

FOREWORD

The information contained in:

- the "Refrigeration Family products": **REFRIBASE**, **REFREPAIR**, **REFRIDAG**, **REFRILEC**, **CHILREPAIR** and the **MANAGER Software**
- the "**REFRIBASE Manual**"
- the "**REFREPAIR Manual**"
- the "Water Family products": **HYDRAUREPAIR**,
- and this "**User's Manual**"

are liable to be amended without warning.

The organisation KOTZA INTERNATIONAL cannot be held responsible for any omissions, nor for any damage, accidental or otherwise, that results from the supply or use of its Software or any of its Manuals.



In this Manual, **the individual in possession of the password** (the supervisor, trainer etc.) will be referred to as: **THE SUPERVISOR**. Those individuals not in possession of the password (students, trainees, technicians, engineers etc.) will be referred to as: **THE USER**.

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**All versions of the software have been registered
with the Software Protection Agency since 1990.**

The Software will only operate on a multimedia PC using Windows 2000, XP, Vista or Seven. The PC should be configured to a *minimum* of 800 x 600 point mode with 65536 colours in small fonts.

In effect, the Software referred to in this Manual will not function on a PC if the corresponding demonstration version of the Software does not function on that PC.

If you require any further information, please contact:

KOTZA INTERNATIONAL – Le Chêne – 05130 TALLARD (France)
Tel.: **+33 (0) 492 540 733** - Fax: **+33 (0) 492 540 730**
E-mail: **kotza@kotza.com** Internet: **www.kotza.com**

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Translation from french by Gareth J. Rees & Ann Auzet

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USER'S MANUAL FOR HYDRAUREPAIR

HYDRAUREPAIR: DETAILED DESCRIPTION

HYDRAUREPAIR is at a level of difficulty situated between “intermediate” and “confirmed”.



Prior knowledge of refrigerating systems is not absolutely necessary, but we would highly recommend acquiring some basic notions (with CHILREPAIR, for example).

HYDRAUREPAIR: USING AND DURATION OF TRAINING

The professions of refrigeration and air-conditioning engineers are not easy ones. Similarly, the HYDRAUREPAIR software package can sometimes appear difficult from an electrical point of view.

This is why **we would recommend that you proceed as follows:**

- 1) Study the REFREPAIR Manual** (average time required: from 10 to 20 hours, in several sessions).
- 2) Make a first attempt using the PC**, making corrections with the help of the REFREPAIR Manual (average time required: from 2 to 10 hours, in several sessions).
- 3) Make a second study of the Manual** (average time required: from 5 to 10 hours, in several sessions).
- 4) Make a second attempt using the PC**, alone, without using the REFREPAIR Manual, making final corrections by using the on-line help (average time required: from 2 to 6 hours, in several sessions).

A User who wishes to do so could run the HYDRAUREPAIR Software as often as is needed until he achieves an 'excellent' score (more than 80%).

Note: These times are, of course, simply indications of what might be expected. The time taken varies enormously according to the User's initial knowledge.



When a User obtains a good score using HYDRAUREPAIR, and completes every step entirely on his own, he should be able to diagnose most of the usual hydraulic repairs that he is likely to come across in the plant room.

HYDRAUREPAIR: THE SEQUENCE OF STEPS

Every time HYDRAUREPAIR is run, the User is taken automatically to the appropriate step and his last score (as points and percentage) is displayed.

HYDRAUREPAIR RECORDS THE RESULT OF *EVERY QUESTION IN EVERY STEP FOR EVERY USER. IT IS THEREFORE PERFECTLY OK TO QUIT A STEP WHENEVER YOU LIKE.*

After every answer, HYDRAUREPAIR updates the score, archives it on the hard disk and provides the User with the choice of continuing or of ending the session.



Each Step considers a principal theme or a particular equipment configuration. The progressive nature of the problems posed and the different methods used to formulate questions encourage the acquisition of knowledge, which can quickly be put to use in the plant room.

This is a tried and tested self-teaching approach, used since the first version of REFREPAIR appeared in 1990.

HYDRAUREPAIR: THE THEME OF EACH STEP

- Step 1** Installation of a small liquid chiller with a series of terminal units. Where should the pump be installed?
- Step 2** Installation of the expansion chamber. Safety valve. Operating pressure. Filling operation and system purging procedure,
- Step 3** Start running the chilled water pump. Pressure heads in a closed circuit. Pressure drop across the evaporator. Relationship between flow and pressure. Pump curves.
- Step 4** Total Head of a pump. The total pressure drop across the system. Differential pressure-switch. $\Delta\theta$ for the water between the inlet and outlet of the evaporator.
- Step 5** Using a trend table: Diagnosis of a fault from its symptoms. Finding the only impossible fault from measurements displayed. From the operating conditions shown, what is the most likely fault?
- Step 6** Plant room with an Air Handling Unit. Connect the chiller unit to the chilled water system. Installation of a 3-way valve
- Step 7** Installation of the circulator and expansion chamber. Control thermostat, Flow switch, differential pressure switch and anti frost control.

- Step 8** Flow of water. Pressure drop between the inlet and outlet of the evaporator. Total pressure drop across the system. Circulator graph, network graph and adjustment of the circulator speed.
- Step 9** Twin circulators. Compressor control. Readings with the system running normally. Diagnosis of a fault from measurements made.
- Step 10** Adjustable flow circulators. Primary circuit with 2 secondary circuits. Flow through the circulators. Pressure-break cylinder. Various repairs.
- Step 11** Condenser connected to a potable water supply. Annual water consumption. Various repairs. Recovery unit.
- Step 12** Supply the water-cooled condenser using a supply of well-water. NPSH of a pump. Cavitation in pumps. Multistage pump.
- Step 13** Installing a dry-cooler. Glycol solution. Installation of the circulator and expansion chamber. HP repairs.
- Step 14** Condenser connected to an open cooling tower. Measurement of the various pressures (pump off).
- Step 15** Open cooling tower. Measurement of the various pressures (pump on). Pressure drops.
- Step 16** Pressure drop of a filter. The filter becomes blocked. Total Head of the pump. Pump graph.
- Step 17** Hydraulic breakdown training session.
- Step 18** Repairs with cooling towers (de-concentration, float valve, scaling, filter blocked, tower nozzles, tower pump, valves, tower fan, etc).
- Step 19** Repairing various breakdown. Cavitation of the pump.
- Step 20** Indirect cooling tower. Expansion chamber under or over-inflated. Add glycol solution. Purge of the hydraulic system. Various repairs.
- Step 21** Check the nitrogen pressure in the expansion chamber. Expansion chamber located at the pump inlet / outlet.
- Step 22** Breakdown training session (liquid chiller + cooling tower + Air Handling Unit)
- Step 23** Finding the only impossible fault from measurements displayed.

After every answer, the cumulative score (in points and as a percentage score) is updated. HYDRAUREPAIR comments briefly on the answer given by the User and indicates the page of the Manual where additional information can be found. This ensures that effective auto-correction takes place.

Unfortunately you've fallen into the trap! If you want an explanation [click here](#)

Explanations: manual page 316

Clicking on the commentary accesses on-line help, which allows the User to consult (on screen) the appropriate pages of the REFREPAIR Manual.

In total, hydrarepair poses 330 different questions throughout its 23 steps (unless the configuration has been changed). At the end of every question, HYDRAUREPAIR archives the results on the hard disk and gives the User the choice of continuing or ending the session.

When a User chooses to end the session, then at the start of the next session, HYDRAUREPAIR will bring him back to exactly the same point at which he left the program.



KOTZA International - Distribution Centre
Le Chêne F- 05130 Tallard (France)

Tel: +33 492 540 733 Fax: +33 492 540 730
E-mail: kotza@kotza.com