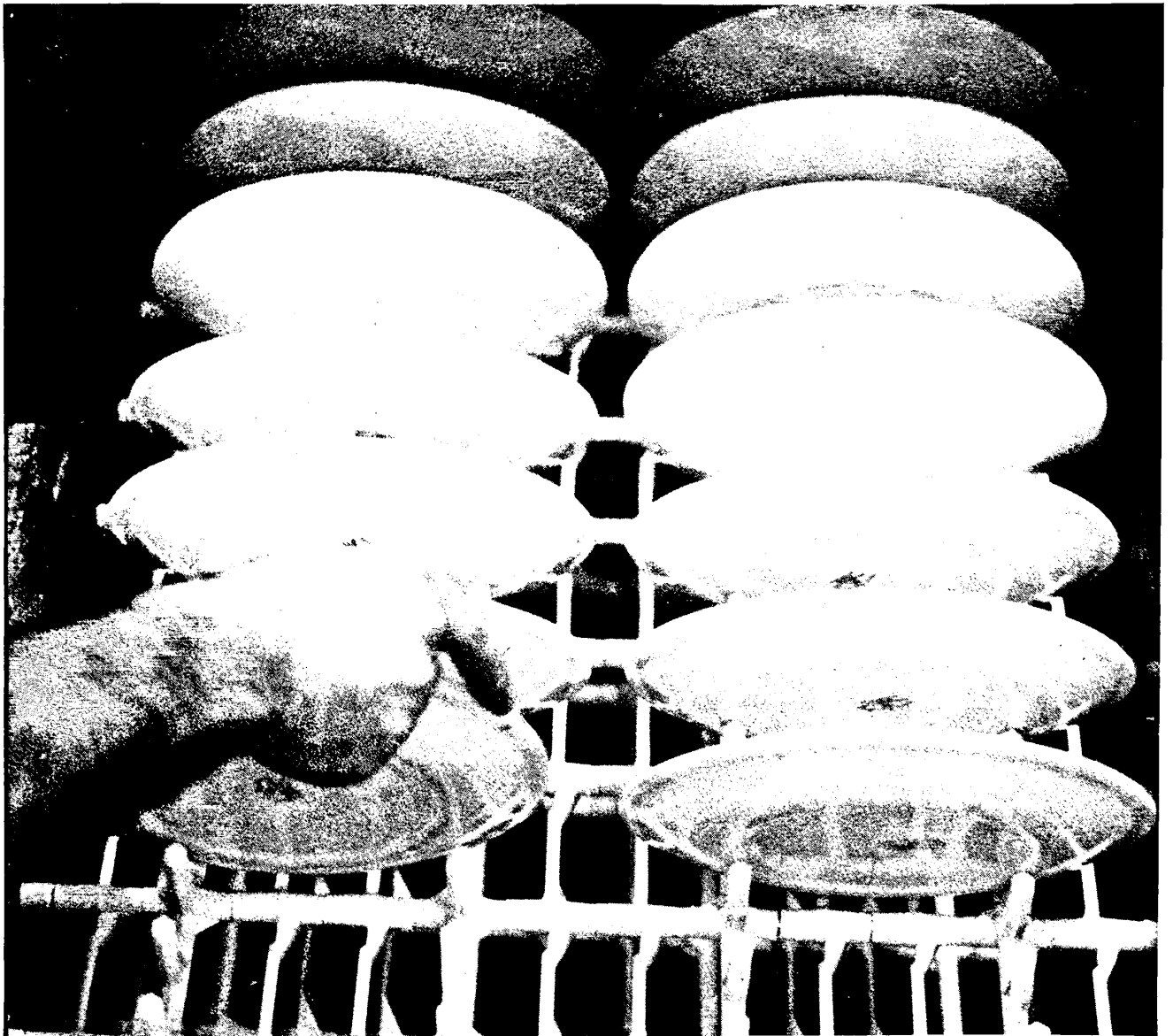




A King's Fund Report

Crockery Washing



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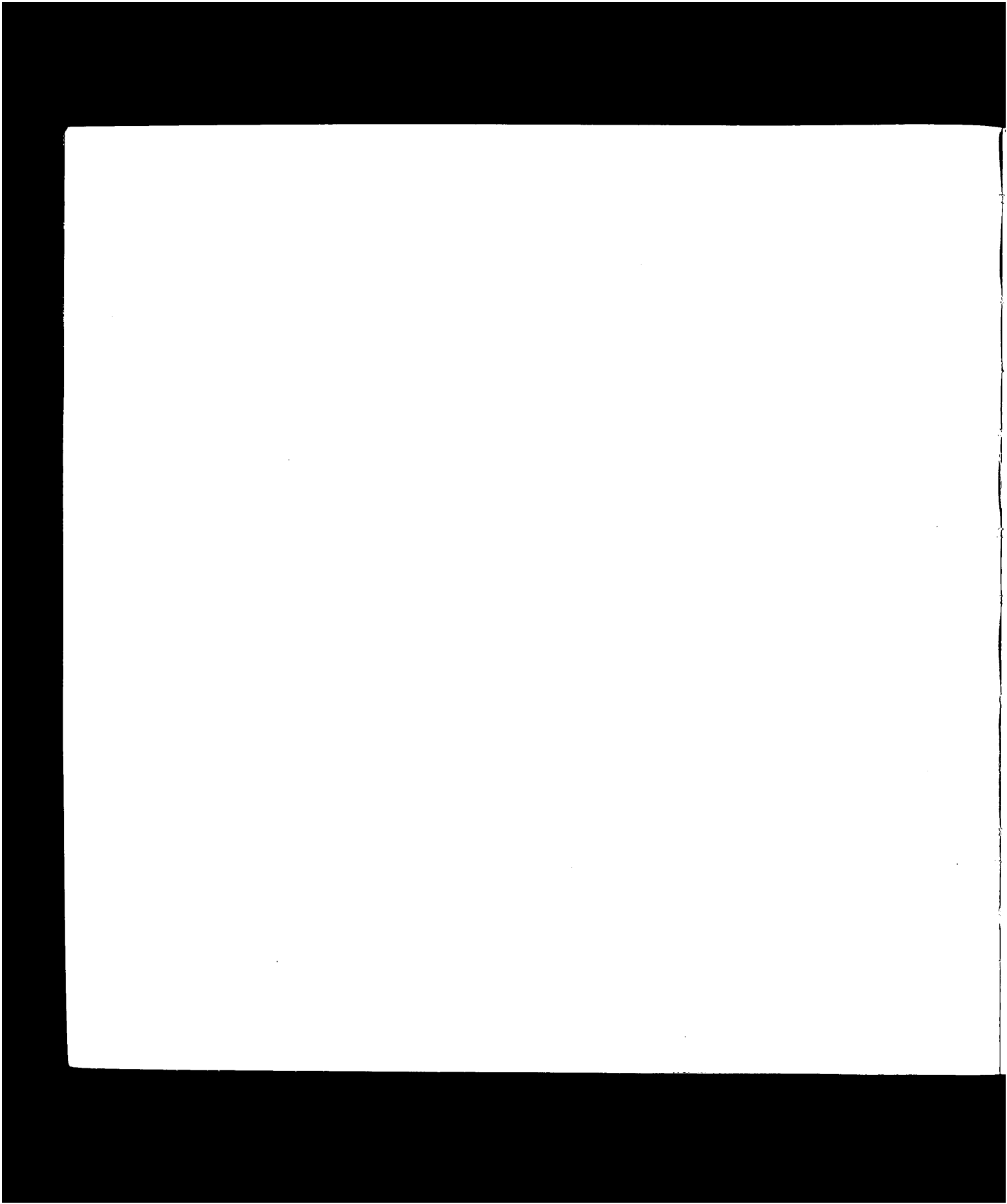
Crockery Washing

12-14-1914

Crockery Washing

The report of an investigation into crockery washing carried out by the Catering Advisory Service of the King's Fund with particular reference to the use of detergent dispensers and the centralisation of patients' crockery washing

Published by King Edward's Hospital Fund for London 1967
Price: Six shillings



Foreword

This booklet was first produced at the end of 1963. The demand was such that within two months the 2,000 copies which had been printed were sold out. However, although there was still a demand for this booklet it was felt that it would be better to revise and bring it up to date following further experiments rather than merely to reprint the booklet in its original form. The present edition, therefore, is in two parts: the first is a repeat of the original on the use of detergent dispensers whilst the second refers to experiments on the centralisation of patients' crockery washing. In the appendices some layouts of washing up units in operation are shown with observations on local difficulties. There are also illustrations of three types of crockery trolley currently being used in hospitals. It is hoped that the information contained in the second part will be helpful to those considering the setting up of centralised crockery washing units.

Acknowledgement is made to the assistance given by:

Barnet General Hospital

St. Bartholomew's Hospital

Paddington General Hospital

St. Charles' Hospital

The National Hospital for Nervous Diseases

Whittington Hospital

New Cross Hospital

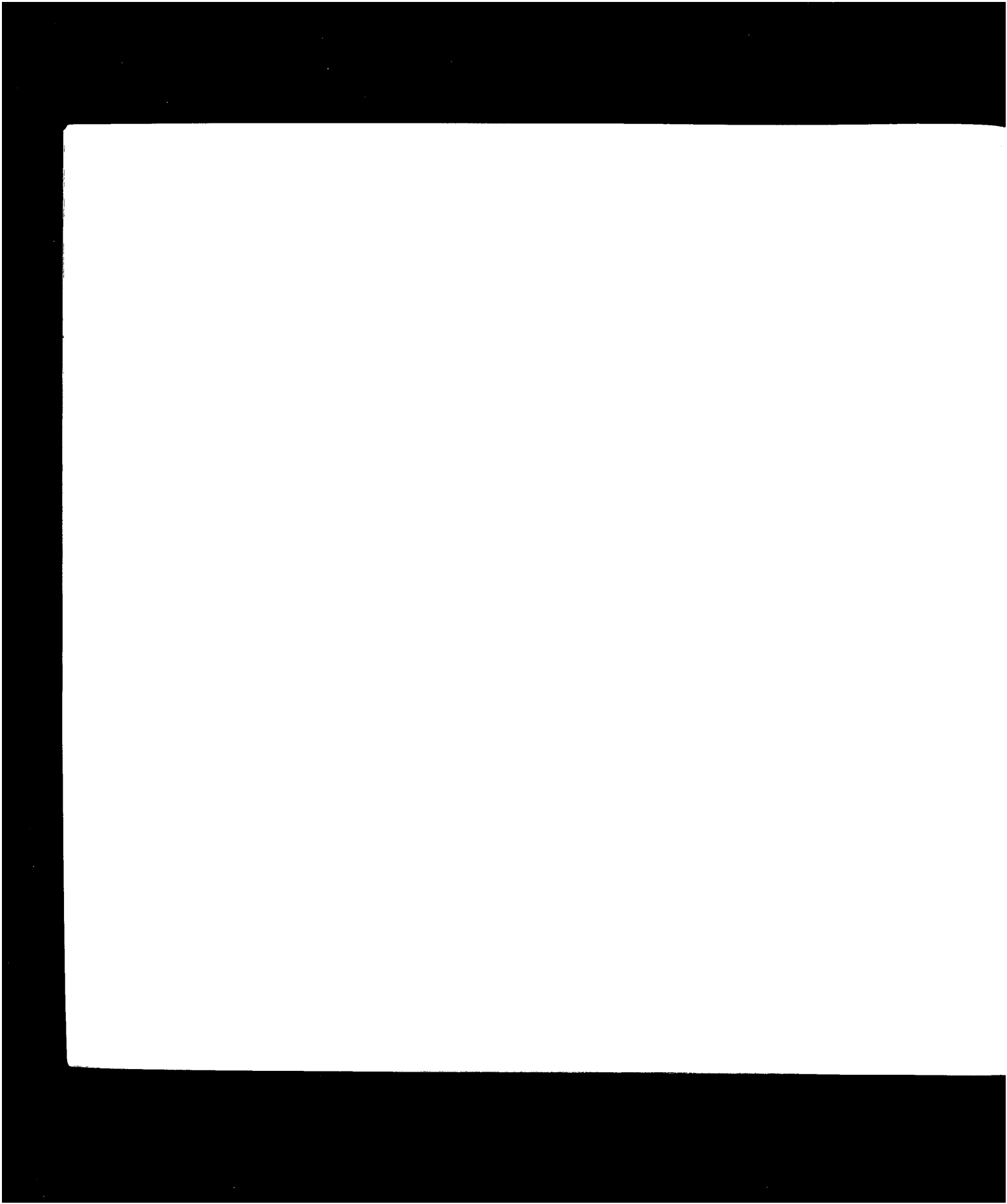
Miss Betty Hobbs, O.St.J., D.Sc., Ph.D., Dip.Bact., F.R.S.H. and

Miss Anne White, Ph.D. of the Food Hygiene Laboratory of the Public Health Laboratory Service, who carried out the bacteriological tests

The manufacturers mentioned in Appendix VII

The King's Fund also thanks those other hospitals who have so kindly supplied information on their crockery washing systems

G. J. Stormont, F.H.C.I. *Catering Adviser to the King's Fund*



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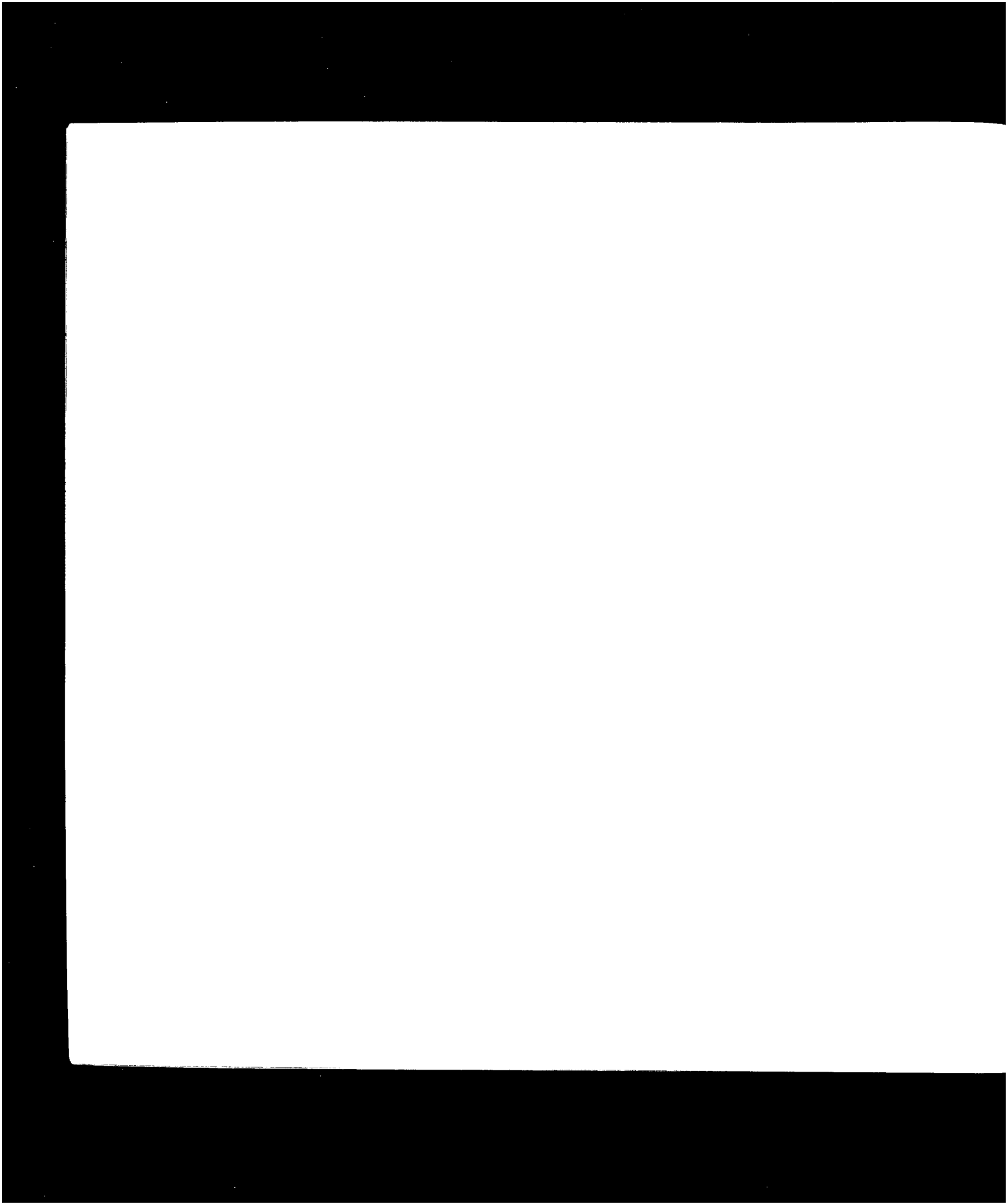
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Part I

Detergent Dispensers

Introduction

For many years now hospitals have been using machines for crockery washing with greater or less efficiency depending on many factors. It is well-known in the catering trade that it is difficult to operate these machines to give good results, both bacteriologically and apparently, without the use of detergents.

From visits to a large number of hospitals it was observed that almost invariably, irrespective of the type of machine, crockery was dried by hand towelling. Further, the machines used were rarely operated correctly or in accordance with the instructions of the manufacturers of the equipment or detergent. It was for this reason the King's Fund decided to investigate crockery washing more fully. The Catering Advisory Service made studies in six hospitals using spray type machines as these seemed the ones most frequently installed. Five were the cabinet type in which the operator had to push the trays in and pull them out and one was the rack conveyor type.

The study was carried out in four stages of one month for each stage in each hospital, observations being made at frequent intervals during the whole experiment. The investigation was completed in twelve months as some of the studies ran concurrently. This report is thus presented in four parts terminating with conclusions, a summary of recommendations, and some general observations. The first part is a summary of the observations made in the hospitals in the first stage of the investigation and mentions the shortcomings of the present crockery washing operations. The second part deals with the second stage when the hospitals' detergents were replaced by three particular brands of detergent. In the third stage detergent dispensers and rinse injectors of the automatic hydraulic type were introduced. These in turn were replaced by electronic dispensers in the fourth stage.

In the report on each of these stages, references are made to the appendices which show the quantities and cost of detergents used and the results of the bacteriological tests.

STAGE 1

The first stage observations were made on the normal procedure for washing crockery in each hospital. Particular attention was paid to the following points.

1. The method of crockery washing starting with the return of 'dirties' from the dining room to storage after washing.
2. The operation of the machine.
3. The temperatures of wash and rinse waters.
4. The type of detergent used.
5. The total quantity and cost of detergent used in each of four weeks.
6. The number of pieces of crockery and cutlery washed daily.
7. The cleanliness of the plates, both apparently and bacteriologically.

It was observed that in some hospitals there was no system of washing because the staff had been given no instructions or were unwilling to carry out the instructions or failed to understand them. Crockery returning from the dining room was rarely sorted and in some instances heaped on a side table or benching of inadequate length for the operator to sort as well as possible.

Plates were usually rough scraped into a bowl before racking but much of the debris or plate waste went into the machine, making the water dirty in a short space of time. In all instances except two the same wash water was used throughout the washing period, the rinse water being relied upon to effect the replacement of wash water. This is considered satisfactory providing the rinse is used for every rack of dishes and all crockery is pre-rinsed before washing.

On the semi-automatic machines the operator after inserting the rack switched on the wash water which continued to re-circulate until the operator switched it off or changed to rinse. All the machines had gauges which showed the temperature of the wash water. In one or two instances the water used was not up to the correct washing temperature, that is, 140°F.-150°F. (60°C.-65.5°C.). However, in no instance did the operator check the thermometer to see the water was the right temperature. The generally accepted time for washing plates is 45 seconds. In every instance with one operator, the crockery was washed for not less than this time as he was usually preparing the next rack.

Where there were two operators, on occasion, the crockery was not washed for the full 45 seconds.

For rinsing the plates on a semi-automatic machine it is necessary to hold the lever, which is spring loaded, in position for a period of 10-15 seconds with the rinse water at a temperature of 180°F.-190°F. (82.2°C.-87.7°C.). On some occasions no rinse was used and on others for only 3-6 seconds. Some operators knew there should be a 10-15 seconds rinse but were very bad judges of time and believed the 3 seconds given was 10 seconds. Others felt they were too busy to 'waste time rinsing'.

It was not possible on the semi-automatic machine for the operator to check the temperature of the rinse water. However, using special

thermometers, tests were made with the result that in only two instances was the water shown to be above 180°F. (82.2°C.). Most were as low as 160°F. (71.1°C.), including a new machine.

As regards the use of detergent, it appeared that all operators had received instructions on the quantity to be used. It took the form of:

- (a) two tablets (or two cupsful) at the beginning of washing and one tablet (or one cupful) in one hour's time, etc.; or
- (b) a handful to start and a handful every half-hour.

In one or two instances these instructions were carried out but usually the operators forgot to add more at the prescribed times or put in the full amount for the whole period at the start of the washing operation. With the exception of Hospital A the results were poor or indifferent – this is reflected in the type and quantity of the detergent used.

The type, quantity and cost of detergent used in the six hospitals are shown in Appendix VIII together with the number of pieces of crockery washed daily. From this it will be seen that the cost for 10,000 pieces varied from 2s. 06d. to 8s. 11d., but these costs bore no relation to the results achieved. The two cheapest, B and E, were foaming detergents which were entirely unsuitable for spray type dishwashers.

In no instance did the crockery dry automatically and hand towelling was required. This was due to:

- (a) the crockery not having been raised to a high enough temperature;
- (b) globules of water collecting on the surface of the crockery.

An examination of the crockery before hand towelling revealed, with few exceptions, stains and chalky streaks on the surfaces. This was due to:

- (a) unsuitable or insufficient detergent;
- (b) insufficient rinse water being used (sometimes because of blocked jets);
- (c) the temperatures of the wash and rinse waters being too low.

Tests for bacteria were also carried out on tea towels in use in various kitchens. These tests showed that after use fairly high counts of bacteria accumulated on these tea towels.*

STAGE 2

For the second stage the hospitals' detergents were replaced by one of three brands being tested. These were used in the same way as in Stage 1, that is, hand feeding. Attention was also paid to the same points. The main difference was that all operators were given instruction in the amount of detergent to use at the beginning, and the frequency with which further detergent should be added. Whilst the best method of hand feeding is to add detergent after a fixed number of racks have been through the machine, in practice it was found that it was too difficult for the staff to remember the number of racks which had passed through. Therefore a fixed time of 20 minutes was given. It is realised, of course, that it is

*Tests have previously been made by the Public Health Laboratory Service. Higgins, M. and Hobbs, B. C. (1950) *Mon.Bull.Minist.Hlth.Lab.Serv.*, 9, 38. White, A. (1964) *Mon.Bull.Minist.Hlth.Lab.Serv.*, 23, 7.

possible to use more detergent than is necessary if the scheduled number of racks of crockery have not been washed in the period.

In general the only improvements in apparent cleanliness shown in this stage were where the detergent introduced was more suitable than the one previously used.

From Appendix IX it will be seen that Hospital A used less than previously and the cost per 10,000 pieces was almost halved.

Hospital B costs almost doubled but the apparent results were a great improvement on the first test primarily due to using a more suitable detergent. Similar remarks apply to E although the cost was increased by approximately 35 per cent. There was also an improvement in C due to the detergent being more suitable for the hard water but the cost was quite high. The results in Hospital F were better but the cost was more than trebled.

It was noticed that generally the measures used for adding the detergents became caked with detergent, consequently the amount was more often less than required, although in some cases the operator added an extra measure 'just to make sure'. On other occasions the operator added all the detergent required for the full meal's crockery washing at the beginning of the wash period. This, of course, produced an over-concentration of detergent for the first racks of crockery going through the machine and therefore there were traces of detergent still on the plates afterwards. The racks going through the machine at the end of the service were not clean and in all instances showed chalky deposits, even in the middle of the washing period, as the water had become so diluted by the addition of the rinse water that there was little detergent left.

The plates did not dry automatically, not even when the correct water temperature prevailed, and in all cases hand towelling was resorted to. Bacteriologically the results were the same as in Stage 1.

STAGE 3

Detergent dispensers and rinse injectors from three separate firms were used in Stage 3, and were of the automatic hydraulic type. Although the dispensers add detergent automatically it is essential to add detergent by hand when the machine is first filled with water. The degree of concentration to be maintained is decided in advance in consultation with the manufacturer of the detergent, who then adjusts the dispenser accordingly.

A wetting agent is dispensed by means of the rinse injector and works on the same principle as the detergent dispenser but is connected to the rinse water supply. The action of the wetting agent is to split up the large globules of water by reducing surface tension and so facilitate crockery drying. If the rinse is not used, as sometimes happens on the semi-automatic machines, the crockery has no chance of drying automatically.

As will be seen from Appendix XI, the amount of detergent used with the exception of Hospitals D and F is more than in Stage 2 when it was

hand fed. The cost is higher but this might be due to the valve adjustment made by the manufacturer who probably recommended a higher concentration of detergent than his competitor.

The crockery was generally much cleaner and no longer were there any chalky deposits and stains and there were few rejections. This was particularly noticeable towards the end of the washing period compared with Stages 1 and 2 where almost invariably the crockery was not clean. However, there were a number of occasions when this improvement did not take place. Although the staff noticed the crockery washed was not as clean as it should be, it never occurred to them that the hopper containing the detergent might be empty, as indeed it frequently was. This could account for the lower consumption in Hospitals D and F.

On the smaller machines or where there were not so many pieces of crockery going through the machine, if the hopper were filled for the first wash of the day, it was sufficient to last the whole day. On the larger machines and at those hospitals with a larger number of pieces to be washed it was essential to check the hopper before each service.

In setting the concentration of detergent, consideration must be given to the hardness of water, the number of pieces to be washed, and whether there is a pre-wash sink. If the water used is up to 8° of hardness a soft water detergent can be used. If acceptable results are to be obtained with water above 8° hardness a special hard water detergent should be used, but the cost in some instances is nearly double. However, better results will always be obtained with soft water because the final rinse with hard water frequently leaves a light film on the surface of the crockery. A pre-wash sink unit, if operated correctly, will save a good deal of detergent as food soil on crockery will be reduced to comparatively small proportions in the wash water in the machine.

When the crockery did not dry automatically and a towel was used, it was found to be due to:

- (a) the bottle of wetting agent being empty,
- or (b) the operator on a semi-automatic machine not holding the rinse lever for the prescribed time,
- or (c) the water not being hot enough,
- or (d) badly scaled-up rinse jets.

If the crockery is not brought up to the correct temperature the drying time is prolonged from 30 to 60 or more seconds, in which case staff are inclined to hand dry it.

STAGE 4

In Stage 4 the hydraulic detergent dispensers were replaced by electronic dispensers, but the same rinse injector retained. With electronic dispensers two probes in the wash water determine the strength of the solution and can be set by the manufacturer for any agreed concentration. As the concentration of detergent drops the probes come into action and more detergent is fed into the water. In conjunction with the probes are signal lights. One is on all the time to indicate the equipment is working.

A second one flashes intermittently when the detergent solution is being fed to the wash water but glows continuously when the dispenser has no detergent left.

On many occasions it was noticed that the light continued to glow and staff paid little heed to it and therefore, because of lack of detergent, some crockery came out of the machine rather streaky. However, where staff were not being frequently changed and could be trained on the machine, they checked the hopper before each service and the apparatus functioned correctly with good results.

In three hospitals the consumption of detergent increased after the fitting of electronic dispensers. As will be seen from Appendix XII, the consumption rose in Hospital A from 7.5 lbs. per 10,000 to 18.75 lbs. An adjustment was made to the probe by the manufacturers to reduce the consumption and it was found that although less detergent was being used there were no adverse effects on the standard of crockery washed. With the exception of Hospital E, the apparent results were good on all crockery. However, in Hospital E the machine had become so scaled up and in need of maintenance that the washing action was very much retarded and it was not possible to assess the dispensers' efficiency. In addition to the normal bacteriological tests a further series of tests were made on the efficiency of detergents in keeping down the level of bacteria in the wash water and on washed crockery. To make the assessment, two different kinds of detergents were used, one inorganic non-bactericidal and the other, it was claimed, had bactericidal properties. Each of these detergents was used in a dishwashing machine working at normal temperatures and then again in the same machine working at greatly reduced temperatures. The results of these tests can be seen in Appendix XIII a, b, c and d. The use of a bactericidal detergent which was hand fed to the machines showed no improvement over a non-bactericidal detergent, nor were better results obtained when the detergent was added by automatic dispensers.

Conclusions

1. Detergents contribute to the apparent cleanliness of crockery but only if they are of the correct type for the water. They do not make any appreciable contribution to a reduction in bacteria count nor do the special bactericidal detergents.
2. The correct temperatures of the wash and rinse waters also the length of time of the wash and rinse operations make the greatest contribution to a low bacteria count but this can be defeated if the plates have to be hand towelled.
3. Rinse additives, when used correctly, make a worthy contribution as they ensure the drying of crockery in 30-50 seconds if a reasonable temperature has been reached.
4. Softened water (3° hardness) gives better results than hard water irrespective of the detergent used. The cost of detergent is also considerably less and machines require less maintenance.

5. If a single wash tank machine is fully automatic for wash and rinse, a hydraulically operated detergent dispenser is suitable and cheaper to install. If the machine is of the multi-wash tank type, an electronic dispenser is better.
6. All three designs of rinsing agent dispensers worked equally well, two being mechanical and working on the rate of rinse water flow and the third having an electrically operated micro-pump.
7. A pre-wash sink conserves the cleanliness of the wash water, indirectly saves detergent and provides the initial heating of crockery.
8. When there is an efficient washing operation resulting in crockery automatically drying clean, there is an indirect saving in the cost of tea towels and in manhours. There is also a greater standard of hygiene.

Recommendations

The following recommendations are made in regard to detergents and dispensers.

1. Detergent to suit the local water should always be obtained.
2. Detergent dispensers and rinse injectors should be fitted to spray type machines.
3. The dispensers should always have a hopper large enough to last the full day's washing operation.
4. The supervisor should check the hopper (and rinse injector) every morning to ensure both are full.
5. Single tank machines should be automatic and have a fully timed wash and rinse control mechanism.
6. The hydraulic type dispenser should be used for the single tank machine but is obtainable only on loan from the manufacturer of the detergent. Electronic dispensers can be purchased outright. The price is approximately £60 (1963).
7. For multi-wash tank machines electronic dispensers should be used because of the great difficulty in maintaining the correct concentration of detergent.
8. Softened water should always be used.

General Observations

Whilst the main object of the experiment was the investigation into the use of detergents, detergent dispensers, rinse additives and injectors, much valuable information was gained on the whole of the crockery washing operation and the following observations are made.

1. Dispensing equipment is an aid to clean crockery washing but in itself will not produce clean crockery without a machine in good working order, a correct working procedure and an adequate layout.
2. Machines should be well maintained, kept free of scale deposit and be working at the correct water temperatures and pressures. Therefore the machine should be inspected monthly and maintenance carried out. If this cannot be done by the hospital personnel there should be a contract with a firm to do the work. The major manufacturers of

dishwashing equipment offer a service contract. In some instances suppliers of detergent will carry out a monthly inspection and submit a report free of charge.

3. Staff should be given instruction in the operation of the machine and training in correct dishwashing procedure from the sorting of crockery to the final storage. Instructions in the operation of the machine should also be displayed in a position all staff can see.

4. A good layout is essential to an efficient crockery washing operation, examples are shown in Appendices XIV and XV. For single tank machines there should always be included a pre-wash sink as this gets rid of the bulk of soil and provides a first washing to the plate. The rinse spray can be suspended above the sink or be a flexible hose.

5. The soiled crockery benching should have a slight slope for draining water which should go into the pre-wash sink. It should not drain into the machine tank. Another drainage point can be interposed immediately before the tank.

6. The pre-wash sink should be one rack's distance from the machine.

7. There should be dirties' benching for not less than five racks including pre-wash sink. Clean benching should also hold five racks so that the crockery has a chance to air dry.

8. Further aids to crockery washing are illustrated in Appendix XIV and the sorting area includes an angled overshef, which is essential when crockery is being brought to a wash unsorted.

9. There should be a soak tank for cutlery and a further soak tank if possible for any pieces of crockery which have come through the machine and are still not properly clean.

10. In the dirties' benching a waste disposal unit or waste shoot with an easily removable bin should be interposed.

11. Roller conveyors are helpful in the movement of racks for drying and the return to the dirties' benching, see Appendix XIV.

12. With large machines, that is, fully automatic with conveyor belts, the sorting and dirties' benching requirements are the same as for the small machines. The same length of drying benching and soak tanks are also required. However, with these larger machines there may be a need for roller benching only in regard to returns, but no pre-wash sinks.

13. All machines require good steam extraction except for some of the Flight type, which may have a condenser unit incorporated.

14. Acoustic treatment of the crockery washing area should also be considered, as apart from other considerations, it lessens operators' fatigue.

The Washing of Staff Crockery

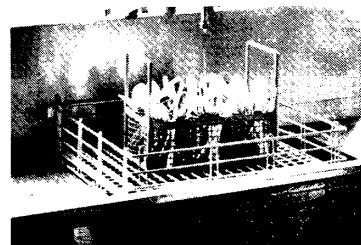
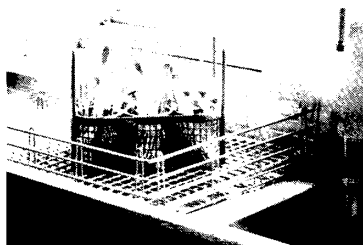
Organisation

The organisation of a dishwashing unit begins in the dining room where dirty dishes are first collected by a waitress or dining room maid. Assuming that the most efficient layout has been installed, chaos can still

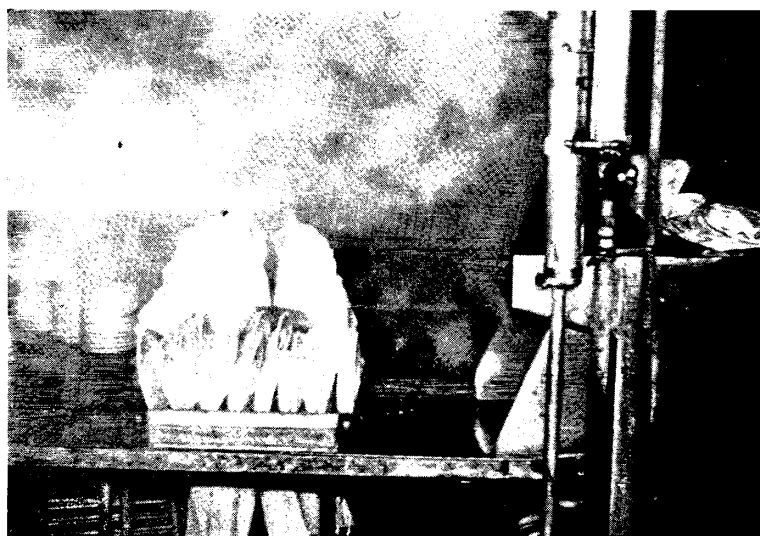
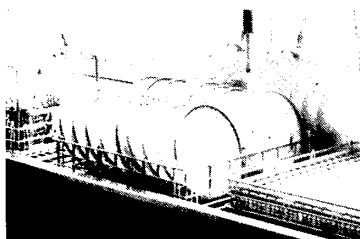
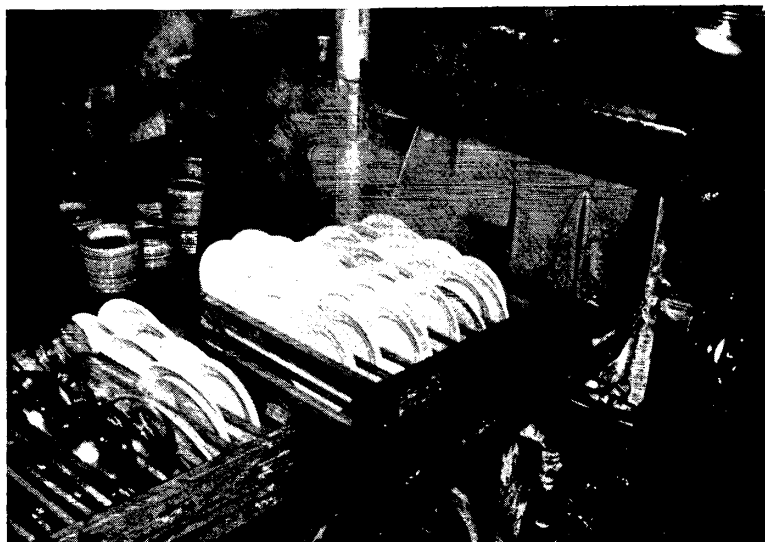
Example of a machine badly maintained showing two jets blocked allowing no water to pass, two jets partially blocked resulting in water trickling in single columns and one jet only spraying as it should.



Correct and incorrect racking of cutlery. Bowls, prongs and blades must be uppermost.



These two large illustrations show examples of bad racking—plates overlap and different kinds of plates mixed. The small illustration shows plates correctly racked.



reign if maids are queueing up to unload their trays or trolleys in the dishwashing room.

Firstly, the personnel must be trained to collect dirty dishes and begin sorting at the same time by stacking plates of the same kind together, separating cups from saucers, keeping glassware separately; further, where possible, different kinds of cutlery should be separated. If a trolley be used for clearing, sections for cutlery baskets, cup baskets and glasses, plus a scrap bin, can be arranged.

At the dirties' table in the dish room a series of decoys should be placed in position as shown in Appendix XIV so that the staff unloading their trays or trolleys will place the soiled crockery in the correct places. The machine operator will now be able to rack up dirty dishes of all the same kind/size into the appropriate rack without delay. By so doing the dishes when clean can be stacked and put away immediately as no sorting is required.

By using such methods, the number of machine operators can be kept down to two persons in most cases, except where large numbers are being fed.

Not only does this sytem increase efficiency but it also decreases breakages and chipping of crockery considerably. To extend the method still further insert baskets should be used for cups and glasses, see Appendix XIV, which are on the overshef. These baskets fit inside a standard dishwashing rack and can be used for storage after washing without removal of the contents.

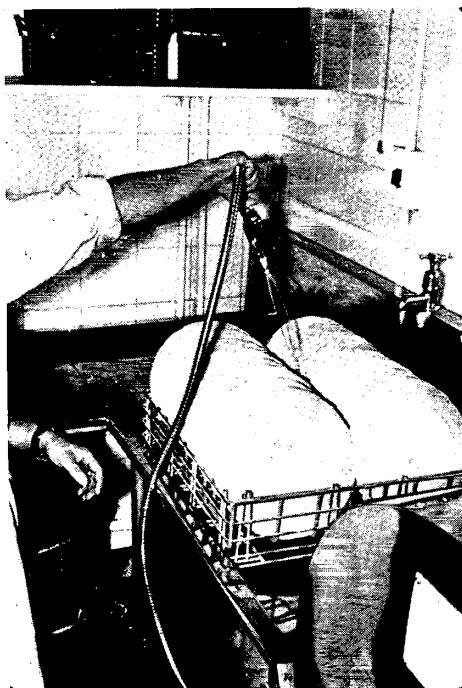
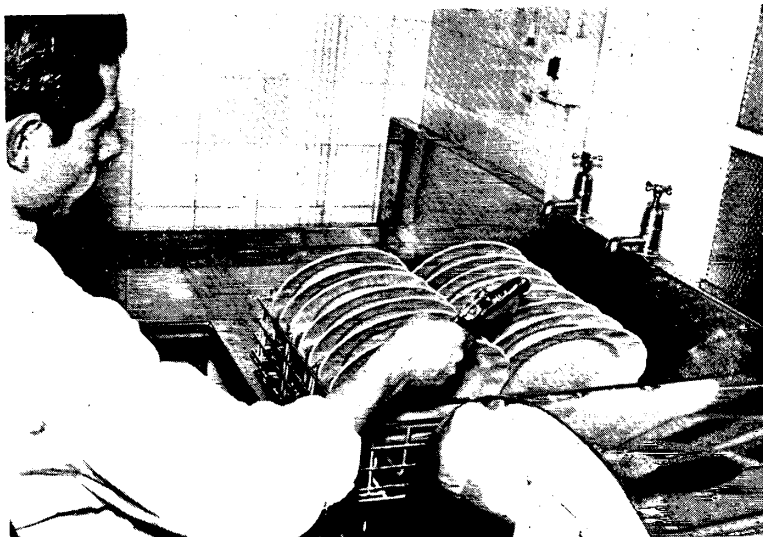
Example of Instructions

The following instructions have been prepared as a sequence of operations to assist you in understanding and operating the dishwasher.

PREPARING DISHWASHER FOR OPERATION

1. Close drain by turning handle to 'SHUT' position.
2. Place the overflow cover and the two strainer pans into position.
3. Detergent. Scatter initial charge of detergent (3 ozs.) on the strainer pans.
4. Turn on FILL valve (BLUE COLOURED HANDLE) and fill tanks to overflow level.
5. Turn on HEATING control (RED COLOURED HANDLE).
6. THERMOMETERS. Check that correct temperatures have been reached before commencing to wash up.
WASH THERMOMETER 140°F. to 160°F. (60°C. to 71.1°C.)
RINSE THERMOMETER 180°F. to 190°F. (82.2°C. to 87.7°C.)
(These temperatures are necessary for good dishwashing.)
7. Check that detergent feeder has been charged with detergent powder and that the rinse injector is charged with wetting agent.

Correct and incorrect racking. The lower illustration shows the difficulty of prewashing when plates are racked facing the wrong direction.



PACKING AND SORTING CROCKERY

All crockery must be sorted in small stacks of each kind, i.e. dinner plates, soup plates, side plates, etc., must all be in separate stacks.

DO'S

1. Place all crockery to be washed in correct rack.
2. Stand all plates and flat dishes on edge in the racks.
3. Put glasses and cups into flat open racks 'bottoms up' and place retaining grid on top of crockery before washing.
4. Cutlery is to be washed in the special baskets provided, spoons and forks with handles uppermost.
5. Pre-rinse all racks of crockery before washing.

DONT'S

Do not stack dishes on top of one another. Water must have free access to both sides of every dish.

DO NOT OVERLAP PLATES, SAUCERS AND FLAT DISHES.

Do not mix glasses and cups in the same rack, or place metal articles in same rack as china or glass.

Do not pack cutlery too tightly in the compartments of the baskets, or they will not be washed clean.

Do not push food scraps, dirty water, etc., into the dishwasher. Always use the pre-wash sink.

WASHING THE CROCKERY

1. Push each rack of crockery to the pre-rinse sink and spray thoroughly.
2. After rinsing a rack of crockery, raise the doors of dishwasher, slide the rack into the machine. Close the doors.
3. Push the time switch to 'ON' position, a red light will then show that dishwasher is automatically washing and rinsing. When the light goes out, push the timer switch to the 'OFF' position, and open the doors.
4. Slide in the next rack of dirty crockery, pushing the clean rack of dishes on to the dish table. The dishes in the first rack will be hot and will air dry in 45 seconds. DO NOT attempt to dry them with a towel.

CLEANING THE DISHWASHER

After all washing up is finished:

1. TURN OFF THE HEATER (RED COLOURED HANDLE).
2. Drain the machine by turning drain handle to open position.
3. Clean down the soiled dish table.
4. Take out strainer pans and empty scraps into waste bin.
5. Lift out the overflow pipe and clean thoroughly.
6. Close the doors of the machine and operate the rinse with the manual control for a few seconds (with drain open) to cleanse the inside of the machine.
7. Open doors, replace strainer pans and overflow pipe and leave machine with doors open.

Part II

Centralised Washing of Patients' Crockery

Many experiments have been carried out on the centralisation of patients, crockery washing and a list is given in the Foreword of those hospitals which have notified the King's Fund of their experiments.

In general it seems that advantages are to be gained by centralisation.

- (a) A better standard of hygiene is achieved – all are agreed on this.
- (b) There is a saving in manhours.
- (c) Crockery breakages are reduced.
- (d) Replacements of crockery are simplified.
- (e) A source of noise is removed from the wards.

Manhours

Whilst the degree of success naturally depends on the efficiency of the organisation, the number of paid manhours saved also will depend on local circumstances. One hospital stated that it cannot claim any saving in manhours as most of the crockery washing was previously done by patients on the wards. In this hospital there are 21 wards and at midday each ward used to have 3 patients and one staff (when available) who took $\frac{3}{4}$ hour to wash the crockery, which is equivalent to 16 paid manhours. With centralisation, 4 staff took only $1\frac{1}{2}$ hours to wash crockery for the 21 wards. However, to this must be added the time taken for porters to bring the trolleys to the central wash, unload them, wash them, reload and return them to the wards. So in this hospital there may have been no saving in paid manhours.

On the other hand an experiment carried out in a comparatively small general hospital where only paid labour was employed showed that a saving in manhours could be achieved, as illustrated in the following paragraphs.

This hospital had 8 wards on two floors and the crockery washing operations by hand were examined in 5 wards. The analysis was as follows:

Time Taken to Wash Up by Hand

Ward	1	2	3	4	5
No. of Patients	22	26	27	26	21
Breakfast	Mins 47	Mins 48	Mins 30	Mins 32	Mins 35
Midday Meal	33	57	31	35	31
Afternoon Tea	31	18	20	20	40
Supper	48	71	37	50	20
Totals	159	194	118	137	126

Frequently there was more than one person involved in washing up and
The Total Manhours Spent for the above period were:

Ward	1	2	3	4	5
Breakfast	Mins 95	Mins 48	Mins 60	Mins 64	Mins 70
Midday Meal	82	57	62	70	62
Afternoon Tea	61	36	40	40	40
Supper	48	71	37	50	40
Totals	286	212	199	224	212

Thus apart from early morning tea and late evening drinks each ward spent on an average 3 hours 46.6 minutes daily on crockery washing.
 From the above charts it will be seen that the average lapsed time per ward for washing the midday meal crockery was 37 minutes involving 66.3 minutes in manhours. For 8 wards it would be 8 hours 50 minutes.
 With centralised crockery washing the time period was $1\frac{3}{4}$ hours involving 3 hours 24 minutes in manhours composed as follows:

<i>Machine operator</i>	100 minutes	
(includes washing machine, tabling and floor)		
<i>8 Ward Maids</i>		
9 minutes each assisting operator	72	..
4 minutes each bringing and taking trolleys to and from central wash up	32	..
	<hr/>	
(3 hours 24 mins)	204	..

Thus a substantial saving in manhours was achieved and later similar savings were made for other meals. However, it should be stated that because of a small slope up which the trolleys had to be pushed a porter had to be employed to replace the maids.

Crockery Breakages

From results of enquiries made to 37 general hospitals with decentralised crockery washing arrangements, replacements per person per year usually comprise

3 Plates 2½ Glasses 4½ Cups 2 Saucers

If the cost of an average plate is 1/5d., a glass 6d., a cup 1/1d. and a saucer 8½d., then on average the cost per patient per year would be 11/9½d. With centralisation it is generally considered that breakages are reduced, (only one hospital stated that there was an increase in breakages but no statistics were supplied). Extracts from one hospital report show:

	Replacements in former years for the months March – June inclusive			Average for the 4 months in year men- tioned	Replace- ments March/ June 1960
	1956/7	1957/8	1958/9		
Patients' Saucers	212	239	228	226	22
Patients' Cups	369	336	290	332	67
Patients' Dinner Plates	110	136	125	124	14
Patients' Tea Plates	219	143	145	169	56
	Total Quantities			851	159
	Total Costs			£46.5.7	£7.16.1
	Average saving on period of 4 months				£38.9.6
	Pro rata annual saving				£115.8.6

Another example is given below where the crockery in use was Opalware, both before and after a centralised crockery wash was introduced:

	Before			After					
	Nov '60	Feb '61	Mar '61	Nov '61	Feb '62	Mar '62	Jun '63	Jul '63	Aug '63
Cups	34	58	28	23	1	33	15	8	24
Saucers	15	—	14	4	14	31	12	—	33
Tea Plates	12	17	11	6	6	—	8	8	—
Dinner Plates	5	4	7	—	1	10	—	—	—
Dessert Plates	12	1	7	—	—	—	8	3	—
Soup Plates	5	5	9	8	17	—	10	14	—

A third example using normal white earthenware expresses savings in percentages:

Tea Cups	41% reduction in issues
Egg Cups	34% ..
Plates Pudding	83% ..
Plates Soup	78% ..
Plates Tea	74% ..
Saucers	64% ..
Soup Basins	78% ..
Glass Tumblers	40% ..

Crockery Replacements

The problem of crockery replacements can be simplified by centralisation. No longer is it necessary for each ward sister to write out an indent each month for replacements, nor does the supplies department have to check 10, 20 or more indents, record them in ledgers, count out and dispatch crockery to numerous points. Some hospitals have arranged for a cupboard or store to be sited in the wash up room. The broken crockery is returned with the soiled crockery and an exchange is made immediately so that a full complement of crockery is returned to the ward.

Organising a Central Wash Up

From the foregoing it can be seen that it is advantageous to centralise the washing of patients crockery but naturally there are a number of questions to be answered before instituting such an organisation.

1. Is the hospital suitable for a centralised crockery washing unit?
2. How will crockery be conveyed to the central point?
3. Who will convey it?
4. Who will operate the machine?
5. Will all patients' crockery be washed centrally?
6. How many collections (and deliveries) daily?
7. What sort of equipment is required?

Hospital's Suitability for Centralised Crockery Washing

Early thoughts on this point were that the hospital must be compact, not too large, and have enclosed corridors. Experiments have shown that hospitals with 1,300 patients accommodated in separate buildings can successfully institute a centralised crockery washing system. So size alone does not matter, nor is it essential to have enclosed corridors. However, a factor which might be an obstacle to full centralisation is a multi-storey building, or a number of multi-storey buildings, having a limited number of lifts. There are a number of general hospitals in the country which have a series of ward blocks connected by corridors at the different floor levels but have only one or two lifts which are used for all purposes. Because of this they are in constant use for patients, staff and goods, to the different blocks. In these circumstances it might be better to have partial centralisation in that a crockery washing unit for the wards on each floor could be planned.

Conveyance of Crockery

This will depend on the size and layout of the hospital. If there are separate ward blocks and open roads to traverse, motorised transport is recommended. It is known, however, that one hospital with some 1,300 patients and separate ward blocks uses man-drawn trolleys. If the wards are comparatively near to the proposed central wash up and especially if there are covered corridors connecting, purpose built trolleys should be used.

Staff Requirements

By using motorised transport for the conveyance of crockery, the crockery washing operation will be entirely divorced from ward staff with the exception of placing the crockery in the containers for transportation. If trolleys are used, they may be pushed by ward staff or a porter may have to be employed, dependent on local circumstances. But no matter what the system, it has been found advantageous to strip and sort the crockery at ward level before dispatching to the central point. The extent to which the porter(s) or ward maids help with the washing operation will depend on the size of hospital and amount of crockery to be washed. In large hospitals using large machines one operator is fully occupied loading the machine and another stacking the crockery as it comes out clean and dry from the machine. With smaller machines only one operator is employed and in such circumstances it has been found that the porter (or ward maid) can speed the operation by helping to rack the plates and stack them after they have passed through the machine. Whilst the crockery is being washed it is usual for the trolley to be cleaned by the porter (or ward maid).

Collection and Delivery of Crockery

A problem which most hospitals have encountered is the extent to which crockery will be washed centrally. All are agreed that the three main meals can easily be organised but the 'in between' meal beverages need special consideration. Should there be a collection and delivery for the early morning tea and similarly for the mid-morning beverage and again for

the afternoon tea and finally for the late evening beverage? These would make a total of seven collections and deliveries instead of three. Some hospitals consider that these extra collections are not justified on the grounds of labour cost. However, it should be remembered that one of the main points of centralised crockery washing is the better standard of hygiene achieved. Surely the hygienic washing of cups is at least as important as that of plates? Other hospitals have considered the issue of extra cups and saucers so as to keep to three collections and deliveries. This, of course, involves a treble or possibly a quadruple issue of cups depending on whether all the crockery can be returned to the wards in time for the next service. For example, the peak period would be between supper and the mid-morning beverage. With a treble issue of clean crockery in the ward after the supper meal the cups would be used for late evening and early morning beverages, also breakfast. They would have to be returned to the wards by 10 or 10.30 a.m. ready for the mid-morning beverage. There are some hospitals which have considered the use of disposable beakers for the late evening and mid-morning beverages. It would seem that an acceptable arrangement, where it is possible to collect, wash and deliver crockery in between the services, might be a double issue of cups and saucers to each ward and the use of a disposable beaker for the late evening drinks. Where the hospital is too large for the complete operation to take place between services, a double issue of all crockery should be made and six or seven collections and deliveries per day made depending on the acceptability of a disposable beaker for one beverage.

Equipment

Equipment is required for the conveyance of crockery to and from the wards and for washing it. In the case of the former a small problem is sometimes created by the variety of sizes of crockery in use. It may vary not only from hospital to hospital and from ward to ward but also within a ward. It has been known for there to be as many as eight different types of soup plate in one ward varying from 8in. to 10½in. If crockery sizes were standardised it would help with the design of a trolley or a container for conveying the crockery—recommended sizes are 9in. meat plate, 7in. soup and sweet plates of the rimless or almost rimless pattern.

In general, trolleys are designed with a shelf for plates and saucers in stacks which is sometimes sectionalised for different sizes, a lower shelf for carrying two full sized cup racks, a space for the cutlery rack and a scrap bin either internal or external to the trolley.

In considering the design the trolley should be one which is easily cleaned and can be hosed out and dried within 3-4 minutes, so as to be ready to receive the clean crockery.

It was thought by some that to be able to heat the plates in the same trolley as conveyed the crockery from the wash up would be an advantage. Consequently one or two manufacturers have designed trolleys

accordingly. Providing everything is satisfactory it saves one operation, that is, transferring plates to the hot cupboard. If this be the decision taken, care is needed to ensure that the trolley will heat the plates in a reasonable time. Plates which are stacked, with only a small wattage element used, take a very long time to heat through to the centre. Another style of trolley is being tried. All crockery is set in the trolley ready for washing, for example, plates are standing on edge with space between, cups are separate and upside down. The trolley, just as it comes from the ward, is pushed straight into a cabinet, the doors are closed and the sprays turned on. It is too early at this stage to say how successful this operation is but a report on this will be available in due course.

Illustrations of trolleys available are shown in the Appendices.

For washing crockery various types of machines may be used but those which are automatic and require the minimum of manual effort are recommended. Whilst brush and water turbulence types are effective, spray type machines lend themselves more easily to automation. The largest machines may have an automatic five stage operation, a cool pre-wash, a detergent wash, a hot wash, a rinse and a hot air dry. These machines are usually the Flight type (pegs). Racks are not used with them as crockery is put on individually. Therefore benching at each end of the machine need only be short. Smaller machines have to combine these operations and rely on an efficient system together with a good layout. The smallest of the spray type machines should be operated in conjunction with an external pre-wash sink and adequate benching either side of the machine to allow for racking and automatic drying of crockery. Guidance on particular points of layout has already been given in earlier paragraphs but the actual layouts of two hospitals which have centralised their crockery washing are shown in Appendices XVI, XVII.

If trolleys are used for the conveyance of crockery, or the boxes which may be used for motorised transport are too big to go through the machine, separate arrangements must be made for washing them. It is suggested they are hosed out with a microspray and dried with a clean cloth.

Organisation

It is essential to ensure that every employee concerned knows the system and what he or she has to do. An example in one particular hospital of instructions given to the ward maids who take the trolleys to the crockery wash is given below.

Routine for Use of Crockery Trolley

Guidance to the ward maid for a central crockery washing operation –

LOADING

1. The crockery trolley should be stationed in the ward kitchen with the

food scrap box and cutlery basket ready to receive their respective contents.

2. Cup baskets should be placed on the draining boards or on trays. Alternatively they may be carried on a clearing trolley with the cutlery basket and food scrap box.
3. All plates should be scraped and sorted into stacks of each kind and placed on the top shelves of the trolley.
4. Glasses, jugs, basins should be put in the rack on the bottom shelf of the trolley.
5. Cutlery should not be packed too tightly in the compartment of the cutlery basket; spoons, forks, knives should be mixed together.
6. Once the trolley is packed the doors must be properly secured before it is pushed to the central crockery wash.

WASHING

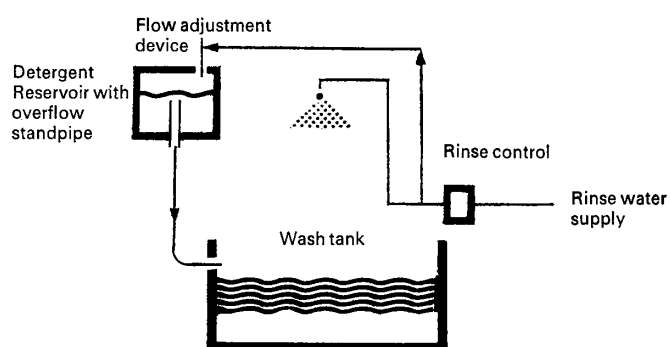
On arrival at the wash up –

1. Unload all plates and assist machine operator to rack them.
2. Lift out cup racks on to benching.
3. Empty food scrap bin into waste disposal unit.
4. Lift out cutlery basket, and place it in an open dishwasher rack together with empty food scrap box.
5. While the machine operator is sending the racks through the dishwasher, spray the inside and outside of the trolleys with microspray provided. This spray has a steradent and detergent already mixed into the solution. Wipe the trolley clean with the fresh cloth provided. Throw the cloth into the bucket after use. (Note while the trolley is being cleaned the crockery is being washed.)
6. Unrack plates and stack in a clean trolley. Transfer cup racks complete.
7. When the rack containing the cutlery basket and food scrap box comes to the clean side, this will signify that all the crockery for that ward has been washed.
8. Return trolley to ward.

Part III Appendices

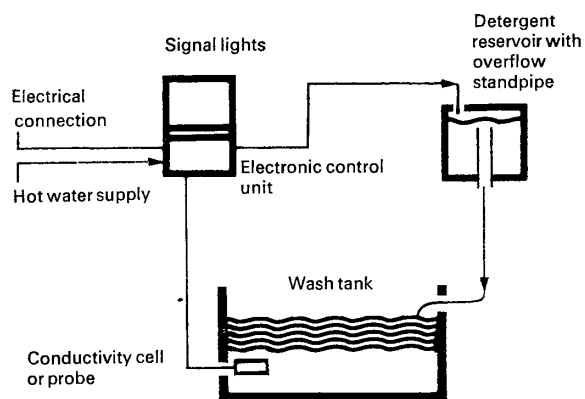
Appendix I Hydraulic Type of Detergent Dispenser

This consists of a stainless steel or polythene bowl sited above the machine. The bowl is connected by copper or polythene tubing to the dishwasher with the open end of the tube entering the machine in a convenient position to feed the wash tank with detergent solution. The other end is connected to a standpipe in the centre of the dispenser bowl into which detergent powder (usually a predetermined amount) is placed. Hot water, which is fed to the bowl from the rinse water line of the machine every time the rinse comes into action, dissolves the powder and causes the solution to overflow into the wash tank.



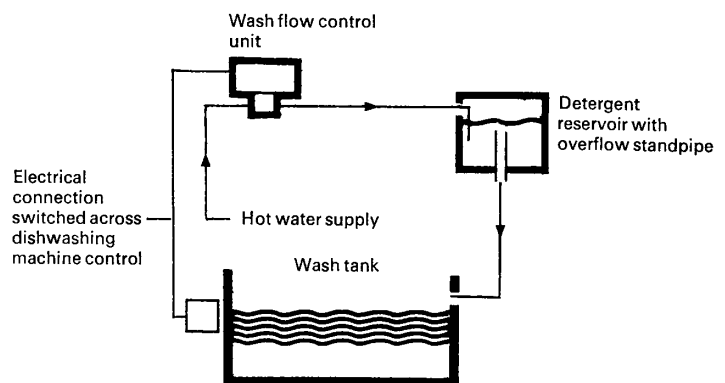
Appendix II Electronically Controlled Type of Dispenser

The dispenser with electronic controls has the same stainless steel or polythene container with a suitable outlet pipe connected to the dishwasher to feed the wash tank with detergent solution and a hot water feed pipe. The control of the dispenser is activated by two probes or a conductivity cell, which are fitted into the side of the wash tank below the water level. The two probes measure the strength of the detergent solution by passing a signal between them. When the solution drops below a predetermined strength a switch is operated which allows hot fresh water to flow into the detergent dispenser. This overflows the detergent reservoir and the concentrated solution flows into the machine wash tank until the strength of detergent is brought back to the required level. (When the dispenser is switched on a green or amber light shows continuously as a signal that it is in working order.) When the detergent dispenser feeds, a red light signal flashes (on one model a buzzer sounds as well). When the dispenser is empty the red light signal shows continuously to warn operators that they must add more detergent powder to the dispenser.



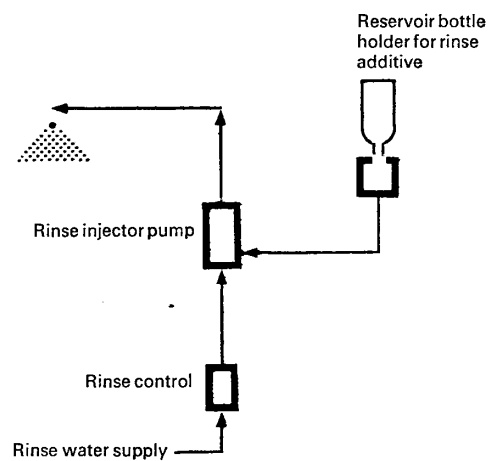
Appendix III
Automatic Type Detergent Feeder

The automatic detergent feeder has the same stainless steel container and connections to the machine wash tank and to the hot water supply as previously described. The control of the feeder is electrically operated and is switched across the dishwashing machine control. It is designed to add a solution of detergent to the wash tank at regular timed intervals. The intervals and the amount of solution can be controlled and are set according to the rinse water consumption of the machine to maintain a constant detergent strength. No light signals or switches are necessary and it only requires the operator to add detergent powder to the container.



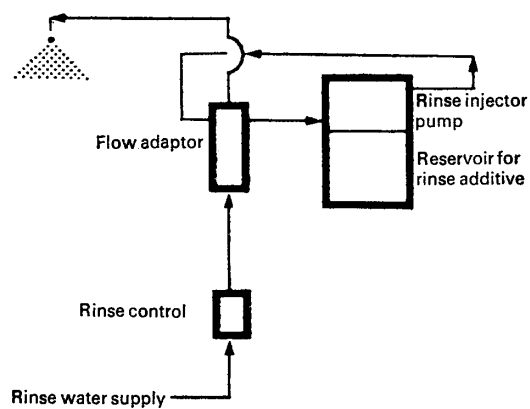
Appendix IV
Mechanical Type Rinse Line
Injector

This injector consists of a reservoir bottle holder which contains an 8 oz. bottle of rinse additive fluid with a polythene tube connecting it to a rinse injector micropump. This rinse injector pump is operated by the flow of water in the rinse water line. An adjustment to regulate the amount of rinse additive is incorporated. The injector is entirely mechanical and no electrical connections are required.



Appendix V
Hydraulic Type Rinse Line Injector

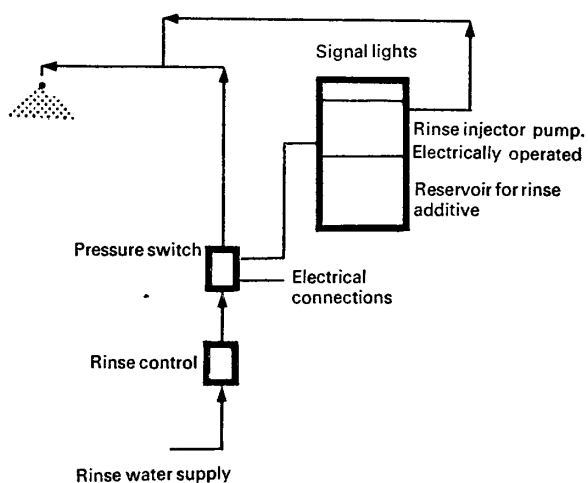
The operation of this type is again dependent on the flow of water through the rinse water line but will work on extremely low pressures as well as high water pressures. A special injector fitting is bolted into the rinse water line and connected by two copper pipes to a container which holds the rinse additive. To inject a correct amount of rinse additive or wetting agent, the pressure of water is measured which automatically allows a predetermined amount of fluid to pass into the rinse water. The injector fitted contains no moving parts and requires no electrical connections, its action being based on the 'Venturi' and 'Pilot Tube' principles.



Appendix VI

Electrical Type Rinse Line Injector

This type is electrically operated having two signal lights. It has a micro-injector pump and the electric power for its operation is controlled by a pressure switch which is fitted into the rinse water line. This switch is activated by the pressure of water each time the machine or operator rinses the dishes. When working a continuous white signal light operates and when empty a red light flashes.



Appendix VII
Suppliers of Detergent Dispensers,
Rinse Injectors, Detergents and
Dishwashing Machines Concerned
in the King's Fund Experiment

Automatic Detergent Feeder Electrically Operated Rinse Injector	British Hydrological Corp., Colloidal Works, Deer Park Road, London, S.W.19.
Hydraulic Type Detergent Dispenser Electronic Controlled Detergent Dispenser Rinse Injector Automatic Detergent Dispenser for Liquid Detergent for Spray Type Machines (Not tested in our experiment)	Diversey (U.K.) Ltd., Diversey House, Cockfosters Road, Barnet, Herts.
Hydraulic Type Detergent Dispenser Electronic Controlled Detergent Dispenser Rinse Injector	Soilax (Eclab) Ltd., North House, 31 North Street, Carshalton, Surrey.
L.E. 3CT Automatic Timed Dishwasher, 1962 L.E. Semi-Automatic Dishwasher, 1948	Hobarts Ltd., Hobart Corner, New Southgate, London, N.11.
A.A. Model, 1956 C.A. Automatic, 1956 A. Model, 1954 A. Model, 1952	Dawson Bros. Ltd., 406 Roding Lane, South Woodford Green, Essex.

Appendix VIII

Table of Costs and Detergent Consumption, Stage 1

Hand-feeding of detergent currently in use

Hospital Detergent	A I.S.L. Bryta	B Byprox and Domestos	C Chinabrite tablets	D Ampolite	E Teepol	F M.o.W. Dish- washing powder
Quantity used in 4 weeks	28 lbs	8 gals Byprox 2 gals Domestos	112 tablets	100 lbs	28 pints	200 lbs
Quantity used for 10,000 pieces	2.09 lbs	4.9 pints	6.6 tablets	5.9 lbs	3.3 pints	10 lbs
Cost per 10,000 pieces	4/11.8d	2/10.3d	8/11d	5/8d	2/0.06d	4/2d
Average cost per person per meal	0.0342d	0.222d	0.0473d	0.0645d	0.0024d	0.025d
Pieces of crockery per week	24,000	40,700	42,000	42,380	21,700	50,120
Meals per week	4,207	6,300	9,450	7,770	3,850	10,150

Appendix IX
Table of Costs and Detergent Consumption, Stage 2

Hand-feeding of detergent

Hospital Detergent	A Soilax S.W.	B Soilax Acclaim	C Diversey Ampolite	D Diversey Ampolite	E Chinabrite 3346	F Chinabrite 3322
Quantity used in 4 weeks	20 lbs 8 ozs	56 lbs	127 lbs	100 lbs	49 lbs	208 lbs
Quantity used for 10,000 pieces	2 lbs 2 ozs	3 lbs 13.1 ozs	7 lbs 9 ozs	5.9 lbs	1.8 lbs	10.4 lbs
Cost per 10,000 pieces	2/3.5d	5/0.4d	5/0.4d	5/8d	2/9.1d	13/6d
Cost per meal served per week	0.0133d	0.0478d	0.0427d	0.0645d	0.0334d	0.079d

Appendix X

Results of Bacteriological Examination of Wash and Rinse Waters and Swabs from Utensils and Crockery Taken at Various Hospitals

Hospital	A Temp.	Count per ml*	B Temp.	Count per ml*	C Temp.	Count per ml*	D Temp.	Count per ml*	E Temp.	Count per ml*	F Temp.	Count per ml*
Wash water (1)	60° C	930	63° C	470	66° C	45	70° C	120	69° C	3	74° C	20
(2)	60° C	24	61° C	20	60° C	1,420	70° C	170	70° C	0	84° C	14
Rinse water temp.	65° C	—	77° C	—	77° C	—	80° C	—	71° C	—	84° C	—
Dinner plates (1)		1		3		0		8		0		1
(2)		0		2		8		86		0		3
Pudding plates (1)		0		0		5		0		0		2
(2)		0		1		0		1		4		2
Forks (1)		1		90		4		5		17		24
(2)		0		1,370		2		100		58		350
Spoons (1)		1		710		1		19		29		140
(2)		0		6		4		260		4		76
Cups (1)		0		2		5		4		4		1
(2)		3		1		1		1		3		14
Glasses (1)		—		1		—		—		—		4
(2)		—		1		—		—		—		7

Note: — = No test carried out * = Plate count after 2 days at 37°C.

Appendix XI

Detergent Dispensing with Hydraulic Dispenser and Rinse Injector, Stage 3

	A Soilax S.W. Soilax Rinse Dry	B Soilax Acclaim Soilax Rinse Dry	C Diversey Ampolite Diversey Zero Spot	D Diversey Ampolite Diversey Zero Spot	E Chinabrite 3346 —	F Chinabrite 3322 —
Hospital Detergent Wetting agent for rinsing						
Quantities used in 4 weeks	D. 72 lbs W.A. 2 pts 8 ozs	114 lbs 8 ozs 1 pint 16 ozs	210 lbs 6 pints	38 lbs 1 pint 14 ozs	158 lbs —	172 lbs —
Quantities used for 10,000 pieces	D. 7.5 lbs W.A. 5 ozs	6 lbs 13 ozs 2.028 ozs	7.1428 lbs 0.2976 pints	2 lbs 3.8962 ozs 2.04 ozs	18 lbs 3.2446 ozs —	8.6 lbs —
Cost per 10,000 pieces	D. 4/8d W.A. 5/0d	12/2.4285d 2/0.2857d	13/2.33d 13/2.619d	3/9.1283d 1/3.33d	27/10.5622d —	11/1d —
Cost per meal served	0.0668d	0.0970d	0.0629d	0.0327d	0.1886d	0.0666d

Appendix XII

Detergent Dispensing with Electronic Dispensers and Rinse Injector, Stage 4

Hospital Detergent Wetting Agent	A Soilax Acclaim Soilax Rinse Dry	B Soilax Acclaim Soilax Rinse Dry	C Diversey Divoklor Diversey Zero Spot	D Diversey Ampolite Diversey Zero Spot	E	F Chinabrite 3322 B.H.C. Blu-Raid
Quantity used in 4 weeks	D. 182 lbs W.A. 2 pints	98 lbs 2 pints 8 ozs	140 lbs 5 3/5th pints	90 lbs 1 pint		172 lbs 5 2/5th pints
Quantity per 10,000 pieces	D. 18-75 lbs W.A. 4-85 ozs	6-2 lbs 2-9 ozs	8-33 lbs 6-6 ozs	5-12 lbs 0-1136 ozs		8-6 lbs 6-4 ozs
Cost per 10,000 pieces	D. 33/4d W.A. 4/2-3d	10/9-23d 2/11-38d	16/8-5d 8/1-85d	8/6-27d 1/2-93d		11/1d 1/8-2d
Average cost per person per week	0-2615d	0-064d	0-1313d	0-0671d		0-0759d

Appendix XIIIa

Results of Bacteriological Examination of Wash and Rinse Waters and Swabs from Utensils and Crockery Taken at Hospital A

Using detergent dispenser

Description of sample	Non-Bactericidal Detergent (7 ozs to 12 gallons)			Bactericidal Detergent (5 ozs to 12 gallons)		
	<i>First Sampling 1.10 pm</i>	<i>Second Sampling 1.15 pm</i>	<i>Third Sampling 1.45 pm</i>	<i>First Sampling 1.10 pm</i>	<i>Second Sampling 1.15 pm</i>	<i>Third Sampling 1.45 pm</i>
Temperature of wash water	64° C	46° C	40° C	65° C	46° C	36° C
Temperature of rinse water	66° C	48° C	38° C	71° C	47° C	38° C
Wash water count per ml (37° C)	2	15	1,550	8	130	2,340
	Count per article at 37° C			Count per article at 37° C		
Dinner plates	4	—	3	1	0	54
Pudding plates	3	95	21	1	0	74
Spoons	0	2	1	1	2	32
Forks	1	2	19	0	2	1
Cups	2	44	1	0	7	38

Appendix XIIIb

Results of Bacteriological Examination of Wash and Rinse Waters and Swabs from Utensils and Crockery Taken at Hospital C

Detergent added by measure at half-hourly intervals

Description of sample	Non-Bactericidal Detergent (7 ozs to 12 gallons)			Bactericidal Detergent (5 ozs to 12 gallons)		
	<i>First Sampling 12.50 pm</i>	<i>Second Sampling 1.10 pm</i>	<i>Third Sampling 1.45 pm</i>	<i>First Sampling 12.50 pm</i>	<i>Second Sampling 1.10 pm</i>	<i>Third Sampling 1.45 pm</i>
Temperature of wash water	65° C	35° C	39° C	64° C	35° C	37° C
Temperature of rinse water	80° C	40° C	60° C	80° C	39° C	39° C
Wash water count per ml (37° C)	750	25,400	51,500	550	198,000	103,000
	Count per article at 37° C			Count per article at 37° C		
Dinner plates	6	46	43	0	150	360
Pudding plates	13	14	14	120	300	24
Spoons	14	64	32	6	340	220
Forks	71	46	230	320	40	180

Appendix XIIIc

Results of Bacteriological Examination of Wash and Rinse Waters and Swabs from Utensils and Crockery Taken at Hospital D

Detergent added by measure at half-hourly intervals

Description of sample	Non-Bactericidal Detergent (7 ozs to 12 gallons)			Bactericidal Detergent (5 ozs to 12 gallons)		
	First Sampling 1.15 pm	Second Sampling 1.20 pm	Third Sampling 1.50 pm	First Sampling 1.15 pm	Second Sampling 1.20 pm	Third Sampling 1.50 pm
Temperature of wash water	53° C	27° C	37° C	55° C	44° C	43° C
Temperature of rinse water	59° C	39° C	37° C	59° C	47° C	44° C
Wash water count per ml (37° C)	1,650	5,600	16,200	2,640	4,240	12,100
	Count per article at 37° C			Count per article at 37° C		
Dinner plates	550	—	340	93	—	870
Pudding plates	370	—	410	54	—	420
Spoons	130	—	440	15	—	46
Forks	28	—	410	37	—	25
Cups	31	—	—	20	—	140

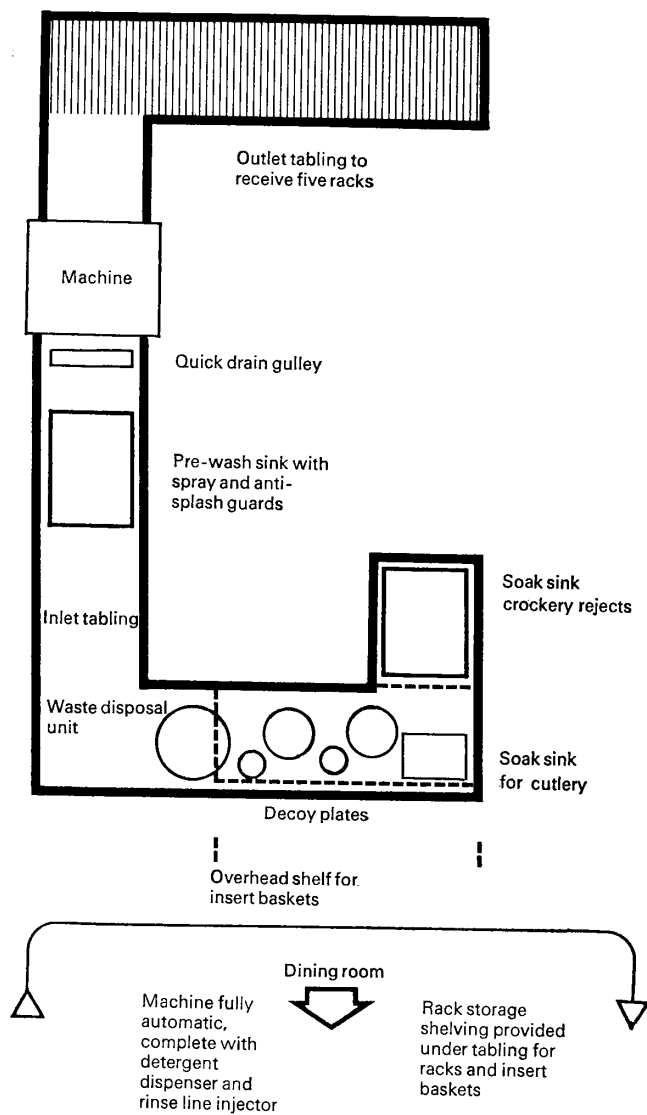
Appendix XIIId

Results of Bacteriological Examination of Wash and Rinse Waters and Swabs from Utensils and Crockery Taken at Hospital B

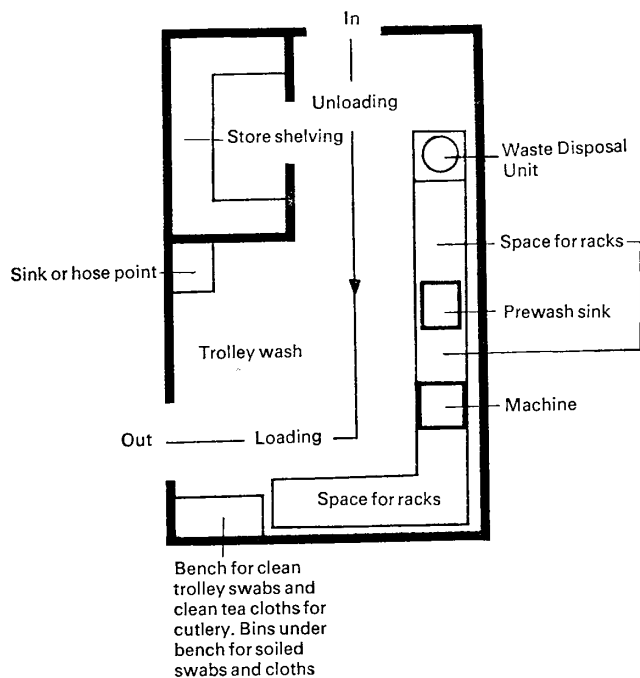
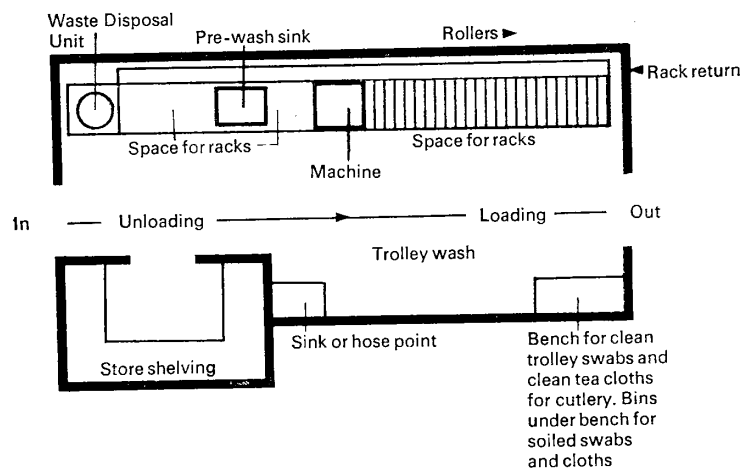
Detergent added by measure at half-hourly intervals

Description of sample	Non-Bactericidal Detergent (7 ozs to 12 gallons)			Bactericidal Detergent (5 ozs to 12 gallons)		
	First Sampling 1.10 pm	Second Sampling 1.15 pm	Third Sampling 1.45 pm	First Sampling 1.10 pm	Second Sampling 1.15 pm	Third Sampling 1.45 pm
Temperature of wash water	65° C	52° C	41° C	65° C	56° C	45° C
Temperature of rinse water	70° C	54° C	47° C	68° C	58° C	46° C
Wash water count per ml (37° C)	1	16	290	8	11	740
	Count per article at 37° C			Count per article at 37° C		
Dinner plates	2	2	1	0	3	11
Pudding plates	1	2	11	2	1	12
Spoons	2	1	9	3	1	13
Forks	0	4	26	0	8	10
Cups	130	5	22	0	0	480

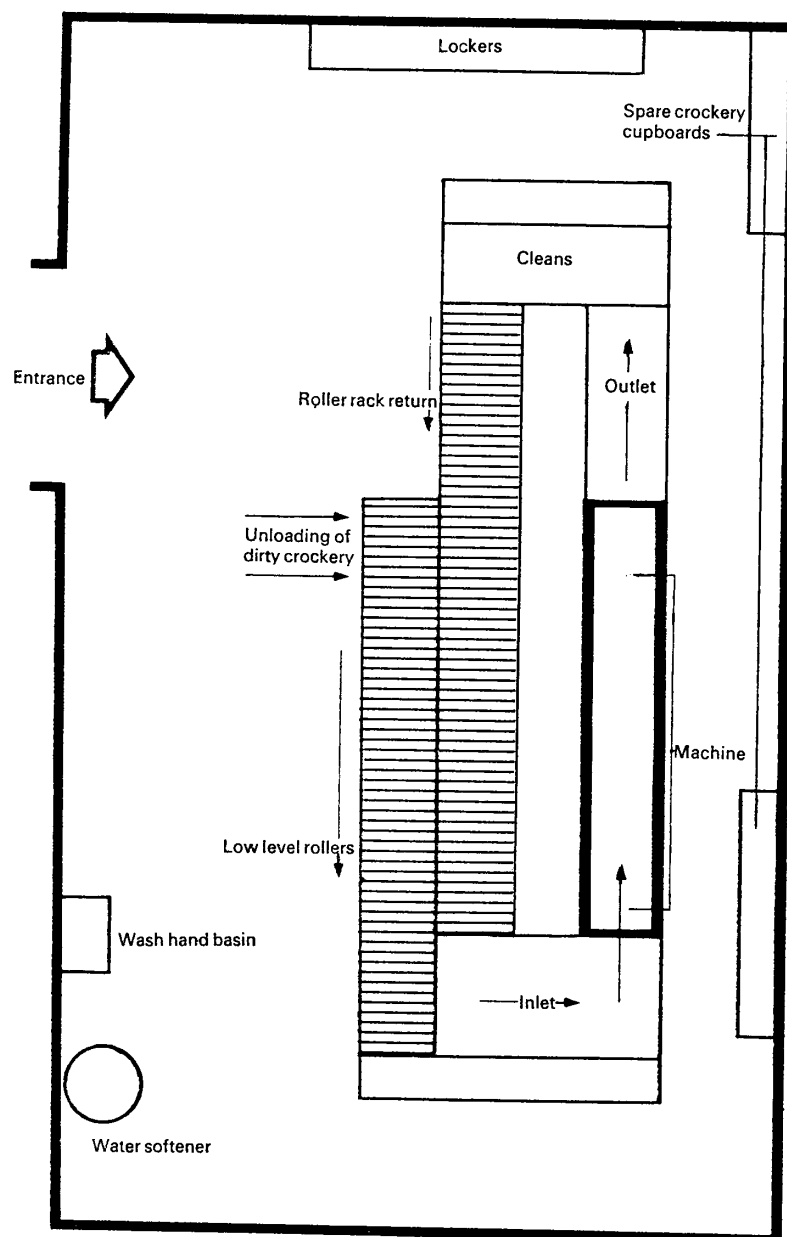
Appendix XIV
Diagrammatic Layout of Crockery
Washing Area near Dining Room



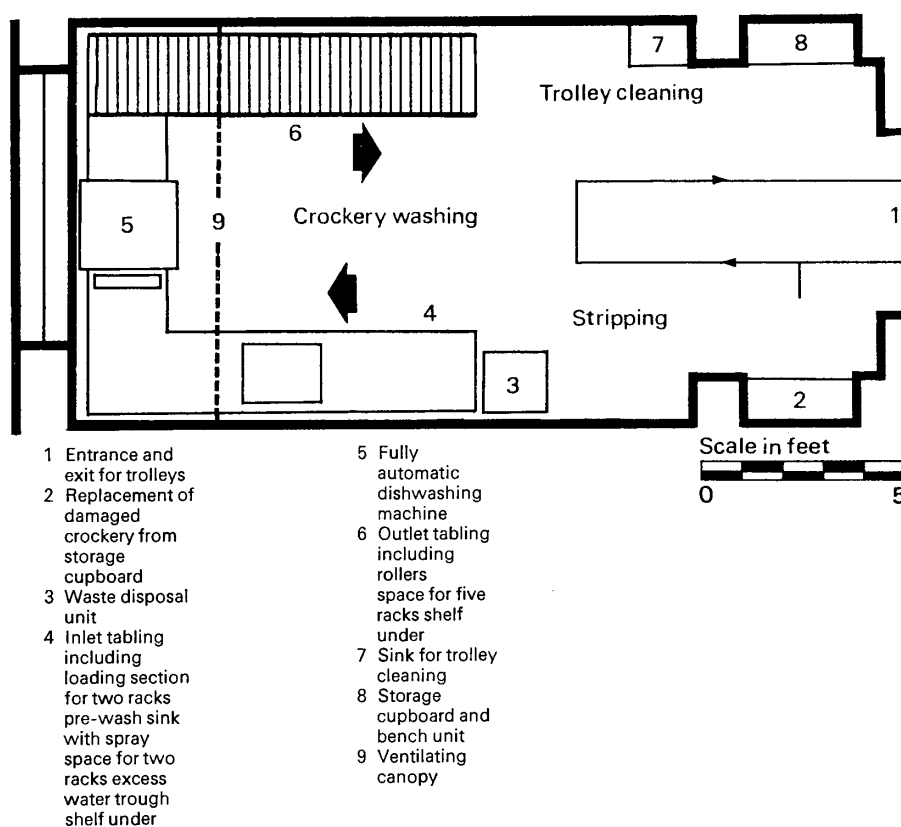
Appendix XV
Diagrammatic Layout Suitable for
Central Crockery Wash in Medium
Size Hospitals



Appendix XVI
Barnet General Hospital: Central
Crockery Wash for 490 Patients –
Flight Machine



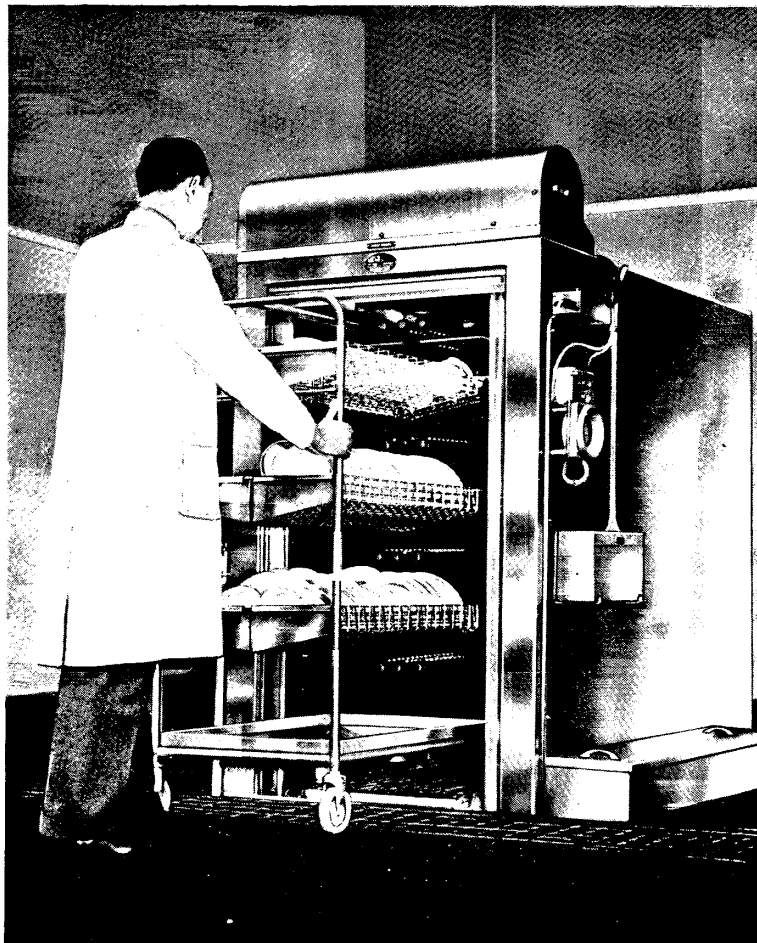
Appendix XVII
New Cross Hospital:
Central Crockery Wash for 240
Patients – Spray Type Machine



Appendix XVIII
Examples of Trolleys for the
Conveyance of Crockery

1. Dawson

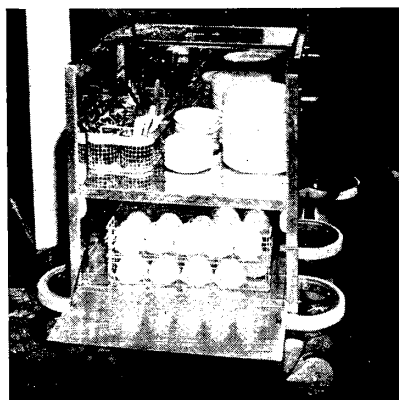
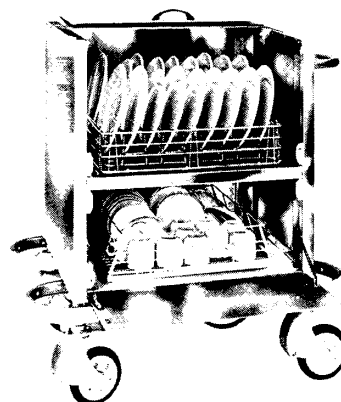
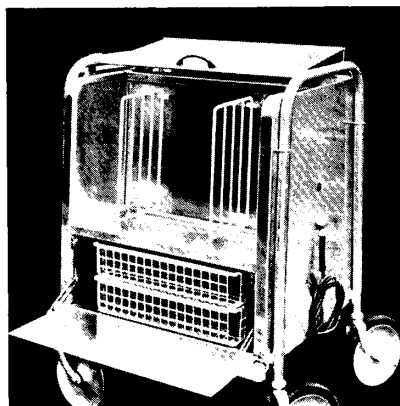
Whilst in general spray type machines in conjunction with conveyor belts or roller tabling is considered the most suitable for central crockery washing, there is another system worthy of consideration, i.e. The Dawson System. Plates are racked on the trolley at ward level, the trolley is wheeled straight into the machine where sprays wash the plates. Because of the temperature the plates automatically dry on being withdrawn from the machine. The plates are covered and the trolley is wheeled straight back to the ward. It is stated that a good deal of time is saved in plate handling by this method. Dawson Bros. Ltd., 406 Roding Lane, South, Woodford Green, Essex.



2. The Grundy Trolley

The standard trolley can be used in three different ways as illustrated.

Grundy (Teddington) Ltd., Somerset Works,
Elmtree Road, Teddington, Middlesex.



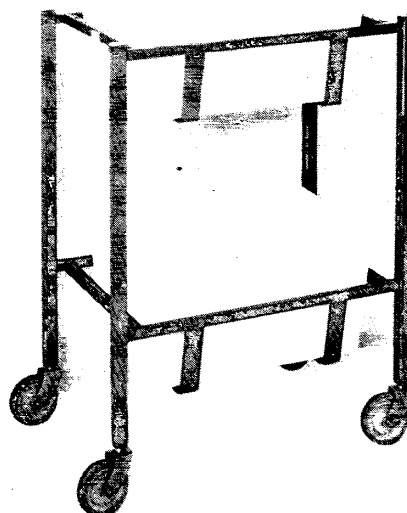
3. Institution Supplies

Trolley for collection of used crockery from wards and return of washed crockery.

Trolley for removal of used crockery in staff dining rooms. Crockery can be stacked without scraping.

Containers are of polypropylene.

Institution Supplies (Leeds) Ltd., 46 Park Place, Leeds 1.



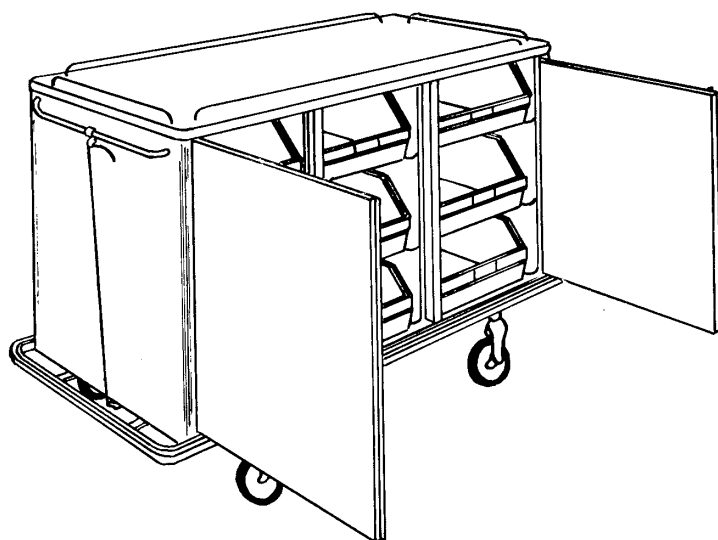
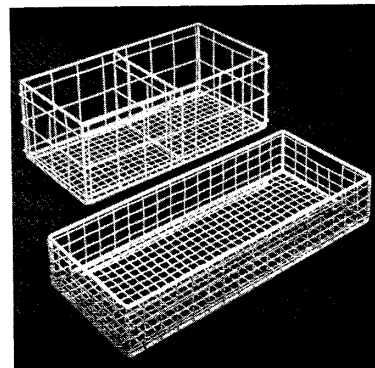
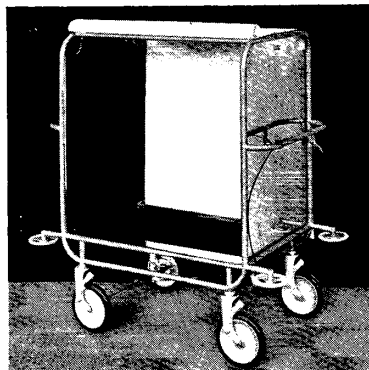
4. Capecraft

The Capecraft Trolley. Trolley for conveying crockery in baskets.

Baskets used with trolley for carrying plates in piles.

Trolley carries nine polypropylene 'fix' boxes, each of which can contain up to six complete sets of crockery and cutlery. Mounted on 9 inch sprung castors and fitted with braking system.

Capecraft Limited, Warwick.



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