

**JAPAN INTERNATIONAL COOPERATION AGENCY  
MINISTRY OF RURAL DEVELOPMENT, CAMBODIA**

**THE STUDY ON GROUNDWATER DEVELOPMENT  
IN  
CENTRAL CAMBODIA**

**FINAL REPORT  
EDUCATION MATERIALS  
(REVISED EDITION)**

**MAY 2002**

**KOKUSAI KOGYO CO., LTD.**

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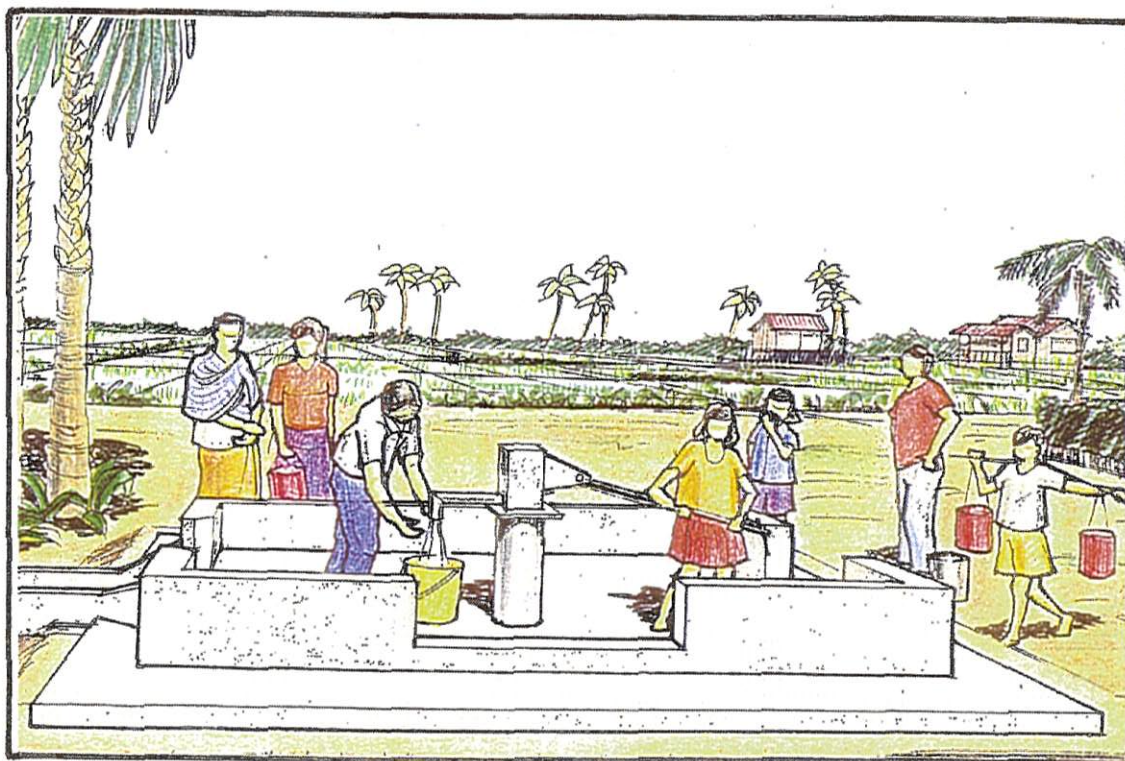
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(Khmer Version)

**Text 1**

**Operation and Maintenance Manual of the Pilot Well**  
**Water Supply Facility**  
**(English Version)**

**OPERATION AND MAINTENANCE MANUAL  
OF  
THE PILOT WELL WATER SUPPLY FACILITY**

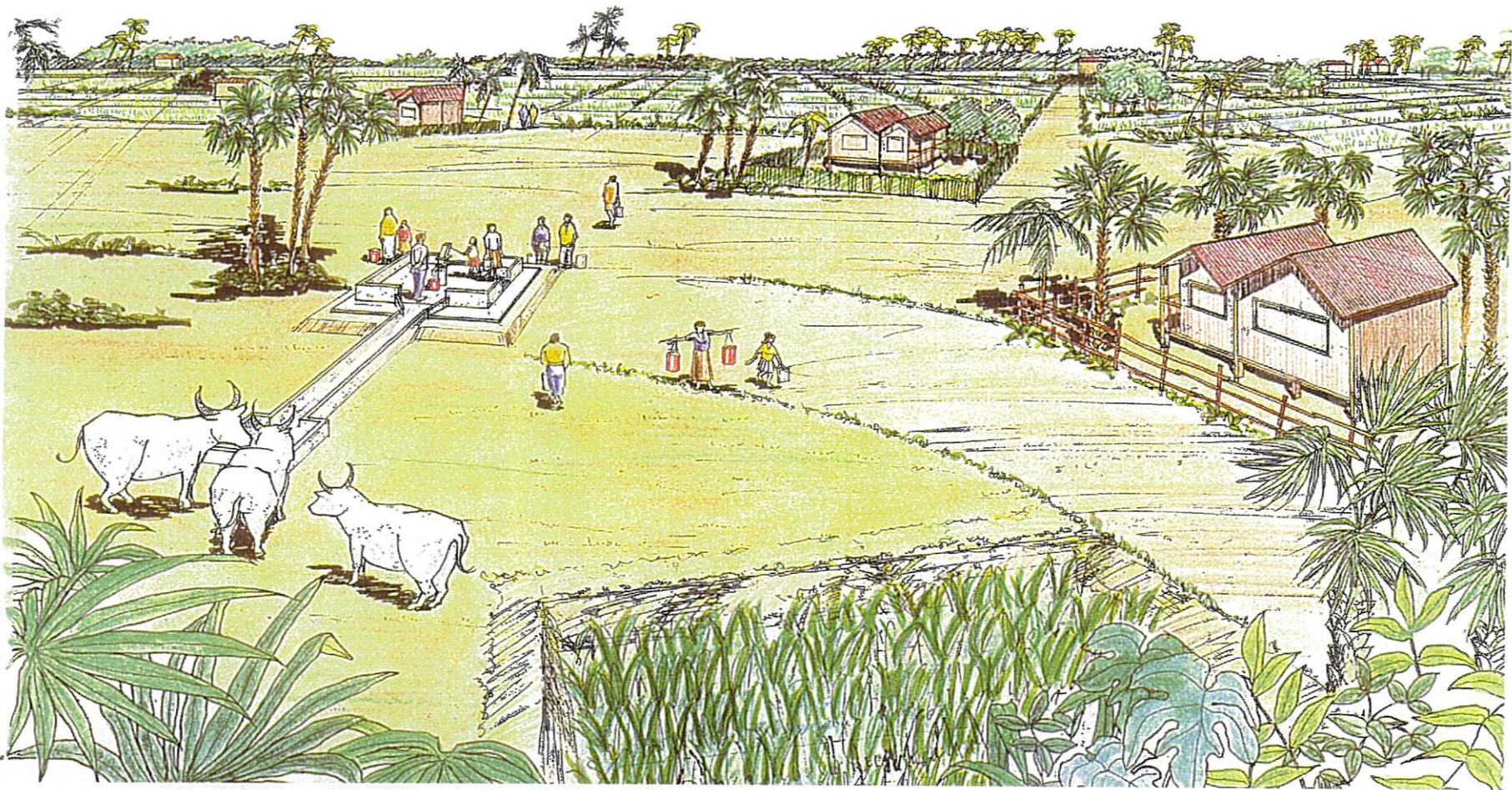
**FOR THE STUDY ON GROUNDWATER DEVELOPMENT  
IN CENTRAL CAMBODIA**



**MAY 2002**

**MRD / JICA**





## **1. Feature**

This manual is prepared by the Ministry of Rural Development (MRD) and the JICA Study Team for the purpose to achieve the village level operation and maintenance (VLOM) and to ensure the sustainability of wells constructed in the pilot study villages. This manual is aimed to be used by not only users but also concerning Cambodia government staffs.

This manual shows the methods how to repair and handle these hand pumps and countermeasures against problems that may arise with the use of the hand pumps.

## **2. Guidelines for Hand Pump Facility Usage**

- The hand pump is public property and will be used with care.
- The handle of hand pump will be operated with a long and smooth motion and not in a rattling manner.
- The hand pump will be used holding the end of the handle.
- Children will be prohibited to play with the hand pump.
- The platform will always be kept clean and the concrete surface dry.
- The area designated for laundry, bathing and toilet will be located at more than 30 meters away from hand pump.
- The platform and drainage shall always be kept clean.

## **3. Guidelines for Hand Pump Facilities Maintenance**

- The platform and drainage are public properties and will be kept clean at all times.
- The vicinity of platform will be kept clean at all times.
- Disposal like trash, leftovers, or tree leaves in vicinity of hand pump is strictly prohibited.
- The drainage canals will be kept clean at all times.
- Access pit will be constructed 30 meters away from water source.
- The hand pump bolts, nuts, etc., will be greased.
- The hand pump bolts, nuts, etc., will be tightened.
- Any damage to the platform, drainage canals surrounding embankment, etc., will be repaired immediately.
- Any defects or damage to the hand pump will immediately be reported to the WPC who will report to PDRD for technical support.



#### **4. Roles of Caretakers in Technical Aspect**

- To conduct daily and regular inspection.
- To check whether hand pump handle is functioning well.
- To check whether all bolts and knots are tight.
- To check whether pump axle are tight.
- To check nuts are properly greased.
- To check whether pump interior is clean.

#### **5. Facility Maintenance Outdoors Repair**

To make it a pleasant place of commune, the platform will be kept clean at all times. Leaving the surrounding unclean after the conduct of various activities, e.g., bathing, dish washing, laundry, could lead to the breeding of mosquitoes and contamination of the water, the latter resulting from the seepage of dirty water into the well. Platforms and drainage canals will constantly be kept clean by conducting regular inspections, to create and maintain a clean and pretty environment.

To ensure the sustainable use of the hand pump by villagers, caretakers will regularly conduct inspection, visually check hand pump perimeter, grease machinery coarsened by rain and wind, and tighten loosened bolts and nuts.

#### **6. Operation & Maintenance of Hand Pump by Caretakers**

In case hand pump suffers breakdown, caretaker will effectively conduct repair or replacement of spare parts using the tool provided. Any breakdown, however minor, will not be left unattended.

In case of major breakdowns, caretakers will discuss any possible countermeasure with WPC. The details of repair will be entered into the repair order form and immediately submitted to PDRD Office. In reply, PDRD will immediately dispatch rural water supply mechanics to the site. Water use charges will be collected from the beneficiaries by WPC to establish water fund for operation and maintenance.

#### **7. Explanation of Important Documents**

##### **(1) Supporting system for WPC**

The communication system between village water committees and the central government office shall be in accordance with the supporting system. In case of any

abnormalities in the hand pump, countermeasures will be immediately taken in accordance with the system as explained below:

**1) Record of Repairs**

In case the hand pump undergoes several breakdowns or needs spare parts replacement, the date to be broke down, the date to be repaired, repair fee, cause of breakdown, and the person handling the repair will be specified in the form for record keeping.

**2) Repair Order Form**

In case of major facility breakdowns, the details will be discussed with the chairperson of WPC and entered into the order form, and PDRD will be contacted by WPC through caretakers. PDRD shall immediately dispatch water supply mechanics for facility repair.

**3) Spare Parts Application Form**

In case spare parts are needed for the repair of minor breakdowns which are to be carried out by caretakers, the required parts will be specified in the application form. PDRD Office will be informed by VWC. PDRD will immediately transport required spare parts to the site.

**(2) Receipt of delivery of spare parts and tools**

The completion of hand pump operation and maintenance education programs would ensure sustainability of hand pump use. PDRD will be provided with the necessary spare parts and WPC will be provided with tools in order for the beneficiaries to independently conduct minor repairs. The spare parts and tools shall be stored properly to avoid misuse and loss.

A receipt will be required for the provision of spare parts and tools. Using the drawings as reference, PDRD will confirm spare parts. The receipt shall bear the signature of the village chief, WPC chairman and caretakers.

**(3) Hand pump installation**

The hand pump installation and spare parts replacement methods will be carried out as specified in the drawings.

**(4) Well/hand pump monitoring form**

This form will be used during the conduct of regular inspection, to ensure the exhaustive conduct of facility use, operation and maintenance conditions, as well as the



beneficiaries' know-how.

## **Appendix**

**Appendix 1:     Manual of Hand Pump**

**Appendix 2:     Manual of Iron Removal Device**

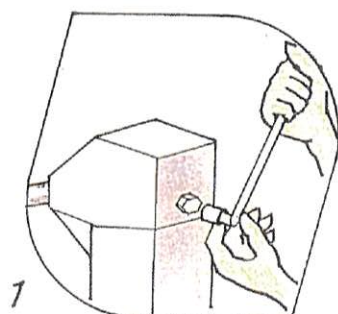
**Appendix 3:     Manual of Disinfections of Wells**

**Appendix 4:     Contents of Technical Training**

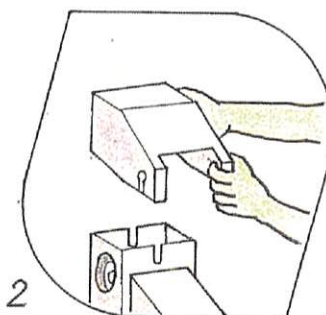
**Appendix 5:     Forms for Operation and Maintenance**

## Appendix 1

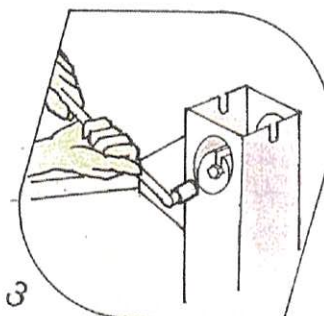
### Manual of Hand Pump



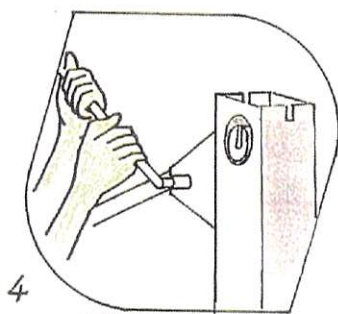
1 LOOSEN THE COVER BOLT



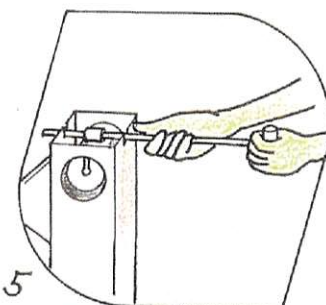
2 REMOVE THE PUMP HEAD COVER



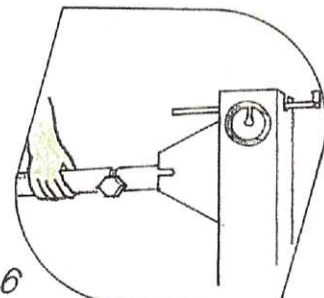
3 HOLDING THE HANDLE IN POSITION  
(SUPPORTING THE PUMP RODS),  
LOOSEN NUTS AND TAKE OUT THE HANGER PIN



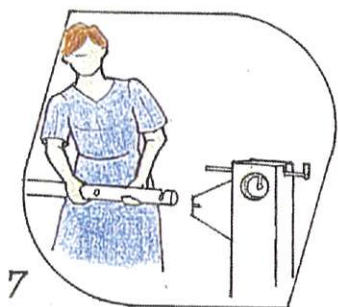
4 LOOSEN THE FULCRUM PIN



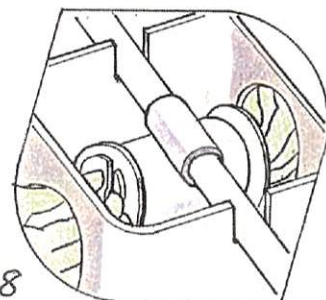
5 INSERT SPANNER INTO THE ROD HANGER



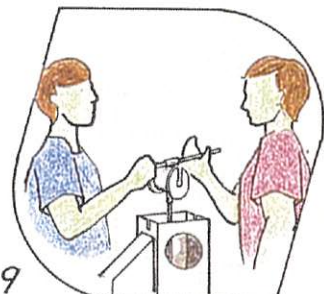
6 REMOVE THE HANDLE



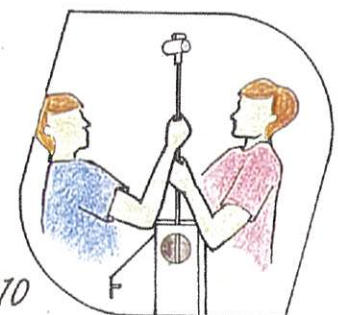
7 PULL OUT CAREFULLY THE SLOTS ON THE HANDLE  
FORKS FROM PUMP HEAD BODY



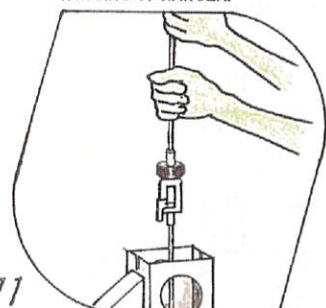
8 PULL OUT THE ROD HANGER PIN  
AND THE PLASTIC BUSHES FROM THE  
HOUSING OF HANGER.



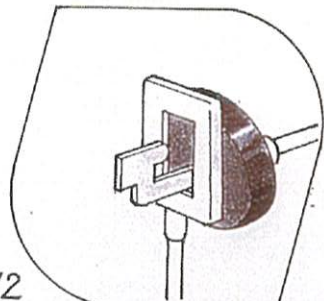
9 HOLD THE SPANNER AND PULL UP  
THE CONNECTING ROD



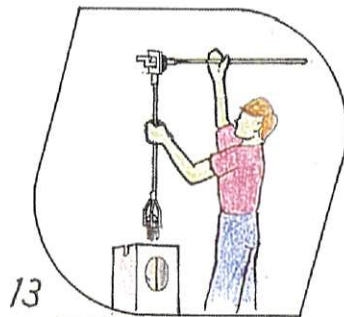
10 PULL UP THE CONNECTING ROD



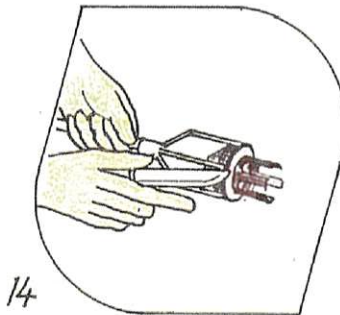
11 CONTINUE REMOVING AND PULL UP  
THE CONNECTING ROD



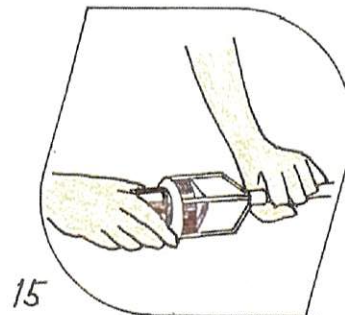
12 LIFT UP THE CENTRALISER AND PULL OUT  
THE CONNECTING ROD THROUGH  
THE EYE CONNECTOR



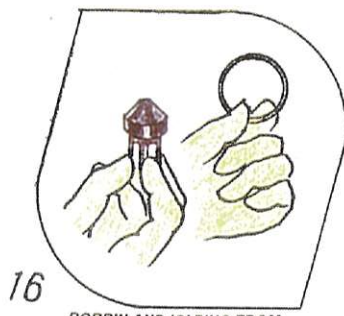
13 PULL UP THE ROD TILL THE PLUNGER VALVE APPEARS.



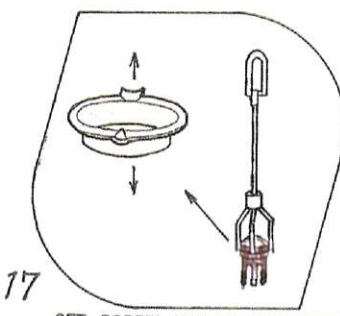
14 CUT AND REMOVE 'O' RING FROM THE VALVE BOBBIN



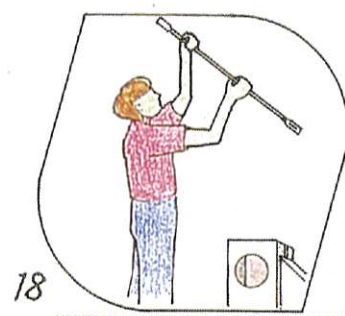
15 SEPARATE FOOT VALVE FROM THE VALVE BOBBIN



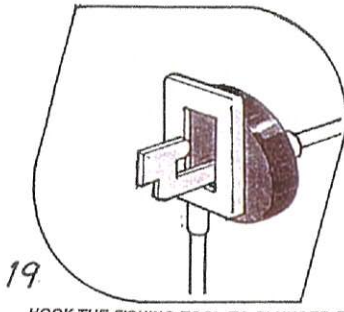
16 BOBBIN AND 'O' RING FROM THE FOOT VALVE



17 SET BOBBIN INTO THE BUSH BEARING ASSEMBLY



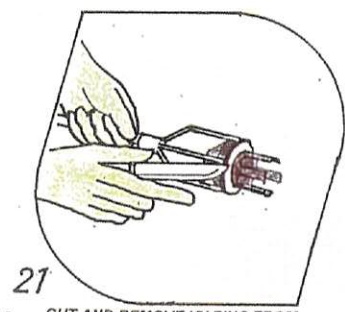
18 INSERT FISHING TOOL INTO THE RISING MAIN



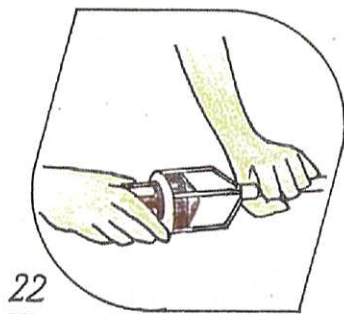
19 HOOK THE FISHING TOOL TO PLUNGER ROD THROUGH EYE CONNECTOR AND PLACE ROD CENTRALISER OVER THE EYE



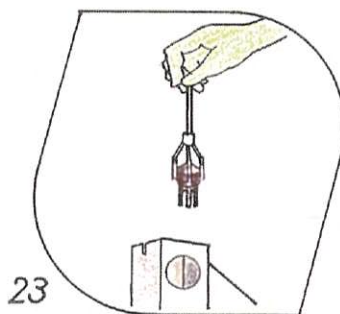
20 CONTINUE JOINING AND LOWERING THE ROD TILL THE PLUNGER TOUCHES THE FOOT VALVE



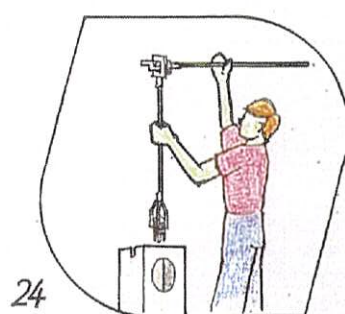
21 CUT AND REMOVE 'O' RING FROM VALVE BOBBIN



22 SEPARATE FOOT VALVE FROM VALVE BOBBIN

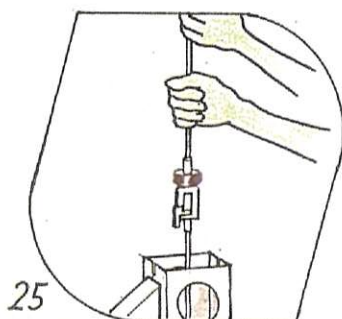


23 HOLD THE FOOT VALVE BY PICK UP DEVICE AND DROP INTO THE RISING MAIN



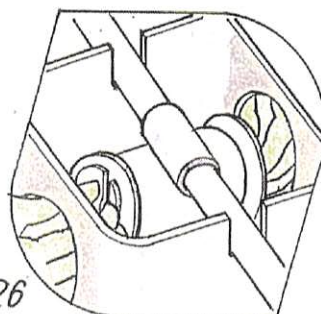
24 LOWER PLUNGER AND ROD INTO THE RISING MAIN





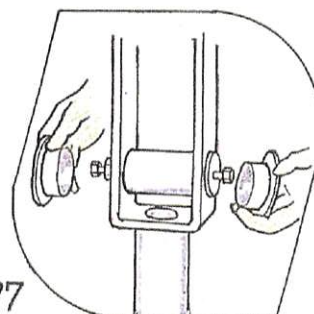
25

HOOK THE FIRST ROD INTO THE EYE OF PLUNGER ROD. PUSH ROD CENTRALISER IN PLACE OVER THE EYE



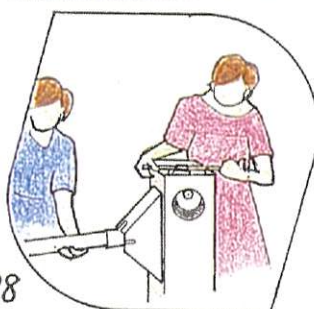
26

SCREW THE ROD HANGER AND PASS HOOK OF SPANNER INTO THE EYE OF ROD HANGER AND LIFT THE PUMP RODS.



27

INSERT HANGER PIN AND PLASTIC BUSHES INTO THE HOUSING OF HANGER



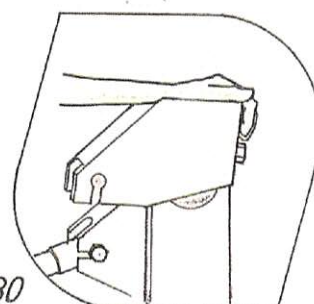
28

FIT THE HANDLE INTO THE HEAD AND CAREFULLY LOWER THE HANDLE TO ENGAGE THE HANGER.



29

INSERT FULCRUM PIN AND PLASTIC BUSHES INTO THE FULCRUM HOUSING OF HANDLE



30

FIT THE PUMP HEAD COVER AND TIGHTEN THE COVER BOLT

#### MAINTENANCE TOOLS AND SPARE KIT



BUSH BEARING ASSEMBLIES



'U' SEAL



BOBBIN



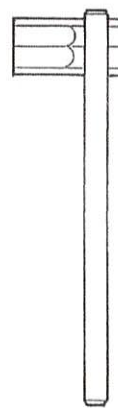
'O'RING

#### SPARE KITS



FISHING TOOL

#### MAINTENANCE TOOLS



SPANNER (OPTIONAL)