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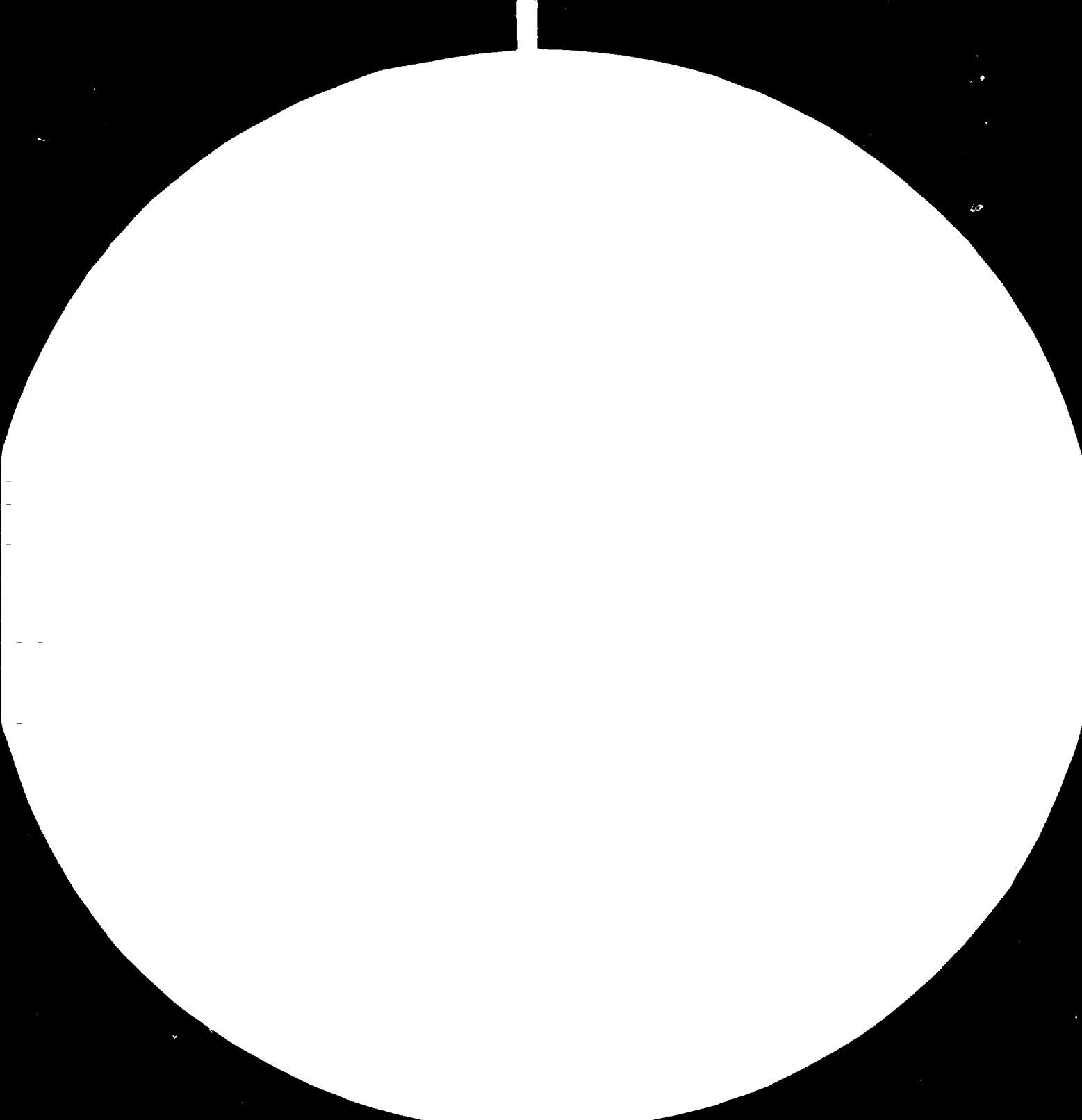

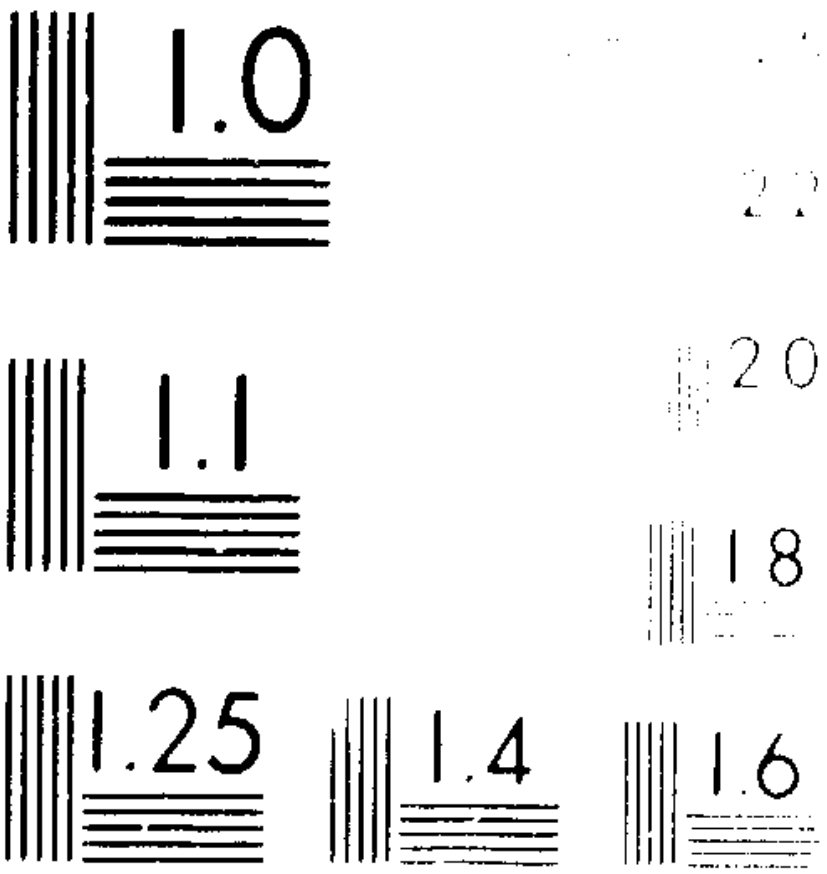
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21st June 1982

EQUIPMENT STANDARDISATION
DP/BHU/80/005
BHUTAN

Terminal Report

Prepared for the Government of Bhutan
by the United Nations Industrial Development Organisation,
executing agency for the United Nations Development Programme

Based on the work of Gordon Atkinson
Expert in the Standardisation of Equipment

United Nations Industrial Development Organisation
Vienna

This report has not been cleared with the United Nations Industrial Development Organisation which does not, therefore, necessarily share the views presented.

EQUIPMENT STANDARDISATION
DP/BHU/80/005
BHUTAN

Terminal Report

TABLE OF CONTENTS

ABSTRACT

Title:- Equipment Standardisation

Number:- BHU/80/005/A/01/37

Purpose:- To assist the Government and specifically the "Equipment Standardisation Committee" in their efforts to standardise machinery and equipment with a view to minimising maintenance costs, to facilitate procurement and to optimise procurement costs.

Objective:- The development objective towards whose ultimate attainment the present project is expected to contribute is the development, along the most economical and rational lines, of the equipment infrastructure required to meet the logistical and support needs of the Government and of the developing industrial sector.

Duration of Project:-4 months

Main Conclusions & Recommendations

Main Conclusions

Following the immediate objectives of the project, the Equipment Standardisation Committee has approved:-

(a) A Draft Equipment Standardisation Policy

(b) Draft Equipment Standardisation Policy Guidelines covering items and makes, equipment infrastructure, implementation, management and procurement.

These two documents form the basis of the Equipment Standardisation Programme and will be the subject of Cabinet consideration prior to ratification as the official policy of the Royal Government of Bhutan. See Annex IV & V Respectively.

(c) Consideration has been given, within the context of Equipment Standardisation and also on a wider basis, to the urgent problem of equipment maintenance. This essential element in the equipment infrastructure of the country will be the subject of further discussion and possible integration as outlined in the discussion paper "Some thoughts on Maintenance", attached to this report as Annex VI

Recommendations

Subsequent to the ratification and promulgation, by Government, of the Equipment Standardisation Policy and Guidelines, considerable effort should be made internationally to encourage donor agencies to conform to this Government initiative. The initial problem which required the solution of "standardisation" was created largely as a result of diverse equipment supplied from various donor sources.

Although an equipment infrastructure has been proposed and accepted by the Equipment Standardisation Committee, no action has yet been taken to implement these proposals while awaiting the final ratification of the "Programme" by a higher authority. Follow-up action is necessary in the creation and staffing of a Secretariat being essential to maintain the impetus which currently exists in the Standardisation Programme.

Serious thought should be given to the capacity and capability of this Secretariat in terms of its function of co-ordinating the actions and interests of a number of major government departments and of the developing private sector.

The factor of status, capacity and capability becomes even more important if the maintenance and training function is included within its responsibilities.

When the Government's policy towards central workshops and equipment maintenance in general has been finally established, there will be a need to review and complete Appendix VI of the Equipment Standardisation Guidelines :-'Maintenance & Training' Also see Annex II.

I. INTRODUCTION

A. Project Background

Given the accelerating pace of development as well as the overall Government policy of introducing labour saving, and mechanized, technology whenever possible and economically justifiable, an increasing quantity and diversity of equipment is being introduced into the country. Despite the proportionally great increase in equipment and the fact that given the country's size and overall state of development the equipment infrastructure will be relatively large, the total equipment in the country continues and will continue to be relatively modest in absolute terms and would not easily support an excessive diversity.

The Government has become increasingly aware of the difficulties and wastage which the importation of equipment could lead to in the longer-run if proper arrangements are not made for the servicing and maintenance of the equipment. At the same time the Government has also become increasingly aware of the considerable difficulties and cost which building up adequate repair and maintenance facilities can entail.

In order both to reduce the cost and complexity involved in maintaining the equipment in working order and to maximize the benefits derived from the introduction of equipment by ensuring compatibility and ease of re-placement and expansion the Government has therefore decided that an overall policy aimed at introducing some standardisation of equipment should be adopted and implemented.

Towards this end an Equipment Standardisation Committee has been set up as an independent unit under the Chairmanship of the Secretary General of the Ministry of Development. The Committee consists of representatives of the various technical departments of the Government and of the Planning Commission.

The purpose of the Committe is both to elaborate an appropriate policy, including the formulation of detailed guidelines on the equipment to be included, and to monitor the effective application of the newly formulated rules and regulations.

In order to assist the Committee and get it well launched the Government has requested the assistance of a short-term consultant for a period of four months, to be fielded as soon as possible, who would provide guidance and the relevant expertise to the Committee in achieving the objectives included in Part II. B. above and in, as appropriate, providing on-the-job training as well as advising as to the possible and relevant training programmes which may be required.

The inital list of equipment containing items standardised by the Royal Government of Bhutan was issued during August 1975 by the Ministry of Finance. Subsequently an Equipment Standardisation Committee was set up, by Royal Command, during 1978 and unfortunately remained ineffective until the establishment of this present project.

B. Official Arrangements

The Project Document was approved in June 1980 being formalised by:-

Lyonpo Dawa Tsering - Finance Minister
on behalf of the Royal Government of Bhutan

Mr. Peider Koening - Director, Division of Policy Co-ordination, UNIDO, Vienna

Mr. Tilak R. Malhotra - Resident Representative
on behalf of the United Nations Development Programme

The project became operational on the recruitment of the Consultant on 14th March, 1982 for a period of four months.

C. Contributions

Total contribution from UNDP - US $21,000
There was no reason for adjustment to this amount
Government input was in the form of counterpart staff, supporting services and facilities for inland transport.

D. Objectives of the Project

Development Objective

The development objective towards whose ultimate attainment the present project is expected to contribute is the development, along the most economical and rational lines, of the equipment infrastructure required to meet the logistical and support needs of the Government and of the developing industrial sector.

Immediate Objectives

The immediate objectives of the project itself are to:-

(a) Develop an overall Government policy with regard to equipment standardisation

(b) Determine for the various types of equipment the items and makes to be covered and

(c) Develop procedures to ensure the effective implementation and, as appropriate, further development or elaboration of the Governments's overall standardisation policy and of the specific equipment item and make guidelines.

Revision of Original Objectives

During the early discussions on the original objectives it was considered necessary to add further emphasis to the maintenance aspect of Equipment Standardisation.

This increased emphasis did not, however, appear in a revised project document but became the subject of further discussion in preparation for the establishment of a revised Government policy related to the operation and management of Central Workshops and the Maintenance Function in general.

With the exception of the objectives related to maintenance, all other objectives were achieved.

E. Training

Formal training arrangements were made for an Equipment Standardisation Training Course and Workshop attended by representatives from the major technical departments of Government including - P.W.D., Power, Forest, Wireless, Health Services, Ministry of Finance, Irrigation (Agriculture), Central Workshop and Technical Education.

The course ran from Monday, 7th June - Tuesday, 16th June, it was reasonably successful in explaining the Equipment Standardisation Policy and Guidelines and the development during the workshop period of the initial list of equipment proposed for standardisation.

Informal training of counterpart staff continued throughout the period of the consultancy.

II RECOMMENDATIONS

(1) Through the office of the UNDP and by contact with the headquarters of the Executing Agencies active in Bhutan, to ensure, as far as possible, that donor equipment, supplied to Bhutan, follows the Equipment Standardisation Policy and Guidelines.

(2) Through major bi-lateral donor agencies to request conformity with the Equipment Standardisation Programme or alternatively provide life-time support for equipment supplied.

(3) By Government, the urgent and active review of the whole question of equipment maintenance, repair and overhaul, the development of facilities, skills and training in order to provide the essential support needs of both "Standardisation" and "Mechanisation" in the development of the economy of Bhutan.

(4) By Government, the strengthening of the capacity and capability of the Equipment Standardisation Secretariat to ensure the consolidation and continuity of the Equipment Standardisation Programme.

(5) By Government and UNDP, following the establishment of a Government policy related to "Maintenance", the development of an adequate maintenance system in the country; a revision of the Equipment Standardisation Guidelines to reflect this maintenance and training capability.

(6) By Government and UNDP, after a period of active experience in the operation of the Equipment Standardisation Programme, a thorough review of the programme relative to the possibly changing nature of the economy of Bhutan and the broadening of its industrial base.

III MAIN REPORT

A. Duties and Account of Activities

From the job description for the "Expert in the Standardisation of Equipment" there were six specific duties. These, together with an analytical account of the associated activities, are outlined below:-

(1a) DETERMINE THE EXISTING NUMBER, TYPE AND LOCATION OF EQUIPMENT ITEMS IN BOTH THE PUBLIC AND PRIVATE SECTORS AND THE EXISTING REPAIR AND MAINTENANCE AS WELL AS SUPPLY FACILITIES.

(1b) A number of attempts had been made, by the Officer-in-Charge of the Technical Education Cell, acting as Member Secretary to the Equipment Standardisation Committee, to obtain inventories of equipment from major government departments; the equipment component of the private sector being very small.

The response to these requests were very disappointing and hence the Equipment Standardisation Training Course and Workshop, see Annex VII, was conceived as a means of obtaining this detailed information under controlled conditions. The timing of this course was arranged to follow the approval of the Draft Equipment Standardisation Policy and Guidelines by the Equipment Standardisation Committee.

In general, equipment supply is either via donor agencies or through the Ministry of Finance.

(2a) MAKE PRELIMINARY PROJECTIONS AS TO THE PROBABLE GROWTH IN THE QUANTITY AND TYPE OF EQUIPMENT TO BE INTRODUCED.

(2b) As the majority of equipment entering the country at this time and possibly for the immediate future, arrives as a result of donor assistance, the question of predictions was not pursued and was not considered to be a practical consideration at this stage in the development of the Equipment Standardisation Programme.

(3a) FORMULATE THE BROAD OUTLINES OF GOVERNMENT'S OVERALL STANDARDISATION POLICY AND PREPARE THE NECESSARY DRAFT DOCUMENTATION.

(3b) A "Draft Equipment Standardisation Policy" is attached as Annex 1V. This documentation was produced following considerable study and revision of a paper prepared by the consultant and presented for discussion to the sub-committee. Later the "Policy" was forwarded to and approved by the Equipment Standardisation Committee.

(4a) WORK OUT DETAILED GUIDELINES ON THE ITEMS AND MAKES TO BE INCLUDED AMONG THE STANDARDISED EQUIPMENT.

(4b) Guidelines were developed in the form of six appendicies each of which was related to different aspects of the explanation and interpretation of the "Policy". As international donor equipment supply is a major factor in the current equipment infrastructure in Bhutan, two of these guidelines are specifically related to donor activities and must be brought to the attention of donors who wish to supply equipment into the country. Thus some of the guidelines are more important for domestic information while others are more concerned with international supply. They can therefore be used in any configuration to fit the situation.

Draft Equipment Standardisation Policy Guidelines are attached as Annex V, Appendix II is specifically concerned with lists of equipment proposed for standardisation.

(5a) WORK OUT AN APPROPRIATE PROCEDURE TO MONITOR THE APPLICATION OF THE GOVERNMENT'S STANDARDISATION POLICY AND ENSURE COMPLIANCE WITH THE SPECIFIC GUIDELINES ISSUED.

(5b) Draft Guidelines have been approved by the Equipment Standardisation Committee. As indicated in the Table of Contents under Annex V these consist of Appendicies 1 through VI being concerned with General Conditions, Equipment Procurement, Technical Data & Specification, Monitoring, Compliance, Continuity and Co-ordination.

Appendix VI - Maintenance & Training has not been completed awaiting a review by Government of Central Workshop activities and the establishment of a policy with regard to equipment maintenance in general.

B. Achievement of Immediate Objectives

The results achieved closely follow the schedule and targets of the Work Plan, attached as Annex 1; also of the objectives of the project

C. Utilisation of Project Results

The Draft Equipment Standardisation Policy and Guidelines have been accepted by the Equipment Standardisation Committee but are subject to ratification by the Royal Government of Bhutan before becoming official instruments and therefore utilisation is not possible.

Once approval has been given, by Government, it is confidently expected that the Standardisation Programme will be actively encouraged and widely utilised. It is generally appreciated that the inception of the programme is not an end in itself but that Equipment Standardisation is a live and progressive activity having many aspects and providing many economic advantages.

Factors which might affect the full utilisation of this "Programme" are:-

(a) Delay and procrastination in the concurrent development of adequate maintenance capacity and capability and its associated training.

(b) Lack of sufficient status and effectiveness within the Equipment Standardisation Secretariat.

D. Findings

Record is made of the appreciation, expressed by the consultant, to all members of the Government Service and to private individuals, who have contributed in time and effort to the success which has been achieved in fulfilling the main objectives of this project.

Particular expression of appreciation is made to Lyonpo Sangye Penjor, Honourable Minister of Communications and Tourism, Chairman, Equipment Standardisation Committee, Lakpa Tshering, Officer-in-Charge, Technical Education Cell, Member Secretary, Equipment Standardisation Committee, Chairman, E.S. Sub-Committee and counterpart to the consultant. Also to Mr. T.R. Malhotra and the staff of the UNDP office, Thimphu, for continued support and encouragement, and to members of both Committee and Sub-Committee for Equipment Standardisation.

BHU/80/005

PROJECT DOCUMENT

ANNEX 1

DRAFT WORK PLAN — 1st APRIL 1982

Synopsis of activities as shown on the attached Bar Chart.

Activity (1) ORIENTATION:- Visits to Government Departments, Workshops, Stores, etc. Discussion with personnel responsible for equipment selection, operation, repair and maintenance.

(2) ANALYSIS I :- of the equipment details obtained from (1) and as supplied in response to the Equipment Standardisation Committee Survey covering Project Document Part II 'F' Activities (a) & (b).

(3) ANALYSIS II :- of the general problems associated with the development of guidelines towards a National Equipment Standardisation Policy.

(4) DEVELOPMENT:- of draft proposals for the creation of an Equipment Standardisation Policy and discussion of such proposals with the E.S. Sub-Committee

(5) FORMULATION :- of broad outlines on E.S.Policy for submission to the E.S.C.

(6) PREPARATION :- of draft documentation for the implementation of the E.S. Policy.

(7) ELABORATION I:- on the policy details relative to the standardisation of items of major equipment.

(8) ELABORATION II :- on the policy details relative to the standardisation of items of minor equipment.

(9) CREATION :- of monitoring and compliance procedures covering the E.S. Policy.

(10) PROPOSALS:- for Training Programmes to cover the implementation of E.S.P.

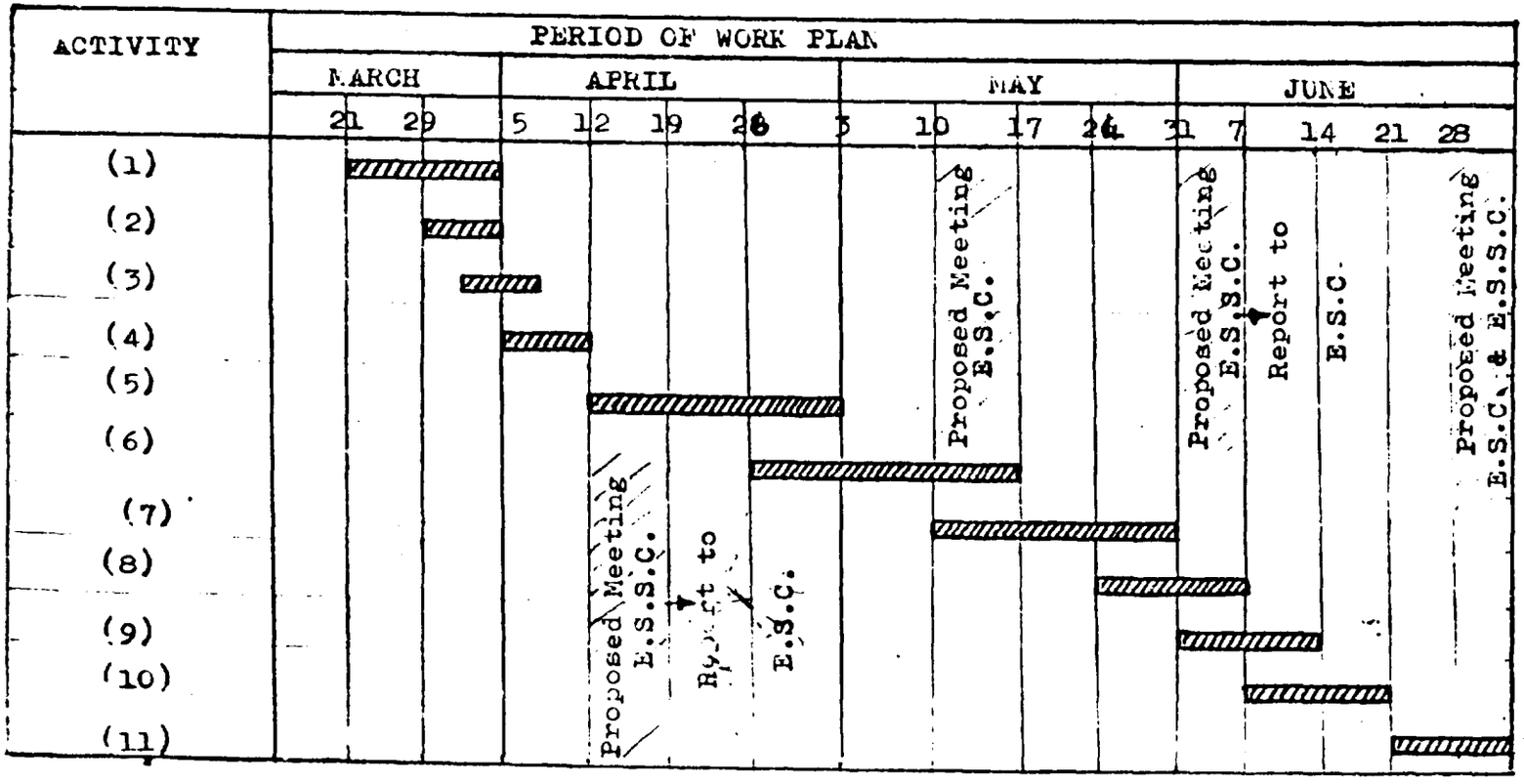
(11) FINAL REPORT:- covering the period of the Consultancy in Equipment Standardisation.

GORDON ATKINSON. UNIDO.
CONSULTANT - EQUIPMENT STANDARDISATION.

BHU/80/005
PROJECT DOCUMENT

ANNEX 1

DRAFT WORK PLAN - BAR CHART



E.S.C. - Equipment Standardisation Committee
E.S.S.C. - " " Sub-Committee

ANNEX II

ROYAL GOVERNMENT OF BHUTAN

CONSIDERATIONS IN THE DEVELOPMENT OF EQUIPMENT MAINTENANCE ASSOCIATED WITH THE NATIONAL EQUIPMENT STANDARDISATION POLICY

MAY 1982

EQUIPMENT STANDARDISATION

THE MAINTENANCE FUNCTION

1. Introduction

"No policy of equipment standardisation will reflect the true economies that should result from a reasoned and selective choice of equipment unless that equipment is allowed the full benefit of efficient maintenance"

Given the circumstances and conditions within Bhutan, with a diversity of equipment operating in rather isolated conditions and mainly under the control of the various departments of government, with an urgent need for a restructuring and up-grading of government workshops, with an almost complete lack of capability and facilities for maintenance in the field, it is essential that the question of transport and equipment overhaul, repair and maintenance be viewed and integrated nationally and not on an isolated item by item basis or even on a departmental or central workshop basis.

The focal point of any such system of repair and maintenance must be the central workshops and stores organisation for it is from here that the ultimate technical and material control must emanate, it is to those workshops that the major repair and overhaul work must be directed and the materials, supplies and spare parts requested.

These two actions following (a) the senior expertise to be located at these workshops and (b) the location of major items of machinery, test and diagnostic equipment which would be far too expensive and sophisticated to locate other than in a central workshop.

An Integrated System of Overhaul, Repair & Maintenance.

With any degree of internal road communications within a country and with any development towards mechanisation and industrialisation there is an increasing need for the use of technically based equipment. No commercial equipment is designed and manufactured to operate for an extended period of time without attention. Even if modern technology could produce such machines and items of equipment it would not be in the interests of normal commercial practice to do so.

ANNEX II

Inevitably, many machines are made up of moving parts which are not only subjected to all the stress imposed by severe operating conditions but also to all the variations in material quality, manufacturing deficiencies, assembly techniques and maintenance.

In an attempt to delay the ravages of the many destructive factors, a comprehensive system of maintenance, repair and overhaul is advocated by the machine manufacturer. If we consider earth moving equipment as an example, other equipment having greater or lesser needs related to the severity of their operating conditions, degree of complexity etc., provision is made by the equipment manufacturer for daily maintenance routines similar to those one should associate with the use of a private car. Provision is also made for the regular, periodic major service where running adjustments are made in order to maintain operating efficiency, oils are changed to counteract the inevitable deterioration to such oil as a result of the destructuve effects of atmospheric pollution, oxidation and other forms of decomposition and contamination.

Even with regular and efficient attention to maintenance the operating performance of equipment deteriorates, for maintenance is only a system which delays the destructuve process of operating equipment or even the destructive efforts of equipment lying idle. Thus, loss of operating efficiency can eventually lead to the need for more serious attention to the machinery which will restore that lost efficiency. The capacity, within the machine, for this restoration of original operating performance is often designed into the machine and me[illegible]quires the application of the appropriate skill and the use [illegible]ssary sophisticated workshop equipment, machine tools, dia[illegible]ic and performance testing equipment, special dismantling and assembly tools and equipment associated with the specific machine being overhauled; also the essential availability of supplies, spare parts etc. required during the overhauling procedure.

Equipment costs money, often the use of scarce foreign exchange. The use of equipment for construction, production, transport etc. must be cost efficient. This can only be achieved by utilising the maximum service life of the equipment. Unit costs of production are related to the amortisation and operating costs of the production equipment when considered in terms of the total production. When there is no production or reduced production due to equipment down-time, unit costs automatically rise and any competitive positions are affected. The effects of such equipment failures are generally of considerably greater impact on the cost structure than the normal recurrent maintenance costs which themselves can usually be of a predictable nature and therefore accountable rather than the expensive, lengthy and unpredictable breakdown costs.

Also of considerable importance is the creation and development of skills within the Maintenance, Repair and Overhaul function. Long and very expensive periods of equipment down-time have been the result of lack of knowledge, training and experience of personnel having responsibility for equipment operation.

Equipment is designed and adjusted to operate at optimum performance under specific conditions. It is a part of the general maintenance function to ensure that the equipment is kept at or very near this state of optimum performance.

Design features and performance conditions are such that considerable difficulties and expensive breakdowns will result if these features and conditions are not observed during normal operations and followed in the maintenance procedures.

Such procedures exclude the use of incorrect lubricating oils which are unsuitable for use either under extremely hot conditions of operation or for extremely low temperature starting conditions. The use of poor quality fuels which not only reduce power output but also create problems in storage and cold start conditions. The ability to measure and adjust anti-freeze coolant solutions, to understand the need for such considerations can also prevent expensive damage and the possibility of complete destruction of expensive equipment.

The use of inferior fuels and lubricating oils cannot always be avoided but the understanding of their effects and the actions required to minimise these effects, particularly in relation to continued and successful equipment operation can and must be as a result of basic and further training.

Of equal importance to the development of a maintenance system through operator maintenance to complete overhaul, where appropriate, is the need for sustained training at all levels in order that the necessary knowledge and skills are acquired to enable efficient and effective equipment utilisation to be achieved

Functions of a Maintenance Network

Operator

Responsible to the site or field workshop for the carrying out of all normal daily maintenance tasks as detailed by the equipment manufacturers schedule of daily maintenance checks and as delegated by the equipment maintenance supervisor.

The necessary facilities, supplies and materials must be available on site for the carrying out of the checks and the necessary additions of oil, grease, other hydraulic fluids, water, anti-freeze, fuel, etc. and the supervision of the securing and condition of these supplies.

Such supplies and materials should be held in stock in sufficient quantity to avoid equipment down-time or breakdown due to non-availability and stocks and usage records maintained for consumption and performance analysis by headquarters or central workshop staff.

Tools and equipment must be provided in sufficient quantity to enable operators in general to establish their own kit of tools, etc., to avoid the delays endemic in shared minor tools and service equipment. Special tools etc. to be associated with specific equipment and in the charge of the operator of that equipment, to be transferred with the equipment whenever operators change.

Site Mechanic/Field Workshop

The major function of the site mechanic/field workshop is to ensure, as far as possible, the serviceability and availability of equipment at the production site. This infers the absolute minimum of equipment down-time as a result of breakdown and an organised scheduled and controlled down-time to cover maintenance routines and replacement of broken, worn or defective parts.

The essential function of serviceability and availability of equipment can be greatly enhanced by a system of replacement/ service exchange parts.

The organisation of this exchange part service is a very important contribution to the function of equipment serviceability and availability can be assured by an organised system where Central Workshops are responsible for the overhaul of major components which would be available on an exchange basis with broken, worn or damaged components removed from operating equipment.

With such a system, Central Workshop facilities and expertise would be more fully utilised, if necessary, depending upon the management and ownership of central workshops, a standardised system of charging for such overhaul and repair would be instituted so that charges for this specialised overhaul and repair facility would be charged in Departmental Equipment Maintenance Accounts on an individual basis and these costs for individual items included on the individual equipment item cost records for a later historical analysis of the equipment's performance and operating cost, as a comparison for future modifications to standardisation practices.

ANNEX II

Conclusion.

As stated in the introduction to this discussion paper, no policy of equipment standardisation can reflect the true economies that should result from a reasoned and selective choice of equipment, unless that equipment is allowed the full benefit of efficient maintenance. In fact, there is little point in a policy of standardisation unless the maintenance function is a serious consideration and developed, as far as possible, in conjunction with the designation of standardised ' makes and models '

Many of the items and ranges of equipment under consideration at this time respond to an almost universal approach to maintenance. Although sizes, types and technologies may be different, the routine need for lubrication, attention, adjustment and part replacement remain much the same.

As the current situation in Bhutan reflects the growing awareness, the need for action and the apparent intention that action should be taken in terms of maintaining equipment together with the implications that this implies, it is seriously suggested that the approach to the question of Overhaul, Repair and Maintenance be considered as an integrated system.

Integrated, not only in the sense that major equipment operating departments would develop their own site maintenance and field workshop facilities and utilise the more sophisticated facilities of central workshops as necessary, but also in the sense that the general approach to maintenance should be similar throughout those departments.

This development, integration and organisation of the equipment maintenance function, both at the site and field workshop and at the central stores and workshops, requires considerable expertise and financial aid - possibly as a result of Bi-lateral or International Assistance.

G. Atkinson
May 1982.

ANNEX III

ROYAL GOVERNMENT OF BHUTAN

CONSIDERATIONS IN THE DEVELOPMENT OF A PROPOSED TRAINING PROGRAMME ASSOCIATED WITH THE NATIONAL EQUIPMENT STANDARDISATION POLICY.

MAY 1982

ANNEX III

EQUIPMENT STANDARDISATION

TRAINING

1.0 Introduction

1.1 With the development of a National Standardisation Policy and after the ratification of this Policy by the Royal Government of Bhutan, there is an urgent need for the dissemination of the details of this policy and of the guidelines covering the policy implementation.

1.2 Relating this need to the Organisational Structure of the Equipment Standardisation System it will be seen that the training elements involved may be considered in three main sections.

(a) The Control and Management Function
(b) The "Standardisation" Function
(c) The Maintenance Function

1.3 Although discussions have taken place during the various stages of development of the policy and guidelines for Equipment Standardisation, with Heads of Departments and others responsible for the management and control of the System, it is suggested that once the policy and guidelines have been established, a short seminar be organised to ensure that the details of the system and the implementation mechanism are fully understood and that a common unified approach is maintained by all concerned.

1.4 Such a seminar would expect the participants to consist, in general, of members of the Equipment Standardisation Committee and of its Sub-Committee and possibly occupy the whole of one day.

1.0 Introduction

1.5 Personnel concerned with the detailed implementation of the policy guidelines, particularly with the " make and model " aspects, the monitoring and compliance, the equipment specifications and procurement procedures, including those in the Equipment Sub-Committee Secretariat and those attached to individual Government Departments responsible within the Department for the implementation of the Standardisation Policy Guidelines, should also receive training in all aspects of their duties.

1.6 Of equal importance to the training requirements already mentioned is that concerned with the maintenance function. Whereas the control, management and implementation of the " make and model " function of Standardisation can be implemented by perhaps one man attached to the Equipment Standardisation Sub-Committee to form a Secretariat, departmental staff already in situ being given the added responsibility for policy guideline implementation within their departments, maintenance training will need to cover the whole range of maintenance activities as proposed in the discussion paper " Considerations in the Development of Equipment Maintenance associated with the National Equipment Standardisation Policy "

1.7 As the question of Overhaul, Repair and Maintenance is currently under review, which must eventually mean considerable changes to any system in operation at the moment, it is not possible to be more specific in terms of maintenance training at this time. The whole question of training for this essential function, in total and as part of Equipment Standardisation must be integrated with whatever Government Policy is evolved.

1.8 Sufficient to record that this integration should include the inputs as indicated on the organisation chart, being those associated with and provided by the standardised equipment manufacturer or his appointed agent any project training component input associated with equipment operation repair and maintenance and of course, the essential basic technical and vocational training and further in-plant training under the control of the Technical Education Cell of His Majesty's Government of Bhutan.

ANNEX III

2.0 Equipment Standardisation Seminar

Brief Outline of One Day Programme

(1) Introduction

Detailed explanation of Equipment Standardisation Policy.

(2) The Organisation of Equipment Standardisation

The explanation of the system for the implementation of the Equipment Standardisation Policy.

(3) Implementation Guidelines:- Standardisation

Detailed coverage of the Equipment Standardisation Policy Guidelines and the means of implementation of those guidelines on a National and Departmental Basis, i.e. setting up the list of Standardised Equipment, Monitoring and Compliance, Records & Data, Procurement. Training Requirements.

(4) Implementation Guidelines:- Maintenance

Detailed coverage of the maintenance aspects of Equipment Standardisation.

The need for an integrated system

Departmental responsibility for operational serviceability of their equipment

Materials, supplies, spare parts and assemblies

Co-ordination with Government Policy on Overhaul, Repair & Maintenance.

(5) General Summary & Close.

ANNEX III

3.0 Equipment Standardisation Training Course

Brief Outline of Training Programme

(1) Introduction

The aims and objectives of Equipment Standardisation

(2) Policy

The development of an Equipment Standardisation Policy to cover those aims and objectives

(3) Guidelines

Policy expressed in the form of Guidelines for the implementation of the Equipment Standardisation Policy

(4) Organisation

An organisational structure or mechanism for this implementation

(5) "Standardisation"

Setting up lists of standardised equipment in the form of " makes and models" Flexibility relative to obsolescence , technology change, production requirements, etc.

(6) Supervision

Equipment standardised on a National Basis
Equipment to be standardised on a Departmental Basis
monitoring the standardisation system
Compliance procedures
General and overall supervision of the Equipment Standardisation System by the Equipment Standardisation Committee through the delegated responsibility of its Sub-Committee and Secretariat

ANNEX III

3.0 Equipment Standardisation Training Course

Brief Outline of Training Programme

(7) Documentation

Detailed records of individual items of equipment, make, model, purchase date, price, manufacturer, agent, spares and assemblies, manuals - workshop, maintenance, spare parts, operator. Specifications. Equipment location etc.

(8) Equipment Maintenance

An introduction to the needs, requirements, procedures and scheduling of maintenance repair and overhaul, as an appreciation of the maintenance function in the total system of Equipment Standardisation.

4.0 Equipment Standardisation Workshop

A workshop to be organised for personnel who will be involved with the detailed implementations of the Equipment Standardisation Policy, with particular emphasis on the preparation, selection, maintaining, modification, up-dating, monitoring and advising on the standardised equipment lists and of the day to day supervision of equipment standardisation on a national or departmental basis.

The Workshop to proceed after prospective candidates have attended the Equipment Standardisation Training Course and with time allowed before commencing this Workshop for the collection of equipment information.

Participants will be expected to bring to the Workshop details of the equipment component of their national or individual departmental inventory in preparation for the prime purpose of this workshop and its ultimate result - the completion of an initial list of Standardised Equipment.

C.A.

ANNEX IV

ROYAL GOVERNMENT OF BHUTAN

EQUIPMENT STANDARDISATION COMMITTEE

DRAFT

EQUIPMENT STANDARDISATION POLICY

MAY 1982

ANNEX IV

ROYAL GOVERNMENT OF BHUTAN

EQUIPMENT STANDARDISATION

By order of the Royal Government of Bhutan, an Equipment Standardisation Committee has been appointed to develop and control an Equipment Standardisation Policy for the Kingdom of Bhutan.

The Policy and its Guidelines to be implemented through the delegated authority of the Equipment Standardisation Sub-Committee.

EQUIPMENT STANDARDISATION POLICY

(1) To create and develop an active list of Standardised Equipment on:-

(a) a national basis, being concerned with common user items, vehicles, tractors, etc.

(b) a departmental basis, being concerned with equipment specific to the activities and operations of a particular department.

ANNEX IV

ROYAL GOVERNMENT OF BHUTAN

EQUIPMENT STANDARDISATION COMMITTEE

DRAFT EQUIPMENT STANDARDISATION POLICY

Introduction.

Equipment Standardisation is the development, along the most economical and rational lines, of the equipment infrastructure required to meet the logistical and support needs of the Government and of the developing industrial sector.

To this aim, an infrastructure organisation has been created, through which these equipment logistical and support needs can be rationalised, controlled and monitored, according to the following Equipment Standardisation Policy.

As the major purpose of equipment standardisation is to obtain maximum economy in the procurement and operation of equipment, throughout its normal life-span, maintenance, the availability of spare parts and technical 'know-how' are important elements.

Equipment covered by this Standardisation Policy can generally be defined as that equipment which will require to be the subject of routine maintenance procedures to enable the economic life-span of such equipment to be realised and its operating efficiency ensured.

ANNEX IV

(2) To ensure that Donor Agencies are fully aware of the Royal Government of Bhutan's Equipment Standardisation Policy and are requested to conform to this Policy wherever possible or alternatively, to provide comprehensive spare parts support, technical 'know-how' and training in order to ensure that equipment provided outside of the directives of this policy is self supporting through a reasonable life cycle.

(3) To elaborate on the Equipment Standardisation Policy in the form of Policy Guidelines to assist generally in the interpretation, understanding and application of the spirit and letter of The Policy.

(4) To encourage the application of the Equipment Standardisation Policy through incentives and by other means to ensure maximum compliance with the principles of this Policy.

(5) To promote adequate maintenance, repair and overhaul capability, in co-operation with other Government or Private Agencies, for all standardised equipment.

(6) To ensure adequate training for personnel involved in the control and implementation of the Equipment Standardisation Policy and its Guidelines and in the overhaul, repair and maintenance techniques and procedures of such equipment.

G.A.

ANNEX V

ROYAL GOVERNMENT OF BHUTAN

EQUIPMENT STANDARDISATION COMMITTEE

DRAFT EQUIPMENT STANDARDISATION POLICY GUIDELINES

MAY 1982

ANNEX V

Royal Government of Bhutan

Equipment Standardisation Policy Guidelines

Introduction

Created and developed to assist in the interpretation, understanding and implementation of the Equipment Standardisation Policy of the Royal Government of Bhutan, the Guidelines reflect the basic reasoning from which the Policy was conceived.

This reasoning is outlined in the original discussion papers as enumerated in the bibliograph shown as Appendix V11.

For reasons apparent in the discussion papers, specific guidelines relating to standardised equipment overhaul, repair and maintenance have not been detailed at this time and should be the subject of a Guideline Revision, in due course, when this function has been finally organised and established. The main guideline classifications are as follows, each separate classification being compiled as an individual appendix.

Guideline Classification & Category

Classification

Appendix 1 :- General Considerations
" 11 :- Standardised Equipment
" 111 :- Equipment Procurement
" 1V :- Technical Data & Specifications
" V :- Monitoring, Compliance, Continuity, Co-operation & Co-ordination (Management)
" V1 :- Maintenance & Training

ANNEX V

Royal Government of Bhutan

Equipment Standardisation Policy Guidelines

Category

Within the appendices, specifically Appendix 11, Standardised Equipment, categories have been established to cover particular types and ranges of equipment.

The initial categorisation has been determined as a result of the Equipment Standardisation Workshop and the addition of further categories may be included as the sphere of equipment is widened.

Classification

APPENDIX 11

Category A :- Equipment Standardised on a National Basis

thus A_1 :- Vehicles, Cars & Jeeps

A_2 :- Vehicles, Trucks & Buses

A_3 :- Motor Cycles - Scooters

A_4 :- Heavy Plant - Bulldozers, Road Rollers

A_5 :- Tractors, Mobile Compressors - associated equipment

A_6 :- Office Equipment, Photo-Copiers - Typewriters

ANNEX V

Royal Government of Bhutan

Equipment Standardisation Policy Guidelines

Category B through G:- Equipment Standardised on a Departmental Basis

Category	B	:-	Public Works Department
"	C	:-	Department of Agriculture
"	D	:-	Department of Forest
"	E	:-	Department of Power
"	F	:-	Department of Health Service
"	G	:-	Department of Wireless

Equipment Standardisation Guidelines

Appendix I

General Conditions

1.0 Introduction

1.1 The Kingdom of Bhutan is a small, land-locked, mountainous, Himalayan State, generally accessible only from Northern India by road, having difficult land communication and currently designated by the United Nations General Assembly as one of the Least Developed Countries.

1.2 In contrast to many other developing countries, Bhutan suffers from having a small population and consequently, a lack of manpower in addition to a lack of trained personnel.

1.3 The majority of industrialisation is contained within the realm of government activity, the private sector forming a very small portion of this development.

1.4 Mechanisation rather than the use of labour intensive methods is therefore established Government Policy.

1.5 Immediate and near-term industrial growth is generally expected to remain under Government control with the Civil Service organising and controlling the development of the industrial sector.

1.6 With no major resources currently available for export, foreign exchange is restricted and Government decisions relative to equipment standardisation, selection, procurement, spare parts and service factors must take serious account of this position.

1.7 Naturally the Indian Sub-Continent is an obvious choice for the supply of equipment, spare parts and expertise into Bhutan, particularly in respect to communication and the general use of a mutual currency, however:-

1.8 Operating conditions and therefore equipment requirements are often considerably different in the very cold winter temperatures and high altitudes of Bhutan than in the mainly tropical and sub-tropical areas of India.

1.9 The standardisation of particular items of equipment to be as a result of experiment and proven satisfactory experience under the often difficult conditions in Bhutan, together with the essential and effective collaboration of the equipment manufacturers in terms of service, spare parts and training.

1.10 During the period required for the establishment and initial implementation of the Equipment Standardisation Policy and thereafter as required by the economic resources of Government, a severely restricted range of equipment should be maintained in each Category.

1.11 This restricted range of standardised equipment is introduced in its primary form in Appendix II, Categories A & B together with their numerous sub-divisions.

1.12 The range and types of standardised equipment will not remain static but will require continual correction and modification to compensate for the numerous factors creating change, commercial, financial, technological, etc.

1.13 The importation, from whatever source, of a relatively large number of similar items of equipment, not corresponding to the items as included within the Standardisation Category, should be actively discouraged until such items have been proven to be generally superior in all essential respects to the standardised item and warrant a phasing out of the old item for replacement by the new.

1.14 Other elements associated with these General Conditions, Appendix 1, Equipment Standardisation Guidelines include those set out in Appendicies III through VI respectively.

Equipment Standardisation Guidelines

Appendix II

Standardised Equipment

Contents

Lists of Standardised Equipment

Category 'A'

Equipment Standardised on a National Basis

A_1	:-	Vehicles:- Cars & Jeeps
A_2	:-	Vehicles:- Trucks & Buses
A_3	:-	Motor Cycles - Scooters
A_4	:-	Heavy Plant - Bulldozers, Road Rollers
A_5	:-	Tractors, Mobile Compressors & associated equipment
A_6	:-	Office Equipment - Photo Copiers - Typewriters

etc. etc.

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A 1 VEHICLES - CARS.

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Sedan	Toyota	Corolla 4 K	(Head office) 1) Toyota Motor Sales Co.Ltd. No.23-22,IZUMUI -Chome Higash-Ku, Kagoya, Japan Tel. 952-2111 Cable Address: (Jidosha, Nagoya) 2) (Tokyo Office) Toyota Motor Sales Co-Ltd. 30-3-18, 2 Choma, Kudarminami Chiyoda-ku, Tokyo, Japan. Cable Address: (Jidosha, Tokyo)	Ministry of Finance Thimphu, Bhutan	Engine 1290 c.c. 4 cylinders. 9:1 High Compression (Recommend high Octane fuel) 90 OCTANE
Sedan	Toyota	Corona TT133R-TEKDS	- do -	- do -	Engine 1588 cc, 4 Cylinders. 9:1 High Compression (Recommend high Octane fuel) 90 OCTANE
Sedan	Volks Wagon	Golf Diesel	M/S Volkswagovwenk AG Export Asia 3180 Wolfsbung West Germany	Raj Nath Motors Motibagh South Diplomatic Enclave, New Delhi 110021 India	Engine 23.5 :1 Ratio 4 Cylinder.

(Contd.....)

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A 1 VEHICLES - CARS

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Sedan	Isuzu	Isuzu Diesel PFD 60		Ministry of Finance Thimphu, Bhutan	Engine 1584 cc 4 cylinders.
Sedan	Ambassador	Mark 4	Hindustan Motors Ltd. India	Tashi Commercial Corporation, Thimphu, Bhutan	Engine 1584 cc 4 Cylinders.
Sedan	Premier Padnium (fiat)	Fiat	The Premier Automobiles Ltd. L.B. Shastri Marg Kunla Bombay 400070 India	Ministry of Finance Thimphu, Bhutan Raj Nath Motors Motibagh South Diplomatic Enclave, New Delhi - 110021 India	Engine 1500 cc 4 Cylinders

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A 1 VEHICLES - JEEPS.

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Jeep	Toyota	Land Crnisev FJ 60 RV-KC FJ 40 RV-KC PETROL	Toyota Motor Sales Co- Ltd. No. 23-22 IZUMUI -Chome Higash-Ku, Kago- ya, Japan Tel. 952- 2111 Cable Address : (Jidosha,Nagoya)	Ministry of Finance Thimphu, Bhutan	Engine 4230 cc 6 Cylind- ers 83 OCTANE
Jeep	Toyota	Land Crnisev BJ40 RV -KC BJ 60 RV- KC Diesel	Toyota Motor Sales Co- Ltd. No.23-22 IZUMUI - Chome Higash-Ku,Kagoya, Japan, Tel. 952-2111 Cable Address : (Jidosha Nagoya)	Ministry of Finance Thimphu	Engine 2977 cc 4 Cylind- ers
Jeep	Land Rover	V 8 Petrol	Rover Company England	Land Rover Ltd. Lode Lane, Solihull West Midlands B928 NW United Kingdom	3528 cc. V 8 90 OCTANE PETROL
Jeep	Land Rover	Land Rover Diesel	Rover Company England	- do -	4 Cylinders 2286 cc

(Contd.....)

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A 1 VEHICLES- JEEPS

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Jeep	Mahind-ra Mahi-ndra	Mahind-ra Petrol CJ.4	Mahindra Mahindra India	M/S Mahindra Mahindra Ltd. Automotive Divis-ion Marketing Depart-ment Wovli Road-No 13 Bombay - 400018	

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A2 VEHICLES - TRUCKS & BUSES.

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Truck	Tata	Tata	Tata Company India	M/S Tata Engineering and Locomotive Co.Ltd Sales office 148 Mahatma Gandhi Road Bombay - 400023	6 Cylinders Diesel
Bus	Tata	Tata	Tata Company India	- do -	6 Cylinders Diesel
Bus	Toyota	Coaster	Toyota Motor Sales Co-Ltd.No.23-22,IZUMUI -Chome Higash-Ku, Kage-ya, Japan Tel.952-2111 Cable Address: (Jidosha, Nagoya)	Ministry of Finance Thimphu	Engine - 3168 cc 4 Cylinders. Diesel.

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A3 MOTOR CYCLES -SCOOTERS

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Motor Cycle	Suzuki	Suzuki 100 cc	Suzuki Motor Company Japan	Ministry of Finance Thimphu	Engine - 100 cc Single Cylinder.
Motor Cycle	Enfield	Enfield 350 cc	Enfield India	Enfield India Ltd. 29 Eldams Road Madras 600018 India	Engine - 350 cc Single Cylinder
Scooter	Bajaj	Bajaj 150 cc	Bajaj Scooter Company India	The Sales Executive Bajaj Auto Ltd. Akundi Poona 411035 India	Engine - 150 cc Single Cylinder

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A4 HEAVY PLANT, BULLDOZERS, ROAD ROLLERS.

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Bull Dozer	International Harvester	TD20E	International Harvester Co-401 North Michigan Avenue Chicago, Illinois 60611 U.S.A.	VOLTAS Ltd. Gillander House Netaji Subhas Road Calcutta - 700001	Weight - 21 M.T.approx overall length 6.11 metre overall width 4.41 Height (less exhaunt pipe & air cleaner): 2.48 metre Engine : 1.H V-800 Flywheel H.P:220 approx at 2000 rpm.
Bull Dozer	Caterpiller	D 4 E	Caterpiller U.S.A.	Tractors India Ltd. O No. 1 Taratolla Road Garden Reach Calcutta 24 India	Overall length: 3.2 Metre overall width : 3.12 metre overall height : 2.743 metre Engine: 4 Cylinder diesel Fly wheel H.P. 75 at 2000 rpm.
Bull Dozer	- do -	D 7	- do -	- do-	Overall length:4.19metre overall width: 3.86 metre overall height:3.35metre Engine 6 Cylinders diesel Fly weel H.P: 200 at 2000 rpm.

(Contd.....)

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A4 HEAVY PLANT, BULLDOZER, ROAD ROLLERS.

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Bull Dozer	BEML	D50A15	M/s Bharat Earthmovers Ltd, India	Bharat Earthmovers Ltd. Unity Buildings Bangalore - 560002	Operating weignt 11,000 kg overall length : 4.7 M overall width :3.35 metre overall height:2.69 metre (Top of exhaust pipe) 4 Cylinders cummins Engine.
Bull Dozer	- do-	D80A12	- do -	- do -	overall length:5.890 metre overall width:4.26 metre overall height:3.06 metre (top of Exhaust pipe) 6 Cylinders cummins engine Fly wheel HP 180 approx at 2000 rpm.

(Contd.....)

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT IDENTIFICATION POLICY GUIDELINES
APPENDIX II

A4 HEAVY PLANT, BULLDOZERS, ROAD ROLLERS.

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Bulldozer	Komatsu	D 50	Komatsu Japan	Komatsu Ltd. 3-4, Akosaka 2-Chome, Minato-ku Tokyo, Japan	
Bulldozer	Komatsu	D 20	Komatsu Japan	-------dc----------	
Road Roller	Aveling Jessop	GC 5 8-1Ton Cap/810	Jessop & Co. Ltd India	M/S Jessop & Co. Ltd 63 Netaji Subhash Road Calcutta 700001	Overall length:4.825Metre Rolling width:1.675 " Height with Awning:2.875 Metre Weight (ballasted):10 Tons Engine :Perkim P4 BHP: 33.5, at 1500 rpm.

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A5 TRACTORS MOBILE COMPRESSORS

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Tractor	Ford	Ford	Escort Tractors Ltd. Escorts House Boshanara Road Delhi - 110007	Deki Corporation Phuntsholing.	Engine - 3600 cc 3 Cylinders Diesel
Tractor	Fergusen MF	MF-35	Ferguson Company India	Deki Corporation Phuntsholing.	Engine - 4 Cylinder Diesel
Air Compresson	Atlase Copco	VT250PD	Atlas Copco(India)Ltd. India	Atlas Copco(India)Ltd. Mahatma Gandhi Memorial Building Nataji Subhash Road Bombay - 400002	Engine, Perkins P6/354

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A6 OFFICE EQUIPMENT

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Reming tone Rand	R/R	Remin-82-83	Remington Rand of India Ltd 3,Council House Street Post Box No188 Calcutta - 700001	Tashi Commercial Corporation Phunstheling Bhutan	Max L - 18 - 24" Mini L - 16"
IBM : Type Writer Correcting Selectic Models	IBM	893 995 855	IBM Products Division New York - 10017	No local agent	Model-855,893,& 895 855 Pitch= Single 893+895 Pitch= Dual Writing Cune=13.0",11,0" + 13.0" Pap Capacity=15.00",13.00" +15.0" Case width 22.0"20.0" + 22.0" Weight =16 Kg-17.3kg + 16kg.
Gestetner Duplicating Machine	Gestetner London & Indian	466 & 460	Gestetner London + Indian Duplicating Compancy limited	Indian Duplicating Co. Ltd Nachan Road (Bhrighi) PO. Durgapur 713213 Dist. Bardan	H = 44 cm(17½") W = 53cm(21") Depth- Open -99 cm(39") Closed-46cm(13") Machine Size

(Contd.....)

[illegible] EQUIPMENT [illegible]
EQUIPMENT IMPORT IMPIO POLICY GUIDELINES
APPENDIX III

A6 OFFICE EQUIPMENT

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Photo Copier Ricoh DT 850 &750	Japan 8	DT-850 DT-750	RICOH Company, Ltd. Address: 5-15, 1 Chome, Minami-Aoyania, Minato-Ku, Tokyo Tele. Tokyo 479-3111 Telex:242-5418 242-5415 Cable :RICOHBLOG TOKYO	No local agent	Paper Sizes Minimum 7.5x12.5 cm(3"x 5") Maximum 38x25 cm(15"x10") Print Area Up to 33x21 cm(13"x8½") Drive: 1/6 G.P. motor Available in most AC Voltages. Copying Proof=Plain Paper. Original size=B4 size Copy paper=Ordinary Copy speed=15 CPM First copy time=5.5 Sec. Max. Waiting time=3 to 35 Sec Power Source:115V/60HZ 220V/50HZ 220V/60HZ

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ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

A6 OFFICE EQUIPMENT

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Gestetner Copier 2010 model	Gestetn-London	2010	Gestetner Duplicaters Limited, 210 Eurton Road, London NW12DA	Indian Duplicator Co.Ltd New Delhi	Power Consinpt=1.45KVA Weigth=71Kg(115Vmachine) Dimension=738 mm(OV) x 505mm (D) x 350mm(H) Photo conductor-Zinc Oxide Masters. Toner Type-Dry magnetic Fusing system-Heat Model type-Desk top Dimensions=37x48x84 cm Weight - 60 kg Electrical Requirement :+220/240V 13 Amp 110V:15amp Warm up time=[illegible]1 First copying time=8 seconds Speed = 10 CMP A4 Max paper size = B4 Mini Paper size = A 5

Equipment Standardisation Guidelines

Appendix 11

Standardised Equipment

Contents

Lists of Standardised Equipment

Categories 'B' through 'G'

Equipment Standardised on a Departmental Basis

B	:-	Public Works Department
C	:-	Department of Agriculture
D	:-	Department of Forest
E	:-	Department of Power
F	:-	Department of Health Service
G	:-	Department of Wireless

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

CATEGORY 'B' PUBLIC WORKS DEPARTMENT

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Stone Crusher	Frederick Parker	Hunter Series	Frederick Parker (Canada) Ltd.Canada.	Frederick Parker(Canada) Ltd. Scarborough Outario, Canada Agent in India: M/S International Engineering & Construction Co.16 Biplabi R. Basu Road.P.O.Box 2219 Calcutta, India.	Rock Size 24"x 10" Crusher Capacity: 19 to 34m^3/Hr Screen:Rotary 3'x8' for garding Engine:Lister HR4 Diesel
Pay Loader	International Havester.	530	International Harvester Co. U.S.A.	International Havester Co. Payline Group 600 Wordfield Schanmburg III, 60172 U.S.A.	Loader:Rubber tyred Engine:1H414 turbocharged 6 Cylinder diesel
Concrete Mixer	Millar's	10/7BL	Millar's Timber & Trading Co. Ltd, India	Millar's Timber & Trading Co. Victoria House Victoria Road Bombay 27.	Engine:Kirlosker AV1 Single Cylinder diesel Mixed batch capacity: 7 Cft.
Road Roller	Aveling Barford	DC011	Aveling Barford Ltd. U.K.	Aveling Barford Ltd. Grantham, England	Length with drawbar:4.6 metre Width: 1.88 metre Height: 2.936 metre Engine:Perkins P4-236 four Cylinder diesel

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT RECLASSIFICATION POLICY GUIDELINES
APPENDIX II

CATEGORY C DEPARTMENT OF AGRICULTURE.

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Power Tiller	Kabota	K 120	Kubota Japan	Kubota Ltd. 2-47, Shikisuhigashi 1-Chome, Naniwa-ku, Osaka, Japan	
4-wheel, Tractor L 3001, L 305	Kubota	-	Kubota Japan	-------do-------	
Automatic Thresher 5 - 6 H P	Kubota	-	Kubota Japan	-------do-------	
Power Sprayer (Portable) 4-cycle, 6-7HP	-	-	-	-	
Power Sprayer Tractor Trailer Type 400-500 Litre Capicity	-	-	-	-	

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

CATEGORY C DEPARTMENT OF AGRICULTURE.

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Oil Expeller 7.5. KW Electrict Motor	-	-	-	-	

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

CATEGORY 'D' DEPARTMENT OF FOREST

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Yarder	Nesler	330 Cat	M/S Nesler, Mashinenbau P.O.Box 63 A.6700 Blumdenz Vosarlbing Austria	-	Single Drum. 2.5 Ton Duetze Diesel Engine 93 HP
Power Chain Saw	Partner	P 85	AB Partner Fack S.4314 Mordal Sweden.	M/S Deki Corporation (P) LTD C/O Delha Exports LTD 443 Shamsal Heda.RD Calutta, 10017 India	8.3 Kg Weight
Power Chain Saw	Panther	P100	DITTO	DITTO Also at Phuntsholing	DITTO
Truck-Loader	Caterpillar	94 B	Caterpillar. USA	Tractors India LTD No.1, Tratella Road Garden Reach. Calcutta -24	Rope Canopy Complete with Hyster D4F winch.
Tractor-Loader	Highlander	HF120E4	James Jones-sons Broomage Ave. Larbert Stirlingshire Scotland U.K.	Escorts Tractors Ltd Escorts House Boshanara Rd Delhi 110007	Ford Tractor County 6 Cylinders 120 HP Atlas Crane

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ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

CATEGORY 'E' DEPARTMENT OF POWER

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Caterpiller Diesel Gen. Set Sl.No. 6707214	USA	No.3408 Dita Diesel	Caterpiller U.S.A.	M/S Tractor India Ltd Post Box No. 323 Calcutta 700001	Direct inject Turbo charged after cooled pakage Gen set each capable of developing 225 KW Prime mover at 400 Volts 50 HZ 3 Phase 1500 RPM
Caterpiller Diesel Gen Set	USA	No.D-398 JWAC	Caterpiller U.S.A.	M/S Tractor India Ltd Post Box No. 323 Calcutta 700001	500 KW 400 Volts phase 3 5o HZ Power factor 0.8 RPM 1000
Jyoti Hydro Gen set Turbine Alternator	Jyoti Ltd Baroda	Gilkes Paten Turgo Impulse s wheel shaft 10.1/2"	India	M/S Jyoti Calor Mark Baroda	Speed 1500 RPM Ref No. 6088 or 6089 Net head 335'(102.1M) out put 13' BHP. 90 KW PF 0.8 volgae 440 HZ 50 Phase 3.
Kirloskar Man Diesel	Kirloskar	WBV 17.5./22.I	Kirloskar Electric Co. Ltd.export Division P.B. No. 5555 Bangalor 55	M/S Tashi Commercial Corporation Phuntsholing (or) D/S Deki Corporation Pvt. Limitted Phuntsholing Bhutan	187.5. KVA 1000 RPM 400 Volts 50 HZ Phase 3

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

CATEGORY 'F' DEPARTMENT OF HEALTH SERVICES

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Deep Freezer	LEC	R-12	LEC Ragrigerant Ltd. Britain		220/240 volt 220 watt
Refrigerator	Sanyo	R-12	Sany Electrical Co.Ltd Japan		220 valt 130 watt 210 Capacity
X-Ray Diagnostic Set Table	Philip	Type 9804 300.101 02 xD 3001/01 NR.4800 3.	Philips Germany		
X.Ray Tube head	"	Type 9804 602 600 01 XD 6026/00 NRD 54 8435	"		MA. 500
X.Ray Traus	"	NRC 38- Cod.15 2 100.25721	Philips Holand		150 KOV

(Contd. .....)

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ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

CATEGORY 'F' DEPARTMENT OF HEALTH SERVICES

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
X.Ray Control Parel (Board)	Philip	MED051	Philips Holand		Ma. 500 150 KOV
Suction Machine	Little Sister	AND.LSB 673/14	Surgical Equpils Supplies Westfield Road- London.		Type 516 AMPS . 8.4. 50 S. P
Dental Unit Sirona S.5	Siemens	D3111	Siemens Ltd. Germany		Sl.No. 00510 220 Volt 50 HZ 0.63 AMP
Dental Lamp	Siemens	S.L.No. D3003 27438	Siemens Ltd. Germany		12 volt 55 Waltt Sl.No. 778
Casting Machine	Jelenko	LFG	Dental Health Product Jelenko	Jeleres Technicial Products WRNP New Hydepark. NY USA	115. 13 AMPS 1436 W.
X.Ray Diagmosti Set (Table)	Escort 102	- 227	Escort India Ltd Company		
X.Ray Tube Head	Eureka X.Ray	B 596[illegible]	[illegible] X.Ray Tube Corpn [illegible]		Type. Rd 59 - 8-11-8 100 M.a. 130 K.V.

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ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

CATEGORY 'F' DEPARTMENT OF HEALTH SERVICES

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
Clinical Microscope.	Olympus	KC 255-221	Olympus Optical Co. Ltd. Japan		High Power 40 0.65.0.17 Low Power 10 0.25
Incubetor	Gallon kamp	Cat No INC 700-2107	Gallon Kamp Exchange unit London.		Size 3.
Spetoza Photo meter	BAUSCH & LOMB	S.L.0617 B-03077 APA No 778 1265 EE			220. 240 voltage-50HZ.
Flame Photometer	Corning	S1-100/ 10-320	Corning Ltd Hills Tract ESSEX England.		Cap. 50/60 HZ

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ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

CATEGORY 'G' DEPARTMENT OF WIRELESS

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
TRANSCEIVER WIRELESS SET	YAESU MUSEN CO.LTD JAPAN	FT300C	YAESU MUSEN CO.LTD JAPAN	Head Office: 7-7, 1 Chome, Yaesu, Chuo-Ku, Tokyo, JAPAN	Power Capacity:100watt PEP Emission:A1,A3,A3J Channel:6 Channels (Preset) Freguency Range: 1.6 to9MHZ& 12 to17MHZ Power Consumption 270 watt. Power Source: 13.5.Volts DC & 220V.A.C.
Auto Line Voltage Regulator	Indian	9121-S	Applied Electronics Ltd. India	A-5/6 Wagle Industrial Estate, Thane,400604 (India)	Power Capacity - 1.5.KVA Unput -184-253 V Output - 230 V± 0.5%
Auto Line Voltage Regulator	Indian	9126	Applied Electronics Ltd. India.	A-5/6 Wagle Industrial Estate, Thane, 400604. (India)	Power Capacity:10.5KVA Input - 184-253 V Output-230V ± 0.5.%

ROYAL GOVERNMENT OF BHUTAN
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APPENDIX II

CATEGORY 'G' DEPARTMENT OF WIRELESS

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
SOLAR GENERATING UNIT		ARCO-SI 16-2000		LOCAL AGENT - F Faurer Bumthang Bhutan	8 Pannels 2 Control units (To be used with FT300C transceiver Set)
BATTERY CHARGING ENGINE	Indian	RBC/VI	M/S Aviduippo of India Ltd INDIA	22, Chittaranjam Avenue Calcutta-700072 India	Power Capacity:500 Watt Volts - 30 V Current -16.5 Amps Engine -Villiers 12/2 Horse Power - 1.95 Weight - 42 Kgs.
NOTE : The battery Charging Engine is the alternative system for SOLAR Generating Unit.					
POWER GENERATOR	Indian	TAF 2	KIRLOSKAR India	Local Agent :- Deki Corporation Phuntsholing, Bhutan	Power Capacity - 10KVA Output Volts -230 V.A.C Single Phase, 50 HZ
SECONDARY BATTERY	Indian	6x19-3R	EXIDE India	Local Agent :- Bhutan Distributor Phuntsholing, Phutan	Output -12V DC 180 Ampere Hour Capacity

(Contd.....)

ROYAL GOVERNMENT OF BHUTAN
EQUIPMENT STANDARDISATION POLICY GUIDELINES
APPENDIX II

CATEGORY 'G' DEPARTMENT OF WIRELESS

DESCRIPTION	MAKE	MODEL	MANUFACTURER & COUNTRY OF ORIGIN	ADDRESS MANUF. OR LOCAL AGENT	BRIEF SPECIFICATION.
TRANSMITTER	U.S.A.	HF-8130 A	M/S Collins, Radio Co. U.S.A.	Cendar Rapids, 10WA, 52406 (U.S.A)	Power Output - 1KW Emission - A1,A3J,A3H, A3B. Frequency - 1.6 to 30MHz
RADIO RECEIVER	U.S.A.	651S-1	- do -	- do -	Mode -AM,USB,LSB,ATTY, CW. Freq -0.25 -30 MHZ Stability - 5parts in10
LINEAR AMPLIFIER	U.S.A.				Output - 5 KW.
AERIAL(HF)	U.S.A.	237B-3	- do -	- do -	Freq range - 6.5 to40MHZ Capacity -50KW PEP,25KW AVR Polarization -Horizontal Gain - 12 db minimum
TELEPRINTER SET	Indian	T2B-SN.SR LU-10/1 T2B-TF-203,T2B PF2	Hindustan Teleprinter L. Madras, India	G.T. Road Guindy Madras-600032(India)	Page Teleprinter

Royal Government of Bhutan

Equipment Standardisation Policy Guidelines

Appendix III - Equipment Procurement

1.0 Introduction

1.1 Although international donors have provided the majority of equipment presently available in Bhutan, an increasing component of the equipment inventory of the country can be expected to be procured by Government.

1.2 The procurement of equipment requires not only technical expertise in terms of detailed specifications but also the legal, financial and commercial knowledge to handle government regulations and international requirements and procedures.

2.0 Standardisation & Procurement

2.1 Equipment standardisation automatically limits the breadth of choice and the range of supplies.

2.2 The considerable advantages of standardisation also produce related disadvantages. Whilest the advantages have already been documented, the disadvantages have yet to be enumerated.

These include:-

(1) The possible creation of a monopoly situation with the inherent danger of commercial pressure.

(2) Standardised equipment is not necessarily the cheapest available and hence the major advantages of the chosen item must carry the necessary justification for that standardisation.

2.3 During the initial period of operation of the Equipment Standardisation Policy, it is recommended that the range of equipment, of any one category, considered for inclusion as a standard item, be strictly limited.

2.4 In general not more than three different makes of a particular category of equipment should be considered and this only when the equipment is large and/or expensive and required in reasonable numbers.

2.5 When the equipment is small and relatively inexpensive a single make could be chosen for standardisation.

2.6 Traditional and major donors, whose equipment imports are already in evidence in the mechanisation of the Bhutanese industry, should be given serious consideration when equipment standardisation is being considered.

3.0 Procurement Procedures

3.1 Although, during the earlier stages in the development of equipment procurement procedures, the following series of actions may seem to be very formal, eventually and particularly under various forms of international funding the following stages in the procurement process represent standard international practice and can often provide the necessary safeguards for both the supplier and the purchaser.

3.2 Very briefly the procedures are itemised as follows:-

(1) Technical Specifications
(2) Commercial, financial and legal conditions
(3) Choice of potential suppliers - consistent with Standardisation Policy
(4) Quotations or Invitation to Tender
(5) Evaluation and selection of Bids
(6) Notification of intention to Purchase - Contract of Sale
(7) Delivery - Commissioning
(8) Inspection and Acceptance
(9) Guarantee - Spares, Service, Training Contract
(10) Performance Bond - Payment

4.0 System of Procurement

4.1 Although perhaps the major component of the equipment inventory currently in this country has been obtained and supplied by donor agencies, utilising their own systems of procurement, eventually Government itself will be responsible for the majority of such procurement. The ultimate objective should therefore be the development of a national capability to effect international procurement irrespective of the source of finance.

4.2 It should be recognised that the development of such a capability could only be achieved over a period of time and with the necessary investment in resources.

4.3 During the creation and in the initial stages in the development of such a capability it is envisaged that external advice and assistance may well be required in the complexities of international procurement. International and bi-lateral agencies should be receptive to requests from Government for such assistance.

4.4 Meanwhile, as a special measure and as required by Government, assistance could be sought through the facilities of the United Nations Organisation and its Agencies in the procurement of equipment, particularly when large quantities and monetary values are involved or equipment is of a complex nature.

4.5 The use of the Long Term Supply Contract is another advantage that can be used in conjunction with standardised equipment. This could particularly apply to the common user items where a reasonable prediction can be made of say, annual requirements.

4.6 By such a Long Term Supply Contract considerable advantages may be gained not only in financial and supply terms but also in a more direct liaison with the manufacturer.

4.7 This liaison should include all aspects of production, sales and service information and assistance.

Royal Government of Bhutan

Equipment Standardisation Policy Guidelines

Appendix IV - Technical Data & Specifications

1.0 Introduction

1.1 Equipment standardisation can only be effective in ensuring the desired economies, if details of such equipment are known, recorded and available for dissemination to personnel involved in the management, control and operation of the Standardisation Policy.

1.2 Probably the first concern is for technical information to be available in a consistant system of international units of measurement.

1.3 Compatibility between individual items of equipment, their fittings and accessories and the interchangeability of common components depend entirely upon a common base of standardised units of measurement.

1.4 Traditionally there have been numerous systems of measurement which have been refined, rationalised and internationalised over the years, until a system has evolved which is universally recognised, if not completely applied internationally.

1.5 Such a system is the S.I. (Standard International) Metric System which is the established system in Bhutan.

1.6 All equipment imported into the country is required to follow the S.I. Metric System unless circumstances make this impossible.

1.7 Situations still exist where American and other manufacturers follow the Inch or Imperial Standard. This standard of measurement is not compatible with the S.I. Metric System.

1.8 American industry although technically converted from Imperial to S.I. Units has still not converted in a practical sense - often for very sound economic and commercial reasons.

1.9 Specific American equipment such as that manufactured by Caterpillar still retains the Imperial Standard.

1.10 Unfortunely when more than one system of measurement has to be accommodated in a practical environment, tools, measuring instruments, test fixtures, etc., etc., have to be available for each type of system.

1.11 As equipment standardisation is wise and economical for Bhutan, so the standardisation of measurement systems is wise and ultimately economically sound internationally.

1.12 The process of standardisation to the S.I. Metric System is still in a transient stage in many countries and resulting problems need to be recognised and accommodated.

2.0 Specifications

2.1 Specifications are the means by which technical information is communicated, either from the manufacturer to the potential purchaser, or, from the potential purchaser to the supplier or manufacturer.

2.2 Manufacturers specifications will indicate the equipment characteristics, including dimensions, capacities, power rating, performance etc., specific to the particular make and model.

2.3 Purchaser specifications will indicate the requirements of equipment for a specific duty or operation.

2.4 Such purchaser specifications are generally of a more open type, indicating acceptable ranges of performance, power output, size and capacity.

2.5 Manufacturers specifications are used to evaluate a particular piece of equipment relative to purchaser requirements.

2.6 Purchaser specifications are used when an invitation to bid is being circulated or a number of quotations requested.

2.7 The more general and open specifications as drawn up by the potential purchaser will allow a number of manufacturers/suppliers to respond to the bid in terms of their own specific equipment.

2.8 The whole purpose of such an invitation to bid is to receive offers for the supply of equipment within a limited type range to enable the potential purchaser to compare prices and other relevant technical details, as an aid towards a final selection.

2.9 Although limited in scope, this approach to procurement is still valid within an equipment standardisation environment and takes advantage of current individual manufacturer circumstances in terms of production, delivery and other conditions which could and do, affect bid prices.

2.10 In addition to the standard specifications for a particular type of equipment, other factors, with particular reference to the environmental conditions of Bhutan, should be considered.

2.11 These factors would include the terrain on which equipment might be expected to operate, the altitude, temperature and access to theworking situations, available fuels, lubricating oils, etc.

2.12 Each of these factors will require particular attention within the specification.

2.13 Terrain related not only to the power requirements but also related to the safety aspects in the working situation - low centre of gravity.

2.14 Altitude related to I.C. engine power loss.

2.15 Temperature also related with altitude to power loss, also in terms of cold starting, fuel and lubricating oil problems, engine cooling systems, etc.

2.16 Access, many areas in which equipment might be expected to operate have difficult access conditions and consideration must be given to overall sizes, wheel track dimensions, etc.

2.17 In general ~~the quality of~~ both petrol and diesel engine fuels are of low quality. For the petrol engine it is necessary that low compression ratios be included within engine specification to accommodate the low quality petrol; in the case of diesel engines, their effectiveness in winter, high altitude, cold conditions, are seriously affected by fuel quality.

2.18 Generally, simplicity in equipment design, construction and operation is often a measure of its robustness and ease of repair and maintenance.

2.19 Sophisticated equipment should be avoided whenever possible.

3.0 Technical Data

3.1 Whenever there is a need for information on equipment, types, makes, models, specifications, prices, production changes, etc., it is necessary to refer to published documentation, available from the equipment manufacturer.

3.2 Prior to an invitation to tender or to the submission of an equipment list for procurement, it is essential that details of the equipment required are known.

3.3 Experience shows that without this information, included in an invitation or request for purchase, equipment of ridiculous proportions, capabilities, etc, is often delivered.

3.4 Once equipment is obtained and there is a need for replacement or increased inventory, the use of a previous purchase order, as an example, or the use of retained records of technical information, specifications, etc., is a valuable time and trouble saving agent.

3.5 In the case of overhaul, repair and maintenance, whenever equipment is obtained, from whatever source, serious efforts should be made to obtain a full and continuous range of documentation, covering not only the total maintenance but also lists of spare parts, prices, service bulletins, etc.

3.6 Sophisticated equipment is available, in the Central Workshop, for the diagnostic testing, the repair, performance checking and adjustment of vehicles and other equipment.

3.7 The use of these facilities in general is often frustrated by the lack of specific technical data, covering a particular type and model of equipment.

3.8 This information is readily available from the equipment manufacturer and should always be obtained with the equipment when it is supplied, to avoid the lengthy correspondence, delays and even equipment down-time.

3.9 These factors, included under section heading 3.0 and many others, all suggest the need for a reference library associated with the Equipment Standardisation System and established within the Secretariat.

3.10 Copies of the technical data, particularly that associated with the overhaul, repair and maintenance of standardised equipment should also be kept in the appropriate department or workshop responsible for these operations.

3.11 In a similar way, equipment usage and maintenance records should be kept by the appropriate department or workshop; this development being suggested as part of the outcome of a study into the total aspects of equipment overhaul, repair and maintenance, already mentioned elsewhere and to be included in a revised Appendix VI - Maintenance & Training.

Royal Government of Bhutan

Equipment Standardisation Policy Guidelines

Appendix V Monitoring - Compliance

Continuity - Co-operation & Co-ordination

(Management)

1.0 Introduction

1.1 During the creation and initial development of Equipment Standardisation the basic logic of a system was outlined and discussed.

1.2 From the study and discussion of this logic and taking into account the current situation in Bhutan, an organisational structure has been formed to meet the present and predicted future needs.

1.3 These needs include the utmost economy in the use of resources, staff and facilities, in the operation and management of such a system, in order to optimise the basic purposes of Standardisation as outlined in the Introduction to the Draft Equipment Standardisation Policy.

1.4 As the Equipment Standardisation Committee, appointed by Royal Command, is the policy making body, a sub-committee was set-up, by that Committee, to carry the delegated responsibility for the implementation of the Equipment Standardisation Policy and Policy Guidelines, formulated by the main committee.

1.5 As overall control and management of equipment standardisation is the prerogative of the Committee it must carry the responsibility for promulgating its Policy internationally

1.6 Much equipment is imported into Bhutan as a result of the actions of numerous donor agencies.

1.7 For equipment standardisation to be effective, such agencies should be fully aware of the Government's Policy and encouraged to conform to that Policy and its Guidelines.

1.8 Such is the proportion of equipment entering Bhutan at this time that without a high degree of conformity by donor agencies the Equipment Standardisation Policy of the Royal Government of Bhutan cannot be effective.

1.9 Obstruction or restrictions contained within agency agreements should be examined during the initial consideration of possible agreements, to avoid situations which make it difficult, or impossible, for personnel implementing such agreements to follow the Equipment Standardisation Policy.

1.10 It should be the practice of the Equipment Standardisation Committee members, particularly those concerned with International Co-operation, Foreign Affairs and Planning, to ensure that, as far as possible, donor agency projects do not contain restrictive elements which counteract the Equipment Standardisation Policy of the Royal Government of Bhutan.

1.11 As will be seen from the list of constituent members of the E.S. Committee, the majority of Government Departments and Ministries are included together with representatives of the private sector.

1.12 In this way, all factions of the economy of the country are aware of the purpose and operation of the Equipment Standardisation Policy and participate, not only in the formulation of policy, but also in the management of the means of implementation of that policy and of its associated Guidelines.

2.0 Organisation Structure

2.1 Mention has already been made of the express need for ensuring that Donor Agencies are fully aware of the Policy and that they are actively encouraged to follow the directives of that Policy and of its Guidelines.

2.2 This function of communication with donors is shown at the head of the Organisation Chart - attached as Ref.1. Page (V_7)

2.3 Implementation of the Equipment Standardisation Policy and the interpretation of that Policy by means of the Policy Guidelines, is the delegated responsibility of the E.S. Sub-Committee.

2.4 This responsibility is effected by :-

(a) Direct action through its own Secretariat related to the standardisation of common user items - those items in relatively common use by a number of government departments and the private sector.

(b) Delegated responsibility to Government Departments for the standardisation of equipment, where the use of such equipment is specific to the operations of particular departments and perhaps also to a narrow range of the public sector dependent upon such departments for mechanisation.

2.5 In the case of 2.4 (b) the E.S. Sub-Committee Secretariat will be the liaison point between the E.S.S.C. and the departmental staff responsible for the day to day interpretation of Policy Guidelines.

2.6 As indicated in the Equipment Standardisation Policy, the three major concerns when considering policy implementation are:-

(a) Standardisation of "Make and Model"

(b) Maintenance

(c) Training

2.7 "Make and Model" standardisation is the prerogative of Secretariat or Department as explained in 2.4

2.8 Maintenance of standardised equipment will follow the same division of responsibility as in 2.4 but with the proviso that, as the full range of maintenance can often include the need for the use of facilities and expertise beyond the scope allowed to individual departments, by Government Order, there is a need for co-ordination of maintenance on a national scale.

2.9 In a similar way to that indicated in 2.8, training for overhaul, repair and maintenance will basically reflect the division of responsibility as in 2.4 but with the proviso that there can often be a need for the co-ordination of training inputs which transcend the individual departmental requirement.

2.10 The recognised need for co-ordination of the maintenance and training elements of standardisation will be accommodated by the E.S.S.C. Secretariat.

2.11 Equipment, recommended for standardisation by the respective government department or by the secretariat, for common user items, through the E.S.S.C. and ratified by the Equipment Standardisation Committee, would become part of the established List of Standardised Equipment available at the Secretariat and held on behalf of the Equipment Standardisation Committee.

3.0 Monitoring & Compliance

3.1 As the Equipment Standardisation Sub-Committee holds the responsibility for the implementation of The Policy and Guidelines and as these instruments are established by Government Order, then the E.S.S.C. also has the responsibility of monitoring those instruments and ensuring compliance with their directives.

3.2 Thus the Secretariat of the E.S.S.C. will be the body through which this monitoring will be effected and through which compliance will be initiated.

3.3 The private sector of the national economy is represented on the Equipment Standardisation Committee by the Bhutan Chamber of Commerce and as such, is expected to advise its members to conform to the Government's Equipment Standardisation Policy.

3.4 Input into the standardisation of equipment is also encouraged through the Chamber of Commerce both via the Secretariat, individual government departments and as a main committee member.

3.5 The Chairman of the E.S.S.C. to be the Head of the Secretariat and through him, deviations from the Standardisation Policy and Guidelines, if not clarified or justified through the services of the secretariat, would be brought to the notice of the Equipment Standardisation Committee for their consideration.

4.0 Continuity

4.1 During the initial inception of the Equipment Standardisation Policy and Guidelines it will only be possible to establish a relatively small list of items standardised.

4.2 As the system develops, as more experience is gained, as more knowledge is attained of the different makes, types, performance and capabilities of different equipment, the range and depth of the equipment listed will increase.

4.3 As technologies change, as manufacturing and production techniques change, as resource development expands and diversifies, so the range and types of equipment that required to be standardised will increase.

4.4 Because of these and other factors, equipment standardisation is a live, progressive and continuing activity and must be viewed as such in order that the essential purposes for its creation are attained.

5.0 Co-operation & Co-ordination

5.1 As Bhutan moves into an era of increased mechanisation there is little doubt that the effective application of an equipment standardisation policy will result in considerable economies.

5.2 An effective standardisation policy does, however, impose a discipline on department heads and others having the responsibility for equipment procurement, operation, maintenance and training.

5.3 This discipline involves not only a thorough re-view of current equipment against alternative and new equipment prior to its justification for inclusion in the Standardised Equipment List, but also:-

5.4 A re-view of the complete list of standardised equipment to ensure that similar equipment is not already standardised by any other department or on a national basis.

5.5 Thus, there is a need for co-operation between the various departments and personnel in the day-to-day operation and interpretation of the Policy and Guidelines.

5.6 In a similar way there may well be in existence or as a result of some future development, facilities for repair and maintenance, expertise, technical data and specifications, procurement experience or training capabilities in one department, cell, workshop or institution which would be of valuable assistance to other areas and departments within the framework of the Equipment Standardisation System.

5.7 Thus, the utilisation of such facilities would be another valuable asset to the E.S. System in general and enhance the capability of that System in providing worthwhile economies in overall expenditures.

5.8 However, this degree of interchange of facilities and services requires the development and continuity of goodwill between departments and the personnel involved and perhaps the establishment of a system of payment, inter - departmental and otherwise, in order to share the costs of maintaining those facilities.

5.9 The considerations already mentioned under this section heading, 5.0. Co-operation and Co-ordination can never be fully effective if it relies entirely upon the abilities of the various personnel involved to co-operate.

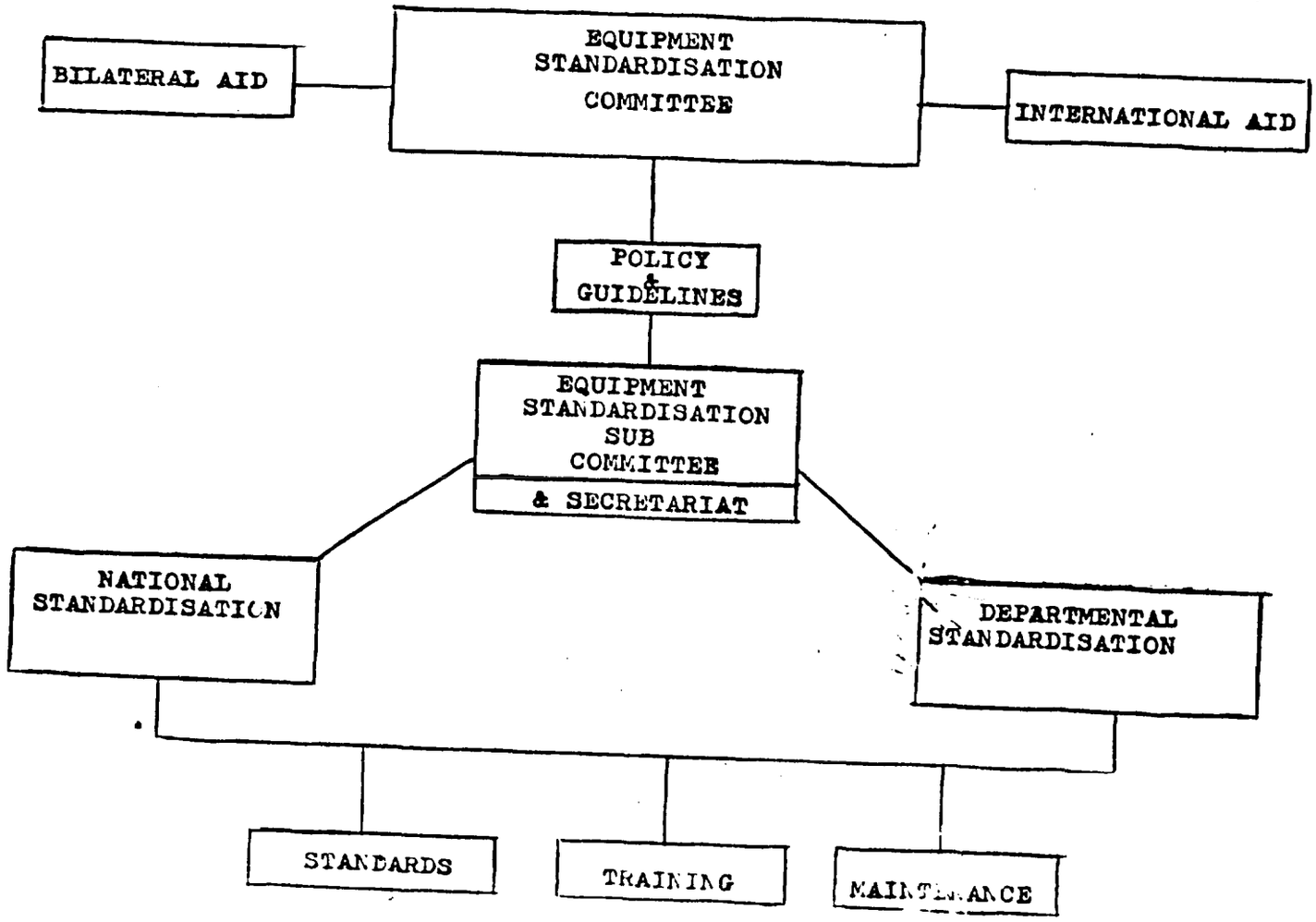
5.10 Greater efficiency can be attained, in this function of the utilisation of scarce facilities and expertise, throughout the Equipment Standardisation System, by the co-ordination that must be provided through the services of the E.S. Sub-Committee Secretariat.

Ref. 1

(7 A)

EQUIPMENT STANDARDISATION

ORGANISATIONAL CHART



Royal Government of Bhutan

Equipment Standardisation Policy Guidelines

Appendix VI Maintenance & Training

1.0 Introduction

1.1 As mentioned in the Introduction to the Equipment Standardisation Guidelines and as shown on Page 1, the detailing of this Guideline is not being completed at this time due to the need for a comprehensive re-view of the overhaul, repair and maintenance function covering all aspects of government and private activity in this field.

1.2 A general summary of the relationship and needs of the total maintenance function - overhaul, repair and maintenance - as viewed from the operation of the Equipment Standardisation System, is available in the discussion paper " Considerations in the Development of Equipment Maintenance Associated with the National Equipment Standardisation Policy", attached to the Consultant's Terminal Report.

1.3 In a similar way, apart from the initial training of personnel involved in the creation and operation of the Equipment Standardisation System and as outlined in the discussion paper " Considerations in the Development of a Proposed Training Programme Associated with the National Equipment Standardisation Policy ", the majority of the subsequent training will rotate around the operation and maintenance of equipment currently standardised and equipment continually and progressively added to the Standardised List.

1.4 Although the need for co-ordination within the various sectors of the Equipment Standardisation System has already been mentioned in Appendix V to include both maintenance and training, the training requirements and hence the section of this Guideline covering those requirements cannot be detailed until the maintenance system is more fully developed.

1.5 These notes, made at the time of the inception of the E.S. Policy and Guidelines, will be modified or replaced as necessary when this Guideline is revised.

ANNEX VI

ROYAL GOVERNMENT OF BHUTAN

EQUIPMENT STANDARDISATION COMMITTEE

SOME THOUGHTS ON EQUIPMENT MAINTENANCE

JUNE 1982

ANNEX VI

EQUIPMENT MAINTENANCE

1.0 Introduction

1.1 Recently the Royal Government of Bhutan has been instrumental in the development of an Equipment Standardisation Programme as a means of maximising the economics of equipment operation.

1.2 This programme, assisted by UNIDO/UNDP, includes the establishment of an Equipment Standardisation Policy and of detailed Guidelines for the explanation and interpretation of this Policy.

1.3 These guidelines include lists of equipment which have been proposed for acceptance as standardised items and which, after further consideration and possible modification, will form the basic standardised items under the Equipment Standardisation Programme.

1.4 Progress to date has been most encouraging in this quest to achieve the logical and rational advantages of Standardisation. However, the documentary organisation of equipment will have little effect without proper attention to the intimately associated maintenance function required to keep such equipment operational.

2.0 Maintenance Facilities

2.1 Facilities for maintenance include the personnel, the knowledge and skill, the buildings and transport, the tools and repair equipment, the materials and supplies, including spare parts and sub-assemblies, the management ability and motivation necessary to organised and successfully operate an integrated maintenance system throughout Bhutan.

2.2 Maintenance is defined in the context of this discussion paper as being any service required to maintain equipment in its full operating roll.

2.3 Such maintenance requirements can be very limited and trivial for simple equipment on the one hand and lengthy, complicated and expensive on the other when sophisticated equipment is involved.

2.4 At the present time such facilities are either non-existent, fragmented, or in need of re-organising and upgrading in all aspects of operation.

2.5 Total requirements for maintenance facilities are not large due to the present level of mechanisation in the country but, because of the mountainous terrain, the scattered communities and the somewhat difficult road communications, serious consideration should be given to the maintenance infra-structure.

2.6 For a number of important reasons, duplication, whether it be in buildings, skills, repair facilities, etc., must be avoided and hence an integrated maintenance system would seem to be a realistic form of organisation to cover the maintenance needs of equipment in Bhutan.

3.0 Organisation of Maintenance

3.1 As maintenance is an integral part of the Government's Equipment Standardisation Policy it is imperative that the organisation of the maintenance function be inter-related to that of Standardisation in terms of the selected equipment.

3.2 Changes in equipment selected for standardisation, for whatever reason, commercial, technological or financial will automatically affect the maintenance requirement and of the training element which is an essential part of maintenance.

3.3 As these factors are already designed and incorporated into the infrastructure of Equipment Standardisation, it is suggested that the "Organisation of Maintenance" be included within the general responsibilities of the Sub-Committee carrying the delegated authority of the Equipment Standardisation Committee.

3.4 It will be appreciated that the additional capacity and capability required within the Equipment Standardisation Secretariat will be substantial and attention should be given to this factor before getting too involved in the detailed study of a maintenance system.

3.5 The general principle of national responsibility for common items of equipment and departmental responsibility for specific equipment items related to their specialised activities has already been accepted in the Equipment Standardisation Policy of the Equipment Standardisation Committee.

3.6 The co-ordination of the activities of national and departmental responsibilities within the Secretariat relative to Standardised Makes and Models of equipment is relatively simple and straight forward.

3.7 The co-ordination of the maintenance function between national (common user items) and departmental equipment will be more complex and not as clearly defined.

3.8 The more complex nature of the co-ordination of the maintenance functions will arise due to the need to use any maintenance facilities to service transport and other equipment in addition to what might be its particular specialised equipment, i.e. a maintenance facility for power tillers and agricultural implements in a rural area would also be expected to service vehicles located in that area.

4.0 Development of the Maintenance Function

4.1 Following a detailed review of the total equipment maintenance requirement of the country, particularly related to standardised equipment but not necessarily limited to this field, an integrated system should be developed including the supply and distribution of spare parts, materials supplies and the provision of trained personnel.

4.2 This review and subsequent integrated system should result in the number and siting of various types of maintenance services, the equipment, the staff and facility requirements in order to provide those services, the development of common maintenance procedures and record keeping where practical, the recommendation for staff training both in the organisation and management of maintenance and in the creation and development of the necessary practical skills.

4.3 At this stage in the process of mechanisation in Bhutan a survey of maintenance facility requirements might well consider the use of a number of mobile workshop units to be more economical and efficient than the establishment of numerous workshops.

4.4 Obviously mobile units need a workshop base but with scattered and somewhat isolated communities a mobile workshop, although spending time travelling, could itself be more easily maintained and therefore more effective and economical in the use of staff and repair equipment than small isolated workshops.

4.5 The integrated system could well consist of a mix of facilities including central workshops, site workshops, mobile units, operator or driver maintenance, specific and specialised equipment maintenance personnel.

4.6 An example of the above mentioned could possibly include a maintenance facility for the upkeep of health services and hospital equipment.

4.7 Consideration of the development of the maintenance function must also include the question of lubricating oils, greases, fuels and other working fluids.

4.8 As already mentioned in "Considerations in the Development of Equipment Maintenance associated with the National Equipment Standardisation Policy" the quality of fuels and lubricating oils, including hydraulic oils, anti-freeze solutions, etc., have a considerable effect upon the operation, performance, life-span and hence the need for maintenance.

4.9 Serious consideration should be given to this quality factor in relation to the more effective utilisation of equipment.

4.10 Although higher quality fuels and the use of higher specification lubricating oils are more expensive than low grade equivalents, the more efficient performance, the increased effective operating time, the reduction in detrimental action to the equipment and hence the reduced maintenance and need for replacement parts together with the reduction in down-time make the use of such fuels and lubricants a considerable economic advantage.

5.0 Assistance in the Development of the Maintenance Function

5.1 Recent inputs from the United Nations Organisation has emphasised the urgent need for improvement in the general approach to the problems of equipment maintenance.

5.2 This need, if not fulfilled in the near future, will lead to a situation where considerable amounts of equipment, previously supplied by donor agencies and procured by government, will have passed the first flush of its youth and will have arrived at the stage where without service and adequate maintenance, it is no longer functional.

ANNEX VI

5.3 Advantages gained and developments expected will be lost with all the frustrations that this implies.

5.4 As the documentation part of the Equipment Standardisation Programme is nearing completion, a realistic approach should be made to this need for maintenance.

5.5 It is suggested that following detailed discussion on the maintenance requirements in Bhutan in general and related to equipment standardisation in particular, an approach could be made to the Resident Representative and Resident Co-ordinator of the United Nations System's Operational Activities for Development, Mr. T. Malhotra, for guidance and advice concerning possible assistance from the United Nations Organisation.

G.A.

ANNEX VII

ROYAL GOVERNMENT OF BHUTAN

EQUIPMENT STANDARDISATION COMMITTEE

EQUIPMENT STANDARDISATION

TRAINING COURSE & WORKSHOP

JUNE 1982

Equipment Standardisation Training Course & Workshop

Introduction

An essential component of the Equipment Standardisation Policy Guidelines is that Guideline, indicated as Appendix II and consisting of lists of equipment proposed for standardisation.

The orgainsation and control of the standardisation programme is based on a combination of equipment standardised on a national basis, i.e. common user items and the more specific equipment associated with particular government departments and their specialist activities.

Participants in the training course and workshop were therefore selected either as representatives of departments or as members of a group to be concerned with the proposals for common user item standardisation. A list of participants is attached.

Objectives of the Training Course & Workshop

The management of the standardisation programme is via the Secretariat of the Equipment Standardisation Sub-Committee, being directly concerned with common user items and having a co-ordinating function relative to the direct responsibilities of departments for their own specific equipment standardisation. The objectives of the course and workshop were two-fold as the title suggests.

Objectives of the Training Course

To introduce the participants to the basic reasoning behind the development of the Equipment Standardisation Programme and to cover the substance of the Draft Equipment Standardisation Policy and of its Guidelines in detail.

To explain the need for a formalised approach to the compilation of equipment inventories from which the lists of equipment proposed for standardisation would be created.

Equipment Standardisation Training Course & Workshop

Objectives of the Training Workshop

The participants, having been introduced to the Standardisation Programme, were asked to return to their respective departments in order to complete the necessary equipment inventories. They were occupied in this activity for a number of days, the consultant visiting them to ensure that they understood the requirements and were obtaining the relevant information for the Workshop.

The group were then re-assembled and occupied a further two days of concentrated activity which resulted in the proposed list of equipment for standardised equipment and included as Appendix II of the Guidelines shown as Annex V in the Terminal Report.

Training Course & Workshop Programme:-

Commencing at 10.a.m. June 7th, 1982 in the Conference Room, Department of Agriculture, Thimphu.

Introduction to the Course:-

Mr.Lakpa Tshering, Officer-in-Charge, Technical Education Cell, Member Secretary, Equipment Standardisation Committee, formally opened the course and introduced the Course Director, Mr. G. Atkinson, UNIDO Consultant.

Detailed Programme.

Training Course - duration two days

Monday, 7th June, 1982

10.00 - 10.30	General Introduction
10.30 - 12.00	Appreciation of the need for Standardisation. Historical progress in Bhutan towards the achievement of this aim Explanation of the development of the present organisation and structure Maintenance as an integral part of Standardisation
12.00 - 12.30	Break
12.30 - 2.00 p.m.	More detailed explanation of the proposed Equipment Standardisation System. Considerations leading up to the Draft Equipment Standardisation Policy

...sday,8th June, 1982

9.00 - 10.30	Detailed discussions on the Draft Equipment Standardisation Policy
10.30 - 11.00	Break
11.00 - 12.30p.m.	Detailed explanation and discussions on the Draft Equipment Standardisation Guidelines
12.30 - 1.00p.m.	Break
1.00 - 2.00p.m.	Explanation of Course Work required to be undertaken prior to the Workshop. Details of equipment inventory information required in preparation for the assembly of proposed List of Standardised Equipment

Research - duration four days

Wednesday, Thursday, Friday

& Saturday 9th -12th June

Participants undertake research and discussion within their respective departments and generally, in order to ascertain present equipment inventories and determine equipment makes and models proposed for standardisation

Training Workshop - duration two days

Monday, 14th June, 1982

9.00 - 10.30	Formation of group concerned with standardisation of common user items, also departmental groups.
10.30 - 11.00	Break
11.00 - 12.30	Discussion on details of suitable equipment for standardisation, considering previous experience in the use of equipment in Bhutan, service and spare parts factors, environmental conditions, available fuels and lubricants, etc.
12.30 - 1.00p.m.	Break
1.00 - 2.00p.m.	Concentrated activity in the formulation of equipment considered suitable for inclusion in the proposed list of equipment for standardisation

Tuesday, 15th June, 1982

9.00 - 10.30	Finalisation of information details on inventory equipment
10.30 - 11.00	Break
11.00 - 12.30	Formation of initial set of lists of equipment to be submitted to the Equipment Standardisation Sub-Committee for detailed discussion as Standardised Equipment
...30 - 1.00p.m.	Break
...00 - 2.00p.m.	Finalisation of Equipment Lists and close of Training Course & Workshop

Equipment Standardisation Training Course & Workshop

List of Participants

(1) Mr. Choki Dorji
Technical Assistant, Department of Education

(2) Mr. Kunzang Dorjee
Section Officer, Department of Power

(3) Mr. Tshering Wangchuck
Forest Ranger, Department of Forest

(4) Mr. Harka Narayan Pradhan
Deputy Radio Officer, Department of Wireless

(5) Mr. Siddki Karna Sharma
Under Secretary, Ministry of Finance

(6) Mr. Arun Kumar Bhaumik
Assistant Engineer (M), Public Works Department

(7) Mr. Sosthenes D. Akoto
U.N. Volunteer, Government Workshop, Thimphu

(8) Mr. Karma Namgyel
Foreman, Government Workshop, Thimphu

(9) Mr. Golong Tshering
Welfare Officer, Department of Health Services

(10) Mr. Nar Bahadur Tamang
Administrative Officer, Department of Health Services

(11) Mr. Kunzang Wangchuck
Storekeeper, Department of Health Services

(1)

Royal Government of Bhutan

Equipment Standardisation Committee

Chairman & Members - June 1982

1. Lyonpo Sangye Penjor,
   Honourable Minister of Communication & Tourism - Chairman
2. Dasho C. Dorji
   Director, Department of Forest, Thimphu.
3. Dasho Pem Tshering
   Director, Department of Industry & Mines, Thimphu.
4. Dasho Pema Wangchuk
   Director, Department of Agriculture, Thimphu.
5. Mr. Dorji Norbu
   Director, Public Works Department, Thimphu.
6. Dasho (Dr.) T. Youten
   Director, Department of Health Service, Thimphu.
7. Mr. A.K. Pradhan
   Director, Department of Power, Thimphu.
8. Mr. T. Younten
   Director, Department of Wireless Communication, Thimphu.

(cont)

Royal Government of Bhutan

Equipment Standardisation Committee

Chairman & Members - June 1982

9. Mr. Sonam Tshering
Deputy Secretary, Ministry of Finance, Thimphu.

10. Mr. Pema Wangdi
Deputy Secretary, Division for International Economic Co-operation, Thimphu.

11. Mr. Thinley Gyamtsho
Deputy Secretary, Ministry of Trade, Industry & Forests, Thimphu.

12. Lt. Ugyen Tenzin
Deputy Director, Central Stores for Transport & Workshop, Phuntsholing.

13. Mr. Karma Wangchuk
Mechanical Engineer, Government Workshop, Thimphu.

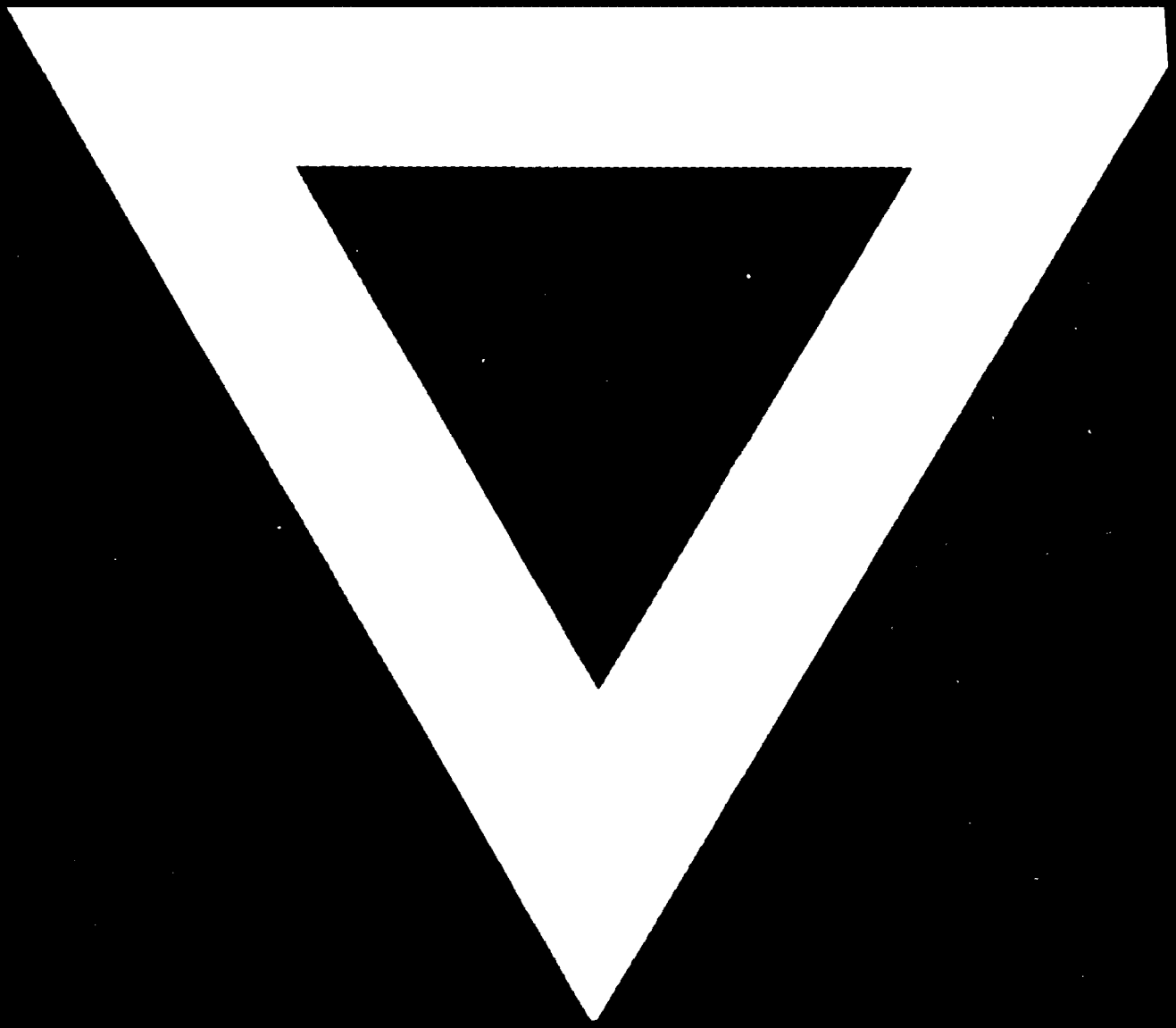
14. Representative - Chamber of Commerce, Thimphu.

15. Mr. Lakpa Tshering
Officer-in-Charge, Technical Education Cell, Thimphu - Secretary.

Equipment Standardisation Sub-Committee

Chairman & Members - June 1982

1. Mr. Lakpa Tshering - Chairman,
   Officer-in-Charge, Technical Education Cell, Thimphu,
2. Dasho C. Dorji,
   Director, Department of Forest, Thimphu.
3. Dasho Pem Tshering,
   Director, Department of Industry & Mines, Thimphu.
4. Dasho Pema Wangchuk,
   Director, Department of Agriculture, Thimphu.
5. Mr. Dorji Norbu,
   Director, Public Works Department, Thimphu.
6. Mr. A.K. Pradham,
   Director, Department of Power, Thimphu.
7. Mr. Karma Wangchuk,
   Mechanical Engineer, Government Workshop, Thimphu.



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