

MT/11

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# British Railways Board

Mechanical & Electrical Engineering Department

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## TYRE PROFILE and WHEEL GAUGES for ROLLING STOCK







This booklet is concerned with the approved British Railways gauges used in the measurement of tyre/wheel wear and is produced as a result of Rolling Stock Maintenance Sub-Committee Minute 926, 14.11.67.

These instructions and gauges supersede all previous instructions and gauges issued and used in connection with wheels and tyres on B.R. Rolling Stock. Certain existing wheelsets will not pass present gauges.

The profile identification for both built up and solid wheels are listed in the 'Profile Identification' chapter. All new wheelsets must be to the distance between wheels as shown on the respective wheel profile drawing.

The appropriate Drawing and B.R. Catalogue Numbers are listed separately and follow the contents page.

All metal gauges are to be kept clean and lightly oiled.

Each gauge must be examined periodically; the time between examinations for each gauge is shown in the individual instructions for each gauge.

Orders for new or replacement gauges should be placed on -

Director of Supply  
Derwent House  
Railway Technical Centre  
Derby

Orders from Regional C.M. & E.E.'s shall be placed through Regional Headquarters.

Orders from B.R.E.L. shall be placed through B.R.E.L. H.Q., Derby.

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Issued by:-

C.M. & E.E. (B.R.B.)  
Railway Technical Centre  
Derby

October 1973

Issue 2





LIST OF GAUGES - RUNNING MAINTENANCE (REGIONAL)

GAUGE TYPE	DRG. NO.	B.R. CAT. NO.	PAGE NO.
Tyre Profile P1	F-A2-140	39/29771	5
Tyre Profile P2	F-A2-141	39/29772	5
Tyre Profile P3 & P5	F-A2-142	39/29773	5
Tyre Profile P4	F-A2-143	39/29774	5
Tyre Profile P6	F-A2-1399	39/29782	5
Depth of 'Hollow' Wear	F-A1-4642	39/29945	6
Flange Thickness and Height	F-A2-41	39/29967	8
Go-Not Go Flange Thickness and Height (Profile P1)	F-A3-457	39/29779	11
Go-Not Go Flange Thickness and Height (Profile P2 & P4)	F-A3-196	39/29776	11
Go-Not Go Flange Thickness and Height (Profile P3 & P5)	F-A3-458	39/29781	11
Go-Not Go Flange Thickness and Height (Profile P6)	F-A3-1400	39/29783	11
Toe Radius	F-A4-7325	39/29233	13
Tyre Thickness	F-A3-42	39/29778	14
Throat Gauge (1.3/16")	F-A2-47	39/29968	18
Throat Gauge (1.7/16")	F-A2-47	39/29969	18
Sliding Gauge (Road Gauge)	F-S-4800	39/29160	20
Micrometer Gauge (Road Gauge)	F-A0-4796	39/29777	23
Tread Diameter Comparison	F-S-4545	39/29975	26
Go-Not Go Gauge for Distance between Wheels, Profiles P1, P5 & P6	F-A2-2575	39/29650	28
Go-Not Go Gauge for Distance between Wheels, Profiles P3 & P4	F-A2-2575	39/29651	28
R.I.V. Gauge	F-A3-361	39/29825	30
R.I.V. Flange Slope Wear Gauge	F-A3-6991	39/29231	32





LIST OF GAUGES - WORKSHOPS (MACHINING)

GAUGE TYPE	DRG. NO.	B.R. CAT. NO.	PAGE NO
Tyre Profile P1	F-A2-4199	39/29789	35
Tyre Profile P3 & P5	F-A2-4201	39/29792	35
Tyre Profile P4	F-A2-4202	39/29791	35
Tyre Profile P6	F-A2-4203	39/29786	35
Go-Not Go Plug Gauge	F-A3-4909	39/29763	35
Tyre Thickness	F-A2-5748	39/29799	37
Throat Gauge (1.3/16")	F-A2-47	39/29968	39
Throat Gauge (1.7/16")	F-A2-47	39/29969	39
Go-Not Go Gauge for Distance between Wheels, Profiles P1, P5 & P6.	F-A2-2575	39/29650	40
Go-Not Go Gauge for Distance between Wheels, Profiles P3 & P4.	F-A2-2575	39/29651	40
Go-Not Go Gauge for Distance between Wheels, Main Workshops only.	F-A2-7221	39/29803	40
Sliding Gauge	F-A0-5563	39/29804	41
Carriage & Wagon Tread Diameter Comparison	F-S-5514	39/29806	43
Tyre/Wheel Profile Wear Gauge P1 & P6.	F-A0-5971	39/29807	45
Tyre/Wheel Profile Wear Gauge P3, P4 & P5.	F-A0-5971	39/29808	45
Setting Block	F-A0-5971	39/5236	45





PROFILE IDENTIFICATION

The type of tyre/wheel profile fitted to a vehicle is identified by a symbol which is painted in white and positioned as shown in Fig.1. The profile letter and number are included with the symbol and also stamped on the tyres/wheels.

The tyre/wheel stamping location and the types of profiles are as follows:-

1. Tyre/wheel stamping location

The profile identification letter and number are stamped in  $\frac{3}{8}$  in. high characters and are located as follows:-

(a) Built-up Wheels

On the outside of the tyre adjacent to the cast number etc.

(b) Solid Wheels

On the inner side of the boss following the 'B.R.' stamp or the last digit of P.O. (Private Owners) vehicles.

NOTE:-

Vehicles with P.1. profiles will not carry identification and by that will be recognised as the P.1. profile.

2. Profile Types

<u>Profile No.</u>		<u>Drawing No.</u>
P1	Standard 1 in 20 Profile	F-A2-1
* P2	Heumann Tyre Profile	F-A2-2
P3	U.I.C. Tyre Profile (for wheels greater than 840 mm dia).	F-A2-3
P4	U.I.C. Tyre Profile (for wheels 840 mm dia. and less)	F-A2-4
P5	Tyre Profile (for wheels greater than 840 mm dia).	F-A2-5
P6	R.D. 5 Tyre Profile	F-A2-6
* P7	R.D. 5A Tyre Profile	F-A2-7
* P8	R.D. 4 Tyre Profile	F-A2-8
P9	Thin Flange Tyre Profile	F-A2-9

NOTE:-

\* Indicates Non-Standard Profiles.





3. Identification

Painting Diagram

Stamping Diagram

Drawing No.

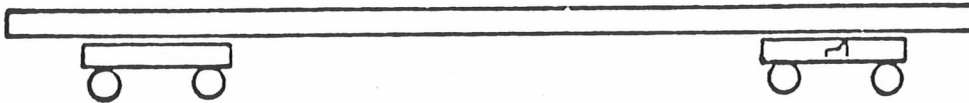
F-A4-286

210

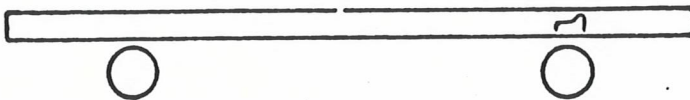


## NOTE

DIGIT TO SUIT APPROPRIATE PROFILE DRAWING No.  
TO BE PAINTED IN WHITE IN THE LATEST RAIL ALPHABET.



ON R. H. BOGIE SOLEBAR ON BOGIE VEHICLES.



ON SOLEBAR OVER R.H. WHEEL ON NON-BOGIE VEHICLES.

PROFILE IDENTIFICATION SYMBOL

FIG. 1



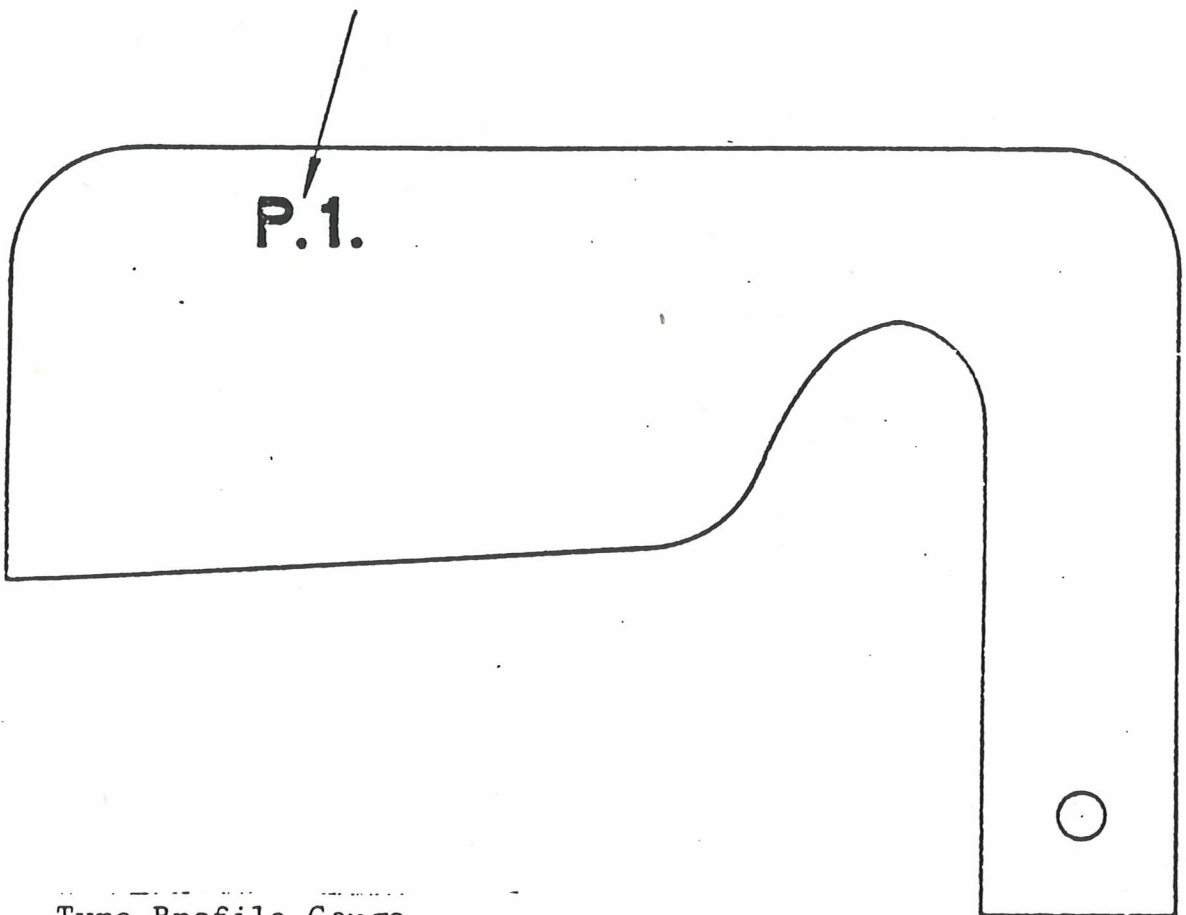
TYRE PROFILE GAUGE

1.1 The tyre profile gauges are similar to those at present in use and are designed and manufactured to the maximum tolerances permitted by the profile drawings. Each gauge is stamped with the profile letter and number as shown in Fig.2.

1.2 Refer to page 1 for the tyre profile gauge Drawing and B.R. Cat. Nos.

1.3 When the ceramic coating is worn away on the gauging edge, the gauge should be replaced.

FIGURE INDICATES THE PARTICULAR PROFILE



Tyre Profile Gauge  
Fig. 2





## DEPTH OF HOLLOW WEAR GAUGE

### 2.1. Function

This gauge is designed to ascertain the depth of 'hollow' wear of the tyre/wheel tread.

It is suitable for use on all profiles and determines, in conjunction with the wear limits in Table 1, page 7, when the tyre/wheel requires re-turning.

A Jockey needle is incorporated which allows the registered wear to be read when the gauge has been removed from the tyre/wheel.

### 2.2. Using the Gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

Measuring the depth of hollow wear. To re-set the Jockey needle turn anti-clockwise until it hits the stop.

The dial face is marked both in imperial and metric units. The dial turns one revolution only, the maximum readings shown are 0.300 in. and 7.5 millimetres. The imperial markings are in black and the metric in red.

It must be ensured that the gauge is radially in alignment with the wheel centre, press the stock firmly against the back of the flange, lower the gauge gently onto the wheel (to avoid false readings) until the plate touches the tyre/wheel and the depth of hollow wear (if any) will be registered by the dial reading (Fig. 3, Page 7).

### 2.3. Hollow Wear Limits

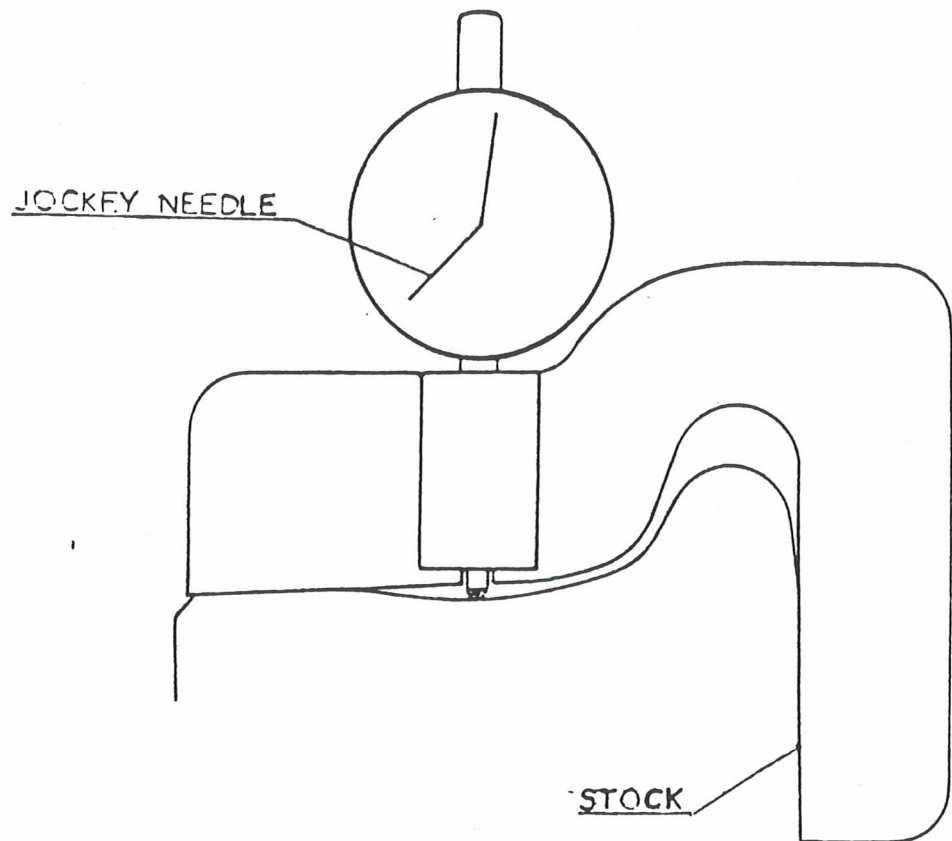
The maximum permissible depth of hollow wear, acceptable to B.R., for all profiles are shown in Table 1.

Vehicles belonging to Continental Railways will be gauged with the R.I.V. gauge.

### 2.4. Checking Accuracy of Gauge

The hollow wear gauge must be checked for accuracy every 5 years.





DEPTH OF HOLLOW WEAR GAUGE  
FIG 3

TABLE 1

TYPE OF VEHICLE	PROFILE IDENTIFICATION	WEAR LIMITS	
		in.	mm
Freight Stock	P1, P3, P4, P5	0.188 $\left(\frac{3}{16}\right)$	4.80
Freight Stock	P2, P6	0.250 $\left(\frac{1}{4}\right)$	6.80
Milk Tank Wagons	All	0.094 $\left(\frac{3}{32}\right)$	2.40
Coaching Stock DMU's EMU's fitted with:-			
BR Bogies (100 mile/h)	All	0.047 $\left(\frac{3}{64}\right)$	1.20
BR Bogies (Others)	All	0.094 $\left(\frac{3}{32}\right)$	2.40
Commonwealth and BR B4 Bogies	All	0.188 $\left(\frac{3}{16}\right)$	4.80
Other Coaching Stock. DMU's and EMU's	All	0.125 $\left(\frac{1}{8}\right)$	3.20





## FLANGE THICKNESS AND HEIGHT GAUGE

### 3.1. Function

This gauge is designed to measure flange thickness and flange height from the tread and is for use only where precise measurement is required, and determines, in conjunction with Table 2 page 10, Fig. 4 page 9, when a tyre/wheel requires re-turning.

### 3.2. Using the Gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc. at the section to be gauged.

#### Checking flange thickness.

Slide 'B' (see Fig. 4 page 9) is not required for determining the flange thickness and must be set clear of the flange.

To determine the flange thickness, press the gauge against the back of the flange and draw the gauge down radially until the stop contacts the tread (Fig. 4 page 9). Adjust slide 'A' by means of the knurled knob until the slide point just touches the flange. The flange thickness is indicated on the graduated scale 'A' and can be read in either inches or millimetres.

The minimum permissible dimension (dimension 'X' on Fig. 4 page 9) for all profiles are listed in Table 2 page 10.

#### Checking flange height

Slide 'A' (see Fig. 4 page 9) is not required for determining the flange height and must remain clear of the flange.

To determine the flange height, press the gauge against the back of the flange and draw the gauge down radially until the stop contacts the tread (Fig. 4 page 9).

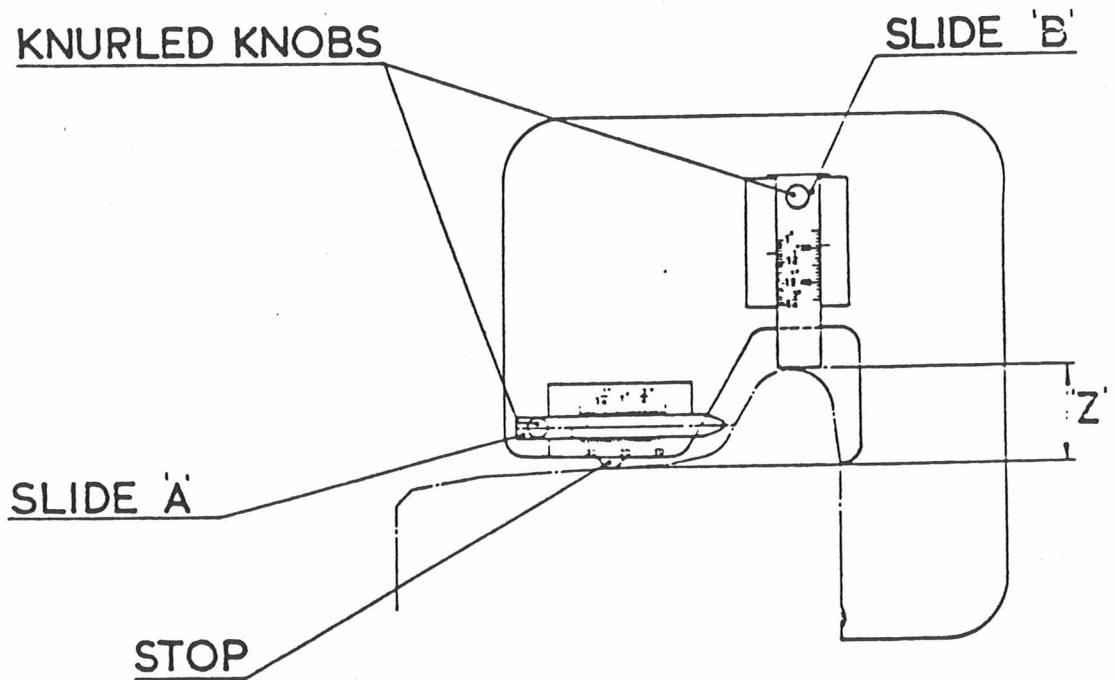
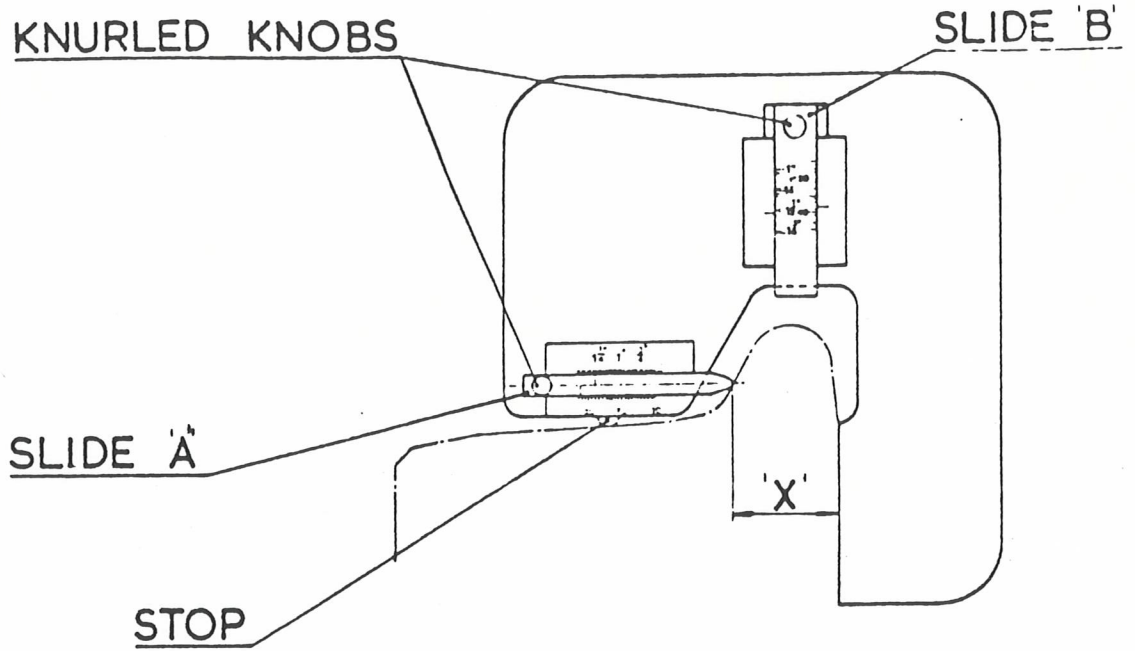
Adjust Slide 'B' by means of the knurled knob until the slide just touches the top of the flange. The flange height is indicated on the graduated scale 'B' and can be read either in inches or millimetres.

The maximum permissible flange height (dimension 'Z' as shown on Fig. 4 page 9) for all profiles, are listed in Table 2 page 10.

### 3.3. Checking Accuracy of Gauge

The flange thickness and height gauge must be checked for accuracy every 5 years.





BLANCE THICKNESS AND HEIGHT GAUGE





TABLE 2

PROFILE IDENTIFICATION NO	MIN. PERMISSIBLE DIMENSION X		MAX. FLANGE HEIGHT	
	in.	mm	in.	mm
P1	15/16	24	1.3/8	35
P2	1.1/16	27	1.7/16	36.5
P3	1.1/16	27	1.5/16	33
P4	1.1/16	27	1.7/16	36.5
P5	1.1/16	27	1.5/16	33
P6	1	25.5	1.7/16	36.5



GO-NOT GO FLANGE THICKNESS  
AND HEIGHT GAUGE

4.1. Function

This gauge is designed for determining the two following flange conditions which require a tyre/wheel profile to be re-turned.

- (a) Minimum flange thickness.
- (b) Maximum flange height.

Several gauges are supplied to cover the various profiles and are clearly marked with the identification letters and numbers of the profiles on which they can be used (i.e. 'P1' 'P2 P4' 'P3 P5' 'P6').

4.2. Using the gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

Minimum flange thickness

This condition is determined by pressing face 'A' of the gauge (Fig. 5 page 12) against the back of the flange and drawing the gauge down radially (to the wheel centre) until either the 'X' or the 'unmarked' stop touch the profile. Should the 'X' stop touch the tyre/wheel first, minimum flange thickness is indicated, hence requiring the profile to be re-turned.

The 'unmarked' stop touching the flange prior to the 'X' stop contacting the tread indicates permissible flange thickness.

Maximum flange height

This condition is determined by pressing face 'B' of the gauge against the back of the flange (Fig. 5 page 12) and drawing the gauge down radially (to the wheel centre) until either:-

- (a) The top of the flange is contacted or
- (b) The 'X' stop contacts the tyre/wheel tread.

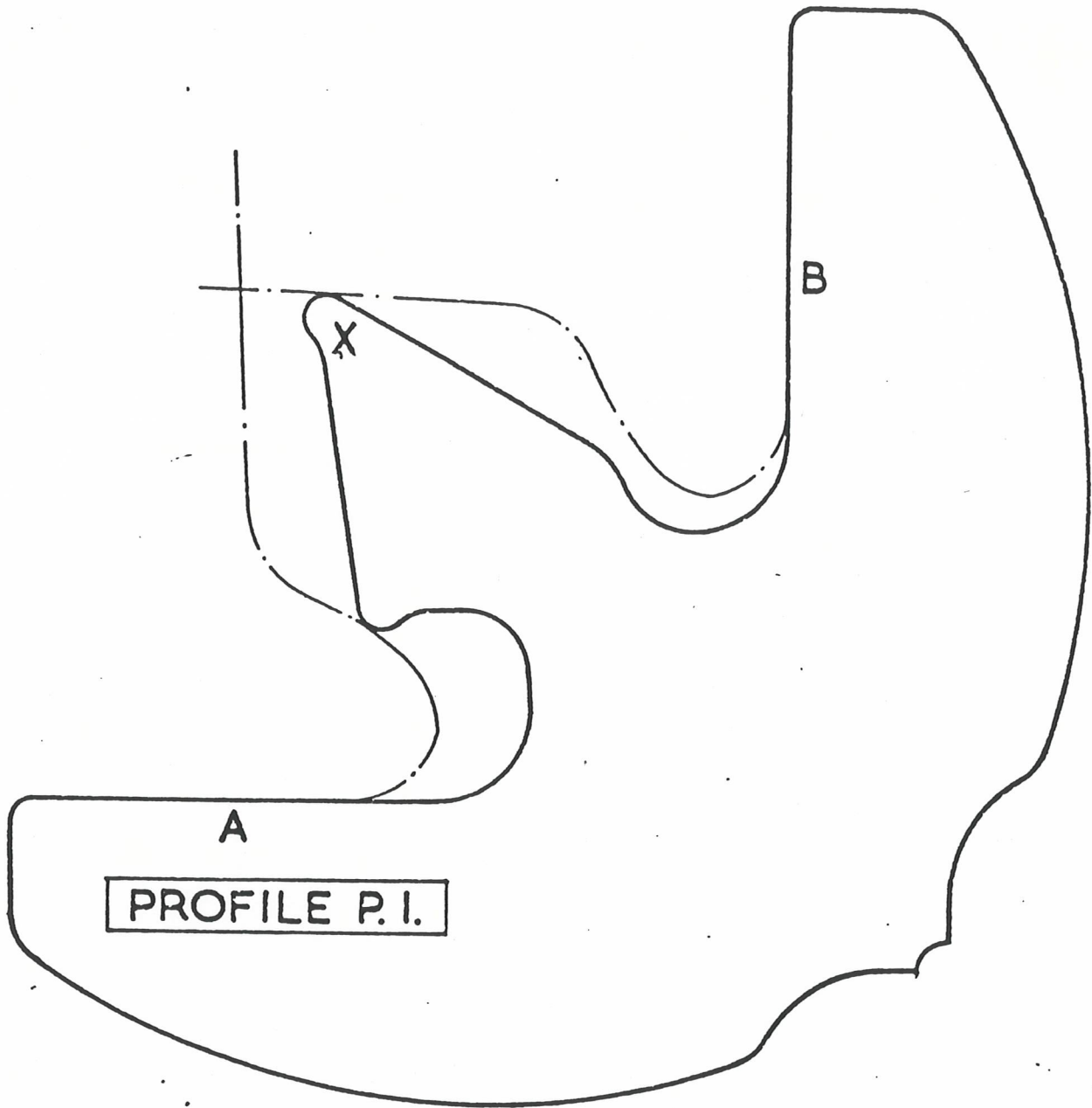
Case (a) denotes maximum flange height and hence the profile requires re-turning. Case (b) indicates permissible flange height.

4.3. Checking of Gauge

When the ceramic coating on the gauging edges is worn away or damaged at any point exposing the plastic edge, the gauge should then be scrapped and replaced.







GO-NOT GO FLANGE THICKNESS  
AND HEIGHT GAUGE

FIG. 5.



## WHEEL FLANGE TOE RADIUS GAUGE

### 5.1. Function

This gauge is designed for determining the maximum permissible build-up of material on the toe radius of the flange.

### 5.2. Using the gauge

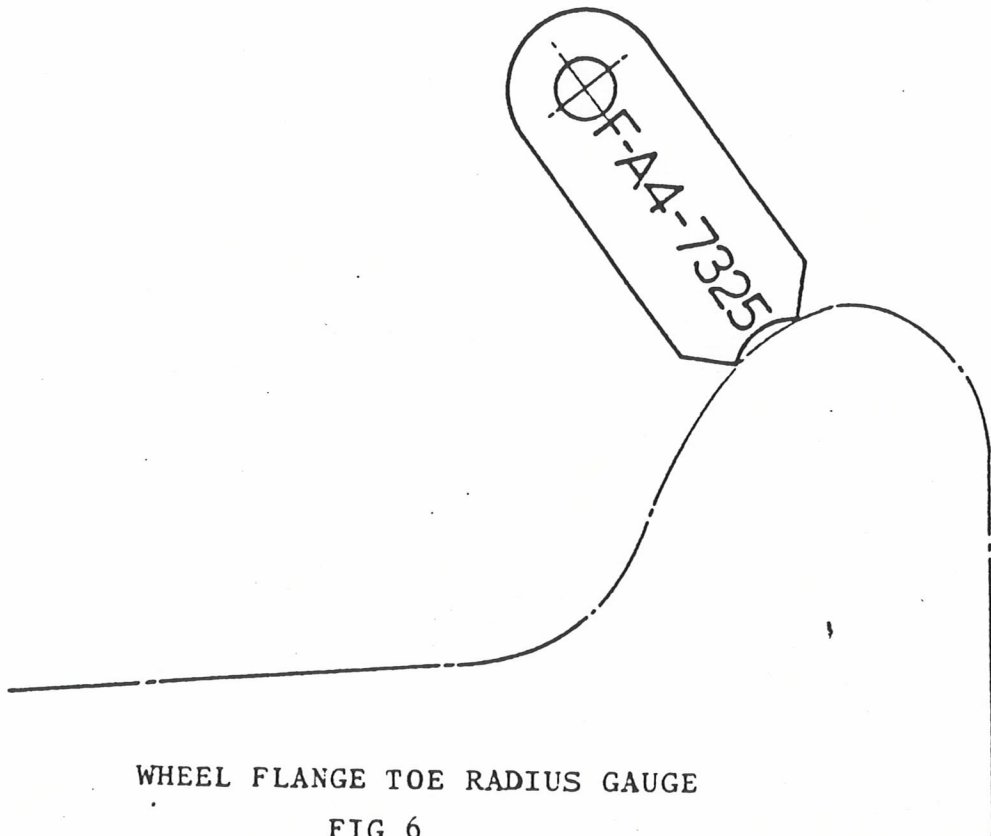
To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs etc., at the section to be gauged.

Maximum permissible build-up of material on the toe radius of the tyre/wheel flange.

This condition is determined by the quadrant as shown in Fig. 6 page 13, being brought into contact with the toe radius. If a maximum build-up of material is present the gauge will rock at some point on the build-up. If this condition applies the profile requires re-turning.

### 5.3. Checking accuracy of gauge

The wheel flange toe radius gauge must be checked for accuracy every 5 years.



WHEEL FLANGE TOE RADIUS GAUGE

FIG 6



TYRE THICKNESS GAUGE

6.1. Function

This gauge is designed for the measurement of tyre thickness and determines when wheels require re-tyring. All profiles are covered by the gauge, with the tyre scrapping sizes listed in Table 3 pages 14 & 15, which is in vehicle order.

6.2. Using the Gauge

To ensure accurate use of gauge the tyre must be free from burrs, roll-overs, etc. at the section to be gauged.

Press the gauge firmly against the outer face of the tyre and draw the gauge down radially until the stop touches the tyre tread (Fig. 7 page 17). The tyre thickness is indicated by taking a reading from the scale against the inside bore of the tyre i.e. a  $2\frac{1}{4}$ " reading is shown in Fig. 7.

The millimetre scale is on the reverse side of the gauge and is read by adopting the same procedure as for inches.

For explanation of Groups 1, 2 and 3 (Table 3 Page 15) See Page 16.

6.3. Checking Accuracy of the Gauge

The tyre thickness gauge must be checked for accuracy every 5 years.

TABLE 3  
FREIGHT STOCK

TYPE OF VEHICLE	SCRAPPING SIZES		MIN. THICKNESS AFTER TURNING	
	in.	mm	in.	mm
Std. wagons up to and including 9" x $4\frac{1}{4}$ " Journals.	15/16	24	1.1/8	28.5
Std. wagons over 9" x $4\frac{1}{4}$ " Journals.	1.1/4	32	1.7/16	36.5
Std. wagons roller bearings.	1.1/4	32	1.7/16	36.5





TABLE 3 (Cont'd)  
COACHING STOCK

TYPE OF VEHICLE	SCRAPPING SIZES			MIN. THICKNESS AFTER TURNING		
	GROUP			GROUP		
	1	2	3	1	2	3
(a) <u>LOCO HAULED COACHING STOCK (FITTED WITH)</u>						
Non-Compensated Bogies	-	$1\frac{21}{32}$ " * 42 mm	$1\frac{21}{32}$ " * 42 mm	-	$1\frac{27}{32}$ " * 47 mm	$1\frac{27}{32}$ " * 47 mm
Compensated Bogies	-	$1\frac{3}{16}$ " 30 mm	$1\frac{1}{16}$ " 27 mm	-	$1\frac{3}{8}$ " 35 mm	$1\frac{1}{4}$ " 32 mm
Commonwealth B4 and B5 Bogies	$1\frac{3}{8}$ " 35 mm	$1\frac{1}{4}$ " 32 mm	-	$1\frac{9}{16}$ " 39.5 mm	$1\frac{7}{16}$ " 37.5 mm	-
(b) <u>DIESEL MECHANICAL MULTIPLE UNITS</u>	$1\frac{3}{8}$ " 35 mm	$1\frac{1}{4}$ " 32 mm	-	$1\frac{9}{16}$ " 39.5 mm	$1\frac{7}{16}$ " 37.5 mm	-
(c) <u>ELECTRIC &amp; DIESEL ELECTRIC MULTIPLE UNITS</u>						
Watford Stock	$2\frac{13}{16}$ " 71.5 mm	$2\frac{5}{16}$ " 58.5 mm	$1\frac{13}{16}$ " 46 mm	3" 76 mm	$2\frac{1}{2}$ " 63.5 mm	2" 51 mm
AM4 & AM10 Stock	$1\frac{5}{8}$ " 41 mm	$1\frac{1}{2}$ " 38 mm	-	$1\frac{13}{16}$ " 46 mm	$1\frac{11}{16}$ " 43 mm	-
AM3 & AM11 Stock	$1\frac{13}{16}$ " 46 mm	$1\frac{11}{16}$ " 43 mm	-	2" 51 mm	$1\frac{7}{8}$ " 47.5 mm	-
BR Stock	$1\frac{3}{8}$ " 35 mm	$1\frac{1}{4}$ " 32 mm	$1\frac{1}{8}$ " 28.5 mm	$1\frac{9}{16}$ " 39.5 mm	$1\frac{7}{16}$ " 37.5 mm	$1\frac{5}{16}$ " 33.5 mm
S.R. (Mark 6) Stock	$1\frac{7}{16}$ " 37.5 mm	-	-	$1\frac{5}{8}$ " 41 mm	-	-
Other S.R. Stock	$1\frac{5}{16}$ " 33.5 mm	$1\frac{3}{16}$ " 30 mm	$1\frac{1}{16}$ " 27 mm	$1\frac{1}{2}$ " 38 mm	$1\frac{3}{8}$ " 35 mm	$1\frac{1}{4}$ " 32 mm



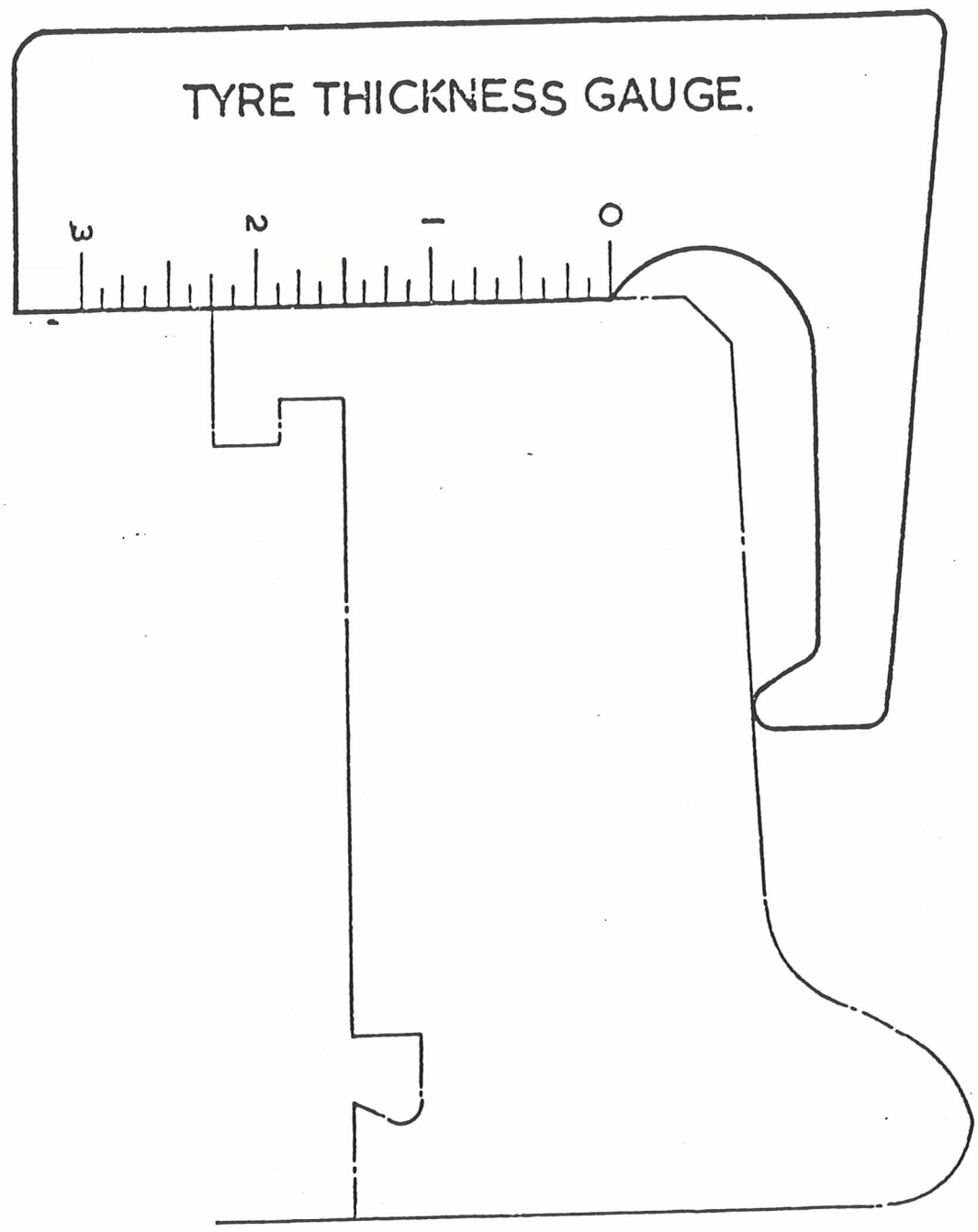
Stock in Group 1 - Wheels with  $4\frac{3}{4}$ " dia. Journals and over (Plain Bearings) and vehicles over 36 tons (Roller Bearings).

Stock in Group 2 - Wheels with journals under  $4\frac{3}{4}$ " dia. 31-36 tons (Plain Bearings) and vehicles up to 36 tons (Roller Bearings).

Stock in Group 3 - Wheels with journals under  $4\frac{3}{4}$ " dia. up to 31 tons (Plain Bearings).

\*To eliminate brake lever contacting axle. Such wheel sets to be used with compensated brakework until minimum thickness after final turning is reached.





TYRE THICKNESS GAUGE

FIG. 7





THROAT GAUGE7.1. Function

This gauge is designed for determining the throat thickness of solid wheels and indicates by means of a stop when minimum throat thickness is reached.

7.2. Using the GaugeAccurate Use of Gauge

The wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

Check Throat Thickness

The dimension 'X' as shown in Table 4 falls into two categories with separate gauges manufactured to suit these requirements. It is therefore essential to use the correct throat gauge for the differing journal sizes.

The gauge is of the caliper type and closes over the throat of the wheel, as shown in Fig. 8. If the stop of the gauge is reached the wheel is unacceptable for service.

7.3. Scrapping Thickness (Dimension 'X')

The scrapping thicknesses, dimension 'X', of the wheels are listed in Table 4 below.

7.4. Checking Accuracy of Gauge

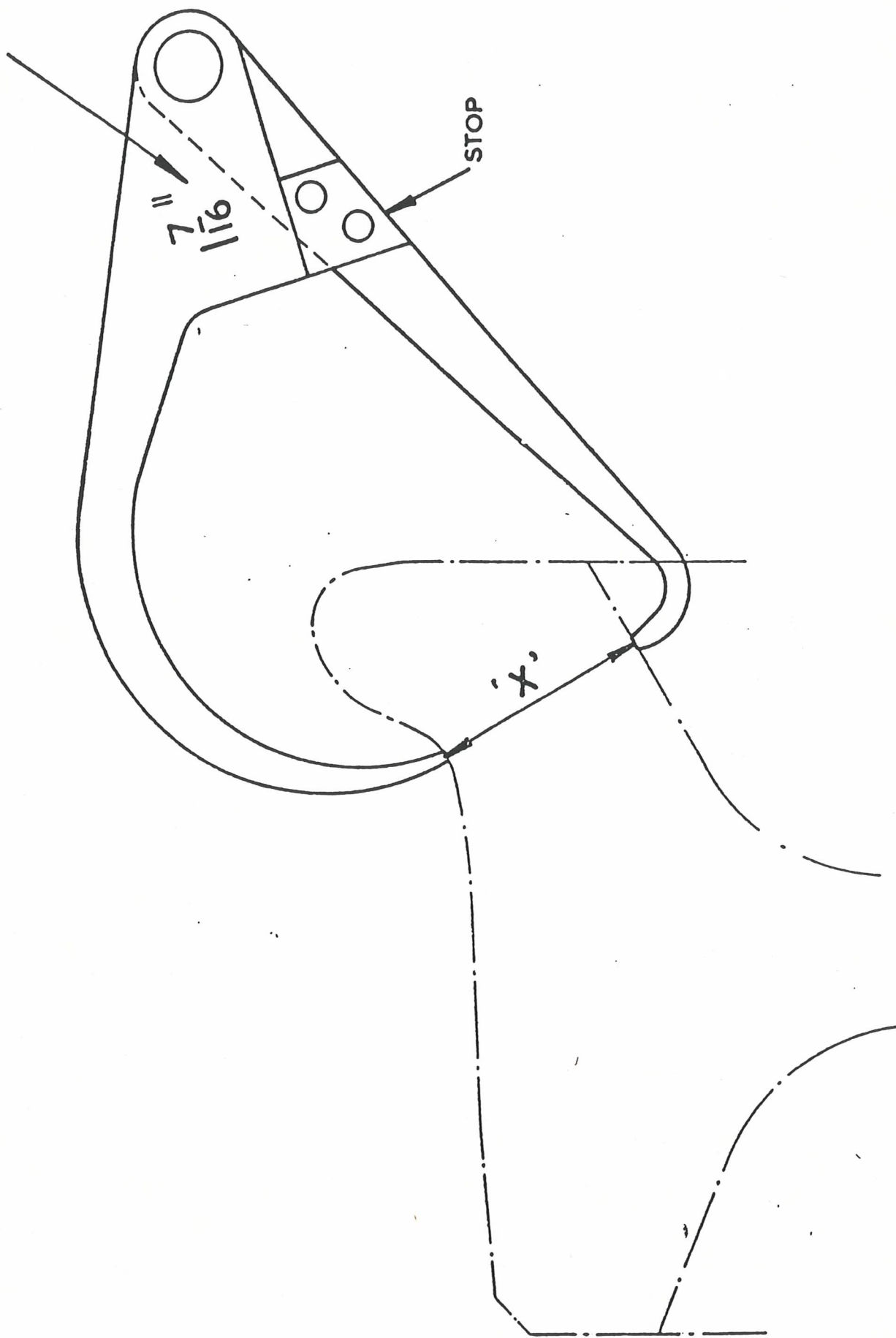
The throat gauge must be checked for accuracy every 5 years.

TABLE 4

JOURNAL DIAMETER	DIMENSION 'X'	
	in.	mm
Plain Bearings.		
4 $\frac{1}{4}$ "	1.3/16	30
4 $\frac{1}{2}$ "	1.3/16	30
5" and over	1.7/16	36.5
Roller Bearings.		
4 $\frac{3}{8}$ "	1.3/16	30
4 $\frac{7}{8}$ "	1.7/16	36.5
5 $\frac{1}{2}$ "	1.7/16	36.5
120 mm	1.7/16	36.5
130 mm	1.7/16	36.5



MARKED TO SUIT DIMENSION 'X'



THROAT GAUGE



## SLIDING GAUGE (ROAD GAUGE)

### 8.1. Function

This gauge is primarily designed to check that the back to back tolerance of wheel sets is within the permitted limits.

It can also be used to check the alignment of the tyre/wheel profiles and the line of the relief gradient.

This gauge can be used for checking bent axles.

Two profile plates for each of profiles P1, P3, P4, P5 and P6 are provided with each gauge and a slip gauge to cover the following 3 profiles P1, P5, P6, one for the P3 and one for P4 are also provided with each gauge. The P3 and P4 slip gauges are of the same dimensions.

### 8.2. Using the Gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

#### Checking flange back to back dimension

Set the gauge as shown in Fig. 9 page 21, using the correct profile plates and slip gauge according to the profile of the wheelset being checked.

For checking the minimum limit the narrow end of the slip gauge to be in position and for checking the maximum limit the wide end of the slip gauge to be in position.

For tolerances between flange backs for different profiles see Table 5 page 22.

Align the gauge with the axle, applying it as near to the horizontal centre line as possible.

To be within the permitted limits the profile plates must contact the tyre/wheel treads when the narrow end of the slip gauge is in position and not when the wide end of the slip gauge is in position.

#### Checking alignment of profiles and line of relief gradient

With the gauge in situ, i.e. when the profile plates are in contact with the tread, the tyre/wheel profiles may be checked against the outline of the profile plates.

With the gauge in situ, on the wheelset, the relief gradient of the tyre/wheel can be checked by using a suitable straight edge in alignment with the scribed line marked on the profile plate.

### 8.3. Checking Accuracy of Slip Gauges

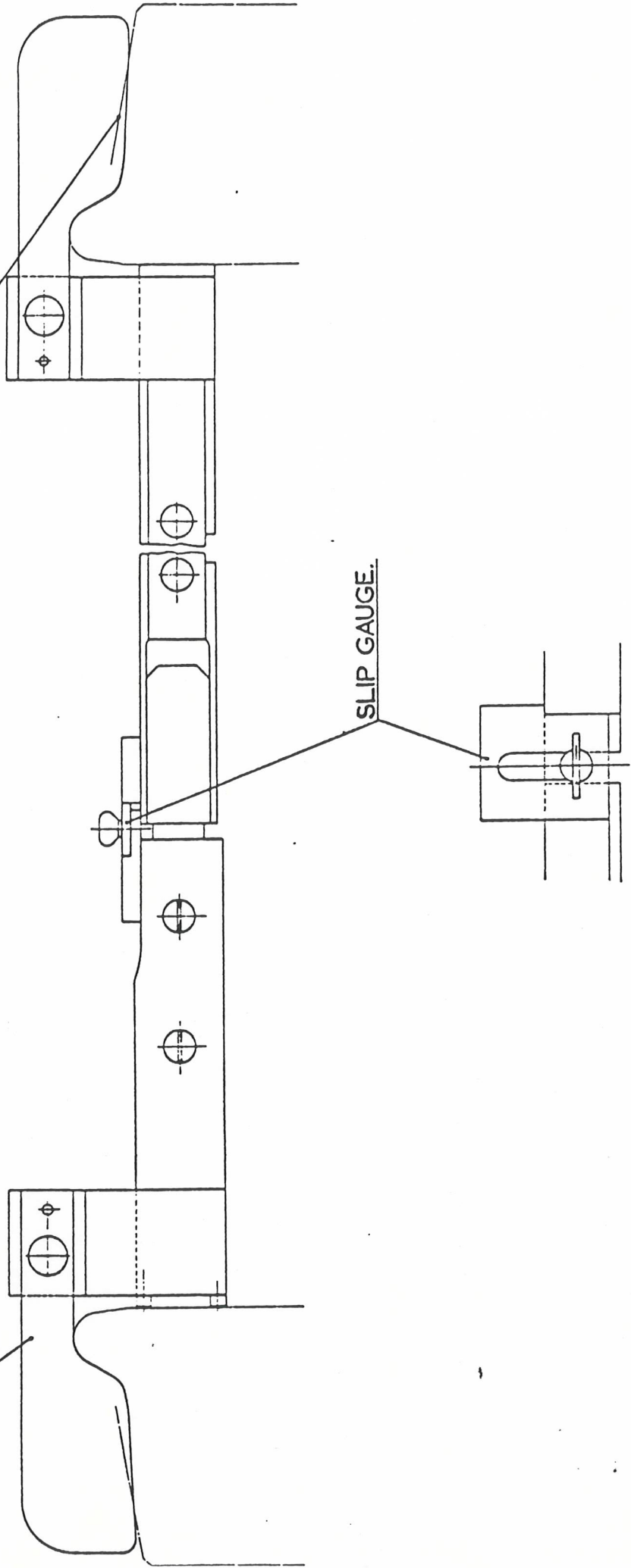
The slip gauges must be checked for accuracy every 5 years.





APPROPRIATE PROFILE TO  
BE FITTED.

FOR CHECKING RELIEF  
GRADIENT.



ROAD GAUGE (USING GAUGE SLIPS)

FIG. 9.



TABLE 5

PROFILE	TOLERANCE BETWEEN FLANGE BACKS
P1, P5 & P6	+0.050" -0.000"
P3 & P4	+0.080" -0.000"



## MICROMETER GAUGE (ROAD GAUGE)

### 9.1. Function

This gauge is primarily designed to ascertain the precise measurement between the backs of tyre/wheel flanges of wheel-sets.

It can also be used to check the alignment of the tyre profiles and the relief gradient for which purposes two plate gauges for each of profiles P1, P3 and P5, P4 and P6 are provided with each gauge.

This gauge can be used for checking bent axles.

### 9.2. Using the Gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

#### Checking precise measurement between flange backs

The gauge to be as shown in Fig. 10 page 25.

For minimum and maximum dimensions between flange backs for different profiles see Table 6 page 24. The millimetre dimensions shown cannot be measured with this gauge.

Set the micrometer at 0.000.

Slide the fixed anvil to contact the micrometer anvil and finger tighten the wing screw.

This gives a set measurement over location buttons of 53.000 inches.

Aligning the gauge with the axle bring the plain location plates on to the toe of the tyre/wheel flanges, place the fixed end location button against the tyre/wheel back, loosen the wing screw, slide the adjustable end outwards until the location button at this end makes contact with the tyre/wheel back, adjust the micrometer until the two anvils make contact.

The reading on the micrometer added to 53.000 inches thus gives the precise measurement between flange backs at this particular position.

#### Checking alignment of profiles and line of relief gradient

The gauge to be as shown in Fig. 10 page 25 with the correct profile plates fitted according to the profile of the wheel set being gauged. The profile plates to be fitted after a precise measurement between flange backs has been taken.

Aligning the gauge with the axle, draw the gauge radially down onto the wheel set until either one or both profile plates make contact with the tyre/wheel flanges. The alignment of the tyre/wheel profiles can then be checked against the outline of the profile plates.





With the gauge in situ on the wheel set, the relief gradient of the tyre wheel can be checked by using a suitable straight edge in alignment with the scribed line marked on the profile plates.

9.3. When not in use the micrometer is to be unwound to  $-0.050''$  to prevent damage to anvil faces.

When setting gauge, micrometer to be unwound to  $-0.050''$ .

#### 9.4. Checking Accuracy of Gauge

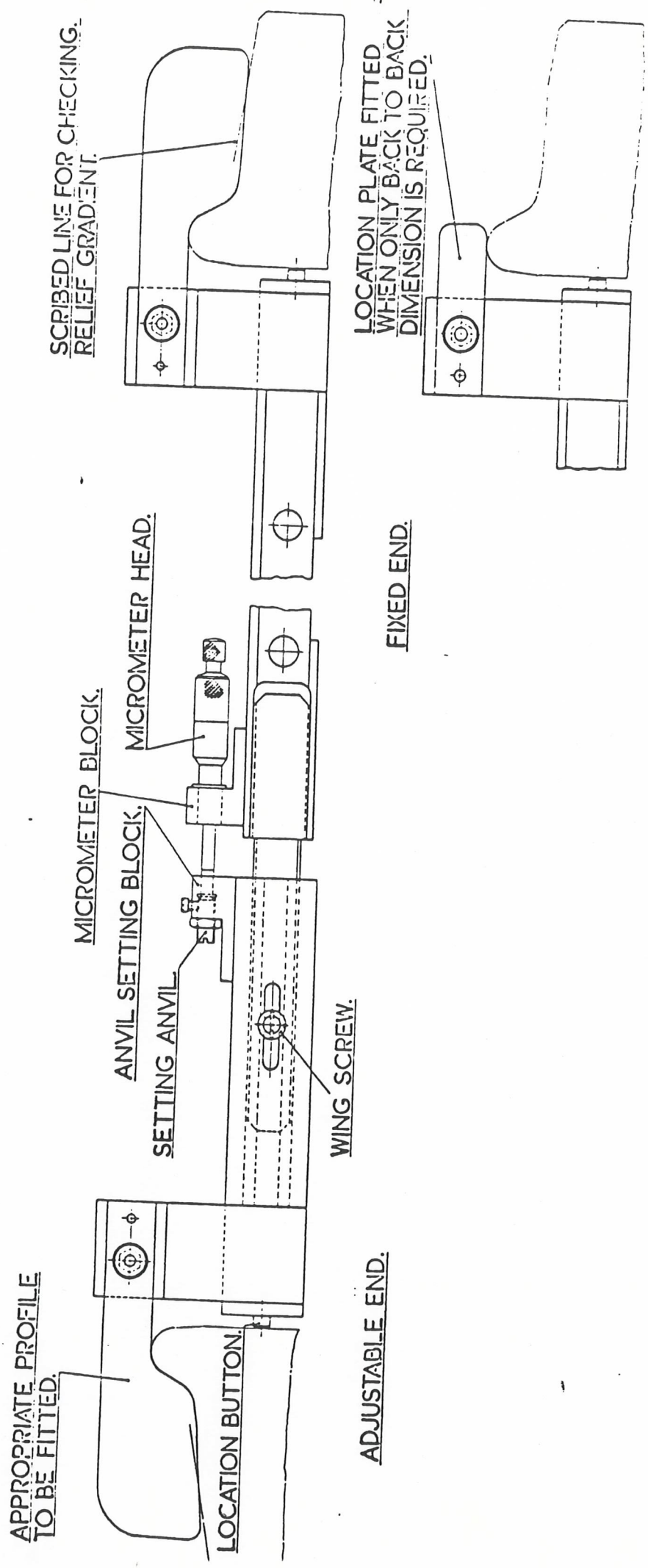
The gauge must be checked every 5 years for accuracy of the micrometer and measurement over location buttons.

The gauge should always be checked if it is suspected that the micrometer anvil has been moved, or the anvil locknut has become loose.

TABLE 6

PROFILE IDENTIFICATION	DISTANCE BETWEEN FLANGE BACKS	
	in.	mm
P1, P5 & P6	53.625 - 53.675	1 362 - 1 363.25
P3 & P4	53.437 5 - 53.517 5	1 357 - 1 359.5





ROAD GAUGE (MICROMETER)

FIG. 10



## TREAD DIAMETER COMPARISON GAUGE

### 10.1. Function

This gauge is primarily designed to check that the diameter of one wheel on the axle is within 0.010 in. of the diameter of the other wheel for carriage stock, and within 0.020 in. of the diameter of the other wheel for freight stock. It can also be used to find the exact diameter of a wheel when used with an inside micrometer.

### 10.2. Using the Gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

#### (a) Comparison of Wheel Diameters (Fig. 11 Page 27).

When adjusting gauge length 'A', the knurled nuts must firstly be loosened on the location point stand and the dial gauge stand, then setting the location point 'C' and point 'D' (dial gauge roller stylus) so that they equal approximately the diameter of the wheel 'A' to be checked.

Ensuring that the ball locators 'B' are against the flange-back and the location point 'C' is up against the tread, rotate the dial stylus 'D' over the circumference of the wheel. The maximum registered dial reading must be recorded for the comparison against the other wheel.

Repeat the procedure for the other wheel. The two dial readings must be within the prescribed limits laid down.

The comparison of the wheel diameters is made by taking the flange backs as the datum for the ball locators 'B' which positions the location point 'C'.

#### (b) Finding the Diameter of a Wheel

Follow the procedure set down in (a). Remove the gauge, place an inside micrometer on the location point 'C', and adjust the inside micrometer until its other end touches the roller stylus and the dial gauge registers the reading that has been recorded. The dimension then shown on the inside micrometer is the wheel diameter of that particular wheel.

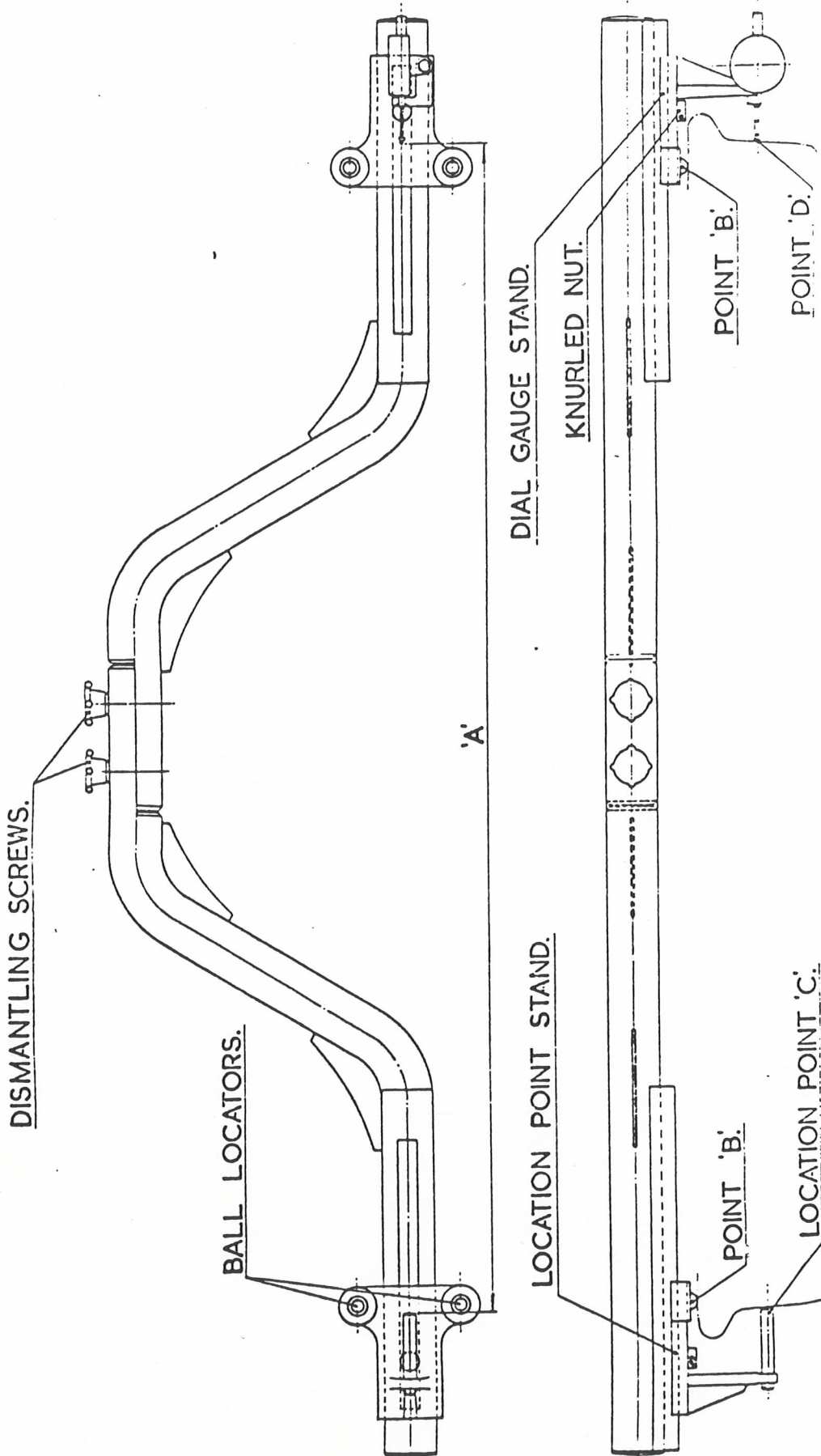
#### (c) Storage and Transport of Gauge

If required the gauge can be split into two halves after removing the dismantling screws. The location point stand and the dial gauge stand can be removed by unscrewing the knurled nuts.

### 10.3. Checking Accuracy of the Gauge

The tread diameter comparison gauge must be checked for accuracy every 5 years.





TREAD DIAMETER COMPARISON GAUGE

FIG. 11





GO-NOT GO GAUGES FOR DISTANCE  
BETWEEN WHEELS

11.1. Function

The Go-Not Go gauge is designed to check that the distance between wheel backs is within the prescribed limits laid down, as shown in Table 7 below. This gauge can be used for checking bent axles.

11.2. Using the Gauge

To ensure accurate use of the gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

Checking the distance between wheel backs

The gauge to be aligned with the axle, apply it as near to the horizontal centre line as possible. For the back to back distance to be within the permitted limits, as shown in Table 7 page 28. The GO side of the gauge should pass between the wheel backs, as shown in Fig. 12 page 29, and the NOT GO side of the gauge should not pass between wheel backs.

When using the gauge for checking for bent axles, it will be necessary to move the wheel to ensure that the necessary measurements are always made at or near the horizontal centre line.

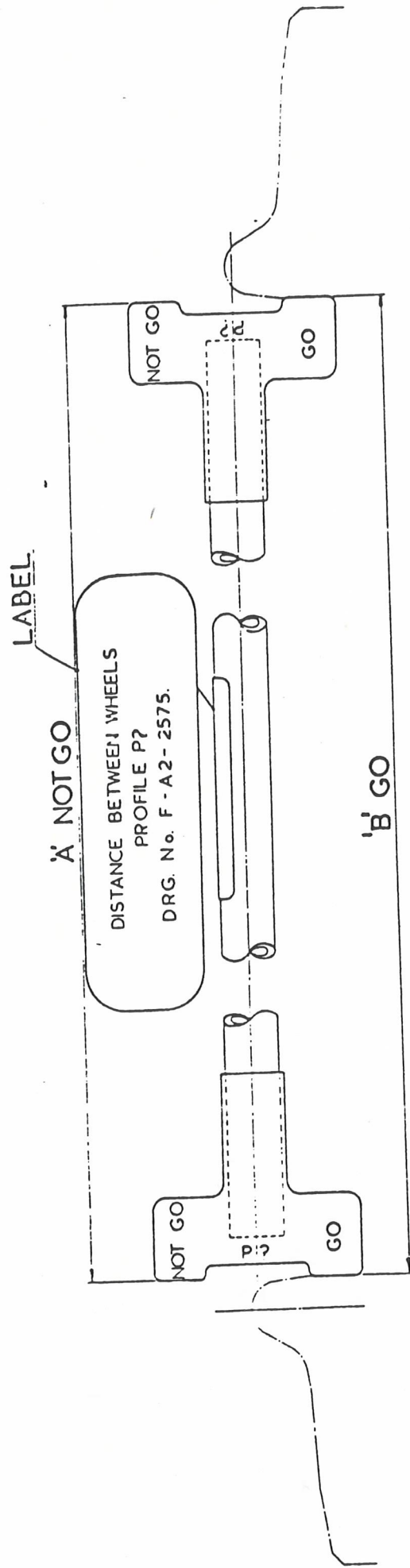
11.3. Checking Accuracy of Gauge

The gauge must be checked for accuracy every 5 years.

TABLE 7

PROFILE	DIMENSION A	DIMENSION B
P1, P5, P6	53.675" (1 363.25 mm)	53.625" (1 362 mm)
P3, P4	53.622" (1 362 mm)	53.542" (1 360 mm)





GO-NOT GO GAUGE FOR DISTANCE BETWEEN WHEELS

FIG. 12



R.I.V. GAUGE  
(International Traffic Marked R.I.V.)

12.1. Function

This gauge is designed for use on wheel sets fitted to vehicles in International Traffic and is clearly stamped R.I.V., for identification purposes.

The gauge is used to determine the following conditions which require the tyre/wheel profile to be re-turned.

- (a) Minimum flange thickness
- (b) Maximum tread wear
- (c) Maximum allowable flats on the tyre/wheel tread

The gauge also provides a check for maximum permissible accidental groove wear damage due to brake linkage etc., fouling the axle.

12.2. Using the Gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

Minimum Flange Thickness

This condition is determined by pressing face 'A' of the gauge against the back of the flange and drawing the gauge down radially (to the wheel centre) until either the tread or the flange is contacted. If the tread is contacted by the gauge minimum flange thickness is indicated, therefore the profile requires re-turning.

Maximum Tread Wear

This condition is determined by pressing face 'B' of the gauge against the back of the flange and drawing the gauge down radially until either the tread or the top of the flange is contacted. If the dimension 'Z' part of the gauge, as shown in Fig. 13 page 31 contacts the top of the flange, maximum tread wear is indicated, hence the profile requires re-turning.

Maximum allowable flats on the tyre/wheel tread

The maximum allowable worn flat on the tyre/wheel tread is indicated by the distance shown between the two sawcuts in the gauge, i.e. dimension 'Y' in Fig. 13 page 31.

Maximum Groove Wear in Axles

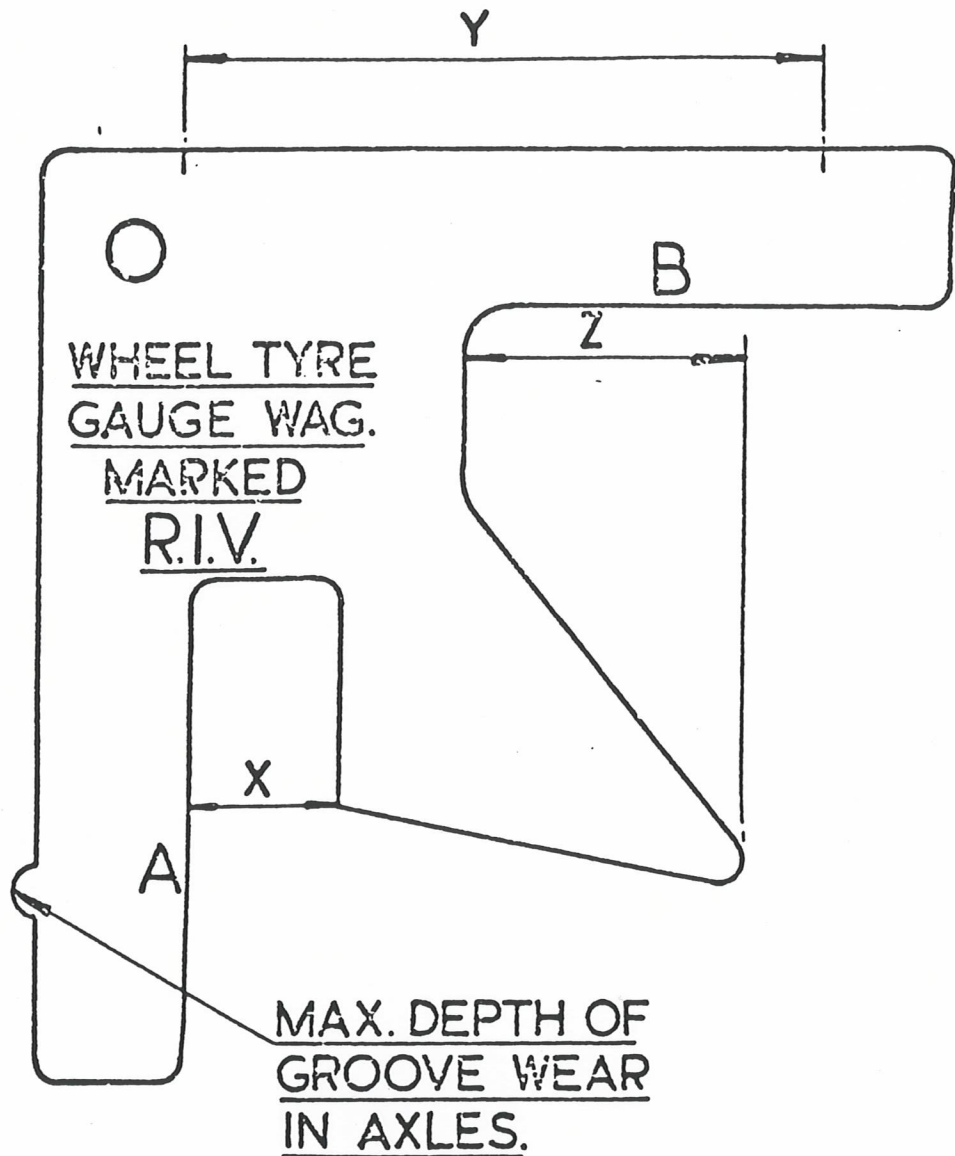
This condition can appear on any part of the axle and is due to brake linkage etc., fouling the axle when in service. The maximum depth of groove wear must not exceed that of the 'dimple' on the gauge, as shown in Fig. 13 page 31. If the groove is in excess of the gauge, maximum groove wear is indicated.





12.3. Checking Accuracy of the Gauge

The R.I.V. gauge must be checked for accuracy every 5 years.



R.I.V. GAUGE

FIG. 13.



## R.I.V. FLANGE SLOPE WEAR GAUGE

### 13.1. Function

This gauge is designed for use on wheel sets fitted to vehicles in International Traffic and is clearly stamped R.I.V. for identification purposes.

The gauge is used to determine when the flange slope is worn to the minimum condition on British Railways owned R.I.V. vehicles leaving Britain, normal B.R. Gauging System as in Booklet is adequate for all other points.

### 13.2. Using the Gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

#### Checking Flange Slope Wear (Fig. 14 Page 33).

Lower the gauge radially onto the tyre/wheel until point 'A' and face 'D' touch the tread and the flange toe respectively.

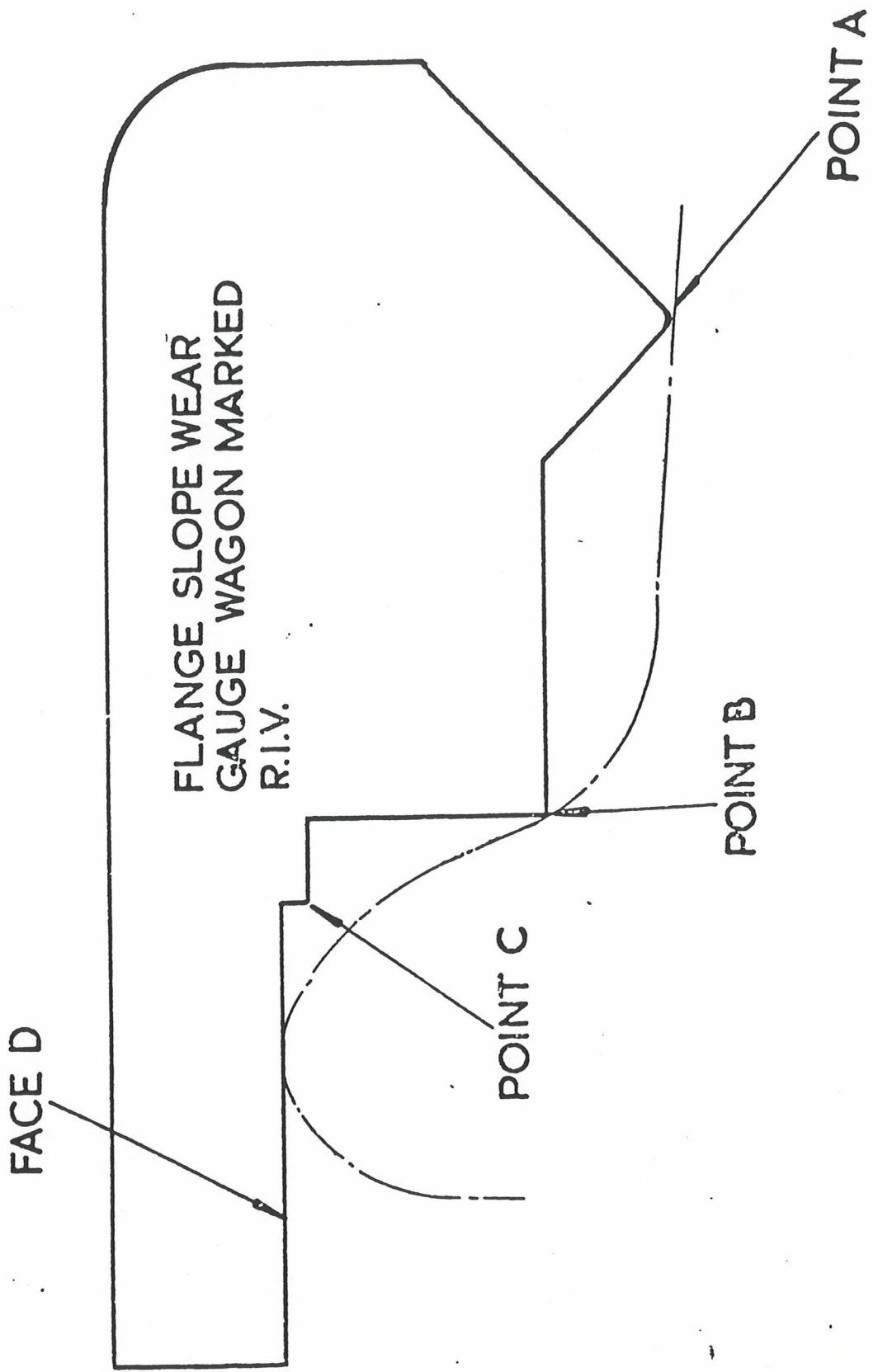
If point 'B' contacts the flange slope and point 'C' does not contact the slope, the wear (if any) is acceptable.

If point 'C' contacts the flange slope the profile requires re-turning.

### 13.3. Checking the Accuracy of the Gauge

The R.I.V. flange slope wear gauge must be checked for accuracy every 5 years.





R.I.V. FLANGE SLOPE WEAR GAUGE

FIG. 14



WORKSHOPS  
(MACHINING)  
GAUGES

NOTE:-

These gauges are for checking the machining of wheelsets. They will therefore be required wherever this operation is carried out, including certain Regional Maintenance Depots as well as B.R.E.L. Workshops.





TYRE PROFILE GAUGE AND  
GO-NOT GO GAUGE

14.1. Function

This gauge is designed to check that after machining, the tyre/wheel profiles are within the permitted limits. The Go-Not Go plug gauge shown in Fig. 15 page 36 is to be used in conjunction with this gauge to enable the check to be effected.

14.2. Using the Gauge

Set the appropriate gauge on the tyre as shown in Fig. 15 page 36. It must be held radially, with the face 'X'-'Y' pressed against the back of the tyre/wheel, Fig. 15 page 36.

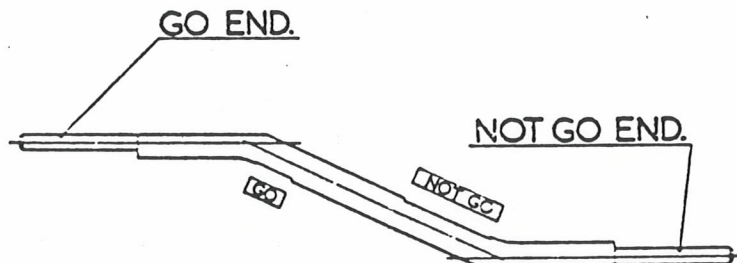
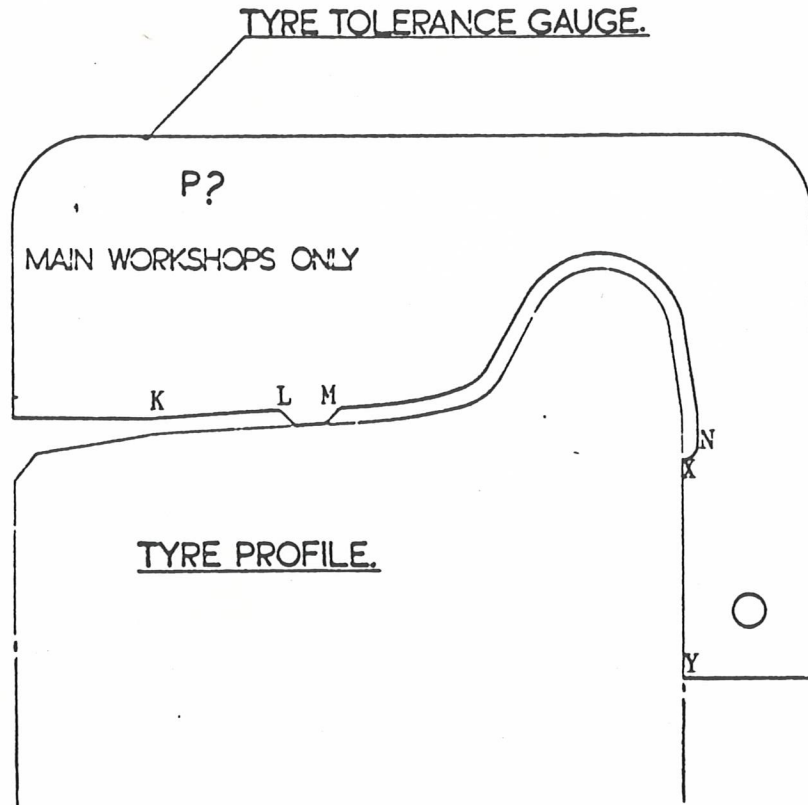
The 'Go' end of the plug gauge is introduced into the slot between points K & L, M & N, and must slide the full length of the slot.

The 'Not Go' end of the gauge must then be offered to the slot, but must not enter it anywhere between points K & L, M & N.

14.3. Checking Accuracy of the Gauges

The Go-Not Go gauge must be checked for accuracy every 12 months and the profile gauges returned to Derby Locomotive Works periodically in accordance with record card supplied with each gauge.





GO-NOT GO PLUG GAUGE.

TYRE PROFILE GAUGE AND  
GO-NOT GO PLUG GAUGE

FIG. 15



## TYRE THICKNESS GAUGE

### 15.1. Function

This gauge is designed for the measurement of tyre thickness and determines when wheels require re-tyring and that re-profiled wheels are not below the final turning size. All profiles are covered by the gauge, with the tyre scrapping sizes listed in Table 3 pages 14 & 15 which is in vehicle order.

### 15.2. Using the Gauge

#### Accurate use of gauge

The tyre must be free from burrs, roll-overs etc., at the section to be gauged.

#### Measuring the tyre thickness

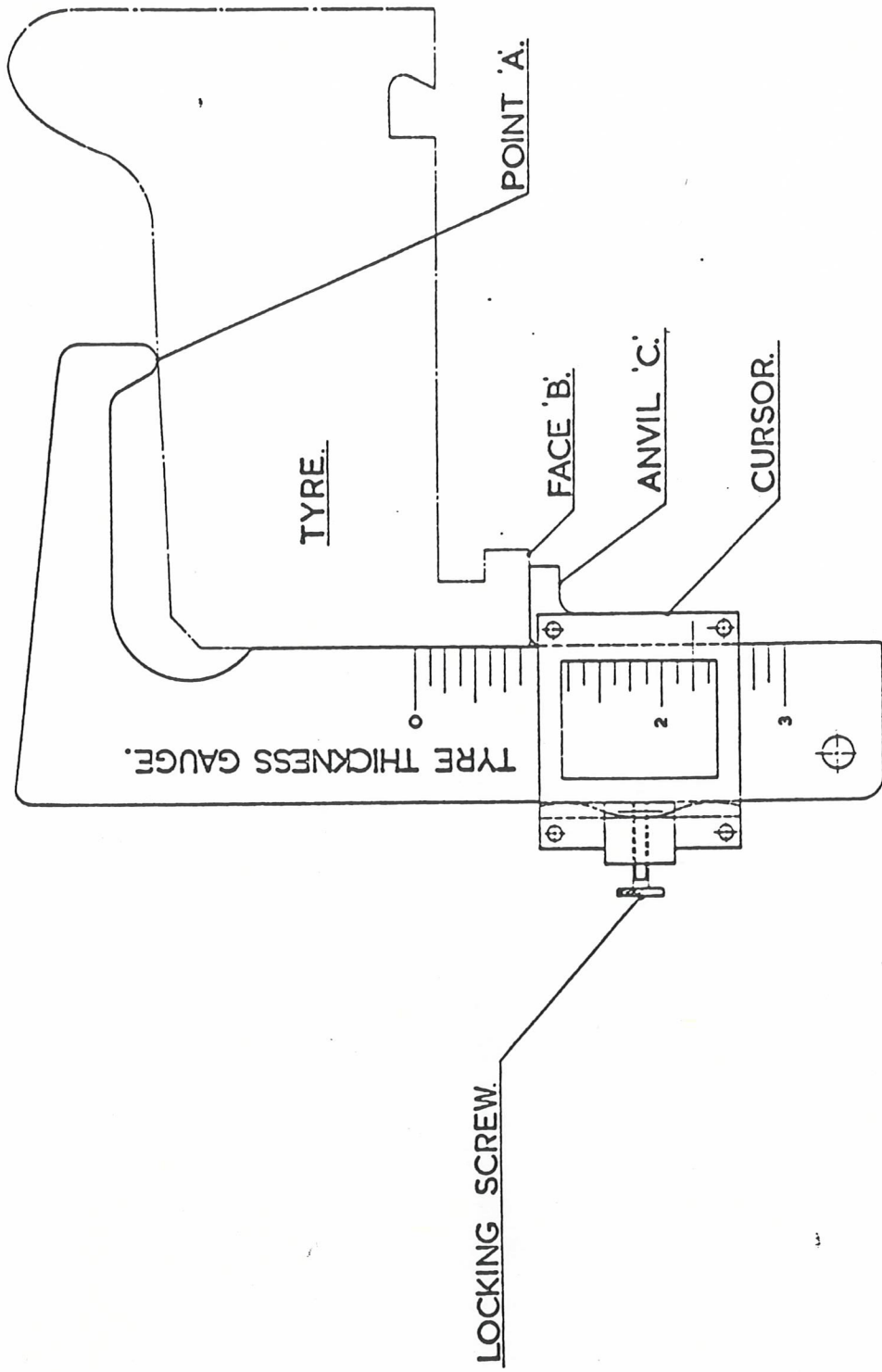
Position the cursor to clear the tyre, press the gauge firmly against the outer face of the tyre and draw the gauge down radially until the gauge point 'A' contacts the tyre tread, Fig. 16 page 38. Slide the cursor up the gauge until the anvil 'C' contacts face 'B' of the tyre bore. The cursor can be locked in position by the knurled knob whilst the tyre thickness reading is taken. i.e. a  $2\frac{1}{4}$ " reading is shown in Fig. 16. The millimetre scale is on the reverse side of the gauge and is read by adopting the same procedure as for inches.

### 15.3. Checking Accuracy of the Gauge

The tyre thickness gauge must be checked for accuracy every 12 months and returned to Derby Locomotive Works periodically in accordance with record card supplied with each gauge.







TYRE THICKNESS GAUGE

FIG. 16



THROAT GAUGE

16.1. The function and use of this gauge is identical to the throat gauge described on page 18.

16.2. Checking Accuracy

The regional gauges must be checked for accuracy every 5 years. Workshop gauges to be included in the Works Register of Gauges with an inspection periodicity of 12 months.



GO-NOT GO GAUGES FOR DISTANCE  
BETWEEN WHEELS

19.1. The function and use of this gauge is identical to the Go-Not Go gauges for distance between wheels described on page 28. However the gauge to Drg. No. F-A2-7221 is to be used for existing wheelsets, assembled to wheel back to back dimension of  $4'5\frac{5}{8}" +0, -1/16"$ . When wheelsets are re-assembled the back to back dimension must conform to Drg. No. F-A2-2575.

19.2. Checking Accuracy of Gauge

The regional gauges must be checked for accuracy every 5 years. Workshop gauges must be returned to Derby Locomotive Works for checking periodically as indicated on the record card supplied with each gauge.



## SLIDING GAUGE

### 17.1. Function

This gauge is designed to check the profile tolerance and alignment of tyre/wheel profiles after machining. The Go-Not Go plug gauge shown in Fig. 17 page 42 is to be used in conjunction with this gauge to enable the check to be effected.

Each profile gauge is stamped with the profile letter and number as shown in Fig. 17 page 42.

### 17.2. Using the Gauge

#### Checking the Profile Alignment

Compress the gauge slightly, align it with the axle and lower radially into the wheelset. Release when in position as shown in Fig. 17, page 42, the spring pressure will hold the gauge in position. The 'Go' end of the plug gauge shown in Fig. 17 page 42 is introduced into the slots between points K & L, M & N and must slide the full length of the slot.

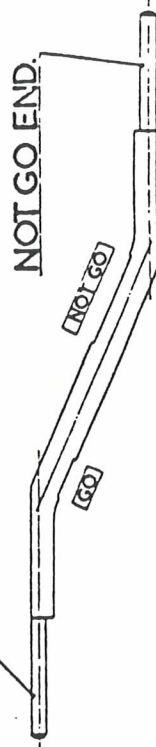
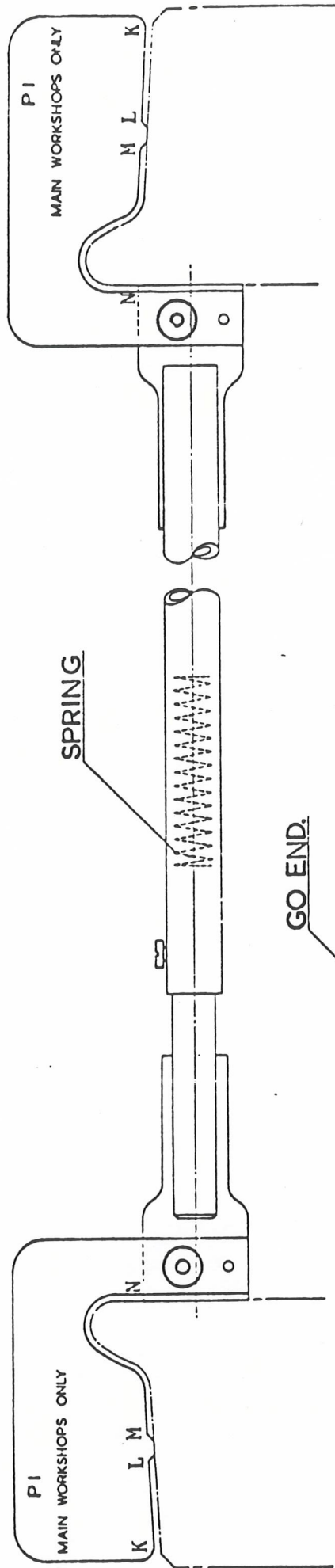
The 'Not Go' end of the gauge must be offered to the slot, but must not enter it anywhere between K & L, M & N.

### 17.3. Checking Accuracy of the Gauges

The regional gauges must be checked for accuracy every 5 years. Workshop gauges must be checked for accuracy every 12 months, and returned to Derby Locomotive Works periodically in accordance with the record card supplied with each gauge.







GO-NOT GO PLUG GAUGE.

SLIDING GAUGE



CARRIAGE AND WAGON TREAD DIAMETER  
COMPARISON GAUGE

18.1. Function

This gauge is primarily designed to check that the diameter of one wheel on the axle is within 0.010 in. of the diameter of the other wheel for carriage stock, and within 0.020 in. of the diameter of the other wheel for freight stock. It can also be used to find the exact diameter of a wheel when used with an inside micrometer.

18.2. Using the Gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

(a) Comparison of Wheel Diameters Fig. 18 (Page 44).

When adjusting gauge length 'A', the knurled nuts must firstly be loosened on the location point stand and the dial gauge stand, then setting the location point 'C' and point 'D' (dial gauge roller stylus) so that they equal approximately the diameter of the wheel 'A' to be checked. Ensuring that the ball locators 'B' are against the flangeback and the location point 'C' is up against the tread, rotate the dial stylus 'D' over the circumference of the wheel. The maximum registered dial reading must be recorded for the comparison against the other wheel.

Repeat the procedure for the other wheel. The two dial readings must be within the prescribed limits laid down.

The comparison of the wheel diameters is made by taking the flange backs as the datum for the ball locators 'B' which positions the location point 'C'.

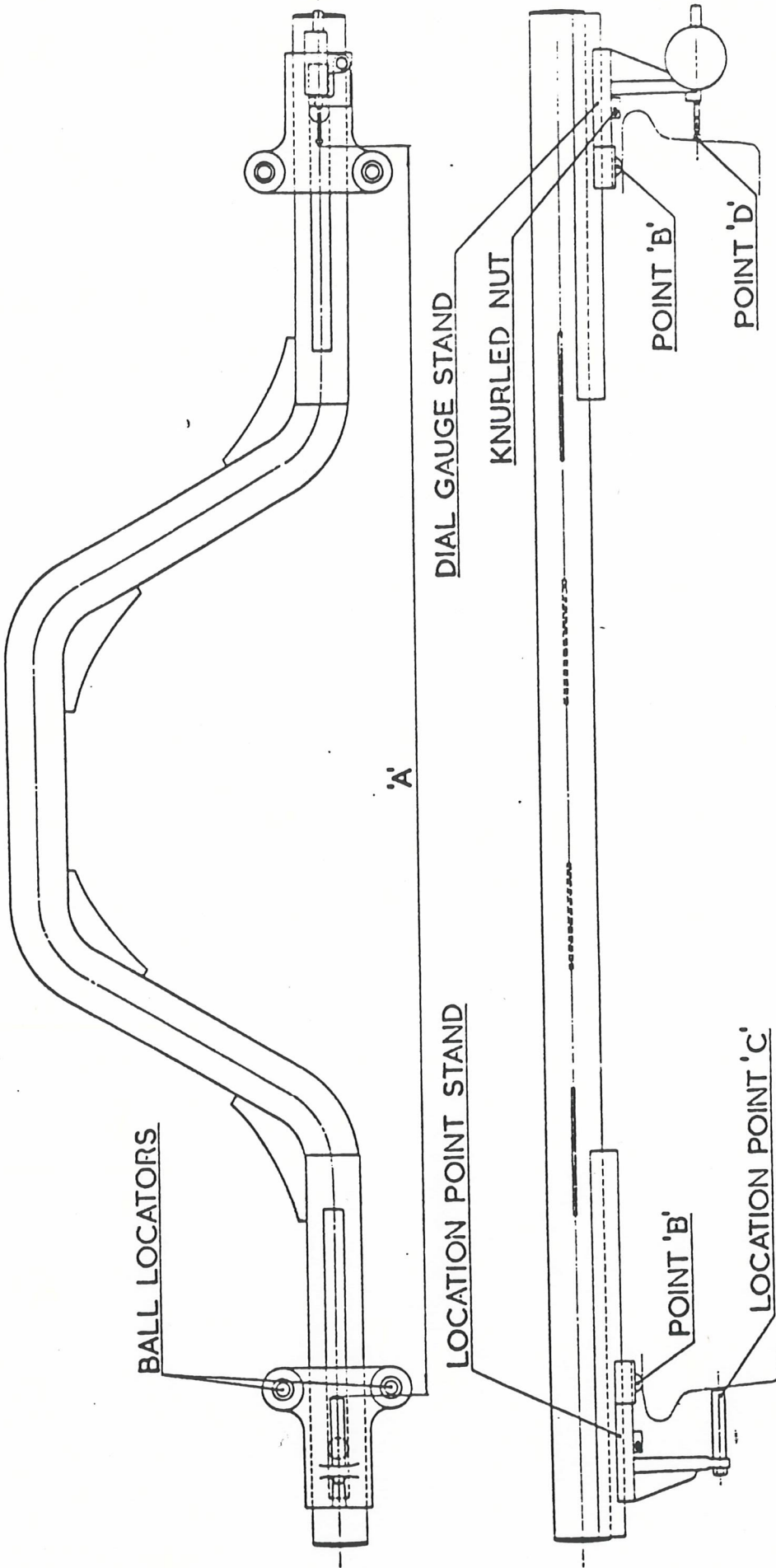
(b) Finding the Diameter of a Wheel

Follow the procedure set down in (a). Remove the gauge, place an inside micrometer on the location point 'C', and adjust the inside micrometer until its other end touches the roller stylus and the dial gauge registers the reading that has been recorded. The dimension then shown on the inside micrometer is the wheel diameter of that particular wheel.

18.3. Checking Accuracy of the Gauge

The regional gauge must be checked for accuracy every 5 years. Workshop gauges must be checked for accuracy every 12 months, and returned to Derby Locomotive Works periodically in accordance with the record card supplied with each gauge.





CARRIAGE & WAGON TREAD DIAMETER  
COMPARISON GAUGE

FIG. 18





## TYRE/WHEEL PROFILE WEAR GAUGE

### 20.1. Function

This gauge is designed to determine the minimum amount of metal to be removed, to return the profile to nominal.

### 20.2. Using the Gauge

To ensure accurate use of gauge the tyre/wheel must be free from burrs, roll-overs, etc., at the section to be gauged.

#### Measuring the amount of wear

Press the gauge firmly against the tyre/wheel back and draw the gauge down radially until the location point 'A' touches the flange (see Fig. 19 page 46). A reading will be shown on the dial indicator which will indicate the minimum amount of metal to be removed to enable a complete profile to be machined on the tyre/wheel. This gauge does not necessarily take into account such things as flats, shellings, corns, fissures etc., but where possible allowance should be made for these, and the measurement should be taken where the maximum amount of damage occurs.

### 20.3. Setting of Gauge

There is one gauge for the P1 and P6 profiles and one gauge for P3, P4 and P5 profiles. The dial indicator is interchangeable between the two gauges.

When the gauge requires setting for a particular profile the following procedure should be followed.

The stepped block is to be positioned so that the profile identification required is set over dowel 'C' (see Fig. 19 page 46).

Unwind the clamping screw 'D' to its full extent.

Place the profile wear gauge in the setting block holding the back of the location plate against the back of the setting block and lowering the profile wear gauge until location point 'A' contacts the 60° slope on the setting block.

Clamp the profile wear gauge to the setting block by means of the clamping screw 'D', ensuring that the profile wear gauge is touching both the back and the slope of the setting block and taking care gauge is not strained.

Slacken off the clamping screw 'B' on the profile wear gauge so that the height of the dial indicator can be adjusted.

Adjust the height of the dial indicator until the dial reads zero.

Tighten up the clamping screw 'B' on the profile wear gauge.

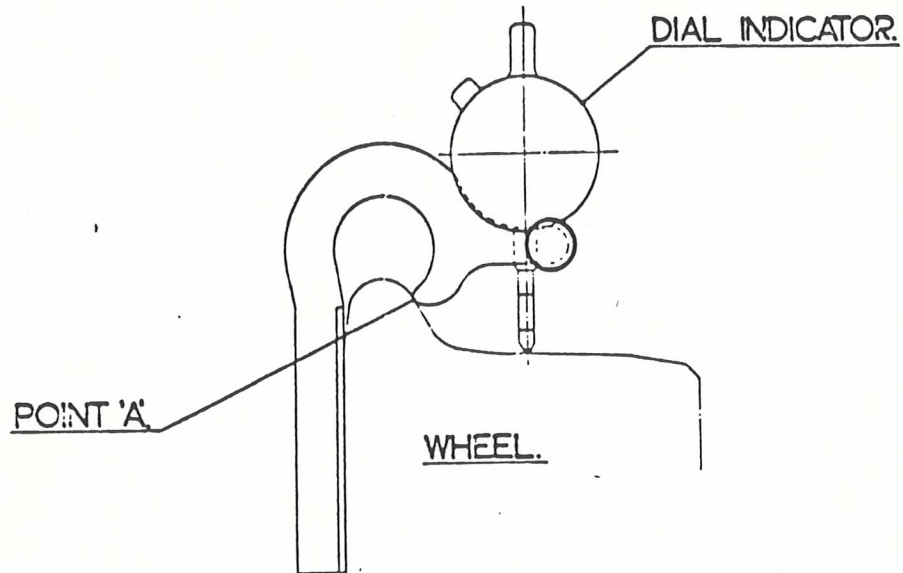




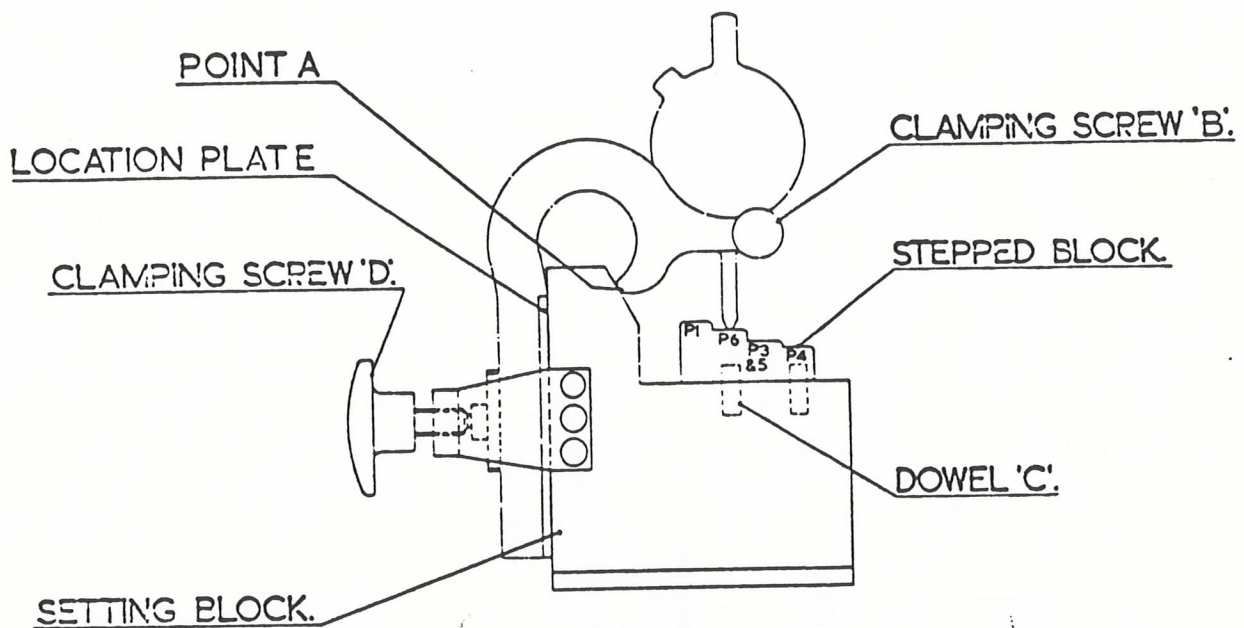
Slacken the clamp on the setting block, and remove the profile wear gauge from the setting block. The gauge is now ready for use.

#### 20.4. Checking Accuracy of Gauge

The gauges and setting block are to be included in the Works Register of Gauges with an inspection periodicity of 12 months.



TYRE/WHEEL PROFILE WEAR GAUGE



SETTING OF  
TYRE/WHEEL PROFILE WEAR GAUGE



