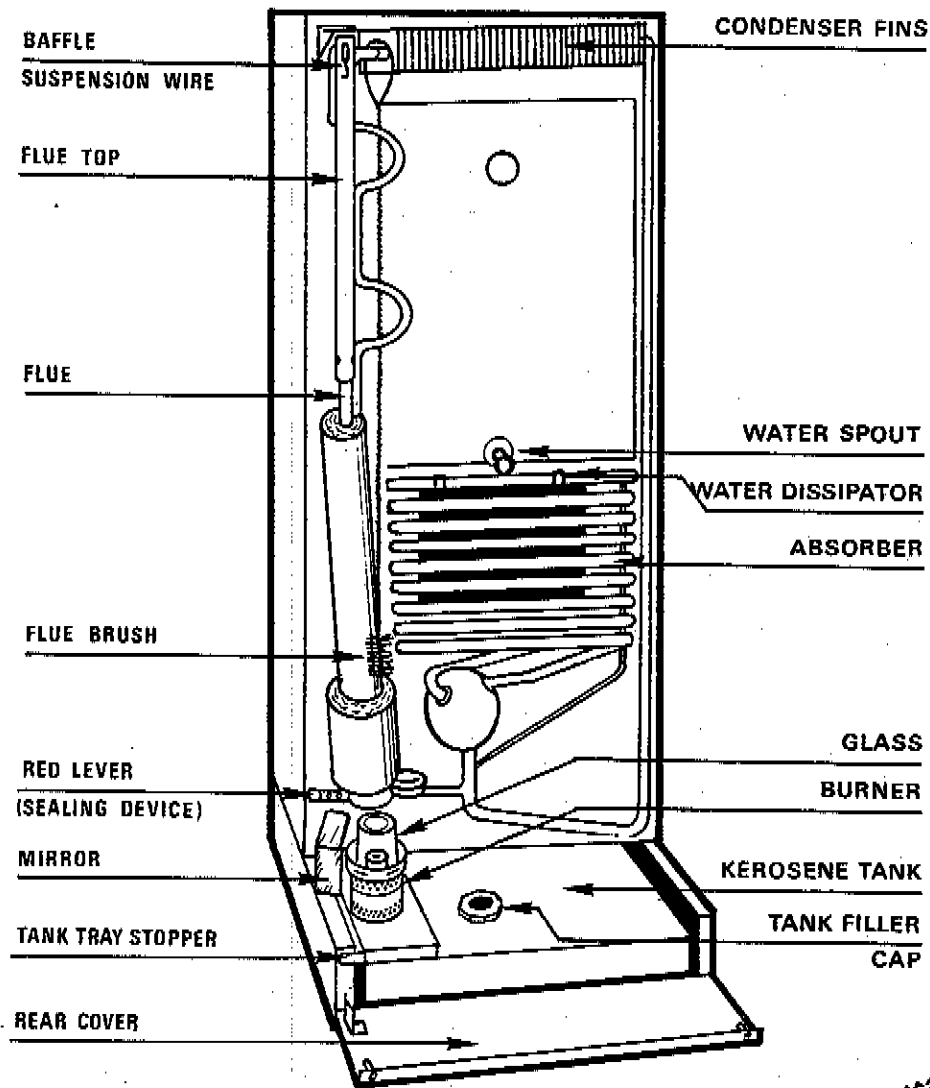
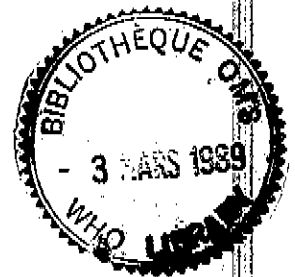


USER'S HANDBOOK FOR KEROSENE OPERATED ABSORPTION REFRIGERATOR (SIBIR)



17B



**Before using this book
make sure that the refrigerator
in your care looks like the drawing above
which shows the back of an Absorption Refrigerator**

Ordering Code:
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(Revised January 1989)

This document, and others in the EPI Training Series, are available from:

Expanded Programme on Immunization
World Health Organization
1211 Geneva 27, Switzerland

USER AND MAINTENANCE HANDBOOKS

This User Handbook, produced by the Expanded Programme on Immunization, is included in two series of cold chain training course materials:

- (a) Refrigerator Use, Maintenance and Repair Series;
and
- (b) Logistics and Cold Chain for Primary Health Care Series.

The complete list of modules available in these two series is listed below:

(a) Refrigerator Use, Maintenance and Repair Series

This series comprises 20 booklets designed to improve the standards of refrigerator and cold room maintenance and repair, which are grouped into two sub-series:

- User and Maintenance Handbooks:

Each of the following pairs of Handbooks forms a one-day course for people who use cold rooms or compression, kerosene, gas or solar refrigerators:

- 14. How to look after a compression refrigerator
- 15. User's handbook for compression refrigerators

- 16. How to look after a kerosene refrigerator
- 17A. User's handbook for kerosene refrigerators (Electrolux RAK 1302)
- 17B. User's handbook for kerosene refrigerators (Sibir S2325)

- 18. How to look after a gas refrigerator
- 19. User's handbook for gas refrigerators

- 21. How to look after a cold store
- 22. User's handbook for cold stores

- 25. How to look after a photovoltaic refrigerator
- 26. User's handbook for photovoltaic refrigerators

(continued on back inside cover)

**USER'S GUIDE
FOR STORING VACCINE
IN SIBIR S2325 KEROSENE REFRIGERATOR**

This booklet should be read from beginning to end before you start operating your SIBIR S2325 kerosene refrigerator. The booklet explains step by step how to install and operate the refrigerator for safe-keeping of vaccines.

After you have started to operate the refrigerator, the booklet will also be useful to you as a reference whenever you have problems with the refrigerator or if you forget how to do a certain operation. The contents list below will help you find the sections you need and the two annexes, "Trouble Shooting" and "How to Do", should be especially useful.

CONTENTS

| | |
|--|----|
| Introduction | 2 |
| A. Kerosene refrigerator parts list | 6 |
| - The two types of burners | 7 |
| - Models of (Sibir) refrigerator used in EPI | 8 |
| B. Installing the refrigerator | 9 |
| - Receiving the refrigerator | 9 |
| - Installation check | 9 |
| - Location of refrigerator | 12 |
| - Venting | 12 |
| - Levelling | 13 |
| C. Operating the refrigerator | 14 |
| - Filling the tank | 14 |
| - Lighting the burner | 14 |
| - Controlling the temperature | 16 |
| - Adjusting the flame | 16 |
| - Recording temperature | 18 |
| D. Maintaining and cleaning the refrigerator | 20 |
| ANNEX 1: How to Do | 23 |
| ANNEX 2: Trouble Shooting | 33 |

INTRODUCTION

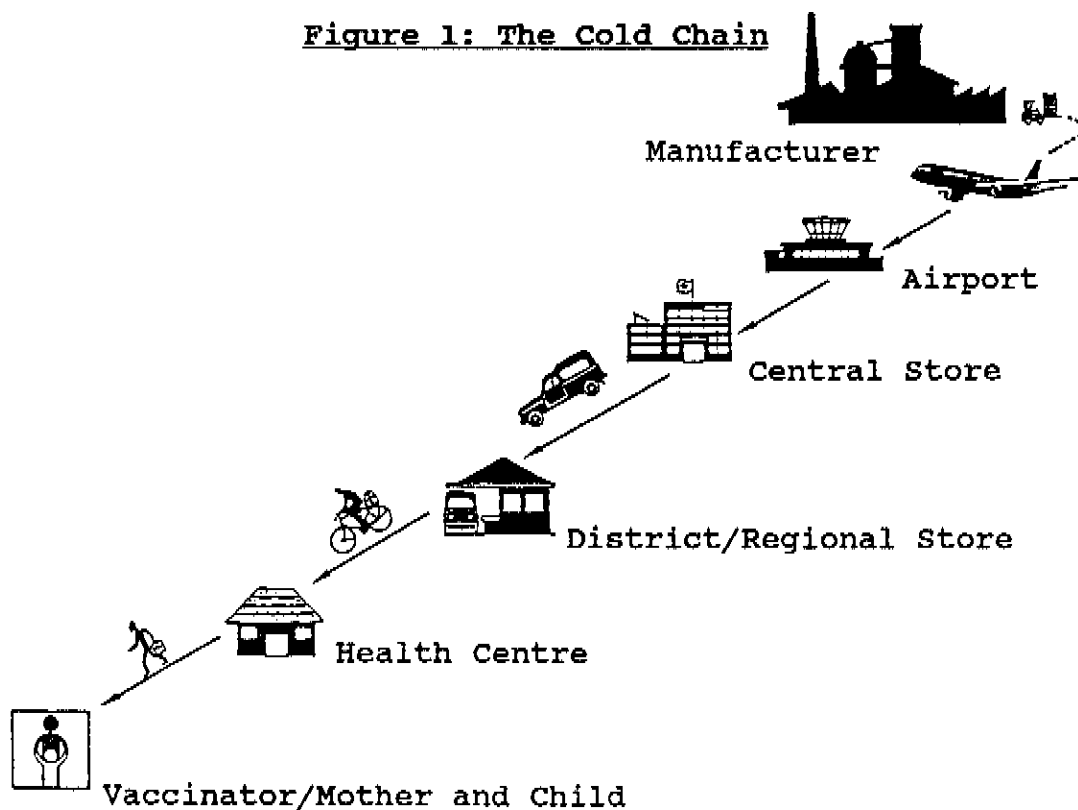
Being responsible for a refrigerator in the Expanded Programme on Immunization (EPI) means that you are responsible for a link in the cold chain which brings vaccines safely from the manufacturer to the child or to the pregnant woman who is to receive protection against the EPI target diseases.

To ensure that the vaccine is potent when it reaches the woman or child, it has to be kept at the correct temperature (0 to +8°C) through all links of the cold chain - this means at all intermediate stores (in cold rooms and refrigerators) and during all transport between the stores (in refrigerated vehicles, cold boxes or vaccine carriers). Even at the vaccination table it has to be kept cold.

If just one link of the cold chain fails, it means that the efforts at all the other links have been wasted - the vaccine will have lost its potency. The child receiving an impotent vaccine will not be protected against the disease.

You are a member of the cold chain team. Be a responsible member and, together with the rest of the team, bring potent vaccines and health to the women and children of your country. You can be a responsible member by following the guidelines and instructions of this booklet.

Figure 1: The Cold Chain



This booklet is concerned mainly with how to control the temperature inside the refrigerator by adjusting the flame of the kerosene burner and how to maintain the refrigerator. However, your daily use of the refrigerator also influences how safely the vaccines can be kept in it.

When using the refrigerator there are things you MUST DO and things you MUST NOT DO:

- You must keep enough frozen icepacks for use in your cold boxes or vaccine carriers. When freezing large quantities of icepacks, start by freezing 4.8 kg (8 large or 12 small icepacks); when they are completely frozen, you can add more (4.8 kg) and so on.
- You must keep enough spare kerosene to keep the refrigerator running for as long as it will take to use the vaccine in the refrigerator.
- You must keep vaccine well stacked in trays or boxes.
- You must keep cold icepacks in the bottom of the refrigerator for stabilizing and pre-cooling.
- You must have a functioning thermometer either on the door or inside the refrigerator.
- You must keep the door locked and the key in a safe place.
- You must keep an appropriate stock of spare parts and, whenever you use any of them, immediately reorder replacements so that the stock is never depleted.
- You must allow at least 15 mm between stacks and stacks and walls (see Figure 2).

You must NOT try to freeze more than 4.8 kgs at any one time.

You must NOT stack the vaccine so tight that air cannot circulate between the stacks nor between the stacks and walls.

You must NOT let anything touch the evaporator.

You must NOT open the door more often than necessary.

You must NOT keep any thing apart from vaccines and ice-packs in the refrigerator.

Figure 2: Correct stacking of boxes containing vaccines

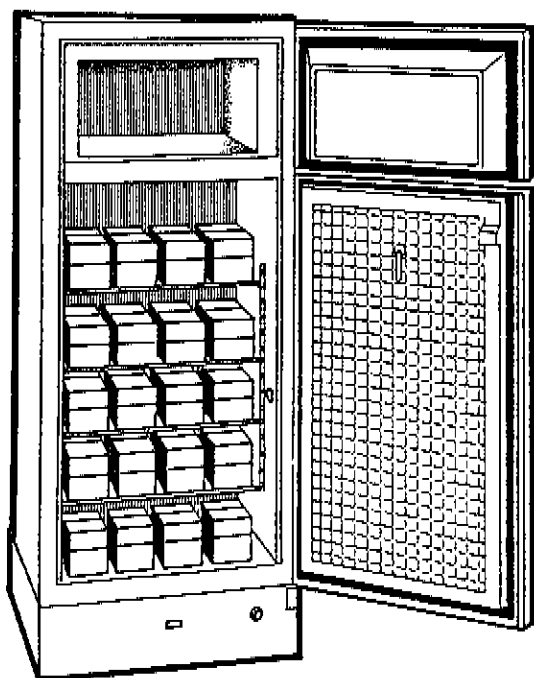
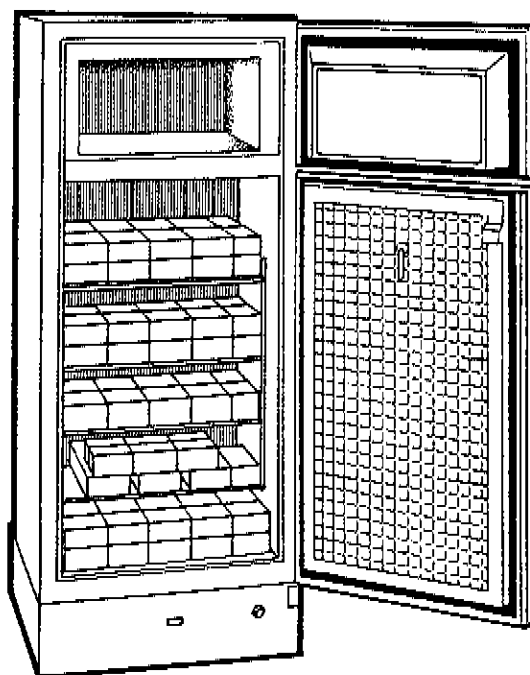


Figure 3: Incorrect stacking of boxes containing vaccines



EMPTYING THE REFRIGERATOR:

Whenever you are removing vaccine from the refrigerator, follow the guidance given below in order to make sure that you are not breaking the cold chain:

- Use a cold box when moving larger amounts of vaccine from one place to another (for example, from a District store to a health center), or when emptying the refrigerator for defrosting and cleaning. Each type of cold box requires a standard type and number of icepacks. Check your cold box. Always keep at least the number of frozen icepacks that it requires in your freezer.
- When moving smaller amounts of vaccine from one place to another (for example, from one store to another), or when going for a vaccination session either in the clinic or at outreach, use a vaccine carrier. Each type of vaccine carrier requires a standard type and number of icepacks. Check your vaccine carrier. Always keep at least the number of frozen icepacks that it requires in your freezer.

On the vaccination table the vaccine also has to be kept cold. For this purpose also keep a frozen icepack in the freezer.

A. KEROSENE REFRIGERATOR PARTS LIST

The kerosene refrigerator consists of many different parts. Many of them you will deal with in your daily work. In this booklet we will be using the names for the various parts that you see in the Figures below. Learn these names - it will make it easier for you to understand this booklet and it will also help you when reporting faults to your cold chain supervisor.

Figure 4: Front of Refrigerator

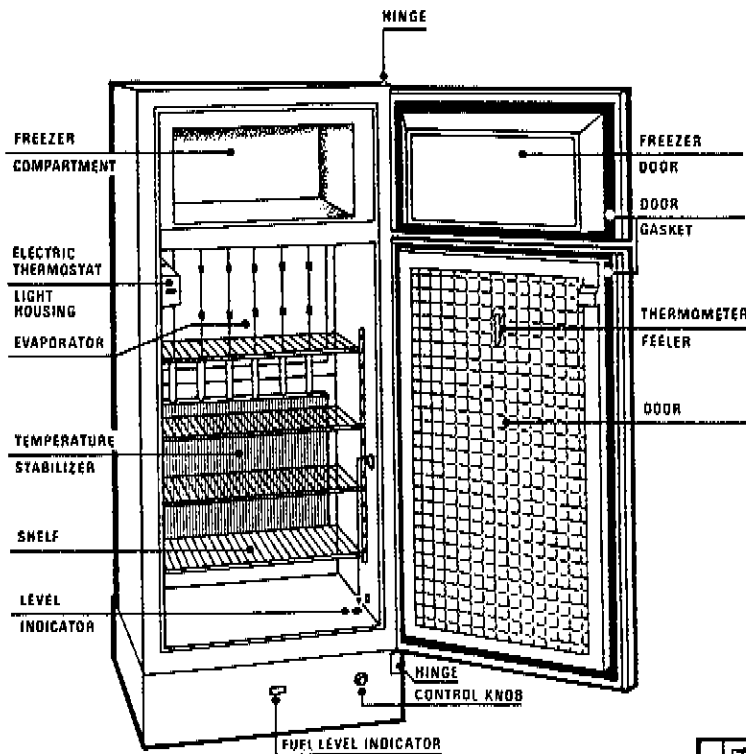
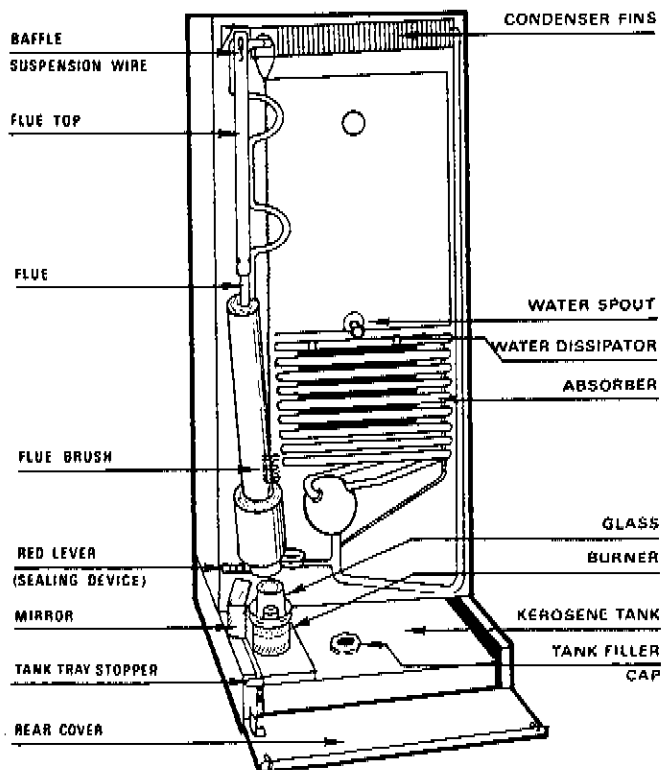


Figure 5: Rear of Refrigerator



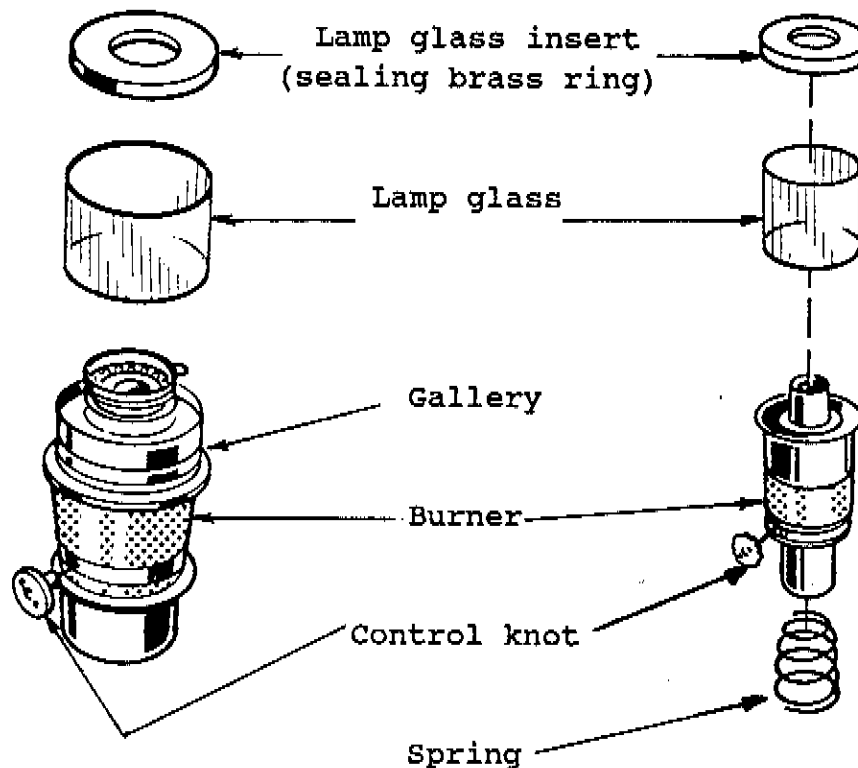
THE TWO DIFFERENT TYPES OF BURNERS:

- the "Aladdin" type burner, which is large and has a blue flame; and
- the "Kosmos" type burner, which is smaller and has a yellow flame.

These two types of burners have to be treated differently, so it is important that you know the difference and that you know what type of burner your refrigerator has.

For the Sibir S2325 refrigerator the burner will always be the Aladdin type, "blue-flame" burner.

Look at the two drawings below, compare them with your own burner and find out which type your burner is.

Figure 6: The Aladdin BurnerFigure 7: The Kosmos Burner

MODELS OF (SIBIR) REFRIGERATORS USED BY EPI:

There are at present three different models of the Sibir refrigerator used by EPI. To follow the instructions, you have to know which model your refrigerator is. The different models are:

Sibir S2325 PEV;
 Sibir S2325 PEV1/ST (new model name from 1988 on: Sibir V240KE);
 Sibir S2325 PEV1

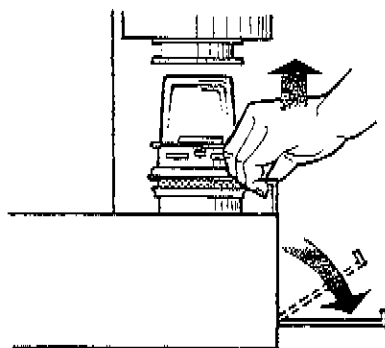
The difference between the PEV1 and the PEV1/ST is that the PEV1/ST has a so-called stabilizer, which the PEV1 does not have. The stabilizer is the stainless steel plate you see in the back of the cooling compartment. This device stabilizes the temperature. Despite this difference, the operation of the PEV1 and PEV1/ST is similar.

However, the operation of the PEV1 and the PEV differs so you have to know which type your refrigerator is. At the back of the refrigerator there is a label with the type of refrigerator marked on it. If this has disappeared or is not readable you can easily distinguish between the models in the following way:

Look at the foundation from the back:

Figure 8: Model Sibir S2325 PEV 1

In order to slide out the tank, you have to lift the rear foundation cover and tilt it.

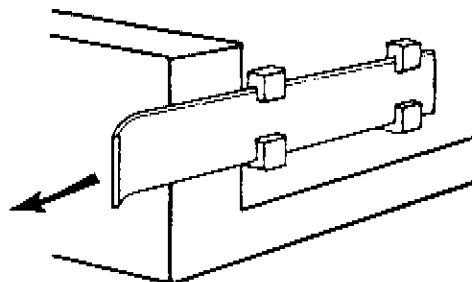


So:

- If the refrigerator has a yellow lever, it is a PEV-model;
- If the refrigerator has a cover to tilt then it is a PEV1-model.

Figure 9:**Model Sibir S2325 PEV**

In order to slide out the tank, there is a yellow lever right at the bottom which you release.



B. INSTALLING THE REFRIGERATOR

RECEIVING THE REFRIGERATOR:

When the refrigerator arrives, unpack it carefully and make sure that all packing materials have been removed. Be careful to ensure that the following is removed:

- tape and paper on the burner,
- tape around the foundation at rear,
- a white foam bar which is in between the tank and the refrigerator.

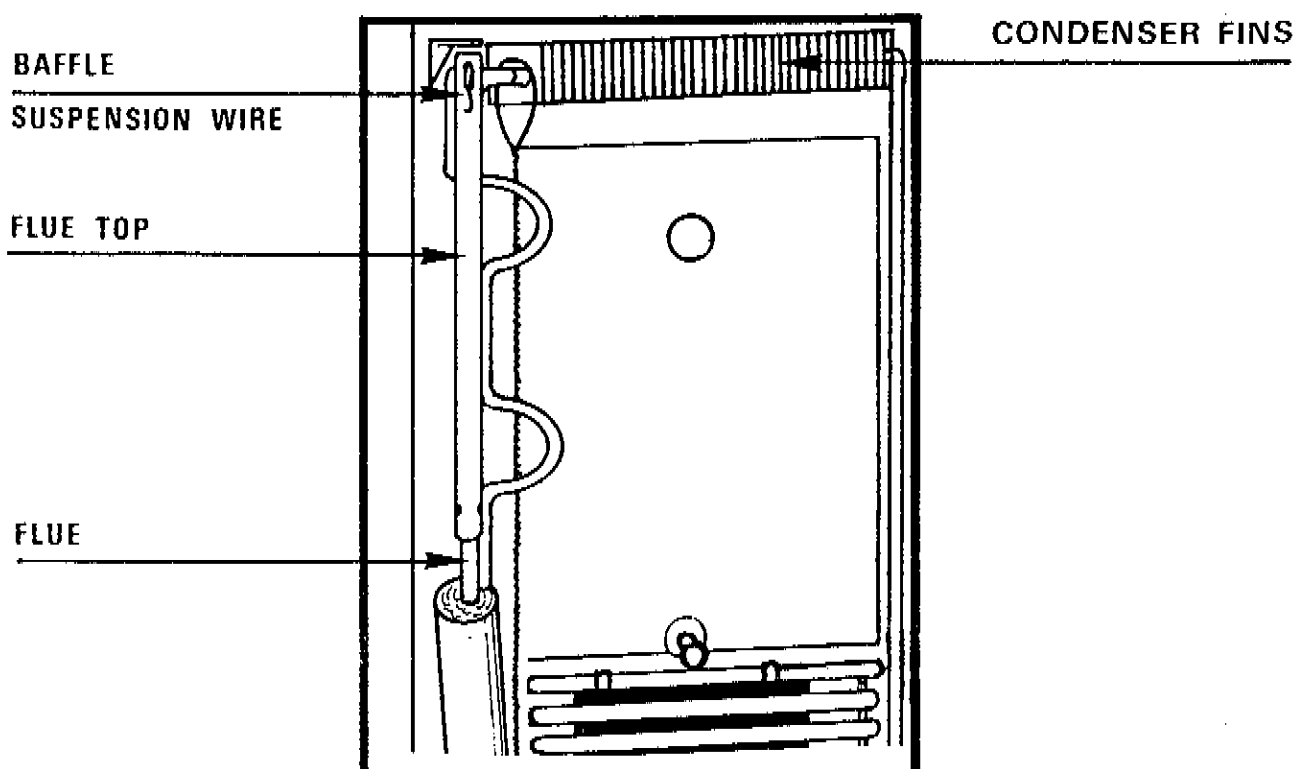
Open the boxes inside the refrigerator to study the spare parts supplied.

INSTALLATION CHECK:

Before you put the refrigerator in place, you have to check that all parts are present and properly fixed.

1. Look at the flue top at the rear of the refrigerator. Make sure that the baffle suspension wire is in place, as shown in Figure 10.

Figure 10



2. Look at the tank area base of refrigerator rear; release the tank as shown in Figures 8 or 9.
3. Hold the red lever (Figure 11) down. Slide out the tank to the rear until the burner and the tank cap are well clear of the refrigerator (Figure 12).

Figure 11

Press down to release burner.

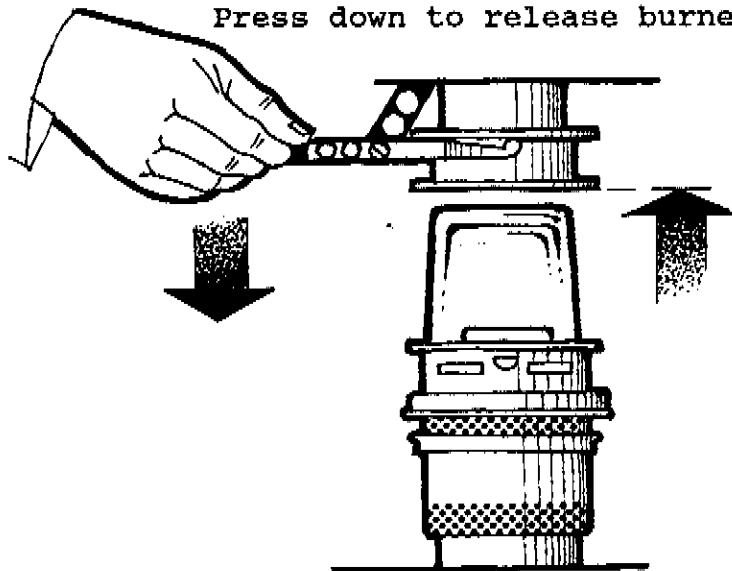
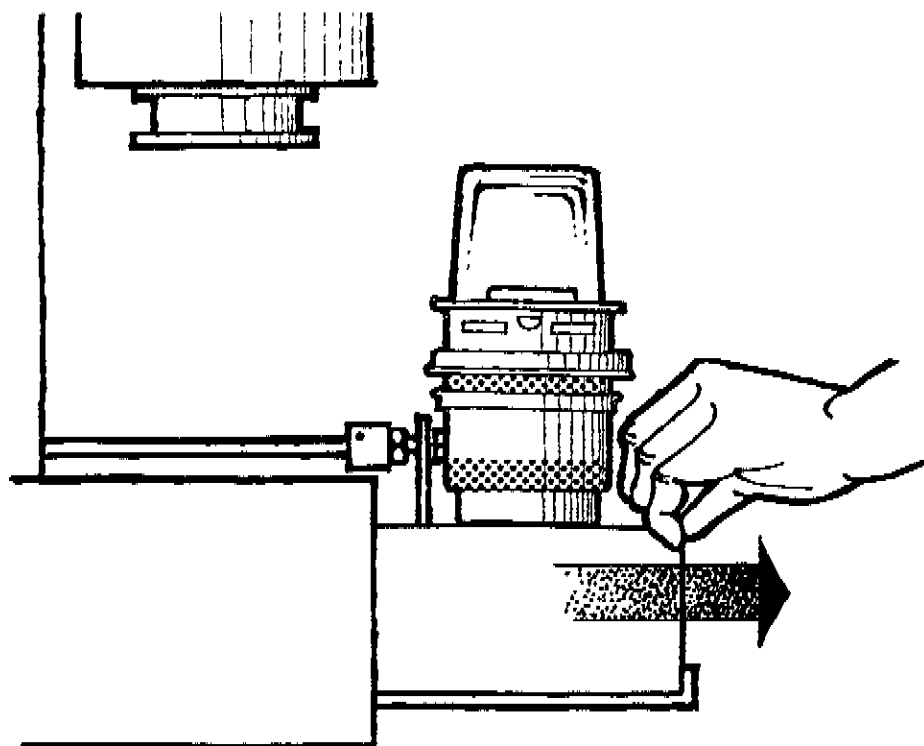


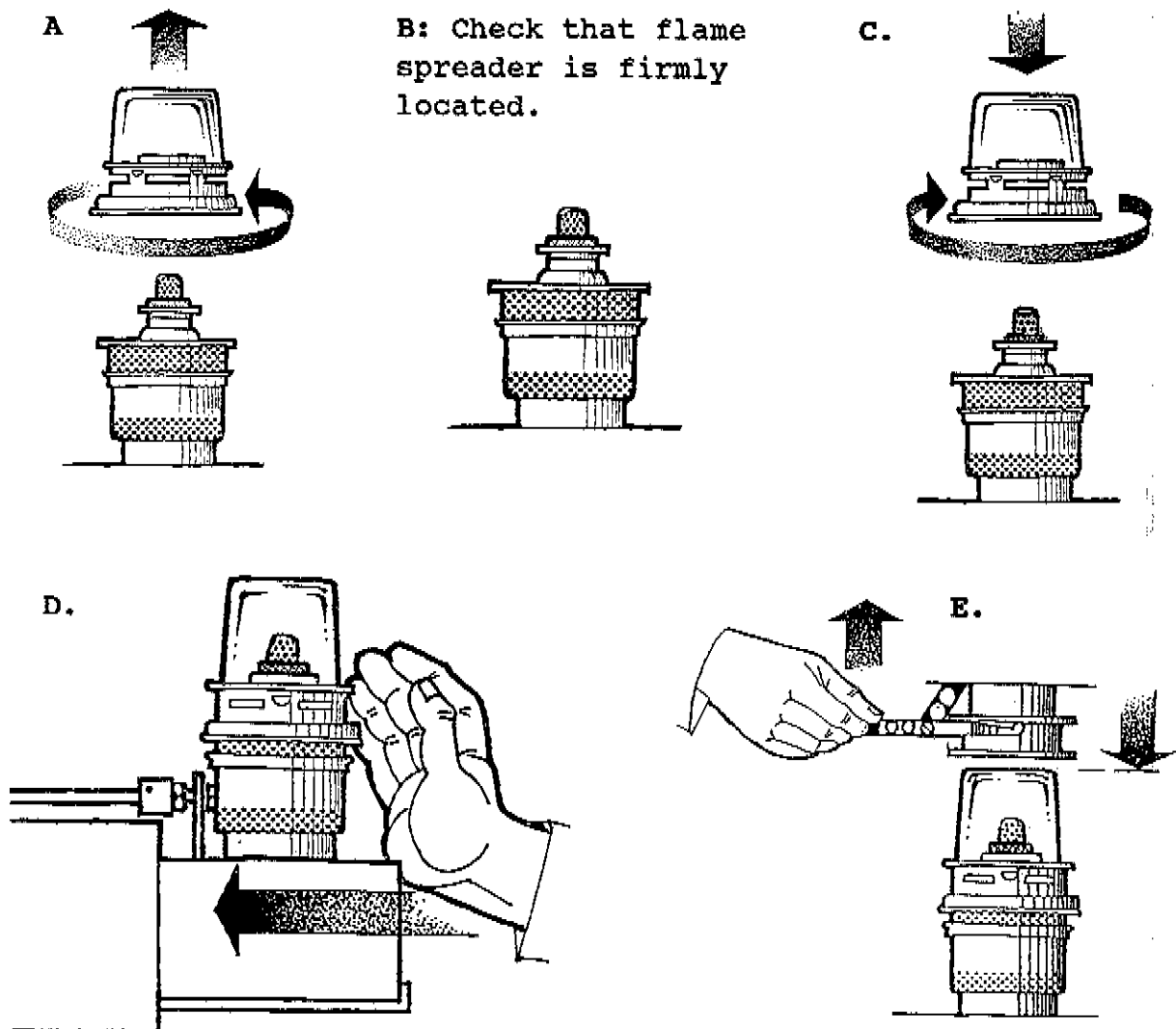
Figure 12

Slide tank towards rear until burner and tank filler cap are well accessible.



4. Make sure that nothing is lying in the tank space beneath the refrigerator.
5. Check that the tank is clean and free of moisture.
6. Unscrew the glass and gallery (Figure 13A) by turning it counter clockwise by hand.
7. Remove packing material and check that the flame spreader is firmly located in the center of the wick tube (Figure 13B).
8. Put the lamp glass and the gallery in place. Press them down firmly and turn clockwise (Figure 13C).
9. Slide back the tank (Figure 13D).
10. Fit the brassing (Figure 13E).

Figures 13 A - E: Checking the burner.



LOCATION OF THE REFRIGERATOR:

The refrigerator must be placed in a cool shaded place:

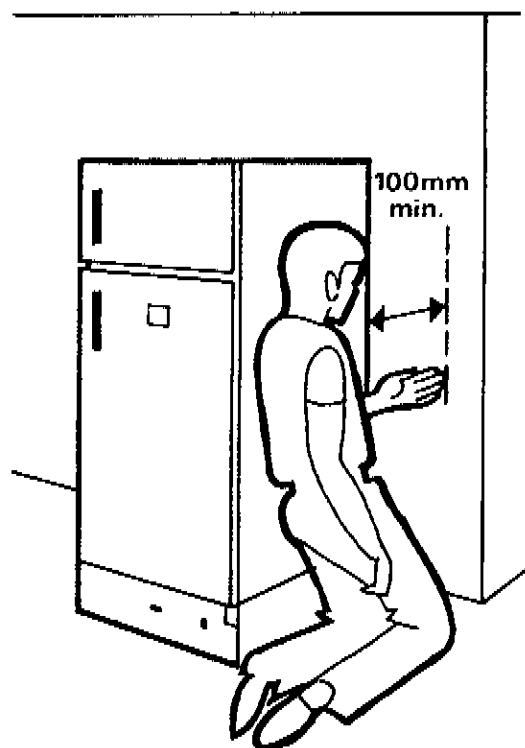
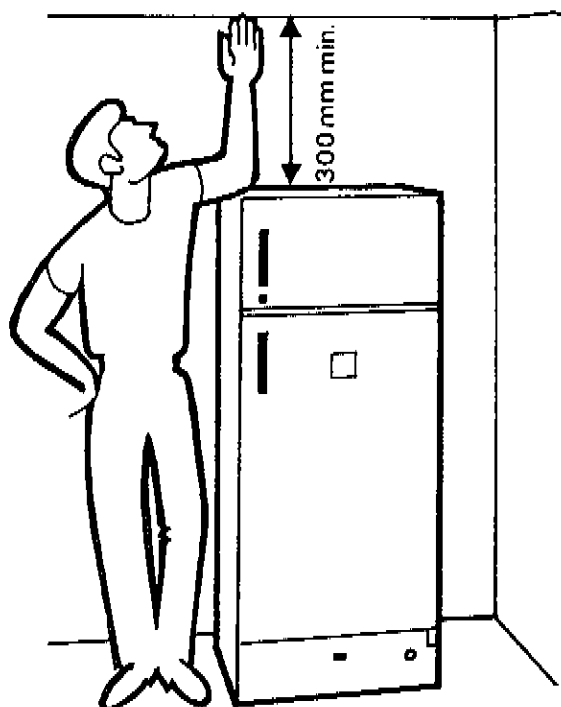
1. Avoid draughty positions.
2. Make sure that the room is well ventilated.
Do not use the refrigerator in a room that has been completely sealed against draughts.
3. Allow space on the right side of the refrigerator to see the flame reflector.

VENTING:

The refrigerator should be able to get rid of the hot air which is produced by the burner. Therefore, clearance to walls and roof must be at least as big as that shown in the drawing (Figures 14A and B).

Do not place anything on top of the refrigerator.

Figures 14 A-B

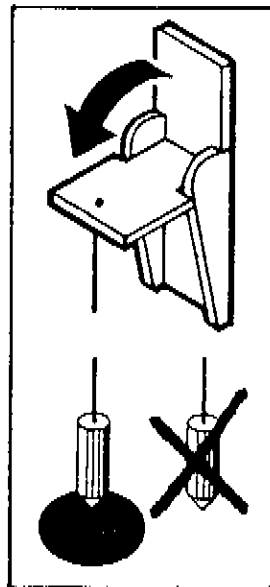


LEVELLING:

The refrigerator must be level for proper operation. If the refrigerator must be moved each time the tank is filled, construct a firm base or level the floor on which it stands. This will remove the necessity of re-levelling the refrigerator each time it is moved.

The Sibir refrigerator is provided with a plumb bob inside (Figure 15). Use this for levelling. Check the level side-to-side and front-to-back. Allow the plumb bob to swing freely: when it is pointing at the brown spot, the refrigerator is level. If it does not point at the brown spot, the position of the refrigerator has to be adjusted. To do this, put pieces of wood or bricks under the wheels to make the refrigerator level.

Figure 15



C. OPERATING THE REFRIGERATOR

FILLING THE TANK

1. Pull off the filler cap. This is on the rear of the refrigerator and is marked with a black circle.
2. Fill the tank with approximately 15 liters (3 1/4 gallons) of pure kerosene.
Use the funnel.
Never use petrol, diesel or kerosene polluted with one of the two.
3. Be careful and do not over-fill the tank.
4. Replace the filler cap.
Wipe the top of the tank clean.
5. If the wick is dry, allow it to suck for three hours before lighting.

LIGHTING THE BURNER:

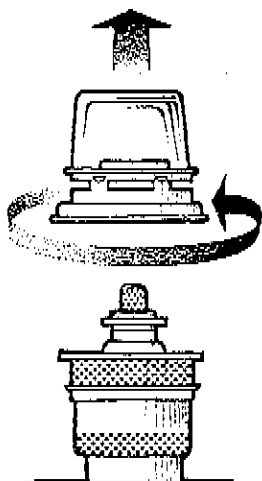
1. Press the the red lever to release the burner.
2. Slide the tank out.
3. Remove the lamp glass and gallery together (Figure 16A).
4. Turn the wick winder until five rows of holes show on the flame spreader (Figure 16B).
5. Light the wick all the way round. The flame may take about 30 seconds to spread round completely.
6. Replace the lamp glass and gallery.
Turn them gently to make sure that they are secure (Figure 16C).
7. Press the red lever to raise the brass ring.

8. Push the tank fully forward until the stopper meets the frame:
 - For Model PEV1: put the rear cover back into position.
 - For Model PEV: slide back the yellow lever.
9. Lift the red lever and make sure that the brass ring rests firmly on the lamp glass.

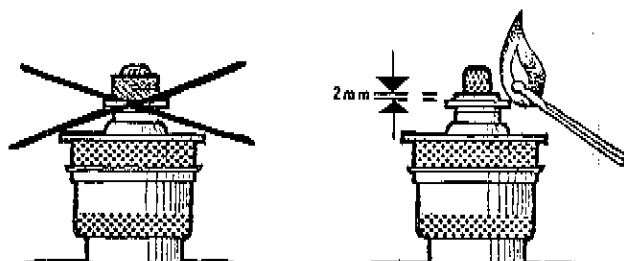
A good fit is essential for a good flame.

Figures 16 A-C

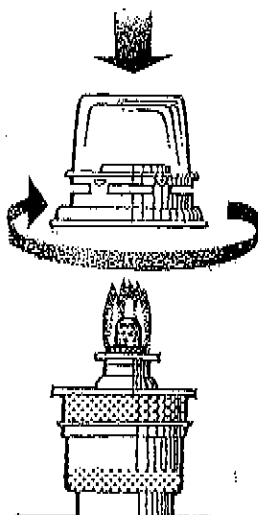
A: Turn gallery counterclockwise and remove gallery, together with glass.



B: Adjust wick so that 5 rows of holes show on flame spreader. Light the wick.



C: Replace glass and gallery and secure by turning clockwise.



CONTROLLING THE TEMPERATURE:

1. The correct temperature for storing vaccines is 0 to +8°C.
2. The temperature control for kerosene refrigerators is simply a high blue or a low blue flame. The flame height is controlled by a knob:
 - it raises the wick if you turn it clockwise; or
 - it lowers the wick if you turn it counter clockwise.

There is no thermostatic control of the flame - adjustment is done by the user, based upon experience.

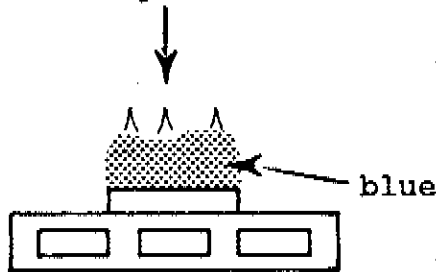

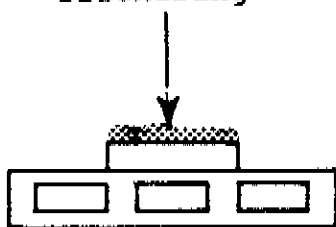
NOTE: The system is slow acting. It takes several hours from the time you adjust the flame until the temperature inside the refrigerator has stabilized.

ADJUSTING THE FLAME:

Normally the flame will be viewed from the flame reflector at the back of the refrigerator.

1. The brass ring should sit well and firmly on the lamp glass.
2. The flame should be completely blue. A slight red glow above the blue flame is normal. If intermittent red flecks appear, this shows there is dust in the air and is also quite normal.
3. A yellow color shows that the flame is too low. Yellow spikes above the flame show that the flame is too high.
4. Do not allow the tank to run dry. This will cause the wick to burn away and shorten its life.

Figure 17: Adjusting the flame.

| | |
|---|---|
| <p>TO MAKE REFRIGERATOR COLDER:</p> <p>Turn wick up high so that yellow spikes appear above the flame.</p> <p>Then turn wick down until the yellow spikes just disappear.</p> | <p>Yellow spikes here indicate that flame is too high.</p>  <p>blue</p> <p>BAD FLAME, TOO HIGH</p> |
| <p>DAY TIME/HOT WEATHER:</p> <p>Flame high, about 6mm.</p> <p>NIGHT TIME/COOLER WEATHER:</p> <p>Flame low, about 2mm.</p> | <p>Maximum 6mm. For hot weather.</p> <p>Normal 2mm.</p>  <p>blue</p> <p>NORMAL FLAME, GOOD</p> |
| <p>IF REFRIGERATOR IS TOO COLD AT ANY TIME:</p> <p>Turn wick down until flame is almost out with yellow flickering on edges.</p> <p>Then raise wick so that yellow disappears and flame is blue.</p> <p>Raise wick slightly once more.</p> | <p>yellow flickering</p>  <p>BAD FLAME, TOO LOW</p> |

Other factors, besides the size of the flame, also influence the temperature inside the refrigerator.

Temperatures might increase during the day for the following reasons:

1. Higher ambient temperature.
2. Frequent opening of the refrigerator.
3. Frozen icepacks being replaced by warm icepacks.

Temperatures might decrease during the night for the following reasons:

1. Lower ambient temperature.
2. Warm icepacks placed in the refrigerator during the day are now frozen.

D. MAINTAINING AND CLEANING THE REFRIGERATOR

To ensure that the refrigerator functions well at all times, it has to be maintained and cleaned regularly. The environment will influence the frequency with which you have to do the different tasks. If the room where you keep the refrigerator is open to the outside, the cooling unit and condenser will probably need more frequent cleaning. If the environment is very humid, you will have to defrost more often. Follow the maintenance schedule outlined below:

1. Action for every day:

- 1.1 Check and record temperature in the morning and at the end of each working day (correct range is 0 to +8°C).
- 1.2 Adjust the flame according to temperature reading and experience.

2. Action for every week:

- 2.1 Check ice formation on the evaporator. Defrost and clean inside if there is more than 5 mm.

Note: If the refrigerator is switched off for defrosting and cleaning, the vaccine should be kept in a coldbox or vaccine carrier with frozen icepacks until refrigerator returns to correct temperature (0 to +8°C).

- 2.2 Fill the tank with clean kerosene.
- 2.3 Clean flue and baffle.
- 2.4 Clean the burner.
- 2.5 Trim the wick.
- 2.6 Check that the refrigerator is level.

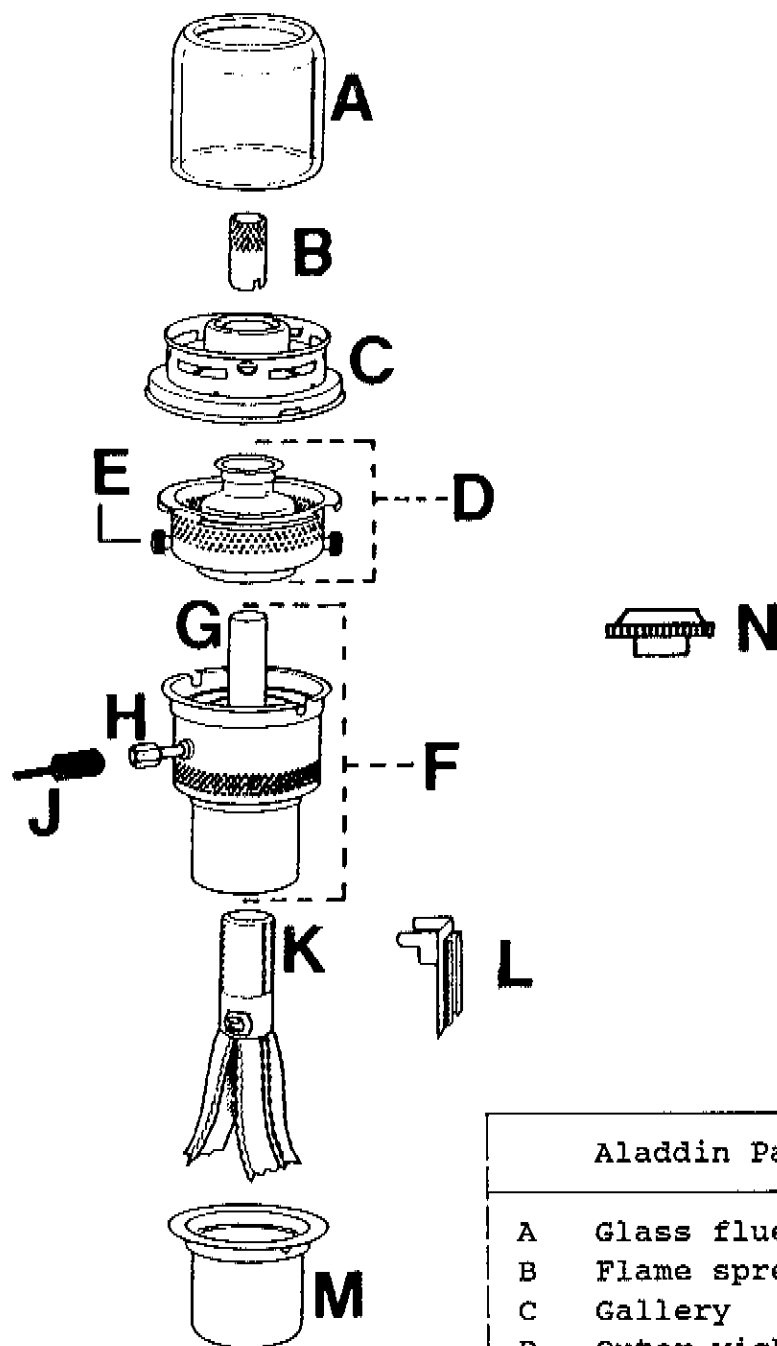
3. Action for every month:

- 3.1 Check that the condenser and cooling unit are clean. Remove any dirt or dust with a soft brush.
- 3.2 Clean the tank inside and outside with clean kerosene.
- 3.3 Check the outside of the refrigerator for damaged paint work and repaint if necessary.
- 3.4 Clean door gasket with soap and water; then powder with some talcum powder.

ANNEX 1:**HOW TO DO**

This annex includes instructions on:

1. How to release the burner
2. How to clean the wick
3. How to re-shape the wick
4. How to fit a new wick
5. How to make a better fit of brass ring to lamp glass
6. How to clean the burner - light cleaning
7. How to clean the burner - thorough cleaning
8. How to clean the flue
9. How to defrost the refrigerator and freezer



Aladdin Parts:

| | |
|---|------------------------------|
| A | Glass flue |
| B | Flame spreader |
| C | Gallery |
| D | Outer wick tube |
| E | Outer wick tube locking nut |
| F | Burner base complete |
| G | Centre tube. Note a spare. |
| H | Wick winder. Not a spare |
| J | Wick winder rod. Sibir part. |
| K | Wick |
| L | Wick carrier |
| M | Tank sleeve |
| N | Wick cleaner |

1. HOW TO RELEASE THE BURNER

- 1.1 Press red lever downwards in order to raise the flue from the lamp glass.
- 1.2 Turn the wick down completely and blow out the flame.
- 1.3 Release the tank (Figures 8 and 9).
- 1.4 Slide the tank out towards the rear until the burner is well clear of the refrigerator .

2. HOW TO CLEAN THE WICK

- 2.1 Use the Aladdin wick cleaner (N) for this operation.
- 2.2 Release the burner.
- 2.3 Remove the lamp glass (A) and the gallery (C) together by turning them slightly counter clockwise. (Figure 16)
- 2.4 Remove flame spreader (B).
- 2.5 Turn the wick right down.
- 2.6 Place the wick-cleaner (N) onto the top of the burner.
- 2.7 With one hand turn the wick cleaner (N) clockwise; with the other hand turn the wick up.
- 2.8 As the wick touches the underside of the wick-cleaner, spots of carbon will appear through the holes. After a few turns no further carbon will appear; this will indicate that the wick is properly cleaned.
- 2.9 Turn the wick down and remove wick-cleaner.
- 2.10 Store the wick-cleaner in a safe place.

3. HOW TO RE-SHAPE THE WICK

Wicks become uneven or roughened:

- if they are cleaned infrequently or incorrectly;
- if parts of the burner are damaged; or
- if the tank is allowed to run dry.

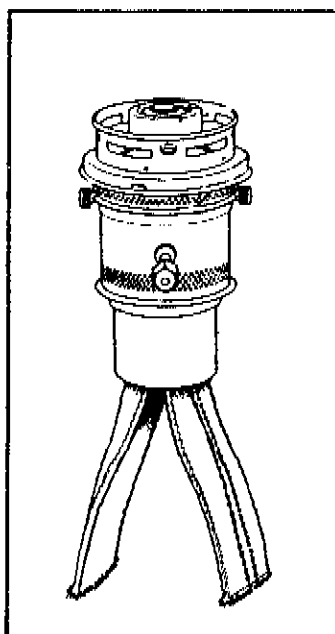
3.1 Remove glass and gallery.

3.2 Adjust the wick so that the lowest part of the burning edge is level with the outer wick tube flange.

3.3 Cut the wick even with a razor blade.

3.4 If this does not help, replace the wick.

4. HOW TO FIT A NEW WICK



When the wick cannot be raised any further without forcing the wick winder (H), the wick needs replacing. Using force on the wick winder will damage the mechanism.

Important: Leave the new wick to soak in kerosene for 3 hours before you switch off the refrigerator.

4.1 Slide out the tank.

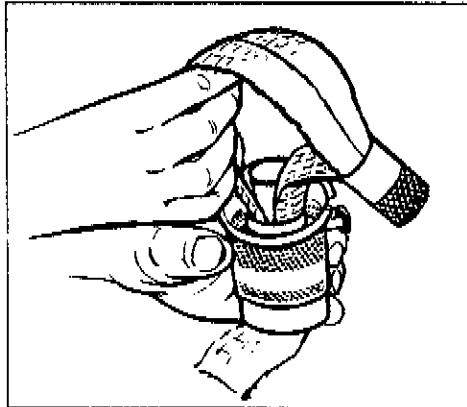
4.2 Release wick winder rod (J) from the wick winder (H), by pushing the rod towards the front of the refrigerator. It is spring-loaded and will come off.

4.3 Lift the base from the tank.

4.4 Unscrew both knurled nuts (E).

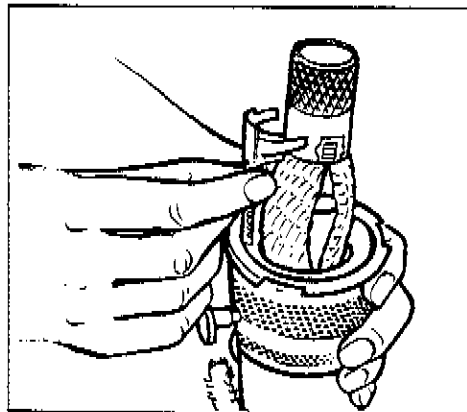
4.5 Remove outer wick tube (D) and gallery (C), by pulling upwards. Leave the flame spreader in place, this will make fitting the new wick easier.

- 4.6 Turn the wick winder (H) clockwise until the wick is fully up. Pull out the wick and the wick carrier (L).
- 4.7 Keep the wick carrier (L) and throw away the old wick.
- 4.8 Clean the burner thoroughly (see paragraph 7 below).
- 4.9 Handle the new wick carefully so that the edge is not damaged.



- 4.10 Insert the wick tails one at a time through the slots in the burner base (F). When both wick tails are through the slots, pull the wick tails down until the yellow band inside the wick passes just over the center tube (G).

- 4.11 Fit wick carrier to wick.



- 4.12 Slide the wick carrier (L) down into the burner base (F) until the rack teeth engage with the cogs on the wick winder.

- 4.13 Turn the wick winder (H) to turn the wick down.

- 4.14 Replace outer wick tube (D).

- 4.15 Screw knurled nuts (E) tight.
- 4.16 Replace the burner base (F) back into the tank with the wick winder facing the front of the refrigerator.
- 4.17 Light the burner.
- 4.18 Replace glass and gallery.
- 4.19 Slide back tank into position.
- 4.20 Engage the wick winder into the rod (J).

5. HOW TO MAKE A BETTER FIT OF BRASS RING TO LAMP GLASS

Sometimes you will find that you cannot make a good fit of the brass ring to the lamp glass when you lift the lever. If so, try to:

5.1 Adjust the tank stopper.

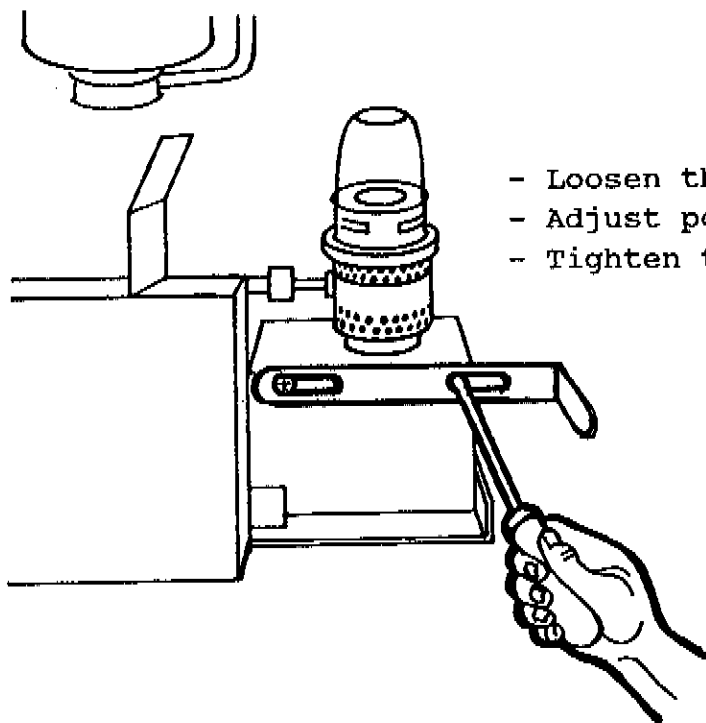
Loosen the two screws.

Slide the tank and burner so that the burner fits exactly under the flue.

Adjust the stopper so it holds the tank in this position.

Tighten the screws again.

Adjusting the tank tray stopper

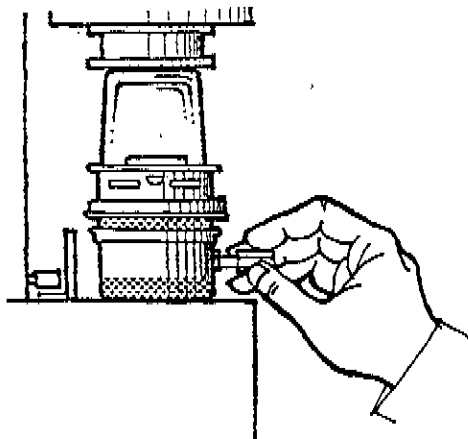


If this does not help, there is another possibility:

- 5.2 The spring in the winding rod might cause the burner to tilt. If this is the case, release the burner from the winding rod. Now turn the burner so that you can adjust it from the back. The burner can now be placed so it fits. You now have to adjust the burner from the back. Therefore, move the refrigerator so this is possible.

Modifying burner position for a better fit

Turn the burner so that you can adjust from the back of the refrigerator.



6. HOW TO CLEAN THE BURNER - LIGHT CLEANING

This cleaning should be done every week.

- 6.1 Remove all black carbon from the burner assembly using a soft brush.
- 6.2 Clear any fluff, lint or dirt from the burner base (F), the flame spreader (B), and the outer wick tube (D).
- 6.3 Re-assemble the burner; make sure that the flame spreader is fitted the correct way up.

7. HOW TO CLEAN THE BURNER - THOROUGH CLEANING

This cleaning should be carried out once per year or when you are fitting a new wick.

- 7.1 Release the burner. Remove all burner parts except tank sleeve (M). Remove the old wick.
- 7.2 Wash all burner parts separately in clean kerosene. Clean out all holes.
- 7.3 Shake off all kerosene.
- 7.4 Remove the tank and wash it out with clean kerosene.

8. HOW TO CLEAN THE FLUE

The flue should be cleaned every week when the refrigerator is in regular use on kerosene.

8.1 Slide out the tank.

8.2 Remove the flue top as shown in figures below. There is a baffle attached by a suspension wire to the flue top; lift out the complete unit together. Make sure that the suspension wire stays firmly attached to the flue top. Do not cut or shorten the suspension wire.

8.3 Place a cloth beneath the flue base to collect any soot.

8.4 Clean the flue top, suspension wire and baffle .

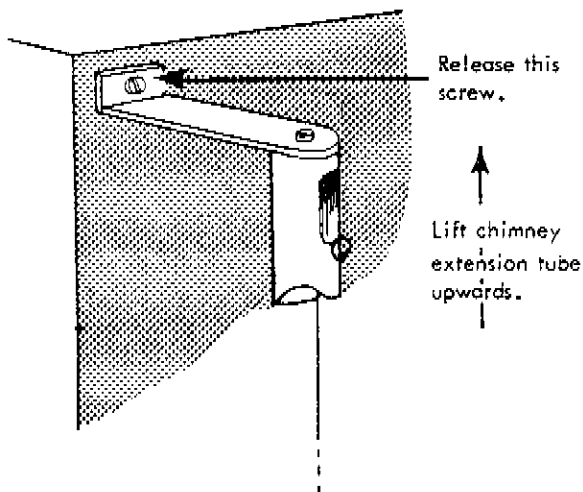
8.5 Insert the brush into the flue from the top, push the brush down until the handle touches the top of the flue. The brush is normally kept hanging on the cooling unit at the rear of the refrigerator.

8.6 Brush several times to remove all soot.

8.7 Lower the baffle into the flue and replace the flue top. Make sure that the suspension wire is still in place.

8.8 Light the burner and return it to its operating position.

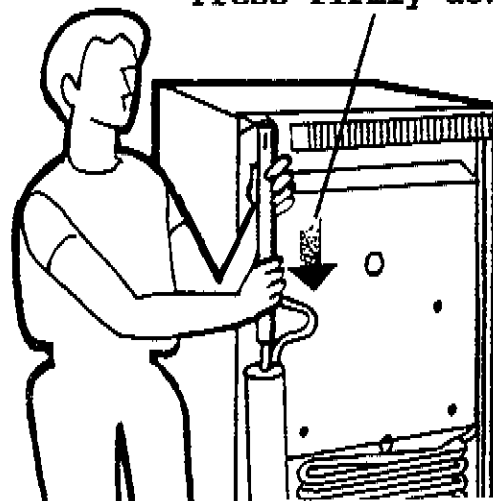
Model S2325 PEV
Removing the top



Make sure that baffle is in place on end of wire.

Model S2325 PEV 1
Removing the top;

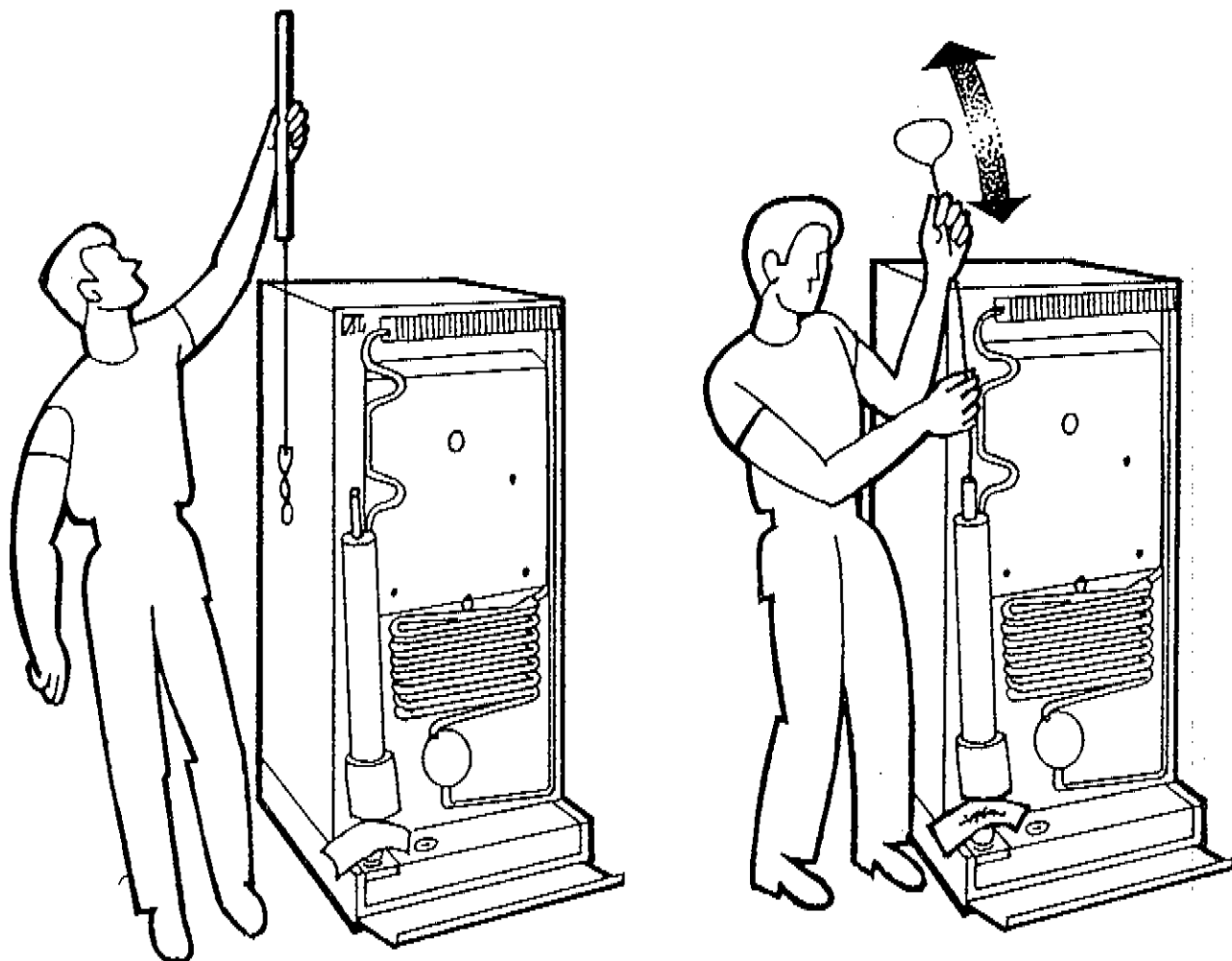
Press firmly down.



Model S2325 PEV and Model S2325 PEV 1

Lift up the top and baffle together.

Clean by moving brush up & down



9. HOW-TO DEFROST THE REFRIGERATOR AND FREEZER

The refrigerator should be defrosted whenever ice has built up to more than 5 mm on the evaporator fins, or when ice has built up too much in the freezing compartment. It is normal that there is some frost on the first two to three evaporator fins to the left and a little ice in the freezing compartment.

Heavy frosting on the evaporator fins will impair the cooling efficiency.

When you are defrosting, defrost both compartments.

9.1 Turn out the flame.

Remove vaccines to a vaccine carrier or coldbox with sufficient frozen icepacks.

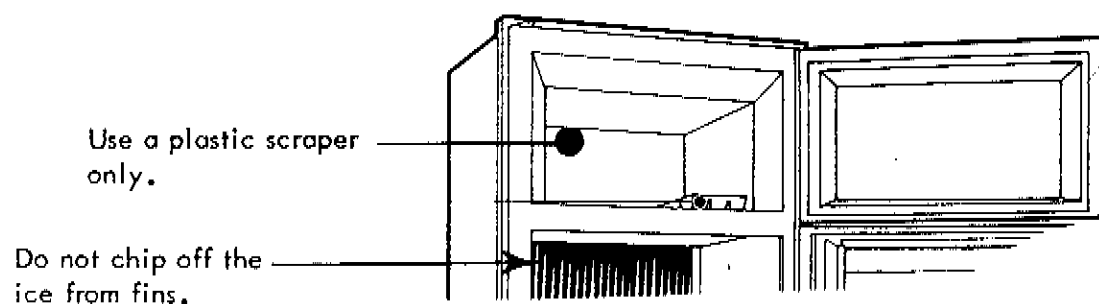
9.2 Open the doors and allow the ice to melt and drip off by itself. Never use a knife or other sharp instruments to remove the ice. If you want to speed up the process you can do so by placing bowls of hot water in the two compartments.

9.3 After all the ice has melted, clean and dry the refrigerator inside and outside.

9.4 Light the burner.

9.5 When the correct temperature (0 to +8°C) has been obtained, replace the vaccine.

Defrosting the refrigerator



ANNEX 2**TROUBLE SHOOTING**

This annex includes instructions to correct the following problems:

1. If the burner will not stay alight.
2. If refrigerator is not cold enough
3. If refrigerator is too cold
4. If blue flame cannot be obtained
5. If there is excessive frost on fins
6. If freezer compartment is cold, but cabinet is not cold

1. IF BURNER WILL NOT STAY ALIGHT

- 1.1 Check tank for fuel level. Do not allow level to fall too low. Refill every week.
- 1.2 Check for draught. Screen refrigerator or move it to another location if necessary.
- 1.3 Check for correct fuel. It should be pure, clean kerosene:
 - Check that there is no moisture in the tank.
 - Check that fuel is pure, clear and smells like kerosene.

- 1.4 Check that wick is not burnt-out or uneven. Clean wick.
- 1.5 Check that brass ring is properly seated on lamp glass. Check that glass is not broken.
- 1.6 Check burner holes. Clean burner.
- 1.7 Clean flue.
2. IF REFRIGERATOR IS NOT COLD ENOUGH
 - 2.1 Check refrigerator is level.
 - 2.2 Check fit of brass ring on lamp glass.
 - 2.3 Check that glass is not broken.
 - 2.4 Check fit of door.
 - 2.5 Turn wick up so that flame is high, but not high enough to cause yellow spikes.
 - 2.6 Clean flue.
 - 2.7 Check for frost. If evaporator fins are heavily frosted, this will reduce cooling. Defrost refrigerator.
 - 2.8 If large quantities of vaccines or warm icepacks have been placed in the refrigerator at one time, this will naturally affect the cabinet temperature for a period. In this case, leave the refrigerator operating on a high flame; it will return to the correct temperature within a few hours.

Never place more than 4.8 kg of unfrozen icepacks (8 large or 12 small icepacks) in the freezer per day. 4.8 kg is the maximum safe freezing capacity of the Sibir refrigerator.
 - 2.9 Make sure that packages are not placed too tightly on shelves and around fins inside the refrigerator. Leave space for cold air to circulate inside the refrigerator. Make sure that nothing has fallen on to condenser fins at rear of refrigerator.

3. IF REFRIGERATOR IS TOO COLD

First, turn flame low until it burns yellow and starts flickering; then turn flame up until yellow turns to blue; lastly turn flame up slightly again.

4. IF BLUE FLAME CANNOT BE OBTAINED

4.1 Check that brass ring is properly seated on lamp glass.

4.2 Check that glass is not broken.

4.3 Clean wick. Replace if necessary.

4.4 Clean burner assembly, check for any signs of damage.

4.5 Clean flue.

4.6 Check for correct fuel. It should be pure, clean kerosene without moisture and not polluted with diesel or petrol.

5. IF THERE IS EXCESSIVE FROST ON FINS

5.1 Turn the flame lower.

5.2 Check door gasket.

6. IF FREEZER COMPARTMENT IS COLD, BUT CABINET IS NOT COLD

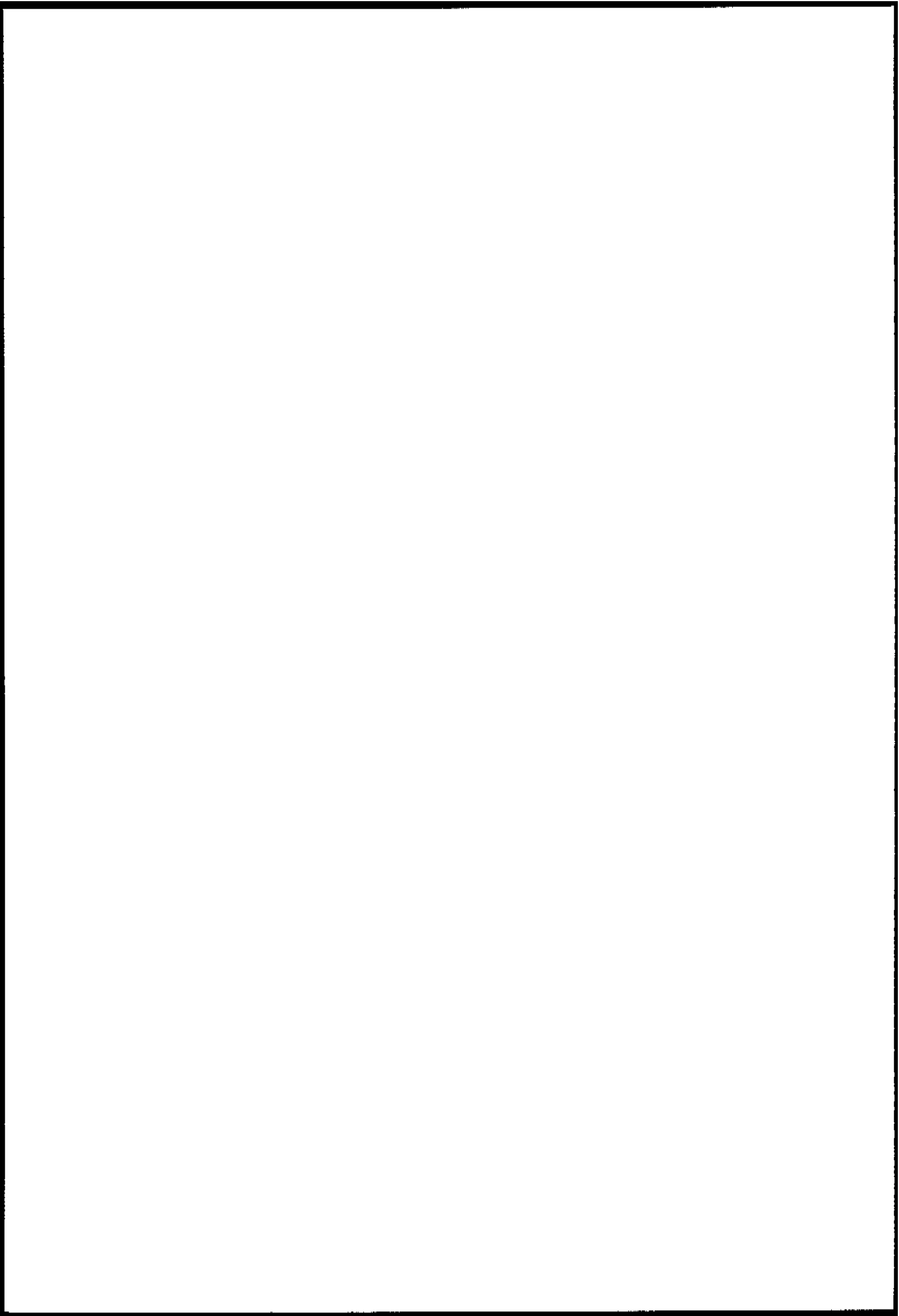
6.1 Check refrigerator is level.

6.2 Check if there is:

- any sign of yellow crystals on welds of refrigeration unit at rear of cabinet;
- any sign of yellow marking on tubing; or
- any smell of ammonia.

If you detect any of these signs, contact your supervisor.

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(Continued from front inside cover)

- Repair Technicians Handbooks:

The following handbooks are the basic training materials for a 10-day course for refrigerator repair technicians:

- A. Servicing and repair techniques
- B. Faults and fault-finding
- C. Repair work
- D. How to keep stocks of spare parts
- E & Task sheets and progress tests
- Add.1 Task sheets on solar refrigerators
- F. Instructor's handbook
- G manufacturer's spare parts lists
- H. Fault finding and repair of solar powered refrigerators

(b) Logistics and Cold Chain for Primary Health Care Series

This series comprises 27 booklets which are designed to estimate the demand for supplies, to store and distribute the supplies properly, and to maintain the equipment required for storage. Following is the complete list of booklets in this series:

- 1. How to estimate requirements for an existing store
- 2. How to store supplies
- 3. How to distribute supplies
- 4. How to keep records and calculate wastage
- 5. How to control quality of stocks
- 6. How to estimate requirements
- 7. How to estimate chloroquine requirements
- 8. How to estimate ORS packet requirements
- 9. How to estimate vaccine requirements
- 10. How to estimate contraceptive requirements
- 11. How to estimate essential drug requirements
- 12. The cold chain game
- 13. How to improve communication
- 14. How to look after a compression refrigerator
- 15. User's handbook for compression refrigerators
- 16. How to look after a kerosene refrigerator
- 17A. User's handbook for kerosene refrigerators (Electrolux RAK 1302)
- 17B. User's handbook for kerosene refrigerators (Sibir S2325)
- 18. How to look after a gas refrigerator
- 19. User's handbook for gas refrigerators
- 21. How to look after a cold store
- 22. User's handbook for cold stores
- 25. How to look after a photovoltaic refrigerator
- 26. User's handbook for photovoltaic refrigerators