No. EL/3.2.30 Dated - -1992

Government of India
Ministry of Railways
Research, Designs & Standards Organisation
Manak Nagar, Lucknow - 226 011

SPECIAL MAINTENANCE INSTRUCTIONS NO. RDSO/ELRS/SMI-145 CRANK SHAFT FRACTURE OF NO.32 TAP CHANGER

1. OBJECT

Railways have reported cases of Crank Shaft fracture of tap changer ABB make. The probable reasons and remedial measures to overcome above failures are listed in the following enclosed instructions for compliance.

2. INSTRUCTIONS

i. Instructions for assembling crank shaft with the help of fixture (Annexure-1)
ii. Maintenance of Crank Shaft in AOH, IOH and POH (Annexure-2)
iii. Cause effect diagram (Annexure-3)
iv. Check sheet for Crank shaft breakage (Annexure-4)

3. REFERENCE

i. M/SABB Instruction No. SWT 5126, SWT 5129 and SWT 5131
ii. Co-ordination Meeting held on 8.1.1992 at ABB, Baroda.

4. INSTRUCTION DRAWING

Enclosed with instructions

5. APPLICATION TO CLASS OF LOCOMOTIVE

All locomotives fitted with No.32 tap changer of M/S ABB make.

6. AGENCY OF IMPLEMENTATION

Sheds/Shops.

7. PERIODICITY OF IMPLEMENTATION

As per the instructions enclosed.

8. DISTRIBUTION

All Chief Electrical Engineers.

(Arun Srivastava)
Krite Maha Nideshak/Vidyut.

Encl As above

Instruction for making crank shaft assembly to our drawing AG 106 705 R1

1) Degrease the bearing pin–1 and key–2 with a solvent such as trichlorethylene. or white spirit.
2) Press the key in the key way of pin sufficiently such that the bearing–3 can be just inserted. (See Fig. 1)

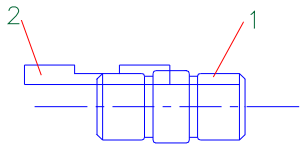


Fig.1

3) Fill the bearing with Lithium base grade–3 grease and insert.
4) With the key in a vice or press, push it untill the ball bearing butts against the race. (See Fig. 2)

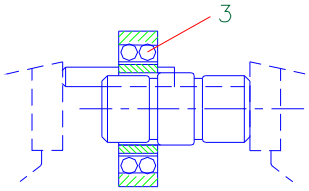


Fig.2

5) Using the bushing–4,Press ball bearing and key togther on to the pin. (See Fig.3)

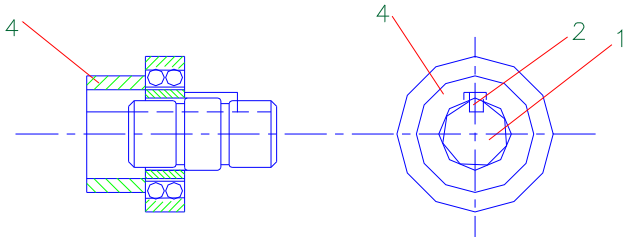


Fig.3

Ref. HAGT 30454–E

MODIFICATION				
REPLACESD BY:		DRAWN		
		CHECKED		
REPLACES		APPRD.		
		AUTHOD.		
BBC HINDUSTAN BROWN BOVERI		SwT 5126 sh. 1 of 3		

6) Make sure the seating diameters ø 24–r5 at both ends of bearing pin are clean & free from grease.

7) Lightly press the bearing pin in to the half crank shaft–5 untill guidance can be felt. (See Fig. 4)

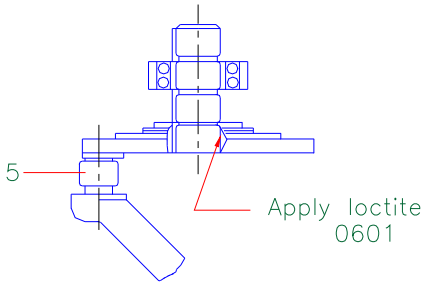


Fig.4

8) Coat the bore ø24–H7 of the half crank shaft with loctite 0601 (joining parts) and press on the bearing pin (See Fig. 4) pressing of bearing pin is to be done with suitable ficture such that load comes on round disc ø128 only (See Fig. 5) and end diameter is guided as per figure.

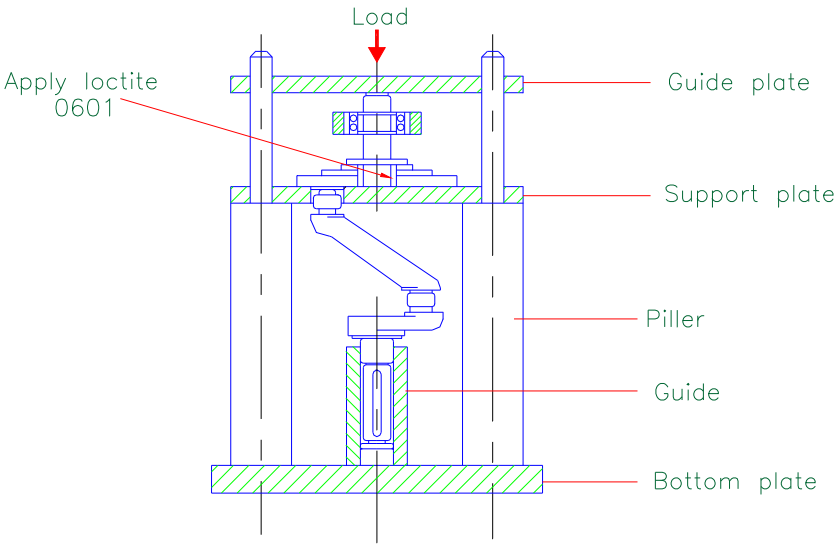


Fig.5

MODIFICATION:				
REPLACESD BY:		DRAWN		
		CHECKED		
REPLACES		APPRD.		
		AUTHOD.		
BBC HINDUSTAN BROWN BOVERI ②		SwT 5126 sh. 2 of 3		

9) Press bearing block–6 on the bearing.

10) Press the second half on crank shaft with fixture such that load comes on round disc ø 128 only and both end diameters are guided as per figure. (See Fig.6)

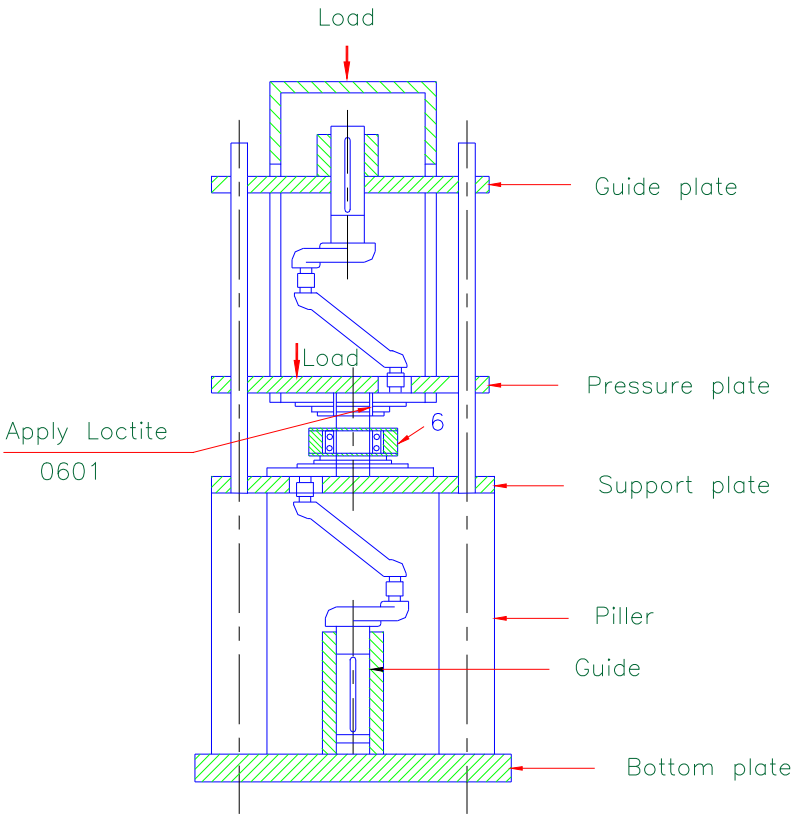


Fig.6

MODIFICATION:				
REPLACESD BY:		DRAWN		
		CHECKED		
REPLACES:		APPRD.		
		AUTHOD.		
BBC HINDUSTAN BROWN BOVERI 2/2		SwT 5126 sh. 3 of 3		

Maintainance of Crank shaft

AoH

1) Lubricate connecting Rod bearing area with graphite Lubricating oil.
2) Ensure that the fly wheel is not wobbling and not loose. If required change key 6102 or fly wheel 2112
3) Check total play between crank pin and connecting rod with bearing liner (2314/2313). If play is more than o.4 mm change bearing liner 2313.
4) Check the tightness of fixing bolts 2107. If they are loose tighten them after ensuring that both ends are equidistants from support. Use medium grade loctite 242 on the bolts to prevent loosening
5) Check for any other abnormality.

IoH

1) Observe the groove at the crank pins for crank using Die Penetrant test. If crank are observed replace crank shaft.

Rest of the check points as per AoH.

Prepared:	Checked :	Approved :	Maintainance of Crank shaft of Tap changer NO.32	
Without See PL ☐	Seq PL No. ☐	Seq PL Other No. ☐		
Drived from:				
Revision :				
ABBAsea Brown Boveri Ltd.				SwT 5129

PoH

During poH the crank shaft should be Checked for cracks at the crank pin portion. Also looseness of two halves of crank shaft to be checked. If they are found loose key 2101.5 may have to be replaced and assembly to be done as per the guide lines given in instruction SwT 5126..... The end Bearing are to be lubricated with Lithium base grease class 2 If the crank pin diameter is 17.6 mm the crank shaft is to be replaced.

The crank shaft assembly to the base plate is to be done such that the ends of crank shafts are at the same distance from the base of Base plate 1101.

The fixture TC–98 may be used for the purpose

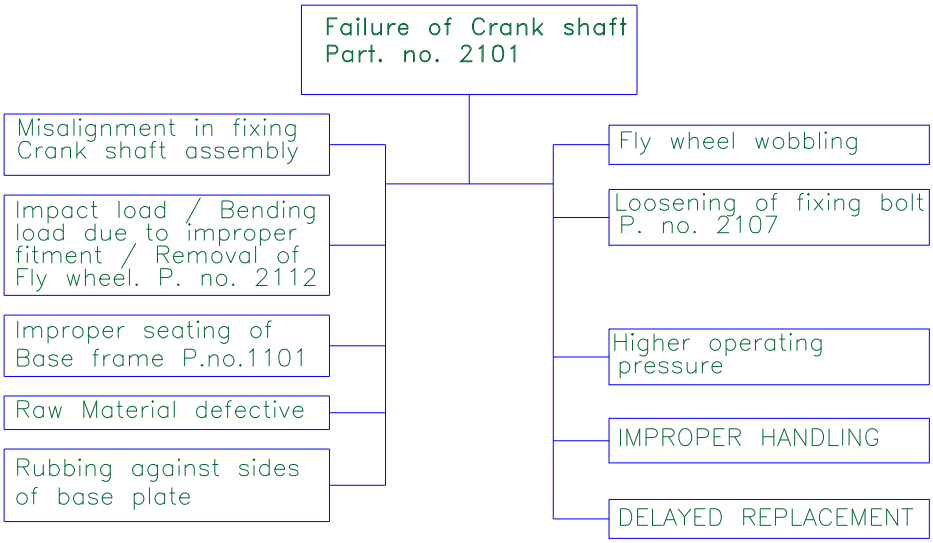
All other points as given for AoH And IoH are to be taken care of.

In case Air Motor with support is to be fitted on different Tap changer procedure for fitment to be followed as per instruction SwT 5130.

The crank shaft should be replaced in 2nd poH.

Prepared:	Checked :	Approved :	Maintainance of Crank shaft of Tap changer NO.32	
Without See PL ☐	Seq PL No. ☐	Seq PL Other No. ☐		
Drived from:				
Revision :				
ABB Asea Brown Boveri Ltd.				SwT 5129

ANNEXURE–
(1) 115



Prepared:	Checked :	Approved :	Maintainance of Crank shaft of Tap changer NO.32	
Without See PL ☐	Seq PL No. ☐	Seq PL Other No. ☐		
Drived from:				
Revision :				
ABB Asea Brown Boveri Ltd.				SwT 5129

For Crank shaft Breakage (Part no. 2101)

Air Motor Sr. No :

Tap changer Sr. No. :

Loco No. / Type :

Date of Commissioning :

Date of Failure :

Whether Line Failure / Shed :

Detection :

Details of Failure :

Shed Investigation Details:

Further Details

Whether there is rubbing of crank shaft rib with the sides of Base plate Part no. 1101 :

Whether Fixing Bolts Part no. 2107 are loose. :

Whether the Fly wheel is wobbling :

Whether the Fly wheel is loose :

Whether Crank shaft ends are at equidistance from Base of Base plate Part no. 1101 :

Prepared:	Checked :	Approved :	Check sheet for Crank Shaft breakage (Part no. 2101) Of tap changer NO.32	
Without See PL ☐	Seq PL No. ☐	Seq PL Other No. ☐		
Drived from:				
Revision :				
ABB Asea Brown Boveri Ltd.				SwT 5131

Base plate Part NO. 1101	:	mm			
Distance of Crank shaft end at Bevel gear side from base of Base plate Part no. 1101	:	mm			
Whether Key 1916 properly seated in support 1911	:				
Whether support 1911 is broken	:				
Whether Hex. bolts 1909 are loose	:				
Whether washer 1943 & Belliville washer 1910 provided on bolts 1909	:				
Whether Bevel gear Alignment 1926 & 1924 is proper with 50–70% uniform gear meshing	:				
Whether there is looseness of crank shaft from the central shaft & key	:				
Whether there is excessive play between crank shaft	:				
Crank pin & Connecting rod with Bearing liner (2314/2313)	: Play:	I mm	II mm	III mm	IV mm
Whether Self aligned ball bearing 2103 is defective	:				
Whether there is lateral play in Crank shaft	:				

Prepared:	Checked :	Approved :	Check sheet for Crank Shaft breakage (Part no. 2101) Of tap changer NO.32	
Without See PL ☐	Seq PL No. ☐	Seq PL Other No. ☐		
Drived from:				
Revision :				
ABB Asea Brown Boveri Ltd.				SwT 5131

Place at 0 or 32 Notch	:
The actual operating pressure of Air motor	:
(The pressure regulator of control panel to be checked)	
Any other abnormality	:
Previous History of Air motor	:
Other Associated failures	:

Prepared:	Checked :	Approved :	Check sheet for Crank Shaft beakage (Part no. 2101) Of tap changer NO.32	
Without See PL ☐	Seq PL No. ☐	Seq PL Other No. ☐		
Drived from:				
Revision :				
ABB Asea Brown Bovert Ltd.				SwT 5131