for subsequent passes. A three point linkage kit is available to enable the use of light, mounted equipment behind the Discs e.g. light spring tine or packer roller.

2. DISC HARROW ADJUSTMENTS

BACKGROUND, PROCEDURE AND PRE-OPERATION SET UP

- NOTE:**
- i. All references to "left" and "right" hand are when standing behind the disc harrow, with the machine moving away.
 - ii. When attempting work adjustments, alter one setting at a time, then drive forward sufficiently to ensure that the disc has achieved a stable working position after each adjustment.
 - iii. The addition of an implement (e.g. press roll) to the rear of the disc will generally alter the operation and require adjustments to be made to the disc. Ensure any such implement is attached prior to adjusting as outlined in the subsequent sections.

A) TRACTOR

1. Whenever possible, ensure that the **tractor drawbar** is able to swing freely to the left from the central position by removing the left hand locking pin.
2. Providing the tractor drawbar swings freely (i.e. not in constant contact with the left hand stop) steerability of the tractor will not be significantly affected.
3. If the tractor drawbar cannot swing, it is sometimes necessary to adjust the implement drawbar to minimise the steering effect on the tractor. See the Trouble Shooting Section page 9 for further details. A revised front shackle hitch is available for extreme cases.
4. When the disc harrow is to be pulled by Track Marshall crawlers equipped with a 'reduced angle' type, swinging drawbar (integral with linkage), a purpose built, offset drawbar is available from Track Marshall for use with offset hitch implements.

B) **DRAWBAR - HEIGHT ADJUSTMENT**

Alternative drawbar height settings are available to match the implement to the tractor drawbar.

1. The standard drawbar setting is in the central hole.

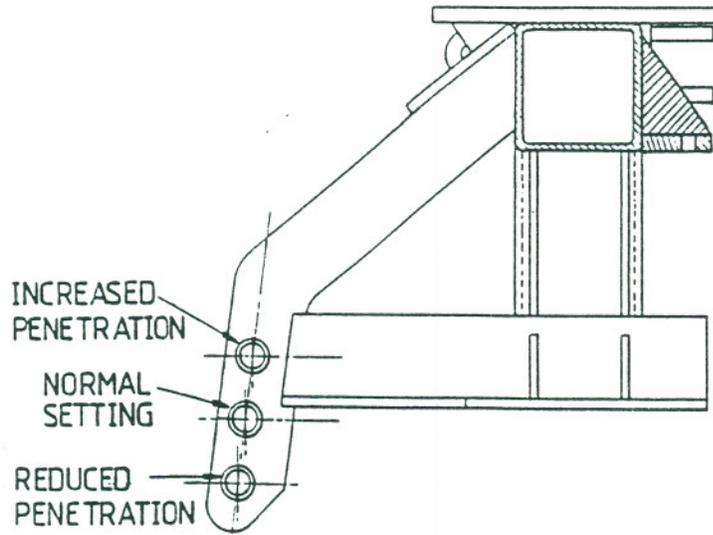


FIGURE 1

2. When in work, this should enable the drawbar to be 50 to 100mm higher at the tractor end.
3. Adjustment from this setting should not be necessary except in the following circumstances:-
 - a) Adjust to the **TOP** hole for:-
 - Excessively high tractor drawbars.
 - Extreme conditions to increase penetration.
 - b) Adjust to the **BOTTOM** hole for:-
 - Light land conditions - primary or secondary cultivations.
 - Low tractor drawbars.

C) **GANG ADJUSTMENT**

Gang angle (inclusive angle between gangs) adjustment was traditionally the means of controlling depth and maintaining the implement squarely behind the tractor.

- Increasing angle increased penetration and depth.
- Decreasing angle decreased penetration and depth.

- Increasing front/decreasing rear swings implement to the left.
- Increasing rear/decreasing front swings implement to the right.

Since the gang angle adjustment also dictates the soil cultivation effect, it is beneficial to set the gangs to give the required cultivation and control depth by other means (page 4).

1. Increasing front gang angle increases soil and residue cut, thrown and mixed.
2. Reduced rear gang angle reduces re-inversion of incorporated matter from the front gang.
3. Minimising both gang angles imparts a "chopping" and breaking action as a secondary cultivation without raising large amounts of wetter material from below, to the surface.
4. Most machines incorporate a "standard" and "minimum" angle setting corresponding to "normal" and "secondary" cultivations. Select the appropriate setting according to the majority of work to be undertaken (pages 17,18).

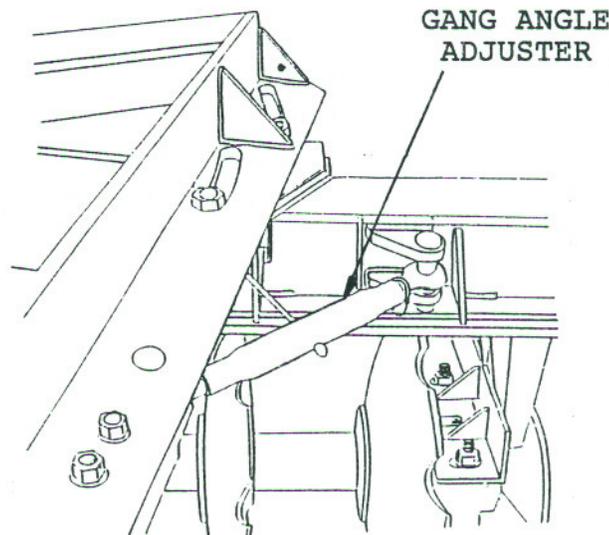


FIGURE 2

5. Within the above settings the angles can be adjusted from maximum angle (bolts at front of slots for front gang, rear of slots for rear gang) according to the desired result.
6. A typical "starting setting" as a proportion of maximum would be:-

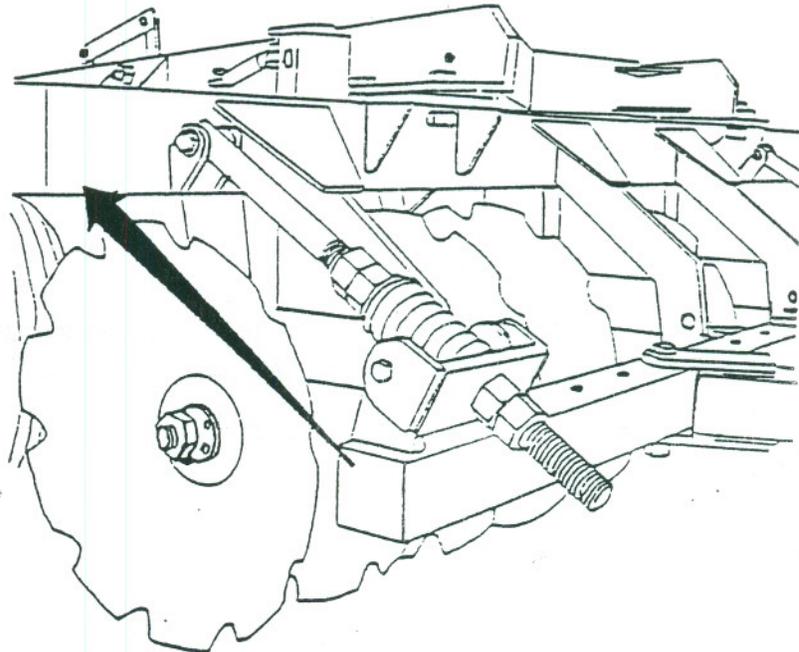
- Primary Cultivations: Front $\frac{3}{4}$ to $\frac{1}{2}$
Rear $\frac{1}{2}$ to $\frac{1}{4}$
- Secondary Cultivations: Front $\frac{1}{2}$ to $\frac{1}{4}$
Rear $\frac{1}{4}$ to $\frac{1}{2}$

D) DEPTH CONTROL

The traditional means of depth control via gang angle setting has already been outlined (Section C). The ability to maintain a consistent depth by angle adjustment is dependent largely upon the field conditions (primarily soil resistance) also being constant. It is therefore normal to limit working depth by means of the transport wheels, thereby enabling angle selection to be based on cultivation requirements such as amount of mixing, etc

1. Adjust depth limiting stops according to final desired depth, ensuring they are adjusted equally each side.
2. Ensure disc penetrates until wheels contact the ground when set for depth. Increase gang angles if necessary until this occurs.

E) PITCH ADJUSTMENT



"UPWARD" ADJUSTMENT
TO SHORTEN SPRING/
COLLAR ASSEMBLY.

FIGURE 3

Adjustment of the levelling spring/collar assembly (ies) enables the balance of weight between the front and rear gangs to be varied. Essentially, the assembly should be regarded as a top link on a mounted implement, for example shortening the assembly will increase weight on the front of the machine, increasing penetration.

NOTE: The use of additional implements behind the disc harrow (e.g press roll) will alter the front to rear balance in work and as such usually requires an adjustment of the spring collar assembly (ies). Adjustment of the unit, with or without additional implements is by the following procedure irrespective of the type of implement attached behind.

1. Set the assembly to suit the tractor drawbar height. With the disc fully raised (and rear roll coupled and also raised, if fitted with transport wheels) the front central blade should be 50 to 75mm closer to the ground than the corresponding blade on the rear gang. Adjust by moving both pairs of nuts.
2. Shortening the assembly will move the front gang nearer to the ground and is adjusted easiest with the disc raised when the disc is used on its own or lowered when used in conjunction with a rear roll.
3. Lengthening the assembly will move the rear gang nearer to the ground and is adjusted easiest with the disc lowered when the disc is used on its own or raised when used in conjunction with a rear roll.
4. Adjust the spring compression. With the disc raised, adjust the upper pair of nuts until the spring is compressed, leaving a gap of 3 to 4mm between each coil.
5. In work, shortening the levelling spring/rod assembly increases the effectiveness of the front gang, i.e.

- Improves front gang penetration.

- Increases the tendency for the disc to swing to the LEFT about the hitch pin.

Lengthening the assembly increases the effectiveness of the rear gang, i.e.

- Improves rear gang penetration, reduces front gang penetration.

- Increases the tendency for the disc to swing to the RIGHT about the hitch pin.

6. ON MACHINES WITH TWO LEVELLING SPRING ASSEMBLIES it is possible to counteract uneven cut depth across the cultivated width by adjusting one assembly relative to the other.

For example, if more penetration is required on the front left hand side of the machine, shorten the assembly on this side.

If less penetration is required on the front right hand side of the machine, lengthen the assembly on this side.

F) DRAWBAR - LATERAL ADJUSTMENT

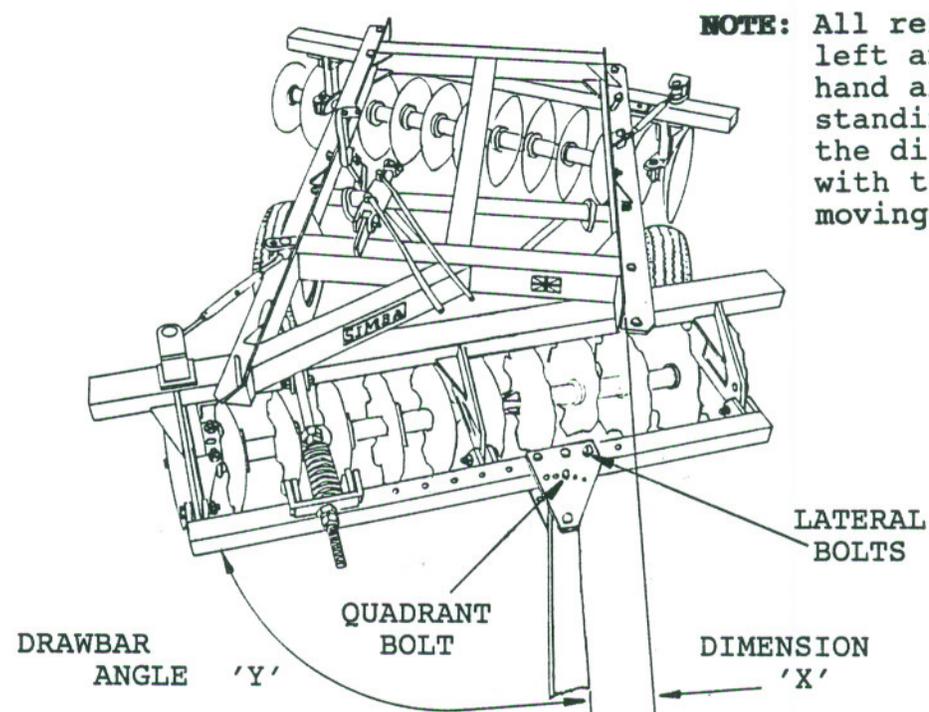


FIGURE 4

The disc harrow will operate correctly when adjusted to be offset to the tractor centre line. The amount of offset will vary with gang angle (this is self compensating by the design of the gang to drawbar attachment) and implement width.

NOTE: Adjustments are described assuming that the front gang is on 3/4 to maximum angle setting (bolts to front of slots). If otherwise, allowances should then be made accordingly.

1. Adjust the drawbar lateral setting (DIMENSION 'X') by relocating the three lateral drawbar plate to cross drawbar bolts.

- Reducing DIMENSION 'X' will reduce the steering effect on the tractor (ie reduces the tendency for the tractor drawbar to swing hard to the left)

MODEL	DIMENSION 'X'
Series 1 to 4 Rigid 6' to 14'	300 - 200mm
Series 1, 2 Folding 12' to 14'	400 - 200mm
Series 1 to 3 Folding 14' to 18'	300 - 100mm
Series 1 to 3 Folding 20' +	300 - 200mm

DIMENSION 'X' indicates an "average" working setting.

2. Adjust the drawbar angle 'Y' by relocating the quadrant bolt on the drawbar plates.

- Drawbar should normally be parallel with the top frame side members with the front gang on 3/4 to maximum angle.

NOTE i. **DO NOT** attempt to adjust the drawbar settings before adjusting the gang angle and pitch.

ii. Once set to suit the tractor and ground conditions the drawbar angle and lateral settings **DO NOT** NORMALLY REQUIRE FURTHER ADJUSTMENT.

G) **TORQUE TUBE**

All disc harrow frames have an inbuilt 'twist' which counteracts the natural tendency for the front right and rear left hand gang corners to penetrate more easily.

Some models which incorporate a range of gang widths for a common frame have the ability to vary the torque setting. This is preset at the factory, and should not be adjusted without prior consultation with SIMBA.

3. OPERATIONAL ADJUSTMENTS AND TROUBLE SHOOTING.

As a general guide the disc harrow should be initially set prior to work as outlined in the preceding sections.

It should then be possible to adjust to the specific conditions by reference to the fault/remedy guide.

NOTE: A detailed outline of various cultivation techniques to incorporate straw with disc harrows is available from Simba Machinery entitled:-

"Straw Incorporation Systems".

For primary cultivations (Straw/Residue Incorporation) the object is to invert soil and bury trash with the front gang leaving the rear gang to chop and mix rather than reinvert. A common cause of poor incorporation is to attempt to work too deeply on the first pass. By working the disc at the settings indicated the second pass will usually attain sufficient depth.

The most common method of straw incorporation is to use the disc harrow in conjunction with a press roll, ahead of a subsurface cultivator, or alternatively ahead of the plough, or a heavy disc. In both cases, the method of work is the same.

1. One pass with the disc harrow (and suitable press roll) to cut and mix the straw and soil to a depth of 75 to 100 mm, leaving a consolidated finish to encourage volunteer germination and provide weather insurance if wet or dry.

NOTE: In wetter years the use of a following press roll may not be required. Reduced gang angles and working depths may be appropriate on the first pass to ensure trafficability in later passes.

2. Possible subsurface cultivation to eliminate any problem areas of compaction. Ensure a consolidating roll is used in conjunction with the subsurface cultivator.
3. Second disc and press pass to 125 to 150mm depth giving a broken down, consolidated mix with the opportunity to cultivate out volunteer regrowth. Alternatively, plough or heavy disc to depth.

Generally a forward speed of 5/7 M.P.H. (8/11 K.P.H.) will achieve optimum results, maximising inversion and burial. Speeds in excess of those stated above will tend to give a deterioration in the quality of the work. This may be seen as a ridge and trough effect across the work surface due to soil being thrown too far by the leading discs, the rear discs then are unable to turn enough soil back.

IMPORTANT - NEVER turn to the right with the machine in work.

TROUBLE SHOOTING

Referring to the chart below attempt only **one adjustment** at a **time** starting from the top of the chart, then drive forward sufficiently far enough to ensure that the disc has achieved a stable working position before carrying out the next adjustment (if necessary).

NOTE: All references to "left" and "right" hand are when standing behind the disc harrow, with the machine moving away.

FAULT

REMEDY (SECTION REFERENCE)

1. Disc steers tractor (pushes tractor rear end left).

Ensure tractor drawbar can swing freely from centre to the left (A,1; A,2).

Reduce gang angles, providing cultivation is acceptable (C).

Move drawbar hitch to the left via quadrant hole, increasing 'Y' (F,2).

Move drawbar hitch to the left via rear 3 bolts, reducing 'X' (F,1).

2. Rear of disc hangs to the left.

Lengthen the levelling spring rod(s) to raise the front gang and lower the rear gang (E,5).

Decrease the angle of front disc gang (C).

Increase the angle of rear disc gang (C).

Move the implement hitch to the right, reduce 'Y', then increase 'X' (F).

3. Rear of disc hangs to the right.

Shorten the levelling spring rod(s) to lower the front gang and raise the rear gang (E,5).

Increase the angle of the front disc gang (C).

Decrease the angle of the rear disc gang (C).

Move the implement hitch to the left, increase 'Y', then reduce 'X' (F).

TROUBLE SHOOTING cont'd

FAULT

REMEDY (SECTION REFERENCE)

4. Disc penetrates deeper one side.

- general
- Front right side too deep.
- Front left side too deep.
- Entire left side too deep (light land)

Adjust levelling spring rod(s):

- Shorten to increase depth of front gang (E,5).
- Lengthen to reduce depth of front gang (E,5).

Insufficient torque adjustment:

- Adjust each levelling spring rod (E,5; E,6).
- Consult Simba factory (G).

Excessive torque adjustment:

- Adjust each levelling spring rod (E,5; E,6).
- Consult Simba factory (G).

Relocate cross drawbar:

- Lower to bottom hole (B,3).
- Move front drawbar to left hand side on cross drawbar, 3 bolt lateral adjustment, reduce 'X', and if necessary 'Y' (F,1).

5. Disc fails to penetrate.

Check depth control stops (D).

Check gangs are in normal settings and increase gang angles if appropriate to cultivations (C).

Shorten levelling spring rod(s) (E,5).

Check blades for wear.

Check specification is right for ground conditions.

Raise cross drawbar to top holes (B,3).

HYDRAULIC DEPTH CONTROL

OPERATIONAL CHARACTERISTICS AND FAULT FINDING

The hydraulic circuit is designed to limit the pressure on the rod side of the double acting hydraulic cylinder to be only sufficient to raise the wheels up to the adjustable depth control stops. This inhibits axle movement in work, thus minimising wear to the axle linkage and pivot points.

Excess pressure which would damage the axle assembly opens the relief valve and the oil flow is returned in an open circuit to the tractor.

The hydraulic circuit therefore exhibits the following characteristics:-

1. Tractors which automatically return to the neutral setting at the limit of the cylinder stroke will need to be manually returned to neutral.
2. Tractors with high oil flow rates (exceeding 10 gallons per minute) can overload the capacities of the circuit.

Symptoms can be:

- failure to fully raise the wheels up to the depth control stops.
- premature operation of the tractor relief valve.
- premature switching of the tractor pump to "idle" setting (closed centre pumps only)

In all cases reduce tractor oil flow rate (if this is adjustable) until the system functions correctly.

Consult the factory if the system still fails to operate satisfactorily.

4. TRANSPORT



WARNING - TRANSPORT STRAPS SHOULD BE FITTED BEFORE THE MACHINE IS TRANSPORTED.



WARNING - DO NOT ATTEMPT TO LOWER THE MACHINE WITH THE TRANSPORT STRAPS FITTED AS THIS WILL RESULT IN DAMAGE TO THE MACHINE.

Fully raise the machine, then fit the transport straps between the topframe and the carrier arm. Both straps **MUST** be fitted before the machine is transported.

NOTE: When removing the transport straps the following should be observed:-

Raise the machine to relieve pressure on the straps.

Exercise **CARE** when extending the axle cylinder to ensure that the machine is not lowered which would damage the machine.



WARNING - LOWERING THE MACHINE WITH THE TRANSPORT STRAPS FITTED WILL DAMAGE THE MACHINE.

NOTE: Exercise great care if the disc harrow is used to transport a press roll on public highways as the combination will become a very long vehicle, especially when an End Tow press roll or Landpacker is transported.

5. MAINTENANCE



WARNING - WHEN WORKING ON MACHINES IN THE RAISED / TRANSPORT POSITION ALWAYS ENSURE THAT THE TRANSPORT STRAPS ARE FITTED.



WARNING - WHEN WORKING UNDER MACHINES ALWAYS ENSURE THAT THEY ARE FULLY SUPPORTED AND WILL NOT TIP UP SHOULD THE BALANCE OF WEIGHT BE MOVED (FOR EXAMPLE - SHOULD A GANG BE DETACHED).

Any disc axle nuts must be checked daily, if they are allowed to work loose, damage to the discs, spools and bearings may occur. Always bend over the locking tabs after tightening the disc axle nuts.

NEW MACHINES

On a new machine tighten all nuts and bolts after 5 hours work and again after 15 hours. This also applies to parts that have been moved or replaced. After the initial 15 hours of work a once a week check is sufficient.

NOTE: When tightening the main axle nuts, loosen the bearings to avoid preloading the bearings, housings and pillars.

DAILY SERVICE

1. Remove all soil from around the bearing 'U' bolt. Ensure vent hole is clear to prevent the incoming grease from pressurising the bearing housing.
2. Grease disc axle bearings until grease shows out of the vent hole. Use a standard agricultural grease.
3. Grease top axle plummer block until grease shows.
4. Grease axle carrier arm until grease shows.
5. Check disc blades for damage. Damaged discs may lead to damage or failure of other components.
6. Check hydraulic connections for leaks. Leaking hydraulics may allow the machine to lower in work or road transport.

WEEKLY SERVICE

1. Tighten all nuts and bolts including wheel nuts. Vibration through the machine may cause the nuts and bolts to work loose leading to wear.

IMPORTANT: - Never use a hammer to assist tightening of nuts and bolts.

- Using an incorrect size or grade of bolt may result in damage to the implement.

MAXIMUM NUT AND BOLT TORQUES

M16 GRADE 8.8	-	24 KG.M.	(176 lb.ft.)
M20 GRADE 8.8	-	48 KG.M.	(352 lb.ft.)
M24 GRADE 8.8	-	80 KG.M.	(587 lb.ft.)
M30 GRADE 8.8	-	150 KG.M.	(1100 lb.ft.)
M36 GRADE 8.8	-	280 KG.M.	(2055 lb.ft.)

WHEEL NUT TORQUES

6 STUD HUBS M18 - 27.7 KG.M. (200 lb.ft)

2. Check all disc axles are tight. If the disc axles are allowed to run loose the discs will become worn in the centre and may wear into the disc axle. If this occurs the axle will not be able to be tightened correctly.

Carry out the following procedure if a disc axle requires tightening.

- a) On axles with two bearings loosen the bearing mounting 'U' bolts on one pillar.

On axles with three bearings loosen the bearing mounting 'U' bolts on the outer pillars.

NOTE: This is to allow the bearing to move slightly when tightening the axle. This ensures that the bearings are not preloaded, which could lead to early bearing failure.

NOTE: When the axle needs tightening again, on two bearing axles loosen the bearing that was not loosened the previous time.

- b) Bend back the locking tab from the axle nut.
- c) Fit one of the disc axle spanners onto the square section of the axle at the opposite end of the gang that is being tightened. The spanner should be jammed onto the ground to prevent it from slipping when the axle is tightened.
- d) Tighten the axle, ensuring that the end disc blade is sitting on the square section of the axle correctly prior to tightening, otherwise the axle cannot be fully tightened.

NOTE: If the axle fails to fully tighten (i.e. blades are still loose when nut is tight) this indicates that the square in the end disc has not aligned with the square shaft. Loosen the nut, spin the end disc until it locates on the square then retighten.

NOTE: On used machines if the axle cannot be tightened any further this may be an indication that the disc blades have worn into the axle then fallen into the groove. If this has occurred the axle will need to be stripped and a new axle fitted.

- e) Bend the locking tab back round the axle nut.
- f) Retighten the bearing 'U' bolts.
- g) Adjust the position of the disc scrapers.

NOTE: a) of section 2 is to allow the bearing to move slightly when the tension is applied to the main axle nut when tightening the axle. This ensures that the bearings are not preloaded, which could lead to early failure.

- 3. Check tyre pressures. Running the implement with tyres at the incorrect pressure may cause excessive wear, over heating and possible failure.

<u>TYRE SIZE</u>	<u>MAX. P.S.I.</u>	<u>MAX. BAR</u>
400/60-15.5, 10 PLY	50	3.5

END OF SEASON SERVICE

1. Grease all disc axle bearings to flush any soil away from the bearing (See Daily Service Section).
2. Grease all pivot points (see Daily Service Section).
3. Grease any exposed bolt threads especially the levelling bar to ease adjustment.
4. Grease any exposed areas of hydraulic cylinder rods to prevent them from becoming pitted.
5. Strip and grease all toplinks
6. Wheel bearings are prepacked with grease at the factory but should be inspected and regreased.
7. Check for worn or damaged components. Replace if necessary to avoid damaging other components.
8. Tighten all nuts and bolts. (see Weekly Service section)

WEARING PARTS

Any wearing parts must be replaced as necessary or damage to a more expensive item may occur.

6. ASSEMBLY

Lifting equipment and two men are recommended to assemble the Disc Harrow due to the weight and positioning of certain components.

Depending upon the width, your disc harrow should arrive fully assembled. Most machines will arrive as three separate units:-

1. Top frame/Lift axle assembly.
2. Front gang/Drawbar assembly.
3. Rear gang.

NOTE: Left and right hand items may be identified by viewing from the rear of the machine in the direction of travel.

The following procedures, outline the assembly of machines arriving in a partially assembled state.



WARNING - ALWAYS ENSURE THE MACHINE IS SAFELY SUPPORTED, BEFORE ANY WORK IS CARRIED OUT.

A) FRONT GANG/DRAWBAR

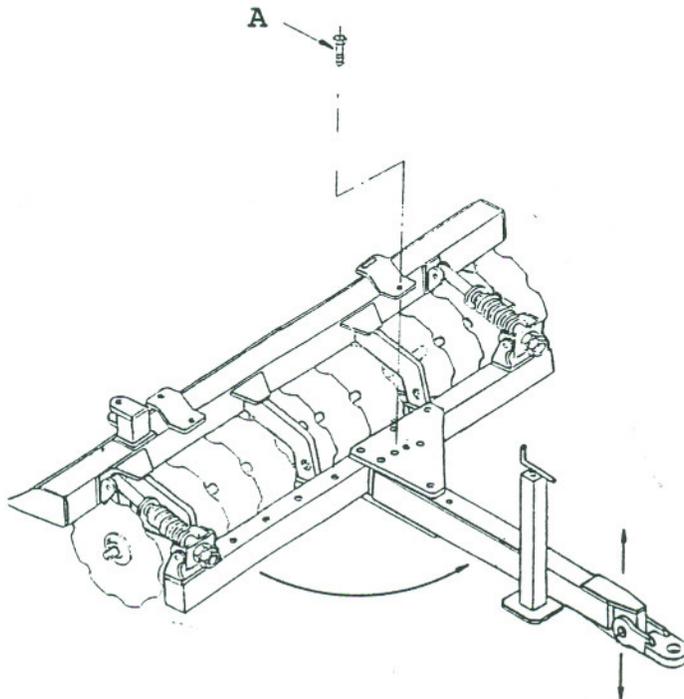


FIGURE 5

1. Support assembly.
2. Swing **drawbar** outwards.
3. Loosely fit **quadrant bolt** (A).
4. Adjust **jack** to level the assembly on even surface.

B) TOP FRAME/AXLE

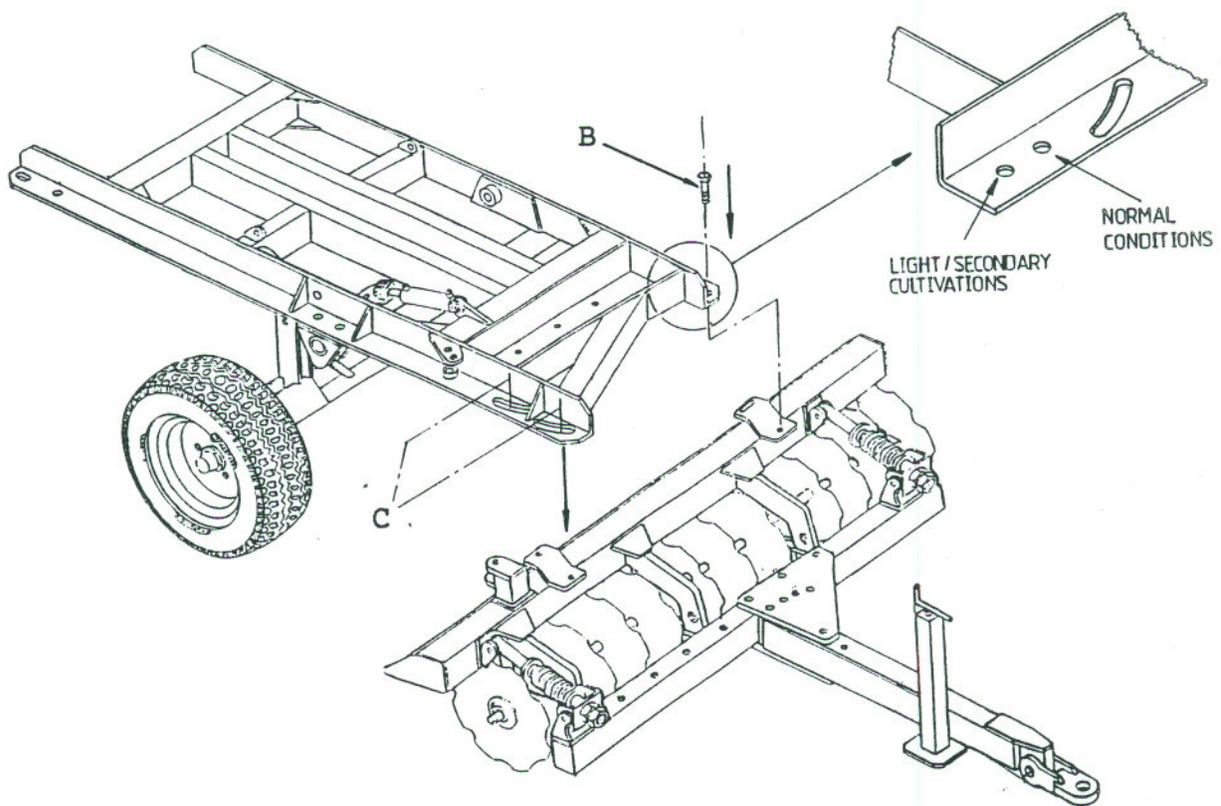


FIGURE 6

5. Position the top frame over the front gang carrier.
6. Align and fit **pivot bolt** (B) into the desired setting.
7. Fit the remaining **3 bolts**:- swing the top frame until the mounting bolts are fully forwards along slots 'C' (ie to maximum angle).
8. Tighten all of the mounting **bolts**, leaving **1mm gap** for ease of angle adjustment.
9. Fit the **toplink type gang adjuster** or the **hydraulic angling cylinder** (if fitted).

C) REAR GANG

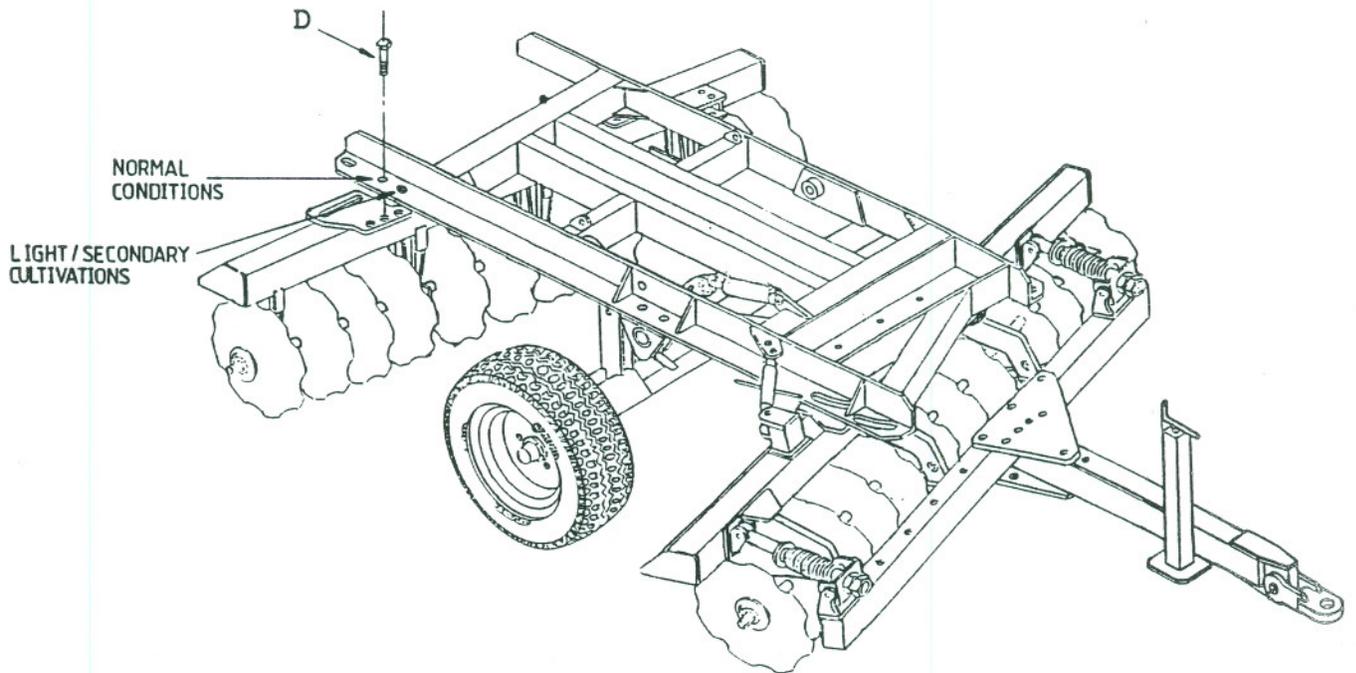
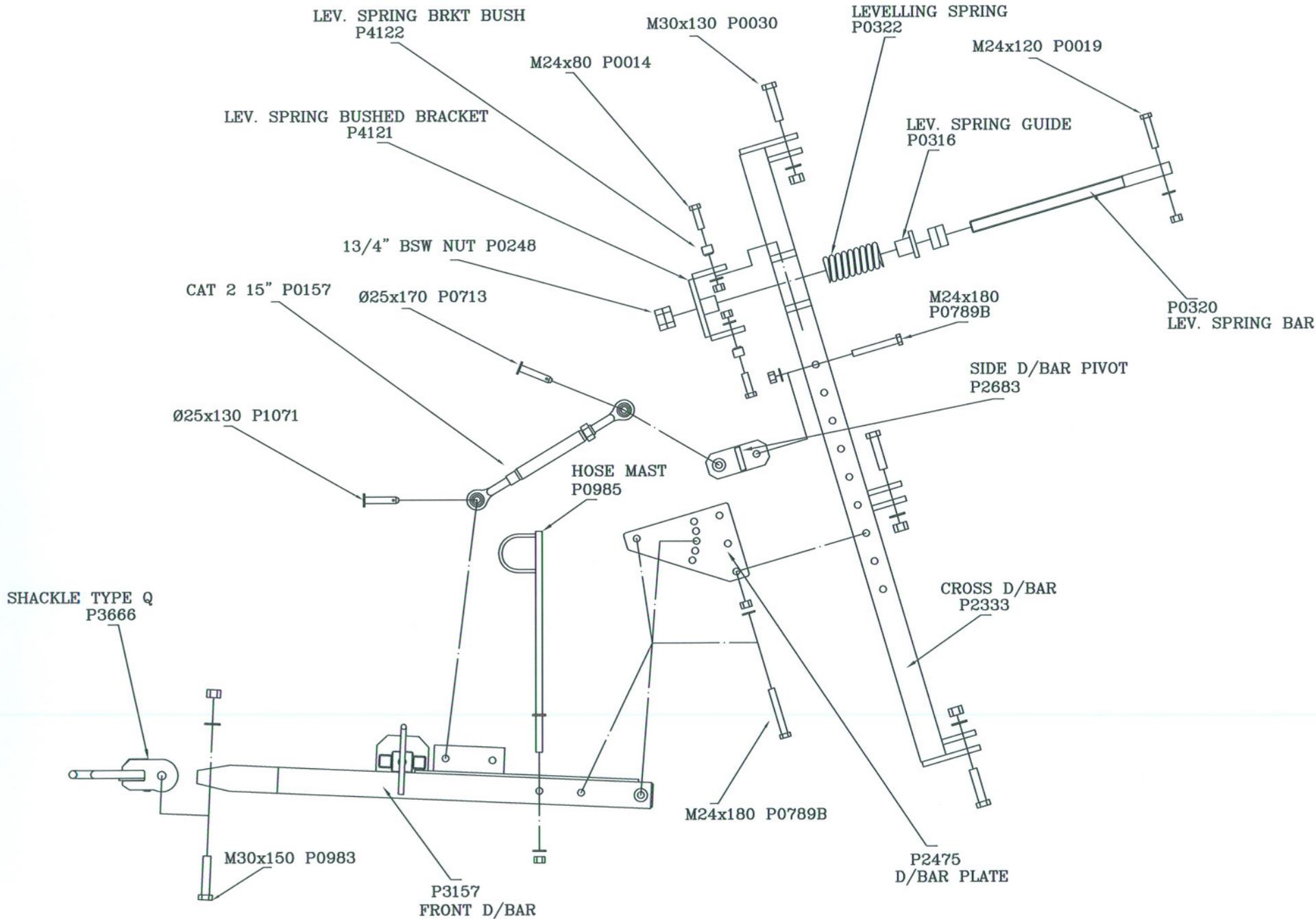


FIGURE 7

10. Couple up the hydraulics and extend the **lift cylinder(s)** to raise the top frame. If a tractor is unavailable, a forklift may be used to lower the top frame onto the rear gang carrier.
11. Position the rear gang assembly, align **bolt (D)** into desired setting.
12. Fit the remaining **bolts**, and adjuster as per steps 7 - 9.

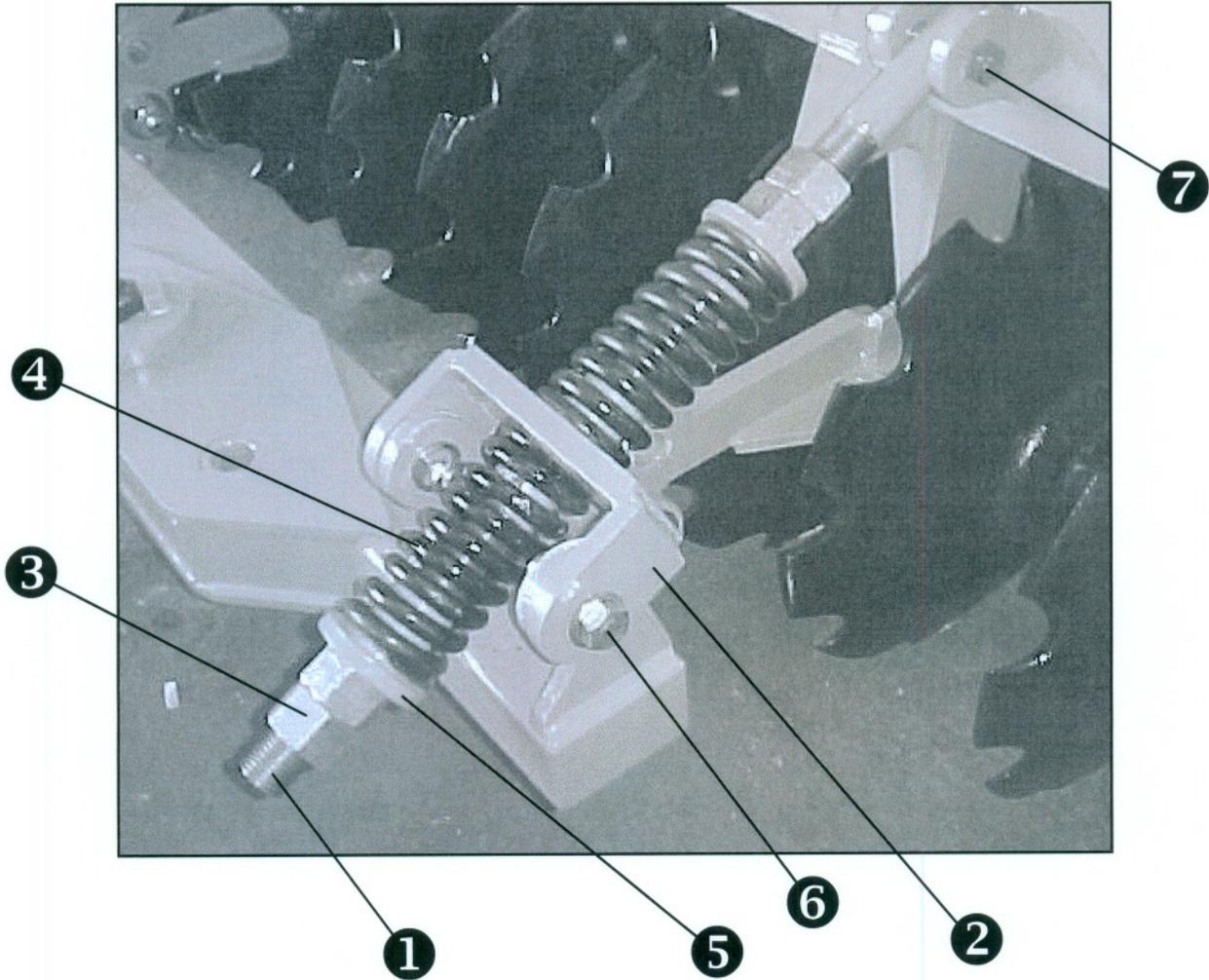


SERIES 12C - 10' RIGID FRONT DRAWBAR ASSEMBLY

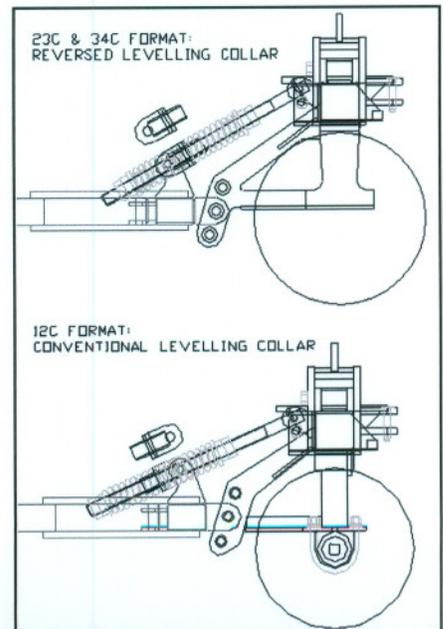
DRAWN 20/04/98 UPDATED	PART NUMBER	FROM SERIAL NO.	TO SERIAL NO.	ISSUE	DRAWING NO.
					AS0487

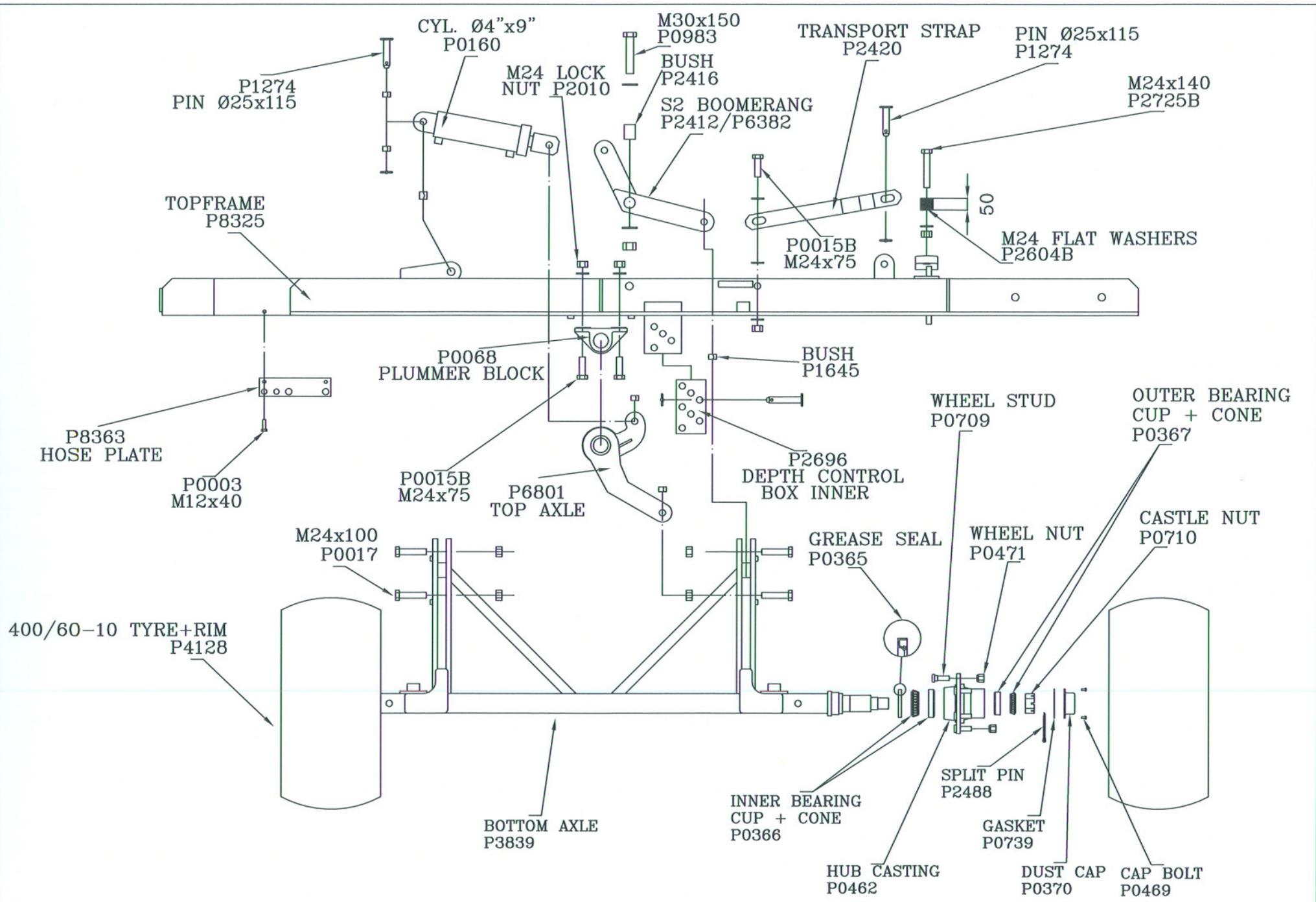
BUMPER SPRING VARIATIONS *(New Zealand Models)*

The configuration for the bumper spring on 23C models for New Zealand differs as per the picture below (note double spring). For 12C models the collar is rotated through 180° to accommodate for the difference between the gang pull points (see diagram).



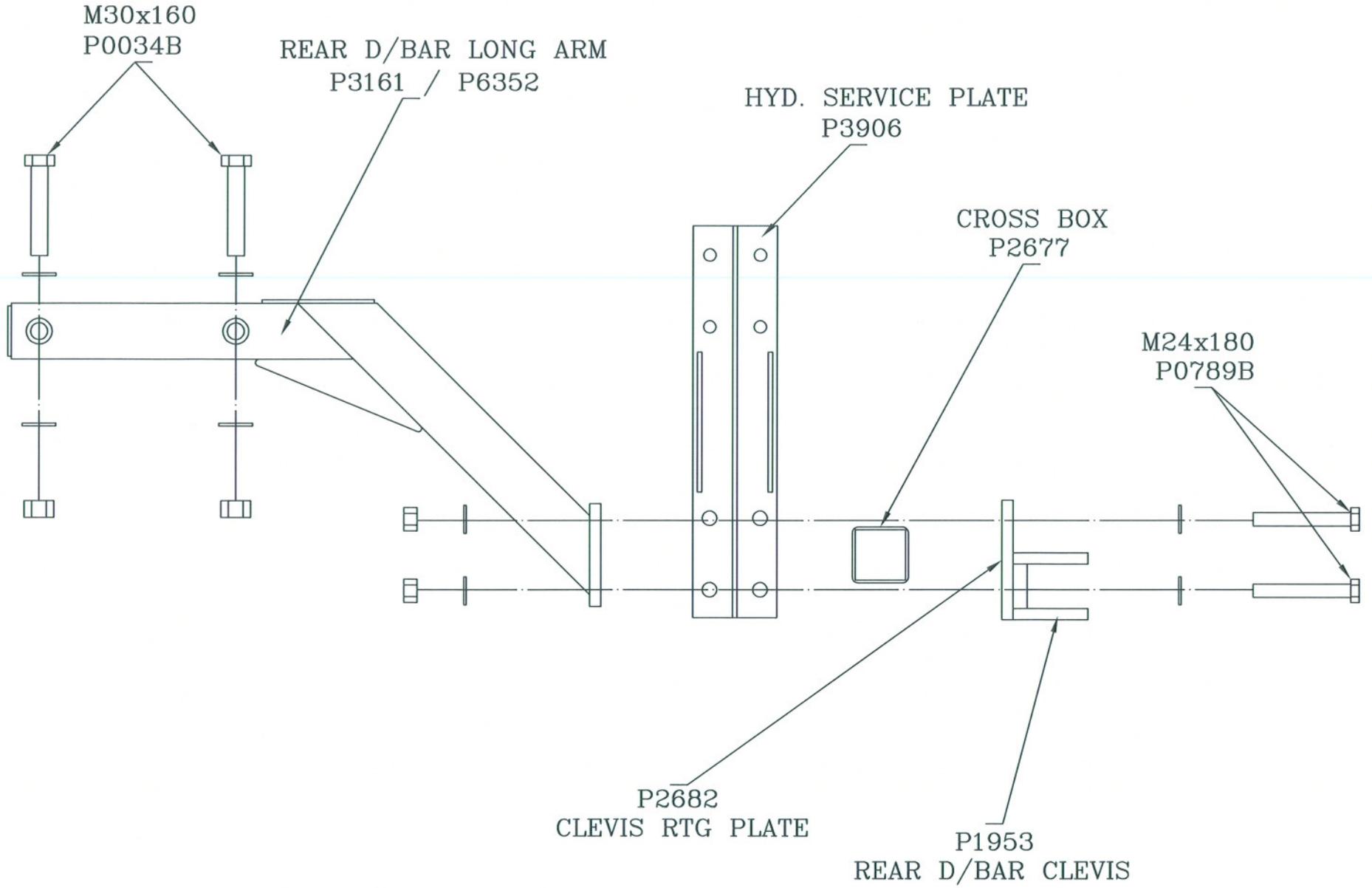
Item	Part Number	Description
1	P10823	Bumper Spring Bar
2	P10822	Bumper Spring Bracket
3	P00248	1 3/4" BSW Nut
4	P00322	Spring
5	P00316	Bumper Spring Collar
6	P00014 P02010 P02604	M24x80 Bolt M24 Lock Nut M24 Flat Washer
7	P00019 P02010 P02604	M24x120 Bolt M24 Lock Nut M24 Flat Washer





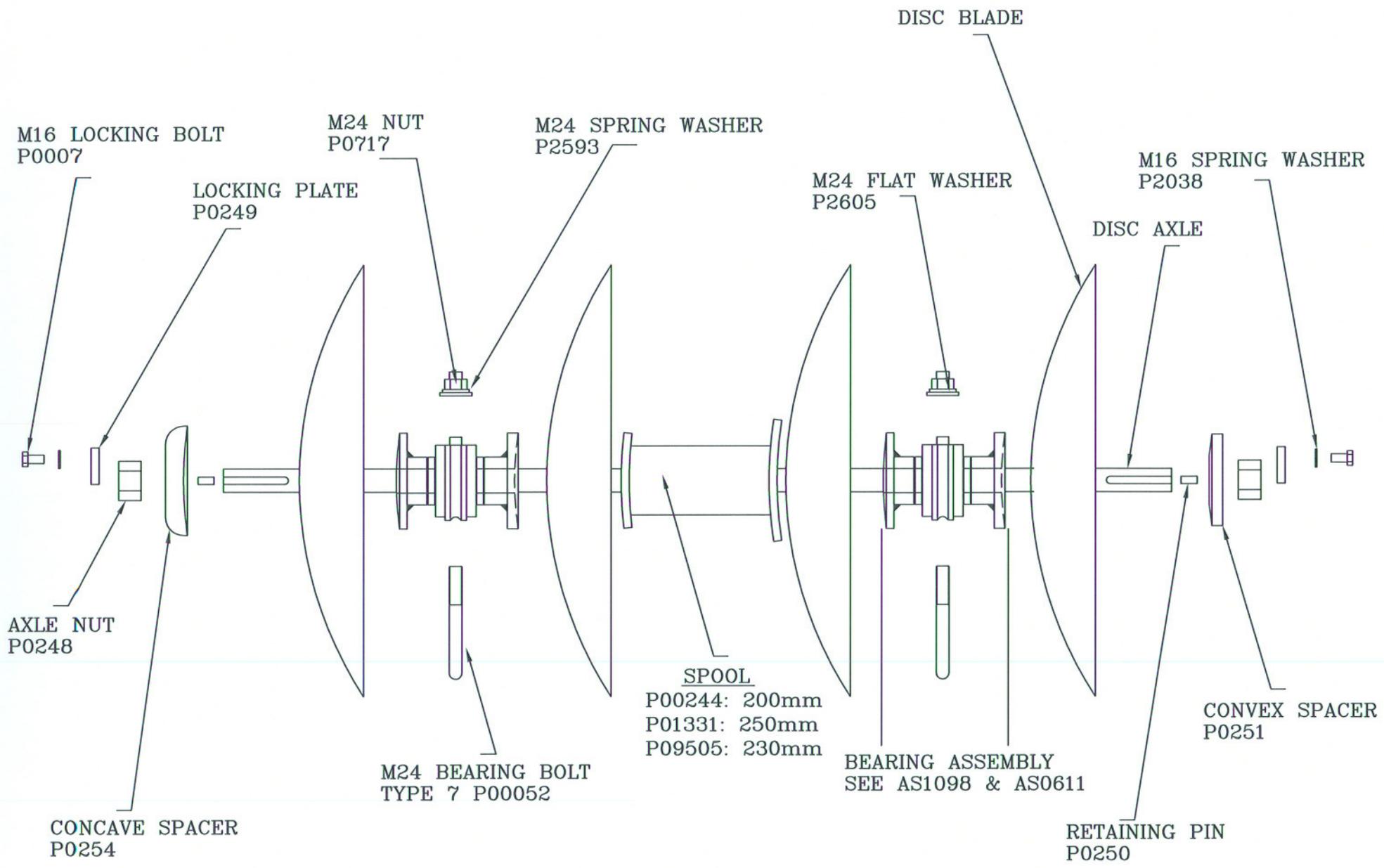
SERIES 12C 10' RIGID - LIFT AXLE & TOPFRAME ASSEMBLY

DRAWN	PART NUMBER	FROM SERIAL NO.	TO SERIAL NO.	ISSUE	DRAWING NO.
23/04/98				A	AS0491
UPDATED					



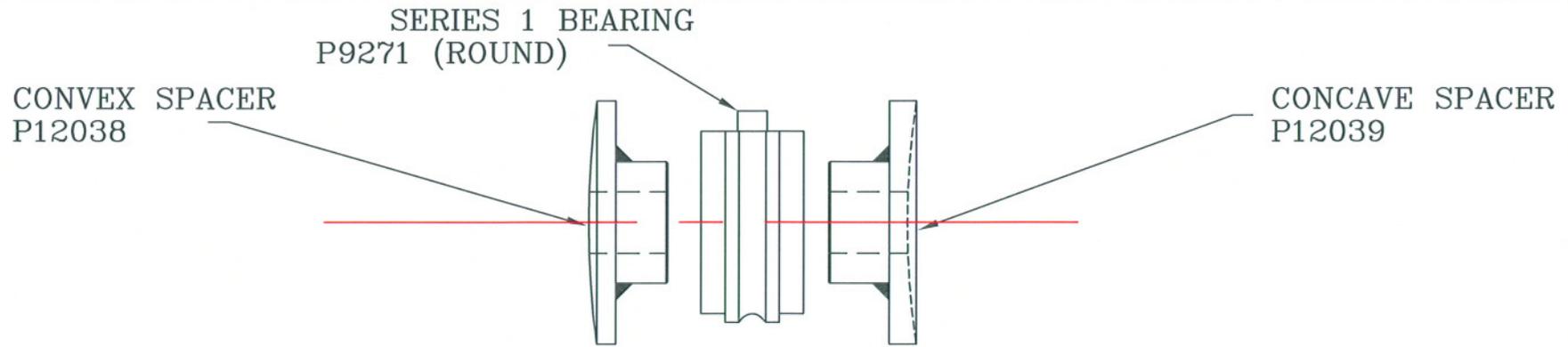
SERIES 12C REAR DRAWBAR ASSEMBLY

DRAWN 21/04/98 UPDATED	PART NUMBER	FROM SERIAL NO.	TO SERIAL NO.	ISSUE	DRAWING NO. AS0490
------------------------------	-------------	-----------------	---------------	-------	-----------------------

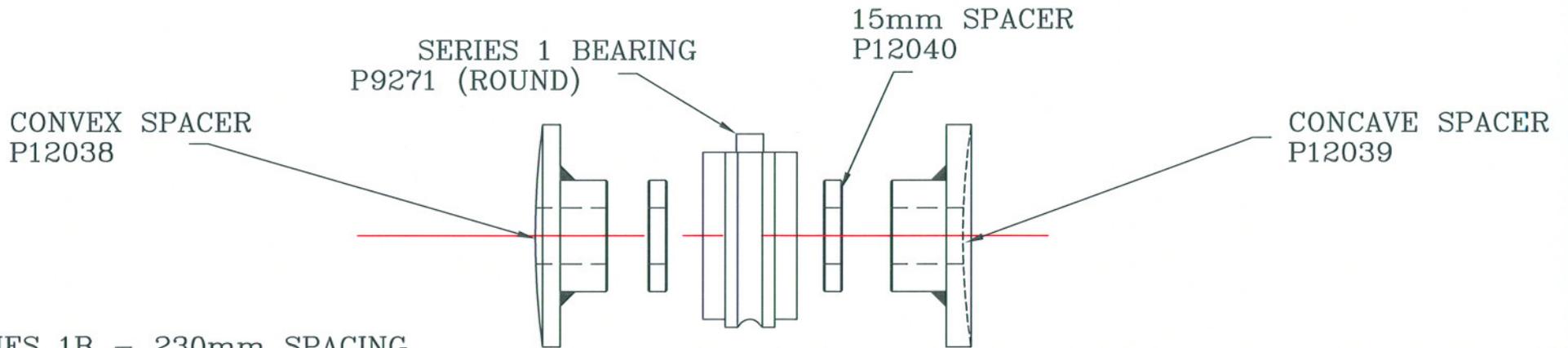


SERIES 1, 12C DISC AXLE GENERAL ASSEMBLY

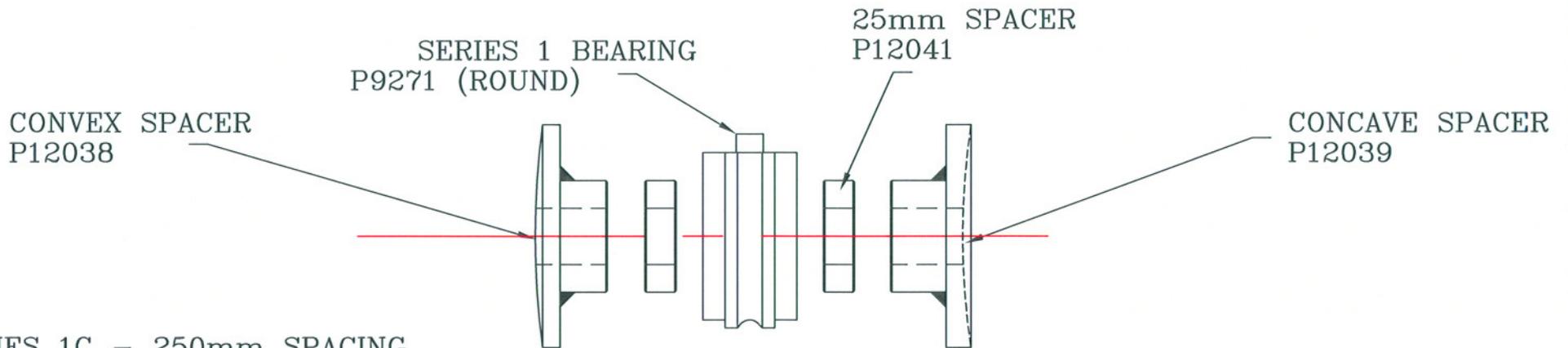
UPDATED	FROM SERIAL NO.	TO SERIAL NO.	ISSUE	DRAWING NO.
9/2/98	ALL		1	AS0176



SERIES 1A - 200mm SPACING



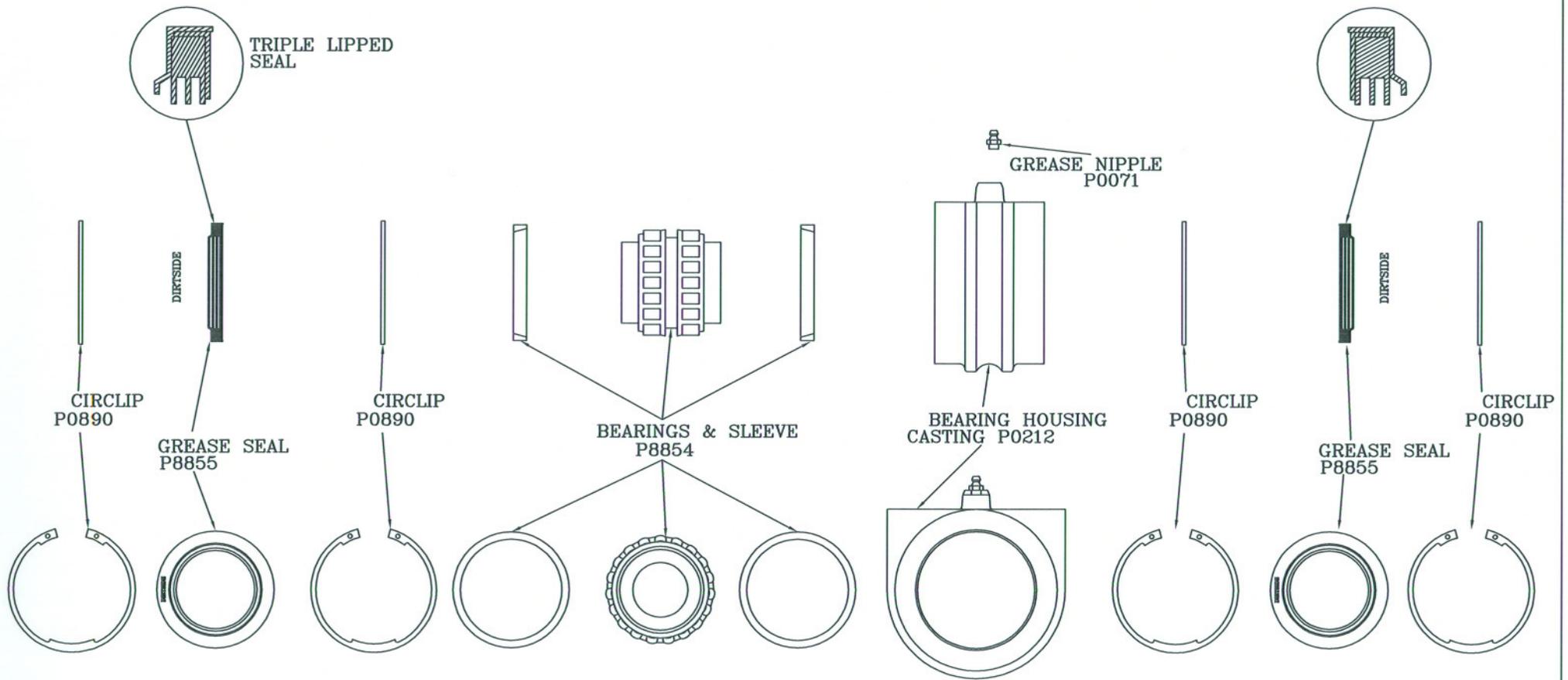
SERIES 1B - 230mm SPACING



SERIES 1C - 250mm SPACING

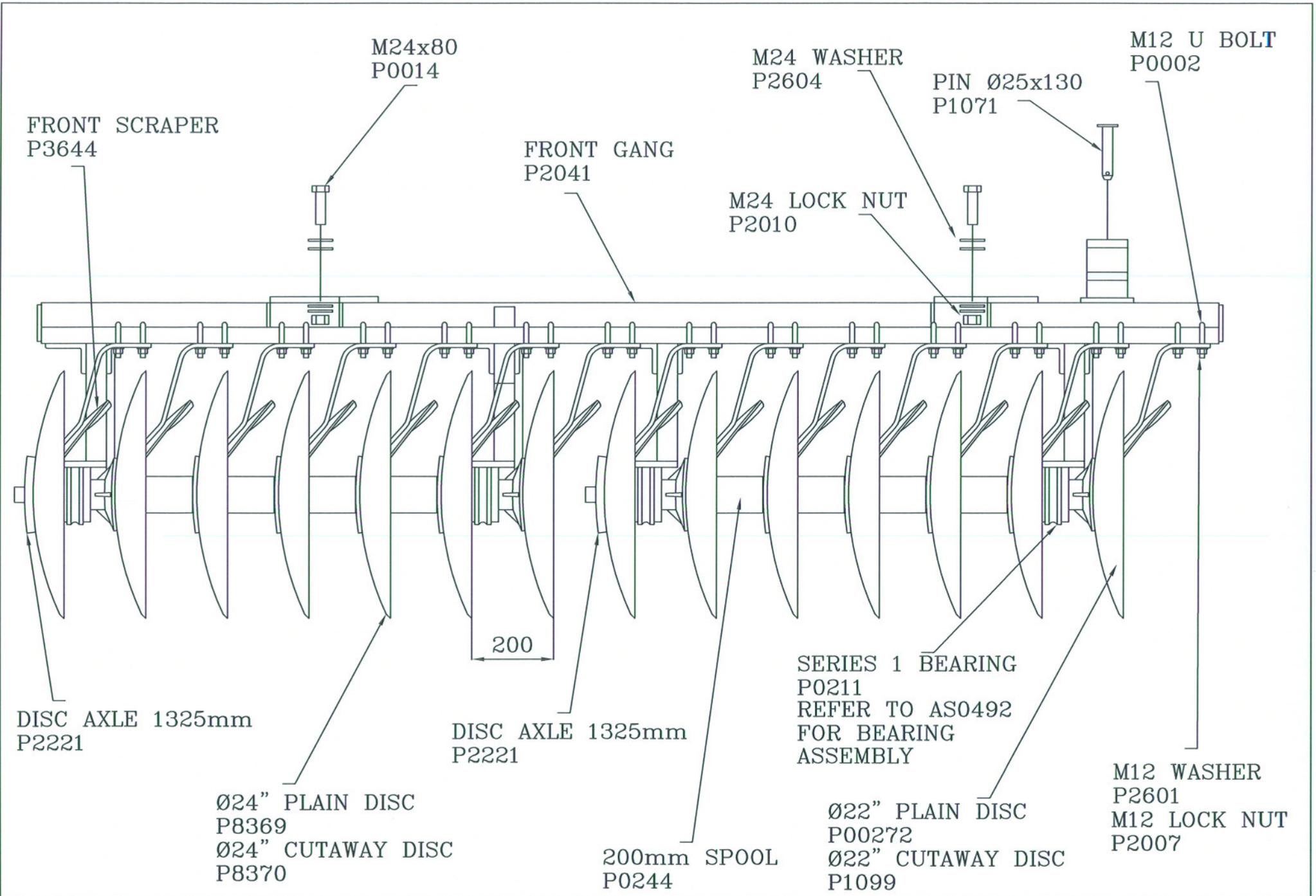
SERIES 1 BEARING + FABRICATED SPACER BUILD UP

DRAWN 19/02/03 UPDATED	PART NUMBER	FROM SERIAL NO.	TO SERIAL NO.	ISSUE	DRAWING NO.
				A	AS1098



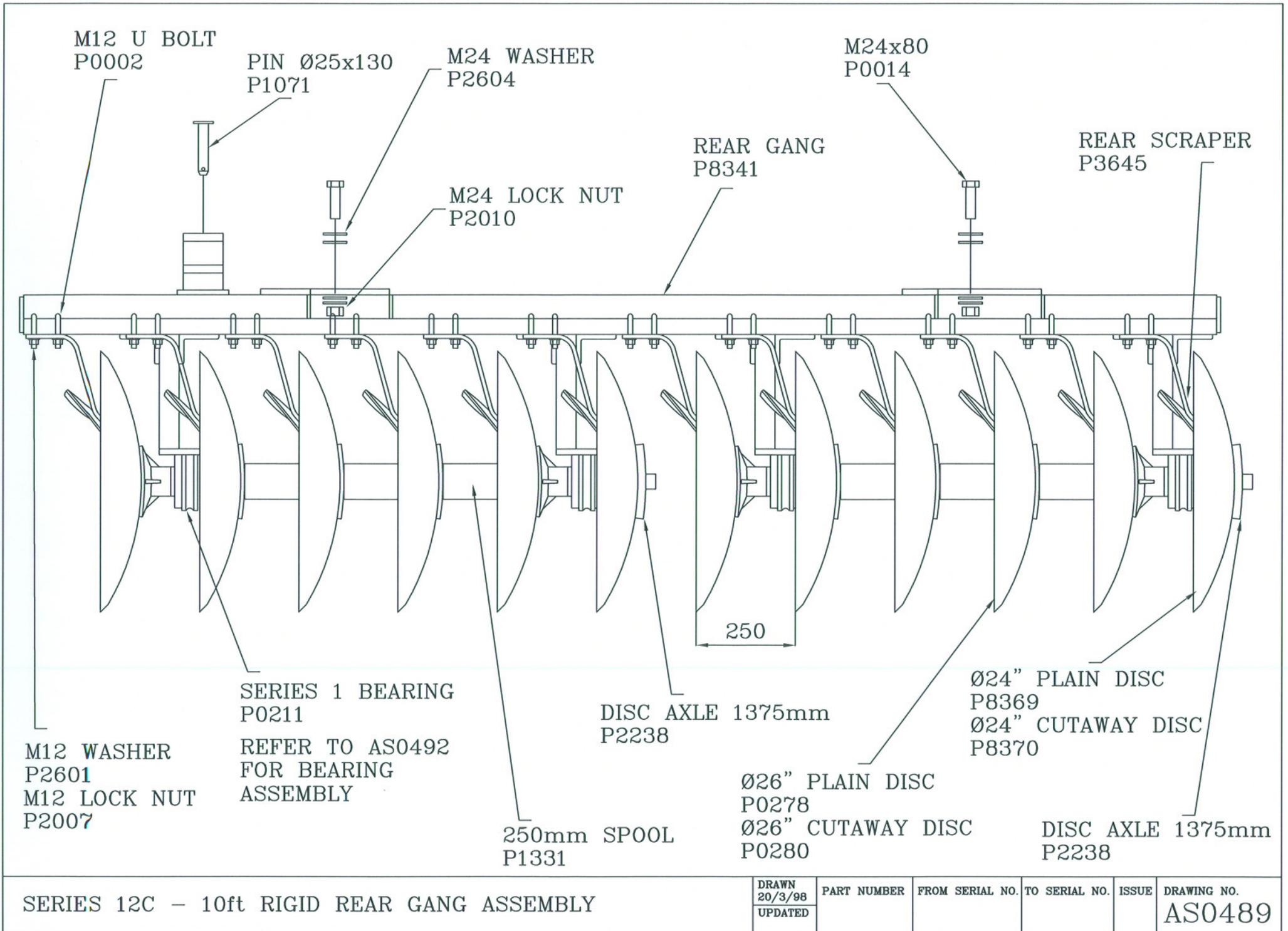
SERIES 1 BEARING ASSEMBLY: 2000 Type ROUND

DRAWN 05/11/99	PART NUMBER P9271	FROM SERIAL NO.	TO SERIAL NO.	ISSUE	DRAWING NO. AS0611
UPDATED					



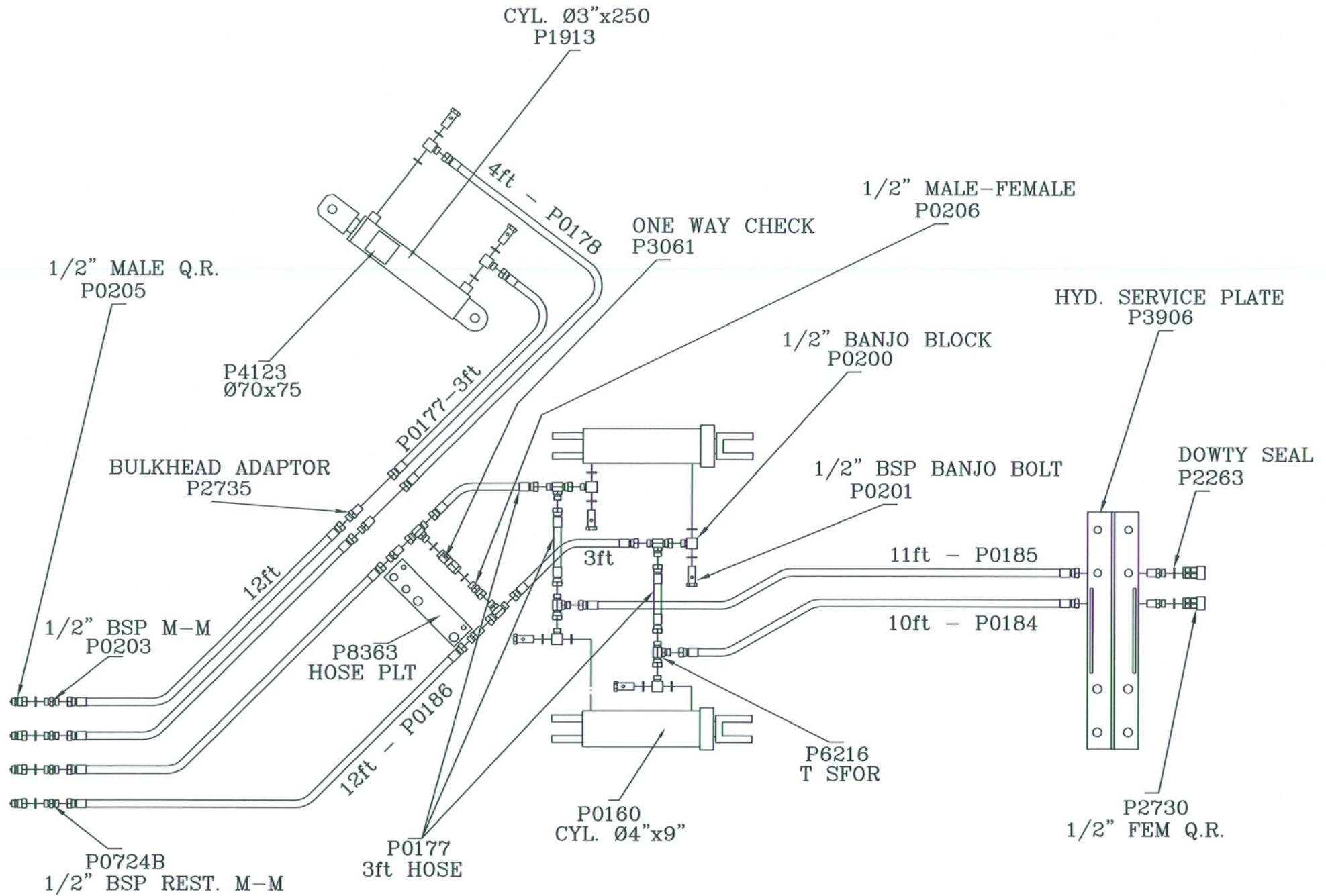
SERIES 12C - 10ft RIGID FRONT GANG ASSEMBLY

DRAWN 20/3/98 UPDATED	PART NUMBER	FROM SERIAL NO.	TO SERIAL NO.	ISSUE	DRAWING NO.
					AS0488



SERIES 12C - 10ft RIGID REAR GANG ASSEMBLY

DRAWN 20/3/98 UPDATED	PART NUMBER	FROM SERIAL NO.	TO SERIAL NO.	ISSUE	DRAWING NO.
					AS0489



SERIES 12C 10' RIGID - HYDRAULIC LAYOUT
 LIFT & HYDRAULIC ANGLING

DRAWN	PART NUMBER	FROM SERIAL NO.	TO SERIAL NO.	ISSUE	DRAWING NO.
22/04/98 UPDATED					AS0493