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Beyond A Graduate

PAST PAPERS

Faculty	Department / Section/Division
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Past Papers

Faculty of Maritime Science
Department of Marine Electrical

Reefer container Technician Course

2015-2022

Document Control & Approving Authority	Senior Director – Quality Management & Administration

1st Issue Date: 2017.011.30	Revision No.00	Revision Date: 11/08/2020	Validated by: Librarian

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CINEC CAMPUS
Beyond A Graduate

00012

Faculty of Marine Engineering
Department of Marine Electrical Engineering
REEFER CONTAINER TECHNICIAN COURSE.
COURSE CODE: EED -300/ B001

FINAL EXAMINATION
REEFER CONTAINER THEORY & PRACTICE.

- *This question paper consists of 03 sections.*

Student Index number; .....

Date: 2020-08-17 *Pass mark 50%* *Time allocated: 03Hrs*

SECTION "A"

Underline the most suitable answer. Each of 15 no's questions carry-03 marks. Total 45 marks.

01). What is the most correct for heat & temperature?

a. Heat travels from low temperature to high temperature.
b. Heat & temperature is not the same, but units are same.
c. Heat is the is the measurement of temperature.
d. Temperature is the level of heat energy of a substance.

02). "Saturation temperature" of a refrigerant is

a. Temperature below its freezing point.
b. Temperature above its boiling point.
c. Temperature when its evaporation/condensation takes place under same pressure.
d. Temperature when its state changes at different pressures.

03). "Degree of superheat" of a reefer plant is

a. Slightly important for gas charging.
b. Very important for the entire plants' coefficient of performance.
c. Important only for the condenser.
d. Important only for the expansion valve.

04). In a "Sub cooling condenser" refrigerant always,

a. Cools only up to its condensation temperature.
b. Cools only up to its evaporation temperature.
c. Cools below its saturation temperature at condensing pressure.
d. Cools above its saturation temperature at evaporating pressure.

05). What is the difference of Air-conditioning and Refrigeration system?

a Refrigeration system remove large quantity of latent heat than Air conditioning.

b Air conditioning is the process of controlling human comfort temperature, moisture, dust etc.; while refrigeration is the process of preserving the dead and live cargo by cooling down.

c Only Air conditioning systems use the air as the secondary refrigerant.

d In the refrigeration system Evaporator pressure is higher than the Air conditioning system evaporator pressure.

06). Find different between Frozen and Chill cargo.

a. It needs humidity and ventilation control for frozen cargo.

b. Temperature pull down to below -10^{0}C for chill cargo.

c. Temperature maintain between 0C and – 30 C for frozen cargo.

d. Temperature for perishable cargo is above -5^{0}C and for frozen cargo less than -5^{0}C.

07). In a star cool reefer AFAM (Advanced Fresh Air Management) is controlling,

a. Humidity level for chill cargo.

b. Atmosphere gases entering through fresh air as well as exhaust air controlling.

c. Controlling humidity and CO_2 level.

d. Ethylene & Butane gas generated by the cargo.

08). Reefer controller all the input thermal sensor values are,

a. Resistance low Temperature high.

b. Temperature high Resistance high.

c. Resistance high Temperature low.

d. Resistance low Temperature low.

09). What are the starting steps of a reefer container? (Starting sequence)

a. Display modular, Compressor, condenser fan and evaporator fans.

b. Display modular, Evaporator fans then compressor & condenser.

c. Display modular, Evaporator high/low speed then compressor and condenser fan motor.

d. Display modular then Evaporator motors high/ low, condenser fan then compressor.

10). The reason for if reefer unit is operating long or continuous in cooling mode.

a. Undercharge of refrigerant.

b. Evaporator coil is on defrosting.

c. Air short cycling through Condenser fan.

d. Air short cycling around evaporator coil.

11). What is the reason for high discharge temperature and pressure?

a Discharge temperature sensor drifting low.

b Failed economizer, TXV or solenoid valve.

c Superheat setting too low.

d Too much air in the system.

12). What is the cause for low suction pressure in display?

a High refrigerant charge.

b Faulty discharge pressure transducer.

c High heat load inside reefer.

d Faulty suction pressure transducer.

13). If reefer runs with high suction pressure with low superheat degree,

a Broken capillary of TXV.

b High refrigerant charge.

c Superheat setting of TXV too low.

d Choked filter drier.

14). The purpose of suction modulation valve of Daikin reefer is

a To control capacity load at in range.

b To increase discharge temperature.

c To cool down the compressor motor.

d To maintain the degree of superheat.

15). In chill cargo reefer the control temperature is high speed supply air because,

a Their humidity level is too high.

b They emit Ethylene gas.

c They produce heat and produce ethylene gas.

d They need more Oxygen for living.

SECTION "B"

Answer all 07 questions. Each question carries 05 marks. Total 35 marks.

Select & write the correct meaning answer number for the following refrigeration terms from the bellow.

01.

a. Saturation point is : .....

b. Condensation is : .....

c. Flash gas is : .....

d. Conduction & convection is: .....

e. Thermostatic expansion valve always works to maintain:

.....

f. Thermostatic expansion valve is most suitable for when:

.....

g. Importance of liquid quench valve is .....

Answers:

1. The boiled refrigerant bubbles in the liquid line.
2. The constant evaporation temperature.
3. To cool down the compressor motor by cooled suction gas.
4. The heat absorbs methods in the evaporator.
5. Process of heat rejection (removing) form High pressure and high temperature gas changing of its state to high pressure liquid.
6. The Temperature of a Vapor or a liquid change their states.
7. To maintain constant temperature in the evaporator.

SECTION -C

Answer any two (02) questions from the following 04. Each question carries 10 marks. Total marks-20.

1). Draw the basic refrigeration cycle with all components & name the refrigerant status. (H/P liquid L/P liquid, Vapor, gas etc.;) at different places of cycle.

2). Write the basic refrigerant 4 component functions briefly.

3). Briefly explain how you charge the refrigerant gas to reefer unit.

4). Briefly explain what is P.T.I. & importance of P.T.I. on board for fault finding?

CINEC 19 DEC 2015 EXAMINATION

Colombo International Nautical and Engineering College

CINEC CAMPUS

Faculty of Marine Engineering

Department of Marine Electrical Engineering

REEFER CONTAINER TECHNICIAN COURSE.

COURSE CODE : EED -0295/ B002

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ELECTRICAL KNOWLEDGE & PRACTICE

REPEAT EXAM

Answer all questions.

Index number :.....

Date: 2015.12.19 *Pass mark 50%* *Time allocated: 03Hrs*

SECTION-"A"

Answer all the 10 Questions. Each question carry 05 Marks. Total marks -50.

01. Briefly explain the following terms and their units.
    i. Resistance.....
    ii. Frequency .....
    iii. Electric current. .....
    iv. Electric Power.....

02. What are the five (5) general safety rules should be followed before beginning of electrical maintains.

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03. Write the OHM"s law. If a 24 volts D.C. Supply is connected in series with a bulb of 48 Ohms, find the current passing through bulb & the power rating of bulb.

04. What is the meaning of following.

i. M.C.B. -.....

ii. I.P .-.....

iii. A.W.G. -.....

iv. C.T .-.....

v. O.C.R. -.....

vi. F.L.C . -.....

05. Draw the symbols of the following devices.

i. Capacitor

ii. M.C.B (3 pole)

iii. O.C.R.

iv. Single phase auto transformer

v. Resistor

vi. Fuse

vii. Thermistor (N.T.C)

viii. NPN Transistor

ix. Full wave rectifier

x. Δ / Y – Transformer

06. When an electrical cables is expressed as, Cu/XLPE/PVC – $16mm^2$ - 7/1.70mm from 300/500V Explain meaning of each words...

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07. What is an Induction motor? Explain briefly with the aid of a simple sketch.

08. i. Define synchronous speed and rotor speed of an induction motor.
ii. A three phase induction motor rating plate has written 1440 rpm 400V/50Hz. What is the number of magnetic poles and calculate the synchronous speed at 50 Hz and 60 Hz.

09. How can the direction of rotation of the three phase induction motor – rotor be reversed ? Draw the power circuit with magnetic contactors.

10. Draw the power and control circuit for D.O.L. 3-phase Induction Motor starting system. (work identification letters and terminal numbers) .

"SECTION-B"

Please refer the Carrier Trans cold model-69NT40-511 to 535 (Provided with ML 2i Controller) circuit diagram and answer the following questions. (Each question carry 05 marks. Total marks-25)

Q1. Write the location of the following components in the electrical diagram.

i. Reefer container powerplug.....
ii. 24 Volt control transformer.....
iii. Compressor motor contactor coil.....
iv. Circuit breaker of reefer panel.....
v. Defrosting heater contactor coil.....
vi. Suction modulation valve.....
vii. Heater termination thermostat.....
viii. Compressor motor thermistor.....
ix. Liquid injection solenoid valve.....
x. Economizer solenoid valve.....

Q2. What can be the reasons if evaporator fan motors (both) are not running? Write all possible reasons step by step according to the circuit diagram.

i. .....
ii. .....
iii. .....
iv. .....
v. .....

Q3. Write the following signal input terminal numbers of the Micro controller module ML 2i in the circuit diagram given.

i. Suction pressure transducer .....
ii. Supply temperature sensor. .....
iii. Ambient sensor. .....
iv. Humidity sensor. .....
v. Supply recorder sensor. .....

Q4. a. What are the signal output terminal numbers of the Micro controller module ML 2i in the circuit diagram given.

i. Suction modulation valve .....
ii. Display module & key pad .....
iii. Communication modem .....
iv. Battery charging terminals .....

b. Write the possible reasons for the following alarm & indications?

i. In range (green) light.
ii. Cool (white) light.
iii. Defrost (orange) light.

Q5. What is the alarm code for the following faults.

i. Manual defrost switch failure .....
ii. Co_2 Sensor failure .....
iii. Compressor current high .....
iv. Discharge pressure high .....
v. Internal microprocessor failure .....

Please refer the Star cool reefer model SCU-40 and SCI-40 Electrical circuit diagram and answer all the following questions. Each question carry 1.25 marks. Total marks-25.

Q6. What is the power line connection & how many power supply connection to the frequency controller?

.....

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Q7. What is the connection code & the connection numbers in the controller for Co_2 & RH sensors?

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Q8. What is the high pressure switch (socket) connection in the controller?

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Q9. What is the Pressure discharge & pressure suction "x" socket with the code numbers to controller?

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Q10. What is the "x" socket number with the terminal numbers for the controller of sensors & name them.

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Q11. Which evaporator contactor has interlock contact for speed changer?

Q12. Name all the contactors involve in the system as per the electrical diagram.

Q13. What could be causes for Condenser fan motor is not functioning when contactor energized.

Q14. Evaporator fan motor's internal protector signal in put is in which section of the controller? Name the "x" socket and the terminal numbers.

Q15. Compressor contactor is in which section of the controller?

Q16. Heater contactor coil voltage output is in which section of the controller?

Q17. What is the reason if transformer output voltage is zero?

Q18. What is the air exchange sensor input signal to controller ? Name "x" socket & terminal numbers.

Q19. What is the power supply cord conductor cross section area?

Q20. What are the electrical protections provided by main switch in side the controller box?

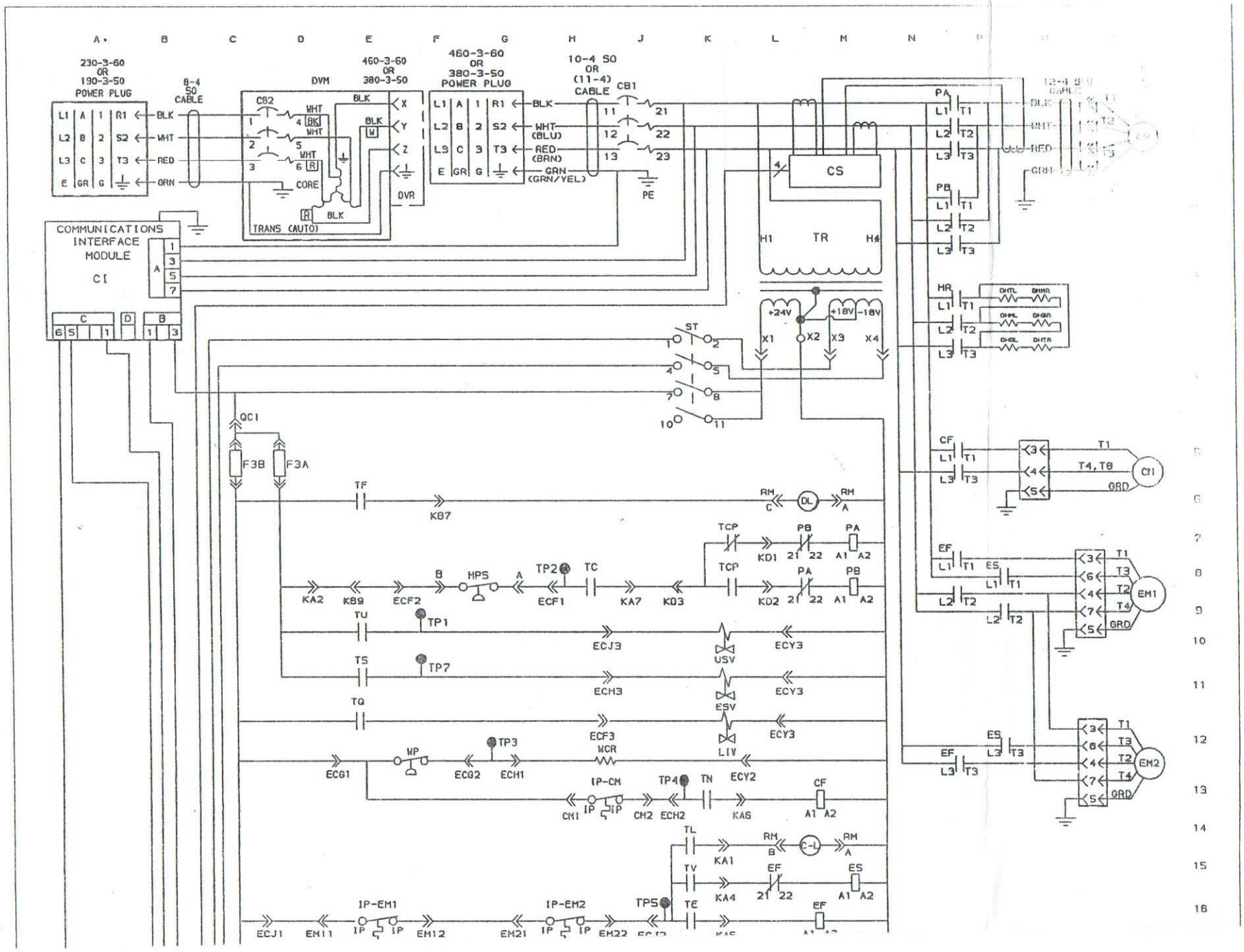
Q21. What are the control voltages of star cool reefers?

Q22. What are the keypad supply in put socket & terminal numbers?

Q23. What is the power supply "x" socket and terminal numbers for electronical expansion valve for evaporator?

Q-24. If hot gas cycle not operating, find out what is the first to check up?

Q-25. What is the ambient air sensor input to the controller?


230-3-60 OR 190-3-50 POWER PLUG
8-4 SO CABLE
DVM
460-3-60 OR 380-3-50
460-3-60 OR 380-3-50 POWER PLUG
10-4 SO OR (11-4) CABLE
CB1
CB2
TRANS (AUTO)
DVR
PE
COMMUNICATIONS INTERFACE MODULE CI
CS
TR
H1
H4
+24V
+18V
-18V
X1
X2
X3
X4
ST
QC1
F3B
F3A
TF
KB7
RM
DL
TCP
PB
PA
KD1
KD2
KA2
KB9
ECF2
HPS
TP2
TC
ECF1
KA7
KD3
TU
TP1
ECJ3
USV
ECY3
TS
TP7
ECH3
TQ
ESV
ECF3
LIV
ECG1
WP
TP3
ECG2
ECH1
WCR
IP-CM
TP4
TN
ECY2
CM1
CM2
ECH2
KA6
CF
TL
KA1
TV
KA4
EF
ES
IP-EM1
IP-EM2
TPS
TE
ECJ1
EM11
EM12
EM21
EM22
HR
CM1
EM1
EM2
GRD
T1
T4, T8
T3
T2
T4

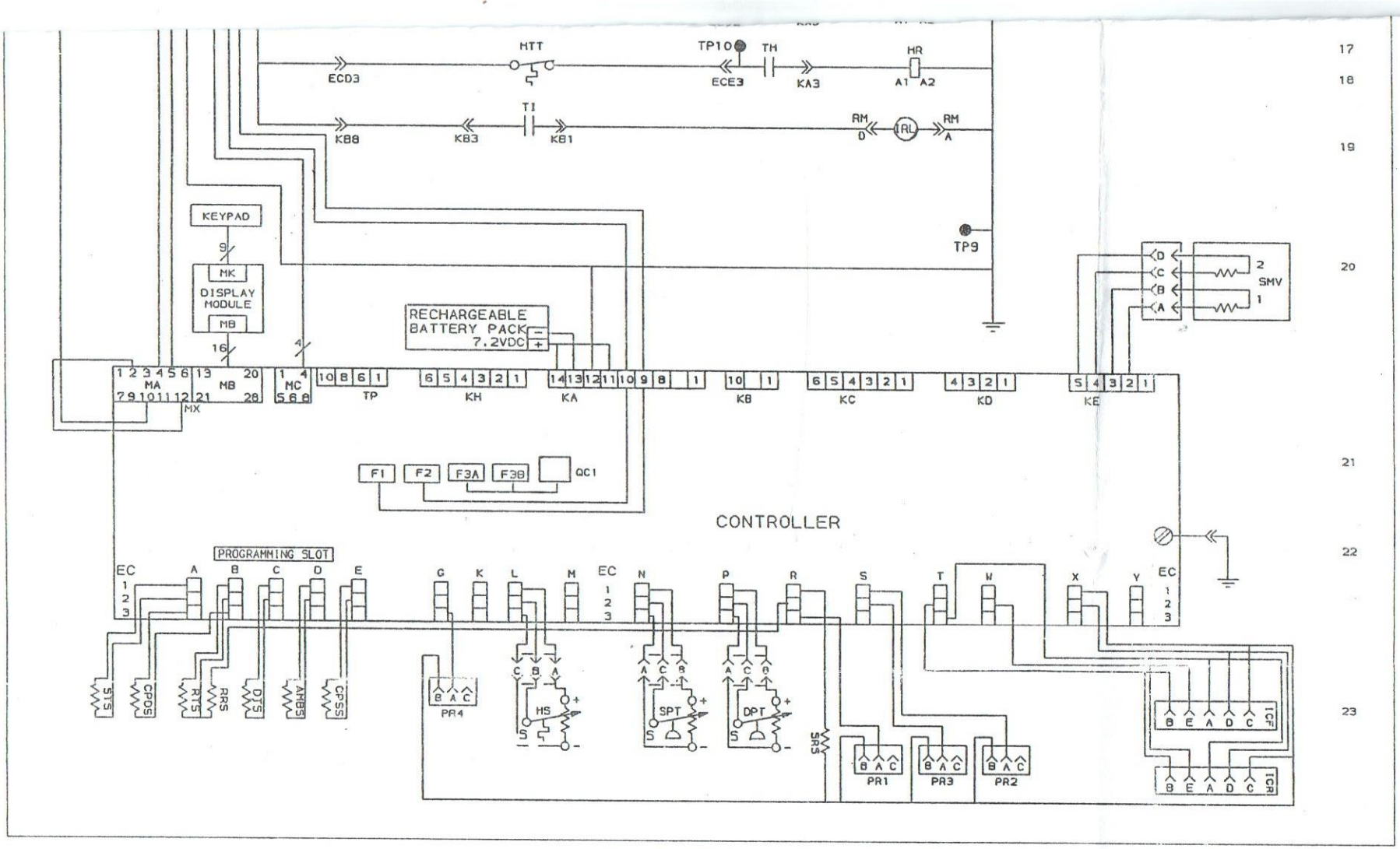
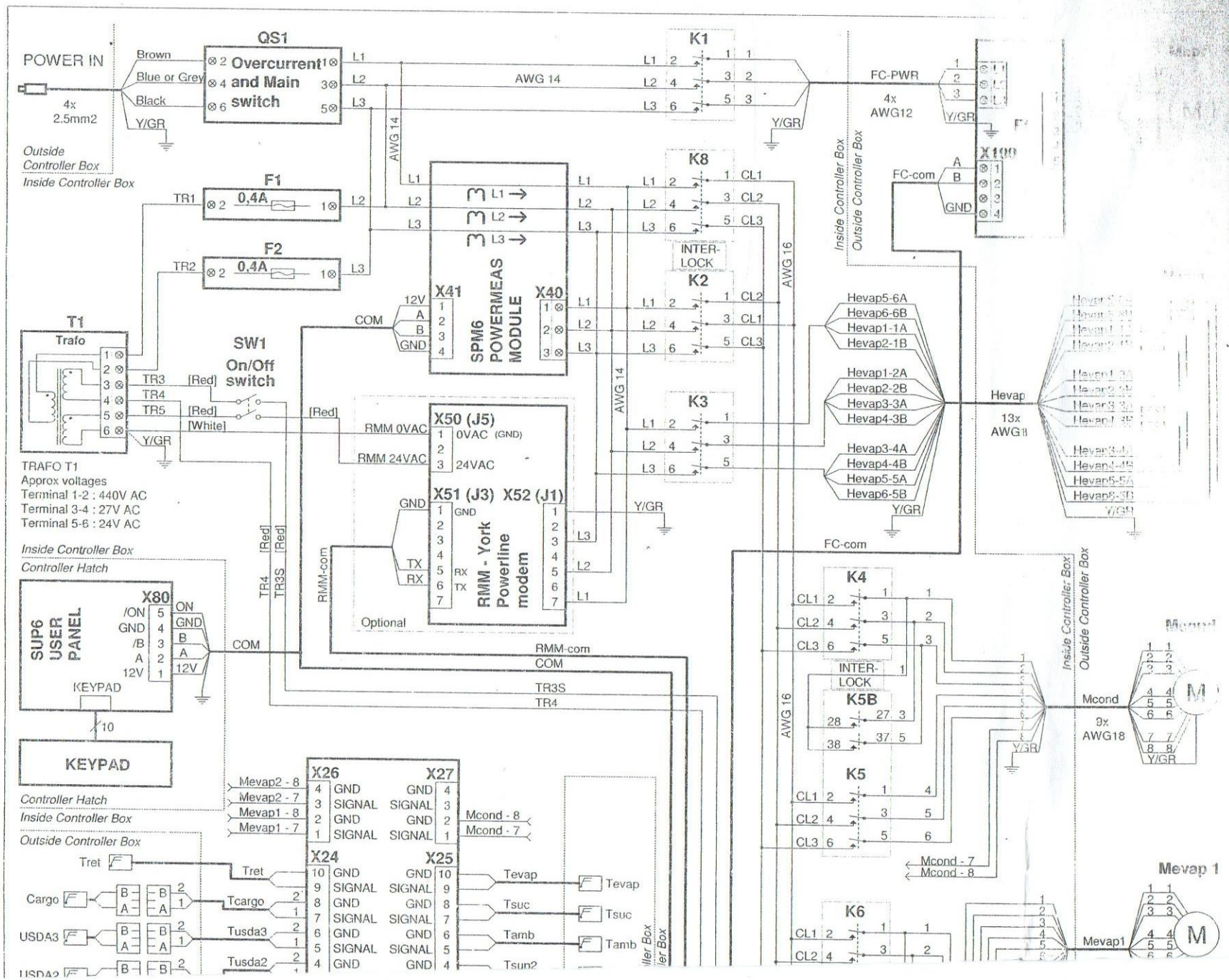
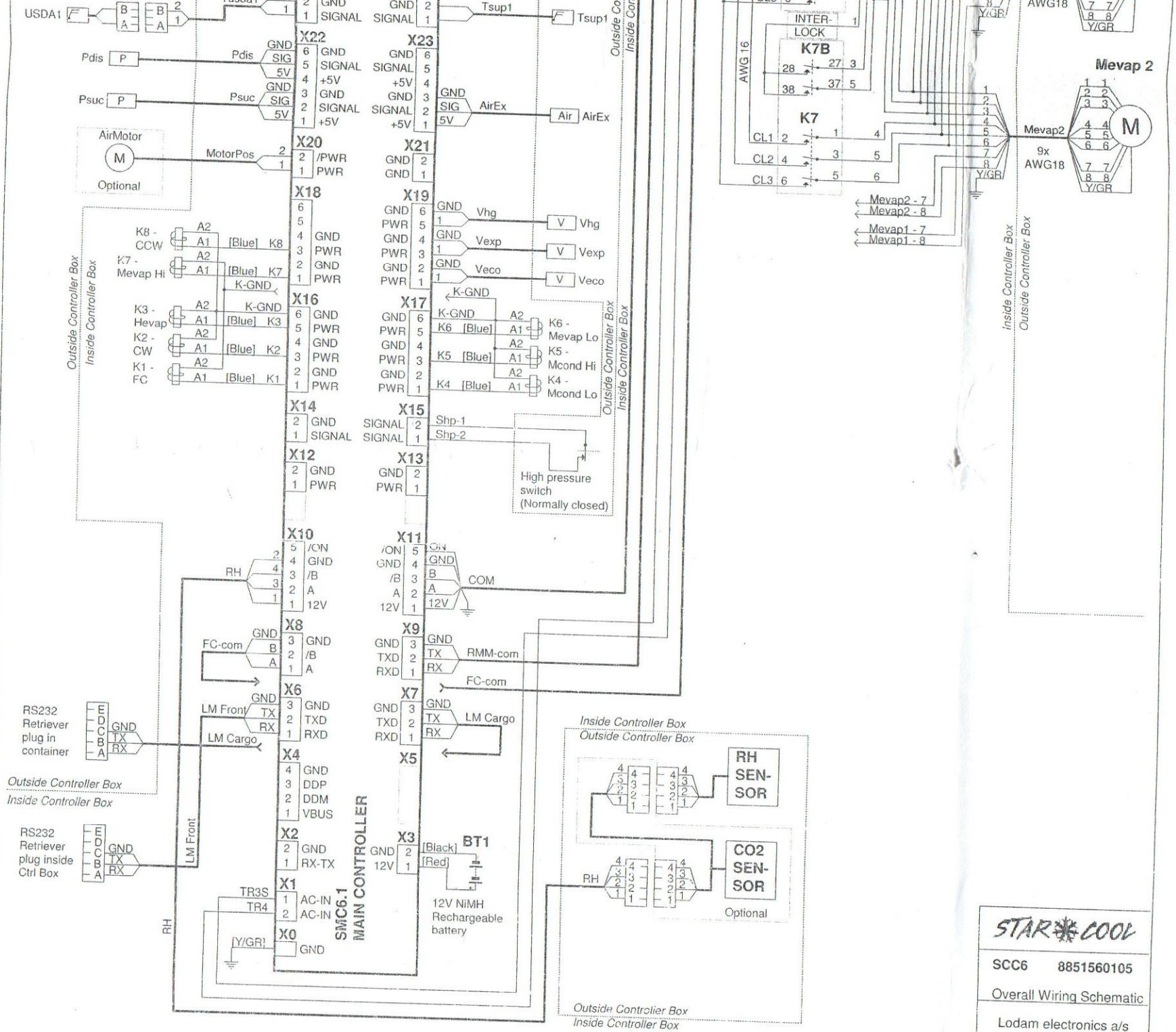


Figure 7-2 SCHEMATIC DIAGRAM


POWER IN
4x 2.5mm2
Brown
Blue or Grey
Black
Y/GR
QS1
Overcurrent and Main switch
AWG 14
K1
FC-PWR
4x AWG12
Outside Controller Box
Inside Controller Box
F1
0,4A
F2
0,4A
K8
K2
K3
INTER-LOCK
X41
X40
SPM6 POWERMEAS MODULE
COM
12V
A
B
GND
AWG 16
AWG 14
T1
Trafo
SW1
On/Off switch
TR1
TR2
TR3
TR4
TR5
[Red]
[White]
TRAFO T1
Approx voltages
Terminal 1-2 : 440V AC
Terminal 3-4 : 27V AC
Terminal 5-6 : 24V AC
X50 (J5)
RMM 0VAC
0VAC (GND)
RMM 24VAC
24VAC
X51 (J3) X52 (J1)
RMM - York Powerline modem
Optional
RMM-com
TX
RX
FC-com
X100
Hevap5-6A
Hevap6-6B
Hevap1-1A
Hevap2-1B
Hevap1-2A
Hevap2-2B
Hevap3-3A
Hevap4-3B
Hevap3-4A
Hevap4-4B
Hevap5-5A
Hevap6-5B
Hevap
13x AWG18
Inside Controller Box
Controller Hatch
SUP6 USER PANEL
X80
/ON
GND
/B
A
12V
ON
B
KEYPAD
10
TR3S
K4
K5B
K5
K6
Mcond
9x AWG18
Mevap 1
Mevap1
Mevap2 - 8
Mevap2 - 7
Mevap1 - 8
Mevap1 - 7
Mcond - 8
Mcond - 7
X26
X27
X24
X25
SIGNAL
Tret
Cargo
USDA3
Tcargo
Tusda3
Tusda2
Tevap
Tsuc
Tamb
Tsup2



STAR COOL

SCC6 8851560105

Overall Wiring Schematic

Lodam electronics a/s

P/N: 5251560412 Rev: 2.0

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Department of Marine Electrical Engineering
REEFER CONTAINER TECHNICIAN COURSE..
COURSE CODE : EED -0295/ B001

CINEC 19 Dec 2015 EXAMINATION

SAFETY & SHIP ROUTINE
RE REPEAT EXAMINATION

- *Answer all questions*

Index Number : .....

Date: 2015.12.19 *Pass mark 50%* *Time allocated: 03 Hrs*

1. i. Why it need to take number of safety measures before start a job onboard

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.....

ii. State common cause of accidents onboard

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(10 Marks)

2. i. What is the need of Risk assessment, whey it is necessary?

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ii. Briefly describe each steps you consider when filling a RISK ASSESMENT.

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(10 Marks)

3. i. Define the term PPE, Briefly explain the use of each equipment (PPE).

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ii. List the equipments you get familiarize as soon as you join the ship.

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(10 Marks)

4. i. What are the safety precautions need to be taken before start work with reefer containers

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ii. What is the safe practice to plug and unplug reefer units.

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(10 Marks)

5. i. What are the hazards during working in an engineering environment.

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ii. What are the hazards during working in reefer containers

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(10Marks)

6. i. List all the 6 annexes of MARPOL.

ii. What are the regulations for annex V & the colour code

(10 Marks)

7. i. What is MLC , Why it is useful for crew members onboard.

ii. What is the minimum requirements for seafarers to work on a ship and explain rest hours.

(10 Marks)

8. i. List all the officers and crew members onboard according to the chart.

ii. As per your rank, you are belong to which department, and list your job description.

(10 Marks)

9. i. What are the safety precautions to be followed when working with electrical system.

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ii. What are the essential things to maintain for proper house keeping.

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(10 Marks)

10. i. What is ISM, Briefly explain the need of ISM

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.....

ii. Who is DPA , and the need of DPA for shipping company

.....

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(10 Marks)

CINEC
19 JAN 2015
EXAMINATION

Colombo International Nautical and Engineering College
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Department of Marine Electrical Engineering
REEFER CONTAINER TECHNICIAN COURSE..
COURSE CODE : EED -0295/ B002

18

REPEAT EXAMINATION
SAFETY & SHIP ROUTINE

Answer all questions
Index Number : .....
Date: 2015.12. 19 *Pass mark 50%* *Time allocated: 03 Hrs*

1. a. Explain why safety is so important onboard ships

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b. What are the safety precautions you take before begin a job.

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(10 Marks)

2. a. What are the safety precautions to be followed when working with electrical system?

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b. What are the common hazards during working with reefer containers

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(10 Marks)

3. a. What is risk assessment

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b. Briefly describe each steps you consider when filling a RISK ASSESMENT.

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(10 Marks)

4. List the equipment's that you should get familiarize as soon as you join onboard (Ship).

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(10 Marks)

5. a. What are the safety precautions you must follow when plugging and unplugging reefer units.

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b. What are the safety equipment use for following ?

i. Head Protecting .....

ii. Hearing protection .....

iii. Face & eye protection .....

iv. Respiratory .....

v. Hand & Foot .....

(10 Marks)

6. a. What are the MARPOL ANNEXES, list it out accordingly. 18

Annex 01.....

Annex 02.....

Annex 03.....

Annex 04.....

Annex 05.....

Annex 06 .....

b. What are the regulation for annex 4 & 5

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(10 Marks)

7. a What is the purpose of ISM

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.....

b. Who is DPA, and the purpose of DPA of shipping company

.....

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(10 Marks)

8. a. What is MLC , what are the minimum requirements for seafarers to work on a ship

.....

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.....

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b. What are the employment conditions and rest hour and work hour periods

.....

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.....

(10 Marks)

9. a. List out the officers and crewmembers on board accordingly.

b. As per your rank, you are belong to which department, and list your job description

(10 Marks)

10. a. Explain IMDG and how many divisions are there with IMDG

b.List all Groups specified under IMDG

C.How do you identify the IMDG Container form the normal container

c. What are the precautions to be taken while working with IMDG Containers

(10 Marks)

000023

CINEC
03 OCT 2015
EXAMINATION

Colombo International Nautical and Engineering College

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Faculty of Marine Engineering

Department of Marine Electrical Engineering

REEFER CONTAINER TECHNICIAN COURSE..

COURSE CODE : EED -0295/ B001

FINAL EXAMINATION

SAFETY & SHIP ROUTING

- This question paper consists of 20 Questions.
- Answer all questions

Index Number : .....

Date: 2015.10.03 Pass mark 50% Time allocated: 03Hrs

SAFETY

1) What should you check and examine, respect to safety view about your work place as well as your stores? As soon as you join on-board a vessel (5 Marks)

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Explain briefly each item to check.

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2). What are the safety equipment use for Following? (5 Marks)

i). Head protection .....

ii). Hearing protection .....

iii). Face & eye Protection .....

iv). Respiratory .....

v). Hand & Foot Protection .....

3). (a). What are the different types of safety wear to protect different part of the body? (5 Marks)

i) .....

ii) .....

iii) .....

(b). What safety precautions to be followed when working With Electrical system?

i) .....

ii) .....

iii) .....

4) State 5 common cause for an accident **(5 Marks)**

i) .....
ii) .....
iii) .....
iv) .....
v) .....

5) What is the purpose of risk assessment, why it is necessary, explain briefly **(5 Marks)**

i) .....
ii) .....
iii) .....
iv) .....
v) .....

6) Common hazard during with reefer container work **(5 Marks)**

i) .....
ii) .....
iii) .....

7) Safety precautions during plugging and unplugging of reefer container units. **(5 Marks)**

i) .....
ii) .....
iii) .....

8) List Safety equipment's that are usually need to be familiarized onboard ship during the first day, as soon as you board the vessel. **(5 Marks)**

i) .....
ii) .....
iii) .....
iv) .....
v) .....
vi) .....
vii) .....
viii) .....
ix) .....
x) .....
xi) .....
xii) .....
xiii) .....
.....

ISM

9) Define ISM, Briefly explain the purpose of ISM **(5 Marks)**

i) .....
ii) .....
iii) .....
iv) .....
v) .....

10) List ISM elements **(5 Marks)**

i) .....
ii) .....
iii) .....
iv) .....
v) .....

11) What are the two key issues dealing with maritime Industry legislation developed by IMO **(5 Marks)**

i) .....
ii) .....

MARPOL

11) What are the MARPOL ANNEXES, Define briefly **(5 Marks)**

i) .....
ii) .....
iii) .....
iv) .....
v) .....
vi) .....

12) What are the regulation for discharge of bilges overboard **(5 Marks)**

i) .....
ii) .....
iii) .....

13) What is the regulation for garbage disposal onboard, color category for each type of waste. **(5 Marks)**

i) .....
ii) .....

MLC

13)What are the minimum requirements for seafarers to work on a ship. **(5 Marks)**

i) .....

ii) .....

14)What is the regulation for working and rest hours **(5 Marks)**

i) .....

ii) .....

15) Draw the flow chart for the officers and crew onboard , and your rank job description **(5 Marks)**

i) .....

ii) .....

IMDG

16) What is the purpose of IMDG code **(5 Marks)**

i) .....

ii) .....

17) How many classes /divisions are available in IMDG **(5 Marks)**

i) .....

Name and List all classes available under IMDG

i) .....

ii) .....

iii) .....

iv) .....

v) .....

vi) .....

vii) .....

viii) .....

ix) .....

x) .....

18) What is the purpose of UN number **(5 Marks)**

i) .....

ii) .....

What is the purpose of PSN

i) .....

Library

05

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REEFER CONTAINER TECHNICIAN COURSE.

COURSE CODE : EED -0295/ B001

ELECTRICAL KNOWLEDGE & PRACTICE

REPEAT EXAM

- *This question paper consist of 2 Sections. Answer both section's all the questions.*

Student Index Number :.....

Date: 2015.11.02 *Pass mark 50%* *Time allocated: 03Hrs*

SECTION-"A"

Answer all the 10 Questions. Each question carry 05 Marks. Total marks -50.

01). Briefly explain the following terms and their units.

i. Resistance

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ii. Frequency

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iii. Electric current

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iv. Electric Power

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02). What are the five (5) general safety rules should be followed before beginning of electrical maintains.

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03). A 10 A motor operates from a 440 V/ 50Hz insulated system. The supply cables have a total impedance of 0.01W . what circuit current would flow in each case?

If

i. an open – circuit fault.
ii. an earth fault .
iii. a short circuit fault occurred.

04). What are the meaning of following letters.

i. M.C.B .-.....

ii. I.P .-.....

iii. A.W.G. -.....

iv. C.T .-.....

v. O.C.R. -.....

vi. F.L.C. -.....

05). A 230V filament lamp has its hot resistance of 529W. Find

i. The current taken by the lamp and ,
ii. The power rating of lamp.

06). Draw the symbols of the following devices. 05

i. Capacitor

ii. M.C.B (3 pole)

iii. O.C.R.

iv. Single phase auto transformer

v. Resistor

vi. Fuse

vii. Thermistor (N.T.C.)

viii. NPN Transistor

ix. Full wave rectifier

x. Transformer

07). When an electrical cables is expressed as, Cu/XLPE/PVC – $16mm^2$ - 7/1.70mm from 300/500V Explain meaning of each words.

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08). i. Define synchronous speed and rotor speed of the induction motor.
ii. A three phase induction motor rating plate has 1440 rpm 400V/50Hz. What is the number of magnetic poles and calculate the synchronous speed at 50 Hz and 60 Hz.

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09). How can the direction of rotation of the three phase induction motor – rotor be reversed ? Draw the power circuit with magnetic contractors.

10). Draw the power and control circuit for D.O.L. 3-phase Induction Motor starting system. (work identification letters and terminal numbers) .

SECTION-B

(I). Please refer the Carrier Transi cold model-69NT40-511 to 535 (Provided with ML 2i Controller) circuit diagram and answer the following questions. Each question carry 05 marks. Total marks-25.

Q1. Write the location of the following components in the electrical diagram.

i. Reefer container power plug.....

ii. 24 volt control transformer.....

iii. Compressor motor contactor coil.....

iv. Circuit breaker of reefer panel.....

v. Defrosting heater contactor coil.....

vi. Suction modulation valve.....

vii. Heater termination thermostat.....

viii. Compressor motor thermistor.....

ix. Liquid injection solenoid valve.....

x. Economizer solenoid valve.....

Q2. What can be the reasons if evaporator fan motors (both) are not running? Write all possible reasons step by step according to the circuit diagram.

i. .....

ii. .....

iii. .....

iv. .....

v. .....

Q3. Write the following signal input terminal numbers of the Micro controller module ML 2i in the circuit diagram given.

i. Suction pressure transducer .....

ii. Supply temperature sensor. .....

iii. Ambient sensor. .....

iv. Humidity sensor. .....

v. Supply recorder sensor. .....

Q4. a. What are the signal output terminal numbers of the Micro controller module ML 2i in the circuit diagram given.

i. Suction modulation valve .....
ii. Display module & key pad .....
iii. Communication modem .....
iv. Battery charging terminals .....

b. Write the possible reasons for the following alarm & indications?

i. In range (green) light. .....

ii. Cool (white) light. In range (green) light .....

iii. Defrost (orange) light. In range (green) light. .....

Q5. What is the alarm code for the following faults.

i. . Manual defrost switch failure .....

ii. Co_2 Sensor failure .....

iii. Compressor current high .....

iv. Discharge pressure high .....

v. Internal microprocessor failure .....

(II). Please refer the Star cool reefer model SCU-40 and SCI-40 Electrical circuit diagram and answer all the following questions. Each question carry 1.25 marks. Total marks-25.

Q6. What is the power line connection & how many power supply connect to the frequency controller?

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Q7. What is the connection code & the connection numbers in the controller for Co_2 & RH sensors?

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Q8. What is the high pressure switch(socket) connection in the controller?

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Q9. What is the Pressure discharge & pressure suction "x" socket with the code numbers to controller?

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Q10. What is the "x" socket number with the terminal numbers for the controller of sensors & name them.

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Q11. Which evaporator contactor has interlock contact for speed changer?

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Q12. Name all the contactors involve in the system as per the electrical diagram

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Q13. What could be causes for Condenser fan motor is not functioning when contactor energized.

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Q14. Evaporator fan motor's internal protector signal in put is in which section of the controller? Name the "x" socket and the terminal numbers.

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Q15. Compressor contactor is in which section of the controller?

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Q16. Heater contactor coil voltage output is in which section of the controller?

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Q17. What is the reason if transformer output voltage is zero?

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Q18. What is the air exchange sensor input signal to controller ? Name "x" socket & terminal numbers.

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Q19. What is the power supply cord conductor cross section area?

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Q20. What are the electrical protections provided by main switch in side the controller box?

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Q21. What are the control voltages of star cool reefers?

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Q22. What are the keypad supply in put socket & terminal numbers?

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Q23. What is the power supply "x" socket and terminal numbers for electronical expansion valve for evaporator?

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Q24. If hot gas cycle not operating what is the first check up?

.....

.....

Q25. What is the ambient air sensor input to the controller?

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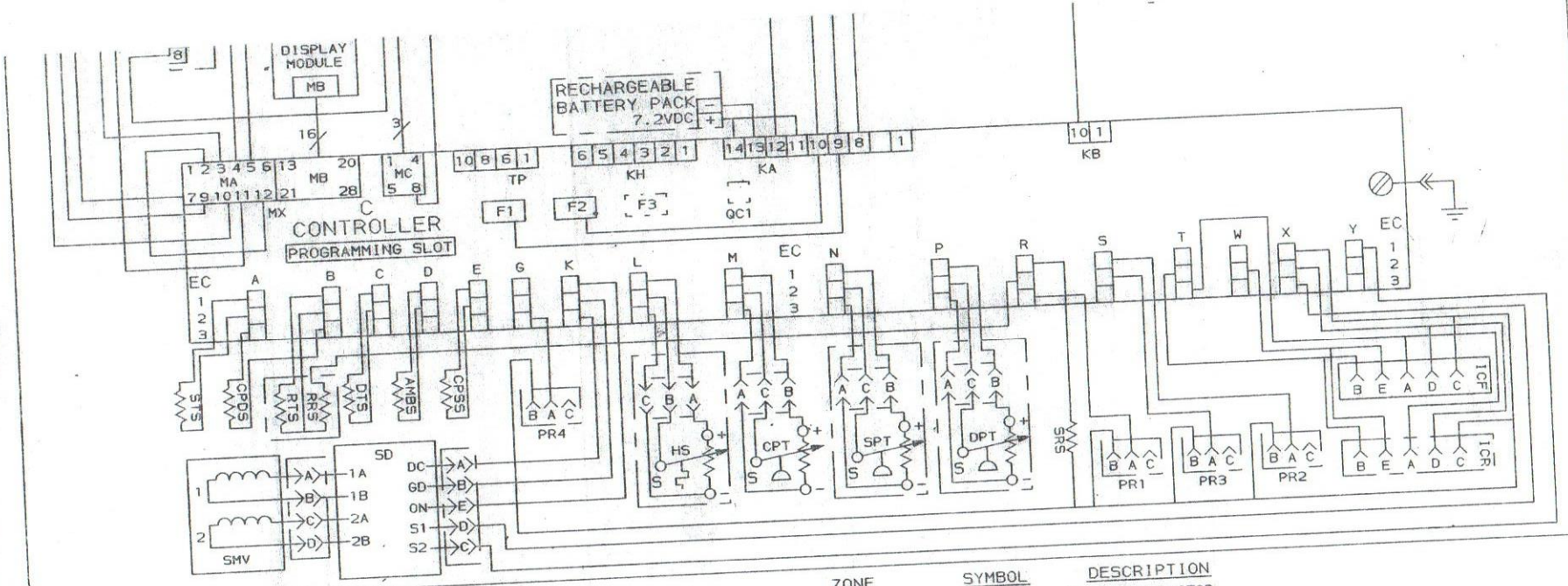

LEGEND

ZONE	SYMBOL	DESCRIPTION
B16	C	CONTROLLER
D18	AMBS	— AMBIENT SENSOR
J1	CB1	— CIRCUIT BREAKER 460V
D1	CB2	— OPTIONAL CIRCUIT BREAKER 230V (DVM OPTION) TERMINAL BLOCK WHEN CB2 NOT PRESENT
M9,P6	CF	— CONDENSER FAN CONTACTOR
A4	CI	— COMMUNICATIONS INTERFACE MODULE (OPTION)
M8,P1,K9	CH	— COMPRESSOR CONTACTOR
M9	C-L	— COOL LIGHT (OPTION)
H9,T6	CM	— CONDENSER FAN MOTOR
E8,T2	CP	— COMPRESSOR MOTOR
C18	CPDS	— COMPRESSOR DISCHARGE SENSOR (TEMP.)
E18	CPSS	— COMPRESSOR SUCTION SENSOR (TEMP.) (OPTION)
H19	CPT	— CONDENSER PRESSURE TRANSDUCER
B14	CR	— CHART RECORDER (OPTION)
M2	CS	— CURRENT SENSOR
R4	DHBL	— DEFROST HEATER - BOTTOM LEFT
T4	DHBR	— DEFROST HEATER - BOTTOM RIGHT
R4	DHML	— DEFROST HEATER - MIDDLE LEFT
T3	DHMR	— DEFROST HEATER - MIDDLE RIGHT
R3	DHTL	— DEFROST HEATER - TOP LEFT
T4	DHTR	— DEFROST HEATER - TOP RIGHT
M12	DL	— DEFROST LIGHT (OPTION)
K19	DPT	— DISCHARGE PRESSURE TRANSDUCER (OPTION)
D18	DTS	— DEFROST TEMPERATURE SENSOR
D1	DVM	— DUAL VOLTAGE MODULE (OPTIONAL)
F2	DVR	— DUAL VOLTAGE RECEPTACLE (OPTIONAL)
L11,M10,P7,P8	EF	— EVAPORATOR FAN CONTACTOR (HIGH SPEED)
E10,H10,T8,T10	EM	— EVAPORATOR FAN MOTOR
M11,R7	ES	— EVAPORATOR FAN CONTACTOR (LOW SPEED)
C7,E16,F16,G16,H6	F	— FUSE
	FLA	— FULL LOAD AMPS
	HPS	— HIGH PRESSURE SWITCH

ZONE	SYMBOL	DESCRIPTION
M11,P3	HR	— HEATER CONTACTOR
G19	HS	— HUMIDITY SENSOR
H11	HTT	— HEAT TERMINATION THERMOSTAT
T20	IC	— INTERROGATOR CONNECTOR (OPTION)
E8,E10,G10,H9	IP	— INTERNAL PROTECTOR
M13	IRL	— IN-RANGE LIGHT (OPTION)
G13	MDS	— MANUAL DEFROST SWITCH
F19,M20,N20,P20	PR	— PROBE RECEPTACLE (USDA OPTION)
L9,L12,L13	RM	— REMOTE MONITORING RECEPTACLE (OPTION)
C18	RRS	— RETURN RECORDER SENSOR (OPTION)
C18	RTS	— RETURN TEMPERATURE SENSOR
D20	SD	— STEPPER MOTOR DRIVE
B20	SMV	— STEPPER MOTOR SUCTION MODULATION VALVE
J20	SPT	— SUCTION PRESSURE TRANSDUCER (OPTION)
L19	SRS	— SUPPLY RECORDER SENSOR (OPTION)
K5	ST	— START-STOP SWITCH
B18	STS	— SUPPLY TEMPERATURE SENSOR
K8	TC	— CONTROLLER RELAY (COOLING)
D7	TCC	— TRANSFRESH COMMUNICATIONS CONNECTOR (OPTION)
K10	TE	— CONTROLLER RELAY (HIGH SPEED EVAPORATOR FANS)
G7	TFC	— TRANSFRESH CONTROLLER (OPTION)
K11	TH	— CONTROLLER RELAY (HEATING)
K13	TI	— INRANGE RELAY
K12	TF	— DEFROST RELAY
K9	TN	— CONTROLLER RELAY (CONDENSER FAN)
E16,G9,J8,J9 J10,J11,M13	TP	— TEST POINT
M3	TR	— TRANSFORMER
D2	TRANS	— TRANSFORMER AUTO 230/460 (OPTION)
E7	TRC	— TRANSFRESH REAR CONNECTOR (OPTION)
K11	TV	— CONTROLLER RELAY (LOW SPEED EVAPORATOR FANS)
E9	WP	— WATER PRESSURE SWITCH (OPTION)

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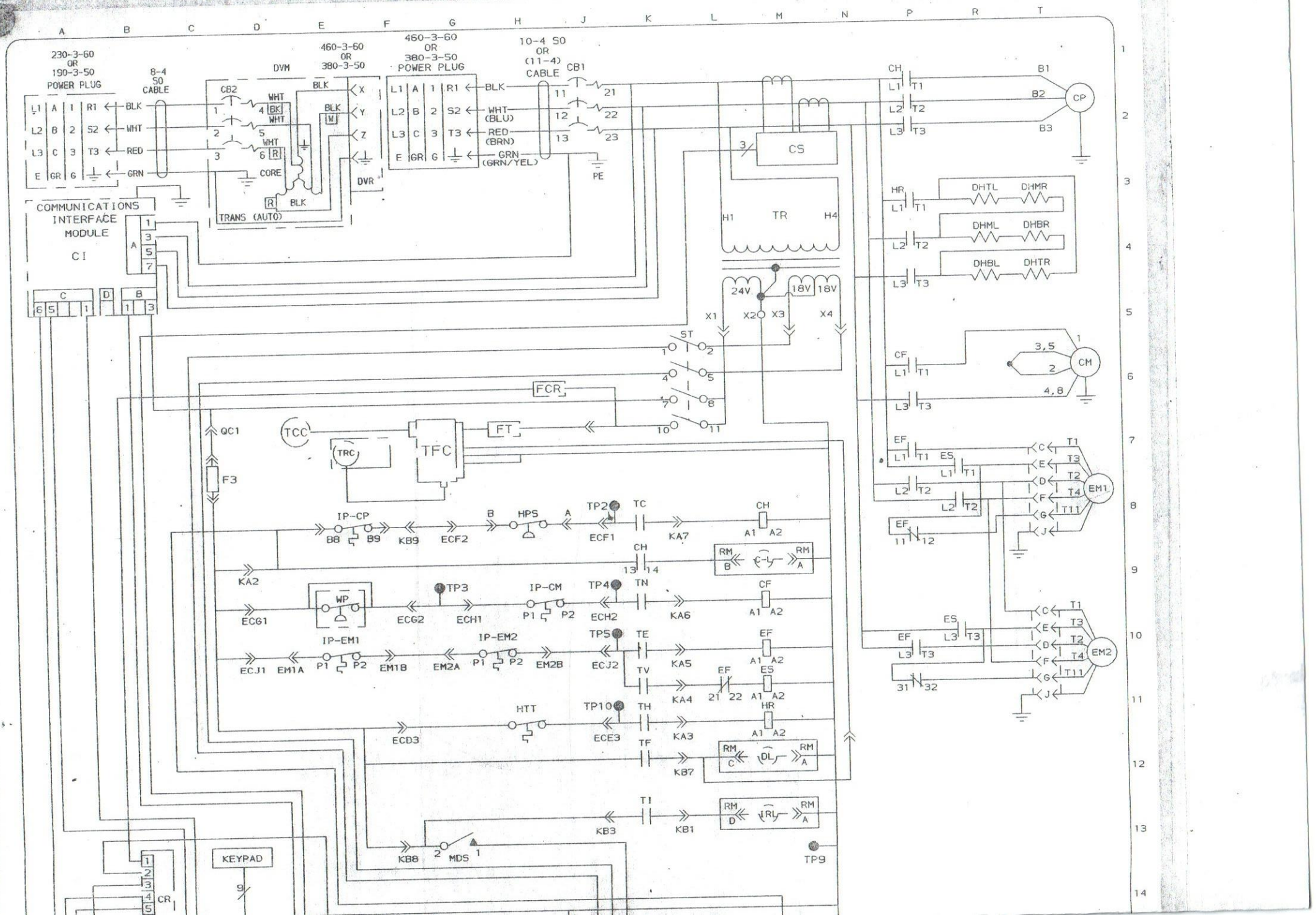
ARTWORK	PLATE
62-10731-ART1-S1-R-	62-10731-00

05


230-3-60 OR 190-3-50 POWER PLUG
8-4 SO CABLE
DVM
460-3-60 OR 380-3-50
460-3-60 OR 380-3-50 POWER PLUG
10-4 SO OR (11-4) CABLE
CB1
CB2
COMMUNICATIONS INTERFACE MODULE
CI
TRANS (AUTO)
DVR
PE
CS
TR
CP
CM
EM1
EM2
DHTL
DHTR
DHML
DHBR
DHBL
24V
18V
FCR
TCC
TRC
TFC
FT
QC1
F3
ST
IP-CP
HPS
IP-CM
IP-EM1
IP-EM2
WP
KEYPAD
MDS
TP2
TP3
TP4
TP5
TP9
TP10
TC
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KA2
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KA4
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KA6
KA7
KB1
KB3
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ECF1
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ECE3
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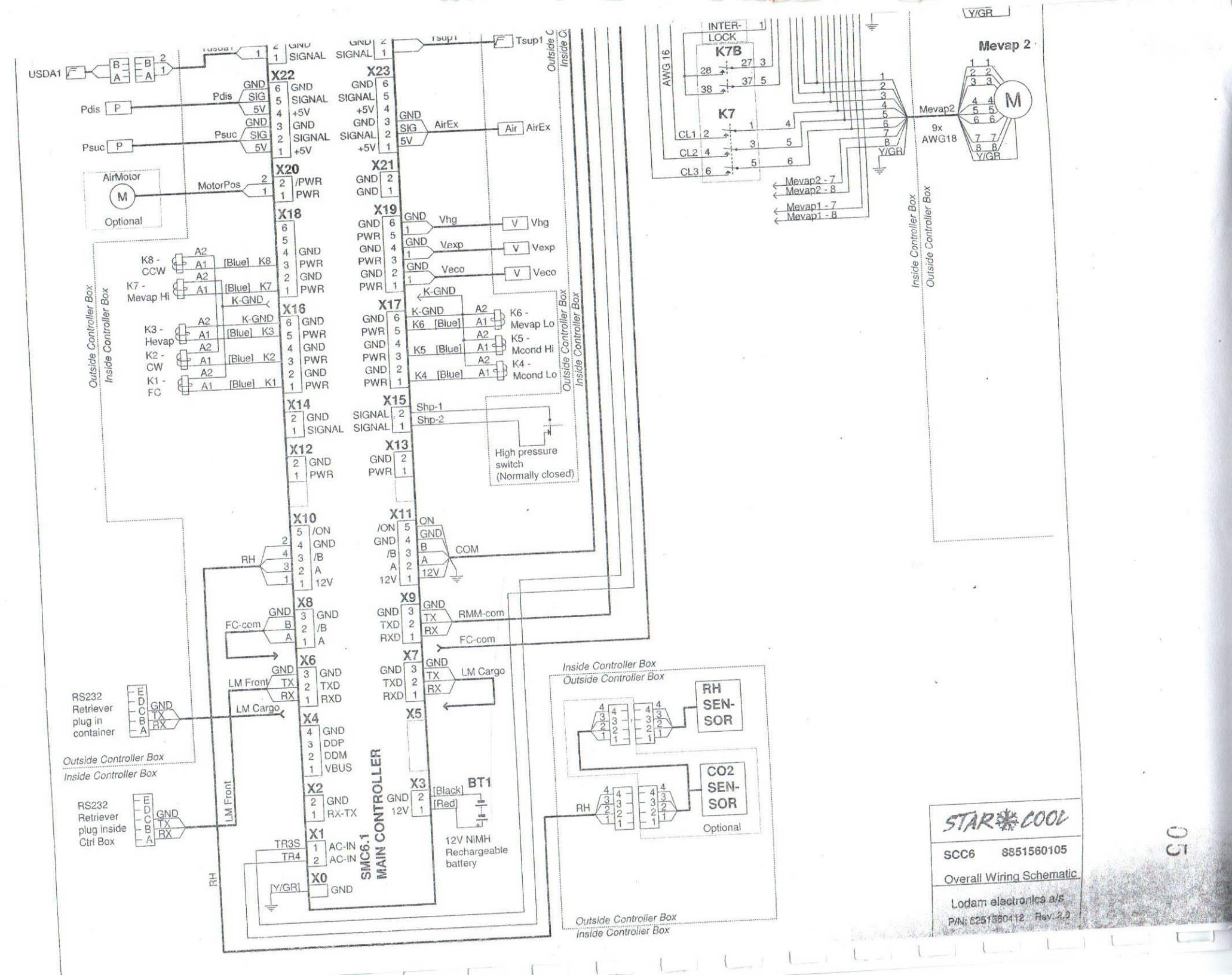
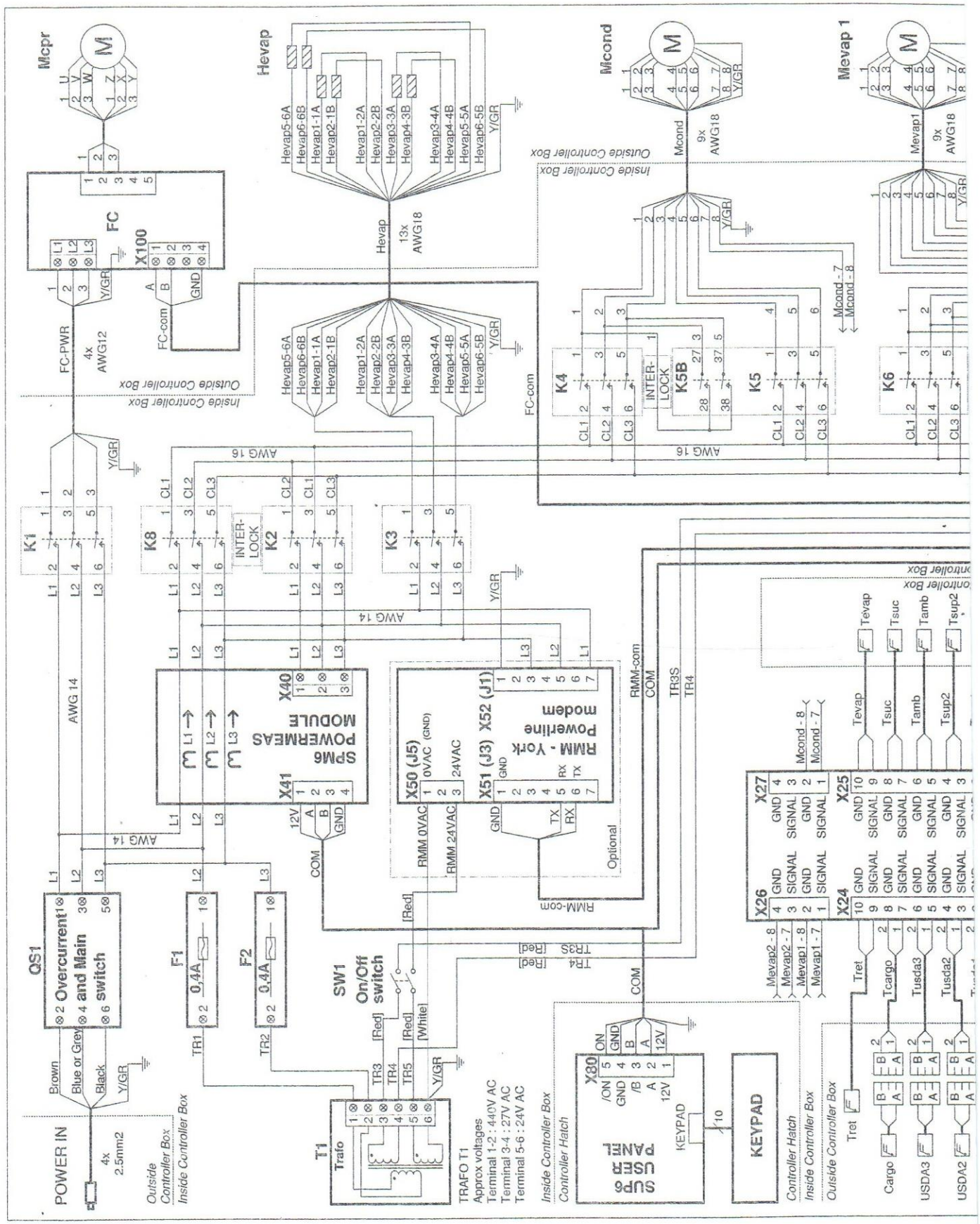

USDA1
Pdis
Psuc
AirMotor
Optional
MotorPos
K8 - CCW
K7 - Mevap Hi
K3 - Hevap
K2 - CW
K1 - FC
[Blue]
K-GND
X22
X23
X20
X21
X18
X19
X16
X17
X14
X15
X12
X13
X10
X11
X8
X9
X6
X7
X4
X5
X2
X3
X1
X0
SIGNAL
GND
PWR
/PWR
+5V
Tsup1
AirEx
Air
Vhg
Vexp
Veco
V
K6 - Mevap Lo
K5 - Mcond Hi
K4 - Mcond Lo
Shp-1
Shp-2
High pressure switch (Normally closed)
/ON
/B
A
12V
COM
RMM-com
FC-com
LM Front
LM Cargo
TX
RX
TXD
RXD
DDP
DDM
VBUS
RX-TX
AC-IN
TR3S
TR4
[Y/GR]
SMC6.1
MAIN CONTROLLER
BT1
[Black]
[Red]
12V NiMH Rechargeable battery
RS232 Retriever plug in container
RS232 Retriever plug inside Ctrl Box
RH
Outside Controller Box
Inside Controller Box
INTER-LOCK
K7B
K7
CL1
CL2
CL3
AWG 16
Mevap2
9x AWG18
Mevap 2
Mevap2 - 7
Mevap2 - 8
Mevap1 - 7
Mevap1 - 8
RH SEN-SOR
CO2 SEN-SOR
Optional
STAR COOL
SCC6 8851560105
Overall Wiring Schematic
Lodam electronics a/s
P/N: 8251560412 Rev: 2.0

Overall Wiring Schematic



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REEFER CONTAINER TECHNICIAN COURSE..
COURSE CODE : EED -0295/ B001

REPEAT EXAMINATION
SAFETY & SHIP ROUTINE

- *This question paper consists of 10 Questions.*
- *Answer all questions*

Index Number : .....

Date: 2015.11.02 *Pass mark 50%* *Time allocated: 03 Hrs*

1. i. Briefly explain why safety is so important onboard ships.

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ii. Respect to safety what are the safety measures need to be taken before begin a job.

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(10 Marks)

2. i. What do you mean by RISK ASSESMENT .

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ii. Briefly describe each steps you consider when filling a RISK ASSESMENT.

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(10 Marks)

3. i. Define the term PPE, Briefly explain the use of each equipment (PPE).

ii. What are the different types of safety wear to protect different part of the body.

(10 Marks)

4. i. What you mean by permit to work and what are the checks done during the process.

ii. List the jobs that require to take permit to work onboard.

(10 Marks)

5. i. What are the hazards during working in an engineering environment.

ii. What are the hazards during working in reefer containers

iii. What is the safe practice to plug and unplug reefer units.

(10 Marks)

6. i. What is the meaning of MARPOL, Why MARPOL was introduced.

ii. List all the 6 annexes of MARPOL.

iii. What is the regulation for MARPOL annex 5. (The material related to Annex 5)

(10 Marks)

7. i. Explain or define MLC, Why it was introduced.

ii. What is the minimum requirements for seafarers to work on a ship and explain rest hours.

(10 Marks)

8. i. List all the officers and crew members onboard according to the chart.

ii. As per your rank, you are belong to which department, and list your job description.

(10 Marks)

9. i. What are the safety precautions to be followed when working with electrical system.

ii. What are the essential things to maintain for proper house keeping.

(10 Marks)

10. i. Define the term ISM, Why ISM was Introduced.

ii. What is the main purpose of ISM.

(10 Marks)

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Colombo International Nautical and Engineering College

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Faculty of Marine Engineering

Department of Marine Electrical Engineering

REEFER CONTAINER TECHNICIAN COURSE..

COURSE CODE : EED -0295/ B001

09 NOV 2015

REPEAT EXAMINATION

REFRIGERATION THEORY

- *This question paper consist 03 sections.*

Student Index No : .....

Date: 2015.11.09 *Pass mark 50%* *Time allocated: 3Hrs*

SECTION "A"

Underline the most suitable answer . This section has 20 questions. Each question carry-02 marks. Total 40 marks.

01). What is the most correct for heat & temperature?

a. Heat travels from low temperature to high temperature.
b. Heat & temperature is the same but units are different.
c. Heat is a kind of Energy.
d. Temperature is the kind of energy.

02). "Saturation temperature" of a refrigerant is

a. Temperature below its freezing point.
b. Temperature above its boiling point.
c. Temperature when its state changes under the same pressure.
d. Temperature when its state changes at different pressures.

03). "Degree of superheat" of a reefer plant is

a. Sensible heat absorbed by the refrigerant vapor at the saturation temperature.
b. Not important for the evaporator function.
c. Important only for the condenser.
d. Important only for the expansion valve.

04). In a "Sub cooling condenser" refrigerant always,

a. Cools only up to its condensation temperature.
b. Cools only up to its evaporation temperature.
c. Cools below its saturation temperature.
d. Cools above its evaporation temperature.

05). What is the difference between Air-conditioning and Refrigeration system.

a Refrigeration system remove large quantity of heat than Air conditioning.

b Air conditioning is the process of controlling human comfort temperature, moisture ,dust etc; while refrigeration is the process of cooling down the dead & live cargo.

c Only Air conditioning systems use the air as the secondary refrigerant.

d In the refrigeration system Evaporator pressure is higher than the Air conditioning system evaporator pressure.

06). Reefer containers used

a. To pull down fresh cargo temperature.

b. To use as a storage cool room for chill & frozen cargo.

c. For transportation only chill cargo.

d. To maintain chill & frozen cargo temperatures while transportation.

07). Frozen and Chill cargo temperature deviation is

a. Frozen cargo temperature always maintain above -10C .

b. Temperature pull down to 0C below for chill cargo .

c. Freezer cargo temperature maintain between -5C and – 15 C .

d. Temperature deviation scale is above -5C and below -5C.

08). AFAM (Advanced Fresh Air Management) is controlling,

a. Humidity level for cargo.

b. Atmosphere gases entering through fresh air.

c. Controlling fresh and Co2 gas level.

d. Ethylene gas generated by the cargo.

09). Microprocessor controller's the input thermal sensor is

a. Resistance low Temperature high.

b. Temperature high Resistance high.

c. Resistance high Temperature low.

d. Resistance low Temperature low.

10). What is the starting sequence of a reefer container when we switch on the reefer unit.

a. Compressor then condenser fan and evaporator fans.

b. Evaporator fans then compressor and condenser fan.

c. Evaporator low speed then display modular and compressor.

d. Display modular then evaporator motors and condenser fan motor.

11). TXV Sensor bulb located(fixed) on,

a. The Evaporator inlet pipe line.
b. The Condenser outlet line.
c. Near the SMV pipeline.
d. The Evaporator out let pipe line.

12). When one of the evaporator fan motor's thermal protector become faulty,

a. Unit operates with one motor.
b. Unit will shut down.
c. Unit operates with alarm indication.
d. Alarm indicate and unit shut off.

13). Unit high pressure cuts off due to (because),

a. Compressor internal protector open circuit.
b. Compressor failure (defective).
c. Condenser fan faulty and condenser coil bad condition.
d. Under charge gas in the system.

14). What is the reason for reefer unit compressor operates long or continuous in cooling cycle.

a. Overcharge of refrigerant.
b. Evaporator coil is on defrosting.
c. Air bypass around evaporator coil.
d. Condenser fan inoperative.

15). The cause for high discharge temperature is

a Discharge temperature sensor out of range.(faulty)
b Failed economizer, TXV or solenoid valve.
c Wrong degree of superheat adjustment in TXV.
d SMV operated at full close mode.

16). What is the cause for low suction pressure in display?

a High refrigerant charge.
b Faulty discharge pressure transducer.
c High heat load inside the reefer.
d Faulty suction pressure transducer.

17). Filter drier need to change when the unit's,

a. Temperature not pull down.

b. Filter drier is hot. (worm)

c. Moisture indicator is green color.

d. Moisture indicator is yellow.

18). If reefer runs with high suction pressure with low superheat degree,

a Broken capillary of TXV.

b High refrigerant charge.

c Superheat setting of TXV too low.

d Choked filter drier.

19). The purpose of suction modulation valve(SMV) of Daikin reefer is

a To control capacity load.

b To increase discharge temperature.

c To cool down the compressor motor.

d To maintain the degree of superheat.

20). Return air temperature of frozen cargo is measured for controlling because,

a Their humidity level is too high.

b They emit Ethylene gas.

c They produce heat.

d They do not emit heat.

SECTION - B

Fill in the blanks by selecting the suitable answer given bellow in brackets.
Each question carry- 05 marks. Total -20 marks.

1) If Liquid level not visible , Sight glass indicates full , Liquid level indicate half of the sight glass.

a. ..... suction modulation valve full open when heat load is present.

b. ..... if temperature in range and no heat absorb.

c. ..... high heat load and low(poor) condensation.

2). Carrier unit evaporator fan motors rotates on.....(same directions, opposite directions, high speed to low speed.)

3). PTI test menu AUTO PTI 01 has .....(full cool & heat functions, all components test auto function, check components one by one test.)

4). When reefer unit operates at -18^{0}C set temperature, if you change setting to +10^{0}C then the fan motors operate on .....(same speed, low speed to high speed, high speed to low speed.)

SECTION -C

Answer any two (02) questions. Each question carry 20 marks. Total marks-40.

1). Draw the basic refrigeration cycle with all 4 main components, heat exchanger & refrigerant status at various places of cycle.

2). Write the 4 basic components of refrigeration cycle & heat exchanger functions briefly.

3). Draw the Pressure-Enthalpy diagram and name all data on it.

04). What would you check & observe before you plug in the reefer container on board ship?

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COURSE CODE : EED -0295/ B002

FINAL EXAMINATION
REFRIGERATION THEORY

- *This question paper consists of 03 Sections.*

Index Number : .....

Date: 2015.11. 09 *Pass mark 50%* *Time allocated: 03 Hrs*

SECTION "A"

Underline the most suitable answer . Each question carry-02 marks. Total 40 marks.

01). Find the wrong statement for the heat & temperature?

a. Heat travels from high temperature to low temperature.
b. Heat & temperature is not the same also units are different.
c. Temperature is a kind of energy.
d. Heat is a kind of Energy.

02). "Condensation temperature" of a refrigerant is

a. temperature below its freezing point.
b. temperature above its boiling point.
c. temperature when vapor changes to liquid under same pressure.
d. temperature when vapor changes to gas at different pressures.

03). "SUPERHEAT AMOUNT" of a reefer plant is

a. the sensible heat gain after evaporation.
b. the sensible heat gain after condensation.
c. the total heat gain in evaporator by the refrigerant.
d. the total heat absorbed by the gas in the compressor.

04). In a "Sub cooling condenser" refrigerant always,

a. Cools only up to its evaporation temperature.
b. Cools above its evaporation temperature.
c. Cools below its condensation temperature.
d. Cools only up to its condensation temperature.

05). What is the correct statement of the following,

a Refrigeration system remove large quantity of heat than Air conditioning.

b Freezer cargo temperature must be accurate through out the period.

c Reefer containers divide in to frozen cargo & chill cargo modes.

d In the refrigeration system Evaporator pressure is higher than the Air conditioning system evaporator pressure.

06). The temperature of a Banana pellets in a Reefer container is monitored by,

a. the return air temperature.

b. the temperature in the evaporator.

c. the supply air temperature.

d. the USDA temperature .

07). Find the difference between Frozen and Chill cargo.

a. Humidity and ventilation must control for frozen cargo.

b. Temperature pull down to -10^{0}C below for chill cargo .

c. Freezer cargo will maintain above -5^{0}C & chill cargo will maintain below -5^{0}C

d. Chill cargo emits co_2 'moisture, ethylene and heat while freezer cargo emits non.

08). AFAM (Advanced Fresh Air Management) is controlling,

a. only temperature & humidity level for cargo.

b. atmosphere gas pressure entering through fresh air.

c. controlling Oxygen and Co2 level.

d. ethylene gas generated by the cargo.

09). In reefer controller , all the input thermal sensors.

a. Resistance low Temperature high.

b. Temperature high Resistance high.

c. Resistance high Temperature low.

d. Resistance low Temperature low.

10). What is the starting steps of a carrier reefer container? (Starting sequence)

a. Display modular,Compressor then condenser fan and evaporator fans.

b. Display modular followed by Evaporator fans then compressor.

c. Evaporator low speed then display modular.

d. Display modular then evaporator motors on then condenser fans & compressor.

00 660

11). Carrier and Thermoking reefer motor starter contactors operate with,

a. Primary voltage .
b. DC voltage.
c. AC low voltage.
d. AC and DC low voltage.

12). When one of the evaporator fan motor's thermal protector faulty,

a. Unit operates with one motor.
b. Unit will shut down.
c. Unit operates with alarm indication.
d. Alarm indicate and unit shut off.

13). Unit high pressure cuts off due to (because)

a. Liquid (injection)quench valve stuck in open position.
b. Refrigerant flow control TXV failure (defective).
c. Suction modulation valve failure.
d. Condenser fan faulty and condenser coil bad condition.

14). If reefer unit operates long or continuous in cooling cycle is due to

a. Overcharge of refrigerant.
b. Evaporator coil is on defrosting.
c. Short cycle air in evaporator coil.
d. Moisture in the system.

15). What is the advantage of having a SMV (suction modulation valve)?

a Compressor suction pressure to increase.
b To control the drive modular.
c To increase the Superheat degree of suction vapor.
d To control the evaporator capacity & the compressor volume.

16). What is the cause for low suction pressure increase?

a High refrigerant charge.
b Manual defrost switch defective.
c High heat load capacity in the evaporator.
d Faulty suction pressure transducer.

17). Unit fails to stop defrosting because of ,

a faulty HTT sensor.

b difference of supply & return air temperature increase.(delta T).

c faulty or wrongly fix Micro controller.

d burnt defrost heater contactor coil.

18). If reefer runs with low suction pressure with high superheat degree,

a Damage capillary tube of TXV.

b High refrigerant charge.

c Superheat setting of TXV too low.

d Choked filter drier.

19). The method of defrosting a star cool reefer is by ,

a hot gas bypass system.

b defrosting heater activation.

c hot gas & changing the evaporator fan direction.

d hot gas bypass & defrosting heaters both.

20). In chill cargo reefer container supply air has be temperature controlled because,

a Their humidity level is too high.

b They emit Ethylene gas.

c They res-pirate & produce heat.

d They need more Oxygen.

SECTION - B

Fill in the blanks by selecting suitable answer given bellow.

Each question carry- 10 marks. Total -20 marks.

01). If Liquid level not visible , Sight glass indicates full , level indicate half of the sight glass

a. Modulation valve full open when heat load is present - .....

b. Temperature in range and no heat absorb - .....

c. High heat load and (poor) low condensation - .....

02). Compressor oil level indicates (100% , 3/4 , 1/2, 1/3, 0%) from the gauge glass.

a. When Compressor in operation - .....

b. When Compressor is shutdown (off cycle) - .....

c. Compressor operates in full cool mode - .....

SECTION -C

00 060

Answer any two (02) questions. Each question carry 20 marks. Total marks-40.

1). Draw the basic refrigeration cycle with compressor, condenser, evaporator, TXV, filter drier ,liquid receiver, sight glass.

2). Write the above all refrigerant component's functions briefly.

3). Draw the basic pressure -enthalpy diagram and name all data on it.

04). What are the reasons for cargo has to be pre cooled before loading in to pre cooled reefer container?

Library

CINEC
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EXAMINATION

000076

Colombo International Nautical and Engineering College
CINEC CAMPUS
Faculty of Marine Engineering
Department of Marine Electrical Engineering
REEFER CONTAINER TECHNICIAN COURSE..
COURSE CODE : EED -0295/ B002

FINAL EXAMINATION
SAFETY & SHIP ROUTINE

- *This question paper consists of 10 Questions.*
- *Answer all questions*

Index Number : .....

Date: 2015.11. 06 *Pass mark 50%* *Time allocated: 03 Hrs*

1. a. What are the safety precautions you take before begin a job.

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b. What are the hazards in an engineering environment..

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(10 Marks)

2. a. What is the meaning of risk assessment..

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b. What are the steps you follow while filling a risk assessment

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.....
.....

(10 Marks)

3. a. What is PPE, List all the PPE and the use of each equipment

b. What are the hazards during working with a reefer container

(10 Marks)

4. List the equipment's that you should get familiarize as soon as you join onboard (Ship).

(10 Marks)

5. a. What are the safety precautions you must follow when plugging and unplugging reefer units.

b. How to maintain proper house keeping onboard ships

(10 Marks)

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6. a. What are the MARPOL ANNEXES, list it out accordingly.

Annex 01.....

Annex 02.....

Annex 03.....

Annex 04.....

Annex 05.....

Annex 06 .....

b. What are the regulation and details for annex 4 & 5

.....

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(10 Marks)

7. a What is the purpose of ISM

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b. Define DPA, and the purpose of DPA

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(10 Marks)

8. a. Write in Short of MLC , what are the minimum requirements for seafarers to work on a ship

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b. What are the employment conditions and rest hour and work hour periods

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(10 Marks)

9. a. List out the officers and crewmembers on board accordingly.

b. As per your rank, you are belong to which department, and list your job description

(10 Marks)

10. a. Explain IMDG and how many divisions are there with IMDG

b.List all Groups specified under IMDG

C.How do you identify the IMDG Container form the normal container

c. What are the precautions to be taken while working with IMDG Containers

(10 Marks)

Colombo International Nautical and Engineering College

CINEC CAMPUS

Faculty of Marine Engineering

Department of Marine Electrical Engineering

REEFER CONTAINER TECHNICIAN COURSE..

COURSE CODE : EED -0295/ B002

CINEC
06 NOV 2015
EXAMINATION

FINAL EXAMINATION

ELECTRICAL KNOWLEDGE PRACTICE

- *This question paper consist 2 Sections.*

Student Index Number : .....

Date: 2015.11.07 *Pass mark 50%* *Time allocated: 03Hrs*

SECTION-"A"

Answer all the 6 Questions. Each question carry 06 Marks. Total marks -36.

1). a. What are the five (5) general safety rules should be followed before beginning electrical maintenance work on board?

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b. i. Write three basic Electrical circuit faults that can occur on a ship.

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ii. A Three phase transformer has apparent power of 6kVA and 440/230 Volts. What is the primary and secondary current?

02). a. What are the classification of A.C. motors.

b. Draw the symbols of following devices.

i. Capacitor (general)

ii. Full wave rectifier

iii. N-P-N- transistor

iv. 3 Pole – M.C.B

v. 3 Pole O.C.R

vi. Three -phase auto transformer

vii. 3-phase induction motor (Stator winding is star connection)

viii. Single phase induction motor (Starting capacitor type)

ix. 3-phase induction motor (2-speed /single winding connected)

x. Magnetic contactor coil and contacts.

03). a. Define synchronous speed and rotor speed of a induction motor.

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b. A three phase 4 pole induction motor has 1440 r.p.m. calculate the synchronous speed at 50Hz and 60 Hz.

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04). a. What are the method of testing three phase compressor motor. Give important parameters.

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b. How can the direction of rotation of the three phase asynchronous motor-rotor be reversed? Draw the power & control voltage wiring diagram for direct on-line motor starter with magnetic contactors.

05). a. Explain the following devices.

i. Thermostat

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ii. Varistor

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iii. Thermocouple

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iv. C.T.

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v. Solenoid valve

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06). a. What is the function of transducer?

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b. What type of transducers are used for the following?

i. Temperature sensor: .....

ii. Pressure sensor. .....

SECTION -"B"

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Answer the following 02 circuit diagram's questions. Each question carries 32 marks. Total marks-64.
Please refer the Carrier Tans cold model-69NT40-551-400 to 425 (ML 2I) circuit diagram and answer the following questions.

07). a. Write all the Electrical , mechanical & refrigeration system safety devices of reefer unit.

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b. Explain how SMV operates or control by the microprocessor? Detail the control voltages of microprocessor, drive modular and SMV.

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c. What is the difference and the functions of RTC and Cadmium batteries.

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.....

d. Find the zone area(Location) for the following components,

i. Defrost temperature sensor :.....

ii. Ambient temperature sensor. :.....

iii. Condenser pressure transducer sensor. :.....

iv. Defrosting heaters magnetic contactor coil. :.....

v. Compressor motor contactor coil. :.....

e. When TP 4 of the diagram shows the control voltage but cannot measure control voltage of CF coil terminal point A1. What is the reason?

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f. What are the possible causes for the following.
i). C.B.-1 trip off.

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.....

ii). AF3 fuse blow off.

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.....

g). Give the details of unit functions and modes for following indicator lights

i. White LED : .....

ii. Red LED : .....

iii. Green LED : .....

iv. Yellow LED : .....

v. Orange LED : .....

h). Detail the trouble shooting of the control circuit for following test points.

i. TP 9 and TP 3 : .....

ii. TP 9 and TP 5 : .....

iii. TP 9 and TP 10 : .....

iv. TP 9 and TP 4 : .....

v. TP 9 AND TP2 : .....

8). Please refer the Star cool reefer model SCU-40 and SCI-40 circuit diagram and answer the following questions.

a. What is the power line connection & how many power supply connect to the frequency controller?

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.....

.....

b. In which module current transformer sensors indicate? Write the input power socket numbers.

.....

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c. What are the control transformer (output) voltages?

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d. What can be the reasons for Main controller to be faulty?

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e. What can be the reason to blow off F1 & F2 fuses?

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f. What is the defrost heaters connection type as in the circuit

.....

.....

g. What is the Air motor control supply terminals from micro controller?

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h. If you suspect return air temperature sensor which terminals & which voltage (AC or DC) you should check ?

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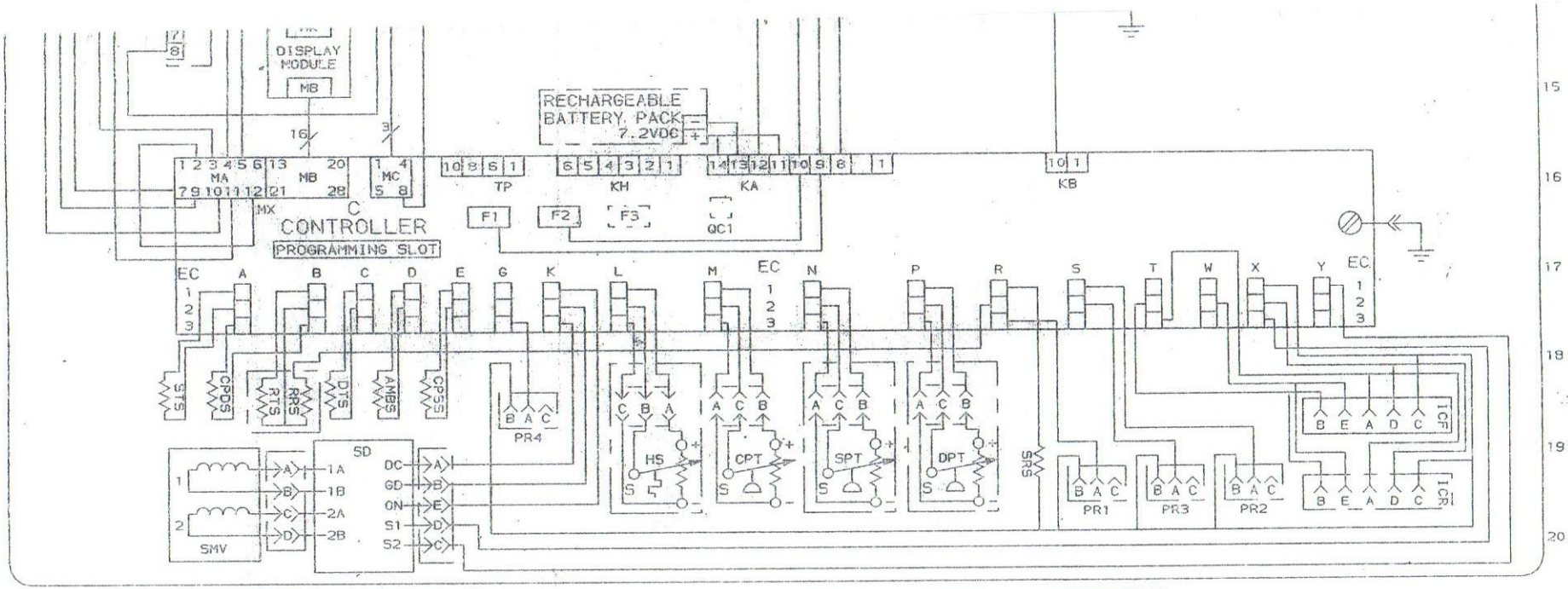

LEGEND

ZONE	SYMBOL		DESCRIPTION
B16	C		CONTROLLER
D18	AMBS	—	AMBIENT SENSOR
J1	CB1	—	CIRCUIT BREAKER 460V
D1	CB2	—	OPTIONAL CIRCUIT BREAKER 230V (DVM OPTION) TERMINAL BLOCK WHEN CB2 NOT PRESENT
M9,P6	CF	—	CONDENSER FAN CONTACTOR
A4	CI	—	COMMUNICATIONS INTERFACE MODULE (OPTION)
M8,P1,K9	CH	—	COMPRESSOR CONTACTOR
M9	C-L	—	COOL LIGHT (OPTION)
H9,T6	CM	—	CONDENSER FAN MOTOR
E8,T2	CP	—	COMPRESSOR MOTOR
C18	CPDS	—	COMPRESSOR DISCHARGE SENSOR (TEMP.)
E18	CPSS	—	COMPRESSOR SUCTION SENSOR (TEMP.) (OPTION)
H19	CPT	—	CONDENSER PRESSURE TRANSDUCER
B14	CR	—	CHART RECORDER (OPTION)
M2	CS	—	CURRENT SENSOR
R4	DHBL	—	DEFROST HEATER - BOTTOM LEFT
T4	DHBR	—	DEFROST HEATER - BOTTOM RIGHT
R4	DHML	—	DEFROST HEATER - MIDDLE LEFT
T3	DHMR	—	DEFROST HEATER - MIDDLE RIGHT
R3	DHTL	—	DEFROST HEATER - TOP LEFT
T4	DHTR	—	DEFROST HEATER - TOP RIGHT
M12	DL	—	DEFROST LIGHT (OPTION)
K19	DPT	—	DISCHARGE PRESSURE TRANSDUCER (OPTION)
D18	DTS	—	DEFROST TEMPERATURE SENSOR
D1	DVM	—	DUAL VOLTAGE MODULE (OPTIONAL)
F2	DVR	—	DUAL VOLTAGE RECEPTACLE (OPTIONAL)
L11,M10,P7,P8	EF	—	EVAPORATOR FAN CONTACTOR (HIGH SPEED)
E10,H10,T8,T10	EM	—	EVAPORATOR FAN MOTOR
N11,R7	ES	—	EVAPORATOR FAN CONTACTOR (LOW SPEED)
C7,E16,F16,G16,H6	F	—	FUSE
	FLA	—	FULL LOAD AMPS
	HPS	—	HIGH PRESSURE SWITCH

ZONE	SYMBOL		DESCRIPTION
M11,P3	HR	—	HEATER CONTACTOR
G19	HS	—	HUMIDITY SENSOR
H11	HTT	—	HEAT TERMINATION THERMOSTAT
T20	IC	—	INTERROGATOR CONNECTOR (OPTION)
E8,E10,G10,H9	IP	—	INTERNAL PROTECTOR
M13	IRL	—	IN-RANGE LIGHT (OPTION)
G13	MDS	—	MANUAL DEFROST SWITCH
F19,M20,N20,P20	PR	—	PROBE RECEPTACLE (USDA OPTION)
L9,L12,L13	RM	—	REMOTE MONITORING RECEPTACLE (OPTION)
C18	RRS	—	RETURN RECORDER SENSOR (OPTION)
C18	RTS	—	RETURN TEMPERATURE SENSOR
D20	SD	—	STEPPER MOTOR DRIVE
B20	SMV	—	STEPPER MOTOR SUCTION MODULATION VALVE
J20	SPT	—	SUCTION PRESSURE TRANSDUCER (OPTION)
L19	SRS	—	SUPPLY RECORDER SENSOR (OPTION)
K5	ST	—	START-STOP SWITCH
B18	STS	—	SUPPLY TEMPERATURE SENSOR
K8	TC	—	CONTROLLER RELAY (COOLING)
D7	TCC	—	TRANSFRESH COMMUNICATIONS CONNECTOR (OPTION)
K10	TE	—	CONTROLLER RELAY (HIGH SPEED EVAPORATOR FANS)
G7	TFC	—	TRANSFRESH CONTROLLER (OPTION)
K11	TH	—	CONTROLLER RELAY (HEATING)
K13	TI	—	INRANGE RELAY
K12	TF	—	DEFROST RELAY
K9	TN	—	CONTROLLER RELAY (CONDENSER FAN)
E16,G9,J8,J9 J10,J11,M13	TP	—	TEST POINT
M3	TR	—	TRANSFORMER
D2	TRANS	—	TRANSFORMER AUTO 230/460 (OPTION)
E7	TRC	—	TRANSFRESH REAR CONNECTOR (OPTION)
K11	TV	—	CONTROLLER RELAY (LOW SPEED EVAPORATOR FANS)
E9	WP	—	WATER PRESSURE SWITCH (OPTION)

LEGEND

ARTWORK	PLATE
62-10731-ART1-S1-R-	62-10731-00

TO REORDER SPECIFY: CTD P/N 79-01832-00

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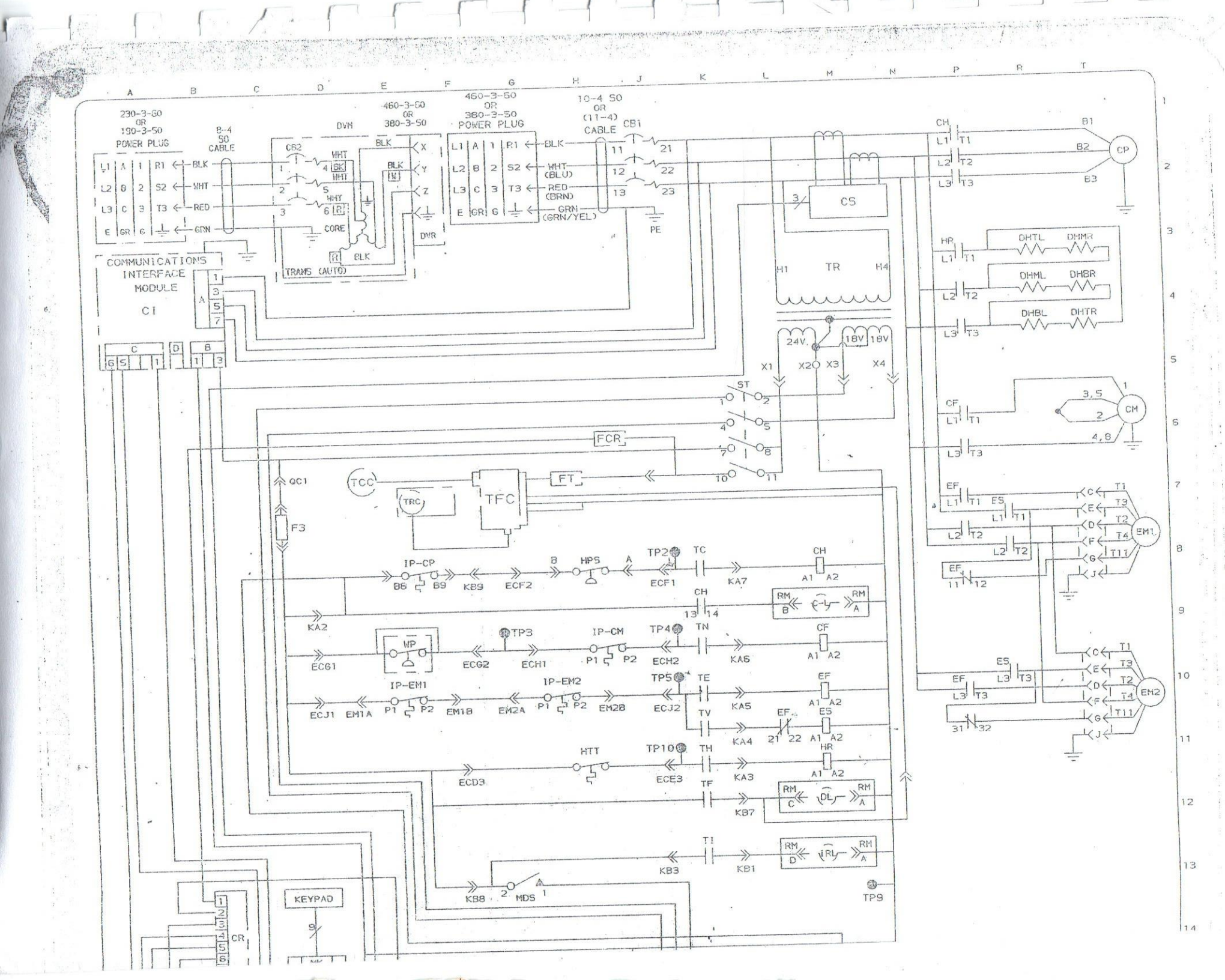
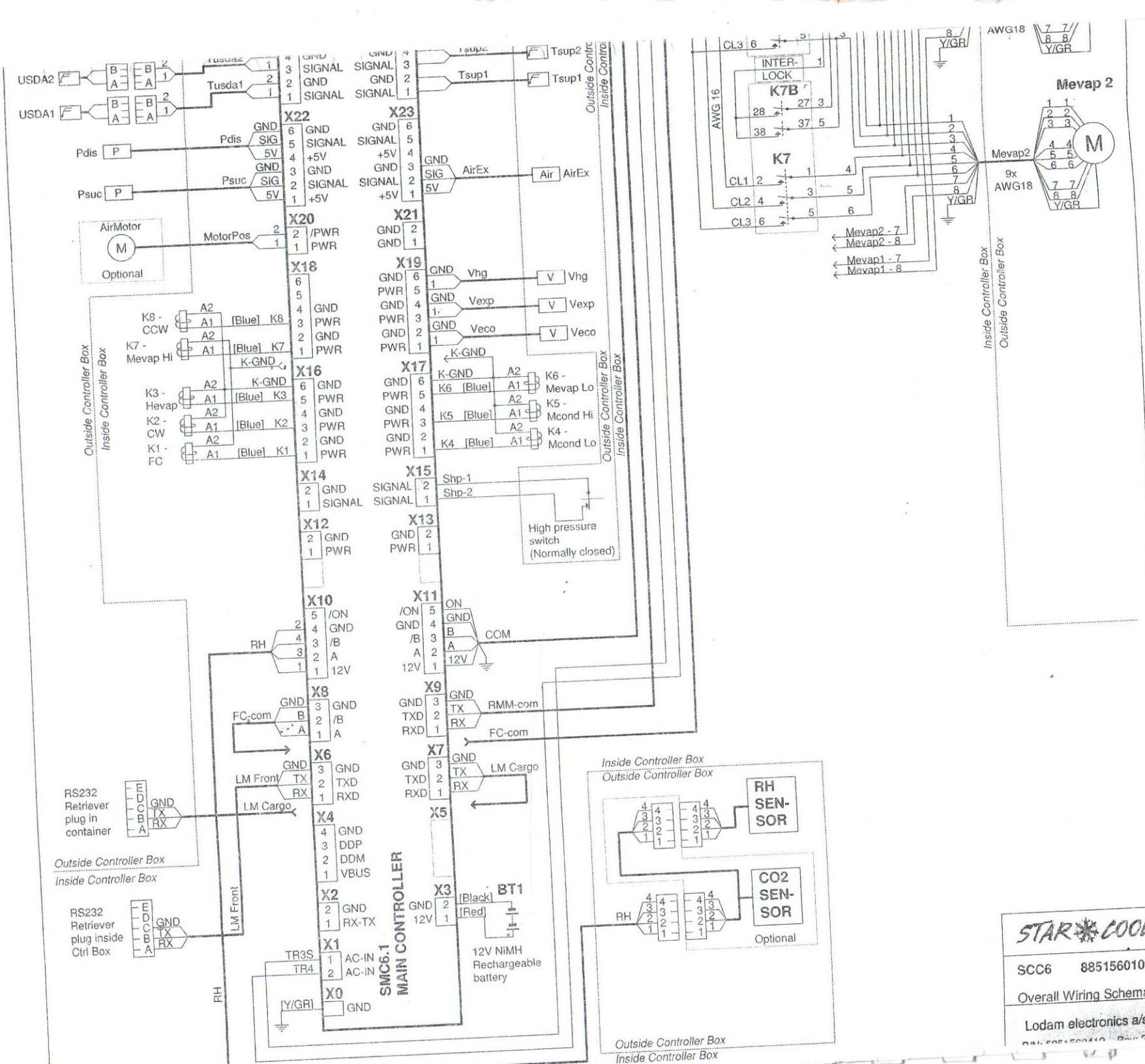

230-3-60 OR 190-3-50 POWER PLUG
8-4 SO CABLE
DVM
460-3-60 OR 380-3-50
460-3-60 OR 380-3-50 POWER PLUG
10-4 SO OR (11-4) CABLE
CB1
CB2
WHT
BLK
RED
GRN
CORE
DVR
TRANS (AUTO)
PE
COMMUNICATIONS INTERFACE MODULE
CI
CS
TR
H1
H4
24V.
18V
18V
X1
X2
X3
X4
ST
FCR
QC1
TCC
TRC
TFC
FT
F3
IP-CP
B8
B9
KB9
ECF2
HPS
TP2
ECF1
TC
KA7
CH
A1
A2
RM
KA2
MP
ECG1
TP3
ECG2
ECH1
IP-CM
P1
P2
TP4
ECH2
TN
KA6
CF
IP-EM1
EM1A
EM1B
IP-EM2
EM2A
EM2B
ECJ1
ECJ2
TP5
TE
KA5
EF
ES
TV
KA4
21
22
31
32
HTT
ECD3
TP10
ECE3
TH
KA3
HR
TF
KB7
DL
TI
KB3
KB1
KB8
MDS
TP9
KEYPAD
CR
HP
DHTL
DHMR
DHML
DHBR
DHBL
DHTR
CP
B1
B2
B3
CM
3,5
4,8
EM1
EM2
T1
T2
T3
T4
T11

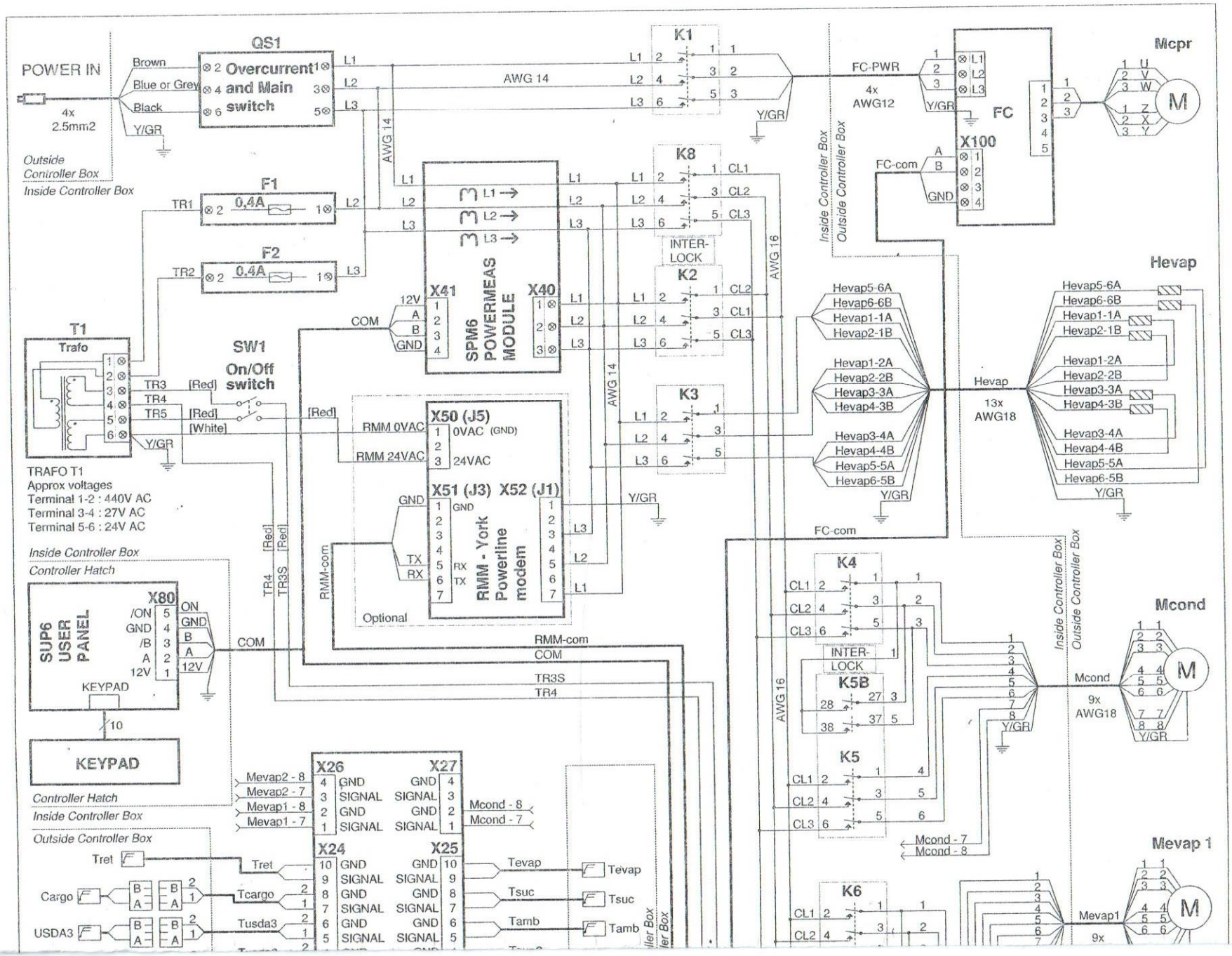


STAR COOL

SCC6 8851560105

Overall Wiring Schematic

Lodam electronics a/s


POWER IN
4x 2.5mm2
Brown
Blue or Grey
Black
Y/GR
QS1
Overcurrent and Main switch
AWG 14
K1
FC-PWR
4x AWG12
FC
X100
FC-com
GND
Mcpr
Outside Controller Box
Inside Controller Box
F1
0,4A
F2
0.4A
TR1
TR2
K8
INTER-LOCK
K2
K3
X41
X40
SPM6 POWERMEAS MODULE
12V
COM
T1
Trafo
SW1
On/Off switch
TR3
TR4
TR5
[Red]
[White]
TRAFO T1
Approx voltages
Terminal 1-2 : 440V AC
Terminal 3-4 : 27V AC
Terminal 5-6 : 24V AC
X50 (J5)
RMM 0VAC
RMM 24VAC
0VAC (GND)
24VAC
X51 (J3) X52 (J1)
RMM - York Powerline modem
Optional
Hevap
Hevap5-6A
Hevap6-6B
Hevap1-1A
Hevap2-1B
Hevap1-2A
Hevap2-2B
Hevap3-3A
Hevap4-3B
Hevap3-4A
Hevap4-4B
Hevap5-5A
Hevap6-5B
13x AWG18
Inside Controller Box
Controller Hatch
SUP6 USER PANEL
X80
KEYPAD
RMM-com
COM
TR3S
TR4
K4
K5B
K5
K6
Mcond
9x AWG18
Mevap 1
Mevap1
Mevap2 - 8
Mevap2 - 7
Mevap1 - 8
Mevap1 - 7
Mcond - 8
Mcond - 7
X26
X27
X24
X25
Tret
Cargo
USDA3
Tcargo
Tusda3
Tevap
Tsuc
Tamb
AWG 16