

DIESEL MECHANIC



MINING QUALIFICATIONS AUTHORITY

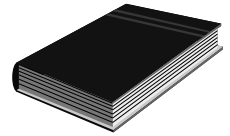
CODE: BRR-4

REMOVE AND MOUNT A BEARING MECHANICALLY

INDEX

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SOURCE REFERENCES

Bearing display board in the training centre.

Audio-visual aids.

OBJECTIVE

You will be learning towards the outcome “Remove and mount a bearing mechanically”.

Whilst learning towards the outcome you will be required to achieve the following:

- Enable you to remove and mount bearings, using a press.

On completion of this module, the learner must be able to:

- Use a press to remove a shaft and bearing assembly from a housing.
- Use a press to remove a bearing from a shaft.
- Use a press to fit a bearing onto a shaft.

During this process you must adhere to certain specified requirements as listed in the Module.

ASSESSMENT AND EVALUATION CRITERIA


You will be assessed, when you are confident that you are able to achieve the outcomes as listed, to determine your competence as measured against the required criteria. This assessment will be in line with accepted best practices regarding assessment.

- A practical test will be set at the end of the module and must be completed without using references
- The learner will be given a shaft and bearing assembly in a housing and will be required to remove, clean and examine, and replace the bearing, using an hydraulic press.

The following standards must be achieved:

- The correct procedures as described in these notes must be used to remove the bearing from the assembly.
- The bearing must be correctly cleaned and examined for serviceability.
- The bearing must be re-fitted to the shaft using the correct procedures, as described in these notes.
- No contamination of the bearing must take place before and during fitting.
- No damage to equipment, the bearing, shaft or housing should take place.

All safety procedures must be adhered to.

<h2 style="text-align: center; margin: 0;">HAZARD IDENTIFICATION AND CONTROL (HIAC) FORM</h2>		
 <div style="display: inline-block; vertical-align: middle; text-align: center;"> <h3 style="margin: 0;">BRR-4</h3> <h3 style="margin: 0;">REMOVE AND MOUNT A BEARING MECHANICALLY</h3> </div>		
STEPS IN OPERATION / PROCESS	POTENTIAL ACCIDENT / INCIDENT	CONTROLS (BY RESPONSIBLE PERSON)
1. Use hand tools.	<ul style="list-style-type: none"> Using damaged tools or wrong tools for the job can cause injury and damage to equipment. 	<ul style="list-style-type: none"> Always use the correct tool for the job. Ensure tools are in good condition. Use tools correctly. Wear appropriate PPE where necessary. Always take good care of tools. Maintain, clean and store it properly.

NOTE: Before doing the practical work contained in this module, the learner must study the content of the above HIAC form again and then sign the statement below.

The above risks, which will be encountered in this module, are fully understood and will be controlled during the practical work.

Signature of learner:

Signature of Training Officer:

Date:



DICTIONARY

Bearing	:	A supporting part of a machine that bears the friction, especially between a rotating shaft and its housing.
Hydraulic press	:	Machine in which pressure of a body of oil gives increased force by transmission from small to larger cylinder.
Reservoir	:	Receptacle for fluid, place where fluid collects, part of machine holding fluid.
Shaft	:	Revolving bar transferring force in a motor.
Housing	:	Casing for moving mechanism.
Burr	:	Rough edge on cut, punched or worn metal.

1. INTRODUCTION

ITEM / TASK: Hydraulic press.

DESCRIPTION:

- A. A hydraulic press can be used for removing and mounting most types of bearings.
- B. The press normally consists of a frame, a hydraulic cylinder and a hydraulic pump. (Fig 1)

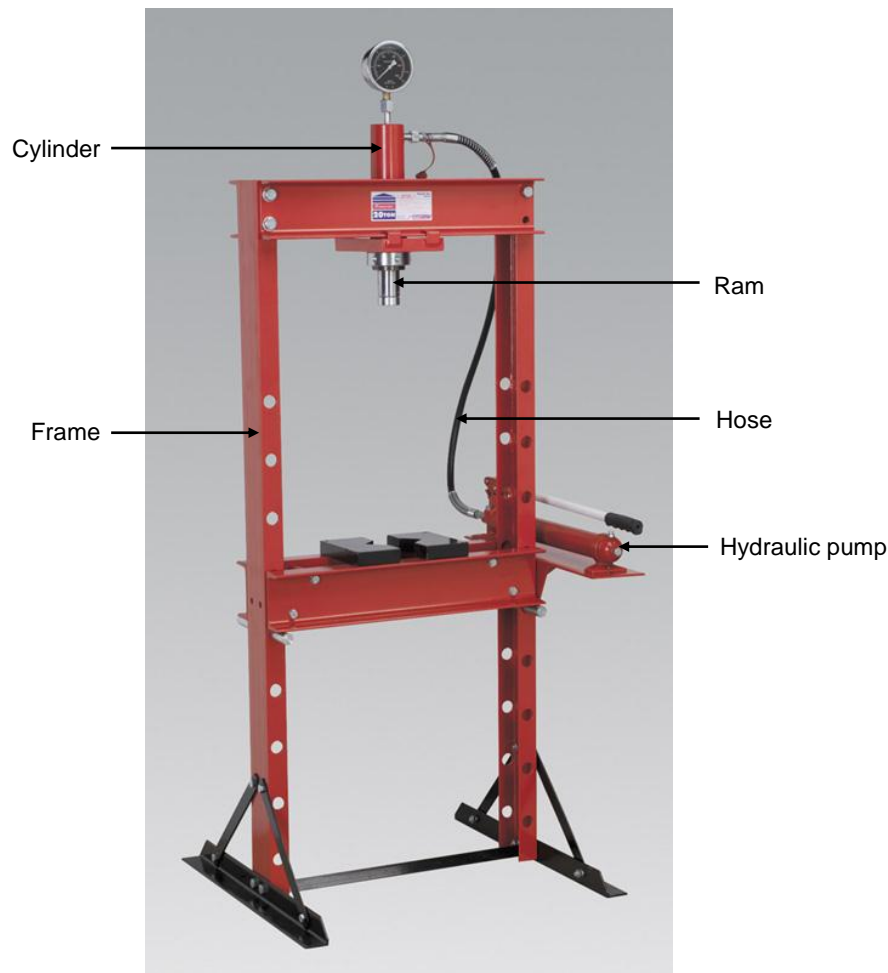


FIG 1.

- C. The hydraulic pump has a reservoir for the oil. It can also be of a manual or mechanical type. The manual type, i.e. a hand operated pump, is shown above and described below.

ITEM / TASK: Operation of a hydraulic press.

DESCRIPTION:

- A. The hand-pump pumps the oil into the cylinder.
- B. A control valve is used to control the flow of the fluid to or from the cylinder.
- C. When the valve is in a closed position the oil will flow into the cylinder and the ram will move out.
- D. When it is in open position the spring will return the ram, and the oil will flow from the cylinder back into the reservoir.
- E. Support strips are placed over the bed to support the bearings or housing whichever is applicable. (Fig 2)

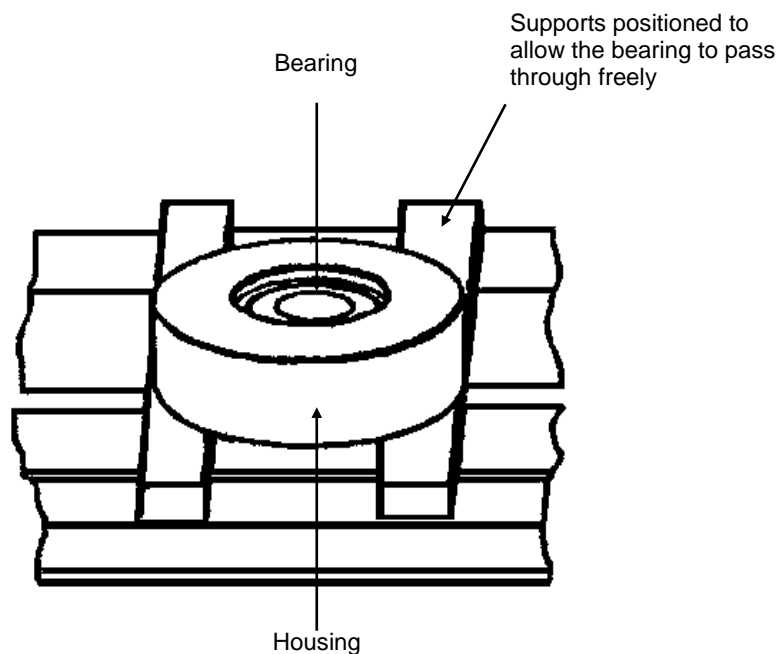
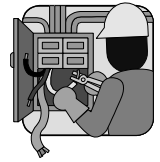


FIG 2.

2. REMOVE THE SHAFT ASSEMBLY FROM THE HOUSING



ITEM / TASK: Procedure for removing the shaft assembly.

DESCRIPTION:

- A. Wipe the press clean with a lint-free cloth. This is done to prevent any contaminants entering the bearing.
- B. Clean your hands.
- C. Clean the tools, which you are going to use.
- D. Measure the depth of the bearing in the housing and record it. (Fig 3)

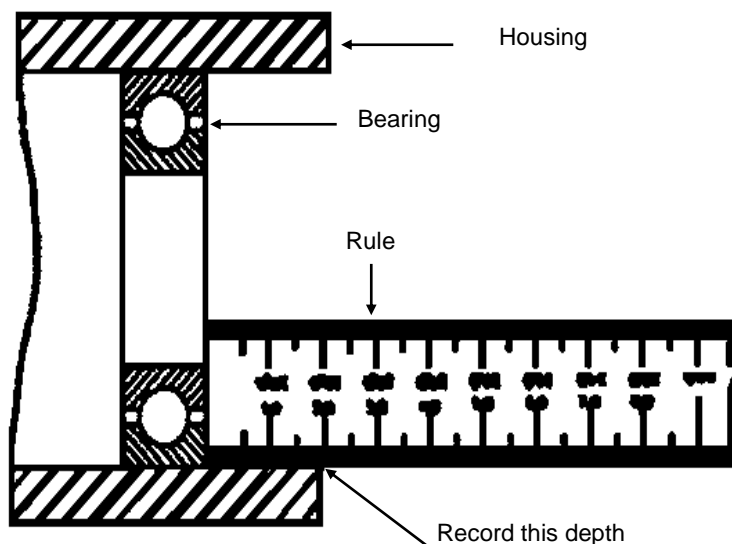


FIG 3.

- E. Remove any burrs from the inside bore of the housing with a half round file.
- F. Remove any rust with emery paper. Take care not to contaminate the bearing.
- G. Select a dolly that will fit on the **outer ring** of the bearing.



NB:

Remember that in removing or replacing a bearing, force should always be applied against the ring with the interference fit. (Fig 4)

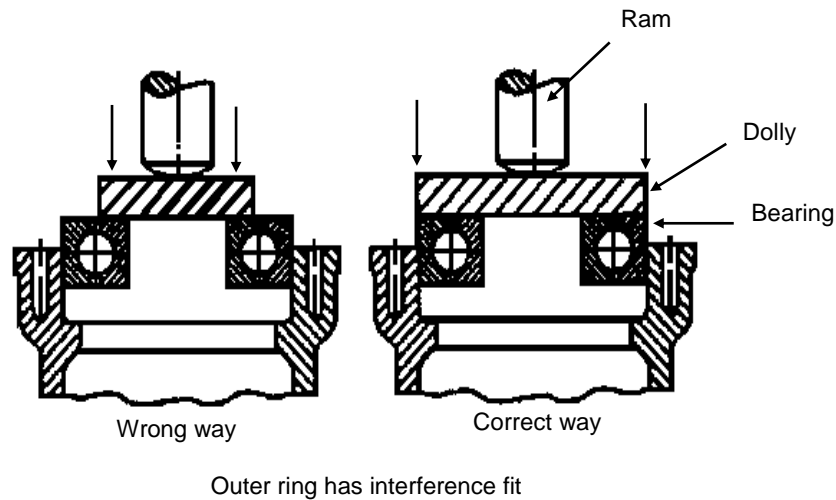
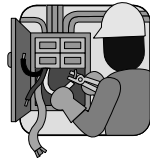


FIG 4.

- H. Support the housing firmly with two support strips placed over the press bed. Make sure that the strips clear the bearing. (Fig 2)
- I. Tap bearing into position with a mallet, and ensure bearing is square with housing.
- J. Close the control valve.
- K. Operate the hand pump until the ram presses on the spindle.
- L. Check that the housing and the shaft are square with the ram.
- M. Press the shaft assembly out slowly, stopping frequently to check squareness.
- N. Support the shaft assembly with your hand to prevent it from falling to the floor.
- O. Open the control valve so that the ram will return.
- P. Remove the housing and shaft assembly from the press.

**DO THE PRACTICE ON THE NEXT PAGE BEFORE
CONTINUING WITH THE REST OF THE MODULE.**



PRACTICE

Use a housing, which is fitted with a shaft assembly (a shaft fitted with a bearing).

Follow the methods described and remove the shaft assembly from the housing.

Ask your Training Officer to sign you off when you have completed the task correctly and achieved the required standards, then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

3. REMOVE THE BEARING FROM THE SHAFT

ITEM / TASK: Procedure for removing the bearing.

DESCRIPTION:

- A. Measure the position of the bearing and record it.
- B. Remove any burrs from the shaft with a smooth file.
- C. Remove any rust from the shaft with emery tape.
- D. Support the **inner ring** of the bearing with support strips placed over the press bed.

(Fig 5)

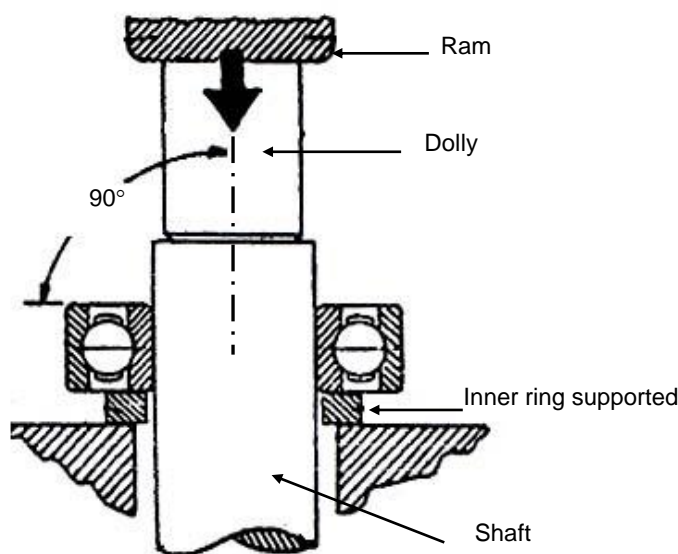
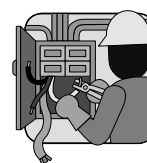


FIG 5.

NB:

If the outer ring is supported when removing the bearing from the shaft, the bearing will be damaged. Make sure that the strips clear the shaft.

- E. Place a dolly between the ram and the shaft assembly. The outside diameter of the dolly must be smaller than the shaft. (Fig 5)
- F. Close the control valve.
- G. Hold the dolly with one hand and operate the hand pump with the other until the ram presses on the dolly.
- H. Check that the shaft and dolly are lined up in the press and that the bearing is square and at right angles (90°) to the dolly. (Fig 5)
- I. Press the shaft out slowly, stopping frequently to check that it is square.



- J. Support the shaft with your hand to prevent it from falling to the floor.
- K. Open the control valve to return the ram.
- L. Remove the bearing and shaft from the press.
- M. Clean and inspect the bearing and record your findings on the standard checklist.

NOTE:

A standard bearing checklist is included at the end of the module.

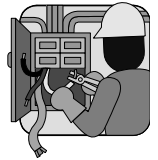


NB:

Remember that the bearing must not be spun with the compressed air while drying it.

- N. Wrap the bearing in oil paper to protect it from contamination.

**DO THE PRACTICE ON THE NEXT PAGE BEFORE
CONTINUING WITH THE REST OF THE MODULE.**



PRACTICE

Use the shaft assembly, which you have removed from the housing during the previous practice. Follow the methods described and remove the bearing from the shaft.

Ask your Training Officer to sign you off when you have completed the task correctly and achieved the required standards, then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

4. REPLACE THE BEARING ONTO THE SHAFT

ITEM / TASK: Two ways of fitting a bearing onto a shaft.

DESCRIPTION:

A. A bearing can be fitted onto a shaft by either pressing it onto the shaft (Fig 6), or by pressing the shaft onto the bearing. (Fig 7)

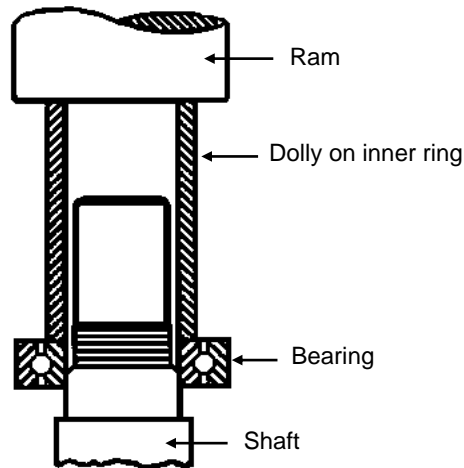


FIG 6.

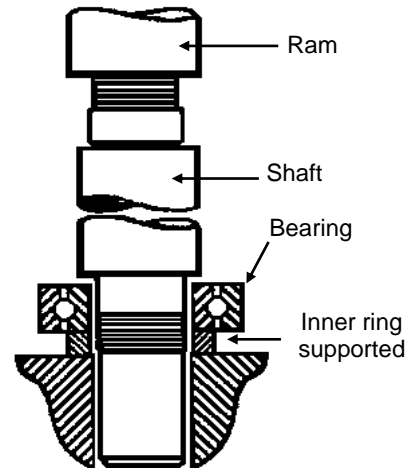


FIG 7.

ITEM / TASK: Press a bearing onto a shaft.

DESCRIPTION:

- Remove any burrs from the shaft with a smooth file.
- Smear oil over the shaft.
- Remove the bearing from the oil paper.
- Align the bearing square with the shaft and start fitting it by hand onto the shaft. A soft mallet may be used if necessary. (Fig 8)

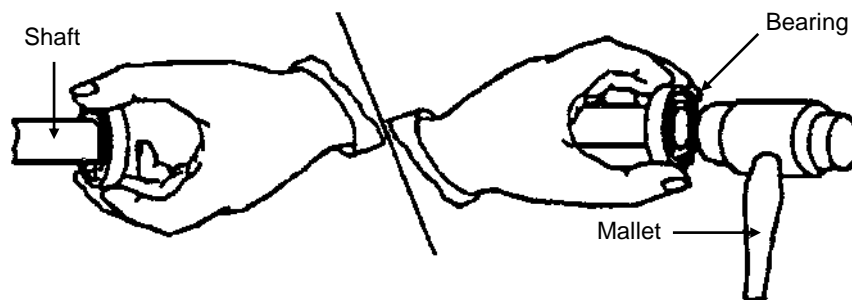
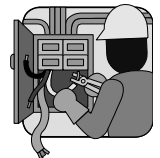


FIG 8.

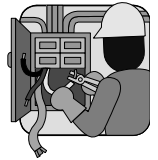
- E. Select a dolly to suit the inner ring of the bearing.
- F. Place the dolly on **the inner ring**.
- G. Close the control valve.
- H. Hold the dolly with one hand and operate the pump with the other until the ram presses on the dolly.
- I. Check that the shaft and the dolly are in line and that the bearing is square with the ram and dolly.
- J. Press the bearing slowly onto the shaft for the same distance as recorded previously, stopping frequently to check that it is square.
- K. Open the control valve to return the ram. Remove the shaft assembly from the press.

ITEM / TASK: Press the shaft into the bearing.

DESCRIPTION:

- A. Follow the same procedure as described for the previous method, but only support the bearing on the press bed with two supports as shown in Fig 7.

**DO THE PRACTICE ON THE NEXT PAGE BEFORE
CONTINUING WITH THE REST OF THE MODULE.**

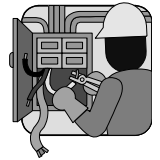


PRACTICE

Mount the bearing onto the shaft following either of the two methods described.

Ask your Training Officer to sign you off when you have completed the task correctly and achieved the required standards.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :



5. TO REPLACE THE SHAFT ASSEMBLY INTO THE HOUSING

ITEM / TASK: Procedure for replacing the shaft assembly.

DESCRIPTION:

- A. Remove any burrs from the inside bore of the housing.
- B. Smear the bearing seating in the housing with oil.
- C. Align the bearing square to housing and start fitting it by hand into the housing. A soft mallet may be used if necessary. (Fig 9)

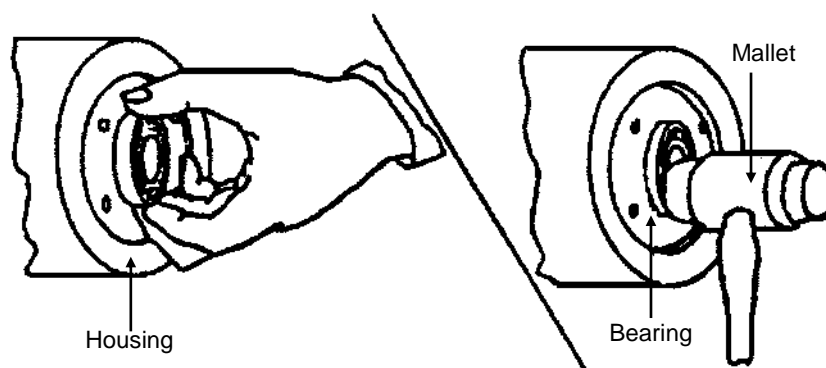


FIG 9.

- D. Support the housing on the strips as shown in Fig 10.

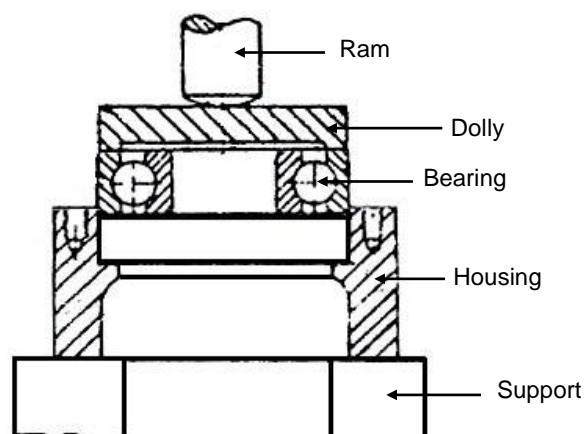
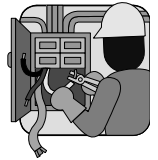


FIG 10.

- E. Select a dolly to suit **the outer ring** of the bearing and place it on the bearing.
- F. Close the control valve.
- G. Hold the dolly with one hand and operate the pump until the ram presses on the dolly.
- H. Check that the shaft assembly is square with the ram.
- I. Press the bearing slowly into the housing, frequently checking its depth in the housing with a rule.
- J. Check that the bearing is pressed to the same depth that you recorded before you removed the shaft assembly.
- K. Open the control valve so that the ram will return.
- L. Remove the housing with the shaft assembly from the press.

**DO THE PRACTICE ON THE NEXT PAGE BEFORE
ATTEMPTING THE ASSESSMENT FOR THE MODULE.**



PRACTICE

Take the shaft assembly and the housing. Follow the method described and press the shaft assembly into the housing.

Ask your Training Officer to sign you off when you have completed the task correctly and achieved the required standards.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :



REMEMBER ALWAYS WORK SAFE

Once you have passed the entire practice, you are now at liberty to request a Formative Assessment from your Assessor.

STANDARD BEARING CHECKLIST.

Bearing type
(Identification) : _____

CHECK FOR :	YES	NO
Bearing rusty.		
Bearing discoloured.		
Bearing fractured.		
Bearing cracked.		
Bearing pitted.		
Bearing flaking.		
Bearing brinelling.		
Bearing scratched.		
Lack of lubrication.		
Seals damaged.		
Cage damaged.		
Bearing loose in housing.		
Housing worn.		
Bearing loose on shaft.		
Shaft worn.		
* Bearing overheating.		
* Bearing vibration.		
BEARING ACCEPTABLE		

* For in service inspection only.

REASONS FOR BEARING NOT ACCEPTABLE.

STANDARD BEARING CHECKLIST.

Bearing type
(Identification) : _____

CHECK FOR :	YES	NO
Bearing rusty.		
Bearing discoloured.		
Bearing fractured.		
Bearing cracked.		
Bearing pitted.		
Bearing flaking.		
Bearing brinelling.		
Bearing scratched.		
Lack of lubrication.		
Seals damaged.		
Cage damaged.		
Bearing loose in housing.		
Housing worn.		
Bearing loose on shaft.		
Shaft worn.		
* Bearing overheating.		
* Bearing vibration.		
BEARING ACCEPTABLE		

* For in service inspection only.

REASONS FOR BEARING NOT ACCEPTABLE.

STANDARD BEARING CHECKLIST.

Bearing type
(Identification) : _____

CHECK FOR :	YES	NO
Bearing rusty.		
Bearing discoloured.		
Bearing fractured.		
Bearing cracked.		
Bearing pitted.		
Bearing flaking.		
Bearing brinelling.		
Bearing scratched.		
Lack of lubrication.		
Seals damaged.		
Cage damaged.		
Bearing loose in housing.		
Housing worn.		
Bearing loose on shaft.		
Shaft worn.		
* Bearing overheating.		
* Bearing vibration.		
BEARING ACCEPTABLE		

* For in service inspection only.

REASONS FOR BEARING NOT ACCEPTABLE.

STANDARD BEARING CHECKLIST.

Bearing type
(Identification) : _____

CHECK FOR :	YES	NO
Bearing rusty.		
Bearing discoloured.		
Bearing fractured.		
Bearing cracked.		
Bearing pitted.		
Bearing flaking.		
Bearing brinelling.		
Bearing scratched.		
Lack of lubrication.		
Seals damaged.		
Cage damaged.		
Bearing loose in housing.		
Housing worn.		
Bearing loose on shaft.		
Shaft worn.		
* Bearing overheating.		
* Bearing vibration.		
BEARING ACCEPTABLE		

* For in service inspection only.

REASONS FOR BEARING NOT ACCEPTABLE.
