CENTRIFUGAL PUMPS

LIST OF TROUBLES

TROUBLE 1 : PUMP DOES NOT START

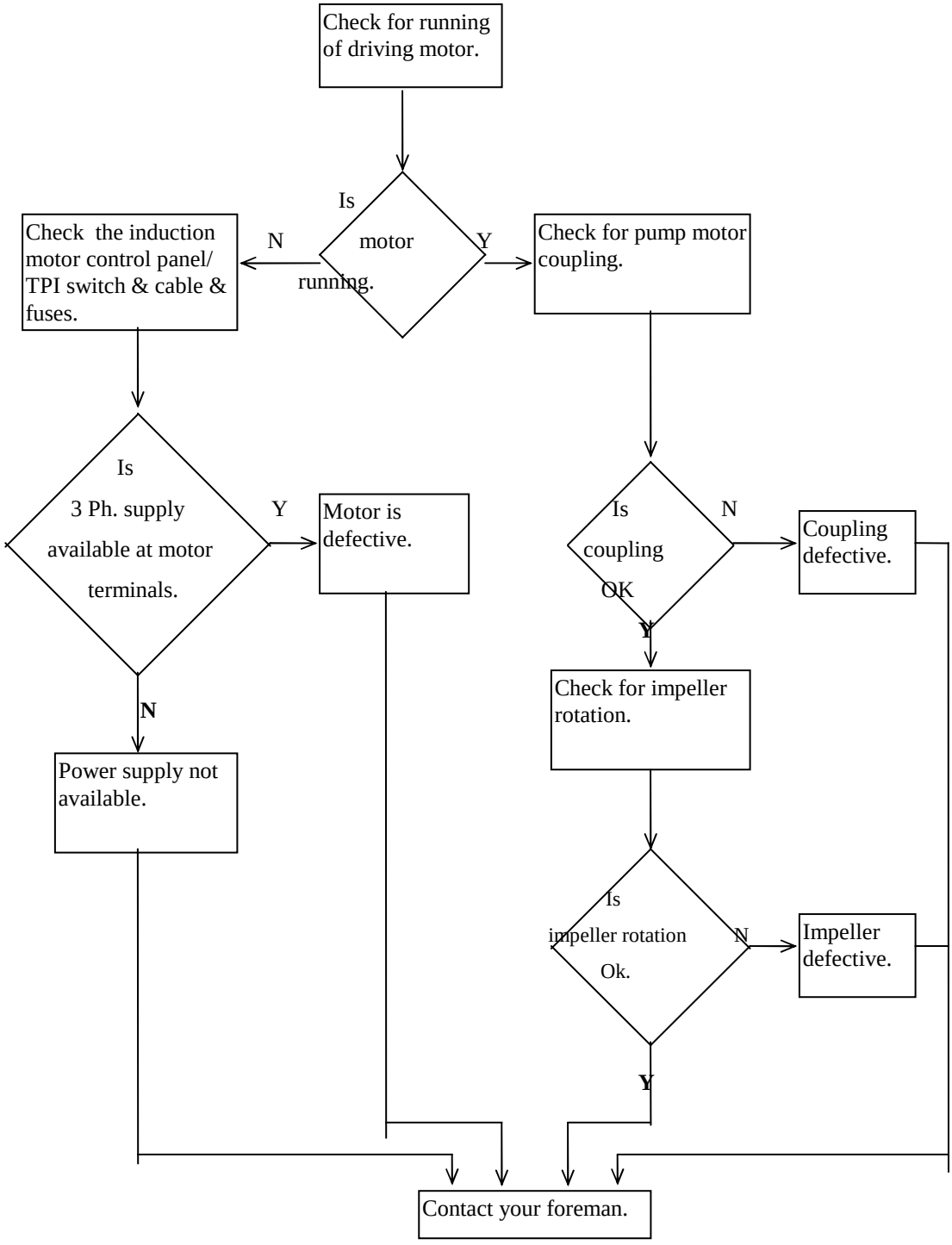

Chart No. 1

TROUBLE 2 : NO WATER DELIVERED.

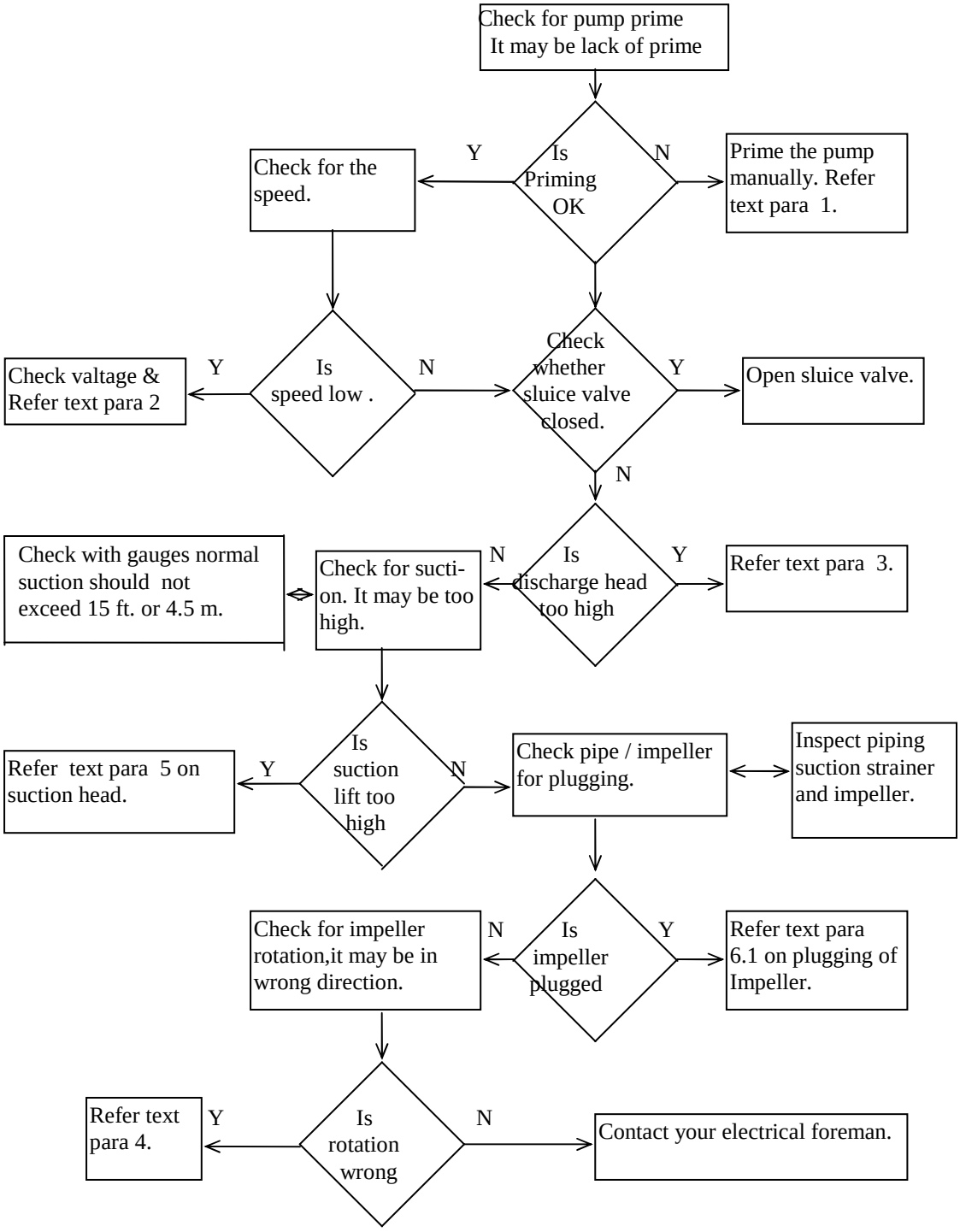

Chart No. 2

TROUBLE 3 : NOT ENOUGH WATER BEING DELIVERED

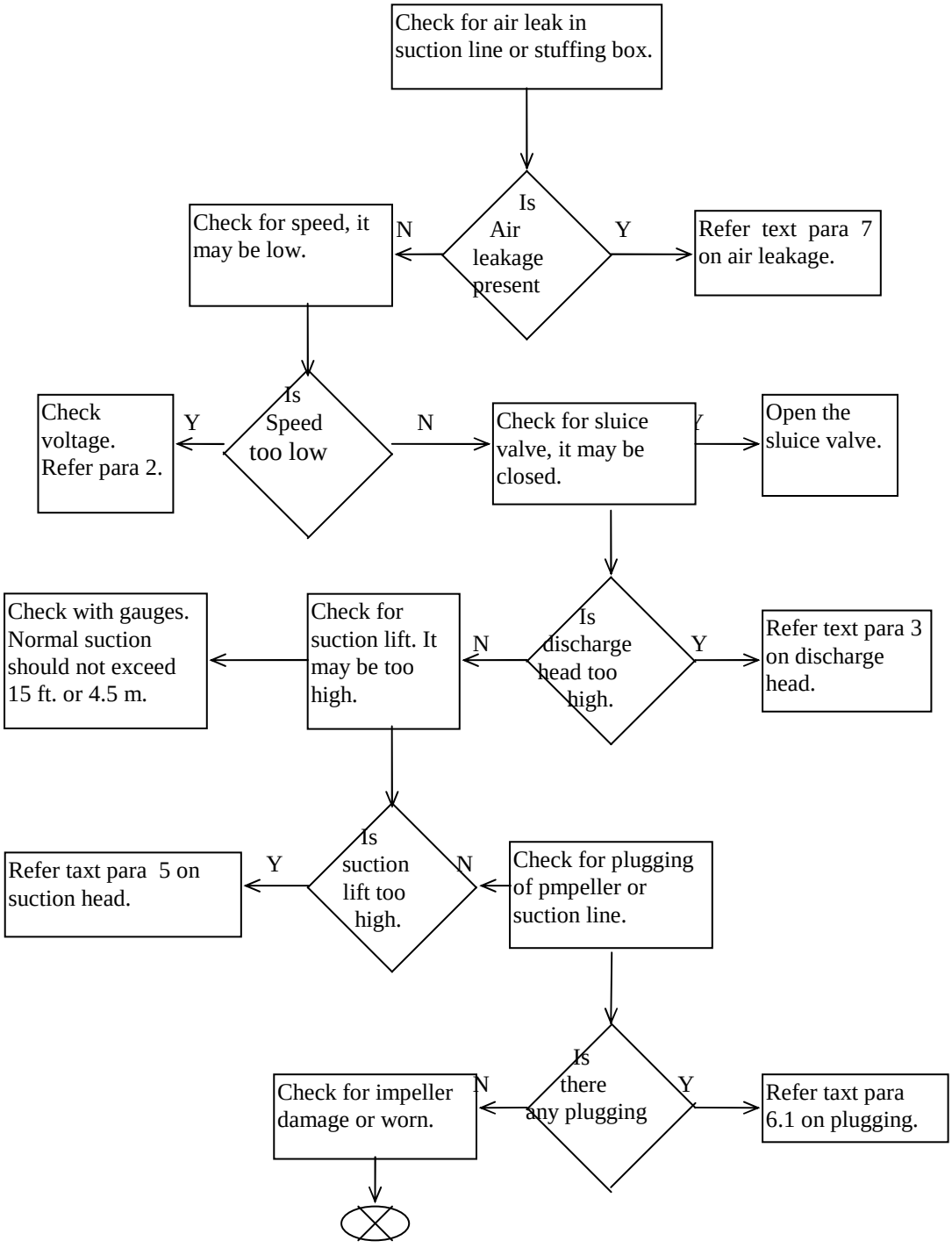

Chart No. 3

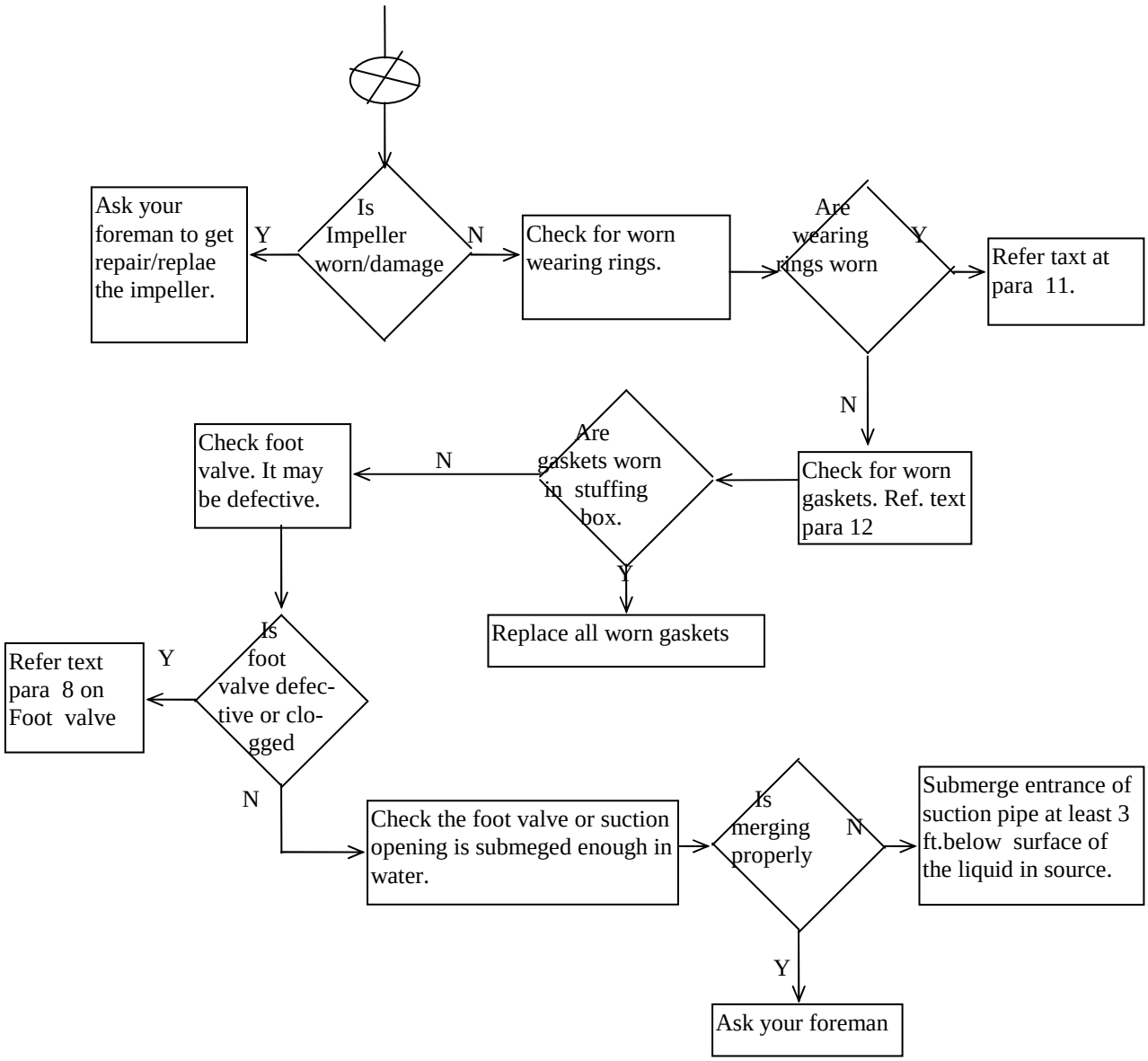

Chart No. 3a

TROUBLE 4 : PUMP DISCHARGE PRESSURE IS LOW

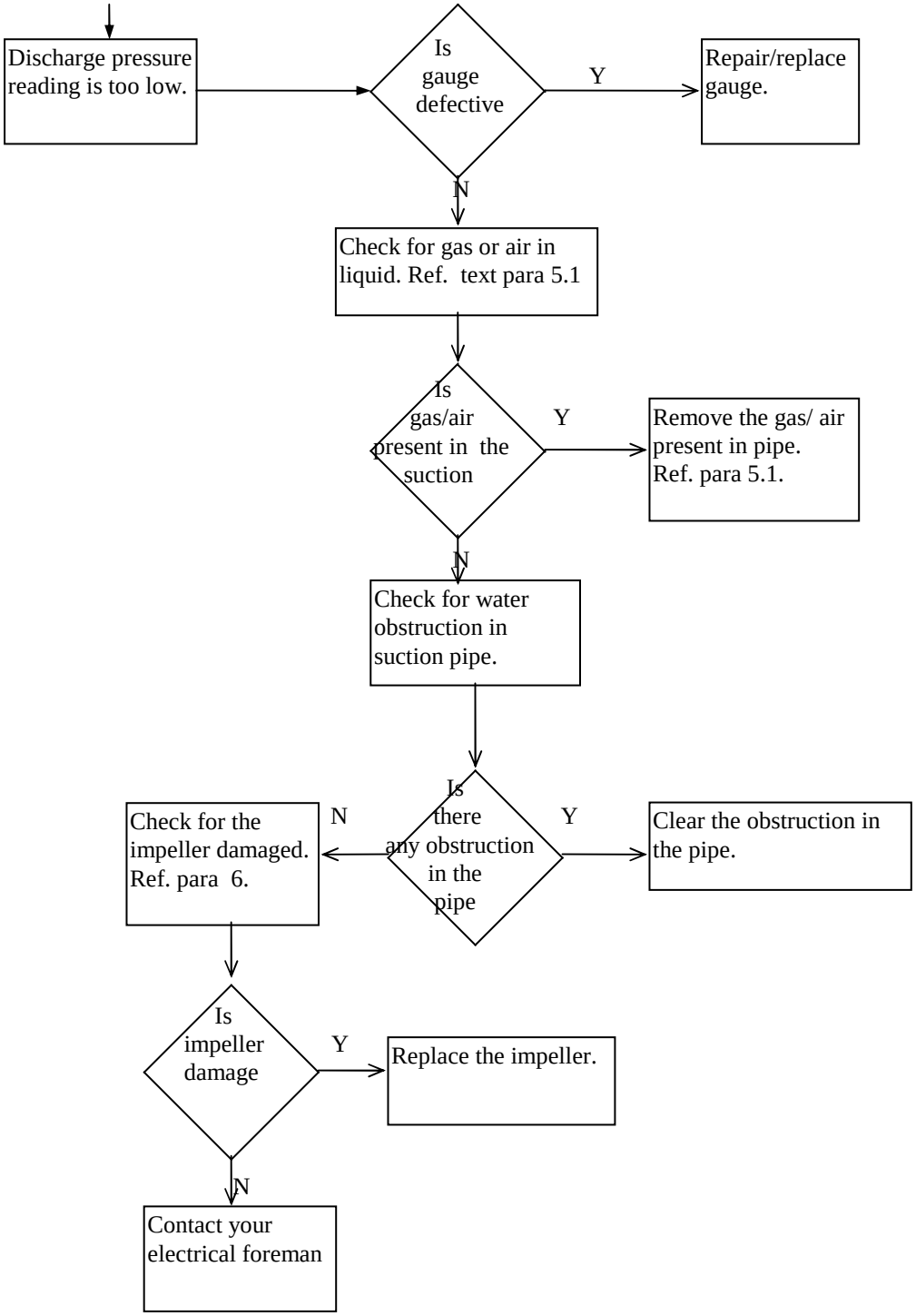
Discharge pressure reading is too low.
Is gauge defective
Y
Repair/replace gauge.
N
Check for gas or air in liquid. Ref. text para 5.1
Is gas/air present in the suction
Y
Remove the gas/ air present in pipe. Ref. para 5.1.
N
Check for water obstruction in suction pipe.
Is there any obstruction in the pipe
N
Check for the impeller damaged. Ref. para 6.
Y
Clear the obstruction in the pipe.
Is impeller damage
Y
Replace the impeller.
N
Contact your electrical foreman

Chart No. 4

TROUBLE 5 : PUMP LOOSES PRIME AFTER STARTING

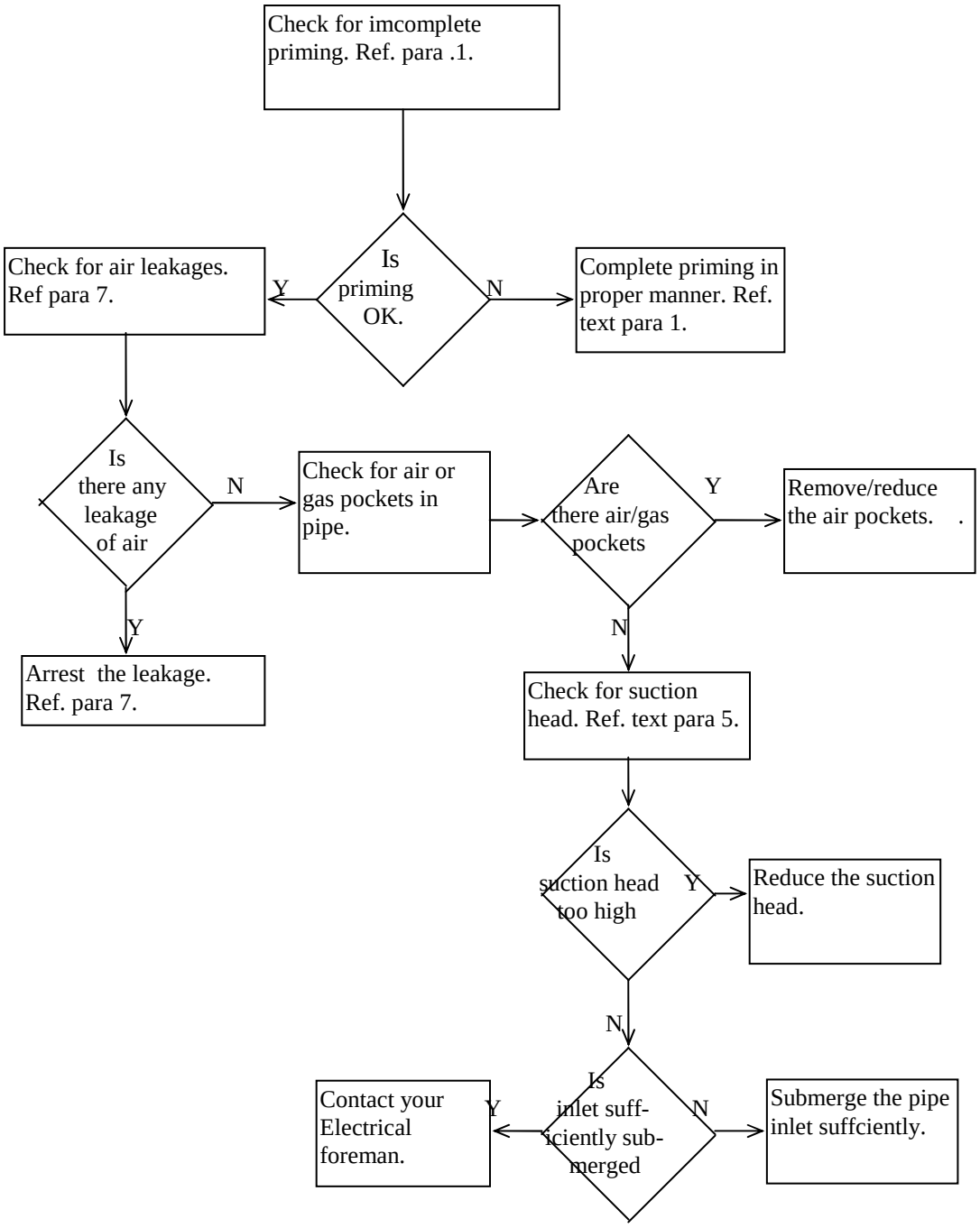

Chart No. 5

TROUBLE 6 : PUMP OVERLOADS THE DRIVER

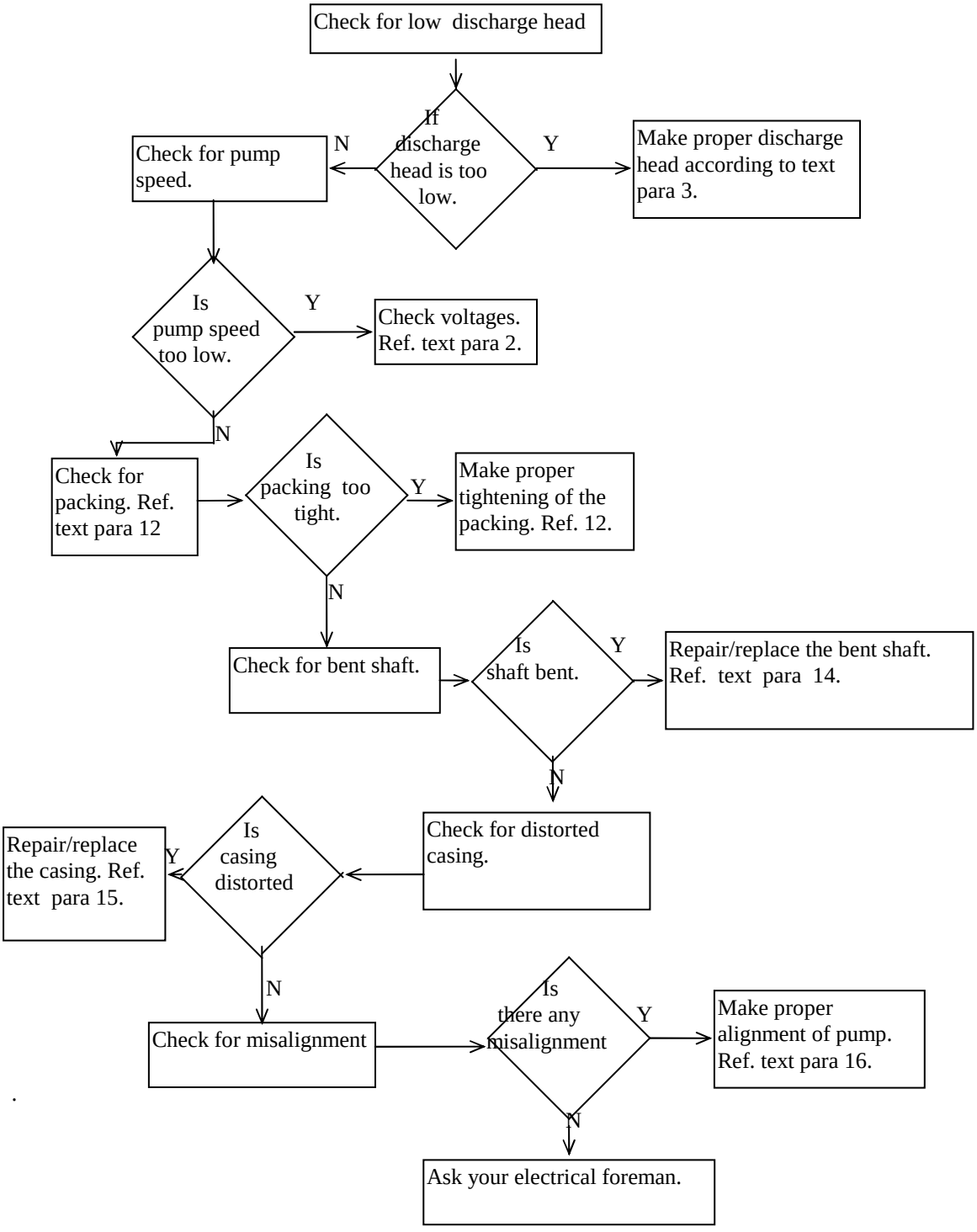

Chart No. 6

TROUBLE 7 : EXCESSIVE VIBATION OF PUMP

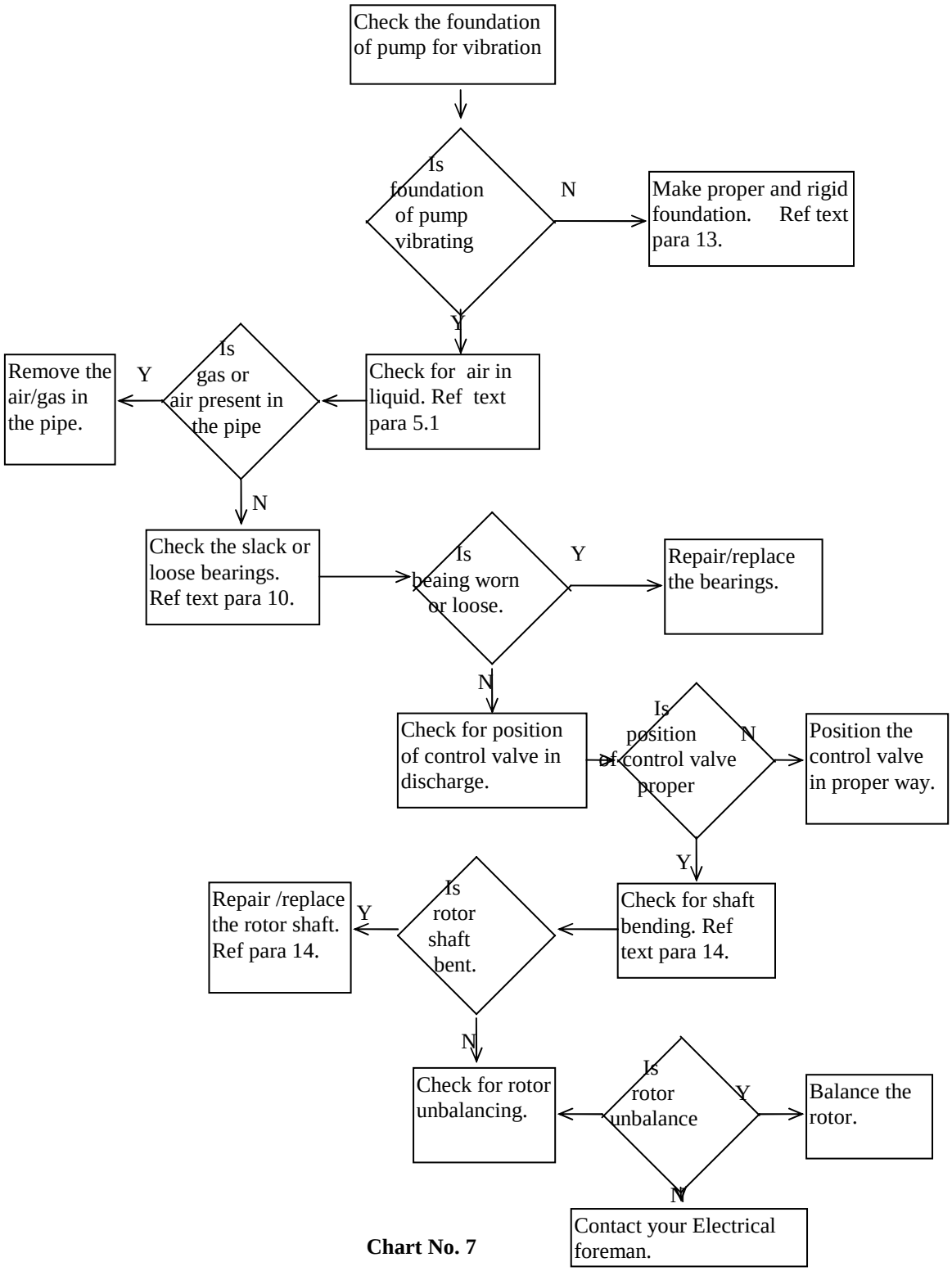

Chart No. 7

TROUBLE 8 : BEARING OVERHEAT

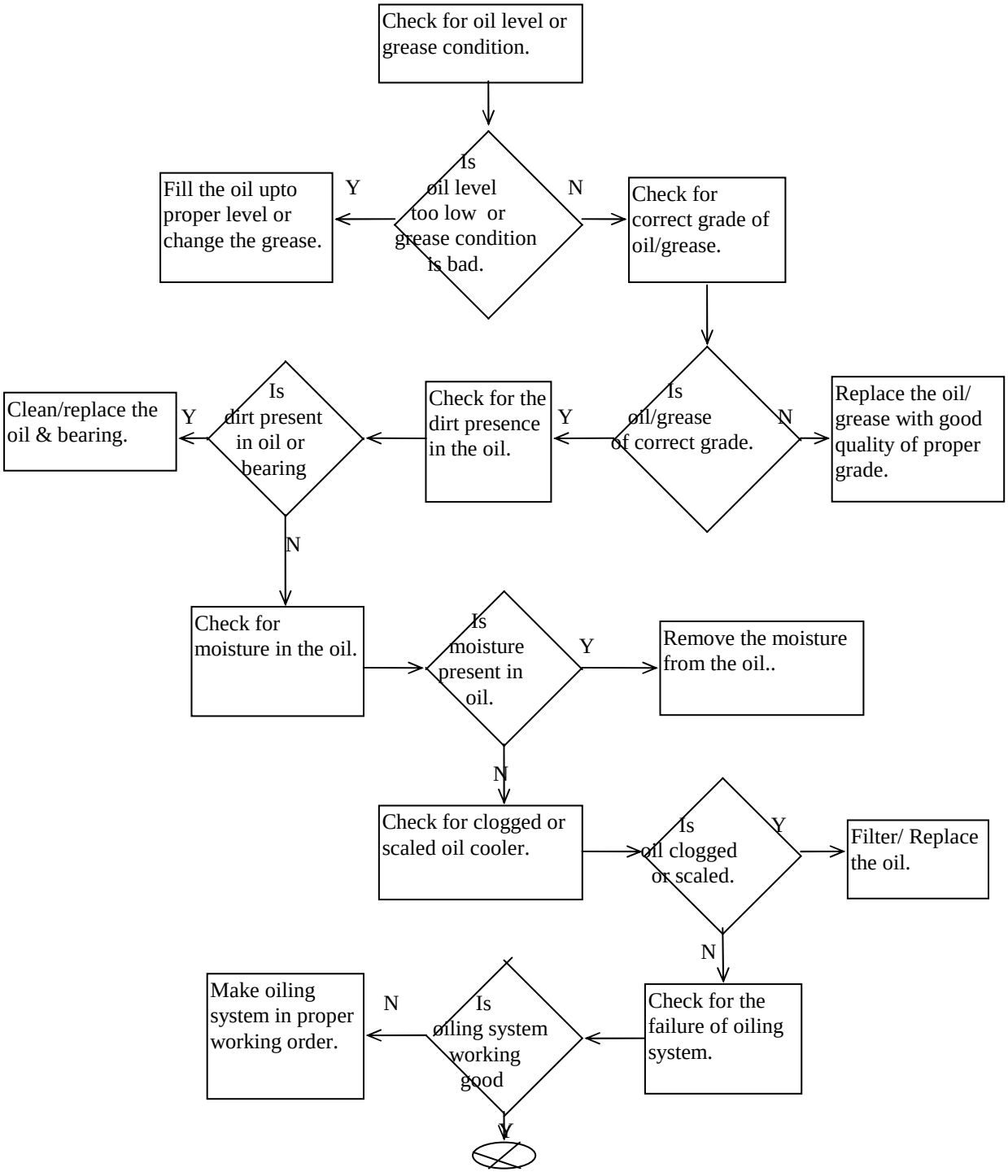

Chart No. 8

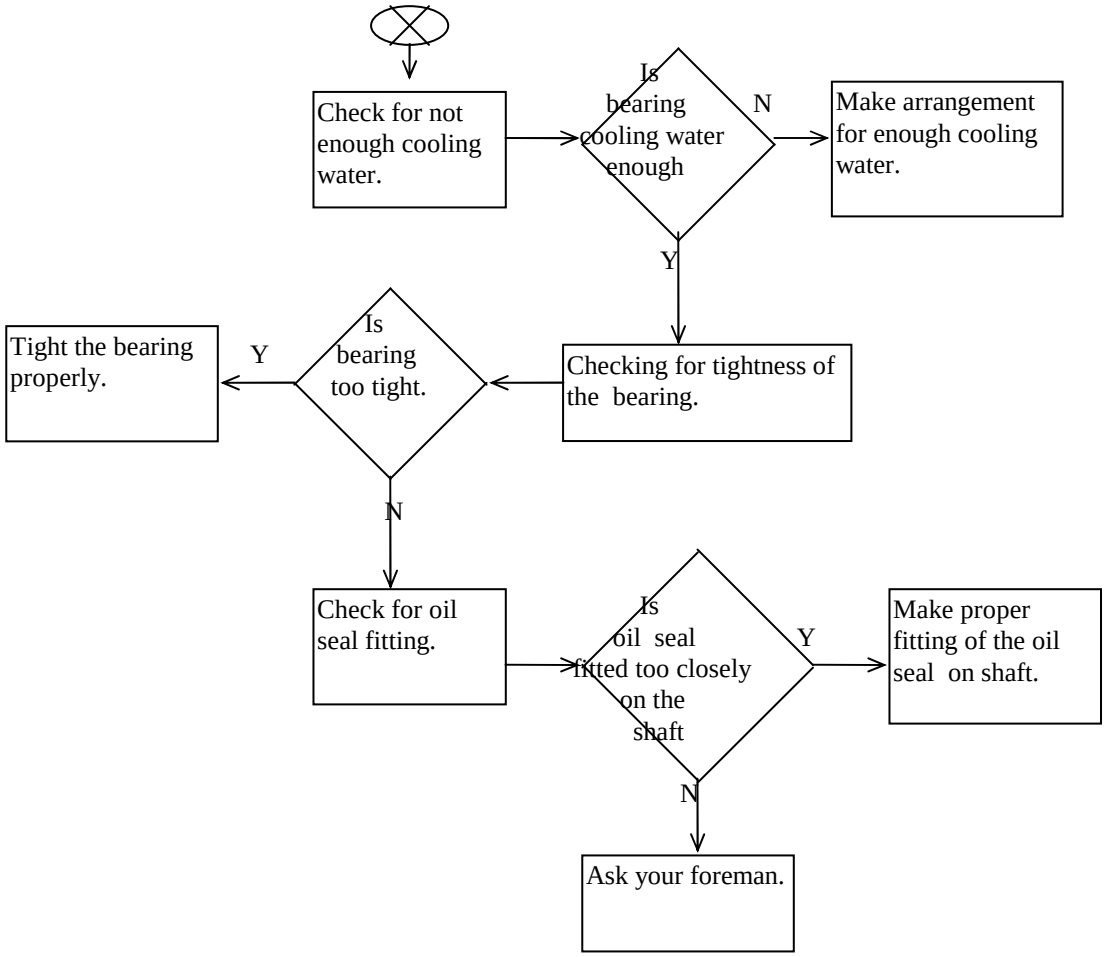

Chart No. 8a

TROUBLE 9 : BEARING WEAR RAPIDLY

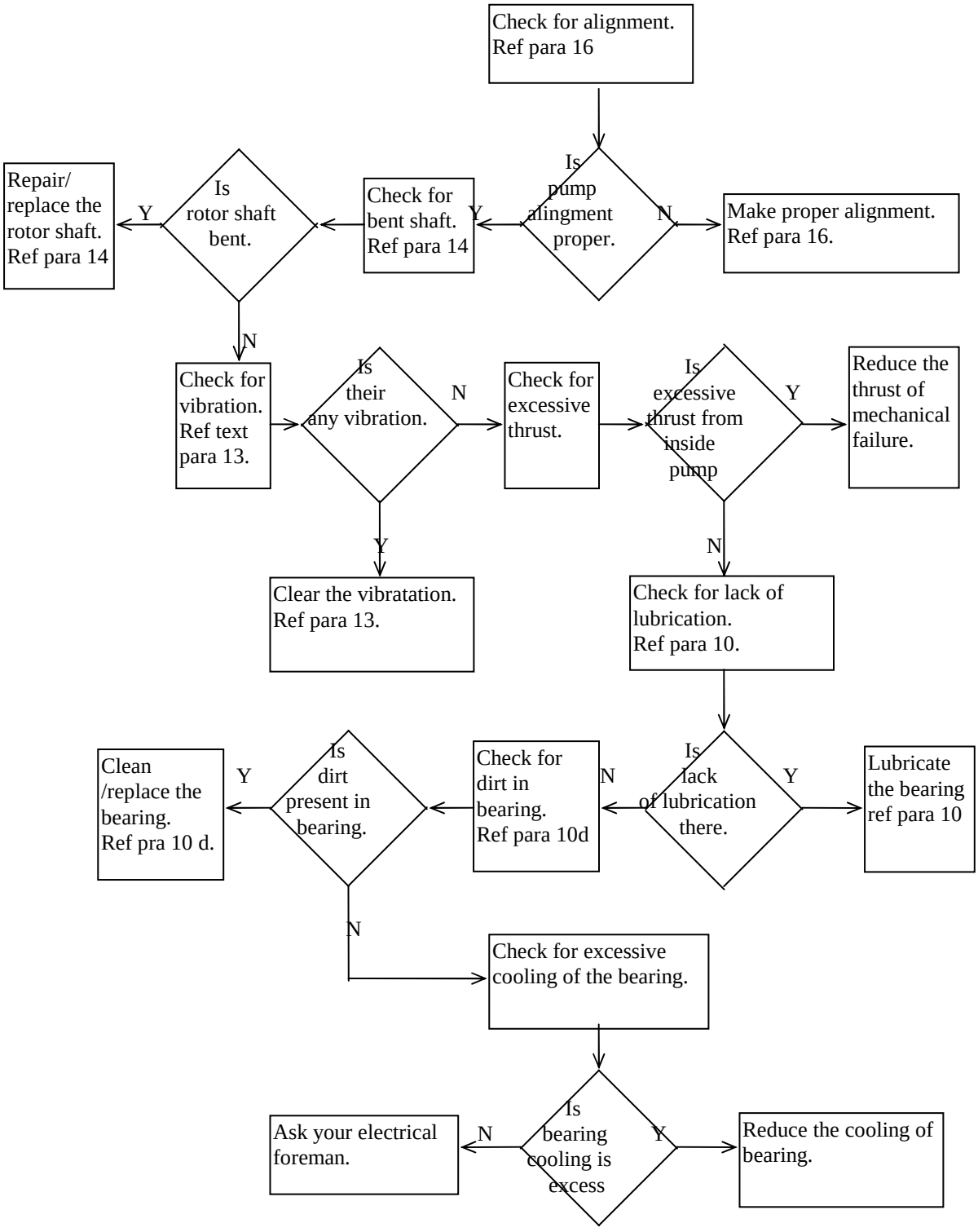

Chart No. 9

TEXT-PARAS

1. PRIMING :-

Filling the pump with water is called Priming. The pump should not start without being primed. Priming is done filling the pump casing and suction pipe completely with water, thus ensuring that all the air contained in the pump and suction pipe is made to escape. The filling of water can be done manually through the funnel. While filling water, the air-release valve is Kept-open to permit the air to escape from the pump section. Spilling of water through the air release valve is an indication that priming has been completed. The pump is started after closing the valve. The mannual priming is required to be done rarely , when either the foot valve is not functioning properly or there is an air pocket in the suction pipe.

2. LOW SPEED OF THE ROTATION OF PUMP :-

The speed of motor driving the pump may be low because of low voltage. Hence it is necessary to check the voltage. Some times the motor may have an open phase which causes it to run at a speed lower than its rated speed. In case of an engine driven pump the fuel supply and governer should be checked.

3. DISCHARGE HEAD:-

This represents the height through which the delivered water has to be lifted on the discharge side of the pump. It indicates the difference in level or height between the datum (or centre line of the pump)and the delivery spout of the discharge pipe if water discharge into an overhead service tank or the level of water in that tank at a given instant, if the delivery pipe is connected to the bottom of the tank. The principal reasons of too high discharge head is partially closed sluice valve on the delivery side and blocking of the suction or delivery pipe with solid entrained in water. If the discharge head is kept less than the designed value, it will result in overloading of the pump and motor.

4. DIRECTION OF ROTATION :-

The pump must be run in the direction indicated by an arrow on the casing which is always toward the discharge nozzel. Rotation, right-hand or left hand, is determined by facing the pump from the drive end. It is noted that the impeller rotates in a direction away from the vane curvature.

5. SUCTION HEAD:-

Suction head represents the difference in level between the centre line of the pump (also called datum or datum line) and the water level in the source. It indicates the vertical height through which the water has to be lifted or sucked on the suction side of the pump. The suction lift may be too high due to the clogging of the pump inlet with mud, gravel or some other obstruction. The other reason could be a broken disk or a clogged strainer of the foot valve. In case the pump is being started for the first time, the actual suction lift could be execessive. In such a case the pump is to be lowered so that the total suction lift is with in 6.5 meter (preferably within 4.5m to ensure efficient operation)

5.1 VAPOUR LOCK IN SUCTION LINE :-

Vapour pockets may develop in the pump suction line due to excessive suction head and inadequate submergence of the foot valve. The possible remedies include lowering the pump and increasing the submergence of the foot valve below the pumping water level.

6. IMPELLER:-

Impeller is the rotary element of the pump. It is a wheel or discmounted on the shaft and provided with a number of vanes are arranged in a circular array around an inlet opening at the centre. The impeller is secured on a shaft mounted on suitable bearings. The design of the impeller greatly influences the efficiency and operating characteristics of centrifugal pump.

6.1 PLUGGING OF IMPELLER :-

In case of cavity wells, solids in the water may get a accumulated in the impeller. This may block the pump either completely or partially. Under such situation, the pump casing should be opened and all the parts of the impeller cleaned periodically.

6.2 IMPELLER EYE TOO SMALL :-

The capacity of a pump is a function of diameter of the impeller eye. Therefore, incorrect choice of a pump or moving it from one base to the other may result in this trouble. The only remedy in such a case replacement of the pump with a properly selected one.

7. AIR LEAKAGE :-

Air leakage may take place either in the stuffing box or in the suction pipe. The stuffing box should leak a small amount of water during pump operation. First of all, one should check for the desired leakage by making suitable adjustments. If this adjustments fails to give the desired results, the pump should be stopped and the gland packing checked for damage. A damaged gland packing should be replaced by a new one. The leakage from the stuffing box is again checked. If even after replacement of the gland packing, the defect is not removed, the suction line will have to be checked for air leakage. The flanges and screwed joints are tightened first. In case the leakage is not traceable the same can be located by using a flame or a lighted match stick. The flame if held close to the pipe and flanges, will be drawn towards any leak.

8. FOOT VALVE :-

Foot valve is an integral component of a centrifugal pump. It is fixed at the bottom of the suction pipe. It keeps the centrifugal pump primed and restricts the entry of foreign matter, specially floating debris and aquatic plants into the suction pipe. The valve is a one way flap piece made of leather or rubber and hinged to the valve body. When the pump is not working the valve rests on a well machine base plate and prevents the return flow of water to the well or other source. Thus water is retained in the pump casing and suction pipe. The total area of the opening in the strainer of the footvalve should be about 2.5 times the cross sectional area of the suction pipe. Any reduction in the open area results in heavy friction losses and reduced pump discharge. Similarly, the flap valve in the valve body should open fully.

9. SLUICE VALVE :-

If sluice valve is provided, it is kept closed at the time of starting. This will allow the motor to be started without load. When the pump reaches its full speed, the sluice valve is opened gradually until the desired quantity of water is delivered. Care is taken not to run the pump for a long period with the sluice valve closed, as this may over heat the pump.

10. BEARING:-

(a) Grease lubrication:-

For grease lubricated ball bearing, only a small amount of lubricant is required and lubrication intervals are generally long. How long a bearing can run without grease being added or replaced, depends upon the grease properties, the size and design of the bearing and housing, the speed and other operating conditions. For pumps operating under severe service, perhaps greasing is required every three months and for normal service 1 year to be on the safe side, the addition of grease should be determined from experience.

(b) Oil lubrication :-

For oil-lubricated ball bearings mineral oil of the best quality should be used. Bearing housing with oil-bath lubrication or with an oil sump which is to be filled to a given level, ordinarily are equipped with oil gauges. Oil is added when the oil level due to loss, has dropped below the established low limit. In general, the oil level should never reach higher than centre of the lowest rolling element when the bearing is not rotating.

(c) Heating of bearing :-

Heating of bearing invariably means too much grease. Careful inspection to determine the trouble should be made before more grease is added.

(d) Cleaning of bearing:-

Great care should be exercised to keep the bearing housing immaculately clean, and only clean grease should be used. Under no circumstances should grease which has been used before be applied. Foreign solids or liquids invading the housing can completely ruin the bearings in a short time. It is important to use clean instruments and clothes when cleaning housing. The housing should be flushed clean, using gasoline or a high grade of water free kerosene.

11. WEARING RINGS :-

Wearing ring clearances should be checked from time to time. When the wearing ring clearance is increased, a loss in capacity and head is caused . If the clearance is approximately twice the original, or if the loss in capacity and head does not meet requirements, it is time to replace the rings.

12. STUFFING BOX AND SHAFT PACKINGS :-

Stuffing box should be carefully cleaned and the packing placed in them. Generally a leakage of 15-30 drops of liquid per minute from the stuffing box is excessive or the packing is worn, the entire packing in the box will have to be replaced. Replacing just a ring or two will not result in an effective sealing. The shaft and shaft sleeve surface are properly cleaned before inserting the packing

rings. There should not be any burrs or scores on the working surface. If the shaft sleeve is badly worn or scored, it is replaced.

The radial clearance between the shaft and the stuffing box is measured for determining the size of a new gland packing to be provided.

Be sure that sufficient packing is placed at the back of the water seal cage. If the water is to be pumped is dirty or gritty, sealing water should be piped to the stuffing box from clean outside source of supply in order to prevent damage to the packing and shaft. In placing the packing each packing ring should be cut to the proper length so that end comes together but do not overlap. The succeding rings of packing should be placed in the stuffing box having packing joints staggered. The packing should not be pressed too tight as it may result in burning the packing and cutting the shaft. If the stuffing is not properly packed, friction in stuffing box prevents turning the rotor by hand. On starting the pump it is advised to have the packing slightly loose without causing an air leak, and if it seems to leak, instead of putting too much pressure initially tightened up the gland gradually. The packing should be occassionally changed.

13. Pump Foundation :-

The foundation should be sufficiently substantial to absorb any vibration and to form a permanent rigid support for the base plate. This is important for maintaining the alignment of a direct connected unit. A concrete fondation on a solid base is advisable . Foundation bolts of the proper size should be embedded in the concrete located by a drawing or emplate. Apipe sleeve of about two and one half diameter larger than the bolts should be used to allow movement for the final position of the foundation bolts.

14. BENT SHAFT :-

Thermal distoration, damage during pump overhaul or wrong assembly of the rotating assembly can cause the bent shaft. Check the shaft deflection by means of a dial gauge by turning the shaft between lathe centres.

The average run out of the shaft should not be more than 0.075 mm and 0.150 mm for high speed and low speed pumps respectively. The shaft deflection should be checked with a dial gauge by turning the shaft between the lathe centres. If the shaft is found damaged it should be replaced.

15 DISTORTED CASING :-

Many a time, the casing gets distorted because of poorly aligned suction and discharge piping. This results in excessive friction between the impeller and casing. The piping and the alignment of the primemover should be checked. The wearing rings should also be checked and replaced, if found damaged.

16. PUMP ALIGNMENT :-

The alignment of the shaft is one of the important considerations. Realignment of pump is necessary after complete unit has been levelled on the foundation and again after the grout has been set and foundation both has been tightened. The alignment must be checked after the unit is piped up and rechecked periodically.

Type of misalignment

(a) Angular misalignment:-

Shaft with axis concentric but not parallel.

(b) Parallel misalignment:-

Shaft with axis parallel but not conentric.

The two halves of the coupling should be at least 4 mm apart so that they cannot touch each other when the driver shaft is rotated. Necessary tools for approximately checking are a straight edge and an out side caliper.

A check for parallel alignment is made by placing a straight edge across both coupling periphery at the top, bottom and both the sides. The unit will be in parallel alignment when the straight edge rests evenly on the coupling periphery at all positions Care must be taken to have the straight edge parallel to the axis of the shafts.

A check for angular misalignment is made by using an out side caliper across the width of the coupling faces at various points.

OPERATIONAL CHECKS FOR THE PUMPS

1. Checks for the pump before starting.

a) The shaft rotates freely.
b) The pump is primed.
c) If there is any valve in delivery branch, it is open.
d) The stuffing box (gland) is properly tightened (in case of gland packed pump)

2. Checks during running conditions :

a) The direction of rotation is correct.
b) The pump is running smoothly.
c) See that the prime mover is not overloaded.
d) Leakage through stuffing box is normal i.e. 50 to 60 drops per minute In the gland packing pump.
e) There is no leakage from mechanical seal.
f) The ball bearing do not get excessive hot.
g) Avoid idle running on operation against closed discharge valve for a longer period of time.

Part list of Centrifugal pump.

SN	Part Name	Description
1.	Air vent	A valve for removing air during priming operation.
2.	Balancing disc	The rotating member of a hydraulic or drum balancing device.
3.	Balancing ring.	The stationary member of a hydraulic balancing device.
4.	Bearing	Small smooth steel balls/rollers to reduce rotational friction.
5.	Bearing cover	A protective cover for the bearing.
6.	Bearing driving end	The bearing nearest to the coupling or pulley.
7.	Bearing housing	An overhung casing accommodating the bearings.
8.	Bearing non driving	The bearing farthest from the coupling end or pulley.
9.	Bearing pedestal	A casing with supporting feel accommodating the bearing or bearings. In the case of horizontally split casing pump, the casing includes both the lower and upper valves.
10.	Casing	In the case of multistage pump, the casing includes suction casing, delivery casing and the casing for the intermediate stage of the pump.
11.	Casing delivery	In the case of multistage pump the case which is connected to the delivery pumping.
12.	Casing lower half	The lower or supporting half of the casing of a horizontal split casing pump.
13.	Casing suction	In the case of multistage pumps the casing which is connected to the suction piping.
14.	Casing upper half	The upper or removable half of the casing of a horizontal split casing pump.
15.	Casing ring	A stationary replaceable ring to protect the casing at a running fit with the impeller ring or the impeller.
16.	Companion flanges	Flanges used to connect the pump to the piping.
17.	Coupling bolts.	Bolt provided with rubber bushes or any other flexible material for transmitting power from the driver to the pump.
18.	Coupling flexible	A device flexibly connecting the pump shaft and the motor shaft for transmission.
SN	**Part Name**	**Description**

19.	Coupling prime mover	The half of the flexible coupling half, which is fitted on the prime mover shaft.
20.	Coupling pump half	The half of the flexible coupling.
21.	Deflector liquid	A device to protect bearings by slinging off stuffing box leakage.
22.	Diffuser	A component adjacent to the impeller discharge which has multiple passages of increasing area for converting velocity head into pressure head.
23.	Gasket	A joining to provide leakage proof joint.
24.	Gland	A follower which comprises packing in a stuffing box.
25.	Grease nipple	A non return valve through which grease is pumped to the bearing.
26.	Impeller	A rotating element producing head.
27.	Impeller enclosed	An impeller having shrouds (walls) on both sides.
28.	Impeller open	An impeller without any shrouds.
29.	Impeller semi open	An impeller with a single shroud.
30.	Impeller hub sleeve	A replaceable, cylinder wearing part mounted on the extended pump impeller hub.
31.	Impeller key	A parallel side piece used to prevent the impeller from rotating relative to the shaft.
32.	Impeller nut	A threaded piece used to secure the impeller on the shaft usually provided complete with locking device.
33.	Impeller ring	A replaceable ring fitted on the impeller shroud hub where it rotates in the casing or casing ring.
34.	Interstage bushing	A replaceable bushing fitted into the stage through which the shaft or shaft sleeve rotates.
35.	Interstage crossover	A specially designed piece that carries the flow from one stage to another in a multistage pump.
36.	Interstage diaphragm	A removable stationary portion between stages of multistage pump.
37.	Interstage sleeve	A cylindrical piece mounted on the pump shaft between impellers of a multistage pump.
38	Jack shaft	An auxiliary shaft through which the pump shaft is driven.
39.	Lantern ring	Sealing liquid is supplied through the lantern ring into the stuffing box to prevent air leakage into the pump.
40.	Lubricator	A device for applying lubricant to the point of use,
SN	**Part Name**	**Description**

41.	Mechanical seal (rotating)	A flexible device mounted on the shaft in the stuffing box and lapped rotating element sealing face held against stationary face.
42.	Mechanical seal (Stationary)	A sub assembly consisting of one or more parts mounted on the stuffing stationary element box and having lapped sealing face.
43.	Packing stuffing box	A pliable lubricated material used to provide a seal around the portion of the shaft located in the stuffing box.
44	Priming funnel	A funnel used for priming the pump.
45.	Priming funnel cock	A valve to control liquid supply.
46.	Pump bracket	A casing in monosets accommodating pump on one side and motor on the other.
47.	Pump shaft	A shaft which holds the rotating impeller and transmits the power.
48.	Shaft sleeve	A replaceable sleeve for protecting the shaft where it passes through the stuffing box and stage bushing.
49	Shaft sleeve nut	A threaded piece used to locate the shaft sleeve on the shaft.
50.	Sleeve bearing	A bush type bearing
51.	Stuffing box	A portion of the casing or cover through which the shaft extends and in which the packing and gland or a mechanical seal is placed to prevent leakage.
52	Stuffing box bushing	A replaceable bushing fitted into the stuffing box throat through which shaft or shaft sleeve rotates.
53.	Suction cover	A removable piece (with which the inlet nozzle may be integral) used to enclose the suction side of the casing of an end suction pump.
54.	Wear plate	A replaceable plate against which the semi open impeller rotates.

Maintenance schedule of Centrifugal pumps

1. Daily observations

a) Leakage through packing.
b) Bearing temperature
c) Whether any under noise or vibration is present and
d) Pressure, Voltage and current reading.

2. Half yearly attention

a) Free movement of the gland of the stuffing box
b) Cleaning and oiling of the gland bolts.
c) Inspection of packing and repacking , if necessary.
d) Alignment of the pump and the drive.
e) Cleaning of the oil lubricated bearings and replenishing fresh oil. If bearings are grease lubricated, the condition of grease should be checked and replaced to correct quantity, if necessary.

3. Annual attention

Complete overhaul, painting and output test.

Note : Never neglect maintenance just to adhere to arbitrary schedule. On the other hand, do not perform unnecessary maintenance operation because this defects the purpose of the routine preventive programe.

Daily observations

1. Leakage through packing :

Water leak of 40 to 60 drops per minute is required for adequate cooling. If leakage from the stuffing box is excessive or the packing is badly worn, replace all the packings in the box. Never replace just one or two rings, they will not sent effectively. Be certain to use only the grade of packing recommended by the pump builder.

2. Bearing temperature :

In general the temperature of any bearing in a centrifugal pump should not exceed 160 °F. Before allowing a bearing to operate at any temperature above the recommended, check with the pump manufacturer. Much depend on the type of bearing, its lubricant and the duty of the bearing performs in the pump.

If any bearing is running hot, check for the cause. Ball or roller bearings may be over lubricated. Remove some grease and test under load. Hot sleeve bearing may not have enough oil, the oil rings may be stuck or broken, or the lubricant may be too thick for its job. If the oil is thought to be too thick, change it. Run the pump again. If the bearing still runs hot, dis-assemble, wash and inspect the bearing. Replace bearing. Replace worn or damaged parts.

3. Any undue noise or vibration :

If any undue noise or vibration present check for the cause and rectify, see the trouble shooting charts.

4. Pressure, Voltage and current readings :

Maintenance activities (overhaul) of the pump

Maintenance of rotating parts

1. Impeller :

a) Removing of the impeller :

Before the impeller can be removed for inspection, scale and burrs must be removed from the shaft with a file. To prevent the damage of the unbolting & removing the case, use a screw driver to loosen the impeller set screw, clean the shaft as the work progress.

If a bronze impeller is a shrink fit on the shaft, slip a metal sleeve over shaft, while the impeller is heated. Start heating of the impeller with a torch from the outside of the shroud, working towards the hub. Remove the impeller while heating it, so its temperature will be equalise. When the impeller is loose pry it off the shaft being carefull to press only against the shroud. Wear asbestos globes when lifting the next impeller or use special lifting claims supplied by the pump manufacturers.

b) Cleaning of impeller :

If the impeller is dirty, clean it carefully before its inspection. Use a soft wire brush or a steam lance to remove thick gummy residues. Scale, cock and other deposits can be removed by chemical cleaning or sand blasting. In either case, precautions must be taken to see that the impeller material is not damaged by the cleaning methods chosen. Petting of the impeller may be caused by condition, which can occur without audible noise.

c) Inspection :

After removing the impeller from a pump inspect its eye, vanes, shrouds, wearing rings, passages, hub and other parts. Wear may occur at the eye, vanes, shrouds and other impeller parts. Corrosion, cavitation and erosion are generally accompanied by a wasting away of the impeller or vane surfaces. Where the

attack is severe, the thinned suction may have holes through them or may wrap and defect.

d) Impeller Runout :

With pumps having bearings at each end of the shaft, mount the impellers, wearing rings, spacer, and shaft sleeves on the shaft and support the assembly between between centers. Set a dial gauge at zero and take readings at each and at the centre of each shaft sleeve. Also take similar readings at each impeller wearing ring. For most pumps, if the runout is not more than 0.0015 in., the assembly can be considered accurate and the shaft installed as is. If the reading is greater, check for a bent shaft, out of square, dirty, or burred impeller end of a shaft or spacer sleeve.

Check the runout on single-stage cantilevered-shaft pumps as shown in fig. If the shaft binds or the dial gage shows a runout greater than 0.0015 in., loosen the ball bearing lock nut the check the runout again. If the impeller and shaft assembly runs true, either the loc-nut washer is burred or the faces of it and the bearing are not parallel. Smooth out the burrs, tighten the lock nut, and check the runout. If there are no burrs, install a new washer and check the runout.

If the assembly runs out more than 0.0015 in. after the lock nut is loosened, dismantle and check for a bent shaft, cocked or loose ball bearing, or out-of-square abutting faces of parts on the shaft. All abutting faces should be square with the shaft centre line and parallel to each other. True up the faces in a lathe, if necessary .

e) Balance :

Badly worn or corroded impellers may vibrate excessively. While the presence of vibration is usually easy to detect, a special balancing machine is need to detect how much unbalance exists. It is usually necessary to return the impeller and shaft to the manufacturer for a check of this type.

To balance an impeller by hand, press it on an Arbor, the ends of which rest on two parallel and leel knife-edges. If out of balance, the impeller will turn and come to rest with its heavy side down. To balance the impeller, metal must

be removed from the heavy side. This must be done without imparting the pump performance or accelerating erosion. For this reason, drilling holes in the heavy side is undesirable. The best practice is to mount a shrouded impeller off centre in a lathe and take a cut from the shroud, deepest at the rim . This may be done on one or both shrouds, depending on their thickness and the amount the metal to be removed. In semiopen impellers, remove metal from the shroud If the design permits, or from the underside of the vanes of open impellers.

To check the diametrical clearance of an impeller, place it in its stage piece, and move it laterally against a dial gage. Compare this reading with manufacturer's recommendation..

2. Shaft :

Check for a bent shaft by means of a dial gauge. Badly bent shaft should be returned to the pump manufacturer for straightening. A shaft may also be checked for trueness by swinging bewton lathe or other centers and checking the runout with a dial gauge. Tap the impeller shaft key to see that it is right twist of the shaft under load, expansion or corrosion will progressively loosen the impeller.

Reconditioning a shaft :

Centrifugal pump shafts wear while in use. Typical wear points are at the packing box and other places where the friction load is high. Keep the friction wear low by using a good grade of packing and adjusting the glands evenly. Be sure that the glands follower does not ride on the shaft. As soon as the packing becomes dry, replace it.

If a new shaft is costly or wear is rapid it may pay to add tougher wear-resistance surface to the shaft at pints of sliding or rotating contact. This process is known as hard surfacing and can increase the life of some parts from four to thirty times.

3. Wearing Rings :

These are installed in the casing or impeller, or both, to take the wear resulting from rotation of the impeller, grit and other abrasives in the liquid handled and any other cause. They are replaceable at a far lower cost than either the impeller or casing, whose wear they prevent. Although wearing rings are designed for uniform clearance around their circumstances, certain conditions may cause them to rub during pump operation,

Wearing ring clearance is of extreme importance because as the clearance increase in a given pump, leakage of liquid past the rings becomes greater reducing the efficiency.

Installation in the pump :

Centrifugal pump fitted with wearing rings come supplied with the rings. So it is not necessary to install rings on a new pump. Once the rings wear, they must replaced. To do this first secure suitable replacements for the rings in the pump from the manufacturer. Remove worn impeller rings which are threaded or shrunk in place, by heating the ring with a torch, being careful not to heat the impeller. Or inset a few pieces of dry ice in the impeller eye to shrink the impeller away from the ring.

Since many impeller rings are shrink fits, heat the ring before slipping into place and pining. Insert the pin after the ring is in place.

4. Shaft Sleeves :

These wear when packed too tightly. They may be reconditioned by welding or metalling. Where the wear is extereme, replacement of worn sleeves with a new one is often recommended. Use sleeve puller to remove the old sleeves from the shaft. When the sleeve is rusted to the shaft , use the impeller nut to help loosen the sleeve. In extreme cases hammer and chisel may be needed to split the sleeve before removal. After installing a new shaft sleeve check its concentricity on the shaft.

4. Bearings :

Modern pump are supplied with a ball or roller antifriction bearings. These bearings on pumps and motors, as delivered from the factory, are usually furnished with sufficient lubrication to last for 2 or 3 months of operation. No additional lubrication should be added when first putting the unit in the service. Injury to antifriction bearings is more likely to result from too much lubricant than too little. The real purpose of the lubricant for these bearings is to form a coating on the highly polished surface as a protection against corrosion, rather than for lubrication. An oversupply of lubricant will cause excessive heating due to pumping action o the bearing. Properly lubricated antifriction bearing will require additional lubricant only two or three times a year, depending on the continuity of a service. About once a year, it is desirable that the bearings should be cleaned and flushed out thoroughly with gasoline or kerosene and then filled with fresh lubricant. In addition fresh lubricant, the bearing housing (cover) should be filled about one-forth to one-third.

Pumps fitted with plain bearings are usually supplied without any lubricant. Before starting the pump, clean the bearings thoroughly, as dirt or other foreign matter may have got into the bearing housing during transport or erection. The bearings should then be filled with a neutral mineral oil of about 300 S.S.U. viscosity at 20°C. This oil should be changed when it becomes dirty and the bearings should be cleaned again.

The bearings should be examined for wear, at frequent intervals. When first starting the pump make sure that the oil rings turn freely. During the first hour or two after the pump is started for the first, watch the bearings carefully for overheating.

Maintenance of stationary parts

Usually the repairs of stationary components is negligible. The bed plate is kept clean of grease and oil at regular intervals. The joints and piping are checked regularly for leakage etc. The foundations are kept clean. The cracks in foundation, if any are repaired in time. The surface of casing may require painting to safe guard against rusting.

Spare parts required

a) Consumable & lubricants

Adequate stocks of the following :

1. Gland packings.
2. Bolts
3. Lubricating oils.
4. Greases.

b) Replacement spares

1. Set of ball bearings.
2. Set of casing rings
3. Glands packing (in case of gland packed pump)
4. Mechanical seal (in case of mechanical seal pumps)
5. Shaft sleeve (In case of gland packed pump)
6. Bush bearing (if provided)
7. Wearing ring(If provided)
8. Capacitors (in case of single phase monoblock pump)
9. Water deflector
10. Packings.
11. Impeller

Do's and Dont's for Pumps

DO's

1. Keep the friction wear low by using a good grade of packing and adjusting the gland evenly.
2. Put the pump near the source of water, is it minimise adjusting the suction lift.
3. Plateform should be plane & rigid.
4. Pump should be proper aligned.
5. Bend should be of 90° (right angled).
6. Keep the friction wear on shaft low by using a good grade of packing and adjusting the glands evenly.
7. Spray the impeller with a rubber, plastic or metallic coating to reduce wear from liquids coating abrasives.
8. DO use recommended grade of oil or grease.
9. Do provide ample space on all sides of pump so that the pump can be Inspected while in operation and cane be serviced conveniently whenever required.
10. Keep sufficient space around the foot valve.

Dont’s

1. Don’t use any oil heavier than light motor oil (SAE 10) for bearing cleaning.
2. Don’t press the packing tightly by over tightening of the gland-nut as this may result in burning of the packing and cutting of the shaft.
3. Don’t back off the gland nut while the pump is running.
4. Dot use the pump without lubricating the bearing with grease or oil as the case may be.
5. Dot use the pump outside the recommended.
6. Dot use the pump with liquid other than specified.
7. Dot use the pump with less NOSH than recommended.
8. Dot use the pump with delivery valve fully shut for longer period.
9. Dot use the pump when misaligned.
10. Dont use the pump without lubricant to the stuffing box either external or internal.
11. Don’t use the pump unless the periodical checks as suggested.
12. Don’t use the pump with under weight on suction and delivery pipe flanges.
13. Don’t use the pump when strainer removed from the suction.
14. Never over lubricate the bearing.