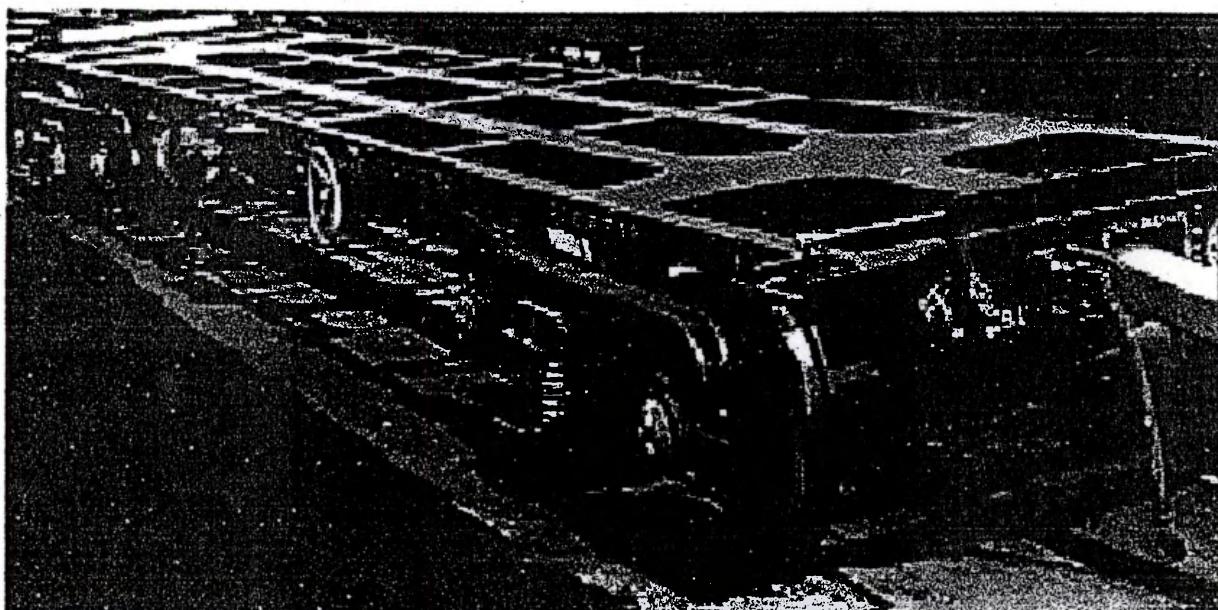


BOGIE CONTAINER FLAT WAGON TYPE BLCA & BLCB

MAINTENANCE MANUAL



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MAINTENANCE MANUAL FOR
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TYPE BLCA, BLCB.

FOREWORD

This manual has been prepared for the guidance of staff dealing with repair and maintenance of Bogie Container Flat Wagons owned & operated by CONCOR. The purpose of this manual is to lay down guidelines for easy maintainability and effective use of the fleet of wagons with minimum or zero break-down en-route, thus increasing the efficiency of movement of goods through container flat wagons.

Taking into account the large territory covered by the Indian Railways and geographic, climatic and other variations, some local variation in practices and procedures are inescapable. To this extent this manual should be supplemented by detailed maintenance instructions issued by individual zonal railways in the form of workshop orders, carriage & wagons circulars, technical standing orders etc. It is also to be noted that this manual does not *Ipso-facto* supersede all instructions issued by Railway Board, RDSO and IRCA in regard to repairs and maintenance of goods stock. Such instructions must be referred to when required.

Statutory provisions and instructions in the general rules and various codes are to be followed and remain unaffected by the issue of this manual.

The maintenance manual has been prepared with the object for optimum utilization of the Bogie Container Flat Wagons. Being a new design, the manual will be further reviewed after sufficient experience is gained on operation of the Bogie Container Flat wagons on the Indian Railways.

Manual has been prepared by RITES Ltd.(Mechanical Design Division), New Delhi. Reviewed and approved by RDSO (Carriage Directorate) Lucknow vide letter No. MC/CONTR/ISO/BG-Flat dated 07.11.2001

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CHAPTER - 1

BROAD PARTICULARS OF BOGIE CONTAINER FLAT WAGON (BROAD GAUGE)

- 1.1.0 Bogie Container Flat Wagon generally conforms to Drg. No. CONTR - 9405-S/3 for CAR - A (Fig. 1.2) to Drg. No. CONTR/9406 – S/3 for CAR – B (Fig. 1.3) prepared on the basis of Technical Specification. The design of the wagon has the similar features to the existing BFKI Container Flat Wagons which are in use on Indian Railways since 1975. The design of the wagon has been optimised to achieve reduced tare weight, thereby having a higher payload.
- 1.1.1 The wagon has been designed for transportation of 2896 mm (9'-6") height Series I ISO Containers, at an operating speed of 100 kmph. In order to ensure that the wagon loaded with 9'-6" high ISO Container lies within the maximum moving dimensions of Standard 'X' class Engines, low platform height of 1009 mm has been achieved with the use of hybrid design of bogie frame, bolster and with the use of smaller wheel diameter.
- 1.1.2 The wagon is of all welded construction. It is mounted on two axle cast steel bogies and is fitted with centre buffer coupler at the outer end of 'A' Car. Inner end of 'A' Car and both ends of 'B' Car are connected with slackless drawbar system. The wagon is provided with single pipe graduated release Airbrake System with two - stage automatic load sensing device and wheel type hand brake.
- 1.1.3 The wagon loaded with 2896 mm (9'-6") high ISO Containers when standing on straight and level track is within the Maximum Moving Dimensions of Standard 'X' class Engines.

BASIC CHARACTERISTICS AND DIMENSIONS

- 1.2.0
- 1.2.1 The Bogie Container Flat Wagons have the following basic characteristics/leading dimensions.

S.No.	Description	'A' Car	'B' Car
1.	Track Gauge	1676 mm	1676 mm
2.	Estimated Tare Weight	19.10 t	18.00 t
3.	Payload	61.00 t	61.00 t
4.	Gross Weight	80.10 t	79.00 t
5.	Length over Headstock	13625 mm	12212 mm
6.	Width over sole bar at centre line of wagon	2100 mm	2100 mm
7.	Distance between Bogie Centres	9675 mm	8812 mm

S.No.	Description	'A' Car	'B' Car
8.	Floor height	1009 mm	1009 mm
9.	Height of Centre Buffer Coupler from Rail Level	1105 mm	-
10.	Height of drawbar system from Rail Level	845 mm	845 mm
11.	Wheel base	2000 mm	2000 mm
12.	Diameter of wheel (New)/ (Fully Worn)	840/780 mm	840 /780mm

1.2.2 Each unit consists of 2 'A' Cars at ends and 3 'B' Cars in the middle (Fig. 1.1).

1.3.0 CONSTRUCTION DETAILS

1.3.1 The Underframe of these wagons conforms generally to arrangement shown in Drg. Nos. CONTR/9405 – S/4 for 'A' Car (Fig. 1.4 & 1.6) and CONTR/9406 – S/4 for 'B' Car (Fig. 1.5 & 1.7). The Underframe is of all – welded construction, having centre sill and side sills connected with body bolsters and cross bars. These have been fabricated from steel plates of high tensile steel to specification IS – 8500 Grade Fe 570–B. The underframe is of lightweight design with an optimum payload to tare ratio. The Underframe is designed as such that load transfer of container takes place through the longitudinal members to the underframe. 8 nos. of locking devices are provided in the underframe to secure two nos. of 20' ISO Containers. The locks provided at the ends are of fixed type, while retractable type locks are provided at the centre of underframe to facilitate loading of 40' ISO Containers.

1.3.2 The Bogie Container Flats are mounted on two nos. of cast steel bogies (Fig. 1.8) similar to CASNUM bogies. Each bogie consists of 2 cast steel side frames, one cast steel bolster, one spring plank, all coil helical springs, elastomeric pads and adapters. The bogies are suitable for 20.32 t axle load for a track gauge of 1676 mm and have a wheel base of 2000 mm. The flat centre pivot and spring loaded side bearers are provided in this wagon (Fig.1.9 & 1.10). The suspension is such that it is softer under tare condition and stiffer under gross load condition. The design of elastomeric pads has been optimised in order to achieve minimum wheel wear. Load proportional friction damping is provided to meet the damping requirement under empty and loaded condition.

1.4.0 LOAD DISTRIBUTION

1.4.1 The weight distribution between center pivots and side bearers are optimized to avoid hunting. 90% of the load under tare condition is borne by the side bearers which are of spring loaded

design to ensure that no hunting takes place. The spring loaded side bearer arrangement has the distinct advantage of retaining the load distribution between centre pivot and side bearers irrespective of any manufacturing inaccuracies in the body and bogie bolster as well as the condition of the wheel (New or Worn). 10% of tare & full payload under loaded condition.

- 1.5.0 **WHEEL AND AXLE**
- 1.5.1 The wheel and axle shall be provided as per IRS: R -19/93 Pt. II & Pt. III and IRS:R -16/95. The permissible wheel diameter on tread is 840 mm (New) 780 mm (Worn).
- 1.5.2 The wheel shall be fitted with Standard AAR Class E Cartridge Taper Roller Bearing size 6" x 11".
- 1.6.0 **COUPLER AND DRAFT GEAR**
- 1.6.1 Outer end of 'A' Car is fitted with AAR-E type, High tensile Centre Buffer Coupler on raised end at a height of 1105 mm from rail level to facilitate coupling with locomotive and standard wagons. The inner end of 'A' Car and both ends 'B' Car are fitted with Slackless Drawbar System.
- 1.7.0 **AIR BRAKE AND HAND BRAKE (Fig. 1.11 & 1.12)**
- 1.7.1 The Bogie Container flat wagon is fitted with single pipe graduated release Airbrake System as per RDSO specifications and shall meet all the requirements of UIC Specifications 540 and 547. The brake system is also provided with slack adjuster for automatic slack take up between brake blocks and wheels. Provisions have been made for two stage Automatic load sensing device.
- 1.7.2 Container wagon is also fitted with side operated hand brake, which can be operated with hand wheel provided on both sides of the wagon.
- 1.7.3 Use of 'L' type composition brake blocks are used in order to achieve an emergency braking distance within 1200 m.
- 1.8.0 **OPERATING INSTRUCTIONS**
- 1.8.1 The Bogie Container wagon should not be loose shunted or Hump shunted.
- 1.8.2 Whenever one container wagon is marked 'Sick' or requires detachment, the unit of 5 wagons to be disconnected for easy operation by operating CBC uncoupling rod.

- 1.8.3 As automatic locks are provided in the Bogie Container Wagon, special care is to be taken while lowering the containers or removing the containers to and from the wagon. Containers are required to be lowered equally, parallelly locating the locks in position without any jerk or sudden drop. Similarly when it is lifted it is preferable to lift gently, equally and see the locks are turning itself to pave way for releasing of container in locks **so that underframe not get lifted while lifting the container.** Direct hit on the lock head by swing of the container results in damage of locks. Locks are designed only for fastening the container in proper locations. After lowering container on the wagon, sufficient clearance be observed all round the lock portion so that no load comes on the lock and enable rotation of lock head while lifting/lowering the container.
- 1.8.4 When required to disconnect 'A' Car from 'B' Car or B Car from B car, yoke pin support bolts, nuts with split pins are removed and yoke pin support is removed. If yoke pin is not dropping itself, a bump through draw bar may enable the yoke pin to drop by its weight, like wise to connect, by lifting the wedge block inside the yoke, the yoke pin holes can be matched. Or otherwise a taper chisel may be inserted between front stop of striker casting and front follower of the draft gear to match the yoke pinholes for inserting yoke pin. The existing procedure of compressing the draft gear with a jack for assembling the coupler may be incorporated in this type of draft gear arrangement also.

1.8.5 For due ROH/POH the unit of 5 wagons be detached and sent for repairs.

1.8.6 Salient features at a glance.

Bogie: High speed three piece cast steel bogie.

Floor Height: 1009 mm which is 266 mm less than IRS wagon height.

Axle Load: 20.32 tonne.

Carrying Capacity: 61.0 tonne (two 20'-0" or one 40'-0" ISO container on each wagon).

Maximum permitted operating speed: 100 kmph.

Unit: Each unit consists of 5 wagons, two "A" Cars at the ends and three "B" Cars in the middle.

Rake: Rake consists of 45 wagons in the form of 9 units. Length of each unit – 69 meters approximately.

Coupling: Outer ends of "A" Cars are fitted with standard Centre Buffer Couplers (CBC) inner end of "A" Car and both ends of "B" car are fitted with slackless drawbar.

Brake Beam: Bogie is fitted with sliding type brake beam and brake head is the integral part of brake beam. Composition brake blocks are fitted.

Wheel: Forged wheels and axles are used. Wheel dia New-840 mm. Worn out-780 mm.

Air Brake System: It consists of (i) Single pipe graduated release (ii) Distributor valve fitted with empty load function (iii) Automatic slack adjuster (iv) Automatic load sensing device (v) Brake cylinder pressure under tare 2.2 kg/cm^2 and under loaded 3.8 kg/cm^2 (vi) Control reservoir charged to 5 kg/cm^2 (vii) Auxiliary reservoir charged to 5 kg/cm^2 (viii) Initial charging of brake pipe at 5 kg/cm^2 .

Automatic Load Sensing Device(LSD): Two stage empty/ load braking is controlled by two nos. of change over valves type VTA fitted on each bogie bolster.

Automatic Twist Locks: Automatic twist locks are provided on the wagon for securing containers for quick loading and unloading.

Bolster Suspension: Each group of helical spring consists of 7 outer springs, 6 inner springs and 2 snubber springs.

Spring Loaded Side Bearer Arrangements: It consists of two helical springs on each side bearer which bear 90% tare load.

Roller Bearings: Cartridge taper roller bearings (CTRBB) being used on Indian Railways Freight Stock.

Sl. No.	Features	BLC	BFKN	BOXK/BOXKH
01	Wagon Unit	Consist of 5 wagons 2 nos. A-Car + 3 nos. B-Car	Single wagon	Single wagon
02	Platform Height from R.L.	1009 mm	1269 mm	1275 mm
03	Wagon length over head stock	A-Car 13625 mm B-Car 12212 mm	13716 mm	12800 mm
04	Tare	A-Car 19.10 t. ✓ B-Car 18.10 t. ✓	20.5 t	19.5 t
05	Payload	61 t ✓	61 t	48/60 t
06	Wheel dia	840 mm	1000 mm	1000 mm
07	Type of bearing	Tapered two row cartridge roller bearing	Tapered two row cartridge roller bearing	Cylindrical roller bearing
08	Speed	100 KMPH	75 KMPH	75 KMPH
09	Coupling	CBC & Slackless Drawbar	CBC	CBC
10	Twist lock	Automatic	Manual	Guide bracket & Guide block
11	Empty/Load Device	Two stage automatic pneumatically ✓ operated	Manually leverage	Manually leverage
12	Side bearer arrangement	Spring loaded side ✓ bearer arrangement	Rubber bonded	Guide steel liner
13	Suspension	Two stage suspension	Single stage suspension	Single stage suspension
14	Rake carrying capacity/Rake length	45 wagons 90 TEUs 618 Mtrs. approx.	40 wagons 80 TEUs 587 Mtrs.	42 wagons 84 TEUs 576 Mtrs.
15	Brake system	Air brake	Air brake	Vaccum brake
16	Brake cylinder pressure	3.8 kg/cm.sq loaded ✓ 2.2 kg/cm.sq empty ✓	-	-

CHAPTER - 2

GENERAL INSTRUCTIONS

2.1.0 INTRODUCTION

2.1.1 BLC rake consists of 9 units and each unit consists of 5 wagons i.e. 2 Car-A (Type BLCA) and 3 Car-B (type BLCB). Car-A is at outer end of the unit whereas Car-B is in the middle of the unit. These Flat Wagons are designed to carry either two 20' or one 40' ISO containers with 9'-6" height, and are fit to run at 100 Kmph.

2.2.0 GENERAL GUIDE LINES

2.2.1 To enable the Railway to handle goods by Container Flat Wagons effectively, efficiently, smoothly and safely, it is necessary to have a well-maintained fleet of wagons. There is increasing demand for higher throughput, better average speed, heavier train loads and greater security of consignments tendered for transport in recent years. From the point of view of wagon maintenance, it is therefore, necessary that

- a) Defects, which arise, are attended to in time and effectively so that the wagons remain fit for traffic for as long a period as possible such as ROH to ROH or ROH to POH.
- a) Detention of the wagon due to defects is kept to near minimum.
- a) Preventive maintenance is given to avoid occurrence of predictable defects

2.2.2 Though unified maintenance manual was issued to Railways by Railway Board, this container flat wagon is of new design and so guidelines from this manual may be read along with the Indian Railways Maintenance Manual for Wagon issued by Railway Board. It is however to be noted that to keep the dimensions of this manual within reasonable limits the important aspects of the Bogie flat wagon maintenance have been covered. Staff must refer to the various maintenance instructions, pamphlets and other publications issued by RDSO, Railway Board and IRCA to obtain detailed information not contained in this manual. The Important letters contain much more details and should be taken into account the particular requirements and conditions on individual user Railway and these must be read in conjunction with the manual.

- 2.2.3 Broad particulars and sketches of Container Flat Wagon are given in Chapter-1.
- 2.2.4 While proper maintenance has a vital role in ensuring effectiveness of the Rolling stock, an equal crucial role is to be played by proper handling and care of the wagon fleet to minimise the incidence of damage and need for repairs. Considerable damage to locks of container wagons while placing the containers on wagon, damage to the running gear, draft and buffering gear, wagon underframe, hand brake etc. can be avoided if proper care is taken while loading, unloading & shunting etc. All staff should see that mal-practices are avoided and work carried out with care, attention and possessiveness in order to get the best out of the wagon fleet.
- 2.2.5 The following rule books, guides, pamphlets containing information are either directly meant for staff or has a bearing on their work. Staff should, therefore, make themselves conversant with the contents of these publications to the extent they are of concern to them.
- i) Conference Rules Part III
 - ii) RDSO Technical Pamphlet G-37 recommended practices for Welded fabrication of wagon.
 - iii) RDSO Technical Pamphlet G-76 Instructions for inspection and maintenance of Centre Buffer coupler.
 - iv) RDSO Technical Pamphlet G-80 Inspection of CBC (for workshop staff)
 - v) RDSO Technical Pamphlet G-97 Maintenance Manual of Air Brake system for freight stock.
 - vi) RDSO Technical Pamphlet G-92 Maintenance Manual for IRSA 600 Slack Adjuster.
 - vii) RDSO Technical Pamphlet Instructions G-81, 1993 inspection and maintenance of cartridge roller bearing fitted in cast steel bogie
 - viii) Indian Railway Code for Mechanical Department (Workshop).
 - ix) General & subsidiary rules.
 - x) Accident Manual

- xii) Inspection and maintenance manual of CASNUB BOGIE.-G95
- xiii) General Standing Specification for Fabrication of Wagon underframes and bodies, G-72.
- xiv) Manufacturer's Manuals for major Sub-Assemblies i.e. Distributor Valve ,Slack Adjuster, Air Brake Equipment, CBC etc.

CHAPTER - 3

INSPECTION AND MAINTENANCE SCHEDULES

3.1.0 INTRODUCTION

3.1.1 This chapter gives general information on the various types of inspection and maintenance schedules for container flat wagon on open line. Prescribed periods at which POH is to be carried out and where relevant special practices to be followed for repairs are indicated. Detailed workshop practice relating to POH of Stock is already prescribed by Zonal Railways.

3.2.0 ROLLING IN EXAMINATION AT TERMINATING POINTS

3.2.1 All terminating trains should be given a rolling in examination while entering a station. To carry out this examination the train examiner and his staff should take position on both sides of the lines, short of the normal halting place on which the train is to be received. The following inspection should be carried out.

- i) Look out for any loose or dangling components.
- ii) Observe & listen for flat tyre on wheel by sound.
- iii) Observe & listen for over heated axle box.
- iv) Listen & detect for broken springs.
- v) Abnormal behaviour of any of the vehicles or any other observation which may relate to unsafe working conditions.

3.2.2 After the train comes to a halt, feel the axle boxes; which are found comparatively hotter than the other boxes, mark sick and stick label on both sides for identification and attention in sick line/maintenance line. Rolling in examination and feeling of axle boxes are required to be carried out to all terminating trains.

3.2.3 Obtain Driver's remarks on a register for brake power on train en-route.

3.4.0 ROUND TRIP EXAMINATION AT BASE DEPOTS

3.4.1 A Round Trip Examination may be carried out at the nominated "base depot" of the rake, provided the integrity of the rake is maintained.

3.4.2 The Incoming rake after unloading of containers at Container Depot is offered for inspection and attention. The details of tentative examination and attention required thereon in general are listed below.

- i) All underframe fittings including brake gear, draw & buffing gear and running gear should be examined and made in sound condition with all fittings intact.
- ii) Wheels must be tapped to detect loose/cracked wheel.
- iii) The wheel profile should be checked to ensure that rejectable defects have not been allowed. Tyre Defect Gauge may also be used for this purpose.
- iv) The air brake system of the rake should be checked as follows:
 - a) Connect compressor line on stationary air compressor to one end of rake through a rake test rig.
 - b) Charge the BP of rake to 5 kg./cm².
 - c) Check for defective brake operation or for distributor valves, isolated brake cylinders or leaks etc. and attend to the parts of Air Brake system components like distributor valve, load sensing device, double check valve, pressure reducing valve, brake cylinder, centrifugal dirt collector, cut off angle cocks and auxiliary reservoir.
 - d) Record reading as per proforma specified at Enclosure 6 of pages 80 and 81 of this manual.
 - e) Check the "A" Dimension of Slack Adjuster and set to dim. 72 +0, -2 mm. Adjust the pins in the pull rod holes if required. Due corrections and repairs to be made for ensuring 100% Brake Power.
- v) The general conditions of underframe, bogies with load sensing device, side bearer assembly etc. should be examined and repairs attended to.
- vi) Check all safety fittings, safety brackets etc. and defects if any attended to.
- vii) Inspect hand brake system for proper functioning.
- viii) Check all the automatic locks mounted on underframe for any welding failure of mounting brackets.
- ix) Inspection of all springs (side bearer and suspension).
- x) Visual inspection of Elastomeric pads for any defect. e.g. cracks bond failure, perished rubber etc.
- xi) All dirt collectors, drain cocks should be drained at least once in two months.
- xii) Replace worn out brake blocks (thickness less than 10mm)

3.5.0 **EXAMINATION OF TRAINS AT ORIGINATING STATIONS & ENROUTE STATION WHERE LOADING & UNLOADING TAKES PLACE**

- 3.5.1 All trains originating from enroute stations where loading, unloading of containers has taken place should be examined by train examining staff before despatch to ensure that the wagons are in a fit condition and do not have any rejectable defects. The guard must ensure continuity of brake pipe by dropping and recharging of air pressure in brake pipe from brake van. The rejectable defects are those defects covered by IRCA part III. It is to be noted that a fit certificate has to be given to the yardmaster by the TXR to this effect without which the train can not be despatched.
- 3.5.2 The level of Air pressure on the Engine and the brake van along with the percentage of effective brake power must be recorded on the brake power certificate and countersigned by the driver and the guard. 100% brake power should be ensured at the primary maintenance station.
- 3.5.3 All automatic locks are to be examined for proper working condition and ensure that the containers loaded on the flats are secured.
- 3.5.4 It should be ensured that the side bearer assembly, bolster suspension springs and adaptor over CTRB are in proper position before dispatch of the train.
- 3.5.5 The round trip MV5 should be revalidated at each such station before the dispatch of the train.

3.6.0 **MAINTENANCE SCHEDULES**

ROH & POH will be as follows:

3.7.0 **ROH OF WAGONS**

3.7.1 A routine overhaul should be given to all wagons as a unit of 5 wagons (Car A-2, Car B-3) at nominated Depot at intervals of 18 months.

3.7.2 Disconnect 5 Car units into separate individual Car. Each Car requires to undergo ROH individually. The important points generally to look into is given below for ready reference. Other details of ROH procedure as per RDSO instructions for ROH on wagons should also be looked into.

- (1) Remove bogie brake rigging attachments to underframe, brake gears & flexible pipes connected to VTA.
- (2) Remove Center pivot split pin, lock pin & shackle lock etc.
- (3) Lift the body through lifting pads.
- (4) Run out the bogie.
- (5) Clearance of 16 mm between load sensing device sensing tip to stopper are required to be maintained within tolerance of ± 1 mm.
- (6) Place the underframe on trestles.
- (7) After removing the side frame key and lifting the bogie remove wheel sets from the bogie. Machine the wheel tread of all the wheels to worn wheel tread profile.

- (8) Strip the bogie. After proper cleaning, examine the bogie side frames, bolster and other castings for crack etc.
- (9) All the side bearer liners of the Spigot and hole should be replaced. The procedure for attending the repairs of bogie frames, bolster and liners are given in chapter "BOGIE Type LCCF 20 (C)" (refer clause 4.28.2).
- (10) Check bolster springs & side bearer springs for defective/broken springs. Replace the defective one such that variation in the free height of springs in the same group not to exceed 2mm.
- (11) Examine centre pivot, centre pivot pin, centre pivot liner.
- (12) Strip brake gear fittings and examine for wear & damage and serviceability bogie brake gear levers, replace worn-out bushes & pins.
- (13) Examine the load sensing device on bogie with Air Brake in respect of item 5.
- (14) Replace all the worn out brake blocks and repair worn out brake head.
- (15) Check the roller bearing for grease leakage and check adapter & replace if found any defect. Refer fig. 4.25 to 4.30.
- (16) Reset the load sensing valve on bogie and tack weld the fasteners after setting with the necessary gap (16 mm) between tip and stopper as mentioned.
- (17) Examine underframe brake gear levers; replace worn-out bushes & pins.
- (18) Examine slack adjuster (SAB) and replace or attend to the defects as per RDSO instruction G-92. After fitment set the SAB "A" dimension $72 +2, -0$ mm.
- (19) Check up Hand Brake arrangement for repair. Replace the missing or damaged parts. Lubricate the gears.
- (20) Lower the under frame on bogies and provide pivot pin shackle, pin with split pin & connect brake gear pin. Dimension $60 +0, -0.5$ mm between Centre Pivot Top to Side Bearer Top liner should be maintained.
- (21) Test air brake as per G-97 RDSO instruction.
- (22) Check Automatic locks. Replace the defective locks. Check welding failures. Check Automatic locks for any damage to lock head and for rotation of head. Change the lock head and Rubber Spring of Lock.
- (23) Check the distance from Side Frame top liner to Side-Bearer Seat $131 +0, -0.5$ mm at all four Side Bearer points under tare condition of the Flat Wagon. Keep the distance within tolerance by altering Shims provided at the top side bearer locations.
- (24) Ensure all APD (Anti Pilferage Devices) measures are incorporated after assembly.
- (25) Paint the bogie, stencil station code & date of ROH.
- (26) Touch up paint & lettering.

- (27) Special instruction: The Draw bar height & CBC height should not be more than 845 & 1105 mm respectively. No packing be given over axle box adapter.

3.7.3 The following items must be attended to during ROH of BLC rakes:

- (1) Ultrasonic testing of axles.
- (2) Wheel treads profiling.
- (3) Side bearer line renewal for spigot & base.
- (4) Wide jaw adapter renewal/replacement.
- (5) Side frame repair/building up at location of adapter.
- (6) Brake beam (truss bar) pocket liner replacement/rotation.

3.8.0 **POH OF WAGONS**

3.8.1 The period between POH repairs will be 6 years for first POH. Period for subsequent POH shall be determined after witnessing the performance of 1st rake. The general procedure laid down for POH of BOXN and other wagon is applicable to these wagons. As these wagons are as unit of 5 wagons containing 2 car A and 3 car B. The container wagons may be sent to nominated wagon repair shops for POH in rakes so that the shops can turn out the wagons as rakes for service.

3.8.2 The unit will be disconnected and maintenance and repairs as individual wagon carried out as per routine POH method.

3.8.3 The important aspects, which require particular attention, are given below:

3.8.4 **BOGIE SHOP**

1. Dismantle the bogies, replace the pins and bushes in brake gear, check the side frames and bolster etc. for any defect. Attend or replace as necessary.
2. Check the springs and replace the defective ones. All the springs are required to be tested as per load test chart. Fig. 4.32.
3. Check the side bearer parts, centre pivot and its liners. All liners including centre pivot liner must be replaced.
4. All brake gear components should be dismantled, cleaned and necessary repairs are to be carried out. All pins and bushes require renewal.
5. Attend to wheel sets for new tread profile. All Roller Bearings need thorough attention and ultrasonic testing of axle.
6. Assemble the bogies and check for leading dimension and tolerances.

7. Set to 16 mm clearance on tare load, on the load-sensing device of bogie and tack weld the fasteners.
8. Side Bearer Springs must be replaced if the heights under load testing of individual springs are not within specified limits.
9. Examine all draft & Buffing gear, CBC, uncoupling gear etc.. Attend to defective and worn out parts as per G-76 of RDSO instructions. Examine the Slackless Draw Bar, Key Stone Draft Gear and replace the defective one. Dimension 25 mm clearance of the wedge block on the Yoke should be maintained.

3.8.5

UNDERFRAME AND ASSEMBLY SHOP

1. Underframes are wire brushed, or shot blasted & cleaned and checked for any member defective due to welding defects, etc. and defects are attended to before primer coat paint.
2. All stiffeners, strengthening pieces etc. checked for defect and repair to be carried out.
3. Air Brake equipments are attended to by replacing all rubber items & defective parts.
4. Clean the strainers & drain the water and dirt etc. in dirt collectors, Auxiliary Reservoir, Check valve, Pressure Reducing Valve etc. Attend to air brake as per instructions laid by G- 96 RDSO instruction.
5. Remove SAB, dismantle and change the worn-out parts, grease the items inside and attend to as per RDSO instructions G - 92 to the extent applicable.
6. Dismantle & attend to worn-out parts by replacing/attending to the defects in CBC components draft gear, coupler body, yoke, yoke pin, wear liner on coupler body and striker casting, uncoupling gear etc. as per RDSO instructions.
7. Check Slackless draw bar yoke pin holes along with other areas like butt-end etc. and attend to or replace the drawbar as required. Check Key Stone draft gear and attend or replace the defective one.
8. Lowering down of underframe on the bogies after attending to all repairs. Heights in CAR A and CAR B and other leading dimensions are to be maintained after repairs. 6mm thick washer should be ensured under all the springs of the bolster at drawbar end bogie of CAR'A'.
9. Automatic locks should be checked for operation and defective parts require renewal. Preferably all locks should be dismantled and re-assembled with new Rubber Springs of locks. Locks positions and dimensions are required to be checked and set right by rework/ replacement.

3.8.6 **PAINT SHOP**

3.8.6.1 After two-primer coats application, two finish coats to be applied on container flats. Sufficient drying time should be allowed between each coat. Write station code, POH date, Base Depot, return date etc. Write marking particulars as per drawing No.CONTR-9404-S/19 Alt revised for Car A and CONTR-9406-S/12 Alt. revised for Car B (Fig. 3.2 & 3.3).

3.8.7 **DELIVERY LINE**

3.8.7.1 Connect the BOGIE container flats as a 5 Car unit with 2 "A" Car at ends and 3 "B" Car in between. As units dispatch to the concerned Depot nominated by CONCOR.

3.8.7.2 The general procedure as being followed for other wagons like BRN etc. during POH is also required to be followed.

3.8.7.3 It is to be borne in mind that any wagon after POH has to run for 6 years till next POH without any major breakdown. Hence care at every stage has to be effected so that qualitative repairs are carried out during POH. Any major repair require to be carried out at open line need dismantling of the Car unit which causes undue delay of Operation.

3.8.7.4 It is suggested to follow/study the maintenance manual of various components used in the bogie container flat wagon issued by the manufacturer for safe and trouble free service.

3.9.0 **MATERIAL HANDLING EQUIPMENT/FACILITIES REQUIRED FOR ROH DEPOT.**

- (i) Over head cranes 15 t capacity : 2Nos.
- (ii) Power Operated lifting Jacks 25 t capacity : 5 Nos.
- (iii) Fork Lifts 5 t capacity : 3 Nos.
- (iv) Hydraulic Jacks 25 t capacity : 4 Nos.

3.9.1 Other facilities like SAB repair shop, Air Brake repair and Overhaul shop, CBC, Drawbar repair shop, Stores etc. need be provided. The repair in shop/ROH depot of these items will be as is the practice for other air brakes bogie stocks.

3.10 **DRAWINGS**

During maintenance of container flats drawings with latest alterations.

The list of drawings of Car A, Car B & bogie are enclosed.

LIST OF DRAWINGS FOR BOGIE CONTAINER WAGON (BG)

DRAWING NO.	DESCRIPTION
<u>CAR 'A'</u>	
CONTR-9405-S/1	INDEX
CONTR-9405-S/2	DIAGRAM WITH TWO 20' OR ONE 40' LONG ISO CONTAINER
CONTR-9405-S/3	GENERAL ARRANGEMENT
CONTR-9405-S/4	UNDERFRAME GENERAL ARRANGEMENT
CONTR-9405-S/5	UNDERFRAME BOLSTER AND SIDE BEARER ARRANGEMENT
CONTR-9405-S/6	UNDERFRAME DETAILS
CONTR-9405-S/6A	UNDERFRAME DETAILS
CONTR-9405-S/7	UNDERFRAME BOLSTER DETAILS
CONTR-9405-S/8	WELDING DETAILS
CONTR-9405-S/9	AIR BRAKE DIAGRAM AND UNDERFRAME BRAKE GEAR PIN & BUSHES
CONTR-9405-S/10	UNDERFRAME BRAKE GEAR ARRANGEMENT
CONTR-9405-S/11	UNDERFRAME BRAKE GEAR DETAILS
CONTR-9405-S/12	SIDE OPERATED HAND BRAKE ARRANGEMENT AND DETAILS
CONTR-9405-S/13	FITMENT OF GRADUATED RELEASE AIR BRAKE EQUIPMENT PIPE LAYOUT
CONTR-9405-S/14	GRADUATED RELEASE AIR BRAKE EQUIPMENT AND PIPE LAYOUT DETAILS SHEET-I
CONTR-9405-S/15	GRADUATED RELEASE AIR BRAKE EQUIPMENT AND PIPE LAYOUT SHEET-II
CONTR-9405-S/16	FITMENT OF LOAD SENSING DEVICE
CONTR-9405-S/17	UNCOUPLING GEAR ARRANGEMENT FOR NON TRANSITION CBC
CONTR-9405-S/18	PIPE DETAILS OF LOAD SENSING DEVICE
CONTR-9405-S/19	MARKING DIAGRAM
CONTR-9405-S/20	APD FOR DISTRIBUTOR VALVE
CONTR-9405-S/21	FITMENT OF AUTOMATIC TWIST LOCK
RITES/TP-9405-S/001	DRAW BAR ARRANGEMENT
RITES/TP-9405-S/002	STRIKER CASTING
<u>CAR 'B'</u>	
CONTR-9406-S/1	INDEX
CONTR-9406-S/2	DIAGRAM WITH TWO 20' OR ONE 40' LONG ISO CONTAINERS
CONTR-9406-S/3	GENERAL ARRANGEMENT
CONTR-9406-S/4	UNDERFRAME GENERAL ARRANGEMENT
CONTR-9406-S/5	UNDERFRAME DETAILS
CONTR-9406-S/6	AIR BRAKE DIAGRAM AND UNDERFRAME BRAKE GEAR PIN AND BUSHER

DRAWING NO.	DESCRIPTION
CONTR-9406-S/7	UNDERFRAME BRAKE GEAR ARRANGEMENT
CONTR-9406-S/8	SIDE OPERATED HAND BRAKE ARRANGEMENT AND DETAILS
CONTR-9406-S/9	FITMENT OF GRADUATED RELEASE AIR BRAKE EQUIPMENT PIPE LAYOUT
CONTR-9406-S/10	GRADUATED RELEASE AIR BRAKE EQUIPMENT AND PIPE LAYOUT DETAILS
CONTR-9406-S/11	PIPE DETAILS OF LOAD SENSING DEVICE
CONTR-9406-S/12	MARKING DIAGRAM

BOGIE

CONTR-9404-S/1	INDEX
CONTR-9404-S/2	BOGIE GENERAL ARRANGEMENT
CONTR-9404-S/3	CAST STEEL SIDEFRAME ARRANGEMENT
CONTR-9404-S/4	BOGIE DETAILS
CONTR-9404-S/5	CAST STEEL BOLSTER ARRANGEMENT & DETAILS
CONTR-9404-S/6	WEDGE
CONTR-9404-S/7	SPRING DETAILS
CONTR-9404-S/8	CENTER PIVOT AND SIDE BEARER ARRANGEMENT
CONTR-9404-S/9	BOGIE BRAKE GEAR ARRANGEMENT
CONTR-9404-S/10	BOGIE BRAKE GEAR DETAILS
CONTR-9404-S/11	L-TYPE COMPOSITION BRAKE BLOCK
CONTR-9404-S/12	WHEEL AND AXLE ASSEMBLY
CONTR-9404-S/13	WHEEL
CONTR-9404-S/14	LEADING DIMENSIONS & TOLERANCES
CONTR-9404-S/15	SPRING LOADED SIDE BEARER ARRANGEMENT & DETAILS
CONTR-9404-S/16	MARKING SCHEME FOR CAST STEEL SIDEFRAMES AND BOLSTER
CONTR-9404-S/17	BRAKE BEAM

CHAPTER - 4

CAST STEEL BOGIE TYPE LCCF 20(C) - 96

4.1.0 GENERAL

4.1.1 The cast steel Bogie comprises of two cast steel side frames and a floating Bolster. The Bolster is supported on the sideframes through two groups of springs, which also incorporate a load proportionate friction damping. A spring plank to maintain the bogie square connects the side-frames. The Side Bearer assembly is spring loaded, constant touch with Top Side Bearer of Underframe. These bogies are designed for traffic operation upto 100 kmph.

4.1.2 The general arrangement of the Cast Steel Bogie is as shown in Fig 1.8, 1.10, 4.1 & 4.2

4.2.0 SALIENT FEATURES OF THE BOGIE (FIG.4.3)

- a) Gauge : 1676
- b) Axle load : 20.32 t
- c) Wheel dia : 840-mm (New) 780 mm (Worn)
- d) Wheel Base : 2000 mm
- e) Type of roller bearing : Cartridge Taper roller bearing with wide Jaw adapter.
- f) Distance between Journal Centres : 2260 mm
- g) Distance between Side Bearers : 1750 mm
- h) Side Bearers : Spring loaded side- bearers
- i) Centre Pivot : Flat type
- j) Bolster Spring Group : Long travel Helical Springs. Inner springs are kept lower than outer springs.
- k) Damping : Load proportionate friction damping arrangement with springs, manganese steel-wedge, friction liners on bolster & side-frame
- l) Anti-rotation Features : Anti rotation lugs are provided on Bolster and simultaneous anti-rotation stopper at side-frame
- m) Load Sensing Device : Fitted on Bolster and spring plank for two stage empty/load brake system
- n) Type of brake beam : Unit type fabricated brake beam

4.3.0

BOGIE COMPONENTS (FIG. 1.8)

- a) Side frames with friction liners and brake wear liners.
- b) Spring plank.
- c) Bolster with wear liners.
- d) Wedge.
- e) Load Bearing Springs
- f) Snubber springs
- g) Bogie pivot with shackle lock, lock pin, split pin and metal cum rubber washer.
- h) Centre Pivot top (supplied along with the Bogie)
- i) Centre Pivot Bottom liner.
- j) Wheel sets with bearings, adapters and elastomeric pads.
- k) Side frame key with key bolt, spring washer, nut and split pin.
- l) Bogie brake gear, brake beam, equalizing levers, push rod, end pull rod, pins and bushes etc
- m) Fit bolts, rivets, bolt & nuts etc.
- n) Side bearers & side bearer springs.

4.4.0

SPECIAL FEATURE - THE SIDE BEARER ARRANGEMENT (FIG.1.10)

4.4.1

The side bearer arrangement is as per drg. No. CONTR 9404-S/15. The side bearers are spring loaded in the housing as shown. The wear liners are provided in side bearer seat, sliding block and side bearer top. The side bearer seat is bolted to the bolster as shown. Side bearer top is resting on the springs housed on the side bearer seat. 90% of tare weight is taken by side bearers. Under pay load condition no load is transmitted on side bearer. 10% of tare and pay load are taken by flat centre pivot.

4.4.2

The top side bearer liner of underframe and the side bearer top liner of bogie are smoothly finished to have a desired friction during movement on curves.

4.4.3

Comparison of CASNUB-22-NLB and Container Bogie Type LCCF20(C) with respect to similar and dissimilar features.

S.N.	Description	CASNUB-22-NLB	Container Bogie Type LCCF-20(C) - 96
DIS-SIMILARITY			
1	Centre Pivot Height from rail level	932 mm ✓	715 mm ✓
2	Maximum height of side frame from rail level	851 mm ✓	786 mm ✓
3	Bottom of side frame from rail level	165 mm	149 mm
4	Height of side bearer top from rail level	921 mm	772 mm
5	Wheel dia	1000/925 mm ✓	840/780 mm ✓
6	Side frame design	Cast steel design suitable for narrow jaw adapter	Cast steel design suitable for wide jaw adapter
7	Bolster Design	Cast steel design- separate type centre pivot, straight bottom.	Cast steel design integral flat type centre pivot
8	Design of centre pivots	Separate pivots, IRS spherical type, assembled by rivets	Bottom pivot integral with bolster, flat type top pivot separate bolted to underframe.
9	Centre pivot liner	No liner is provided	Manganese steel liners conforming to IRS-R-65-78 are provided at bottom and vertical
10	Side bearer	Rubber type in a cast steel housing.	Friction type with coil springs in a cast steel housing. ✓
11	Load bearing coil springs	12 outer and 8 inner Material IS:3195 60 Si7	14outer and 12 inner springs. Material IS:3195 Gr. 60 Si7
12	Snubber springs	4 Snubber springs Material IS:3195 Gr. 60 Si7	4 Snubber spring Material IS:3195 Gr 50 CrMoV4
13	Brake shoe	Conventional brake shoe Material cast iron.	Non-metallic brake shoe.

S.N.	Description	CASNUB-22-NLB	Container Type	Bogie Type
14	Adapters	Narrow adapter.	jaw	LCCF-20(C) - 96 Wide jaw adapter.

SIMILARITY

1	Wheel base	2000 mm
2	Journal centres	2260 mm
3	Spring plank	Pressed plate design from 12 mm plate.
4	Centre pivot bolt	Similar design.
5	Wedge	Similar design.
6	Cartridge bearing	Standard AAR Cartridge bearing type roller bearing Class-E.
7	Side frame key	Similar design
8	Bogie brake gear	Similar design in case of bogies with CBC end but an extra equalising lever has been provided in U-shape to connect underframe bracket with 2 nos. of end pull rods.
9	Elastomeric pads	Similar.

4.5.0

METHODS OF DISASSEMBLING OF THE BOGIES

- a) Disconnect the bogie brake rigging attachments to underframe and underframe brake gear including rubber hose pipes and raise the wagon body after removing split pin, lock pin and shackle lock etc.
- b) 25 t whiting jacks (Jamalpur Jacks) can be used at each lifting pad location for lifting.
- c) Run out the bogies.
- d) Lower the car body in the trusses.
- e) Remove the retainer key with bolts.
- f) Remove the bogie by lifting a crane of 4t capacity from the wheel sets.
- g) Place on a fixture having locations for seating the pedestal tops of side frame.
- h) Remove the push rod and other brake rigging.
- i) Insert the assembly pins 12 mm dia x 250 mm long to retain wedges.
- j) Raise the bolster to contact top member of the side-frame by any crane.
- k) Remove the outer, inner and snubber springs
- l) Remove the assembly pins and lower wedge blocks to take them out.

- m) Remove the side bearer from the bolster.
- n) Remove the fit bolts, rivets.
- o) Remove the center pivot pin etc
- p) Remove the spring plank from one end.
- q) Lower the bolster and rest on the two Packing Blocks on the fixture so that bolster ends are free in bolster opening of side-frame.
- r) Now take out the sideframes from each end for repair.
- s) Take out the bolster for repair.
- t) Remove adapter retainer bolt to release the adapter and elastomeric pad.

4.6.0

METHODS OF REASSEMBLING (FIG. 4.4 & 4.5)

- a) Place the Bolster on the fixture at the centre over the packing blocks.
- b) Insert the side frames from each end and place the pedestals of side frame on the fixture. Clamp the pedestals.
- c) Lift the Bolster upto the top member of the side frame in the opening.
- d) Insert the spring plank and match the holes of the spring plank w.r.t. side frame.
- e) Set the side frames so that the pop marks on the side frames representing journal centre measuring diagonally be within 3018 ± 4.5 mm and clearance of bolster lugs to sideframe 12.5 ± 1.5 mm. The maximum permissible variation between two half diagonals is 4 mm.
- f) Ream the fit-bolt holes of spring plank to suit 24 dia fit bolt. Fix the fit bolts and tighten the nuts connecting the side frame and spring plank.
- g) Ream the holes of spring plank for rivetting if necessary.
- h) Rivet the remaining holes of spring plank.
- i) Check diagonal and journal centres by tramel gauge.
- j) Inspect all the load and snubber springs and group the good springs to equal height.
- k) Re-assemble the bogie by reversing the disassembly procedure.
- l) Check the clearances and tolerances of the assembled bogies as per the enclosed load test chart to Fig.3.1. The 'NOTE' 1 to 5 mentioned in this figure is adhered to strictly.

4.7.0

ALTERNATE ASSEMBLY PROCEDURE (FIG. 4.6., 4.7 & 4.8)

- 1) Keep both the side-frames in the fixture.
- 2) Insert the Spring Plank and locate the holes
- 3) Set the distance 2260 ± 1.5 mm & 3018 ± 4.5 mm and clamp the side frames .

- 4) Weld with 4 tie rods between side frames keeping at the above position .
- 5) Remove the Spring Plank from one end.
- 6) Insert the Bolster from one end and keep the bolster in position in the side-frames.
- 7) Lift the Bolster so that it can reach the top most part of bolster opening on side frames.
- 8) Insert the spring plank and locate the pre-drilled fit bolt hole and fasten the side frames and spring plank at rivet holes four on each side.
- 9) Insert assembly pins 12 X 250 mm to retain wedge.
- 10) Remove the clamps on side frames and lift this assembly with bolster and keep in the drilling fixture .
- 11) Ream the holes of pre drilled for fit bolts, by removing one by one locators on fit bolt holes. After reaming the holes fasten them with fit bolts.
- 12) After providing the fit bolts remove the whole assembly to the high riveting fixture. The bolster is kept in top position in the fixture. Rivet the spring plank with side frames. Remove the assembly from the fixture .
- 13) Place the Bolster & Snubber springs in position and lower the bolster over springs.
- 14) Fit the side bearer and side bearer springs
- 15) Fit the center top, pins etc.
- 16) Assemble brake beam with side frame after fitting the break beam wear liners with the corresponding inner guides of the frame(Fig.4.5).
- 17) Fit the adapter elastomeric pad and retainer bolt (Fig. 4.5).
- 18) Lower the bogie on wheels fitted with cartridge bearing .
- 19) Fit the side frame key with bolt and spring washer.
- 20) Check all leading dimensions .
- 21) Assemble all bogie components and load test as per the load test chart

4.8.0

MAINTENANCE OF THE BOGIE (FIG. 1.8 & 3.1)

4.8.1

The bogie as designed is not expected to call for break-down maintenance. However to obtain optimum life of the bogie, it is desirable to maintain the various clearances within recommended limits. Due to wear of the mating components, increase in clearance should be monitored for this purpose.. The bogie clearances and tolerances should be checked and rectified, if found necessary.

4.8.2

Whenever the wear reaches the recommended limits or it is felt that it will cross the recommended wear limit before next ROH the repairs should be undertaken by either building up the wear

surfaces or changing of their liners as the case may be as per the facilities available with the depot.(Ref.Cl.4.9.0.) It is suggested to replace the bogie instead of repairing and then conduct repairs by building up worn out surface in ROH depot. In case the lower spring plank is required to be removed, the bogie should be sent to POH shops for repairs.

4.8.3 Figure 4.9 indicates the method of checking the combined wear in bolster, sideframe and wedge. Due to wear in bolster, side frame liners and wedge surfaces the wedge will move upwards. If the holes in bolster pocket wall and wedge start crossing, repair shall be undertaken. Alternatively the gauge shown in Fig. 4.10 shall be used to determine the wear limit, to decide whether repair shall be undertaken.

4.8.4 Positioning the job for down hand welding in suitable manipulators should be carried out for the repairs. After the repairs, the repaired surfaces should be checked with relevant gauge for correctness. Excess material if any should be removed by grinding. The class of electrode, gauge of electrode, the welding procedure to be undertaken while repairing the surfaces by welding should be followed as per enclosure 1.

4.8.5 During POH of wagon in shops, all the wearing surfaces of the bogie shall be brought to as new condition. The method of checking the combined wear in bolster, side frame and wedge is as per the gauge shown in Fig. 4.10.

4.9.0 **THE REPAIR PROCEDURE FOR THE MAJOR BOGIE COMPONENTS**

4.9.1 **Bolster**

4.9.2 The wearing surfaces in the bolster are shown in Fig. 4.11. Bolster Pocket has been given with 8 mm thick silicon manganese steel liner in the slope pocket. The liner may be permitted in service upto a thickness of 3 mm. Chip off the welded liner to prepare the surface for welding new liner. The procedure for welding of liner is given in the enclosure 2. No paint or grease should be applied on the liner.

4.9.3 Whenever wheels are changed or bogie dismantled, the bogie clearances and tolerances should be checked and rectified, if found necessary during ROH of wagons in sick line.

Bolster land surface and rotation stop lugs.

Wear limit for Bolster land Surface = 3 mm Gauge: Fig.4.12

Wear limit Rotation Stop lug = 3 mm

Dimension over Bolster land surface : New 444+1.5 Worn 438
Dimension over rotation stop lug : New 518 Worn 512

4.9.4 Before repair is undertaken, the wear is measured by using the gauge as shown in Fig. 4.12. The centre line of the gauge should fall in line within the marked centre line of the bolster as shown in the figure. With the gauge in position if a 4 mm thick shim can be inserted between the casting and the gauge at land surfaces, rotation stop lug then wherever the 4 mm thick shim enters that location need to be dressed smooth to enable welding of suitable thickness of Silico-manganese steel liner as per welding procedure given in enclosure 2. The width over the land surfaces and rotation stop lugs after the welding of liners should answer the gauge.

Note: Two shims of size 4 mm are required to be used simultaneously. Preferably liner on land surface should be welded after reclaiming inner column gib by welding and before reclaiming outer gibs by liner.

Bolster Column Gibs (Gauge Fig. 4.13).

Wear limit :Outer gib = 5 mm Inner gib = 5 mm

4.9.5 The gauge determines the wear on outer and inner column gibs.
Outer gib New/Renewed 241+2 mm Worn 251 mm
Inner gib New/Renewed 136+3mm Worn 146 mm
-0

4.9.6 With the gauge in position as shown in Fig. 4.13 if a shim of 6 mm for outer and inner gauge can be inserted between casting and the gauge at each end at any point outer gibs are to be reclaimed by welding silico manganese steel liners of suitable thickness as shown in Fig.4.13 following the welding procedure as per enclosure 2. Inner gibs are to be reclaimed by welding procedure as per enclosure 1. After reclaiming both the gibs it should be ensured that width over the gibs should answer the gauge.

Note: Two 6-mm shims are required to be used simultaneously for each location.

4.10.0 **CENTRE PIVOT LINER GAUGE (FIG. 4.14)**

4.10.1 Wear Limit 2 mm. The liners required to be changed if the wear on the liner exceeds 2 mm.

4.10.2 The liner after replacement be welded with the bolster casting (Fig.4.5)

4.10.3 A plate gauge as shown in Fig. 4.14 may be used for checking the wear on the liner. A feeler gauge of 3mm thick if goes then the liner should be changed. The gauge should be moved around to check up for proper fitment of C.P. liner.

4.11.0 **CENTER PIVOT GUAGE (INTEGRAL TYPE CENTER PIVOT FLAT BOTTOM BOLSTERS) FIG. 4.16**

Wear limit Vertical side =2mm
 Seat =2mm

Determine the amount of wear on seat and side of center bolt by using the gauge shown in Fig. 4.16.

Remove the liner and replace with new one and weld.

4.12.0 **SIDE FRAME**

4.12.1 The wearing surfaces in the side frame are shown in Fig.4.17. Details of reclamation procedure for each location are given as under: -
Wear limit: 4 mm

4.12.2 Side frame columns have been provided with 10 mm thick manganese steel wear liners welded on to the columns. The liners may be permitted in service upto thickness of 6 mm or whenever found cracked or broken. Use friction liners as shown in Fig. 4.18.

4.12.3 Dress the surface of column face The new friction liner is to be held tight against the column face during welding. Welding should be done in down hand position. Start welding at diagonal ends of liner and weld towards the centre. Refer enclosure 2 for other welding details. No paint or grease should be applied on the friction liner.

4.13.0 **SIDE FRAME COLUMN SIDES**

4.13.1 Wear limit: 5 mm
Gauge: Fig. 4.19

4.13.2 Column sides: New/renewed work 216 ± 1.5 mm worn 206 mm. This gauge determines the amount of wear on the outside and the inside of side-frame columns. Mark the centre line on the friction plate of steel casting and place the gauge so that the centre line of the gauge falls in line with the centre line of the side frame column. If a 6mm shim can be inserted between the casting and gauge at each side at any point, the surfaces should be welded with suitable thick liners of silico-manganese steel as per the procedure under

enclosure 2 after dressing the area to weld. After the repair the gauge should answer all the relevant locations.

4.14.0 SIDE FRAME ANTI ROTATION LUG

Wear limit 3mm

Gauge Fig. 4.20

Anti rotation lug

new/renewed

450 +2,-0 mm

Worn

456mm

4.14.1

This gauge determines the wear on the anti rotation lug. With the gauge in position if a 4 mm shim can be inserted between the casting and the gauge at each rotation stop at any point the surface should be welded with suitable thick liners of Mn steel as per the welding procedure.

4.14.2

The gauge is designed to use with friction liners of the side frame column. If anti rotation lugs are gauged without friction liners two 10mm thick spacers (one on each side) should be positioned within the column to simulate the condition for using the gauge.

4.15.0

PEDESTAL CROWN ROOF

Wear limit: 5 mm Gauge: Fig. 4.21

New/Renewed

Worn

Key seat to

Pedestal crown roof

318 \pm 3

323

4.15.1

Determine the amount of wear on the side frame pedestal crown roof by using the gauge as per Fig.4.21 with the gauge in position. If a shim of 6 mm thickness can be inserted between the casting and the gauge at any point, surfaces should be repaired by welding with a suitable thick liners as per procedure mentioned in enclosure 2.

4.15.2

The repaired crown roof should be checked with the gauge and crown roof profile also to be ensured by grinding the excessive material.

4.16.0

PEDESTAL CROWN SIDES AND SIDES OF THE PEDESTAL

Wear limits Crown Sides 4 mm

Fig-4.22

Pedestal Sides 2 mm

New/Renewed

Worn

Crown sides

152 mm

144 mm

Pedestal sides

105 mm

101 mm

- 4.17.0 **PEDESTAL CROWN SIDES**
- 4.17.1 With the gauge in position as shown in Fig. 4.22(A) if a shim of 5 mm thickness can be inserted between the casting and the gauge at each end at any point repair should be made by welding as per encl. 1, followed by grinding.
Note: Before using the gauge the centre line of the pedestal crown sides is to be marked taking the UNWORN surface as datum. Thus the gauge centre line should be matched with the casting centre line and using 5mm thick shim on both sides the wear on each side is measured.
- 4.17.2 Pre heat the area to be reclaimed upto a temperature 250° C before undertaking the reclamation work.
- 4.17.3 After welding, the welded portion should be allowed to cool slowly by covering it with asbestos/sand.
- 4.18.0 **SIDES OF THE PEDESTAL**
- 4.18.1 With the gauge in position as shown in Fig. 4.22(B) if a shim of 3 mm thick can be inserted between the casting and the gauge at each end at any point repair should be undertaken by welding as per enclosure 1. It is to be ensured that centre line of the unworn sides of the Pedestal and the gauge centre line are matched and then checked for repair. Pre heat is not necessary.
- 4.19.0 **PEDESTAL JAW**
- | | | | |
|----------------------------|---------------|--------|--|
| Wear limit 4 mm | | | |
| Gauge as shown in fig 4.23 | New/Renewed | Worn | |
| Distance between jaws | 278 +2, -0 mm | 286 mm | |
| Crown side | 152 mm | 144 mm | |
- 4.19.1 Determine the amount of wear on Pedestal Jaw by using the gauge shown in Fig. 4.23. With the gauge in position as shown in Fig. 4.23 if a shim of 3 mm thickness can be inserted between the casting and the gauge at each end at any point of Pedestal jaw face, should be reclaimed and resorted to original contour by welding spring steel liner as shown in Fig. 4.24. After reclaiming it should answer the gauge in the jaw opening.

4.20.0

WIDE JAW ADAPTER

Reference Fig. 4.25

4.20.1

When bogies are dismantled for any purpose, adapters must be thoroughly inspected for soundness and wear. The inspection for wear shall include the application of gauges shown at locations detailed in Fig.4.25. The following conditions shall render the adapter to be scraped and replaced.

- i) Cracked or broken at any location.
- ii) Warped or twisted or distorted. To check the adapter for distortion places the adapter on the bearing outer ring. It should sit firmly on the outer ring without rocking when hand pressure is applied on top of the adapter. When uniform wear band is not seen at the adapter sitting location on bearing, the adapter should be scrapped. Non uniform wear band on the outer end indicates that the adapter does not match with the outer cup dia.
- iii) Worn to the extent that ridges or grooves prevent the proper seating of adapter on the bearing.
- iv) When the wear at the thrust shoulder, adapter bore, crown lugs, crown seat, side lugs reaches the condemning limits indicated in this chapter
- v) Whenever visual marks of the adapter seating are found to be confined on a limit length on circumference of the outer cup, the bearing should be rotated so as to bring that portion of the outer cup seating area under the adapter which does not have adapter seating marks. This procedure will facilitate shifting of the loaded zone during lift of the bearings and thus increase the life of the cartridge bearing.
- vi) Adapters which are worn in one side between lugs from brake reactions but which are otherwise satisfactory for reuse should be reversed when reused. When both sides exceed 3-mm wear do not reuse adapter.

4.21.0

THRUST SHOULDERS

Wear limit 0.625 mm gauge Fig. 4.26

4.21.1

The thrust shoulder of the used adapter may have groove due to contact with the ends of the roller bearing outer ring. The depth of such groove shall be gauged by using the gauge. If at any point on periphery of adapter the gauge touches the groove is greater than 0.7 mm the adapter shall be scrapped.

- 4.22.0 **ADAPTER BORE (BEARING SEAT)**
Wear limit = 0.8 mm
- 4.22.1 Machined relief is provided at the ends of the bearing seats at a different level. When measured, machined relief depth shall be 0.8 mm or more.
- 4.22.2 The gauge shown in Fig. 4.26 shall seat on the bearing seat without touching the machined relief. If the gauge touches the machined relief the adapter shall be scrapped. The adapter-bearing seat must be checked all over the arc by this gauge.
- 4.23.0 **ADAPTER CROWN LUGS**
Wear limit 4 mm gauge Fig. 4.27
- | | New/Renewed | Worn |
|--------------------|---------------------|------|
| Adapter crown lugs | 156 +2.75, -0.425mm | 164 |
- 4.23.1 To determine the wear the gauge is positioned as per figure matching the centre lines of crown seat and gauge and if a 5 mm thick shim can be inserted between the worn lug and the gauge on either side at any point the adapter shall be scrapped.
- 4.24.0 **ADAPTER CROWN SEAT**
Wear limit 3.5 mm gauge Fig. 4.28
- | | New/Renewed | Worn |
|----------------------------|---------------------|---------|
| Adapter bore seat to crown | 48.5 mm +1.05, -0.1 | 44.5 mm |
- 4.24.1 When the twin gauges are applied as shown in Fig. 4.28 and if a 4.5-mm shim can be inserted between the gauges 1 and 2 it indicates the condemning limit and hence the adapter should be scrapped.
- 4.25.0 **ADAPTER SIDE LUGS**
Wear limit 3 mm gauge Fig. 4.29
New 130 mm +3.35 Worn 136 mm
- 4.25.1 With the gauge in position matching the centre lines of the gauge and adapter side lug if a 4-mm thick shim can be inserted between

worn surface of the lug and the gauge at either sides at any point the adapter shall be scrapped.

4.26.0 **ADAPTER SIDES**

Wear limit 3mm gauge Fig. 4.30

New 268 mm +0.287, - 2.8 Worn out 262 mm

4.26.1 With the gauge in position as shown in fig.A matching the centre lines of the gauge and adapter sides if a feeler gauge of 3.5mm thickness can be inserted on each end both sides at any point of the adapter and the gauge then the adapter should be scrapped.

4.26.2 It is to be noted that no rework by welding etc. is permitted on adapter and it should be scrapped if the wear is found to be beyond limits specified above.

4.27.0 **ELASTOMERIC PADS**

4.27.1 Elastomeric pads shall be condemned on the following grounds and be replaced by new one.

- i) If the top or the bottom plates show any crack in service.
- ii) If any crack of more than 50 mm is developed at any surface of rubber.
- iii) If a bond failure giving way more than 40 mm in any direction is developed in service.
- iv) When the pad has taken a permanent set and the free height becomes 42 mm instead of 46-mm normal size. If any sign of crushing of rubber is noticed the pad is rejected.

4.28.0 **SIDE BEARER**

4.28.1 The side bearer arrangement is as per Drg. CONTR 9404-S/15 (Fig. 1.10).

4.28.2 The liners on the housing (side bearer seat), sliding block, side bearer top etc., if worn by 2 mm, it should be changed.

4.28.3 Side bearer springs are condemned on the basis of height. Springs should be replaced if minimum spring height is at or less than the dimension given below: -

Free height	Recommended Free Height
Nominal	for condemning
123 mm	119 mm

4.28.4 Grouping : Matching of the springs is important. Its recommended those springs having variations upto 2 mm in free height are only assembled in the same Bolster. The springs are to be manufactured as per drawing and RDSO specn. WD-01-HLS-94. Mixing of new and old springs should be avoided. The side bearer top liners are finished smooth so that the co-efficient of friction between liners is minimum.

4.29.0 **LOAD AND SNUBBER SPRINGS**

4.29.1 The spring group of this bogie is shown on the Fig. 4.31 & Spring details are shown in Fig.4.32

4.29.2 The springs are condemned on the basis of free height springs should be replaced if minimum spring height is at or less than shown below:

✓ Spring	Free height Nominal	Recommended Condemning height
Outer	260 ± 2	245
Inner	243 $+0,-3$	228
Snubber	288 ± 3	274

4.29.3 Matching of both load and snubber springs is important. It is recommended that springs having not more than 3 mm free height variation should be assembled in the same group. Mixing of new and old springs should be avoided. The springs are required to be manufactured as per drawing and specification No.WD-01-HLS-94.

4.30.0 **WEDGE GAUGE**

Gauge : Fig. 4.33

Wear limit Vertical surface - 7mm

Slope surface - 3 mm

Vertical surface from centre line	New/renewed 61mm	Worn 54mm
--------------------------------------	---------------------	--------------

4.30.1 Vertical surface : With gauge in position if an 8 mm shim can be inserted between the casting vertical surface and the gauge at any point repair should be made. The worn surface shall be reclaimed by welding. A lot of precaution is to be taken for welding of this wedge as this is made of IS 276 Gr. I Manganese steel. A replacement of the worn out wedge is easier & preferable.

4.30.2 Slope surface: The wear on the slope surface is measured with gauge in position as shown in figure and if a 4 mm shim can be inserted between the gauge and centre point of the casting profile

the wedge is required to be replaced. No rework can be done to keep the profile 940 R of the casting.

4.30.3 Reclamation of wedge block at ROH depot vertical face: A manganese steel liner of 120 mm x 140 mm with suitable thickness is to be welded on the wedge face using class H2 electrode as per IRS M-28-76.

4.30.4 Other Surface: Plate to be used of dimension 5 mm shorter alround. Material: manganese steel liner.

4.31.0 RECLAMATION OF FRICTION WEDGE BY WELDING (PREFERABLY DURING POH)

4.31.1 Surface preparation: The surfaces to be welded should be cleaned properly to remove dust, oil, cracks, scales prior to welding Electrode 4 mm dia approved by RDSO under class H2 of IRS-M-28-1976.

4.32.0 CURRENT CONDITIONS

4.32.1 The power source as recommended by the manufacturer of the electrodes shall be used. The lowest possible current capable of producing satisfactory welding should be used. Over heating should be avoided.

4.33.0 WELDING PROCEDURE

- i. Short and stringent welding bead should be used
- ii. Skip welding should be followed
- iii. Short arc should be maintained
- iv. Weaving is not recommended
- v. The subsequent weld runs are only after previous run get cooled to room temperature. The weld bead should be peened immediately after welding.
- vi. The crater should be filled up by removing the electrodes slowly after going backward.
- vii. Post weld heat treatment: It should be ensured that the weld metal is quickly cooled.(Forced air through fan).
- viii. Inspection: The welded surface after cooling be ground properly to required dimension and then subjected to dye - penetrant test. As manganese steel has work hardening nature grinding should be effected in bits and enough cooling time between runs and effective immediate cooling after each run is to be employed.

- ix. A lot of precaution needs the repair of wedge. Hence it is always preferable to replace the worn out wedge with a new one instead of repairing the old.

4.34.0 **WHEELS SETS WITH BEARING UNITS**

4.34.1 Wheel sets with cartridge roller bearing and wide jaw adapter are used in the bogie. During ROH & POH all wheel sets are removed from the bogie and the treads are machined to new tread profile.

4.34.2 Bearing requires attention during POH. But in ROH the roller bearings are rotated by hand and any obstruction in free movement of bearings on journal is felt and defective bearings replaced. All axles require ultrasonic testing during ROH & POH.

4.34.3 Maintenance periodicity of cartridge roller bearing:

4.34.4 Schedule of Inspection and Maintenance. The bearings should be examined for

- a) Abnormal noise.
- b) If a bearing is noticeably warmer than other bearings on the wagon on arrival, the bearing should be checked with a temperature indicating crayon suitable for temperature of around 90° C on the front face of the adapter location. Direct reading pyrometers can also be used for measuring the temperature. If the bearing temperature is in excess of 90° C then the bearing needs attention for further examination.
- c) Visible Damage : Inspect adapter, axle cap screws, locking plate, outside of the cup and seal. If any of these are found cracked, broken or distorted the wheelset must be removed from service. If one cap screw is found loose or missing examine the bearing by rotating it. If it is good, remove all the cap screws. Fit a new locking plate and torque tighten all the cap screws. If two or more cap screws are found loose or missing, the bearing should be removed from service for complete inspection and servicing before reuse. If locking plate tabs are broken the locking plate must be replaced and properly bending the tabs with screw heads.
- d) Displaced Adapter

Check displaced adapter from its correct location on the bearing outer cup which can result from lack of care at the time of bogie assembly or from improper use of the flat

wagon during shunting etc.. A displaced adapter can cause mechanical damage, off centre loading, accelerated fatigue damage and premature bearing failure. Any wear or damage to the end cap or backing ring is an indicator that the adapter has been out of position. If an adapter is found displaced, the bogie should be lifted. Outer cup, backing ring and end cap should be thoroughly examined and then the adapter should be properly seated.

e) Grease Leakage

In case of grease purging or leaking out of the bearing, check for visible damage to seals. If seal is loose it can be moved by hand.

Grease leaking between backing ring on the axle dust guard is an indication of a loose backing ring and a loose bearing.

If a backing ring can be moved by hand on application of pressure it is considered to be loose. Bearing with loose backing ring should be removed from service. In no case the bearing should be opened out in the yards, sick line, and ROH depot.

4.35.0 **EXAMINATION IN SICK LINE**

4.35.1 Whenever wagons pass through sick lines for any repair the bearing should be subjected to external examination as mentioned earlier. In case if the bogie is lifted for any reason the bearing should be rotated by hand and checked for any unusual sound due to race way damage. Bearings giving unusual sound should be removed from service.

4.35.2 For attending to wheel defects by tyre turning open out the axle end cap and replace it with a dummy cover. The dummy cover can be made as per RDSO drg. no. WDIIA-8514/S-1

4.35.3 After tyre turning, clear the axle end thoroughly taking special care to see that no grit or swarf is left any where near the cover bearing, cap screw holes etc. No cotton waste is used for cleaning and only cloth to be used for the purpose.

4.36.0 **OVERHAULING OF TAPER BEARING:**

4.36.1 The overhaul includes the removal, cleaning, inspection repair or replacement, assembly of all parts and installation. Overhauling

should be carried out at the time of POH of wagon and also at the following occasions.

- a) Rediscing
- b) When wagon has been submerged in flood.
- c) When Hot Box or Bearing failure has been reported on account of broken cup, unusual sound etc.,
- d) Derailment

4.36.2 All the bearing of wagons involved in accident should be removed and sent for servicing/overhauling in the workshop. The word 'Accident Involved' should be painted on the outside of the cup of such bearings before sending to workshop for detailed examination.

4.36.3 The workshops should attend to the bearing as detailed in the technical pamphlet no.G81 issued by RDSO, Manak Nagar, Lucknow 226011.and Railway tapered bearing units (TBU) mounting & maintenance manual.

(G -81 -Instructions for inspection and maintenance of cartridge taper roller bearing fitted on cast steel bogies).

4.37.0 PRECAUTIONS WHEN CLEANING OR REPAIRING WAGONS

4.37.1 When cleaning and repairing wagons ensure that some stage in the procedure does not contribute in any way to the premature failure of a bearing. Some innocent looking operation, incorrectly carried out, could easily do the damage. Some of the operations which could ruin a taper roller bearing, together with advice on necessary precautions are discussed in the following paragraphs.

4.38.0 WHEN WASHING AND PAINTING

4.38.1 Never let the jet of water be directed towards the taper roller bearing seals, especially if it is unduly powerful or contains cleaning fluids. There is every chance that the jet of water might open the seal, for just a moment, and allow water to pass through and then stay inside after the seal has closed again. Permanent damage to the seal can easily be caused if the jet of water is very powerful.

4.39.0 WHEN ABRASIVE BLASTING

4.39.1 If for some reason it is necessary to clean the wagon by sand or grit blasting, make sure that the taper roller bearing is carefully protected.

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4.39.0 WHEN ABRASIVE BLASTING

4.39.1 If for some reason it is necessary to clean the wagon by sand or grit blasting, make sure that the taper roller bearing is carefully protected.

4.39.2 Protect the entire taper roller bearing, including the front and rear seals, with an efficient wrapping so that sand or grit cannot penetrate.

4.40.0 **WHEN WHEEL TURNING**

4.40.1 This machining operation can be carried out without removing the taper roller bearing, but to protect it from swarf and grit, the end cap should temporarily be replaced by a steel cover. The backing ring seal should also be protected by some suitable wrapping. After turning, clean the axle end thoroughly, taking special care to see that no grit or swarf is left. Then mount the end cap and the locking plate again, but ensure that they are clean. Finally rotate the bearing and check the condition of bearing, seals and adapter.

4.41.0 **WHEN ELECTRIC WELDING**

4.41.1 Even at a very small potential difference, say 0.4 V, between the journal and the adapter an electric current may "jump" the film of lubricant between rollers and raceways. The result will be a number of burn craters or "washboard effect". Such damage may be caused, for example, by faulty earthing when welding a component to the wagon.

4.41.2 Therefore, the earth connection must not be attached to the axle, wheel, bogie or rail under any circumstances. All welding must be done with the earthing cable attached directly to the part being welded.

4.42.0 **WHEN TORCH CUTTING OR TORCH HEATING**

4.42.1 Ensure that the taper roller and especially its seals are well protected against the cutting or heating torch when it is used around the taper roller bearing. Hot fragments hitting the rubber lip of a seal will damage it instantly.

4.42.2 After the cutting or heating is finished, check the seal lips. If only one is found just slightly damaged, change it, because seal failure always leads to bearing failure.

4.43.0 **STORAGE & PACKING OF ROLLER BEARING**

4.43.1 Wagon equipped with taper roller bearings, stored for any length of time, and should be moved periodically to distribute the lubricant on the internal surfaces of the taper roller bearing.

4.43.2 Taper roller bearings mounted on axle assemblies for storage should have all outside surfaces including the backing rings and end caps covered with rust preventive.

4.44.0 WHEEL & AXLE(FIG. 4.34 & 4.35)

4.44.1 General

Wheel is one of the very important safety items of rolling stock. It is therefore essential to provide meticulous attention to all the components of the wheel set during POH in the workshops.

4.44.2 Pre -Inspection of Wheels

Wheel sets as removed from bogies should be sent to the roller bearing section. The axle boxes and roller bearings are stripped from the wheel journals if required as per the maintenance schedule or condition of the bearings, and the wheel sets are then sent to the wheel shop for maintenance.

4.44.3 All incoming wheels are first inspected for assessing the condition of the components of wheels such as axle, wheel disc.

4.44.4 During pre inspection following checks are made.

a) Measurement of wheel gauge (distance between two wheel flanges on the same axle).

As per Conference Rule (Wheel gauge) measurement should be $1600 + 2,-1$ mm. Measurement is made with the help of adjustable wheel gauge. The readings are taken at 3 different location 60 degrees apart. If the measurement is not within limits or difference in readings taken at the three locations is observed, the axle is termed as loose/bent axle. The wheel should then be marked for necessary corrective action.

b) Measurements of Wheel Diameter (Tread diameter)

The wheel diameter is usually measured with the help of trammel gauge with least count of 0.5 mm to check the diameter of incoming wheel set on both wheels. A wheel diameter measuring gauge with least count of 0.1 mm is recommended, as the measurement of diameter would be more accurate with this gauge. The flanges on both sides of wheel set are checked with the help of a profile gauge and the thickness and height of flanges are measured. With the

profile gauge, accurate measurement of flange height and flange thickness is not possible. It is therefore, recommended to use a wheel profile gauge with which accurate measurement of flange height and flange thickness to the extent of 0.1 mm can be made. The difference in tread diameters of the two wheels on the same axle should not exceed 0.5 mm as per IRCA Conference Rule. After recording the diameters of wheels and the flange measurements, the wheel set is marked for necessary repairs.

4.44.5 **Inspection of Axle**

Axle journals should be thoroughly cleaned for inspection to detect flaws, pitting, ovality, taper, ridges, etc. Each axle should also be ultrasonically tested for detecting internal flaws and defects as per the Code of Procedure issued by RDSO. Axle found flawed, pitted, tapered, or worn oval beyond limits should be replaced.

4.44.6 **The wheels are categorised after pre -inspection as below :**

i) **Normal Repair Wheels**

If all the components are within the acceptable range of limits, these wheels are taken directly for wheel profiling and servicing of roller bearings.

ii) **Wheels Requiring Replacement of Axle**

If the axle is condemned during pre-inspection due to bent axle, dimensional deviation on journal/wheel seat, axle having dents, corrosion, pitting marks on the surface of axle or found flawed in ultrasonic flaw detection test, the wheel set is taken for replacement of axle and categorises as RA wheels.

iii) **Wheel Requiring Replacement of Solid Discs**

If the tread diameter of solid wheel is approaching the condemning limits or wheel treads have heavy skid marks which are likely to cause tread dia going below shop condemning size on tyre profiling, the wheel set is taken for replacement and are categorised as RD wheels.

4.44.7 Wheel Repair

Normal Repair Wheels:

- a) Normal repair wheel should be taken for ultrasonic flaw detection test before sending it for wheel profiling on a wheel lathe.
- b) The wheel tread should be checked and machined to of machining standard N-11 to IS- 3073. The wheel set should be subjected to the spinning test specified in clause 22 of IRS R-19. The root radius is an important dimension of any contour and most of the lateral wear takes place at this location. It is, therefore, very important that the full root radius specified be obtained and a particularly fine finish given at this location.
- c) If the wheels are sent for wheel profiling without dismounting roller bearing from the Journal, special protective cover should be fitted on the bearings on either side of wheel to avoid entry of metal chips/dust or damage to the bearing during machining. Wheels with roller bearings, after wheel profiling and inspection of tread dia, wheel gauge, if passed are taken for roller bearing attention. Roller bearings and components are cleaned in position. The roller bearing maintenance work is then carried out as laid down in RDSO maintenance manual for roller bearings.

4.44.8 Activities Involved in Normal of Repair Wheels

- Pre inspection of incoming wheels. \]
- Flaw detection test of axle.
- If required, dismount roller bearing from the Journal.
- Machined wheel profile to the prescribed dimensions.
- Inspection of wheel profile.
- Clean roller bearing and assemble component in position, if not dismounted. Inspect roller bearings and assembly in position.
- Check radial clearance and confirm to be within specified limits.
- Pack fresh grease..
- Fit covers and despatch.

4.44.9 RA (Replacement of Axle) Wheels

- a) During pre inspection if it is found that axle is rejected for any reasons such as bent axle, journal. Detected flaws in ultrasonic test, the wheel set is taken for replacement of axle.
- b) The wheel set is taken on wheel press separating the rejected axles from the wheels.
- c) New axle should be machined as per drawing dimensions. When journal fillets and shoulder are machined. Each should be finished smooth concentric and with out ridges, burrs or chatter marks. Fillets on both ends of journals must be finished to the dimensions given in the respective drawings.
- d) The dimension of the finished journal must be measured with the micrometer. The dia should be measured at three points along length of the journal both in vertical and horizontal axis the ovality and taper must not exceed the prescribed limits. surface finish of the axle on journal, wheel seat and middle portion should be as prescribed 0.8 micron for journal 1.6 micron for wheel seat and 3.2 micron for middle portion.
- e) The axle should be given ultrasonic flaw detection test before pressing on the wheels.
- f) The serviceable wheel (separated from the RA wheel) is re-bored on the vertical boring machine. Care should be taken to ensure that the finished bore is straight, concentric to the tread of the wheel and has a smooth surface free from ridges, scores and chatter marks. The radius of 2.5 mm which is provided on the hub to facilities mounting, must be made after the finishing cut. Inside micrometer should be used for measuring wheel bores to ensure consistent results. Each wheel bore must be checked at not less than 3 points in its length and on the different diameters at each of these points to ensure roundness and absence of taper. The variation for any of these measurements must not exceed 0.05 mm.
- g) If any taper does exist, the small diameter must be at the outside end of the hub bore (reverse taper is not allowed). Surface finish of the bore should be within the prescribed permissible limits.

- h) The wheel seats are machined to suit the bore of the wheel centers keeping interference allowance as specified.
- i) The bore and the wheel seat should be maintained to the specified surface finish and diameters to achieve correct interference fit and pressing-in pressure.
- j) Before pressing – in operation, wheel seat on the axle and bore on the wheel should be carefully cleaned to remove rust, grit, swarf, dirt, etc. The wheel seat and bore should be lubricated with a mixture of basic carbonate white lead and boiled linseed oil, in the proportion of 1.2 kg of white lead paste to 1 litre of boiled linseed oil. The wheel and axle should be carefully aligned on the wheel press.
- k) Wheel press should be equipped with a dial pressure gauge and pressure recording gauge with graph to record mounting pressure diagram for each assembly. Wheel should be mounted within the prescribed pressure limits. Wheel should be mounted carefully on the axle such that the gauge distance is maintained. The axle end should be stamped with the shop code, date of mounting, pressing- in pressure, axle no., and cast no., cons. no., to enable identification of wheel.
- l) After mounting, the wheels should be rotated on a lathe to make sure that they are not eccentric nor out of plane with respect to the axle. The wheel gauge should be checked by gauging at three or more equi-angular points around the circumference.

4.44.10 RD-Redisicing of Wheel

- a) During pre – inspection, if the diameters of solid disc wheels are found to be nearing condemning size, the wheel is taken for replacement of discs.
- b) Dismount the roller bearing. Journal diameters should be checked to confirm to be within permissible limits. The wheels should also be ultrasonically tested for flaw detection and confirmed to be flawless.
- c) The wheel is then taken to wheel press for separating the condemned discs from the axle.

- d) New discs are bored on the vertical boring machine. Care is taken to ensure that the finished bore is straight, concentric to the tread of the wheel and has a smooth surface free from ridges, scores, and chatter marks. The radius of 2.5 mm which is provided on the hub to facilitate mounting, must be made after the finishing cut. Inside micrometer should be used for measuring wheel bores to ensure consistent results. Each wheel bore must be checked at not less than 3 points in its length and on the different diameters at each of these points to ensure roundness and absence of taper. The variation among any of these measurements must not exceed 0.05 mm. If any taper does exist, the small diameter must be at the outside end of the hub bore (reverse taper is not allowed).
- e) The wheel seats on the old serviceable axle released from RD wheels are machined to suit the bore of the wheel centres keeping interference allowance as prescribed. The bore and the wheel seat should be machined to the specified surface finish to achieve correct interference fit and pressing-in pressure. Before pressing- in operation, wheel seats on the axle and bore on the wheel should be properly lubricated. The wheel and axle should be carefully aligned.
- f) Wheel press must have a dial pressure gauge and pressure recording gauge with graph to record mounting pressure diagram for each assembly. Wheel should be mounted within the prescribed pressure limits. Wheel discs should be mounted carefully on the axle so as to maintain the gauge distance.
- g) The axle end should be stamped with the shop code, date of mounting, pressing – in pressure, axle no., cast no., and cons. no. and also on the outer periphery of the wheel disc on the area below the condemning diameter line, for tracing the history of the wheel.
- h) After mounting, the wheel should be rotated on a lathe to make sure that it is not eccentric nor out of plane with respect to the axle. The wheel gauge must be checked by gauging at three or more equi- angular points around the circumference.

4.44.11 Activities Involved in RD Wheels

- Pre-inspect incoming wheels. .
- Press off the wheel to separate axle and wheel centres.
- Bore the wheel discs and inspect.
- Machine wheel seat on the axle to suit the bore of wheel disc keeping the interference allowance as per prescribed limits and inspect.
- Press on the wheel discs on the axle to the respective wheel seats. Record the mounting pressure and the pressure graph for each wheel seat.
- Maintain the wheel distance with the gauge to the prescribed limit.
- Stamp the required details on the axle ends as per instruction.

4.44.12 All Wheel Sets

Axles used for the wagons should be punched in 5 mm letters, the following particulars should be punched on journal face.

- (a) Serial number (b) Place of pressing (c) Date of pressing (d) Journal centre (e) Pressure of pressing.

4.44.13 Assembly of Wheel Sets - Precautions

During assembly of wheel sets in bogie the following points need to be ensured

- i) Wheel dia on the same axle should not vary by more than 0.5 mm
- ii) 5 mm wheel dia variation only be permitted on wheel sets on the same bogie and on one bogie to another bogie maximum variation permitted is 13mm. The condemning size of wheel dia is 780 mm.

4.45.0 BRAKE GEAR MAINTENANCE

4.45.1 The general arrangement of brake gear is shown in Fig. 4.36 and bogie brake details are as per drawing CONTR-9404-S/10 (Fig. 4.37).

4.45.2 The brake gear consists mainly of brake beam with brake block, brake shoe key and split pin, equalising levers push road, end pull rod etc.

- 4.45.3 Location of pins and bushes used are as shown in Fig. 4.38 & 4.39. The bushes provided are of steel to IS 5517-45C8 case hardened and pins are made from steel to IS:2026 Fe 410WA. The maximum permissible wear on the pin dia and bush inside dia is limited to 1.5 mm. In service as the tread dia of wheel decreases due to wear, pins located in end pull rod with underframe having equally pitched holes are to be relocated as shown in Fig. 4.40.
- 4.45.4 The brake beam is a fabricated one. Brake beam strut and end piece casting are of cast steel. Brake head is integral part of end piece casting.
- 4.45.5 The non metallic brake block is as shown in(Fig.4.41). The wear of this brake block is hardly 1.5mm to 2 mm per 2000 km run.
- 4.45.6 A cracked brake block is liable for rejection and requires replacement..
- 4.45.7 A direct hit on the brake block by hammer may be avoided. The brake block gets cracked or gets chipped off due to this, leading to rejection of the brake block.
- 4.45.8 All the brake blocks may be replaced on condition basis during ROH/POH. For maintenance in yard brake block thickness upto 10mm is permitted. Whenever brake block is changed it is preferable that equal thickness of brake block may be fitted on both the ends of brake beam. More uneven wear on the brake block is due to improper fitment of brake block on brake beam head with brake shoe key. The key loses tension and the grip on brake block slackens causing uneven wear. Thus this type of keys require change and brake block worn uneven should be changed.

4.46.0 RECLAMATION OF BRAKE BEAM ON ACCOUNT OF WORN OUT BRAKE HEAD

- 4.46.1 The wear on brake head is due to the following reasons.
- i) The uneven wear on the brake block.
 - ii) The train is allowed to run with worn out brake block or with broken/missing brake blocks.
- 4.46.1 The proper brake shoe key with correct tension should be used to keep brake block in parallel to the tread of wheel. Brake blocks should be replaced when worn to 10mm. No train should be

allowed to run with broken, cracked or missing and unevenly worn brake blocks. (Refer para 4.45.6)

4.46.2 Reclamation: Brake head is integrally cast with end piece casting which is welded with structural steel brake beam channel and 'truss flat' at ends as shown in Fig. 4.42 & 4.44. Depending upon the extent of wear either it is repaired by building up the profile by welding and grinding as per enclosure, or the worn brake heads can be replaced by new brake head as follows.

- i) Removal of worn-out 'Brake Head' from end piece casting Gas cut the head as shown cross hatched in Fig. 4.42 & 4.43 and grind the gas cut surfaces to achieve contour as shown in Fig. 4.44.
- ii) Fabrication of new Brake Head: New Brake head shall be manufactured as per details in Fig. 4.45. Alternatively Brake Head can be produced by modifying the standard brake head of brake beam to SK 69596 meant for CASNUB 22 W Bogie. The modifications required to be carried out is only the provision of opening to size 41 x 27mm.
- iii) Welding of New Brake Head with this repaired brake beam is as per Fig. 4.46 and Fig. 4.47. New brake head shall be welded with the above repaired brake beam by keeping in a fixture so that both heads are parallel and to the required inclination even after welding. The welding procedure is as per enclosure 2.

4.47.0 **PRECAUTIONS TO BE TAKEN WHILE DOING WELDING OPERATION ON WAGON OR BOGIE FITTED WITH ROLLER BEARING**

4.47.1 Whenever wagon or bogies require welding in workshops/ROH depots/sick lines special attention should be paid so that electric current may not pass through the bearings. The return current (earth) may not pass through the bearings. The return current lead for earthing purposes should be fixed very close to the welding area and the earthing wire should be tightly secured at both ends. If wagon is not properly earthed the current passing through the bearings will cause arcing in between the roller and race ways leading to failure.

4.48.0 **MAINTENANCE IN YARD**

4.48.1 Generally there is no necessity for doing any major repairs at yard regarding bogie. The following points may be noted for maintenance.

- i) Missing parts if any should be replaced.
- ii) Check the side bearer clearance of 8 mm between the top plate and side bearer housing for any broken spring, for any broken top plate, replace broken spring and top plate.
- iii) Bolster springs got broken in service can be changed in yard as per the existing procedure of lifting the bolster at end by a 10 ton hydraulic jack. A fork type extension piece is being used to lift the bolster by inserting one end at the end of bolster and the other end is lifted by the jack. The bolster is lifted till it touches the sideframe column opening top so that the springs are free. The free springs are lifted up and pushed aside by a lever.
- iv) Worn out to 10mm, cracked, broken brake blocks require change, equal thickness of brake block should be ensured at both ends of the brake beam. (Also refer para 4.45.6)
- v) All the parts of bogie are checked for crack or defects and marked sick if found on major parts like sideframe, bolster spring plant etc.
- vi) For wheel defects as per wheel defect gauge the car should be marked sick for placement in sick line if arrangements for wheel changing are not provided in yard.
- vii) Roller bearing defects observed through warm axle box, found through axle box feeling on arrival be attended in sick line

4.49.0 **ATTENTION IN SICK LINE**

- i) Whenever any car is marked sick and placed in sick line as one unit of 5 cars, all the cars are required to be checked for any defect/deficiency.
- ii) Apart from attending to the particular defect other areas are also to be checked and attended to like; air brake, locks, buffing and draw gear & underframe, apart from all bogie parts to avoid frequent detachment of any car between ROH to ROH or POH.

- iii) As lifting of wagon is required to change the wheel-sets, brake beam etc. by run out the bogie from wagon, a systematic check for all the cars placed in sick line for any reason may be carried out and defects attended to avoid frequent lifting. Special attention be paid to side bearer arrangement and the dimension to this arrangement be checked and variation attended.

4.50.0 **LIFTING OF CARS**

4.50.1 Whenever unit of 5 cars (2 'A' cars and 3 'B' cars) is placed on sick line for a defect on one or more cars which necessitates lifting, it is preferable that the adjacent cars are disconnected by removing the yoke pin support and yoke pin. The following are the reasons for attending to repair which necessitate lifting:

- i) Wheel changing.
- ii) Brake beam changing (which necessitates removal of wheels).
- iii) The failure of centre pivot top for cracks.
- iv) Centre pivot bottom liner changing.
- v) Repair on parts of side bearer arrangement.

4.50.2 The General procedure of lifting in ROH/Sick line:

- i) Disconnect the bogie brake rigging with underframe brake gear and SAB pull rod and VTA hose pipe connection.
- ii) Remove split pin, lock pin & shackle lock.
- iii) Under frame is lifted at lifting pads on both ends by 25t whiting jack .
- iv) Run out the bogie and keep the underframe on the trestles.
- v) Remove side-frame key and adapter retaining bolt.
- vi) Lift the bogie by overhead crane/jib-crane.
- vii) Attend to repairs like wheel changing, brake beam changing etc.

4.50.3 The modern procedure is to lift the car in yard and effect wheel changing and other repairs by special mobile lifting arrangement.

4.51.0 **FITMENT & MAINTENANCE OF COMPOSITION BRAKE BLOCK**

4.51.1 Fig. 4.48: Ideal Fitment

This illustrates an 'ideal' fitment of composite brake blocks on brake block holders. The 'gap' at the centre shown on the drawing of approximately 0 to 3 mm is considered ideal.

4.51.2 Fig. 4.49: Poor Fitment

This illustrates the gap at the ends of the brake block and is considered a poor fitment. Although the brake block will still function satisfactorily and provide safe braking, cracks may develop in the block. These cracks may develop across the face of the brake block but will not affect its performance. In this situation it is recommended that the brake block be replaced when 50% of the block is used. It is further recommended that the brake block holder be replaced or modified so that fitment is as per figure.

4.51.3 Fig. 4.50: Unacceptable Fitment

This unacceptable fitment is due to an incorrect radius on the key. In this situation the brake block is loose and can be twisted or moved relative to the brake holder. In this case, a new key is required to ensure a tight fit.

4.51.4 Wheel Condition

There are no real concerns when using brake blocks on new wheels other than ensuring the correct wheels are fitted with a compatible taper to the one on the block. The wheel radius will be at its maximum however this will not be a problem if the front radius of the block was correctly specified.

When fitting brake blocks to old wheels, the condition of the tread surface will impact on the wear life of the block in service. A rough surface will tend to wear the brake block more rapidly in the initial stages until a consistent wheel surface condition is achieved. The wheel radius will have also changed relative to a new wheel so the bedding in time required may increase a little when new blocks are fitted. Effective braking will still be maintained despite the initial reduction in surface area contact.

In general, composition brake blocks are normally designed with a large factor of safety built into them so they continue to provide effective braking performance in difficult conditions.

4.51.5 Maintenance

Correctly fitted composite brake blocks require little or no maintenance. Blocks must be replaced 10 mm before friction material is left on back plate. The life of the block depends on the service, they have a life of at least 5 times that of cast iron. As a

guide, if composition brake blocks are fitted for the first time on a new service the following inspection frequency is recommended.

Inspection	Period	Comments
1	4 weeks	Check for any loose blocks/keys and tighten as necessary. Check for any abnormal wear. This may indicate a 'stuck' brake or other brake rigging problem.
2	12 weeks	Check for wear rate per 1,000 km and estimate average life of brake blocks to determine time of last inspection.
3	90% of average life	Replace blocks as necessary at or before 10mm condemning limit.

4.51.6 Limits of Acceptable Cracks(Fig. 4.51)

The following are limits of cracking which apply to brake blocks. Brake blocks found with cracks in excess of these limited are to be renewed.(Also refer to para 4.45.6)

- a) The number of radial cracks permitted in service is limited to two. One or both cracks may be open cracks upto 5 mm deep.
- b) Open cracks are permitted upto a maximum of 2 mm at the widest point.
- c) Blocks showing indications of splitting between the composite and steel backing plate are not permitted.
- d) Longitudinal cracks are not permitted.
- e) Broken brake blocks are not permitted.

4.51.7 Action when Defects are Found

If a brake block exceeds any of the criteria quoted above, it shall be renewed. It is recommended that the following checks are carried out :-

- a) Check brake block carrier for defects, e.g. loose, missing, worn, or damaged parts.
- b) Check brake rigging for defects, e.g. loose, missing, worn, or damaged parts.
- c) Check brake cylinder pressure in accordance with the specified limits.
- d) If any component/assembly is found to be defective then appropriate remedial action should be taken.

ENCLOSURE TO CAST STEEL BOGIE LCCF 20 (C)

WELDING ON COST STEEL COMPONENTS

1.0

COMPONENTS

- i) Brake heads for brake beam of Cast Steel Bogies type LCCF 20(C)
- ii) Center Pivots.
- iii) Sideframe and Bolster

2.0

ELECTRODE

Low Hydrogen Electrodes approved by RDSO under both the class C2 & D1 shall be used. Electrodes shall be preheated in a drying oven at temperature of 150 – 200° C or as per recommendations of manufacturers atleast one hour before use. The size of electrode shall depend upon extent of wear.

Alternatively RDSO approved electrodes under Class C&D may be used. These electrodes are to be dried before used as recommended by manufactures. Short arc is to be maintained. 4 or 5 mm electrodes are to be used.

3.0

PROCEDURE

- a) The wornout area shall be cleaned preferably by grinding with portable grinder.
- b) The ground area shall be examined visually for presence of any crack.
- c) Each run of weld metal shall be de-slaged thoroughly before further run in applied, particularly at the junction region between the weld metal and fusion faces. Visible defects such as cracks, porosity, voids and other deposition faults shall be removed before depositing further weld metal
- d) Each bead shall be peened with a ball pen hammer immediately after deposition, starting from the hot end and then proceeding backwards.
- e) The welding operation, once started, shall be completed in one stretch maintaining an interpass temperature between 250 – 300°c.
- f) All welding shall be carried out preferably in down hand position with the help of manipulator whenever required. In

- case if necessary, welding can also be carried out in horizontal or vertical – up position.
- g) While using low hydrogen electrode, it shall be ensured to maintain shortest possible arc and minimum weaving of electrodes.
 - h) The crater ends must be filled up by retracing back the electrodes to about 12mm followed by withdrawal from weld pool. When a new electrode is to be started, this shall be travel back over the crater end and then forward again.
 - i) No post weld heat – treatment is necessary.
 - j) The built – up area shall be finished by grinding up to the original dimensions avoiding formations of grinding cracks.
 - k) The reconditioned area shall be examined visually as well as be Magnetic Particle Test(MPT)/Dye Penetrant Test(DPT) to ensure freedom from any defects/cracks. If any crack/defect is still evident/persists the same should be removed and repaired and then rechecked by MPT/DPT.

4.0

WELDERS

All welding shall be done by welders qualified as per IS : 7318 Pt. 1. Welding Current as recommended by Electrode Manufacturers.

ENCLOSURE – 2

A. WELDING OF SPRING STEEL LINERS TO IS:3885 PART-1 GR.4 ON CAST STEEL SURFACE

ELECTRODES TO BE USED:

Austenitic Stainless electrode having nominal composition of 188 Chromium, 88 Nickel and 58 Manganese and approved by RDSO against Class M1 of IRSM – 28 shall be used.

GENERAL WELDING PROCEDURE:

- i) The liner shall be held in position by tack welding at mid points of the length side.
- ii) welding shall be done in down hand position.
- iii) Fillet size shall be maintained as stipulated in the drawing.

PRECAUTIONS :

Uniform bead is to be deposited. Weaving is not permitted. Each weld is to be followed by light peening. If any crack is noticed, welding shall be removed by cutting electrode and reweld. Check weld with dye penetrant test to ensure freedom from cracks.

B. WELDING OF SPRING STEEL LINER TO IS-3885-PT-1 GR.4 WITH CAST STEEL BOLSTER, ELECTRODES TO BE USED :-

Same as recommended earlier for welding spring steel liners on Cast Steel surfaces in general.

WELDING PROCEDURE FIG. 4.52 IS TO BE REFERRED.

- The liner shall be held in position by tack welding on either side (side AE & MR). Tack welding shall be done at the mid point of the length side on either side i.e. top (AAE) and bottom side (MR).
- Welding shall be done in down hand position preferably as per the sequence given in Fig. 4.52.
- The length of the spring steel liner is about 150 mm. This length shall be divided in to four equal sizes and marked as 1,2,3 & 4 on one side and 5,6,7 & 8 on the opposite side.
- Start welding at and weld up to (E). Start again at and weld up to (D).
- Then start at (B) and weld up to (X) covering the corner (A). Start at (D) and weld up to (Y) covering the corner (E).

- The opposite side (Side MR) shall be welded in the manner as per sequence given in Fig.4.52.
- the width sides (Sides AM and ER) are not accessible for welding.
- The fillet size shall be maintained as stipulated in the drawing.
- Welding is to be done in two passes firstly with 3.15 mm dia. Electrode and then with 4 and 5 mm dia.

PRECAUTIONS :

same as mentioned for general application under same encl. 2 as mentioned above.

C. WELDING OF SPRING STEEL LINER TO R - 65 - 78 ON THE SIDEFRAME COLUMN.

Type of electrodes to be used, their size and precautions to be taken shall be same as described for bolster liner application. Down hand welding shall be used.

WELDING SEQUENCE(FIG.4.52)

- Start from one corner and then weld opposite corner and so on till all four corners are completed in the same pass.
- Sequence of welding Corner (A), (M), (L) and (N) :
- Sequence of welding at each corner (e.g.) Corner (A).
- Leg. (A),(C) & (B) :- Start at (C) and weld outwards towards (A), Start again at (C) and weld outwards towards (B).
- Leg. (A), (E) & (D) :- Start at (E) and weld towards (A). Start at (E) and weld towards (D).

ENCLOSURE-3

A. WELDING OF STRUCTURAL STEEL TO IS : 2062 FE 410 VA & CAST STEEL.

Welding of New Brake Head (Structural Steel) IS : 2062 Fe 410WA with 'End Piece Casting' (IS : 1030 Gr. 280 – 520W)

ELECTRODES TO BE USED

Any brand of Low Hydrogen Electrodes approved by RDSO, against Class C2 D1 of IRSM – 28 shall be used.

WELDING PROCEDURE

- i) The 'Brake head' shall be held in position with the help of suitable clamps and then tack welded on either side.
- ii) The weld area shall be cleaned properly to make it free from heavy scale, rust, paint, oil, grease etc. Before welding.
- iii) Welding shall be carried out in down hand position with the help of suitable clamps.
- iv) Each run shall be deslagged thoroughly before depositing subsequent run.
- v) Shortest possible arc and minimum weaving shall be maintained while using 'Low Hydrogen Electrodes'. Stray arcing should be avoided.
- vi) The crater end must be filled up properly by retracing back slightly.
- vii) Visible defects such as cracks, porosity, voids and other deposition faults shall be removed by gouging before depositing further weld metal.

PRECAUTION

Low Hydrogen Electrodes shall be preheated in an Electrode drying oven at a temperature of 150 – 200 C or as per recommendations of Electrodes Manufacturer for at least one hour before use.

B. RECLAMATION OF FRICTION WEDGE BY WELDING (PREFERABLY DURING POH)

SURFACE PREPARATION

The surfaces to be welded should be cleaned properly to remove dust, oil, cracks, and scales prior to welding electrode 4 mm dia of

the electrodes approved by RDSO under class H2 of IRS –M – 28 – 1976.

CURRENT CONDITIONS

The power source as recommended by the manufacturer of the electrodes shall be used. The lowest possible current capable of producing satisfactory welding should be used. Over heating should be avoided.

WELDING PROCEDURE

- i) Short and stringent welding bead should be used
- ii) Skip welding should be followed
- iii) short arc should be maintained
- iv) Weaving is not recommended
- v) The subsequent weld runs are only after previous run gets cooled to room temperature.
- vi) The weld bead should be peened immediately after welding.
- vii) The crater should be filled up by removing the electrodes slowly after going backward.
- viii) Post weld heat treatment : It should be ensured that the weld metal is quickly cooled. (Forced air through Fan).

INSPECTION

The welded surface after cooling be grounded properly to required dimension and then subjected to dyepenetrant test. As manganese steel has work hardening nature grinding should be effected in bits and enough cooling time between runs and effective immediate cooling after each run is to be employed.

A lot of precaution needs the repair of wedge. Hence it is always preferable to replace the worn out wedge with a new one instead of repairing the old.

CHAPTER - 5

BRAKE SYSTEM FOR CONTAINER WAGON

5.1.0 SYSTEM DESCRIPTION (FIG. 5.1)

5.1.1 The basic system conforms to the Graduated release, single pipe air brake system as per RDSO specification 02-ABR-94 together with the latest amendments using "Automatic, two stage empty/load braking control". This changeover from load to empty braking condition is provided by the distributor valve type C3W2 which in turn is governed by two nos. of change over valves, type VTA, one on each bogie.

5.2.0 TWO NOS. OF LOAD SENSING VALVES

5.2.1 Since the wagon is designed to carry one or two containers, the various loading patterns arising in service may require sensing of load even in one bogie though the other may be in empty condition.

5.2.2 In view of this, two nos. of Changeover valves are provided, one on each bogie, so that even if any of the bogies is under loaded condition, the VTA valve installed in that bogie would actuate and deliver a signal pressure to the C3W2 Distributor valve.

5.3.0 LOAD SENSING VALVE CIRCUIT

5.3.1 If one of the two VTA valves only moves to open condition while the other continues to be in empty condition, the load sensing signal generated by the VTA in open condition, will get exhausted to atmosphere in the other VTA valve which will still be in empty condition. If this situation is not prevented, the load-sensing signal will dissipate and not serve the purpose.

5.3.2 As a counter-measure, the Double check valve type 24-A is used between two VTA valves, to divert the delivery pressure of one of the VTA valves to the C3W2 Distributor valve.

5.3.3 By the same logic, it can be seen that the Double check valve may become inactive, if both the VTAs are in open conditions, in which case the shuttle inside, under equal intensity of signals on either side, "may" tend to block the delivery passage leading to the Distributor valve.

5.3.4 To eliminate this possibility, the Pressure Reducing valve type N-1 connected in the inlet piping of one of the VTA valves is provided to

reduce the inlet pressure to that VTA valve itself to a predetermined safe maximum level, which will be less than that charging into the inlet of the other VTA valve. Hence the shuttle inside the Double check valve, under positive differential, will never align to any mid position during the actuation of the system.

CAUTION: SINCE THE SHUTTLE INSIDE THE DOUBLE CHECK VALE IS A FLOATING ASSY., THE VALVE SHOULD BE MOUNTED, AS FAR AS POSSIBLE IN A HORIZONTAL POSITION.

- 5.4.0 The individual operation of various elements of the system and maintenance thereof are given by the manufacturers as per prevailing practices. The instruction for the special items like C3W2, VTA valve & pressure-reducing valve etc. are reproduced in Enclosure 1 to Enclosure 6.
- 5.4.1 The Maintenance instructions for C3W2 Distributor valve (Enclosure 1).
- 5.4.2 The Maintenance instructions for Changeover valve type VTA (Enclosure 2).
- 5.4.3 The Maintenance instructions for N-1 Pressure Reducing valve (Enclosure 3).
- 5.4.4 Enclosure 4 contains maintenance instructions for Slack Adjuster (SAB).
- 5.4.5 Enclosure 5 contains other brake equipment such as double check valve, control reservoir etc.
- 5.4.6 Enclosure 6 contains proforma for single wagon test for Bogie Container Flat Wagon.

FUNCTIONING OF THE SYSTEM

- 5.5.1 In the release position, the Driver's brake valve in the locomotive, charge compressed air through a high capacity relay valve at a predetermined pressure, into the brake pipe of the train. When the Cut off angle cock of the wagon is opened, with the other side Cut off angle cock closed, air pressure passes through the Air brake hose coupling assembly into the brake pipe of the wagon and builds up pressure in the brake system.
- 5.5.2 This air pressure gets filtered at the 3 way Centrifugal dirt collector and passes into the branch pipe leading to the Common pipe

bracket to which the Distributor valve C3W2 is fixed. When the handle of the isolating cock in the Combined sandwich piece moved into open position (Handle downwards), the compressed air charges into the distributor valve which in turn diverts it into the 6-litres Control reservoir and the 100-litres Auxiliary reservoir in about the same period of time.

- 5.5.3 In this condition, with both the reservoirs at 5 kg/sq.cm pressure, the Distributor valve connects the Brake cylinder to atmosphere and keeps the brake released.

5.6.0 **LOAD SENSING**

- 5.6.1 Compressed air from Auxiliary reservoir charges into another branch pipe and reaches the inlet ports of both the VTA valves. However, on one side, the compressed air passes through the Pressure Reducing valve type N-1 where the pressure gets regulated to 4 kg/sq.cm before reaching the inlet port of the VTA connected to that branch of pipe.

5.7.0 **WAGON IN EMPTY CONDITION**

- 5.7.1 Since the VTA valve/s is/are not actuated in this condition, the compressed air at the inlet port of the VTA valve/s is/are not connected to the delivery ports of these valves. On the contrary, the delivery ports are connected to the atmosphere at the exhaust ports of the VTA valve/s.

- 5.7.2 In the absence of the signal pressure from any of these VTA valves, the empty load port of the C3W2 Distributor valve is connected to atmosphere and hence any brake application during this stage will be maintained in empty condition by the Distributor valve. However, irrespective of the empty or loaded Brake cylinder pressure, the Distributor valve maintains the specified application and release timings as per the specifications.

5.8.0 **WAGON IN LOADED CONDITION**

- 5.8.1 If both the VTA valves are actuated due to bogie deflection on both sides, the compressed air at the inlet ports of the VTA valves is connected to the delivery ports which are interconnected at the 24-A Double check valve. Since the compressed air pressure to one of the VTA valves is maintained by the Reducing valve type N-1 to be specifically lower than that which could come to the other VTA valve, the higher of the two delivery pressure from the VTA valves will push the shuttle inside the Double check valve to the opposite side and charges into the Distributor valve. Under the

influence of the load sensing signal pressure, the Distributor valve generates a higher Brake cylinder pressure during all brake applications in this stage.

- 5.8.2 When the brake pipe pressure is reduced by the driver at his brake valve, the Distributor valve senses the amount of depletion caused in the brake pipe pressure and moves to apply the brake in proportion to the depletion.
- 5.8.3 As long as the brake pipe pressure is maintained below the regime pressure, the Distributor valve also maintains the Brake cylinder pressure at a constant level irrespective of the normal leakages in the piping.
- 5.8.4 When the pressure level in the Brake pipe is increased by the driver by movement of the brake valve handle in the locomotive either partly or fully into the release position, the Distributor in the wagons reacts to the increase in pressure level and correspondingly reduces the Brake cylinder pressure by connecting to atmosphere.
- 5.8.5 The braking function performed by the Distributor is purely dependent on the pressure level of the brake pipe irrespective of whether the wagon is in loaded or in the empty condition. Only difference between these two conditions is the different levels of maximum Brake cylinder pressure generated by the Distributor.

5.9.0 WAGON TESTING

- 5.9.1 Before fixing on the wagon, all the elements of the brake system should be thoroughly tested for satisfactory performance as per the individual test specifications laid out for each item and only then they have to be taken for fitment on wagon.
- 5.9.2 After fixing all the assemblies of the Brake system in the wagon and connecting the Brake beams with appropriate rigging levers to the Brake cylinder, the wagon brake system should be checked both in empty and loaded condition as per the specifications laid out by RDSO for acceptance both for system leak tightness as well as for performance as per the test chart given by RDSO. (Encl.6).

5.10.0 EXAMINATION OF AIR BRAKES

- 5.10.1 The Air Brake Equipment fitted on container flat wagons shall be given following Schedule of examination and maintenance on open line and workshop.

- Examination at Primary maintenance depot.
- Examination at terminating station.
- Examination during ROH.
- Examination during POH.

5.10.2 Examination at Primary Maintenance Depot

5.10.2.1 The following examination/test, maintenance schedule shall be carried out during examination at Primary Maintenance Depot generally during each Round Trip.

During the examination ensure that

- a) Hand Brakes of all wagons are fully released.
- b) Maintain load sensing devise gap 16mm on empty condition.
- c) Hose couplings of brake pipe on all wagons are coupled to one another to form a continuous air passage from the locomotive end to the rear end of train.
- d) All angle cocks except those at the rear end of the rake are kept open.
- e) Hose coupling at the rear end of the rake is placed on hose coupling support.
- f) Isolating cock of Distributor valve on all wagons is in open condition.

5.10.2.2 Carry out the following checks after charging, brake application & release with the help of test rig or by Engine.

- a) After full charging of the system, Brake pipe pressure should be as follows: upto 9 units and Brake Van when the engine pressure is 5.0 Kg/sq.cm the pressure at the rear end brake van should be 4.8 Kg/sq.cm.(each unit consists of 5 wagons of 2 car A and 3 car B).
- b) The leakage in the train shall be less than 0.25 Kg/Sq.cm. per minute.
- c) Piston stroke in empty and loaded condition are within the specified limits on full service application On Empty- 95 ± 10 and under Load - 120 ± 10
- d) Brake blocks on wagons are mating the wheels after the brake application. Tap the wheels, Dull sound indicates brakes are applied.
- e) After the release of brake, the piston of brake cylinder is fully released inside and the brake blocks are away from the wheels. Tap the wheels ringing sound indicates the brakes are released.
- f) 100% of cylinders should be in working order.

- g) Load sensing valves are fitted properly with fasteners fully tightened and tack welded with its setting of 18mm under tare.
- h) Pressure Reducing Valve fitted on the wagons has no leak.
- i) All the dirt collector and drain cock should be drained after every three months.

5.10.3 **Examination at Terminating Station**

Since the rake has to be certified for Round the trip the rake need not be checked in detail for all the air brake system requirements at the other end. But adequate inspection regarding percentage brake power and safe to run inspection should be carried out at the station other than primary maintenance depot. Inoperative brake cylinder on the rake should be restricted to one in this case. Detachment of the train engine, release of the rake, attend to emergency repairs if any, pertaining to safety and re-attachment of train engine for despatch are some of the requirements at all the terminating stations.

5.10.4 **Examination During ROH**

The existing procedure of ROH as prescribed by RDSO is required to be followed. The air Brake manufacturer's recommendations should be strictly followed. Special check on rubber items and replacement of the defective one with approved one is a must.

5.10.5 **Examination During POH**

The POH procedure is as per the existing procedure for the fleet of wagons of Railways. But special care is required during POH and to be more specific all the rubber components require renewal and each and every component of Air Brake System require complete overhauling and all relevant parts not to specification require renewal. All air brake components should be tested as per individual component's specification before fitment to wagon.

ENCLOSURE-1

C3W2 DISTRIBUTOR VALVE

1.0 FUNCTION

The C3W2 Distributor is basically a C3W Distributor valve with the Empty Load function added to provide two ranges of brake cylinder pressures for a given BP pressure. This valve has been approved by UIC to comply with the requirements of its specification 540 & 543.

C3W2 Distributor valve works in conjunction with an external load sensing valve which provides a pneumatic signal depending on the load or empty condition.

Based on this signal, C3W2 Distributor Valve delivers maximum pressure of 3.8 kg/sq.cm (load condition) or a lower pressure of 2.2 kg/sq.cm (empty condition).

In order to perform this additional function, C3W2 Distributor valve includes an additional portion sandwiched between the body and the bottom cover of the C3W.

1.2 MAIN CHARACTERISTICS

- The brake does not apply with a brake pipe drop of approximately 0.5 kg/sq.cm in one minute.
- In running position, with the brake pipe at 5 kg/sq.cm, the distributor is insensitive to a release kick of short duration.
- When the BP is dropped at the rate of 0.6 kg/sq.cm in 6 seconds, the brake commences to apply in 0.8 sec.
- Maximum brake cylinder pressure will be either 3.8 kg/sq.cm or 2.2 kg/sq.cm, on load or empty condition as the case may be, even in emergency condition.
- To facilitate faster release of brakes, following a full service application, the brake pipe pressure can be increased to 6 kg/sq.cm without any risk of over charging the control & auxiliary reservoirs for a specified period of time.
- The brake is released and the distributor is re-set when the brake pipe pressure is approximately 4.83 kg/sq.cm

- All the other characteristics of C3W Distributor valve are applicable to this C3W2 valve.

1.3

APPLICATION

C3W2 Distributor valve can be used for wagon applications to provide differential BC pressures depending on the load conditions.

1.4

CONSTRUCTION

The C3W2 Distributor valve is made up of the same parts as the C3W, the only difference being the body with some additional machining; main valve which is arranged to take the second brake cylinder diaphragm & followers and the sandwich piece which contains the empty load changeover device and the second brake cylinder diaphragm.

All control chokes are accessible from outside. Their replacement does not require a complete re-test of the distributor. It is only necessary to check for leakage and verify the new timings.

1.5

WORKING (REF. FIG. 5.2 TO 5.10)

1.5.1

Application

a. Empty Condition:

When the wagon is empty, there will not be any signal from the VN5 sensing valve. Then the piston (265) will be at its lower position and the valve (260) seats itself. No air pressure will be acting in chamber 'M'.

When the BP pressure is reduced to apply brake, diaphragm follower is acted upon by CR pressure and it lifts the main valve stem (30) to open the main valve (37) thereby admitting AR air into BC.

As the BC gets filled, air in chamber 'O' acts upon diaphragm follower assembly (55 to 509). As soon as the BC pressure reaches 2.2 kg/sq.cm, the combined force developed by this diaphragm follower assembly and the spring (221) on top of the diaphragm follower assembly (28) will be able to bring down the main valve stem (30) to stop further supply to BC except to compensate for leakages.

b. Load Condition:

In this conditions, the pneumatic signal generated by the VN5 load sensing valve will make the piston (265) to get lifted which in turn keeps the valve (260) open. This air also acts on the underside of (55 to 59) diaphragm follower assembly (Chamber 'M').

When the brake pipe pressure is reduced during brake application, the main valve stem will be lifted by the combined forces of CR pressure (in chamber 'R') and the external signal pressure (in chamber 'M').

Air from AR flows into BC through chambers 'O' and 'P'. As the BC pressure increases, the same acts on diaphragm (28) (Chamber 'N') from chamber 'P' through Valve (260). BC air also acts on diaphragm follower (55 to 509) (Chamber 'V') from Chamber 'O'. Since the upward force on the main valve stem is more (compared to the empty condition), the BC pressure will increase upto 3.8 kg/sq.cm. The combined force generated by diaphragm assemblies (55 to 509 & 28) when acted upon by 3.8 kg/sq.cm pressure will bring down main valve stem (30) to close further supply of air through valve (37).

1.5.2

RELEASE

During brake release, BC air gets exhausted through exhaust choke (506) in empty condition and both (506 and 505) chokes during the 'Load' condition.

Note: All other functions of C3W2 Distributor Valve are the same as that of C3W Distributor valve.

1.5.3

MAINTENANCE

Generally the same tools, fixtures, dismantling, cleaning the parts, assembly procedures and lubrication as given in C3W Distributor valve manual can be followed for C3W2 also.

MAINTENANCE INSTRUCTIONS FOR CHANGEOVER VALVE TYPE 'VTA'

1.0 INTRODUCTION (FIG. 5.11, 5.12 & 5.13)

Changover valve type VTA is of a robust design from SAB WABCO, FRANCE and has been in service over more than two decades in many International Railways. The valve combines the features of "Operating valve" and "spring buffer assembly" of RDSO design in one housing. The valve is provided with 60 mm of stroke which together with the initial gap of 16 mm (or as desired) offers a satisfactory load sensing function over the entire range of bogie deflection.

The valve "cracks off" to open position within an initial stroke of 19 mm max. Thereafter the stem deflects inside to accommodate the remaining movement of the bogie.

2.0 FUNCTION

This is a normally closed valve and moves to open condition when the stem is pushed inside. When the valve stem is released, the spring inside will push the valve stem outwards to close the inlet and simultaneously connect its delivery port to exhaust.

3.0 HYDRAULIC DAMPER

The main design feature of the valve is the hydraulic damper inside due to which the valve exhibits "delayed" response even to "crack off". Similarly, the valve moves to close position only after a delay caused by the damper. This delay in both the open and close operations is a specially designed feature to prevent the valve from changing its condition either from load to empty or vice versa due to dynamic and temporary bogie deflections under normal running condition. Thus the valve is reliable and avoids spurious load changeover conditions.

4.0 INSTALLATION

The valve is mounted on a saddle type bracket on the bogie bolster with a fixed stopper mounted on the spring plank. After setting the initial gap, the valve changes over from empty to loaded condition when the bogie deflects through the "changeover range".

The connections at the inlet and delivery ports are through flexible pipes and the exhaust is let off to atmosphere.

5.0

CAUTION

SINCE THE DAMPER DELAYS THE RESPONSE, SUFFICIENT TIME IS TO BE ALLOWED TO VERIFY THE PRESSURE BUILD-UP IN THE DELIVERY PORT (WHEN INSPECTING THE VALVE ASSEMBLED IN THE BOGIE).

6.0

DISMANTLING FROM WAGON

Remove the two flexible hose connections from the inlet and delivery ports of the valve taking care to plug the open ends of the hoses.

Remove two nos. of M16 Hex. Screws holding the valve mounting pad on the saddle bracket and take out the washers. The screws and the washers can be hand tightened again in the mounting bracket until the valve is refixed.

Take the valve to a workshop for further dismantling.

Dismantling reassembly and testing Overhauling are as per the maintenance manual of Air Brake Manufacturer's instructions.

ENCLOSURE-3

PRESSURE REDUCING VALVE TYPE N-1 (FIG. 5.14)

1.0 INTRODUCTION

The N-1 Pressure Reducing valve is a small capacity, self lapping, diaphragm operated type regulating valve and function to reduce an air supply pressure, to that of a lower delivery pressure. The delivery pressure is determined by a control spring force that is adjustable within specific limits. The reducing valve portion is fixed to a pipe bracket to facilitate easy removal for overhauling without disturbing the pipe connections.

2.0 DESCRIPTION

The pipe bracket has four port connections, two for inlet and two for outlet to facilitate orientation of inlet and delivery piping convenience. The adjusting screw is not provided with any handle, as these valves are used only for constant delivery pressure, which once set will not normally get disturbed. The valve has a rubber boot on the top to prevent dirt or other foreign matter entry into valve.

3.0 OPERATION

Compressed air enters the valve at the port marked "IN" and flows through passage "s" to supply the chamber "c". The valve is in lap position with the inlet and exhaust valve seated, with the system charged to the setting of the adjusting screw.

When the air pressure in the delivery line and in chamber "b" and "a" have fallen than the predetermined level, spring moves the diaphragm with the exhaust valve seat assembly and the exhaust and inlet valve upwards. This movement unseats the inlet valve, and supply air from chamber "c" flows past inlet valve seat assembly into chamber "b" and hence through passage "r" to the delivery port. The air also flows through a choked passage in the body to chamber "a" above diaphragm. When the air pressure in the passage "r" and chamber "a" reaches the pressure for which adjusting screw is set, the air pressure and exhaust valve spring move diaphragm with exhaust valve seat assembly downwards. Inlet valve spring moves the inlet valve down on its seat, cutting off further flow of air from chamber "c" to chamber "b". If the delivery pipe and chambers "b" and "a" be charged in excess of the setting of the adjusting screw, the air pressure and exhaust valve spring will move diaphragm with exhaust valve seat assembly downward

away from the exhaust valve. The overcharge of air from chambers "b" and "a" then flows past exhaust valve seat into spring housing and out of the exhaust opening to atmosphere. As the pressure in chamber "a" reaches the setting of adjusting screw, spring moves diaphragm follower upward to seat the exhaust valve, preventing further exhaust of air. Manual adjustment of delivery pressure is made at the adjusting screw on the control spring. If a higher pressure is desired than what is delivered, the tension on the spring is increased so that a higher delivery pressure will be required to lap the valve and vice versa.

Maintenance of this valve may be carried out as per the manufacturer's instructions. Generally the overhauling of this valve may be carried out during POH only.

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D.Y. C.R.E (W/C)

MAINTENANCE INSTRUCTIONS FOR SLACK ADJUSTER TYPE IRSA 600 (FIG. 5.15)

1.0 INTRODUCTION

The Slack adjuster is a part of the brake rigging linkages which in addition to adjusting the gap between the Brake shoes and the wheels, transmits the braking force from the actuator to the wheels. While doing this function, the adjuster changes its length in such a way that the shoes are always moved to maintain the specified gaps with reference to the wheels.

RSA 600 Slack Adjuster is a double acting, rapid action type with a maximum take - up capacity of 600 mm. The slack adjuster is robust in construction, simple in design and reliable in performance.

2.0 FUNCTIONS

The Adjuster performs three functions namely;

- Take -up which the excess slack being created at the Brake shoes is taken up to bring the gap to the specified limits.
- Pay-out in which the adjuster lengthens itself if the gap between shoe and wheel reduces due to any reason such as when ice has formed or during renewal of Brake shoes.
- Verification in which the adjuster first indexes internally with reference to the amount to be adjusted during Pay - out and actually adjusts its length only if the verified gap is true. If the resistance offered between shoe and wheel is temporary, the adjuster cancels the indexed amount of adjustment and maintains the original gap.

To be able to sense the adjustment needed, the adjuster maintains a reference dimension called "A" dimension against which it compares the actual gap between the shoes and the wheels.

The "A" dimension for IRSA 600 adjuster in CONCOR wagon is 72 + 0, -2.

Dismantling, reassembling & overhauling are as per the maintenance manual of SAB manufacturer's instruction.

3.0 **INSRUCIONS**

3.1 General

- i) Inspect entire Brake Rigging including Bogie Rigging.
- ii) Ensure no Pins are missing or tight fitted.
- iii) Ensure no Brake Shoe is missing.
- iv) Ensure Brake Cylinder, Brake Shaft and Hand Brake released fully and the Brake Cylinder is in working order.
- v) Any Pins or Blocks missing must be replaced before the rest of the Rigging is checked.

3.2 Checking Slack Adjuster & Associated Rigging

- i) Ensure general conditions required (as above) are restored properly.
- ii) Make two or three Brake applications at requisite Brake Cylinder Pressure and release fully.
- iii) Check 'A' Dimension. This is usually specified for type of wagons in operation.

3.3 Adjusting 'A' Dimension

- i) Ensure the required movement and direction of the Control Rod to achieve the specified 'A' Dimension.
- ii) Take out the Nut of Anchor Pin.
- iii) In order to increase or decrease 'A' Dimension Control Rod has to be turn in or turn out, respectively.
 - a) To increase 'A' Dimension -Control Rod Thread goes inside Control Rod Head.
 - b) To decrease 'A' Dimension-Control Rod Thread comes out of Control Rod Head.

Note: One complete rotation of Control Rod alters 'A' Dimension by approximately 2 mm.

- iv) Put back the nut on Anchor Pin and tightened the Lock Nut. 'A' Dimension and Brake Block clearance cannot be adjusted by turning the Barrel. Control Rod has to be shortened or lengthened.

3.4 Piston Stroke and Slack Adjuster

- i) Apply Brake Cylinder Pressure and note the Piston Stroke.
- ii) Tap the Tie Rod Pins on entire Brake Rigging System. These should not be excessively tight or slack.

Once 'A' Dimension is properly set relative to Control Rod adjustment there will be no change in Piston Stroke.

There are various causes for high or low Piston Strokes. Some of these causes are as below:

A) For High Piston Stroke

- i) Excessive free Piston Stroke.
- ii) Hand Brake Pull Rod Short.
- iii) High Pressure application level.
- iv) Defective Distributor Valve.
- v) Excess 'A' Dimension.
- vi) Defective Brake Rigging.
- vii) Brake Cylinder Pin under size.
- viii) Manual adjustment in respect to wear of Wheel Rim and Brake Block has not been maintained as per specification.

B) For Low Piston Stroke

- i) Very little free Piston Stroke.
- ii) Low Air Pressure application level.
- iii) Defective Brake Cylinder (leakage).
- iv) Small 'A' Dimension.
- v) Defective Brake Rigging.

Hence, it is advised not to take Piston Stroke alone as a guide line. Correct adjustment has to be incorporated considering –

- i) Entire Tie Rod checking.
- ii) Pull Rod adjustment and
- iii) 'A' Dimension actuation, where ever necessary all consideration are to be adapted.

C) Cause of Brake Binding on Wagons

- i) Leakage on Brake Pipe lines.
- ii) Distributor Valve not operating properly.
- iii) Hand Brake partially applied.
- iv) Due to partial jamming of Brake Rigging.
- v) Rigging Ratio of respective wagons is not properly determined.
- vi) Over loading of wagons.
- vii) 'A' Dimension is less than specified dimension.

D) Renewal of Brake Shoes in Service

- i) Rotate the Regulator and ensures Pull Rod comes out of the Regulator. This will ensure clearance between Brake Block and Wheel Rim.
- ii) Remove old Brake Block and replaced with new Block.
- iii) Application of Brake either pneumatically through Distributor Valve or mechanically through Hand Brake three to four times. This will automatically adjust the Brake Rigging System.

Note: Under any circumstances please do not adjust 'A' Dimension at the time of renewal of Brake Blocks, even if it seems to be too large. After application of Brakes for three to four times 'A' Dimension and Brake Block clearance will compensate the requirement automatically.

E) Test to Establish Proper Working of Slack Adjuster

Keeping in view that 'A' Dimension and Piston Stroke is correctly installed then:

- i) Rotate adjuster two or three times clockwise and see clearance between Brake Block and Wheel Rim will increase.
- ii) Apply Hand Brake Gear or Brake application and notice the Piston Stroke, at first application it should be higher.
- iii) After three to four applications it will be normal.
- iv) Hence take up is satisfactory.
- v) Rotate Adjuster two or three times anti-clockwise and see clearance between Brake Block and Wheel Rim decreases (i.e. Pull Rod goes inside the Regulator).
- vi) Apply Hand Brake or Brake Cylinder is charged to note Piston Stroke and if it is found short, on first application, it should be normal after three to four applications.
- vii) Hence, pay out is satisfactory.

OTHER BRAKE EQUIPMENTS

A.

CONTROL RESERVOIR (FIG. 5.16)

The Control reservoir is of 6 litters volume and performs very critical function in the Brake system that it stores the reference air pressure for the Distributor valve to function. Hence this assembly is to be inspected periodically and ensured to be leak tight.

B.

COMMON PIPE BRACKET(FIG. 5.17)

This is mounting bracket to hold the Distributor valve type C3W2 and also to serve as interface between the DV and various pipe connections. As the name indicates, the design of the bracket is made such a way that it can receive various makes of Distributor valves in service on Indian Railways, by fixing a suitable intermediate piece for any particular Distributor valve.

The casting has cored passages in the inside to route air pressure into various ports such as Brake pipe, Control reservoir, Brake cylinder, Auxiliary reservoir and the Empty – load signal port.

The front face of the bracket is provided with port holes to suit the variations in the locations of the air passage holes in various Distributors. A circular gasket, located by a pipe fixed into the Brake pipe hole of the bracket, is pressed into the recess on the face.

At the bottom of the bracket, a filter housing is provided to trap the dust from entering the Distributor valve. On the rear face of the bracket, the Control reservoir is fixed as a compact assembly.

No specific maintenance is required on this bracket other than to open the four screws at the bottom to remove the filter body. The nylon disc filter can be extracted from the grove made in the filter housing for cleaning if required. The filter housing itself has to be emptied and cleaned periodically.

For overhauling schedules, the pipe bracket has to be removed from the wagon by separating all the pipe connections with flanges and taken to a workshop.

C. **24 – A DOUBLE CHECK VALVE(FIG. 5.18)**

This is a simple device with three port connections and very few components in the assembly. When two independent single pressures are required to actuate the same control port of another device one at a time, 24 – A Double check valve is used.

DESCRIPTION

The body (1) consists of a valve (2), which has two 'O' rings (3) on its two sides for proper sealing. The end cover (4) also has an 'O'ring (5) in its groove and is fastened to the body (1) with two screws (6).

OPERATION

The valve (2) moves to and fro depending on the intensity of the pressure in the two inlet ports and seals the port which has lower pressure, from the common delivery port. While doing so the other inlet port with a higher pressure is connected to the common delivery port.

D. **AUXILIARY RESERVOIR(FIG. 5.19)**

This is a storage reservoir of 100 litres volume which maintains a pressure of 5 kg/cm² bar and charges air to the Brake cylinder whenever brakes are applied.

E. **CENTRIFUGAL DIRT COLLECTOR (3 WAY) FIG. 5.20**

This is a static assembly fixed in the Brake pipe and branch pipe junction and serves not only to filter the compressed air charging into the Distributor valve type C3W2 but also acts as Tee joint in the piping. This is a self cleaning type of filter due to the two way flow of air, since the pressure in the Brake pipe increases during brake release and decreases during application. The only periodic maintenance that is required during ROH is to open the Drain plug at the bottom and allow the condensate to drain, preferably under air pressure. This can be done in situ, without having to dismantle the item from the piping. For a complete overhaul, remove the screws connecting this item to the pipe flanges on the three sides and take out the assembly.

If it is required, the assembly can be dismantled at the wagon itself for overhaul. However, it is always advisable to do this work inside a workshop where the assembly can be tested thoroughly for leak tightness before reuse. If the assembly is removed and overhauled

near the wagon itself, ensure thorough leak tightness by charging air pressure in the Brake pipe to 5 kg/cm² at all the joints which have been opened.

F. DIA 355 BRAKE CYLINDER

Brake cylinder is an actuator which when charged with compressed air pressure, develops an output force proportional to the level of pressure.

This design is standardized on Indian Railways by RDSO for both Freight & Passenger application, only difference between the two being the absence of the pivot bracket in the latter. When the air pressure is discharged from the Brake cylinder, the piston is returned to its normal position by the spring.

It is important to maintain the inside surface condition of the cylinder by proper greasing as per the stipulated Maintenance schedules.

G. CUT OFF ANGLE COCK 1-1/4" (FIG. 5.21)

These are ball valves of 32 mm bore, fixed one on each side of the wagon. The valve also has a venting feature by which the pressure delivered into the angle end side of the valve can be exhausted to atmosphere, when the handle of the valve is moved to close position. To prevent accidental movement of the handle, from open to close or vice versa, the handle has a spring latch exerting a force on the handle to "hug" the body and remain locked. To move the handle, it has to be lifted off the locking position and only then moved. Dropping the handle at the closed position would automatically lock the handle again and prevent any movement. The Angle cut off cock for Brake pipe is painted in New Mid Brunswick green colour as per RDSO specification for proper identification and should not be painted in any other colour.

H. COMBINED SANDWICH PIECE ISOLATING COCK(FIG. 5.22)

This is an interface casting between the Common pipe bracket and the C3W2 Distributor valve. However, each type of Distributor valve of any particular manufacture needs its own sandwich piece specifically designed to match the port configuration of the Distributor valve in question. It also serves to blank off such of those ports on the Common pipe bracket, not needed for the particular Distributor valve.

Hence Sandwich piece of RPIL make can be used only for Distributor valves type C3W2 only and cannot receive any other make of DV.

Dismantling, reassemble & overhauling are to be carried out as per the maintenance manual of air brake manufacturer's instruction.

ENCLOSURE-6

PROFORMA FOR SINGLE WAGON TEST FOR BOGIE CONTAINER FLAT WAGONS (Fig. 5.14)

S.No.	Check	Specified
1	Pressure in BP	$5 \pm 0.1 \text{ kg/cm}^2$
2	Pressure in AR	$5 \pm 0.1 \text{ kg/cm}^2$
3	Leakage from the system after charging	0.1 kg/cm^2 in one minute
4	Full service application	
4.1	Brake cylinder filling time (Pressure rise from 0 to 3.6 kg/cm^2)	
	a) Empty	18 to 30 sec.
	b) Loaded	18 to 30 sec.
4.2	Maximum brake cylinder pressure	
	a) Empty	$2.2 \pm 0.25 \text{ kg/cm}^2$
	b) Loaded	$3.8 \pm 0.1 \text{ kg/cm}^2$
4.3	Reduction in BP pressure required for full service application	1.3 to 1.6 kg/cm^2
5	Release after full service	-
5.1	Draining time (Brake cylinder pressure to fall from 3.8 $\pm 0.1 \text{ kg/cm}^2$ to 0.4 kg/cm^2)	45 to 60 sec.
6	Sensitivity of brakes isolate brake pipe from main line. Check the response of brakes when brake pipe pressure is reduced at the most equal to 0.6 kg/cm^2 in 6 sec.	Brake should apply within 6 sec.
7	Insensitivity of brake. Isolate brake pipe from mainline. Check the response of brakes when brake pipe pressure is reduced at least equal to 0.3 kg/cm^2 in 60 sec.	Brake should not apply

8	Emergency application		
8.1	Brake cylinder filling time (Pressure to rise from 0 to 3.6 kg/cm ²)		
	a) Empty	18 to 30 sec.	
	b) Loaded	18 to 30 sec.	
8.2	Maximum brake cylinder pressure		
	a) Empty	2.2 ± 0.25 kg/cm ²	
	b) Loaded	3.8 ± 0.1 kg/cm ²	
9	Piston stroke		
	a) Empty	120 ± 10 mm	
	b) Loaded	95 ± 10 mm	
10	Leakage from brake cylinder after emergency application		
11	Automatic exhausting of brake cylinder and control chamber		
11.1	Apply emergency brakes (i.e. BP= 0 kg/cm ²). Check the brake cylinder pressure after giving a brief pull to release hook.	Brake cylinder and control reservoirs should exhaust automatically	

Signature & Name of
Testing Authority.

Date:

TESTING

The schematic arrangement of the test rack is shown in the sketch no. RPIL/VTA/0125.

	OPERATION	RESULTS TO BE OBTAINED
1.	PRESSURE TIGHTNESS CHECK	
	Will be carried out at low and high pressure.	1 and 5 kg/cm ²
2.	Regime Pressure :	5 kg/cm ²
3.	Charge 1 kg/cm ² in the inlet port & check for leakage at delivery port and exhaust port.	Maximum of 20 dia bubble in 10 seconds permitted.
4.	Increase pressure to 5 kg/cm ² and repeat leak tightness check as at 2.0.	Maximum of 20 dia bubble in 10 seconds permitted.
5.	Open valve pushing the stem inside in a time of two seconds max. and charge delivery port.	Pressure on delivery port 5 kg/cm ²
6.	Check for leak tightness on exhaust port.	maximum of 20 dia bubble in 10 seconds permitted.
7.	Release stem to normal position.	Pressure on delivery side atmosphere.
8.	DAMPER ACTION	
9.	Repeat step 4 and note down the time of filling up of one litre reservoir to 90% of the regime pressure.	Time 8 - 10 seconds.
10.	Repeat step 6 and note down the time of emptying the one litre reservoir.	Time 40 – 50 seconds.
11.	Discharge pressure from the test set-up and close open ports with suitable closure plugs.	

CHAPTER - 6

DRAW AND BUFFING GEAR

- 6.1.0 The Bogie Container Flats are to run in units of 5 wagons. Each unit consists of 2 CAR 'A' and 3 CAR 'B' Flats. Each Car 'A' is fitted with CBC at the raised end and slackless draw bar system on the other end. CAR 'B' is fitted with slackless draw gear arrangement on both ends.
- 6.1.1 The brief particulars of slackless draw gear arrangement and standard AAR-M 901E draft gear arrangement is as per figure 6.1 & 6.2.
- 6.1.2 The detailed instructions governing installation, removal & maintenance of slackless drawbar system are given in figure 6.3,6.4,6.5 & 6.6. The slackless draw bar system provides virtually slack free train handling due to the taper wedge block gets adjusted and then arrests the slack between wagons.
- 6.1.3 One Draw bar each connected in between 'A' Car and 'B' Car and 'B' Car with 'B' Car. 'A' Car to 'A' Car from one unit to other unit is connected by standard AAR centre buffer coupler. A sketch of slackless draw bar is enclosed in figure 6.7. As such there is no service required between POH in the slackless draw bar system. If slack is found more due to damage to parts of the system observed then only, the concerned parts should be changed.
- 6.1.4 Repairs to CBC may be effected as per RDSO instructions G 76 and G 80 and maintenance instructions issued by RDSO from time to time.

UNCOUPLING OF DRAW BAR BETWEEN FLATS

- 6.2.1 The yoke pin support plate is removed after dismantling the yoke pin support bolts with nuts and split pin. Yoke pin gets dropped down by gravity. If required, the wedge may be raised to give room to give a sufficient slack so that the yoke pin can be taken out; or by use of a special jack the draft gear assembly should be compressed to remove the pin. As the yoke pin is the connecting link and once the pin is removed the cars get uncoupled. A sketch showing in detail with the parts description and assembly instructions is shown in figure 6.2 & 6.4.
- 6.2.2 Between 'A' Cars, CBC coupling gear handle may be operated for unlocking the knuckle and the units can be separated.

6.3.0 **485-4A MINI BUFFER GEAR SLACKLESS DRAWBAR ARRANGEMENT**

6.3.1 Description (Fig.6.1 & 6.2)

Figure 6.1 shows parts are included with each part number as mentioned above.

6.3.2 Installation (Fig.6.3)

Installation is accomplished as follows:

- i) Install Filler Block, Wedge, Shim, 485-4A Gear and Y46 Follower in Y45 Yoke. Centre all parts within 3 mm.
- ii) Push gravity drop wedge up as high as possible until it contacts the top yoke strap and temporarily secure it in this raised position.
- iii) Using commercially, available hydraulic draft gear compression tool, compress entire arrangement to approximately 619 mm. This will allow 6 mm clearance for assembly in 625 mm pocket.
- iv) Lift yoke and preshortened parts into car pocket and install both the yoke support plate and the safety plate.
- v) Release hydraulic draft gear compression tool allowing parts to become tight in the car pocket. Check to assure that a minimum wedge height of 25 mm (Figure 6.5) is maintained. Wedge height may be adjusted by adding a thicker shim. 1.6 mm increased shim thickness will result in 6.4 mm increased wedge height.
- vi) Make sure that Y45 yoke is pulled out towards striker as far as possible to aid in drawbar assembly. Install drawbar but into Y45 Yoke.
- vii) Lift Y47 coupler pin up through yoke and drawbar pin holes.
- viii) Install connector pin support.

6.3.3 Removal (Fig. 6.4)

Removal is accomplished as follows:

- i) Remove connector pin support.
- ii) Remove Y47 Coupler Pin.

- iii) Remove Drawbar.
- iv) Support yoke under yoke support plate and safety plate using draft gear table or similar device to prevent it from falling from car pocket upon removal of support plates.
- v) Using commercially available draft gear compression tool, compress parts until they become loose within car pocket (approximately 6 mm).
- vi) Remove yoke support plate bolts and safety bolts.
- vii) Carefully lower yoke and parts from car pocket.
- viii) Release hydraulic draft gear compression tool.
- ix) Slide parts out of yoke beginning with shim.

6.3.4 Maintenance

Periodically, gravity drop wedge height should be inspected to assure that the system is maintaining the proper slackless connection. Figure 6.5 shows how wedge height is to be measured.

For new applications, 25 mm minimum wedge height should be maintained. During periodic in service inspections, 6 mm minimum wedge height is acceptable.

In the case where height is found to be less than 6 mm, shim thickness should be adjusted to raise the wedge to its original minimum height. 1.6 mm increase in shim thickness will result in 6.4 mm increased wedge height.

While it is desirable to use full one-piece shims in varying thickness increments, it is acceptable to use 3 mm minimum thickness weld-on-shims(Figure 6.6).

Summary of items to be inspected at service intervals:

- i) 6 mm minimum wedge height.
- ii) No cracked or broken castings.
- iii) No missing parts.

6.3.5 Replacement Parts

Replacement parts can be ordered as follows:

Part Number	Description	(Kg) Weight	Drawing Number
12635	485-4a Mini Buffer Gear	80	SC12635
13412	Gravity Drop Wedge	18	SB13412
13413	Filler Block	96	SC12413
15221	Shim	6	SB15221

CHAPTER - 7

AUTOMATIC TWIST LOCKS

7.10 SALIANT FEATURES

7.1.1 The Automatic TWIST Lock (Atl) is the compact container locating and securing device fitted at the locating points of underframe sole bar. It is manufactured by Holland/USA and the salient features of the lock are given below.

7.1.2 The Automatic Twist Lock secures any container equipped with ISO corner castings. It also adopts fixed position of flat wagon to carry wider containers. The ATL locks and releases automatically. The advantages of these automatic twist locks are

- Easy to install.
- Easy to maintain.
- Fully automatic, Locking/Unlocking of Containers on wagon is automatically controlled.

7.1.3 Automatic Twist Lock assembly is shown Fig. 7.1. The detailed parts of the assembly are also shown in Fig.7.2. Because rubber spring is used in the lock, care should be taken during welding of twist lock assembly directly to the wagon. To avoid damage to the rubber spring, welding should be undertaken within the specified limits. Out of 8 twist locks required to be mounted on a wagon, 4 nos. are to be mounted at each corner of underframe and remaining 4 locks are to be mounted at the middle of the two sole bars mounted on flexible brackets(Fig. 7.3). The positioning requirements of the twist lock on underframe for use with ISO containers are detailed in Fig. 7.4, 7.5 & 7.6. Alternatively instead of controlling the welding method to the limits, the lower housings can be welded to the wagon and the lock then be assembled. The guidelines for welding of assembled locks on underframe is enclosed.

7.2.0 TWIST LOCK OPERATION

7.2.1 A maximum force of 1200 lbs.(550kg) is required for twisting the lock during entrance of the container and while removing the same a force of 1600-2200 lbs. is required.

7.2.2 The container is positioned so that the bottom aperture of the four corner castings are above the twist locks heads. The container is then lowered down slowly. The weight of the container causes the twist head to rotate and the corner casting slide past the twist head. Immediately after this the twist head rotates back in place engaging the corner casting and thereby securing the container.

7.2.3 If 20ft containers are used the locks on the middle should be kept in position. If the 40 ft. container is loaded to a wagon the middle locks mounted on folding bracket should be folded down before the placement of 40' container on the flat.

7.3.0 PRECAUTIONS

- i. The loader should see that the container has seated over the twist head and has engaged the corner casting.
- ii. Corner casting opening should be free from mud and other foreign matters so that the locks move freely in the corner casting.
- iii. It is desired that TXR staff should see each loaded wagon on the train to ensure the containers are adequately secured on the wagons.
- iv. While loading or unloading the containers, the loader/operator should lift the container as close to vertical as possible and evenly positioned. The greater the shift in angle of lift off vertical, the higher the release forces which could lead to lifting of wagon.
- v. Before the use of 40ft. containers the middle locks should be folded down.
- vi. The operation of the twist locks in unloading the ISO containers mainly depends upon the way containers are lifted. As the lift is made upward the corner casting engages the bottom side of the twist head. Once a lifting force of 1600-2200 lbs. is reached at a corner of the container the twist head will rotate and that corner will release. If the container is lifted straight up vertically & evenly the locks tend to release all four corners simultaneously.

7.4.0 TWISTLOCK INSPECTION

7.4.1 Twist lock inspection can be done visually. Check that all four fasteners are in place and secure. Visually check that the lower and upper housings show no structural damage. Also check that the twist head is intact and aligned properly. Viewed from the top, the centerline of the twist head is about 50 degrees off, of the centerline of the shear block. Viewed from the side the twist lock is vertically up and down. If the internal shaft is bent the twist head appear as tilted.

7.4.2 The spring is the key component that can't be visually inspected as installed. The potential problem would be in the corrosion of the steel outer ring. Corrosion can eventually lead to separation of the steel outer ring from the rubber. If the twist head can be spun freely by hand then it means the steel-rubber separation has occurred. Corrosion could also lead to loss of structure in the ring. The twist head might then rotate partially and become

wedged in a position out of the 50 degree off the shear block proper alignment.

- 7.5.0 **TWISTLOCK MAINTENANCE & REPAIR**
- 7.5.1 Automatic twist locks are designed to be maintenance free. Plastic bearings are used on bearing surfaces; so lubrication of the twist lock is not required and in fact could cause problems. Application of oil or grease might begin the degradation of the rubber twist lock spring. Also the presence of oil or grease on the twist head will cause the twist lock to operate with less force than designed. In this case the containers could be released by a force under the 1600-2200 lb range. It is desired to keep the exit forces in the designed range, **DO NOT LUBRICATE THE TWIST LOCK.**
- 7.5.2 Service parts for the twist lock are currently provided in four parts. If the twist head or upper housing is damaged or if the internal shaft is bent, the upper housing assembly can be replaced. This sub-assembly includes the twist head, upper housing, internal shaft, and bearing spacer pieces.
- 7.5.3 The torsion spring, screw and lock nut, and lower housing piece are all available and can be procured for replacement if required.
- 7.5.4 The replacement of any of these service parts on the twist lock require disassembly of the twist lock. Because a distorted thread lock nut is used, it is recommended that the screws and lock nuts be replaced each time the lock is taken apart for repair

CHAPTER - 8

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS

Procurement of the following Spares may be effected in stages as and when required. These are non standard/Uncommon Items.

A. CAST STEEL BOGIE LCCF 20(C)-96

S.No.	Description	Drawing	No. of per wagon	Qty For ROH Open line	
1.	Bogie complete (General Arrangements)	CONTR - 9404 - S/2	2	30	-
2.	Side Frame Key Bolt with nut, spring washer & 4 dia split pin	CONTR - 9404-S/4 item 5	8	2800	140
3.	Side Frame Key	CONTR - 9404 - S/4 item 3	8	1100	140
4.	Sideframe friction liner	CONTR - 9404 - S/4 item 6	8	NIL	-
5.	Wedge	CONTR - 9404 - S/6	8	140	-
6.	Bolster Spring (Outer)	CONTR - 9404 - S/7 item 1	28	3860	2000
7.	Bolster Spring (Inner)	CONTR - 9404 - S/7 item - 2	24	3300	1600
8.	Snubber Spring	CONTR - 9404 - S/7 item - 3	8	1100	800
9.	Adapter Retainer Bolt & nut	CONTR - 9404 - S/4 item - 4	8	280	140
10.	Bolster Liner	CONTR - 9404 - S/5 item - 2	8	-	-
11.	Centre Pivot Liner	CONTR - 9404 - S/5 item - 3	2	1380	140
12.	Shackle Lock	CONTR - 9404 - S/8 item - 2	2	140	40
13.	Lock Pin & Spacer	CONTR - 9404 - S/8 item - 3,1	2	1380	640
14.	Centre Pivot Pin	" item - 4	2	140	40
15.	Centre Pivot Top	" item - 1	2	140	-
16.	Retaining Ring	" item - 13	2	80	-
17.	Washer (120 dia Bonded)	" item - 5	2	280	140

S.No.	Description	Drawing	No. of per wagon	Qty For ROH Open line	
18.	Top Side Bearer Liner	CONTR - 9404 - S/8 item - 6	4	60	10
19.	M - 16 Bolt without Spring Washer & split pin 4 mm dia	" item - 7	16	160	25
20 a.	Packing Shim 1 mm thick	CONTR - 9404 - S/8 item - 11	4	1120	280
20 b.	Packing Shim 3 mm thick	" item - 12	8	1120	280
21.	Equalising Lever	CONTR - 9404 - S/10 item - 1	Acar-3 Bcar-2	120	30
22.	Equalising Lever	CONTR - 9404 - S/10 item - 2	Acar-3 Bcar-2	15	10
23.	Bogie End Pull rod	" item - 4	2	60	15
24.	Bogie Brake Push rod	" item - 3	2	60	15
25.	Pin with washer & Bulb Cotter	" item - 6	9	1400	280
26.	Pin with washer & Bulb Cotter	" item - 7	4	1120	560
27.	Brake Block	CONTR - 9404 - S/11	8	11200	22400
28.	Spacer	CONTR - 9404 - S/10 item - 5	4	280	-
29.	Bush for equalising lever 29 dia x 27	CONTR - 9404 - S/10 item - 8	5	8000	560
30.	Bush for equalising lever	" item - 9	4	5600	560
31.	Bush for equalising 41 dia x 32	" item - 10	4	5600	560
32.	Wheel & Axle Assembly 840 dia with Roller bearing	CONTR - 9404 - S/12	4	480	140
33.	Side Bearer Side Block	CONTR - 9404 - S/15 item - 1	4	280	55
34.	Side Bearer Seat	" item - 2	4	280	55
35.	Side bearer Spring	" item - 3	8	2800	2800
36.	Liner for side block 60x78x4	" item - 4	8	2800	40
37.	Liner for side block 30x78x4	" item - 5	4	2240	40
38.	Liner for side bearer seat	" item - 6	8	2800	40
39.	Liner for side bearer seat	" item - 7	8	560	-
40.	Side bearer top liner	" item - 8	4	280	40

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS

B. COUPLER & DRAWBAR ARRANGEMENT

S.NO.	Description	Drawing	No. off per wagon		Qty For ROH Open Line	
			A	B		
1.	485 – 4A Mini Gear	RITES/TP/9405-S/ 001 Item-6	1	2	40	-
2.	Filler Block	RITES/TP/9405-S/ 001 Item -3	1	2	40	-
3.	Wedge	RITES/TP/9405-S/ 001 Item – 4	1	2	40	-
4.	Shim	RITES/TP/9405-S/001 Item – 5	1	2	40	-
5.	Follower	RITES/TP/9405-S/001 Item – 7	1	2	40	-
6.	Draw Bar	RITES/TP/9405- S/001 Item – 10	1	1	30	-
7.	Coupler ROD	CONTR-9405-S/17 item-1	1	--	30	--
8.	Bearing piece assembly parts	CONTR-9405-S/17 item – 3,4,5,6	1	-	30	-
9.	Striker Casting	RITES/TP-9405-S/002	1	2	60	-
10.	Safety Plate	RITES/TP/9405-S/001 item - 12	1	2	140	30

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS

C. UNDERFRAME BRAKE GEAR ARRANGEMENT

S.NO.	Description	Drawing	No. off per Wagon	Qty. for	
				ROH	Open Line
1.	Horizontal Lever	CONTR-9405-S/11 item - 1	2	55	15
2.	Tie Rod for car A	" item - 2	1	55	15
3.	Tie Rod for car B	item - 2	1	70	15
4.	Pull Rod Main for car A	" item - 3	1	40	30
5.	Pull Rod Main for car B	" item - 3	1	40	30
6.	Pull Rod Main SAB side for Car - A	" item - 4	1	40	30
7.	Pull Rod Main SAB side for Car - B	" item - 4	1	40	30
8.	Pulley	" item - 13	2	40	30
9.	Pin	" item - 12	2	40	15
10.	Hand Brake Pull Rod (Car - A)	CONTR-9405-S/12 item - 1	1	30	15
11.	Hand Brake Shaft	" item - 2	1	30	15
12.	Hand Brake Screw	" item - 3	1	30	15
13.	Hand Brake screw Nut	" item - 4	1	30	15
14.	Brake Equilising Lever	" item - 6	2	70	40
15.	Bush for Hand Brake Pull Road	CONTR-9406-S/9 item - S	2	560	280
16.	Hand Brake Pull Road (Car - B)	CONTR-9406-S/8 item - 1	1	70	30

BOGIE CONTAINER,FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS

D. AIR BRAKE PINS & BUSHES

S.NO.	Description	Drawing	NO. off per Wagon	Qty For ROH Open Line	
1.	Pin No.1	CONTR-9405-S/9	2	700	700
2.	Pin No.2	"	1	280	280
3.	Pin No.3	"	1	280	280
4.	Pin No.4	"	1	280	280
5.	Pin No.5		2	700	700
6.	Pin No.6	CONTR-9405-S/9	1	280	280
7.	Pin No.7	"	2	700	700
8.	Pin No.8	"	1	280	280
9.	Washers 56 dia x 8	CONTR-9405 -S/9	2	560	560
10.	" 36 dia x 5	"	1	560	560
11.	" 31 dia x 6	"	2	560	560
12.	" 42 dia x 6	"	1	280	280
13.	Bushes : S. 36 dia x 16 U. 30 dia x 16	CONTR-9405-S/9 CONTR-9406-S/6	6 4	1680 1920	1680 1920

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS

E. FITMENT OF AIR BRAKE EQUIPMENT

S.NO.	Description	Drawing	No. off per Wagon	Qty For ROH Open Line	
1.	Pressure Reducing Value	SAB WABCO	1	140	15

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS

F. LOAD SENSING DEVICE

S.NO.	Description	Drawing	No. off per Wagon	Qty For ROH Open Line	
1.	Load sensing valve type VTA	CONTR -9405 - S/16	2	115	80

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS

G. FITMENT OF LOCKING DEVICE

S.NO.	Description	Drawing	No. off per Wagon	Qty For ROH Open Line	
1.	Automatic Twist Lock	Holland USA	8	140	8
2.	Lock upper assembly	"	8	40	15
3.	Rubber spring	"	8	40	30
4.	Special Bolt with Nut	"	32	600	80

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS (REVISED – TENTATIVE)

Procurement of the following Spares may be effected in stages as and when required. These are standard/Common Items.

A. CAST STEEL BOGIE LCCF 20(C)-96

S.NO.	Description	Drawing	No. off per Wagon	Qty For ROH Open Line	
1.	Elastomeric Pad	WD- 95005-S/1	8	11100	5000
2.	Wide Jaw Adaptor	SK 78527	8	280	140
3.	M 24 Fit Bolt with Castle nut, washer and split pin	IS:3640, IS: 2232 CONTR-9404-S/2 item-15	8	280	140
4.	24 Dia snap head rivets	IS:1929 IS:1148 CONTR-9404-S/2 item-16 CONTR-9404-S/8 item - 8	15	-	-
5.	Brake Shoe Key	W/BG – 6150	5	5600	5600
6.	M 20 Bolt with nut Washer & 4 dia split pin	IS:1363, IS :2016 IS:549 CONTR-9404-S/9 item -11	4	240	40
7.	Brake Beam Wear plate	CONTR-9404-S/17 item -8	16	140	280

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS (REVISED – TENTATIVE)

B. COUPLERS & DRAW BAR ARRANGEMENT

S.NO.	Description	Drawing	No. off per Wagon A - B		Qty For ROH Open Line	
1.	Centre Buffer Coupler Assembly	WD-81010-S-03 Item-1 to 11	1	-	20	5
2.	Knuckle	Item – 2	1	-	30	15
3.	Yoke	Item - 3	2	2	15	-
4.	Draft Gear	Spec, 49 – BD – 94	1	-	30	-
5.	Knuckle Pin	SK 62724 item – 4	1	-	30	15
6.	Knuckle Thrower	SK 62724 item – 9	1	-	30	15
7.	Lock lift assembly	SK 62724 Item – 5,6,7,16	1	-	30 Sets	15 Sets
8.	Lock for CBC	WD-85036-S-01 Item – 4	1	-	30	15
9.	Yoke pin	SK 62724 item – 12	2	2	30	15
10.	20 Dia Bolt, Nut with Check Nut & Split Pin	RITES/TP/9405 – S/001, item – 14	6	12	800	80
11.	Back Stop	W/BD- 699	4	4	60	-
12.	Yoke Support plate	WD-80007-S-14 Item – 6	2	2	60	15
13.	Striker Casting	WA/BD – 4460	1	-	15	-
14.	Yoke Pin Support	WA/BD – 4462	2	2	140	15
15.	Safety Plate with anchor plate	WD-80007/S/14 Item – 5	1	-	60	15
16.	Shank Wear Plate	SK 62724 item - 10	1	-	140	-
17.	Striker Casting Wear plate	WD-87056-S/001	1	-	30	-
18.	Top Lifter hole Cap	SK 62724 item - 11	1	-	140	30
19.	Rivets 22 DIA	IS:1929,IS:1148	33	-	1360	280

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS (REVISED – TENTATIVE)

C. UNDERFRAME BRAKE GEAR ARRANGEMENT

S.NO.	Description	Drawing	No. off per Wagon	Qty For ROH Open Line	
1.	Hand Brake Bevel Gear wheel	W/BG 1131	2	30	15
2.	Hand Brake Wheel	W/BG 1344	2	70	30
3.	Hand Brake Connecting link	W/BG 1190	2	70	30
4.	Sleeve	W/BG 6310	1	160	60
5.	Bush for Equalising Lever support bracket	W/BU – 168 or W/BU – 2364	1	280	140
6.	Bush for equalising Lever	W/BU – 165 or W/BU – 2361	6	1380	560
7.	10 dia rivet	CONTR-9405- S/12 item – 19	2	140	60
8.	Std. Nut & Washer M - 30 for Hand Brake Shaft	- Do -	2	280	80
9.	Hand Break gear box Cover	W/BG – 1134	1	140	60
10.	Hand Break lever gear box	W/BG – 1133	1	60	30
11.	Bush for Hand Brake connecting link (W/BU 1191)	W/BU – 169 or W/BU – 2365	4	560	280

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS (REVISED – TENTATIVE)

D. AIR BRAKE PINS & BUSHES

S.NO.	Description	Drawing	No. of per Wagon	Qty For ROH Open Line	
1.	Split Pin 8 dia x 65	"	1	700	700
2.	Bulb Cotter	WD 94068 – S – 1	10	6800	6800
3.	Bushes :	CONTR-9405-S/9 CONTR-9406-S/6			
	R. 42 dia x 30	L/BU – 528/M. L/BU – 529/M.	1	560	560
	T. 42 dia x 16	L/BU – 526/M. L/BU – 527/M.	4	1120	1120
	V. 52 dia x 16	L/BU – 530/M. L/BU – 531/M.	4	1120	1120
	W. 52 dia x 30	L/BU – 532/M. L/BU – 533/M.	1	410	410

BOGIE CONTAINER FLAT WAGON

SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS (REVISED – TENTATIVE)

E. FITMENT OF AIR BRAKE EQUIPMENT

S.NO.	Description	Drawing	No. off per Wagon	Qty For ROH Open Line	
1.	Bolts with Nuts and spring washer	CONTR-9405-S/13 CONTR-9406-S/9			
	M 10 X 40		16	4160	1380
	M 10 X 50		2	280	280
	M 10 X 100		24	560	560
	M 12 X 40		4	560	560
	M 16 X 70		4	560	560
	M 24 X 70		6	1600	1600
2.	Slack Adjuster SAB	Approved Make	1	140	60
3.	Cut Off Angle Cock	WD – 88123 – S/01	2	420	140
4.	Dirt Collector	WD – 92051 – S/03	1	140	70
5.	Auxiliary Reservoir (100 litres)	WD – 92015 – S/01	1	30	15
6.	Distributor Valve	Approved make	1	140	30
7.	Air Brake Hose Assembly with Coupling BP	SK – 73547	2	720	720
8.	'O' Ring Gasket 20 dia	Approved Make	6	2880	1400
9.	'O' Ring Gasket 32 dia	Approved Make	6	2880	1400
10.	Common pipe Bracket Control Reservoir	WD – 97951 – S/10	1	70	-
11.	Brake Cylinder	WD – 92051 – S/6	1	140	30

BOGIE CONTAINER FLAT WAGON

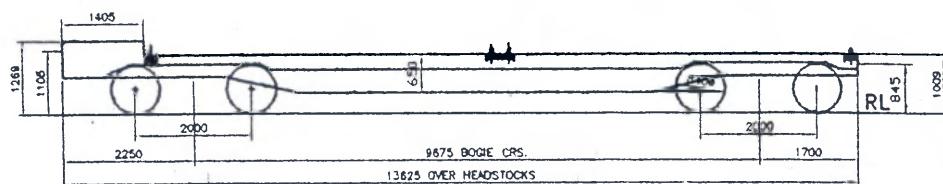
SPARE PARTS LIST FOR ROH & OPEN LINE FOR 1500 WAGONS (REVISED – TENTATIVE)

F. LOAD SENSING DEVICE

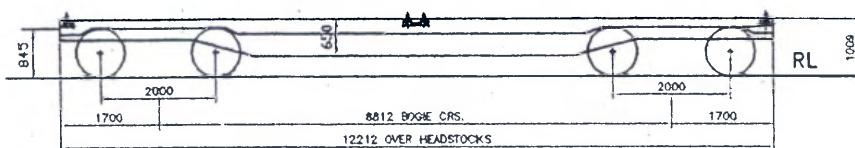
S.NO.	Description	Drawing	No. off per Wagon	Qty For ROH Open Line	
1.	Fasteners M 24 Hex Blots with spring washer, Castle Nut, Spring Washer & Split Pin	CONTR-9405 S/16 item - 7	6	800	800
2.	M 16 Hex Bolt. Nut with Spring Washer & split pin	CONTR-9405- S/16 item – 6	8	690	690
3.	M 16 Hex Bolt, Nut with Spring Washer	CONTR-9405- S/16 item - 8	4	400	400

BOGIE CONTAINER FLAT WAGON

5 - CAR UNIT



A - CAR



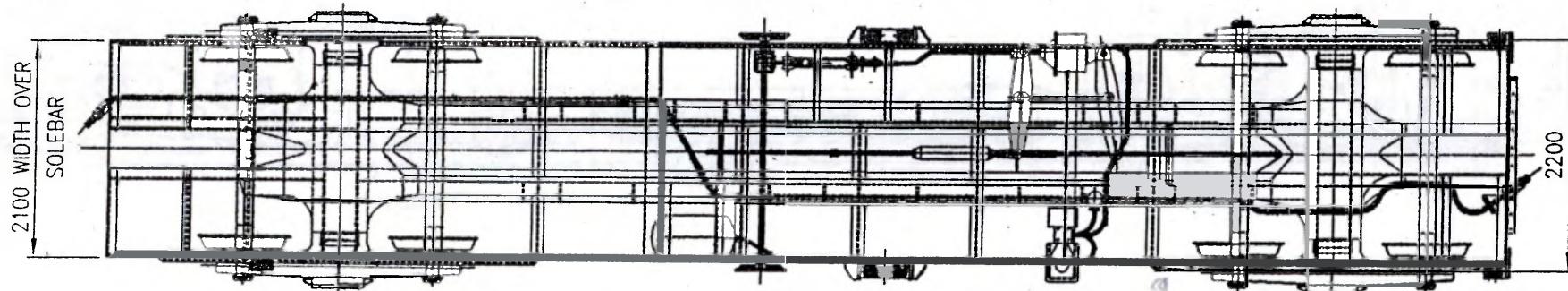
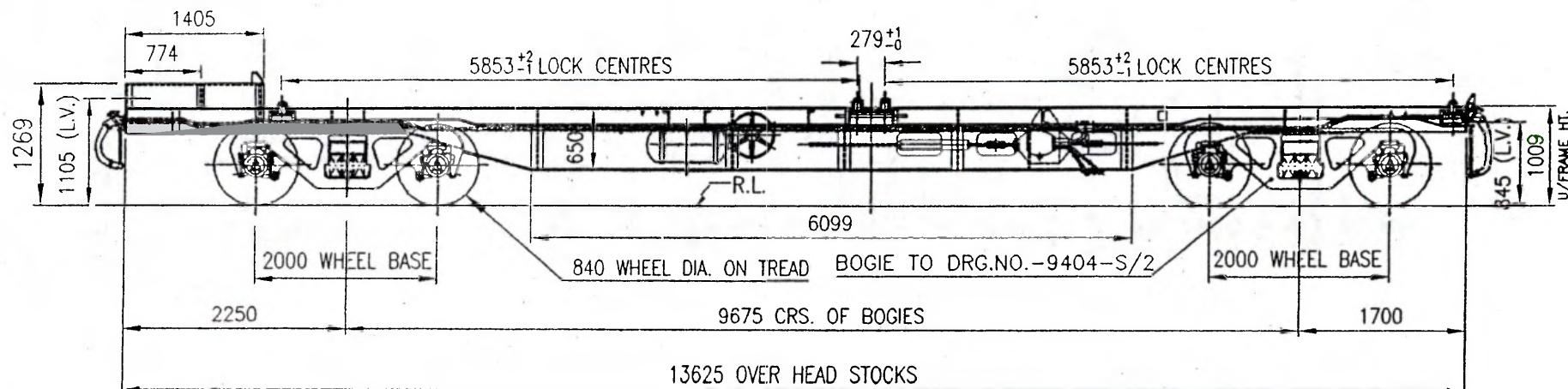
B - CAR

- * UNDERFRAME ALL WELDED CONSTRUCTION
- * BOGIE LOW HEIGHT HIGH SPEED CAST STEEL BOGIE WITH FEATURES OF CASNUB BOGIE
- * COUPLER 'A'CAR - RAISED END - STANDARD AAR E-TYPE CBC
OTHER END - SLACKLESS DRAWBAR
'B'CAR - BOTH ENDS - SLACKLESS DRAWBAR
- * BRAKE GRADUATED AIR BRAKES, WITH TWO STAGE LOAD SENSING DEVICE & SIDE OPERATED HAND BRAKES
- * WHEEL 840 mm DIA (NEW)
780 mm DIA (FULLY WORN)
- * LOCKS 8 NUMBERS AUTOMATIC TWIST LOCKS

FIG. 1.2

GENERAL ARRANGEMENT (A-CAR)

RITES



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IG. 1.3

GENERAL ARRANGEMENT (B-CAR)

RITES

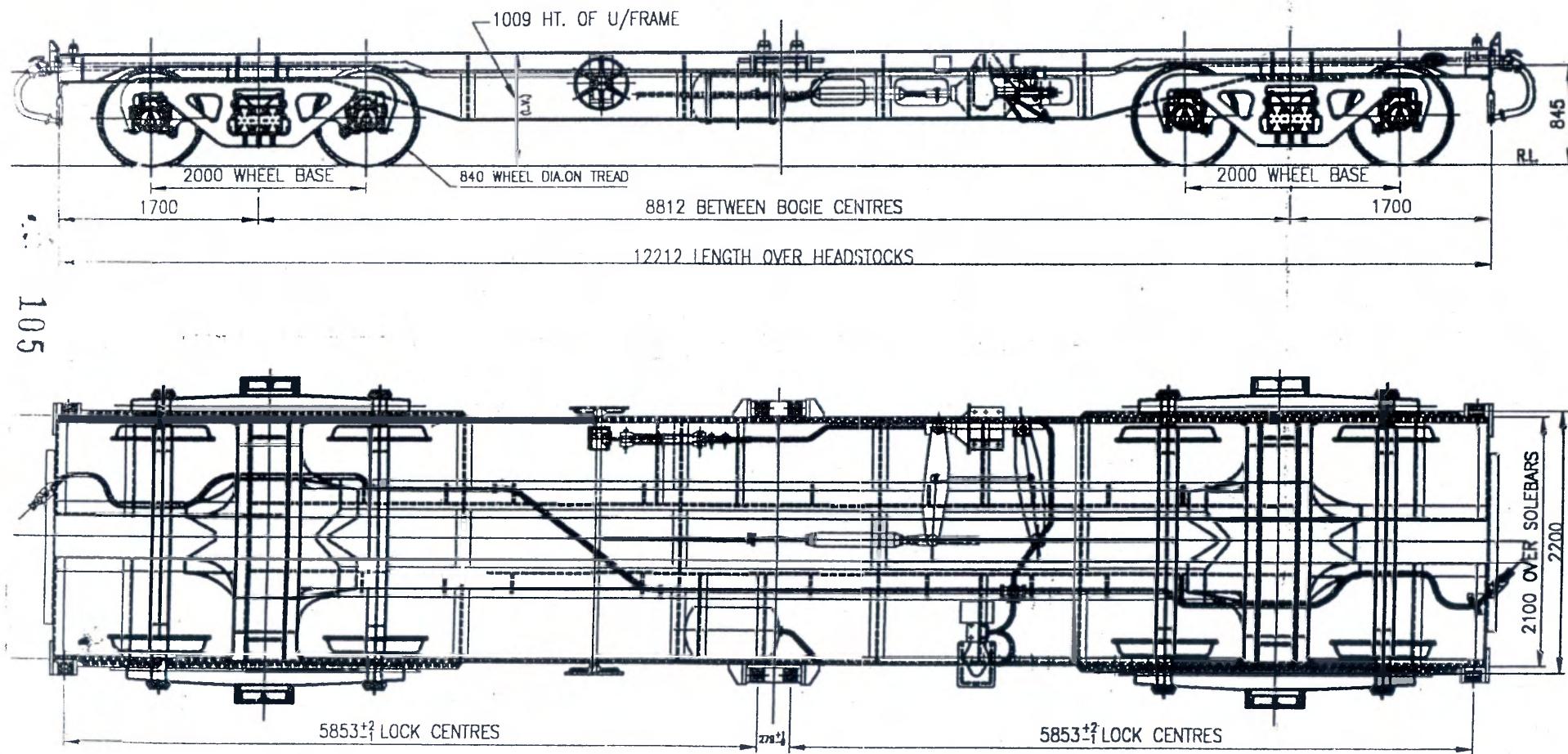
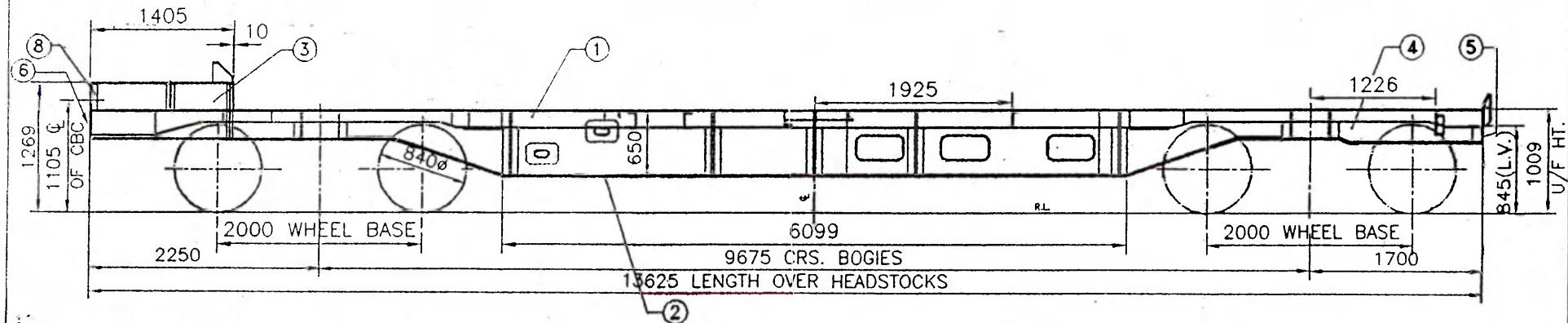


FIG. 1.4
SHEET-1/2

UNDERFRAME GENERAL ARRANGEMENT (A-CAR)

RITES



18

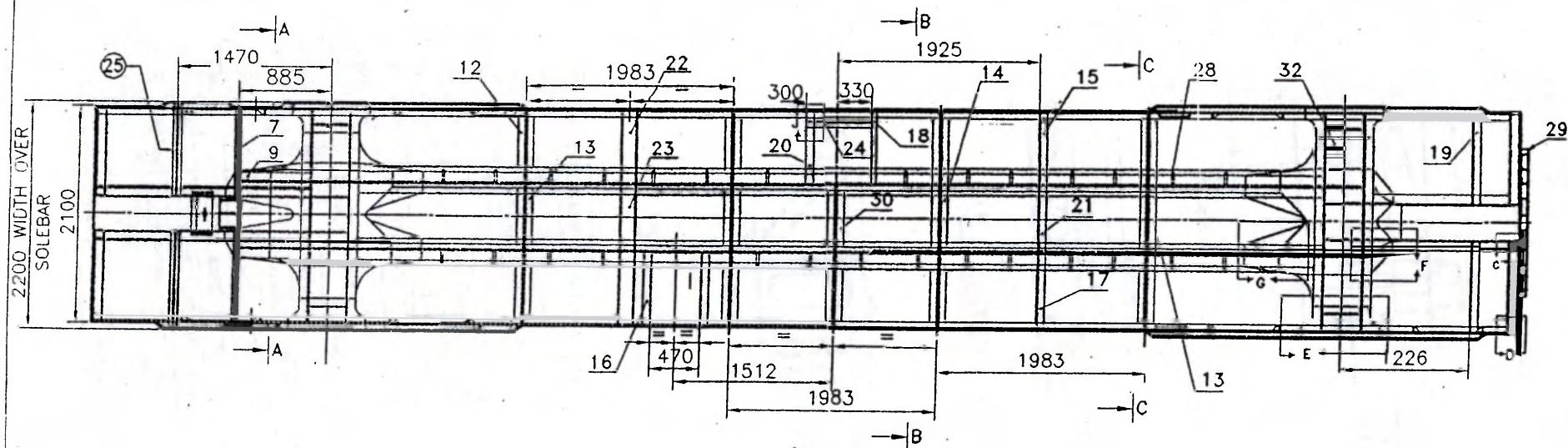
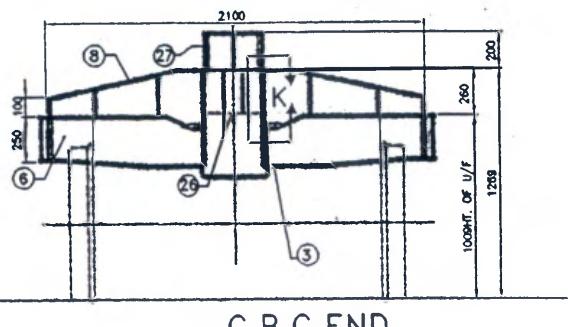


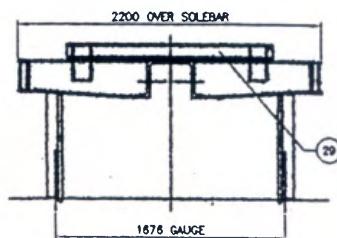
FIG. 1.4
SHEET 2 OF 2

UNDERFRAME GENERAL
ARRANGEMENT (CAR-A)

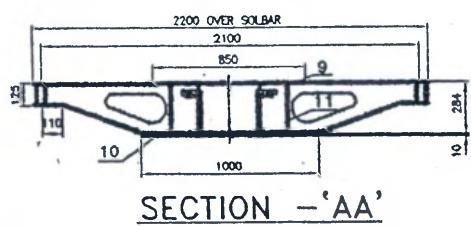
RITES



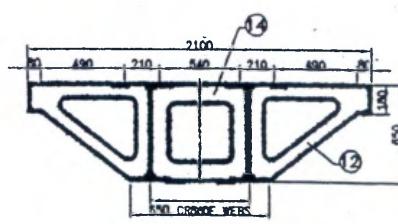
C.B.C.END



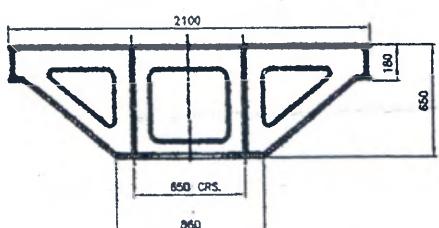
DRAW BAR END



SECTION - 'AA'



SECTION - 'BB'



SECTION - 'CC'

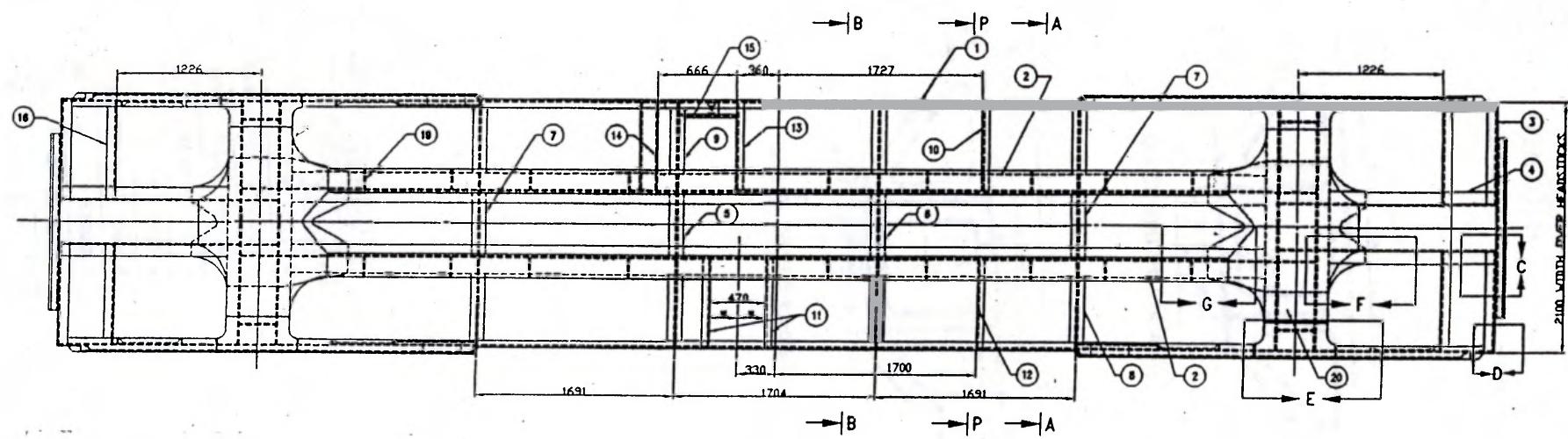
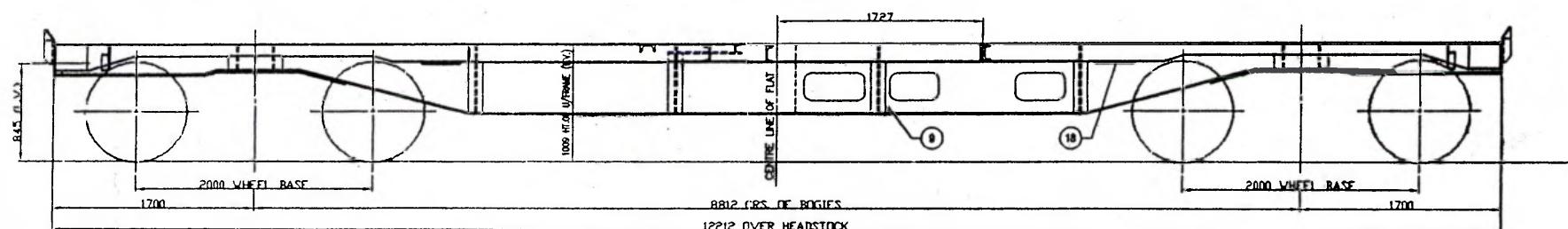
ITEM	DESCRIPTION & DIMENSIONS	NO.OFF	REF.DRG.
16.	CROSS MEMBER FOR RESERVOIR	1LH 1RH	CONTR-9405-S/6A ITEM-16
15.	CROSS MEMBER FOR BR. CYLINDER	1	CONTR-9405-S/6A ITEM-15
14.	CROSS MEMBER(MIDDLE)	1	CONTR-9405-S/6A ITEM-12
13.	CROSS MEMBER (MIDDLE)	4	CONTR-9405-S/6A ITEM-11
12.	CROSS MEMBER(OUTER)	9	CONTR-9405-S/6A ITEM-9
11.	WEB PLATE	2	CONTR-9405-S/7 ITEM-7
10.	COVER PLATE(BOTTOM)	2	CONTR-9405-S/7 ITEM-7
9.	COVER PLATE(TOP)	1	CONTR-9405-S/7 ITEM-7
8.	HEADSTOCK STIFFENING PRESSING (C.B.C.END)	1RH 1LH	CONTR-9405-S/6A ITEM-5
7.	CROSS MEMBER(END)	1RH 1LH	CONTR-9405-S/6A ITEM-7
6.	HEAD STOCK(CBC END)	1RH 1LH	CONTR-9405-S/6A ITEM-4
5.	HEADSTOCK(DRAW BAR END)	1RH 1LH	CONTR-9405-S/6A ITEM-6
4.	CENTRE SILL(DRAW BAR END)	1	CONTR-9405-S/6A ITEM-3
3.	CENTRE SILL(CBC END)	1	CONTR-9405-S/6A ITEM-1
2.	CENTRE SILL ASSY(MIDDLE)	1RH 1LH	CONTR-9405-S/6A ITEM-2
1.	SOLE BAR SUB-ASSY	1RH 1LH	CONTR-9405-S/6A ITEM-1
ITEM	DESCRIPTION & DIMENSIONS	NO.OFF	REF.DRG.

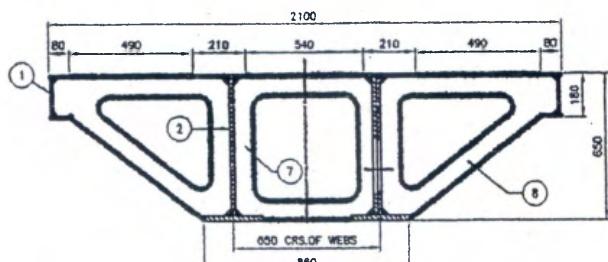
29.	U/F BOLSTER & SIDE BEARER ARRCT.	2	CONTR-9405-S/3
31.	STIFFENING PRESSING FOR LIFTING PAD	2LH 2RH	CONTR-9405-S/6 ITEM-1.13
30.	CROSS MEMBER (MIDDLE)	1	CONTR-9405-S/6A ITEM-13
29.	ANTI-PILFERAGE BKT.(D.B. END)	2	CONTR-9405-S/6A ITEM-27
28.	STIFFENING PLATE	28	CONTR-9405-S/6A ITEM-26
27.	GUIDE BRACKET	1	CONTR-9405-S/6A ITEM-25
26.	STIFFENING PRESSING FOR ITEM-3	1	CONTR-9405-S/6A ITEM-2
25.	STIFFENING CROSS MEMBER	2	CONTR-9405-S/6A ITEM-8
24.	SUPPORTING CHANNEL ISMC100	1	CONTR-9405-S/6A ITEM-23
23.	CROSS MEMBER ISMC150(CENTRE)	1	CONTR-9405-S/6A ITEM-22
22.	CROSS MEMBER ISMC150(OUTER)	2	CONTR-9405-S/6A ITEM-21
21.	CROSS MEMBER CENTRE	1	CONTR-9405-S/6A ITEM-20
20.	CROSS MEMBERFOR H.BR.SCREW	1	CONTR-9405-S/6A ITEM-19
19.	CROSS MEMBERFOR ANCHOR BKT.	1LH 1RH	CONTR-9405-S/6A ITEM-14
18.	CROSS MEMBERFOR EQ.LEVER	1	CONTR-9405-S/6A ITEM-18
17.	CROSS MEMBER FOR D.V.	1	CONTR-9405-S/6A ITEM-17
ITEM	DESCRIPTION & DIMENSIONS	NO.OFF	REF.DRG.

FIG. 1.5
SHEET-1/2

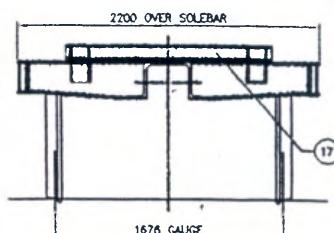
UNDERFRAME GENERAL ARRANGEMENT (B-CAR)

RITES

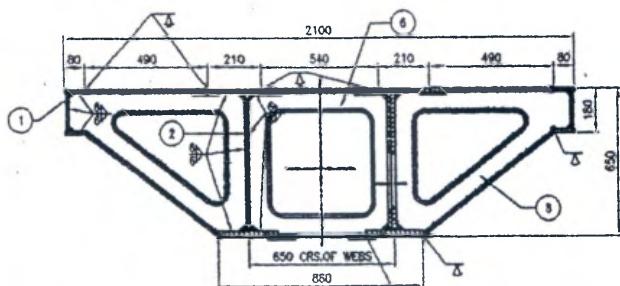




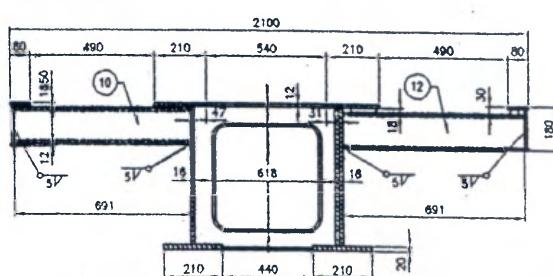
ENLARGED SECTION AT -AA



SIDE VIEW OF FLAT CAR



ENLARGED SECTION AT -BB



ENLARGED SECTION AT -PP

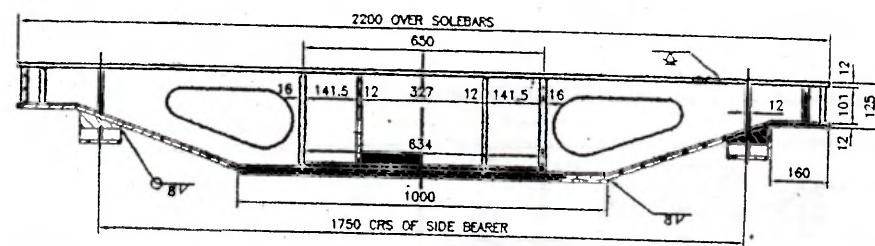
ITEM	DESCRIPTION & ASSEMBLY	NO. OFF.	REF.DRGS.
10	CROSS MEMBER FOR BRAKE CYLINDER ISMC 150	1	" " ITEM-15
9	CROSS MEMBER FOR LEVER BRACKET	1	" " ITEM-10
8	CROSS MEMBER (OUTER)	7	" " ITEM-9
7	CROSS MEMBER (MIDDLE)	2	" " ITEM-11
6	CROSS MEMBER (MIDDLE)	1	" " ITEM-12
5	CROSS MEMBER (MIDDLE)	1	" " ITEM-13
4	CENTRE SILL (D.B.END)	2	" " ITEM-3
3	HEAD STOCK PRESSING	2 L.H. 2 R.H.	CONTR-9405-S/6A ITEM-6
2	CENTRE SILL ASSLY.(MIDDLE)	2 L.H. 2 R.H.	CONTR-9405-S/5 ITEM-2
1	SOLEBAR SUB ASSEMBLY	2	CONTR-9405-S/5 ITEM-1
ITEM	DESCRIPTION & ASSEMBLY	NO. OFF.	REF.DRGS.

20	U/F BOLSTER AND SIDE BEARER ARRANGEMENT	2	CONTR-9405-S/3
19	STIFFENING PLATE	18	CONTR-9405-S/6A ITEM-26
18	LIFTING PAD ASSEMBLY	4	CONTR-9405-S/6 ITEM-1.13
17	A.P.BRACKET	2	CONTR-9405-S/6A ITEM-27
16	CROSS MEMBER FOR ANCHOR BRACKET	2 L.H. 2 R.H.	" " ITEM-14
15	CHANNEL SUPPORT ISMC 100	1	" " ITEM-24
14	CROSS MEMBER FOR HAND BRAKE SCREW ISMC 150	1	" " ITEM-19
13	CHANNEL BRACKET FOR EQUALISING LEVER ISMC 100	1	" " ITEM-18
12	CROSS MEMBER FOR DISTRIBUTOR VALVE ISMC 150	1	" " ITEM-17
11	CROSS MEMBER FOR RESERVOIR ISMC 150	2 L.H. 2 R.H.	" " ITEM-16
ITEM	DESCRIPTION & ASSEMBLY	NO. OFF.	REF.DRGS.

FIG. 1.6

UNDERFRAME BOLSTER & SIDE
BEARER ARRANGEMENT
'A' - CAR C.B.C.END

RITES



SECTION - A A

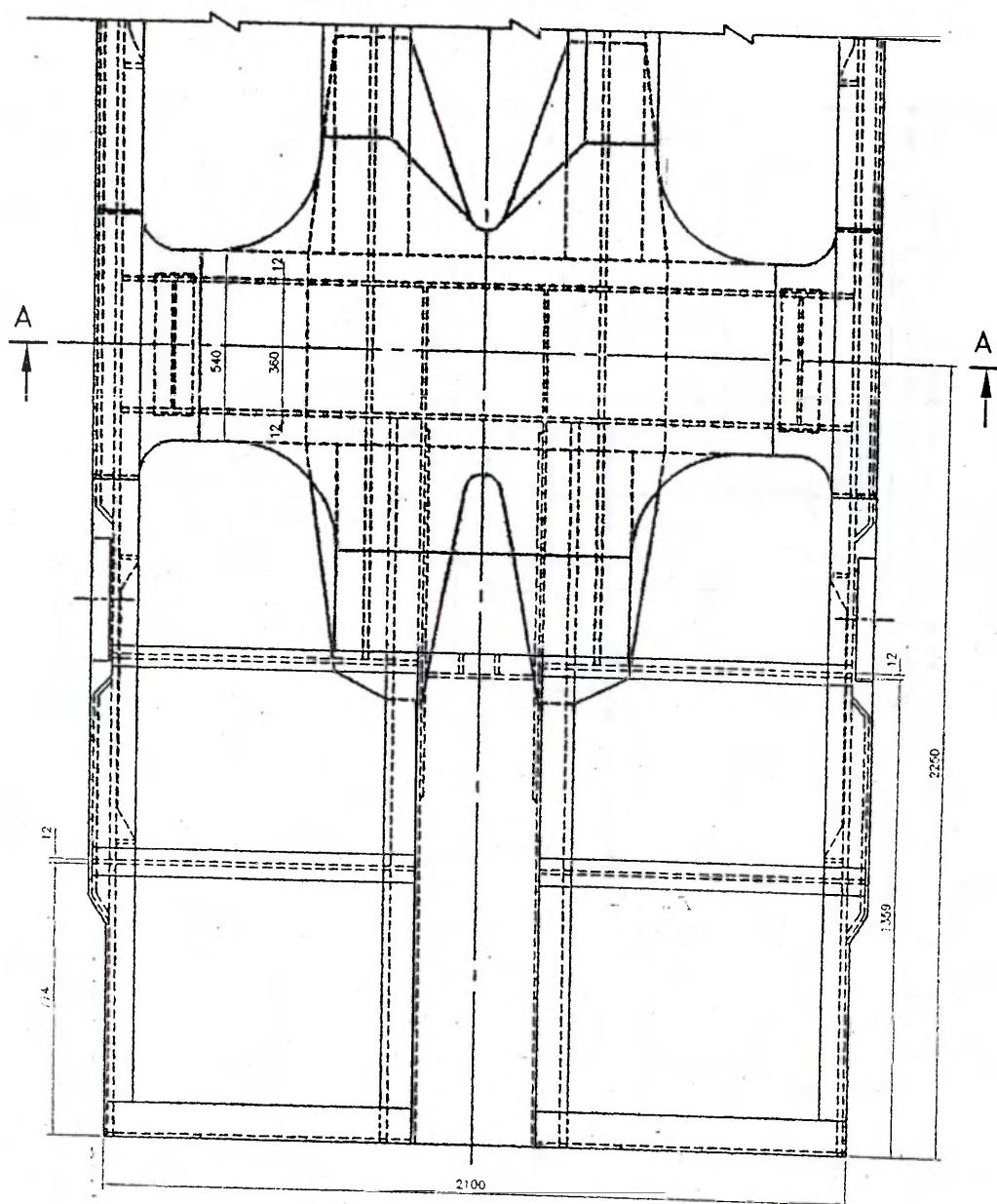
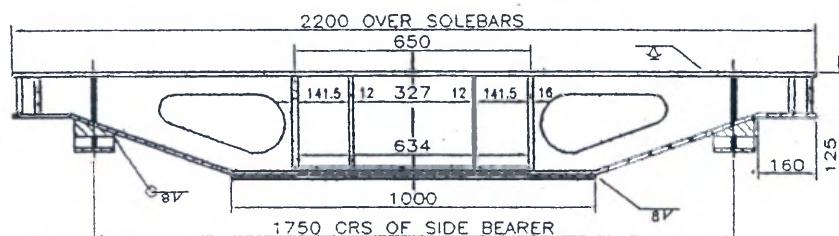


FIG. 1.7

UNDERFRAME BOLSTER & SIDE
BEARER ARRANGEMENT
'A' & 'B' - CAR DRAW BAR END

RITES



SECTION - B B

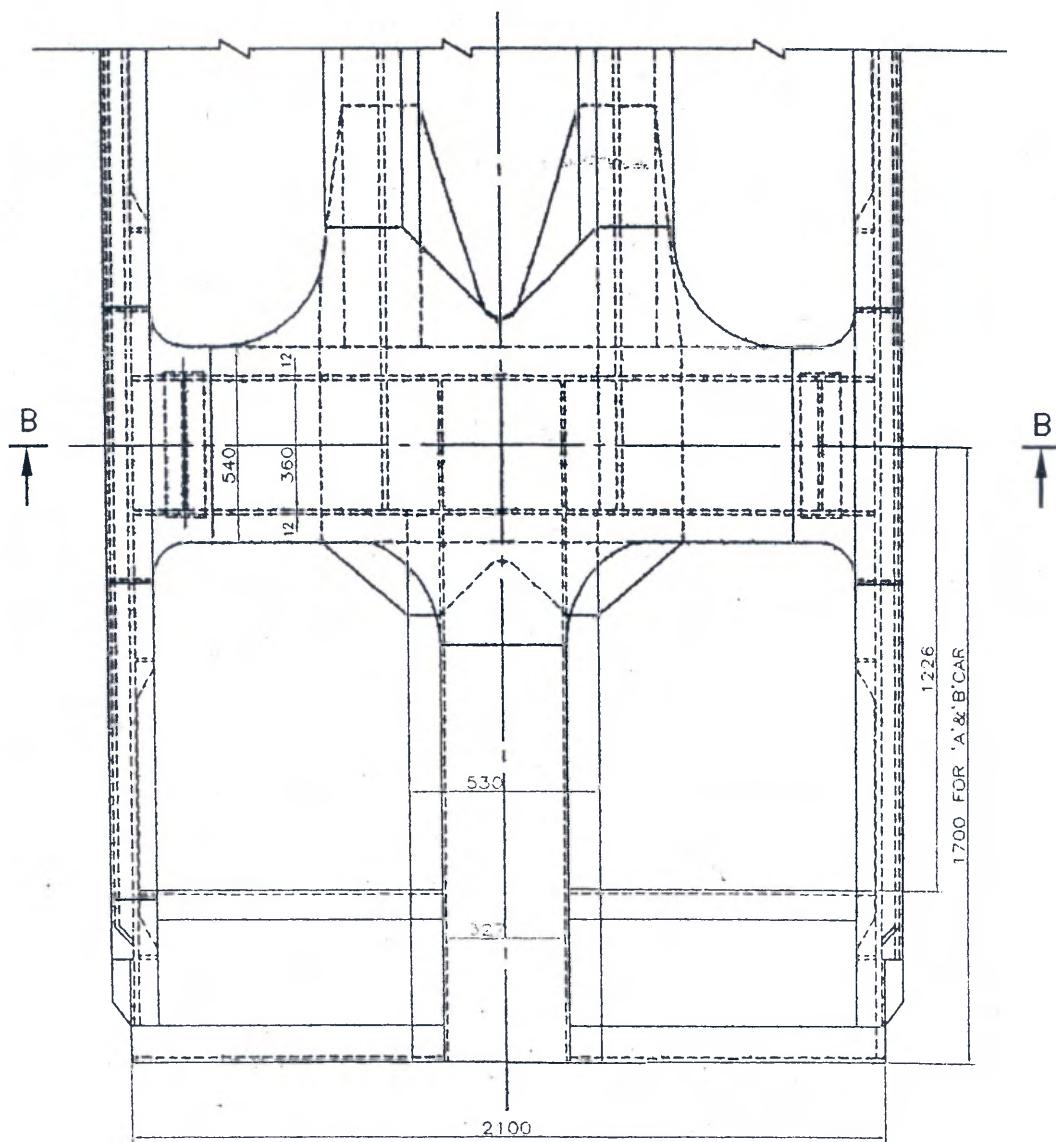
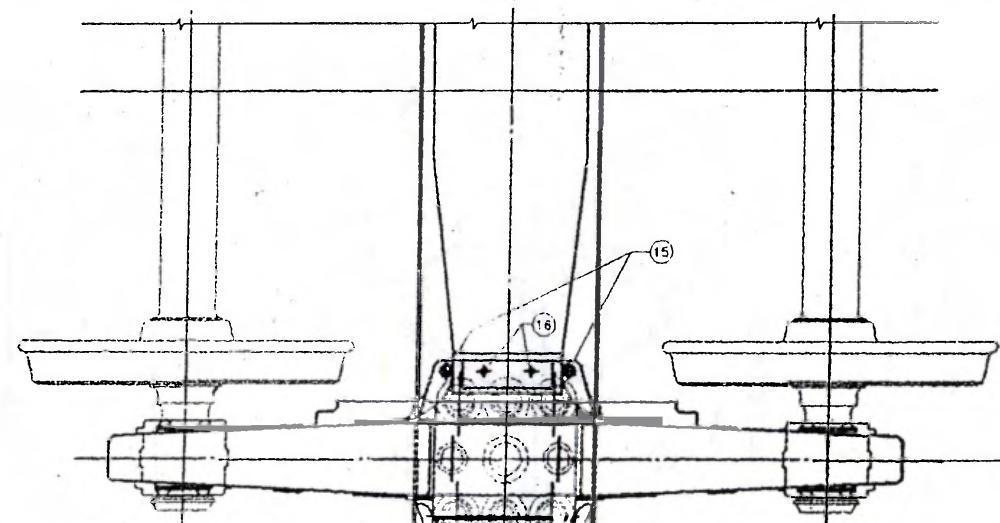
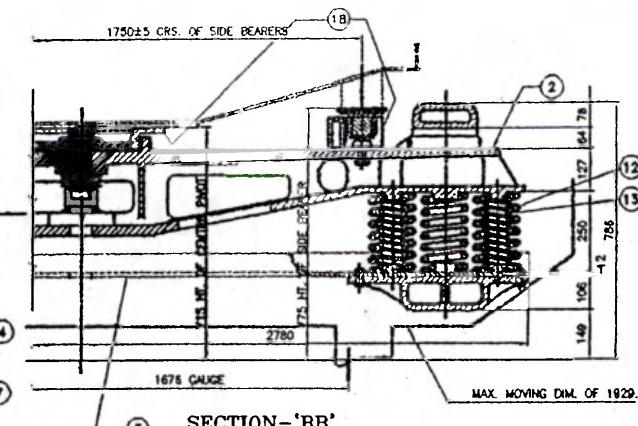
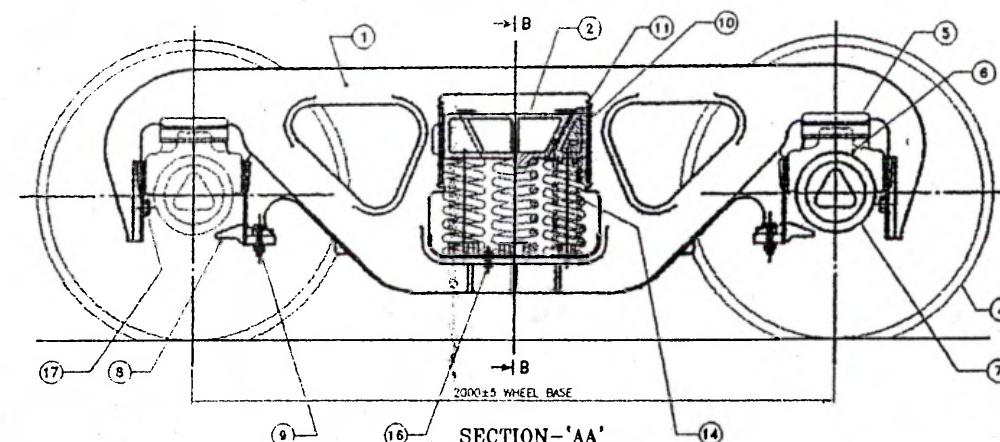


FIG. 1.8

BOGIE GENERAL ARRANGEMENT

RITES



ITEM	DESCRIPTION & DIMENSION	No.OFF /BOGIE	REF.DRG.
18	CENTRE PIVOT & SIDE BEARER ASSEMBLY AND DETAILS	1	CONTR.9404-S/8
17	RETAINER BOLT & NUT	4	CONTR.9404-S/4 ITEM-4
16	244 SNAP HEAD RIVETS	8	-
15	M-24 FIT BOLT WITH CASTLE NUT, WASHER & 5# SPLIT PIN	4	-
14	SNUBBER SPRING	4	CONTR.9404-S/7 ITEM-3
13	BOLSTER SPRING (INNER)	12	" ITEM-2
12	BOLSTER SPRING (OUTER)	14	CONTR.9404-S/7 ITEM-1
11	WEDGE	4	CONTR.9404-S/8
10	SIDE FRAME FRICTION LINER	4	CONTR.9404-S/4 ITEM-6
9	SIDE FRAME KEY BOLT WITH NUT, SPRING WASHER & 4# SPLIT PIN	4	" ITEM-5
8	SIDE FRAME KEY	4	CONTR.9404-S/4 ITEM-3
7	STD. AIR CARTRIDGE R.B.CLASS'E' ASSEMBLY COMPLETE	4	-
6	WIDE JAW ADAPTER	4	SK-78527
5	ELASTOMERIC PAD	4	MD-95005-S/1
4	WHEEL & AXLE COMPLETE	2	CONTR.9404-S/12
3	SPRING PLANK	1	CONTR.9404-S/4 ITEM-1
2	CAST STEEL BOLSTER	1	CONTR.9404-S/5
1	CAST STEEL SIDE FRAME	2	CONTR.9404-S/3

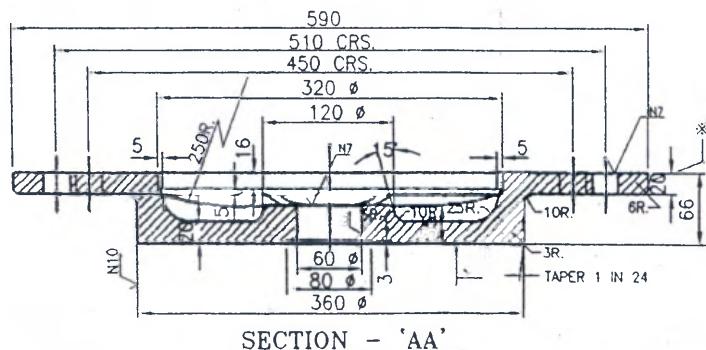
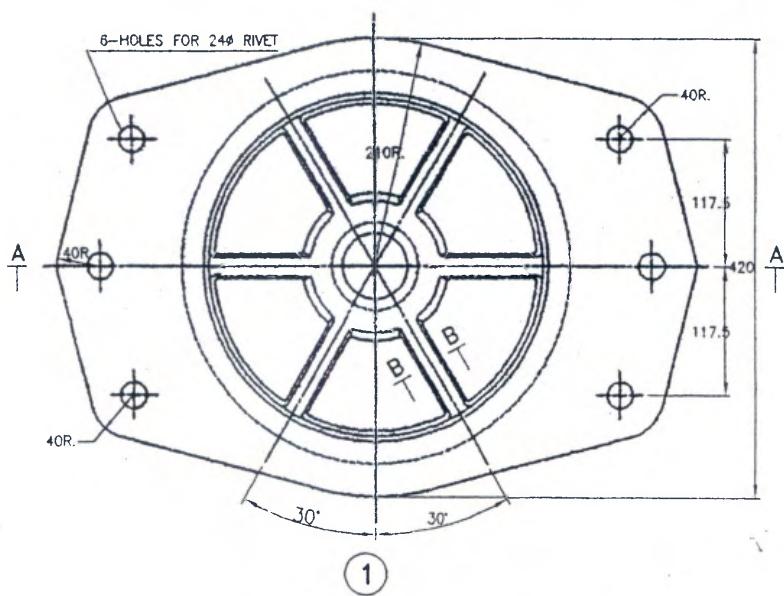
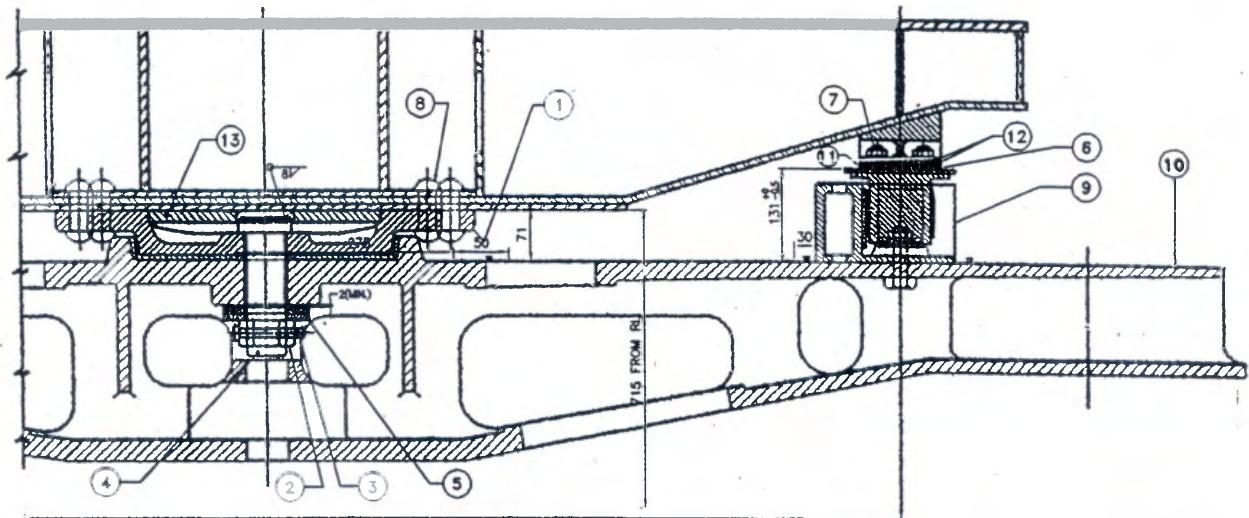
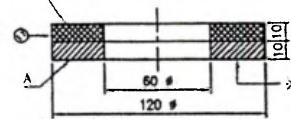
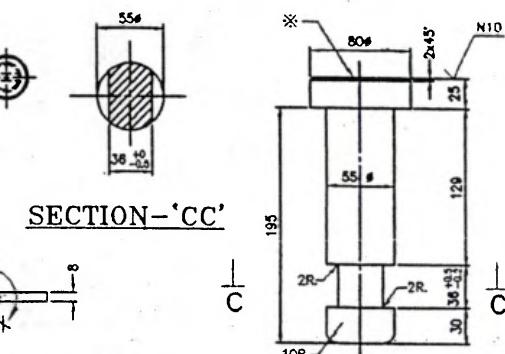
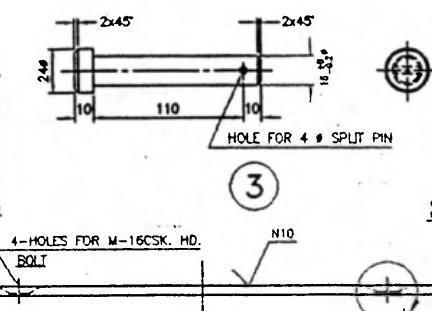
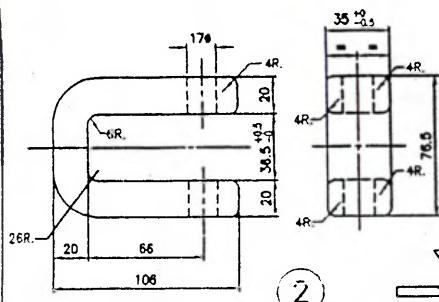


FIG. 1.9
(SHEET 2 OF 2)

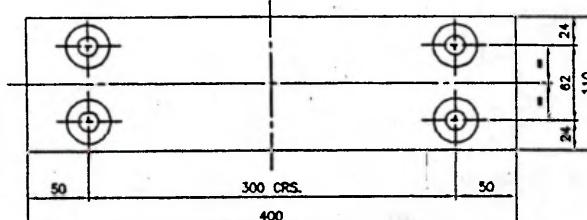
CENTRE PIVOT & SIDE BEARER ASSY & DETAILS

RITES

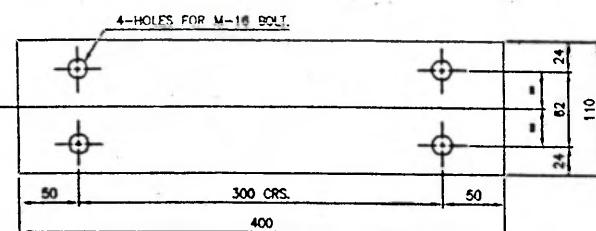


REF. LET.	MATERIAL	SPEC. NO.
A	STEEL	IS:2062Fe410WA
B	VULCANISED NATURAL RUBBER RUBBER BASED COMPOUND.	IS:5192 Gr.-4 TYPE-B

PART 'B' TO BE GLUED/BONDED TO 'A' IN A DIE

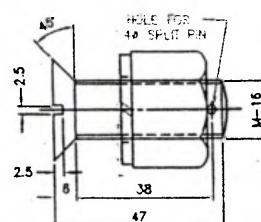
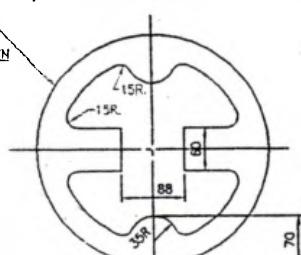


ENLARGED DETAIL AT-'X'



ITEM NO.	THICKNESS
11	1mm.
12	3mm.

STAMP ORG. ITEM No.
MANUFACTURERS INITIALS
MONTH & YEAR OF MANUFACTURE
mm. TYPE



7

13	RETAINING RING	1		IS:2062Fe410WA	
12	PACKING SHIM 3mm THICK	4		IS:2062Fe410WA	
11	PACKING SHIM 1mm THICK	2		IS:1079	
10	BOGIE BOLSTER	1	CONTR-9404-S/5		
9	SIDE BEARER ARRGT. & DETAILS	2	CONTR-9404-S/15		
8	24 ϕ RIVET	6	-	IS:1929 & IS:1148	
7	M-16 BOLT WITH NUT, SPRING WASHER & 4 ϕ SPLIT PIN	8	-	FIT BOLT NUT TO IS:1363	SPRING WASHER IS:3083, SPLIT PIN IS:549
6	TOP SIDE BEARER LINER	2	-	IRS-R-65-78	EXTRAMARINE TO 400-500 BHN
5	WASHER	1	-	SEE TABLE	
4	CENTRE PIVOT PIN	1	-	IS:2062Fe410WA	
3	LOCK PIN	1	-	IS:1875 cl.III	
2	SHACKLE LOCK	1	-	IS:2004 cl-4	
1	CENTRE PIVOT TOP	1	-	AARM-201Gr.C.	300 BHN
ITEM	DESCRIPTION & DIMENSION	No.OFF/BOGIE	REF.DRG.	WT. OF ONE(Kg.)	MATL & SPEC. REMARKS

FIG. 1.10
SHEET 1 OF 2

SPRING LOADED SIDE BEARER ASSEMBLY & DETAILS

RITES

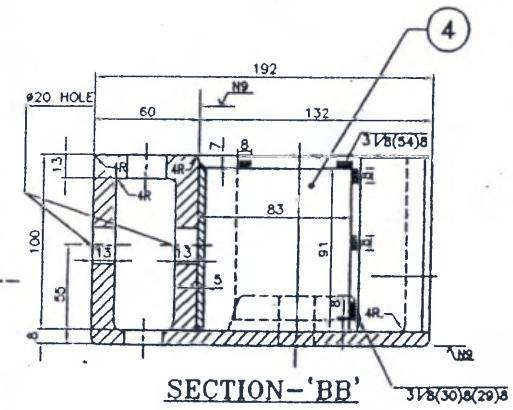
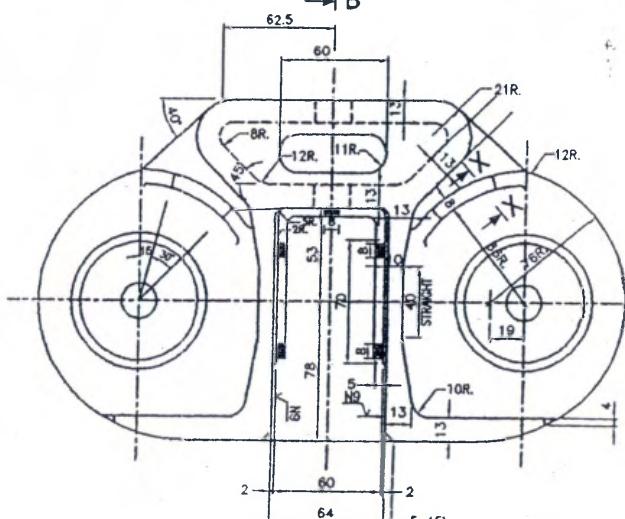
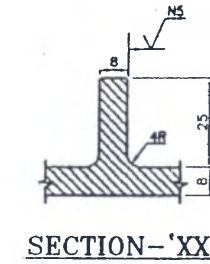
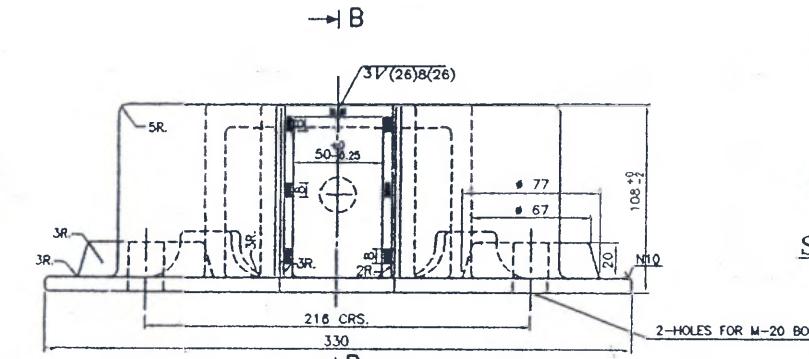
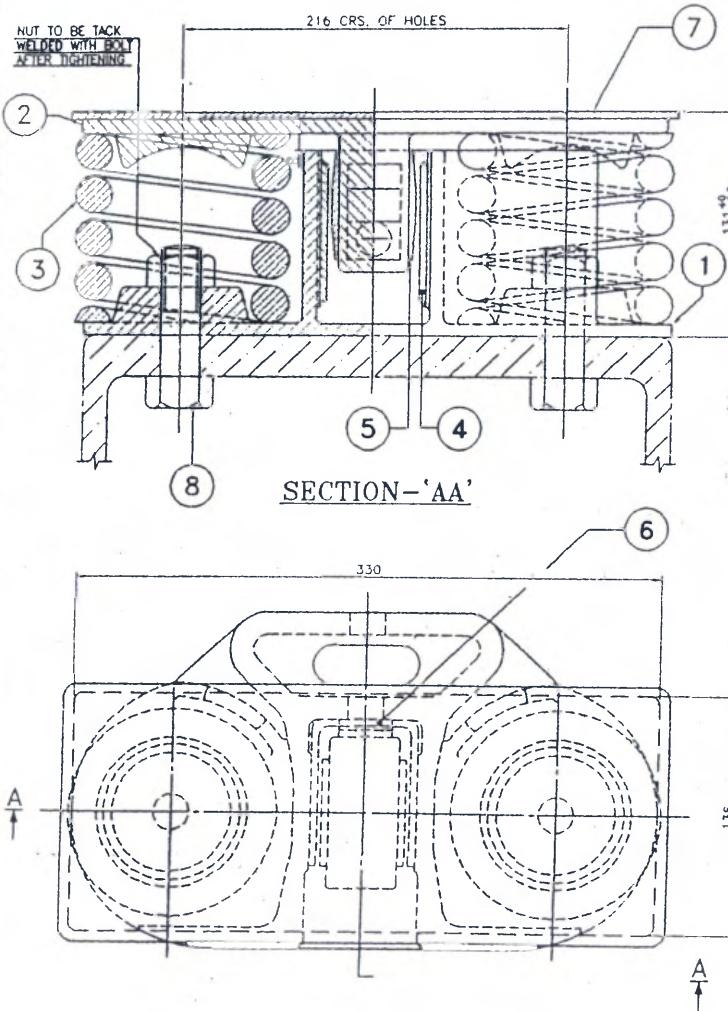
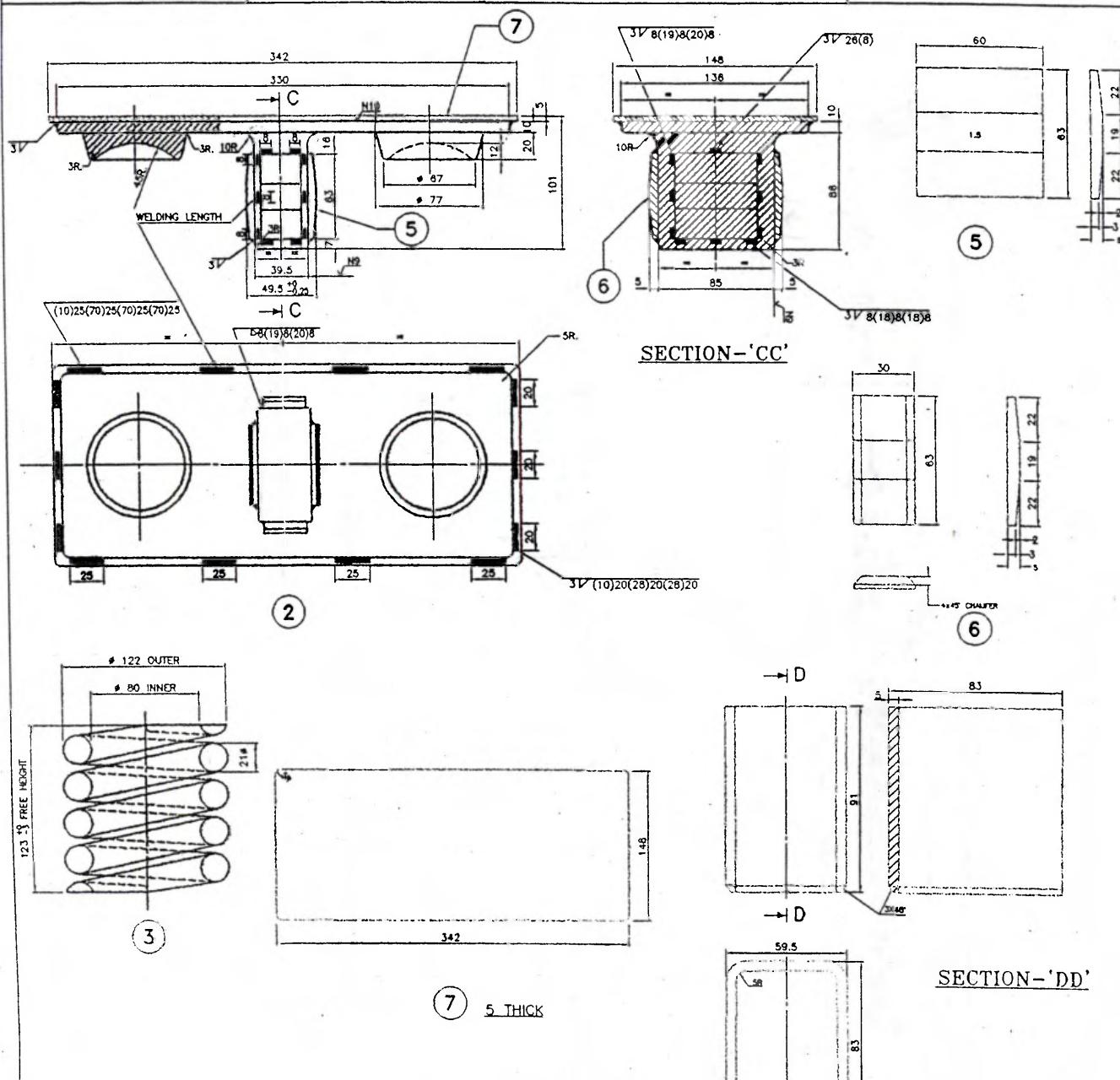


FIG. 1.10
SHEET 2 OF 2

SPRING LOADED SIDE BEARER
ASSEMBLY & DETAILS

RITES



SPRING DATA	
FREE HEIGHT	123 mm.
SOLID HEIGHT	84 mm.
DEFLECTION FREE TO SOLID	39 mm.
WIRE DIA	21 mm.
OUTER DIA OF COIL	122 mm.
LOAD AT SOLID HEIGHT	2502 Kgs.
SCRAF TEST LOAD	2502 Kgs.
DEFLECTION/1000 Kg.	15.59mm.
WINDING	RIGHT HAND
No. OFF EFFECTIVE COILS	3.00
TOTAL No. OF COIL	4.50

ESTIMATED TEST TABLE

LOAD (TONNE)	0	0.5	1.0	1.5	2	TEST LOAD
HEIGHT (mm.)	123	115	107	100	92	84

THE SPRINGS SHALL BE MANUFACTURED AS
PER SPEC. NO. WO-01-HLS-94.

ITEM	DESCRIPTION & DIMENSIONS	NO. OF	REF. DRG	WT. OF MTL. & SPEC.	REMARKS
8	W-20 HEX. HD. BOLT WITH NUTx75LONG	4		IS: 1363	
7	SIDE BEARER TOP LINER	2		IRS-R-65-78	
6	LINER FOR ITEM-2	4		" "	
5	LINER FOR ITEM-2	4		" "	
4	LINER FOR ITEM-1	4		IRS-R-65-78	
3	SPRING	4		IS:3195-92 Cr 51 Cr Mo V4	
2	SIDE BEARER SEAT	2		IS:1030 IS:80320WY	
1	SLIDE BLOCK	2		IS:80320W (IS:80320W)	

FIG.1.11
(SHEET 1 OF 2)

UNDERFRAME BRAKE GEAR ARRANGEMENT (A-CAR)

RITES

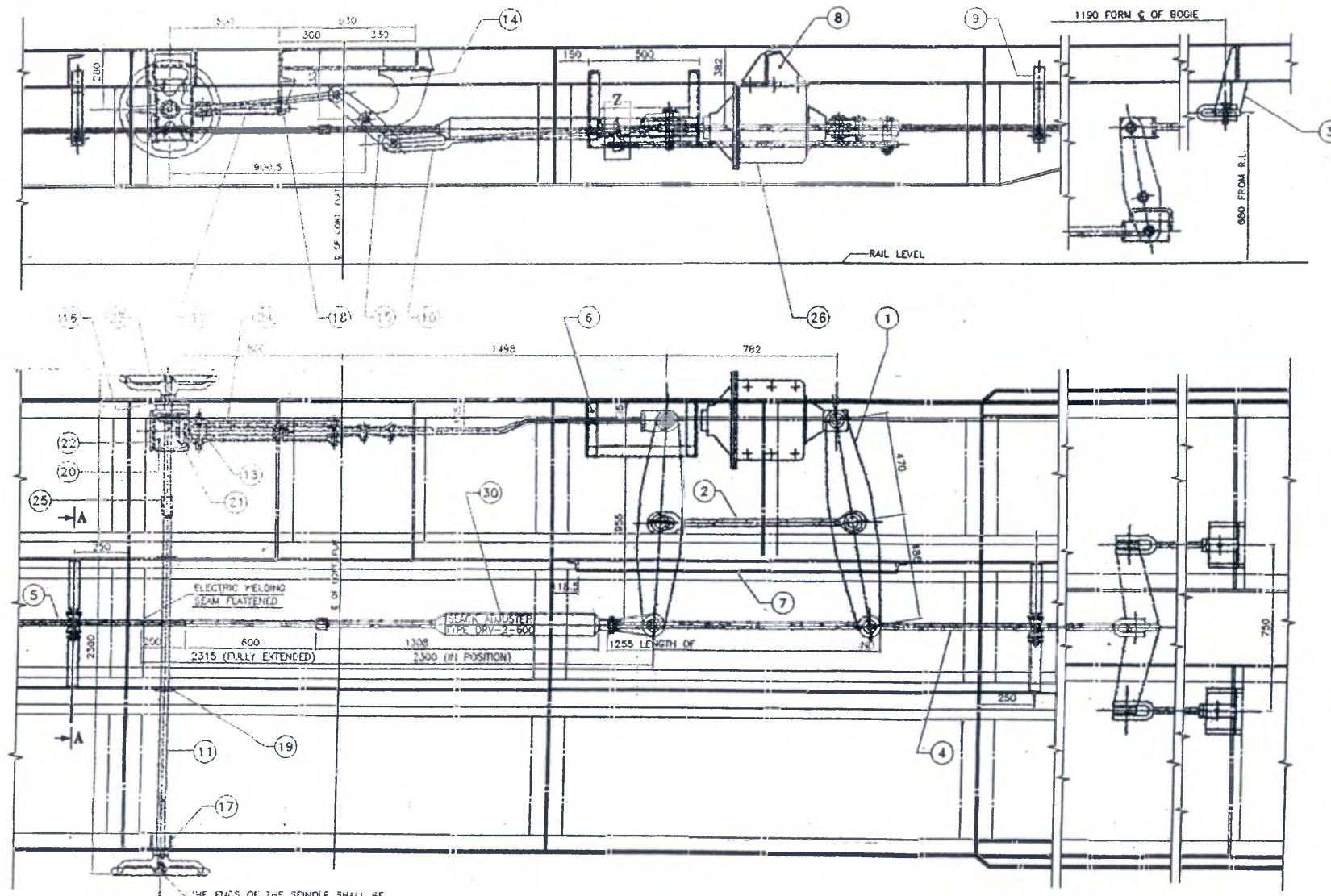
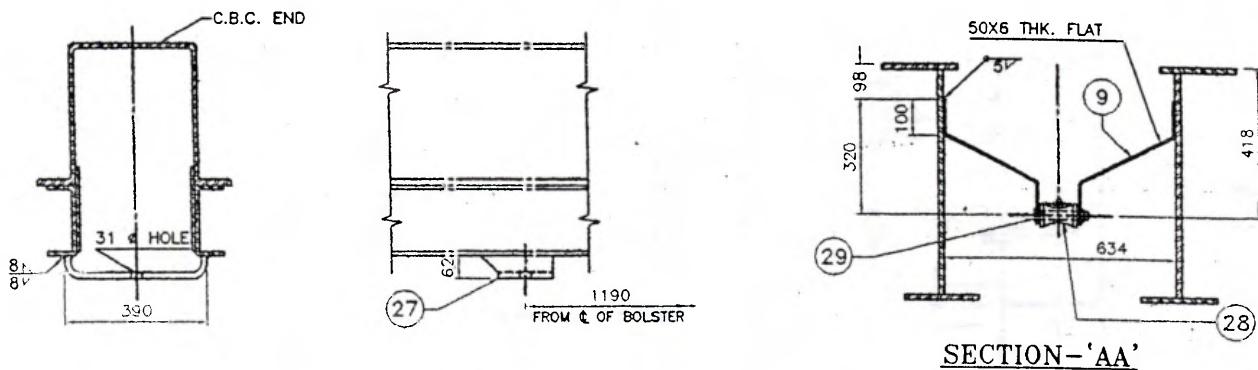


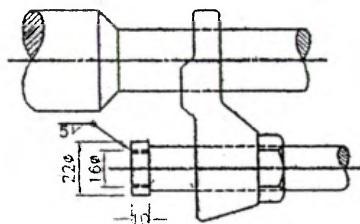
FIG. 1.11
(SHEET 2 OF 2)

UNDERFRAME BRAKE
GEAR ARRANGEMENT - CAR A

RITES



LOCATION OF ANCHOR BRACKET ON C.B.C.END



ENLARGED DETAIL AT - 'Z'

ITEM	DESCRIPTION	NO. OFF PER FLAT	REF. DRG.	WT. IN Kg	MTL. & SPEC	REMARKS
30	SLACK ADJUSTER	1	07-ABR-92			DRV-2-600
29	PIN FOR ITEM-28 WITH WASHER & SPLIT PIN	2	CONTR-9405 S/11 ITEM-12			
28	PULL ROD SUPPORT PULLEY	2	" " " ITEM-13			
27	ANCHOR BRACKET FOR BOGE PULL ROD (C.B.C. END)	1	CONTR-9405-S/11 ITEM-10			
26	BRAKE CYLINDER	1	WD-92051-S/6			
25	SLEEVE	1	W/BG-6310			
24	HAND BRAKE CONNECTING LINK	2	W/BG-1190			
23	HAND BRAKE WHEEL	2	W/BG-1344 (WDO)			
22	HAND BRAKE GEAR BOX COVER	1	W/BG-1134			
21	HAND BRAKE BEVEL WHEEL	2	W/BG-1131			
20	HAND BRAKE BEVEL GEAR BOX	1	W/BG-1133			
19	MIDDLE SUPPORT FOR ITEM-11	2	CONTR-9405 S/12 ITEM-10			
18	SUPPORTING BRACKET FOR ITEM-12	1	" " " ITEM-9			
17	END SUPPORT FOR ITEM-11	1	" " " ITEM-8			
16	GEAR BOX HANGER BRACKET	1	" " " ITEM-7			
15	BRAKE EQUALISING LEVER	2	" " " ITEM-6			
14	EQUALISING LEVER SUPPORT BRACKET	1	" " " ITEM-5			
13	HAND BRAKE SCREW NUT WITH M-30 WASHER & 5° SPLIT PIN	1	" " " ITEM-4			
12	HAND BRAKE SCREW	1	" " " ITEM-3			
11	HAND BRAKE SHAFT	1	" " " ITEM-2			
10	HAND BRAKE PULL ROD	1	CONTR-9405-S/12 ITEM-1			
9	PULL ROD SUPPORT BRACKET	4	CONTR-9405-S/11 ITEM-9			
8	BRACKET FOR BRAKE CYLINDER	1	" " " ITEM-8			
7	HORIZONTAL LEVER SUPPORT (LARGE)	1	" " " ITEM-7			
6	HORIZONTAL LEVER SUPPORT (SMALL)	1	" " " ITEM-5			
5	PULL ROD MAIN SLACK ADJ. SIDE	1	" " " ITEM-4			
4	PULL ROD MAIN	1	" " " ITEM-3			
3	ANCHOR BRACKET FOR BOGE END PULL ROD (DRAW BAR END)	2	" " " ITEM-11			
2	TIE ROD	1	" " " ITEM-2			
1	HORIZONTAL LEVER	2	CONTR-9405-S/11 ITEM-1			

FIG.1.12
(SHEET 1 OF 2)

UNDERFRAME BRAKE GEAR ARRANGEMENT (B-CAR)

RITES

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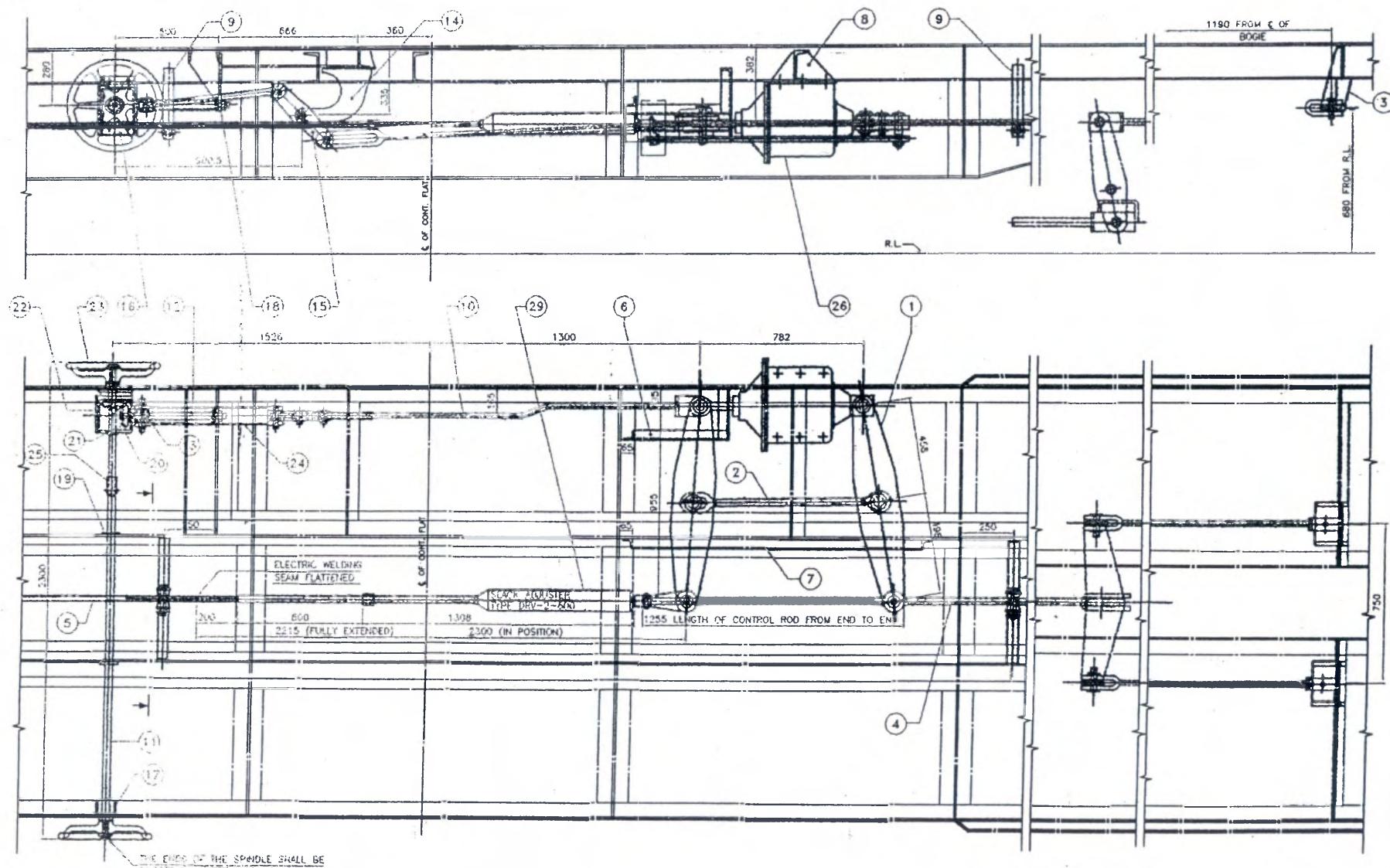
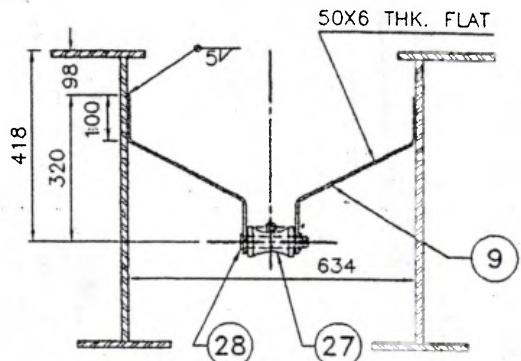
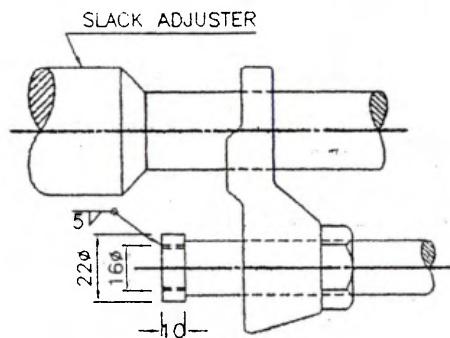


FIG. 1.12
(SHEET 2 OF 2)

UNDERFRAME BRAKE
GEAR ARRANGEMENT
B-CAR

RITES



ENLARGED DETAIL AT - 'Z'

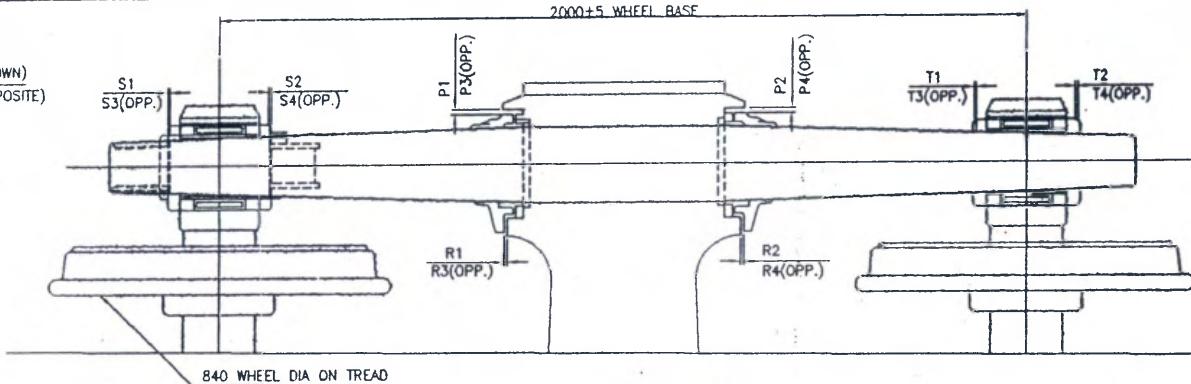
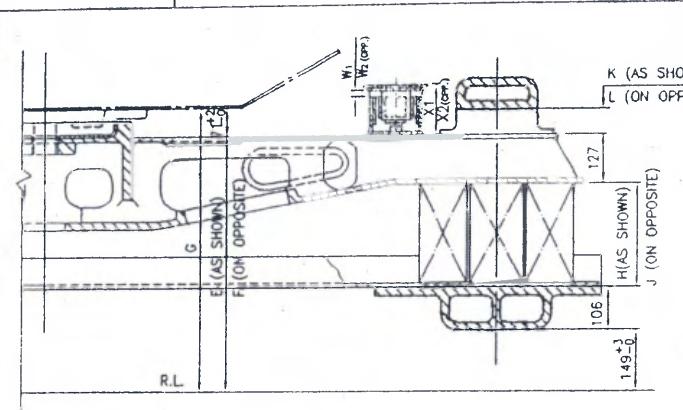
SECTION - 'AA'

ITEM	DESCRIPTION & DIMENSIONS	NO. / FLAT	REF. DRGS.	WT. OF ONE (Kg.)	MATL. & SPEC	REMARKS
29	SLACK ADJUSTER	1	07-ABR-92			DRV-2-600
28	PIN FOR ITEM-27 WITH WASHER & SPLIT PIN	2	CONTR-9405 S/11 ITEM-12			
27	PULL ROD SUPPORT PULLY	2	" ITEM-13			
26	BRAKE CYLINDER	1	WD-92051-S/6			
25	SLEEVE	1	W/BG.-6310			
24	HAND BRAKE CONNECTING LINK	2	W/BG.-1190			
23	HAND BRAKE WHEEL	2	W/BG.-1344			
22	HAND BRAKE GEAR BOX COVER	1	W/BG.-1134			
21	HAND BRAKE BEVEL WHEEL	2	W/BG.-1131			
20	HAND BRAKE BEVEL GEAR BOX	1	W/BG.-1133			
19	MIDDLE SUPPORT FOR ITEM-11	2	CONTR-9406 S/8 ITEM-10			
18	SUPPORTING BRACKET FOR ITEM-12	1	" ITEM-9			
17	END SUPPORT FOR ITEM-11	1	" ITEM-8			
16	GEAR BOX HANGER BRACKET	1	" ITEM-7			
15	BRAKE EQUALISING LEVER	2	" ITEM-6			
14	EQUALISING LEVER SUPPORT BRACKET	1	" ITEM-5			
13	HAND BRAKE SCREW NUT WITH M-30 WASHER & SPLIT PIN	1	" ITEM-4			
12	HAND BRAKE SCREW	1	" ITEM-3			
11	HAND BRAKE SHAFT	1	" ITEM-2			
10	HAND BRAKE PULL ROD	1	CONTR-9406-S/8 ITEM-1			
9	PULL ROD SUPPORT BRACKET	4	CONTR-9405-S/11 ITEM-9			
8	BRACKET FOR BRAKE CYLINDER	1	" ITEM-8			
7	HORIZONTAL LEVER SUPPORT(LARGE)	1	" ITEM-7			
6	HORIZONTAL LEVER SUPPORT(SMALL)	1	" ITEM-6			
5	PULL ROD MAIN (SLACK ADJ. SIDE)	1	" ITEM-4			
4	PULL ROD MAIN	1	" ITEM-3			
3	ANCHOR BRACKET FOR BOGIE PULL ROD	4	" ITEM-11			
2	TIE ROD	1	" ITEM-2			
1	HORIZONTAL LEVER	2	CONTR-9405-S/11 ITEM-1			

FIG. 3.1

LOAD TEST CHART

RITES



TOLERANCES						
AS PER DRG.	12.5 ± 1.5	$2^{+1.5}_0$	10^{+5}_0	10^{+3}_0	8^{+3}_0	$131^{+9}_{-8.5}$
AS MEASURED	P1	R1	S1 + S2 =	T1 + T2 =	W1	X1
	P2	R2				
	P3	R3	S3 + S4 =	T3 + T4 =	W2	X2
	P4	R4				

DIAGONAL DISTANCES BETWEEN SIDE FRAME						
A + D	B + C					
3018 ± 4.5	3018 ± 4.5					

LOAD	DIMENSION	HT. OF	HT. OF	HT. OF	BOLSTER
		S.B.	CENTRE	BOLSTER	CLEAR-
		BOTTOM	PIVOT	SPRING	ANCE
TARE 4.7t	AS PER DRG.	644	715	250 ± 2	64
	AS PER MEASURED	E		H	K
GROSS 35.2t	AS PER DRG.	602	673	208 ± 2	106
	AS PER MEASURED	E		H	K
UNDER 50% EXTRA LOAD 50.5t	AS PER DRG.	580	651	186	128
	AS PER MEASURED	E		H	K
AFTER REMOVAL OF LOAD 4.7t	AS PER DRG.	644	715	250 ± 2	64
	AS PER MEASURED	E		H	K

NOTE:-

1. THE INDICATED HEIGHTS FROM R.L. ARE FOR BOGIE UNDER TARE.
2. THE MAXIMUM DIFFERENCE BETWEEN TWO DIAGONALS SHALL NOT BE MORE THAN 3.5mm.
3. DIAGONAL DISTANCE BETWEEN SIDE FRAMES IS 3018 ± 4.5
4. DIFFERENCE BETWEEN A,B,C & D NOT TO EXCEED 4mm.
5. DIFFERENCE BETWEEN E & F AS ASSEMBLED NOT TO EXCEED 1.0mm.

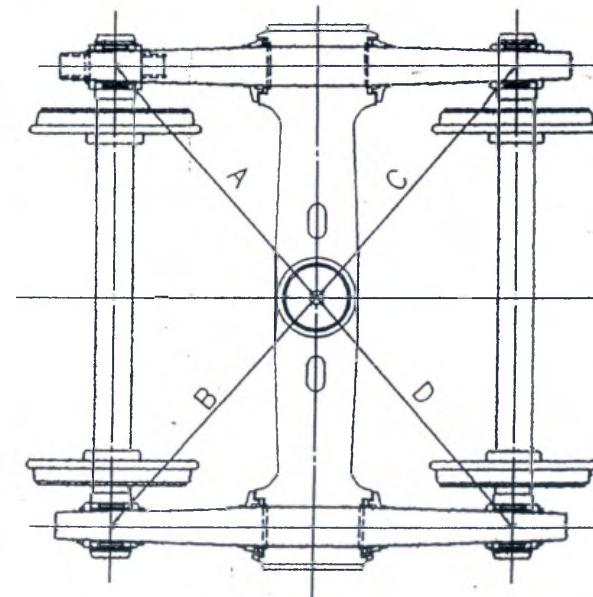
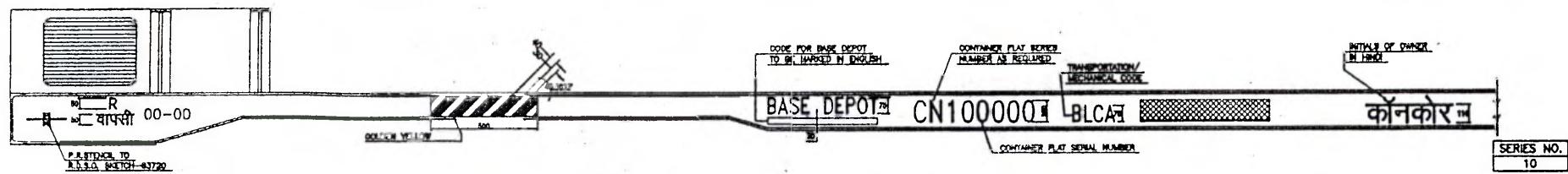


FIG. 3.2
(SHEET 1 OF 2)

MARKING DIAGRAM (A-CAR)

RITES

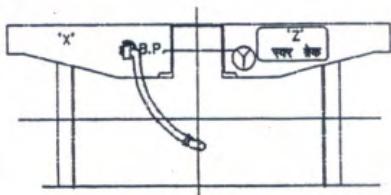
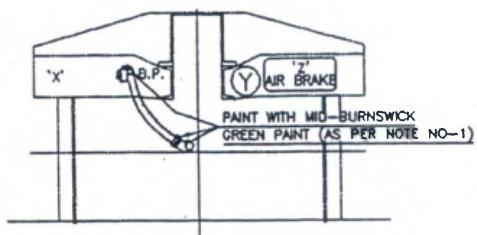


122

FIG 3.2
(SHEET 2 OF 2)

MARKING DIAGRAM
(A-CAR)

RIITES



क्रम सं. स्टेशन कोड तारीख		
100	200	100
25	25	25
25	25	25
400		

(B1)

LEGEND MARKING IN HINDI FOR SICK LINE REPAIRS
SHOWN ABOVE TO BE MARKED IN THE AREA SHOWN THUS ■■■■■

SL.NO. STN.CODE DATE		
100	200	100
25	25	25
25	25	25
400		

(B)

LEGEND MARKING IN ENGLISH FOR SICK LINE
REPAIRS SHOWN ABOVE TO BE MARKED IN THE AREA SHOWN
THUS ■■■■■

CONTRACT No.
DATE OF COMMISSIONING:
COMMISSIONED BY:
INSPECTION DUE ON:
INSPECTION DONE BY (DEPOT):
DATE:

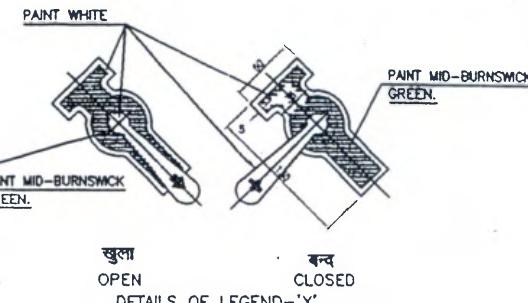
LEGEND SHOWN ABOVE TO BE MARKED IN THE AREA
SHOW THUS ■■■■■
(WARRANTY MARKINGS TO BE DONE BY BUILDERS ONLY)

कान्टेनर नं. :
स्टेशन की तारीख :
प्रिंटिंग :
निरीक्षण की तारीख :
निरीक्षण द्वारा करना :
तारीख :

LEGEND SHOWN ABOVE TO BE MARKED IN THE AREA
SHOW THUS ■■■■■
(WARRANTY MARKINGS TO BE DONE BY BUILDERS ONLY)



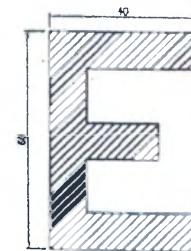
LEGEND-'Y'



चुला
OPEN
कन्द
CLOSED
DETAILS OF LEGEND-'X'

MAKES OF AIR-BRAKE EQUIPMENT	TYPE	प्रकार
ESCORT	ESC-KE	इ. एस के-ई
STONE INDIA	SIL-CH	स्टोन ब्रैक एस-सी
WESTING HOUSE	WSF-WA	वेस्टिंग हाउस ए
S.D.TECHNICAL	SDT-WA	सी.डी.टी.कॉर्पोरेशन ए
SUNDARAM CLAYTON	SCL-CH	सुन्दराम क्लैय्टन ए
GREYSHAM	GRE-O	ग्रीष्म-ओ
BHARAT BRAKES	BBV-O	भारत-ओ

DETAILS OF LEGEND-'Z'



PROPORTION OF ENGLISH
LETTERS & FIGURES

NOTE:-

- 1- PAINT CONTAINER FLAT COMPLETE INCLUDING BRAKE PIPE (B.P.) WITH ITS TWO ANGLE COCKS, HOSE NIPPLES WITH CLAMPS WITH READY MIXED PAINT TO IS:124(PLII) HAVING MID-BRUNSWICK GREEN COLOUR NO. 226 TO IS:5.
- 2- LEGEND 'X' AND OTHER MARKINGS UNLESS SPECIFIED WITH READY MIXED WHITE PAINT TO IS:127
- 3- LEGEND AA1,B,B1,X,Y,&Z SHALL BE PAINTED WITH BLACK LETTERS ON YELLOW BACK GROUND
- 4- ONLY INTERNATIONAL NUMERALS SHOULD BE USED
- 5- FOR THE PROPORTION OF HINDI ALPHABETS REFER R.D.S.O. SK-66510
- 6- THE MARKING IN HINDI SHALL BE DONE ON ONE SIDE OF CONTAINER FLAT AND IN ENGLISH ON THE OTHER SIDE. HOWEVER INITIALS OF OWNER BOTH IN HINDI & ENGLISH AND LEGENDS 'X' AND 'R' ARE TO BE MARKED ON BOTH SIDES OF CONTAINER FLAT.
- 7- STENCIL MARKINGS AFTER SICK LINE REPAIRS WHENEVER CONTAINER FLAT IS ATTENDED ARE TO BE STENCILLED IN HINDI ON ONE SIDE AND IN ENGLISH ON OTHER SIDE.
- 8- SERIES NO. 10 IS TO BE MARKED ON CONTAINER FLATS FITTED WITH AIR BRAKE EQUIPMENTS.
- 9- LEGEND 'Y' MARK HT OR SDB FOR HIGH TENSILE COUPLER OR SLACK FREE DRAWBAR
- 10- MARKING FOR 'X'&'Y' & B.P. REMAIN SAME ON BOTH HINDI & ENGLISH AIR-BRAKE TYPE AS INDICATED SHALL BE STENCILLED ACCORDING TO THE MAKE OF AIR-BRAKE EQUIPMENT FITTED AT 'Z'
- 11- INITIALS OF OWNER IN ENGLISH & HINDI TO BE PAINTED WITH BLACK LETTERS ON WHITE BACKGROUND. FOR COLOUR SCHEME OF 'LOGO' REF. DETAIL-'K'

FIG. 3.3
(SHEET 1 OF 2)

MARKING DIAGRAM (B-CAR)

RITES

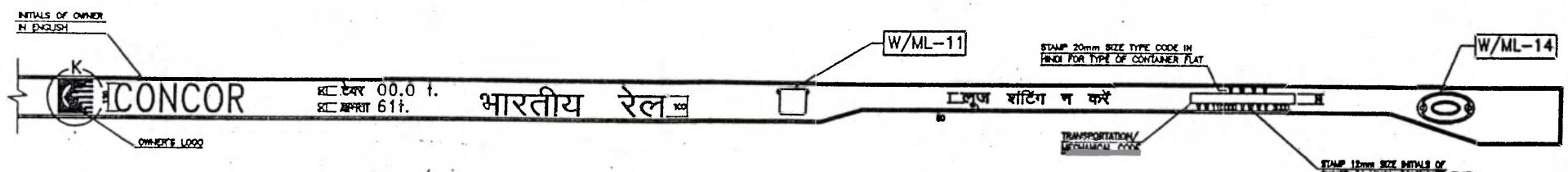
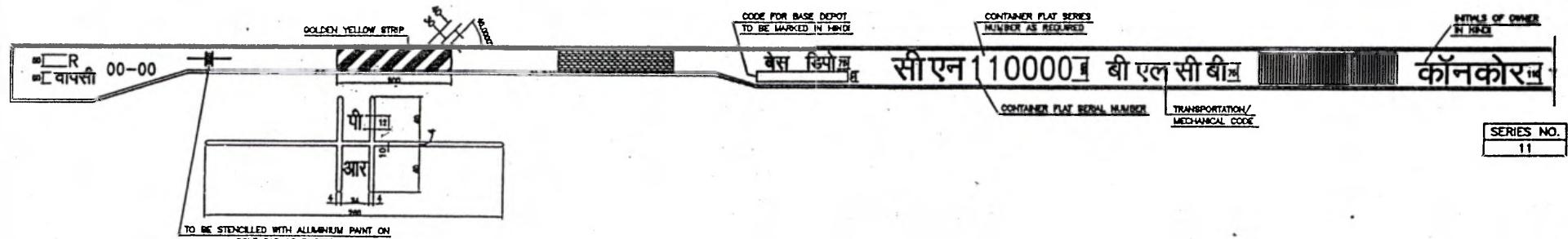
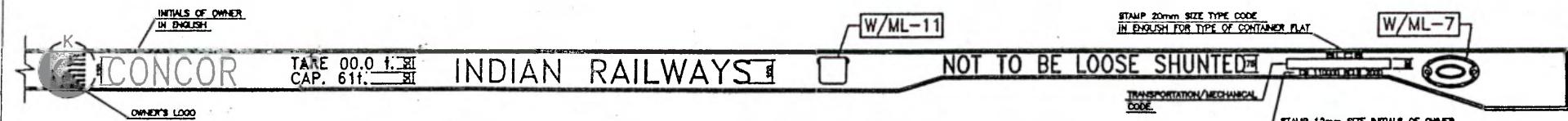
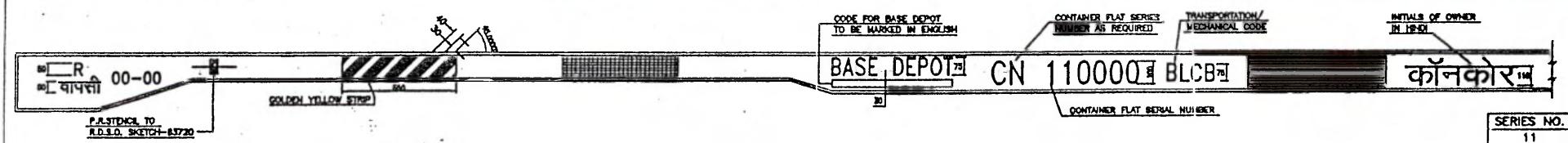
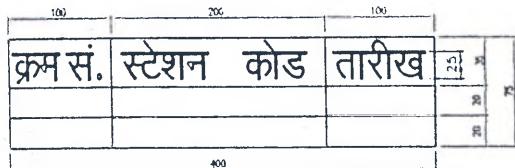
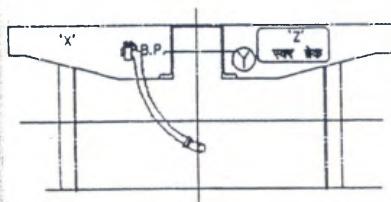
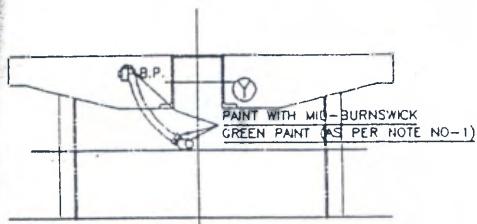


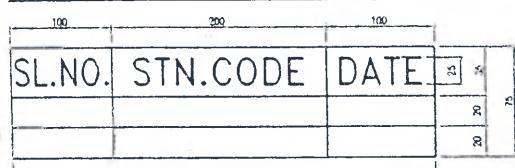
FIG 3.3
(SHEET 2 OF 2)

MARKING DIAGRAM
(B-CAR)

RITES



LEGEND MARKING IN HINDI FOR SICK LINE REPAIRS
SHOWN ABOVE TO BE MARKED IN THE AREA SHOWN



LEGEND MARKING IN ENGLISH FOR SICK LINE
REPAIRS SHOWN ABOVE TO BE MARKED IN THE AREA SHOWN
THIS

(A)

CONTRACT No.
DATE OF COMMISSIONING:
COMMISSIONED BY:
INSPECTION DUE ON:
INSPECTION DONE BY(DEPOT):
DATE:

LEGEND SHOWN ABOVE TO BE MARKED IN THE AREA
SHOW THIS

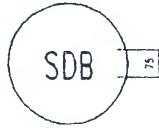
(WARRANTY MARKINGS TO BE DONE BY BUILDERS ONLY)

(A1)

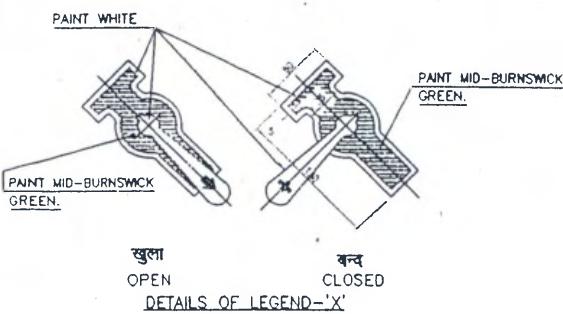
कार्टर नं.:
कार्टरिंग की तरीख :
सिर्किल :
नियन्त्रण की नियत तारीख :
नियन्त्रण किये थे नाम :
तरीख :

LEGEND SHOWN ABOVE TO BE MARKED IN THE AREA
SHOW THIS

(WARRANTY MARKINGS TO BE DONE BY BUILDERS ONLY)



LEGEND-'Y'



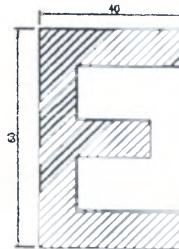
MAKES OF AIR-BRAKE EQUIPMENT	TYPE	प्रकार
ESCORT	ESC-KE	इंस्ट्रॉक्स
STONE INDIA	SIL-CH	स्टोन चैम्पियन
WESTING HOUSE	WSF-WA	वेस्टिंग हाउस
S.D.TECHNICAL	SDT-WA	सी.डी.टी.चैम्पियन
SUNDARAM CLAYTON	SCL-CH	सुन्दराम चैम्पियन
GREYSHAM	GRE-O	ग्रीषम
BHARAT BRAKES	BBV-O	भारत ब्रेक्स

DETAILS OF LEGEND-'Z'



BACKGROUND WHITE

DETAIL-'K'



PROPORTION OF ENGLISH LETTERS & FIGURES

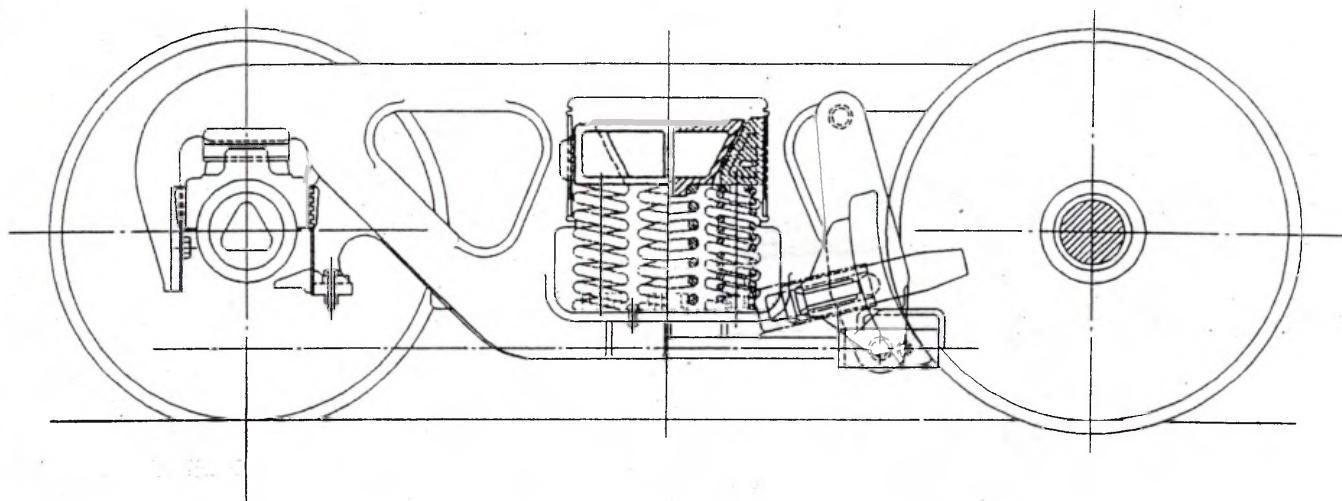
NOTE:-

- 1- PAINT CONTAINER FLAT COMPLETE INCLUDING BRAKE PIPE (B.P.) WITH ITS TWO ANGLE COCKS, HOSE NIPPLES WITH CLAMPS WITH READY MIXED PAINT TO IS:124(PL.III) HAVING MID-BRUNSWICK GREEN COLOUR NO. 226 TO IS:5.
- 2- LEGEND 'X' AND OTHER MARKINGS UNLESS SPECIFIED WITH READY MIXED WHITE PAINT TO IS:127.
- 3- LEGEND AA1.B.B1.X.Y.&Z SHALL BE PAINTED WITH BLACK LETTERS ON YELLOW BACKGROUND.
- 4- ONLY INTERNATIONAL NUMERALS SHOULD BE USED.
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- 6- THE MARKING IN HINDI SHALL BE DONE ON ONE SIDE OF CONTAINER FLAT AND IN ENGLISH ON THE OTHER SIDE. HOWEVER INITIALS OF OWNER BOTH IN HINDI & ENGLISH AND LEGENDS 'X' AND 'Z' ARE TO BE MARKED ON BOTH SIDES OF CONTAINER FLAT.
- 7- STENCIL MARKINGS AFTER SICK LINE REPAIRS WHENEVER CONTAINER FLAT IS ATTENDED TO BE STENCILLED IN HINDI ON ONE SIDE AND IN ENGLISH ON OTHER SIDE.
- 8- SERIES NO. 11 IS TO BE MARKED ON CONTAINER FLATS FITTED WITH AIR BRAKE EQUIPMENTS.
- 9- LEGEND 'Y' MARK HT OR SDB FOR HIGH TENSILE COUPLER OR SLACK FREE DRAWBAR.
- 10- MARKING FOR 'X' 'Y' & 'B.P.' REMAIN SAME ON BOTH HINDI & ENGLISH AIR-BRAKE TYPE AS INDICATED SHALL BE STENCILLED ACCORDING TO THE MAKE OF AIR-BRAKE EQUIPMENT FITTED AT 'Z'
- 11- INITIALS OF OWNER IN ENGLISH & HINDI TO BE PAINTED WITH BLACK LETTERS ON WHITE BACKGROUND. FOR COLOUR SCHEME OF 'LOGO' REF. DETAIL-'K'

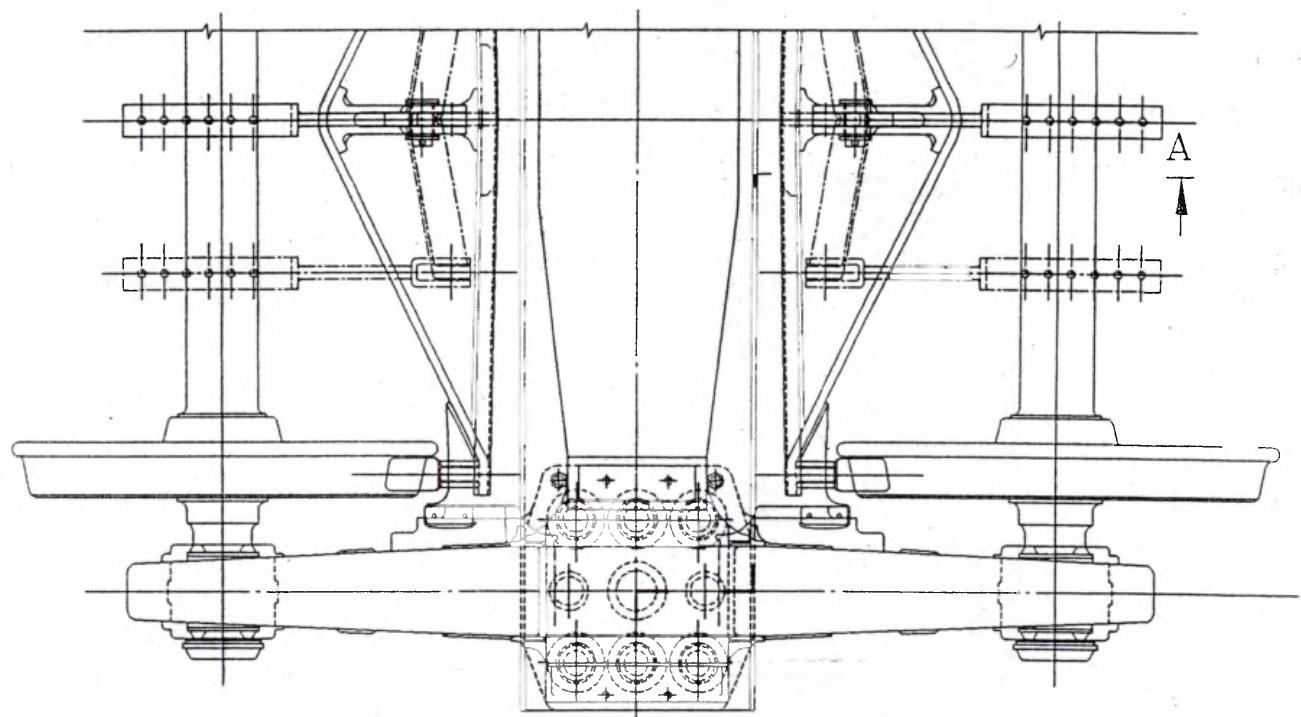
FIG. 4.1

BOGIE GENERAL ARRANGEMENT
FITTED WITH TAPERED
CARTRIDGE ROLLER BEARING

RITES



SECTION - AA

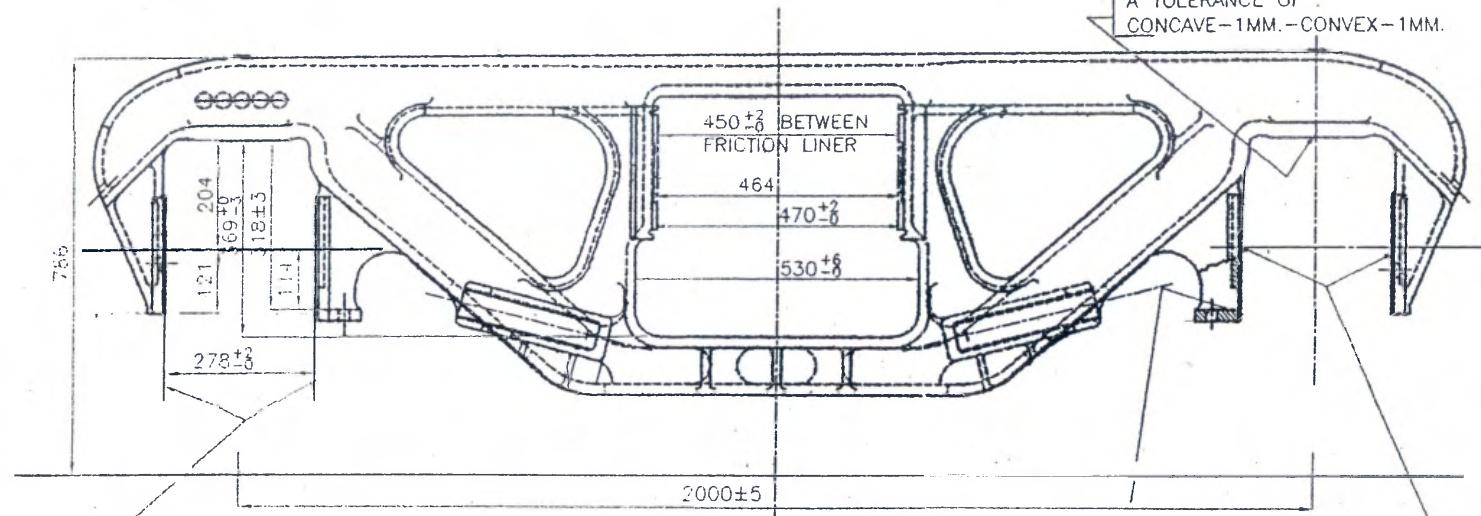


A
↑

FIG. 4.2

CAST STEEL SIDE FRAME

RITES



HALF VIEW LOOKING IN DIRECTION-'Y'

HALF VIEW LOOKING IN DIRECTION-'X'

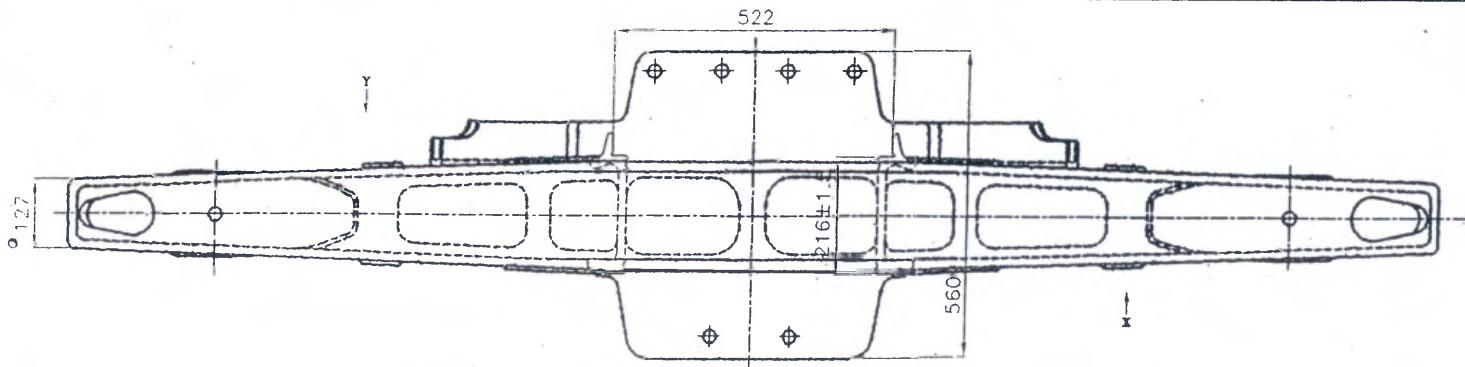
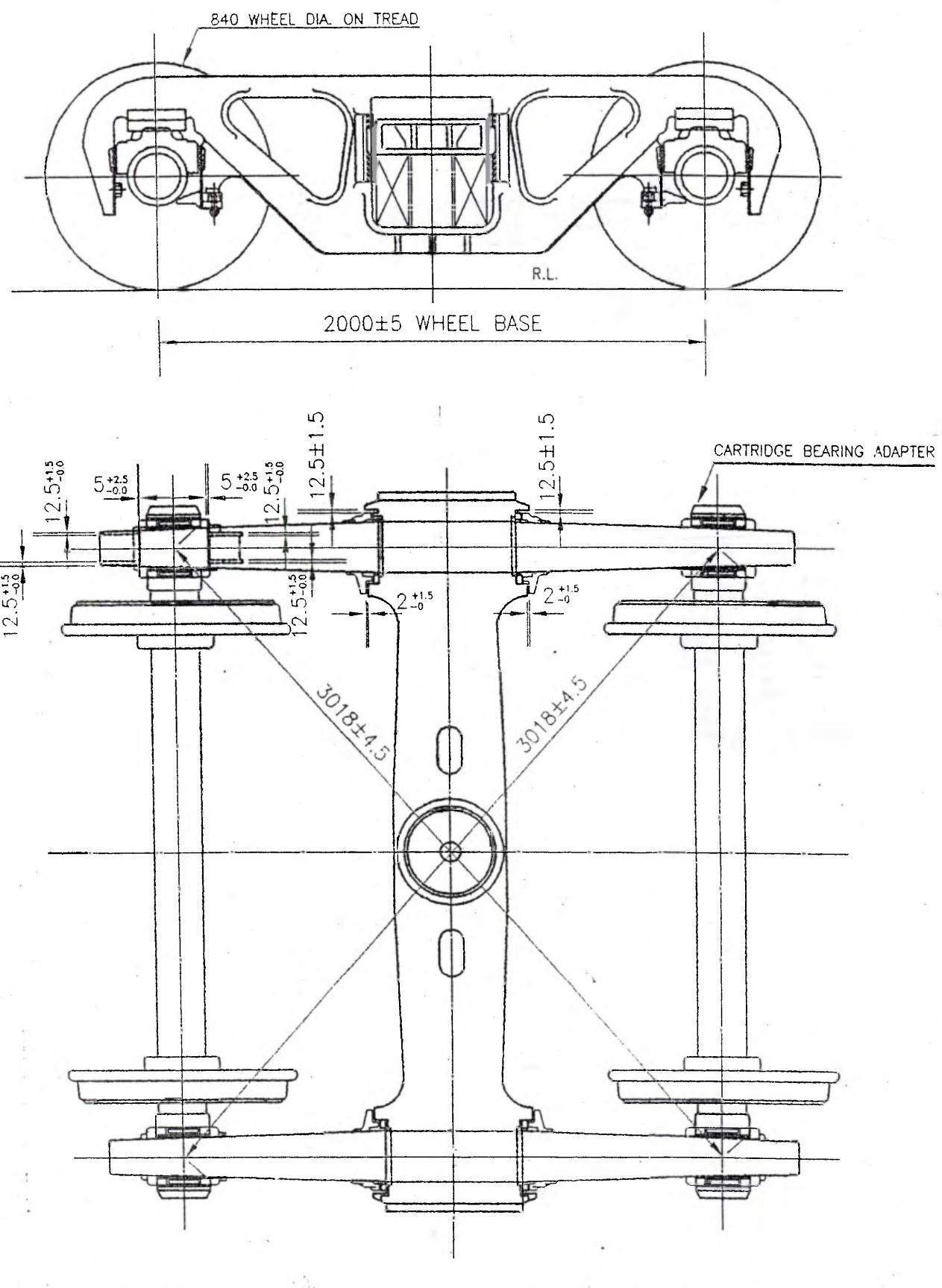
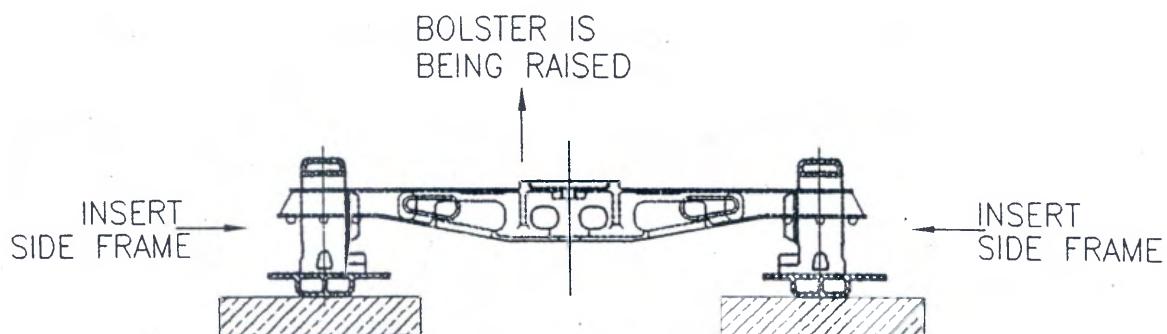


FIG. 4.3

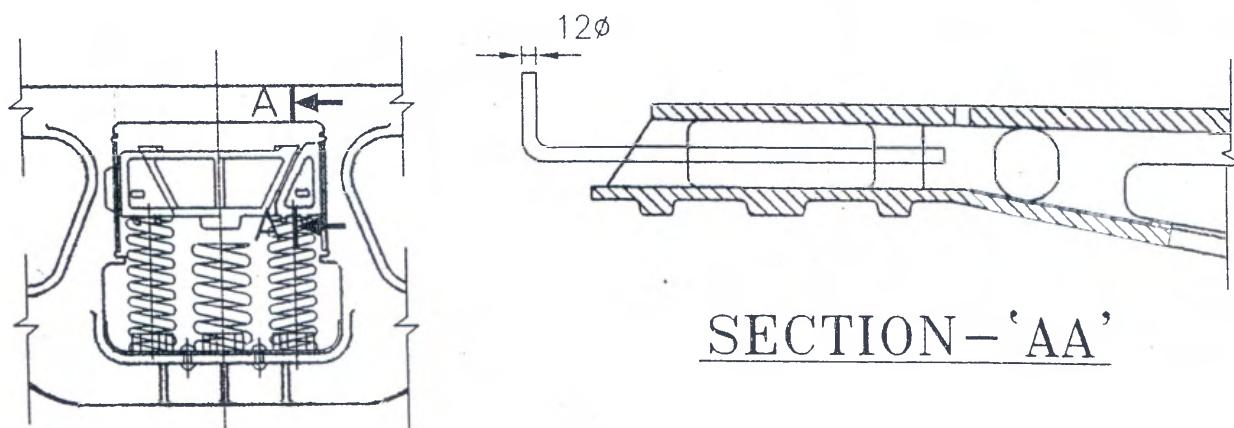
NOMINAL CLEARANCES

RITES



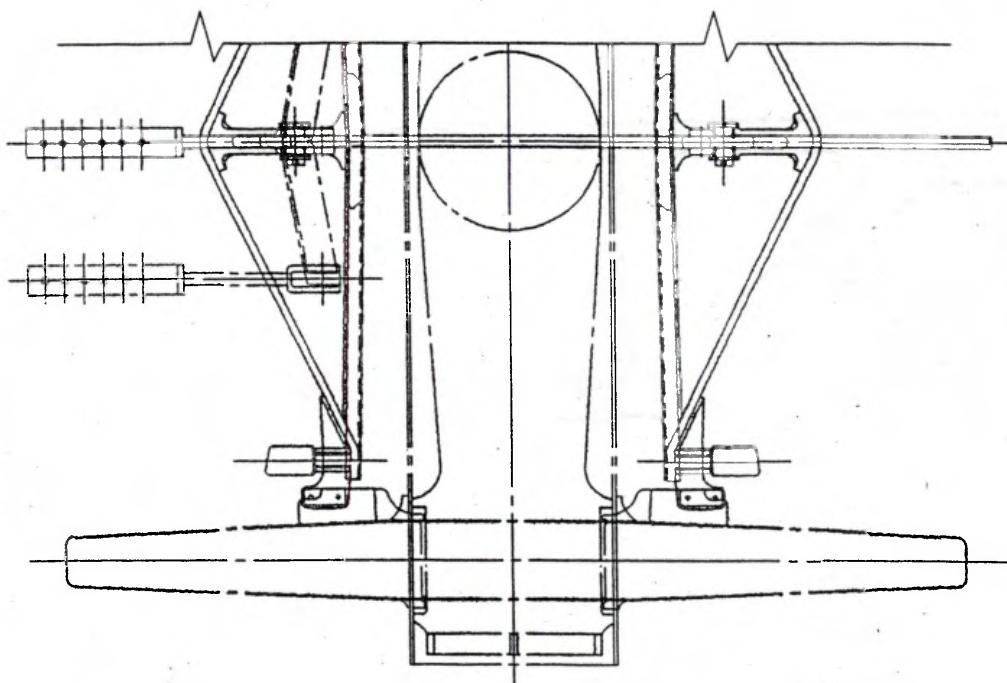


- i) INSERT THE SIDE FRAME FROM EACH END OF BOLSTER.
- ii) CLAMP THE SIDE FRAME.

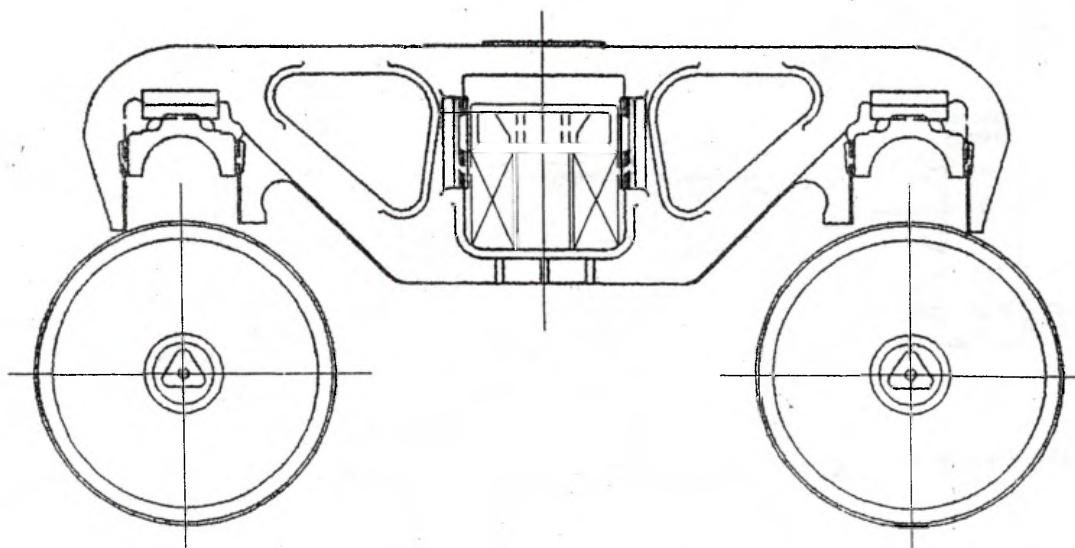


SECTION - 'AA'

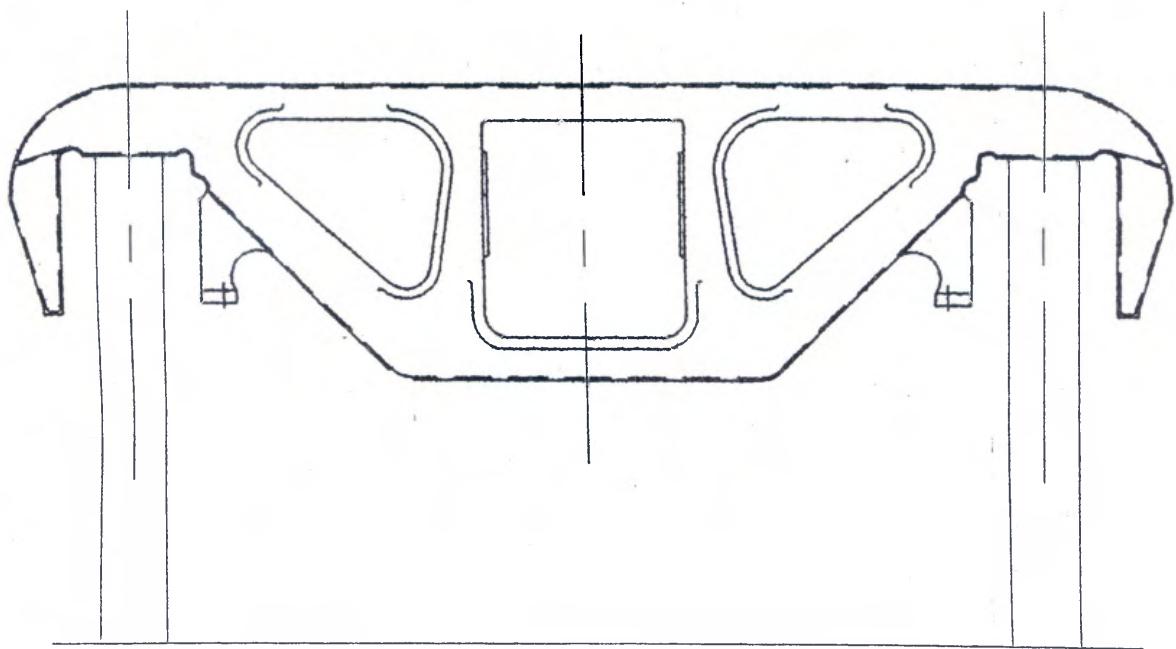
- iii) RAISE BOLSTER TO THE MAXIMUM POSSIBLE EXTENT.
- iv) PUSH THE SPRING PLANK THROUGH ONE END OF SIDE FRAME TO THE OUTER SIDE FRAME.
- v) LOCATE WITH FIT BOLTS AND RIVET THE REMAINING HOLES.
- vi) INSERT SNUBBER WEDGE INTO THE BOLSTER TAIL POCKET AND HOLD THEM BY PINS AS SHOWN.
- vii) PLACE THE LOAD BEARING SPRINGS LOCATING THE LOWER SPIGOTS OF SPRING PLANK.
- viii) LOWER THE BOLSTER TO SETTLE ON THE SPRINGS. ENSURE THE INNER SPRINGS LOCATE THE SPIGOTS PROPERLY AND REMOVE THE WEDGE PIN.



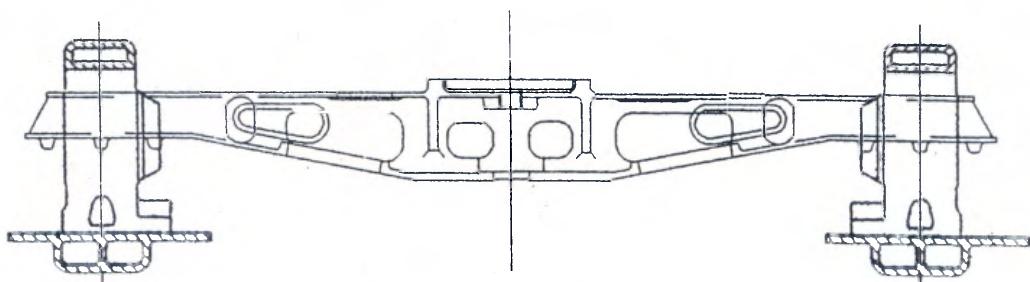
9. ASSEMBLE BRAKE BEAM WITH SIDE FRAMES, AFTER FITTING THE BRAKE BEAM WEAR LINER INTO THE CORRESPONDING INNER GUIDES ON THE FRAME.



10. RAISE THE COMPLETE ASSEMBLY & LOWER OVER AXLE BOX OF WHEEL SETS FITTED WITH CARTIDGE BEARING & FIT THE SIDE FRAME KEY.
11. ASSEMBLE ADAPTER RETAINER BOLTS WITH SIDE FRAME.



1. SIDE FRAME REST ON THE RIG.

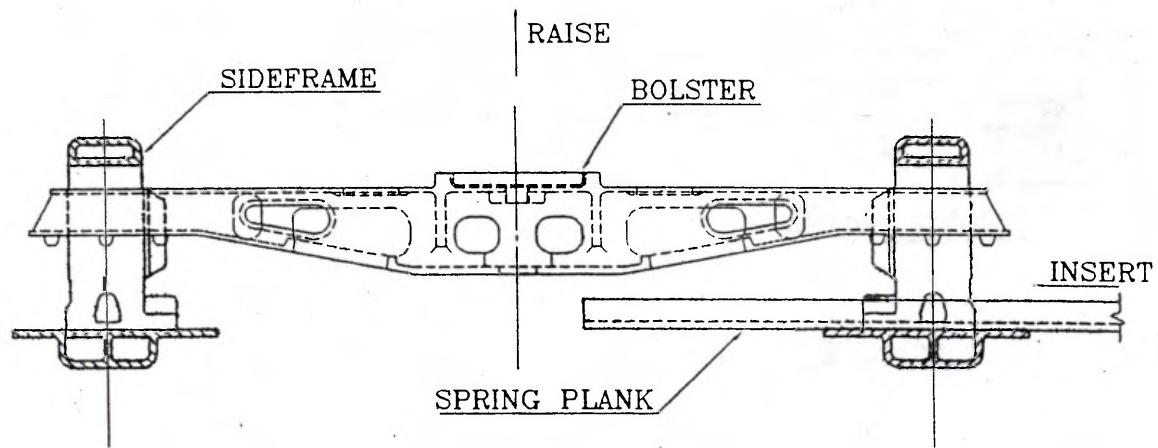


2. INSERT BOLSTER INTO TWO SIDE FRAMES & RAISE

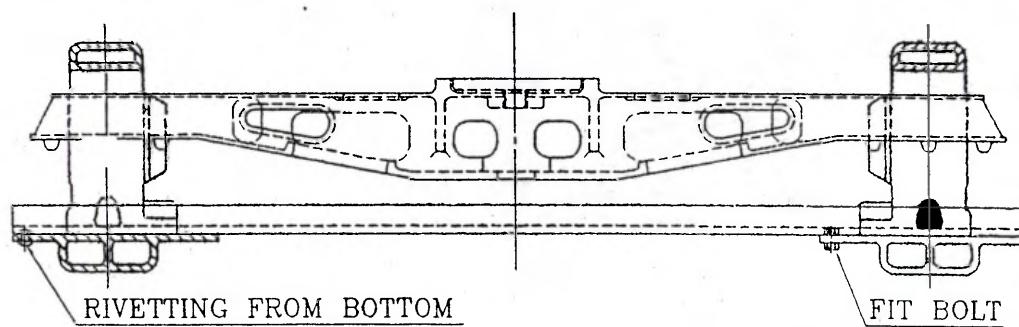
FIG. 4.7

RE-ASSEMBLY PROCEDURE

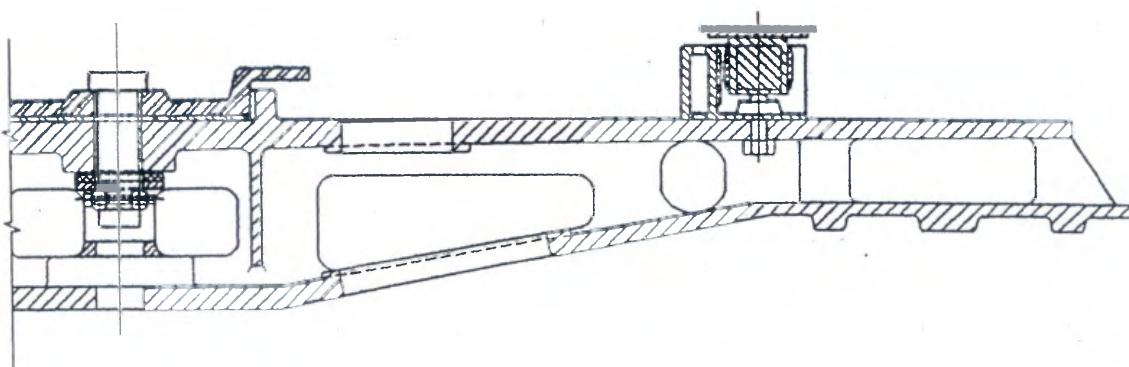
RITES



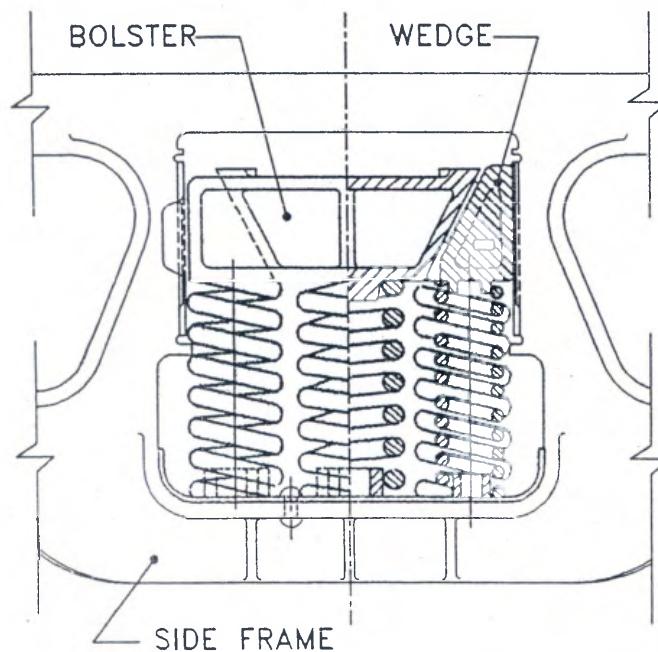
3. RAISE THE BOLSTER AND INSERT SPRING PLANK FROM ONE SIDE



4. ASSEMBLE SPRING PLANK WITH TWO SIDE FRAME FIT WITH THE FIT BOLT BY RIVETING FROM BOTTOM SIDE..



5. FIT THE SIDE BEARER.

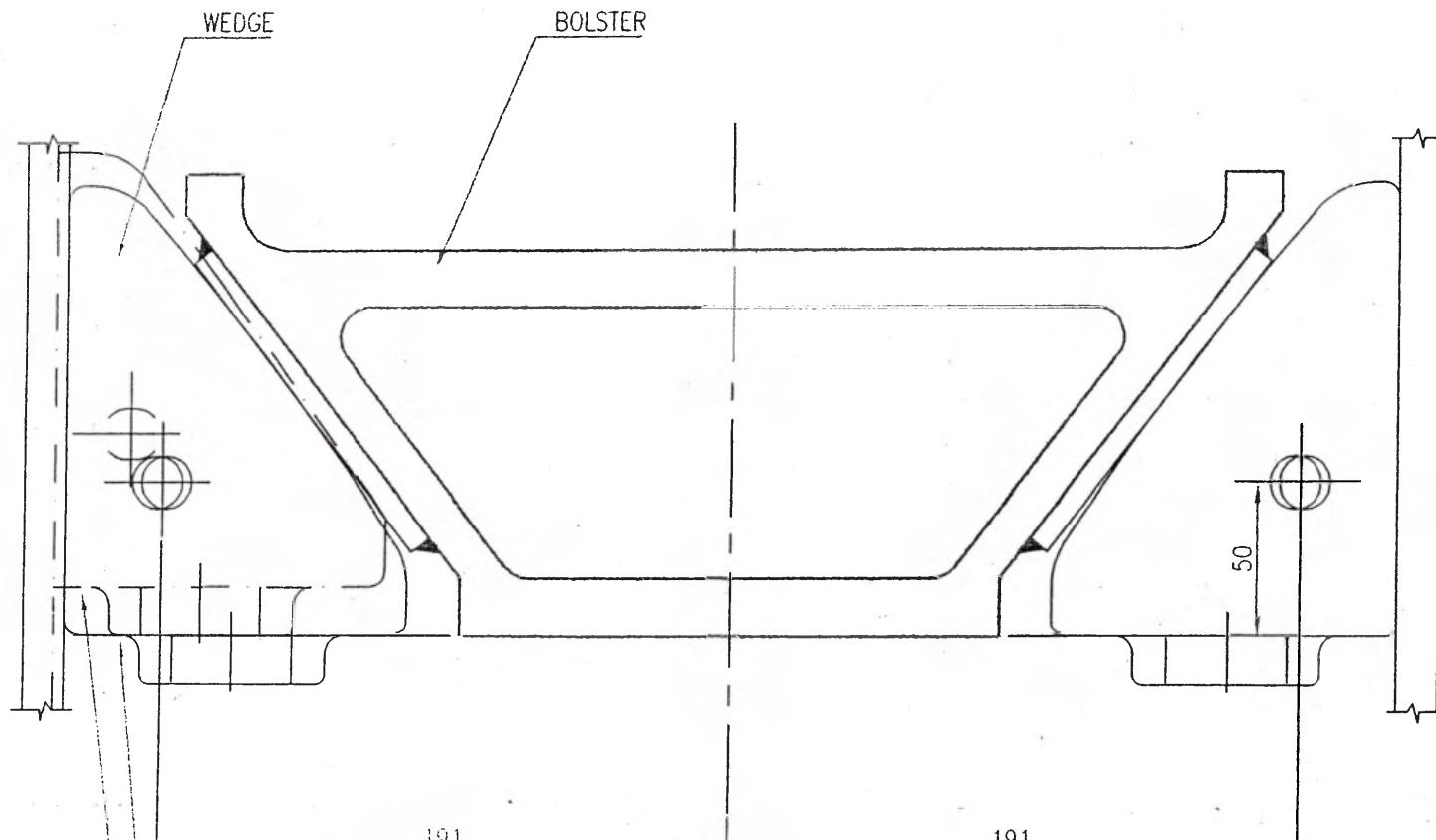


6. RAISE BOLSTER TO THE MAXIMUM POSSIBLE EXTENT.
7. INSERT SNUBBER WEDGE INTO THE BOLSTER TAIL POCKET.
8. PLACE THE LOAD BEARING SPRINGS AND SNUBBER SPRINGS OVER THE LOWER SPIGOTS. LOWER THE BOLSTER TO SETTLE ON THE SPRINGS.

FIG. 4.9

PROCEDURE FOR CHECKING THE COMBINED WEAR OF BOLSTER, SIDE FRAME LINERS & WEDGE

RITES



POSITION OF WEDGE WHEN NEW

POSITION OF WEDGE AFTER SOME
WEAR WHEN RECTIFICATION IS REQUIRED
(HOLES IN BOLSTER WEDGE POCKET &
WEDGE START CROSSING THE EDGES)

FIG. 4.10

GAUGE FOR CHECKING THE
COMBINED WEAR OF BOLSTER,
SIDE FRAME LINERS & WEDGE

RITES

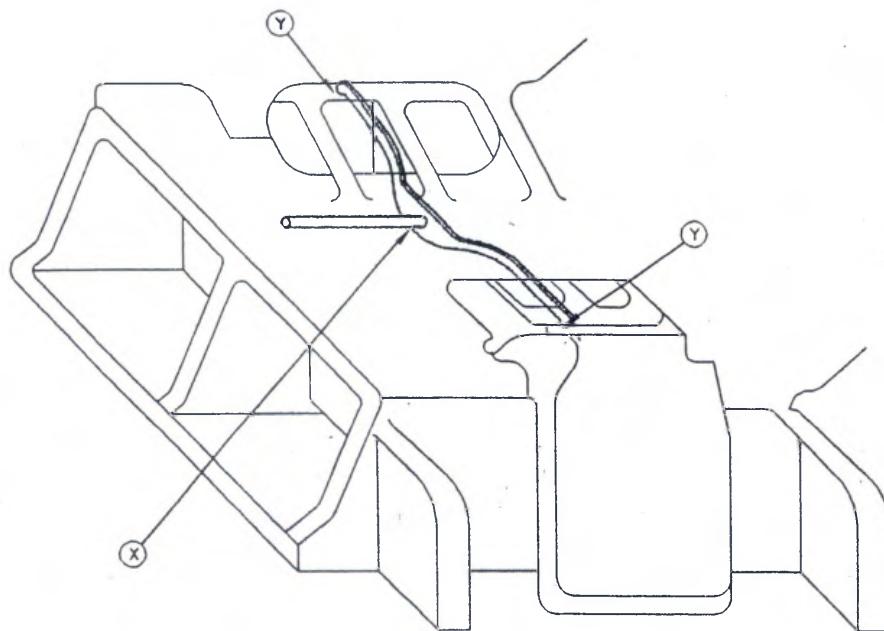
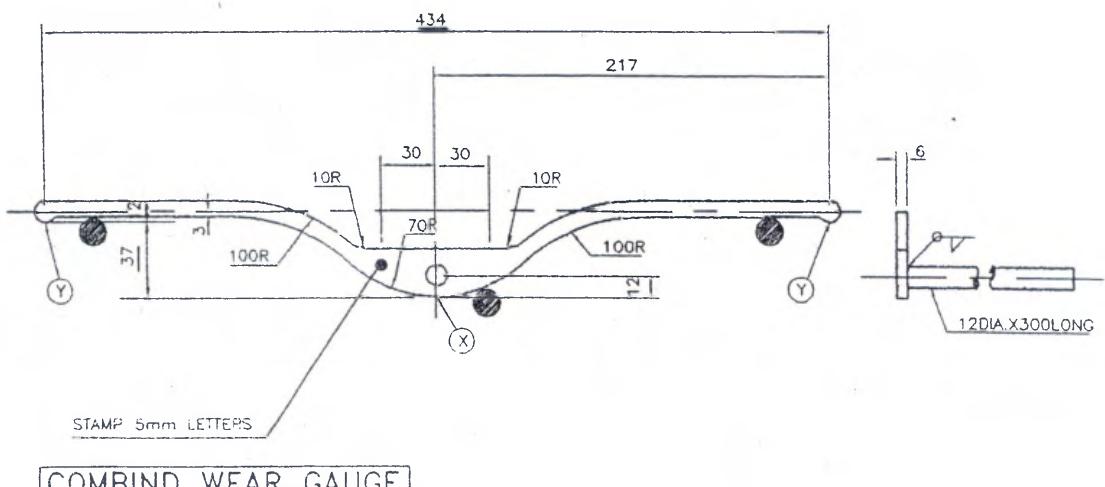


FIG-A



NOTE :-

1. SURFACE MARKED '●' AND DIMENSION UNDER SCORD ARE IMOPRTANT.
2. IF POINTS X & Y START TOUCHING THE CASTING, REPAIR SHALL BE UNDER TAKEN.

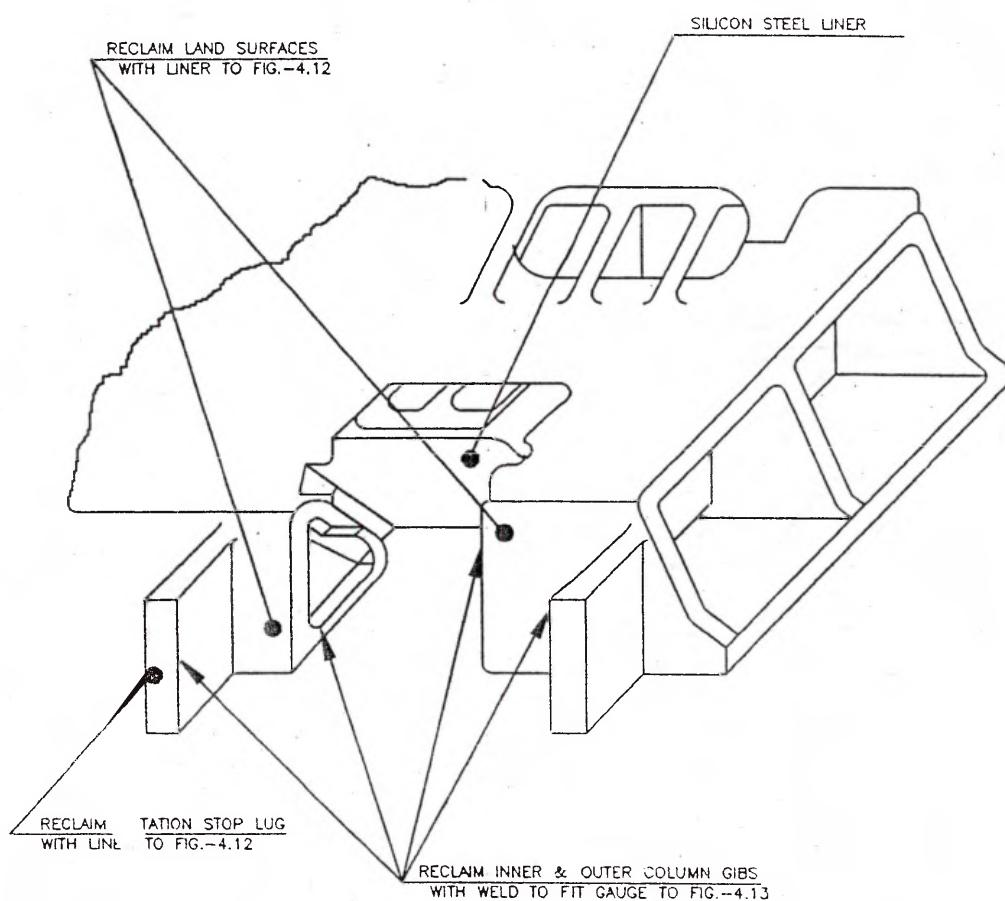
MATERIAL :-

IS:1875 CI-4, HARDENED & GROUND.

FIG. 4.11

RECLAMATION & LOCATIONS
OF WORN BOLSTER

RITES



LOCATION TO BE RECLAIMED

1. BOLSTER POCKET SLOPE SURFACE LINER
2. BOLSTER LAND SURFACES & ROTATION STOP LUGS/LINER
3. BOLSTER COLUMN GIBS

FIG. 4.12

BOLSTER LAND & ROTATION
STOP LUG GAUGE

RITES

STAMP 5mm LETTERS

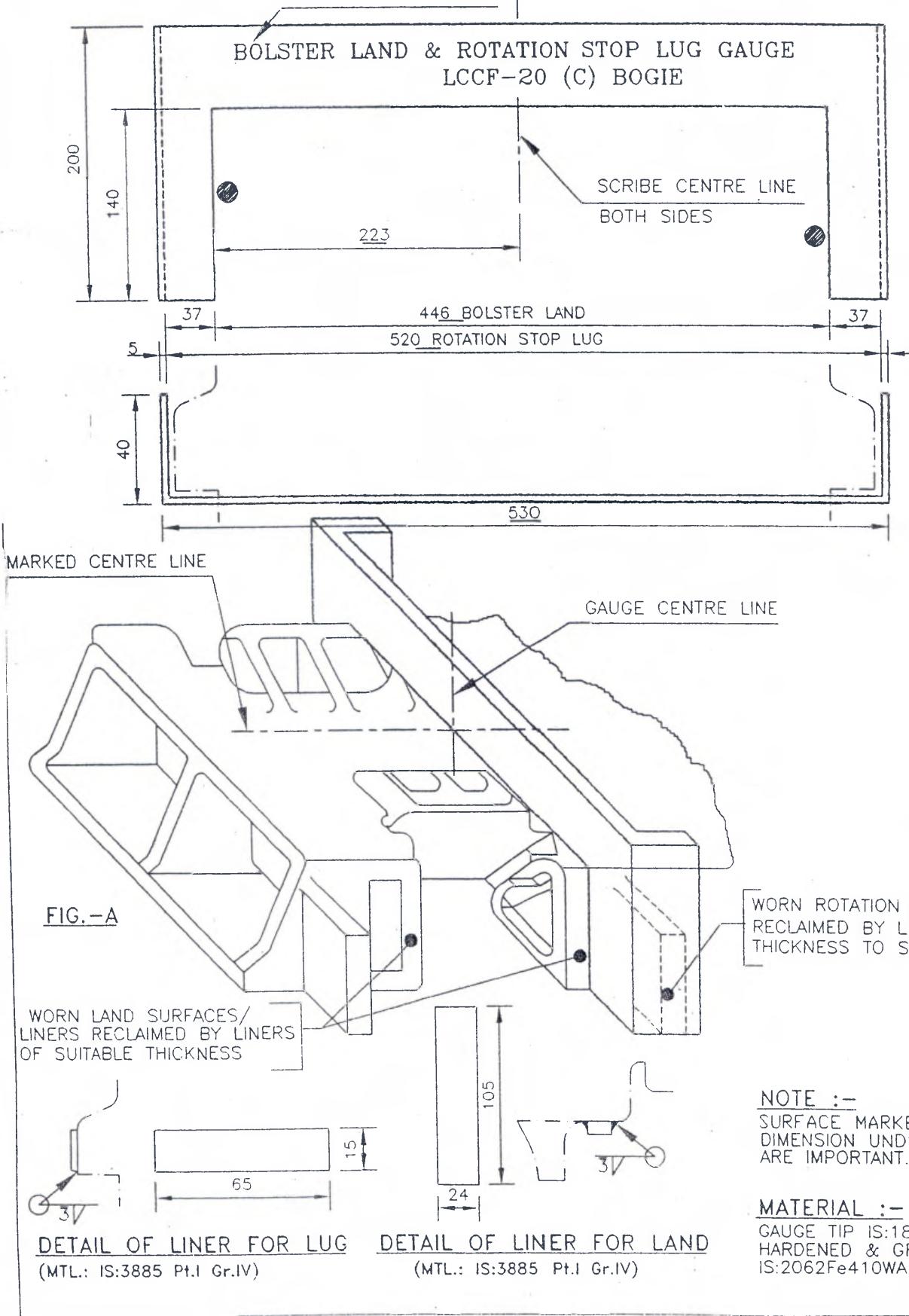
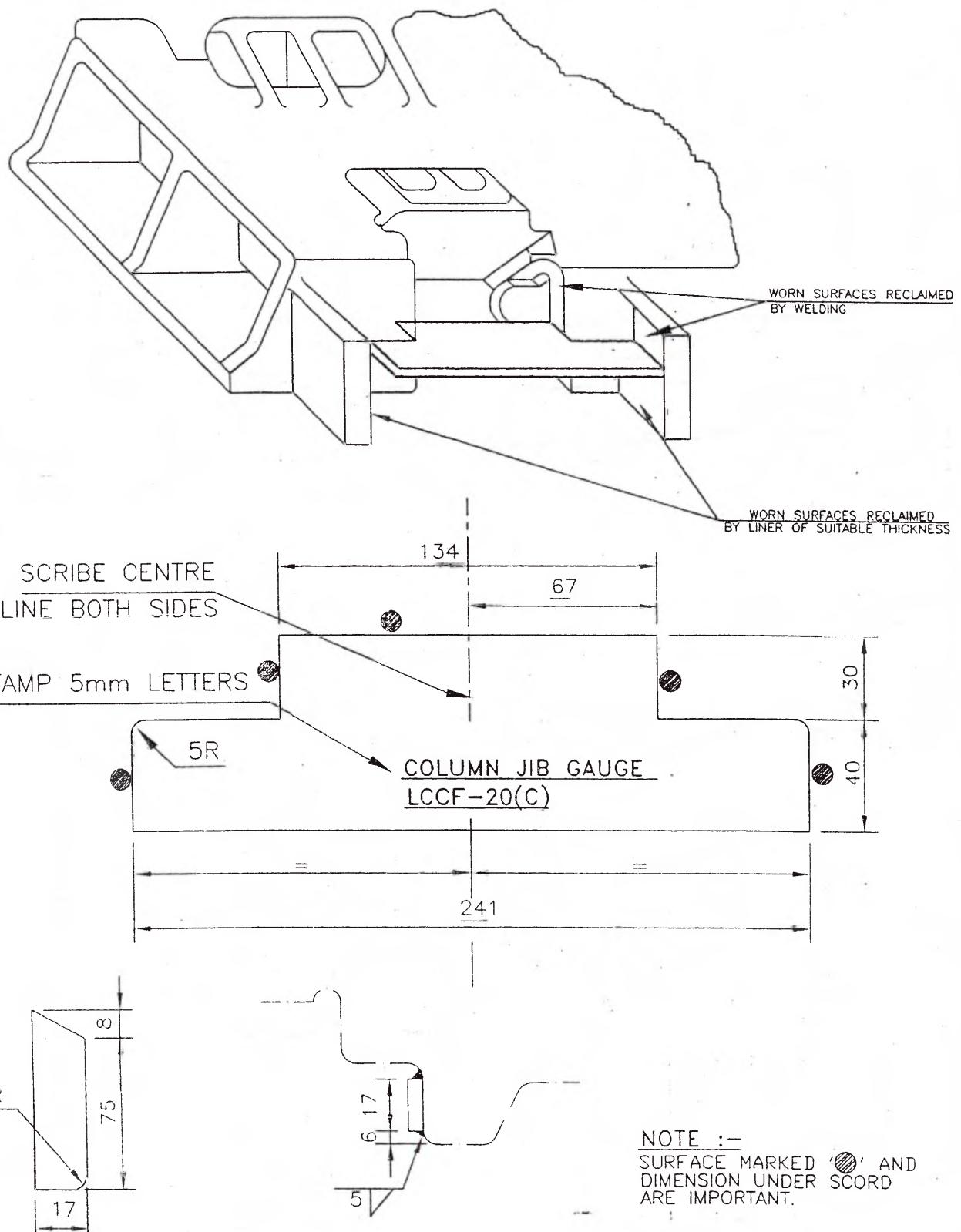


FIG. 4.13

COLUMN JIB GAUGE

RITES



DETAIL OF LINER
FOR OUTER JIB
 (MTL.: IS:3885 Pt.I Gr.IV)

MATERIAL :-
 GAUGE TIP IS:1875 CI-4
 HARDENED & GROUNDED BODY
 IS:2062Fe410WA

FIG. 4.14

CENTRE PIVOT LINER GAUGE

RITES

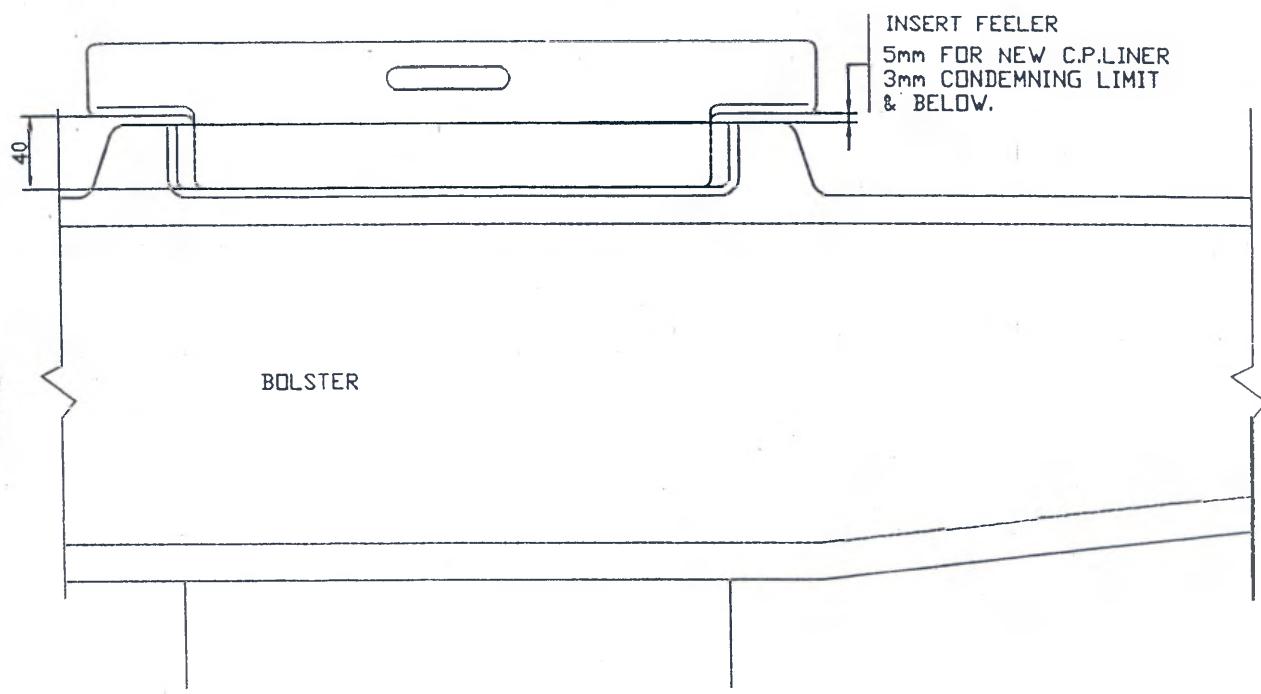
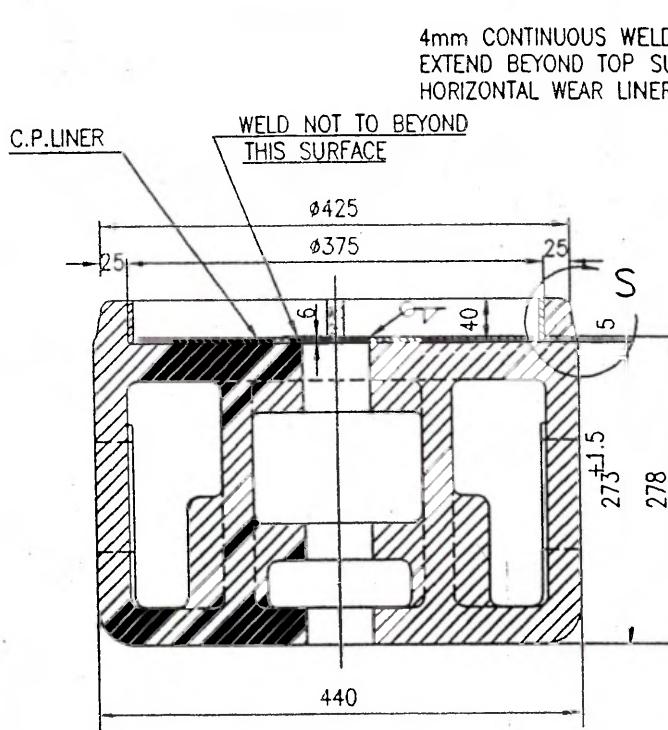


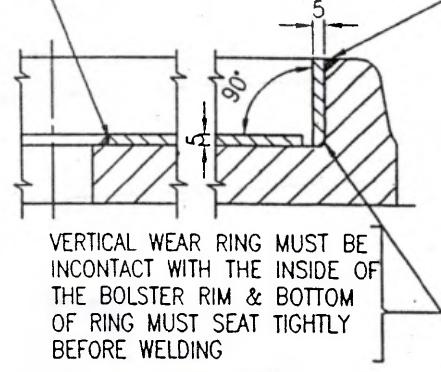
FIG. 4.15

INTEGRATED CENTRE PIVOT
BOTTOM FLAT WITH LINERS

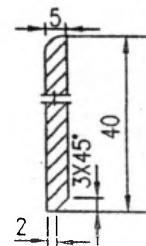
RITES



'J' GROOVE 5mm DEEP x 6mm
DO NOT GRIND WELD FLUSH. WELD
BEAD APPROXIMATELY 1.6mm ABOVE
CASTING IS ACCEPTABLE.

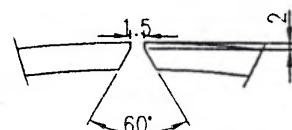


ENLD. DETAIL AT-S

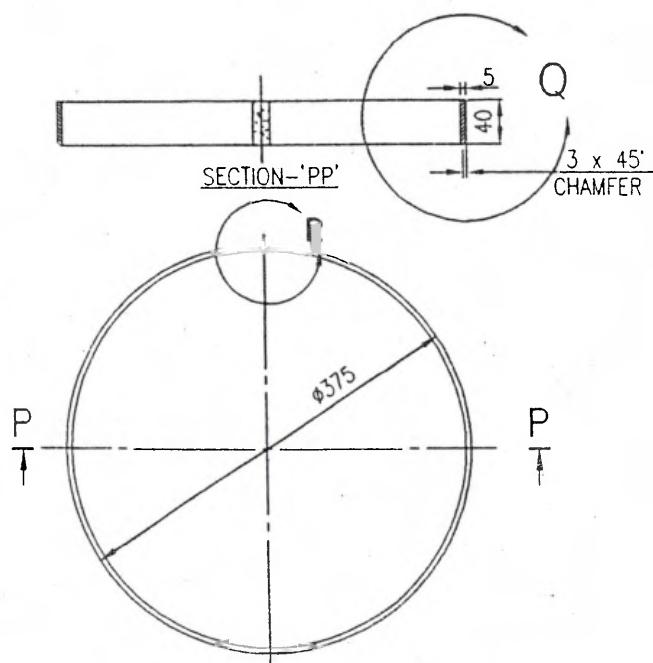


BOLSTER WITH LINERS

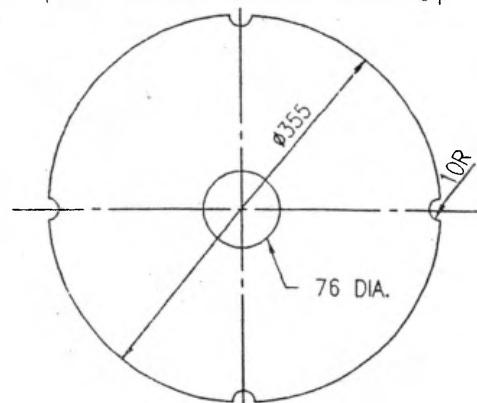
ENLRD.DETAIL AT-Q



ENLRD.DETAIL AT-R



CENTRE PIVOT RING

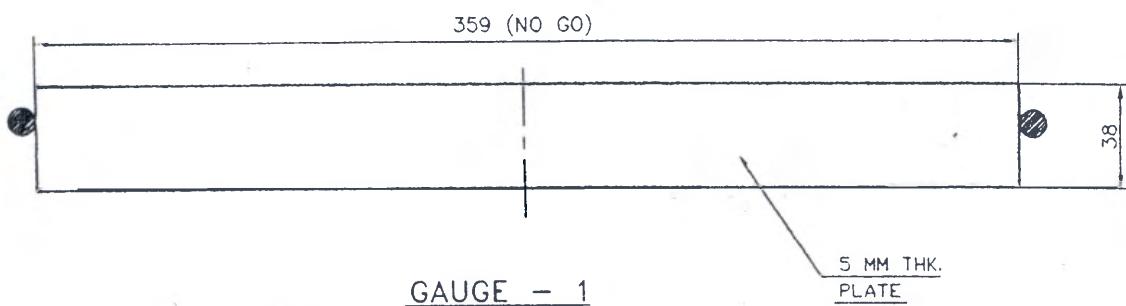


CENTRE PIVOT LINER

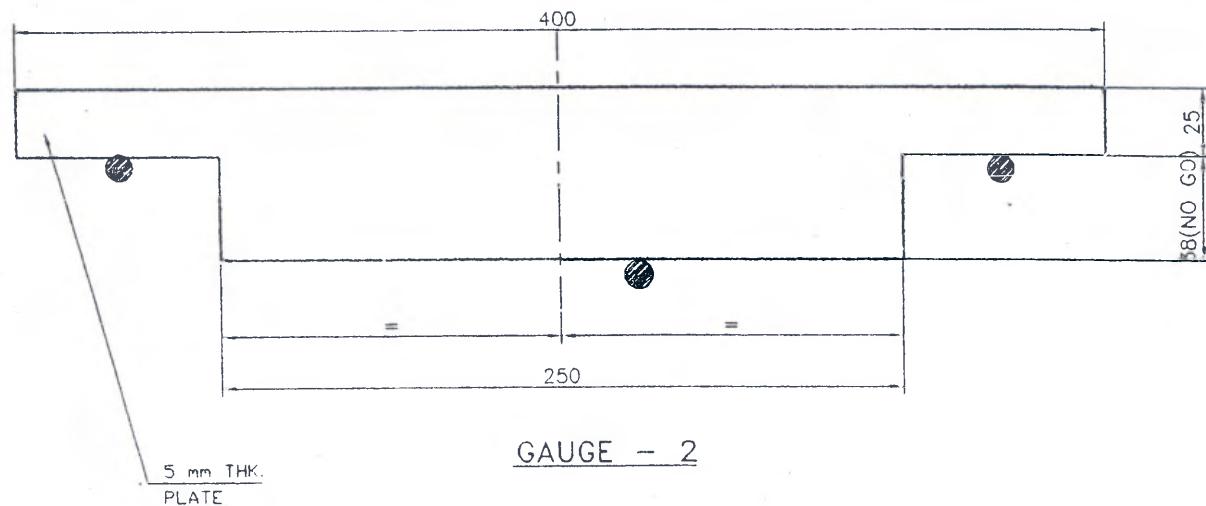
FIG. 4.16

CENTRE PIVOT GAUGE

RITES



5 MM THK.
PLATE



5 mm THK.
PLATE

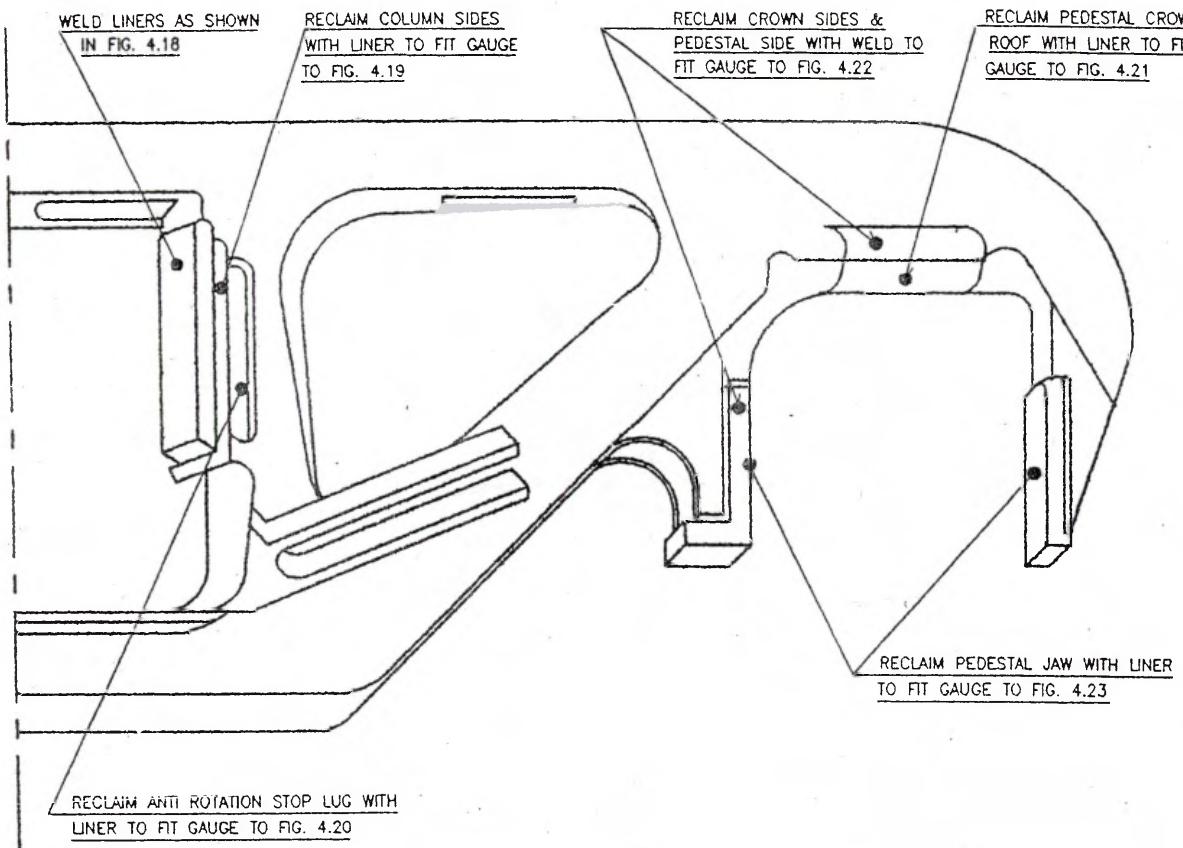
NOTE :-
SURFACE MARKED '◎' AND
DIMENSION UNDER SCORD
ARE IMPORTANT.

MATERIAL :-
GAUGE TIP IS:1875 CI-4
HARDENED & GROUND BODY
IS:2062Fe410WA

FIG. 4.17

RECLAMATION LOCATIONS OF WORN SIDE FRAME

RITES

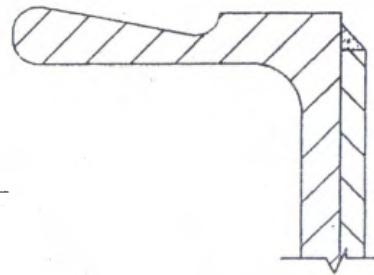
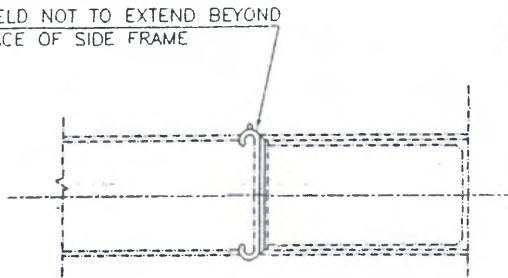


LOCATIONS TO BE RECLAIMED

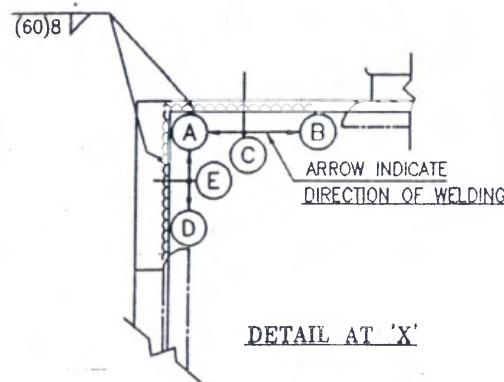
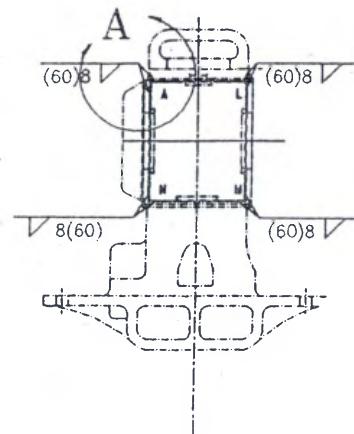
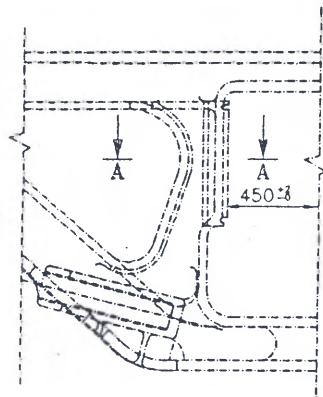
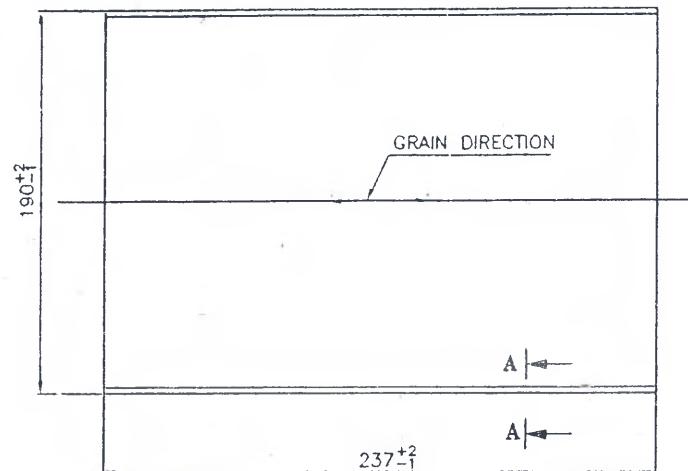
1. SIDE FRAME COLUMN SIDES.
2. ANTI-ROTATION LUGS.
3. SIDE FRAME FRICTION LINERS.
4. PEDESTAL CROWN ROOF.
5. PEDESTAL CROWN SIDES & PEDESTAL SIDES.
6. PEDESTAL JAW.

TO SIDE FRAME

WELD NOT TO EXTEND BEYOND
FACE OF SIDE FRAME



SECTION A-A



DETAIL AT 'X'

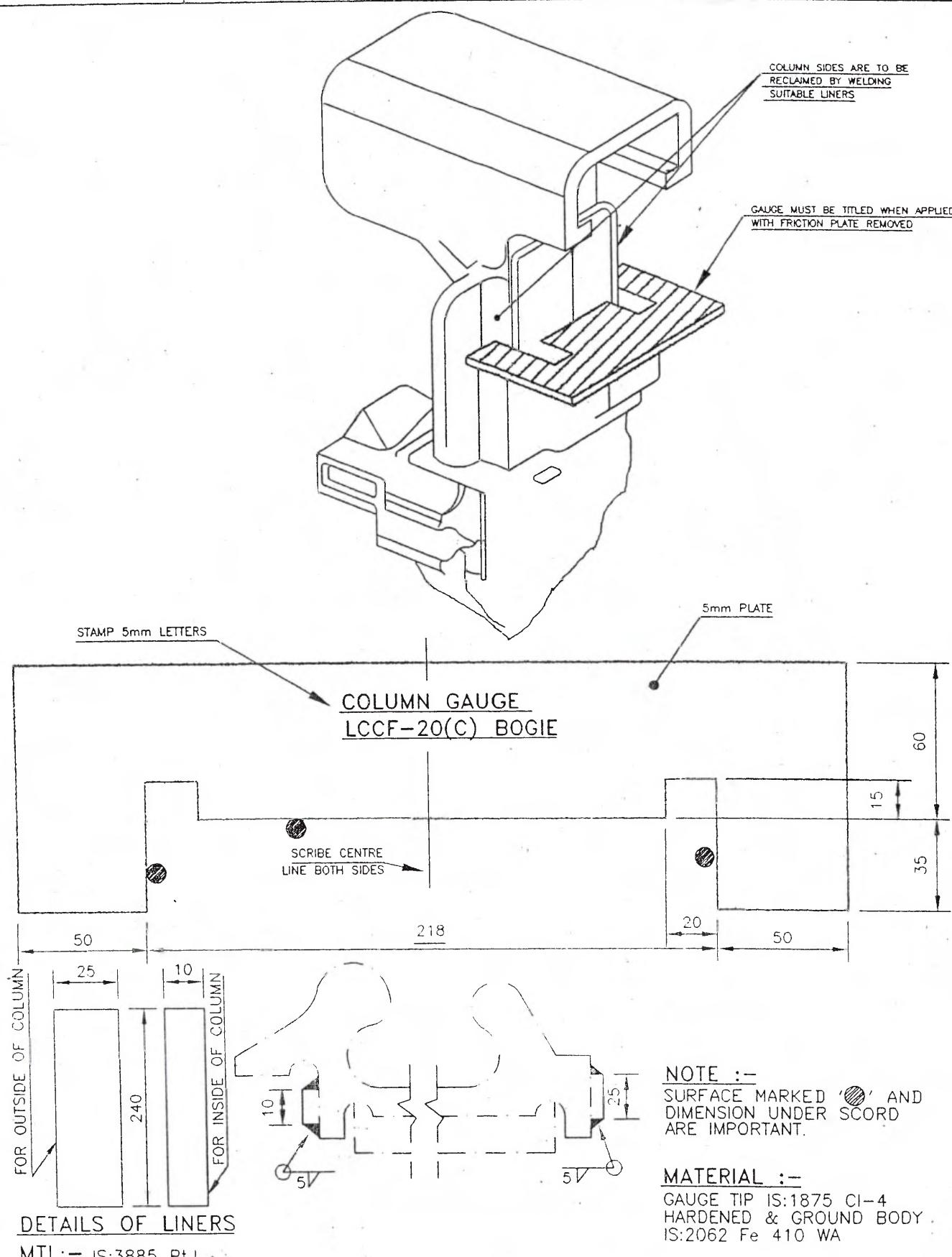
FLAT MUST NOT BE WARPED MORE THAN 0.5mm
AND MUST BE FREE FROM SCALE.

MATERIAL:— SPRING STEEL IS:3885 Pt 1,Gr.IV
BHN (380 TO 420)

FIG. 4.19

COLUMN GAUGE

RITES



ANTI ROTATION LUGS ARE TO BE RECLAIMED BY WELDING

LINERS TO SUIT

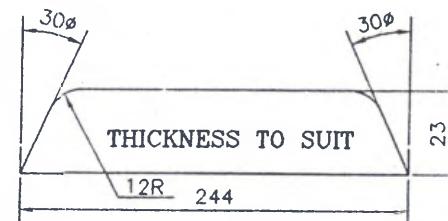
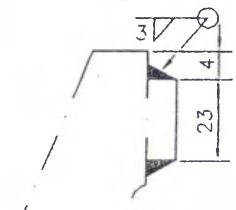
520

ANTI-ROTATION LUG GAUGE
FOR LOW PLATFORM CONTAINER
FLAT WAGON

STAMP 5mm LETTERS

5mm PLATE

448

SCRIBE CENTRE LINE
ON BOTH SIDESDETAIL OF LINER
MTL :- IS:3885 Pt.I Gr.IV

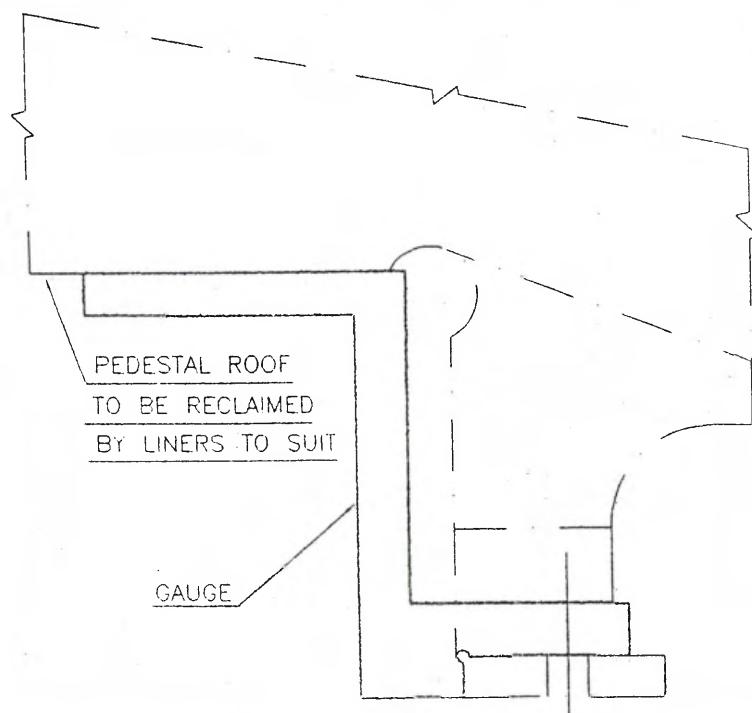
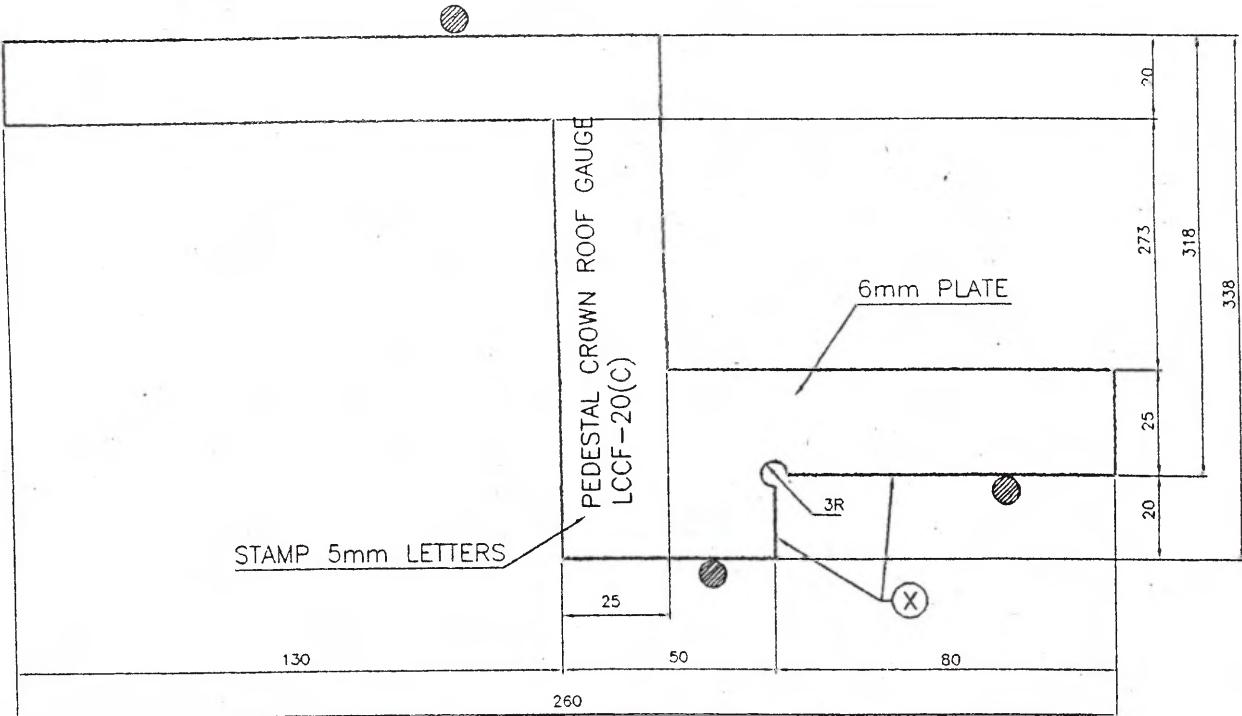
NOTE :-
SURFACE MARKED 'O' AND
DIMENSION UNDER SCORED
ARE IMPORTANT.

MATERIAL :-
GAUGE TIP IS:1875 CI-4
HARDENED & GROUND BODY
IS:2062 Fe 410 WA

FIG. 4.21

PEDESTAL CROWN ROOF GAUGE

RITES



NOTE :-

SURFACE MARKED '●' THUS AND
DIMENSION UNDER LINED ARE
IMPORTANT.

MATERIAL :-

GAUGE TIP IS:1875 CI-4
HARDENED & TEMPERED BODY
IS:2062 Fe 410 WA

FIG. 4.22

PEDESTAL SIDES GAUGE

RITES

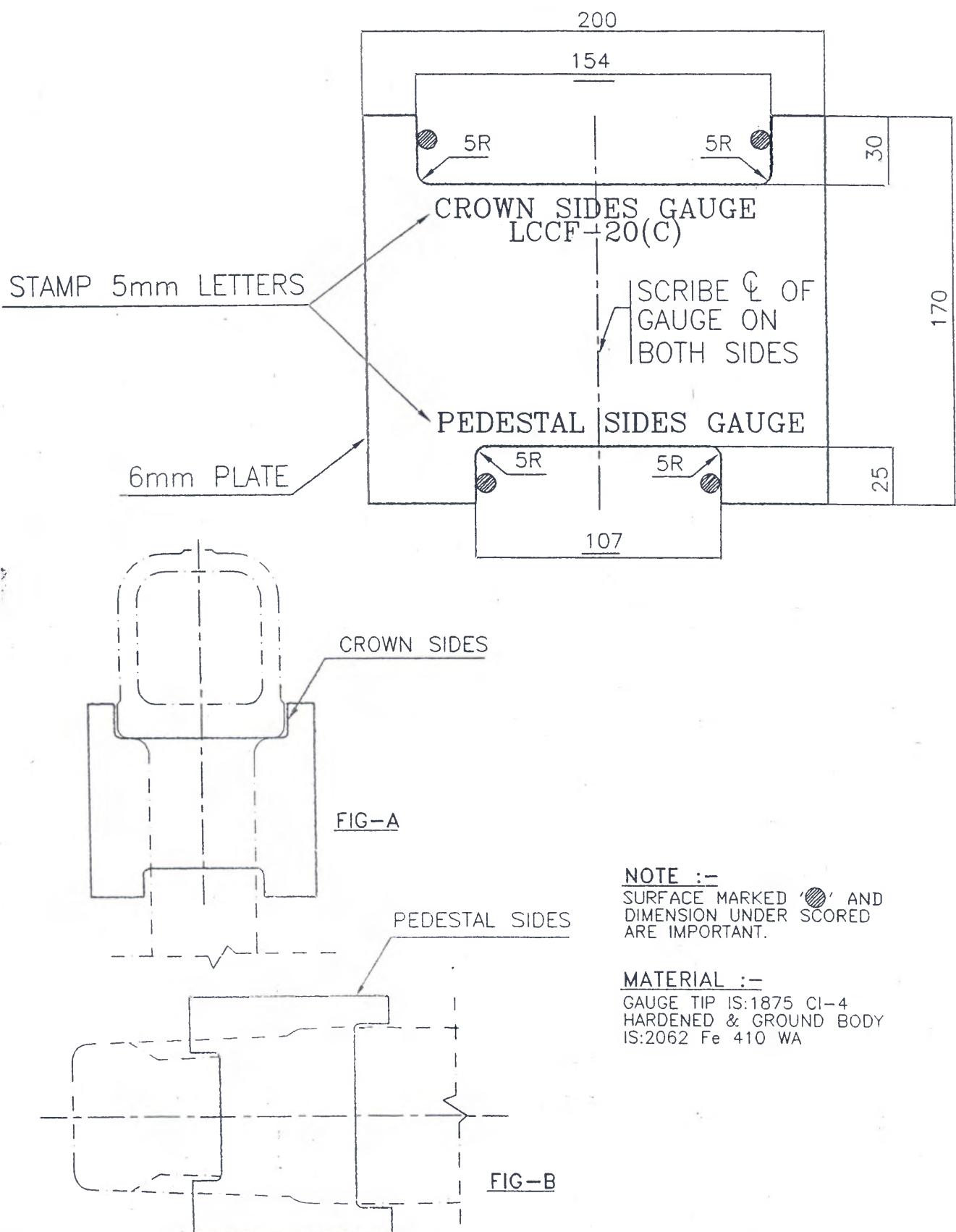
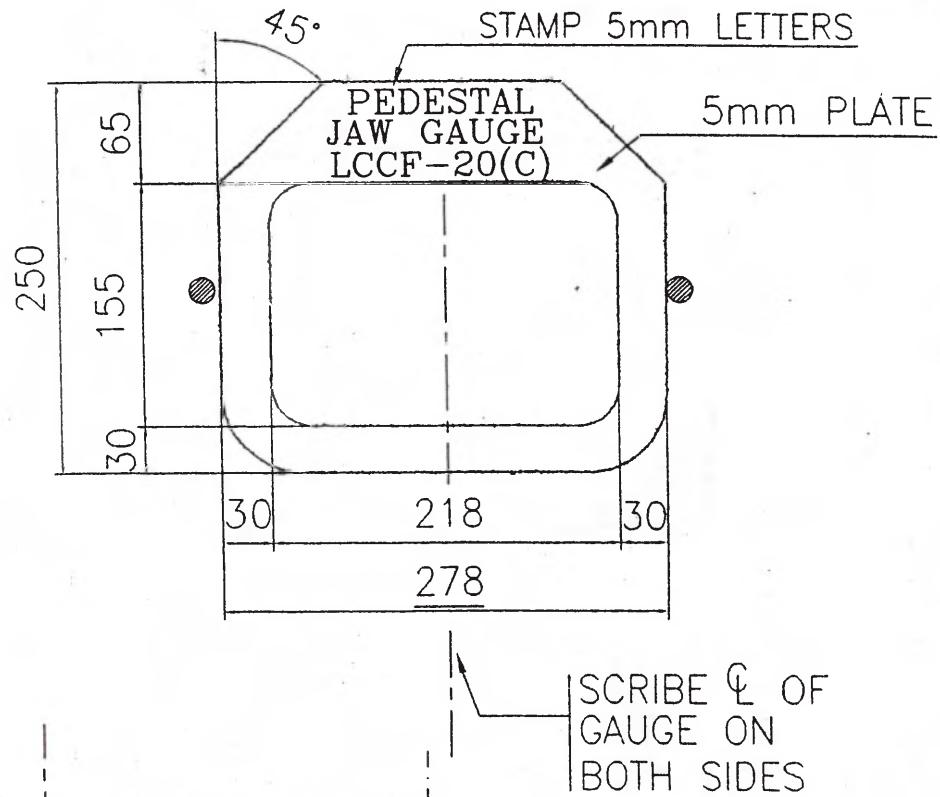


FIG. 4.23

PEDESTAL JAW GAUGE

RITES



SCRIBE $\frac{1}{2}$ OF
GAUGE ON
BOTH SIDES

NOTE :-
SURFACE MARKED '●' AND
DIMENSION UNDER SCORED
ARE IMPORTANT.

MATERIAL :-
GAUGE TIP IS:1875 CI-4
HARDENED & GROUNDED
IS:2062 Fe 410 WA

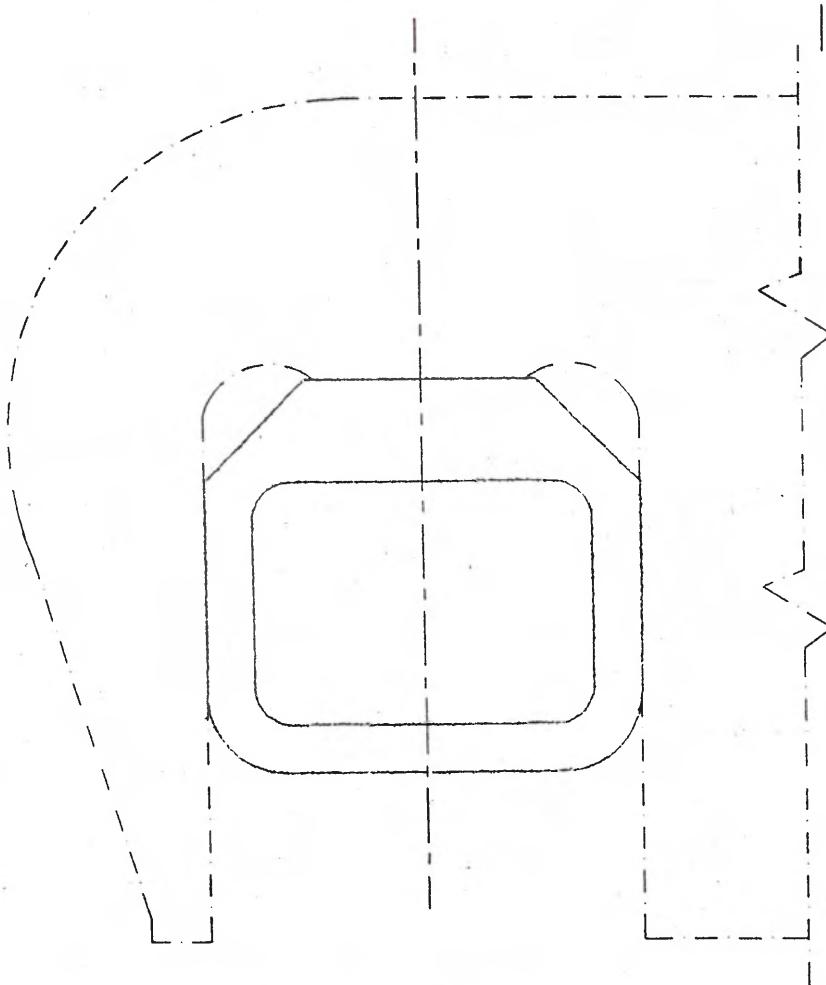
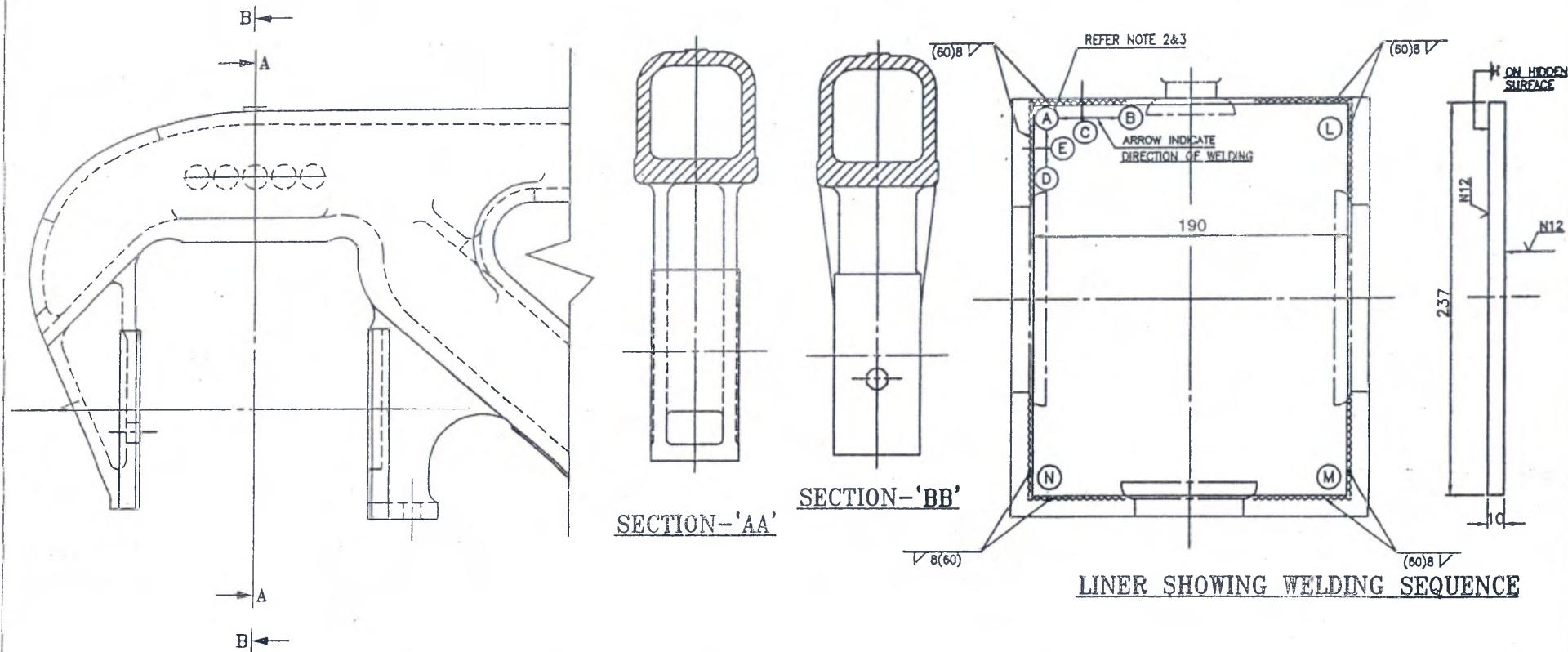


FIG. 4.24

RECLAMATION OF WORN OUT PEDSTAL JAWS BY WELDING SPRING STEEL LINERS

RUTEC



1. WELDING IS TO BE DONE IN TWO PASSAGE-FIRSTLY WITH 3.15 mm ELECTRODE AND THEN WITH 4 OR 5 mm ELECTRODE. THE FIRST PASS IS TO BE COMPLETED AT ALL FOUR CORNERS AS FOLLOWS:-
 - 1.1. START FROM ONE CORNER AND THEN WELD OPPOSITE CORNER AND SO ON TILL ALL FOUR CORNERS COMPLETED IN THE SAME PASS.
 - 1.2. SEQUENCE OF WELDING CORNERS **A**, **M**, **L** & **N** -
 - 1.2.1. SEQUENCE OF WELDING AT EACH CORNER (e.g.) CORNER **A**
 - LEG **A** **C** **B** :- START AT **C** AND WELD OUTWARDS TOWARDS **A** START AGAIN AT **C** AND WELD OUTWARDS TOWARDS **B**.
 - LEG **A** **E** **D** :- START AT **E** AND WELD TOWARDS **A** START AGAIN AT **E** AND WELD TOWARDS **D**.

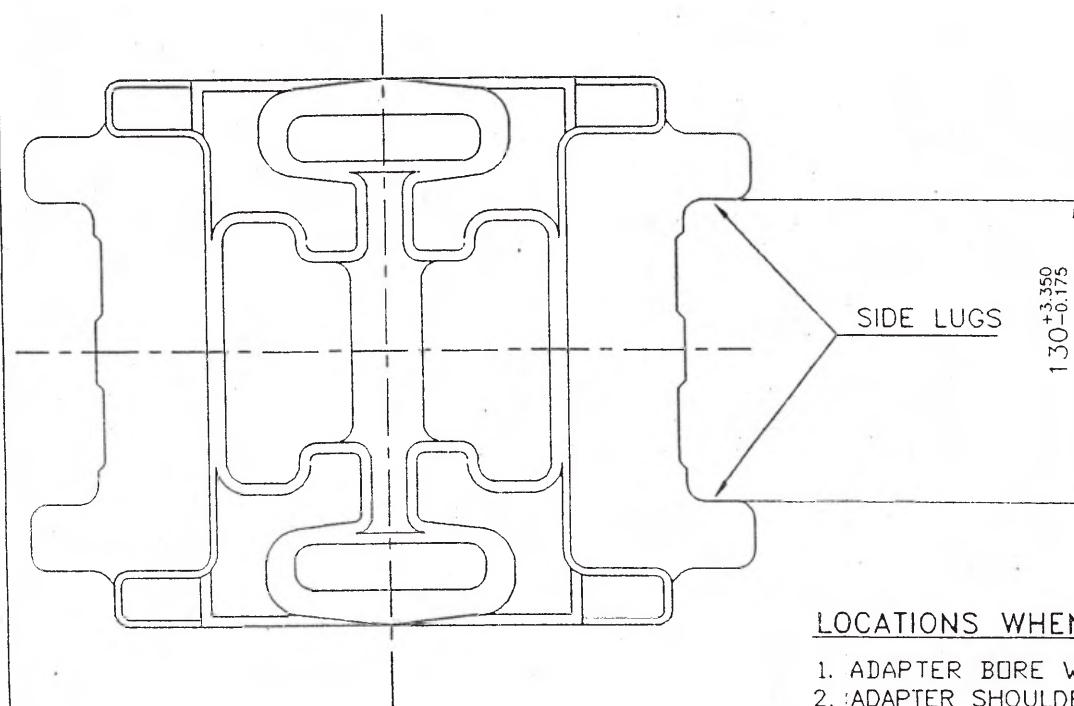
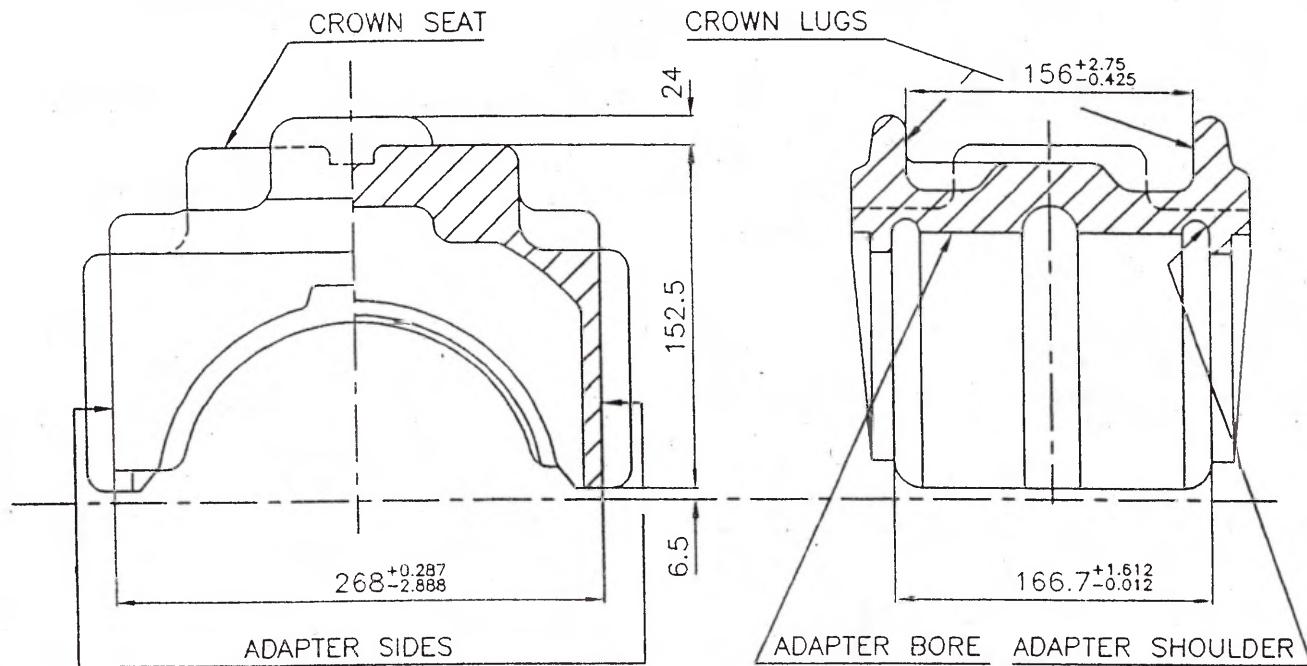
1.2.2. PRECAUTIONS WHILE WELDING:-UNIFORM BEAD IS TO BE DEPOSITED. WEAVING IS NOT PERMITTED. FOLLOW EACH WELD DEPOSITION WITH LIGHT PEENING. IF VISUAL CRACK NOTICED THEN REMOVE WELD WITH CUTTING ELECTRODES AND REWELD ON COMPLETION, CHECK WELD WITH DYE-PENETRANT TEST TO ENSURE FREEDOM FROM CRACKS.

- 1.3.3. ELECTRODES TO BE USED :-
 AUSTENITIC STAINLESS STEEL ELECTRODES HAVING NOMINAL COMPOSITION OF 18% CHROMIUM 8% NICKEL AND 5% MAGANESE AND APPROVED BY R.D.S.O. AGAINST CLASS M1 OF I.R.S. M 28 SHALL BE USED

FIG. 4.25

SCRAP LOCATIONS OF
WORN ADAPTER

RITES



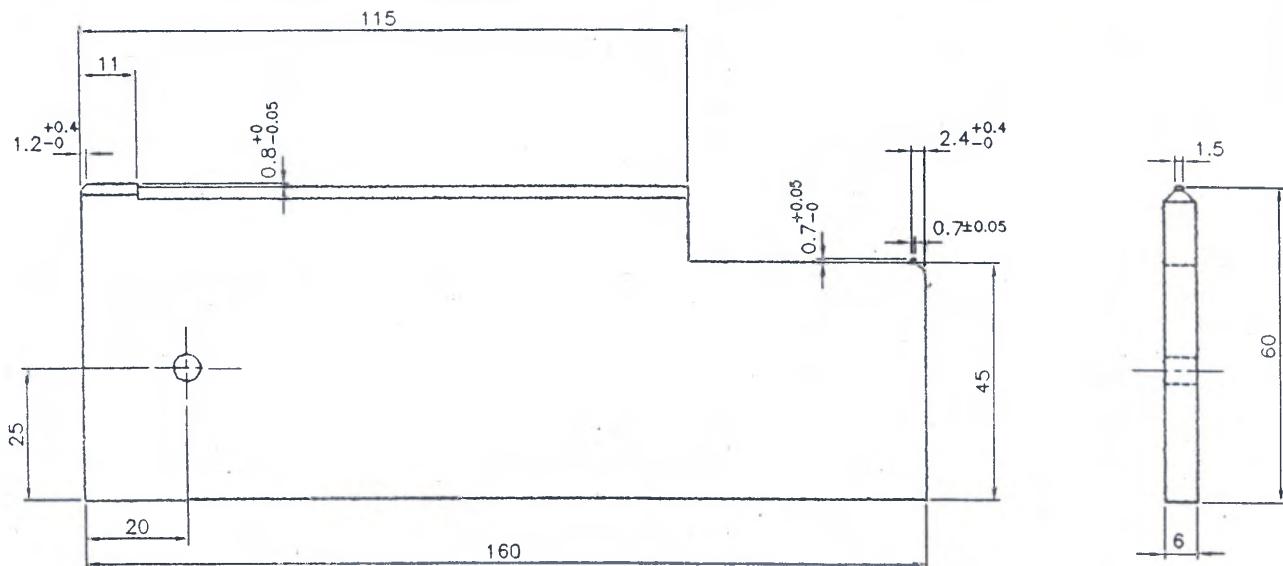
LOCATIONS WHEN SCRAPED

1. ADAPTER BORE WEAR
2. ADAPTER SHOULDER WEAR
3. ADAPTER SIDES
4. ADAPTER CROWN LUGS
5. ADAPTER CROWN SEAT
6. ADAPTER SIDE LUGS

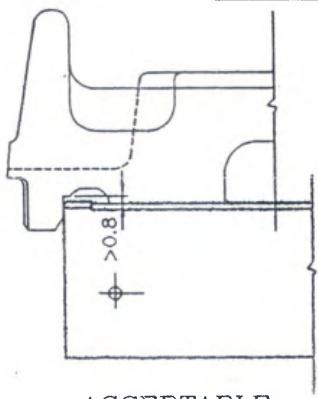
FIG. 4.26

ADAPTER THRUST SHOULDER & BORE WEAR GAUGE

RITES



ADAPTER WEAR GAUGE



ACCEPTABLE

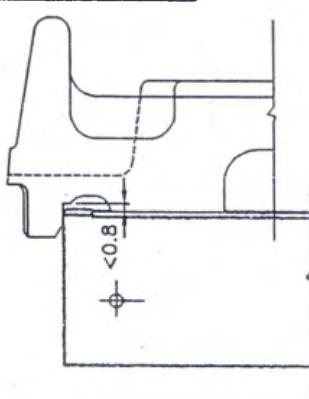


FIG.A

TO BE REJECTED

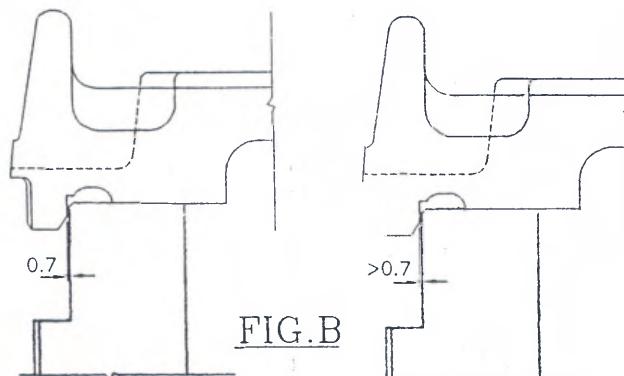
METHOD OF GAUGING THRUST
SHOULDER WEAR

FIG.B

ACCEPTABLE

TO BE REJECTED

METHOD OF GAUGING BORE WEAR

NOTE :-

SHARP CORNERS TO BE
REMOVED.ALL GAUGING SURFACES TO
BE HARDENED & GROUNDED.

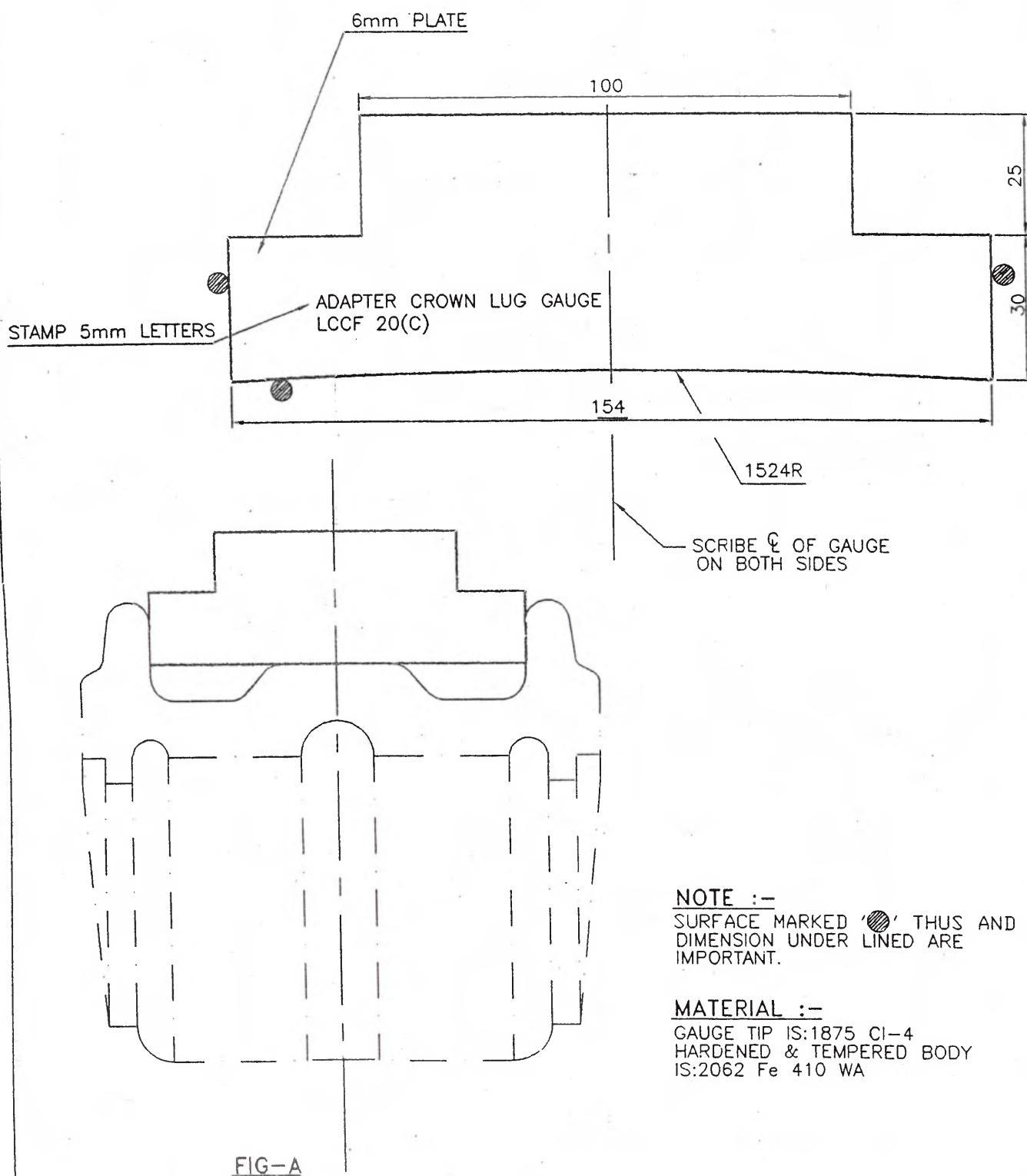
MATERIAL :-

IS:1875 CI-4

FIG. 4.27

ADAPTER CROWN LUG GAUGE

RITES

NOTE :-

SURFACE MARKED '●' THUS AND
DIMENSION UNDER LINED ARE
IMPORTANT.

MATERIAL :-

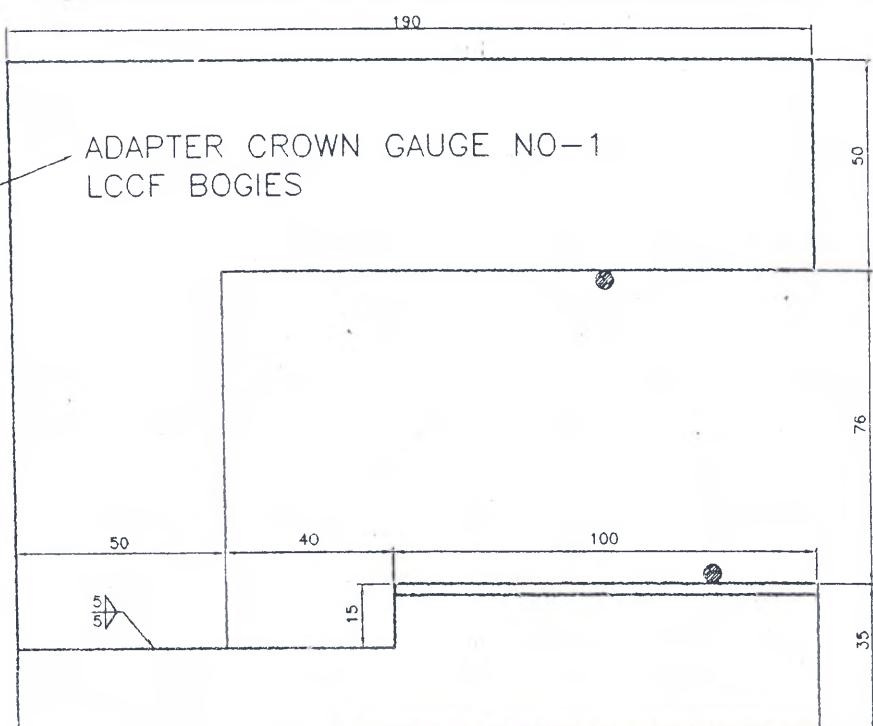
GAUGE TIP IS:1875 CI-4
HARDENED & TEMPERED BODY
IS:2062 Fe 410 WA

FIG. 4.28

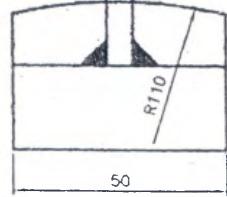
ADAPTER CROWN SEAT GAUGE

RITES

STAMP 5mm LETTERS

ADAPTER CROWN GAUGE NO-1
LCCF BOGIES

GAUGE-1



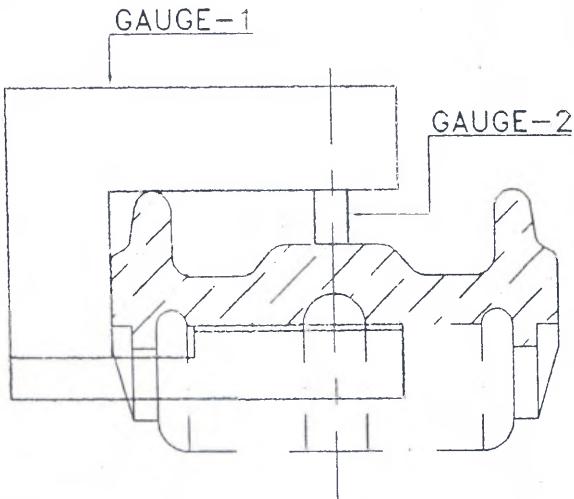
STAMP 5mm LETTERS

ADAPTER CROWN GAUGE NO-2
LCCF BOGIES

200

26

16



GAUGE-2

NOTE :-

SURFACE MARKED '●' THUS AND
DIMENSION UNDER LINED ARE
IMPORTANT.

MATERIAL :-

GAUGE TIP IS:1875 CI-4
HARDENED & TEMPERED BODY
IS:2062 Fe 410 WA

FIG. 4.29

ADAPTER SIDE LUG GAUGE

RITES

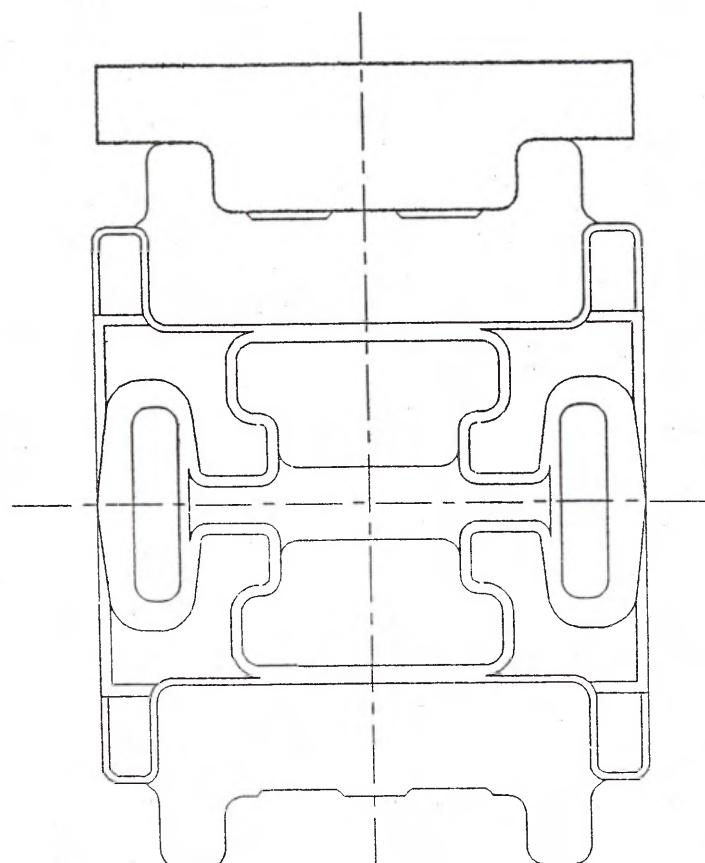
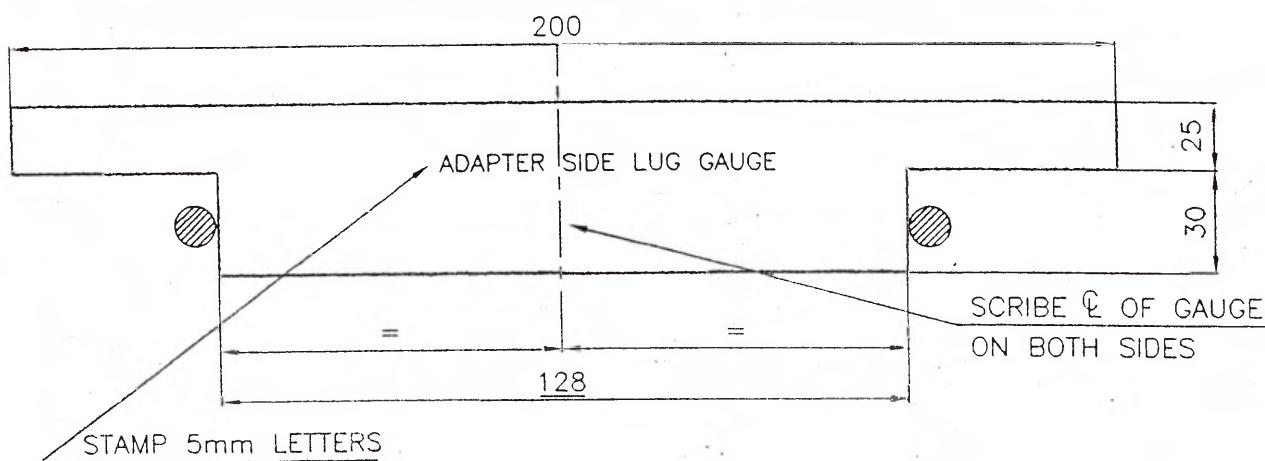


FIG.- A

NOTE :-

SURFACE MARKED '●' AND
DIMENSION UNDER SCORED
ARE IMPORTANT.

MATERIAL :-

GAUGE TIP IS:1875 CI-4
HARDENED & GROUND BODY
IS:2062 Fe 410 WA.

FIG. 4.30

ADAPTER SIDES GAUGE

RITES

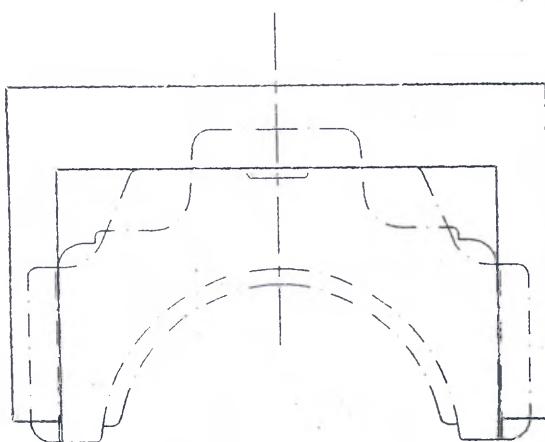
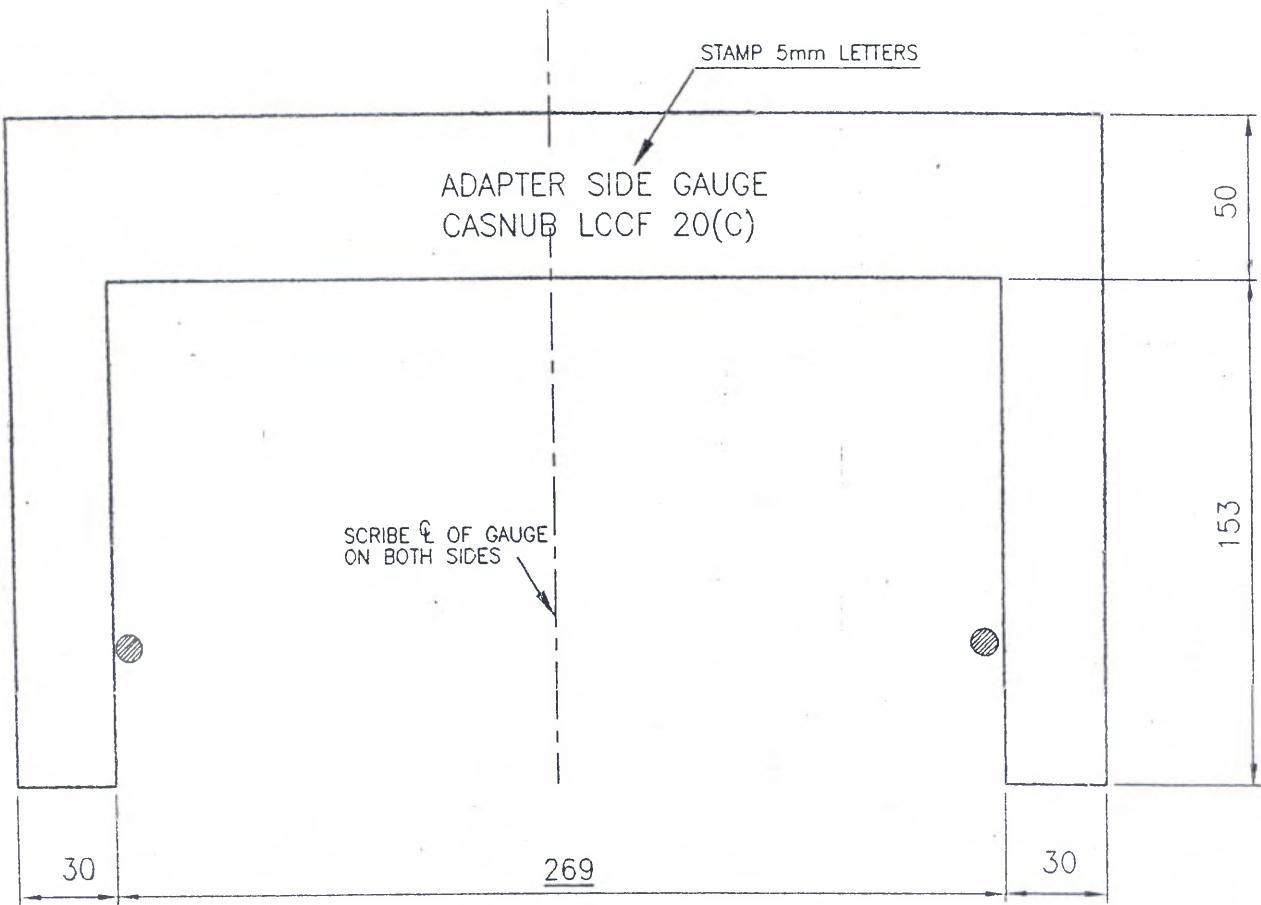


FIG-A

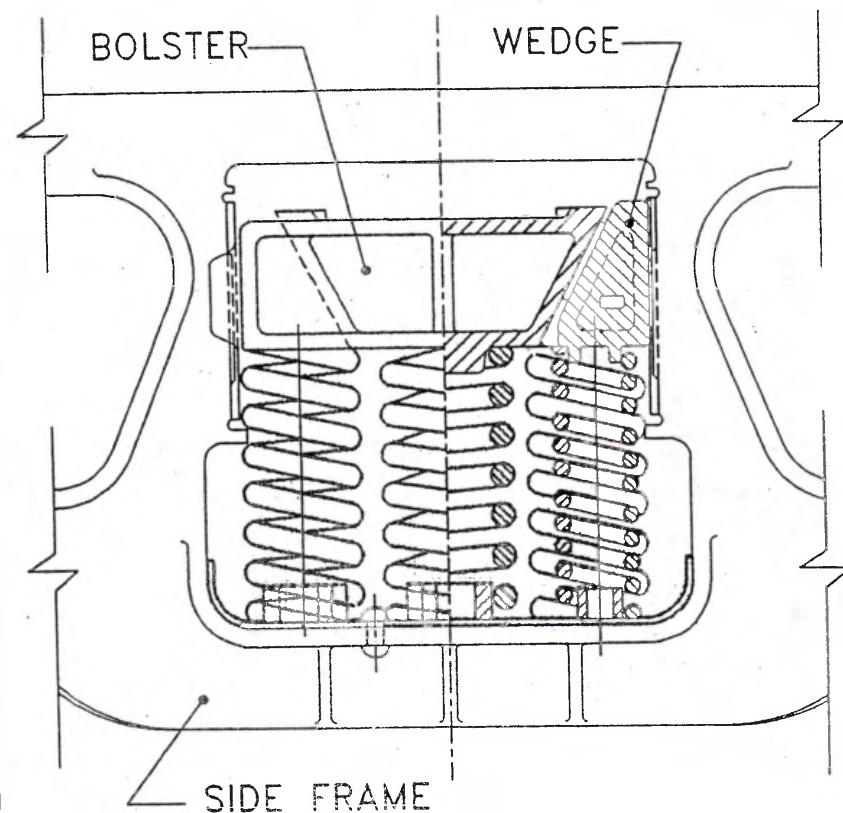
NOTE :-
SURFACE MARKED 'X' AND
DIMENSION UNDER SCORED
ARE IMPORTANT.

MATERIAL :-
GAUGE TIP IS:1875 CI-4
HARDENED & GROUNDED BODY
IS:2062 Fe 410 WA

FIG. 4.31

DETAILS OF BOLSTER
SPRING GROUP ARRANGEMENT

RITES



SECTION- 'AA'

AXLE LOAD	NO OF SPRING REQUIRED		
	OUTER	INNER	SNUBBER
20.3t	14	12	4

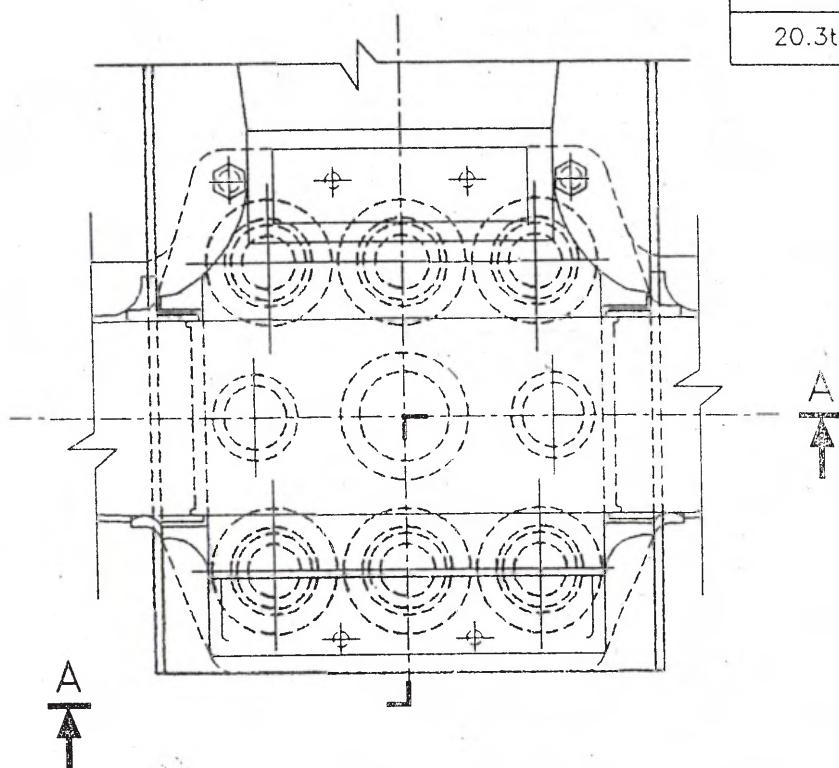
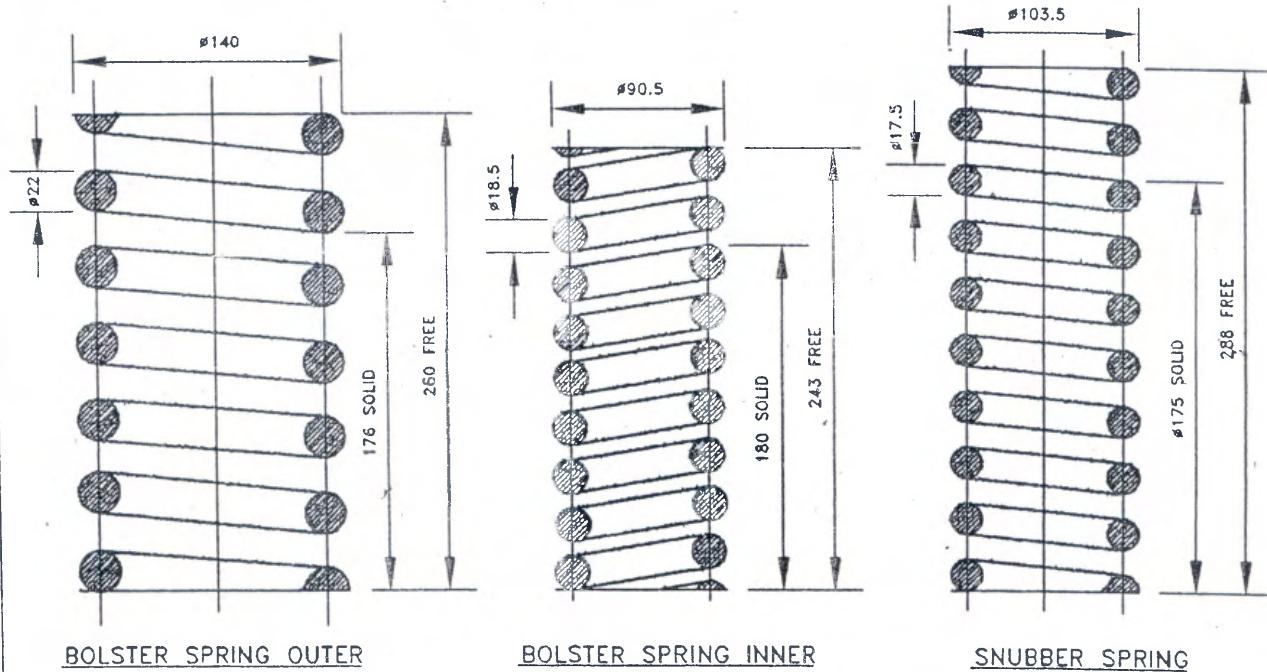


FIG. 4.32

DETAILS OF SPRING

RITES



SPRING DATA

DESCRIPTION	UNIT	BOLSTER SPRING OUTER	BOLSTER SPRING INNER	SNUBBER SPRING
LOAD AT SOLID HEIGHT	kg	1744	2303	1887
WINDING		LEFT HAND	RIGHT HAND	LEFT HAND
TEST LOAD	kg.	1661	2303	1804
HEIGHT AT TEST LOAD	mm	180	180	180
STIFFNESS	kg./mm	20.763	36.661	16.701

ESTIMATED TEST TABLE

DESCRIPTION	LOAD IN TONNES					
	0.25	0.5	1.0	1.5	2.0	TEST LOAD
OUTER SPRING HEIGHT mm.	248	236	212	188	—	180
INNER SPRING HEIGHT mm.	236	229	216	202	188	180
SNUBBER SPRING HEIGHT mm.	273	258	228	198	—	180

MATERIAL

IS:3195 Gr51CrMoV4 (SNUBBER SPRING)
IS:3195 Gr60Si7 (OUTER & INNER SPRING)

COLOUR GROUP

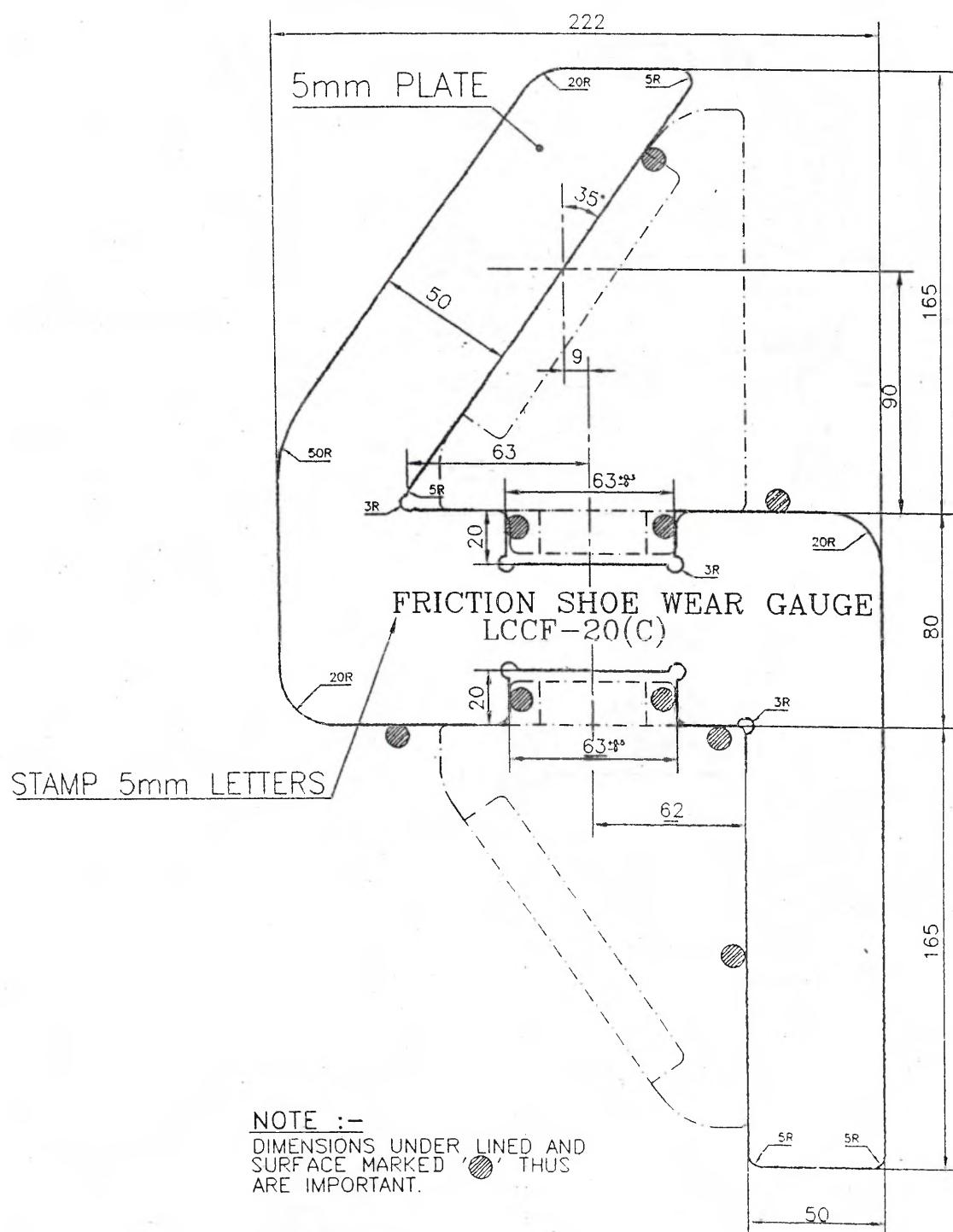
GREEN YELLOW

OUTER	260 ± 2	>259	<269
INNER	243 ± 3	>241	<241
SNUBBER	288 ± 3	>287	<287

FIG. 4.33

WEDGE GAUGE

RITES

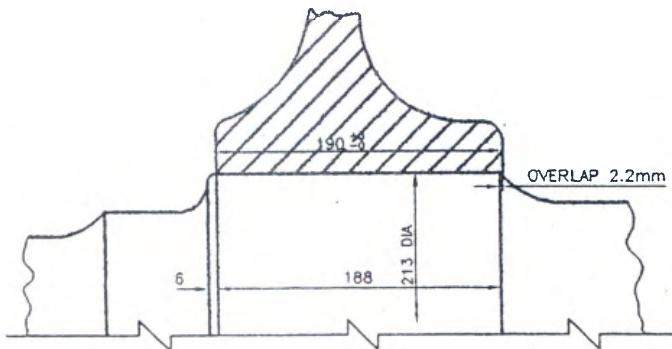
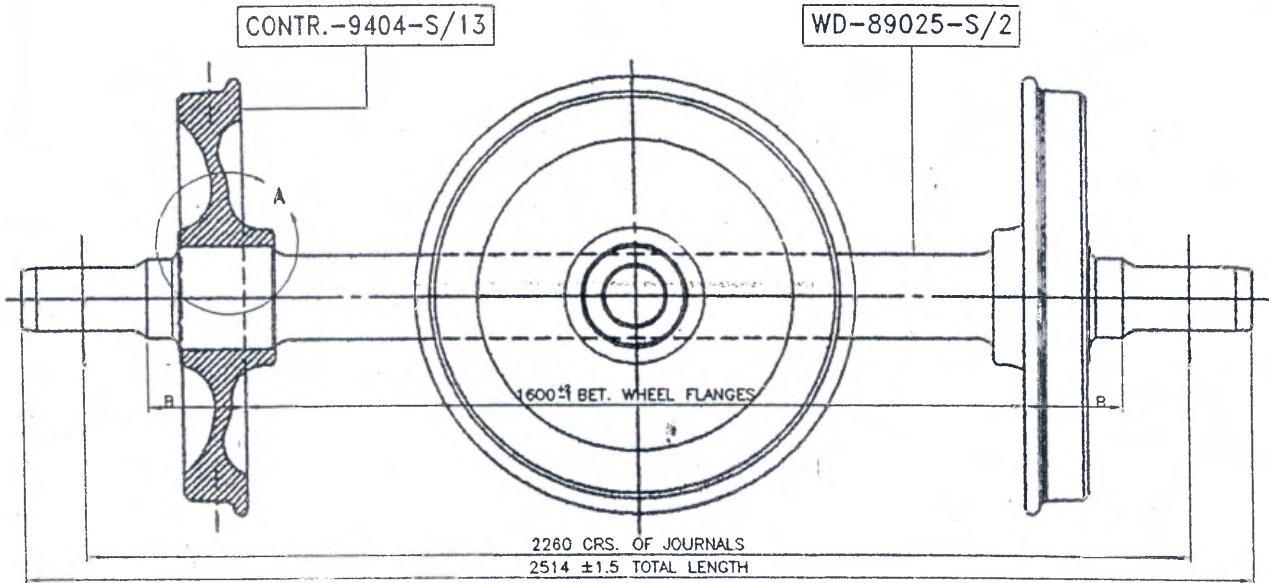


NOTE :-

NOTE. DIMENSIONS UNDER LINED AND SURFACE MARKED '  ' THUS ARE IMPORTANT.

MATERIAL :-

GAUGE TIP IS:1875 CI-4
HARDENED & GROUNDED BODY
IS:2062 Fe 410 WA



ENLARGED DETAIL AT-'A'

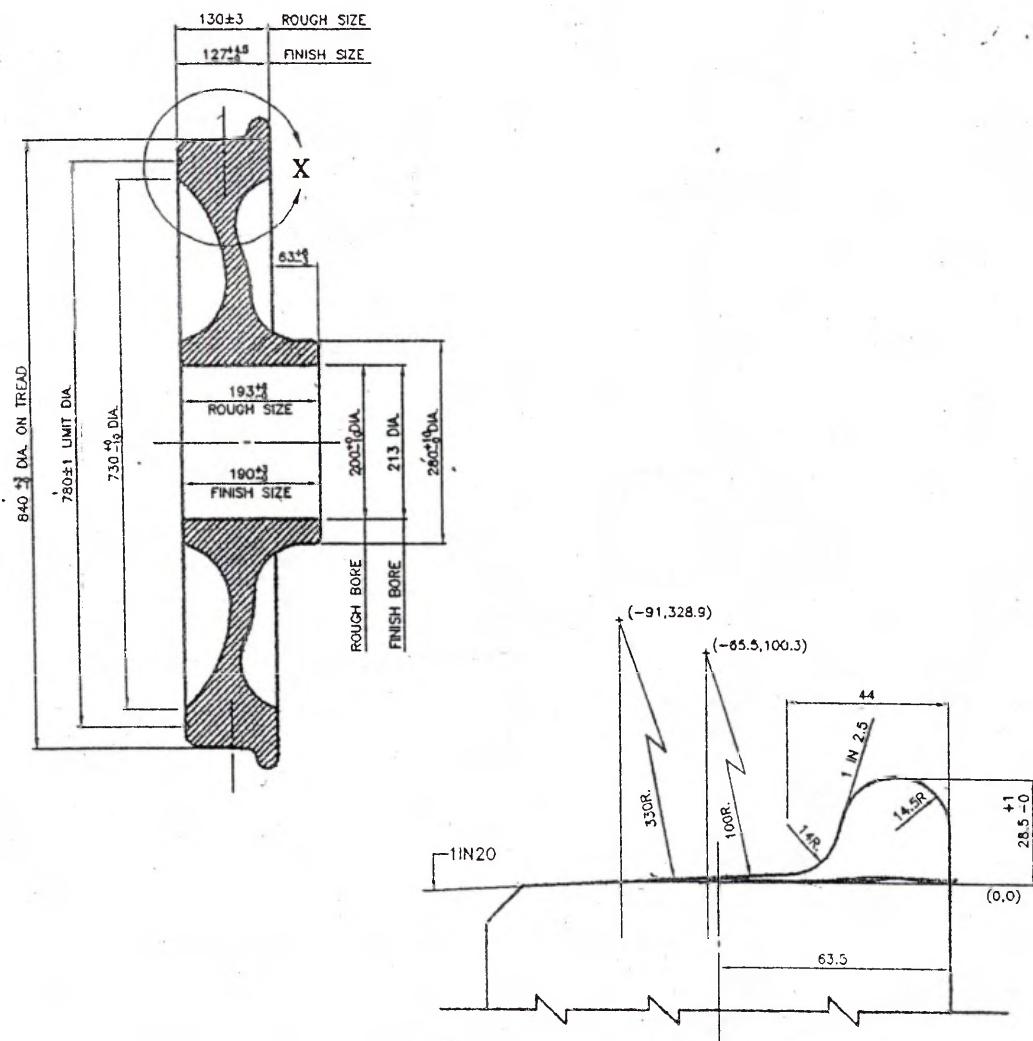
NOTE:

- 1- VARIATION IN TREAD CIRCUMFERENCE OF TWO WHEELS MOUNTED ON THE SAME AXLE TO BE 1.6mm. MAX.
- 2- SELECTIVE ASSEMBLY OF WHEELS & AXLE WILL BE DONE SO AS TO OBTAIN AN INTERFERENCE BETWEEN WHEEL SEAT & BORE OF 1mm.PER METRE DIA. OF WHEEL SEAT & TO ENSURE ASSEMBLY PRESSURE BUILT UP OF 400 TO 520 Kg. PER mm. DIA.QF WHEEL SEAT.
- 3- PRESSURE AT WHICH WHEELS ARE PRESSED ON TO AXLE TO BE STAMPED ON EACH WHEEL HUB AS PER IRS R-19/93 PART-I
- 4- PACKING METHOD OF WHEEL SETS SHALL BE AS PER IRS R-19/93 PART-I
- 5- TOLERANCE OF ± 1 AT 'B' FOR SYMMETRY POSITION OF WHEELS IN RESPECT OF AXLE ABUTMENT MAY BE ALLOWED SUBJECT TO SATISFYING WHEEL GAUGE DIMENSION 1600^{±1} mm.
- 6- FOR ROUGH TURNED AXLE REFER SL.NO.-1 OF DRG.NO.-WD-92039-S/1

FIG. 4.35

WHEEL

RITES

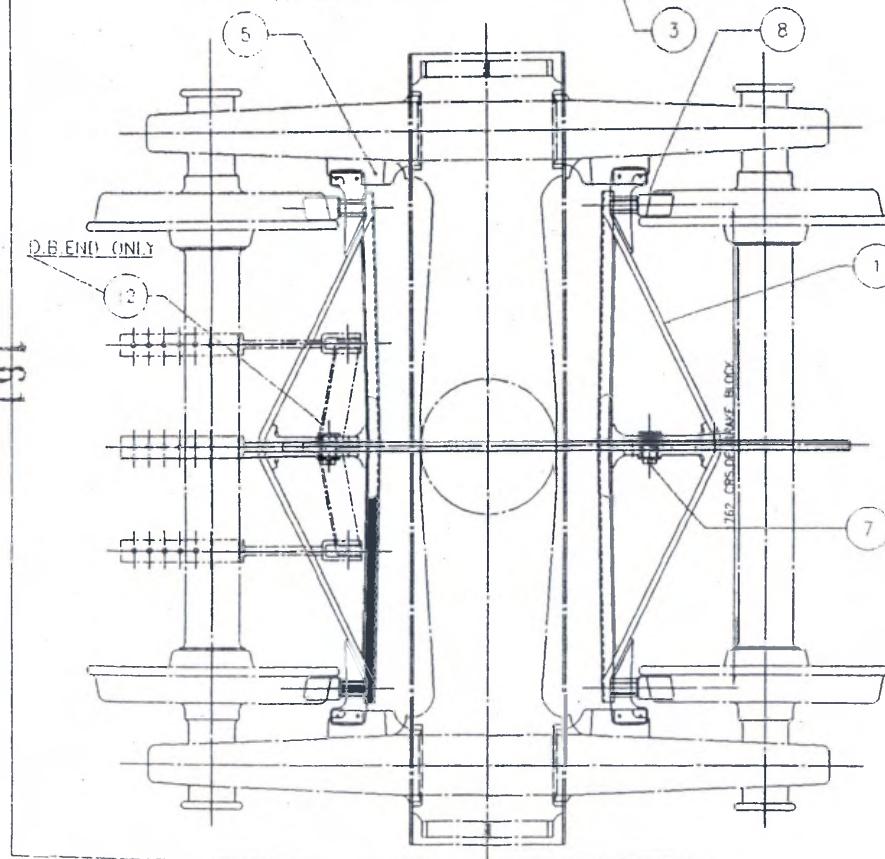
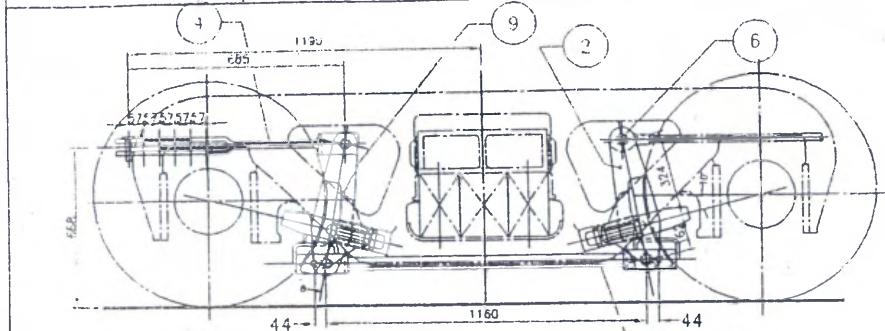
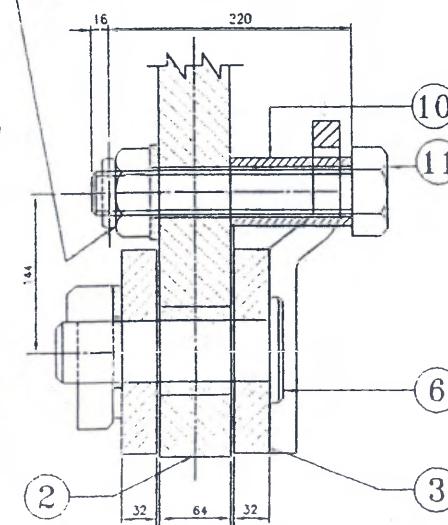
NOTE:DETAIL AT -X

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. WHEEL SHOULD GENERALLY CONFORM TO STANDARD IR SPECIFICATION R-19/93 PART II OR III.
3. STAMPING OF INNER FACE OF RIM AND BOSS SHALL BE AS PER IRS SPECIFICATION R-19/93.
4. BEFORE TAKING UP MANUFACTURE, THE SUPPLIER SHALL SUBMIT DESIGN CALCULATION SUPPORTED BY FEM ANALYSIS AND DETAIL WORKING DRAWINGS SHOWING MATERIAL SPECIFICATION, DIMENSIONS, TOLERANCES ALONG WITH QUALITY ASSURANCE PROGRAMME BEING FOLLOWED.
5. THE WHEEL SHALL BE DESIGNED FOR AN AXLE LOAD OF 20.32t. WITH DYNAMIC AUGMENT OF 50% AT A SPEED OF 110 Kmph. THE BRAKE BLOCK FORCE (LOADED) ON EACH WHEEL SHALL BE 4398 Kg.

FIG. 4.36

BOGIE BRAKE GEAR ARRANGEMENT

RITES

TACK WELD OPEN ENDS OF
SPLIT PIN AFTER ASSEMBLY

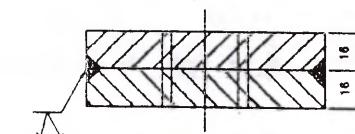
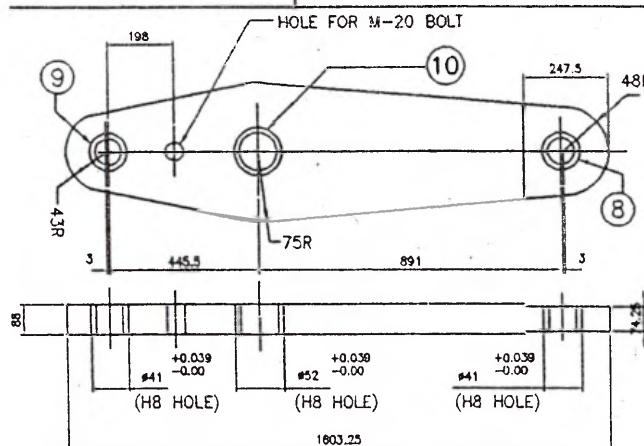
ENLARGED SECTION - 'BB'

ITEM	DESCRIPTION	NO.OFF / BOGIE
12	EQUALISING LEVER	1 DB-END
11	M-20 BOLT WITH NUT, WASHER & 4Ø SPLIT PIN	2
10	SPACER	2
9	BRAKE SHOE KEY	4
8	BRAKE BLOCK	4
7	PIN WITH WASHER & BLUB COTTER	2
6	PIN WITH WASHER & BLUB COTTER	4C8C END 5 D.B-END
5	WEAR PLATE	4
4	BOGIE END PULL ROD	1C8C END 2D.B-END
3	BOGIE BRAKE PUSH ROD	1
2	EQUALISING LEVER	2C8C END 1D.B-END
1	BRAKE BEAM (COMPLETE)	2

FIG. 4.37
(SHEET 1 OF 2)

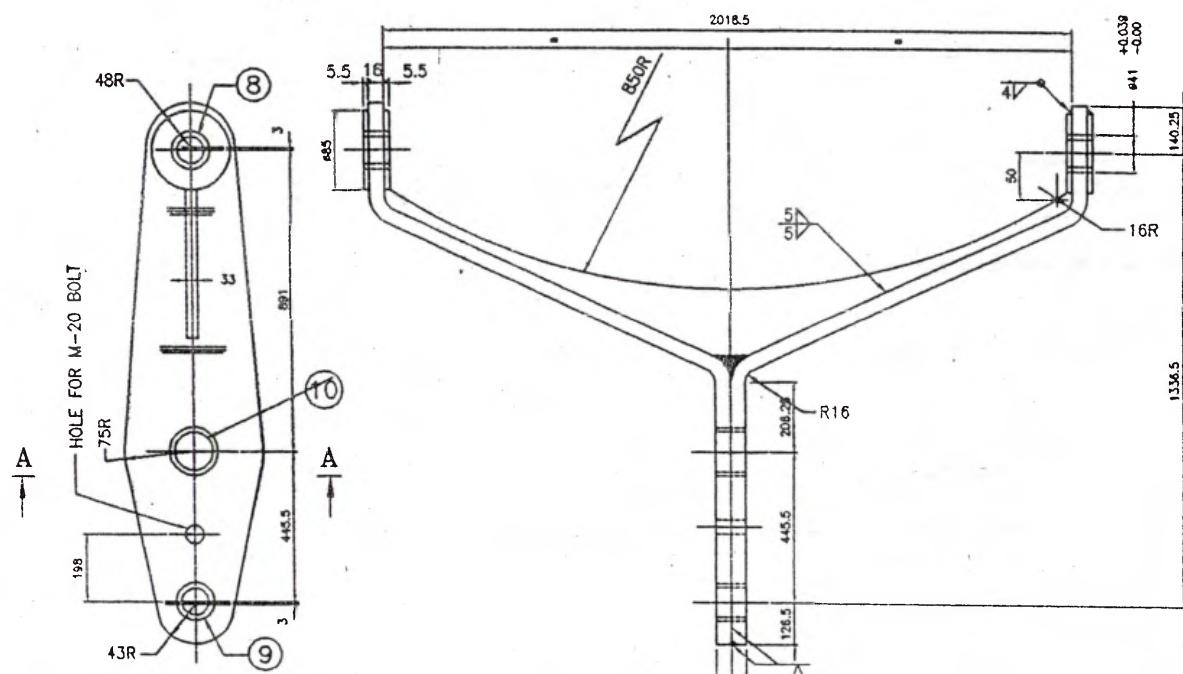
UNDERFRAME BRAKE GEAR ARRANGEMENT (B-CAR)

RITES

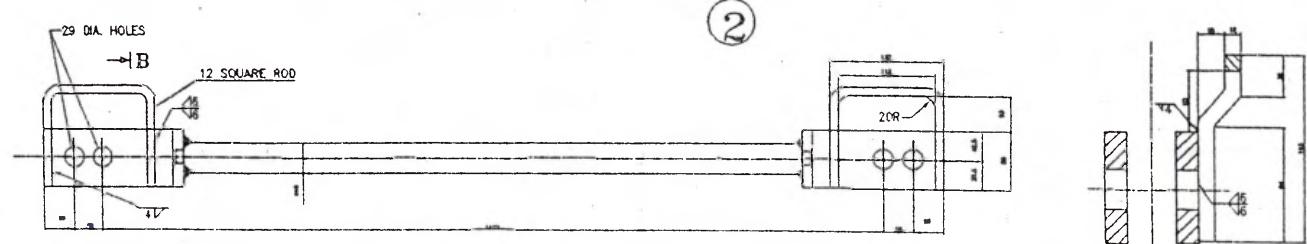


ENLARGED SECTION-AA

①



②



ENLARGED SECTION AT-'BB'

③

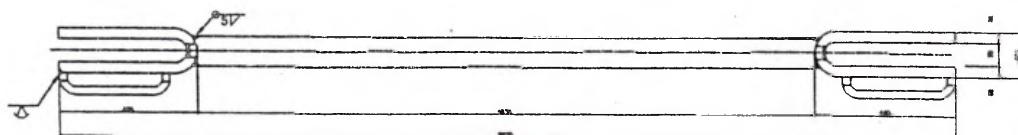
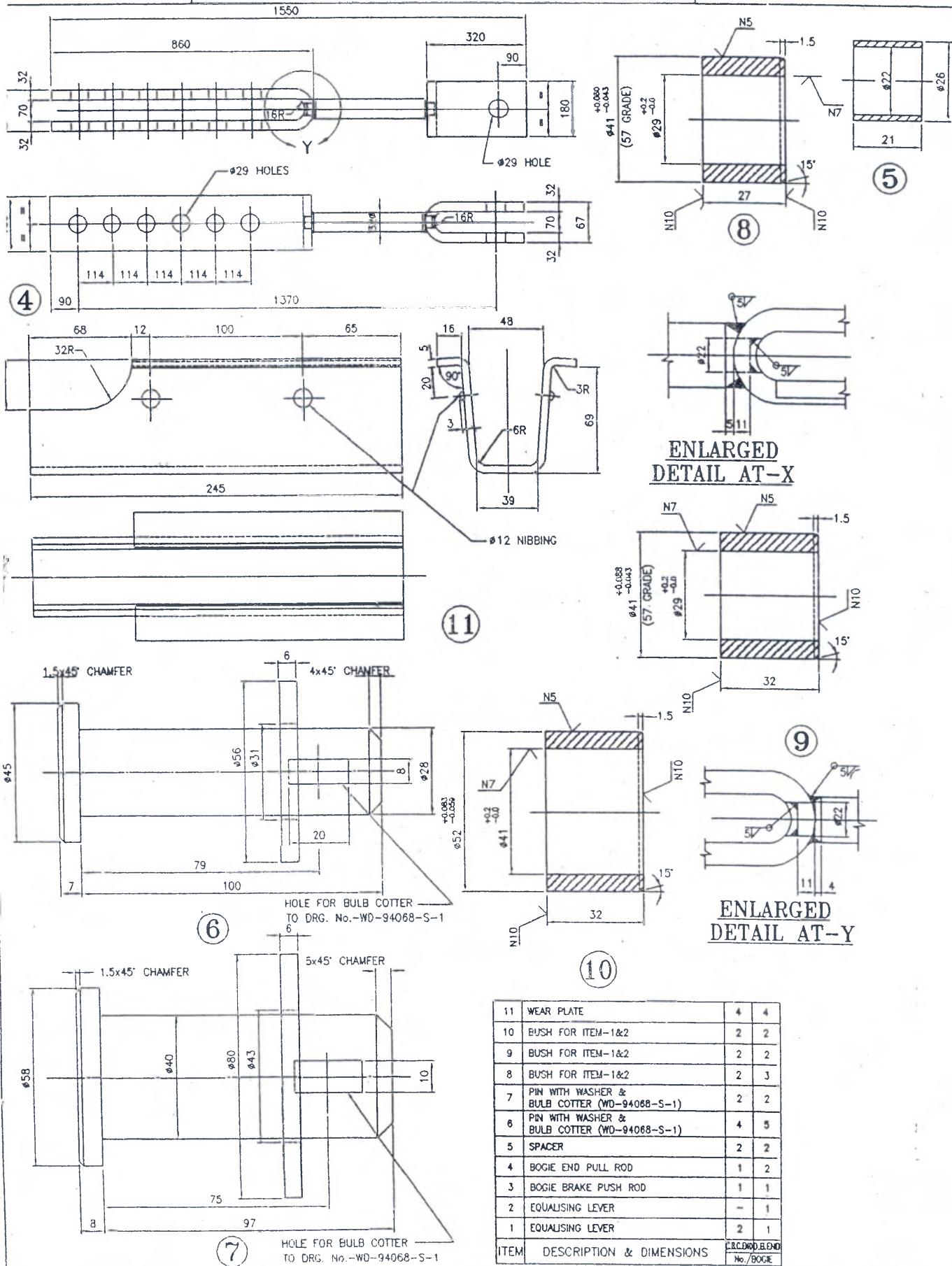


FIG. 4.37
SHEET 2 OF

UNDERFRAME BRAKE GEAR ARRANGEMENT (B-CAR)

RITES



ITEM	DESCRIPTION & DIMENSIONS	4	4
11	WEAR PLATE		
10	BUSH FOR ITEM-1&2	2	2
9	BUSH FOR ITEM-1&2	2	2
8	BUSH FOR ITEM-1&2	2	3
7	PIN WITH WASHER & BULB COTTER (WD-94068-S-1)	2	2
6	PIN WITH WASHER & BULB COTTER (WD-94068-S-1)	4	5
5	SPACER	2	2
4	BOGIE END PULL ROD	1	2
3	BOGIE BRAKE PUSH ROD	1	1
2	EQUALISING LEVER	-	1
1	EQUALISING LEVER	2	1
		CIRC.D.D.B.D.D	No./BOGIE

FIG. 4.38

LOCATIONS OF PINS & BUSHES
(C.B.C. END)

RITES

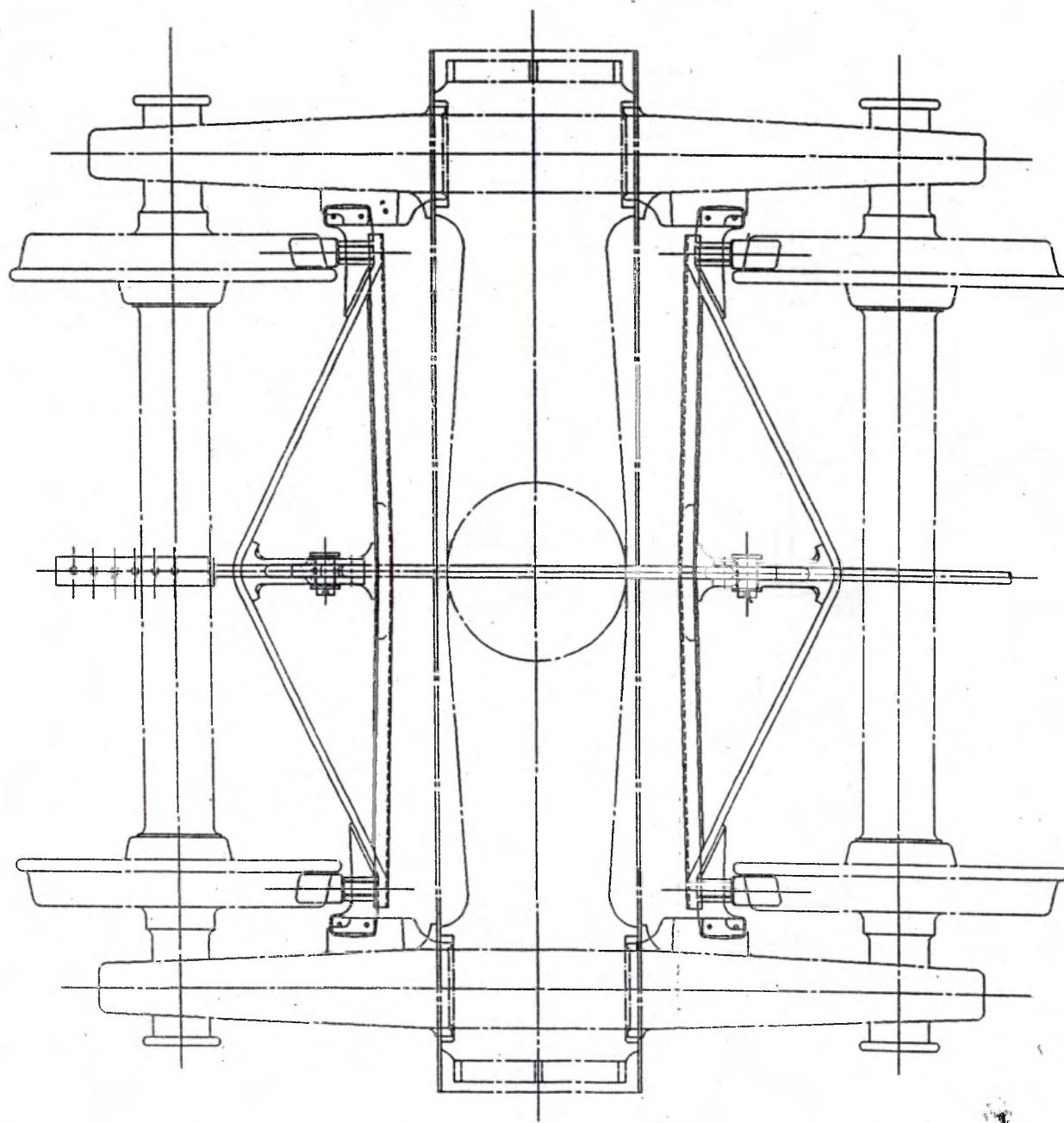
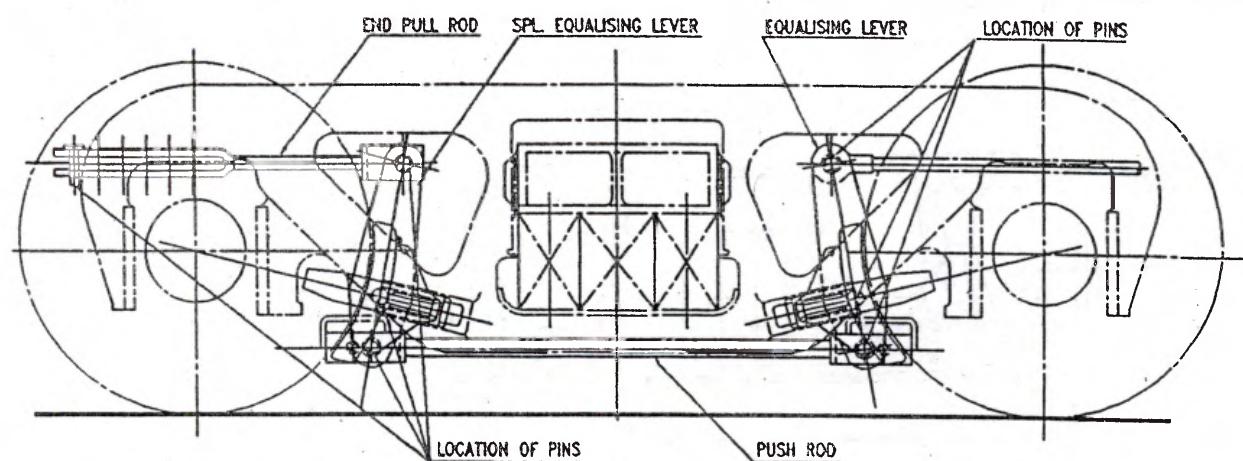


FIG. 4.39

LOCATIONS OF PINS & BUSHES
(DRAW BAR END)

RITES

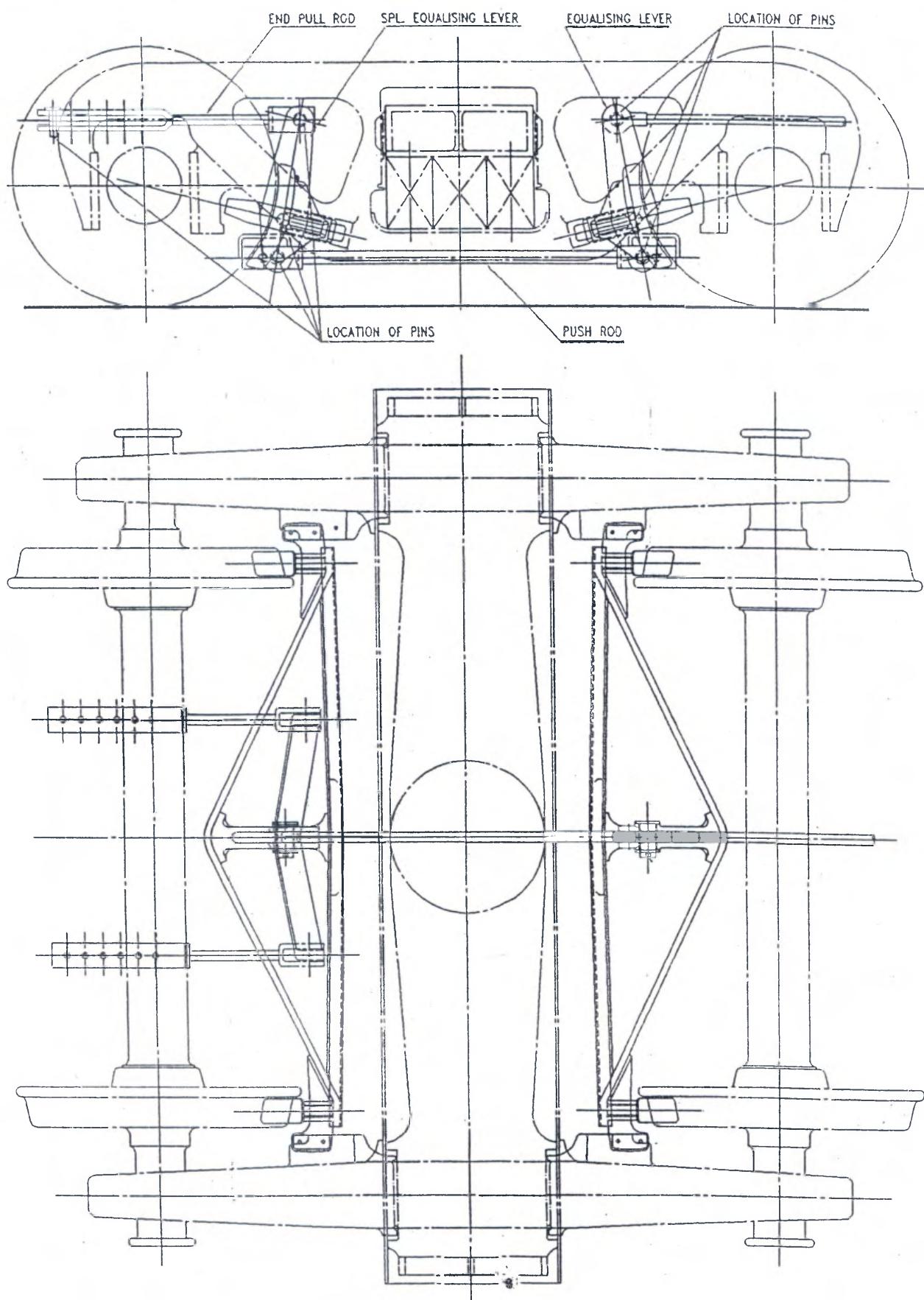
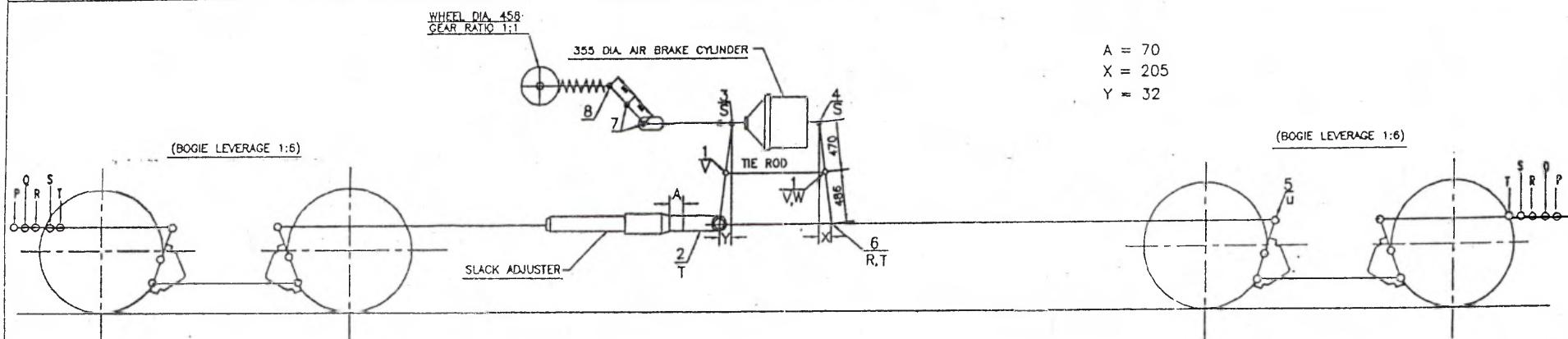


FIG. 4.40

MANUAL ADJUSTMENT OF BOGIE BRAKE GEAR

RITES



LIMITS OF WHEEL DIAMETER FOR MANUAL ADJUSTMENT
OF BRAKE GEAR

WHEEL DIAMETER ON TREAD

HOLES TO BE USED FOR BRAKE ADJUSTMENT	BETWEEN 840-829	BETWEEN 828-817	BETWEEN 816-805	BETWEEN 804-793	BETWEEN 792-780
	P	Q	R	S	T

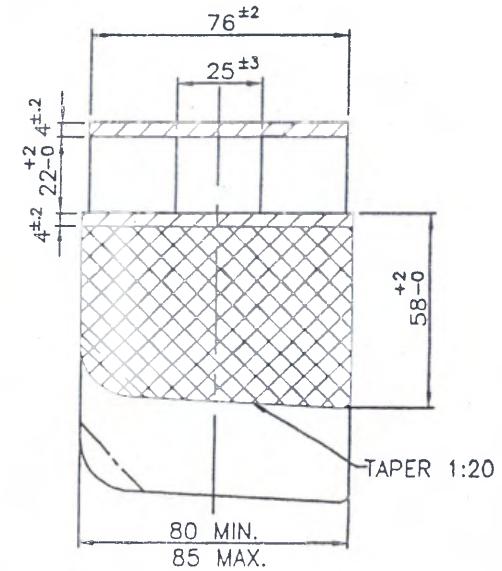
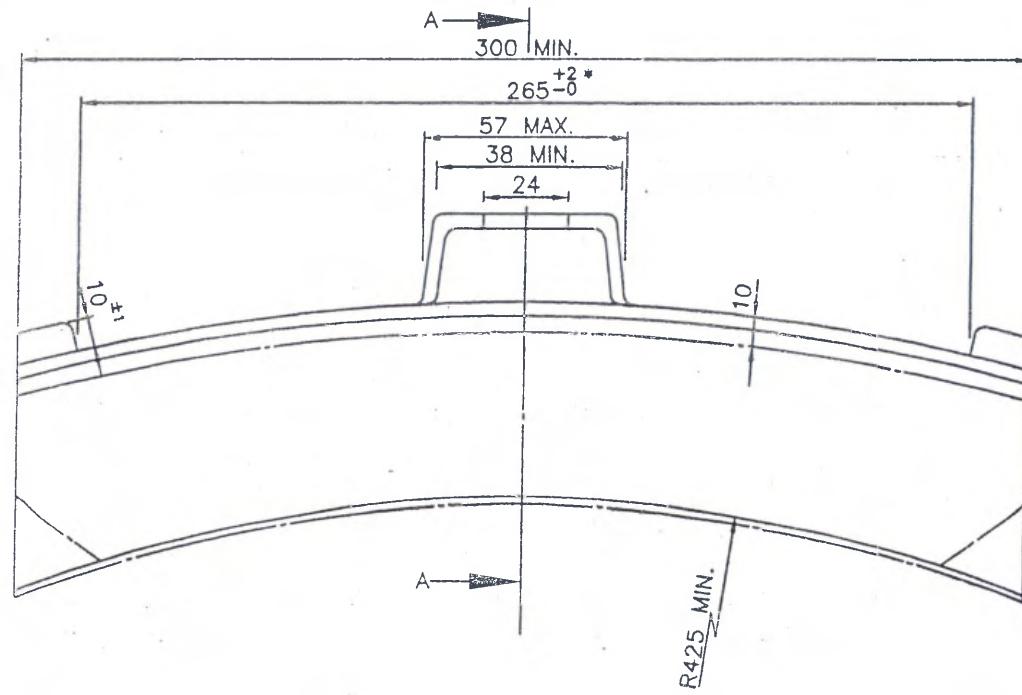
NOTE :-

THE ADJUSTMENT OF BRAKE GEAR PINS SHOULD BE MADE DURING THE CHANGE OF BRAKE BLOCKS & AS WHEEL WEARS, SO THAT THE EQUALIZING LEVER REMAINS IN VERTICAL POSITION. IN THIS REGARD THE HOLES PROVIDED IN THE PUSH ROD CAN ALSO BE MADE USE OF.

FIG. 4.41

COMPOSITE BRAKE BLOCK

RUTES



SECTION A-A

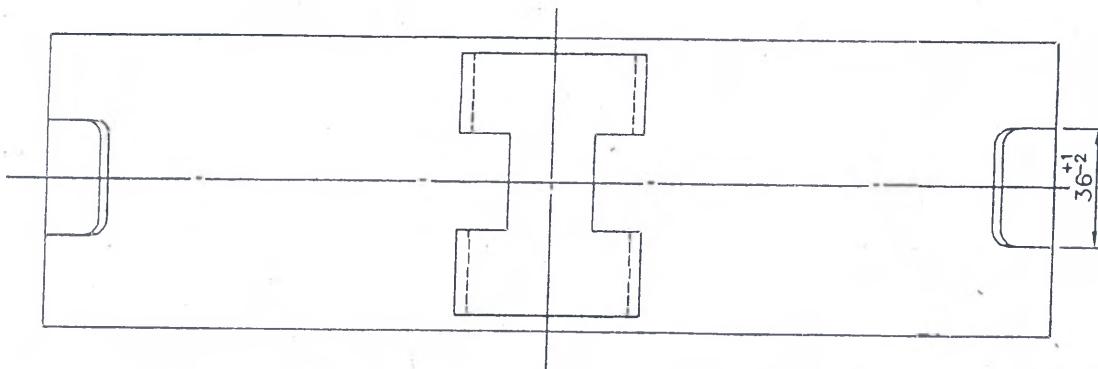
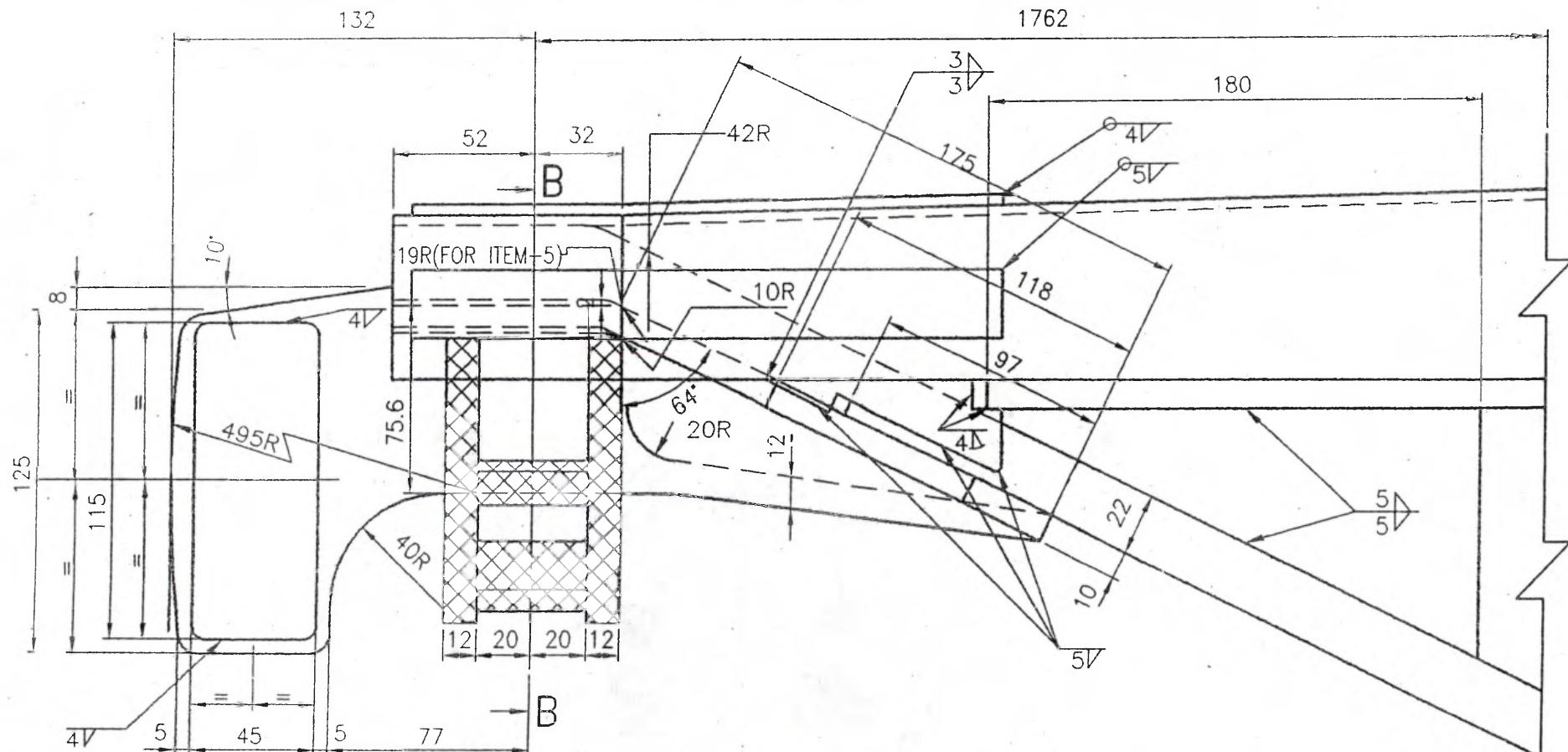


FIG. 4.42

RECLAMATION OF BRAKE BEAM END

RITES

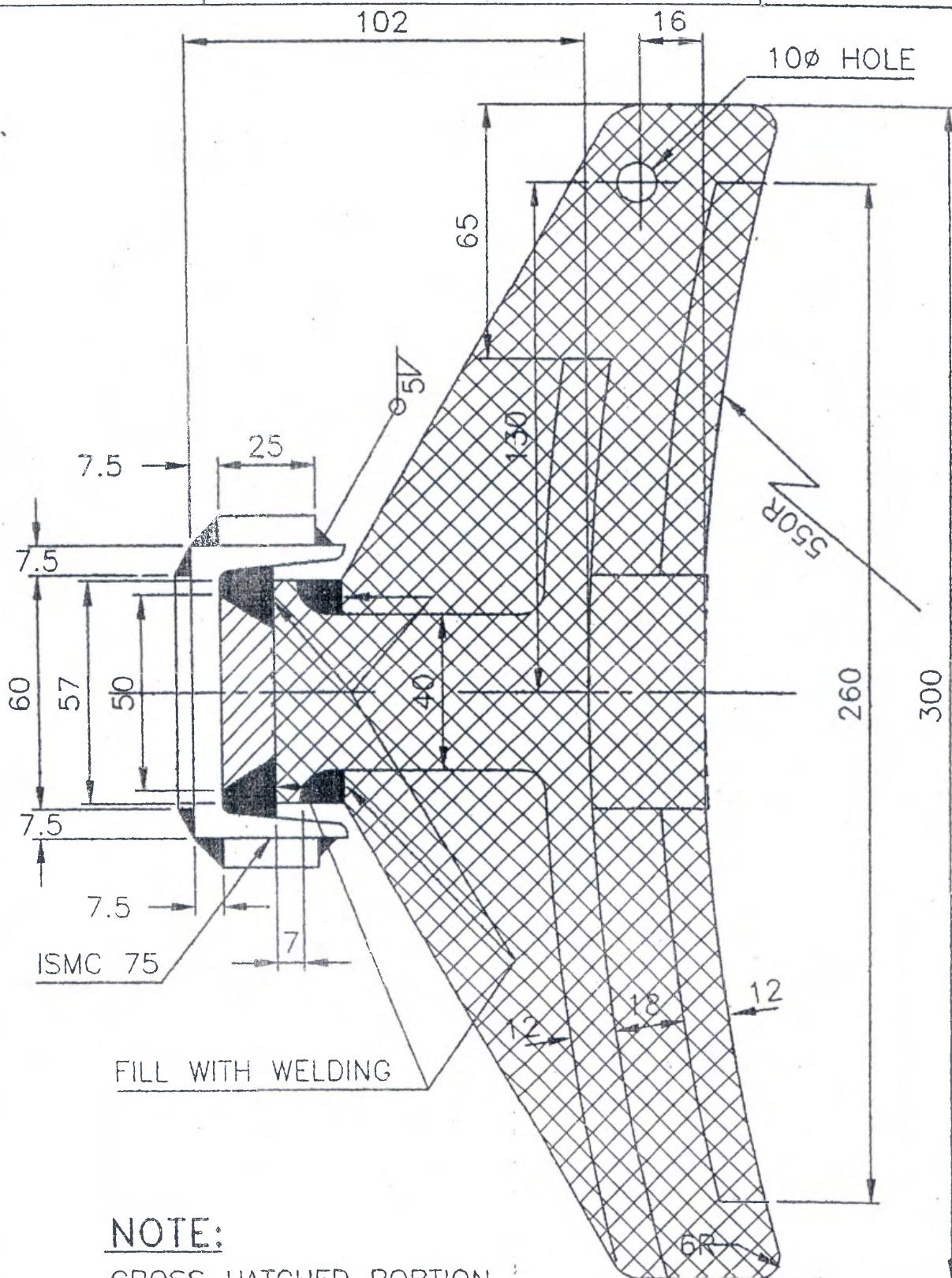
NOTE:-

1. CROSS HATCHED PORTION IS TO BE GAS CUT.
2. REFER FIG.4.43 FOR SECTION-BB.

FIG. 4.43

RECLAMATION OF
BRAKE BEAM END

RITES



NOTE:

CROSS HATCHED PORTION
IS TO BE GAS CUT.

SECTION-'BB' OF FIG 4.42

FIG. 4.44

RECLAMATION OF BRAKE BEAM END

RITES

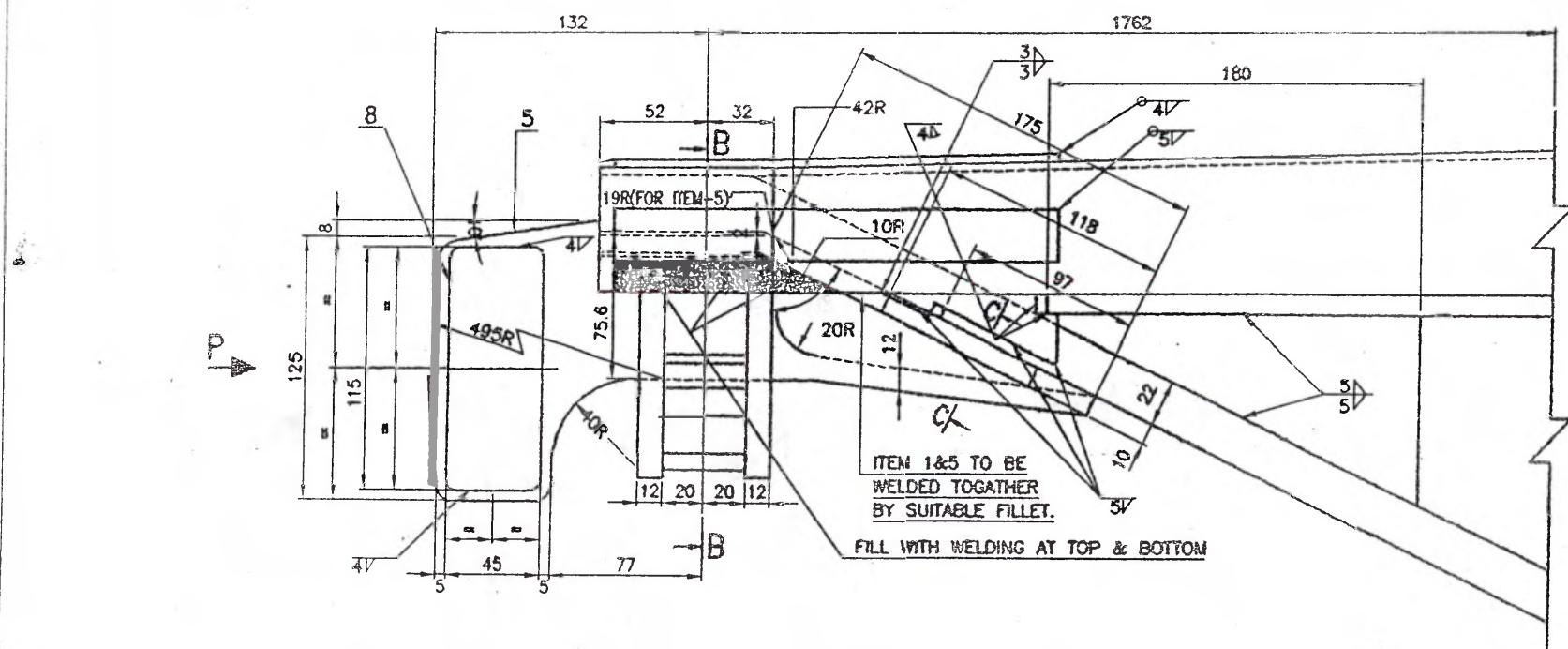


FIG. 4.45

RECLAMATION OF BRAKE BEAM END (BRAKE HEAD)

RITES

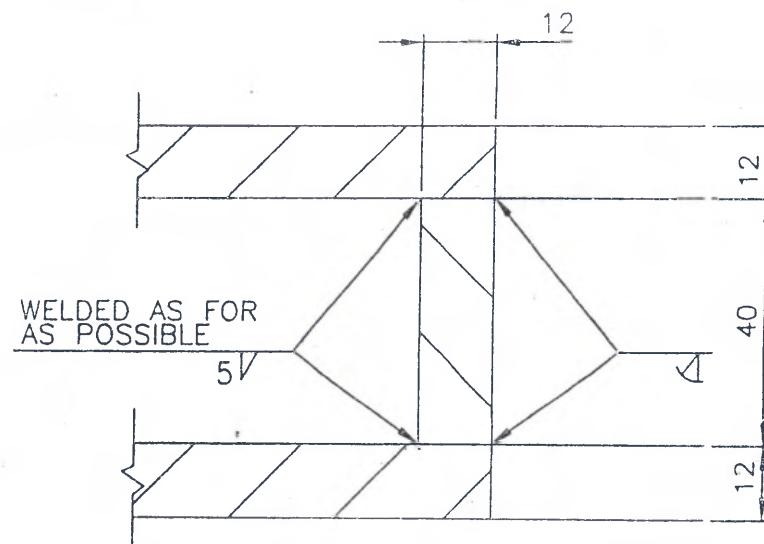
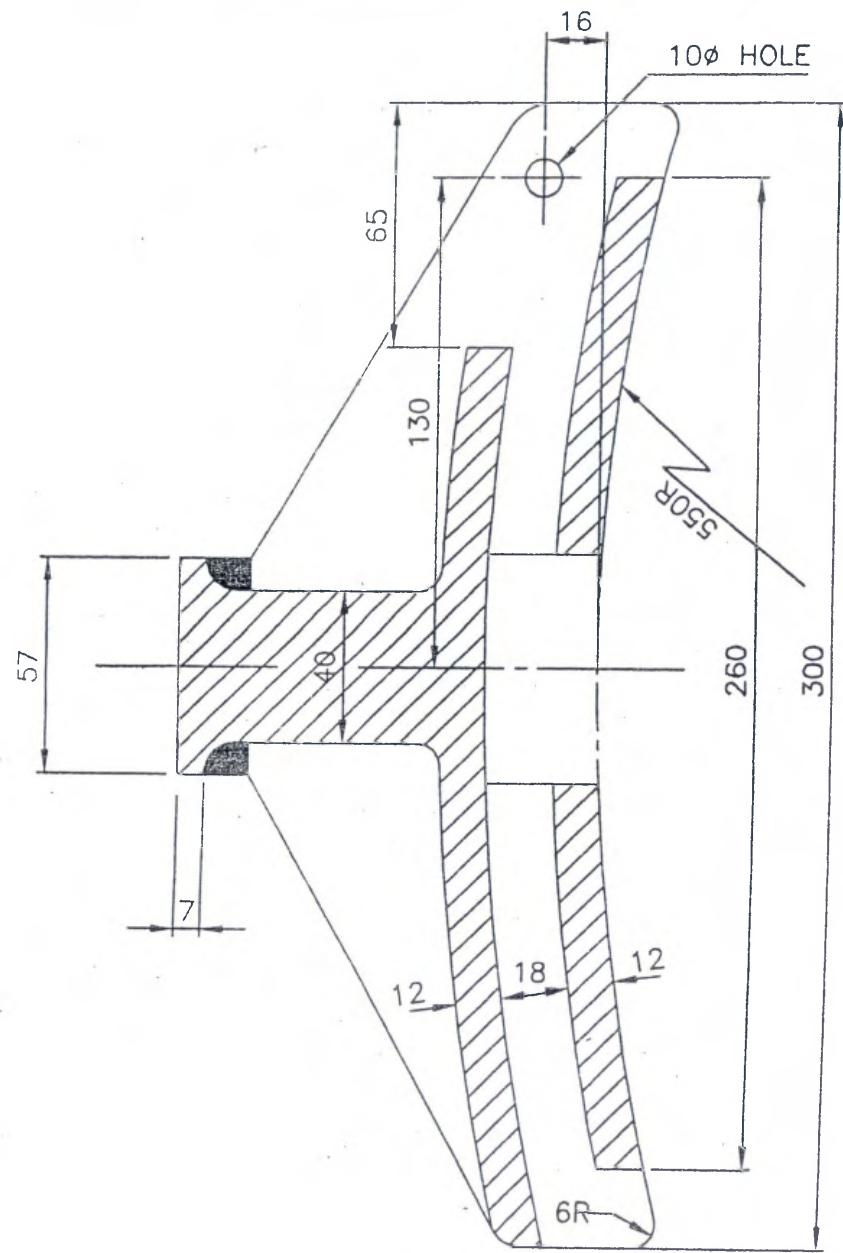


FIG. 4.46

BRAKE BEAM END (RECLAIMED BY NEW BRAKE HEAD)

RITES

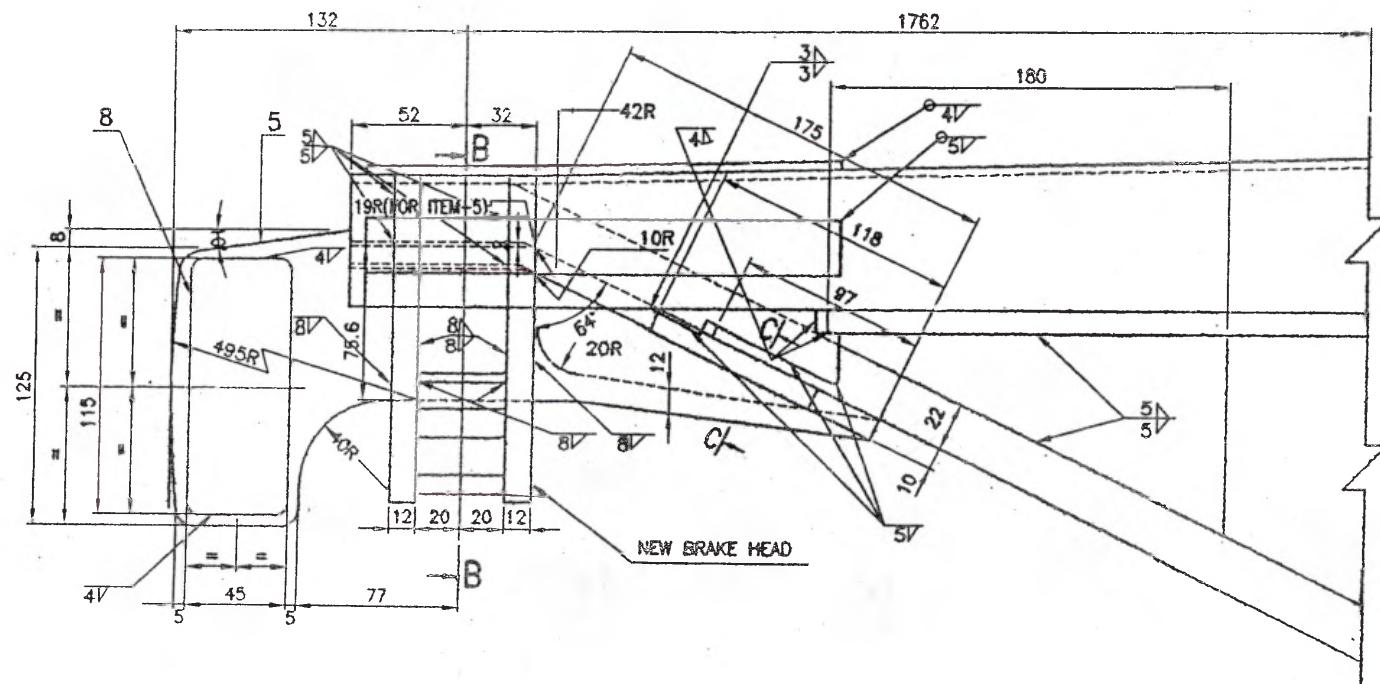


FIG. 4.47

RECLAMATION OF BRAKE
STAMP END

RITES

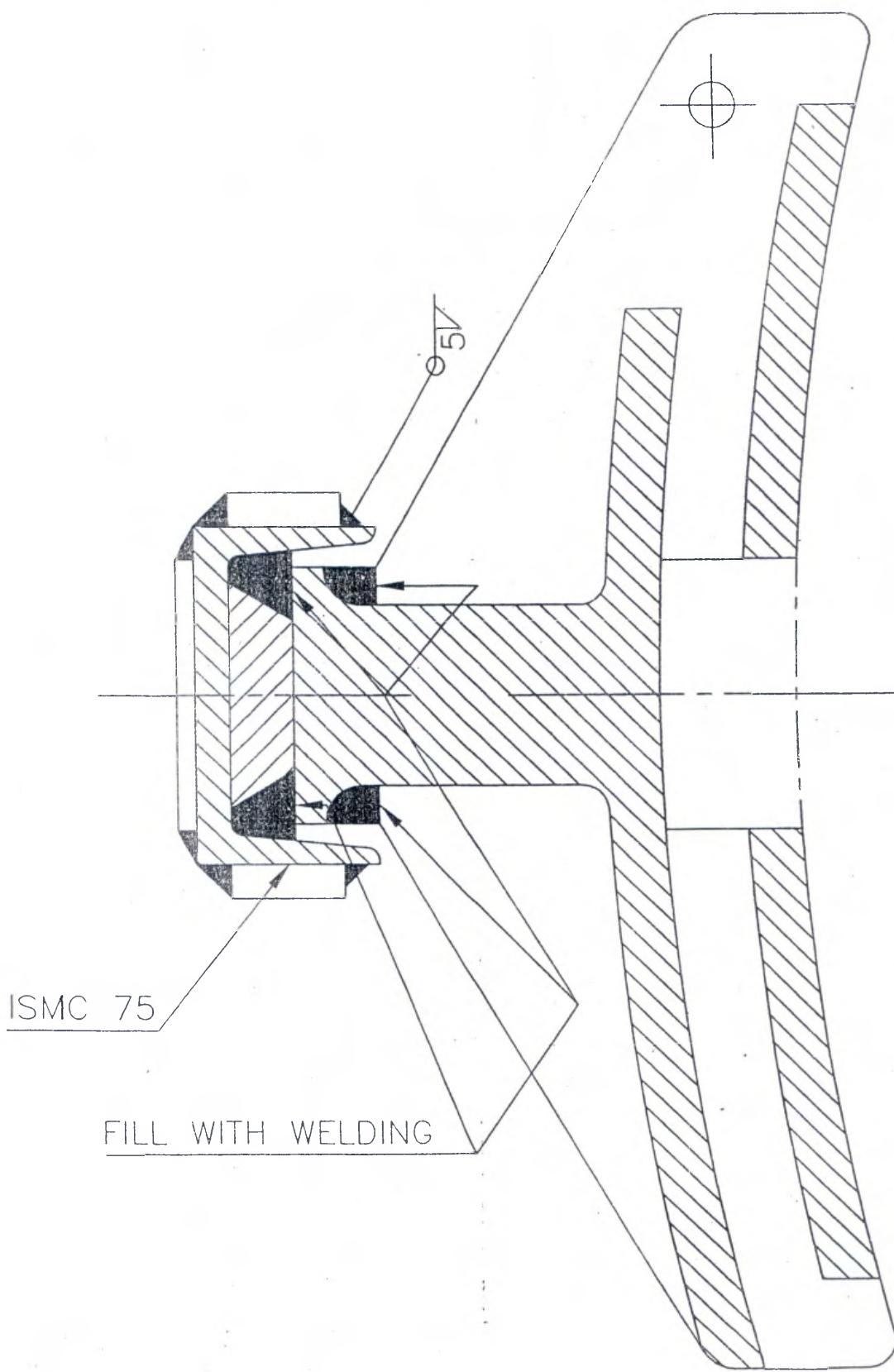


FIG. 4.48

IDEAL FITMENT OF BRAKE
BLOCK

RITES

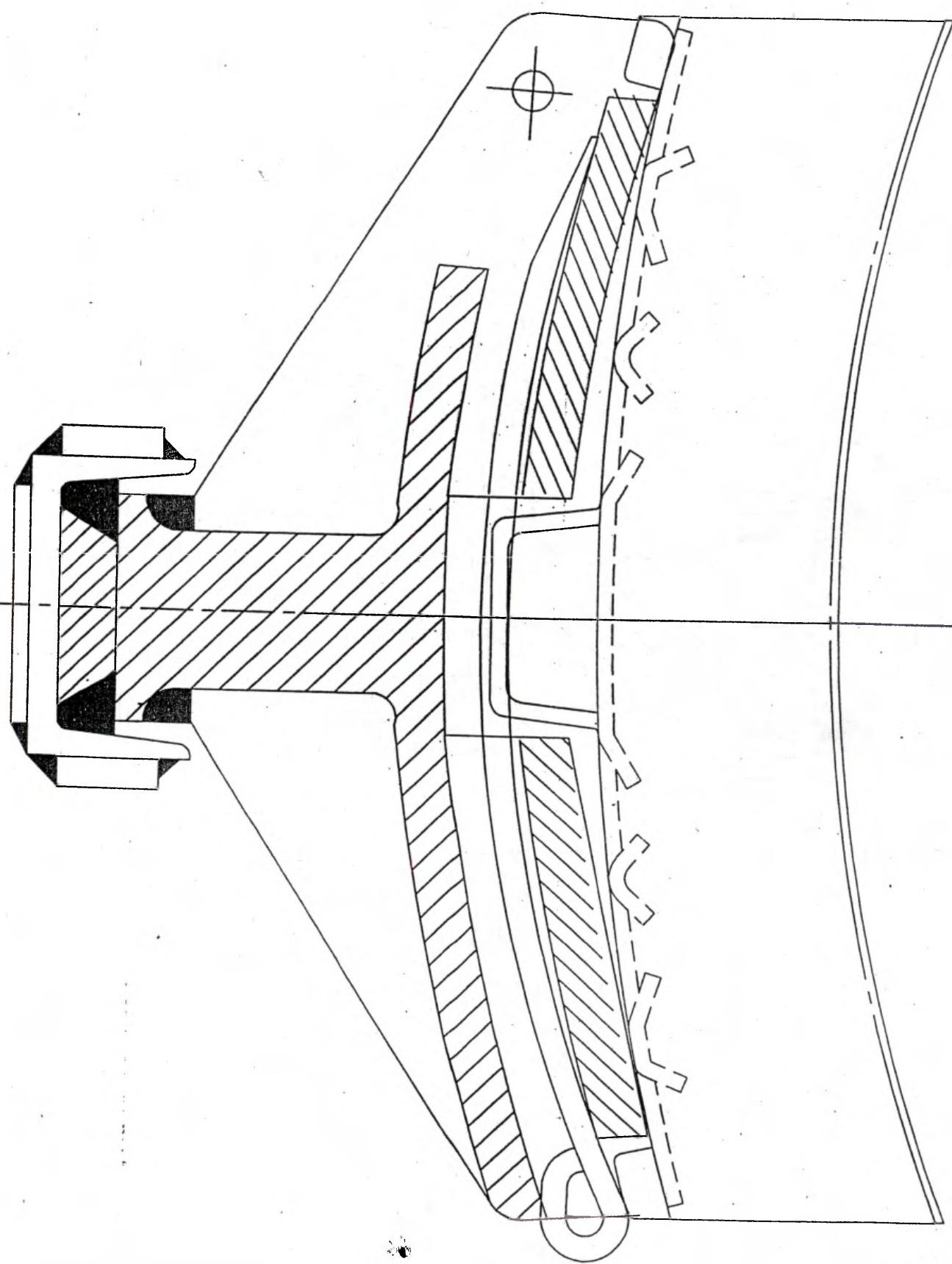


FIG. 4.49

POOR FITMENT OF BRAKE
BLOCK

RITES

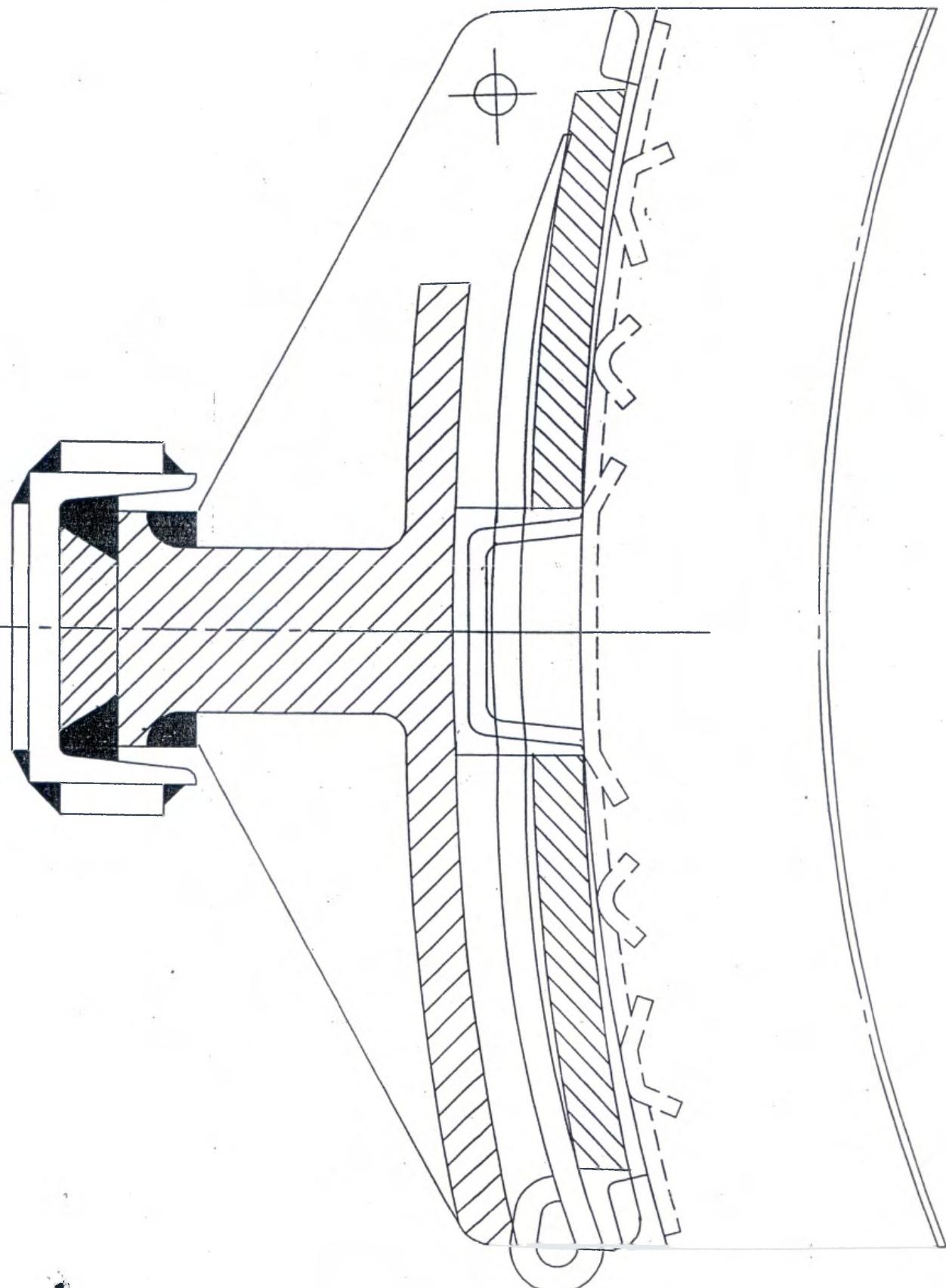


FIG. 4.50

UNACCEPTABLE FITMENT OF
BRAKE BLOCK

RITES

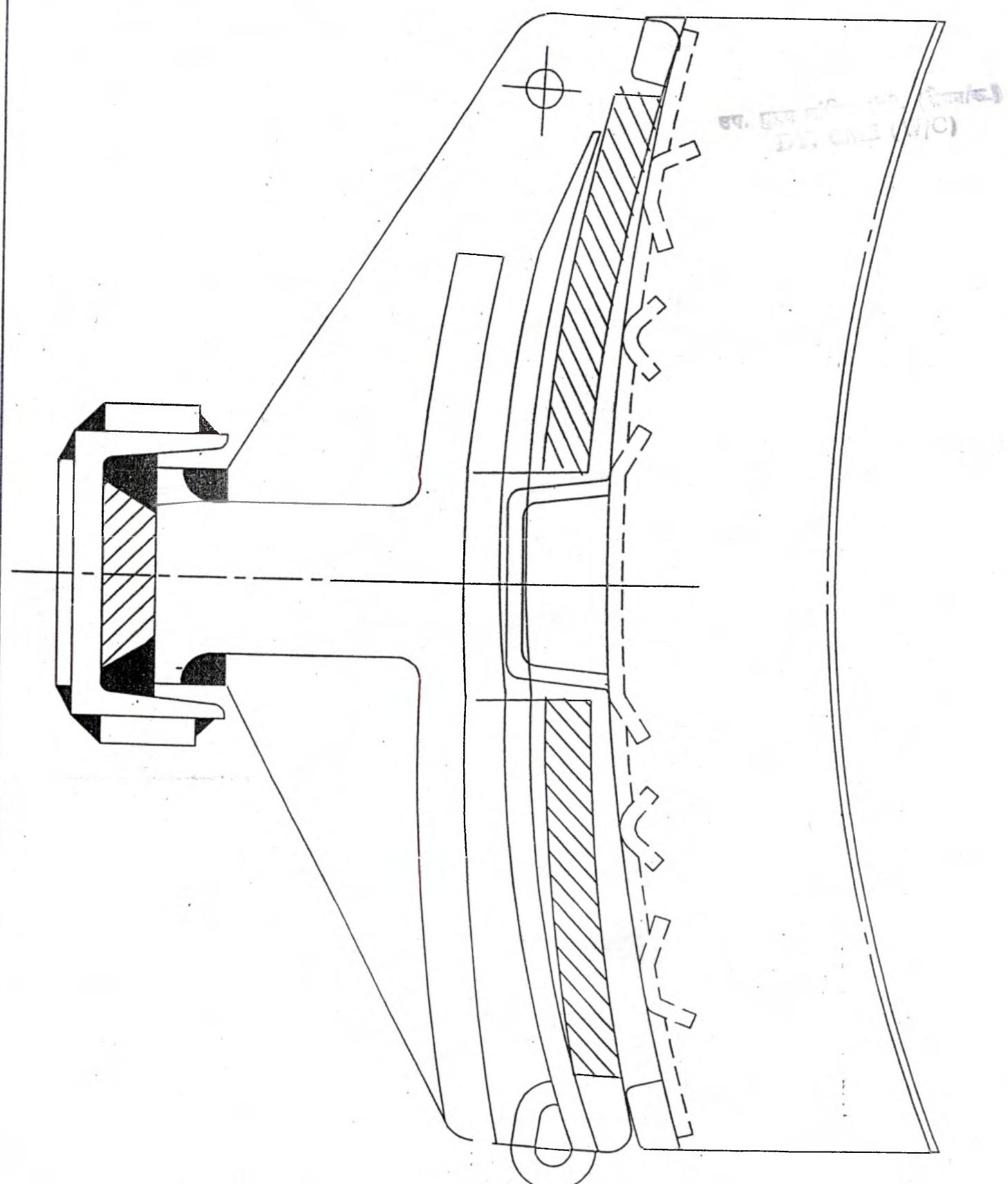
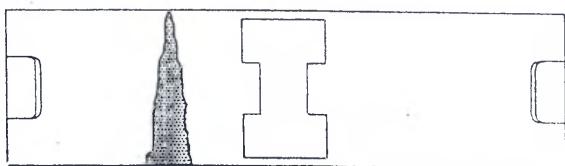
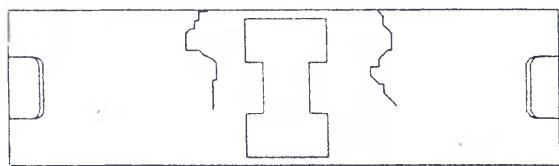
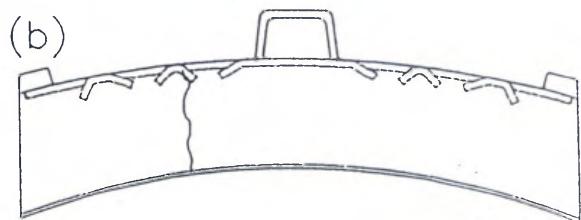
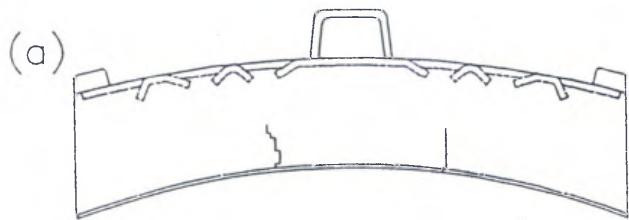


FIG. 4.51

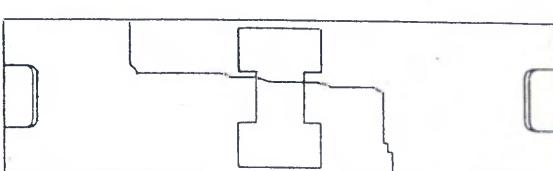
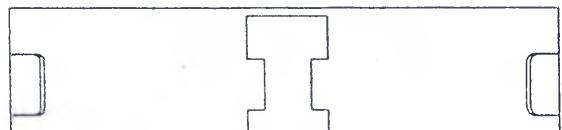
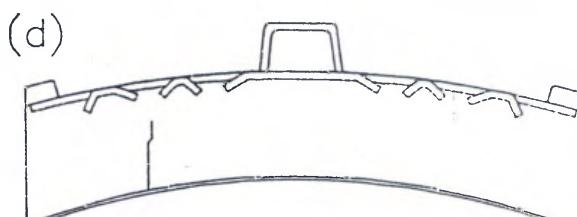
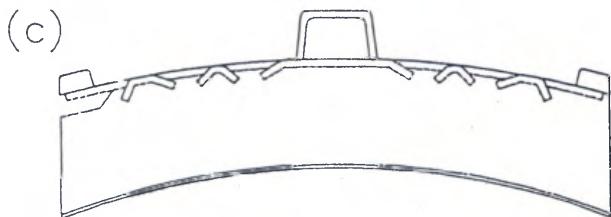
ACCEPTABLE LIMIT OF
BRAKE BLOCK CRACKS

RITES



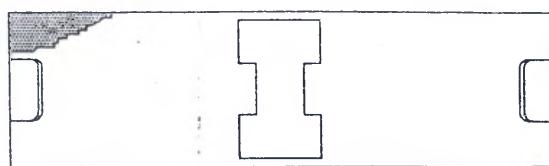
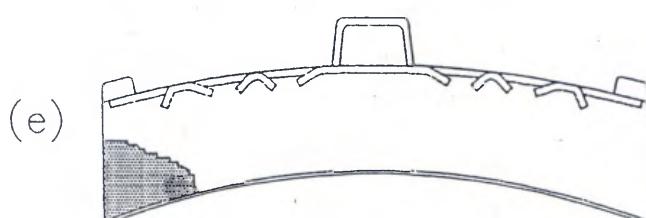
MORE THAN 2 CRACKS 5mm DEEP
UNACCEPTABLE

OPEN CRACK WIDER THAN 2mm
UNACCEPTABLE



BACK PLATE SPLITTING FROM BLOCK
UNACCEPTABLE IF SPLIT IS OVER
10% OF BLOCK LENGTH

LONGITUDINAL CRACK
UNACCEPTABLE



PORTION BROKEN FREE
UNACCEPTABLE OVER 10%

FIG. 4.52

WELDING SEQUENCE OF LINER

RITES



ALL DIMENTIONS ARE IN MM (NOT TO SCALE)

FIG. 5.1

TWO STAGE AUTOMATIC EMPTY-LOAD BRAKE SYSTEM

TRAILERS

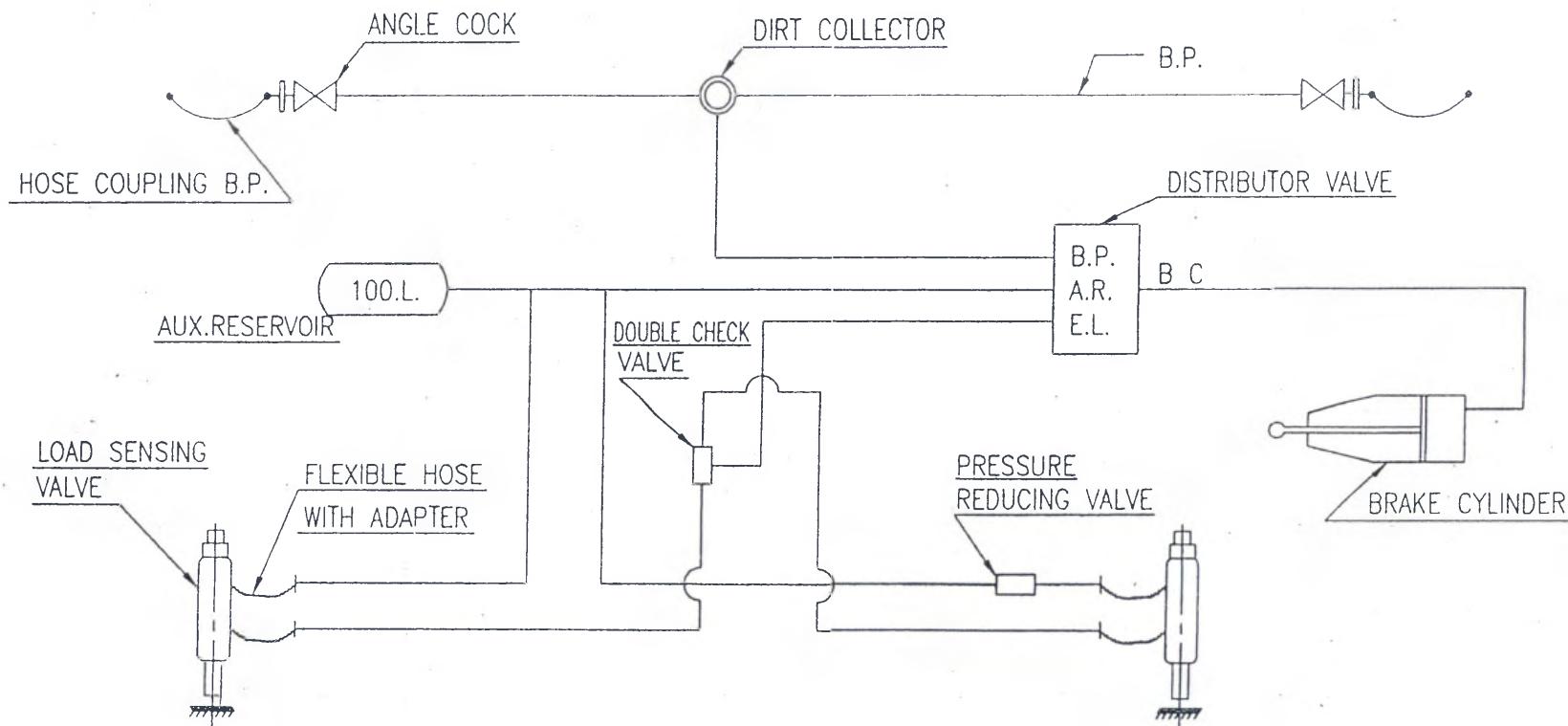


FIG. 5.2

SCHEMATIC DIAGRAM OF DISTRIBUTOR VALVE

RUTES

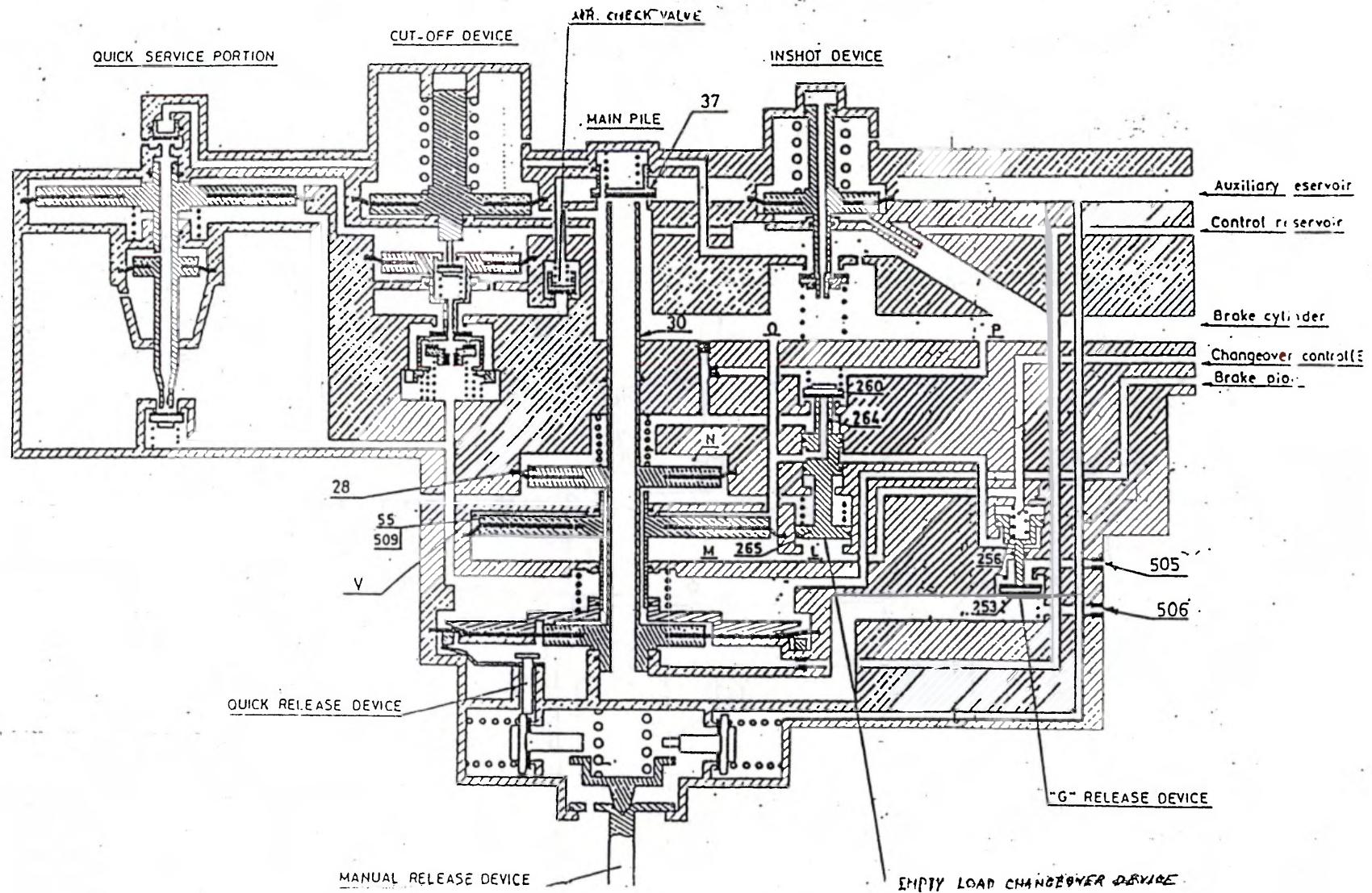
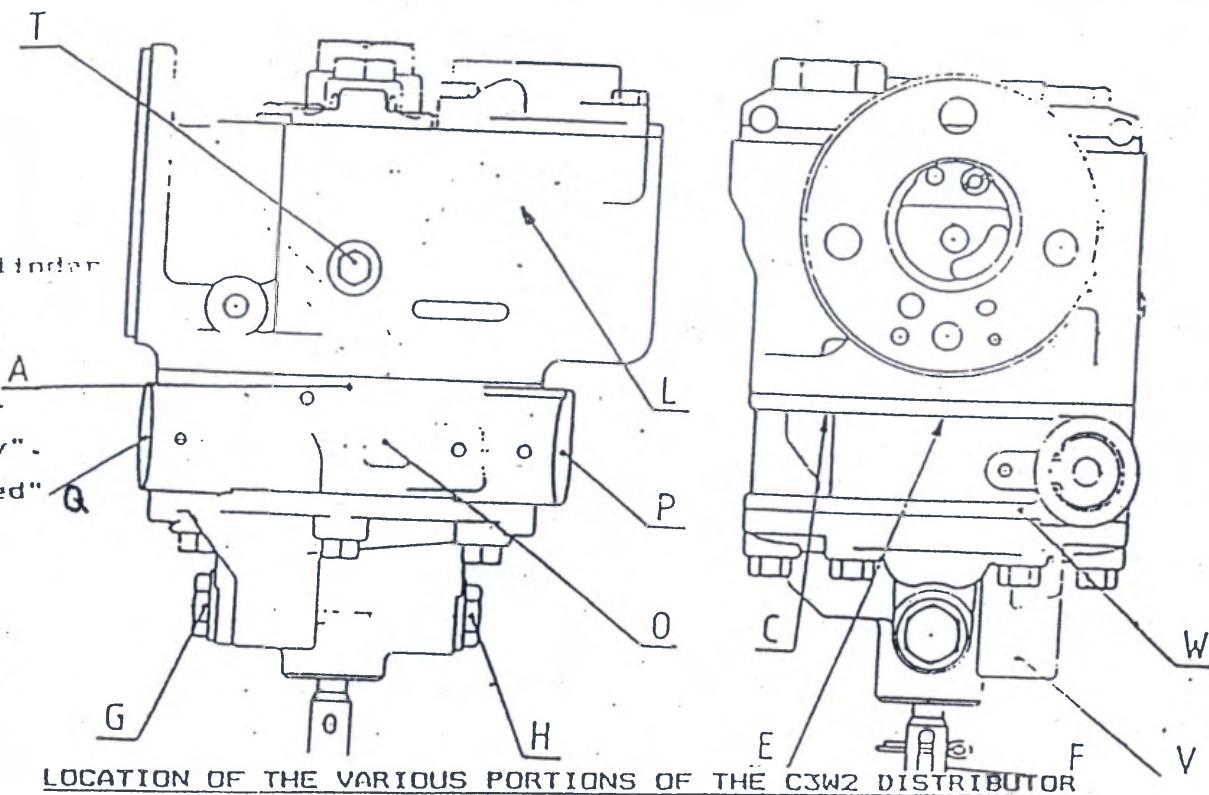
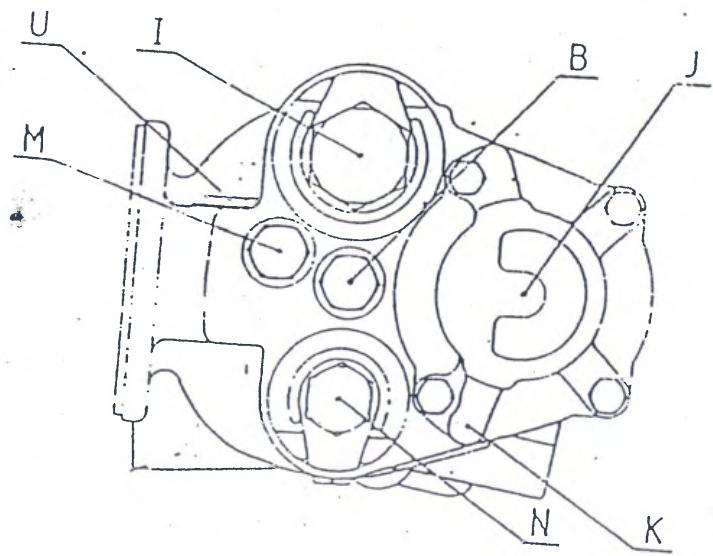


FIG. 5.3

DISTRIBUTOR VALVE ASSEMBLY

RIVEL

- I - Cut-off portion.
- J - Quick service portion.
- K - Quick service latch.
- L - Quick service bulb exhaust
- M - A.R. check valve.
- N - Inshot portion
- O - Changeover device, brake cylinder
- P - Release portion "Goods".
- S - Stop.
- T - Application chokes, "Goods".
- V - Release choke, "Goods, Empty".
- W - Release choke, "Goods, Loaded"



LOCATION OF THE VARIOUS PORTIONS OF THE CSW2 DISTRIBUTOR

- A - Main pile.
- B - Main pile valve.
- C - Connection to atmosphere from below B.C. diaphragm, C.R and changeover device.
- E - Automatic release exhaust.
- F - Control lever of the manual and quick release portions
- G - C.R. vent valve.
- H - A.R. vent valve.

FIG. 5.4

MANUAL & QUICK RELEASE ARRANGEMENT

TRUNTS

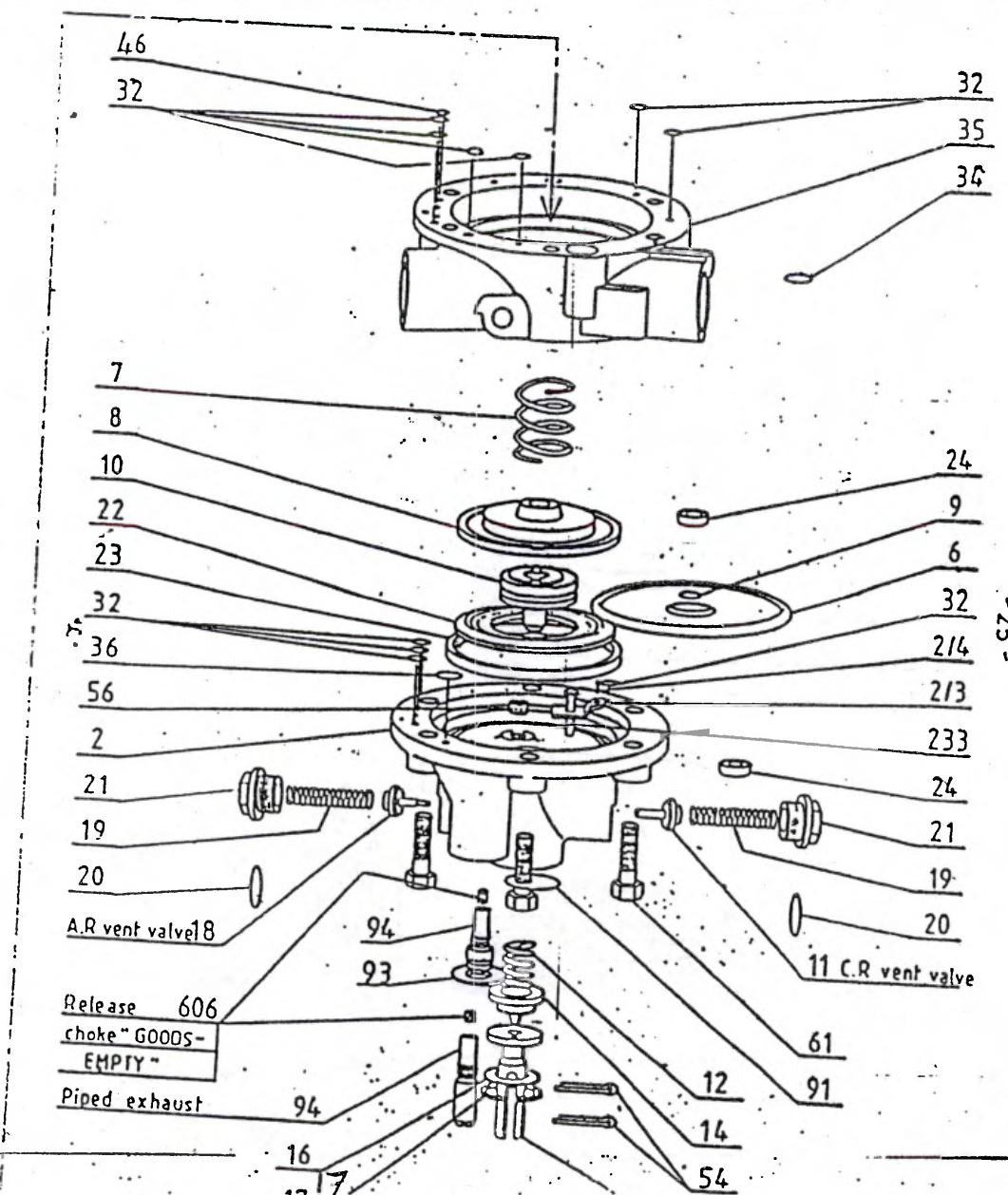


FIG. 5.5

MANUAL & QUICK RELEASE ARRANGEMENT

RITES

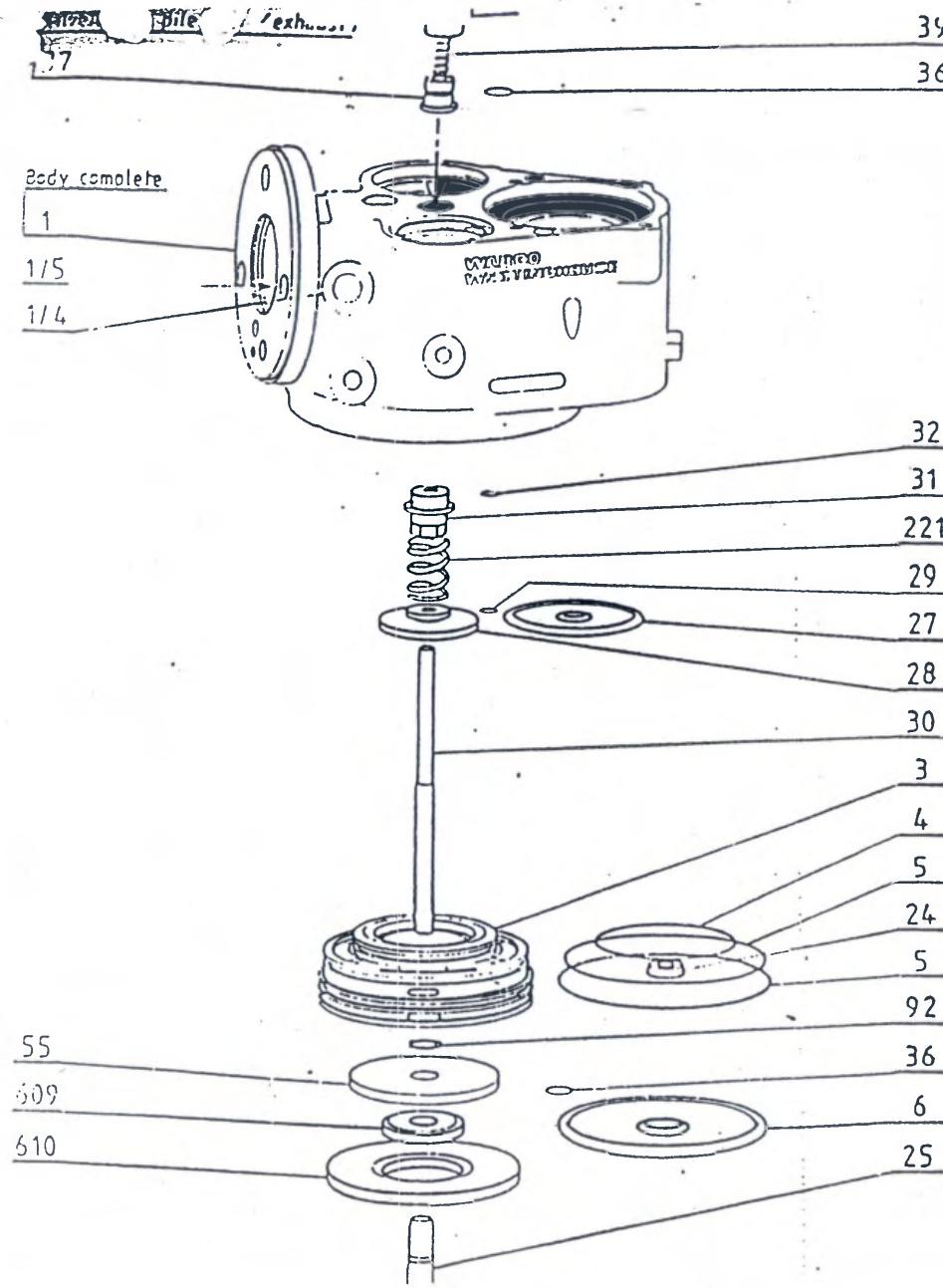


FIG. 5.6

CHANGE OVER DEVICE(BRAKE CYLINDER)

RITES

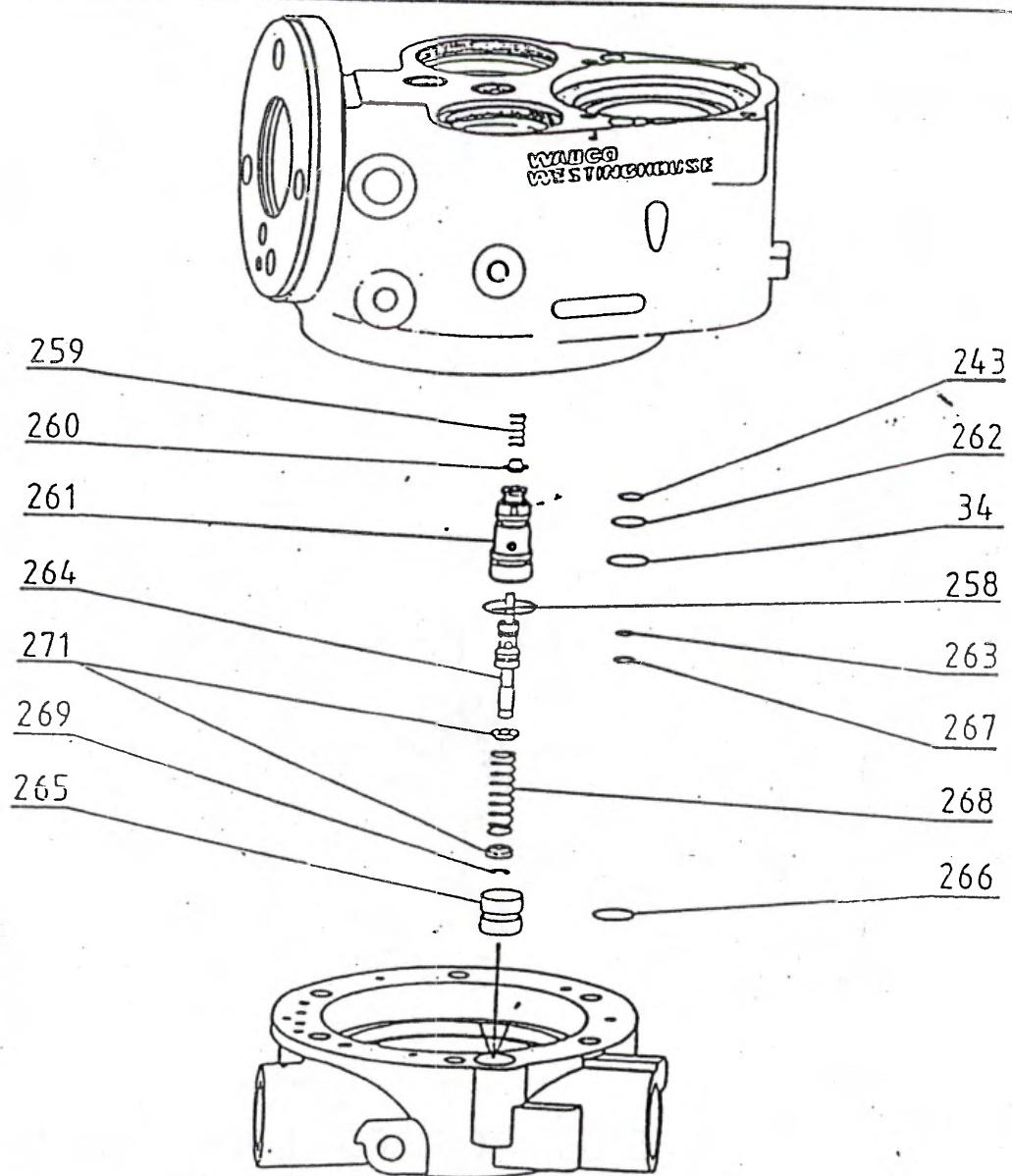


FIG. 5.7

CHARGING CUT OFF DETAILS

RITER

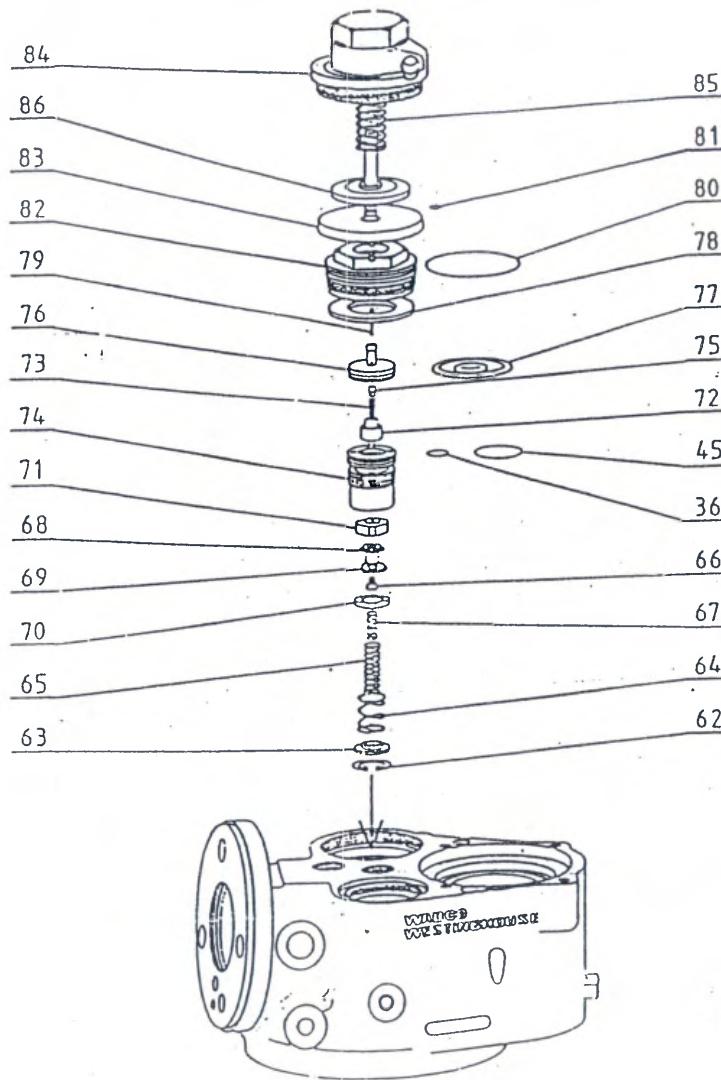


FIG. 5.8

QUICK SERVICE DETAILS

RUTES

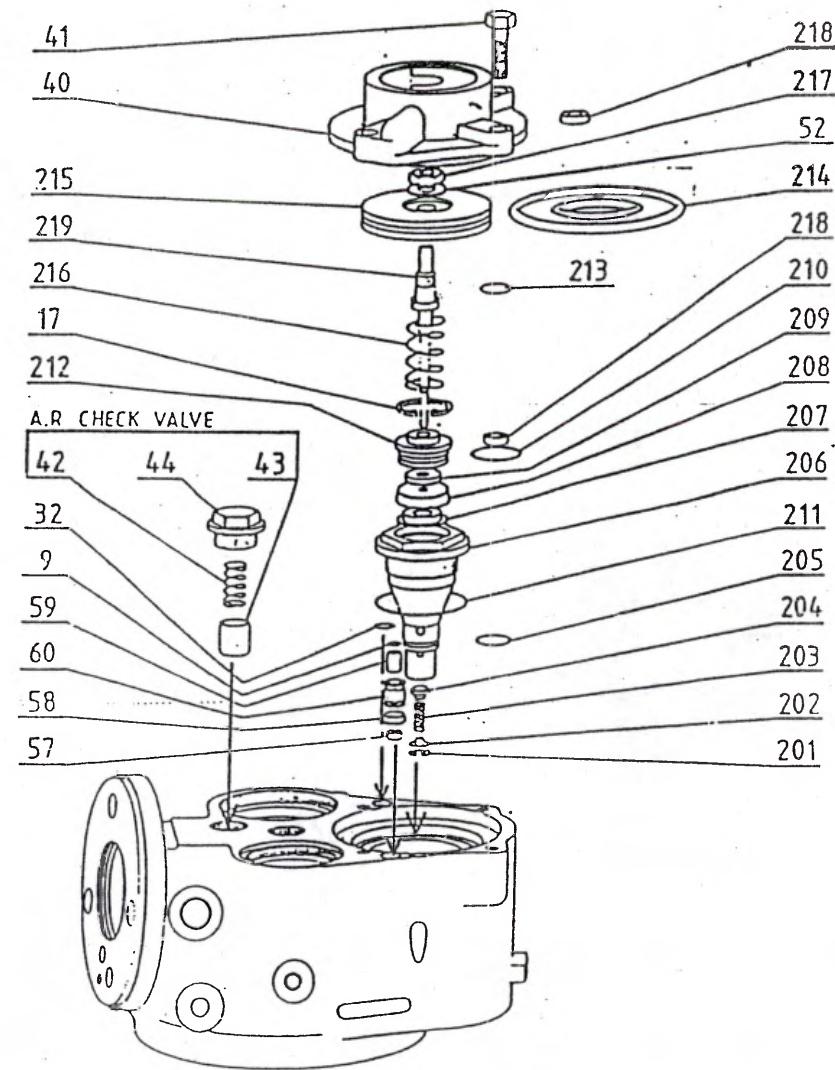
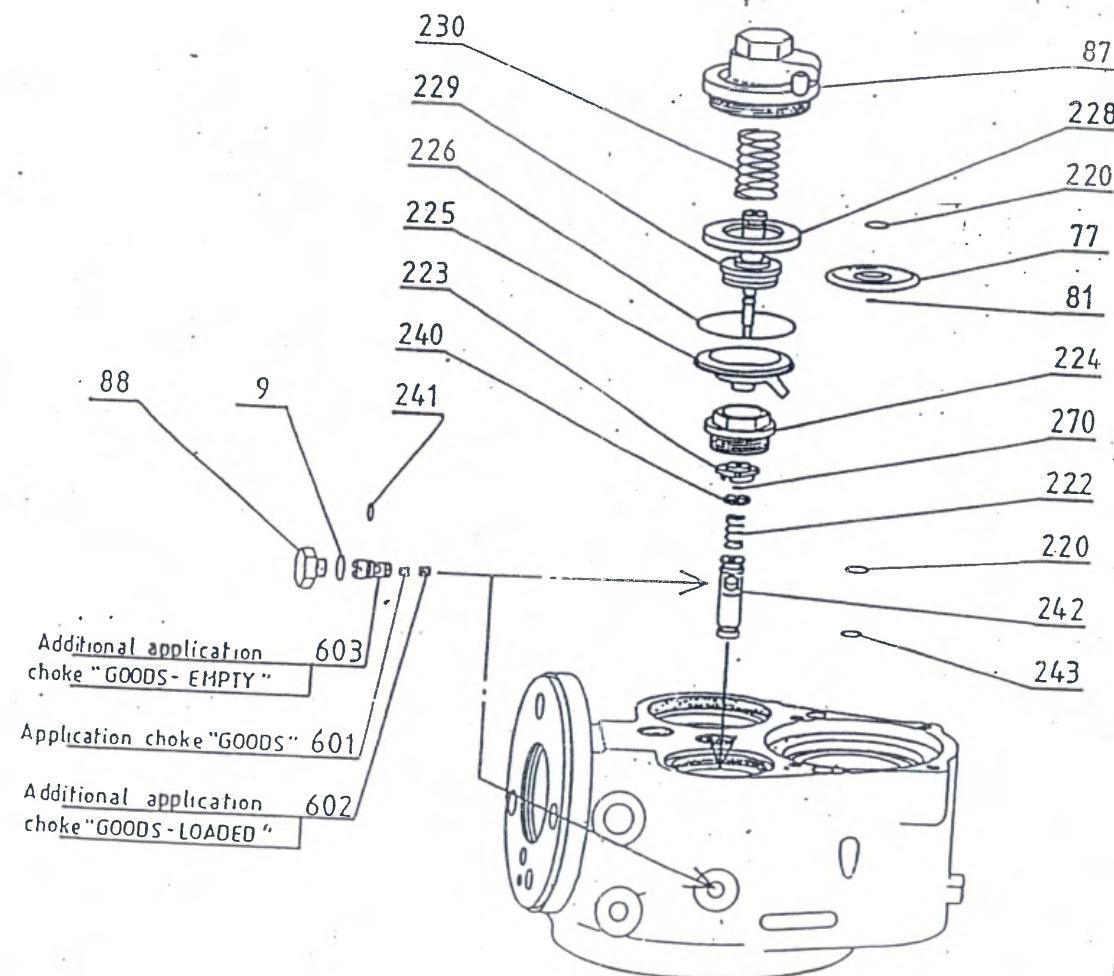


FIG. 5.9

INSHOT DEVICE

RITES



PARTS LIST FOR CJW2 DISTRIBUTOR VALVE

PAGE 1 OF 5

ITEM NO.	PART NO.	DESCRIPTION	QTY / ASSTY			
			1	2	3	4
1	501 1201 00	BODY ASSEMBLY	1			
	501 8501 00	BODY MACHINING	1			
	501 8500 00	BODY (PRE-MACHINED)	1			
	501 4010 00	SEAT	1			
	501 4020 00	SEAT	1			
	501 3040 00	PLUG	1			
	501 3300 00	PLUG	2			
	-	LOWER COVER ASSY	1			
2	501 1020 00	LOWER COVER SUB ASSY	1			
	501 8510 00	LOWER COVER - MACHINING	1			
	501 4030 00	SEAT	2			
	501 8010 00	TRIGGER	1			
	501 8020 00	GROOVED PIN MODIFIED	1			
24	501 7060 00	LIP SEAL	1			
11	501 8040 00	VALVE FINISHED	1			
18	501 8090 00	VALVE FINISHED	1			
19	501 8100 00	VALVE SPRING	2			
20	501 7050 00	SEALING RING	2			
21	501 8110 00	CAP	2			
506	501 4432 00	CHOKE (DIA 1.8)	1			
94	501 7200 00	EXHAUST RING PROTECTOR	1			
93	501 6040 00	EXHAUST PROTECTOR	1			
12	501 8050 00	SPRING	1			
14	501 8070 00	SPRING SEAT & VALVE OPERATOR	1			
	501 1070 00	OPERATING LEVER ASSEMBLY	1			
13	501 8060 00	OPERATING LEVER	1			
601	920 0191 00	HEX. SCREW ISO 4014 - M6 x 30 - 8	2			
602	906 0110 00	HEX. NUT ISO 4032 - M6 - 8	2			
600	740 8118 00	PULLING RING	1			
16	501 8080 00	LEVER SEAT	1			
17	915 0010 00	CIRCLIP 40 x 1.75N	1			
56	501 4300 03	CHOKE BLANK	1			
233	501 8300 00	LOCKING ROD	1			
23	501 3120 00	RING	1			
6	501 7030 00	DIAPHRAGM	1			
22	501 3110 00	DIAPHRAGM FOLLOWER	1			
9	501 7040 00	O RING 12.42 x 15.87 x 1.78	1			
10	501 3330 00	SMALL PISTON OF LOWER DIAPHRAGM	1			
8	501 3320 00	LARGE PISTON OF LOWER DIAPHRAGM	1			
24	501 7060 00	LIP SEAL	1			
7	501 8340 00	SPRING	1			
36	501 7110 00	O RING 19.6 x 19.05 x 1.78	1			
32	501 7090 00	O RING 10 x 15 x 2.5	4			
34	502 7080 00	O RING 22.2 x 16.9 x 2.7	1			
39	501 1060 00	SANDWICH PIECE ASSY	1			
	501 3340 00	SANDWICH PIECE	1			
	501 3290 00	PLUG	7			
	501 3040 00	PLUG	1			

PARTS LIST FOR CJW2 DISTRIBUTOR VALVE

PAGE 2 OF 5

ITEM NO.	PART NO.	DESCRIPTION	QTY / ASSY			
			1	2	3	4
25	501 4310 00	FOLLOWER GUIDE	1			
310	501 3370 00	MIDDLE DIAPHRAGM HOLDER	1			
509	501 3360 00	LOWER FOLLOWER OF MIDDLE DIAPHRAGM	1			
6	501 7030 00	DIAPHRAGM	1			
36	501 7110 00	O RING 15.6 x 19.05 x 1.78	1			
55	501 3350 00	UPPER FOLLOWER OF MIDDLE DIAPHRAGM	1			
92	916 0094 00	CIRCLIP 18 x 1.2N	1			
3	501 3310 00	DIAPHRAGM HOLDER	1			
	501 3310 00	DIAPHRAGM HOLDER (BAR MADE)				
24	501 7060 00	LIP SEAL	1			
5	501 7020 00	O RING 136.92 x 129.77 x 3.53	1			
	501 7021 00	O RING 143.48 x 136.42 x 3.53	1			
4	501 7010 00	O RING 99.25 x 88.5 x 3.53	1			
30	501 4320 00	HOLLOW STEM	1			
28	501 3131 00	DIAPHRAGM CLAMP	1			
27	501 7070 00	DIAPHRAGM	1			
29	501 7080 00	O RING 9.25 x 12.7 x 1.78	1			
221	501 B360 00	SPRING	1			
31	501 4050 00	PLUG	1			
37	501 4060 00	VALVE FINISHED	1			
39	501 8130 00	SPRING	1			
36	501 7110 00	O RING 15.6 x 19.05 x 1.78	1			
38	501 8120 00	CAP	1			
	- EMPTY LOAD CHANGE OVER VALVE					
265	501 4410 00	PISTON	1			
266	501 7440 00	O RING 23.8 x 18.4 x 2.7	1			
269	916 0097 00	CIRCLIP 8 x 0.8N	1			
271	501 4420 00	SPRING SEAT	2			
268	501 8460 00	SPRING	1			
264	501 4400 00	PUSH ROD	1			
267	501 7450 00	O RING 12.7 x 8.9 x 1.9	1			
263	501 7400 00	O RING 11 x 7.2 x 1.9	1			
261	501 8450 00	SLEEVE	1			
258	501 7390 00	O RING 30.16 x 26.7 x 1.78	1			
34	502 7080 00	O RING 22.2 x 16.9 x 2.7	1			
262	501 7430 00	O RING 19 x 13.6 x 2.7	1			
243	501 7420 00	O RING 14.3 x 8.9 x 2.7	1			
260	501 4390 00	VALVE FINISHED	1			
259	501 8440 00	SPRING	1			
46	501 7320 00	O RING 11.11 x 7.65 x 1.78	1			
32	501 7090 00	O RING 10 x 13 x 2.5	7			
61	905 0188 00	HEX BOLT ISO 4014 - M12 x 100 - 8	6			
	501 1100 00	SEAT HOLDER ASSY	1			
206	501 1050 00	SEAT HOLDER W/SEAT ASSEMBLY	1			
	501 3190 00	SEAT HOLDER	1			
	501 4230 00	SEAT	1			
204	501 4220 00	VALVE FINISHED	1			
203	501 B320 00	SPRING	1			
202	501 B310 00	SPRING SEAT	1			

PARTS LIST FOR CJW2 DISTRIBUTOR VALVE

PAGE 3 OF 5

ITEM NO.	PART NO.	DESCRIPTION	QTY / ASSY			
			1	2	3	4
201	915 0030 00	CIRCLIP 14 x 1N	1			
205	301 7210 00	O RING 20.29 x 25.14 x 2.62	1			
218	518 7270 00	SEAL	1			
211	501 7240 00	O RING 30.38 x 57.15 x 3.53	1			
207	501 8330 00	CUP	1			
208	501 7220 00	SEAL	1			
209	501 3200 00	WASHER	1			
212	501 3210 00	SEAL HOLDER	1			
210	501 7230 00	O RING 29.82 x 34.92 x 2.62	1			
218	501 7270 00	SEAL	1			
	501 1110 00	GUIDE PLUNGER ASSY				
219	501 4250 00	GUIDE PLUNGER	1			
213	501 7250 00	O RING 14 x 17.56 x 1.78	1			
215	501 3220 00	DIAPHRAGM CLAMP	1			
216	501 8270 00	SPRING	1			
17	915 0010 00	CIRCLIP 40 x 1.75 M	1			
214	501 7260 00	DIAPHRAGM	1			
52	909 0050 00	WASHER DIA 15/28-1.5	1			
217	501 4240 00	NUT	1			
57	501 7140 00	SEALING WASHER	1			
58	501 7150 00	SEAL	1			
60	501 4100 00	BUSH	1			
39	501 8180 00	VALVE FINISHED	1			
9	501 7040 00	O RING 12.42 x 19.87 x 1.78	1			
32	501 7090 00	O RING 10 x 15 x 2.5	2			
40	501 1160 00	QSB COVER ASSEMBLY	1			
	501 8320 00	QSB COVER MACHINING				
	501 4070 00	SEAT	1			
	923 0050 00	PLUG	2			
218	518 7270 00	SEAL	1			
41	920 0010 00	HEX. SCREW ISO 4014 - M10 x 35 - 8	4			
43	501 4080 00	VALVE FINISHED	1			
42	501 8140 00	VALVE SPRING	1			
44	501 8150 00	CAP	1			
	501 1080 00	CUT-OFF VALVE PLUG ASSY	1			
74	501 4180 00	PLUG		1		
71	501 4160 00	VALVE FINISHED		1		
68	501 4130 00	VALVE FINISHED		1		
69	501 4140 00	SPRING SEAT		1		
66	501 4120 00	JET SOLEX (ORIFICE 0.42mm)		1		
70	501 4150 00	SPRING SEAT		1		
67	501 8210 00	VALVE SPRING		1		
65	501 8200 00	SPRING		1		
64	501 8190 00	SPRING		1		
63	501 4110 00	SPRING SEAT		1		
62	915 0020 00	CIRCLIP 28 x 1.2N		1		
45	501 7120 00	O RING 33.05 x 36.51 x 1.78		1		
36	501 7110 00	O RING 19.6 x 19.05 x 1.78		1		
	501 1120 00	GUIDE ASSY		1		

PARTS LIST FOR C3W2 DISTRIBUTOR VALVE

PAGE 4 OF 5

ITEM. NO.	PART NO.	DESCRIPTION	QTY / ASSY			
			1	2	3	4
76	501 4200 00	GUIDE	1			
77	501 7160 00	DIAPHRAGM	1			
75	501 4190 00	VALVE FINISHED	1			
73	501 8220 00	VALVE SPRING	1			
72	501 4170 00	SEAT (0.8)	1			
78	501 3270 00	DIAPHRAGM CLAMP	1			
79	501 4210 00	PUSH ROD	1			
82	501 1040 00	DIAPHRAGM CLAMPING SCREW ASSY	1			
80	501 7170 00	O RING 55.5 x 61.5 x 3	1			
	501 3190 00	DIAPHRAGM CLAMPING SCREW	1			
	501 8230 00	GUIDE BUSH	1			
83	501 7190 00	SEAL	1			
81	501 7180 00	O RING 4.47 x 7.93 x 1.78	1			
86	501 3170 00	GUIDE	1			
85	501 8350 00	SPRING	1			
84	501 8330 00	CAP	1			
242	501 8380 00	ADAPTOR CARRIER	1			
243	501 7420 00	O RING 14.3 x 8.9 x 2.7	1			
220	501 7410 00	O RING 15.9 x 10.5 x 2.7	2			
222	501 8370 00	SPRING	1			
240	501 4340 00	SPRING SEAT	1			
270	501 7460 00	O RING 8 x 4.2 x 1.9	1			
223	501 4261 00	VALVE FINISHED	1			
224	501 3230 00	PLUG	1			
225	501 6050 00	CUP	1			
226	501 7280 00	O RING 60 x 64.5 x 2	1			
229	501 4330 00	GUIDE	1			
77	501 7160 00	DIAPHRAGM	1			
220	501 7410 00	O RING 15.9 x 10.5 x 2.7	1			
230	501 8291 00	SPRING	1			
81	501 7180 00	O RING 4.47 x 7.93 x 1.78	1			
228	501 6060 00	DIAPHRAGM CLAMP	1			
87	501 8341 00	CAP	1			
502	501 4431 00	CHOKE (BLANK)	1			
501	501 4432 00	CHOKE (DIA 0.53)	1			
503	501 4440 00	ADAPTOR	1			
241	501 7340 00	O RING 11.8 x 8 x 1.9	1			
7	501 7040 00	O RING 12.42 x 15.87 x 1.78	1			
88	501 8251 00	PLUG	1			
	EXHAUST VALVE					
251	501 8410 00	SPRING	1			
253	501 4370 00	MOULDED CHECK VALVE	1			
255	501 8420 00	SLEEVE	1			
249	501 7370 00	O RING 22 x 18 x 2	1			
254	501 7380 00	O RING 27 x 24 x 2	1			
247	501 7360 00	O RING 34 x 30 x 2	1			
81	501 7180 00	O RING 4.47 x 7.93 x 1.78	1			
256	501 4380 00	PISTON	1			
246	501 7350 00	O RING 27 x 19.8 x 3.6	1			

PARTS LIST FOR C3W2 DISTRIBUTOR VALVE

PAGE 5 OF 5

ITEM NO.	PART NO.	DESCRIPTION	QTY / ASSY			
			1	2	3	4
297	501 8430 00	SPRING	1			
244	501 4330 00	PLUG	1			
45	501 7120 00	O RING 33.05 x 36.51 x 1.78	1			
17	913 0010 00	CIRCLIP 40 x 1.75 M	1			
505	501 4305 00	CHOKE (DIA 1.0)	1			
93	501 6040 00	EXHAUST PROTECTOR	1			
47	501 6030 00	FILTER	1			
33	501 6020 00	FILTER	1			
272	501 7100 00	JOINT	1			
15	501 3401 00	NAME PLATE	1			
89	924 0010 00	GROOVED PIN DIA 2 x 6 LONG	2			
	501 6070 00	CLOSURE PLUG	1			

FIG. 5.10

RELEASE DETAILS

RITES

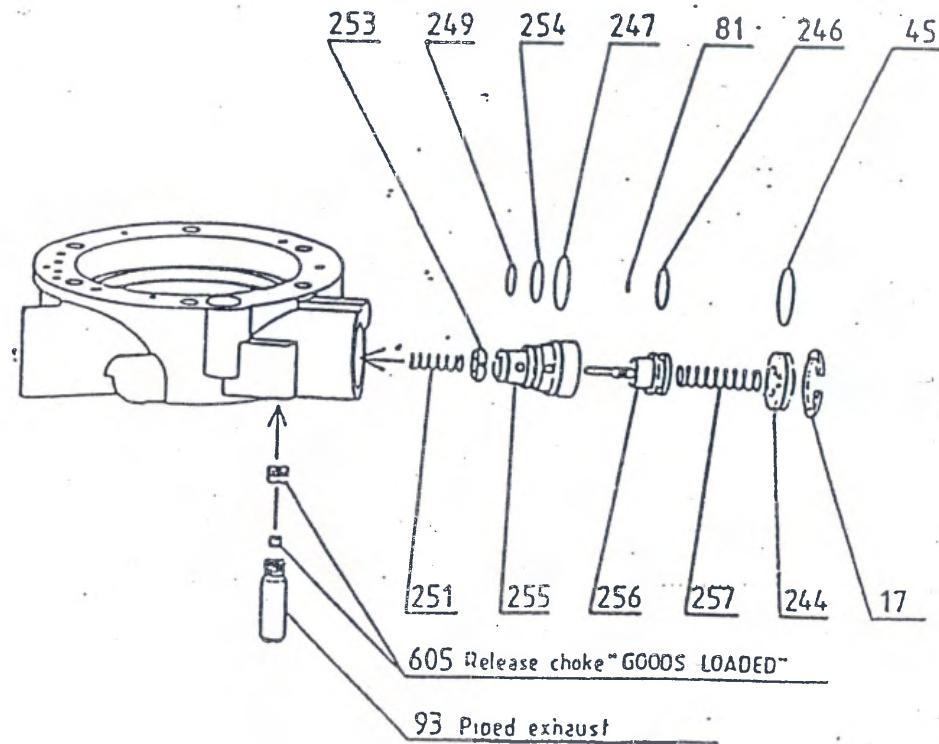
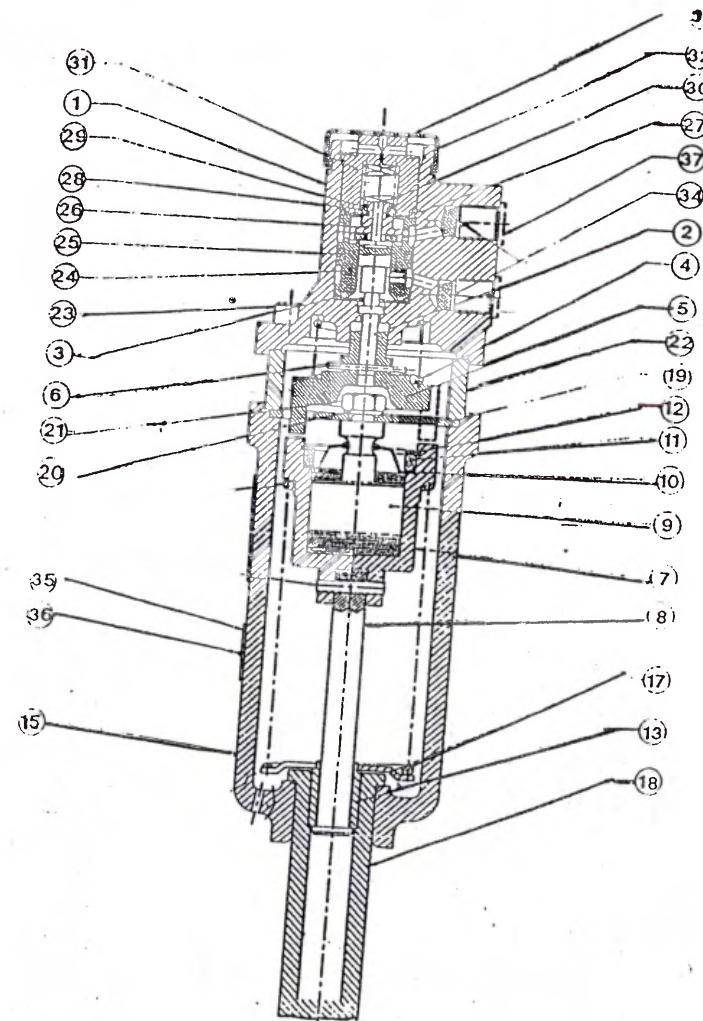


FIG. 5.11

CHANGEOVER VALVE ASSEMBLY

RUTES



ITEM NO	PART NO	DESCRIPTION	QTY	
37	500 6010 00	CLOSURE PLUG	2	
38	924 0031 00	GROOVED PIN Ø3	2	
35	531 3040 00	NAME PLATE	1	
34	531 6030 00	FILTER	2	
33	531 6070 00	COVER GUARD	1	
32	915 0097 00	CIRCLIP 30 x 1.2H	1	
31	531 4090 00	VALVE BOTTOM	1	
**	30	531 8410 00	COMP. SPRING	1
	29	916 0134 00	CIRCLIP 6 (E TYPE)	1
*	28	531 4130 00	VALVE RING	1
*	27	531 7110 00	DIAPHRAGM	1
	26	531 4120 00	VALVE SHUTTER	1
*	25	515 7020 00	O' RING OD 1 1/8" x Ø1/8"	1
	24	531 4100 00	VALVE SEAT SLEEVE	1
	23	901 0070 00	HEX.SOCKET HD. CAP SCREW M8	4
	22	531 8320 00	DISTANCE TUBE	1
	21	906 0146 00	HEX. NUT ISO 4032 - M8-2	1
	20	909 01/3 00	MULTI TOOTH LOCK WASHER 8.2	1
	19	531 8380 00	PISTON DISC	1
	18	531 8430 00	PUSH SLEEVE	1
	17	531 8390 00	SPRING PLATE	1
*	16	531 8400 00	COMP. SPRING	1
	15	531 8310 00	HOUSING - MACHINING	1
	14	910 0050 00	SPRING DOWEL SLEEVE Ø5x24	1
	13	531 6060 00	GUIDE BUSH	1
	12	915 0118 00	INT. CIRCLIP 42 x 1.75 H	1
	11	531 8370 00	DIAPHRAGM RING	1
	10	531 7090 00	DAMPER DIAPHRAGM	1
	9	531 8360 00	DAMPER PISTON	1
	8	531 8340 00	STEM	1
	7	531 8330 00	DAMPER CASING	1
	6	531 8420 00	SPECIAL CLIP	1
	5	531 8350 00	SPIDER - MACHINING	1
	4	531 4140 00	COMPRESSION SPRING	1
	3	531 7100 00	DIAPHRAGM	1
	2	531 4110 00	VALVE STEM	1
	1	531 8300 00	VALVE BODY MACHINING	1

* RUBBER KIT

** SPRING KIT

FIG. 5.12

MOUNTING OF LSD TYPE ' VTA '

RUTES

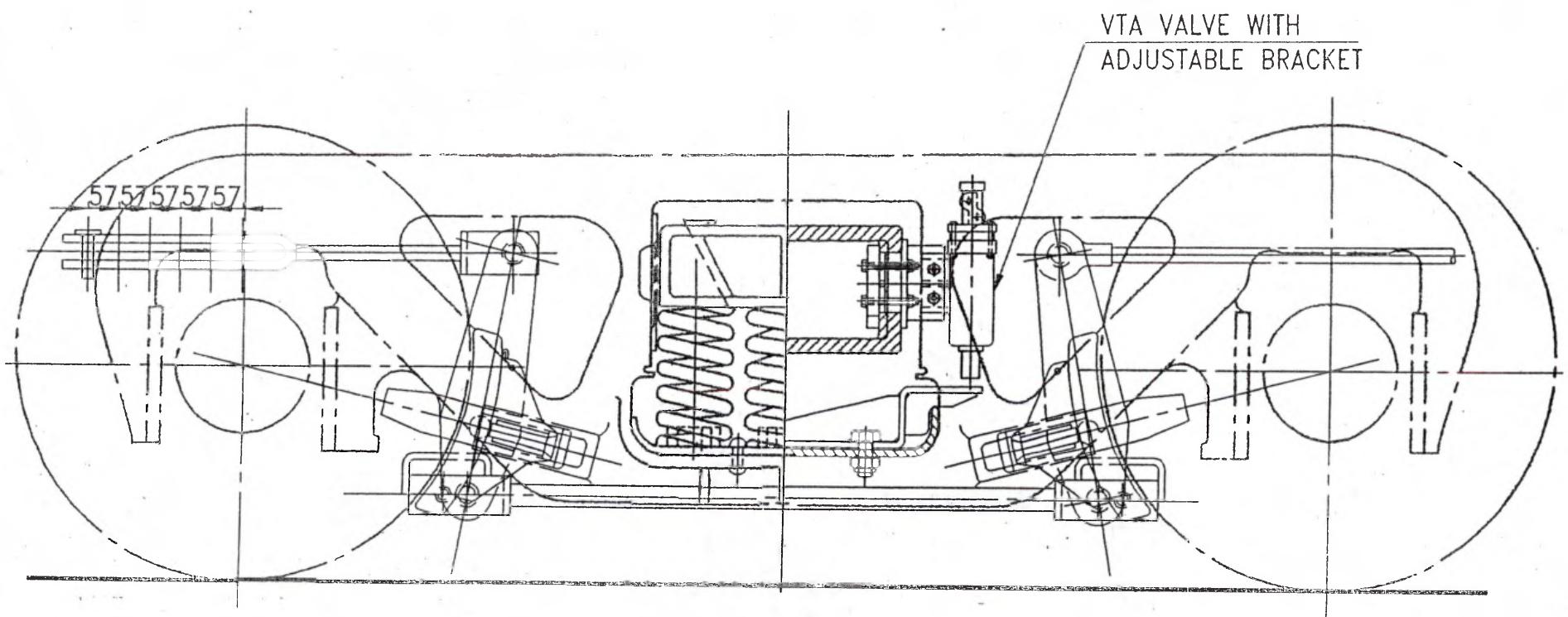


FIG. 5.13

TEST SETUP DIAGRAM FOR LSD TYPE 'VTA'

RUTES

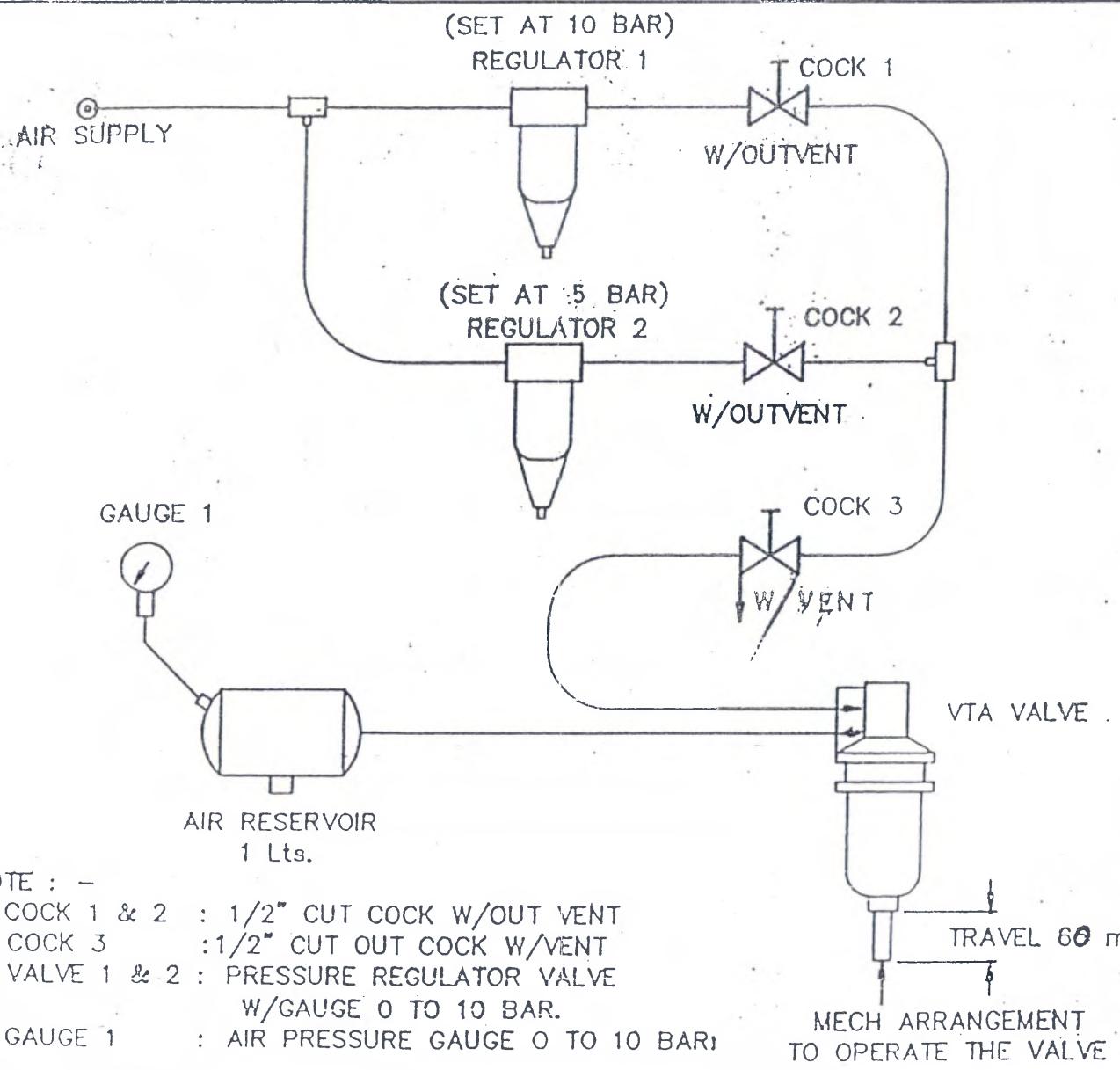
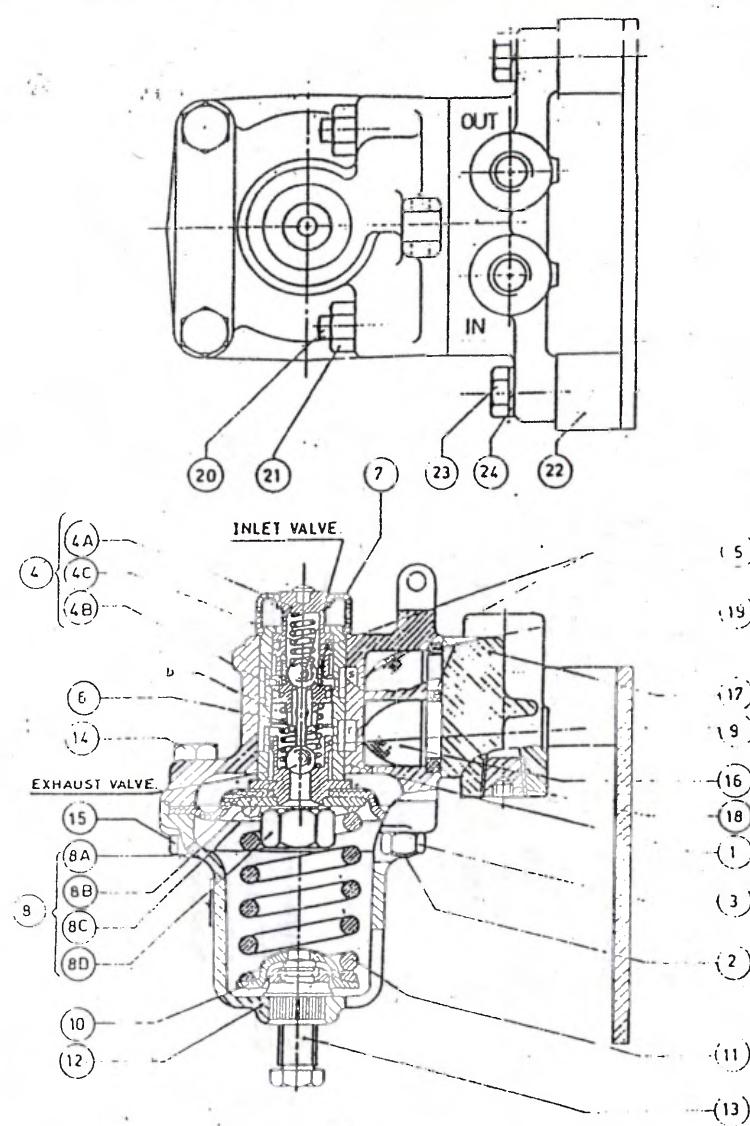


FIG. 5.14

N-1 REDUCING VALVE

RUTES



PARTS LIST FOR N-1 REDUCING VALVE TO PART NO. 523 0010 00

ITEM NO.	PART NO.	DESCRIPTION	QTY/ASSY
1	523 1030 00	BODY PLUGGED	1
2	913 0094 00	STUD 5/16" x 1-1/2"	2
3	906 0143 00	HEX NUT 5/16"	2
** 4	502 1050 00	INLET REGULATING VALVE ASSY	1
4A	502 1060 00	SPRING HOUSING WITH TIP	1
4B	502 1070 00	INLET VALVE SEAT ASSY	1
* 4C	502 8050 00	SPRING	1
5	502 7020 00	O RING	2
* 6	502 8060 00	EXHAUST VALVE SPRING	1
7	523 7010 00	DIRT PROTECTOR	1
8	523 1040 00	DIAPHRAGM W/EXHAUST VALVE SEAT	1
8A	523 4020 00	EXHAUST VALVE SEAT	1
8B	502 4060 00	DIAPHRAGM FOLLOWER	1
8C	502 7040 00	DIAPHRAGM	1
8D	906 0132 00	HEX NUT 9/16"	1
9	502 7090 00	O RING	1
10	523 8030 00	SPRING SEAT	1
11	502 8120 00	SPRING	1
12	511 1080 00	SPRING HOUSING W/STOP NUT	1
13	523 8050 00	ADJUSTING SCREW	1
14	905 0200 00	HEX BOLT 5/16" x 1-3/8"	2
15	906 0143 00	HEX NUT 5/16"	2
* 16	511 1030 00	STRAINER	1
17	523 1050 00	PIPE BRACKET DOWELLED	1
18	511 4180 00	CHOKE PLUG 1/4"	2
19	523 7030 00	GASKET	2
20	913 0093 00	STUD	2
21	906 0141 00	HEX NUT 3/8"	2

SK 523 101 - RUBBER KIT CONSISTS OF ITEMS MARKED THUS (*).

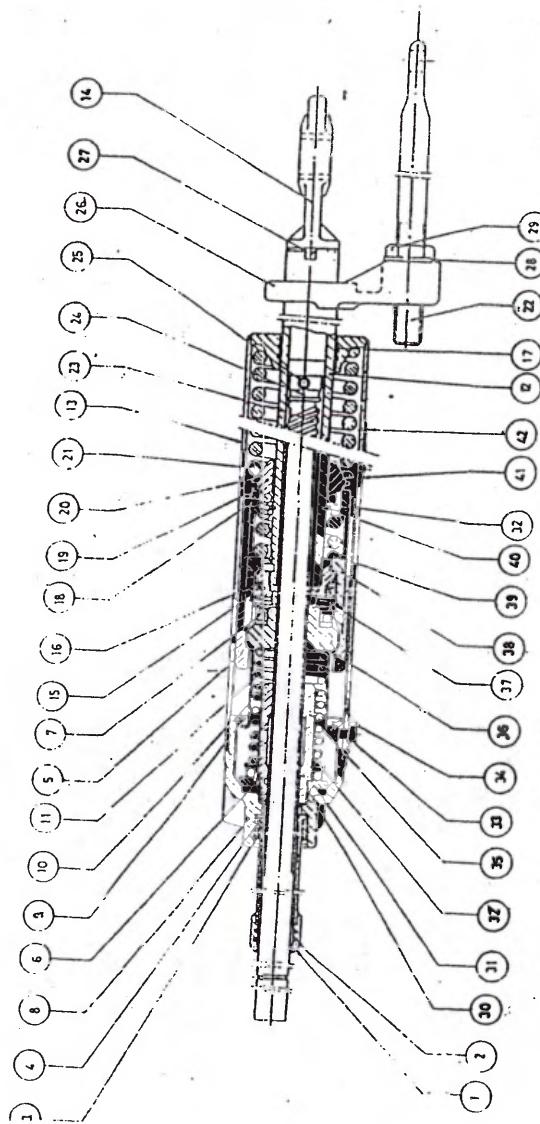
SK 523 103 - SPRING KIT CONSISTS IF ITEMS MARKED THUS (**).

SK 523 104 - GENERAL MAINTENANCE KIT CONSISTS OF ITEMS MARKED THUS (***) .

FIG. 5.15

SLACK ADJUSTER TYPE-IRSA600

RITES



PARTS LIST FOR SLACK ADJUSTER TYPE IRSÄ 600

PAGE 1 OF 2

ITEM NO.	PART NO.	DESCRIPTION	QTY/ASSY		
			1	2	3
1	802 1050 00	SPINDLE SLEEVE ASSY	1		
	802 B191 00	SPINDLE SLEEVE		1	
	802 B200 00	DUST BUSHING		1	
2	802 6020 00	SEAL RING	2		
3	915 0106 00	CIRCLIP 45 x 1.75N	1		
4	802 7020 00	RUBBER BASKET	1		
5	802 1020 00	TRACTION SLEEVE ASSY	1		
	802 8030 00	TRACTION SLEEVE		1	
	802 8290 00	GUIDE PIN		1	
	802 1070 00	LEADER NUT ASSY	1		
35	802 8140 00	LEADER NUT	1		
6	802 8360 00	DOG FIN	1		
31	802 8350 00	LEADER NUT FLANGE	1		
30	916 0121 00	CIRCLIP 40 x 2.5H	1		
7	802 1040 00	BALL BEARING 49-1-11	1		
	802 8370 00	BEARING		1	
	802 8380 00	SHAFTTRACE		2	
8	802 8170 00	LEADER NUT CASING	1		
9	915 0105 00	CIRCLIP 85 x 4H	1		
10	802 8160 00	SPRING SLEEVE	1		
11	802 8150 00	PAY-OUT SPRING	1		
12	802 1031 00	ADJUSTER TUBE ASSY	1		
	802 8041 00	ADJUSTER TUBE		1	
	802 8050 00	ADJUSTER TUBE SOCKET		1	
	802 8320 00	GUIDE BUSHING		1	
	910 0067 00	SPRING DOWEL PIN 6 x 10 HEAVY		1	
13	802 1011 00	BARREL ASSY	1		
	802 8011 00	BARREL		1	
	802 8020 00	BARREL HEAD		1	
14	802 1060 00	ADJUSTER EAR ASSY	1		
	802 8250 00	ADJUSTER EAR		1	
	802 8300 00	EAR BUSHING		1	
15	802 8330 00	WIRE RING	1		
16	802 0120 00	FRICITION WASHER	1		
17	802 6010 00	SEAL RING	2		
18	910 0067 00	SPRING DOWEL PIN 6 x 10 HEAVY	1		
19	802 8090 00	CLUTCH SLEEVE	1		
20	802 8070 00	CLUTCH RING	1		
21	802 8061 00	BARREL SPRING	1		
	802 1080 00	CONTROL ROD ASSY		1	
22	802 8310 00	CONTROL ROD		1	

PARTS LIST FOR SLACK ADJUSTER TYPE IRS A 600

PAGE 2 OF 2

ITEM NO.	PART NO.	DESCRIPTION	QTY/ASSY		
			1	2	3
26	802 8230 00	CONTROL ROD HEAD	1		
28	909 0192 00	MULTI TOOTH LOCK WASHER B 31	1		
29	802 8340 00	LOCK NUT	1		
23	802 8270 00	ADJUSTER SPINDLE	1		
24	802 8220 00	SAFETY COLLAR	1		
25	910 0066 00	SPRING DOWEL PIN 5 x 24 HEAVY	1		
27	802 8240 00	LOCK WASHER	1		
32	802 1041 00	BEARING 45-1-11 W/OUT ONE SET RACE	2		
	802 8370 00	BEARING		1	
	802 8380 00	SHAFTTRACE		1	
33	802 8180 00	LOCK SCREW	1		
34	938 0013 00	TAB WASHER	1		
36	802 8130 00	ADJUSTER NUT	1		
37	802 8110 00	TAKE UP SPRING	1		
38	802 8080 00	ACTUATING SLEEVE	1		
39	802 8100 00	CLUTCH SPRING	1		
40	916 0040 00	CIRCLIP 45 x 2.9H	1		
41	802 3011 00	NAME PLATE	1		
42	921 0015 00	RIVET	4		

FIG. 5.16

CONTROL RESERVOIR

RUTES

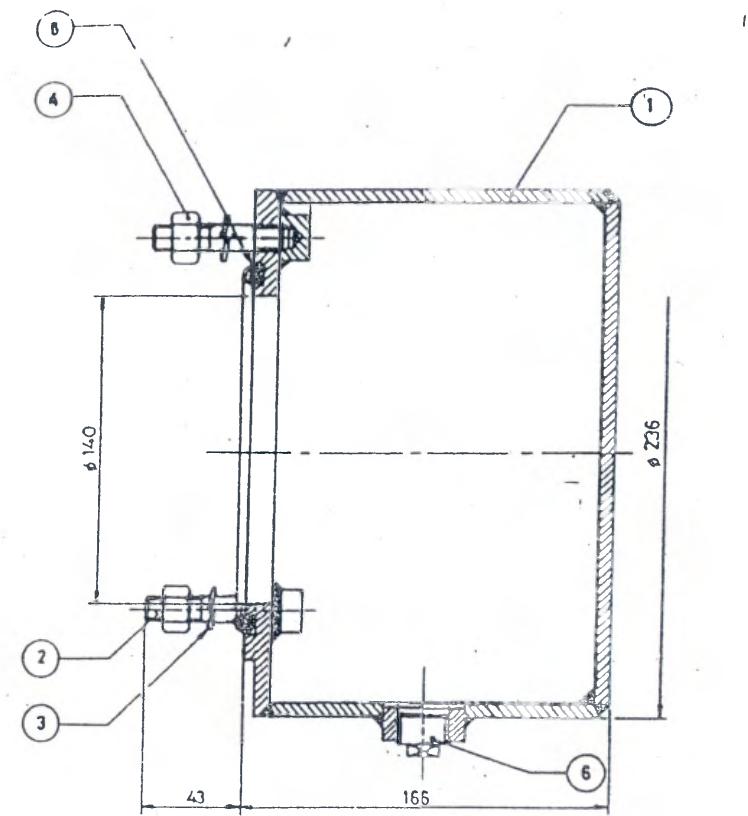


FIG. 5.17

COMMON PIPE BRACKET WITH FILTER & GASKET ASSY.

RUEC

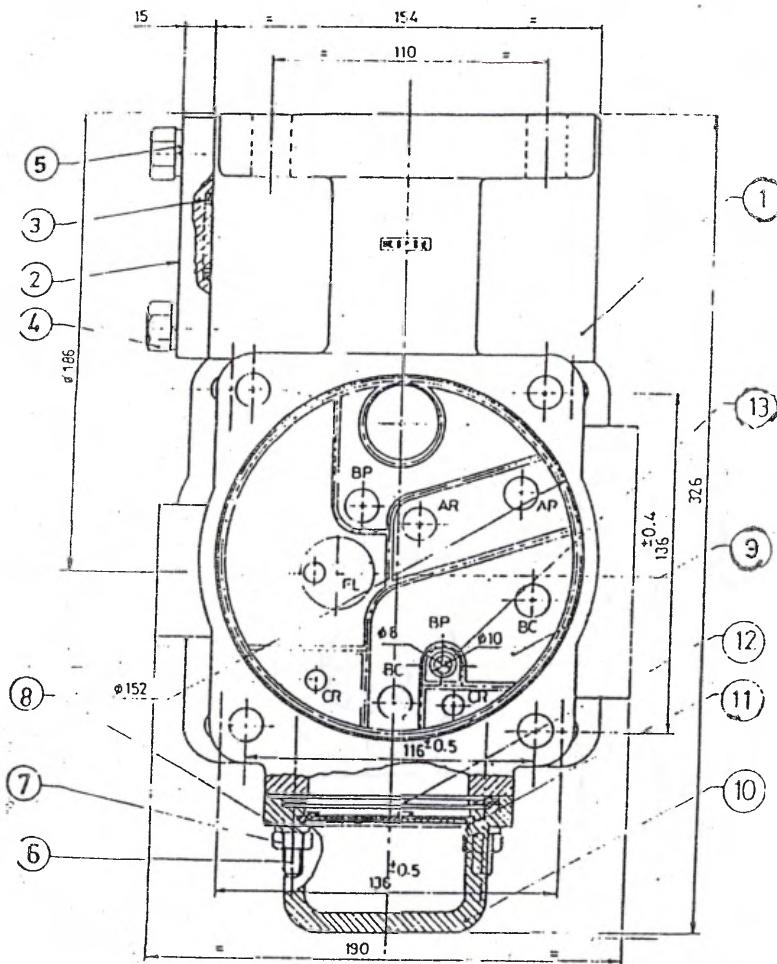


FIG. 5.18

DOUBLE CHECK VALVE

RUTES

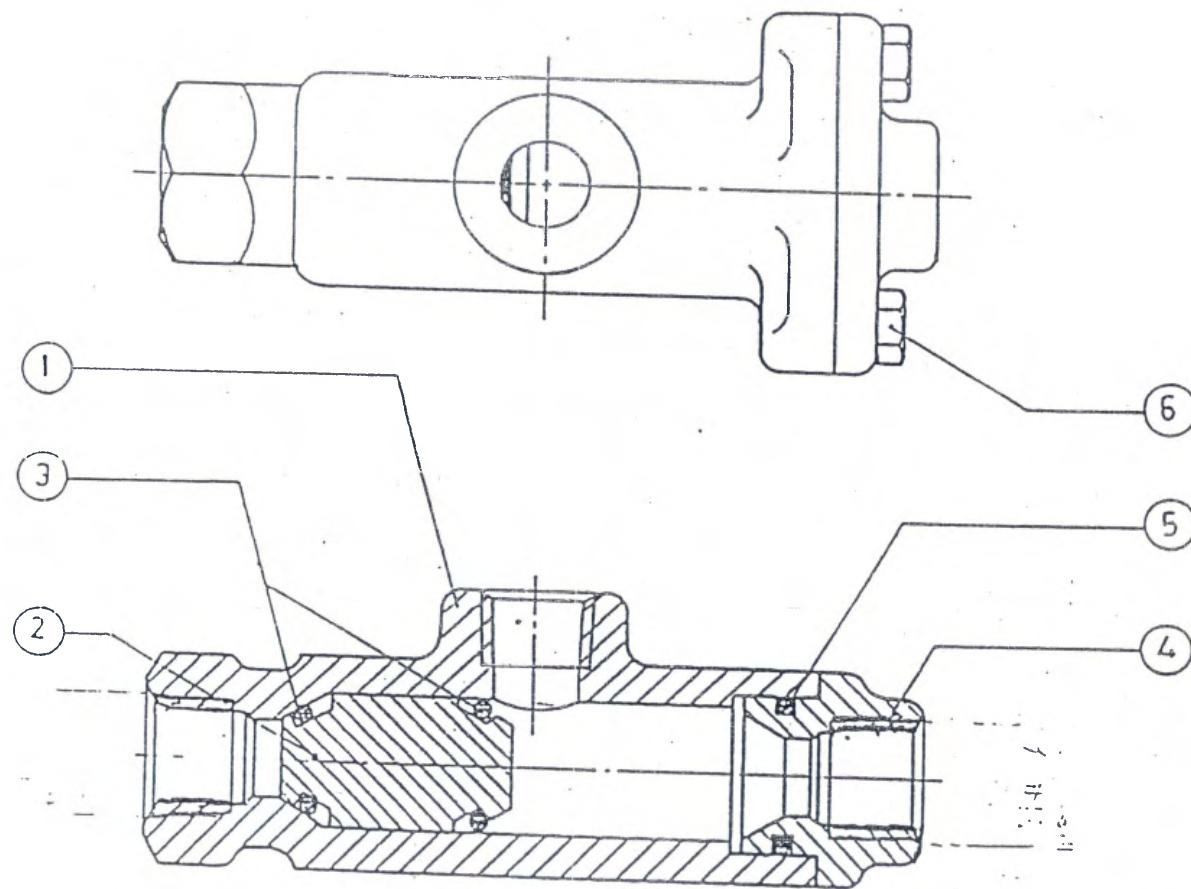
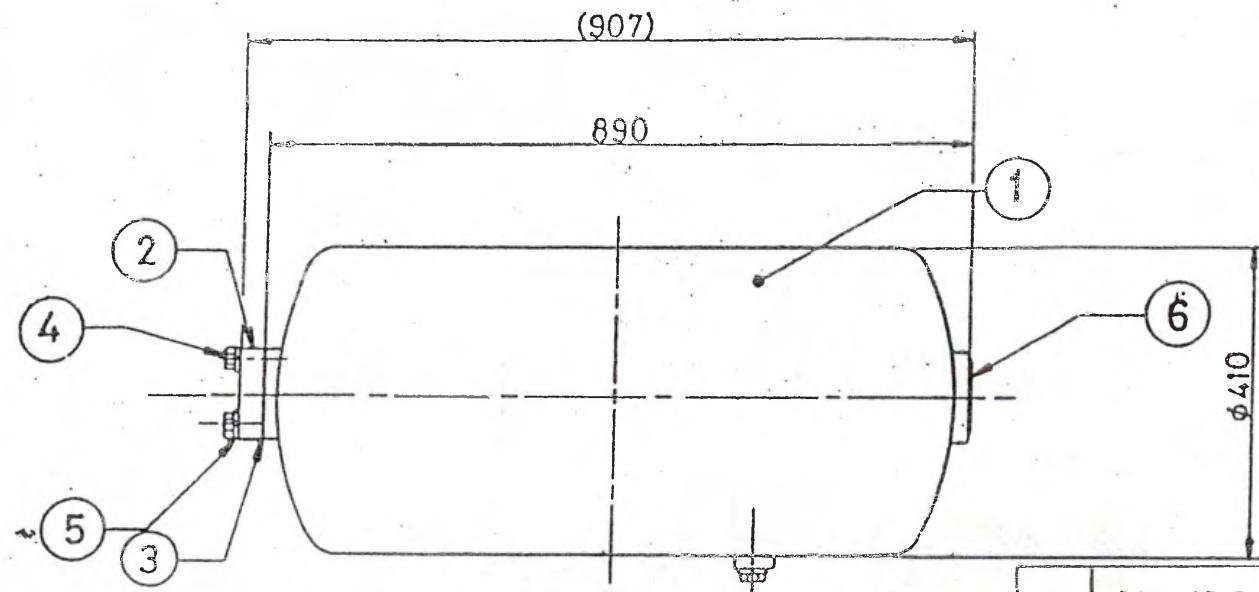


FIG. 5.19

AUXILIARY RESERVOIR ASSY

RITES



SL.No	PART No.	DESCRIPTION	QT
6	605 6010 00	PROTECTION CAP	1
5	909 0030 00	SPRING WASHER ϕ 16	2
4	920 0040 00	HEX. SCREW M 16 x 40	2
3	612 7031 00	SEALING RING ϕ 32	1
2	601 8021 00	BLIND FLANGE	1
1	605 0021 00	AUXILIARY RESERVOIR	1

FIG. 5.20

CENTRIFUGAL DIRT COLLECTOR ASSY

RITES

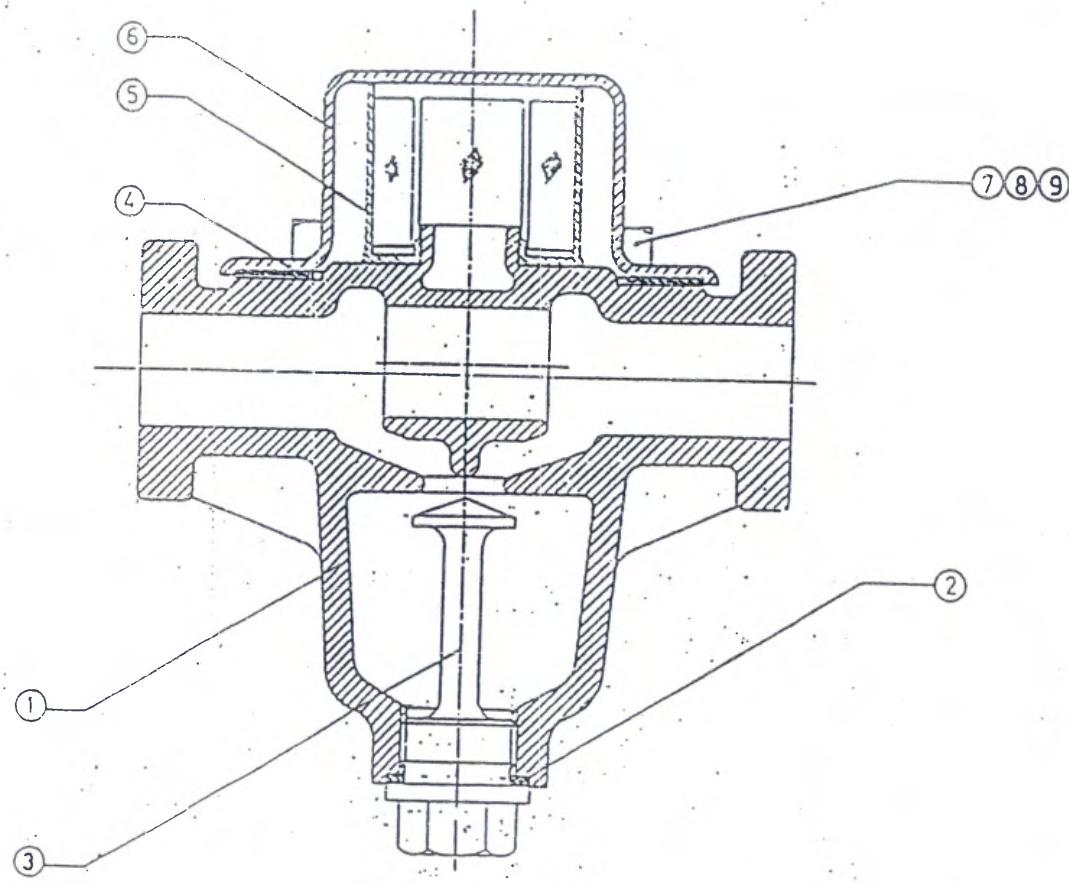


FIG. 5.21

CUT OFF ANGLE COCK - 32 mm

RITES

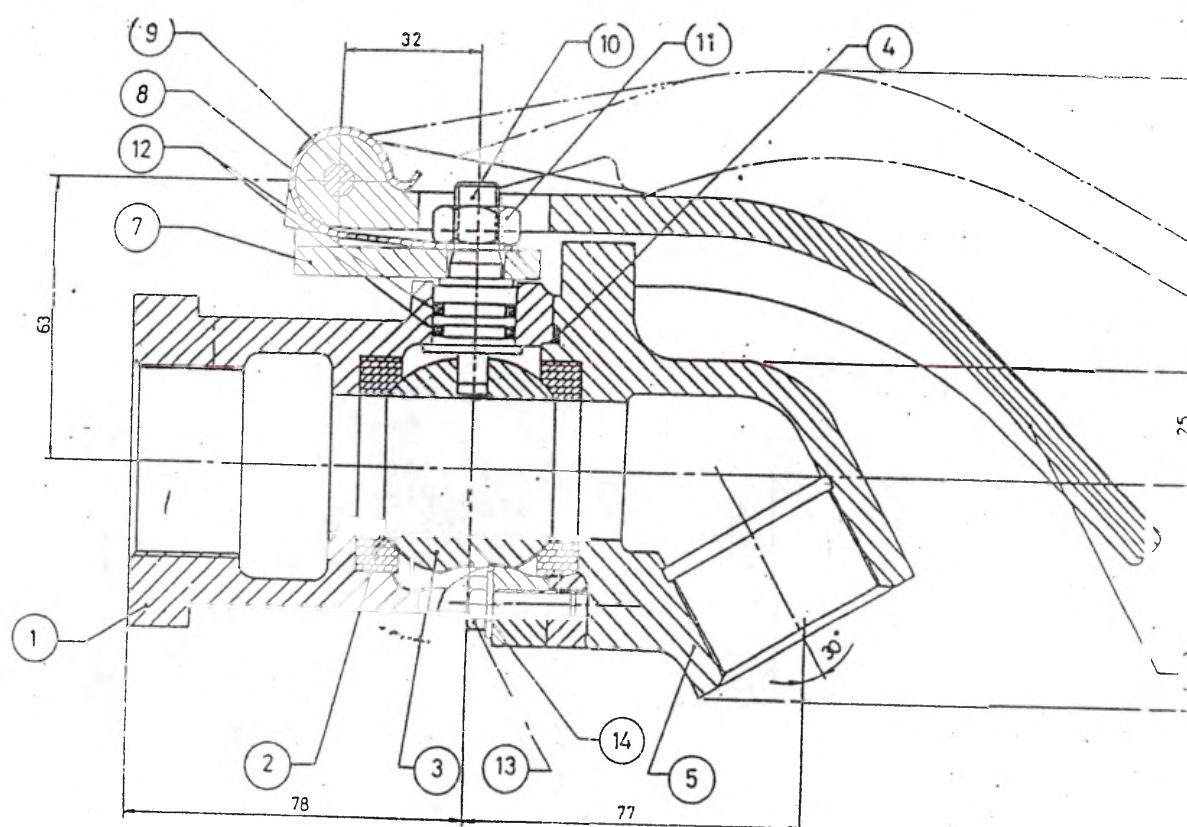
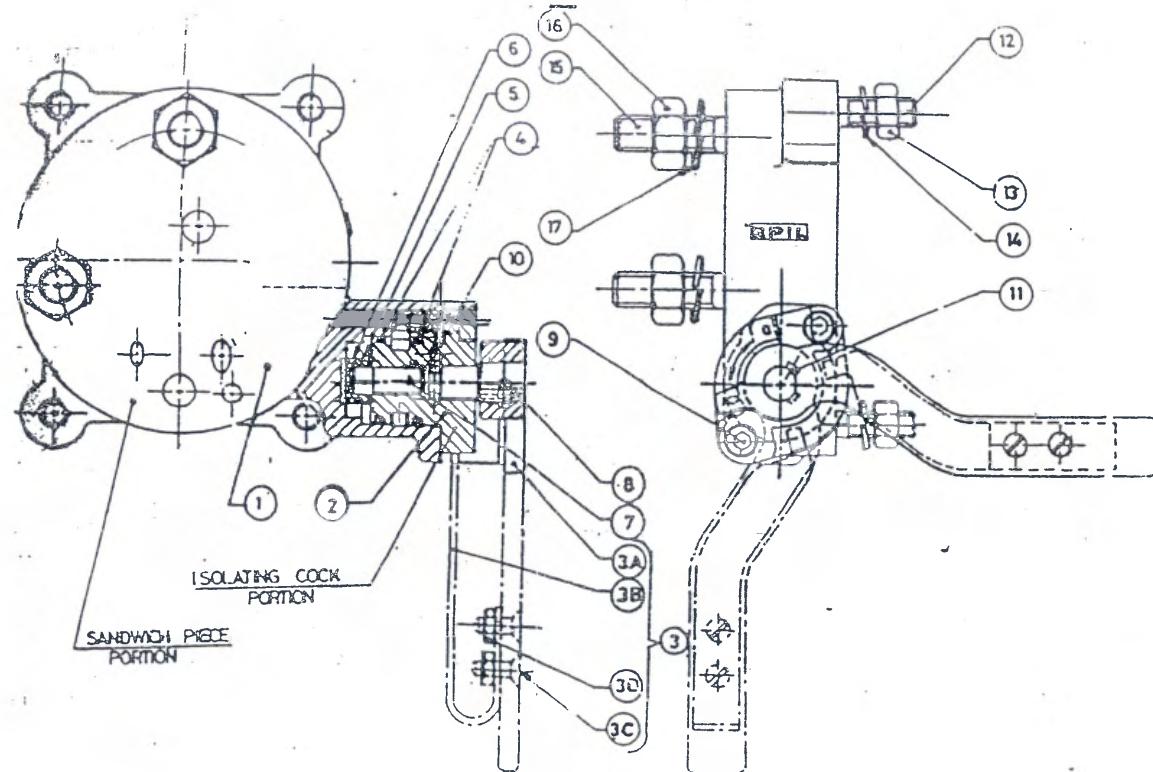


FIG. 5.22

COMBINED SANDWICH PIECE ISOLATING COCK ASSY

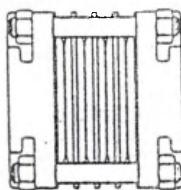
RITES



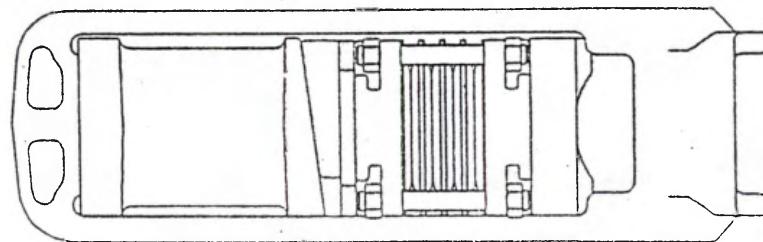
IG. 6.1

SLACKLESS ARRANGEMENT

RITES



PART NO. 12635
MODEL 485-4A GEAR



PART NO. 15296
SLACKLESS ARRANGEMENT

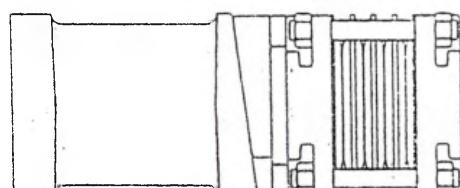
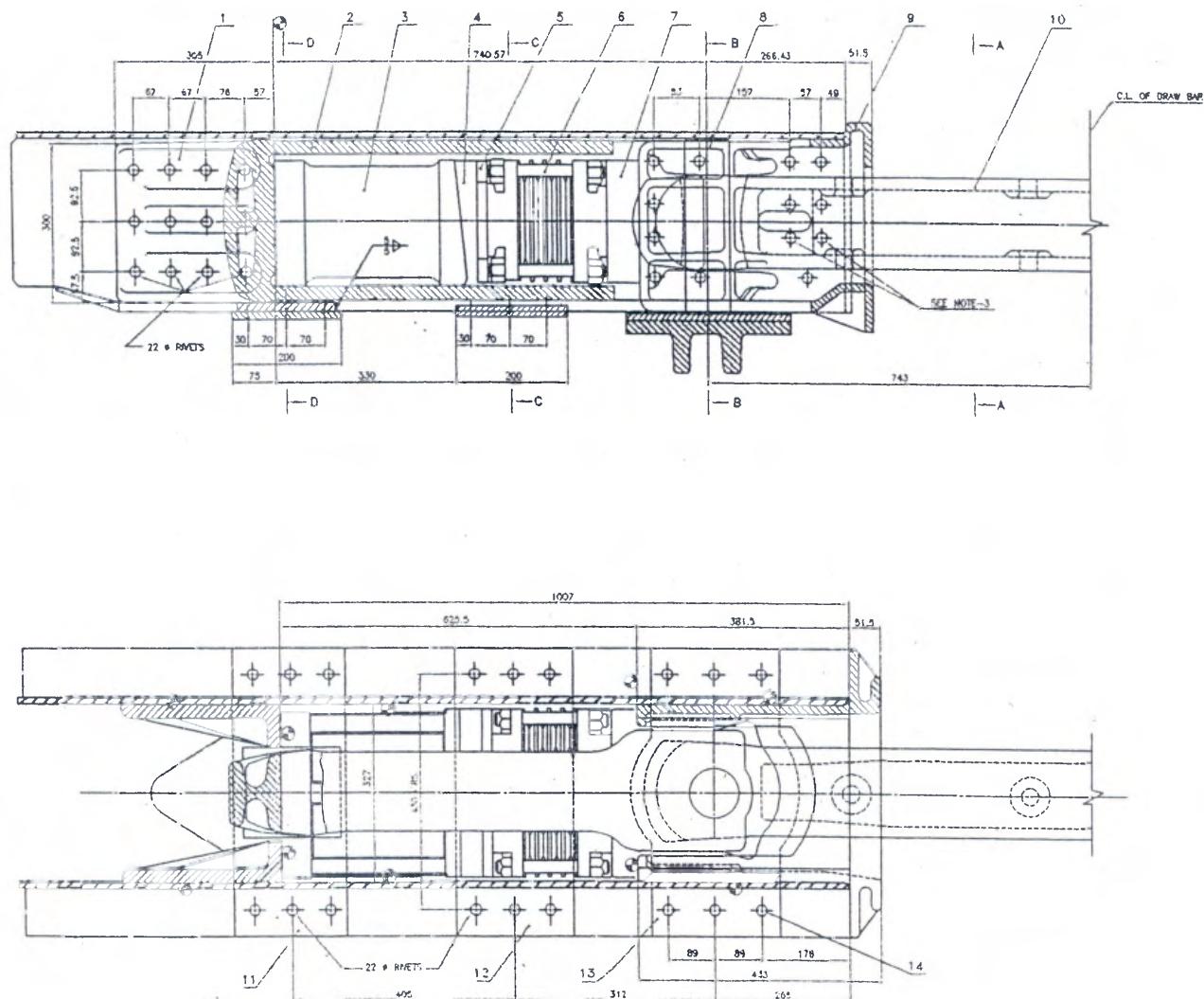
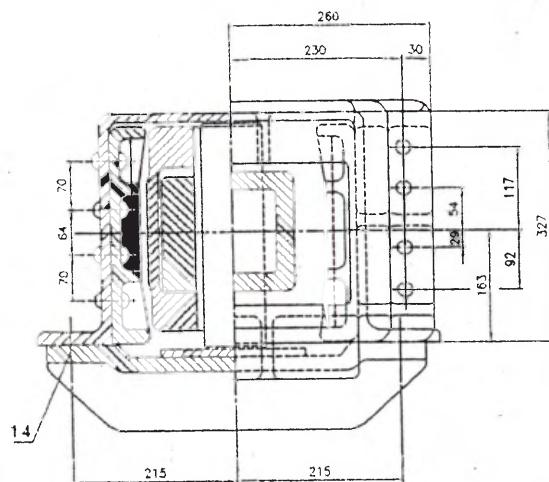


FIG. 6.2
(SHEET 1 OF 2)

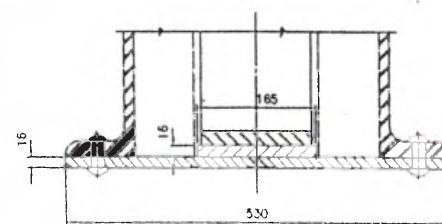
DRAW BAR ARRANGEMENT

RITES

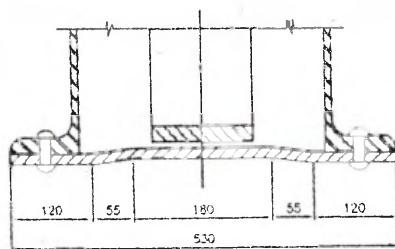




HALF SECTION B-B



HALF SECTION D-D



HALF SECTION A-A

NOTE :-

1. SURFACE MARKED  SHOULD BE SMOOTH, TRUE PARALLEL AND AT RIGHT ANGLE.
2. SIX HOLES IN ITEM - 13 (WA/BD-4462) SHALL BE 21.5^{0.05} TO SUIT 20⁰ BOLT IN PLACE OF 24⁰ HOLES.
3. FIRST TWO ROW OF RIVETS TO HAVE FLATTENED HEAD TO 6mm. HIGH.
4. PACKING PIECE OF 25MM. THICK TD BE REDUCED TO 16MM. IN ITEM-11.

ITEM	DESCRIPTION & DIMENSIONS	CAR-A NO. OFF	CAR-B NO. OFF	REF. ORG.	WT OF ONE (kg.)	MAT. & SPEC.	REMARKS
14.	20 Ø BOLT, NUT WITH CHECK NUT & SPLIT PIN FOR ITEM-13	6	12	IS:1364,IS:549 IS:1S:2232			
13.	YOLKE PIN SUPPORT	1	2	WA/BD-4462			WA/BD-4462
12.	SAFETY PLATE 530X200X16.	1	2			IS 2082 Fe-410 WA	
11.	YOLKE SUPPORT PLATE	1	2	WD-80007-S-14 ITEM-6			
10.	DRAW BAR	1	1	C-50226 -0			M C CONNAY 2 TROLLEY CORP USA
9.	STRIKER CASTING	1	2				
8.	YOLKE PIN	1	2	SK-82724 ITEM-6			
7.	FOLLOWER	1	2	AAR-Y-64AE			
6.	485-4A MINI GEAR	1	2	KEY STONE DRG.			
5.	SHIM	1	2	DO			
4.	WEDGE	1	2	DO			
3.	FILLER BLOCK	1	2	DO			
2.	YOLKE	1	2	WD B5036-S-01 ITEM-3		AAR-M-201 Gr. E	AAR-Y-45 AE
1.	BACK STOP	2	4	W/BD-699			

FIG. 6.3

SLACKLESS ARRANGEMENT
INSTALLATION

RITES

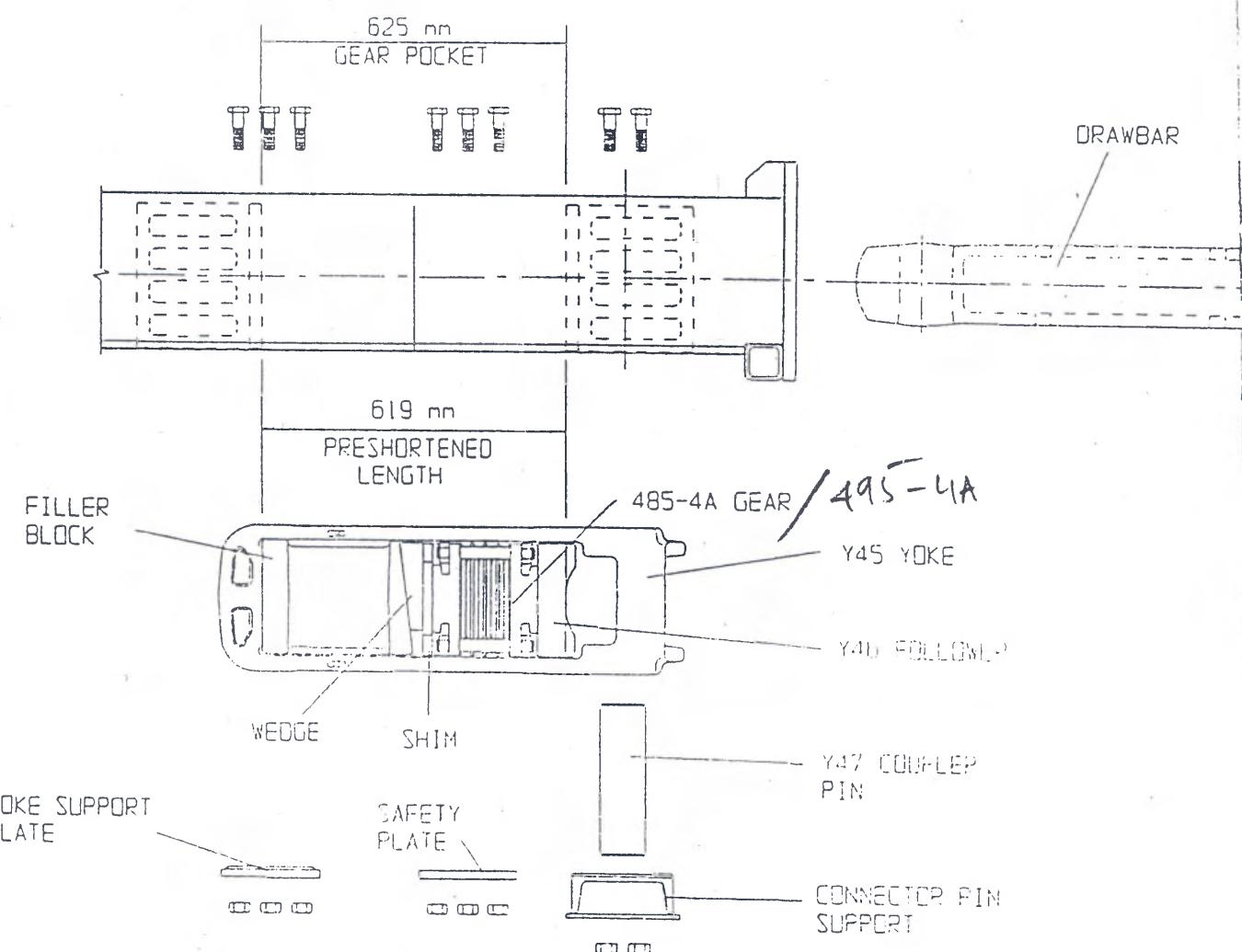
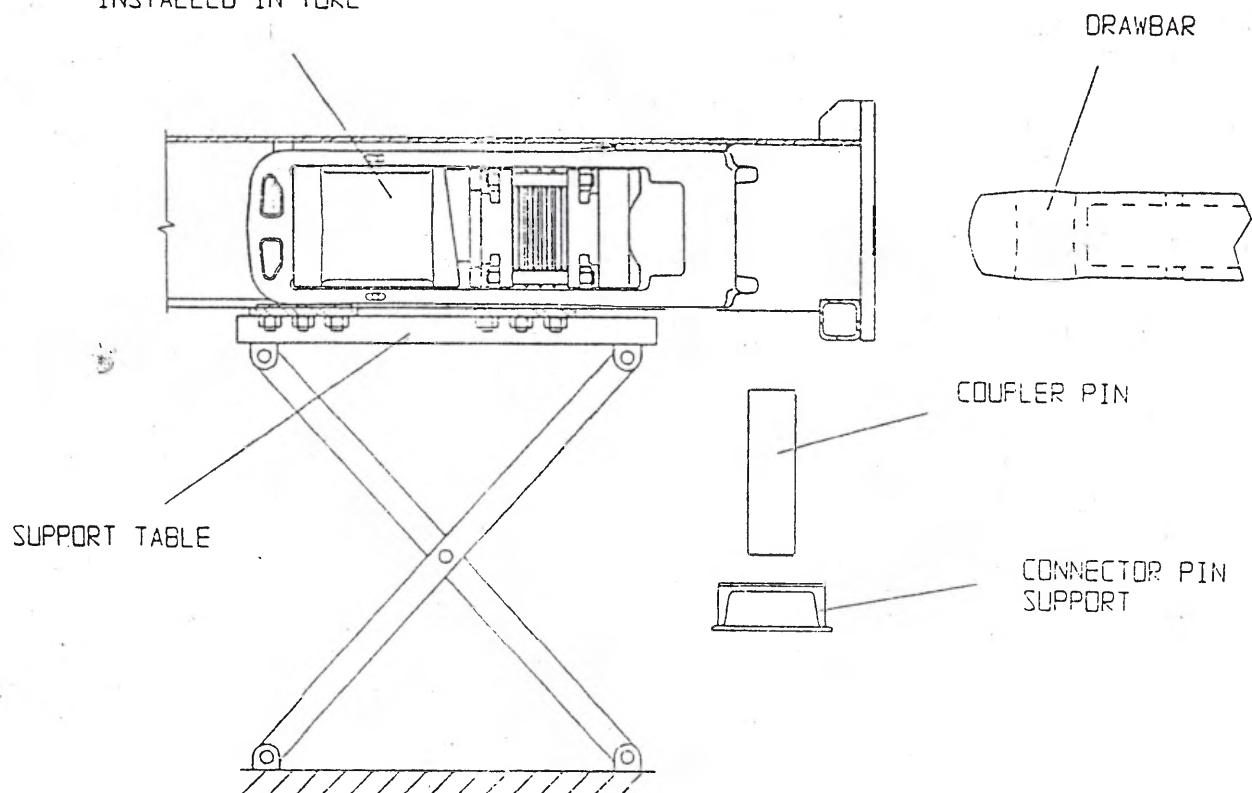


FIG. 6.4

SLACKLESS ARRANGEMENT
REMOVAL

RITES

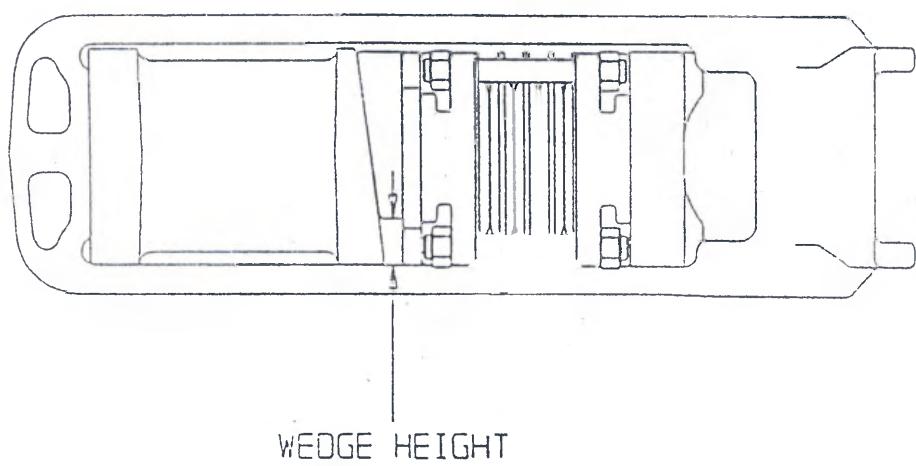
485-4A ARRANGEMENT
INSTALLED IN YOKE



IG. 6.5

SLACKLESS ARRANGEMENT
WEDGE HEIGHT INSPECTION

RITES



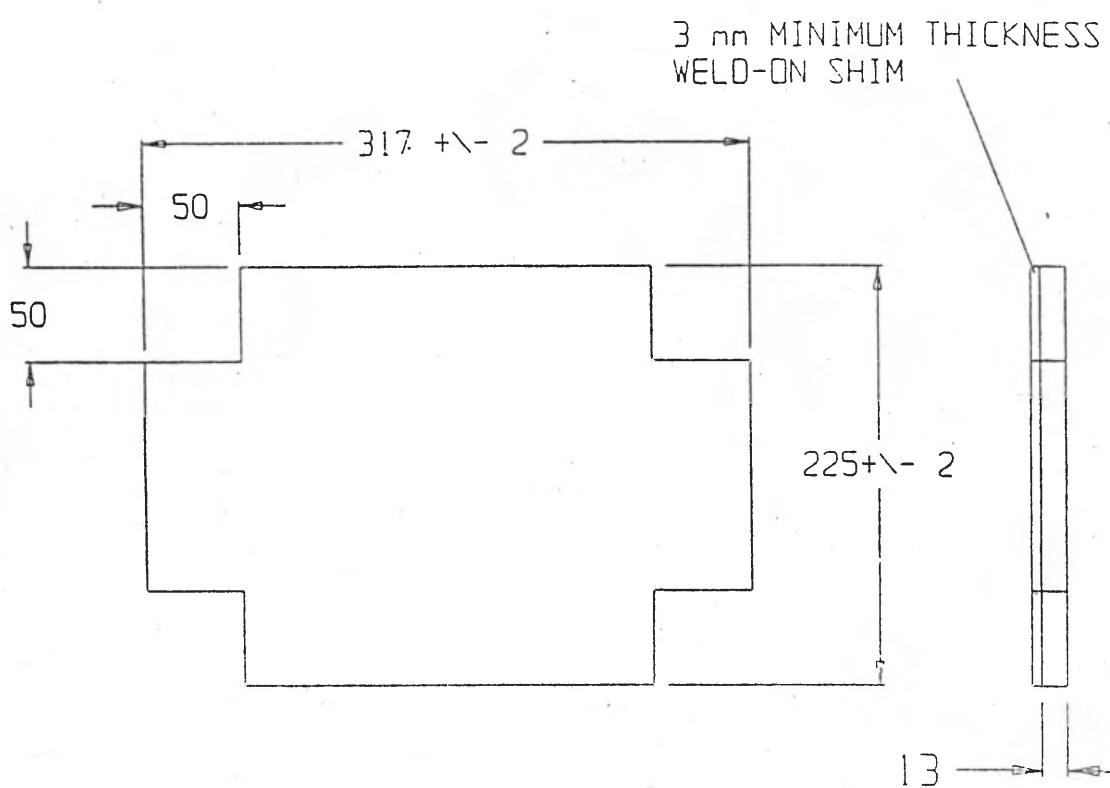
25 mm MIN - NEW APPLICATIONS

6 mm MIN - SERVICE INSPECTIONS

FIG. 6.6

SLACKLESS ARRANGEMENT
SHIM DETAILS

RITES



SHIM THICKNESS MAY BE ADJUSTED
TO ACHIEVE PROPER WEDGE HEIGHT

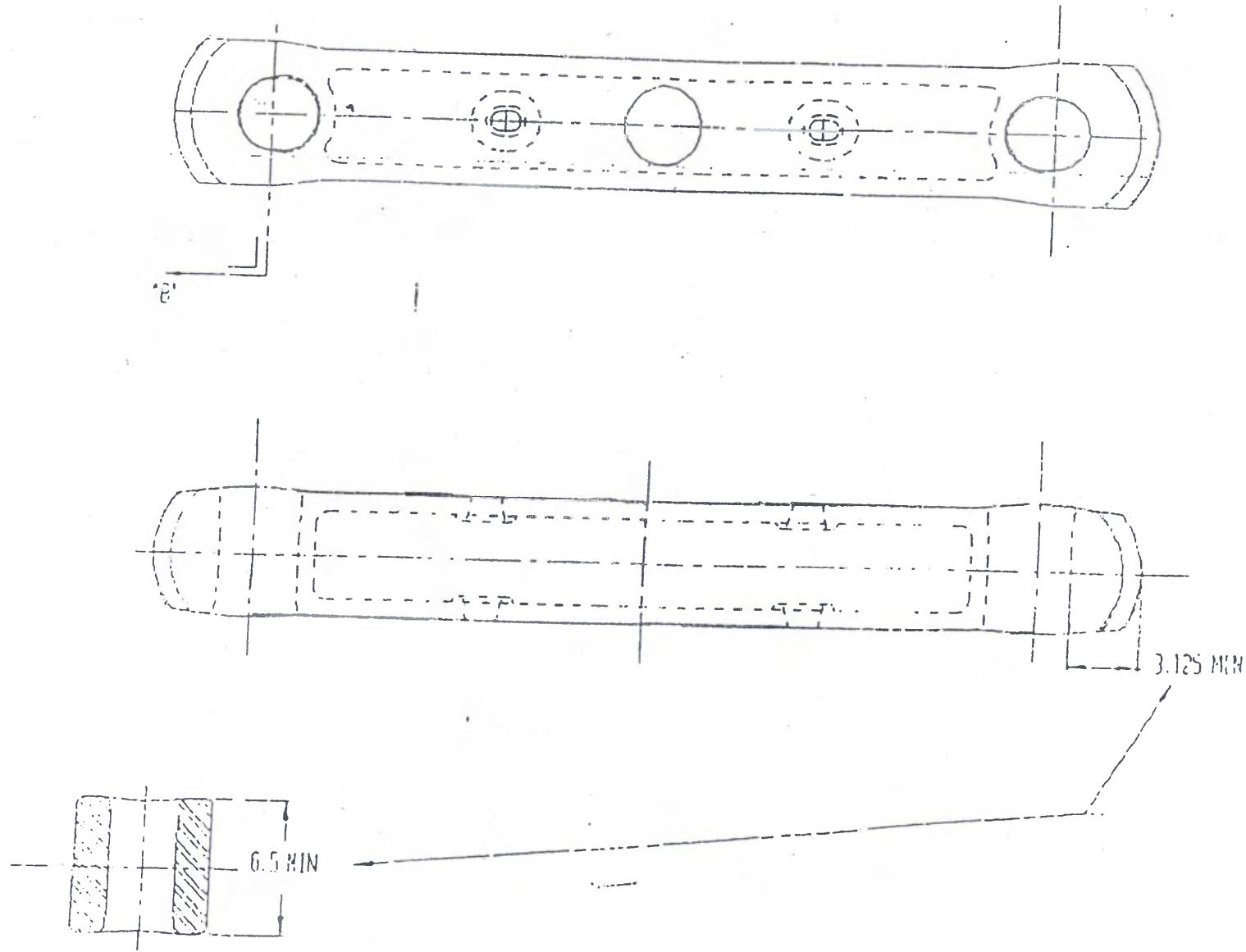
MATERIAL ATSM A-572 GRADE 50 OR BETTER

ALL DIMENSIONS IN mm

FIG. 6.7

SLACKLESS DRAWBAR

RITES

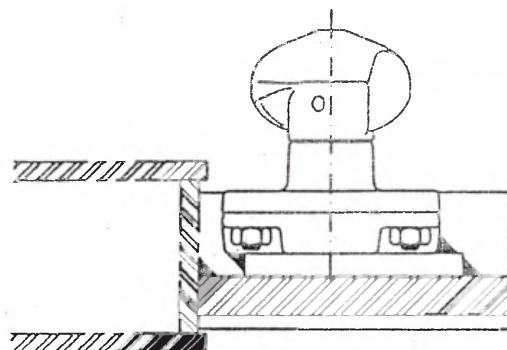


612

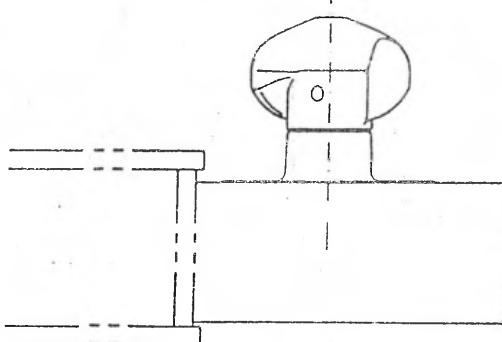
FIG. 7.1

TWIST LOCK ASSEMBLY

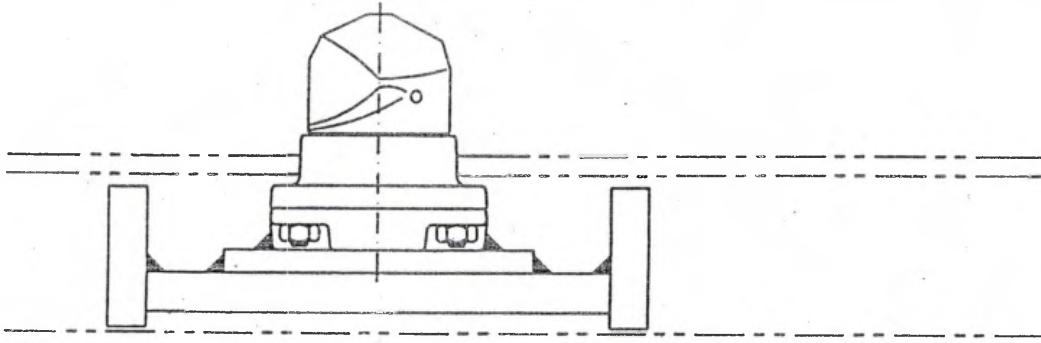
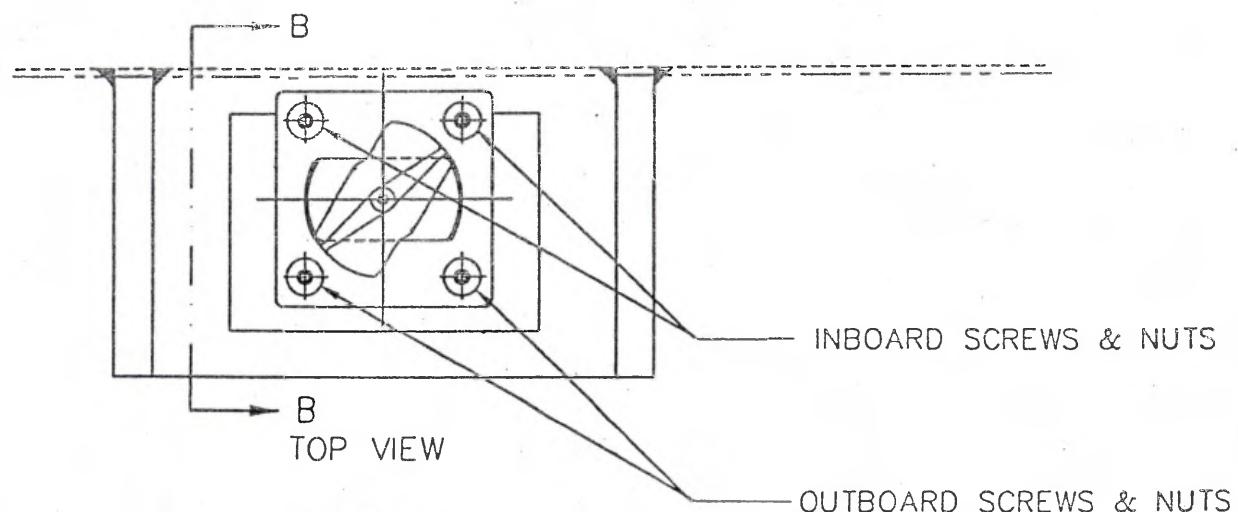
RITES



SECTION B-B



VIEW ALONG SIDE OF CAR

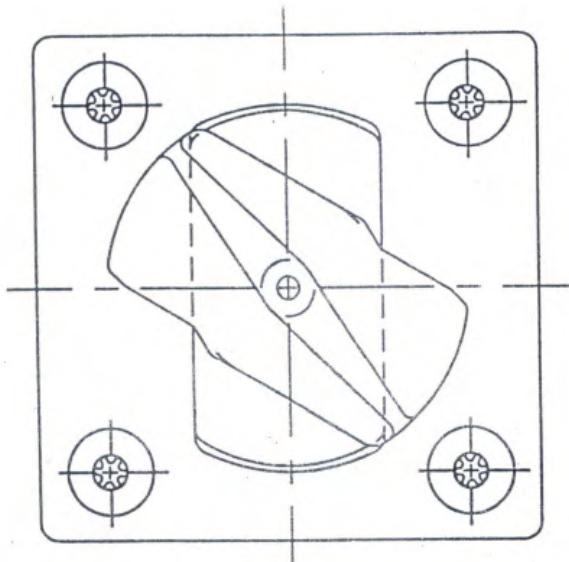


VIEW AT SIDE OF CAR

FIG. 7.2

TWIST LOCK ASSEMBLY
& DETAILS

RITES



BILL OF MATERIALS		
NO.	DESCRIPTION	PART NO. QTY
1	LOWER HOUSING ASSEMBLY	70254 1
2	UPPER HOUSING ASSEMBLY	71474 1
3	SPRING	71470 1
4	1/2X13 TORX FH SCR 1-1/2	70258 4
5	1/2X13 SPECIAL LOCKNUT	70259 4

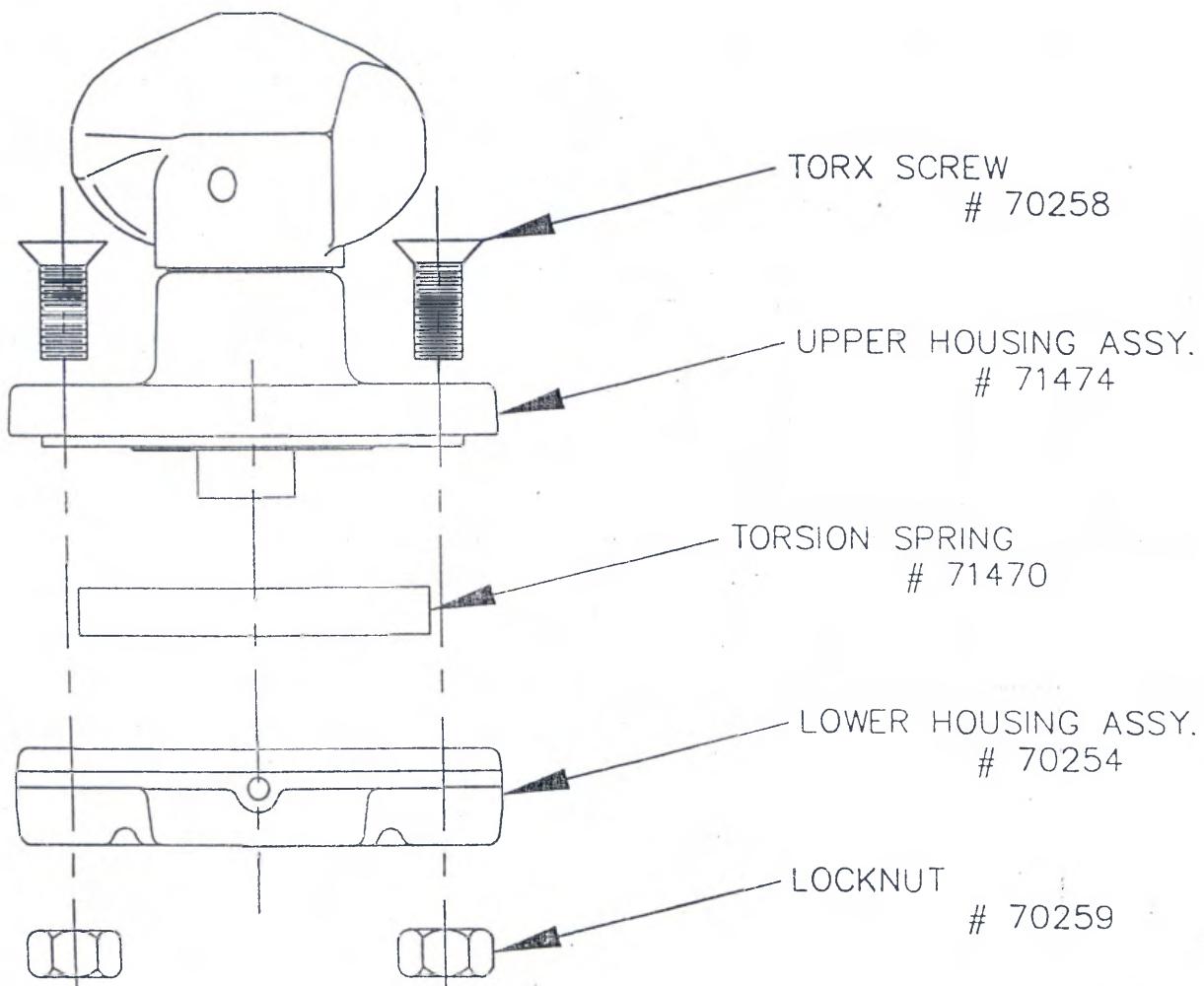


FIG. 7.3

FITMENT OF AUTOMATIC
TWIST LOCK

RITES

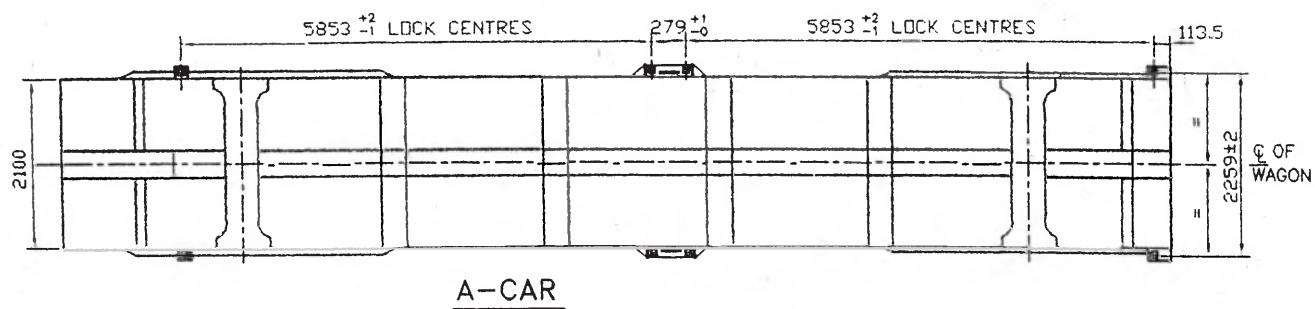
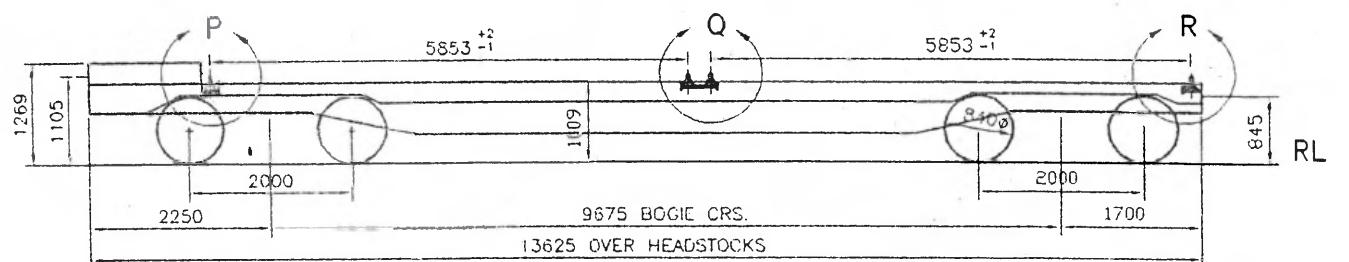
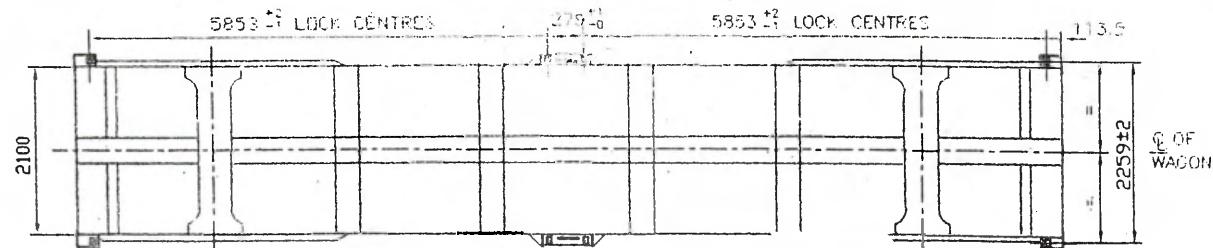
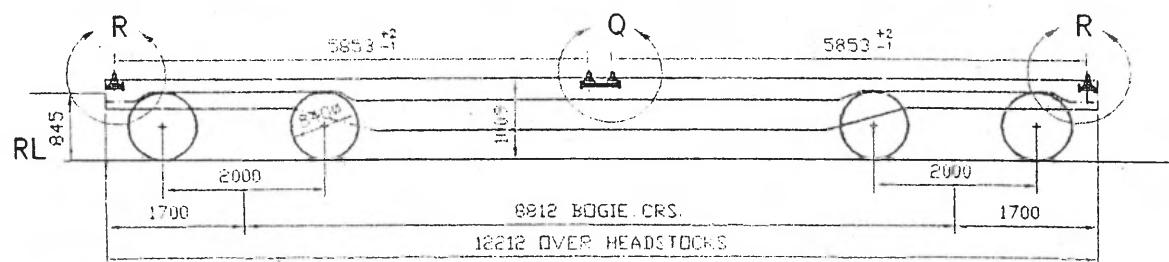
A-CARB-CAR

FIG. 7.4

FITMENT OF AUTOMATIC TWIST LOCK AT CENTRE

RITES

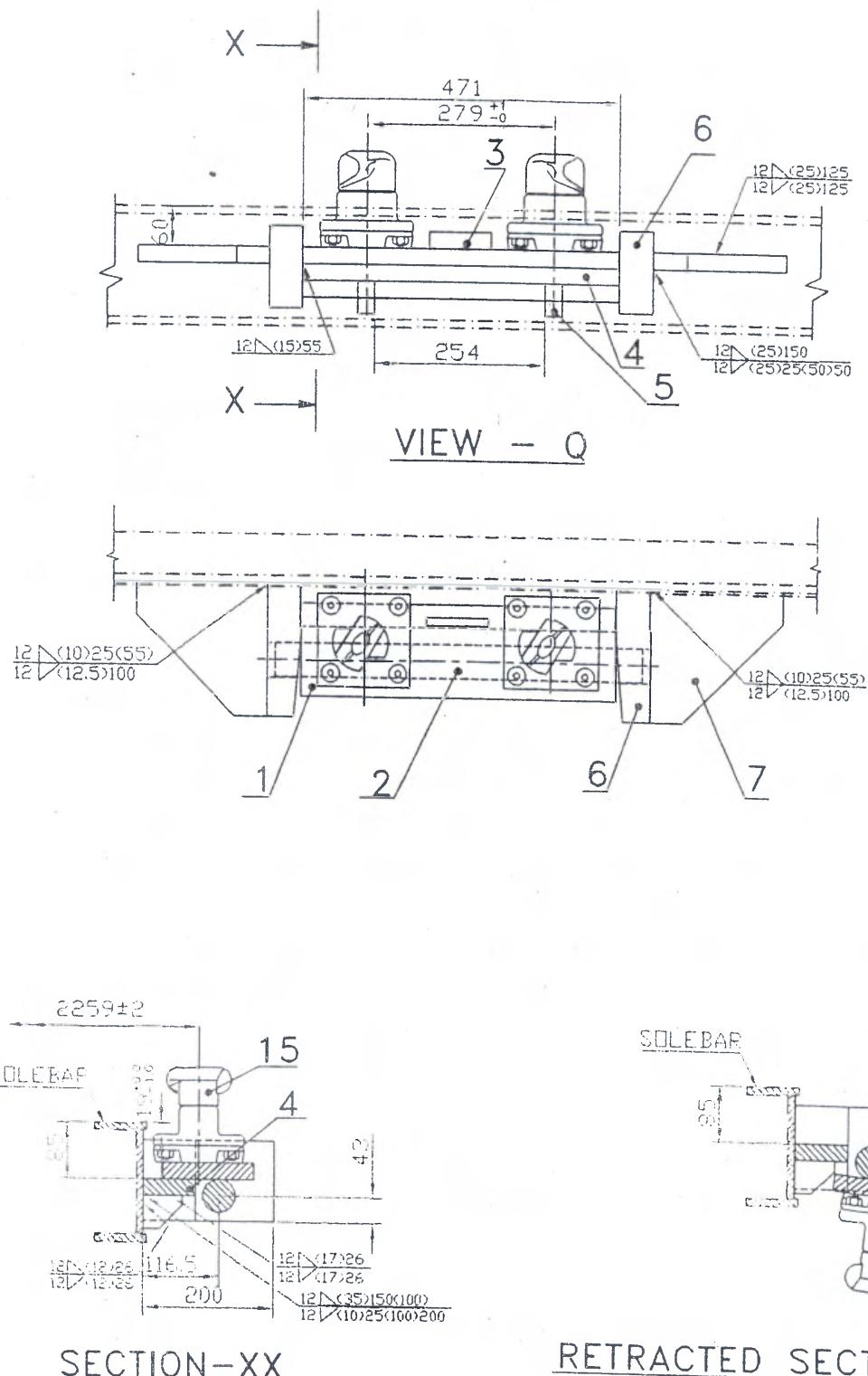
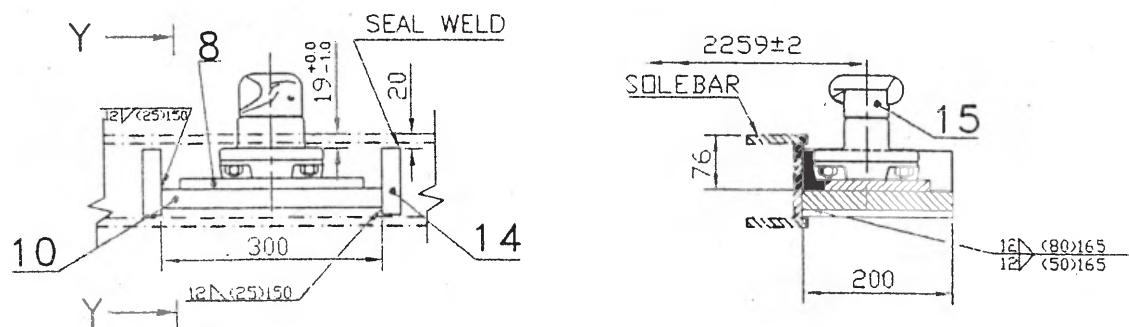


FIG. 7.5

FITMENT OF AUTOMATIC
TWIST LOCK AT CBC END

RITES



SECTION - YY

VIEW - P

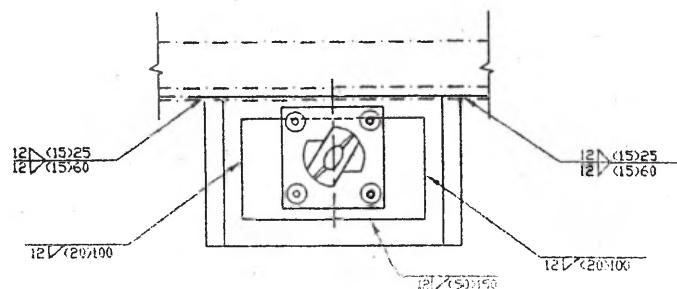
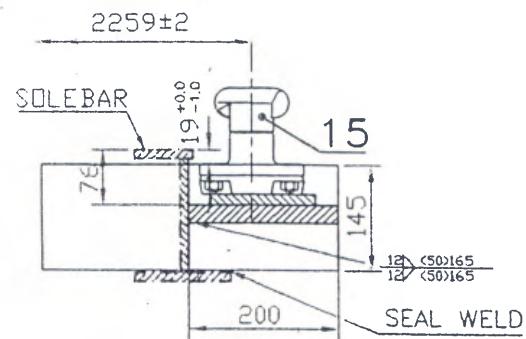
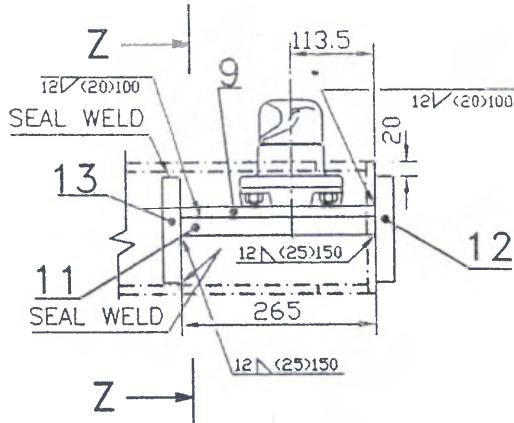


FIG. 7.6

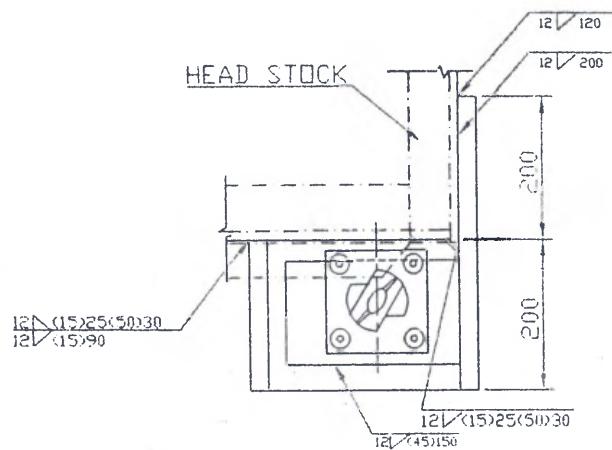
FITMENT OF AUTOMATIC TWIST LOCK AT DRAW BAR END

RITES



SECTION-ZZ

VIEW - R



TYPICAL ACCEPTABLE WELDING GUIDELINES

GMAW (Mig) WELDER SETTINGS:

240 Amps AT 22 VOLTS

1321 mm/min WIRE FEED

84 mm/min ARC TRAVEL TIME (SEE NOTE 1)

FILLER MATERIAL:

1.14 mm (.045") SOLID WIRE CONFORMING TO
AWS A-5.18 (ER70S-3)

WELDER SETTINGS AND WIRE SIZE
MAYBE VARIED TO ASSURE OPTIMUM
WELDING CONDITIONS BUT MUST NOT
EXCEED MAXIMUM HEAT INPUT.

NOTES:

1. ARC TRAVEL SPEED IS DETERMINED BY HAVING A WELDER DEPOSIT A WELD BEAD ON A PIECE OF SCRAP WHILE ANOTHER PERSON TIMES THE OPERATION. THE ARC TRAVEL SPEED IS THE WELD LENGTH IN MILLIMETERS PER MINUTE.
2. REFERENCE: UNITED STATES STEEL WELDING HANDBOOK ADUSS 01-3687-03 WELDING CALCULATOR ADUSS 01-3688-03 FOR HEAT INPUT CALCULATION TECHNIQUE.
3. WELD WORKMANSHIP IS TO BE PER AWS D15.1 SECTION B 12 OR AWS D1.1 SECTION 3.

MAXIMUM HEAT INPUT: (SEE NOTE 2)

3.8 KILOJOULE PER MILLIMETER OR HEAT UNITS

CALCULATION FOR
KILOJOULE PER MILLIMETER =
$$\frac{\text{AMPERES} \times \text{VOLTS} \times 60}{1000 \times \text{ARC TRAVEL TIME}}$$

(HEAT UNITS) (IN MILLIMETERS/MINUTE)

