

CHAPTER 5

DISCUSSION, CONCLUSION AND

RECOMMENDATION

5-1 Discussion:-

- 1.1.-1 The workshop building: - Is not adequate.
- 1.1.-2 There is shortage in the test equipment and tools.
- 1.1.-3 The senior staff (engineers) available is enough.
- 1.1.-4 The care and maintenance is not carried in special unit.
- 1.1.-5 The maintenance system is not established properly.
- 1.1.-6 Staff training is needed specially company training .
- 1.1.-7 Spare parts must be granted.
- 5-1-8 The maintenance of imaging devices:-
 - 5-1-8-1 X-ray equipments:-
 - a) The old x-ray systems:-
 - i) The old units maintained by the hospital engineers.
 - ii) The repair is proper when no spare parts are needed from abroad.
 - iii) Spare parts supply is not adequate.
 - iv) Periodic check is carried out.
 - v) No quality assurance.
 - b) The new x-ray systems:-
 - i) Instated by the company.
 - ii) Still under grantee.
 - iii) Small repair work done by the hospital engineer.
 - 5-1-8-2 U/S systems:-

Maintenance partially by the hospital engineer and partially by a company:-

 - i) Only Repair is done.
 - ii) No periodic check.
 - iii) No quality assurance.
 - 5-1-8-3 C.T system:-

Maintenance under service (contract) and it is proper.
 - 5-1-8-4 The MRI system:-

The maintenance under service contract and it is proper.

5-2 Conclusion:-

To conclude:-

The care and maintenance process is not the ideal for the x-ray and ultrasound. It is ideal for CT and MRI. The maintenance unit should be promoted.

5-3 Recommendation:-

5-3-I recommended that maintenance unit should be designed as diagram fig.(5-1).

i)1.-8 -1 The unit Jobs and duties should be as follows:-

- a) Pre installation work.
- b) Installation of new equipment.
- c) Maintenance.
- d) Calibration.
- e) Repair.
- f) Training.
- g) Radiation protection.
- h) Provide advises in the introduction of new equipment.

5-3-1-2 Workshop sections:-

a) The senior engineer:-Leading and supervising the unit.

b) Planning and researches:-

- i) it conduct researches to assess quality of companies product.
- ii) act as advisory body in the introduction of new equipment

c) The training section:-It trains the:

- i) Radiologist.
- ii) Technologist.
- iii) Biomedical engineers and students.
- iv) Junior staff.

It functions in coordination with the universities and related institutions.

d) Store:-

It stocks and dispenses the spare parts, raw materials and others.

e) The main work shop:-

It is under the responsibility of the senior engineer, it:-

- i) Receives the repair request.
- ii) Receives and stock the equipments before repair.
- iii) It maintains and repairs:-
 - 1. The conventional and specialized X-Ray equipments.
 - 2. Maintain and repair ultrasound units.
 - 3. Maintain & repair MRI units.

f)Radiation protection.

g)Pre-installation group:-

- i) Buildings.
- ii) Electric work.
- iii) Air-conditioning.
- iv) Water supply.
- v)Radiation protection.
- vi) R.f shielding.

5 -3-1-3 the scientific section:-

- a- It keeps the manuals and service data for the different equipments.
- b- It order and keep the related magazines and books.
- c- It repair, maintain and standardize the test tools and measuring equipments.

5-3-1-4 Staff intake:-

- a) Engineers:-
 - i) Radiological instrumentation engineers.
 - ii) Bio medical engineers.
 - iii) Computer engineers.
- b) Junior staff:-Vocational training centers (civil and military)

5-3-1-5 Staff Training:-

- a) Senior staff:-
 - i) Post graduate studies.

- ii) Manufacturer training centers.
- iii) WHO and UNEDO training programmers.
- iv) Other related training.

b) Junior staff:-

- i) Internal training:-
 1. The medical workshops of the Ministry of Health.
 2. The training section
 3. Others.
- ii) External Training:-
 1. The manufacturer centers.

5-3-1-6 Test & measuring instruments and Tools:-

ITEM DESCRIPTION	NO
KVP METER	.1
RAD –CHECK PLUS	.2
DIGITAL DENSITOMETER	.3
FOCAL SPOT TEST TOOL	.4
X-RAY GENERATOR TIMER	.5
TIMING &MAS KIT	.6
STEP – WEDGE PENETROMTER	.7
FILM SCREEN CONTACT MESH	.8
COLLIMATOR TEST TOOL	.9
BEAM ALIGMENT DEVICE	.10
ALUMINIUM FILTER SET	.11
COPER FILTER SET	.12
MAMMOGRAPHIC PHANTOM	.13
TOMOGRAPHIC PHANTOM	.14
X-RAY OUTPUT DETECTOR	.15
CABLE ,8FT BNC TO BNC	.16
VEDIO TEST PATTERN GENERATOR	.17
DIGITAL MAS METER	.18
REPLACEMENT BATTERY	.19

WISCONSIN X-RAY TEST CASSETTE	.20
WISCONSIN MAMMO –TEST CASSETTE	.21
WIDE – RANGE KVP TEST CASSETTE	.22
POWER UNIT	.23
ALPHA KIT ASSEMBLED O'LEVEL KIT ASSEMBLED PLUS POWER REG BOARDS	.24
SASCO DRY –WILPE BOARDS	.25
SASCO BOARDS	.26
BANKERBOX DELUK DRAWER	.27
ESSELETE DYMO SR -35 CALCUL	.28
All tests and phantoms for quality assurance of the different equipment in the department should be supplied by the manufacturer.	.29
Storage oscilloscope.	.30
Dosimeter, dose-rate meter, pocket chamber.	.31

5-3-1-7 The unit building:-

Suitable building should be constructed to accommodate the maintenance unit in a safe comfortable manner.

5-3-2 As much as possible unification of the equipments source should be looked for as this:-

31.1.-8-1 Will economize the stock of spare part.

31.1.-8-2 Simplify the staff training and deposit experience.

These will promote the staff skill and decrease the equipment down time.

5-3-3 Engineers training must be part of any offer for the introduction of new equipment and it should be in proper training center.

5-3-4 Logical and economical stocking of spare parts must be regarded.

5-3-5 Log books and Registers.

5-3-5-1 Always look for the experience deposit, training and improvement of practical skill for the local staff.

5-3-5-2 Specialized test equipment, measuring instrument, phantoms & service manuals must be offered.