

MINISTRY OF RAILWAYS
RESEARCH, DESIGNS & STANDARDS ORGANISATION
Manak Nagar
Lucknow - 226 011

No. EL/3.2.5

Dated : 5.2.1999

MODIFICATION SHEET NO. RDSO/ELRS/MS/WAM4/0216

1. TITLE :

Adoption of modified brush holder assembly on traction motor type
TAO-659

2. PURPOSE :

Railways have reported cases of failure of brush holder assembly on Traction Motor type TAO-659. On investigation, it is learnt that these failures are taking place on finger assembly and spring. In the present design of finger assembly, material of spring and spring lever is spring steel. The spring lever is attached to the spring with the help of two snap head rivets of size 3 mm dia and 10 mm long along with insulating plate/tube and steel plate etc. It is observed that the spring assembly is getting broken and the rivets are sheared off and some times spring itself is broken. These failures are taking place due to aging and higher length of spring lever causing excessive strain at the joints.

To overcome these problems, an improved arrangement has been adopted after study of the similar arrangement on other makes of Traction Motor like that of Hitachi Traction Motor. Salient features of this modification are as follows:

- (i) Spring is of stainless steel and the number of turns are altered. Spring drum is also modified.
- (ii) The length of the spring lever has been reduced and fixation arrangement has been modified.
- (iii) The boss has been eliminated. In lieu, stainless steel washers are provided.
- (iv) Brush holder body, arcing stud assembly and axle remain unchanged.

It is expected that the modified arrangement of brush holder assembly shall work satisfactorily and the typical failure associated with the unmodified brush holder assemblies can be eliminated.

The above modifications have been finalised in consultation with M/s Mica-Mold/Jamshedpur who have also developed the prototype for the modified brush holder assembly.

The existing brush holder body has not been modified and the same can be reused at the time of implementation of the above modification.

3. **WORK TO BE CARRIED OUT:**

- Remove existing brush holder assembly from the brush holder revolving ring.
- Fit the modified brush holder assembly procured as per RDSO Drg. No. SKEL -4505 as per usual process.
- Fit the properly bedded carbon brushes and check the tightness of the pigtail connections.
- Check the spring tension as per usual process.
- Maintain the clearance of 1.5 to 3.5 mm between the brush box and commutator.

Maintain the gap of 10 ± 0.5 mm between the arcing stud tips.

- After mounting the BHRR assembly on the TM check the magnetic neutral axis as per RDSO's SMI No. ELRS/SMI/81 of May' 1996.

4. **APPLICATION:**

Traction Motor type TAO-659.

5. **MATERIAL REQUIRED:**

Railways are requested to procure the material of the brush holder assembly as per following enclosed RDSO's Drawings

Items	RDSO Drawing No
- Brush holder assembly	SKEL-4505
- Brush holder finger assembly	SKEL-4504
- Spring Drum	SKEL-4494
- Axle	SKEL-4495
- Spring	SKEL-4498
- Lifting hook	SKEL-4499
- Insulating plate	SKEL-4500
- Finger	SKEL-4501
- Insulating tube	SKEL-4502

- | | | |
|---|------------------|-----------|
| - | Spring lever | SKEL-4503 |
| - | Washer | SKEL-4506 |
| - | Split Cotter Pin | SKEL-4496 |
| - | Fixing Bracket | SKEL-4497 |

NOTE: Provide filler washer, size 0.5 mm thick, I/D=10 mm, O/D=25 mm, between brush body and spring drum end washer as per requirement to have a tight fitting of stainless steel washer (RDSO Drg. No. SKEL-4506)

6. **MATERIAL RENDERED SURPLUS:**

Existing spring washer, spring lever, insulating tube, spring drum, lifting hook and finger of brush holder assembly etc.

7. **REFERENCE:**

CLW and Hitachi drawings as mentioned in the above RDSO's drawings vide clause 5.

8. **MODIFICATION DRAWINGS:**

Refer Clause 5 above.

9. **SOURCES OF SUPPLY:**

APPROVED :

M/s Mica Mold,

P. O. Sunder Nagar, Jamshedpur-832 107.

APPROVED FOR EDUCATIONAL ORDERS:

M/s ARCO Industries.

Unit No. 20. KEYTUO Indl. Estate

220, Kondivita lane, Marol,

Andheri (East), Mumbai-400 059

10. **PERIODICITY OF IMPLEMENTATION:**

AOD/IOH/POH or Whenever the brush holder assembly is taken out on account of defects for overhauling.

10. **AGENCY OF IMPLEMENTATIONS:**

- All Electric Loco sheds.
- All TM Workshops
- All TM manufacturing units M/s BHEL, Rotomac Electricals Pvt. Ltd.,
Crompton Greaves Ltd., Kirloskar Electric Company.

11. **DISTRIBUTION:**

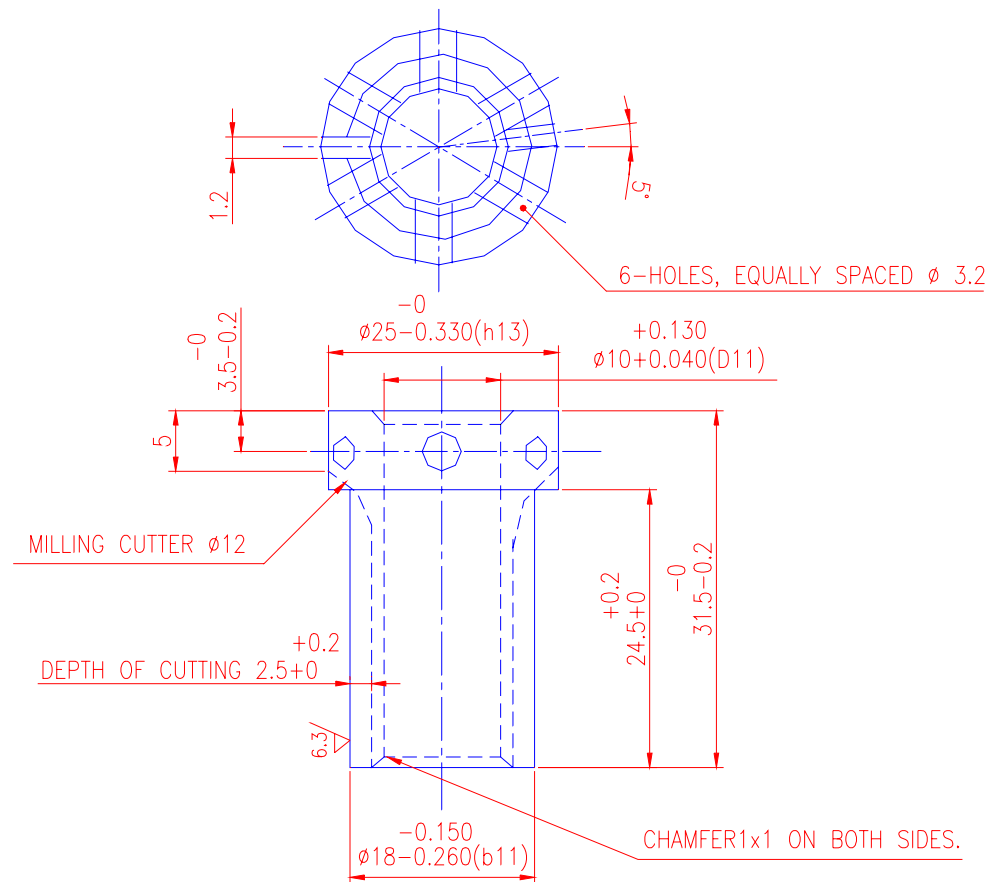
As per enclosed list.



Encl: All above drawings

(R.K. Kulshrestha)

For Director General (Elec.)

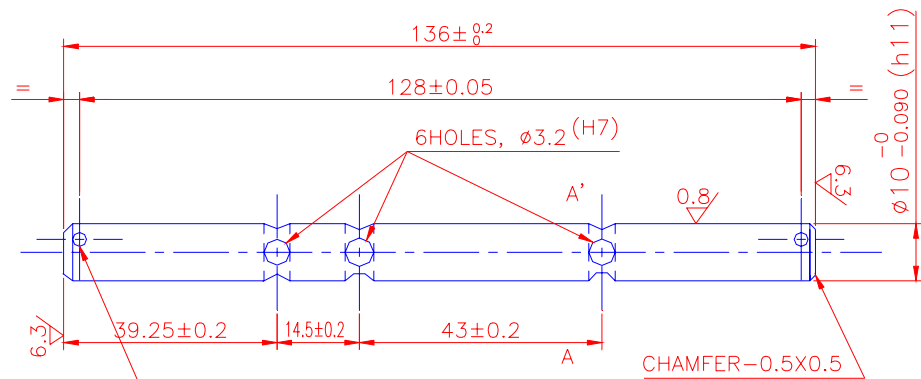


NOTES:-

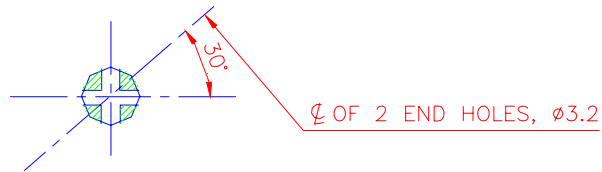
- THIS IS TO BE CADMIUM PLATED GENERALLY TO IS:1572' 68-CL.NO. cd8.
- $\frac{12.5}{\sqrt{\quad}}$ ALL OVER EXCEPT WHERE NOT SHOWN.
- MATERIAL :- STEEL TO IS:2073/1962, FINISH-BRIGHT (COLD DRAWN)
TYPE-C40 OR EQUIVALENT [U.T.S.=58 Kg/MM² -(MIN)]

1	SPRING DRUM	18	SEE-NOTE-3	
ITEM NO.	DESCRIPTION	QTY.	MATL/SPECN	REMARKS
REF:-	CLW DRG. NO. 4TW.092-194 ALT.3	SCALE:- NTS	APPROVED BY: <i>Rajiv Kumar</i>	FOR DG
TRACTION MOTOR TAO-659				
SPRING DRUM				
R.D.S.O.		SKEL - 4494		

Dt.	7.1.99
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2 HOLES, $\phi 3$ SPLIT COTTER PIN SIZE- $\phi 3 \times 20$ L (RDSO DRG.NO.SKEL-4496 Ref-I)
TO BE DRILLED WITH JIG FOR OBTAINING PROPER FITTING WITH B.H.BODY
TO CLW's DRG.NO.2TWD.092.62 ALT-10



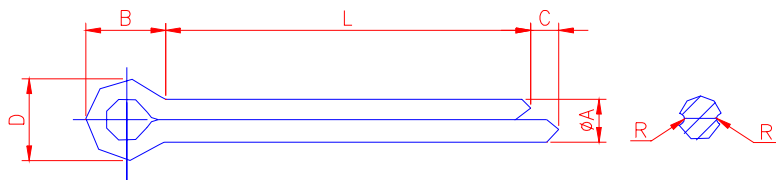
SECTION-"A-A"

NOTE :-

- MATERIAL-STAINLESS STEEL TO AISI-303 OR BS:970'55 EN 58B OR BS:970' 70-Gr 303521.
- TOLERANCE OF HOLES $\phi 3.2$ FROM THE EXACT LOCATION = ± 0.1

1	AXLE	6	SEE-NOTE	
ITEM NO.	DESCRIPTION	QTY.	MATL/SPECN	REMARKS
REF:-	CLW DRG. NO. 4TWD.092.037 ALT2	SCALE:- NTS	APPROVED BY:- <i>Rajeev Kumar</i>	FOR DG
TRACTION MOTOR TAO-659 AXLE (FOR BRUSH HOLDER)				
R.D.S.O. ELEC. DTE.			SK.EL-4495	

Dt.	7.1.99
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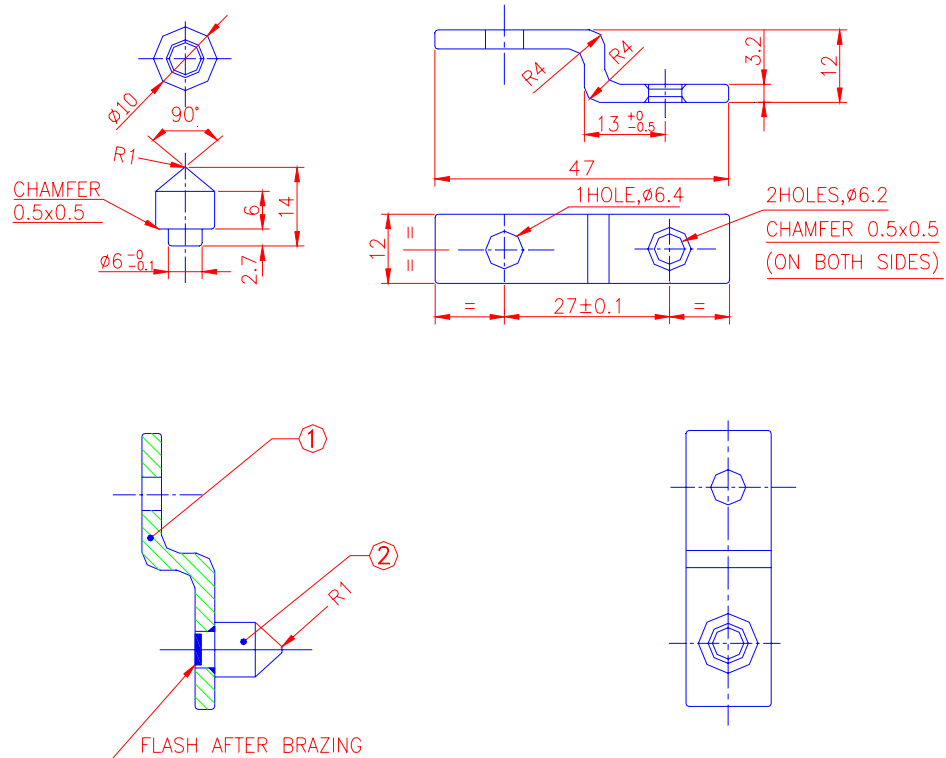
REF.	NOM. DIA OF PIN & HOLE	A		C	B	D		R	L
		MAX.	MIN.			MAX.	MIN.		
1	3	2.70	2.56	4	6.3	6.3	5.6	0.2	25 ± 1.05
2	3.2	2.70	2.56	4	6.3	6.3	5.6	0.2	36 ± 1.25

NOTE:-

Zn/Cd PLATED AND PASSIVATED

2	SPLIT COTTER PIN 3.2x32	18	STEEL-IS:549-1961	
1	SPLIT COTTER PIN 3.2x20	18	STEEL-IS:549-1961	
ITEM No.	DESCRIPTION	QTY	MATL./SPECN.	REMARKS
REF. CLWD RG NO.4TWD.092.202 ALT.-1		SCALE NTS.	APPD. BY <i>Rajiv Kumar</i> (FOR DG.)	
<p style="text-align: center;">TRACTION MOTOR TAO-659 SPLIT COTTER PIN</p>				
R.D.S.O.ELEC. DTE.			SKEL-4496	

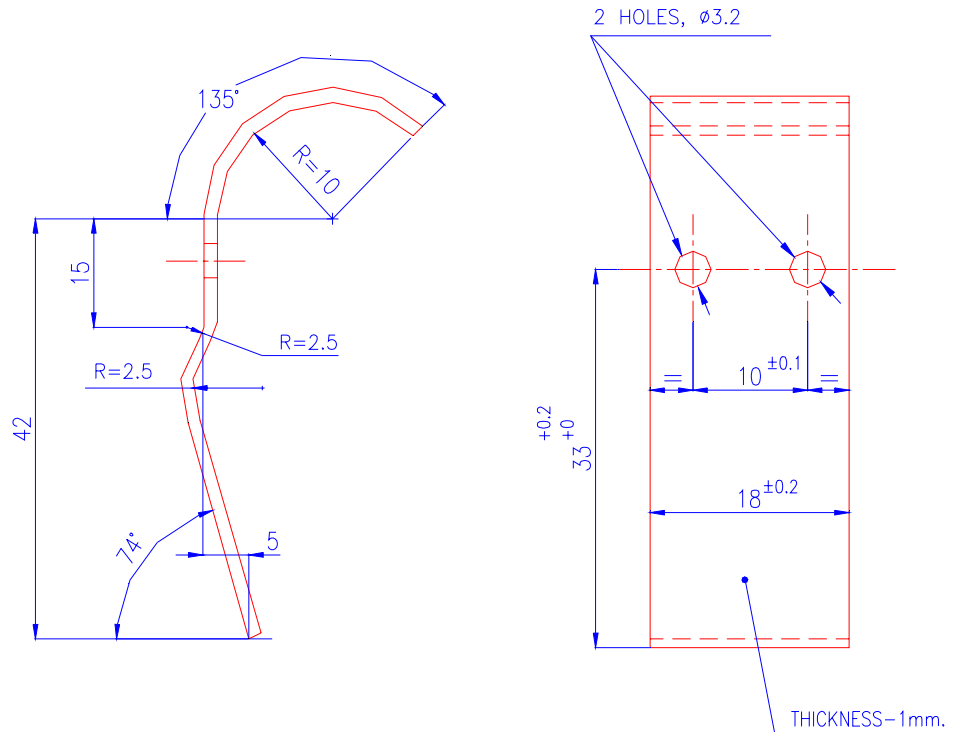
Dt.	7.1.99
D	S.KUMAR
C	
FILE	



NOTE:-

THIS IS TO BE CADMIUM/ZINC PLATED AND PASSIVATED.

2	SPARKING TIP	6	IS:2062-1962	
1	FIXING BRACKET	6	STEEL STRIP TO IS:1079.1998,GR.ST.42	
ITEM No.	DESCRIPTION	QTY	MATL./SPECN.	Remarks-
REF.	CLWDRG NO.4TWD.092.385.	SCALE NTS.	APPD. BY <i>Raj Kumar</i>	(FOR DG.)
TRACTION MOTOR TAO-659 FIXING BRACKET (FOR B.H.BODY)				
R.D.S.O.ELEC. DTE.			SKEL-4497	

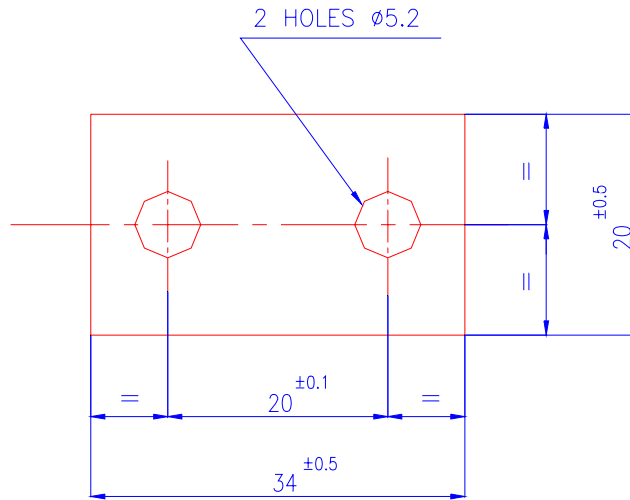


NOTES:-

1. MATERIAL-SPRING STEEL TO B.S.970'72 Gr. 070 A 78 OR EQUIVALENT, SUITABLY TREATED.
2. DEVELOPED LENGTH = 70 (APPROX).
3. HARDENING TEMPERATURE = 800°C. QUENCHING MEDIUM-OIL
TEMPERING TEMPERATURE = 350°C.
4. THIS SHOULD BE CADMIUM PLATED GENERALLY
TO IS:1572'68 - CL. NO. Cd8.

1	LIFTING HOOK	18	SEE-NOTE	
ITEM NO	DESCRIPTION	QTY.	MATL/SPECN	REMARKS
REF:-	CLW DRG NO 4TWD.092.240ALT.1	SCALE:- NTS	APPROVED BY:- <i>Rajiv Kumar</i> 15.1.99	
<p align="center">TRACTION MOTOR TAO-659 LIFTING HOOK (B.H.FINGER ASSEMBLY)</p>				
R.D.S.O. ELEC. DTE			SK.EL-4499	

Dt.	7.1.99
D	S.KUMAR
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FILE	



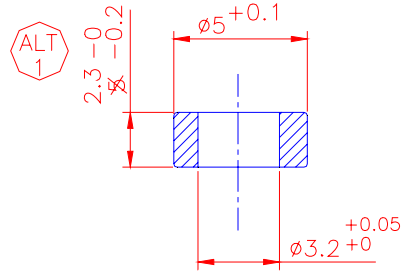
NOTES:-

1. THICKNESS OF THE PLATE=0.4mm.
2. MATERIAL-MICANITE, STABILISED, MICA CONTENT-90%
3. BREAK-DOWN VOLTAGE (MIN)=8KV/mm, AVERAGE=12KV/mm.
4. ALL DIMENSIONS ARE IN mm.

1	INSULATING PLATE	36	SEE-NOTE-2	
ITEM NO	DESCRIPTION	QTY.	MATL/SPECN	REMARKS
REF:-	CLW DRG NO.4TWD. 092.268 ALT-3	SCALE:- NTS	APPROVED BY:- <i>Rajeev Kumar</i> FOR D.G.	
<p style="text-align: center;">TRACTION MOTOR TAO-659 INSULATING PLATE (B.H.FINGER ASSEMBLY)</p>				
R.D.S.O. ELEC. DTE			SKEL-4500	

Dt.	7.1.99
D	S.KUMAR
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ALT. NO.	DESCRIPTION	DATE	SIGNATURE
1	DIMENSIONS ALTERED	26.4.99	<i>Rajiv Kumar</i> 26.4.99



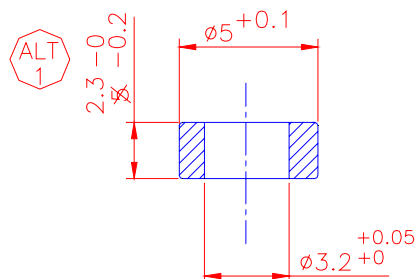
NOTES:-

1. MATERIAL-EXTRUDED TEFLON TUBE (P.T.F.E.)
2. CHARACTERISTICS OF THE TUBE:-
 - a) TENSILE STRENGTH = 200 KG/cm²
 - b) PROOF TEST VOLTAGE = 30 KV/mm (50 C/S FOR 1 MIN)
 - c) % ELONGATION = 2.5 TO 3.5
 - c) DENSITY = 2.14 TO 2.19 gms/cm³
 - e) IT SHOULD BE CAPABLE OF CONTINUOUS SERVICE AT 250°C

1	INSULATING TUBE	36	SEE NOTE 1	
ITEM NO.	DESCRIPTION	QTY	MATL/SPECN.	REMARK
REF:-	CLW DRG NO.4TWD.092 280 Alt-2	SCALE:- NTS	APPROVED BY:- <i>Rajiv Kumar</i> FOR DG	
<p style="text-align: center;">TRACTION MOTOR TAO-659 INSULATING TUBE (B.H. FINGER ASSEMBLY)</p>				
RDSO. ELEC. DTE			SKEL-4502	

Dt.	
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ALT. NO.	DESCRIPTION	DATE	SIGNATURE
1	DIMENSIONS ALTERED	26.4.99	<i>Rajeev Kumar</i> 26.4.99

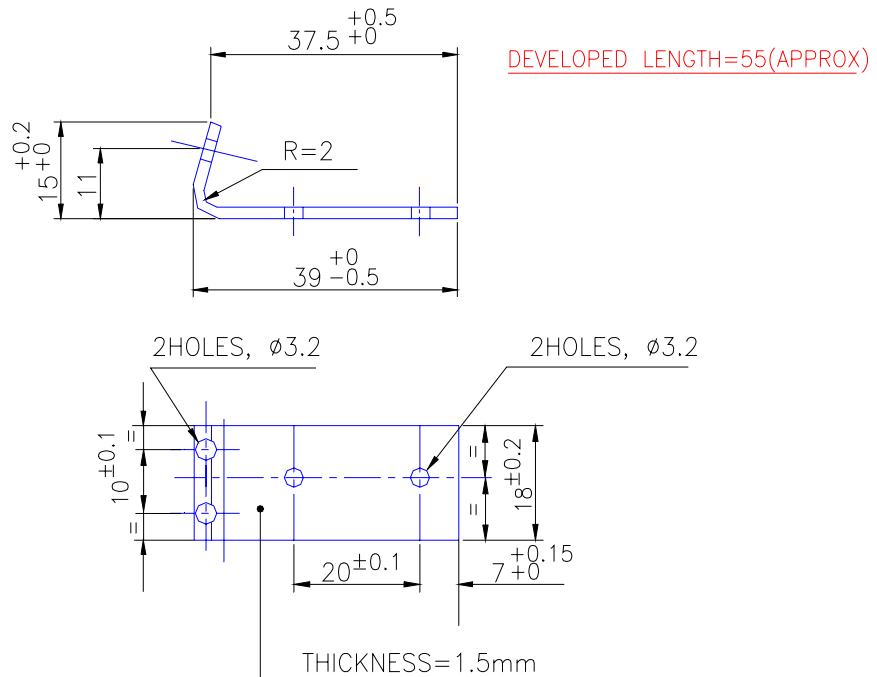


NOTES:-

1. MATERIAL-EXTRUDED TEFLON TUBE (P.T.F.E.)
2. CHARATERISTICS OF THE TUBE:-
 - a) TENSILE STRENGTH = 200 KG/cm²
 - b) PROOF TEST VOLTAGE = 30 KV/mm (50 C/S FOR 1 MIN)
 - c) % ELONGATION = 2.5 TO 3.5
 - c) DENSITY = 2.14 TO 2.19 gms/cm³
 - e) IT SHOULD BE CAPABLE OF CONTINUOUS SERVICE AT 250°C

1	INSULATING TUBE	36	SEE NOTTE 1	
ITEM NO.	DESCRIPTION	QTY	MATL/SPECN.	REMARK
REF:-	CLW DRG NO.4TWD.092 280 Alt-2	SCALE:- NTS	APPROVED BY:- <i>Rajeev Kumar</i> FOR DG	
<p style="text-align: center;">TRACTION MOTOR TAO-659 INSULATING TUBE (B.H. FINGER ASSEMBLY)</p>				
RDSO. ELEC. DTE			SKEL-4502	

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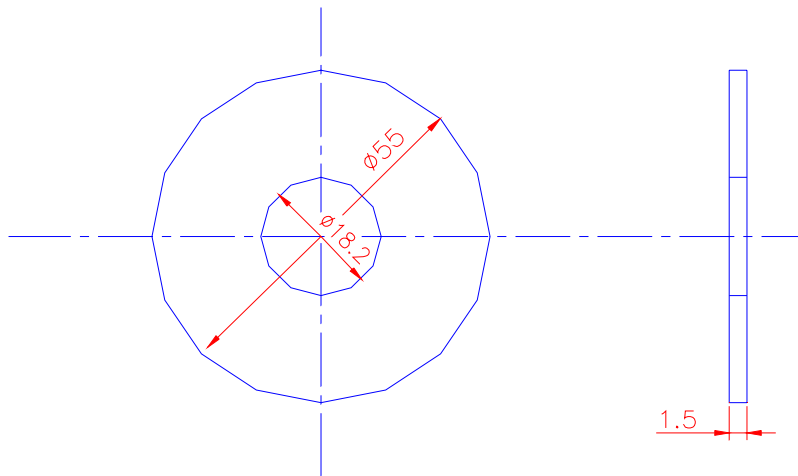


NOTES :-

1. THIS IS TO BE CADMIUM PLATED GENERALLY TO IS:1572'68 CL.NO. cd8 AND PASSIVATED.
2. MATERIAL:-SPRING STEEL TO B.S.S.970'72.GR.070 A78. OR EQUIVALENT, SUITABLY HEAT TREATED.
3. EXPECTED MECHANICAL PROPERTIES :-
U.T.S. $\geq 100 \text{ KG/mm}^2$, ELONGATION=10% (MIN.)
HARDENING TEMP.800°C, QUENCHING MEDIUM-OIL,
TEMPERING TEMP.=350°C

1	SPRING LEVER	18	SEE-NOTE-2	
ITEM. No.	DESCRIPTION	QTY	MATL./SPECN.	REMARKS
REF.	CLW DRG.NO. 4TWD.092.242 ALT.1	SCALE : NTS	APPD. BY <i>Rajiv Kumar</i>	FOR DG
TRACTION MOTOR TAO-659				
SPRING LEVER				
(B.H. FINGER ASSEMBLY)				
R.D.S.O.ELEC.DTE			SKEL-4503	

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NOTE:-

MATERIAL-STAINLESS STEEL AS PER
IS: 6911'72. GRADE 04 Cr 18 NI 10

	2		MATL: CHANGED AS PER NOTE		11.12.2K
	1		MATL: CHD. TO PTFE (BS:6564 Pt. 2'91)		28.8.2K
STATUS	ALT.	REF.No.	DESCRIPTION	APPD.BY	DATE

1	WASHER	36	SEE NOTE	
ITEM NO.	DESCRIPTION	QTY	MATL/SPECN.	REMARK

REF:-

SCALE:- NTS

APPROVED

Rajeev Kumar
FOR DG

TRACTION MOTOR TYPE TAO-659
WASHER
(FOR B.H.ASSEMBLY)

RDSO. ELEC. DTE

SKEL-4506

Dt.	
D	
T	
C	

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RESEARCH DESIGNS & STANDARDS ORGANISATION
Manak Nagar, Lucknow-226011
FAX (0522) - 450374
Dated 15.5.2000

SN 2526

No. EL/3.2.5

(Distribution as per enclosed list.)

AMENDMENT NO. 1

Sub: Amendment to RDSO's Modification Sheet No.RDSO/
ELRS/MS/WAM4/0216 of Feb.'99 for adoption of
Modified brush holder assembly on traction motor type
TAO-659.

Ref: RDSO Modification Sheet No. RDSO/ELRS/MS/WAM4/0216
dated 5.2.99.

The few drawings of the RDSO's modification sheet under reference above have
been modified as follows:

1. Clause 3 – Work to be carried out, Page No. 2, 2nd line : Read SKEL 4505 Alt. 1 in
place of SKEL 4505.
2. Clause 5 – Material required, Page No. 2 & 3 :

Follow the following modified drawings:

RDSO's Modified Drawing

- Brush Holder Assembly.	SKEL 4505 Alt.1
- Brush Holder finger assembly	SKEL 4504 Alt.1
- Spring	SKEL 4498 Alt. 1
- Insulating tube	SKEL 4502 Alt. 1

However, there is no change in the rest drawings as mentioned in the above
referred modification sheet.

DA: Nil


(R K Kulshrestha)
for Director General (Elec)

63107

टेलीक्स/Telex : 0535-2424 RDSO-IN
फैक्स/Fax : 91-0522-458500
तार : 'रेलमानक' लखनऊ
Telegram : 'RAILMANAK', Lucknow
टेलीफोन/Tele : 450567 & 451200



भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ-226011
Government of India-Ministry of Railways
Research Designs & Standards Organisation
LUCKNOW-226011

No. EL/3.2.5

Dt. 22.02.2000

(Distribution as per enclosed list)

Amendment No.2

Sub: Amendment to RDSO's modification sheet No.RDSO/ELRS/MS/WAM4/0216 of Feb'99.
for adoption of modified brush holder assembly on traction-motor type TAO-659.

Ref: RDSO's modification sheet No.RDSO/ELRS/MS/WAM4/0216 dated: 5.2.99.

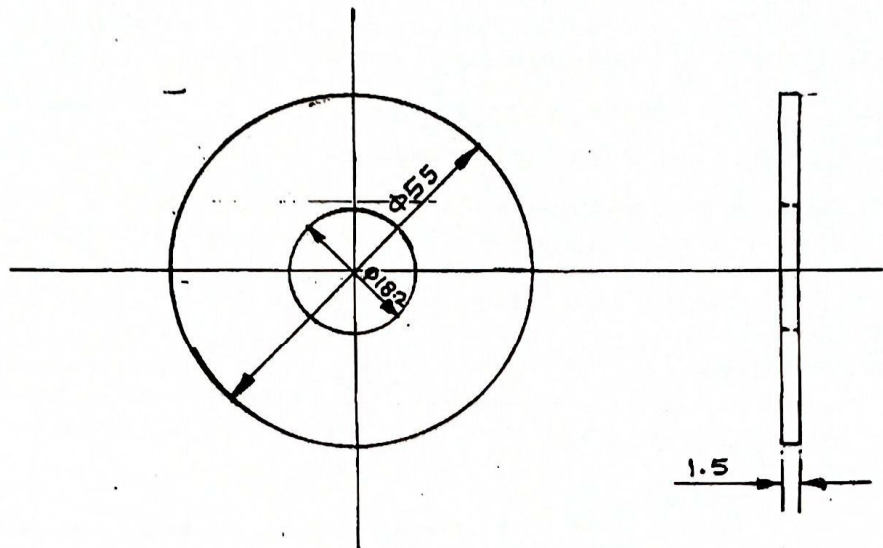
~~RDSO Drawing No. SKEL-4506 of above modification sheet has been modified~~
~~due to change in material from steel to PTFE to avoid flashovers. Railways are advised to~~
~~follow Drawing number SKEL-4506 Alt.-1 in place of existing Drg.No.SKEL-4506.~~

DA - RDSO's Drg.
No. SKEL 4506 Alt.-1


(R.K.Kulshrestha)
for Director General/Elect.

70616

	1		MATL. CHANGED : FROM SS (IS: 6911/72) TO PTFE (BS: 6564 PART-2: 817)	28/8/2000 28.0.2000
STATUS:	ALT.	REF. NO.	DESCRIPTION	APPD. BY. DATE



70617

1	WASHER	36	SS AS PER IS: 6911/72 Gr. 04 Cr 18 Ni 0	
ITEM NO.	DESCRIPTION	QTY	MATL / SPECN.	REMARK
REF: HITACHI: DBG. NO. 10T 806.971 Rev B.		SCALE: NTS	APPROVED	FOR DBG
TRACTION MOTOR				
TAO-659				
WASHER				
(FOR B.H. ASSEMBLY)				
RDSO. ELEC. DTE			SKEL--450641	

टेलीफोन/Fax : 91-0522-458500
टेलीग्राफ : 'रेलमानक' लखनऊ
टेलीफोन/Tele : 451200 (PBX)
450567 (DID)



भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226011
Government of India-Ministry of Railways
Research Design & Standards Organisation
Lucknow - 226011



SN 3138/1

EL/3.2.5

Dated : 12.12.2000

Distribution as per enclosed list

Amendment No.3

Sub : Amendment to RDSO's modification sheet
No.RDSO/ELRS/MS/WAM4/0216 of Feb'99.

Feb : RDSO's Modification Sheet No.RDSO/ELRS/MS/WAM4/0216,
dated 5.2.99.

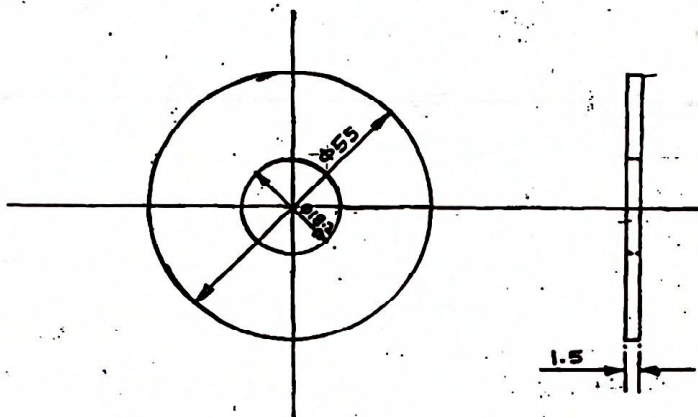
Railways are hereby advised that Amendment No.2 of above modification sheet
issued earlier vide this office letter of even number dated 30.9.2000 is withdrawn.

Railways are also advised to follow RDSO Drawing No.SKEL-4506 Alt.2 (Copy
enclosed) in place of SKEL-4506 Alt.1, for washer of brush holder assembly of Traction-Motor
type TAO-659.

DA:RDSO's Drg.No.SKEL 4506, Alt.2

(R K Kulshrestha)
for Director General/Electrical.

70323



NOTE:-

- MATERIAL - Stainless Steel
as per IS: 6911'72. Grade
04Cr18Ni10.

Qc.	
D.	
C.	
FILE	EL/3-35

2.	MATL CHANGED: (AS PER NOTE)	Qc.	
1.	MATL CHD. TO PTFE (AS: 6564 R. 2.91)	Qc.	
STATUS	ALT.	REF. No.	DESCRIPTION
			APPRO. DATE

1	WASHER		36	SEE NOTE
2	PART No.	DESCRIPTION	DETAIL L. No.	Mo/No
REF.		SCALE: NTS	APPRO. BY	DATE
TRACTION MOTOR TYPE TA0-659				FIRST ISSUED
WASHER (FOR B.H. ASSEMBLY)				SUPERSEDES
R.D.S.O. ELEC. DTE.			SKEL 4506	SUPERSEDED By

Telex : 0535 - 2424 RDSO -IN
Fax : 91-0522-450374
Telephone : 450374 & 451200
Telegram : 'RAILMANAK', Lucknow
e-mail : dell3@rdsol.railnet.gov.in



भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226011
Government of India - Ministry of
Railways
Research, Designs & Standards
Organization, LUCKNOW - 226011

Dated 01.7.2003

No.EL/3.2.100

Distribution as per enclosed list

Amendment No. 5


Sub: Amendment to RDSO's Modification Sheet No. **RDSO/
ELRS/MS/WAM4/0216 of Feb., 99** regarding Brush
Holder assembly on Traction Motor type TAO 659.

1. Above modification was issued to change brush spring material from spring steel for TAO-659 TM on lines of Hitachi Traction Motors type HS 15250A. However, based on feedback from Central Railway and approval of RDSO, CLW vide letter No.EL/TM/4106 dated 05.12.2002 have deleted alternate spring material to IS 6911/72 Gr 10 Cr 17 Ni 7 from Drg./Specification of Hitachi TM and retained only OEM specified material. This amendment is issued to incorporate similar alteration in respect of brush springs of TAO-659 TMs.
2. Brush holder assembly manufacturers have approached RDSO and proposed to use stainless steel material as per IS 6911 '92 Grade 304S2 for items of finger, lifting hook, spring lever and washer of assembly. Matter has been examined and it has been decided to allow use of above material as alternative material for these items, i.e. finger, lifting hook, spring lever and washer.
3. In view of the above, following drawings mentioned in Clause 5 of RDSO's Modification Sheet mentioned above have been modified as under -

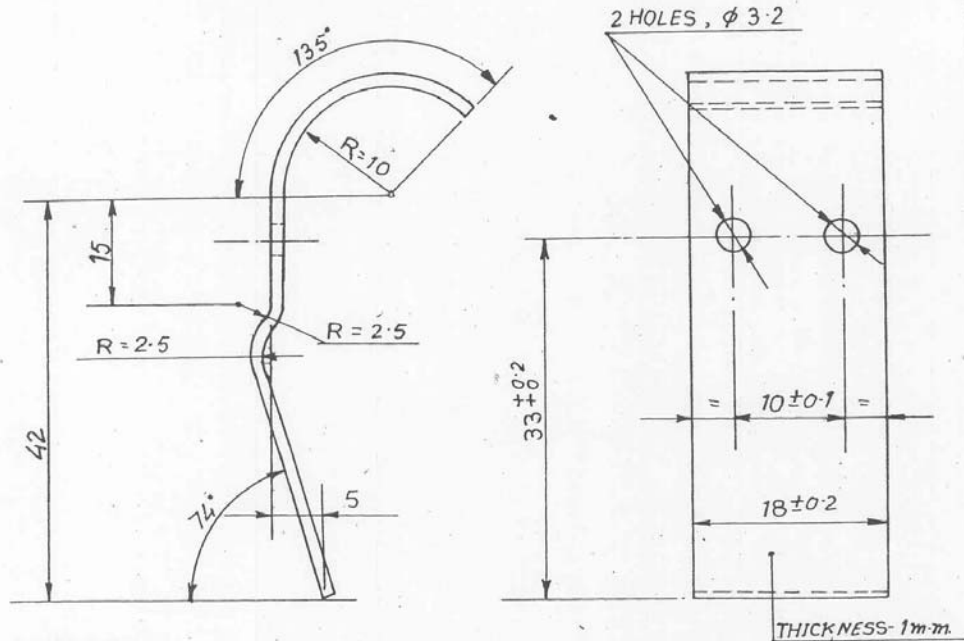
S. No.	Description	RDSO's Modified Drawing Nos.
1.	Spring	SKEL-4498 Alt.2
2.	Lifting hook	SKEL-4499 Alt.1
3.	Finger	SKEL-4501 Alt.1
4.	Spring Lever	SKEL-4503 Alt.1
5.	Brush Holder Finger Assembly	SKEL-4504 Alt.3
6.	Brush Holder Assembly	SKEL-4505 Alt.3
7.	Washer	SKEL-4506 Alt.3

One copy each of the above-modified drawings are enclosed herewith for your ready reference and necessary action.

Encl: RDSO's Drgs. No. SKEL-4498 Alt.2,
4499Alt. 1, 4501 Alt. 1, 4503 Alt. 1,
4504Alt.3, 4505 Alt. 3 & 4506 Alt. 3
(Total 7 nos.)


(M K Singhal)
for Director General (Elec.)

ALT.	DESCRIPTION	DATE	SIGNATURE
1.	ALTERNATE MATL. STAINLESS STEEL MENTIONED.	24.06.03	<i>[Signature]</i>



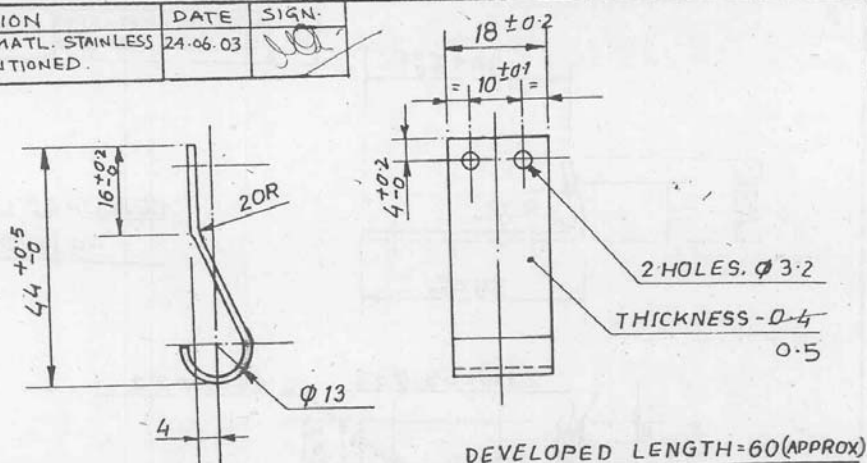
NOTES:-

1. MATERIAL-SPRING STEEL TO B.S.970'72 Gr.070 A 78 OR EQUIVALENT, SUITABLY TREATED.
2. DEVELOPED LENGTH = 70 (APPROX.)
3. HARDENING TEMPERATURE = 800°C, QUENCHING MEDIUM-OIL TEMPERING TEMPERATURE = 350°C.
4. THIS SHOULD BE CADMIUM PLATED GENERALLY TO IS: 1572'68- CL. NO. Cd8.
5. ALTERNATE MATERIAL - STAINLESS STEEL TO IS 6911: 1992 Grade 304 S2 (Gr 02 Cr 19 Ni 10).

1	LIFTING HOOK	18	SEE-NOTE	
ITEM-NO.	DESCRIPTION	QTY.	MATL./SPECN	REMARKS
REF: CLW DRG NO. 4TWD.092.240ALT1	SCALE: NTS	APPROVED <i>[Signature]</i>	FOR DG	15.1.99
TRACTION MOTOR TAO-659				
LIFTING HOOK				
(B.H.FINGER ASSEMBLY)				
R.D.S.O. ELEC. DTE. SKEL- 4499				

Dr.	7.1.99
DES.	S.KUMAR
CHD.	<i>[Signature]</i>
FILE	

ALT.	DESCRIPTION	DATE	SIGN.
1.	ALTERNATE MATL. STAINLESS STEEL MENTIONED.	24.06.03	<i>[Signature]</i>



NOTES:-

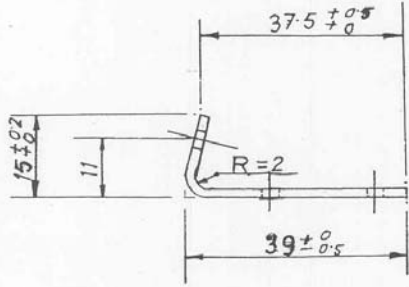
- MATL. = SPRING STEEL TO BS 970 '72, Gr. 735 A 50 OR EQUIVALENT SUITABLY HEAT TREATED.
- HARDENING TEMP. = 830°C.
QUENCHING MEDIUM - OIL, TEMPERING TEMP. = 520°C.
TENSILE STRENGTH = 140 KG./mm² AND ELONGATION = 10%.
- THICKNESS = 0.5 mm.
- CHARACTERISTICS AFTER TREATMENT:-
ROCKWELL HARDNESS NO. (DIAMOND CONE UNDER 150 KG.) FROM 41 TO 45.
- THIS SHOULD BE CADMIUM PLATED GENERALLY TO IS: 1572 '68 - CL. NO. Cd 8 AND PASSIVATED AFTER MACHINING.
- ALTERNATE MATERIAL - STAINLESS STEEL TO IS: 6911: 1992 GRADE 304 S2 (Gr 02 Cr 19 Ni 10).

Dt	7.1.99
DRN	S. KUMAR
CHD	<i>[Signature]</i>
FILE	

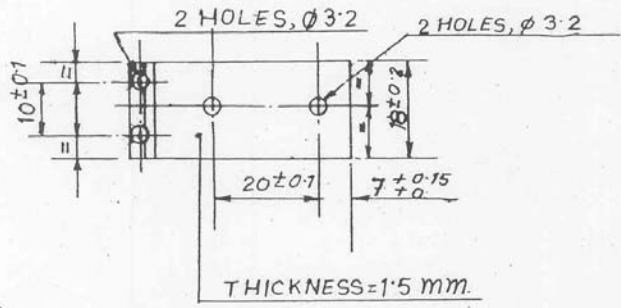
1	FINGER	18	SEE-NOTE	
ITEM. NO.	DESCRIPTION	QTY.	MATL. / SPECN.	REMARKS.
REF: CLW DRG. NO. 4TWD.092.235 ALT.1	SCALE: NTS	APPROVE	<i>[Signature]</i> Kuman	FOR D.G.
TRACTION MOTOR TAO-659				
FINGER				
(B.H. FINGER ASSEMBLY)				
R.D.S.O-ELEC. DTE. SKEL- 4501				

8

ALT.	DESCRIPTION	DATE	SIGN.
1.	ALTERNATE MATL. STAINLESS STEEL MENTIONED	24.06.03	JAL



DEVELOPED LENGTH
= 55 (APPROX).

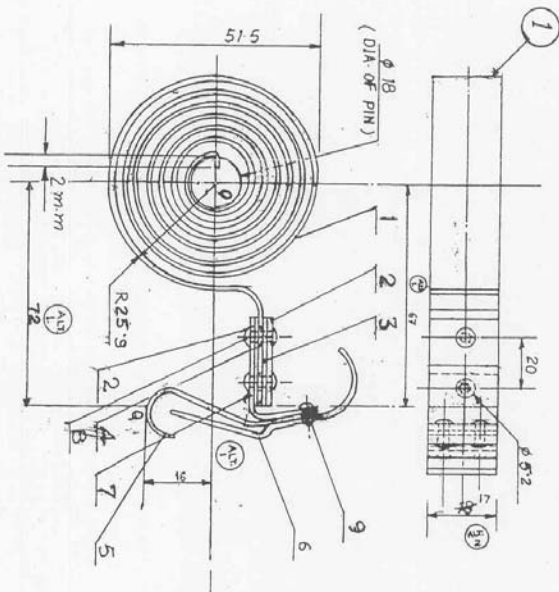


NOTES:-

1. THIS IS TO BE CADMIUM PLATED GENERALLY TO IS: 1572 '68 CL. NO. cd 8 AND PASSIVATED.
2. MATERIAL:- SPRING STEEL TO B.S.S. 970 '72 GR. 070 A 78. OR EQUIVALENT, SUITABLY HEAT TREATED.
3. EXPECTED MECHANICAL PROPERTIES:-
U.T.S. $\geq 100 \text{ KG./mm}^2$, ELONGATION = 10% (MIN.)
HARDENING TEMP. 800°C , QUENCHING MEDIUM - OIL,
TEMPERING TEMP. = 350°C
4. ALTERNATE MATERIAL - STAINLESS STEEL TO IS 6911: 1992 GRADE 304 S2 (G1 02 Cr 19 Ni 10)

DL	
DRN	
CHB	
FILE	

1	SPRING LEVER	18	SEE NOTE-2	
ITEM NO.	DESCRIPTION	QTY	MATL. / SPECN	REMARKS
REF:-	CLW DRG. No. 4TWD. 092. 242 Alt-1	SCALE ~ NTS	APPROVED	Ray Kumar FOR DG
TRACTION MOTOR TAO-659				
SPRING LEVER				
(B.H. FINGER ASSEMBLY)				
R.D.S.O. ELEC. DTE. SKEL-4503				



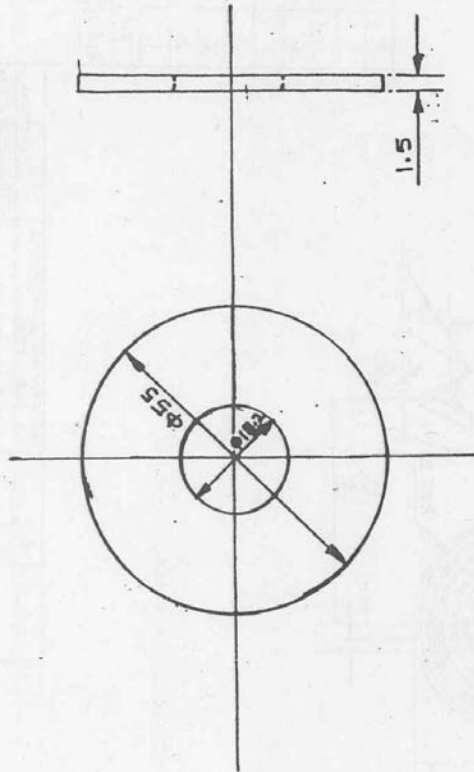
- NOTE:-
1. THE ASSEMBLY SHOULD BE ABLE TO WITHSTAND A TEST OF 500 VOLTS APPLIED BETWEEN BRUSH SPRING (ITEM.1) AND SPRING LEVER (ITEM.7).
 2. THE PRESSURE DROP FROM NEW TO THE CONDEMNING SIZE OF CARBON BRUSH IS THE DEFLECTION OF 23 mm. SHOULD NOT BE MORE THAN 300 gm. AT A P REPEATED FULL MOVEMENT LIMITED BY LIFTING HOOK (ITEM.6) NOR SHALL IT CRACK.

3	ALTERATION INCORPORATED	APPROVED BY	DATE
2	IN PART DRG.		
1	DIMENSION CHANGED		
	FINISH VIEW ALTERED & SIMENS- ION BOARD		
	STATUS	ALT	REF NO

ITEM	DESCRIPTION	QTY/TM	UNIT	SPEC	REMARKS
9	RIVET, SIZE $\phi 3 \times 6L$	36 NOS			
8	RIVET, SIZE $\phi 3 \times 12L$	36 NOS			
7	SPRING LEVER	18 NOS		SKEL-4503	ALT-1
6	LIFTING HOOK	18 NOS		SKEL-4459	ALT-1
5	FINGER	18 NOS		SKEL-4501	ALT-1
4	INSULATING TUBE	36 NOS		SKEL-4502	
3	INSULATING PLATE	36 NOS		SKEL-4500	
2	PLATE	18 NOS			
1	BRUSH SPRING	18 NOS		SKEL-4498	ALT-1

BRUSH HOLDER FINGER ASSEMBLY

R.D.S.O. ELEC-DTE. SKEL-4504



NOTE:-

1. ~~MATERIAL = Stainless Steel~~
- ~~at pgs 18: 6811722 - Grade~~
- ~~04 Cr 10 Ni 10.~~

ALT 3

~~REPROVED MATERIAL -~~

STAINLESS STEEL TO IS 6911:
1992 GRADE 304 S2 (GY 02
Cr 19 Ni 10).

3.	GRADE OF MATL (STAINLESS)	24
	STEEL ALTERED	5K
2.	MATL CHANGED	13
	AS PER NOTE	13
1.	MATL: CHD. TO PTFE	5
	(BS: 6564 R: 2.91)	5
STATUS	ALT.	REF. NO.

DESCRIPTION	APPD. DATE

DESCRIPTION	APPD. DATE

REF.	SCALE: NTS	APPD. DATE

WASHER	36	SEE NO.

DESCRIPTION	DETAIL NO.	MATL.	SPEC.

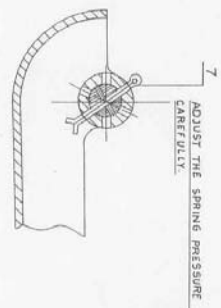
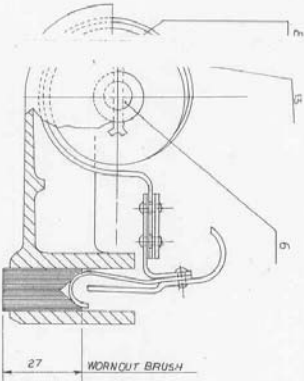
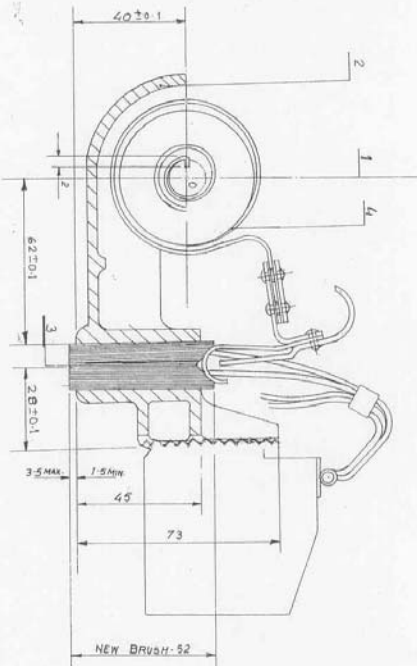
TRACTION MOTOR TYPE TAO-659

WASHER
(FOR B.H. ASSEMBLY)

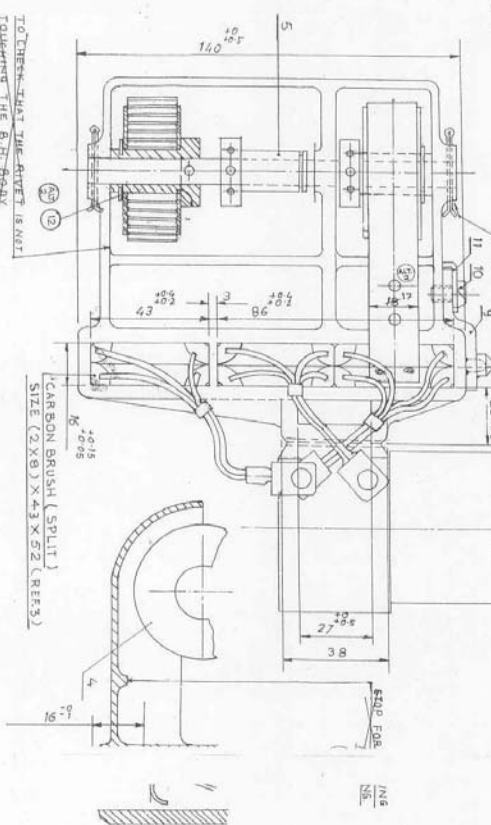
R.D.S.O. ELEC. DTE. SKEL-4506
8y.

FIRST ISSUED
SUPERSEDES
SUPERSEDED

FILED/13.5



DRILL AND BURN 3 HOLES FOR 3mm DIA. SPLIT SPRING REF. 6 WITH STAINLESS STEEL AXLE REF. 6 IN POSITION



ADJUSTMENT OF SPRINGS
EFFORT ON NEW BRUSH - 2.6 KG ± 5%, PRESSURE = 0.350 KG/CM²
EFFORT ON WORN OUT BRUSH - 1.4 KG ± 5%, PRESSURE = 0.320 KG/CM²
HEIGHT OF WORN OUT BRUSH = 27mm

NOTE:
1 AFTER MOUNTING THE SPRING ASSEMBLY, CHECK THAT THE FINGER IS NOT TOUCHING THE BRUSH HOLDER BODY, BE SURE THAT THE POSITIONS OF THE PIG - TAILS FOR CARBON BRUSHES ARE AS PER DRAWING.
2 ALL DIMENSIONS ARE IN mm.

1.	PLATTER DELETED & 26-4-93	SKL-4505
2.	DRAWING ALTERED	28-5-2002
3.	ALTERATIONS INCORPORATED	24-06-03
IN PART BRG		

ITEM	DESCRIPTION	QTY/PM	MATL. /SPEC.
1.	BRUSH HOLDER FINGER ASSEMBLY	18	180004, IN, SPEC.
2.	B. H. BODY	18	180004, IN, SPEC.
3.	DUPLEX CARBON BRUSH - SPLIT	18	180004, IN, SPEC.
4.	WASHER	18	180004, IN, SPEC.
5.	SPRING BRUSH (CAB PLATED)	18	180004, IN, SPEC.
6.	AXLE	18	180004, IN, SPEC.
7.	SPLIT PIN (CAB PLATED)	18	180004, IN, SPEC.
8.	SPLIT PIN (ZINC/CAB PLATED)	18	180004, IN, SPEC.
9.	SPRINGING TIP ASBY (CAB PLATED)	18	180004, IN, SPEC.
10.	BRASS SCREW M6 X 8	18	180004, IN, SPEC.
11.	LOCKING PLATE	18	180004, IN, SPEC.
12.	E-TYPE EXTENSOL CIRCULAR	18	180004, IN, SPEC.

R.D.S.O. ELEC. DIE. BRUSH HOLDER ASSEMBLY SKEL - 4505