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MAURICE AL-DEEK Co. Final Report (Page 1)

ICRC

Industrial Control
Research Center

REPORT

CONVERSION OF

MAURICE AL-DEEK Co.

HOT CHAMBER

FINAL REPORT

Contract No. 99/014

UNIDO's PROJECT No. MP/JOR/98/089

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31 Aug 99

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SYNOPSIS

Under supreme supervision of UNIDO the CFC phase project has been implemented in Jordan to phase out 100 % ODS in some Jordanian White Industries.

The project No. MP/JOR/98/089 has been nominated to Jordan for the Multilateral Fund for the implementation of The Montreal Protocol Financing.

Maurice Al-Deek Co. As a Industrial Refrig. manufacturer in Jordan the main activities of *Maurice Al-Deek Co.* , is producing refrigerators and freezers,

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INTRODUCTION

According to UNIDO contract No. 99/014 with Industrial Control Research Center Co. (ICRC) the existing *Maurice Al-Deek Co.* hot chambers facilities shall be converted and modified to phase out CFC-12 and suitable for R134a refrigerant to perform functionality and performance test of converted refrigerators and complying with ISO standards 7173, 8187, and 5155.

- 2 The CFC phase out project in *Maurice Al-Deek Co.* in Jordan will enable *Maurice Al-Deek Co.* to convert the existing production line facilities and existing hot chambers into Non CFC production line, using R134a refrigerant.
- 3 The converted Hot Chamber Installations will provide more than 20 data points in the refrigeration circuit this means more information and the ability of analyzing refrigeration system and new refrigerant effect.
- 6 The reconstructed Hot Chamber will be able to check and test two refrigerator and /or ref. -freezers units at the same time. The same equipment and data processing system, as will be used at Amman plant test room will be installed in this chamber.
- 7 The immediate effect of this project at *Maurice Al-Deek Co.* is to perform all required check and tests, suitable for Refrigerator & Freezers using Ozone Friendly Gases. The existing test facilities in *Maurice Al-Deek Co.* are not adequate for check and testing, converted ref. and freezer units, in addition to that the hot rooms are not able to perform Energy Consumption and Optimization Program.



ICRC Hot Chamber Characteristics

In order to convert *Maurice Al-Deek Co.* hot rooms facilities , *ICRC* shall provide following services:

- Supply of new equipment.
- Redesign of old equipment
- Delivery of technical drawings and software.
- Installation and commissioning.
- Start-up of the equipment and the technology.
- On-the-job training of the plant personnel.

With respect to ISO standards test requirements, and for the purpose of functionality and performance tests of the new redesigned Refrigerator and Ref.-Freezers using R134a refrigerants. The existing hot room in *Maurice Al-Deek Co.* is being converted and equipped in such a way to enable *Maurice Al-Deek Co.* to check and test at least one different models of refrigerators and freezers at ambient temperature 32 to 43 degree centigrade at one hot room chambers . In addition to these services is providing. But the hot room is capable to test eight refrigerators and freezers in case of adding more transducers and sensors in the main panel in the hot room:

- a) Procurement of new test measurement and data processing equipment.
- b) Redesign and rebuilding of presently used equipment and installation.
- c) Installation, commissioning, trial operation, start-up and on-the-job training



Maurice Al-Deek HOT CHAMBER TECHNICAL SPECIFICATION

As previously mentioned , *Maurice Al-Deek Co.*'s plant is producing 8700 refrigerator in 1996 . And subsequently the hot chamber should have been able to cover plant daily test requirement as well as other activities. Therefore, the converted hot chamber should respond to all test requirement and be able to meet ISO standards numbers 7371, 5155, 8187 as set forth in the contract and IJISI . The Amman plant hot chamber technical specification are as follows:

- Hot Chamber Dimension about 4 mt. by 5 mt.
- Refrigerator test ability simultaneously, 3 units inside and 5 units outside
- Ability to perform following operational tests and report:
 - 1 - Pull down test.
 - 2 - Continuous run test.
 - 3 - Cyclic run test.
 - 4 - Ice Freeze test.
 - 5 - Energy consumption test



- 20 Measuring points, including. (for 4 applia.)
 - 1 - Humidity, one point for one hot room.
 - 2 - Compressor Power, 4 point
 - 3 - Motor current, 4 point.
 - 4 - Supply Voltage, 4 point.
 - 5 - Hot chamber air temperature reading, one point.

- The ability to measure 160 points for eight models .
- Computerized graphical diagram of the refrigerator performance data sheet.
- Test measurement tolerance for temperature reading 0.3 degree centigrade.
- Computerized data processing system.
- Full color test sheet system reporting.



- On screen and data reporting system ability with following characteristics;

- 1 - Test number.
- 2 - Product name.
- 3 - Product model
- 4 - Product internal volume
- 5 - Compressor name
- 6 - Compressor model
- 7 - Compressor cooling capacity
- 8 - Compressor current
- 9 - Thermostat setting
- 10 - Thermostat type.
- 11 - Total test running time.
- 12 - Ambient temperature.
- 13 - Voltage rating
- 14 - Working percentage
- 15 - Evaporator mean air temperature
- 16 - Cabin mean temperature
- 17 - Evaporator bulb temperature
- 18 - Crisper temperature.
- 19 - Actual compressor running time
- 20 - Energy consumption
- 21 - Compressor motor winding temperature
- 22 - Compressor shell temperature.
- 23 - Compressor discharge temperature.
- 24 - Condenser inlet temperature.
- 25 - Condenser out let temperature.
- 26 - Condenser mid temperature
- 27 - Evaporator inlet temperature
- 28 - Evaporator outlet temperature.
- 29 - Freezing temperature.
- 30 - Refrigeration system condition display.

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ACTIVITIES

The following activities were accomplished so far toward achievement of the contract requirement as set forth by **UNIDO** and the counterpart.

- 1 - Planning for;
 - a) Hot chambers DataLogger system management.
 - b) Hot chambers graphic display management.
 - c) Hot chambers calibration setting parameters.
 - d) Hot chambers test standards management
- 2 - Preparing material requirement list.
- 3 - Component and material supply source evaluation.
- 4 - Technical data collecting.
- 5 - Engineering drawing for electronic and electrical system
- 6 - Hot chamber design review.
- 7 - Data processing software planning.
- 8 - Data processing hardware planning.

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- 9 - Thermal amplification electronic cart design
- 10 - Preparation of timer 1 flow chart..
- 11 - Initial test of data loggers electronic cart.
- 12 - Initial connection of data loggers to the computers.
- 13 - Interface electronic cart design for PC and operating system.
- 14 - RTX3 electronic diagram design.
- 15 - RTX electronic diagram design.
- 16 - UNIDO, CRC - 386 design.
- 17 - UNIDO, TC- 100 design.
- 18 - UNIDO, in-out CRC design.
- 19 - Preparation of operating system display flow chart.
- 20 - Visits and coordination;
 - /1- Visiting plant four days , one engineer, one time to Jordan .
 - 20/2- Visiting and coordinating with UNDP officer in Jordan .
 - /3- Technical negotiation with *Maurice Al-Deek Co.* engineers in Amman headquarters in order to coordinate activities.
 - /4- Visiting hot chamber several times and ordering condition system and electrical cabinet and cooling system in Jordan.



21 - Second Visits & installation and Start Up

- /1- Visiting plant 10 days , one engineer, Second time to Jordan . (visit form 25 June to 5 July.)
- 21/2- Visiting and coordinating with UNDP officer in Jordan .
- 21/3- Technical negotiation with *Maurice Al-Deek Co.* engineers in Amman headquarters in order to coordinate activities.
- 21/4- Installing Condition controller on hot chamber
- 21/5- Installing 4 DataLogger0 on the wall of the Hot Chamber
- 21/6- Installing Heating System
- 21/7- Installing Cooling System
- 21/8- Installing Humidifier
- 21/9- installing Main Electronic Panel
- 21/10- Installing Electrical Panel
- 21/11- Installing Computer System With the Version 5 HotRoom Program
- 21/12- Starting Energy Consumption Test for 7 Hour
- 21/13- Testing 3 Frizzier and And 2 Refrigerator
- 21/14- Estimating the operation of samples
- 21/15- Estimating the Energy for each sample
- 21/16- Controlling the Temperature
- 21/17- Reading 64 point Temperature
- 21/18- Reading 4 point Voltage
- 21/19- Reading 4 Point Watt
- 21/20- Reading 4 Point Energy KWh/Day
- 21/21- Curving all parameters In color Mode

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22 - Third Visits & Test & Check & Technical Education

- /1- Visiting plant 3 days , one engineer, Third time to Jordan . (visit form 28 Aug to 30 Aug.)
- 22/2- Visiting and coordinating with UNDP officer in Jordan .
- /3-Technical negotiation with *Maurice Al-Deek Co.* engineers in Amman plant in order to coordinate tests.
- 22/4- Checking the Heat Sensors
- 22/5- Checking the Electrical sensors
- 22/6- Checking the Conditioning Sensors
- 22/7- Estimating the nowledge of plant engineer
- 22/8- Estimating the product quality
- 22/9- Printing 20 page tested exam

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SUPPLY PARTS AND MATERIALS

In order to fabricate components and electronic kits All necessary material and parts have been purchased and prepared and installed as mentioned in Offer , And all kinds of tests is performed .

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Dim Black, Blue, Green
Dim Cyan, red, Magenta, YELLOW
Dim gray, L_Blue, L_Green
Dim L_cyan, L_red, L_Magenta, L_yellow

Dim prn_color As Integer 'False=Black & White ; True=Color

Dim printcolor As Integer
Dim Y, Repstr\$, Rot_Txt_no%
Dim printerdrawwidth As Integer
Dim offset, PageNo
Dim Lb_Tmp As Label
Dim FirstKey

Dim Rec_Max%
Dim SegEn
Dim ActiveFrame As Integer
Dim ActiveLabel As Integer
Dim Seg_n As Integer

Dim PrnPageNo As Integer
Dim ActivePage As Integer

Dim sl%, st%, sw%, sh%, dw%
Dim a30 As String * 30

Dim rr() 'Extracted Results

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Sub cmd_click (Index As Integer)

Select Case Index

Case 0 'print
screen.MousePointer = 11
Cmd(0).Enabled = False
Cmd(1).Enabled = False
DoEvents
Call Print_All
Call Save_Spec
screen.MousePointer = 0
Cmd(0).Enabled = True
Cmd(1).Enabled = True
'Unload Me

Case 1 'Save
nn = Variable("Prnt", "Write")
nn = Variable("Prnt", "Read")

Case 2 'cancel
Unload Me

Case 3
Me.Hide
Paper.Show

End Select

Exit Sub

End Sub

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Sub Color_chk_Click (Value As Integer)

' If color_chk.Value = False Then

' prn_color = False

' color = 0

' Black = color

' Blue = color

' Green = color

' Cyan = color

' red = color

' Magenta = color

' YELLOW = color

' gray = color

' L_Blue = color

' L_Green = color

' L_cyan = color

' L_red = color

' L_Magenta = color

' L_yellow = color

'

' Else

prn_color = True

Black = QBColor(0)

Blue = QBColor(1)

Green = QBColor(2)

Cyan = QBColor(3)

red = QBColor(4)

Magenta = QBColor(5)

YELLOW = QBColor(6)

gray = QBColor(8)

L_Blue = QBColor(9)

L_Green = QBColor(10)

L_cyan = QBColor(11)

L_red = QBColor(12)

L_Magenta = QBColor(13)

L_yellow = QBColor(14)

' End If

End Sub

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Sub crv (mode\$, Rec1, Rec2)

Select Case mode\$

Case "prn"

printer.ForeColor = Black

printer.FontName = "Arial"

printer.FontSize = 10

obj = ActiveObj

'print x_axis

printer.DrawWidth = 3 * printerdrawwidth

printer.Line (Rec1, 0)-(Rec2, 0)'axis

printer.DrawWidth = 1

printer.DrawStyle = 2'=DOt 3=Dash-Dot 4=Dash_Dot_Dot

For i = -300 To 1000 Step 100

printer.Line (Rec1, i)-(Rec2, i)

Next i

rec = zoom(Seg_n).X1

printer.DrawWidth = 3 * printerdrawwidth

printer.ForeColor = If(prn_color = False, Black, zoom(Seg_n).BorderColor)

printer.Line (rec, -300)-(rec, 1000)

printer.DrawStyle = 0 'Solid

printer.DrawWidth = 1 * printerdrawwidth

printer.CurrentX = rec - RecLb(Seg_n).Width / 2

printer.CurrentY = 1030

printer.Print RecLb(Seg_n).Caption

n = -1

R1 = (Rec1 \ 10 + 1) * 10

R2 = (Rec2 \ 10) * 10

printer.FontSize = 5

printer.ForeColor = Black

For rec = R1 To R2 Step 10

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printer.Line (rec, 10)-(rec, -10), Black

n = n + 1

If n Mod 3 = 0 Then

bs = Right\$("0" & rec \ 60, 2) & ":" & Right\$("0" & rec Mod 60, 2)

printer.CurrentX = rec - 2'offset / 13

printer.CurrentY = -12

printer.Print bs

End If

Next rec

'graph

For n = 0 To 1

For d = 1 To 6

If curve_Item(n, d) < 50 Then

z = curve_Item(n, d)

If curve_color(n, d) = 15 Then col = 0 Else col = curve_color(n, d)

printer.ForeColor = If(prn_color = False, Black, QBColor(col))

For rec = Rec1 To Rec2 - 1

bool1 = grf(26, rec) = 789

bool2 = grf(26, rec + 1) = 789

If bool1 And bool2 Then

Y1 = grf(z, rec)

Y2 = grf(z, rec + 1)

printer.Line (rec, Y1)-(rec + 1, Y2)

End If

Next rec

End If

Next d

Next n

Case "grfall"

On Error Resume Next 'Note:Karim

obj = ActiveObj

grafall.Cls

grafall.DrawMode = 7

'(7=xor 13=copy)

RecAll_End = UBound(grf, 2) - 1

If Err = 9 Then

Rec_Max = 0

Exit Sub



End If

```
Rec_Max = RecAll_End
screen.MousePointer = 11
sw = IIf(RecAll_End < 100, 100, RecAll_End)
grafall.ScaleWidth = sw'+ recall_end \ 10
grafall.ScaleLeft = 0
recall_start = 1
grafall.Line (recall_start, 0)-(RecAll_End, 0), QBColor(3)
```

```
For n = 0 To 1
```

```
For d = 1 To 6
```

```
If curve_Item(n, d) < 50 Then
```

```
z = curve_Item(n, d)
```

```
If Hr.lbt(z).Visible = True Then
```

```
grafall.ForeColor = QBColor(curve_color(n, d))
```

```
For rec = recall_start To RecAll_End - 1
```

```
If grf(26, rec) = 789 And grf(26, rec + 1) = 789 Then
```

```
grafall.Line (rec, grf(z, rec))-(rec + 1, grf(z, rec + 1))
```

```
End If
```

```
Next rec
```

```
Else
```

```
curve_Item(n, d) = 50
```

```
Hr.lbt(z).ForeColor = QBColor(0)
```

```
Hr.lbt(z).BackColor = &H202020
```

```
End If
```

```
End If
```

```
Next d
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Next n
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```
screen.MousePointer = 0
```

```
Case "grfzoom"
```

```
On Error Resume Next
```

```
obj = ActiveObj
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```
zoomarea = 30
zoomarea2 = zoomarea \ 2
grafzoom.ScaleWidth = zoomarea
'X = Int(zoom.X1 + .5)
'If X > Rec_Max Then Stop
grafzoom.ScaleLeft = X - zoomarea2

Rec_Start = IIf(X - zoomarea2 > 0, X - zoomarea2, 0)
Rec_end = IIf(X + zoomarea2 < Rec_Max, X + zoomarea2, Rec_Max)

'Rec_Start = Seg(ActiveSeg).Left
'Rec_End = Rec_Start + Seg(ActiveSeg).Width
'grafzoom.ScaleWidth = Seg(ActiveSeg).Width
'grafzoom.ScaleLeft = Rec_Start

grafzoom.Cls
grafzoom.DrawMode = 7 '(7=xor 13=copy)
grafzoom.Line (Rec_Start, 0)-(Rec_end, 0), QBColor(3)
For n = 0 To 1
For d = 1 To 6
If curve_Item(n, d) < 50 Then
z = curve_Item(n, d)
If Hr.lbt(z).Visible = True Then
grafzoom.ForeColor = QBColor(curve_color(n, d))
For rec = Rec_Start To Rec_end - 1
If grf(26, rec) = 789 And grf(26, rec + 1) = 789 Then
grafzoom.Line (rec, grf(z, rec))-(rec + 1, grf(z, rec + 1))
End If
Next rec
Else
curve_Item(n, d) = 50
Hr.lbt(z).ForeColor = QBColor(0)
Hr.lbt(z).BackColor = &H202020
End I
End sub
```

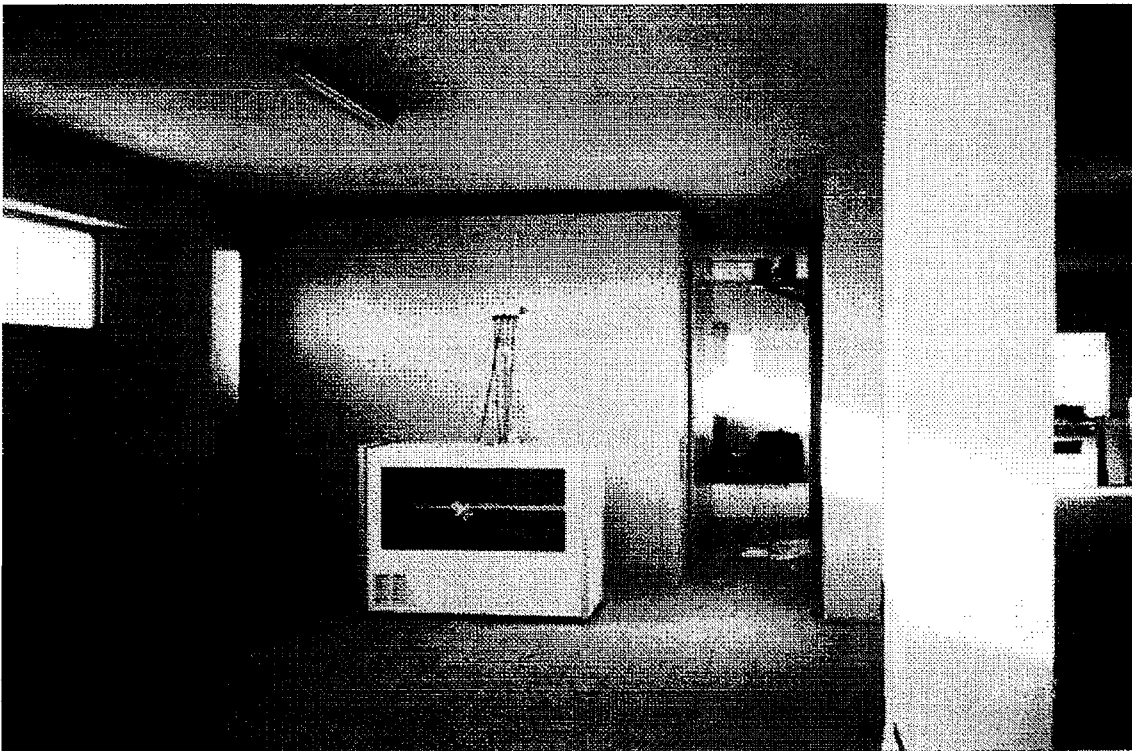
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Maurice Al-Deek Co. (ICEBERG)
Hot Chamber View
Second Floor 3 July 99
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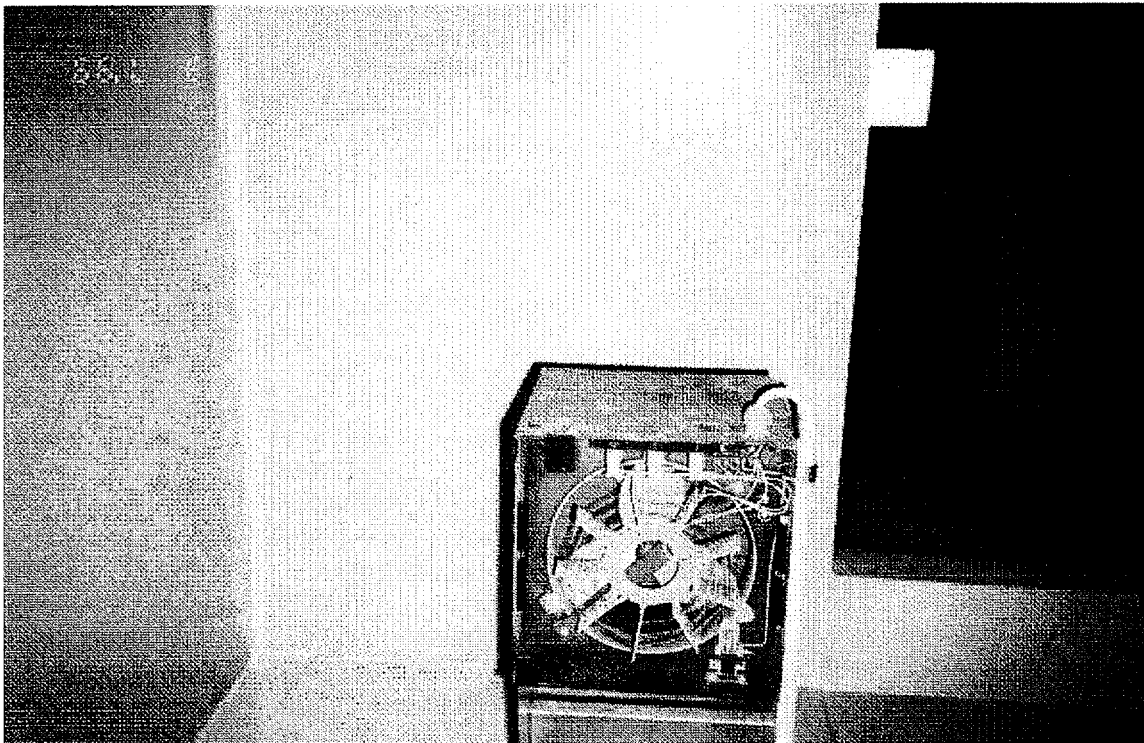
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3.jpg



Maurice Al-Deek Co. (ICEBERG)
Hot Chamber View
Second Floor 3 July 99
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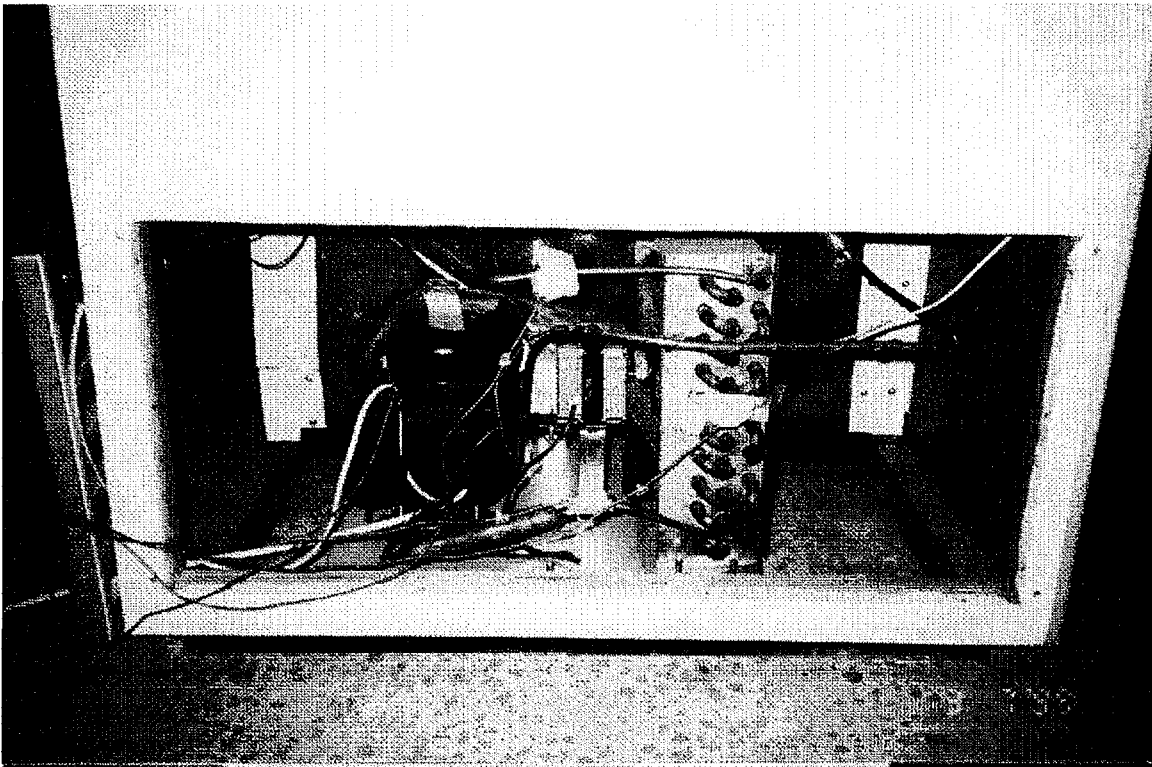
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ICRC
Industrial Control
Research Center

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Maurice Al-Deek Co. (ICEBERG)
Hot Chamber View
Second Floor 3 July 99
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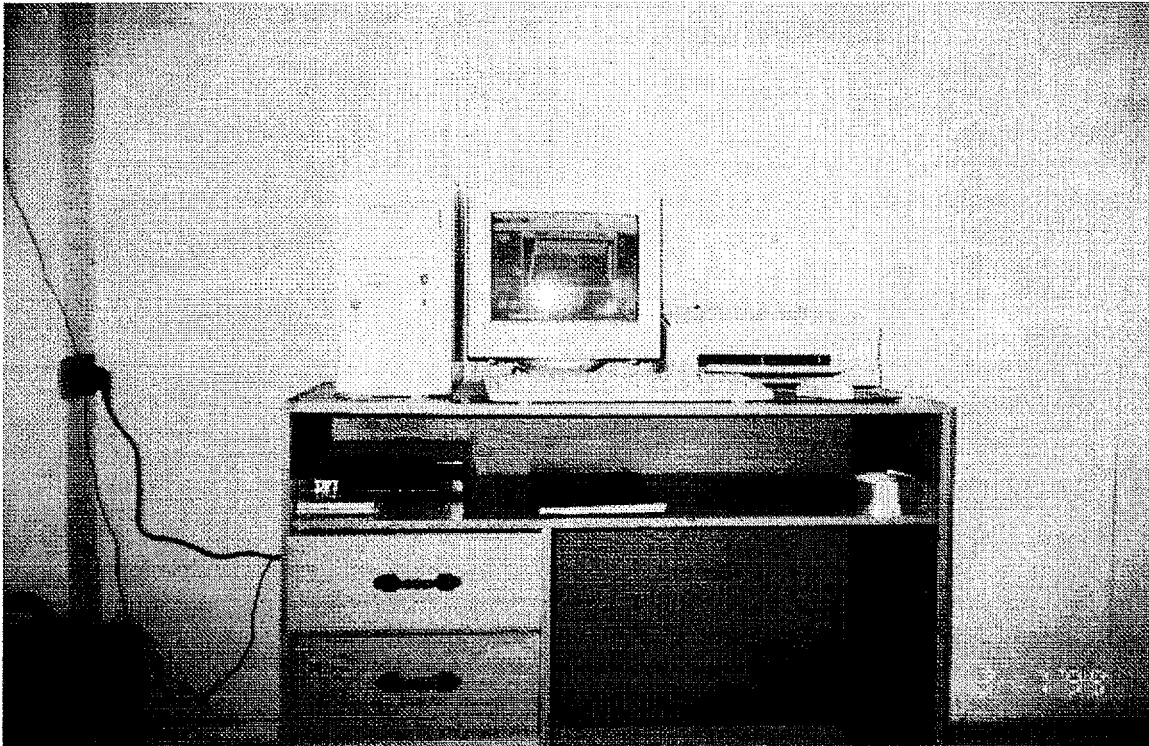
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No. 201 MAHESTAN Building KARGAR Avn. ENGELAB Sqr.

MAURICE AL-DEEK Co. Final Report (Page 24)



5.JPG



Maurice Al-Deek Co. (ICEBERG)
Hot Chamber View
Second Floor 3 July 99
No 4

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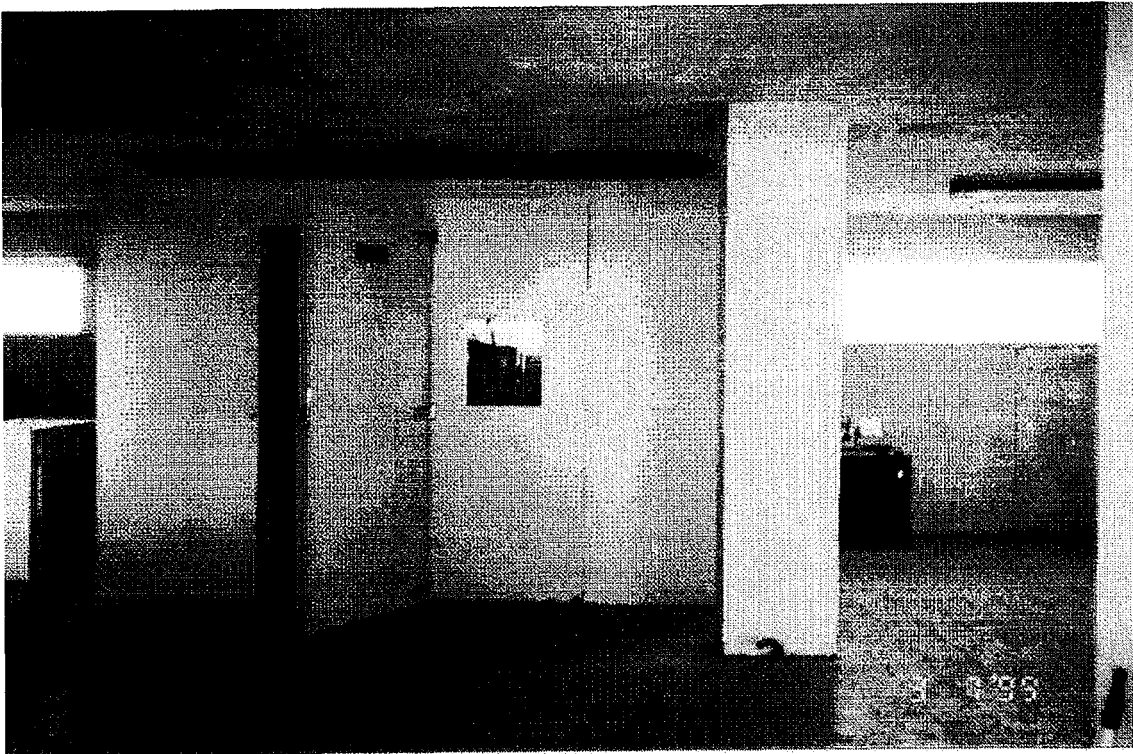
Factory: No. 4 Iraqu Ave. Rajaii Ave. Tehran Iran P.Bo. 18915-133 Telefax 0098-21-5052836

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MAURICE AL-DEEK Co. Final Report (Page 25)

ICRC
Industrial Control
Research Center

6.JPG



Maurice Al-Deek Co. (ICEBERG)
Hot Chamber View
Second Floor 3 July 99
No 5

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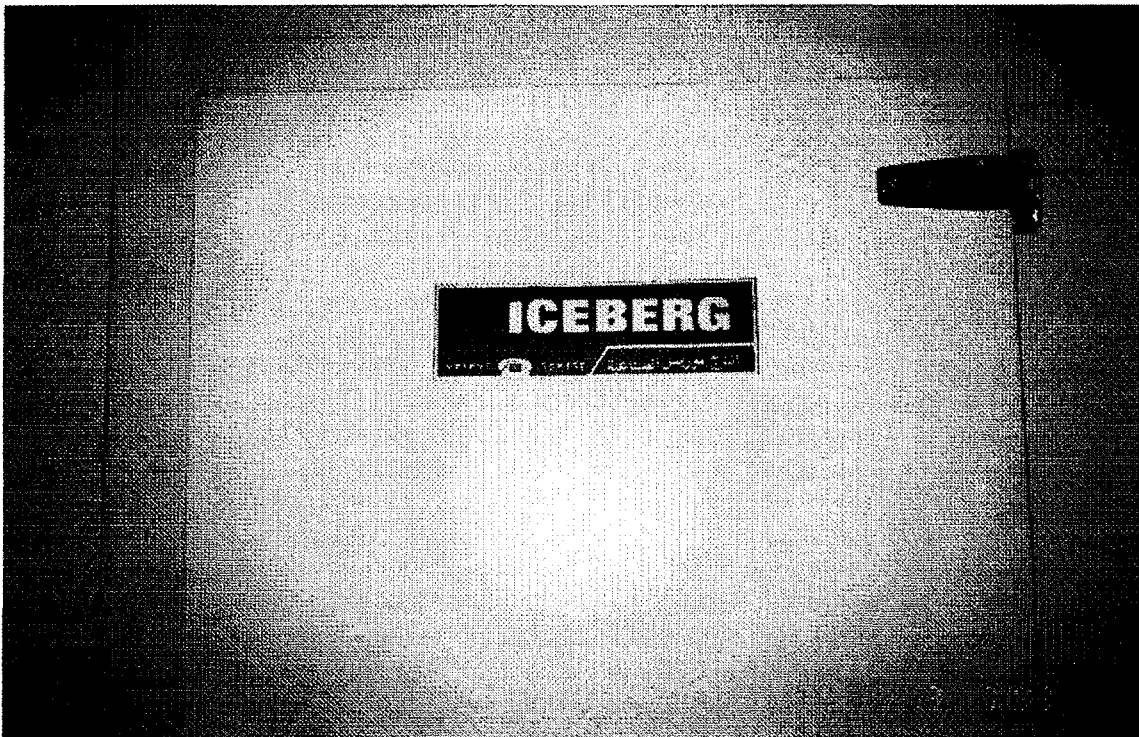
Factory: No. 4 Iraqy Ave. Rajaii Ave. Tehran Iran P.Bo. 18915-133 Telefax 0098-21-5052836

OFFICE : Tel. 0098-21-6432854 Fax 0098-21-6420759 TEHRAN IRAN
No. 201 MAHESTAN Building KARGAR Avn. ENGELAB Sqr.



MAURICE AL-DEEK Co. Final Report (Page 26)

7.JPG



Maurice Al-Deek Co. (ICEBERG)
Hot Chamber View
Second Floor 3 July 99
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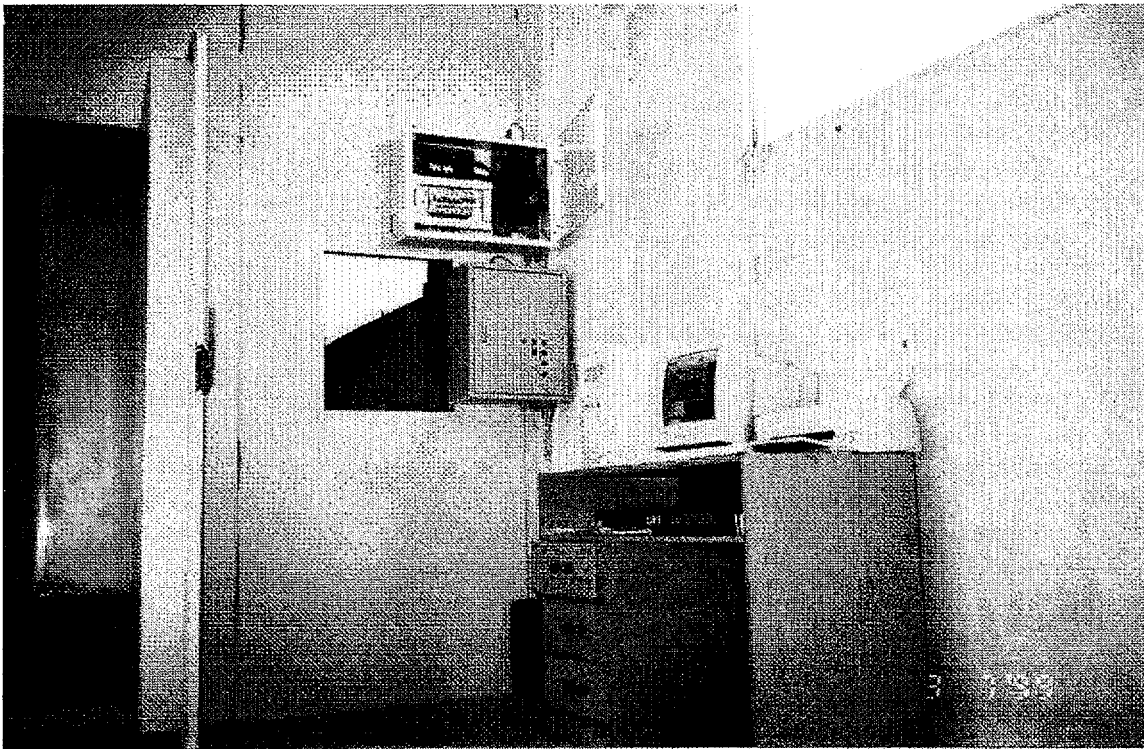
Factory: No. 4 Iraqy Ave. Rajaii Ave. Tehran Iran P.Bo. 18915-133 Telefax 0098-21-5052836

OFFICE : Tel. 0098-21-6432854 Fax 0098-21-6420759 TEHRAN IRAN
No. 201 MAHESTAN Building KARGAR Avn. ENGELAB Sqr.

MAURICE AL-DEEK Co. Final Report (Page 27)



8.JPG



Maurice Al-Deek Co. (ICEBERG)
Hot Chamber View
Second Floor 3 July 99
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Factory: No. 4 Iraqy Ave. Rajaii Ave. Tehran Iran P.Bo. 18915-133 Telefax 0098-21-5052836



TestDate: 99/07/15 15:36

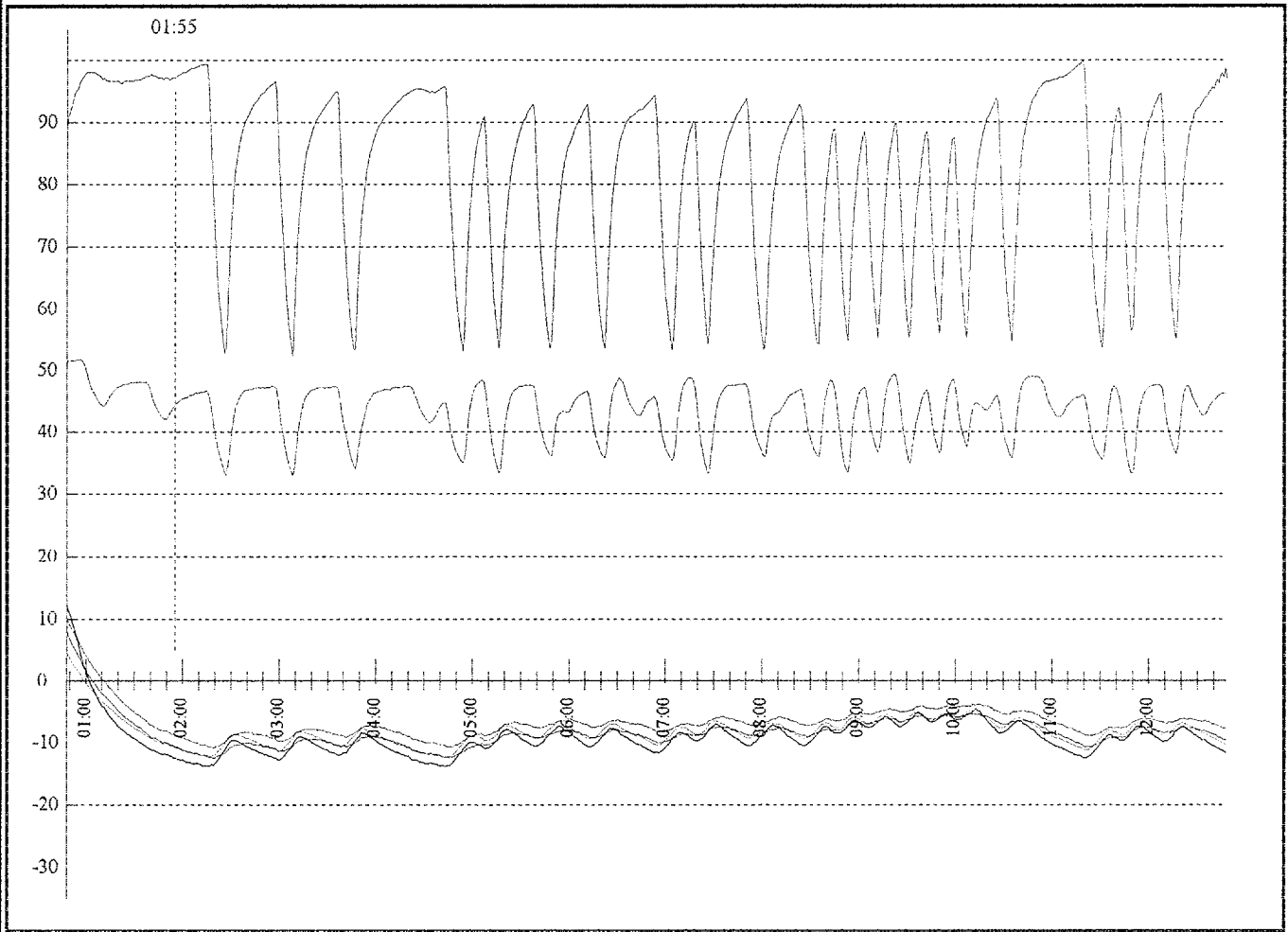
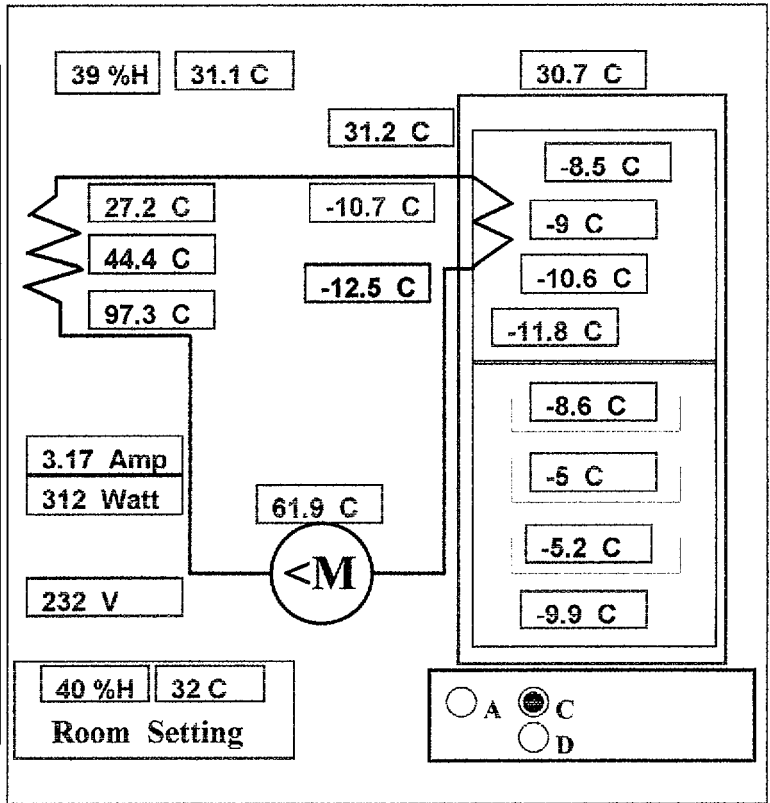
Report No.: () - Page 1

PageTestName: Energy Consumption

ReportDate: 99/08/28 14:39

Page Result :

- 1 - Page Test Time 12 Hours
- 2 - Working Percent 72 %On
- 3 - Energy (Accord to page) 2.57 kwh
- 4 - Zoom Time 1:55 Hour
- 5 - Compr Current 3.17 Amp
- 6 - Evaprator Mean Temp -9.9 C
- 7 - Cabin Mean Temp -6.2 C
- 8 - Crisp Temp -9.9 C
- 9 - Compr Temp 61.9 C
- 10- Condensor In Temp 97.3 C
- 11- Condensor Out Temp 27.2 C
- 12- Condition 31.1 C 39 %H
- 13- Volt Max=245 Mean=238 Min=220
- 14-
- 15-
- 16-
- 17-





TestDate: 99/07/15 15:36

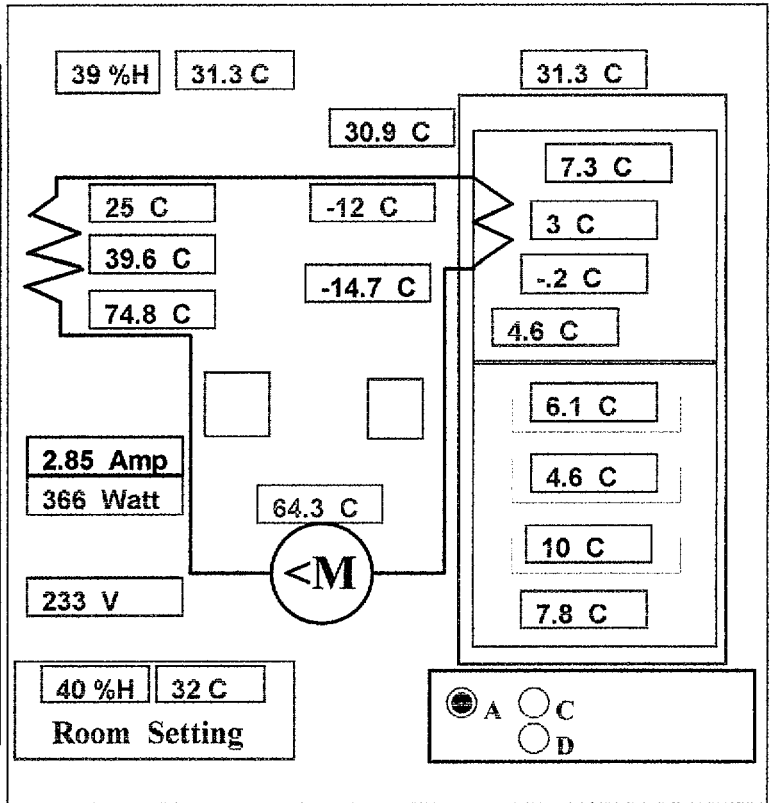
Report No.: () - Page 1

PageTestName: Energy Consumption

ReportDate: 99/08/28 14:32

Page Result :

- 1 - Page Test Time 13 Hours
- 2 - Working Percent 97 %On
- 3 - Energy (Accord to page) 3.719 kwh
- 4 - Zoom Time 4:01 Hour
- 5 - Compr Current 2.85 Amp
- 6 - Evaprator Mean Temp 3.6 C
- 7 - Cabin Mean Temp 6.9 C
- 8 - Crisp Temp 7.8 C
- 9 - Compr Temp 64.3 C
- 10- Condensor In Temp 74.8 C
- 11- Condensor Out Temp 25 C
- 12- Condition 31.3 C 39 %H
- 13- Volt Max=245 Mean=237 Min=218
- 14-
- 15-
- 16-
- 17-



Industrial Control Research Center HotRoom Ver 5

