

HANDPUMP REPAIR AND MAINTENANCE MANUAL

Water For People India

A pump is a device that moves fluids (liquids or gases), or sometimes **slurries**, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps.

Hand pumps are manually operated **pumps**; they use human power and mechanical advantage to move fluids or air from one place to another. They are widely used in every country in the world for a variety of industrial, marine, irrigation and leisure activities. In developing countries, generally they are used for lifting water from groundwater table for domestic use purpose.

The pump principle has changed little since its inception, whether for the piston pump invented in **275 BC** by Ctesibius, or the rope pump invented in the **1**st **century** BC in China.

Even 2,200 years ago, the Greek mathematician and physicist **Archimedes**, invented an apparatus that could raise water from rivers, so it can be used for irrigation. The apparatus is called **Archimedes**' Screw, and it is still used in many places in the world.

New Installation :

For Hand Pump Installation :

- After the formal meeting with the community, generally we decide about the need/ requirement (quantity) of water for that area.
- After it is mandatory to do a geo-hydrological (widely used study is VES) study to know about the depth of groundwater table from the "existing ground level".
- Then we should know about the history of drilling of that surroundings to know about the type of machine to be engaged for drilling
- After drilling, if possible we should have do the recuperation test, i.e. the yield of water from that bore hole
- > Accordingly, we can design the type of hand pump to be installed in that place.

Rehabilitation of the Existing Hand Pump :

Generally, reviving of the water for lifting is called rehabilitation is called rehabilitation of hand pump.

- > After getting the result of geo-hydrological study, the depth of the drilling can be decided.
- > Then as per the early bore hole internal diameter of the re-drilling should be decided.
- > Then the same procedure should be followed off as per in the case of new installation.
- > Accordingly, the depth of the raiser pipe can be decided

Renovation of Existing Hand Pump :

Usually, the meaning of the renovation of hand meant for the hand pump having the yield of water in it's bore hole.

- If contamination is available in the then required treatment can be done
- Required civil renovation can be done according to the requirement of site requirement
- The platform height can be raised according to site requirement
- > The design should be done according to present requirement of the society

For Environmental Safety or Safe Sanitation (Common to All) :

- First, we must have to know about the "High Flood Level" of that area to design the height of the platform from existing water level
- > Accordingly, the soak pit and the drainage system for waste water is decided.
- Generally, one elevated place is decided by the technocrat for the construction of the platform.
- The drainage system should be below ground lining, so that the area can be keep the area sanitized.
- > The minimum distance of soak pit from the center of the bore hole should
- Septic tanks of Latrines or for Sewage Line, the boreholes need to be keep at 10.00 meters away.
- Strom water drainage canals, ditches or houses of up to 7.00 meters.
- Garbage dumps or landfills, as well as gas stations areas should be at least 100.00 meters away.
- The soak pit of waste water of the hand pump should be keep at 3.00 to 10.00 meter or as depending upon the land availability with the required special treatment to avoid contamination of the bore hole water.
- > The drainage of the cattle shade should keep at 5.00 to 10.00 meter from the bore hole.

Introduction :

The surface water from stream, springs are generally contaminated, but the borewell with hand pump are sealed to protect harmful contaminations practically. The deep borewell with hand pump is one of the good quality water are used in many places of India. Generally, India Mark II hand pump with borewell is widely use throughout India because of it's proven workability. It is necessary to get good quality of domestic used water, for that the hand pump should be in good condition. It is also necessary that a well workable hand pump should installed properly with periodically required maintenance should be done accordingly.

WORKING PRINCIPLE OF INDIA MARK-II HAND PUMP AND THEIR PARTS :

India Mark - II Hand Pump is simply working on the principle of reciprocating pump. Its operation can be briefed as under: When the plunger is raised (upward stroke), the space in the cylinder below the plunger fills with air from the suction pipe. On the downward stroke the entrapped air is compressed between plunger and the bottom of the cylinder. Then air lifts the plunger valve and escape through the priming water. On the next up stroke, more air will be drawn out of the pipe and the water will rise higher. On the next downward stroke the plunger and valve pass through the water. When the plunger reaches the bottom of the cylinder and stops, the plunger valve closes, thus trapping the water above the plunger. The plunger will have lifted out from the pump.

The India Mark-II Pump can be divided by function into three main parts

1. The Head Assembly at top of the borewell (Pump head assembly)





2. The Pump Cylinder Assembly should be in contact with water, it should be below the water level as per the requirement (cylinder assembly)

3. The connecting assembly, which the pump stand and cylinder is connected with the help of riser main pipes and connecting pump rods (raiser rod).



PRECAUTION TO BE TAKEN BEFORE USING THE INDIA MARK-II HAND PUMP :

To increase the life and for better performance of the pump, following points should be remember before using the Hand Pump:

- i. Do not use the Hand Pump roughly.
- ii. You should operate the pump handle with slow and long stroke.
- iii. You should try to keep the area around the platform dry and don't let water collect around the, platform.
- iv. Make the proper arrangement for the disposal of waste water and if it is possible then us& the waste water for nearby gardening or by constructing soakage pit. It will avoid collection of waste water around the Hand Pump.

Soakage pit is easy to construct and can be made with locally available materials. It is a simple rectangular pit in which brick ballast of different size and soil is filled up in pit and now waste water will fall in soakage pit through open channel: Waste water being absorbed in the soil of soakage pit. It does not allow to collect water nearby and also helps to make space clean.

SI. No.	Trouble Shooting	Cause	Rectification		
1.	Easily handle of the hand pump is working without pumping water	It may due to no water at the source and well is dry.	 a) If possible we can go for re-bore for more depth b) If water is within 40.00 m. (practically) the we can be lowered the cylinder to a certain depth with increasing the height of raiser pipe and connecting rod/raiser rod. 		
		ʻOR'			
		Priming is losing in pump	Priming the pump as per the technical requirement		
		'OR'			
		The leather washer of the cylinder may be worn out/damaged	Here we should have to replace the cylinder cup washer		
		U	'OR"		
		There may be skidding of connecting rod	Tighten all the connecting rod joint and repair as per the need		
			'OR'		
		There may be broken of pump rod	Replace the rod		
			'OR'		
		Huge leakages in the raiser pipe	Replace the pipe		
		Leakage in the bottom of the cylinder	Check the bottom gasket and if required replace the gasket		

General Problems of India Mark-II Hand Pump with Rectification :

SI. No.	Trouble Shooting	Cause	Rectification	
1.	Easily handle of the hand pump is working without	The outer wall of the cylinder may cracked	Replace the cylinder	
	pumping water	'OR'		
		There may be chocked in the suction pipe	Clear the chock and clean all pipes with clear water and cotton clothes	
2.	Hand pump is working properly, but the delivery of water is quite low	Plunger leather may be damaged	Replace the plunger leather	
			ʻOR'	
		Recuperation of the bore well is very less	Make arrangement for recharge of borewell or make required technical repair	
			'OR'	
		Leakages in valve	Repair if repairable of replace the valve	
3.	Pump needs too many strokes to deliver water	The vertical/horizontal alignment of the priming is turned out	Realigned the priming of the hand pump head assembly	
			'OR'	
		Cup seals of the cylinder may be damaged	Replace the cylinder seal	
4.	Handle of the pump is getting up after down stroke automatically	There may be a chock in the raiser pipe or cylinder	Remove all parts of inside head assembly, i.e. raiser pipe and cylinder clean all and then fix them. 'OR'	
		There may be less in the height of suction pipe	Fix raiser pipe as per the requirement and technical specifications	
			'OR'	
		Water level of the borewell is below the cylinder	Add some more raiser pipe so that the cylinder should be at least more than 10.00 m. (as per recuperation)	
5.	More noise created at the time of pumping	Handle & other parts of head assembly may be loosened	Tighten all parts of the head assembly and if required replace the required parts	
	'OR'		'OR'	
		The connecting rod may be not correct in size	Check the size of connecting rods and if required replace or repair	
			'OR'	
		Due to loosen of connecting rods	Check properly and tighten the connecting rods	
			'OR'	
		Level alignment of the top flange is incorrect	Check the level of top flange, pump stand and if required realigned them	

SI. No.	Trouble Shooting	Cause	Rectification	
5.	More noise created at the time of pumping	Ground fixing of the hand pump stand is loosened	Dismantle the bottom concrete seal and fix it properly with leveling and with M10 PCC	
		ʻOR'		
		Dried up of lubricant in	Lubricate all required parts of the	
		the head assembly	head assembly	

INDIA MARK-II HAND PUMP INSTALLATION :

General Comments :

Sustained safe drinking water supply and sanitation facilities are essential to improve the living conditions of the rural population. The provision of safe water helps to combat water borne diseases and improves community health in general. Benefits of a safe water supply can reach far beyond considerations of public health and have a positive influence on the general wellbeing, economic status and quality of life in a community.

Protection of Water Source :

If a good site is chosen and the well drilled (or dug) into the ground at a site which is elevated and away from water logged areas during the rainy season, the water which percolates from an underground aquifer into the well should be pure enough to drink.

However, a water point obviously attracts a great deal of human contact. This is a potential source of contamination and should be protected against. The safety measures are as follows:

Well Siting :

- a) The well should be in an elevated place, so that during the rainy season the water will run away from it, rather than into it.
- b) It should be at least 10.00 meters away from a latrine and should be the site is situated in the uphill of the latrine.
- c) It should be at least 10.00 meters away from a cattle kraal, and uphill of the kraal.
- d) It should be well away from any depressed area in the ground, such as hollows used for rubbish dumping, hollows used for brick making or any other areas where water might collect.
- e) A good quality platform as per technical specifications should be constructed with required volume of soak pit.

Disinfecting the Borewell :

As soon as the curing time is over and the platform is ready for installation of the handpump, the well needs to be disinfected with chlorine.

Many of the diseases that are common in the communal lands are carried by water, especially from unprotected wells, natural water path, stream, rivers and dams.

Dysentery, diarrhea and typhoid can arise because of drinking water that is infected. The disease carrying organisms found in the water can be effectively killed by disinfecting the water with chlorine.

Therefore, it is recommended to disinfect the well shortly before the installation of the handpump takes place. Proceed as follows:

Mix 300 grams of bleaching powder thoroughly in 15 liters of water in a bucket and pour the solution into the borehole.

- The required dosage of bleaching powder is depending of the amount of water stored in the well.
- It is recommended to use between 150 to 200 grams of bleaching powder per cubic meter water for safe disinfection.
- In some places, due to massive fecal contamination the requirement of potassium permanganate is required. For the application of this chemical, please consult with public health department.

Cylinder Setting :

Static Water Level (SWL)

One of the important factors for the cylinder setting is the surface of the water in a well, which is called "Static Water Level" (SWL). The SWL can vary due to seasonal conditions (dry or wet seasons) and therefore should be checked and recorded over a period of several years. Such records would be important for the decision at what depth the cylinder should be placed.

Dynamic Water Level (DWL)

Apart from seasonal fluctuations, there are also fluctuations in the well itself because of pumping water from the well. To check the drop in the water level (draw down) and to find the DWL, test pumping on a new borehole should be done by the drilling crew.

For handpumps, the test pump should be set for 1,000 liters per hour (maximum) to see where the DWL is reaching. These tests should be continued for approximately 2 hours, to ensure the correct DWL. This figure is another important factor for deciding on the best setting depth of the handpump cylinder. (On marginal holes, pumping rate might be reduced to 800 liters/hour.)

Other Important Factors :

- Any pump intake in a borehole must be set above the well screen in fully screened well or above any rock fissures providing water in an unlined well. A pump intake above the well screen or rock fissures is minimizing the turbulent flow of water and therefore reduces the pumping of fines and silts.
- Pumping water with a too high content of fines or silt is wearing the surface of the pump cylinder and the plunger seals in an unacceptable rate.
- If a pump cylinder is placed too close to the bottom of a borehole, silt and sand could build-up and trap the pump in the hole.

Cylinder setting in Boreholes :

Check the depth of the DWL and the depth where the well screen starts (information must be available from the drilling crew). The start of the well screen should be considerably lower than the DWL. If there were a large difference, it would be ideal to place the cylinder approximately 1.00 meter above the well screen. Check the SWL regularly, especially during the dry season, to avoid that the newly installed pump is running dry. Should the cylinder setting depth be critical during the dry season, add one length of riser pipe and one pump rod.

Preparation Work Prior to Installation :

Riser pipes and Pump Rods

- Step 1 Check all pipe threads with socket for good engagement.
- Step 2 Check all pump rod threads with couplers for good engagement.
- Step 3 Apply hemp fiber with grease or sealing liquid to one threaded end of all pipes and attach one socket.
- Step 4 Place several logs or a pipe stand near the installation place.
- Step 5 Place all prepared pipes neatly on top of the logs or pipe stend (above the ground) so that all



stand (above the ground) so that all threads remain clean.

Step 6 Introduce one pump rod to each of the riser pipes and make sure that the long hexagonal couplers are on the same side as the riser pipe sockets.

Pump Cylinder

> **Step 1** Assemble all components of the plunger



Place Rubber seating to the Upper valve

Attach a Cup seal to the lower part of the Spacer





> Step 2 Assemble all components of the check valve body.



Assemble Check valve with Check valve seat Place Rubber seating and secure with Seat retainer

> Step 3 Assemble the Pump Cylinder

Prior to assembling check cleanliness of cylinder liner and clean all threads and prepare them with sealing fluid or hemp fiber with grease (cylinder pipe and Reducer caps).



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- > **Step 4** Leakage Test Proceed as follows :
 - \checkmark Immerse suction part of cylinder into a bucket with clean water
 - ✓ Operate the plunger by pulling and pushing the plunger rod
 - \checkmark As soon as the cylinder is filled, place it in a vertical position and check for any leaks



Preparation of "Above Ground Components" :

> Step 1 Assembling of Pump handle



Take two spanners (19 mm) and tighten the nut of the Bearing mounting tool, so that both all bearings are pushed into their end position.

If Ball bearings are mounted, remove Bearing mounting tool.



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Step 2 Assembling of Pump head

Introduce the pre-assembled Pump handle into the Pump head assembly and place the Ball bearings near the Axle bushes at the sides of the Pump head.



Knock the handle axle gently into the end position (use a plastic hammer if available).





Introduce Axle washer and fasten one nut by hand

If the pump handle is moving smoothly (up- & down), take second nut as a check nut to secure the correct position.

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Sequences of India Mark-II Hand Pump Installation :

"Borewell Components"

- > **Step 1** Take the first riser pipe with pump rod from the logs. Place it horizontally on the pump platform and connect the pump rod to the plunger rod of the cylinder.
- **Step 2** If the pump rod is tight, apply hemp fibers with grease, sealing liquid or Teflon tape to the pipe thread and screw the riser pipe into the reducer cap of the cylinder.
- > Step 3 Tighten riser pipe with reducer cap of the cylinder with two pipe wrenches.
- > **Step 4** Lower the first riser pipe with cylinder into the pump stand (by hand) until the riser pipe protrudes the top face of the pump stand by approximately 50 cm.









Step 5 Introduce the pipe vice and fasten the riser pipe in this position (ideal working height).



Step 6 Take the second riser pipe with pump rod from the logs, connect the pump rods first and then the riser pipe after hemp fibers with grease, sealing liquid or Teflon tape has been applied.



Step 7 With the help of the two lifting spanners, the rising main can be lowered after the pipe vice has been opened and removed.



Step 8 Proceed in the same manner until the last pump rod and riser pipe is connected.



Please Note : As soon as the rising main is too heavy for being handled with the lifting spanners (5 to 10 pipe lengths), attach the pipe clamp and connect it with the hook of the chain block. Lower the rising main with the help of the chain block on the tripod until the height required (50 cm) for the next connection is reached!

Step 9 At the end of the last riser pipe located in the pipe vice, the water tank will be attached. Therefore, take off the last socket of the last riser pipe and re-apply hemp fibers with grease or sealing liquid to the pipe thread.



Step 10 Then the water tank is screwed onto the last pipe end and tighten by hand.



Step 11 (A) (For shallow installations, when rising main is not heavy). With the help of a short piece of riser pipe attached to the socket in the water tank, the entire rising main can be held in place with the help of 2 or 3 lifting spanners. As soon as the pipe vice has been removed, the riser pipe assembly with water tank can be lowered slowly to the pump stand flange.



Step 11 (B) (For deep installations with heavy rising main assemblies). With a short piece of rope attached to the hook of the chain block, the water tank can be held securely in position, so that the pipe vice can be removed from the pump stand. Then the water tank with rising main attached can be slowly lowered to the pump stand flange.



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Step 12 Turn the water tank so that the spout is pointing into the required direction and tighten it properly to the pump stand with 4 x M12 bolts and nuts. Now the installation of the "above ground components" can start.



Installation of Components "Above the Ground"

Step 1 The protruding last pump rod needs to be cut to the exact length, so that the plunger connected is not knocking the check valve or the cylinder cap during pump operation.



Step 2 Use a hacksaw for marking the exact length of the last pump rod (at the top face of the water tank flange).



Step 3 Lift marked pump rod for easy cutting and fasten with connecting rod vice on the top flange of the water tank. Take a clean piece of cloth and wrap it around the marked rod, to prevent metal shavings or oil from falling into the well (contamination).



> **Step 4** Cut last pump rod at the mark.



Step 5 Remove sharp edges and make a nice chamfer prior to threading.



Step 6 Use little oil for cutting the M12 tread (40 mm long). As soon as thread is finished, remove cloth carefully and clean pump rod, vice and pump stand from remaining oil and shavings. Prevent shavings from falling into well.



Step 7 Insert middle flange.



Step 8 Allow middle flange to rest on top of connecting rod vice and fix the check nut on the newly threaded top rod.



Step 9 Screw the chain coupler on the connecting rod threads by hand.



Step 10 Tighten check nut of connecting rod with the chain coupler.



Step 11 Insert chain coupler supporting tool below the chain coupler. Hold middle flange and remove connecting rod vice.



Step 12 Carefully lower the middle flange to the top of water tank and ensure that all four corners coincide.



Step 13 Hold head assembly in position and insert chain through the hole in the bottom/ flange. Lower head on top of middle flange ensuring all four corners to coincide.



Step 14 Tighten head, middle flange and water tank with bolts and nuts.



Step 15 Lift handle up and attach free end of the chain with high tensile bolt, washer and "Nyloc" nut.



Step 16 Tighten "Nyloc" nut.



Step 18 Lift handle up and apply grease on the chain.



- > Step 19 Make sure :
 - ➔ that the connecting rod moves up and down freely. If it does not, the rod has been bent. Check the rod,
 - → that the chain coupler is fully engaged on the connecting rod and that the lock nut is tight,
 - → that the axle nut and lock nut on the handle are tight,
 - → that the handle axle is firm in place,
 - → that the "Nyloc" nut has been tightened securely with the chain anchor bolt,
 - → that all 8 flange bolts and nuts are tight,
 - → that nothing has been left inside the pump head (tools, cloth etc.).
- > **Step 20** Fit inspection cover.



> **Step 21** Tighten the cover bolt.



- Step 22 Now the handpump must be operated for first filling of the rising main pipe. Depending on the depth of the cylinder setting, the pump handle should have to be operated for many strokes (as an example: a 40.00 m. cylinder setting requires approx. 100 full handle strokes for filling the entire rising main).
- Step 23 As soon as the water is flowing from the spout, operate the pump for another 100 full strokes. Check whether the water is



clean (no oil or dirt). If the water is not clean, the pump operation needs to be continued until the water is acceptable.

- Step 24 If the water quality is acceptable (optically), the leakage test and the discharge test must be made.
- Step 25 If the India Mark II Pump is working as expected, the users must be instructed in "Operation and Maintenance" (O&M) of their pump.
- > **Step 26** Don't forget to fill the "Installation Card".

TOOLS REQUIRED FOR DISMANTELLING/IINSTALLATION OF INDIA MARK-II HAND PUMP :

Pump dismantling may be required for rectification of previously mentioned trouble. So, for as repair and dismantling of pump is concerned, it is necessary that one should arrange some special tools as detailed below :

Self-Locking Clamp/Locking Clamp : It will help at the time of pulling and lowering of riser pipe. If self-locking clamp (Figure-A) is not available, then arrange/fabricate two pieces of such type of clamp (Figure-B)



> Pipe wrench, Slide Wrench and Spanners : Size as per requirement.



Tool for holding the Chain Coupler : It helps to attach the chain with handle and will be use between chain coupler and head assembly flange (Figure-C)



> **Tool for lifting/lowering of the pump rod :** As per requirement, pump rod can be lift out with the help of lifting tool (Figure-D)



Pump rod vice : It is use for holding the pump rod at the time of repairing or thread cutting (Figure-E)



> Other general tools : Hammer, Screw Drivers, Punch and Pipe wrench etc.





DISMANTLING OF PUMP :

For dismantling of pump for repairing, at first remove the inspection cover from head assembly refer (Figure-F)



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Fix the tool for holding the chain coupler inside the head assembly, refer (Figure-G).

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Release the chain with handle after loosen up the nut and bolt in the upward position of the handle, refer (Figure-H)

- Now, carefully release the handle axle by using the punch and hammer. Again, release the handle and flange bolts from head assembly.
- Insert the pipe spanners in the both side holes of the head assembly and lift the head assembly in upward direction, refer (Figure-I)



- Fix the pump rod vice in the flange of water tank after lifting of head assembly in upward direction and make assure the holding of pump rod with the vice
- Rotate the head after loosening the lock nut of head assembly. Remove the chain assembly and head assembly.

Remove the pump rod vice after lifting the pump rod in upward direction with the help of lifter (pump rod clamp). Remove the lifter after lowering of pump rod in downward direction, refer (Figure-J)



Again, hold the riser main pipe by self-locking clamp/locking clamp and remove the water tank after loosening of bolts of bottom flange of water tank

- Collect the riser main pipe and pump rod at a dean place after dismantling. Remove the self-locking damp/locking clamp at the time of dismantling of last riser pipe and pump rod.
- > Dismantle the last riser pipe and pump rod from cylinder by hand after pulling the last pipe connected with cylinder assembly and to the last pump rod.
- Check the all threads of the dismantled pump rod and riser pipe and remove the rust & dust with help of emery paper. If it is necessary, then make the new thread on the riser pipe/pump rod. If the pump rod has been damaged/bend, it is advisable to replace the old (damaged) pump rod by new.

REASSEMBLY OF THE PUMP :

After repairing reassemble the pump properly-As per following Instructions :

- At first joint the plunger rod with pump rod (first pump rod) and pump cylinder with riser pipe (first pipe) and tighten property after applying the sealant on the threads. After tighten the pump rod and riser pipe if you feel there are excess sealant then remove it otherwise it will increase the impurities in the tube well.
- Now lower the cylinder, first pump rod & first riser pipe in the tube well through the pump stand assembly.
- Properly hold the riser pipe with the self-locking clamp/clamp. Again, joint the first pump rod with second pump rod and first riser pipe with second pipe and tighten it properly after applying the sealant on threads.
- Lower the pump rod and riser pipe slowly and slowly after loosening of locking clamp. Repeat the same process up to last pump rod and last riser pipe.
- Lock the last riser pipe with locking clamp
- > Mount and tighten the water tank on the threads of last riser pipe
- Hold the riser pipe properly with the help of pipe wrench after tighten a small piece of pipe in the coupling of water tank. Release the locking clamp from stand (after loosening the riser pipe).
- Lower the water tank carefully in down ward direction and fix it on the flange of pump stand.
- > Release the excess piece of pipe which is fitted in the coupling of water tank.
- > Tighten the all four nut and bolts of the water tank & pump stand flange.
- Lowering the last pump rod carefully in down ward direction after fixing of lifter on the threads of last pump rod and hold it properly in pump rod vice.
- Release the lifter from pump rod after properly resting of pump rod vice on water tank.

- Lowering the pump head through pump rod in down ward direction up to pump rod vice and tighten the chain to pump rod (up to three or four threads only) now.
- > Tighten the chain coupler by the revolving of pump rod.
- > Put the chain coupler holding tool inside the pump rod.
- Allow the lowering of pump rod (after loosening of pump rod vice) up to resting of chain coupler on chain coupler holding tool.
- Release the pump rod vice after pulling the pump head in upward direction with the help of pipe spanners.
- Rest the properly pump head on water tank after carefully lowering of pump head in down ward direction.
- > Put the handle assembly inside the pump head.
- Insert the handle axle inside the hole with the help of punch and hammer. Tighten the all nuts with the help of spanner.
- Connect the chain with handle and be sure that handle shall be in upward position at the time of connection.
- Tighten the nuts of chain & handle by spanner and make the proper lubrication on chain with grease.
- Make the handle in down ward direction and release the tool (tool for holding the chain coupler).
- Now, be assure that all nut & bolts are tighten properly and after assuring mount the inspection cover on head assembly and tighten it.

Finally, start the pumping but it is advisable not to use the water at the first delivery and after 10-15 buckets the water can be used.

As chlorination of tube well is necessary after repairing work therefore pour the chlorine solution into tube well. Remember that hand pump must not be used at least for six hours after chlorination.

THE STANDARD TOOLS REQUIRED BY A COMMUNITY HAND PUMP MECHANIC/JALBANDHU

SI. No.	Tools	Quantity	Unit
1.	Button Die to Suit M12 x 1.75 Threads		No.
2.	Die Set for 32/40 mm. Pipe	1	No.
3.	450 mm. Pipe Wrench	2	Nos.
4.	M17 x M19 Double Ended/Single Ended Spanners (10 mm. x 12 mm.)	1	No.
5.	600 mm. Pipe Wrench	2	Nos.
6.	Screw Driver 300 mm. Long	2	Nos.
7.	10 lb. (ball Point Hammer)	1	No.
8.	Hack Saw Frame and Blade (300 mm.)	1	No.
9.	Injectable Oil Can (200 ml.)	1	No.
10.	Wire Brush	1	No.
11.	250 mm. Half Round File with Handle	1	No.
12.	250 mm. Flat File with Handle	1	No.
13.	Graphite and Lithium Grease	200	MI.
14.	Slide Wrench	1	No.
15.	Nylon Rope (4 Strung)	75.00	М.

REPAIR AND REHABILITATION PROCEDURES :

For installing or dismantling a borehole, at least two trained people are required to oversee and guide the unskilled labor force. The technicians should ensure that they have a complete tool box with all the required tools for installing / dismantling including an extension rod of about 30.00-50.00 cm. length.

THE ROLES OF THE WATER USER COMMITTEE IN ENSURING THE FUNCTIONALITY OF THE WATER POINT :

- Mobilize community members to participate in water source protection for example Building the fence, and regular cleaning of the surrounding.
- > Keep an updated list of the water users in the community.
- > Collect and keep contributions towards the construction cost and the O&M funds
- > Regularly visit and monitor the condition and performance of the water point
- Verification of the purchase of materials needed for the repair or maintenance of the water source.
- > Pay for any repairs carried out by a mason or hand pump mechanic.
- Supervise and provide support to the water source caretakers.

THE ROLES OF THE CARETAKERS :

- Show people how to use the water point properly
- Carry out regular maintenance of the water point for example sweeping and slashing around the borehole.
- Keeping record of all the maintenance work carried out on the source either directly by the caretaker or by a (HPM) Hand Pump Mechanic (*Jalbandhu*), plumber or mason.
- Mobilize community members to participate in maintenance activities for example regular cleaning of the surrounding of the water source, advice the community on regular cleaning of containers both for storage and collection.

GENERAL MAINTENANCE GUIDELINES :

The India Mark II deep borewell with hand pumps are to be properly maintained to ensure safe potable drinking water to the community, without break down. Proper and regular maintenance will prevent breakdowns. The moving parts in the India Mark II hand pump above and below the ground level are few and therefore simplifying the maintenance of the hand pump.

The following schedule of maintenance has been drawn at fixed intervals and has been explained more elaborately.

I. Once in 30 days :

- i. Tighten the handle axle nut and lock nut
- ii. Look for loose or missing flange bolts and nuts
- iii. Open the front of the head cover and clean inside the pump.
- iv. Check the chain anchor bolt for proper fitment. Tighten if necessary.
- v. Clean the chain assembly. Apply graphite grease.
- vi. Look for rusty patches and clean them.
- vii. Check whether the hand pump base is losing in the foundation. In case it is loose an arrangement should be made to redo the foundation.

II. After 365 days (One year)

- a) Examine the pump carefully and check whether :
 - i. Discharge is satisfactory
 - ii. Handle shaky and not firm
 - iii. Guide bush has excessively worn out

- iv. All bolts, nuts and washers are in position
- v. Chain has worn out
- vi. Roller chain guide is excessively worn out
- b) Overhaul the pump and follow the instructions :
 - i. If chain, bearing spacer are damaged, replace them
 - ii. If roller chain is badly worn out, replace the handle assembly
- iii. If there are any damaged pipes have them replaced
- iv. Open out the cylinder assembly and replace cup washers, sealing rings and other components found to be faulty
- v. Check the condition of the water tank riser holder. If the threads are worn out, replace water chamber
- vi. Check for any other seam line failures or cracks
- vii. Re-install the pump as in the training

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REFERENCES