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Government of India - Ministry of Railways
Research Designs & Standards Organisation Lucknow - 226011

No. MW/BOBRN

Dated : 13.04.10

The General Manager (Mechanical.)

1. Northern Railway, Baroda House, New Delhi – 110 001.
2. Central Railway, Chhatrapati Shivaji Terminus, Mumbai – 400 001.
3. Eastern Railway, Fairlie place, Kolkata – 700 001.
4. Western Railway, Churchgate, Mumbai – 400 020.
5. Southern Railway, Park Town, Chennai – 600 003.
6. South Central Railway, Rail Nilayam, Secunderabad – 500 071.
7. South Eastern Railway, Garden Reach, Kolkata – 700 043.
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10. East Central Railway, Hajipur – 844 101.
11. North Central Railway, Allahabad – 211 001
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15. West Central Railway, Jabalpur – 482 001.
16. South East Central Railway, Bilaspur – 495 004.

Sub: Adjustment procedure for "Door Operating mechanism" in BOBRN wagons

Ref: Clause no. 4, Agenda Item no. 2 of the Minutes of 6th WMG circulated vide RDSO letter no MW/WMG-6 dated 03.11.09

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The '**Adjustment procedure for "Door Operating mechanism" in BOBRN wagons'** , has been reviewed & made more user friendly.

The reviewed procedure is attached for wide circulation & implementation.

Encl: As above.

(देवाशीष त्रिपाठी)
कृते महानिदेशक (माल डिब्बा)

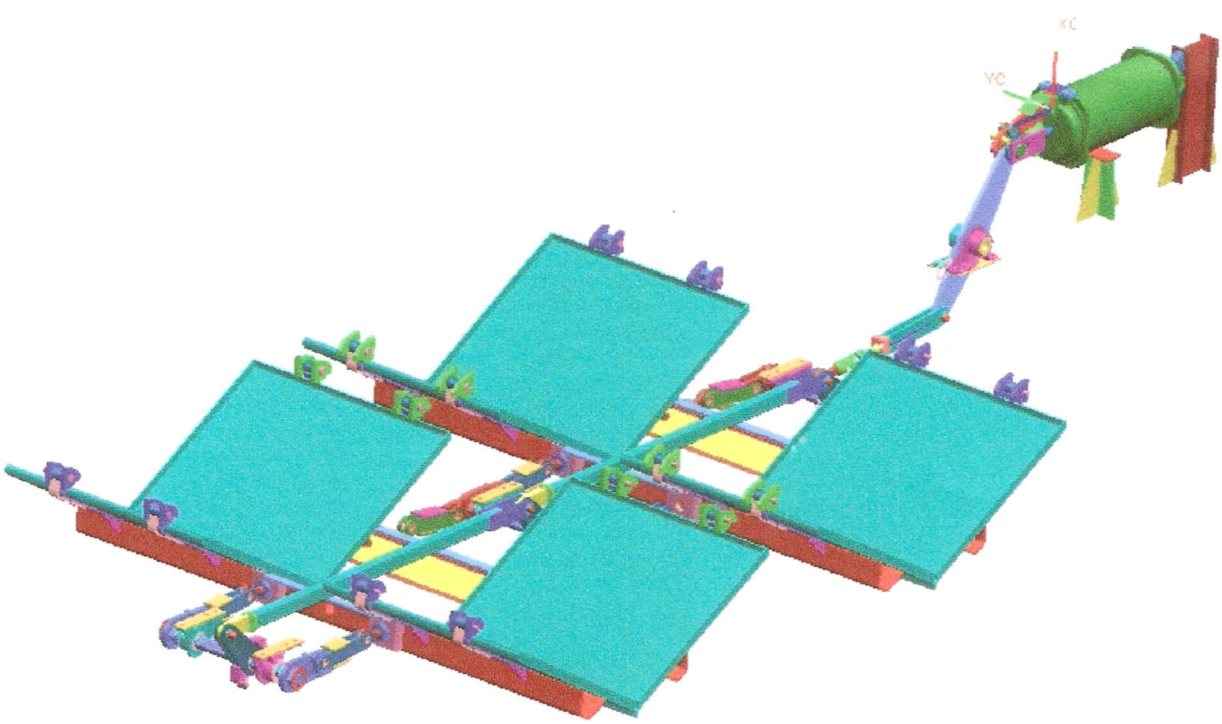
ADJUSTMENT PROCEDURE

FOR

DOOR OPERATING MECHANISM

IN

BOBRN WAGONS



ADJUSTMENT PROCEDURE FOR DOOR OPERATING MECHANISM FOR BOBRN WAGON

1. OPERATING INSTRUCTIONS FOR DOOR OPERATING SYSTEM

The door operating system can be segregated into two major areas:

a. The pneumatic system which includes the air cylinder, 4-way air valve, reservoir, air filter, valve sub-plate piping and other miscellaneous valves
b. The door operating mechanism includes linkages, connecting links, shafts, levers, etc.

2. ADJUSTMENT PROCEDURES

The door operating mechanism has three major areas that require regular inspection to determine if adjustment or repair is required. The three areas are

a. The door operating levers, along with the connecting links, which serve to open and close the doors and provide the primary locking means to hold the doors closed
b. The secondary lock which is located at the air cylinder which serves as a backup locking system
c. The doors which provide a means to retain the commodity in the wagon and prevent any leakage.

3. DOOR OPERATING LEVERS

a. With doors closed and secondary lock engaged observe door-operating levers.
b. Fig. 1a & 1b (Annexure-1) shows correct locking conditions for the end lever & the central lever. The condition is as under
    i. In the "end levers" there should be no gap between the lever face & the connecting link.
    ii. In the central levers i.e. lever between doors, it is permissible to have up to 5mm gap on one of the lever face & the connecting link, subject to the condition that there should be no gap between the other lever face & the connecting link.
c. Fig 2A & 2B (Annexure-2) show photographs of end lever & the central lever with correct adjustment. (The white paint strip may be put to indicate correct adjustment. Subsequently, if there is any misalignment in the white strip, it will indicate disturbed alignment & that readjustment is required. Annexure 3 shows some photographs where the alignment is disturbed)
d. If the alignment of the levers is not as per clause 3(b), then the following procedure has to be followed for adjustment:
    i. Doors must be fully closed & the air pressure supply must be 5-6 kg/cm^2 , before levers can be adjusted. (If air pressure supply is adequate & the doors are still not

fully closed, then it may then be necessary to back off door eyebolts to fully close the doors.)

ii. Begin adjustment at lever (requiring adjustment), which is closest to the air cylinder. To do this, the turnbuckle will have to be adjusted. First remove locking bolts of the turnbuckle. Then with doors closed note gaps at door operating levers so that an estimate can be made of the number of turns required (one complete turn of the turnbuckle moves pin centres 8mm). Rotate the turnbuckle in the direction that increases the pin centres. (However, if adjustment cannot be made because there is no adjustment remaining in the turnbuckle, it will be necessary to check location/dimension of components to determine if they are in correct positions. Correct as required.)

iii. When the adjustment is made, check door operating levers gap with the doors closed. Repeat this process until one or more levers have no gaps. (Turnbuckle locking bolts to be installed after checking secondary lock adjustment). (See Para 4)

iv. The remaining door operating levers, requiring adjustment, will be adjusted using the adjustable levers. For this, proceed in a sequence to the next lever requiring adjustment, until all are completed.

4. SECONDARY LOCK ADJUSTMENT

a. Ensure air supply pressure of 5-6 kg/cm^2.

b. If doors cannot be fully closed, (with levers over centre) and the cylinder is not fully retracted, it means that the doors are too tight. Door eyebolts must be backed off to allow mechanism to fully close the doors. (See Para 5)

c. Now with the doors fully closed, back off turnbuckle until cylinder is fully retracted.

d. Now proceed to secondary lock adjustment after completing the above i.e. the doors should be closed & the cylinder should be fully retracted.

e. If gap between operating lever lock lug and hook pin is not 6 mm to 10mm with air cylinder fully retracted under maximum 6 kg/cm^2 air pressure, adjust as follows (Fig. 3, Annexure 4)

   i. Note gap under air pressure (with doors closed)

   ii. Release air pressure and back off clevis lock nut. This will require first removing tack weld

   iii. If gap was less than 6mm, turn cylinder rod so that it advances into cylinder rod clevis. If gap was over 10 mm, rotate cylinder rod so that it moves away from cylinder clevis. (One turn of cylinder rod changes gap approximately 2 mm)

   iv. Recheck gap with air pressure applied and repeat adjustment until within tolerance. Be sure that cylinder is fully retracted and cylinder rod clevis pin is against "front of slot" when checking gap

   v. After adjustment is completed, securely tighten locknuts and tack weld to clevis (not to cylinder rod).

f. With air pressure removed, gap should be 0 to 2 mm. If it is 0, check to see that hook can be easily pried up. If hook is too tight or if gap is over 2 mm, turnbuckle must be adjusted. See fig. 4 (Annexure-5) for turnbuckle adjustment.

5. DOOR TIGHTNESS ADJUSTMENT

a. Check each door location to determine if doors are closed tight (See fig. 5, Annexure 6). (This is done by observing along the lips of doors to note if they contact one another) If they are not closed tight, adjust the appropriate eyebolt to bring door lips together as shown in Part A of fig. 5 (Annexure-6). Adjustment is made by bending the locking tabs away from the nut and locknut, and loosening the lock nut, until correct adjustment is obtained. Then the lock nut is tightened & locked.

b. After the above adjustment is complete, check air pressure requirements to determine if doors are too tight or too loose. This is done by inserting a pressure gauge into the system as close to the air cylinder as possible. (This can be done at the auxiliary train line at the "Y" end of the wagon or at the door operating mechanism reservoir drain)

   i. With the doors opened and the system drained, slowly build up air pressure up to 20 psi (1.41 kg/cm^2) . Now actuate air valve in the closing direction. Continue to slowly build up air pressure and note the pressure where the door operating levers snap over center. This pressure should be 55 psi (3.87 kg/cm^2) ± 5 psi (0.35 kg/cm^2).

   ii. If the pressure is higher than 55 psi (3.87 kg/cm2) or if the doors cannot be closed, then back off nuts and recheck pressure using the above procedure

   iii. If the pressure is lower than 55 psi (3.87 kg/cm2) , then tighten nuts and recheck.

   iv. After tightness adjustment is complete, tighten locknut nut and bend over locking tabs on nuts and lock nuts.

6. CHECKLIST FOR ADJUSTMENT OF DOOR OPERATING MECHANISM

SN	Cylinder	Secondary lock	Door operating levers	Remarks
1	Closed position no air pressure	Engaged (Gap – 0-2mm)	Over center as per fig. 1A &1B	Adjustment is correct
2	Fully retracted (* under air press)	Engaged (Gap – 6-10mm)	-do-	-do-
3	Closed position (*under air pressure) (without air pressure)	Engaged - Gap 6mm-10mm - Gap 0mm- 2mm	All not fully over-center.	Adjust turnbuckle followed by adjustable lever adjustment where required.
4	Closed position (* with or without air pressure)	Not engaged	Not over-center.	Adjust cylinder clevis first followed by adjustment of turnbuckle & adjustable lever.
5	Closed position (* with or without air pressure)	Not engaged	Fully over-center.	Cylinder clevis needs adjustment. Check turnbuckle fine adjustment for correct gap W/o air.
6	Not fully closed (*under air pressure)	Not engaged or engaged	Not over-center.	Doors too tight. After adjusting doors check secondary lock & cylinder. Adjust as required.

7	Not fully closed (*with or without air pressure)	Not engaged	Fully over-center.	Adjust (Shorten) turnbuckle followed by the checking secondary lock gap. Adjust as required.
8	Not fully closed (*with or without air pressure)	Engaged	Fully over-center.	Adjust (shorten) turnbuckle followed by the checking secondary lock gap. Adjust as required.

* Note: Air pressure should be a minimum $5kg/cm^2$

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ANNEXURE-1

CORRECT ADJUSTMENT POSITION

(WITH OVER CENTER CONDITION OF THE LEVER & LINK)

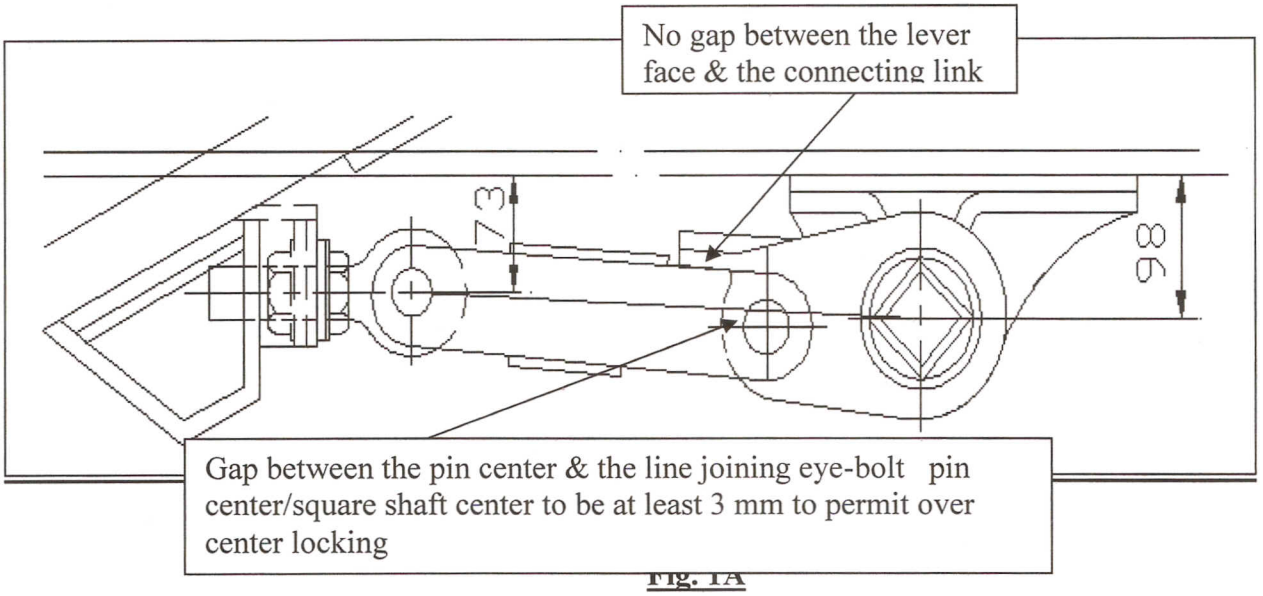


Fig. 1A

END LEVER

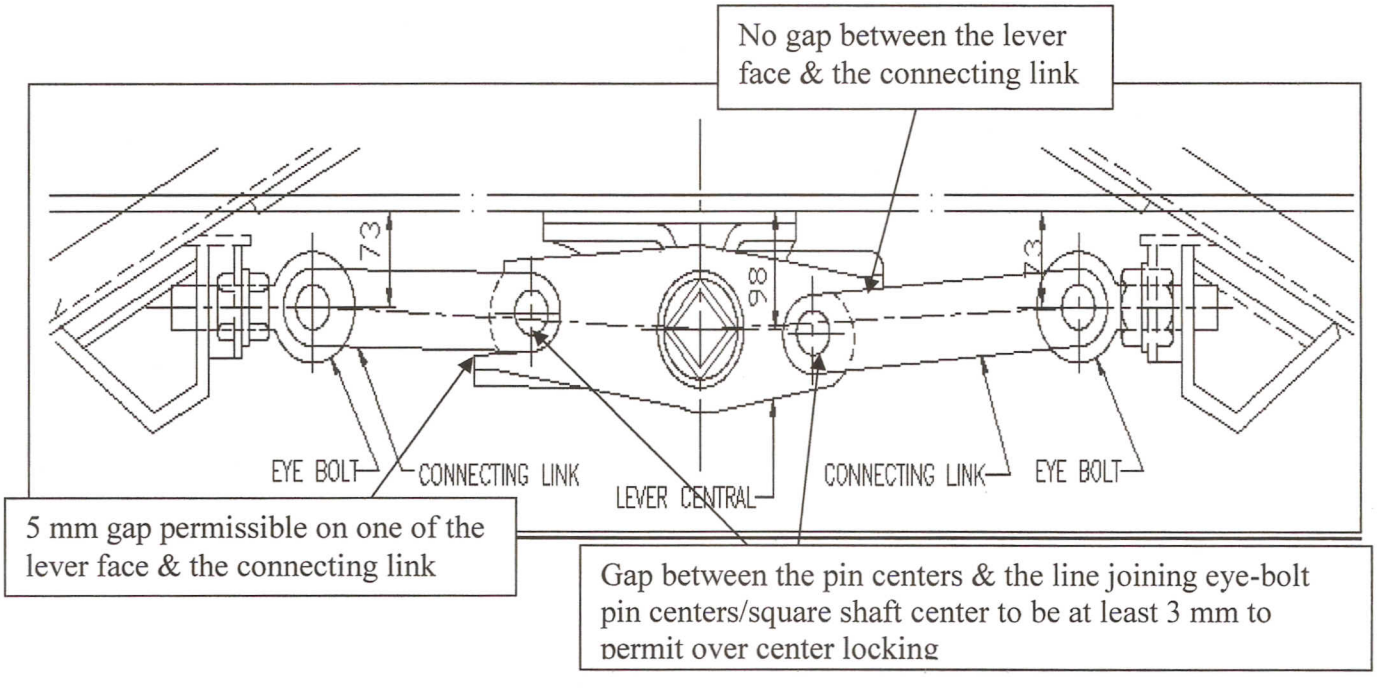


Fig. 1B

CENTRAL LEVER

ANNEXURE-2

CORRECT ADJUSTMENT POSITION

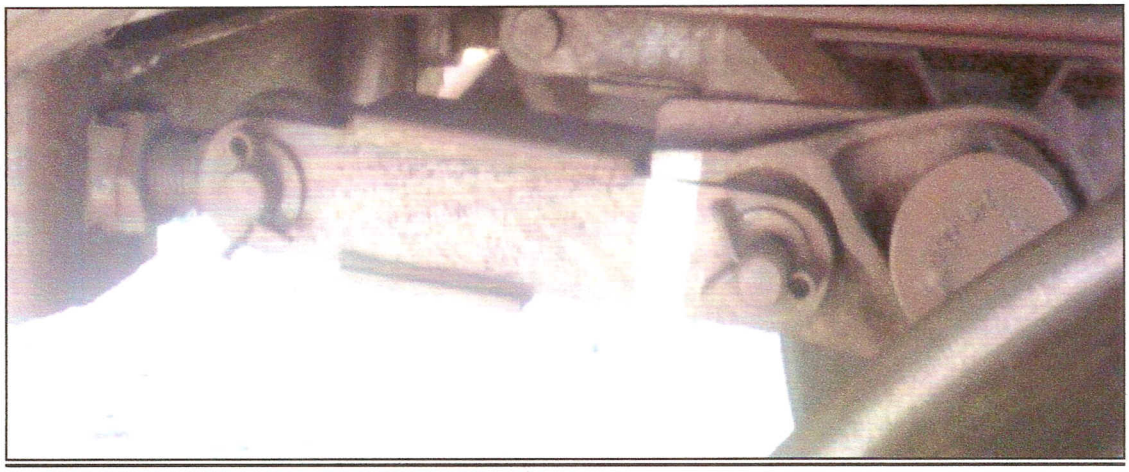


Fig. 2A

END LEVER

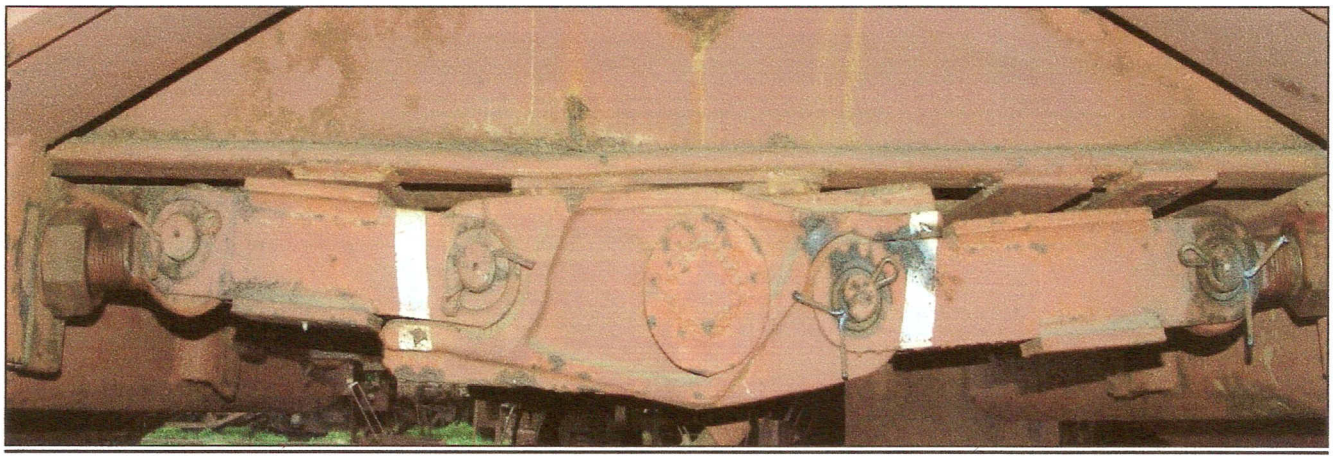


Fig. 2B

CENTRAL LEVER

ANNEXURE-3

INCORRECT ADJUSTMENT POSITION OF THE LEVERS

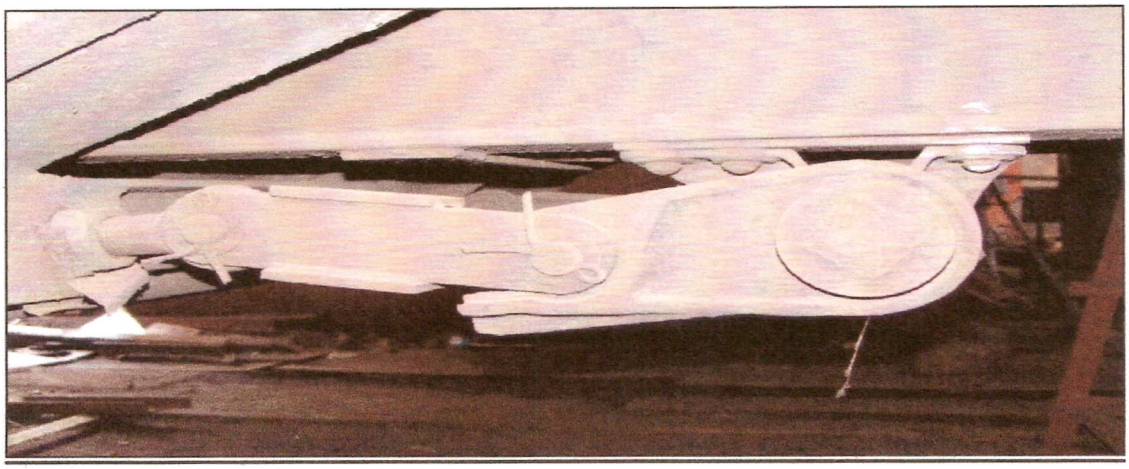


Fig. 3A

END LEVER

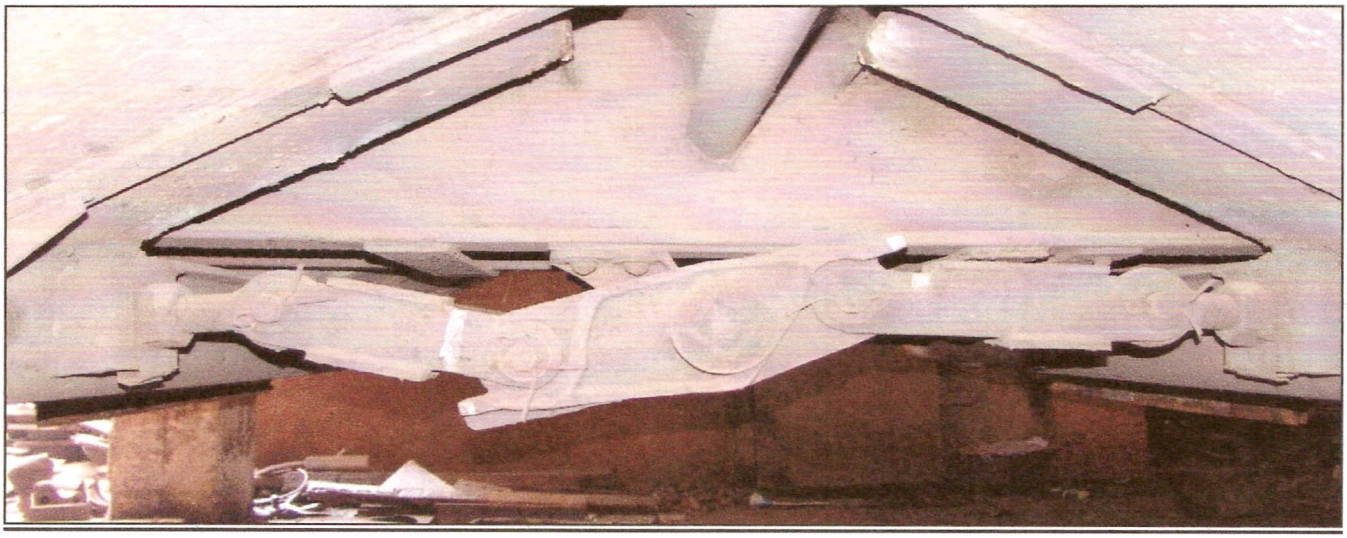


Fig. 3B

CENTRAL LEVER

SECONDARY LOCK ADJUSTMENT
(Y-END OF WAGON)

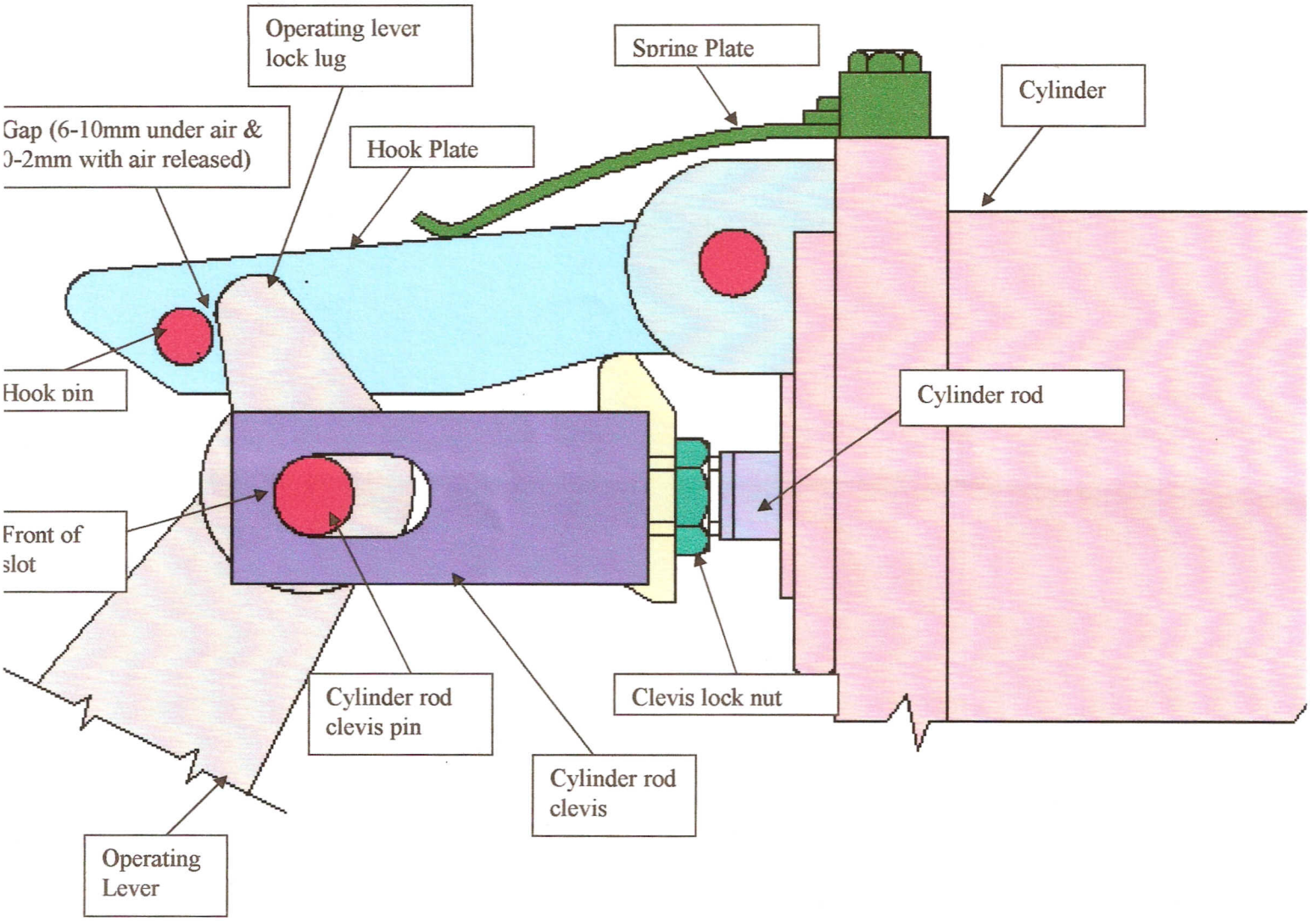


Fig.3

TURNBUCKLE ADJUSTMENT FOR SECONDARY LOCK GAP

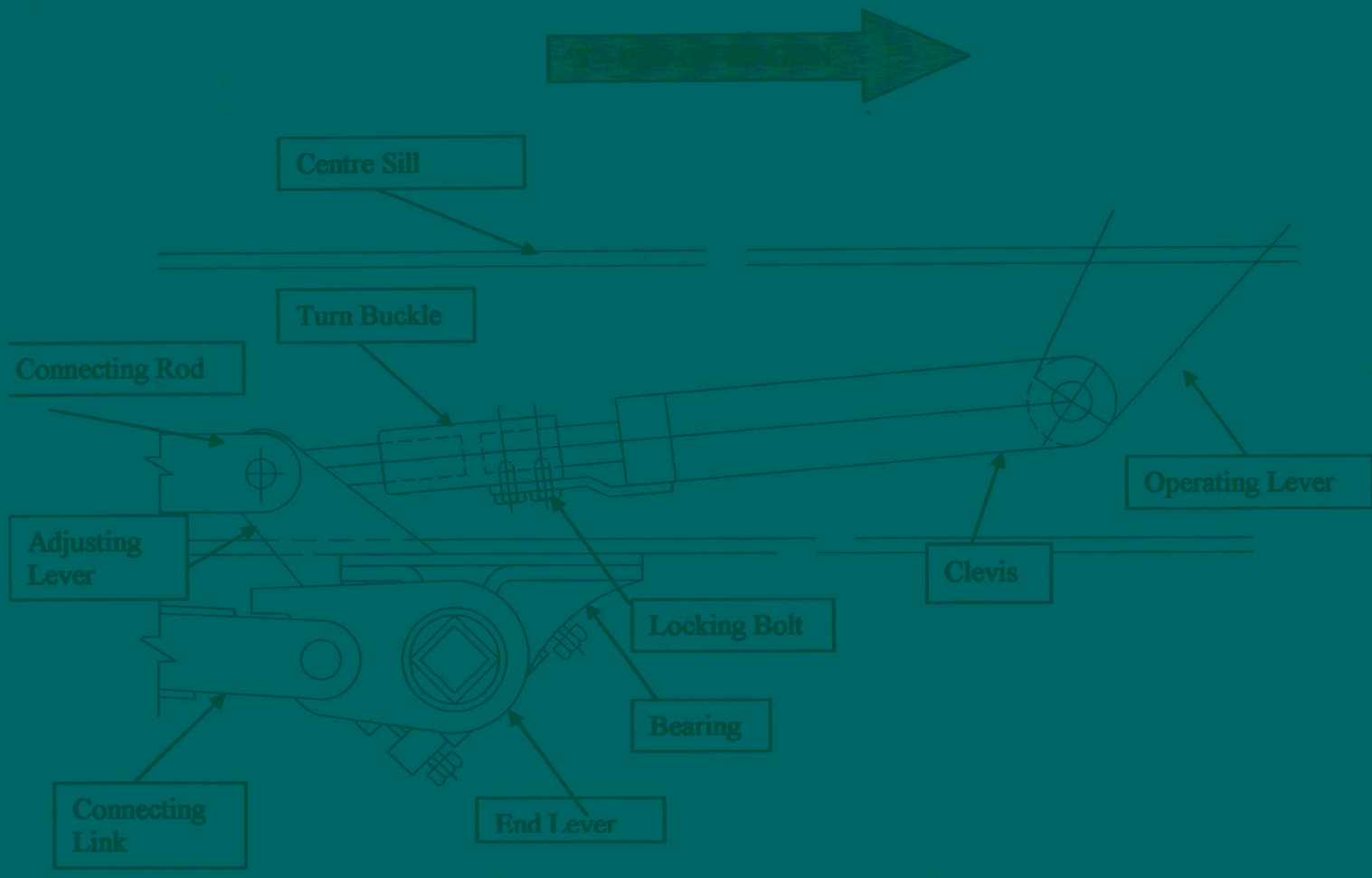


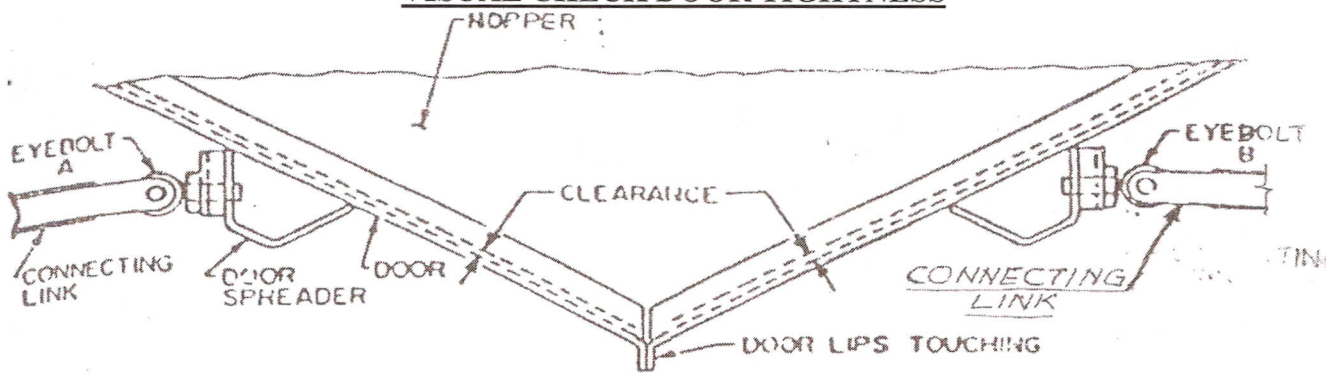
Fig. 4

Final adjustment is made to obtain correct preload on the mechanism. The pre-load is determined by observing the secondary lock gap with air pressure removed after the secondary lock has been adjusted as outlined in Para 3 & 4.

If the secondary gap is too large, rotate the turnbuckle to increase the distance between the pins. If secondary lock gap is tight back off the turnbuckle by rotating so that distance between pins is reduced. Since this is a final adjustment, rotate the turnbuckle in small increments and check secondary lock gap after each increment, until correct adjustment is reached. Install locking bolt when complete

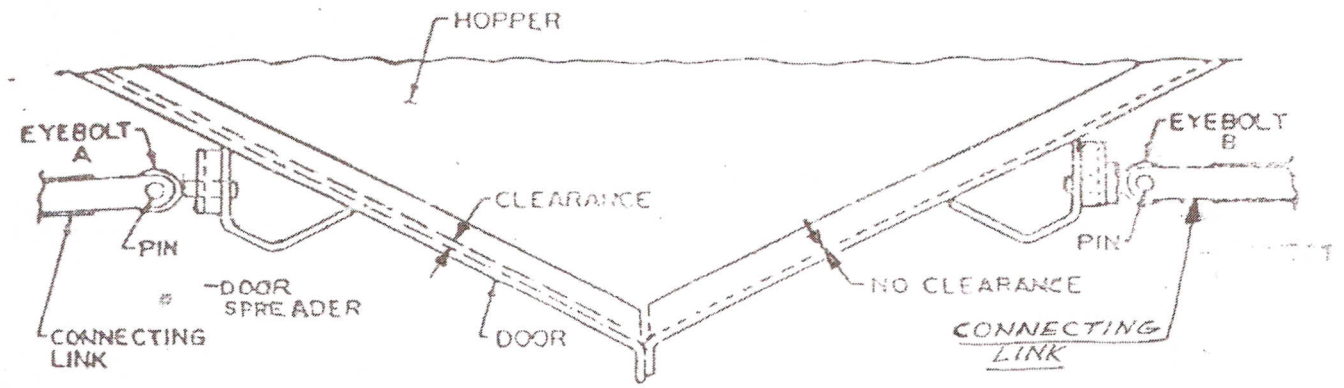
ANNEXURE-6

VISUAL CHECK DOOR TIGHTNESS



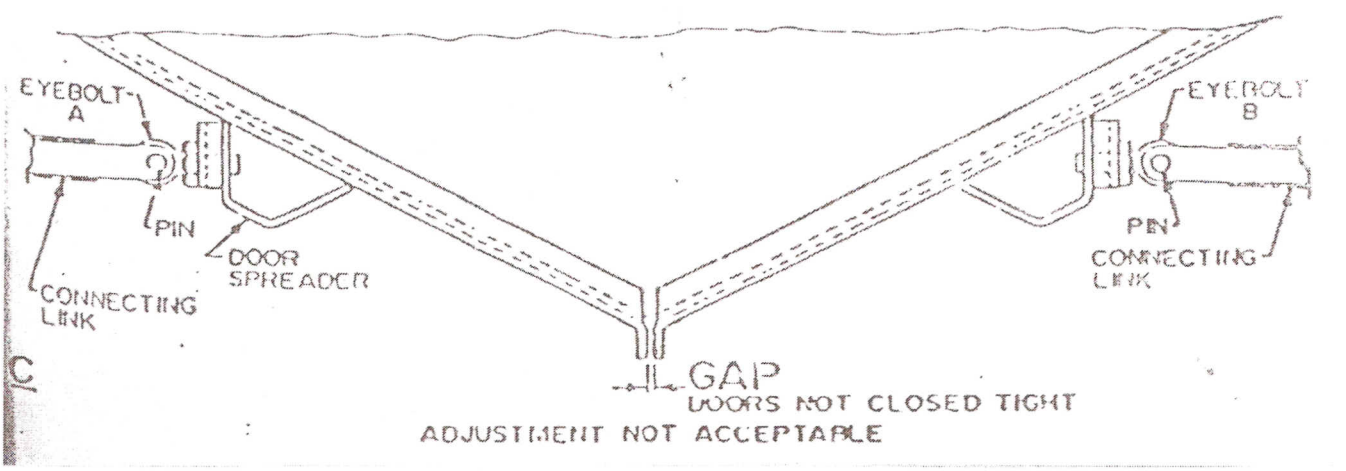
DOOR IN CORRECT ADJUSTMENT

A



DOOR CLOSED TIGHT BUT LIPS ARE NOT EVEN. DOOR ADJUSTMENTS SHOULD BE MADE EQUALLY SO THAT DOORS HAVE CLEARANCE ON BOTH SIDES WITH LIPS TOGETHER AND EVEN.

B



DOORS NOT CLOSED TIGHT

ADJUSTMENT NOT ACCEPTABLE

C

Fig. 5