EVALUATION ON THE SARVODAYA SL-5 HANDPUMP MATARA AND GALLE DISTRICT

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Introduction

This evaluation was conducted to determine the conditions of all pumps in Galle and Matara districts. A pump expert from Sarvodaya and two civil engineering students from Holland visited all the pumps in these districts to examine the pumps technically and to ask the users, particularly women, about the pumps use.
A questionaire and checklist were completed for each pump examined. (*) However, some of the questions were not applicable to the particular areas. Especially it is note worthy that in Matara during the dry season we found no problems with the watersupply and everywhere the children could use the pumps without difficulty. This evaluation form was revised upon completion of this evaluation in hopes that it will be of use in the future.

A good deal of time was spent repairing pumps that were not functioning. Although this meant spending extra time at the pump sight, we could not walk away leaving a pump out of order when we could easily help.

In this report you will find a list of repairs that are needed immediately, along with the information collected from the 42 pumps examined. The statistics and conclusions given are based upon this information.

(*) see figure 1 and 2 in Appendix

Results; problems and statistics

During this evaluation we found many different problems with the pump and also many different causes for them. While making all kind of lists, like a separate list for manufacturing and installation faults, we could get an idea of the causes which can be easily avoided and the causes which are the most important.

In this chapter we will refer to figures in the appendix. We used for each pump a number, on the last page you will find the location and name of the caretaker.

We visited 42 Sarvodaya handpumps 36 SL 5 pumps and 6 SL 1/2 pumps.

All SL 1/2 pumps were installed aproximately 10 years ago. Non of them worked and could be repaired. Most of them worked only for 1 or 2 months. There was only some corroded iron left and sometimes the whole pump was disappeared.

In our further evaluation we 'll only speak about the Sarvodaya SL 5-pump.

Working condition:

	number	percentage
Working	31	86%
Out of order, now repaired	2	6%
not yet repaired	3	8%

On the other hand were there only 2 SL 5 handpumps without any defect.

Facts about the 36 evaluated SL 5 handpumps

Number of households	number	percentage
1 to 5 families	17	52 %
6 to 10 families	12	36 %
11 to 15 families	3	9 %
more than 15 families	1	3 %
	33	100 %

Depth of the wells	number	percentage
till 3 metre	1	3 %
3 to 6 metre	20	57 %
6 to 9 metre	13	37 %
more than 9 metre	1	3 %
	35	100 %

Year of installation	number	percentage
1985	7	19 %
1986	8	22 %
1987	20	56 %
1988	1	3 %
	36	100 %

Year of installation	In use	Out of order (because of technical or taste problems)
1985	6 (86 %)	1 (14 %)
1986	8 (100 %)	
1987	15 (75 %)	5 (25 %)
1988	1	

It 's remarkable to see that 25 % of the pumps installed in 1987 was out of order. Especially when you compare it with the pumps installed in 1985 and 1986.

Waterconsumption	number	percentage
drinking	9	45 %
drinking and some washing	3	15 %
use for total watercon-sumption	8	40 %
	20	100 %

Many problems can be divided by their cause. The main list made is Faults divided in manufacture, installation and wear and tear causes.

Manufacture cause

	number
bush too short inside frontbearing	6
handle fork not symmetric	3
spout too short	2
rubber seal spout not proper glued	1
thread top connector worn	1
fork touches cover	1
mainbearing touches cover	2
rubbervalve footvalve was not of good quality	1
brass of piston plate too big	1
because of bad quality brass footvalve leaking	2
strainer doesn't fit on endcap	1

Installation cause

	number
bad tast water because of using too much grease	1
top checknut missing	6
centering plate missing	4
bolt seal missing	1
piston checknut missing	1
outlet cup replaced in the wrong way	1
too big rubber mainseal in footvalve	1
too small rubber mainseal in footvalve	1
too big bolts used for bush mainbearing results in play mainbearing	1
crack in bottomconnector	2
pump is leaning over to the front	1
bolt under spout too fast tightened through the PVC	1
footvalve bolts were not strong enough tightened and came loose	1
strainer fixed not straight	1
volunteer burned a hole in spout	1
rising pipe and cylinder not straight	2

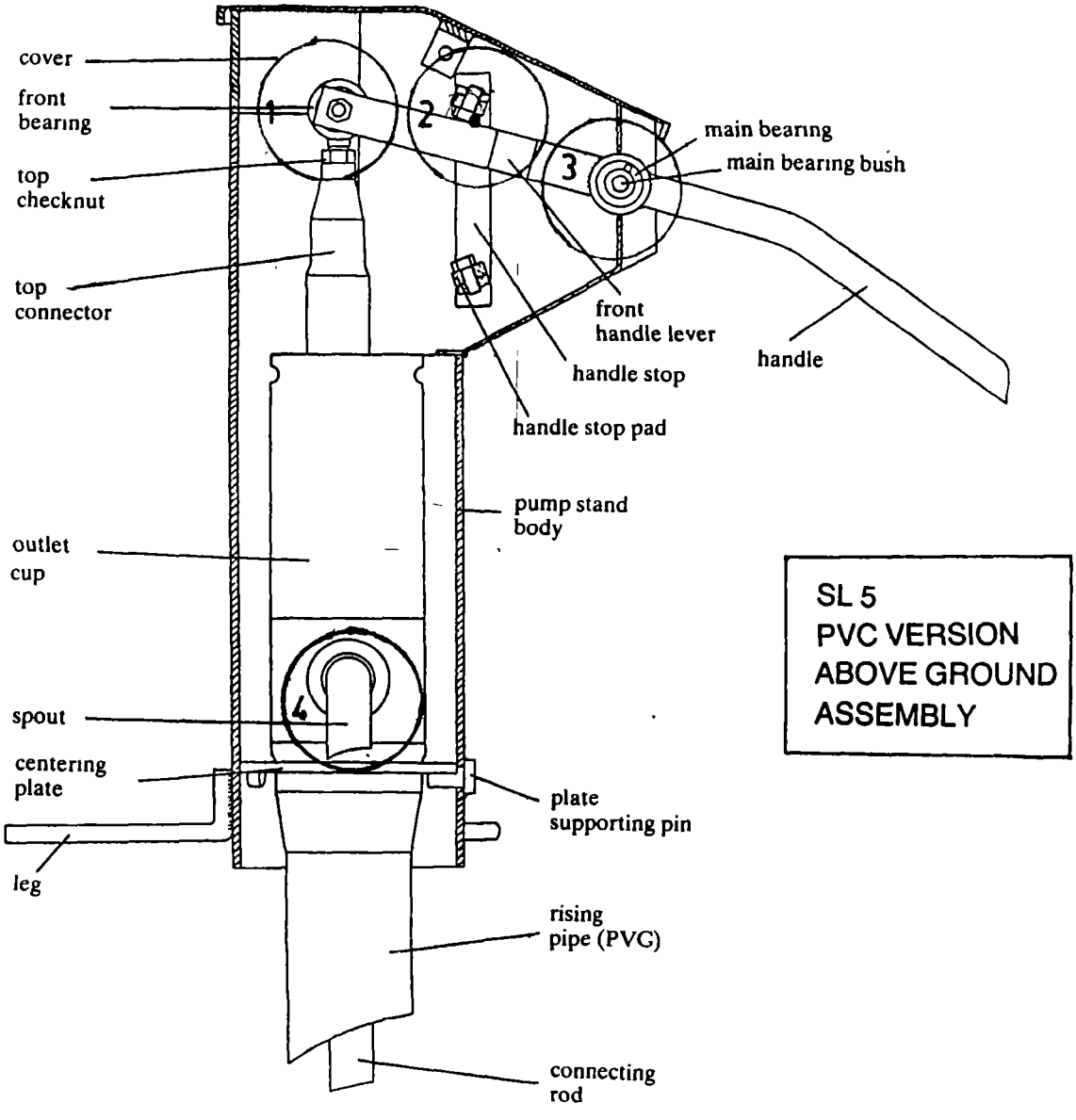
Wear and tear cause

above handle stop pad worn out	20
spout cracked	3
play in main bearing	7
bolt seal worn out	2
pistonvalve not closing because of dirt	1
centering plate broken	1
rubberseal spout worn out	6
piston cup damaged	2
footvalve not working because of dirt inside	1

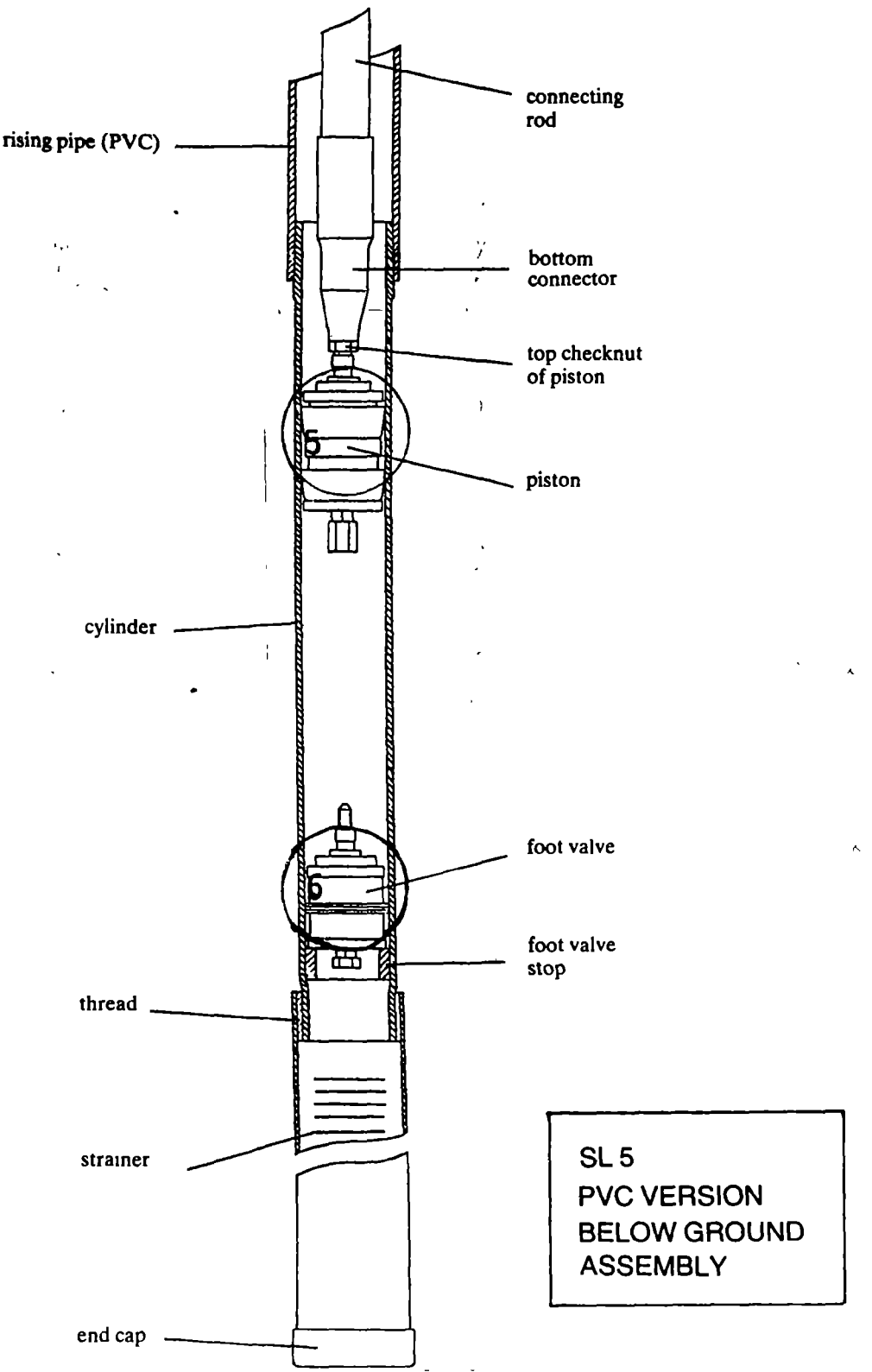
The main problems of the handpumps are:

Main defects		repaired	not yet repaired
Footvalve leaking	6	4	2
Top checknut missing	6	-	6
Centering plate missing (broken)	4	-	4
Handle fork not symmetric	3	1	2
Front bearing bush too short	6	-	6
Piston cups too hard	2	1	1
Piston cups worn out	5	4	1
Main bearing play	7	1	6
Spout leaking	10	5	5
Handle stop above broken	20	3	17
Corrosion inside	10		
outside	11		
Paint gone off (partly)	28		

Design problems pointed out on drawing



1. Frontbearing bush too short.
   The nylon bush inside the bearing has been manufactured wrong or becomes too short if it 's worn.
2. Handle stop pad above broken.
   The pad will wear more quickly if the handle is too high.
3. Mainbearing
   If the pump is well installed and manufactured no problems will occur, but if the handle stop pads are broken or the frontbearing bush is too short problems quickly arise.
4. Spout leaking
   The rubber ring on the outletcup which seals the spout is sometimes worn. Especially when the centering plate is missing and the outletcup hangs on the spout.



5. Pistoncups worn out or too hard.
The cups are good but when the cylinder is not straight or other problems occur the cups are easily damaged and should be replaced.
If the cups are too hard the piston will be heavy to operate and give some shaky shocks when pumping.
6. Footvalve leaking
There is more than one reason for this problem. For example: brass quality not good, rubbervalve worn.

After our visit some defects of the pumps are not yet solved, they need to be repaired in the near future. The whole list is given in the appendix, figure 4.

We also evaluated the platform and surroundings. Because this is very important for the hygienic circumstances near the pump. If the platform is not as it is supposed to be the water will stay on the apron or the drainage will block. These kind of circumstances will cause all kind of diseases like worms and infected wounds. The problems around the pump are often neglected and need attention and sometimes repairs.

The general results of the evaluation:

Problems around the well, platform and drainage

	number	percentage (in %) 35 pumps
Apron		
too small	3	9
not smooth	9	26
partly no slope	2	6
not clean	1	3
not plastered	1	3
Concrete cover manhole		
missing	6	17
damaged	2	6
Well cover		
ot plastered	:	3
: fixed on wellring	4	11
Concrete block under spout, water on it and drainage blocked behind it	2	6
Drainage channel		
blocked	2	6
strainer missing	8	23
open channel across path	3	9
too small pipe diameter	1	3
Protective Hardcore		
parts missing	4	11
totally missing	6	17
Soakpit		
too cloose to the pump	1	3

For specific information of each well see figure 5.
All results have led to an idea of the causes in relation to the main problems with the pumps.
In the next chapter they are noted down.

Findings; causes and solutions

All technical problems have one or more causes. In this chapter we give some important causes we found.

The valve of the foot and the piston have a certain length. Closing and opening of these valves depends on this length. On some pumps the valve was longer than necessary and the valve didn't close in time. This resulted in a shaky feeling when pumping. We placed some small pieces of PVC-pipe (length up to 1 cm.) between valve seal and valve washer. In this way we reduced the length untill an open length between valve washer and bolt of less the 1 cm. was left.

Inside the frontbearing is a nylon bush. The nylon bush is sometimes too short and results in friction between the frontbearing and handle fork. We are not sure about the cause of this trouble. The bush can be worn through use, but often it is manufactured too small. This results in a heavy working pump. In one case even the whole topconnector was broken. It is very difficult to replace the bush. If wear is causing these problems an other material must be sought.

The spout and rubber ring on outletcup are easily damaged. When the spout is taken out it's hard to put back without damaging it. On the latest design of the SL5 this has already been changed.

There are two causes of damage done to the handle stop pad. The type of damage done to the handle stop pad depends on the height of the pump (installation) and on the height of the fixing of the handle stop inside the cover. If the handle stop is not fixed exactly on the right place the handle has a much bigger range of motion and will swing 20 cm. lower/ higher than it is supposed to.
Further is the height of installation of the pump very important. We found out that when the handle was down lower than 57 cm. the handle stop pad wouldn't damage fast. (see figure 6) When the handle stop pad is broken it can cause a lot of trouble for the mainbearing in future (play).

The brass quality is sometimes poor. Because of this some small holes inside the footvalve top plate develope resulting in a leaking footvalve and a remarkable delay in waterflow.

Some parts are not manufactured in the right way (like the fork, the brass inset and others) this is the cause of many problems (see chapter results). The workshop should double check the parts they provide and make sure they meet the specifications. Village people will not be able to see that improperly manufactured parts are causing problems with the pump, and further more they will not be able to replace such parts.
While extending the workshop for increased production quality control must be kept in mind. A good design and proper installation are not the only things necessary for a good pump. Well manufactured parts are equally important.

Some problems are caused by improper installation due to installing the pump without all it's parts. The excuse for building a pump without a top checknut was: "They didn't deliver it with the pump". When the top checknut is missing it can cause a crack in the PVC of the topconnector. Even the district RTS-people are unaware of the importance of using all the parts and installing them properly.

Some problems specific for one area

problem	number	area and evaluation numbers
missing topchecknut	7	Ginymilgaha, Galle (1,2,3) and Imbulegoda, Galle (8,9,10,17)
wellcover loose	4	Kotapolle, Matara (34,35,36,38)
manholecover missing	6	Imbulagoda, Galle (8,9,10) and Palegamme, Matara (28,32,33)

In one case the pump was not straight installed. This caused a lot of troubles because the rising pipe and inner parts didn't reach the water straight. A lot of friction inside was the result.
There are similar problems when the rising pipe is not glued in the proper way.

From nearly all the pumps the paint was partly disappeared. In some cases this resulted in corrosion on parts of the pump. It would be better when the pump will be painted regularly.

Ofcourse it's also very important that the taste of the water is allright. In one case the taste was very bad because they used too much grease by installing the pump.
In other cases there were problems because there was too much iron inside the water.

Conclusions and recommendations

Generally all SL 5 pumps seemed to be of a good quality. But most of the pumps had some large or small defects. That is why we think in future a yearly evaluation and repairing tour of all SL 5 pumps would be a good suggestion.
Although there is a system of warning Sarvodaya in practice villagers do not always apply. There are times even when although they inform the volunteers the latter have "no time" or are unable to act. Furthermore districtcentres do not always react to applications for support.
Sometimes spare parts are not available and so people improvise which makes the problem even worse than before.
There are also many problems which are invisible without opening the pump and inspecting all inner parts. In this case it's very important to make repairs before they will cause serious problems.

Some problems are easy to prevent by inspecting the pumps properly before installation. When the workshop does not deliver the quality they are supposed to, they are to blame for problems starting in the village at a later date. All pumps were functional when received, but might be expected to give trouble before long if the defects were not remedied.

Further there are sometimes problems because the village volunteers do not have enough knowledge about the pump. Although they had a 2 days training from Sarvodaya it seemed to be not enough to carry out larger repairs.

When you compare our results with the report of Martin Brunner; Introduction of handpumps on village level (Zürich, March 1985) it's remarkable to see that the major problems are still nearly the same.
Major problems according to Martin Brunner:
1. Lack of information and motivation of the village people.
2. Problems with the maintenance of the pumps.
3. Missing feedback of defects in the field and elemination by design modifications.
4. a) Poor quality of the installed handpumps.
   b) Problems inside the workshop leading to poor quality of the handpumps.

We hope in future Sarvodaya RTS will provide a yearly evaluation and repairing team and give more attention to the quality of the finished pumps from the workshop.

APPENDIX

Figure 1: Evaluationform July 11th till July 15th 1988

EVALUATIONFORM sl5 and other Sarvodaya handpumps installed by SRTS
evaluation by Mariet de Savornin Lohman and
Annemarieke Mooijman (TU Delft, the Netherlands)

District:	Date of installation:
Place:	Date of evaluation:
Location/address:	Type of handpump:
Wellnumber:	Depth of well:
	Depth of waterline, day of visit:

QUESTIONS TO THE CONSUMERS

Number of households:
Has the pump been broken? yes/no
Repairs:
Did the watersupply fail in the dry season? yes/no
If yes, for how long?
Can childeren use the pump (too heavy/too high)?

Right location?
Depth of waterline, day of visit: metre
in dry season: metre
Is there any person in charge of maintenance? yes/no
Name caretaker:
Remarks:

TECHNICAL EVALUATION

Toppart

handle: front bearing:
bearing bush: top checknut:
handle stop pad outlet/spout:
above: corrosion:
under: paint:
Remarks:

Middle part

connecting rod: top connector:
rising pipe: bottem connector:
Remarks:

Below ground part

top checknut piston: footvalve:
piston: pistonvalve:
Remarks:

Aprom

manhole entrance: protective hardcore:
cover: apron, size:
drainage general:
pipe/open channel:
soak pit:
on same side as outlet:
Remarks:

yakkala 30 june 1988

Figure 2
Changed evaluatieform for using in the future

EVALUATIONFORM Sarvodaya SL 5 pump installed by RTS

District:	Date of installation:
Place:	Date of evaluation:
Location/address:	Type raised wellcover or longstand:
Caretaker:	Depth of well:
	Depth of waterline, day of visit:

QUESTIONS TO THE CONSUMERS

Number of households:
Has the pump been broken? yes/no When? For how long?
Did you inform Sarvodaya?
Repairs:

Is the watersupply sufficient during the dry season? yes/no
If no, for how long?

Depth of waterline, day of visit: metre
in dry season: metre

Is there any person in charge of maintenance? yes/no
Name of volunteer(s):

Height handle:

Waterconsumption: drinking only/ some washing/ everything

TECHNICAL EVALUATION

Toppart

handle:
main bearing:
main bearing bush:
handle stop pad
  above:
  under:
centering plate:
front bearing:
front bearing bush:
top checknut:
outlet/spout:
corrosion:
paint:

Remarks:

Middle part

connecting rod:
rising pipe:
top checknut:
top connector:
bottom connector:
checknut piston:

Remarks:

Below ground part

top checknut piston:
piston:
piston valve seal:
strainer:
piston-footvalve connecting checknut:
footvalve:
footvalve seal:
end cap strainer:

Remarks:

Apron

manhole entrance:
  cover:
drainage
  pipe/open channel:
  strainer:
  soak pit:
  on same side as outlet:
wellcover:
protective hardcore:
apron size:
  general:

Remarks:

Figure 3: General facts about the different pumps (in order of visit)

Number	Date of installation	Number of households	Depth of well (metres)	Depth of waterline (metres)	Has the pump been broken?	Working on day of visit?	Waterconsumption	Condition of the pump
1	June '87	10	4.80	2.40	yes	no		not working (frontbearing thread worn out)
2	June '87	25	9	3	no	yes		spout broken
3	August '87	4(30)	6	2.50	yes	yes		new outletcup needed
6	August '87		6	1.50	no	yes		not in use because of bad taste
8	25 July '87	5	9	6	no	yes		good
9	'87	10	6	3	no	yes		good
10	19 March '88	6	9	6	no	yes		centering plate missing
14	'85	12	4	2.50	no	yes		good
15	'85	30 people	4	1.50	no	yes	all purposes	good
16	'85	8	6	5	no	yes		good, we repaired manufacture faults
17	'87	10-15	7	6	no	yes	all purposes	good
18	Nov. '86	4	8	6	no	yes		good, some friction in main-bearing
19	Oct. '86	5	10	7	no	yes	all purposes	good
20	'85	10	7	4	yes, repaired	yes	only drinking	handle too shaky
21	29 March '86	7	7	3	no	yes		heavy pumping, now repaired partly

Number	Date of installation	Number of households	Depth of well (metres)	Depth of waterline (metres)	Has the pump been broken?	Working on day of visit?	Waterconsumption	Condition of the pump
22	Nov. '86	3	7	5	no	yes		good
23	'87	4	6	4	yes, april '88	yes		need new topconnector
24	11 Aug. '86	5	6.50	3.50	no	yes	only drinking	good
25	11 Aug. '86	6/7	3.50	1.50	no	yes	drinking and some washing	good
26	August '86	5	8	2.50	no	yes	drinking and	some play in mainbearing
27	August '86	5/6	4.50	2.50	yes, foot-valve leaked ones	yes	only drinking	good
28	Nov. '87	3	3	2.50	yes, ones spout leaking	yes	drinking and some washing	friction frontbearing; play in mainbearing
29	Dec. '87	1(10)	4	1	no	yes	only drinking	footvalve leaking
30	Nov. '87	15	2.50	1.50	no	yes	only drinking	footvalve leaking and other small problems
31	Dec. '87	7	7	4	no	yes	only drinking	good
32	Dec. '87	10	4.50	2	yes, piston was disconnected	yes	only drinking	good, footvalve leaking
33	Dec. '87	3	6.50	4.50	yes	no	only drinking	bad but we repaired, now working

Number	Date of installation	Number of households	Depth of well (metres)	Depth of waterline (metres)	Has the pump been broken?	Working on day of visit?	Waterconsumption	Condition of the pump
34	April '87	5/6	4	1.50	yes, footbearing loose	yes	all purposes	good
35	Nov. '87	4	6	2	yes, spout leaked	yes	only drinking	low output, rising pipe not straight
36	July '87	4	5	3	no	yes	all purposes	connecting rod not straight and frontbearingbush too short
37	15 Nov. '87		4.50	2.50	yes	no	all purposes	worked after repairing; centering plate missing
38	July '87	5	5	2.50	no	yes		good
39	7 Nov. '87	4	6	4	yes, repaired dec. '87 now again broken	no		bad
40	Aug. '85	10	8	2	no	yes	all purposes	good, shaky handle
42	25 Aug. '85	5	6	1.50	yes, frontbearing	yes	all purposes	good

Number	Trouble	Cause	Remedy	Parts needed
1	not working	loose frontbearing	replace frontbearing	frontbearing
		above handle stop pad broken	replace handle stop pad	handle stop pad
2	low output	spout cracked	new spout	spout
		handle stop pad broken	replace handle stop pad	handle stop pad
3			replace outletcup	outletcup
		handle stop pad broken	replace handle stop pad	handle stop pad
	crack in top connector	no top checknut	place top checknut	top checknut
6	bad smell and taste of water	too much grease used by installing pump	cleaning pump and well	use of mechanical pump
8		handle stop pad broken	replace handle stop pad	handle stop pad
		no top checknut	place top checknut	top checknut
9		no top checknut	place top checknut	top checknut
10		no top checknut	place top checknut	top checknut
		handle stop pad broken	replace handle stop pad	handle stop pad
	rising pipe rests on spout	centering plate missing	place centering plate	centering plate
15		handle stop pad broken	replace handle stop pad	handle stop pad
17		handle stop pad broken	replace handle stop pad	handle stop pad
18		handle stop pad broken	replace handle stop pad	handle stop pad
19		handle stop pad broken	replace handle stop pad	handle stop pad

Figure 4: Defects not yet repaired

Number	Trouble	Cause	Remedy	Parts needed
20	Shaky handle	mainbearing worn out	replace mainbearing	mainbearing
21	low output	spout too short	renew spout	spout
		centering plate broken	replace centering plate	centering plate
		handle stop pad broken	replace handle stop pad	handle stop pad
22		handle stop pad broken	replace handle stop pad	handle stop pad
23	Pump was broken some time ago	frontbearing loose thread topconnector worn out.	replace top connector	top connector
		handle stop pad broken	replace handle stop pad	handle stop pad
25	low output	spout leaking	replace rubberring	rubberring on outletcup
26	low output	spout leaking	replace rubberring	rubberring on outletcup
		handle stop pad broken	replace handle stop pad	handle stop pad
27		handle stop pad broken	replace handle stop pad	handle stop pad
28	low output	spout leaking	replace rubberring	rubberring on outletcup
	heavy pumping	too short bush inside frontbearing	replace bush	nylon bush frontbearing
	shaky handle	bush mainbearing, thread worn out used wrong bolt	replace bush	bush mainbearing
		handle stop pad broken	replace handle stop pad	handle stop pad
29	heavy pumping	too short bush inside frontbearing	replace bush	nylon bush frontbearing
	delayed waterflow	footvalve leaking	replace topplate footvalve	topplate footvalve

Number	Trouble	Cause	Remedy	Parts needed
30	low output	1. centering plate missing, risingpipe rests on spout so spout cracked 2. spout is too short	spout and centering plate needed	spout and centering plate
33	heavy pumping	too short bush inside frontbearing	replace bush	nylon bush frontbearing
		handle stop pad broken	replace handle stop pad	handle stop pad
34	play handle	frontbearing is not tightened because of touching the vork	maybe new handle	handle
35	low output	cylinder not straight, piston not closing	maybe new cylinder or new installation	cylinder
	low output	spout leaking because of a hole	replace spout	spout
36	heavy pumping	frontbearing bush too short	replace bush	nylon bush frontbearing
	damaged pistoncups	connectingrod is not straight, joint not right fixed	renew fixing	glue only
37	heavy pumping	too short bush inside frontbearing	replace bush	nylon bush frontbearing
	delay waterflow	rising pipe leaking	new piece of pipe	rising pipe
		rising pipe rests on spout	place a centeringplate	centering plate
	shivering handle	pistoncups too hard (not properly opening and closing)	replace softer cups	two soft pistoncups
38	heavy pumping	touching mainbearing-cover on the lowest side	file the cover a bit and paint	a file for iron
	low output	spout leaking	replace rubberring	rubberring on outletcup

Number	Trouble	Cause	Remedy	Parts needed
39	totally broken	top connector missing footvalve broken strainer glued on cylinder	total revision needed	handle stop pad rubberring on outletcup footvalve bolt top connector cylinder and strainer frontbearing
40	shaky handle	mainbearing bush worn out	replace bush	mainbearing bush
41	not working	thread pistonbolt worn because the volunteer used a wrong screw	we gave a new piston bolt but did not install	
42	heavy pumping	frontbearing corrosion and bush damaged, so friction and shaky	frontbearing	frontbearing

Figure 5:
Condition of the different aprons (numbers are evaluationnumbers of the different wells)

1 Apron too small.
2 -
3 Apron not smooth.
6 Deeper part near outlet on apron.
8 No concrete cover on manhole.
Wellcover not plastered.
Apron on one side not smooth and no slope.
9 No concrete cover on manhole.
Hardcore has too small stones.
10 No concrete cover on manhole.
14 Apron too small.
16 Apron too small and not smooth.
19 Apron not smooth.
20 Concrete block under spout leaves water on and behind it.
21 Drainage channel was blocked because it has no strainer.
Parts of the protective hardcore are missing.
The apron is rough.
24 Drainage channel has no strainer.
There is no protective hardcore.
25 No strainer on drainage channel.
Soakpit is too close to the pump.
26 Block under pumpspout keeps water after using.
27 Apron not smooth.
28 No concrete cover on manhole.
29 Pipe drainage channel crosses the path.
Pipe drainage channel is too small.
Parts of the hardcore are missing.
The apron is not smooth.
30 Apron not smooth and dirty.
Protective hardcore is missing.
Drainage channel was blocked but they were making a new one.
31 Parts of the protective hardcore are missing.
No strainer on drainage channel.
32 Concrete manhole cover is missing.
No strainer on drainage channel.

33 Concrete manhole cover is missing.
Protective hardcore is missing.
Open drainage channel across the path.
Apron not plastered and very dirty.

34 Protective hardcore is missing.
Apron not smooth.
Open drainage channel across the path.
Wellcover is not fixed on the well.

35 Manhole cover is damaged.
Protective hardcore is missing (stones easily available).
Wellcover is not fixed on the well.

36 Wellcover is not fixed on the well.

37 No strainer on drainage channel.
Apron on some places no slope.

38 Manhole cover is damaged.
Protective hardcore is missing.
Wellcover is not fixed on the well.

40 No strainer on drainage channel.

41 Not visited.

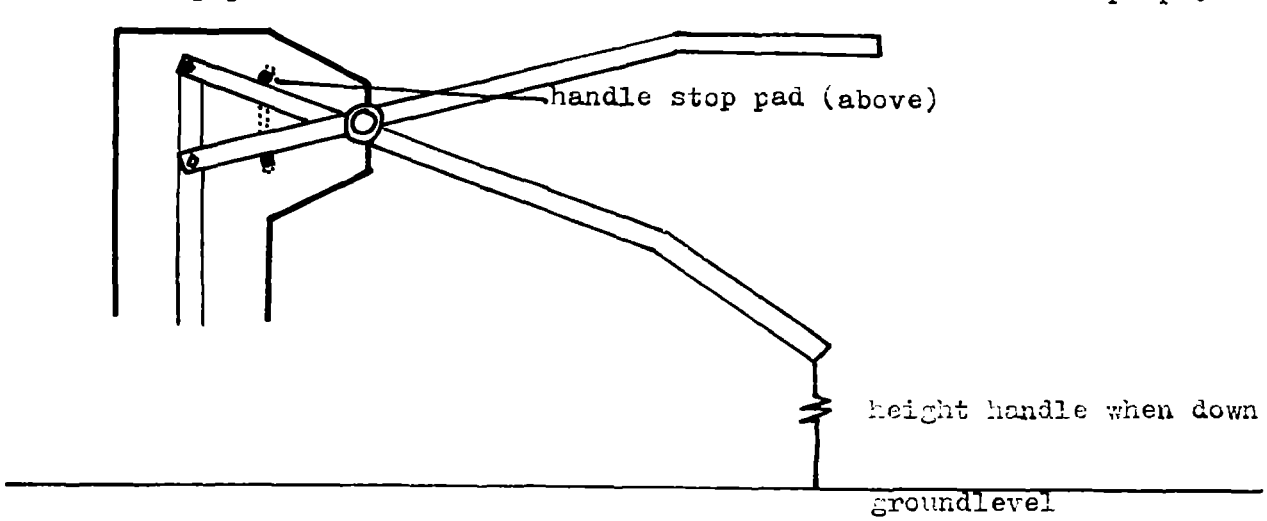
42 No strainer on drainage channel.

Figure 6:

Relation between the height of the handle and broken handle stop pad (above)

number	height handle when down	one side broken	two sides broken	not broken
24	52 cm.			+
25	52 cm.			+
26	58 cm.		+	
27	66 cm.		+	
28	60 cm.	+		
29	43 cm.			+
30	57 cm.			+
31	53 cm.			+
32	48 cm.			+
33	71 cm.		+	
34	58 cm.		+	
35	58 cm.		+	
36	59 cm.		+	
37	58 cm.			+
40	53 cm.			+

This table shows the relation between the height of the handle when the handle is pushed down and whether the handle stop pad is broken. We found that when the height of the handle when down was lower than 57 cm. the handle stop pad was never broken.
So the conclusion can be that it's better to instal the pump at a height lower than 57 cm. (when the handle is down).
The handle stop pad (under) was broken inside none of the evaluated pumps.



nr	district	village	location	caretaker
1	Galle	Ginymilgaha	Galgodelle	Uksrimathi
2	Galle	Ginymilgaha	Janapadhaya	Amarasinghe
3	Galle	Ginymilgaha	Daminde	P. W. Piadashe
6	Galle	Ginymilgaha	farmer colony	P. K. Dipealnandene
8	Galle	Imbulegoda	Ratgama	H. Kunarakne
9	Galle	Imbulegoda		Upel beberende
10	Galle	Imbulegoda	Ratgama	M. Dilinidashe
14	Galle	Pahalakiby	Goderawathehouse	J. Samaranayke
15	Galle	Balagoda	elders house	J. J. Siripele
16	Galle	Balagoda	Paligewatte	Manakar
17	Galle	Kapuhempelle	Yanahegoda	Yanahegoda
18	Matara	Kadurawane	Atjante	Wikrumenaike
19	Matara	Kadurawane	Pitawerdere	D. D. Jayawardene
20	Matara	Kadurawane		K. T. Yahasene
21	Matara	Kadurawane	Medilledenia	W. G. Ginedashe
22	Matara	Buluane		P. A. Piasene
23	Matara	Kadurawane	Pitabedere	K. T. Somowati
24	Matara	Pitabedere	Hattotowe	E. W. Witarene
25	Matara	Pitabedere	Hattotowe	H. N. K. Piadase
26	Matara	Kotagelle		E. Witene
27	Matara	Hewowite	Pitowettere	E. J. Charles
28	Matara	Palegamme	Kolewenigamme	H. Y. Ginadashe
29	Matara	Palegamme	Dodenatotte	Daye Punchihewa
30	Matara	Palegamme	Kolenigamme	Sena Karunaratne
31	Matara	Palegamme	Udahawatte	P. Wanikapurre
32	Matara	Palegamme	Gunatinghe estate	H. Y. Dinoris
33	Matara	Palegamme	Tipalewatte	S. H. Sirdies
34	Matara	Kotapolla	Bodenia	M. A. Somadasha
35	Matara	Kotapolla	Bodenia	M. A. Somadasha
36	Matara	Kotapolla	Henekade	T. G. Siliwathi
37	Matara	Godakumere	Amugodawatte	P. Cornelis
38	Matara	Godakumere	Kotapolla	P. J. Dannepale
39	Matara	Kotapolla	Kudagumbere	H. P. Ranchit
40	Matara	Gatare	Tiuwanegedere	H. T. Jamis
42	Matara	Gatare	Komburupitia	A. W. Piadashe