

## SEMI- PERMANENT COUPLER (SCHAKU COUPLER)

### INTRODUCTION

DEMU/EMU stock are provided with the semi permanent Couplers manufactured by M/S **Scharfenburg Kupplung**, GmbH, Germany (short formed as “**SCHAKU**”). When two coaches are coupled by Semi-permanent Couplers, one coach is fitted with “Semi Permanent Coupler – End ‘A’ & the other one is fitted with “Semi permanent Coupler–End ‘B’”.

### MAIN SUB ASSEMBLIES OF SEMI-PERMANENT COUPLER

- **Coupler – End ‘A’ consists of: -**
  1. Bearing Bracket with Support – Sub Assembly
  2. Draw and Buffer Gear – Sub Assembly.
  3. Intermediate Tube – Sub Assembly.
  4. Air Pipe Coupling – Sub Assembly.
  5. Center Adjustment Device – Sub Assembly.
  6. Adjustable Cup sleeve – Sub Assembly
- **Coupler- End ‘B’ consists of: -**
  1. Bearing Bracket with Support – Sub Assembly.
  2. Draw and Buffer Gear – Sub Assembly.
  3. Intermediate Tube – Sub Assembly.
  4. Air Pipe Coupling – Sub Assembly.
  5. Center Adjustment Device – Sub Assembly.
  6. Centering Device – Sub Assembly.

### FEATURES OF SEMI- PERMANENT COUPLERS

- This coupler is designed for taking a maximum tensile load of 70 tons.
- Due to rigid connection of these Couplers, there exist negligible play between them in coupled position and hence no appreciable wear and tear during the train operation.
- The absorption capacity of the rubber draft gear of the semi permanent Couplers is 800 M-kg.
- The design and construction of the pivot joint between these Couplers and coaches is achieved by using the “Articulation Bearing” and permits a total deflection of  $\pm 75$  mm and horizontal deflection of 284 mm or  $13^\circ$  on either side. This enables the coaches to couple up easily at all track curves and also on points of changing gradient even at the maximum height difference between two coaches.

## DESCRIPTION &amp; FUNCTIONAL FEATURES OF SUB ASSEMBLIES

## BEARING BRACKET (USED BOTH IN END 'A' &amp; END 'B')

It is the part of the semi permanent Coupler which is fixed onto the end part of the coach. This sub-assembly is basically fabricated and machined to house two Ferro zell bushes with concentric vertical axes and connected to the Articulation Bearing of the draw and buffer gear sub-assembly by means of one bearing bolt. One leaf spring holding device which is mounted on this bolt by thread engagement. These leaf springs held together tightly helps to support the overhung portion of the Draw and buffer gear from under side.

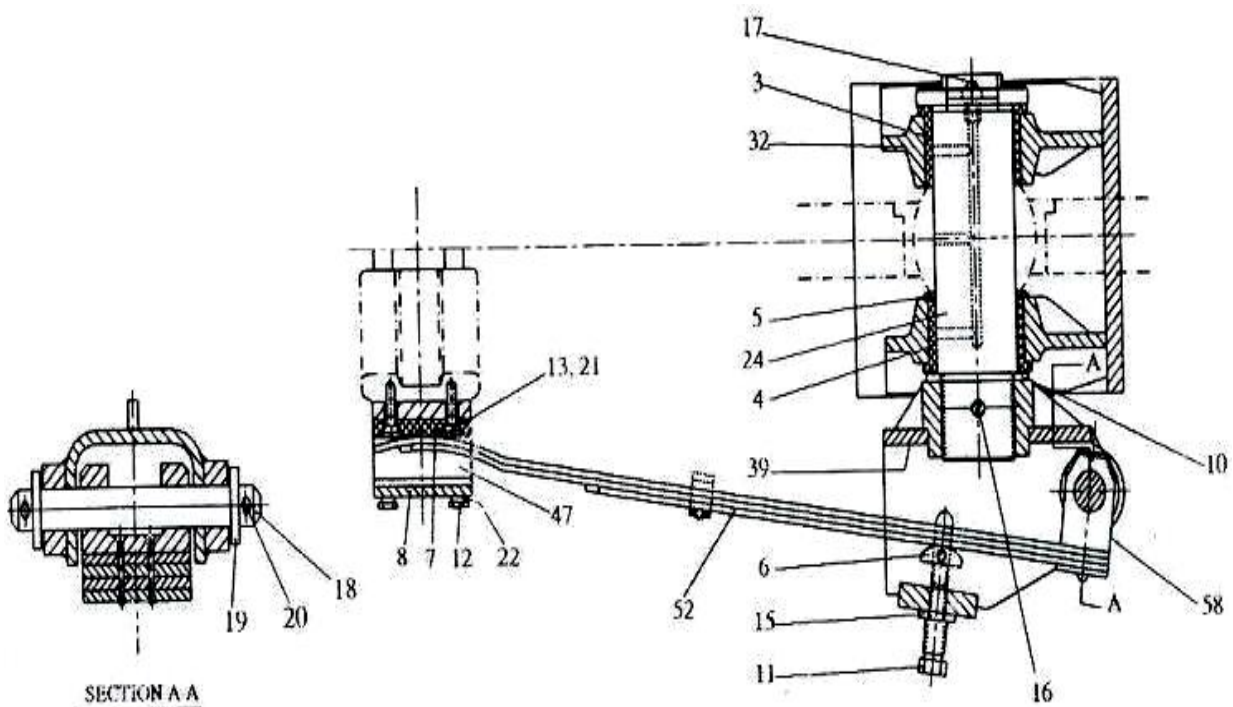
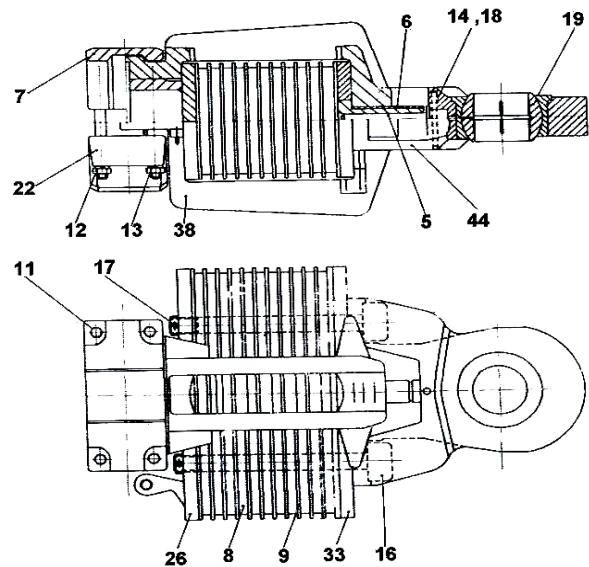


FIG. : BEARING BRACKET WITH SUPPORT

Description	Ref.No.	Description	STC/NBQ/NFR Ref.No.
Bush	3	Pin 32 d 9 x 200 x 180	17
Bush	4	Unmachined Disc 33	18
Disc Thrust Piece	5	Split Pin 8 x 50	19
Slide Plate	6	Fan Disc V10, 5	20
Plate	7	Spring Washer A8	21
Plate Disc	8	Bearing Bolt (Sub Assly.)	22
Hex. Hd Screw A M30 x 90	10	Bearing bracket (sub Assly.)	24
Hex. Hd Screw A M8 x 15	11	Carrier (Sub Assly.)	32
Csk Hd Screw M10 x 30	12	Fastening (Sub Assly.)	47
Hex. Nut M30	13	Leaf Spring Comp. (Sub Assly.)	52
Split Pin 3/8" dia x 5-1/2"	15	Block (Sub Assly.)	58
Grease Nipple A10	16		

## DRAW AND BUFFING GEAR (USED BOTH IN END 'A' & END 'B')

This part of the semi permanent Coupler accommodates the rubber spring (Perforated steel plate with rubber molded on it) and steel plate held alternatively to provide an energy absorption capacity of about 80M- Kg and a draft capacity of 34 tonnes. It comprises of a fabricated yoke which houses the said Rubber springs, plates, one front plate and one rear plate, a fork eye which houses the "Articulation Bearing". This fork eye is mounted on the yoke by means of two Socket head screws, which also keep the Rubber- spring and plate in position. There is a pin with a polyamide bush, which keeps the fork eye in central axis of the yoke. During the train operation the rubber spring along with plates are subjected to compression only in both the cases when the coupler is under tensile load or compressive load. The draw and buffer gear is connected to bearing bracket in one side and rigidly to the intermediate tube on the other side.



**FIG. : DRAW AND BUFFING GEAR**

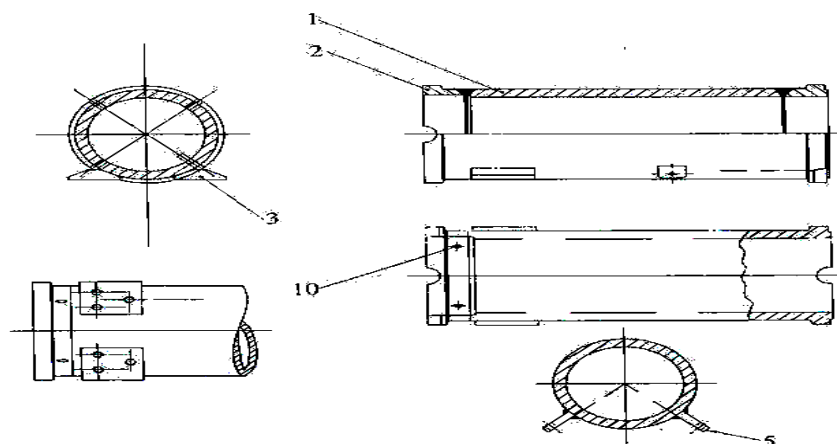
## Nomenclature of fig.

DESCRIPTION	REF.N	DESCRIPTION	REF. NO
Bolt	5	Socket Head Screw M42 x 300	16
Bush	6	Split Pin 10 x 70	17
Upper Part of the Cup Sleeve	7	Clamping Pin 5 x 40	18
Spencer Moulton Rubber Springs	8	Pivoting Bearing – Const'n. Type-A	19
Spencer Mild Steel Plates 3/16"	9	Lower Part of Cup Sleeve	22
Hex. Head Screw M16 x 180	11	Front Plate (Sub Assly.)	26
Hex. Nut M16	12	Rear Plate (Sub Assly.)	33
Spring Washer A16	13	Yoke (Sub Assly.)	38
Clamping Pin 8 x 80	14	Eye (Sub Assly.)	44

### INTERMEDIATE TUBE (USED BOTH IN END 'A' & END 'B')

The intermediate tube is fabricated by welding two forged rings on both side of a seamless (heavy) tube piece. Then subsequent stress relieving and machining is done on it. Intermediate tube being rigidly connected to the draw and buffer gear assembly, become one single solid stock extending from the pivot center (i.e.

articulation bearing) up to its other free end.



**FIG. 3 INTERMEDIATE TUBE ASSLY.**



DESCRIPTION	REF.NO.	DESCRIPTION	STC/NBQ/NFR REF.NO.
Tube	1	Spring Sleeve 10 x 20	10
Ring	2	Lug	5
Plate	3		

## AIR PIPE COUPLING (USED BOTH IN END 'A' & END 'B')

This is bracket type fabricated structure which houses two male thread mountings for main reservoir pipe and brake pipe and two conical rubber washers fitted inside hex. Head sockets which form the coupling face. When both the Semi-permanent Couplers (End 'A' & End 'B') are manually coupled. These rubber washers projected outwards coupled simultaneously to ensure leak proof air passages for MR& BP.

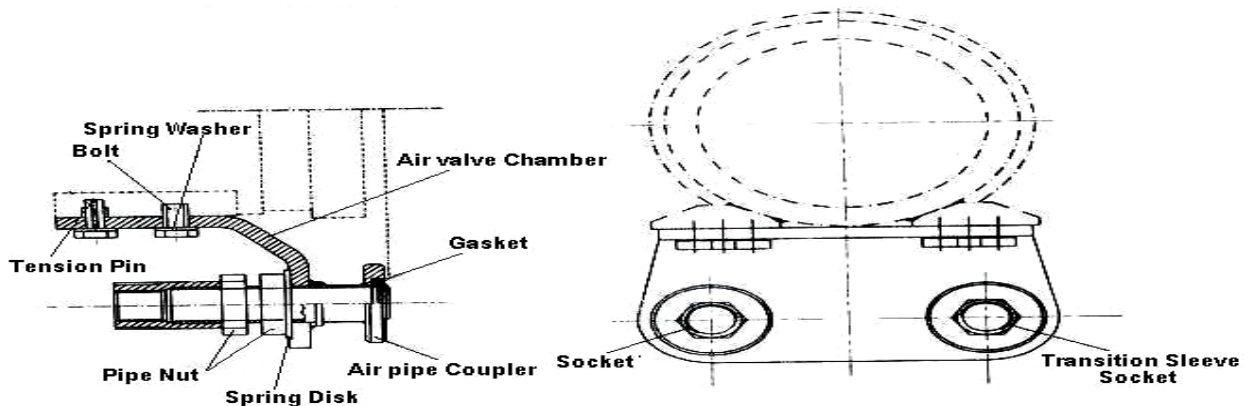


FIG. : AIR PIPE COUPLING

## CENTERING DEVICE (USED ONLY IN END 'B')

This is machined from a circular disc type forging with guide pins welded in it. It forms the coupling face of the Intermediate tube (End 'B').

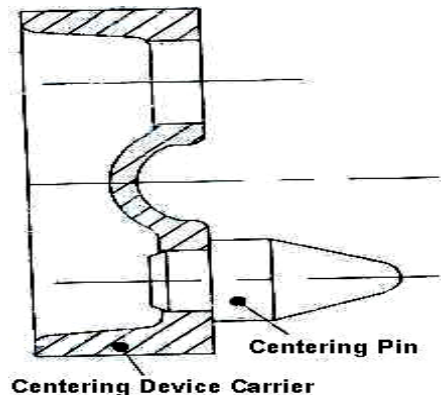


FIG. : CENTERING DEVICE

## ADJUSTABLE CUP SLEEVE (USED ONLY IN END 'A')

This subassembly is mounted on the outer part of the Intermediate tube of Semi-permanent Coupler (End 'A'). This comprises of two semi circular sleeve with tapered slot inside. These sleeves are adjusted and brought in position by means of a spindle with both left hand and right hand thread formed on it. Closing of these two sleeves grips firmly two outer ends of Intermediate Tubes of Semi-permanent Couplers (End 'A' & End 'B') thus forming one rigid connection. The exact centering is done by two guide pins welded onto the centering devices, one housed in the Adjustable Cup sleeve and another fitted at the end of Intermediate Tube (End 'B').

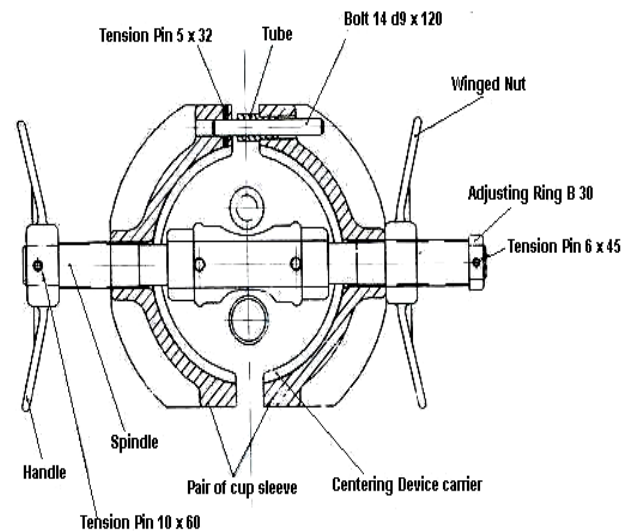


FIG. : ADJUSTABLE CUP SLEEVE

## CENTER ADJUSTMENT DEVICE (USED BOTH IN END 'A' & END 'B')

This consists of two concentric helical compression springs housed in a barrel with clevis end fitting to facilitate mounting onto the underside of the frame. This combination of springs fitted with a push rod always exert are storing force to keep the coupler end in central position which often gets moved sidewise due to relative lateral displacement of two compartments during the train operation.



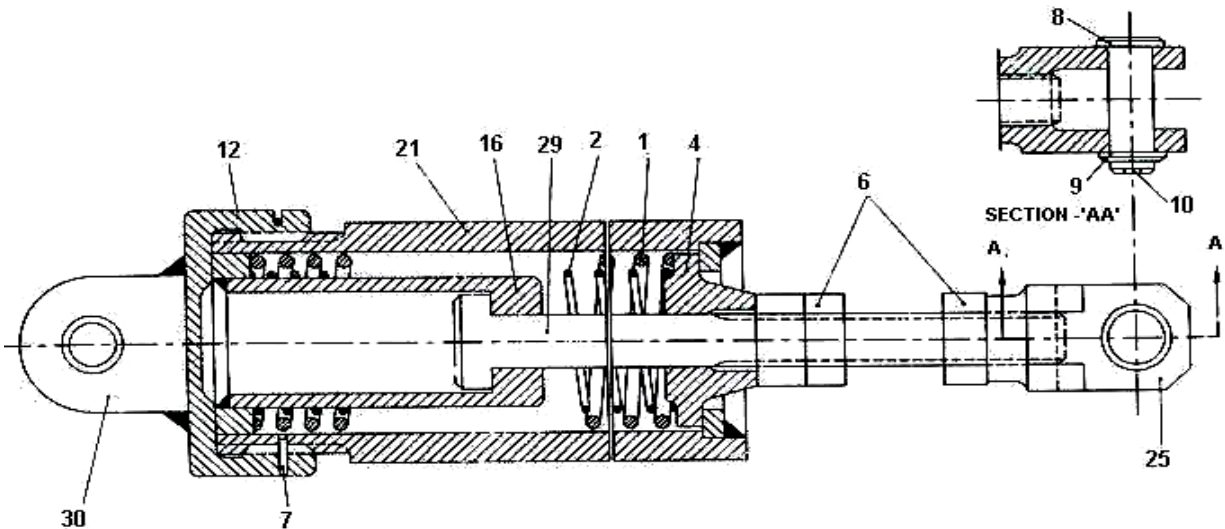


FIG. : CENTER ADJUSTMENT DEVICE

DESCRIPTION	REF.NO.
Compression Spring	1
Compression Spring	2
Disc Spring	4
M24 x Hex. Nut	6
Hook Spring Nut	7
Bolt, B22, h11 x 65 x 58.5	8
M23 washer	9
Split Pin 5 x36	10
Plug (Sub Assly.) Complete Comprising Eye	12
Spring Casing (Sub Assly.) Comp. Comprising	16
Spring Casing (Sub Assly.) Comp. Comprising	21
Fork Head	25
Clamping Screw	29

## MAINTENANCE SCHEDULES

Following maintenance schedules are carry out in the DEMU car shed and workshop.

### TRIP SCHEDULE TO “C” SCHEDULE

- Check slackness by coupler play inspection gauge between two couplers, which should not more than 4 mm.
- Check slackness by coupler play inspection gauge in individual coupler, which should not more than 2 mm.
- Visually check for physical damage/ missing components and replace them