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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

TRAINING COMPONENT OF THE SUDAN SUGAR REHABILITATION PROJECT

SF/SUD/86/003

SUDAN

Technical report: Technical services for training under the Sudan Sugar Rehabilitation Project - PHASE I*

Appendices I - III

Prepared for the Government of Sudan
by the United Nations Industrial Development Organization

Based on the work of John Bye, chief technical advisor

(incorporating extracts and recommendations from reports of other UNIDO experts assigned to the Project)

Backstopping officers: G. Anestis, Section of Integrated Industrial Projects and M. El Gallaf, Industrial Training Branch

* The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Secretariat of UNIDO. This document has not been edited.

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* Contained in IO/R.123/Add.1 and IO/R.123/Add.2

APPENDIX I

AGREEMENT FOR TECHNICAL SERVICES ON TRAINING UNDER THE SUDAN SUGAR REHABILITATION PROJECT

Agreement between the Government of the Republic of Sudan represented by the Sugar Project Implementation Committee (SPIC) in the Ministry of Industry (hereinafter called "The Client") and the United Nations Industrial Development Organization.

Whereas the United Nations Industrial Development Organization (hereinafter referred to as "UNIDO") and the Client have decided to enter into an agreement for implementation of the training component (hereinafter called "The Services"), under the Sudan Sugar Rehabilitation Project (Credit 1506 SU) (hereinafter referred to as "the Project") which is more fully described in the Terms of Reference dated 19 June 1987 attached as Annex A hereto:

Whereas the Client has decided to designate UNIDO for the provision of the Services,

Now therefore, the Client and UNIDO hereby agree as follows:

Article I

1. UNIDO shall be responsible for the provision with due diligence and efficiency of the services described in Annex A to this Agreement. The duration of the services is to be calculated from the date on which this Agreement becomes effective.
The work plan for such services is set forth in Appendix I to Annex A to this Agreement.

2. The client shall retain overall responsibility for the implementation of the project.

3. UNIDO and the Client shall consult closely with respect to all aspects of the provision for the services under this Agreement.

Article II

1. In accordance with its applicable financial regulations and financial rules, UNIDO shall open a special account to which all transactions under this Agreement shall be charged or credited.

2. The Client shall, in the manner referred to in paragraph 3 below, reserve for the cost of the Services a sum estimated at US$ 3,351,236, and UNIDO shall use such funds to meet the costs of the services, including programme support costs.

3. The Client shall promptly after the effective date of this Agreement take steps to present to the International Development Association (IDA) a blanket withdrawal application for reservation of the funds from the credit 1506, a copy of the blanket withdrawal application will be forwarded to UNIDO.

4. The cost of services estimated for the initial period of 6 months shall be transferred to UNIDO upon its request into an account designated by it. Thereafter payment requests shall be submitted by UNIDO in conformity with the blanket withdrawal application, based on quarterly statements of expenditures during the previous three months and estimated expenditures for the next 6 months, less any payments actually received in respect of that period. Payments under this procedure shall not prejudice the right of the Client to dispute any amount claimed by UNIDO and to instruct IDA to adjust future payments by the amount in dispute upon informing UNIDC accordingly. The Client also retains the right to terminate this payment arrangement by notice in writing to UNIDO.

5. UNIDO shall deposit any payments received in a special account for implementation of the project. The funds in the special account shall be kept separate from other funds.

6. All financial accounts and statements shall be expressed in United States dollars, and all transactions shall be converted into United States dollars at the rate of exchange in effect on the date of each transaction.

7. The personnel shall be assigned to work with the Sennar training centre or its successors designated by the Client, shall work under the guidance and directives of UNIDO and shall perform the duties assigned to them for the implementation of the services in accordance with the overall directives of the Client.

8. UNIDO shall not be required to commence or continue the provision of equipment, supplies or services until the respective payments referred to above have been received into the special account. UNIDO shall not assume any liability in excess of the funds paid into the special account.

Article III

1. The special account shall be charged with actual expenditures incurred by UNIDO in the performance of activities under this Agreement.

2. The special account will also be charged with an amount equivalent to 13 (thirteen)percent of all expenditures from the special account, which percentage shall be a charge for programme support costs incurred by UNIDO in the implementation of the project financed under the special account. The programme support activities shall conform to the details set out in Annex A to this Agreement.

3. The special account will also be charged with an amount equivalent to 1 (one) percent of the remuneration of net salary of persons, engaged by UNIDO and whose engagement is financed by the special account, to provide a reserve for coverage of any claim for service-incurred death, injury or illness, under the applicable UNIDO regulations and rules or contracts, which reserve cannot be refunded to the Client.

Article IV

1. UNIDO shall commence and continue to provide services under this Agreement on the receipt of payments in accordance with Art. II, paragraphs 2, 3 and 4. UNIDO shall administer the activities in accordance with the requirements of the Client as communicated within the framework of this Agreement.

2. The Client undertakes to meet the actual costs of the services specified in Annex A, and UNIDO undertakes not to make any commitments for services not specified in Annex A without the approval, in writing, of the Client.

3. If the Client and/or UNIDO consider that changes between components and/or additional services, not foreseen in the Agreement are required, UNIDO will submit a revised budget for approval by the Client showing the required changes in inputs and/or adjusted financing that will be necessary. It shall become operative upon acceptance by both parties.

4. UNIDO shall provide the personnel needed to carry out the services. In the discharge of their responsibilities in accordance with the respective terms of reference contained in their respective job descriptions, such personnel shall be assigned to work with the Client, and shall co-operate closely with the Client's Staff and shall perform the duties assigned to them for implementation of the services in accordance with overall directives laid down by the Client in consultation with UNIDO. UNIDO shall provide such personnel with appropriate guidance, supervision, administrative support, technical backstopping and advisory services as UNIDO may deem necessary for the successful implementation of the services.

5. The total project budget shall also include a budget line containing a 5 (five) percent contingency reserve that shall be available to meet unforseen expenditures for the activities, if required. Any amount of the reserve not required for this purpose shall be returned to the Client.

Article V

1. Ownership of equipment, supplies and other property financed under this Agreement shall vest in SPIC, which shall ensure that it is used solely for the project.

2. UNIDO shall in addition to the insurance arrangements existing under its normal procedures, make appropriate arrangements as may be requested by the Client within the funds available.

Article VI

Evaluation of the activities financed under this Agreement, including joint evaluation by UNIDO and the Client shall be undertaken in accordance with the provisions contained in Annex A.

Article VII

The accounts and expenditures under this Agreement shall be subject to the internal and external auditing procedures of UNIDO. Such audit reports shall be furnished annually to the Client for review, acceptance or observations.

Article VIII

In addition to any reports specified in Annex A, UNIDO shall provide the Client with the following statements and reports in the format normally followed by UNIDO for accounting and financial reporting:

(a) A quarterly financial statement showing income, expenditures, assets and liabilities for each quarter with respect to the funds transferred to the account of UNIDO; and estimated expenditures for the ensuing 6 months.

(b) A final financial statement within 6 months of termination or expiration of the Agreement.

Article IX

UNIDO shall notify the Client when, in the opinion of UNIDO, the purposes for which the Agreement was established have been realized. The date of confirmation by the Client of such notification shall be deemed to be the date of operational completion of the services. This Agreement shall continue in force for the purposes stated in Article XII.

Article X

1. Questions arising under this Agreement which are not covered by or subject to international law shall be subject to and construed in accordance with the law of the Republic of Sudan.

2. Any dispute, controversy or claim arising out of or in connection with this Agreement or any breach thereof shall, unless it is settled by direct negotiation, be settled by arbitration in accordance with the United Nations Commission on International Trade Law (UNCITRAL)

Arbitration Rules in force on the date when this Agreement takes effect. The parties hereto agree to be bound by any arbitration award rendered under this section as the final adjudication of any dispute.

3. Nothing in or relating to any provision shall be deemed a waiver of the privileges and immunities of the Government or of UNIDO.

Article XI

1. This Agreement may be terminated by either party on 30 days notice to the other party, subject to the continuance in force of Article XII for the purposes there stated.

2. The Client may at any time give notice in writing of its intention to terminate the services of any of UNIDO's project personnel which appears to be unsatisfactory for the Client. Within 30 days UNIDO shall take action for appropriate replacement of such personnel.

Article XII

1. On operational completion of the services as specified in Article IX or termination of this Agreement as specified in Article XI the special account shall continue to be held by UNIDO until all expenditures already incurred by UNIDO have been satisfied from such funds, or for a period of 6 months whichever is earlier.

2. Thereafter any surplus remaining in the special account shall be returned to the Client or disposed of as requested by the Client and any balance due to UNIDO under Article IV shall be reimbursed by the Client upon submission of a final financial statement in accordance with Article VIII.

Article XIII

This Agreement shall enter into force upon signature.

In Witness Whereof, the undersigned, being duly authorized thereto, have signed the present Agreement in two copies in English

For the United Nations Industrial Development Organiztion:

Mr Horst P.F. Wiesebach,
Deputy Director-General, Department for Programme and Project Development

Date: 19 June 1987

Place: Vienna

For the Client:

Mr Badr-el-din Habbani,
Chairman, Sugar Project Implementation Committee

Date: _____ 1987

Place: _____

ANNEX

TERMS OF REFERENCE

SF/SUD/86/003

1. BACKGROUND AND JUSTIFICATION

1.1 The State of the Sugar Industry in Sudan

Sudan enjoys a comparative advantage in sugar production due to its favourable conditions for growing sugar cane. The introduction of sugar industry has been an important step towards economic and social change in the areas round the factories and in the country as a whole. The first sugar mill in Sudan was established in 1962, and within the following 20 years the Sudanese sugar industry was strengthened with four additional establishments, as indicated below:

Factory	Start-up year	Present Capacity (t/a)
El Guneid, Gezira Province	1962	60,000
New Halfa, Kassala province	1965	90,000
Sennar, Blue Nile Province	1977	110,000
Assalaya, White Nile Province	1979	110,000
Kenana, White Nile Province	1980	330,000
		700,000

In recent years the output in the public sector mills (El Geneid, New Halfa, Sennar and Assalaya) has been dissappointing. Production at Kenana, the private sector company, was approximately 295,000 t in 1985/86, and estimates for the fiscal year 1986/87 indicated an output of about 310,000 t. In the case of the four public sugar mills these figures were 192,000 tons and 158,000 tons for 1984/1985 and 1985/1986, respectively. The most recent data still indicates a very high underutilized production capacity in the public sector.

1.2 The State of Sugar Industry Training

The four sugar estates in the public sector covered by the Rehabilitation Project employ over 7,400 professional, technical and administrative staff, and over 15,000 unskilled personnel on a seasonal basis. This makes the sugar industry as one of the leading economic sectors in Sudan. These positions, established over a number of years, cover a wide range of technical and professional skill requirements. Due, however, to the increasing unattractiveness of the package of salary and incentives, the turnover has been high, and financial constraints have impeded manpower development.

The estates depend on the education system of the country for their supply of personnel at different levels. The Vocational Training Centres provide basic training for artisans, the Polytechnics for technician level, and the Agricultural and Engineering Colleges, for Senior engineering and management personnel. The institutions primarily involved are: the four

Vocational Training Centres; the Technical Institutes of Agriculture at Wad Medani and Damazien; the Mechanical Engineering College at Atbara; the Polytechnics at Khartoum and Gezira; and the University of Khartoum which provides a specialized two-year post-graduate diploma course in Sugar Technology. In addition, the academic secondary schools, the technical secondary schools and the University of Khartoum provide the output at the general academic levels. The output from these at technical and skilled levels is not however adequate to cover the full needs of the industry.

In addition to the above, the Sennar Training Center, which is located within the Sennar Sugar Estate, was established to provide training within the industry itself for the required number of artisan level entrants. The Center, however, has been practically dormant for a variety of reasons. The main deficiencies could be considered as inadequate infrastructure including building facilities, lack of finance, lack of proper organization of and manning by skilled trainers; and inadequate provision of hostel rooms, teaching facilities and equipment as well as other accommodation and utilities. In addition to the trainers, the administrative and support staffing of the Centre is also very limited.

The present facilities of the Centre consist of board and lodging for 160 trainees, 6 classrooms, four workshops with some equipment, 15 houses for the local staff, 7 pre-fabricated houses for international personnel to be made available with appropriate facilities upon arrival of experts. In addition to the training director, there are 6 potential instructors who currently, assisted by other educational institutions, are preparing vocational training as well as training for administrative personnel. There are also 15 local staff.

As a result, training, both external and in-house, has ceased to keep pace with the evolving needs of the industry which includes moving to other jobs. There is a dire shortage of trained staff at all technical, vocational and operational levels in all the estates. At higher technical levels, the employees have been left with only the entry-level professional education they had received, with practically no systematic attempt at upgrading skills as required for middle and senior management positions.

One of the long-term goals and development plan priorities of the GOS has been the self-sufficiency, and if possible an export surplus in sugar.

To correct the poor performance of the public sector sugar mills, the GOS launched a sugar rehabilitation scheme. The GOS felt that training should play a major role in the rehabilitation of the public sector, and a continuing role in the increase of production with reduced production cost and in the development of the whole industry through improved efficiency by providing the skilled manpower.

It has been noted that this can be achieved only through a long-term training programme with an emphasis on practical skills and technical management training of Sudanese personnel at all levels, using local facilities. In this connection an assessment of training needs of the sugar industry was commissioned by the GOS in association with UNIDO. This study confirmed the need for the establishment of a Sugar Training Centre to be located centrally at the Sennar Sugar Estate with the objective of achieving self-reliance as far as possible in training as also proposed under the Technical Report and draft project proposal prepared by UNIDO under the technical assistance project RP/SUD/83/004 and RP/SUD/84/001, respectively.

In order, however, to reach a level of self-reliance for producing the qualified manpower needed in the sugar sector there is the need to establish and strenghten the training capacities of the individual sugar plants/estates. Implicit in this was the idea that future assistance should not focus solely on the strengthening of the training capacity of the Sennar Sugar Training Centre, but also establish training units at each estate as part of the overall training scheme and training infrastructure, particularly for on-the-job training to train operators and workers.

2. OBJECTIVES

2.1 Development Objective

The development objective is to increase the production with reduced production cost through improved efficiency by providing the skilled manpower through training which constitutes an essential element of the sugar rehabilitation project.

2.2 Immediate Objective

The immediate objectives are to:

- Rehabilitate and strengthen the Sennar Sugar Training Centre (SSTC) complex with the appropriate training and accommodation facilities;

- Establish an integrated training capacity and mechanism at SSTC and the four public sugar estates by providing the inputs including the training infrastructure and training and support staff, needed to make training a viable activity on continuing basis for effective job performance oriented modular training to be conducted at SSTC and the facilities of the sugar industry;

- Provide induction and up-grading training supplementary to the national education system of Sudan in order to develop appropriate skills and know-how to meet the needs of the (a) training officers, trainers and instructors; (b) engineering personnel; (c) technicians and operatives; (d) administrative and financial personnel; (d) field staff.

The emphasis of the training to be provided through the SSTC and on-the-job training in the estates would be on making full use of the national education and developing skills to meet the special requriements of the sugar industry sector at various disciplines and levels.

3. PROJECT OUTLINE

The project will consist of two phases, i.e. the preparatory and the implementation phases.

3.1 Phase I: Preparatory phase

This will be the start-up phase with a six month assignment of the UNIDO Chief Technical Adviser (CTA), the Senior Training Expert (STE) and at least 3 short-term consultants. They will be stationed at Sennar but travel within

the country visiting the sugar estates, educational institutions and relevant Sudanese Authorities with their Sudanese counterparts to assess the training needs, prepare programme outlines, advise on training and other staff requirements of the SSTC and of the four training units; on the rehabilitation of training facilities and training equipment and prepare the details of the work plan related to the outputs, activities and inputs for the implementation phase

The preparatory phase will start after four months following the signing by Sugar Project Implementation Cell (SPIC) on behalf of the Government of Sudan, of the Agreement to which the present terms of reference form a part of it as Annex I. Within the four months period two months are required for SPIC's and UNIDO's mutual concurrence on the assignment of the above indicated UNIDO experts and their counterparts consisting of at least one counterpart for CTA and three for the STE. The training and duties assignement of the short-term consultants and their counterparts (two for each consultants) will be determined one month after the assignment of the CTA and STE.

3.2 Phase II: Implementation phase

The phase II which will start according to the provisions detailed during phase I which inter alia include rehabilitation and extension of training, office and accommodation facilities and the provision of other appropriate logistical facilities and assignment of UNIDO training experts and their counterparts and support personnel as laid down in the terms of reference to be finalized during phase I.

The phase II will last for two years. This, however, will depend on the starting date of phase II. The activities will be adjusted accordingly. The duration of the project is subject to an extension by one year. This phase involves the establishment of the training capacity and implementation of the training activities through:

- The provision of the building facilities for training, training and demonstration equipment, office, board and lodging, transportation and communication and other logistical facilities for SSTC and for the training departments of the sugar estates;

- The assignment of UNIDO experts, counterparts, training and support personnel for SSTC and for the training departments of the four sugar estates;

- The development of a training infrastructure and a training mechanism/ process through co-operation and co-ordination between the SSTC and the training departments of the sugar estates and the staff of Management and Technical Services (MATS).

- Training of training officers and trainers at SSTC and overseas.

- In-depth assessment of training needs.

- Preparation of an integrated performance oriented modular training programme.

- The development of curriculum and training materials based on an in-depth assessment of training needs;

- The organization, validation and evaluation of training activities.

5. ACTIVITIES AND MODALITIES OF IMPLEMENTATION FOR PHASE I

5.1. Purchase of two project cars following signature of the Agreement and receipt of specifications and availability of funds.

5.2. Assignment of CTA and STE;

5.3. Provisional assignment of Counterparts for CTA and STE subject to mutual confirmation following an orientation and probationary period of three months. One of the three counterparts of the STE will be Deputy Director of the Director of SSTC.

5.4. The CTA assisted by the STE and their provisionally appointed counterparts will visit the individual sugar estates, educational institutions and other appropriate establishments for preliminary work on the detailed assessment of training needs and for the recruitment of counterparts and training officers needed for the assessment of training needs and development of modular training programme framework.

5.5. The CTA and STE assisted by the short-term consultants and their provisionally appointed counterparts will prepare a detailed indication of facilities and workplan required to rehabilitate the training, office, accommodation including board and lodging facilities for trainees and other facilities of the SSTC and associated facilities including the establishment of the training department of the sugar estates. The specifications for the building contractors and the costing for the rehabilitation and extension will be done by an independent contractor.

5.6. The CTA and STE assisted by the appropriate short-term consultants will organize a training programme on job analyses, training needs assessment and analyses for the counterpart candidates prior to the detailed assessment of training needs for the preparation of detailed course for induction and up-grading skills and knowledge of managerial/supervisory and technical personnel engaged in plants and agricultural and other related operations.

5.7. - Training needs assessment, preparation of course contents, recruitment of candidates for counterpart. for Phase II of project activities;
- Monitoring of the rehabilitation and extension of the SSTC training and office building and accommodation including board and lodging facilities required for trainees, UNIDO and Counterpart and support personnel;
- Preparation of an orientation programme(s) for counterpart candidates, training officers and key trainers as a preparation for final selection and appointment of counterparts, training officers and key trainers for not less than two months overseas training for trainers.
- Preparation of list and specification for pilot plant, training and demonstration and laboratory equipment.

5.8. Three weeks orientation training course by CTA, STE and short-term training consultant(s) for training of counterparts, training officers and trainers on management, the training, the training function, training methodology and technicians.

Final selection of counterparts and other training staff will be finalized following the above training and a programme for overseas training to commence at the beginning of Phase II under the supervision and monitoring of CTA, STE, UNIDO backstopping officer and the area officer on the UNIDO side and SPIC on the side of the GOS will be prepared.

5.9. Final report covering Phase I, to include inter alia the achievements of Phase I and a detailed work programme for the inputs and activities and modalities of implementation for Phase II to achieve the outputs on given specified target dates will be prepared. The work plan for Phase I is as per Appendix I.

The technical report will include the number of counterparts/training officers, full- and part-time instructors and other personnel and officers required for SSTC and training departments. It will also include the number of personnel at different activities in each sugar estate, course outlines for induction training and for staff at different levels depending on their training needs based on job performance. The schedule of the training activities will include those to be conducted at the Centre and those courses to be conducted through on-the-job training at the sugar estates. The report will include budget estimates both for the external input, i.e. training equipment, UNIDO experts, overseas training and study tours, staff travel and miscellaneous; and for the internal inputs, i.e. training, office and accommodation facilities, including board and lodging for trainees.

With the exception of the aforesaid training activities for assessment of the training needs and orientation programme(s) for counterpart and training personnel no training would yet be provided for the sugar estate personnel.

The counterpart and support personnel, transportation, office and other facilities will be available on a continuous basis to assist the UNIDO experts to accomplish their assignments. The facilities and required personnel including the departmental trainers of each of the four sugar estates will also be available in conducting the training needs survey and analysis and other activities foreseen during Phase II.

The cost estimates for Phase I provides funds for a study tour for about 10 days for five senior management officials responsible in the development of the training facilities at SSTC and at the estates to selected training institutions which could be used for overseas training of counterparts and trainers/instructors.

It will also include cost estimates and their distribution according to the work plan for inputs to be provided in final by the GOS.

The final report will be submitted to SPIC after the completion of Phase I. The tentative work plan is Appendix I.

6. SCOPE OF ACTIVITIES AND MODALITIES OF IMPLEMENTATION AND WORK PLAN FOR PHASE II

The starting of the two-year period for the activities foreseen for Phase II will depend on the satisfactory provision of training facilities including office and accommodation, board and lodging for trainees and other logistical facilities as well as counterpart and support personnel which are to be determined at the end of Phase I. The starting of Phase II will start upon the concurrence of both UNIDO and SPIC on behalf of the GOS on the fulfilment of conditions provided under the final report of Phase I and acceptance by SPIC of the Work Plan and programmes presented by UNIDO to achieve the objectives of Phase II. The first activities will be the starting of the overseas training for confirmed counterpart and training staff and the reassignment of the CTA and STE. The training of trainers could start one month prior to the initiation of the field operations for Phase II.

The CTA, the STE and other UNIDO training experts in selected fields to be determined by the end of Phase I, in conjunction with their counterparts at the SSTC, the training departments of the sugar estates and in consultation with the MATS trainers and as may be appropriate with the Sudanese educational institutions and will:

- develop and prepare the curricula and training materials for induction and up-grading courses for difference categories and level of personnel to be conducted at SSTC and the sugar estates; on the basis of in-depth assessment of training needs;

- provide further training for counterparts, trainers and instructors;

- establish the mechanism and process for courses for estate personnel

- organize as per established work plan the courses at SSTC and sugar estates;

- organize further overseas training and study tours for management and training staff;

- assist in and monitor of training activities organized by the training departments of the sugar estates;

- validate and evaluate the training activities;

- weld together a training system and capacity;

- the detailed terms of reference and the work plan for Phase II will be prepared at the end of Phase I and form part of the final technical report for Phase I.

- The training will be performance and function oriented within an integrated modular approach to meet the manpower requirements.

- The training function will be a continuous process and will be based on the continuous assessment and analysis of the manpower and training needs of the industry.

- The training will be based on an integrated approach to industrial training in the sugar industries, covering operations under actual and simulated conditions. The facilities of the Centre will be used for training of training officers, trainers, instructors, middle and high-level technical and managerial personnel, supervisors, technical and other personnel through induction and upgrading courses. The Centre in performing its training and other activities will make use of the facilities of the four sugar estates.

- The training provided under this project will be aimed at providing and upgrading the skills and technical know-how of personnel to the level of qualification to perform the job, which will be defined by the job description. It will also be aimed at career development for higher positions.

- One of the key elements of the project is the training of trainers, including training officers and instructors both for the SSTC and the Sugar Estates. This will enable the industry to respond to specific manpower needs by upgrading the skills of the personnel currently employed and those to be newly recruited for the industry.

- UNIDO, as the executing agency will make all necessary logistical arrangements for the recruitment of experts, ordering and delivery of eqipment and placement of fellowships. It will provide support service through its field and Headquarters staff, progress reports and review meetings. It will be, however, SPIC's and Government of Sudan's responsibility for the timely provision of training, accommodation, board and lodging and other facilities, qualified counterparts and candidates for local and overseas training.

- The training activities to be provided under the project are considered as a vital management instrument for the rehabilitation of the sugar industries.

- The project budget is as per 8.1 and 8.2 and the work plan will be finalized at the end of phase I.

In assessing the training needs and in preparation of training courses and in determination of other project activities and inputs such as finalizing job descriptions of UNIDO experts and their counterparts and the work plan, the information provided in the 1983 UNIDO technical report prepared under (RP/SUD/83/004) as well as Annexes I, II, III and IV related respectively to the staffing of SSTC, course outline, UNIDO experts, training requirements and proposed work programme of the draft project proposal prepared in 1984 under RP/SUD/84/001, will be taken into consideration. The job descriptions of CTA and STE which also cover the duties for phase I, and draft job descriptions for other UNIDO experts prepared on the basis of the technical report and draft project proposal prepared under RP/SUD/83/004 and RP/SUD/84/001 are as per Annex VI.

7. OUTPUT

7.1 Phase I

- Terms of reference including the work plan for the rehabilitation and extension of training, office, accommodation including board and lodging and other supporting facilities for SSTC and for the training departments of the four public sugar estates;

- 12 trained Counterparts for the assessment and analysis of training needs;

- A study on the assessment and analysis of training needs;

- A course content and programme;

- 24 trained counterparts and trainer candidates in management the training function, training methodologies and techniques for the first group of overseas training;

- A training programme for overseas training for 15 confirmed counterparts, i.e. training officers, trainers and instructors in training methodology and techniques, audio-visual aids, sugar production technology, chemical control, agricultural engineering and other fields such as maintenance systems. The duration and exact fields will be specified during Preparatory Assistance Phase on the basis of the qualifications and needs of the trainees.

- A study tour programme for five concerned officials to selected overseas training institutions;

- Detailed terms of reference including work plan for outputs, activities, inputs for Phase II;

- Technical report to cover the implementation of Phase I and detailed terms of reference for Phase II.

7.2 Phase II

With the completion of Phase II, the main project outputs could be as follows:
A training infrastructure and capacity which includes:

(1) The physical facilities of

(a) the rehabilitated and extended Sennar Sugar Training Centre, consisting of the buildings equipped with training workshops, laboratories, classrooms and other training facilities and office facilities;

(b) housing for the staff;

(c) board and lodging for trainees;

(d) the four training departments of the four sugar estates with upgraded facilities.

(2) Training officers, instructors and administrative personnel

(a) The Sugar Training Centre personnel:

(i)	National Director	1
(ii)	Training officers	15
(iii)	Full-time instructors	20
(iv)	Administrative and support personnel	(to be determined)

8. PROJECT INPUTS

8.1 Local inputs

The training facilities of the SSTC and the trainee board and lodging facilities will be rehabilitated and extended on the basis of the recommendations of the UNIDO experts to be assigned during phase I of the project. Adequate training facilities for the four training departments of the sugar estates will be provided. UNIDO will also be provided with the appropriate support staff and full access to the facilities of sugar estates as well as transportation and communication facilities required to implement the foreseen project activities. The SSTC and training units will be equipped with appropriate office facilities. The exisiting accommodation facilities for UNIDO experts and counterparts will be rehabilitated and new accommodation will also be provided on the basis of established needs. The accommodation to be provided by the Client will be on the basis of a reasonable rent to be paid by the individual UNIDO Expert.

The timely provision of the above at the desirable level and quality will be the responsibility of SPIC on behalf of the GOS.

The training facilities, board and lodging for trainees as well as the accommodation facilities will be provided with the appropriate facilities such as water and electricity.

The local inputs indicated in the estimates provided by the GOS to be determined at the end of Phase I will also include appropriate furniture for facilities such as board, lodging and other facilities including utilities for UNIDO experts and counterparts. The above also applies to Phase I. The local inputs to be provided in kind will also cover administration costs; Appendix II also refers.

The initial costs are estimated as follows:

Main building of the Centre (repair and maintenance)	LS	200,000
New Office building	LS	150,000
Library	LS	80,000
Laboratory	LS	100,000
13 new family houses	LS	980,000
2 new bachelor barracks	LS	200,000
PHYSICAL REHABILITATION TOTAL	LS	1,710,000
ADMINISTRATION	LS	1,285,714
GRAND TOTAL	LS	2,995,714

The exact required amounts and allocations are to be calculated during Phase I.

8.2 Foreign inputs*

Budget for Foreign Inputs ($1,000)

Training Experts*	Phase I	Phase II		Total
CTA	46.5	100.2	105.0	251.7
STE (Mechanical Engineering)	43.2	93	97.8	234.0
Operation and Maintenance of Vehicles and Agricult. Equipment	14.6	58.4	61.2	134.2
Training Methods and Techniques	18.0	45.3	47.7	111.0
Audio visual Aids	15.0	22.65	23.85	61.50
Supervisory skills	-	45.3	64.88	110.18
Instrumentation and Electrical engineering	-	89.7	94.2	183.9
Sugar Technology	-	36.5	38.25	74.75
Agriculture related disciplines	-	88.2	94.2	182.4
Short-term Consultants	36	53.9	76.4	166.3
SUBTOTAL $ 1,509.930	173.3	633.15	703.48	1,509.93
Reserve Fund $ 15.100	1.733	6.332	7.035	15.10
SUBTOTAL $ 1,525.030	175.033	639.482	710.515	1,525.030
Fellowships/Study Tours	34	340	270	644
Equipment *	50	200	150	400
Project Cars	35	70	25	130
Staff Travel	10	25	20	55
Miscellaneous + reports	16	30	40	86
SUBTOTAL $ 1,315.000	145.0	665.0	505.0	1,315.0
SUBTOTAL $ 2,840.030	320.033	1,304.482	1,215.515	2,840.030
13 per cent overhead cost programme support $ 369.204	41.604	169.583	158.017	369.204
5 % Contingency $ 142.002	16.002	65.224	60.776	142.002
GRAND TOTAL $ 3,351.236	377.639	1,539.289	1,434.308	3,351.236

The project budget estimates distribution is as per Appendix III. The schedule of payments is reflected in Annex B.

* The final distribution of the relevant inputs for Phase II within the given periods and the list of equipment to be prepared by CTA and STE during Phase I.

In connection with the UNIDO project (field) personnel:

- UNIDO, in recruiting experts, will make an effort that preference will be given to candidates who, in addition to the required professional qualifications and English fluency, have also a working knowledge of Arabic.

- The Client and UNIDO will consult and agree on the employment of national (Sudanese) experts, taking into consideration, however, the professional requirements of the relevant posts and the expertise available.

- The costs budgeted in BL-11 include such elements as actual salaries and allowances as well as common staff costs such as appointment, home leave and repatriation travel in line with the staff rules. Upon the request of the Client, UNIDO will communicate the grade level of experts contracted by UNIDO. The Client will also be provided by UNIDO a copy of the staff rules which include the salary scales.

9. MONITORING, EVALUATION, REPORTING AND BACKSTOPPING

UNIDO, assisted by the CTA, would have overall responsibility for monitoring, evaluation and reporting. Monitoring and evaluation would be carried out every six months inter alia through submission of periodic progress reports and the proposed mid-term review to be jointly undertaken by UNIDO, co-financiers and the Government of Sudan. Particular attention will be paid to the progress made towards achieving the training of trainers, instructors and trainees, targets detailed in the outputs, as well as to the achievement of the objectives of the projects, i.e. establishment of a training capacity and capability. The provision of technical assistance in these areas would enhance UNIDO's and SPIC's ability to monitor operations and to evaluate results. For phase I, the monitoring and evaluation will be according to the Work Plan.

9.1 REPORTS

UNIDO and the Director STC shall be jointly responsible for the timely preparation and submittal or reports including the following:

- After 8 weeks from the initiation of phase I, a draft report presented to SPIC about the preparatory arrangements for training needs assessment (factory, workshop, agricultural operations etc.);

- After 20 weeks from the initiation of phase I, a report submitted to SPIC concerning the physical rehabilitation needs of the Centre, office and accommodation facilities and the training needs assessment of the sugar estates;

- Within 20 days after the end of phase I, the CTA will submit the final report to SPIC through SSTC concerning the details of phase II (courses, number of people to be trained, staff required, organization structure, costs, recommendations for follow-up of the physical rehabilitation of the Centre, office and board and accommodation facilities;

- Terminal reports prepared during phase II in accordance with the detailed plan for the implementation phase. Six monthly reporting schedule may be the most practical alternative. Reports ought to consist of the following components:

  - Summaries of the project's developments
  - Analysis of the programmes implemented
  - Progress evaluation
  - Advance statements of activities for the following reporting period
  - Problem analysis, measures taken
  - ETC.

Copies of these reports ought to be submitted to the SSTC and SPIC within 20 days following each reporting

- Within 30 days of the completion of the assignment, a final draft report which will contain in detail the results of the assistance services. This report will cover all the aspects of the services in accordance with the description of the Terms of reference. UNIDO will provide the SSTC and SPIC 20 copies of the final report in English, within 30 days after the approval of the draft.

9.2 Project Management and Backstopping

The designated officer in the Industrial Training Branch would be responsible for the overall project management through backstopping and supervision. The designated officer will be supported by a core group comprising relevant staff from the following Branches in order to facilitate efficient support from UNIDO HQs:

(a) Project Personnel Recruitment Branch
(b) Purchase and Contracts Branch (for equipment)
(c) Financial Services Division
(d) Agro-Industries Branch
(e) Engineering Industries Branch

The designated officer will maintain close supervision of the project personnel through regular missions in accordance with the Work Plan. Senior UNIDO staff will maintain close supervision of project management including periodic visits to the project site. Additional HQs and field support will be normally available according to the established practice.

APPENDIX 1

I. Work Plan for Phase I	Timing
- Placement of purchase order of two project cars	as soon as project signed and funds available
- Submission of candidate to SPIC (GOS) for CTA and STE	1.5 months after signing of project
- Submission of counterpart candidatures for CTA and STE for clearance by UNIDO	1.5 months after signing of project
- Clearance of CTA and STE candidates by SPIC	two weeks following presentation of CVs 1/
- Clearance by UNIDO of counterpart candidates for CTA and STE	Two weeks following receipt of CVs by UNIDO
- Assignement of CTA and STE	two months after clearance but not before satisfactory accommodation and office and other facilities needed for the experts are available at SENNAR Sugar Estate
- Assignment of counterparts for CTA and STE	two weeks before arrival of experts
- Preliminary work for assessment of training needs and for recruitment of counterparts and training staff	the first full month following assignment of experts
- Detailed indication of inputs and work plan for the rehabilitation and extension of training, office facilities of SSTC, four training departments, accommodation for experts, conterparts staff, trainees and utilities	by the end of second month
- First UNIDO report by CTA and STE	8 weeks after initiation of Phase I.
- Organization of training programme for counterparts and staff from SSTC and the 4 Training Departments for job analyses, training needs assessment and analysis	last week of second and and first week of third month
- UNIDO HQ mission including a training consultant to review the work of the first two-and-a-half months	first week of third month

1/ In case of non-clearance, one additional month will be required for submission of new candidatures

- Job analysis, training needs assessment and analysis	second week, third month to the middle of fifth month
- Submission candidatures of short-term experts to the Government (SPIC) including those for training of trainers, i.e. Training Methodology and Techniques and Audio-Visual Aids 1/	middle of third month
- Submission of counterpart candidates for short-term experts (BL 11-03 and 11-04) to UNIDO	middle of third month
- Monitoring the rehabilitation and extension of the SSTC facilities and accommodation	third to sixth month
- Second Report	20 weeks after initiation of project's activities
- Assignment of short-term expert's (BL 11-03 and 11-04) counterparts	middle of fourth month
- Preparation and implementation of orientation programmes for counterparts and trainers for selection of personnel for counterparts, training officers and and trainers for overseas training	middle of fifth to middle of six months
- Assignment of short-term experts	last week of fourth month
- Preparation and implementation of course for trainer candidates	second half fifth and first half sixth month
- Purchase and installation of basic training/demonstration equipment for training of trainers	by first half fifth month
- UNIDO's mission to Sudan to review the work and participate in the final selection of candidates for counter parts and training officers and trainers on the basis of their qualifications for overseas training and review progress on the rehabilitation and evaluation of training, office and accommodation facilities	middle of sixth month

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1/ The specialization, recruitment and assignment dates of the 4 m/m of short-term consultants will be determined by the CTA by the end of the third month at the latest.

- Preparation of technical report including detailed work plan for Phase II UNIDO expert in close consultation with the SSTC director	thirty days following termination of Phase I
- Study tour to selected training institutions for 5 staff	one month after completion of Phase I
- Review of progress on building by UNIDO consultant	six months after completion of Phase I

II. Tentative Work Plan outline for Phase II	Timing
- Joint UNIDO and Co-financiers Mission to Sudan for confirmation of availability of training and other facilities required to start the Phase II of the project.	One month following UNDP indication for the mission
- Start of recruitment of training expert for supervisory skills (ESS), instrumentation and electrical engineering (EEE)	As soon as confirmation of availability of facilities
- Recruitment of counterparts for EES	As soon as confirmation of availability of facilities
- Reassignment of CTA and STE, ESS and EEE	Two months after confirmation of availability of facilities
- Placement of orders for equipment	As above
- Starting of recruitment of trainers	2 weeks after arrival of CTA and STE
- First UNIDO Report	end of second month
- Preparation of curriculum and training materials of the first trainers/ instructors programmes	two months after arrival of CTA and STE
- Submission of candidatures of training methodology and audio-visual experts to SPIC for clearance (if the previous experts are to be replaced)	two and half months after arrival of CTA and STE
- Submission of candidatures for vehicle operation and maintenance, agricultural engineering and sugar technology to SPIC	two months after arrival of CTA (the assignment of the last two experts will depend on the cultivation and harvesting season of the cane sugar)

- Submission of counterpart candidatures to UNIDO	as above
- Confirmation of acceptance/reception of expert and counterpart candidates	two weeks after nomination received
- Receipt and installation of basic training equipment	three and a half months after arrival of CTA and STE
- Starting of first training course for trainers/instructors at SSTC	four months after arrival of CTA and STE

Note: Some of the training activities are reflected as the assignment of experts indicated in Appendix III. The more precise dates for the above and other activities for the first year and for the succeeding years including schedule of courses delivery of equipment and reporting missions will be determined during phase I.

APPENDIX 2

GOVERNMENT CONTRIBUTION IN KIND

(1) The physical facilities of

(a) the rehabilitated and extended Sennar Sugar Training Centre, consisting of the buildings equipped with training workshops, laboratories, classrooms and other training facilities and office facilities;

(b) housing for the staff;

(c) board and lodging for trainees;

(d) the four training departments of the four sugar estates with upgraded facilities.

(2) Training officers, instructors and administrative personnel

(a) The Sugar Training Centre personnel:

(i)	National Director	1
(ii)	Training officers	15
(iii)	Full-time instructors	20
(iv)	Administrative and support personnel	(to be determined)

(b) Personnel for the four sugar estates:

(i)	Training officers	8
(ii)	Full-time instructors	40
(iii)	Part-time instructors (allowing for wastage	600
(iv)	Middle and higher level technical and managerial personnel	300
(v)	Other technical and operational personnel (the exact number of personnel to be finalized under the technical report of Phase I)	

The initial costs are estimated as follows:

Main building of the Centre (repair and maintenance)	LS	200,000
New Office building	LS	150,000
Library	LS	80,000
Laboratory	LS	100,000
13 new family houses	LS	980,000
2 new bachelor barracks	LS	200,000
PHYSICAL REHABILITATION TOTAL	LS	1,710,000
ADMINISTRATION	LS	1,285,714
GRAND TOTAL	LS	2,995,714

The exact required amounts and allocations are to be calculated during Phase I.

UNIDO

PROJECT BUDGET/REVISION

3. COUNTRY	4. PROJECT NUMBER AND AMENDMENT	5. SPECIFIC ACTIVITY
Sudan	SF/SUD/86/003	J12309

2. PROJECT TITLE
Training Component of Sudan Sugar Rehabilitation Project
(credit 1506 SU)

1. INTERNATIONAL Training Expert (Functional titles required except for line 11-50)	16. TOTAL		17. Phase I **)		18. 1st year		19. 2nd year		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
11-01 Chief Technical Adviser (CTA)	30	251,700	6	46,500	12	100,200	12	105,000		
02 Senior Trng.Officer,Mech.Eng. STE	30	234,000	6	43,200	12	93,000	12	97,800		
03 Trng.Methodology and Techniques	14.5	111,000	2.5	18,000	6	45,300	6	47,700		
04 Audio-Visual Aids	8	61,500	2	15,000	3	22,650	3	23,850		
05 Oper.+Maiten.of Vehicles+Ag.Equip.	18	134,200	2	14,600	9	58,400	9	61,200		
06 Supervisory and Management Skills	14	110,180			6	45,300	9	64,880		
07 Instrumentation and Elec.Engineer	24	183,900			12	89,700	12	94,200		
08 Sugar Technology	10	74,750			5	36,500	5	38,250		
09 Agricultrual-Related disciplines	24	182,400			12	88,200	12	94,200		
10										
11										
12										
13										
14										
15										
11-50 Short-term Consultants	180	166,300	4	36,000	6	53,900	8	76,400		
Reserve Fund*)		15,100		1,733		6,332		7,035		
11-99 Sub-total—International experts*	100,5	1,525,030	22,5	175,033	82	639,482	86	710,515		

Phase II ***)

21. REMARKS

This does not include the amount of US $369,204 for 13 % overhead cost.

*) This is for the 1 % Reserve Fund for service incurred, illness, disability, etc.

* If more than 18 experts are required check here ☐ and attach continuation sheet 1A. This sub-total *must* include all experts.

**) It is based on the assumption that Phase I will start during the second part of October 1987.
***) The phase II is based on the assumption that it will start by July 1988.

UNIDO

PROJECT BUDGET/REVISION

Phase II

4. PROJECT NUMBER SF/SUD/86/003	16. TOTAL		17. Phase I		18. 1st year		19. 2nd year		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
OPAS EXPERTS (functional titles required)										
12-01										
12-02										
12-03										
12-99 Sub-total—OPAS experts[b]										
ADMINISTRATIVE SUPPORT PERSONNEL										
13-00 Clerks, secretaries, drivers										
13-50 Freelance interpreters (non-UNDP projects)										
13-99 Sub-total—Administrative support personnel										
UN VOLUNTEERS (functional titles required)										
14-01										
14-02										
14-03										
14-04										
14-99 Sub-total—UN Volunteers[b]										
15-00 Project travel										
15-50 Other personnel costs (including UNIDO staff mission costs)		55,000		10,000		25,000		20,000		
NATIONAL EXPERTS (functional titles required)										
17-01										
17-02										
17-03										
17-04										
17-05										
17-99 Sub-total—National experts[b]										
19-99 TOTAL—PERSONNEL COMPONENT	190,5	1,580,030	22,5	185,033	82	664,482	86	730,515		

[b] If additional individual budget lines are required, check here ☐ and attach continuation sheet 1A. These sub-totals must include budget lines listed on page 1A.

PROJECT BUDGET/REVISION

Phase II

PROJECT NUMBER SF/SUD/86/003	16. TOTAL		17. Phase I		18. 1st year		19. 2nd year		20.	
	m/m	$	m/m	$	m/m	$	m/m	$	m/m	$
SUBCONTRACTS										
21-00 Subcontracts										
TRAINING										
31-00 Individual fellowships										
32-00 Study tours: UNDP group training		54,000		34,000		10,000		10,000		
33-00 In-service training										
34-00 Non-UNDP group training		590,000				330,000		260,000		
35-00 Non-UNDP meetings										
39-99 TOTAL-TRAINING COMPONENT		644,000		34,000		340,000		270,000		
EQUIPMENT										
41-00 Expendable equipment		17,000		2,000		5,000		10,000		
42-00 Non-expendable equipment		513,000		83,000		265,000		165,000		
43-00 Premises										
49-99 TOTAL-EQUIPMENT COMPONENT		530,000		85,000		270,000		175,000		
MISCELLANEOUS										
51-00 Sundries		86,000		16,000		30,000		40,000		
55-00 Hospitality (non-UNDP projects)										
56-00 Support costs (CC and OC projects only)										
59-99 TOTAL-MISCELLANEOUS COMPONENT		86,000		16,000		30,000		40,000		
99-99 PROJECT TOTAL	190,5	2,840,030	22,5	320,033	82	1,304,482	86	1,215,515		
5% Contingency		142,002		16,002		65,224		60,276		
[c] NET UNDP CONTRIBUTION										

[c] For information only - not for PAD input

APPENDIX 4

TO THE TERMS OF REFERENCE

PROJECT TITLE: Training Component of the Sudan Sugar Rehabilitation Project (Credit 1506 SU)

PROJECT NUMBER: SF/SUD/86/003

BASIC TERMS AND CONDITIONS GOVERNING THE PROJECT

I. IMPLEMENTATION OF THE PROJECT

1. The Client shall have overall responsibility for the project, including responsibility for its implementation and the realization of its objectives, in accordance with the Terms of Reference.

2. The Client and UNIDO shall each carry out such activities or implement such measures as are stipulated in the Terms of Reference and the Work Plan forming part of the Terms of Reference, which they have undertaken to accomplish by signing this Agreement between the Client and UNIDO.

3. The Client shall inform UNIDO of the Client co-operating agency directly responsible for the Client's participation in the project. Without prejudice to the Client's overall responsibility for the project, the Client and UNIDO may agree that UNIDO shall assume primary responsibility for the implementation of the project in consultation and agreement with the co-operating agency; any arrangement to this effect shall be stipulated in the Terms of Reference or in the related Work Plan forming part of the Terms of Reference, together with arrangements for transfer of such responsibility to the Client or to any entity designated by the Client, which shall be envisaged in the course of project implementation and not later than at the operational completion of the project.

4. Compliance by the Client with any prior obligation agreed to be required for UNIDO execution of the project shall be a condition of performance by UNIDO of its responsibilities with respect to the project. Should provision of such services be commenced before such prior obligations have been met, it may be suspended or terminated without notice at the discretion of UNIDO.

5. UNIDO shall, as appropriate and in consultation with the Client, appoint a chief technical adviser or project co-ordinator responsible to UNIDO for overseeing the participation of UNIDO in the project at the project level. He shall supervise and co-ordinate activities or experts and other UNIDO personnel and be responsible for on-the-job training of Client counterpart personnel. He shall be responsible for the management and efficient utilization of all inputs financed from the special account, including equipment provided to the project.

6. In the performance of their duties, advisory experts or associate experts, consultants, firms, organizations and volunteers* shall act in close consultation with the Client and with persons or bodies designated by the Client and shall comply with such guidance from the Client as may be appropriate to the nature of their duties and the services to be given.

7. Patent rights, copyright rights and other similar rights to any discoveries or work resulting from UNIDO services under this Agreement shall belong to UNIDO. Unless otherwise agreed by the Client and UNIDO in each case, however, the Client shall have the right to use any such discoveries or work within the country free of royalty or any charge of similar nature.

II. INFORMATION CONCERNING THE PROJECT

1. The Client shall furnish UNIDO with such relevant reports, maps, accounts, records, statements, documents, statistical data and other information as it may request concerning the project, its implementation or its continued feasibility and soundness, or concerning the compliance by the Client with its reponsibilities under the Terms of Reference.

2. UNIDO undertakes that the Client shall be kept currently informed of the progress of its service activities under the project. Either party shall have the right, at any time, to observe the progress of operations on the project. Upon request of the Client UNIDO shall make available appropriate documentation.

3. The Client shall, subsequent to the completion of the project, make available to UNIDO at its request information as to benefits derived from and activities undertaken to further the purposes of the project, including information necessary or appropriate to its evaluation or to evaluation of UNIDO service, and shall consult with and permit observation by UNIDO for this purpose.

4. The Client and UNIDO shall consult each other regarding the publication, as appropriate, of any information relating to the project or to benefits derived therefrom.

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* United Nations Volunteers.

III. PARTICIPATION IN AND CONTRIBUTION OF THE CLIENT TOWARDS THE IMPLEMENTATION OF THE PROJECT

1. The Client shall meet charges relating to customs clearance of equipment and supplies, their transportation and insurance from the port of entry to the project site together with any incidental handling or storage and related expenses. Their insurance after release from the port of entry and, unless otherwise provided in the relevant Terms of Reference, its installation, commissioning and maintenance.

2. The Client also shall meet the salaries of trainees and recipients of fellowships during the period of their fellowships.

3. The Client shall, as appropriate, display suitable signs at each project identifying it as one executed by UNIDO.

IV. PRIVILEGES AND IMMUNITIES

1. The Client shall apply to UNIDO, including its organs, its property, funds, assets and its officials, the provisions of the Convention on the Privileges and Immunities of the United Nations, except that, if the Client has acceded in respect of UNIDO to the Convention on the Privileges and Immunities of the Specialized Agencies, the Client shall apply the provisions of the latter Convention, including any annex to that Convention applicable to UNIDO.

2. (a) The Client shall grant all employees, other than nationals of the Sudan employed locally, performing services on behalf of UNIDO, who are not covered by paragraph 1 above, the same privileges and immunities as are granted to officials under section 18 or 19, respectively, of the Conventions on the Privileges and Immunities of the United Nations or of the Specialized Agencies, as applicable.

(b) For purposes of the instruments on privileges and immunities referred to in the preceding parts of this chapter:

(1) All papers and documents relating to the project in the possession or under the control of the persons referred to in sub-paragraph 2(a) above shall be deemed to be documents belonging to UNIDO;

(2) Equipment, materials and supplies brought into, or purchased or leased by those persons within the country for purposes of the project shall be deemed to be property of the project administered by UNIDO.

3. The expression "persons performing services" as used in chapters IV and V of this appendix includes operational experts, volunteers, consultants and juridical as well as national persons and their employees. It includes governmental or non-governmental organizations or firms, which UNIDO may retain to implement or to assist in the implementation of UNIDO services to the project, and their employees.

V. FACILITIES FOR THE IMPLEMENTATION OF UNIDO SERVICES

1. The Client shall take any measure which may be necessary to exempt UNIDO, its experts and other persons performing services on its behalf from regulations or other legal provisions that may interfere with operations under this project and shall grant them such other facilities as may be necessary for the speedy and efficient implementation of UNIDO services. It shall, in particular, grant them the following rights and facilities:

(a) Prompt clearance of experts and other persons performing services on behalf of UNIDO;

(b) Prompt issuance without cost of necessary visas, licenses or permits;

(c) Access to the site of work and all necessary rights of way;

(d) Free movement within or to or from the country to the extent necessary for proper execution of UNIDO services;

(e) The most favourable official rate of exchange;

(f) Any permits necessary for the importation of equipment, materials and supplies and for their subsequent exportation;

(g) Any permits necessary for importation of property belonging to and intended for the personal use or consumption of officials of UNIDO or of other employees performing services on its behalf and for the subsequent exportation of such property.

(h) Prompt release from customs of the items mentioned in sub-paragraph (f) and (g) above.

2. The Client shall bear all risks of operation arising under this project. It shall be responsible for dealing with claims, which may be brought by third parties against UNIDO, its officials, or other persons performing services on their behalf, and shall hold them harmless in respect of claims or liabilities arising from operations under this project. The foregoing provisions shall not apply where the Client and UNIDO have agreed that a claim or liability arises from the gross negligence or wilful misconduct of the above-mentioned individuals.

VI. SUSPENSION OF SERVICES

UNIDO may by 30 days written notice to the Client suspend its services to the project if circumstances arise due to force majeure that interfere with the successful completion of the project or the accomplishment of its purposes. UNIDO shall, whenever possible, in the same or subsequent written notice, indicate the conditions under which it is prepared to resume its services to the project. Any such suspension shall continue until such time as such conditions are accepted by the Client and as UNIDO shall have given written notice to the Client that it is prepared to resume its services.

APPENDIX 5

CONFIRMATION OF GOVERNMENT'S ACCEPTANCE OF UNIDO PROJECT NUMBER SF/SUD/86/003

The Client (SPIC) on behalf of the Government of the Republic of Sudan, having requested the United Nations Industrial Development Organization to assist in the implementation of the "Training Component of the Sudan Sugar Rehabilitation Project (Credit 1506 SU)", hereby agrees that these terms of reference accurately reflect the nature and scope of the project and, as a precondition to the implementation of the project by UNIDO, undertakes to fulfil its counterpart obligations as described in the Terms of Reference and in the following appendices:

Work Programme (Appendix No. I)
Description of Government's contribution (Appendix No. II)
Project budget (Appendix No. III)
Basic terms and conditions governing UNIDO projects (Appendix No. IV)

Signed for the Government of the Republic of Sudan

_____

Mr Badr-el-din- Habbani, Chairman
Sugar Project Implementation Committee

Date: _____ 1987

Place: _____

APPENDIX II

STAFF DEVELOPMENT PROGRAMMES

DOCUMENTS AND REPORTS.

Contents

a. First Staff Development Training Programme Plan.

b. Design of stationary Format for Training Documents.

c. Model Training Programmes prepared by CTA.

1. Electric Are Welding.
   - Introductory Package for Graduate Engineers

ii. Plumbing and Pipe Fitting
   - Installation and Maintenance.

iii. Automotive Engineering
   - Motor Vehicle Basis Maintenance.

iv. Electrical Engineering
   - Basis Analysis for Estate Electrician Grade 1.

d. Programme Report - First Staff Development Training samples of Programme, (WITH HANDOUTS).

e. Programme Plans and Reports prepared by NSTC Instructors for Materials Validation Exercise.

i. Basis Instrument Course.

ii. Alignment of Drive Systems.

iii. Light Vehicles Preventative maintenance Programme Computer Training Programmes.

g. Second Staff Development Training Programme.

National Sugar Training Centre,
Sennar.

A. Staff Development Training Programme.

PROGRAMME PLAN.

Title: **The Introduction to a Modular System of Training to be Developed at the National Sugar Training Centre, Sennar.**

Date: NOVEMBER, 1988

J.Bye.UNIDO. C.T.A

PROGRAMME	:	The introduction to a Modular System of Training to be developed at the National Sugar Training Centre, Sennar.
DURATION	:	Twelve days- 15th to 28th Nov., 1988 (Inclusive).
A I M	:	To provide a uniform understanding of one specific model for a Modular Training System to be used as a basis for developing the various Training Programmes and courses to be established at the National Sugar Training Centre.
LOCATION	:	The National Sugar Training Centre, Sennar.
PARTICIPANTS	:	All Counterparts and Workshop Instructors of the Training Centre.
Plus	:	Nominated Training Officers from the four (4) Public Sector Sugar Mills.
Plus	:	Any visitors from Kenana Sugar Training Centre, (as participants or observors).
LANGUAGE	:	The language of the programme will be ENGLISH.
OBJECTIVE	:	At the completion of the programme each participant will have prepared a Modular Unit based upon the principles and guidelines set out by the programme presenter. The individual Modular Units will be integrated into a complete Learning Package prepared to International specifications, codes of practice and standard format as a group activity.

UNIDO

Subject Structure.

No.	%	Subject Fields.	Subjects.
1.	5	Introduction to the System Approach to Training:-	a. The development of a Modular System. b. Definitions and Terminology. c. The key characteristics of a Modular System.
2.	5	The Modular Concept :-	a. The philosophy of phased development of skills using Training Modules.
3.	10	Training Needs Assessment:-	a. Training Population Analysis. b. Preparing a Trainee Specification c. Job Specifications. d. Identification of Training Needs.
4.	50	Developing a Modular Training Package:-	a. Identifying a Modular Unit. b. Specifying the objective of a Modular Unit. c. Job analysis. d. Task analysis. e. Skills analysis. f. Identifying the steps of work within a Modular Unit. g. Analysing the steps of work. h. Identifying the Learning Elements within a Modular Unit. i. Writing the objectives for a Learning Element. j. Determining the contents of a Learning Element. k. Designing Assignments and Progress checks for Learning Elements. l. Preparing Performance Tests. m. Preparing Instructional Units for future development into Learning Elements.
5.	25	Implementing a Modular Training System:-	a. Preparing Instructor Guidance Material. b. Preparing Trainee Guidance Material. c. Managing the implementation of a Training Programme. d. Evaluating Trainee Progress and Performance. e. Validation of Training Material.

UNIDO

Subject Structure.

No.	%	Subject Fields.	Subjects.
6.	5	Follow-up and Feedback:-	a. Evaluating Efficiency and Effectiveness of Training. b. Designing and Carrying out follow-up procedures after Training.

METHODOLOGY

In order to achieve the objective of the programme the following procedures will be adopted:-

25% of time engaged in Seminar-Lecture activities.

75% of time occupied by supervised project work.

i.e. Individual and Group Projects will be assigned and whilst the time allocation may vary through the duration of the programme, as necessary, the ultimate aim is to spent 30% of total time available on Group Activities and 45% on Individual Project Activities.

The pattern of time allocation will be:-

07.00 to 07.30 - Seminar, discussion etc. to consolidate the previous days assignment activities.

07.30 to 09.00 - Presentation of subject material.

10.00 to 14.00
and
17.00 to 19.00 - Group and Individual Projects.

PROJECT ASSIGNMENTS

The Individual and Group Assignments will be selected and supervised as follws:-

The assignments will be concerned with the detailed development of Modular Units and Modular Unit Learning Packages.

The final sessions of the programme will be devoted to the presentation of the materials developed as a basis for assessment and evaluation.

INSTRUCTIONAL PRACTICE

The application of the training materials and presentation techniques developed during the programme will begin as soon as possible following completion. To this end the National Director for Training and the CTA have planned three Training Programmes to begin on the 3rd December, 1988. These are:-

1. Mechanical - A Practical Course on Skills Awareness for Graduate Engineers.

2. Auto. Mechanics - Basic Practical Course for Vehicle Maintenance Fitters.

3. Elect./Instruments - Basic Practical Course for Instrument Technicians.

Each programme will be limited to (16) participants (ideally 4 from each location) to allow for ease in Assessment of Trainee Performance and Validation of the Modular Units used.

REPORT

A joint report will be prepared by the National Director for Training and the CTA.

J. BYE, OCT. 88

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION. SI/SUD/80/003 TRAINING COMPONENT OF THE SUGAR REHABILITATION PROJECT

NATIONAL SUGAR TRAINING CENTRE - SEMINAR

PROGRAMME

WEEK No (1) FROM. 12th Nov. TO 17th Nov.

Time	SAT.	SUN.	MON.	TUE.	WED.	THUR.
07.00 to 09.00	Introduction to the Systems Approach to Training BYE	Training Needs Assessment. Trainee Specification - Job specification. BYE	Developing Modular Training Package. - Identifying MU. - Objectives - Job Analysis. BYE	Developing Modular Training Package. - Task Analysis. - Skill Analysis. - Steps of Work. BYE	Developing Modular Training Package - Identifying Elmnt. - Writing Objctvs. BYE	Developing Modular Training Package. - Assignments. - Prfrmnce Task. BYE
10.00 to 12.00	The Modular Concpt. BYE	Group Project Assignment Session BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND
12.00 to 14.00	PRIVATE STUDY	Individual Project Assignment Session BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND
17.00 to 19.00	PRIVATE STUDY	PROJECT WORK BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND	P R O J E C T BYE/POULI/BURGLAND	T U T O R I A L BYE/POULI/BURGLAND
Chairman						

Language of the Programme: ENGLISH

UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION. SI/SUD/86/003 TRAINING COMPONENT OF THE SUGAR REHABILITATION PROJECT

NATIONAL SUGAR TRAINING CENTRE - SENNAR

PROGRAMME

WEEK No (2) FROM. 19th Nov. TO 24th Nov.

Time	SAT	SUN	MON	TUE	WED	THUR
07.00 to 09.00	Developing Modular Training Package. - Instructional Units BYE	Implementing Mod. Training System. -Instructor Material. BYE	Implementing Mod. Training System. - Trainee Guidnce. Material. BYE	Implementation and Follow-up. Evaluating Trained Performance and Training Efficiency. BYE	Designing Follow-up System. BYE	PRESENTATION
10.00 to 12.00	P R O J E C T B / P / B	P R O J E C T B / P / B	P R O J E C T B / P / B	P R O J E C T B / P / B	PRESENTATION	PRESENTATION
12.00 to ..00	P R O J E C T B / P / B	P R O J E C T B / P / B	P R O J E C T B / P / B	P R O J E C T B / P / B	PRESENTATION	CLOSING REVIEW
17.00 to 19.00	P R O J E C T B / P / B	P R O J E C T B / P / B	P R O J E C T B / P / B	P R O J E C T B / P / B	PRESENTATION	
Chairman						

Language of the Programme: ENGLISH

B. DESIGN OF STATIONERY FORMAT FOR TRAINING DOCUMENTS

UNIDO		National Sugar Training Centre, Sennar.	

UNIDO	LEARNING PACKAGE	National Sugar Training Centre, Sennar.
		Modular Unit Instruction Sheet.
Modular Unit Title:		M.U.Code:
Occupational Area:	Field of Work:	

Objective:

UNIDO	LEARNING PACKAGE	National Sugar Training Centre, Sennar.
		Modular Unit Content Sheet.

Modular Unit Title :	M.U.Code:
Occupational Area:	Field of Work:

Modular Unit Description:

Learning Elements.

UNIDO	Name.	National Sugar Training Centre, Sennar.
		Modular Unit Assessment Check-List.

Modular Unit Title:	M.U.Code:
Occupational Area:	Field of Work:

Continue to next Modular Unit.		Instructor.
Repeat Elements Indicated - Recheck.		

Date:

MODULAR UNIT LEARNING ELEMENT REFERENCE CHART

National Sugar Training Centre, Sennar.

1

Occupational Area: .....

Field of Work: .....

M.U. Title: .....

M.U. Code: .....

Chart No: ..... Page: .....

3

LEGEND
1 = CATAGORY - 3 = LEARNING ELEMENT

Steps of Work.

Standard Chart Format - Developed by I.L.O. Geneva for the M.E.S. System.

Oct. 1988.

UNIDO	INSTRUCTIONAL UNIT.	National Sugar Training Centre, Bernar.	SF/SUD/86/003
		Modular Unit Title:	M.U. Code:

Occupational Area:	Objective:
Field of Work:	
Prepared by: / Place: Date:	Equipment, Materials & Aids / Page of

No	Key Points of Content	Method	QU	Item / Description	Source	Assignments
						Progress Check
						Safety.
						Handouts.

Standard Sheet Format - Developed by I.L.O. Geneva for the M.E.S. System. Oct. 86.

C. Model Training Programmes prepared by CTA.

i. Electrical Are Welding.

- Introductory Package for Graduate Engineers.

ii. Plumbing and Pipe Fitting

- Installation and Maintenance.

iii. - Automotive Engineering.

- Motor Vehicle Basic Maintenance

iv. - Electrical Engineering

- Basic Analysis

- Estate Electrician - Grade 1

UNIDO	Learning Packages	National Sugar Training Centre, Sennar.				
		IDENTIFICATION CODE	STC	ACW	1	

Instructor Guide

Identification of Modular Unit Content.

Introductory Package for Graduate Engineers.

Occupational Area:	ELECTRIC ARC WELDING
Field of Work:	MANUAL WELDING

UNIDO PROJECT SF/SUD/86/003

FEBRUARY 1989.

UNIDO

MODULAR UNIT LEARNING ELEMENT REFERENCE CHART

National Sugar Training Centre, Sennar.

Occupational Area: ELECTRIC ARC WELDING

Field of Work: MANUAL WELDING

M.U. Title: Producing a Lap Joint

M.U. Code: STC/EAW/1

Chart No: 1 Page: 1

LEGEND
1 = CATAGORY - 3 = LEARNING ELEMENT

Steps of Work.	3	Identify Safety Equipment - Arc Welding		Reading Technical Drawings - Dimensions	Reading Technical Drawings - Scales	Identifying Welding Symbols.		Identify Materials	Measuring - Rules and tapes	Marking out - Rules and tapes	Identifying Eng. Hand Saws.	Identifying Eng. Hand Files	Identifying Hand Tools for Welding		Identifying Electrodes	Identifying Welding Equip	Identifying Welding Screen.		Preparing Joints for Welding	Starting Welding Procedure	Tack Welding	Horizontal Welding - Lap Joint	Horiz! Welding - Supervised	Horiz! Welding - Change Electrodes	Laying Straight Beads H-V Position	Superimposed Beads H-V Position		Materials for Welding	Examining Welds - Weld Faults	Examining Welds - Test Methods	Identifying Weld Stress and Distortion						
1. Review Safety Precautions		○																																				
2. Study Drawing				○	○	○																																
3. Select Material								○	○																				○									
4. Prepare Material										○	○	○	○						○																			
6. Start to Weld		○											○		○	○	○		○																			
6. Tack Weld		○																	○	○	○	○																
7. Complete Joint - Horizontal Weld		○																				○	○	○														
8. Clean Weld Area																						○	○	○														
9. Inspect Weld																															○	○	○					
10. Clean up work station		○																																				
Repeat steps 1 to 6		○		○	○	○		○	○	○	○	○	○		○	○	○		○	○	○	○	○	○													
11. Complete Joint - Horiz!/Vert!		○																							○	○												
Repeat steps 8, 9 and 10.		○																													○	○	○					

Standard Chart Format - Developed by I.L.O. Geneva for the M.E.S. System.

Oct. 1988.

UNIDO	LEARNING PACKAGE	National Sugar Training Centre, Sennar. Modular Unit Content Sheet.

Modular Unit Title: PRODUCING A LAP JOINT	M.U.Code: STC/EAW/1
Occupational Area: ELECTRIC ARC WELDING	Field of Work: MANUAL WELDING

Modular Unit Description:

Producing a lap joint (01) Identifies and selects correct setting on welding set for manual arc welding of specific types of work. Identifies and selects correct electrodes check that preparation of work is satisfactory or prepares the material to be welded. Tack weld and complete a Lap Joint (Horizontal welding and vertical welding). Clean joint area and check quality of weld cleans and precautions and practices.

Learning Elements.

1. Identifying Personal Safety Equipment for Arc Welding
2. Reading Technical Drawings-Dimension
3. Reading Technical Drawing-Scales
4. Identifying Welding Symbols
5. Identifying Steels
6. Measuring using rules and tapes
7. Marking out using rules, tapes and straight edges
8. Identifying Engineering hand saws and their uses
9. Identifying Engineering hand files and their uses
10. Identifying hand tools and measuring tools used by welders
11. Identifying arc welding electrodes
12. Identifying welding equipment for manual arc welding
13. Identifying arc welding sources
14. Preparing joints for welding
15. Starting the welding procedure
16. Tack welding
17. Horizontal welding lap joint-flat position
18. Horizontal welding-two superimposed beads flat position
19. Laying straight beads in horizontal vertical position
20. Horizontal welding laying straight beads on flat surfaces with changing electrodes
21. Laying superimposed beads-horizontal, vertical position
22. Materials for welding
23. Examining welds identifying welding faults
24. Examining welds identifying test methods
25. Identifying welding stresses and distortion

UNIDO

MODULAR UNIT LEARNING ELEMENT REFERENCE CHART

National Sugar Training Centre, Sennar.

Occupational Area: ELECTRIC ARC WELDING

Field of Work: MANUEL WELDING

M.U. Title: Producing a Butt Joint

M.U. Code: STC/EAW/2

Chart No: 1 Page: 1

LEGEND
1 = CATAGORY - 3 = LEARNING ELEMENT

Steps of Work.	3	Identifying Safety Eqpt: Arc Welding		Reading Technical Drawings - Dimensions -	Reading Technical Drawings - Scales -	Identifying Welding Symbols		Identify Materials.	Measuring - Rules and Tapes	Marking Out - Rules and Tapes	Identifying Eng. Hand Saws	Identifying Eng. Hand Files	Identifying Hand Tools Co-ordination		Identifying Electrodes.	Identifying Welding Eqpt.	Identifying Welding Sources.		Preparing Joints for Welding	Starting Welding Procedure	Tack Welding.	Horiz!. Welding - Butt Weld	Horiz!. Welding - Single Vee Butt Joint	Horiz!. Welding - Sealing Run.	Square Butt Joint Horiz!-Vert. Position	Vee Butt Joint Horiz! - Vert. Position		Materials for Welding	Examining Welds - Weld Faults	Examining Welds - Test Methods	Identifying Weld stress and Distortion.						
1. Review Safety Precautions		○																																		
2. Study Drawing				○	○	○																														
3. Select Material								○	○																				○							
4. Prepare Material										○	○	○	○						○																	
5. Start Weld		○											○		○	○	○		○																	
6. Tack Weld		○																	○	○	○	○														
7. Complete Joint - Horiz!. Weld.		○																				○	○	○												
8. Clean Weld Area.																						○	○	○												
9. Inspect Weld																														○	○	○				
10. Clean up work station.		○																																		
Repeat steps 1 to 6.		○		○	○	○		○	○	○	○	○	○		○	○	○		○	○	○	○	○	○											
11. Complete Joint - Horiz!/Vert!		○																							○	○										
Repeat steps 8, 9 and 10.		○																												○	○	○				

Standard Chart Format - Developed by I.L.O. Geneva for the M.E.S. System.

Oct. 1988.

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: PRODUCING A BUTT JOINT	M.U.Code: STC/EAW/2
Occupational Area: ELECTRIC ARC WELDING	Field of Work: MANUAL WELDING

Modular Unit Description:

Producing a Butt Joint (02) Identifies and selects correct setting on welding set for manual arc welding of specific types of work. Identifies and selects correct electrodes checks that preparation of work is satisfactory or prepares the material to be welded. Tack weld and complete a Butt Joint (horizontal welding and vertical welding). Clean joint area and check quality of weld cleans and maintains tools and equipment in good order. Observers all safety precautions and practices.

Learning Elements.

1. Identifying Personal Safety Equipment for Arc Welding
2. Reading Technical Drawings-Dimension
3. Reading Technical Drawing-Scales
4. Identifying Welding Symbols
5. Identifying Steels
6. Measuring using rules and tapes
7. Marking out using rules, tapes and straight edges
8. Identifying Engineering hand saw and their uses
9. Identifying Engineering hand files and their uses
10. Identifying hand tools and measuring tools used by welders
11. Identifying arc welding electrodes
12. Identifying welding equipment for manual arc welding
13. Identifying arc welding sources
14. Preparing joints for welding
15. Starting the welding procedure
16. Tack welding
17. Horizontal Welding-Butt Weld-Flat position
18. Horizontal Welding-Signgle vee Butt joint-flat position
19. Horizontal Welding-Seating run on single vee Butt joint
20. Squsre vee Butt joint-horizontal, vertical position
21. Single vee Butt joint-horizontal, vertical position
22. Materials for welding
23. Examining welds identifying welding faults
24. Examining welds identifying test methods
25. Identifying welding stresses and distoration

UNIDO	Learning Packages	National Sugar Training Centre, Sennar.
		IDENTIFICATION CODE

Instructor Guide

Identification of Modular Unit Content.

Occupational Area:	PLUMBING AND PIPE FITTING
Field of Work:	PIPE FITTING

UNIDO PROJECT SF/SUD/86/003

FEBRUARY 1989.

	LEARNING PACKAGE	National Sugar Training Centre, Sennar.
		Modular Unit Content Sheet.
Modular Unit Title: MEASURING AND MARKING OUT PIPE RUNS		M.U.Code:
Occupational Area:		Field of Work:

Modular Unit Description:

1. **MEASURING AND MARKING OUT PIPE RUNS**

Reads Building Drawings and Piping Layouts to determine the location and position of Pipe Runs. Measures, transfers and marks out on different surfaces, above and below ground the Pipe Runs. Observes safety precautions and rules.

Learning Elements.

01.	Applying First Aid
02.	Identifying Safety Clothing and its use in the Plumbing Workshop
03.	Working Safely (Plumbing Workshop)
04.	Observing Safety Precautions when using Hand and Machine Tools
05.	Observing Safety Precautions when selecting and using Ladders
06.	Identifying Threaded Pipe Fittings and their uses
07.	Identifying Water Pipes and their uses
08.	Measuring using Rules and Tapes
09.	Marking out Pipes and Pipe Layouts using Rules, Tapes and Straight Edges
10.	Marking out Pipe Layouts using Chalk Line and Plumb-Bob
11.	Marking out Pipe Layouts using Spirit Level and Water Level
12.	Reading Construction Plans
13.	Reading Architectural Diagrams
14.	Interpreting Drawings and Sketches of Construction Details
15.	Identifying Ladders and their uses

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title : CUTTING HOLES AND CHASES IN THE BUILDING STRUCTURE (02)	M.U.Code:
Occupational Area:	Field of Work :

Modular Unit Description :

2. **CUTTING HOLES AND CHASES IN THE BUILDING STRUCTURE**

Selects Tools and Equipment to cut Holes, Grooves, Chases, and Ducts in and Through a variety of building materials. Cuts Holes and Chases where required to accommodate Pipe Runs. Observes Safety precautions and Rules.

Learning Elements.

16. Safe handling and storing of Building Materials
17. Identifying types of Pipe Supports, Fixings and their uses
18. Identifying methods of Bracing, Securing and lifting
19. Using Drills, Braces and Bits
20. Using the Claw Hammers
21. Drilling into Masonry using a Hand Drill
22. Drilling into Masonry using a Portable Electric Drill
23. Cutting Holes and Recesses in Masonry using Circular Masonry Cutters
24. Cutting Recesses in Masonry using Hammers and Chisels
25. Cutting Grooves into Masonry using Portable Electric Masonry Cutters
26. Identifying Hand Hammers and their uses
27. Identifying Chisels and their uses
28. Identifying Hand Saws and their uses
29. Identifying Drills, Braces, Wood Bits and their uses.
30. Identifying types of Files and their uses
31. Identifying Portable Electricl Drills and their uses
32. Identifying Masonry Drills, Cutters and their uses

LEARNING PACKAGE	National Sugar Training Centre, Sennar. Modular Unit Content Sheet.

Modular Unit Title : SELECTING STEEL PIPES AND FITTINGS (03) | **M.U.Code:**

Occupational Area: | **Field of Work:**

Modular Unit Description :

3. **SELECTING STEEL PIPES AND FITTINGS**

Identifies and selects from stock black Mild Steel, and galvaised Steel Pipes up to a Diameter of 50 mm. Correctly identifies and selects the sizes and types of Pipe Fittings and determines the quantities required for a specific installation.

Learning Elements.

01. Applying First Aid
02. Identifying Safety Clothing and its uses in the Plumbing Workshop
03. Working Safely (Plumbing Workshop)
04. Observing Safety Precautions when using Hand and Machine Tools
    Identifying Threaded Pipe Fittings and their uses
    Identifying Water Pipes and their uses
    Identifying types of Pipe Support, Fixings and their uses
05. Measuring Galvanised Steel Pipe
06. Preparing Bills of Quantity
07. Measuring using Vernier Caliper
08. Identifying Sectional Views
09. Identifying Irons and Steels by Workshop Methods
10. Identifying Flanged Pipe Fittings and their uses

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title : CUTTING STEEL PIPES (04)	M.U.Code:
Occupational Area:	Field of Work:

Modular Unit Description:

4. **CUTTING STEEL PIPES**

Selects Tools and Equipment for Cutting Steel Pipes up to a DIA of 50 mm to length, using Hackaws, Pipe Cutters, and Power Saws. Files or grinds the Pipe Ends square, reams out the ends removing Burrs. Prepares and maintains Cutting Equipment. Observes Safety Precautions and Rules.

Learning Elements.

Identifying Threaded Pipe Fittings and their uses

Identifying Water Pipes and their uses

Measuring using Rules and Tapes

11. Cutting Galvanised Steel Pipes using Packsaw
12. Cutting Galvanised Steel Pipe using Pipe Cutters
13. Cutting Steel Pipes using a Power Hacksaw
14. Filing Galvanised Steel Pipe
15. Deburring Steel Pipes using a Pipe Reamer
16. Checking Squareness using a Try Square

Identifying Hand Saws and their uses

Identifying types of Files and their uses

17. Identifying Bench Vices and their uses
18. Identifying Pipe Vices and their uses
19. Identifying Pipe Cutters and their uses
20. Identifying Pipe Reamers and their uses
21. Identifying Dimensions
22. Identifying Centre Lines and Centre Points

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: THREADING STEEL PIPES (05)	M.U.Code:
Occupational Area: PLUMBING AND PIPE FITTING	Field of Work: PIPE FITTING

Modular Unit Description:

5. **THREADING STEEL PIPES**

Selects Tools and Equipment for Hand or Machine Threading Pipes up to 50 mm Diameter. Identifies component parts of Stocks and Dies. Assembles, operates and maintains Equipment. Selects Lubricants, cuts Threads to the required pitch and length.

Adjusts Cutting Machine, cleans and services Equipment. Observes Safety Precautions and Rules.

Learning Elements.

23. Recognising Mechanical Properties of Metals
24. Identifying Lubricants, Lubricating Equipment and their uses
15. Deburring Steel Pipes using a Pipe Reamers
25. Threading Pipe using Stocks and Dies
26. Threading Pipe using a Threading Machine
17. Identifying Bench Vices and their uses
18. Identifying Pipe Vices and their uses
27. Identifying Stocks and Dies and their uses
28. Identifying Components on Assembly Drawings

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: BENDING STEEL PIPES (06)	M.U.Code:
Occupational Area: PLUMBING AND PIPE FITTING	Field of Work: PIPE FITTING

Modular Unit Description:

6. **BENDING STEEL PIPES**

Identifies and selects Tools and Equipment for Bending Steel Pipes up to 50 mm Dia. Assembles Bending Machines, or Sand Loading of Pipes prior to heating and bending. Transfer of Measurements, preparing Bending Templates, pulling Bends to the desired radius. Cleaning and maintaining equipment. Observes Safety Precautions and Rules.

Learning Elements.

24.	Identifying Lubricants, Lubricating Equipment and their uses
	Measuring using Rules and Tapes
	Marking Pipes and Pipe Layouts using Rules and Tapes
29.	Producing Patterns and Templates
30.	Bending Galvanised Steel Pipe using a Hand Operated Bending Machine
31.	Bending Galvanised Steel Pipe using a Hydraulic Bending Machine
32.	Bending Galvanised Steel Pipe using Sand and Plugs
33.	Servicing Bending Machines
18.	Identifying Pipe Vices and their uses
34.	Identifying Bending Tools and Equipment and its uses
21.	Identifying Dimensions
22.	Identifying Centre Lines and Centre Points.

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: JOINTING STEEL PIPES (07) | **M.U.Code:**

Occupational Area: BLIMBING AND PIPE FITTING | **Field of Work:** PIPE FITTING

Modular Unit Description:

7. JOINTING STEEL PIPES

Identifies and selects Pipe Jointing Material for Screwed Joints, and Bolted Flanges. Determines the most suitable type of Jointing Material for a specific Pipe Joint on Pipes conveying various Gases, and Fluids. Selects Tools and Equipment required to make a Water/Air Tight Joint. Observes Safety Precautions and Rules.

Learning Elements.

35	Identifying Jointing Materials and their uses
10.	Identifying Flanged Pipe Fittings and their uses
05.	Measuring Galvanised Steel Pipe
14.	Filing Galvanised Steel Pipe
36.	Assembling Galvanised Steel Pipe
37.	Installing Galvanised Steel Pipe
38.	Supporting and Hanging Galvanised Steel Pipe
39.	Laying Main Water Pipes
40.	Cleaning off Pipe Joints
41.	Installing Water Meters
42.	Identifying Pliers, Pipe Wrenches and their uses
43.	Spanners and Wrenches - Kinds and Sizes

LEARNING PACKAGE	National Sugar Training Centre, Sennar. Modular Unit Content Sheet.
Modular Unit Title : ASSEMBLING AND INSTALLING STEEL PIPES (OR)	M.U.Code:
Occupational Area: PLUMBING AND PIPE FITTING	Field of Work: PIPE FITTING

Modular Unit Description:

8. **ASSEMBLING AND INSTALLING STEEL PIPES**

Determines which sections of Pipe Work can be fabricated off the job. Prefabricates these sections to install on Site. Selects Tools and Equipment required to complete installation of Pipework. Prepares work area prior to installing Pipework. Provides Temporary Support to Pipework. Levels, plumbs in, or lays pipes to set Gradients, makes due allowance for the effects of expansion and contraction. OBserves Safety Precautions and Rules.

Learning Elements.

01. Applying First Aid

02. Identifying Safety Clothing and its uses in the Plumbing Workshop

03. Working Safely (Plumbing Workshop)

04. Recognising the Mechanical Properties of Metals

Identifying types of Pipe Supports, Fixings and their uses

Identifying Methods of Bracing, Securing and Lifting

Measuring using Rules and Tapes

Marking out Pipes and Pipe Layouts using Rules, Tapes and Straight Edges

Marking out Pipe Layouts using Chalk Lines and Plumb-Bobs

Assembling Galvanised Steel Pipe

Installing Galvanised Steel Pipe

Laying Main Water Pipes

Supporting and hanging Galvanised Steel Pipe

05. Interconnecting Water Storage Tanks

06. Installing Expansion Joints and Pends

07. Fabricating Pipe Sections

Identifying Ladders and their uses

Identifying Hand Hammers and their uses

Identifying Chisels and their uses

Identifying Portable Electric Drills and their uses

Identifying Masonry Drills, Cutters and their uses

Identifying Pipe Vices and their uses

IdentifyingPliers, Pipe Wrenches and their uses

Reading Construction Plans

Reading Architectural Diagrams

Interpreting Drawings and Sketches of Construction Details

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: INSTALLING TAPS AND VALVES (09)	M.U.Code:
Occupational Area: BLUMBING AND JPIPE FITTING	Field of Work: PIPE FITTING

Modular Unit Description:

9. INSTALLING TAPS AND VALVES

Identifies and selects the correct type, size and pattern of Tap for specific installations. Fits Taps and Valves in correct sequence and postion. Selects tools and equipment to install Taps and Valves. Prepares working area. Protects Taps and Valves against damage. Observes Safety Precautions and Rules.

Learning Elements.

08.	Measuring Flow Rates
	Identifying Jointing Materials and their uses
09.	Identifying Stop Cocks, Gate Valves and their uses
10.	Identifying Ball Cocks, Ball Valves and their uses
11.	Identifying Water Taps, Mixer Taps and their uses
12.	Installing Stop Cocks and Gate Valves
	Installing Water Meters
13.	Installing Bib Taps (Faucets)
14.	Installing Ball Cocks (Ball Valves)
15.	Installing Pressure Relief, Reduction and Non-Return Valves
	Identifying Hammers and their uses
	Identifying Pipe Vices and their uses
	Identifying Pliers, Pipe Wrenches and their uses
16.	Identifying Screwdrivers and their uses

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: SUPPORTING AND HANGING STEEL PIPES (10) **M.U.Code:**

Occupational Area: PLUMBING AND PIPE FITTING **Field of Work:** PIPE FITTING

Modular Unit Description:

10. **SUPPORTING AND HANGING STEEL PIPES**

Identifies and selects various types and patterns of Pipe Clips, Brackets and Hangers for supporting the Pipework. Selects tools and equipment to fix and secure Pipework to the structure. Prepares working area and marks out the position for fixings. Mounts and secures the Pipe supports to the structure. Installs Pipe Runs, firmly fixing Pipe Supports. Observes Safety Precautions and Rules.

Learning Elements.

Identifying methods of Bracing, Securing and Lifting

Identifying types of Pipe Supports, Fixings and their uses

17. Mounting Fixtures and Component using Wood Screws and Plugs

18. Threaded Fasteners for Wood

19. Wall Plugs and Masonry Bolts

Drilling into Masonry using a Hand Drill

Drilling into Masonry using a Portable Electric Drill

Assembling Galvanised Steel Pipes

Installing Galvanised Steel Pipes

Laying Main Water Pipes

Supporting and hanging Galvanised Steel Pipe

20. Levelling-in Pipe Work

Identifying Ladders and their uses

Identifying Hand Hammers and their uses

Identifying Drills, Braces, Wood Bits and their uses

Identifying Portable Electric Drills and their uses

Identifying Masonry Drills, Cutters and their uses

15. Identifying Screwdrivers and their uses

LEARNING PACKAGE	National Sugar Training Centre, Sennar. Modular Unit Content Sheet.

Modular Unit Title : TESTING STEEL PIPES AND JOINTS (11) | **M.U.Code:**

Occupational Area: PLUMBING AND PIPE FITTING | **Field of Work :** PIPE FITTING

Modular Unit Description :

11. TESTING STEEL PIPES AND JOINTS

Selects tools and equipment for pressure Testing Pipes and Joints for soundness. Prepares working area for applying the Tests. Connects equipment and conducts Tests. Identifies Leaks for repair. Observes Safety Precautions and Rules.

Learning Elements.

Identifying Threaded Pipe Fittings and their uses

Identifying Jointing Materials and their uses

01. Testing Service Water Pipes and Measuring Flow

02. Air Testing on Soil and Drain Pipes using Manometer

03. Hydrostatic Water Test on Soil and Drain Pipes using Hoses and Plugs

04. Identifying Pumps and their uses

05. Identifying equipment for Testing Sanitary and Drainage Pipe Work for Soundness

Identifying Pliers, Pipe Wrenches and their uses

Identifying Screwdrivers and their uses

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: REPAIRING PIPES AND VALVES (12)	M.U.Code:
Occupational Area: PLUMBING AND PIPE FITTING	Field of Work: PIPE FITTING

Modular Unit Description:

12. REPAIRING PIPES AND VALVES

Identifies and selects tools and equipment to dismantle Pipes and Valves. Prepares working area. Dismantles Pipe Joints, Repairs, and Replaces. Dismantles Valves, checks for wear, re-seats, repacks and assembles. Tests for Soundness. Observes Safety Precautions and Rules.

Learning Elements.

Identifying Jointing Materials and their uses

Testing Service Water Pipes

06. Reseating Stop Cocks

07. Reseating Water Taps (Bob Taps)

08. Repairing Stop Cocks and Gate Valves

09. Repairing Water Taps

10. Repairing Chrome Water Mixer Taps for Basins, Sinks and Baths

11. Dismantling Pipe Installations

Spanners, Wrenches - Kinds and Sizes

Identifying Engineering Hand files and their uses

Identifying Pliers, Pipe Wrenches and their uses

12. Identifying Tap Re-seating Tools and their uses

13. Identifying Twist Drills, Combination Centres and Countersinks.

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: MAKING GOOD BUILDING STRUCTURE (13)	M.U.Code:
Occupational Area: PLUMBING AND PIPE FITTING	Field of Work: PIPE FITTING

Modular Unit Description:

13. **MAKING GOOD BUILDING STRUCTURE**

Identifies and selects tools and materials necessary to make good Holes and Chases in the Building. Prepares working area. Mixes materials and patches up Holes and Chases around Pipework. Cleans Pipework and surrounding area. completes job in a workmanlike manner. Observes Safety Precautions and Rules.

Learning Elements.

01. Applying First Aid
02. Observing Safety Precautions working with Hand and Machine Tools
03. Selecting Protective Clothing
04. Safe handling and storing of Building Materials
05. Workshop and Building Site Safety, Organisation and Management
06. Protecting and curing Concrete
07. Proportioning Materials for Mixing concrete
08. Filing surfaces to required Shape and size
09. Cutting Timber to Shape using Wood Chisels
10. Cutting Bricks and Concrete Blocks using a Bolster
11. Using a Bricklayers Trowel
12. Hand Mixing Mortars
13. Hand Mixing concrete
14. Hand Mixing Plaster
15. One Coat Plastering, Interior/Exterior
16. Hand Floating Concrete
17. Hand Troweling Concrete
18. Painting using Brushes
19. Cleaning Painting Equipment

UNIDO	Learning Packages	National Sugar Training Centre, Sennar.
		IDENTIFICATION CODE

Instructor Guide

Identification of Modular Unit Content.

Occupational Area:	AUTOMOTIVE ENGINEERING
Field of Work:	MOTOR VEHICLE BASIC MAINTENANCE

UNIDO PROJECT SF/SUD/86/003

FEBRUARY 1989.

LEARNING PACKAGE	National Sugar Training Centre, Sennar.	
	Modular Unit Content Sheet.	
Modular Unit Title: MAINTAINING CAR AIR FILTERS (01)		M.U.Code:
Occupational Area: AUTOMOTIVE ENGINEERING	Field of Work: MOTOR VEHICLE BASIC MAINTENANCE	

Modular Unit Description:

1. **MAINTAINING CAR AIR FILTERS**

Identifies Car Air Filter type and location using Vehicle Manufacturer's Service Manual; selects spare parts, materials, tools and equipment required and prepares work area and the vehicle for maintenance. Performs maintenance operations on Air Filters. Observes all necessary Safety Precautions and Rules.

Learning Elements.

01.	Working safely
02.	Identifying Protective Clothing
03.	Manual Lifting and Carrying
04.	Linear Measures - Metric
05.	Measures of Weight - Metric
06.	Four Stroke Petrol Engine and Four Stroke Diesel Engine
07.	Two Stroke Petrol Engine
08.	Engine Main Parts and Function
09.	Combustion of Petrol in the Engine
10.	Air Filters - Kinds and Purposes
11.	Oil Bath Air Filters
12.	Dry Air Filters
13.	Opening and Closing the Car Bonnet
14.	Removing low Pressure Flexible Hoses
15.	Removing Car Air Filters
16.	Servicing Oil Bath Filters
17.	Servicing dry Air Filters
18.	Installing Car Air Filters
19.	Installing low Pressure Flexible Hoses
20.	Identifying Screwdrivers and their uses
21.	Identifying Pliers and their uses
22.	Spanners and Wrenches - Kinds and Sizes
23.	Using Spanners/Wrenches
24.	Using Manufacturer's Service Manuals.

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: LUBRICATING MOTOR VEHICLES (02) | **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING | **Field of Work:** MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

2. **LUBRICATING MOTOR VEHICLES**

Identifies Lubricating Intervals/Points using Vehicle Manufacturer's Service Manual and Lubrication Chart (S); selects Lubricants and determines the quantities required for this work. Prepares tools, equipment, parts and materials required and prepares work area and the vehicle for lubrication. Performs lubricating operations. Observes all necessary Safety Precautions and Rules.

Learning Elements.

05.	Measures of Weight - Metric
25.	Passenger Cars - Main Assemblies
04.	Engine Main Parts and Function
26.	Friction
27.	Hydro-Dynamic Friction
28.	Engine Lubrication System
29.	Engine Oil Filters
30.	Engine Oils
31.	Engine Oils - SAE Viscosity Classification
32.	engine Oils - API Classification
33.	Transmission Oils
34.	Lubricating Grease
13.	Opening and closing the Car Bonnet
35.	Changing/Topping-up Engine Oil
36.	Replacing/Cleaning Oil Filters
37.	Changing/Topping-up Transmission Oil
38.	Chassis Lubrication
39.	Identifying Car Lifts and their uses
40.	Lifting of Cars using Mobile Jacks
41.	Identifying Mobile Lifting Devices and Support Stand and their uses
22.	Spanners and Wrenches - Kinds and Sizes
23.	Using Spanners/Wrenches
42.	Identifying Hand Hammers and their uses
43.	Using Torque Wrench
44.	Using Oil Plug Wrench
45.	Using Oil Filter Wrench
24.	Using Manufacturers Service Manual
46.	Using Lubrication Charts

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title : CLEANING AND PROTECTING MOTOR VEHICLE (03) **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING **Field of Work :** MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description :

3. CLEANING AND PROTECTING MOTOR VEHICLES

Identifies Manufacturer's Recommendations for Vehicles Cleaning and Care using Service Manual; selects equipment and materials required and prepares work area and the vehicle for maintenance. Cleans the vehicle and protects Body Paint and the underneath of the vehicle. Observes all necessary Safety Precautions.

Learning Elements.

01.	Working Safely
02.	Identifying Protective Clothing
03.	Manual Lifting and Carrying
04.	Classifying Motor Vehicles
	Passenger Car Main Assemblies
	Engine - Main Parts and Function
05.	Cleaning Materials
06.	Polishing Paste
07.	Rust Remover
08.	Wax for Metal Protection
09.	Underseal - Bitumen
10.	Washing Vehicle Body by Hand
11.	Cleaning Car Interior
	Opening and closing the Bonnet
12.	Cleaning Engine Compartment
13.	Polishing Vehicle Body Paint
14.	Waxing the Vehicle Body Paint
15.	Cleaning the underneath of the Motor Vehicle
16.	Protecting the underneath of the Motor Vehicle
	Identifying Car Lifts and their uses
	Lifting up Cars using Mobile Jacks
	Identifying Mobile Lifting Devices and Support Stands and their uses
17.	Identifying Steam Cleaners and their uses
	Using Manufacturer's Service Manual

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title : MAINTAINING ENGINE COOLING SYSTEMS (04) | **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING | **Field of Work :** MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

4. **MAINTAINING ENGINE COOLING SYSTEM**

Identifies, type, layout and components of the Engine Cooling System using Vehicle Manufacturer's Service Manual; selects tools, equipment, materials and spare parts required and prepares work area and vehicle for maintenance. Performs maintenance operation on the cooling system. Observes all necessary Safety Precautions and Rules.

Learning Elements.

01.	Working Safely
02.	Identifying Protective Clothing
	Passenger Car - Main Assemblies
	Four Stroke Petrol Engine and Four Stroke Diesel Engine
	Two Stroke Petrol Engine
	Combustion fo Petrol Engine
	Engine - Main Parts and Function
03.	Cooling System
04.	Pressurised Cooling System
05.	Closed Cooling System
06.	Radiator
07.	Cooling Fan
08.	Thermostat - Design and Function
09.	Water Pump
10.	V Belt Construction - Adjusting and Replacing
11.	Preparation of Coolant
12.	Checking and Topping-up Coolant Level
13.	Draining and re-filling Cooling System
14.	Cleaning Radiator and flushing Cooling System
15.	Removing/installing Thermostat
	Removing Low Pressure Flexible Hoses
	Installing Low Pressure Flexible Hoses
16.	Thermostat Checking
17.	Checking Cooling System for Tightness
	Identifying Screwdrivers and their uses
	Identifying Pliers and their uses
	Spanners/Wrenches - Kinds and Sizes
	Using Spanners/Wrenches
	Identifying Steam Cleaners and their uses
	Using Torque Wrench
18.	Identifying Thermometers and their uses
	Using Manufacturer's Service Manual

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: MAINTAINING FUEL DELIVERY SYSTEM (05) | **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING | **Field of Work:** MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

5. MAINTAINING FUEL DELIVERY SYSTEMS

Identifies type, layout and components of the Fuel Delivery System using Vehicle Manufacturer's Service Manual; selects parts, tools, equipment and materials required and prepares work area and vehicle for maintenance. Performs maintenance operations on the Fuel Delivery System. Observes all necessary Safety Precautions and Rules.

Learning Elements.

01. Working Safely
02. Identifying Protective Clothing
03. Manual Lifting and Carrying
04. Applying First Aid
    Classifying Motor Vehicles
    Passenger Car - Main Assemblies
    Four Stroke Petrol Engine and Four Stroke Diesel Engine
    Two Stroke Petrol Engine
05. Engine Compression Ratio and Pressure
    Combustion of Petrol in the Engine
    Engine - Main Parts and Function
06. Fuel Tank
07. Fuel Sedimenter
08. Fuel Feed Pump - Mechanical Diaphragm Type
    Low Pressure Flexible Hoses
09. Selecting and storing Fuels
    Removing Low Pressure Flexible Hoses
    Installing Low Pressure Flexible Hoses
10. Cleaning the fuel tank and Fuel Lines
11. Removing and installing Fuel Feed Pump
    Identifying Screwdrivers and their uses
    Identifying Pliers and their uses
    Identifying Hand Hammers and their uses
    Spanners/Wrenches - Kinds and Sizes
    Using Spanner/Wrenches
12. Identifying Fire Extinguishers and their uses
    Using Manufacture's Service Manual.

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: MAINTAINING WHEELS AND TYRES (06)	M.U.Code:
Occupational Area: AUTOMOTIVE ENGINEERING	Field of Work: MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

6. **MAINTAINING WHEELS AND TYRES**

Identifies Tyre type, size and inflation pressure(s) using Vehicle Manufacturer's Service Manual; selects tools, equipment, materials and spare parts/new tyres required and prepares work area and the vehicle for maintenance. Performs checks and maintenance operations on Wheels and Tyres. Observes all necessary Safety Precautions and Rules.

Learning Elements.

01.	Working Safely
02.	Identifying Protective Clothing
03.	Observing and using Safety Signs
04.	Manual Lifting and Carrying
05.	Applying First Aid
06.	Observing Safety Precautions in Working with Hand and Power Tools
	Measures of Weight - Metric
07.	Calculating Linear Speeds and Distances
	Passenger Car - Main Assemblies
08.	Identifying Tyre Types and their Construction
09.	Identifying Tyres - Tube and Tubeless
10.	Identifying Tyre size, maximum Tyre Load and Speed Index Letter
11.	Identifying Tyre Tread for Various Purposes
12.	Tyre Life
13.	Why Wheel Balancing is essential
	Lifting up Cars using Mobile Jacks
14.	Removing/fitting Car Tyres
15.	Checking Tyre Inflation Pressure
16.	Inspecting Tyres
17.	Removing/fitting Wheels
18.	Checking Static Wheel Balance
19.	Dynamic Wheel Balancing
20.	Repairing Tyres and Tubes
	Identifying Screwdrivers and their uses
	Identifying Pliers and their uses
	Spanners/Wrenches - Kinds and Sizes
	Using Spanners/Wrenches
	Identifying Car Lifts and their uses
	Identifying Mobile Lighting Devices and Support Stands and their uses
21.	Using Tread Gauges
22.	Using Wheel Balancer
	Using Manufacturer's Service Manuals

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: MAINTAINING CAR BATTERIES (07)	M.U.Code:
Occupational Area: AUTOMOTIVE ENGINEERING	Field of Work: MOTER VEHICLE BASIC MAINTENANCE

Modular Unit Description:

7. **MAINTAINING CAR BATTERIES**

Identifies the capacity of the Battery (in Volts and Amperes) and locates the Battery using Vehicle Manufacturer's Service Manual; selects tools, equipment, materials and new Battery required and prepares work area and the vehicle for maintenance. Checks, services and/or charges the Battery. Observes all necessary Precautions and Rules.

Learning Elements.

01. Working Safely
02. Identifying Protective Clothing
03. Observing and using Safety Signs
04. Manual Lifting and Carrying
05. Applying First Aid

    Measures of Weight
06. Lead-Acid Battery
07. Cell Action
08. Electrolyte
09. Removing/Installing Car Batteries
10. Servicing the Battery (Lead-Acid Type)
11. Putting New Battery into Service
12. Charging Batteries
13. Fast Charging of Battery

    Identifying Screwdrivers and their uses

    Identifying Pliers and their uses

    Spanners/Wrenches - Kinds and Sizes
14. Identifying Hand Files and their uses

    Identifying Thermometers and their uses
15. Using Cell Testers
16. Using Hydrometers
17. Using Battery Chargers

    Identifying Fire Extinguishers and their uses

    Using Manufactur's Service Manuals

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: MAINTAINING SPARK PLUGS (08) | **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING | **Field of Work:** MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

8. MAINTAINING SPARK PLUGS

Identifies type of Spark Plugs using Vehicle Manufacturer's Service Manual and Spark Plug selection/comparison Charts; selects new Spark Plugs, tools equipment and materials required and prepares work area and the vehicle for maintenance. Checks, regaps and replaces Spark Plug. Observes all necessary Safety Precautions and Rules.

Learning Elements.

	Four Stroke Petrol Engine
	Two Stroke Petrol Engine
18.	Engine Compression Ratio and Pressure
	Combustion of Petrol in the Engine
	Engine - Main Parts and Function
19.	Ignition System
20.	Applying Electro - Magnetism Theory to the Ignition System
21.	Spark Plug
22.	Coil and Condenser
23.	De-greasing Solvents
	Opening and Closing the Bonnet
24.	Removing and installing Spark Plugs
25.	Cleaning and Gapping Spark Plugs
26.	Replacing and selecting Spark Plugs
27.	Analysing Spark Plug Face
	Spanners/Wrenches - Kinds and Sizes
	Using Spanners/Wrenches
14.	Identifying Hand Files and their uses
	Using Torque Wrench
28.	Measuring Gaps using Feeler Gauges
29.	Using Spark Plug Setting Tools
30.	Using Spark Plug Cleaners
	Identifying Fire Extinguishers and their uses
	Using Manufacturer's Service Manuals and Spark Plug Comparison Charts.

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: HANDLING MOTOR VEHICLES (09) | **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING | **Field of Work:** MOTOR VEHICLEBASIC MAINTENANCE

Modular Unit Description:

9. HANDLING MOTOR VEHICLES

Carries-out all necessary daily maintenance checks/operations according to the Manufacturer's Recommendations and the Conditions under which the vehicle is used; performs economical, efficient and safe practices in handling the Motor Vehicle. Maintains the vehicle to the required standard to minimise the Air Pollution. Observes Traffic Regulations/Road Signs and all necessary Safety Precautions and Rules.

Learning Elements.

01.	Working safely
02.	Applying First Aid
	Calculating Linear Speeds and Distances
	Classifying Motor Vehicles
	Passenger Car - Main Assemblies
03.	Gearbox, Clutch and their operation
04.	Braking Distance
05.	Aquaplaning
06.	Identifying Enviromental Polution caused by Motor Vehicles
07.	Brake System Layout
08.	Brake Fluids
09.	Keeping Maintenance Records
10.	Economical Driving
11.	Avoiding Brake Failure
12.	Parking a Vehicle
13.	Stopping the Engine
14.	Running-in Motor Vehicles
15.	Loading Goods on Vehicle
16.	Anchoring a Load
17.	Towing a Vehicle
18.	Replacing Bulbs
19.	Replacing Vehicle Fuses
	Removing and refitting Wheels
	Identifying Mobile Lifting Devices and Support Stands and their uses.
	Identifying Fire Extinguishers and their uses
20.	The Motor Vehicle and Road Traffic Ordinance
	Using Manufacturer's Service Manuals.

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: HANDLING SMALL PETROL ENGINES (10) | **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING | **Field of Work:** MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

10. HANDLING SMALL PETROL ENGINES

Identifies the type, Basic Construction and Application of the Engine using Manufacturer's Service Manual; identifies the operating conditions; selects tools, equipment and materials required and prepares the Engine for operation. Performs economical and efficient practices in handling the Engine. Prepares the Engine for storing. Observes all necessary Safety Precautions and Rules.

Learning Elements.

01.	Working Safely
02.	Identifying Protective Clothing
03.	Manual Lifting and Carrying
04.	Applying First Aid
05.	Safety with Small Engines, Machines and Applicances
06.	Work Energy and Power
07.	Small Petrol Engines - Basic Construction and Operation
	Cooling System
08.	Small Petrol Engines - Lubrication
09.	Small Petrol Engines - Fuel Systems
10.	Small Petrol Engines - Ignition Systems
11.	Governors on Small Petrol Engines
12.	Starting Small Engines
13.	Identifying Types of Small Engines
14.	Lubricating Small Engines
15.	Operating Small Engines
16.	Cleaning Small Engines
17.	Storing Small engines
18.	Refueling Small Engines
	Identifying Screwdriver and their uses
	Identifying Pliers and their uses
	Identifying Hand Hammers and their uses
	Identifying Hand Files and their uses
	Spanners/Wrenches - Kinds and Sizes
	Using Spanners/Wrenches
	Using Steam Cleaners
	Identifying Fire Extinguishers and their uses
19.	(Small) Engine Specification
	Using Operating and/or Service Manuals.

UNIDO	LEARNING PACKAGE	National Sugar Training Centre, Sennar. Modular Unit Content Sheet.

Modular Unit Title : MAINTAINING SMALL PETROL ENGINES (11) | **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING | **Field of Work:** MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

11. **MAINTAINING SMALL PETROL ENGINES**

Identifies daily and regular maintenance operations using the Manufacturer's service Manual and Lubrication Charts; selects tools, equipment, materials and spare parts required and prepares work area and the Engine for maintenance. Performs all recommended maintenance works according to operating conditions. Observes all necessary Safety Precautions and Rules.

In connection with Modular Unit No. 10.

Learning Elements.

20. Small Petrol Engines - Carburetors
21. Small Petrol Engines - The Battery
22. Magneto Ignition Systems
23. D.C. Starting/Generating Systems

Engine Oils

Lubricating Greases

Keeping Maintenance Records

24. Small Petrol Engines - Service Hints
25. Small Petrol Engines - Checking Compression

Servicing Oil Bath Filters

Servicing Dry Air Filters

26. Servicing Valves
27. Servicing Cooling System
28. Small Petrol Engines - Servicing Lubrication System
29. Small Petrol Engines - Servicing Crankshaft Breather
30. Small Petrol engines - Servicing Fuel System
31. Small Petrol Engines - Servicing fuel Strainers
32. Checking and adjusting Carburetors
33. Small Petrol Engines - Servicing Ignition System
34. Checking and servicing Batteries
35. Servicing Spark Plugs
36. Checking Magneto Ignition Systems
37. Servicing Governors
38. Servicing Rope Re-wind Starters
39. Servicing Rope Wind Starters
40. Checking Electric Starters
41. Servicing D.C. Starting and Generating Systems

Using Torque Wrench

Measuring Gaps using Feeler Gauges

Identifying Fire Extinguishers and their uses

Using Service Manuals

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: HANDLING SMALL FARM TRACTORS (12)	M.U.Code:
Occupational Area: AUTOMOTIVE ENGINEERING	Field of Work: MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

12. HANDLING SMALL FARM TRACTORS

Identifies the type, basic construction and application of the Tractor using the Manufacturer's Service Manual; identifies operating conditions; selects the implement or machine and accessories required. Selects tools, equipment and materials required. Prepares the Tractor for operation and mounts/attaches the implement or machine. Performs economical and efficient practices in operating the Tractor with the implement or machine. Stores the implement/machine; cleans / protects the implement/machine; parks/stores the tractor. Observes all necessary Safety Precautions and Rules.

Learning Elements.

01. Working Safely
02 Identifying Protective Clothing
03. Manual Lifting and Carrying
04. Applying First Aid
05. Farm Tractors - Type and Main Assemblies
06. Instruments and Controls
07. Drawbar, Pulley and PTO Shaft
08. Hydraulic System and Three Point Linkage
09. Wheels and Tyres
10. Four Stroke Petrol Engine and Four Stroke Diesel Engine
11. Automotive Fasteners
12. Assembling Devices
13. Driving/operating the Tractor
14. Adjusting track Width
15. Ballasting the Tractor
16. Hitching/coupling/adjusting Implements and Machines
17. Operating the Trailer
18. Cleaning the Tractor
19. Protecting the Tractor
20. Storing the Tractor

Identifying Screwdrivers and their uses

Identifying Pliers and their uses

Identifying Hand Hammers and their uses

Identifying Hand Files and their uses

Spanners/Wrenches - Kinds and Sizes

Using Spanners/Wrenches

Using Steam Cleaners

Identifying Fire Extinguisher and their uses

Using the Operating and servicing Manuals

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: MAINTAINING SMALL FARM TRACTORS (13) **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING **Field of Work:** MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

13. MAINTAINING SMALL FARM TRACTORS

Identifies daily maintenance operations using the Manufacturer's Service Manual and Lubrication Chart(s); selects tools, equipment, materials and spare parts required and prepares work area and the Tractor for maintenance. Performs all daily maintenance works accrording to operating conditions. Observes all necessary Safety Precautions and Rules.

Learning Elements.

Linear Measures

Measures of Weight

Four Stroke Petrol Engine - Four Stroke Diesel Engine

Engine Compression Ratio and Pressure

Combustion of Petrol in the Engine

Engine - Main Parts and Function

Cooling System

Pressurised Cooling System

Closed Cooling System

Radiator

Cooling Fan

Thermostat

Water Pump

Engine Lubrication System

Air Filters - Kinds and Purposes

Oil Bath Air Filters

Dry Air Filters

Fuel System - Petrol and Diesel

Fuel Sedimenter/Strainer

Low Pressure Flexible Hoses

11. Automotive Fasteners

Engine Oils

Engine Oils - SAE Viscosity Classification

Engine Oils - A.P.I. Classification

Transmission Oils

Lubricating Grease

Keeping Maintenance Records

Removing Low Pressure Flexible Hoses

Installing Low Pressure Flexible Hoses

Adjusting/replacing V-Belts

Checking/topping-up Coolant Level

Checking Cooling system for Tightness

Cleaning Radiator/Flushing Cooling System

Checking/topping-up Engine Oil

Checking/topping-up Transmission Oil

Removing Air Filters

Installing Air Filters

Servicing Oil Bath Filters

Servicing Dry Air Filters

Servicing Fuel Strainer/Sedimenter

Chassis Lubrication

21. Checking Hydraulic System

Identifying Screwdrivers and their uses

Identifying Pliers and their uses

Spanners/Wrenches - Kinds and Sizes

Using Spanners/Wrenches

Identifying Fire Extinguishers and their uses

Using Service Manuals and Lubrication Charts

LEARNING PACKAGE	National Sugar Training Centre, Sennar.
	Modular Unit Content Sheet.

Modular Unit Title: SERVICING SMALL FARM TRACTORS (14) | **M.U.Code:**

Occupational Area: AUTOMOTIVE ENGINEERING | **Field of Work:** MOTOR VEHICLE BASIC MAINTENANCE

Modular Unit Description:

14. SERVICING SMALL FARM TRACTORS

Identifies regular maintenance operations and adjustments using the Manufacturer's Service Manual and Bulletings; selects tools, equipment, materials and spare parts required and prepares work area and Tractor for maintenance. Performs all recommended regular maintenance works and adjustments according to operating conditions. Observes all necessary Safety Precautions and Rules.

Learning Elements.

Linear Measures - Metric

Measures of Weight

Engine - Main Parts and Function

Thermostat

Engine Lubrication System

Engine Oil Filters

22. Fuel Tank

Fuel Feed Pump-Mechancial Diaphragm Type

23. Fuel Filters

Ignition System

Applying Electro-Magnetism Theory to the Ignition System

Coil and Condenser

Spark Plug

Lead Acid Battery

Cell Action

Starter Motors

Generators

Assembling Devices

24. Bearings

Engine Oils

Engine Oils - S.A.E. Vicosity Classification

Engine Oils - A.P.I. Classification

Transmission Oils

Hydraulic Oils

Removing/installing Thermostat

Preparation of Coolant

Draining/refilling Cooling System

Checking thermostat

Changing Engine Oil

Replacing/cleaning Air Filter

Cleaning Fuel Tank and Fuel Lines

Removing/installing Fuel Feed Pump

Cleaning/replacing Fuel Filters

Removing/installing Spark Plugs

Cleaning/gapping Spark Plugs

Replacing and selecting Spark Plugs

Analysing Spark Plug Face

Removing/installing Batteries

Servicing the Battery

Servicing Starters

Servicing Governors

Replacing Bulbs

Replacing Vehicle Fuses

Checking/replacing Switches

Removing/mounting Tyres

Adjusting Pedals and Controls

Identifying Screwdrivers and their uses

Identifying Pliers and their uses

Spanners/Wrenches - Kinds and Sizes

Using Spanners/Wrenches

Identifying Hand Hammers and their uses

Identifying Hand Files and their uses

Identifying Thermometers and their uses

Using Torque Wrench

Using Steam Cleaners

Feeler Gauges and their uses

Using Spark Plug Cleaners

Using Service Manuals

Keeping Maintenance Records.

① **JOB DESCRIPTION** **Page:** ..... **of** .....

Job Title: Estate Electrician Grade I

Job No./Code: .....

Company: Sudan Sugar Industry

Department: Electric and Instrument Departments.

Occupational Area: Electrical Engineering

Field of Work: Domestic Electrical Installation

② **Description of Functions:**

- Installs electrical lighting and power circuits in domestic dwellings, apartment blocks and other types of buildings.
- Examines building drawings, electrical diagrams and other specifications.
- Selects, positions and fixes distribution boards and fuse boxes, mounts switches, light fixtures, socket outlets and power points.
- Selects and installs cables/conduits onto or into masonry surfaces.
- Connects distribution boards and protective fusing.
- Connects the different electrical circuits in accordance with the diagrams.
- Connects domestic electrical appliances to the electrical supply.
- Connects signal circuits.
- Performs basic tests on completed electrical installation.
- Observes safety precautions and rules.

③ **Organisational Pattern: (Responsible to/Responsible for)**

- Responsible to the Estate Supervisor in charge of electrical installations.

④ **Conditions of Work/Standards:**

- Works on housing maintenance and new constructions.
- Works to national standards and specifications required for domestic electrical installations.

⑤ **Entry Requirements:**

- Must be able to read and write English texts of learning elements.
- Must be able to ado, subtract, divide and multiply.
- Should possess normal physique and eye sight (with or without spectacles), no colour blindness and must be able to develop logical, step-by-step work procedures.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
1. MARKING OUT INSTALLATION LAYOUTS IN BUILDINGS Examines building drawings to identify the layout to be marked. Selects the tools and equipment required and marks out the cable/conduit runs of the installation onto the walls and ceilings of the different rooms of the building. Observes all necessary safety precautions and rules.	± 2 cm	Rules, tapes, straight edges, chalk lines plumbobs, pencil spirit levels, crayons, ladders, safety clothes.
2. MARKING OUT POSITIONS OF COMPONENTS AND FIXTURES IN BUILDINGS Examines buildings drawings and diagrams to determine type, sizes and positions of component and fixtures to be mounted. Selects and prepares tools and equipment required for this work and marks out position of components and fixtures on walls and ceilings. Observes all necessary safety precautions and rules.	± 2 cm	Rules, tapes, spirit levels, pencil, crayons, hammers, masonry drill, garnish awls, ladders, safety clothes.
3. MOUNTING COMPONENTS AND FIXTURES ONTO WOODEN SURFACE Selects and examines components and fixtures to determine positions of component/fixtures to be mounted. Selects threaded fastener for wood and washers. Selects and prepares tools and equipment and prepares mounting holes and mounts components and fixtures to wooden surfaces. Observes all necessary safety precautions and rules.	± 2 cm	Rules, tapes, pencils, garnish awls, gimlets, hammers, screwdrivers, ladders, safety clothes.
4. MOUNTING COMPONENTS AND FIXTURES ONTO MASONRY SURFACES Selects and examines components and fixtures to determine positions of components/fixtures to be mounted. Selects wall plugs, threaded fasteners for wood, washers and masonry bolts and plaster if required. Selects and prepares tools andequipment and prepares mounting holes; sets wall plugs and mounts components and fixtures. Observes all necessary safety precautions and rules.	± 2 cm	Rules, tapes, masonry cutters, masonry chisels, hammers, portable electric drills, portable electric hammers, spirit level screwdrivers, trowels, plaster, ladders, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: _____ Page: ____ of ____

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
5. **MOUNTING COMPONENTS AND FIXTURES INTO MASONRY SURFACES** Selects and examines components, fixtures, markout positions on masonry surfaces into which components are to be mounted. Selects mounting material, fasteners and plaster, and prepares mounting holes and recesses. Selects tools and equipment and mounts components and fixtures into masonry surfaces. Observes all necessary safety rules and precautions.	± 2 cm	Rules, tapes, masonry cutters, masonry chisels, hammers, portable electric drills, portable electric hammers, spirit levels, screwdrivers, trowels, plaster ladders, safety clothes.
6. **MOUNTING OF FUSING/DISTRIBUTION CENTRES ONTO SURFACES** Selects required fusing/distribution centre and examines mounting instructions. Selects fasteners and mounting material, required tools and equipment and prepares holes for mounting position. Assembles fusing/distribution centre and mounts centre to surface. Observes all necessary safety precautions and rules.	According to national standards and specifications for domestic electrical installations.	Rules, tapes, pencil, crayons, garnish awls, hammers, gimlets, masonry drills, masonry chisel, portable electric drills, cement, small trowel, screwdrivers, spanners, wrenches, safety clothes.
7. **MOUNTING OF FUSING/DISTRIBUTION CENTRES INTO SURFACES** Selects required fusing/distribution centre and examines mounting instructions. Prepares recess for mounting and checks its dimensions. Reads assembly instructions and assembles fusing/distribution centre. Selects tools and equipment and mounts centre into masonry surface. Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencil, crayons, garnish awls, hammers, gimlets, masonry chils, masonry chisels, portable electric drills, cement, small trowel, screwdriver, spanners, wrenches, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
8. MOUNTING OF HOUSE CONNECTION BOXES Examines marked-out position for house connection box. Prepares mounting holes, selects tools and equipment, fasteners and mounting material. Prepares house connection box for mounting and mounts it to the surface. Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, crayons, garnish awls, hammers, gimlets, masonry drills, masonry chisels, portable electric drills, cement, small trowel, screwdrivers, spanners, wrenches, safety clothes.
9. MOUNTING OF ELECTRIC METERS Examines marked-out position for electric meter box. Prepares mounting holes; select tools and equipment, fasteners and mounting materials. Prepares electric meter box for mounting and mount it to the surface. Observe all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, garnish awls, gimlets, masonry drills, masonry chisels, wood drills, metal drills, screwdrivers, Spanners, wrenches, safety clothes.
10. INSTALLING CABLES ONTO WOODEN SURFACE USING CLIPS AND SADDLES Reads architectural and circuit diagrams to determine types, quantities and dimensions of cables required. Selects cables, clips, saddles and fasteners. Selects tools and equipment and marks-out spacing for clips and saddles and mounts them to the wooden surface. Prepares and installs cable runs. Observes all necessary safety precautions and rules.	According to national standards and specifications for domestic electrical installations.	Rules, tapes, pencils, garnish awls, hammers, screwdrivers, diagonal cutting pliers, electrician knives, ladders, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
11. INSTALLING CABLES ONTO MASONRY SURFACES USING CLIPS AND SADDLES Reads architectural and circuit diagrams to determine types, quantities and dimensions of cables required. Selects cable, clips, saddles and fasteners. Selects tools and equipment and marks-out spacing for clips and saddles and sets wall plugs, mounts clips and saddles to masonry surfaces. Prepares and installs cable runs. Observes all necessary safety precautions and rules.	See above.	Rules, tapes, pencils, hammers, masonry drills, portable electric drills, screwdrivers, diagonal cutting pliers, electrician knives, ladders, safety clothes.
12. PREPARING RIGID PVC CONDUIT FOR INSTALLATION Reads architectural and circuit diagrams to determine types, quantities and dimensions of PVC conduit required. Selects and cuts to length conduit pieces as required. Removes burrs and sharp edges on conduit and selects accessories such as bends, coupling joints, etc. in sizes and quantities required. Observes all necessary safety precautions and rules.	Cut PVC conduit to ± 2 mm accuracy.	Rules, tapes, pencils, crayons, hacksaws, electrician knives, different files, safety clothes.
13. BENDING RIGID PVC CONDUIT Reads architectural diagrams to determine/calculate bends to be made. Mark out position of bends, select tools and equipment and bend PBV conduit to required dimensions. Observe all necessary safety precautions and rules.	To bend PVC conduit to ± 2 mm accuracy.	Rules, tapes, pencils, special radius gauges, bending spring, plugs, sand, heating equipment to warm-up conduit for bending, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
14. INSTALLING RIGID PVC CONDUIT ONTO MASONRY SURFACES Examines marked-out layouts and conduit pieces/accessories prepared for installation. Selects clips, saddles, wall plugs, tools and equipment and marks-out position for wall plugs. Sets wall plugs, mounts clips/saddles and assembles/ installs conduit. Observes all necessary safety precautions and rules.	According to national standards and specifications for domestic electrical installations.	Rules, tapes, pencils, crayons centre punch, hammers, masonry drills, portable electric drills, screwdrivers, ladders, safety clothes.
15. INSTALLING RIGID PVC CONDUIT INTO MASONRY SURFACES Examines marked-out layouts and conduit pieces/accessories prepared for installation. Selects tools and equipment and cuts grooves/channels for the conduit. Assembles and installs conduit in grooves and closes the grooves by plastering. Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, crayons masonry chisels, hammmer, electri cian knives, trowels, plaster bowl, plaster, electric masonry cutters, ladders safety clothes.
16. FEEDING WIRES INTO CONDUIT Examines circuit diagrams and installation layouts to determine types, sizes, colours and quantities of wire required. In- spects conduit installation for sharp edges, narrow bends, clears passages and removes sharp edges if necessary. Prepares wires, steel/spiral tapes and feeds wires into conduit. Observes all necessary safety precautions and rules.	According to national regulations for colour coding of electrical wiring.	Tapes, diagonal cutting pliers, combination pliers, electrician knives, steel/ spiral tapes, ladders, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
17. **CONNECTING WIRE AND CABLE END TO SCREW-ON AND PUSH-ON TERMINALS IN ELECTRICAL INSTALLATIONS** **(Up to 6 square mm)** Reads and examines diagrams of the particular lighting, signal, power or control circuits to be interconnected as specified in the respective modular unit dealing with the connection of such circuits. Examines components, fixtures, wires and cables to be interconnected. Selects tools and equipment and prepares wire and cable ends for connection. Connects wire and cable ends to screw-on or push-on terminals. Observes all necessary safety precautions and rules.	± 2 mm	Rules, tapes, pencils, combination pliers, diagonal cutting pliers, wire stripping tools, electrician knives, screwdrivers, safety clothes.
18. **CONNECTING WIRE AND CABLE ENDS TO SOLDER-ON TERMINALS** **(Up to 6 square mm)** Reads and examines diagrams of the particular lighting, signal, power or control circuits to be interconnected as specified in the respective modular unit dealing with connection of such circuits. Examines components, fixtures, wires and cables to be interconnected. Selects tools and equipment and prepares wire and cable ends for connection. Prepares and checks soldering equipment. Connects wire and cable ends to solder-on terminals. Observes all necessary safety precautions and rules.	± 2 mm	Rules, tapes, pencils, combination pliers, diagonal cutting pliers, wire stripping tools, electrician Knives, soldering guns, soldering materials, safety clothes.
19. **CONNECTING LIGHTING CIRCUITS WITH ONE-WAY SWITCHES** Reads and examines the diagrams of a one-way circuit to be connected. Selects tools and equipment and connects the circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on, and Push-on Terminals". Observes all necessary safety precautions and rules.	Check function of circuit without error.	Rules, tapes, pencil, combination pliers, wire/cable stripping tool, electrician knives, screwdriver, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: _____ Page: ____ of ____

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
20. **CONNECTING POWER CIRCUIT WITH SINGLE PHASE SOCKET OUTLET** Reads and examines the diagrams of a single phase power circuit to be connected. Selects tools and equipment and connects the circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necssary safety precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tool, electricia knives, screw-drivers, safety clothes.
21. **CONNECTING LIGHTING CIRCUIT WITH TWO-WAY SWITCHES** Reads and examines the diagrams of a two-way circuit to be connected. Selects tools and equipment and connects the circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tool, electricia knives, screw-drivers, safety clothes.
22. **CONNECTING LIGHTING CIRCUITS WITH MULTI-CIRCUIT SITCHES** Reads and examines the diagram of a multi-switch circuit to be connected. Selects tools and equipment and connects circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necessary safety precautions and rules.	As abobe.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tools, electrici knives, screw-drivers, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
23. CONNECTING LIGHTING CIRCUITS WITH INTERMEDIATE SWITCHES Reads and examines the diagrams of an intermediate circuit to be connected. Selects tools and equipment and connects circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tools, electrician knives, screw-drivers, safety clothes.
24. CONNECTING LIGHTING CIRCUITS WITH FLUORESCENT LAMPS Reads and examines the diagram of a circuit with fluorescent lamp to be connected. Select tools and equipment and connect the circuits as specified in the modular unit "Connecting wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tools, electrician knives, screw-drivers, safety clothes.
25. CONNECTING SIGNAL CIRCUITS WITH ELECTRIC BELLS, CHIMES AND BUZZERS Reads and examines the diagrams of different types of signal circuits to be connected. Select tools and equipment and connect circuits, as specified in the modular unit "Connecting wire and Cable Ends to Screw-on and Push-on Terminals". Observe all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tools, electrician knives, safety clothes.

National Sugar Training Centre, Sennar.

D. Staff Development Training Programme.

PROGRAMME REPORT.

Title: The introduction to a Modular System of Training to be developed at the National Sugar Training Centre, Sennar.

Date: January 1989

J.Bye.UNIDO. C.T.A

SUMMARY:

A. The overall content and required outputs of the programme was too ambitious and not enough consideration given to the fact that all the participants were working in a second or (in certain cases) third Language.

B. All the participants are to be complimented upon their efforts in using English Reference Materials, English Technical Data and the preparation of Training Documents in English. Then, finally, addressing the group in English for the presentation.

C. Any future programmes for Staff Development would benefit from slowing down the pace and allowing the same work load to be spread over a period of at least 3 weeks.

D. The present format of the programme is satisfactory and does not require further modification.

E. The classroom and workshop facilities at the Training Centre proved to be edequate.

PROGRAMME REPORT

PROGRAMME : The introduction to a Modular System of Training to be developed at the National Sugar Training Centre, Sennar.

DURATION : Fifteen days - 15th Nov. to 1st Dec. 1988.

AIM : To provide a uniform understanding of one specific model of a Modular Training System to be used as a basis for developing the various Training Programmes and Courses to be established at the National Sugar Training Centre.

LOCATION : The National Sugar Training Centre, Sennar.

PARTICIPANTS : All Counterparts and Workshop Instructors of the Training Centre.

Plus

Nominated Training Officers from 3 of the 4 Sugar Mills.

Plus

Two Instructors from Kenana Training Centre.

The list of participants is included in the text.

LANGUAGE : The language of the programme was English.

OBJECTIVE:

At the completion of the programme each participant will have prepared a Modular Unit based upon the principles and guidelines set out by the programme presenter.

The individual Modular Units will be integrated into a comp'ete Learning Package prepared to International Specifications, Codes of Practice and standard format as a group activity.

EXECUTION OF THE PROGRAMME

1.0. Staff (Details as Annex I)

1.1. Due to the delay in the arrival of Experts Berglund and Pauli the programme was conducted by the C.T.A. until the arrival of Bernt Jan-Olof Berglund on 21st November.

1.2. After a very brief introduction (only 2 hours) to the group, scheme of work, programme plan selected projects and progress made Mr. Berglund was left with the task of continuing the programme since the C.T.A. had to leave for Khartoum to prepare for the visit of UNIDO Deputy Director General Mr. Horst Wiesebach.

1.3. The following day (22nd Nov.) Mr. Edy Pauli, the second Expert arrived to further assist in conducting the programme.

1.4. It is pleasing to note that because of earlier experiences of working together (i.e. Bye and Pauli as Programme Manager and Faculty Member at the I.L.O Turin International Centre for a period of over 2 years) it was possible for Mr. Pauli to immediately "pick-up" the situation and proceed with the inputs without loss of continuity.

1.5. The C.I.A. was able to return on 28th November when it was possible to extend the timetable by two days so that the presentation of all the Project could be evaluated by the whole group of Experts (Bye, Berglund and Pauli). Mr. G. Anestis, the Project Backstopping Officer from UNIDO, HQ. Vienna, was also able to attend some of the presentations.

2.0. Methodology

2.1. The overall proportions of time allocation was divided in the ratio of:

25% Classroom input - Lectures
- Discussions
- Question and Answer Sessions.

75% Individual and Group Project Activities.

30% Group Projects
45% Individual Projects.

2.2. The pattern of activities developed was as follows:

07:00 - 07:30 Consolidation of previous days work.

07:30 - 09:00 Subject input

10:00 - 14:00
and

17:30 - 19:30 Project work.

3.0. The Programme Philosophy

3.1. To fully appreciate the underlying philosophy of the Training Programme it is essential to have a working knowledge of the characteristics and methodology applied in:

3.1.1. The I.L.O. Modules of Employable Skills Training Material or

3.1.2. The N.A.T.O Military Training Manuals for Trade Skills or

3.1.3. The U.S.A. Military Trade Skills Training Methodology or

3.1.4. Particular Training Systems developed by most Industrialised Nations to accelerate the development of individual Skills following the economic recassion of the 1970's and early 1980's.

3.2. The terminology used was that established by the I.L.O. on an international basis in the Directory of Occupations and applies particularly to the Training Schemes set in place in many Developing Countries.

A reference to the terminology is added as Annex 2.

3.3. The principle presented was the use of the I.L.O. Training Material in a manner particularly suited and adapted to the situation in Sudan (in general) and the National Sugar Training Centre (in particular) AND NOT AS THE MATERIAL IS INTENDED TO BE USED IN THE I.L.O. MODULES OF EMPLOYABLE SKILLS SYSTEM.

3.4. The philosophy being to use the TRAINEE CENTRED ACTIVITY BASED training booklets which are validated in Developing Countries AS THE BASIS FOR INDIVIDUAL LESSON PLANS/DEMONSTRATION PLANS IN AN INSTRUCTOR ORIENTED LEARNING SITUATION.

3.5. The importance of this means of training can be appreciated by studying any of the Learning Elements since the contain:

3.5.1 A specific OBJECTIVE

3.5.2. A LIST OF ITEMS required to accomplish the objective.

3.5.3. Well illustrated STEP BY STEP INSTRUCTIONS on how to proceed towards attaining the objective.

3.5.4. A PROGRESS CHECK or ASSIGNMENT to monitor individual trainee performance.

3.5.5. The overall approach being structured to use PRACTICAL ACTIVITIES to acquire related knowledge associated with the practice of developing a SKILL.

3.6. The basis is, therefore, set for the development of any training programme with set criterea within a wider and clearly defined frame of reference with an in-built method of continuous assessment and monitoring.

3.7. With the overall philosophy now firmly established the principle is now being used to develop training programmes in any area of activity for which a Job Description and Job Specification is raised within the whole Sugar Industry of the Republic of Sudan.

4.0. <u>The Programme Content</u>

4.1. The subject structure is attached as Annex 4.

4.2. The overall content of the programme was very demanding on the participants and the quality of output had some correlation with the ability to work wholly in English beside various other factors.

4.3. Whilst, as already stated, there was no loss of continuity, the final two items in the Subject Instructure i.e.:

4.3.1 Implementing a Modular Training System, and

4.3.2. Follow-up and Feedback,

were not dealt with in sufficient depth but simply discussed to provide an appreciation of the topics concerned.

4.4. According to the Subject Structure proposal these topics were scheduled to occupy up to 30% of the available time thus indicating that:

4.4.1. The next Staff Development Training Programme must be scheduled for a period of at least 3 weeks.

4.4.2. The participants of this programme must be invited to return and attend the sessions referred to on 4.3.1. and 4.3.2. above.

5.0. List of Participants

5.1. The following participants from the National Sugar Training Centre began the Training Programme:

Mr. Mohamed Ali Mohamed Osman (El Fadlabi)-Director
Mr. Osman El Tahir Ali - Head, Mech. Eng. Dept.
Mr. Ibrahim Mohamed Abdu - Head, Ag. Eqpt. and Auto Dept.
Mr. Mudawi El Sadiq Mudawi - Head, Electrical and Instrument Dept.
Mr. Mohamed Abbas Mohamed - Senior Instructor, Mech. Eng. Dept.
Mr. Eltayeb Hassan Elshiek - Instructor - Ag. Eqpt. and Auto Dept.
Mr. Awad Mohamed Shaggal Ahmed - Instructor, Ag. Eqpt. & Auto Dept.
Mr. Mohamed El Hassan Atait Alla - Chief Admin. Officer

5.2. The following additional participants completed the programme:

Mr. Suliman Koko - Training Officer - New Halfa.
Mr. Moubarak Mohamed Salah - Training Officer - Assalaya.
Mr. Adil El Daw El Amin - Training Officer - Sennar.
Mr. Fadl El Moula Sarour Taha - Senior Instructor, Kenana Trg. Centre.
Mr. Yahia Mohamed Yahia - Senior Instructor, Kenana Trg. Centre.

6.0. Projects

6.1. Group Projects and contributors.

6.1.1. A Learning Package for training in "Skills Awareness for Graduate Engineers"

Mr. Osman El Tahir Ali
Mr. Mohamed Abbas Mohamed
Mr. Yahia Mohamed Yahia.

6.1.2. A Learning Package for training "Basic Skills for Auto Electricians"

Mr. Ibrahim Mohamed Abdu.
Mr. Eltayeb Hassan Elsheik.
Mr. Awad Mohamed Shaggal Ahmed.
Mr. Fadl El Moula Sarour Taha.

6.1.3. A Learning Package for training in "Basic Instruments Maintenance and Repair".

Mr. Mudawi El Sadiq Mudawi.
Mr. Mahagoub Widat Alla.

6.1.4. A Learning Package for "Developing the Skills of Training Officers"

Mr. Mohamed Ali Mohamed Osman
(El Fadlabi)
Mr. Suliman Koko
Mr. Moubarak Mohamed Salah
Mr. Adil El Daw El Amin
Mr. Mohamed El Hassan Atait Alla.

6.2. Individual Projects together with assessment of content and presentation technique:

6.2.1. Mr. Osman El Tahir Ali.

Project: Modular Unit Title: Turning a Stepped Shaft.

Remarks: Fully understands the concept of the Modular Systems Approach. Analytical in Approach and produced good training material.

Competent Instructor but with a tendency to still prefer more traditional methods.

6.2.2. Mr. Mohamed Abbas Mohamed

Project: M.U. Title: Bench Fitting - Producing a Drill Gauge.

Remarks: Very thorough approach and shows complete understanding of the System. Preparation of Material was excellent.

Presentation clear and accurate - Very Good.

6.2.3. Mr. Yahia Mohamed Yahia

Project: M.U. Title: Methods of Slot Milling.

Remarks: Excellent in all areas i.e. understanding, preparation and presentation.

6.2.4. Mr. Ibrahim Mohamed Abdu.

Project: M.U. Title: Maintaining Spark P;ugs and Checking H.T. Coil.

Remarks: Fully understands the concept of Modular Training Systems and applied it correctly. Tended to be the motivator in the group and able to offer constructive ideas.

Training material was well prepared and the presentation was excellent.

6.2.5. Mr. Eltayeb Hassan Elsheik.

Project: M.u. Title: Maintaining or Repalacing Cotact Braeaker Points and Condensars.

Remarks: Understands the principles of Modular Systems and participated well in project activities however the preparation of material in English may need further attention.

Presentation slightly impulsive.

6.2.6. Mr. Awad Mohamed Shaggal Ahmed.

Project: M.U. Title: Stripping and Assembling Distributors.

Remarks: Satisfactory in all activities and has excellent potential. Fully understands the concept and would benefit from some improvement in the use of English.

6.2.7. Mr. Fadl El Moula Sarour Taha.

Project: M.U. Title: Ignition Circuit Fault Finding.

Remarks: Excellent in all areas and gave a first class presentation.

6.2.8. Mr. Mudawi El Sadiq Mudawi.

Project: M.U. Title: Maintenance and Repair of Vacuum Gauges.

Remarks: Has fixed ideas upon how to instruct which do not necessarily coincide with the Systems Approach to Training. Has far more motivation to become a Lecturer instead of an Instructor. These factors were reflected in his attitude, training materials and presentation.

6.2.9. Mr. Suliman Koko.

Project: M.U. Title:

Remarks: Followed the programme properly and completed the project in a manner showing a full appreciation of the Methodology and in spite of obvious limitations in the Knowledge of English made a clear, concise presentation.

An excellent, well motivated performance.

6.2.10. Mr. Moubarak Mohamed Salah.

Project: M.U. Title: Development of Basic Management Skills.

Remarks: Understood the principle and prepared materials accordingly.

Presented a well structured training module.

6.2.11. Mr. Adil El Amin.

Project: M.U. Title: Preparing a Questionaire.

Remarks: Performed satisfactorily throughout having been newly appointed to attend the Staff Development Programme. Showed complete understanding of the approach and presented a well prepared training module.

7.0. Certification

7.1. A certificate of competance was presented to the participants who successfully completed the programme (sample copy attached as Annex 3).

7.2. It will be noted that for several reasons, three of the participants were unable to complete the course and therefore their certificates are being "held-over" to allow for the opportunity to complete the necessary activities during the next programme.

The certificates retained were prepared in the names of:

Mr. Mohamed Ali Mohamed Osman (El Fadlabi)*1
Mr. Mahagoub Widat Alla
Mr. Mohamed El Hassan Atait Alla.

7.3. The semi-formal 'Graduation Ceremony' was attended by Mr. Gaafar Hussein, Director for Public Industries, Ministry of Industry, as Guest of Honour, together with several Director Generals, Managers and M.A.I.S Officials from the Sugar Mills.

THE OCCASION MARKED AN IMPORTANT STEP FORWARD IN THE DEVELOPMENT OF THE TRAINING CENTRE AND THE PROJECT.

*1 **The Director of the Centre had to withdraw from the programme, very reluctantly, to attend the meeting in Khartoum with the C.I.A.**

8.0. The Programme Timetable

8.1. The pattern and progression of the development of the subject matter was conducted according to the format prepared in the Programme Plan but it must be emphasised that the last 30% of the topics were not covered adequately and, therefore, further study is required.

The Subject Structure is attached as Annex 4.

8.2. The timetable is attached as Annex 5.

9.0. Final Assessment and Validation

9.1. Training Programmes have been implemented at the Training Centre to validate the materials produced as Project Work.

Certain initial modifications have already been undertaken by the Instructors concerned under the supervision and guidance of the Experts.

9.2. It has not been possible to include the two Instructors from Kenana Training Centre in this process.

9.3. The work of the Training Officers is somewhat different in that it requires the execution of certain activities rather than the presentation of technical information. The validation is therefore a longer process.

9.4. Final assessment of the Instructional capability of the individuals concerned will be used to plan the most appropriate Fellowship Training Programmes.

A N N E X 1

STAFFING

The Programme was designed and directed by:

J.Bye, C.T.A.	-	Post 11.01
Nationality	-	British
Specialisation	-	Mechanical and Production Engineering.
B.J.O. Berglund	-	Post 11.51
Nationality	-	Swedish
Specialisation	-	Instrumentation Engineering.
E.Pauli	-	Post 11.05
Nationality	-	Italian.
Specialisation	-	Operation and Maintenance of Vehicles.

Other support was provided by the various Administrative Staff of the Training Centre.

ANNEX 2

TERMINOLOGY

1.	Training Needs	-	The precise definition of all aspects of training necessary to raise the abilities of an individual from the known level at entry to accomplish the requirements of a Job Specification *.
2.	A Modular Unit	-	Is a logical and acceptable division of work within a Field of Work or Occupational Area.
3.	Field of Work	-	A normal sub-division within an Occupational Area - eg. Domestic Electrical Installation.
4.	Occupational Area	-	As defined by International Standards and does not deviate from the normally acceptable English use such as Electrical Engineering.
5.	Job Description	-	A statement identifying the activities of a "Job" within a Field of Work and describes the functions, responsibilities, conditions of Work and when appropriate, the entry requirements.
6.	Job Analysis	-	By analysing the various functions carried out, responsibilities, conditions and STANDARD, a precise JOB SPECIFICATION may be prepared.
7.	Task Analysis	-	By dividing a 'Job' into predetermined **tasks** and then subjecting these to analysis it is possible to identify the **skill content**.

A N N E X 2 (CONTINUED)

8. Skills Analysis - The identified skills are analysed to define what training is required in order for someone to be able to acquire such skills.

9. Skill - The ability to complete a clearly defined activity correctly and with maximum efficiency and be able to repeat it continuously (automatically) to the same high standard.

   In nearly all cases this may only be accomplished by correct training.

10. Learning Elements - Training Booklets prepared by I.L.O. stating an objective. step by step instructions and progress check for accomplishing a particular step of work.

11. Modular Unit Content- A sequenced group of Learning Elements required to complete a Modular Unit.

12. Learning Package - One or more Modular Units (In cases where similar methods, tools and technical content apply) and include Instructor and Trainee Guidance Materials.

REPUBLIC OF THE SUDAN

NATIONAL SUGAR TRAINING CENTRE

Certificate

This is to certify that Mohamed Ali El Fadlabi

has successfully completed the following

Training Programme Introduction to a Modular System of Training from 15 to 30, Nov. 1988

Which included the following topics

System Approach to Training,- The Modular

Concept,- Job, Task and Skills Analysis

Preparing Training Modules and Learing Packages

Programme Manager

Director
National Sugar Training Centre

Date/ 1 - 12 - 1988

جمهورية السودان

المركز القومي لتدريب العاملين في مجال السكر

شهادة

بهذا نشهد بأن [illegible]

قد أكمل بنجاح فترة تدريبية في [illegible]

في الفترة من [illegible] الى [illegible]

وقد شمل تدريبه المواد التالية :

[illegible]

مدير البرنامج

مدير المركز

التاريخ [illegible]

ANNEX IV

Subject Structure.

No.	%	Subject Fields.	Subjects.
1.	5	Introduction to the System Approach to Training:-	a. The development of a Modular System. b. Definitions and Terminology. c. The key characteristics of a Modular System.
2.	5	The Modular Concept :-	a. The philosophy of phased development of skills using Training Modules.
3.	10	Training Needs Assessment:-	a. Training Population Analysis. b. Preparing a Trainee Specification c. Job Specifications. d. Identification of Training Needs.
4.	50	Developing a Modular Training Package:-	a. Identifying a Modular Unit. b. Specifying the objective of a Modular Unit. c. Job analysis. d. Task analysis. e. Skills analysis. f. Identifying the steps of work within a Modular Unit. g. Analysing the steps of work. h. Identifying the Learning Elements within a Modular Unit. i. Writing the objectives for a Learning Element. j. Determining the contents of a Learning Element. k. Designing Assignments and Progress checks for Learning Elements. l. Preparing Performance Tests. m. Preparing Instructional Units for future development into Learning Elements.
5.	25	Implementing a Modular Training System:-	a. Preparing Instructor Guidance Material. b. Preparing Trainee Guidance Material. c. Managing the implementation of a Training Programme. d. Evaluating Trainee Progress and Performance. e. Validation of Training Material.

UNIDO

Subject Structure.

No.	%	Subject Fields.	Subjects.
6.	5	Follow-up and Feedback:-	a. Evaluating Efficiency and Effectiveness of Training. b. Designing and Carrying out follow-up procedures after Training.

NATIONAL SUGAR TRAINING CENTRE - SENNAR

PROGRAMME : Staff Development WEEK No 1 FROM 15th Nov. To 21st Nov. 1988

Time	Tuesday	Wednesday	Thursday	Saturday	Sunday	Mondny
07.00	Introduction to Systems Approach to Training.	Training Needs Assessment.	Identification of Modular Units.	Task Analysis Skills Analysis	Job Specification and Training Packages.	Developing Medular Units.
09.00	Bye	Bye	Bye	Bye	Bye	Bye/Berglund.
10.00	The Modular Concept.	Group Project Assignment.	Setting Objectives Job Analysis	Project Work.	Identifying Learning Elements.	Project Work.
12.00	Bye	Bye	Bye	Bye	Bye	Berglund
12.00	Private Study.	Group Project - Training Needs.	Individual Project Assignment.	Project Work.	Project Work.	Project Work.
16.00		Bye	Bye	Bye	Bye	Berglund
17.30	Administrative Arrangements.	Group Project.	Tutorial.	Project Work.	Project Work.	Project Work.
19.30		Bye		Bye	Bye	Berglund.
Chairman						

Language of the Programme: ENGLISH

NATIONAL SUGAR TRAINING CENTRE - SENNAR

PROGRAMME : Staff Development WEEK No 2 FROM 22nd Nov. TO 28th Nov. '86

Time	Tuesday	Wednesday	Thursday	Saturday	Sunday	Monday
07.00	Assignments & Performance Tests.	Developing Instructional Units.	Instructor and Trainee Guidance Material.	Implementation Procedures.	Follow-up Procedures.	Project Presentation.
09.00	**Pauli**	**Pauli**	**Berglund/Pauli**	**Pauli**	**Pauli**	**Bye/Anestis Berglund/Pauli**
10.00	Project Work.	Project Work.	Project Work.	Project Work.	Project Work.	Presentation
12.00	**Berglund/Pauli**	**Berglund/Pauli**	**Berglund/Pauli**	**Berglund/Pauli**	**Berglund/Pauli**	**Bye/Anestis Berglund/Pauli**
12.00	Project Work.	Project Work.	Review Session	Project Work.	Project Work.	Presentation
14.00	**Berglund**	**Pauli**	**Berglund**	**Pauli**	**Berglund/Pauli**	**Berglund/Pauli**
17.30	Project Work.	Project Work.	Tutorial	Tutorial	Tutorial	Tutorial
19.30	**Pauli**	**Berglund**				
Chairman						

Language of the Programme: ENGLISH

NATIONAL SUGAR TRAINING CENTRE - SENNAR

PROGRAMME : **Staff Development** WEEK No 3 FROM **29th Nov.** TO **1st Dec.'88**

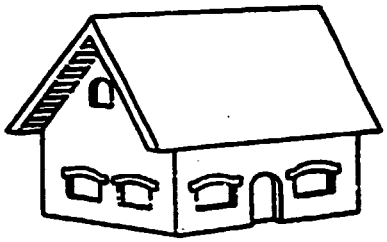
Time	Tuesday	Wednesday	Thursday			
07.00 09.00	Presentation **Berglund/Pauli**	Presentation **Berglund/Pauli**	Final Review. **Bye/Berglund/ Pauli.**			
10.00 12.00	Presentation **Berglund/Pauli**	Presentation **Berglund/Pauli**	Presentation of Certificates. **Mr. Gaafar Hussein**			
12.00 14.00	Presentation **Berglund/Pauli**	Travel Arrangements. **Bye**	Admin. Arrangements.			
Chairman						

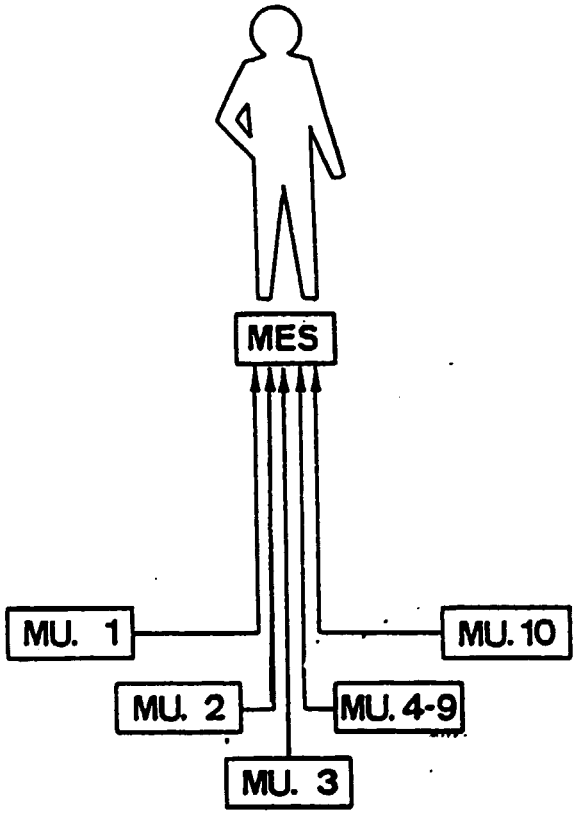
Language of the Programme: ENGLISH

In the first example we have an electrician who works on his own. He has to install the electrical installations of small houses or apartments up to the fusebox. He performs this work completely by himself. He:

- marks out installation layouts in buildings (MU 01);
- mounts components onto masonry surfaces (MU 02);
- installs cables on surface using clips and saddles (MU 03);
- connects different electrical circuits (MU 04-09);
- tests electrical installations (MU 10).

His module of employable skill consists of ten modular units.



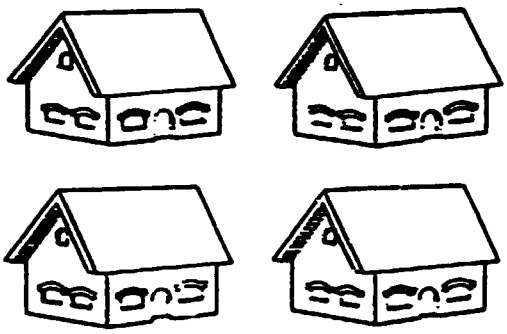


This example shows a situation where there is enough work to justify the employment of two workers. To reduce training time and cost, the module of employable skill for each worker would consist of different modular units reflecting the division of work among them.

Worker No. 1

- marks out installation layouts in buildings;
- mounts components onto masonry surfaces;
- installs cables on surface using clips and saddles.

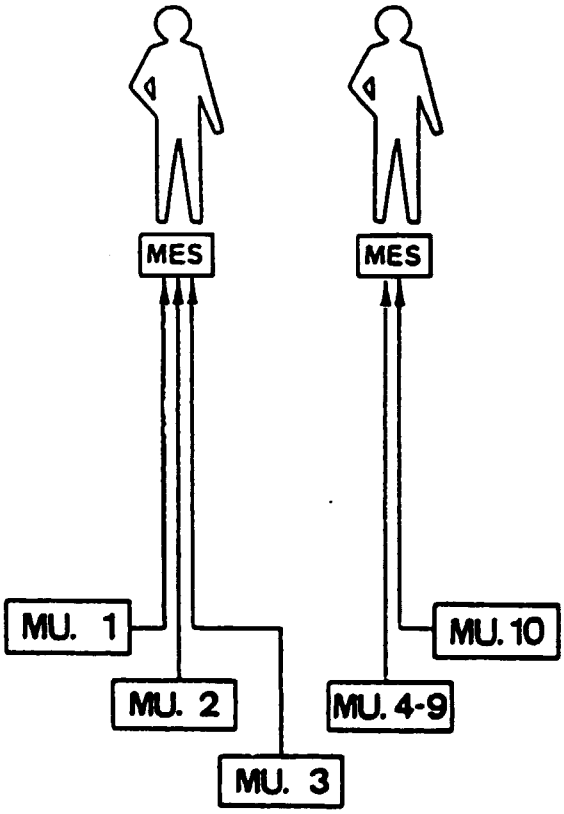
His module of employable skill consists of three modular units.



Worker No. 2

- connects different electrical circuits;
- tests electrical installations.

His module of employable skill consists of six modular units.

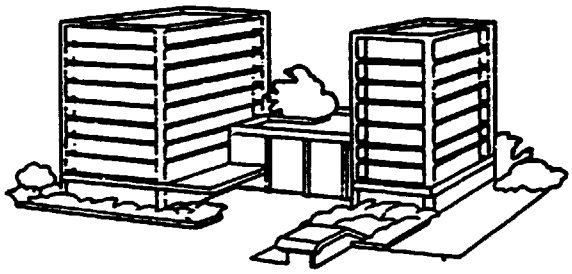


The third example shows a situation where a large number of similar electrical installations are to be installed in a very large building or on a housing estate. In a case like this, each worker could be usefully employed carrying out a small part of each installation. Therefore the module of employable skill for each one of them, reflecting the division of work, might be as shown below:

Worker No. 1

- marks out installation layouts.

His module of employable skill consists of only one modular unit.



Worker No. 2

- mounts components onto masonry surfaces.

His module of employable skill also consists of only one modular unit.

Worker No. 3

- installs cables on surface using clips and saddles.

His module of employable skill also consists of only one modular unit.

Worker No. 4

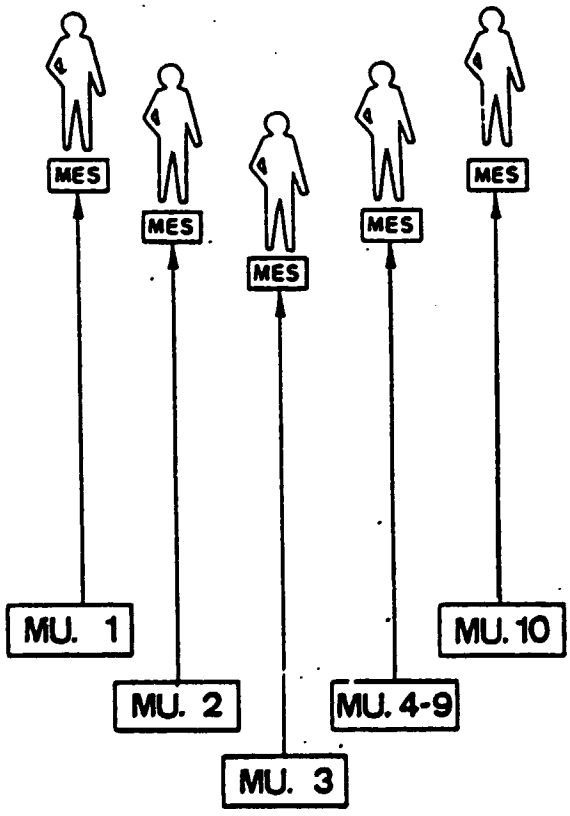
- connects different electrical circuits.

Six modular units are required for his module of employable skill.

Worker No. 5

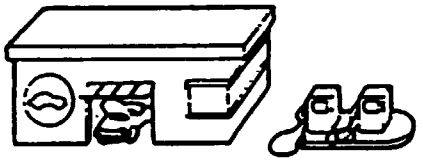
- tests electrical installations.

Again, only one modular unit is required for his module of employable skill.



We shall now look at the three examples of module of employable skill situations from the occupational area of Automative Engineering field of work «Servicing Cars». We will use the seven modular units which we have quoted on Page No.12 in the learning element «Identifying Modular Units».

This example shows a small garage with one car mechanic only. He has to perform the seven modular units listed below.



Here are the titles of the seven modular units:

MU-01 Servicing Ignition System

MU-02 Servicing Battery

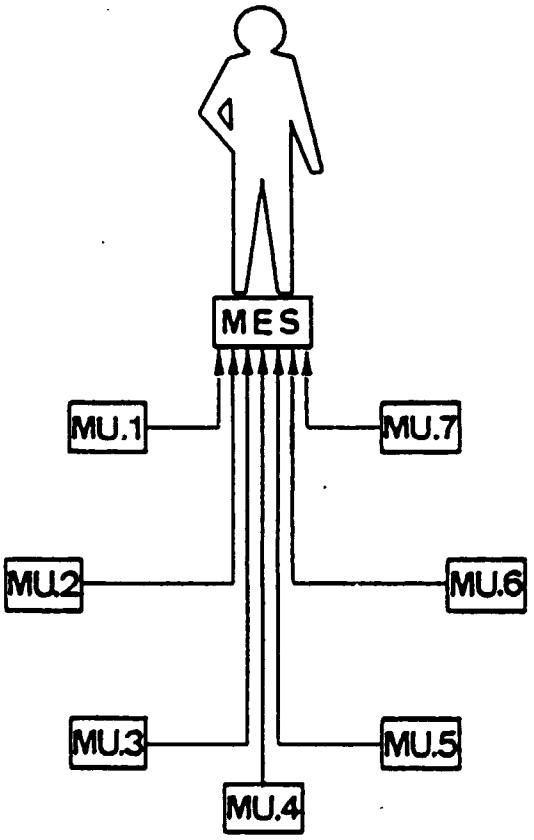
MU-03 Servicing Cooling System

MU-04 Changing Engine Oil

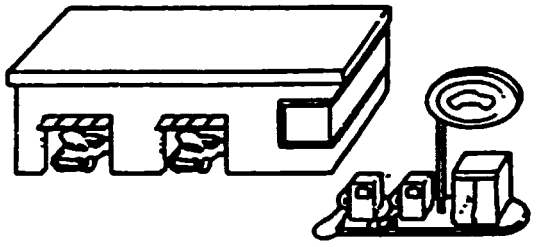
MU-05 Cleaning Car Body

MU-06 Servicing Tyres

MU-07 Servicing Brake System



This is a larger garage which employs three car mechanics, each one carrying out part of the overall servicing of a car.



Worker No. 1

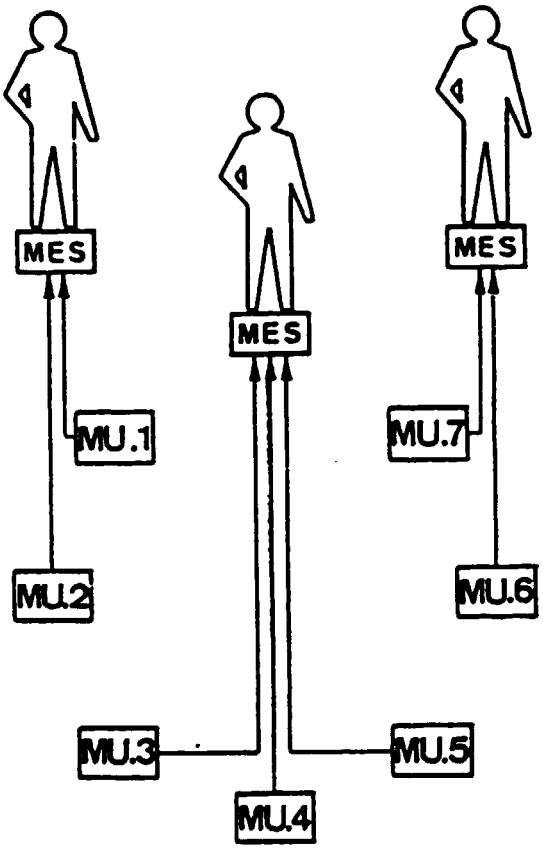
- services Ignition Systems;
- services Batteries.

Worker No. 2

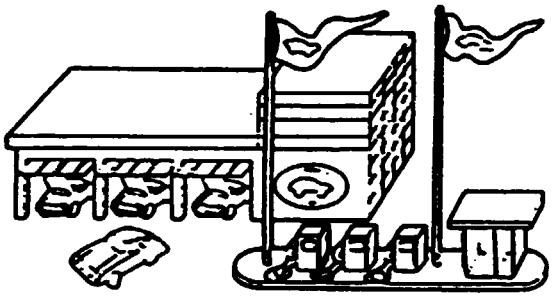
- services Cooling Systems;
- changes Engine Oil;
- cleans Car Bodies.

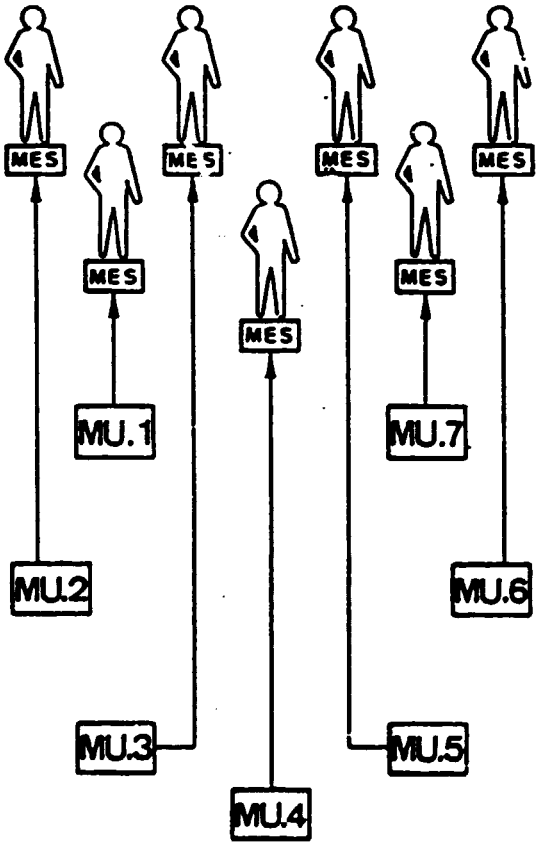
Worker No. 3

- services Tyres;
- services Brake Systems.



This is the division of work that you might find in a very large garage with many employees and where maybe a hundred cars have to be serviced every day. In such a situation, each modular unit might be a module of employable skill for one person.





There are small modules of employable skill and large modules of employable skill. Let us take the case of a man working on the assembly line of a car factory. This man might be employed to mount 4 wheels of the car onto their axles. His module of employable skill consists of one small modular unit.

If you look at what a comprehensive car mechanic does, you might find that he performs the work of maybe 60 or even 100 modular units. In such a case, his module of employable skill could correspond to the traditional job title of an «Automotive Mechanic».

The titles of modules of employable skills can be standardised under certain conditions. Let us take the case of the hotel maintenance mechanic quoted in paragraph 12. If, in a country where tourism is a major source of income, this man could be employed in the majority of the hotels by being able to perform the listed 12 modular units; this M.E.S. could be standardised for the occupation of «Hotel Maintenance Mechanic» in that country.

When identifying modules of employable skills, keep their main characteristics in mind, i.e.

- they state the work to be performed for particular employment situations expressed in the form of modular units;
- they can be small or large ranging from one to hundreds of modular units;
- they can consist of modular units from one occupational area and from one field of work only;
- they can consist of modular units from different occupational areas and different fields of work;
- the titles of modules of employable skills can be standardised under certain conditions.

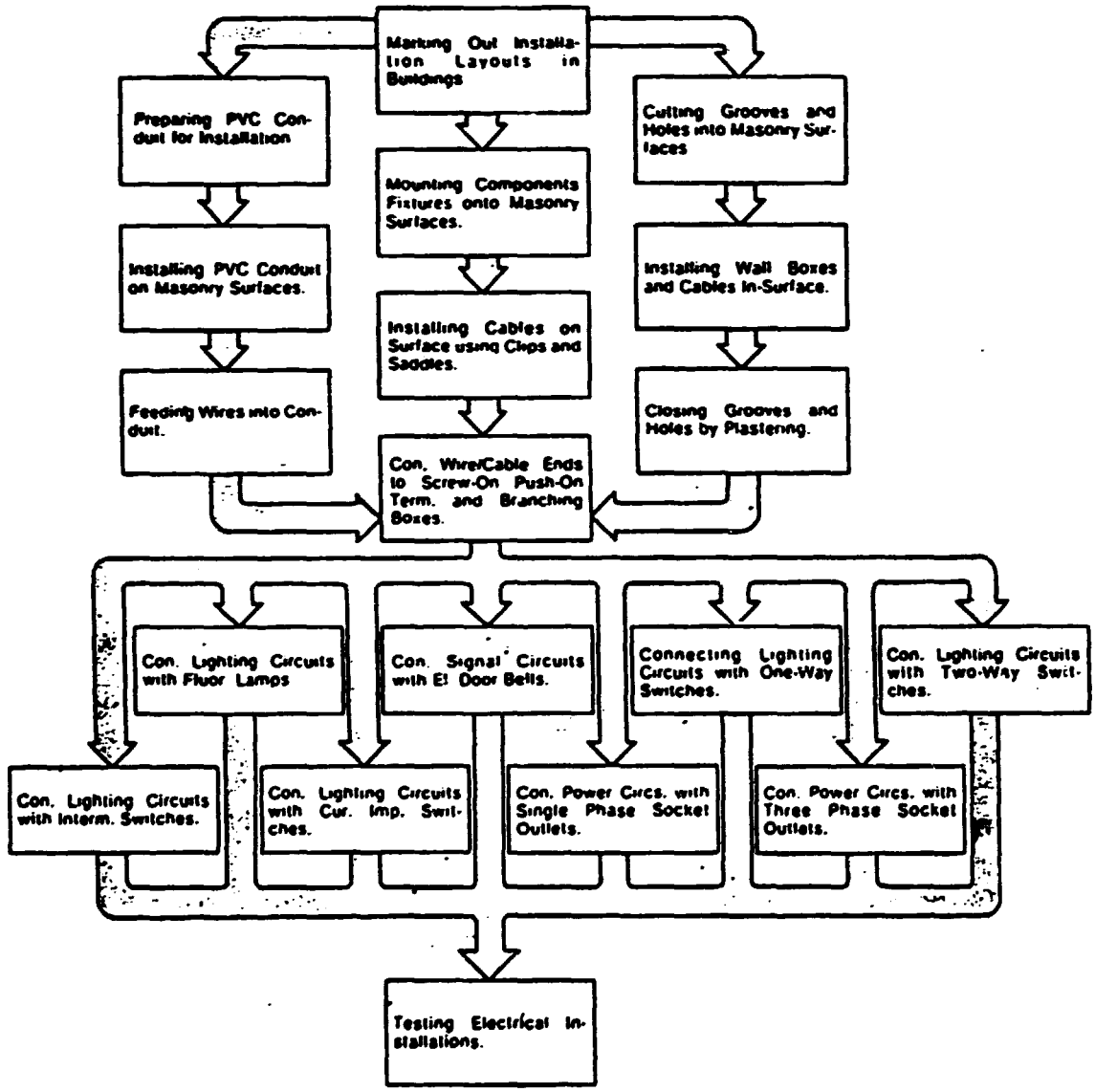
The examples of modules of employable skill that have been quoted so far in this learning element, have been taken from particular occupational areas and specific fields of work. A module of employable skill may, however, consist of modular units from different occupational areas and different fields of work.

Let us look at a first line maintenance mechanic employed in a small hotel. He could be required to perform the following modular units in order to be employable.

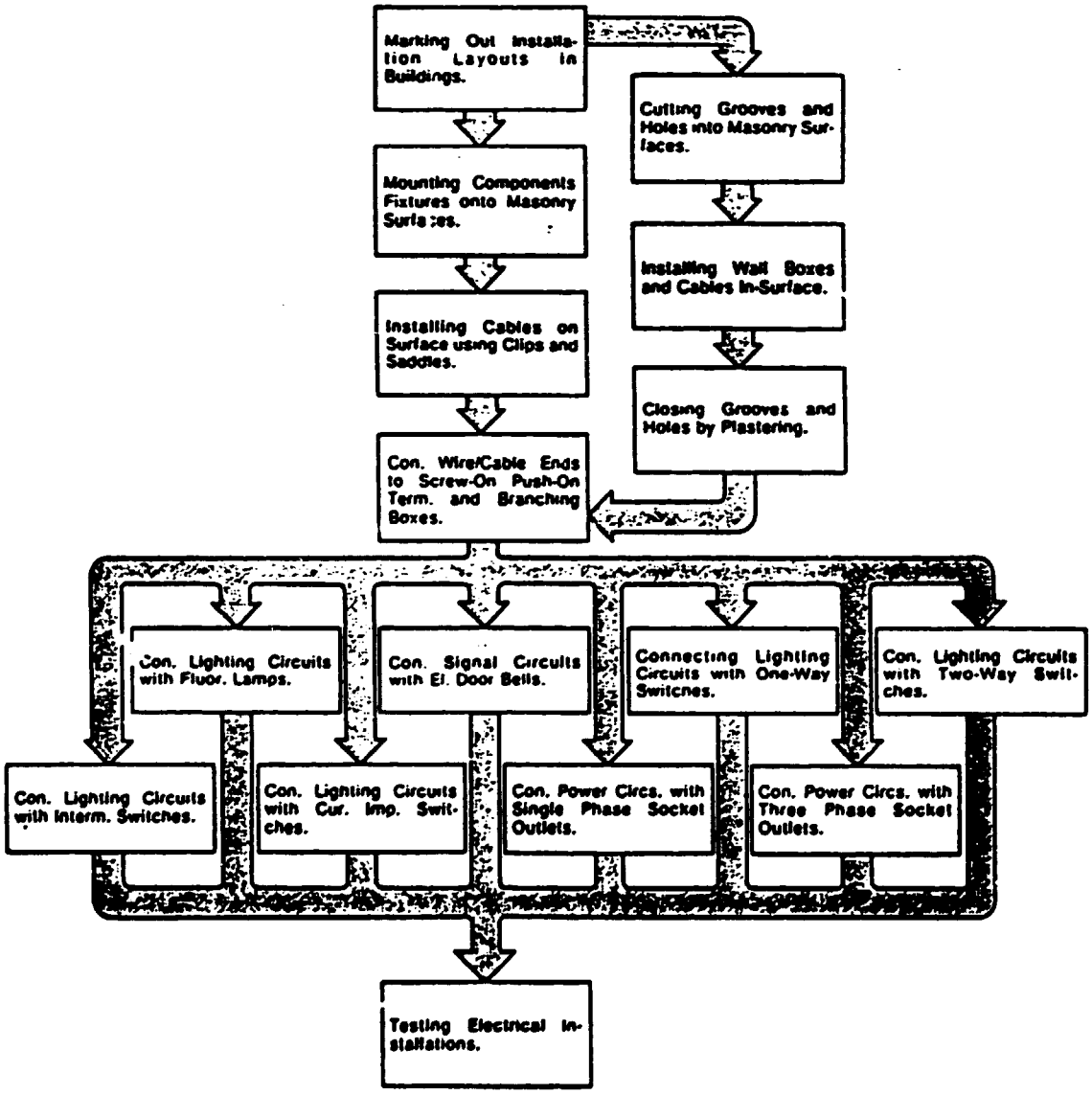
No.	MU Title	Occupational Area	Field of work
MU-01	Changing light bulbs	Electrical Engineering	Domestic electrical installations
MU-02	Replacing single phase power plugs	Electrical Engineering	"
MU-03	Replacing fuses	"	"
MU-04	Replacing washers on water taps	Plumbing and Pipe Fitting	Installing and maintaining domestic water supply systems
MU-05	Replacing water taps and valves	"	"
MU-06	Repairing clogged-up water drains	"	Installing and maintaining drainage systems
MU-07	Replacing locks on doors and windows	Woodworking	Installing and maintaining doors and windows
MU-08	Replacing broken window glass	"	"
MU-09	Patchingup paint-work	Building Construction	Painting in-buildings
MU-10	Maintaining and repairing water tanks	Mechanical Engineering	Sheet metal work
MU-11	Cleaning filters of air conditioners	Air Conditioning and Refrigeration	Installing and Maintaining unit type air conditioners
MU-12	Changing wheels of customers' cars	Automotive Engineering	Car servicing

The module of employable skill for this example of a hotel maintenance mechanic consists of 12 modular units taken from 7 different occupational areas.

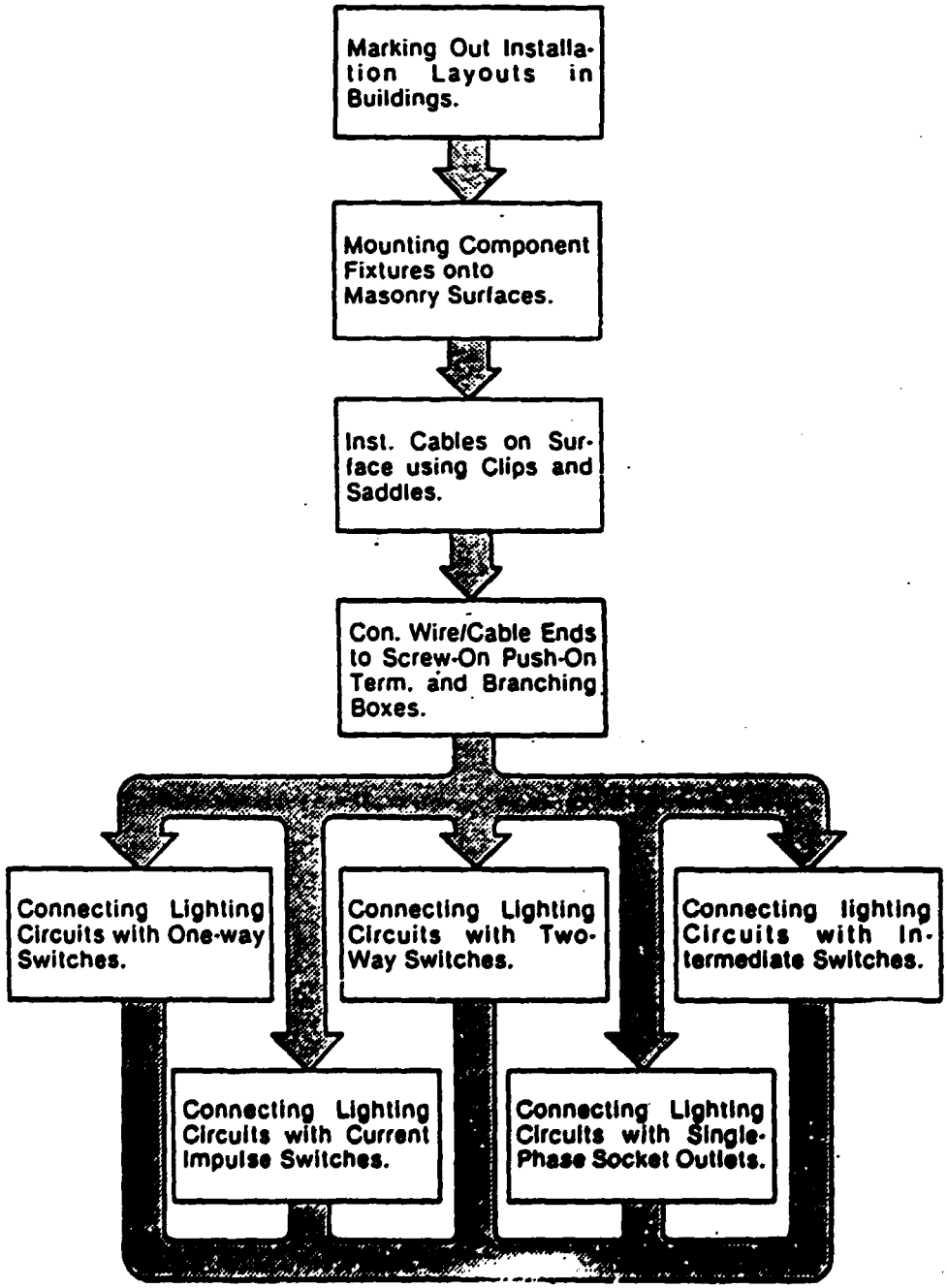
The Global Occupational Profile of the simplified version of a «Building Electrician» consists of 18 modular units, which are shown below in the form of a chart.



For the national standard required in a particular country it has been decided that on-surface installations using PVC conduit are not required as this installation method is not being used. The NATIONAL OCCUPATIONAL PROFILE for this occupation is therefore reduced by three modular units to a total of 16.



The specific profile of that occupation could look like the example shown below which consists of 10 modular units. In this particular case, an electrical contractor installs simple houses which only require four lighting circuits and one power circuit. All circuits are installed on-surface using cables. The testing and inspection of the completed installation is carried out by the foreman.



If for an occupation or field of work where mainly standardised technologies are being used, ALL the modular units required on a global basis would be identified and if these modular units would be presented in the form of global profiles on modular unit/learning element reference charts, this set of charts would very much simplify the process of occupational analysis and curriculum planning.

Instead of having to re-analyse every occupation or field of work again in every country, it would only be necessary to select from the Global Occupational Profile those modular units which are required for national or specific employment/training needs and then verify the content of each modular unit/learning element reference chart in line with the required level of decision making and the working methods used.

We can also verify the content of globally prepared modular unit/learning element charts on the basis of well prepared job specifications. On the following four pages you will find the job specification of a simple «Building Electrician». We have used this job specification as an example in the learning element, «Preparing Job Specifications for M.E.S. Training». The modular units of this job specification are identical to those shown in the chart on page 12, paragraph 20.

① **JOB DESCRIPTION** Page 1 of 3

Job Title: Building Electrician
Occupational Area: Electrical Engineering
Job No./Code: EE/DEI-10
Company: James Electrical Contractors
Field of Work: Domestic Electrical Installations
Department: Project Execution Dept.

② **Description of Functions:**

Installs electric lighting and power circuits in domestic dwelling such as houses and apartment blocks. Examines diagrams and other specifications; selects, positions and mounts switches, light fixtures and socket outlets; selects and installs cables onto wooden and masonry surfaces; connects the different electrical circuits in accordance with the diagrams given to him.

③ **Organisational Pattern: (Responsible to/Responsible for)**

- Responsible to the foreman of the building site in charge of the electrical installations.
- Responsible for one or more electrician helpers.

④ **Conditions of Work/Standards:**

- Works on housing development schemes in remote desert areas.
- Works to national building standards and specifications required for domestic dwellings in desert areas.

⑤ **Entry Requirements:**

- Must be able to read and write the English texts of learning elements.
- Must be able to add, substract, divide and multiply.
- Should possess normal physique and eyesight (with or without spectacles), no colour blindness and must be able to work in hot and remote desert areas.

⑥ Job Title: Building Electrician Job No./Code: EE/DEI-10 Page: 2 of 3

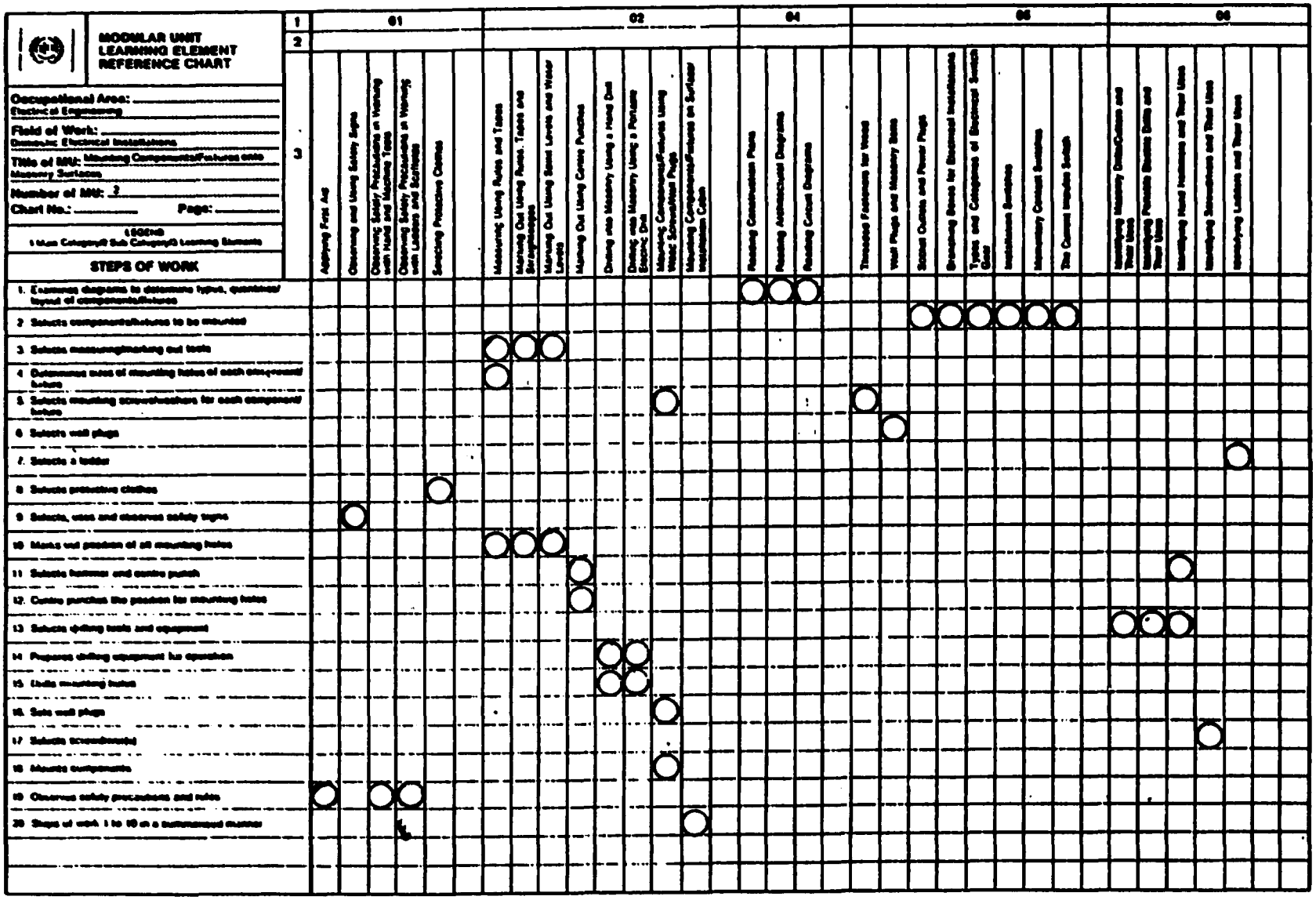
List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
1. Marking Out Installation Layouts Examines diagrams to identify the layout to be marked out; selects the tools and equipment required and marks out the positions of components/fixtures and the cable runs of the installation onto the walls and ceilings of the different rooms of domestic dwellings. Observes all necessary safety precautions and rules.	± 2mm	rules, tapes, straight-edges, chalklines, plumbobs, pencils, safety clothes and safety signs
2. Mounting Components/Fixtures onto Wooden and Masonry Surfaces Examines diagrams to determine types, sizes, quantities and positions of components/fixtures to be mounted. Selects components/fixtures, mounting screws, washers, wall plugs and all the tools required for this work. Prepares tools/equipment, marks out positions and mounts components onto the surfaces of the walls and ceilings. Observes all necessary safety rules and precautions.	± 2mm	rules, tapes, spirit levels, pencils, crayons, centre punches, hammers, masonry drills, portable electric drill, screwdrivers, garnish awls, ladders, safety signs
3. Installing Cables Using Clips and Saddles Examines diagrams to determine types, quantities and layout of cables; selects cables, clips, saddles, fasteners for clips/saddles, and all the tools and equipment required. Prepares tools/equipment and installs cable runs. Cuts to length and removes the sheaths of cables. Inserts cables into cable glands. Observes safety rules and precautions.	± 2mm	rules, tapes, straight-edges, spirit levels, centre punches, pencils, crayons, hammers, masonry drills, portable electric drills, garnish awls, screwdrivers, pliers, electricians knives, wire/cable stripping tools, ladders, safety clothes, safety signs
4. Connecting Wire/Cable Ends to Screw-On Push-On Terminals and Branching Boxes Examines the diagrams of the electrical lighting and power circuits specified in modular units 5 to 9 to determine the inter-connection of the various components/fixtures. Examines the components/fixtures and cables to be inter-connected. Selects all the tools and equipment required. Connects the wire ends of the cables to the terminals of the different components and fixtures in accordance with the circuit diagrams of the lighting/power circuits specified below. Observes all necessary safety rules and precautions.	± 1mm	rules, tapes, pencils, crayons, pliers, wire-stripping tools, screwdrivers, safety clothes, safety signs, ladders

⑥ Job Title: Building Electrician Job No./Code: EE/DEI-10 Page: 3 of 3

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
5. Connecting Lighting Circuits with One-Way Switches		
In connection with modular unit No. 4.	as above	as above
6. Connecting Lighting Circuits with Two-Way Switches		
As above	as above	as above
7. Connecting Lighting Circuits with Intermediate Switches		
As above	as above	as above
8. Connecting Lighting Circuits with Current Impulse Switches		
As above	as above	as above
9. Connecting Power Circuits with Single-Phase Power Outlets		
As above	as above	as above


MODULAR UNIT
LEARNING ELEMENT
REFERENCE CHART
Occupational Area:
Electrical Engineering
Field of Work:
Domestic Electrical Installations
Title of MU: Mounting Components/Fixtures onto Masonry Surfaces
Number of MU: 3
Chart No.:
Page:
LEGEND
1 Main Category/2 Sub Category/3 Learning Elements
STEPS OF WORK
1. Examines diagrams to determine types, quantities/ layout of components/fixtures
2. Selects components/fixtures to be mounted
3. Selects measuring/marking out tools
4. Determines areas of mounting holes of each component/ fixture
5. Selects mounting screws/washers for each component/ fixture
6. Selects wall plugs
7. Selects a ladder
8. Selects protective clothes
9. Selects, uses and observes safety signs
10. Marks out position of all mounting holes
11. Selects hammer and centre punch
12. Centre punches the position for mounting holes
13. Selects drilling tools and equipment
14. Prepares drilling equipment for operation
15. Drills mounting holes
16. Sets wall plugs
17. Selects screwdrivers
18. Mounts components
19. Observes safety precautions and rules
20. Steps of work 1 to 19 in a harmonized manner
01
02
04
05
06
1
2
3
Applying First Aid
Observing and Using Safety Signs
Observing Safety Precautions on Working with Hand and Machine Tools
Observing Safety Precautions on Working with Ladders and Scaffolds
Selecting Protective Clothes
Measuring Using Rules and Tapes
Marking Out Using Rules, Tapers and Straightedges
Marking Out Using Sliding Levels and Water Levels
Marking Out Using Centre Punches
Drilling into Masonry Using a Hand Drill
Drilling into Masonry Using a Portable Electric Drill
Mounting Components/Fixtures Using Wall Plugs and Screws
Mounting Components/Fixtures on Surface Installation Cable
Reading Construction Plans
Reading Architectural Diagrams
Reading Circuit Diagrams
Threading Fasteners for Wood
Wall Plugs and Masonry Bits
Socket Outlets and Power Plugs
Branching Boxes for Electrical Installations
Types and Categories of Electrical Switch Gear
Installation Switches
Momentary Contact Switches
The Current Impulse Switch
Identifying Masonry Drills/Cutters and Their Uses
Identifying Portable Electric Drills and Their Uses
Identifying Hand Hammers and Their Uses
Identifying Screwdrivers and Their Uses
Identifying Ladders and Their Uses

MODULAR UNIT LEARNING ELEMENT REFERENCE CHART

Occupational Area: Electrical Engineering
Field of Work: Domestic Electrical Installations
Title of MU: Mounting Components/Fixtures onto Masonry Surfaces
Number of MU: 2
Chart No.: ______ Page: ______

LEGEND
1 Main Category/2 Sub Category/3 Learning Elements

STEPS OF WORK

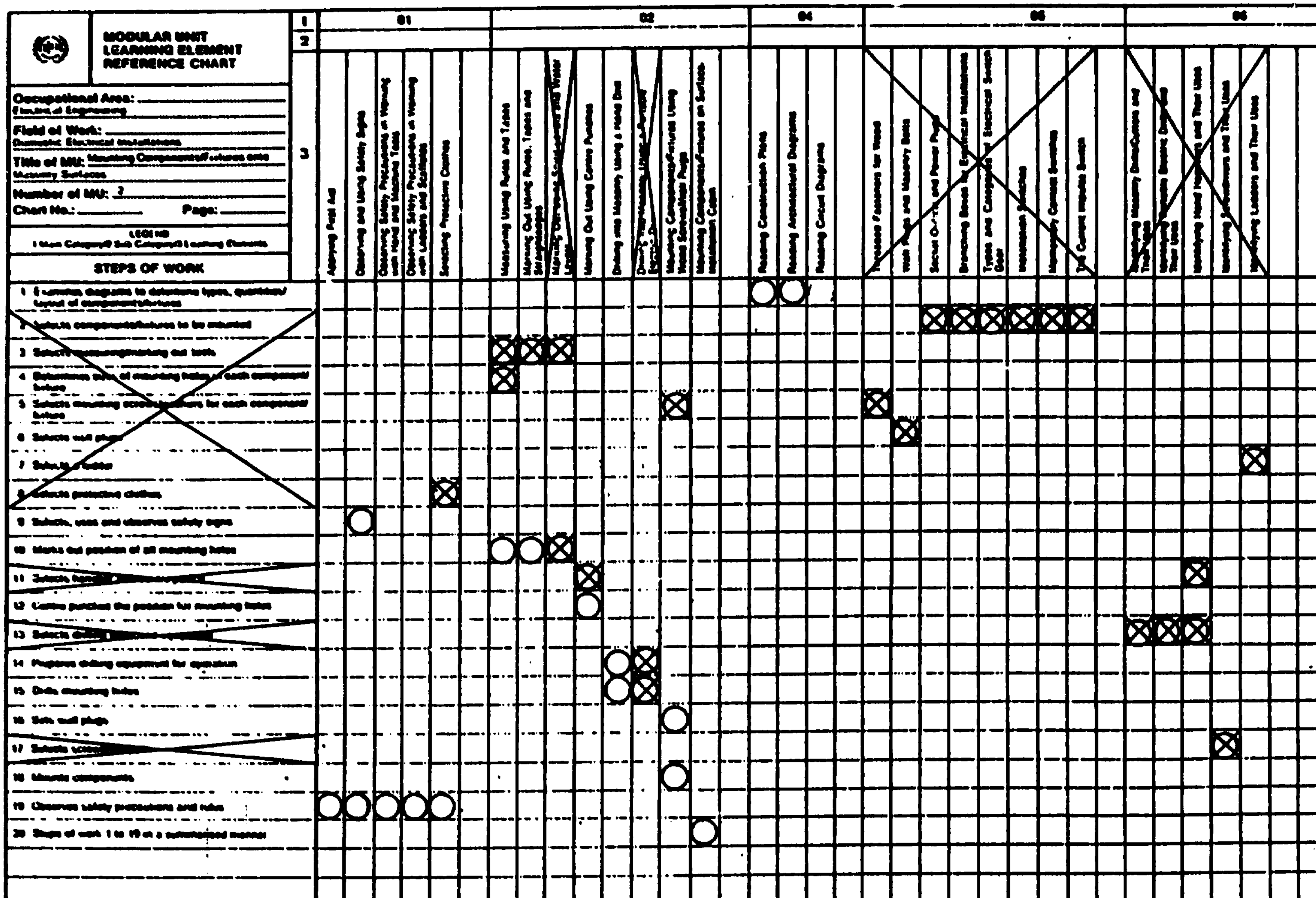
Steps of work	01 Applying First Aid	01 Observing and Using Safety Signs	01 Observing Safety Precautions in Working with Hand and Machine Tools	01 Observing Safety Precautions in Working with Ladders and Scaffolds	01 Selecting Protective Clothes
1 Examines diagrams to determine types, quantities/layout of components/fixtures					
2 Selects components/fixtures to be mounted					
3 Selects measuring/marking out tools					
4 Determines sizes of mounting holes of each component/fixture					
5 Selects mounting screws/washers for each component/fixture					
6 Selects wall plugs					
7 Selects a ladder					
8 Selects protective clothes					O
9 Selects, uses and observes safety signs		O			
10 Marks out position of all mounting holes					
11 Selects hammer and centre punch					
12 Centre punches the position for mounting holes					
13 Selects drilling tools and equipment					
14 Prepares drilling equipment for operation					
15 Drills mounting holes					
16 Sets wall plugs					
17 Selects screwdrivers					
18 Mounts components					
19 Observes safety precautions and rules	O		O	O	
20 Steps of work 1 to 19 in a summarized manner					

Steps of work	02 Measuring Using Rules and Tapes	02 Marking Out Using Rules, Tapes and Straightedges	02 ~~Marking Out Using Spirit Levels and Water Level~~	02 Marking Out Using Centre Punches	02 ~~Drilling into ... Using Drill~~	02 Drilling into Masonry Using a Portable Electric Drill	02 Mounting Components/Fixtures Using Wood Screws/Wall Plugs	02 Mounting Components/Fixtures on Surface-Installation Cable
1								
2								
3	O	O	⊗					
4	O							
5							O	
6								
7								
8								
9								
10	O	O	⊗					
11				O				
12				O				
13								
14					⊗	O		
15					⊗	O		
16							O	
17								
18							O	
19								
20								O

Steps of work	04 Reading Construction Plans	04 Reading Architectural Diagrams	04 Reading Circuit Diagrams
1	O	O	O
2–20			

Steps of work	05 Threaded Fasteners for Wood	05 Wall Plugs and Masonry Bolts	05 Socket Outlets and Power Plugs	05 Branching Boxes for Electrical Installations	05 Types and Categories of Electrical Switch Gear	05 Installation Switches	05 Momentary Contact Switches	05 The Current Impulse Switch
1								
2			O	O	O	O	O	O
3								
4								
5	O							
6		O						
7–20								

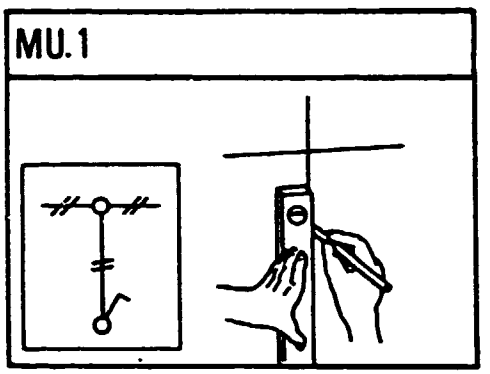
Steps of work	06 Identifying Masonry Drills/Cutters and Their Uses	06 Identifying Portable Electric Drills and Their Uses	06 Identifying Hand Hammers and Their Uses	06 Identifying Screwdrivers and Their Uses	06 Identifying Ladders and Their Uses
1–6					
7					O
8–10					
11			O		
12					
13	O	O	O		
14–16					
17				O	
18–20					


MODULAR UNIT
LEARNING ELEMENT
REFERENCE CHART
Occupational Area:
Field of Work:
Title of MU:
Number of MU:
Chart No.:
Page:
STEPS OF WORK

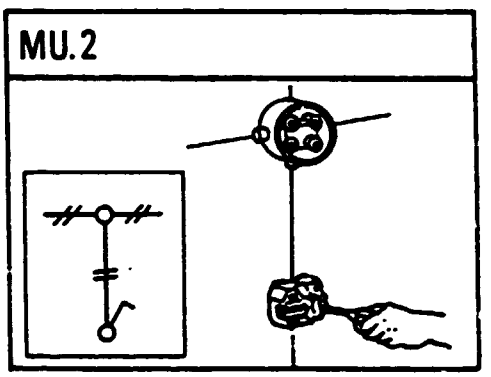
The term MODULAR UNIT (MU) is used by the ILO to define a logical and acceptable division of work within a job, an occupation or a field of work. Modular Units are used as convenient devices to prepare MES training programmes in accordance with given job specifications.

Here are some examples of modular units from the occupational area of Electrical Engineering, field of work - Domestic and Industrial Electrical Installations:

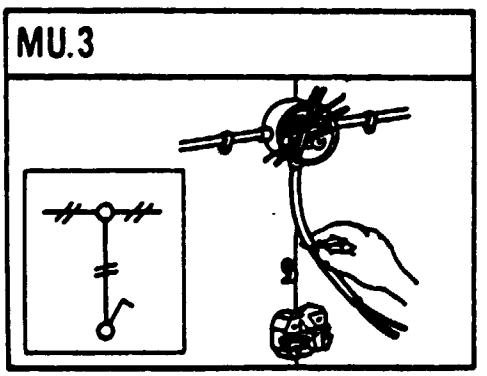
marking out installation layouts in buildings.



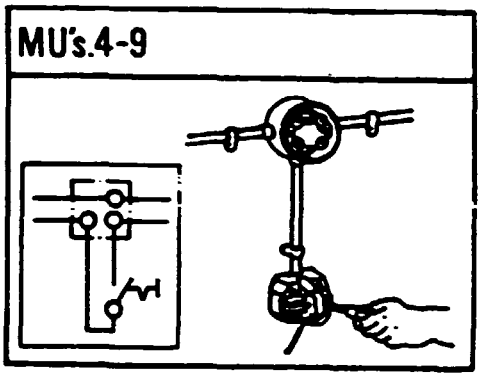
mounting components onto masonry surfaces.



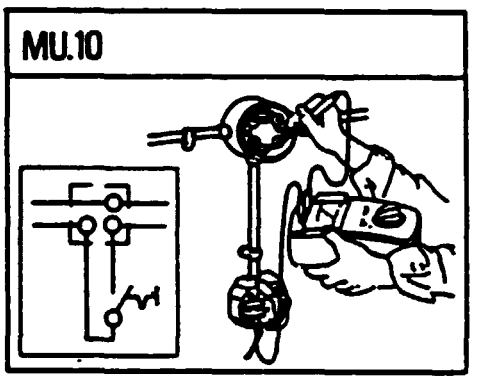
installing cables on surface using clips and saddles.



connecting 5 different electrical circuits.



testing the electrical installation.

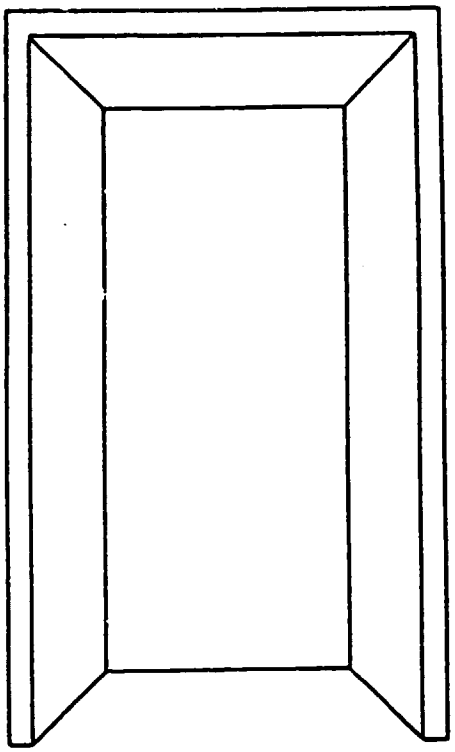


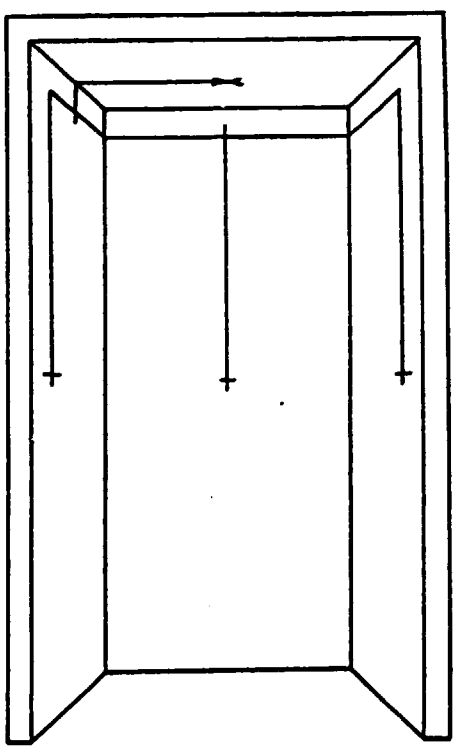
Each of the modular units mentioned represents a logical and acceptable division of work. In this case, these are consecutive parts of the overall work to install completely a particular electrical circuit. In each case, a clear start and finish of an activity can be seen, which would not normally be sub-divided any further.

The titles of modular units must be written in very precise terms in order to clearly express the work performed within the modular unit. For example, it is not sufficient just to say «Marking Out Layouts», but from the title «Marking Out Installation Layouts in Buildings», it is clear what is to be marked out and where. You could add the word «for electrical installations», but this would not be necessary since the titles are always listed together with the occupational area and the field of work, job or occupation to which they belong.

In Modular Unit No. 1, a person starts to work in a room with bare walls and ceiling. (In this example an installation cabin is used to simulate the room).

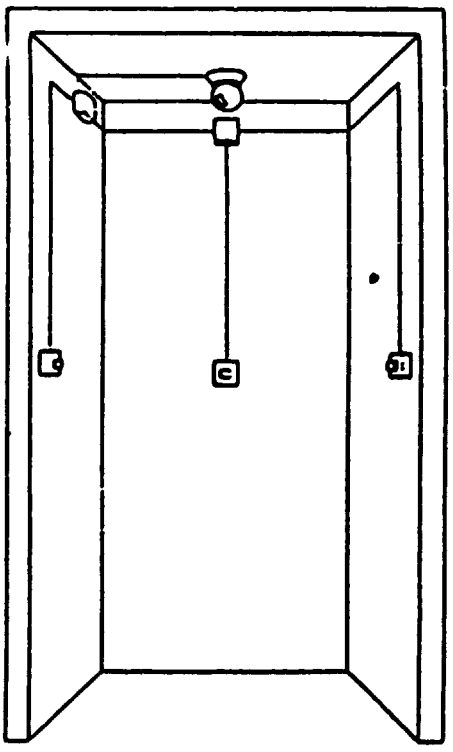
He marks out the layout of the electrical circuit(s) to be installed in that room in accordance with the graphical information given to him.





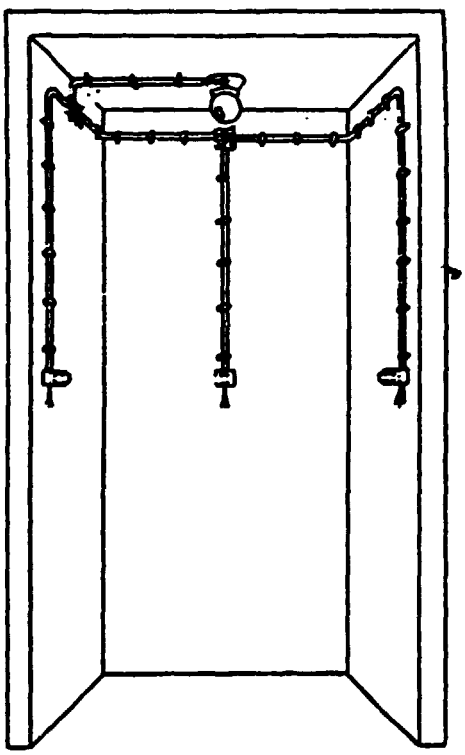
In Modular Unit No. 2, the work is carried out in a room in which the layout of the circuit(s) to be installed is already marked out.

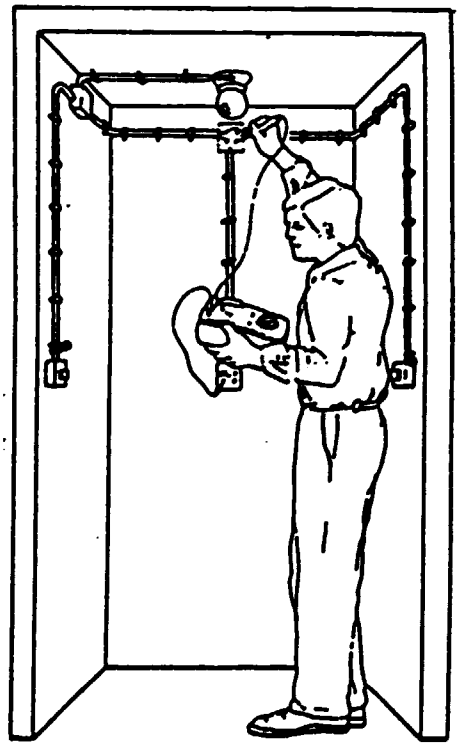
The worker identifies and selects the components of the circuit(s), such as, switches, branching boxes, socket outlets and light fixtures, from the graphic information given and mounts them onto the walls and ceiling of the room in accordance with the marked-out layout.



In Modular Unit No. 3, the starting point is a room in which the layout of the circuit(s) is marked out and in which the components of the installations are already mounted onto the walls and ceiling.

The worker identifies the types and sizes of cables, clips or saddles required to interconnect the components of the circuit(s) from the graphic information given and installs them onto the walls and ceiling of the room, following the marked-out layout.

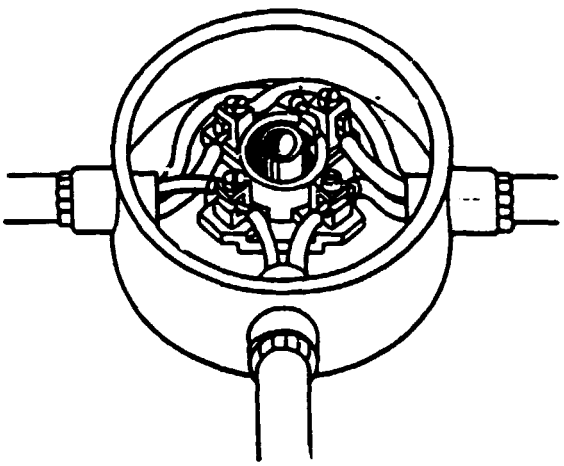




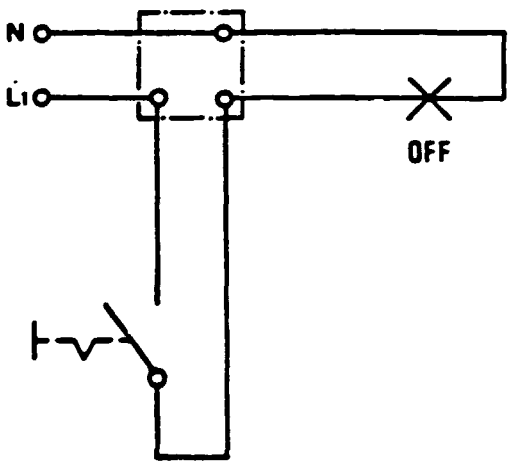
In Modular Unit No. 4 to 9, the worker completes the electrical installation by interconnecting the components and cables of the circuit(s).

In Modular Unit No. 10, the worker tests the electrical installation, closes the covers of the components and connects the circuit(s) to the electrical supply.

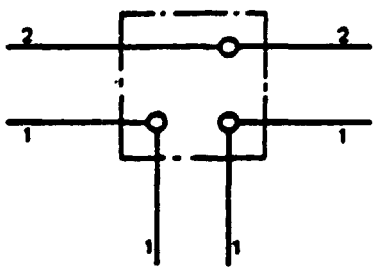
In order to connect the circuit(s) of the said electrical installation, the person performing this work must be able to connect the ends of wires and cables to the particular type of terminal used. In this case, let us assume that screw-on or push-on type terminals are used.



The worker must also be able to read and interpret the graphic information given to interconnect each circuit. This information is given in most cases in the form of circuit diagrams. However, in some case, simple colour code systems are used which do not require the person connecting the circuit to understand the working principles of that circuit.



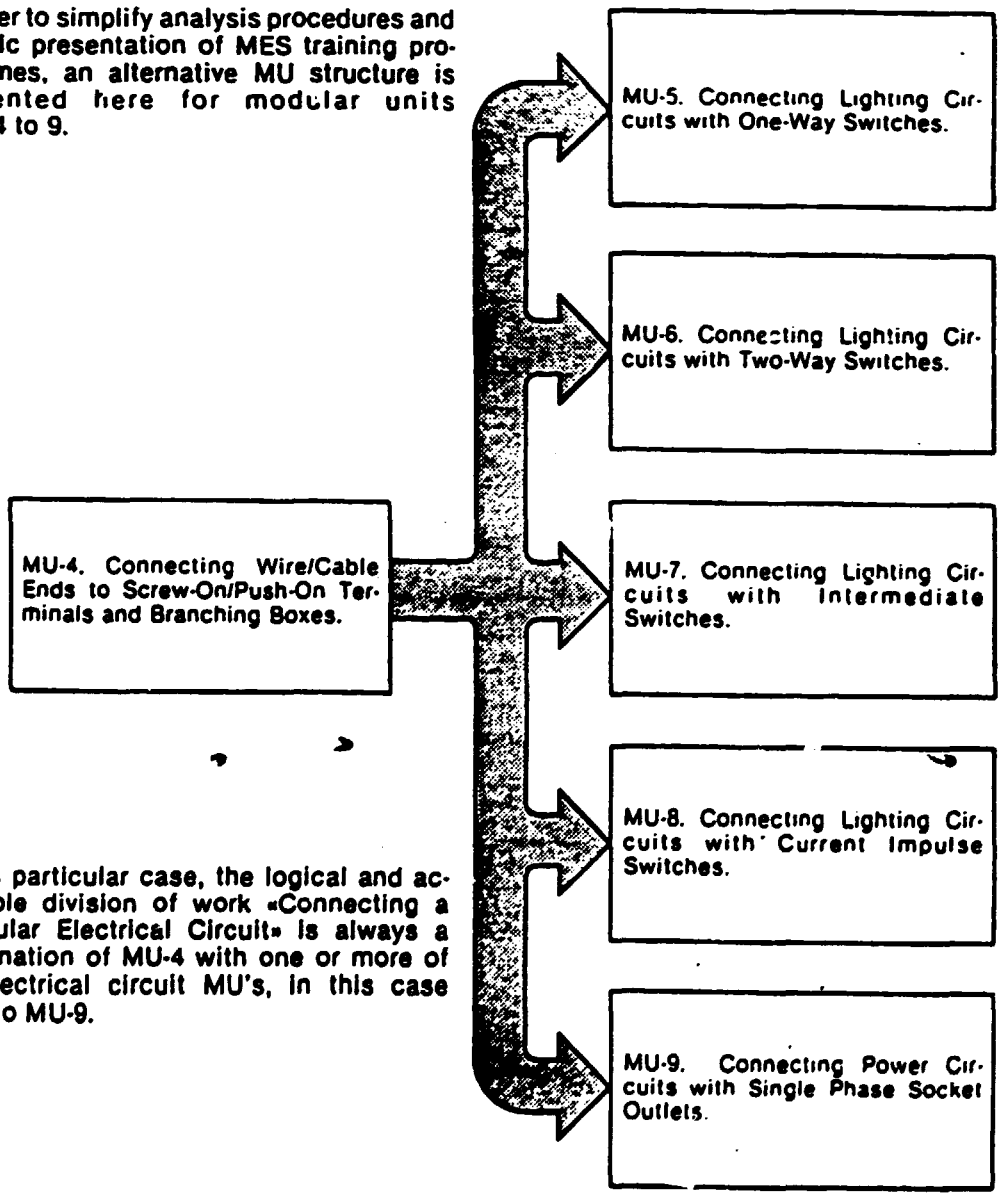
OR



1 - Black or Brown
2 - Blue

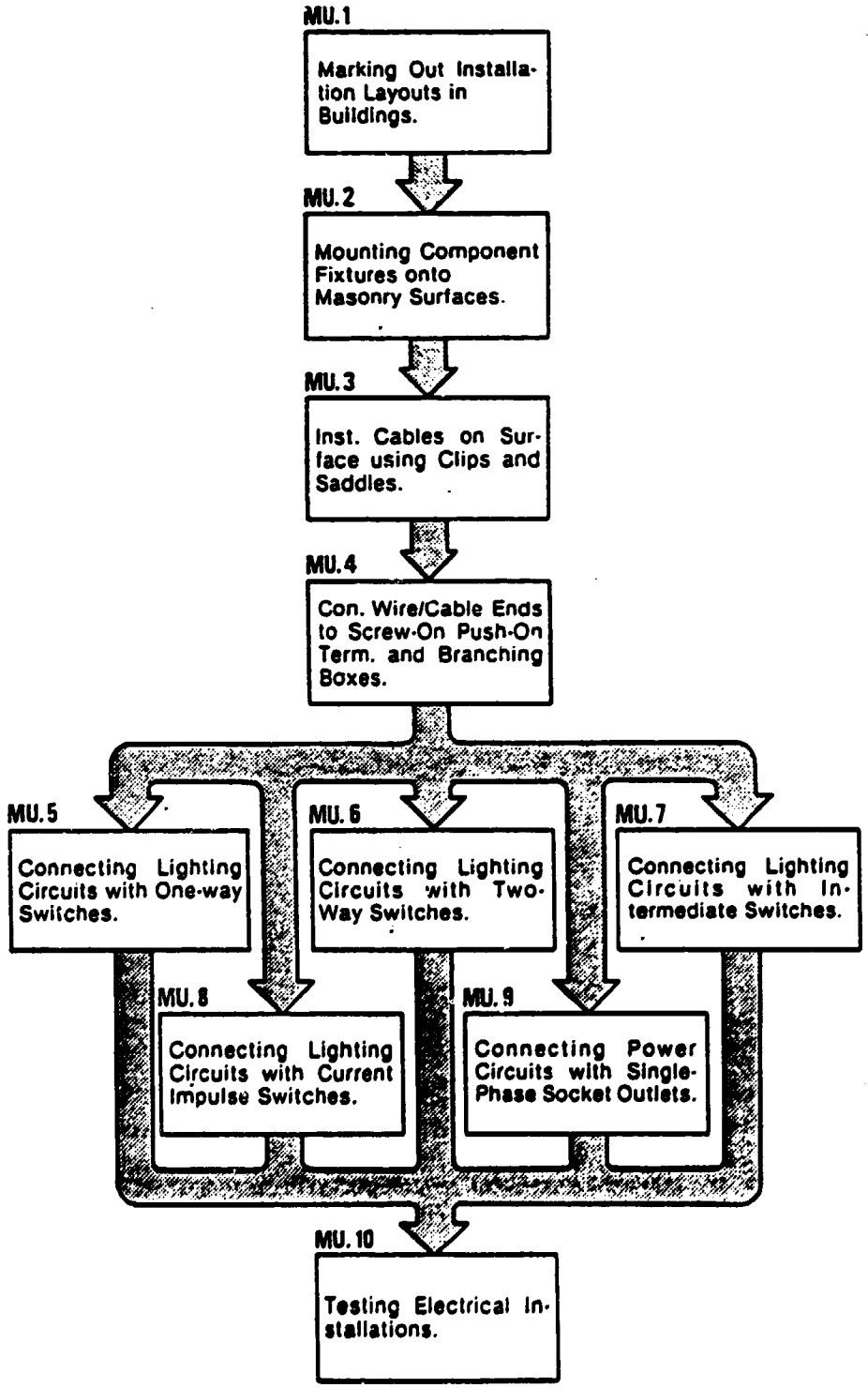
As the wires, cables and components of a particular electrical installation are interconnected in the same manner, regardless of the type of lighting, power or signal circuit, it can be said that the connection of wire and cable ends to a particular type of terminal used is a PREREQUISITE to interconnect a particular type of electrical circuit.

In order to simplify analysis procedures and graphic presentation of MES training programmes, an alternative MU structure is presented here for modular units Nos. 4 to 9.

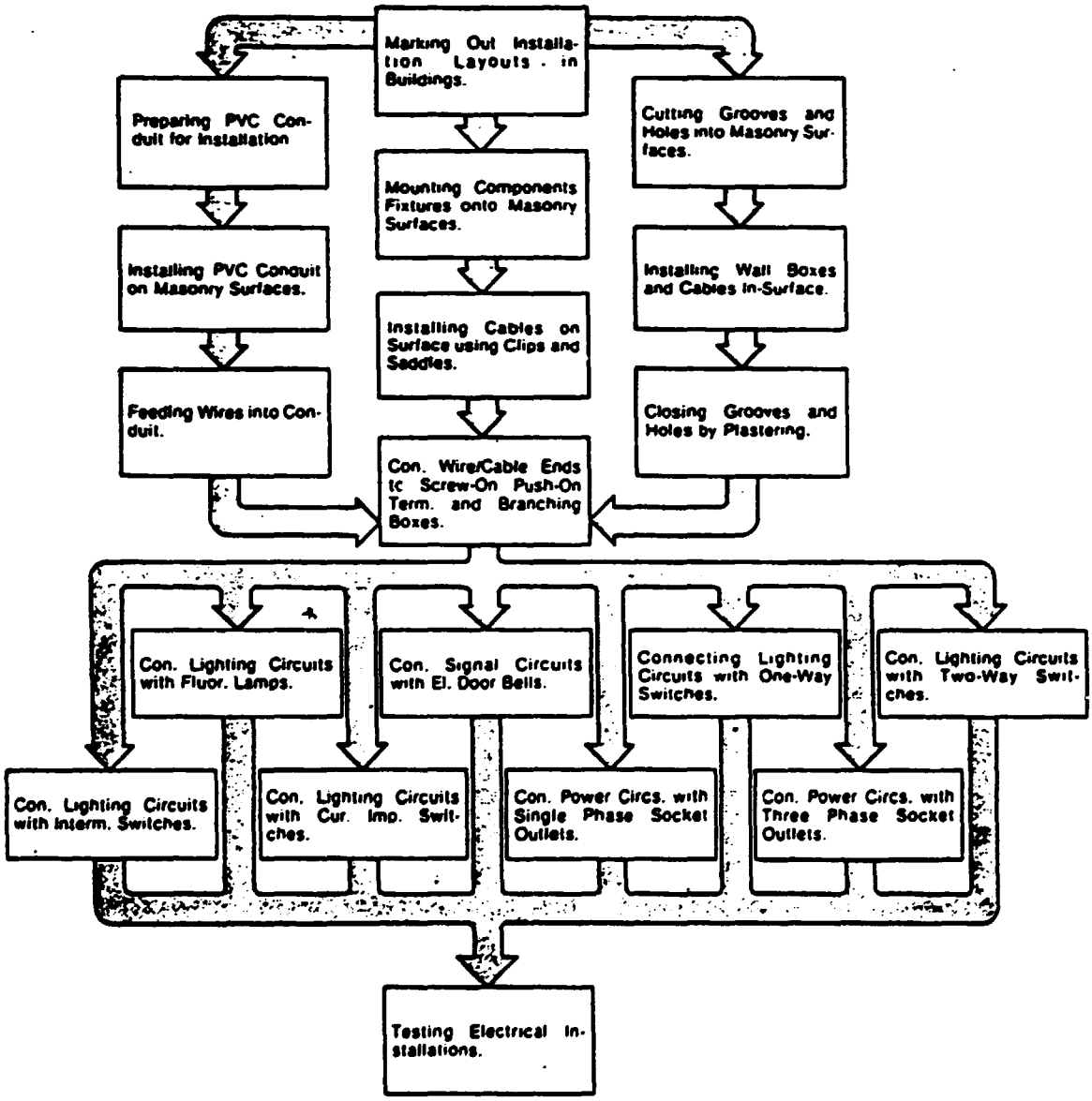


In this particular case, the logical and acceptable division of work «Connecting a Particular Electrical Circuit» is always a combination of MU-4 with one or more of the electrical circuit MU's, in this case MU-5 to MU-9.

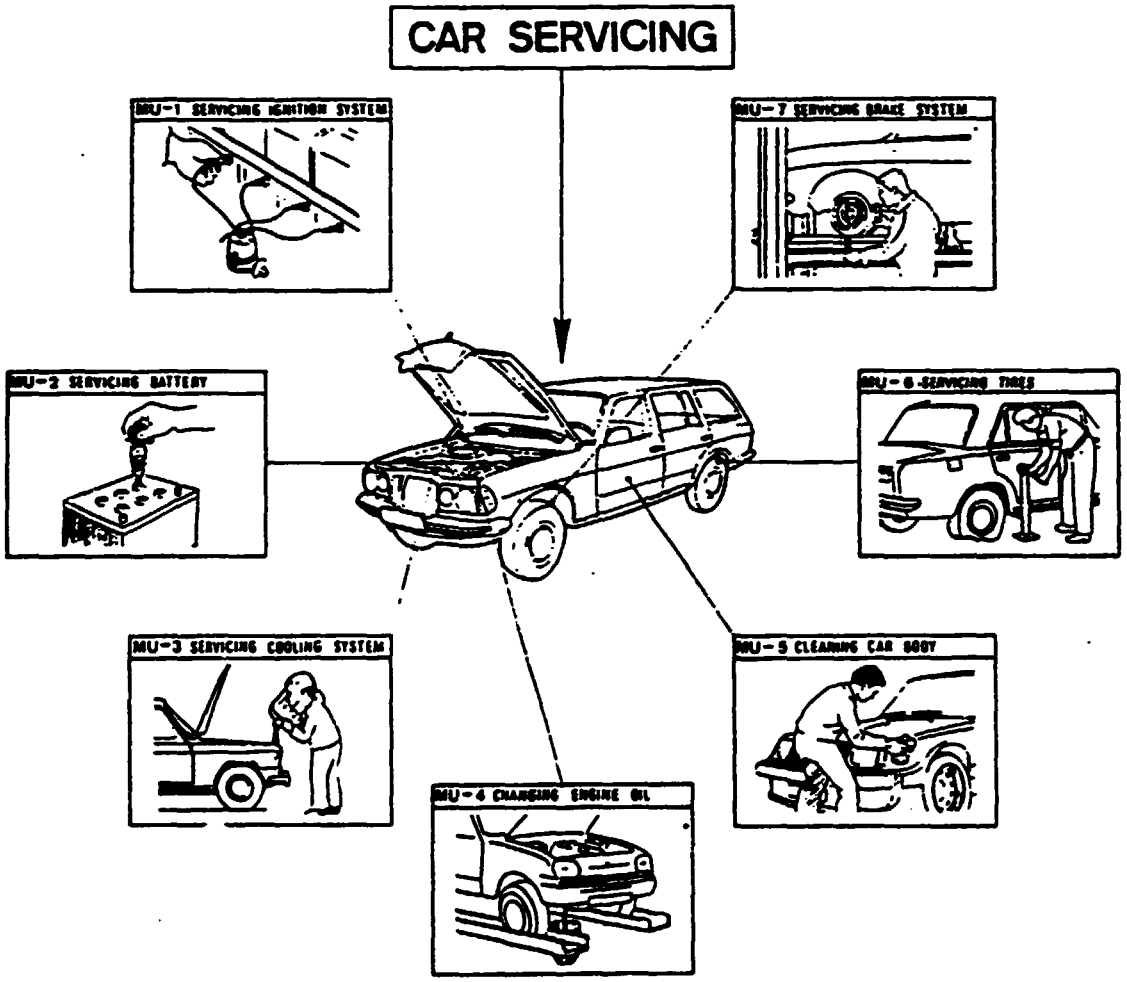
This is a summarised presentation in form of a block diagram of the 10 example MU's quoted here from the occupational area of Electrical Engineering, field of work «Domestic and Electrical Installations».



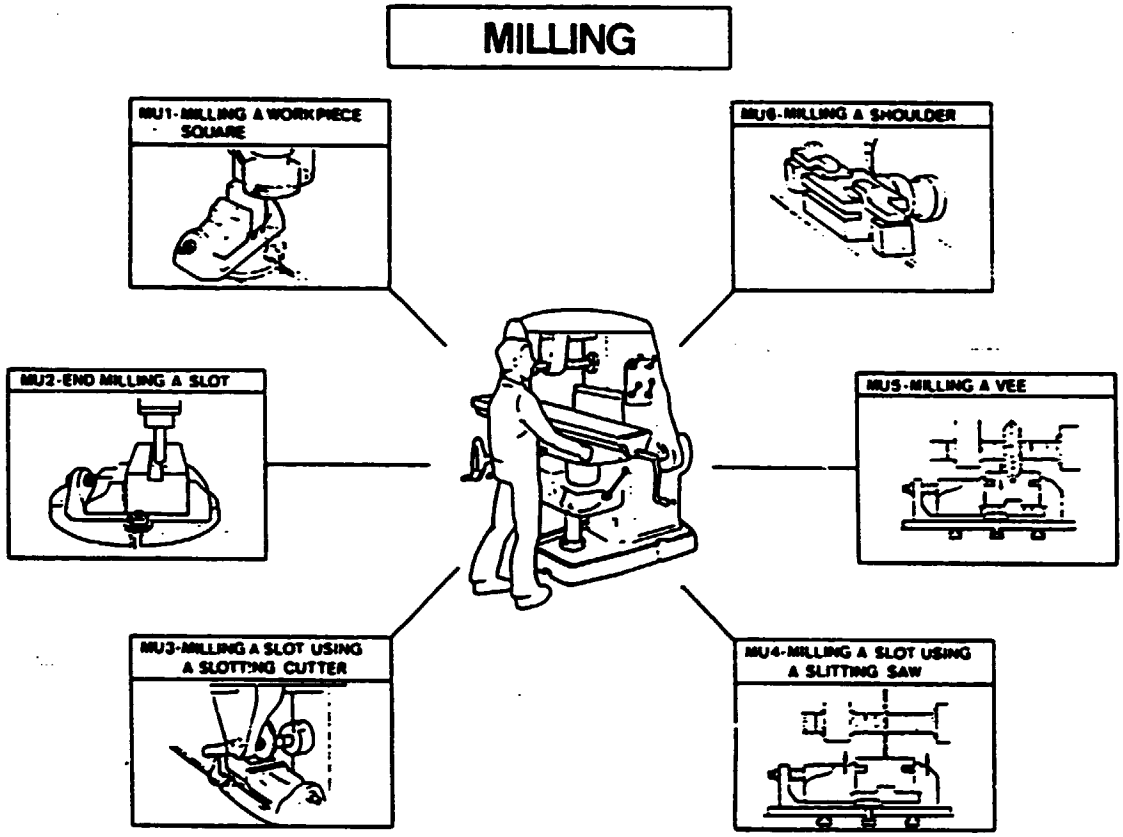
As there are different methods and different circuits which can be employed to serve the same electrical installation purpose, there will be correspondingly different modular units, as illustrated below.



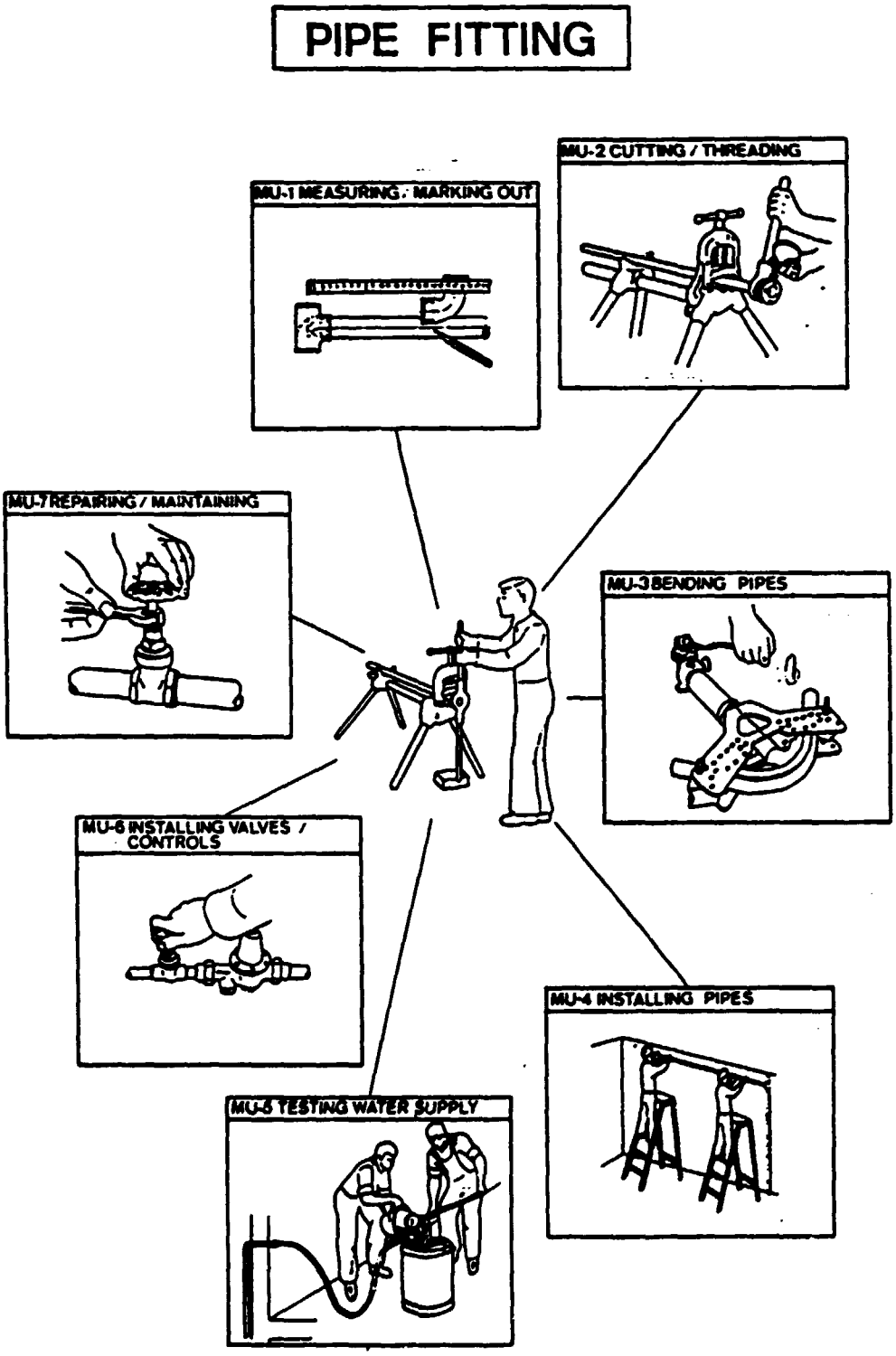
These are some examples of modular units from the occupational area of Automotive Engineering, field of work: «Car Servicing».



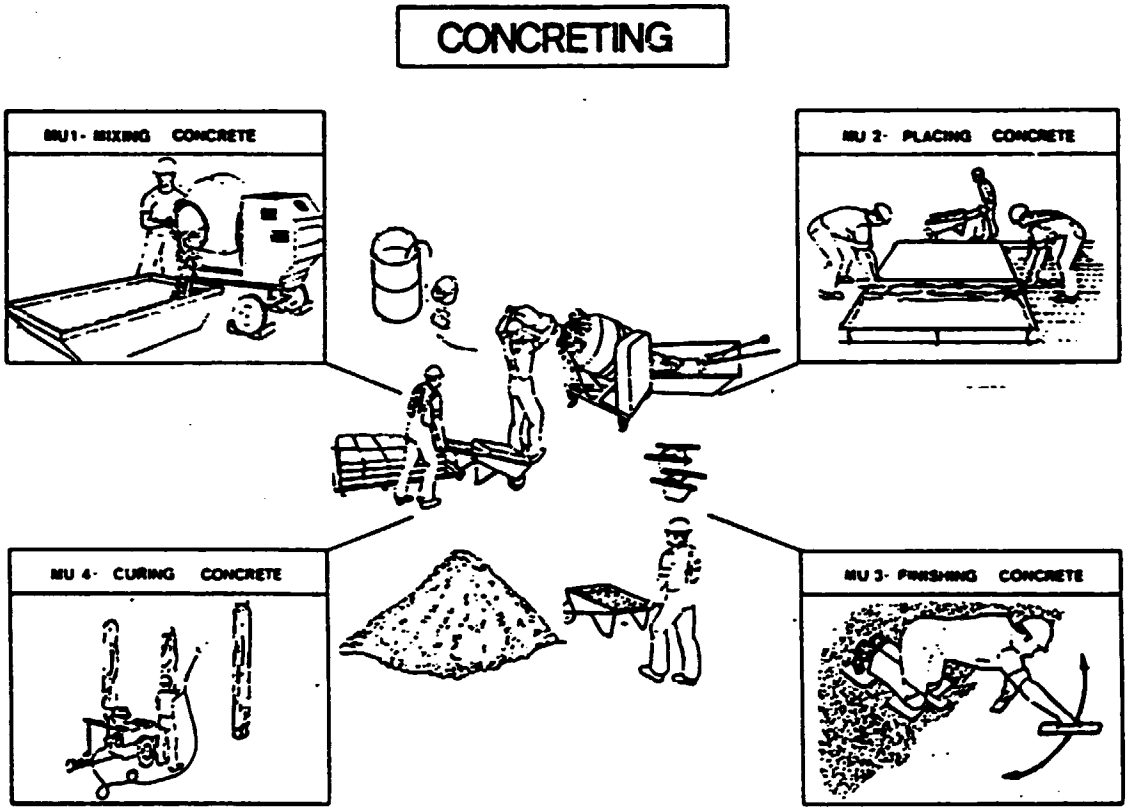
These are some examples of modular units from the occupational area of Mechanical Engineering, field of work: «Milling».



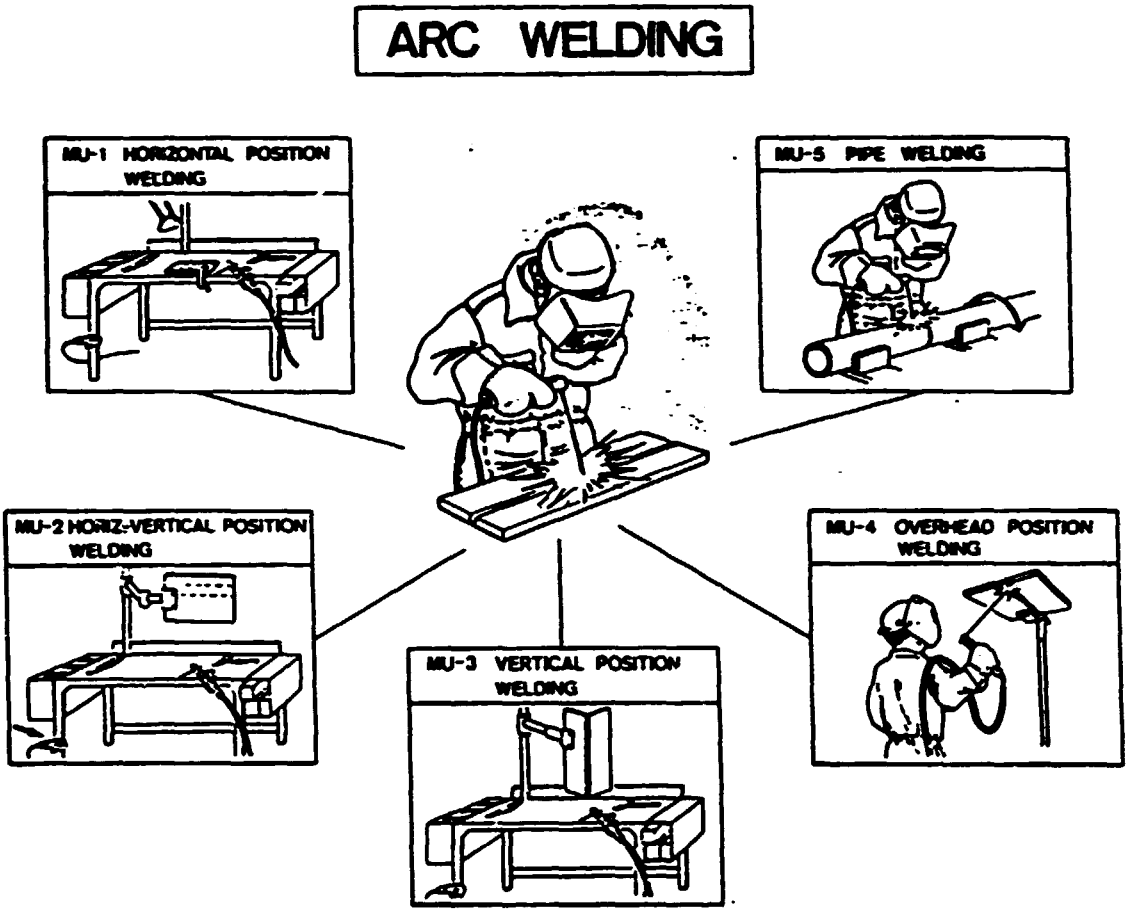
These are some examples of modular units from the occupational area of Plumbing and Pipe Fitting Engineering, field of work: «Pipe Fitting».



These are some examples of modular units from the occupational area of Building and Construction Engineering, field of work: «Concreting».



These are some examples of modular units from the occupational area of Mechanical Engineering, field of work: «Arc Welding».



① **JOB DESCRIPTION** **Page: ..... of .....**

Job Title: .... **Occupational Area:** .....

Job No./Code: ....

Company: ..... **Field of Work:** .....

Department: ....

② **Description of Functions:**

③ **Organisational Pattern: (Responsible to/Responsible for)**

④ **Conditions of Work/Standards:**

⑤ **Entry Requirements:**

⑥ Job Title: _____ Job No./Code: _____ Page: ____ of ____

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used

The «Occupational Area» is «Electrical Engineering» and the «Field of work» is «Domestic Electrical Installations».

Here is the completed first part of a job specification.

① JOB DESCRIPTION Page 1 of 3

Job Title: Building Electrician
Occupational Area: Electrical Engineering
Job No./Code: EE/DEI-10
Company: James Electrical Contractors
Field of Work: Domestic Electrical Installations
Department: Project Execution Dept.

In the second part of a job specification which is called, «Description of Functions», we describe in short and precise sentences the work that is to be performed within the job. Functions which might be of a secondary nature and which are not being performed very frequently must also be mentioned. For example, a worker might be responsible for the closure of the workshop in the evening or for switching on and off the electricity in the morning and evening.

② Description of Functions:

- Installs electric lighting and power circuits in domestic dwellings such as houses and apartment blocks. Examines diagrams and other specifications; selects, positions and mounts switches, light fixtures and socket outlets; selects and installs cables onto wooden and masonry surfaces; connects the different electrical circuits in accordance with the diagrams given to him.
- Is responsible for switching on and off the electrical supply to the workshop in the morning at 6.45 and in the afternoon at 16.15.

In part three, «Organisational Pattern», we have to specify to whom the worker is responsible, for example «foreman», and for whom the worker is responsible, for example one or more «electrician helpers». The last item may have an influence on the training programme for this job as certain supervisory aspects may have to be included.

③ **Organisational Pattern: (Responsible to/Responsible for)**

- Responsible to the foreman of the building site in charge of the electrical installations,
- Responsible for one or more electrician helpers.

In part four we describe the conditions and standards of work. For example an electrician may work in the sheltered environment of an air-conditioned factory or he might have to work in remote desert areas. These «conditions» of work have to be mentioned on the job description. General «standards» of work to which work might have to be performed, such as national building standards or special work standards required for oil installations have also to be mentioned as this will have an effect on the design of a particular training programme.

④ **Conditions of Work/Standards:**

- Works on housing development schemes in remote desert areas.
- Works to national building standards and specifications required for domestic dwellings in desert areas.

In part five, «Entry Requirements», we specify the minimum level with regards to general education that is acceptable for entry into training for this job. We furthermore specify other abilities with regards to the state of health, the general physique and perhaps the adaptability to difficult conditions of work which might be required for a particular job.

⑤ **Entry Requirements:**

- Must be able to read and write the English texts of learning elements.
- Must be able to add, substract, divide and multiply.
- Should possess normal physique and eyesight (with or without spectacles), no colour-blindness and must be able to work in hot and remote desert areas.

In part six, which starts with the second page of the job specification, we list and describe the modular units performed within the job, the performance standards and the tools and equipment commonly used.

The modular units must be described in sufficient detail to enable the identification and technical analysis of the steps of work of each modular unit which is required for curricula development and the identification of M.E.S. learning elements.

On the following pages we will describe the modular units and the performance standards (if applicable) and list the tools and equipment needed for this particular job.

① **JOB DESCRIPTION** Page 1 of 3

Job Title: Building Electrician
Occupational Area: Electrical Engineering
Job No./Code: EE/DEI-10
Company: James Electrical Contractors
Field of Work: Domestic Electrical Installations
Department: Project Execution Dept.

② **Description of Functions:**

Installs electric lighting and power circuits in domestic dwelling such as houses and apartment blocks. Examines diagrams and other specifications; selects, positions and mounts switches, light fixtures and socket outlets; selects and installs cables onto wooden and masonry surfaces; connects the different electrical circuits in accordance with the diagrams given to him.

③ **Organisational Pattern: (Responsible to/Responsible for)**

- Responsible to the foreman of the building site in charge of the electrical installations.
- Responsible for one or more electrician helpers.

④ **Conditions of Work/Standards:**

- Works on housing development schemes in remote desert areas.
- Works to national building standards and specifications required for domestic dwellings in desert areas.

⑤ **Entry Requirements:**

- Must be able to read and write the English texts of learning elements.
- Must be able to add, subetract, divide and multiply.
- Should possess normal physique and eyesight (with or without spectacles), no colour blindness and must be able to work in hot and remote desert areas.

⑥ Job Title: Building Electrician Job No./Code: EE/DEI-10 Page: 2 of 3

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
1. Marking Out Installation Layouts Examines diagrams to identify the layout to be marked out; selects the tools and equipment required and marks out the positions of components/fixtures and the cable runs of the installation onto the walls and ceilings of the different rooms of domestic dwellings. Observes all necessary safety precautions and rules.	± 2mm	rules, tapes, straight-edges, chalklines, plumbobs, pencils, safety clothes and safety signs
2. Mounting Components/Fixtures onto Wooden and Masonry Surfaces Examines diagrams to determine types, sizes, quantities and positions of components/fixtures to be mounted. Selects components/fixtures, mounting screws, washers, wall plugs and all the tools required for this work. Prepares tools/equipment, marks out positions and mounts components onto the surfaces of the walls and ceilings. Observes all necessary safety rules and precautions.	± 2mm	rules, tapes, spirit levels, pencils, crayons, centre punches, hammers, masonry drills, portable electric drill, screwdrivers, garnish awls, ladders, safety signs
3. Installing Cables Using Clips and Saddles Examines diagrams to determine types, quantities and layout of cables; selects cables, clips, saddles, fasteners for clips/saddles, and all the tools and equipment required. Prepares tools/equipment and installs cable runs. Cuts to length and removes the sheaths of cables. Inserts cables into cable glands. Observes safety rules and precautions.	± 2mm	rules, tapes, straight-edges, spirit levels, centre punches, pencils, crayons, hammers, masonry drills, portable electric drills, garnish awls, screwdrivers, pliers, electricians knives, wire/cable stripping tools, ladders, safety clothes, safety signs
4. Connecting Wire/Cable Ends to Screw-On Push-On Terminals and Branching Boxes Examines the diagrams of the electrical lighting and power circuits specified in modular units 5 to 9 to determine the inter-connection of the various components/fixtures. Examines the components/fixtures and cables to be inter-connected. Selects all the tools and equipment required. Connects the wire ends of the cables to the terminals of the different components and fixtures in accordance with the circuit diagrams of the lighting/power circuits specified below. Observes all necessary safety rules and precautions.	± 1mm	rules, tapes, pencils, crayons, pliers, wire-stripping tools, screwdrivers, safety clothes, safety signs, ladders

⑥ Job Title: Building Electrician Job No./Code: EE/DEI-10 Page: 3 of 3

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
5. Connecting Lighting Circuits with One-Way Switches		
In connection with modular unit No. 4.	as above	as above
6. Connecting Lighting Circuits with Two-Way Switches		
As above	as above	as above
7. Connecting Lighting Circuits with Intermediate Switches		
As above	as above	as above
8. Connecting Lighting Circuits with Current Impulse Switches		
As above	as above	as above
9. Connecting Power Circuits with Single-Phase Power Outlets		
As above	as above	as above

National Sugar Training Centre, Sennar.

INSTRUMENTAITION TRAINING PROGRAMME

E. Samples of Programme Plans and Reports prepared by NSTC Instructors for Validation Exercise for Materials and Facilities.

PROGRAMME PLAN.

Title: BASIC INSTRUMENT COURSE

Date:

UNIDO

NATIONAL SUGAR TRAINING CENTRE - SENNAR

PROGRAMME : Basic Instrument Course

DURATION : 4 Weeks

OBJECTIVE : **Upon completing this Modular unit the Trainee will,**

I/ **Understand the Theory of Pressure & temperature and be with the sensing elements of Pressure** and temperature.

2/ **Be able to check & calibrate pressure & temp gauges.**

3/ Know how the closed loop is arranged and differentiate between supply and signal lines.

LOCATION : **National Sugar Training Centre - Sennar**

PARTICIPANTS : **3 from each Sugar Factory.**
Inst.Technician & Engineers.

LANGUAGE : **English.**

AIM : **To provide Basic Information Theory & practical in pressure & temp. measurement and Senser elements used.**

Subject Structure.

No.	%	Subject Fields.	Subjects.
		Pressure Measurement	- Basic Theory of Pressure - Unit of Pressure measurement. - Term used in Pressure measurement. - Pressure Instrument Theory & Practical. - Equipment to test Gauges Practical & Theory - Servicing of Pressure gauges - Installation of Pressure gauges. - Calibration of link type Instrument . - Pring loaded pressure regulators.
		Measurement of Temperature	- Introduction . - State of meter. - Direction of heat flow & types of heat Transfer. - Units of Temperature measurement. - Properties of material in temp. Measurement - Thermometers. - Temperature Indicating Substance.
		Pipe Work	- Cutting Copper pipes using a Hacksaw. - Using Brass flare joint for copper Pipes. - Reaming stop Cock & gate Value.
		Electrical	- Electrical Energy. - Electrical Fuse. - Simple Electric circuit

TIME Set.	10 DEC	11 DEC	12 DEC	13 DEC	14 DEC	15 DEC	17 DEC	18 DEC	19 DEC	20 DEC	21 DEC	22 DEC
	Sun.	Mon.	Tue.	Wed.	Thur	Sat	Sun.	Mon.	Tues.	Wed.	Thur	
7 to 9	Theory Introduc- tion to the Instrument	Theory Basic Theory & of Pressure	Theory Unit of Pressure measurement	Theory Terms used in Pressure measurement	Theory Equipment to test Gauges			Theory Link type Instrument	Theory Spring loaded Pressure gauge	Theory Introd- uction to temp.state of matter	Direction of flow. Properties of materia in temp.	
10	Group Practical Work Into the Workshop	Practical Work Conecting & Duconnecting close Control loop with Air supply & signal lines.	Practical Work Check the available equipment for measureing & testing manometer & Dead weight tester	Check the graduation of the manometer & how to connect gauges for test pmactically	Three group of work To test the dead weight tester & how to operate it.	Servicing Pressure gauges and calibrate	Practical Induidual Work go round Fire experment. I- explain and connect close contrcl loop - Then Des connect.	2- Check Pressure ganges using manometer calibrate and prepare defect for the coming Trainee 3- Check use stand pressure gauge as refrence 4- Check the same with dead weight tester.	Serivice & clibrate the calibrating gauges - recorders	Calibrate Pneumatic recorder and service Pressure Gauges .	Check the Senser used for temperature measurement Practically.	Check the senser of temp measurment and open and test pressure gauges
11												

ELECTRICAL INSTRUMENT DEPARTMENT
INSTRUMENT COURSE LOSEP - 10 JANUARY 89

COURSE ACTIVITIES

	From 7 to 7.50	Break	From 8 to 9	From 9 to 10 Breakfast	From 10 to 10.50	From 10.50 to 11 Break	From 11 to 12	From 12 to 12.15 Break	From 12.15 to 1.15	From 1.15 to 2 Private Work	INSTRUCTOR ONLY FROM 5 to 9
SAT.	THEORY		THEORY		PRACT. WORK		PRACT. WORK		PRACT. WORK		
SUN.	THEORY		THEORY		PRACT. WORK		PRACT. WORK		PRACT. WORK		Preparation for Work
MON.	THEORY		THEORY		PRACT. WORK		PRACT. WORK		PRACT. WORK		
TUES.	TEHORY		THEORY		PRACT. WORK		PRACT. WORK		PRACT. WORK		
WED.	THEORY		THEORY		PRACT. WORK		PRACT. WORK		PRACT. WORK		
THUR.	THEORY		THEORY		PRACT. WORK		PRACT. WORK		PRACT. WORK		

NATIONAL SUGAR TRAINING CENTRE

PRINCIPLE AND PRACTICE OF DRIVE SYSTEM ALIGNMENTS

FOR ASSALAYA SUGAR COMPANY

PROGRAMME TITLE:-

Modular training package on principles and practice of drive system alignments .

DURATION :-

One week .

PARTICIPANTS :-

9 factory fitters.

QUALIFICATION :-

Elementry + Intermediate school graduates or higher .

OBJECTIVE:-

Upon completing the package the trainee will be able to align various types of drive system normaly found in a sugar production plant to an accuracy required by the various individual component manufactures using standard and any special tools or equipment available .

TRAINING MODULES:-

1. Electrical safety .
2. Direct drive (Couplings) alignment .
3. Vee-belts alignment .
4. Chains alignment .

TIME . TABLE:-

Day1 (28.1.89)

7:00 - 9:00 Theory .
10:00 - 14:00 Practical . ((Electrical safety))

Day 2 (29.1.89)

7:00 - 9:00 Theory
10:00 - 14:00 Practical ((Belt drive))

Day 3 (30.1.89)

7:00 - 9:00 Theory
10:00 - 14:00 Practical ((Chain drive))

Day 4 (31.1.89)

7:00 - 9:00 Theory
10:00 - 14:00 Practical ((Couplings-alignment))

Day 5 (1.2.89)

1. Summary & evaluation .
2. Departure to N. S. T. C

NATIONAL SUGAR TRADING CENTRE & SUDAN

Agriculture Equipments & Motorvehicle Section

Course Title :- Basic course in Automobile Electrical System

Objectives :- For the Trainee to achieve

1: Knowledge in Basic of Electricity.
2: To be able to use Electrical Measuring devices & Tools
3: To know the function of the Automobile Electrical Components.
4: To be able to read the Electrical diagrames.
5: To know fault Diagnosis procedure

SUBJECTS TO BE COVERED DURING THE COURSE

1: Safty.
2: Magnetic field and Sources of Energy.
3: Ohm's Law.
4: Automobile Electrical components.
5: Automobile Electrical Systems and their faults.
6:
a Starting Circuit.
b: Battery Charging circuit.
c: Ignition System.
d: Wiring System.

PARTICIPANTS :

a: Qualifications :- Intermediate or Elementry School Certificate.

b: Number 8 Trainees.

DURATION 3 Months

DATE OF COMMENCEMENT :- 30.7.1988

LANGUAGE :- Arabic

FEES

Ibrahim Mohammed Abdo

../Asia

NATIONAL SUGAR TRAINING CENTRE - SENNAR

AGRICULTURE EQUIPMENTS & MOTOR VEHICLES SECTION

Course Title :- Basic principles of the four - Stroke Petrol Engine.

Objectives :- For the Trainees to understand or apply the following:-

1: Safty.
2: How to use the tools?
3: How does the Petrol engine work ?
4: Dismassembly and assembly of the engine different parts and their functions
5: Engine timing
6: How is power Transmitted

SUBJECTS TO BE COVERED DURING THE COURSE

1: Safty.
2: Engine parts.
3: Four Stroke cycle .
4: The Firing order
5: Fuel System
6: Lubriecation System
7: Cooling System.
8: The timing Gear.
9: Valve Timing.
Transmission

PARTICIPANTS a: Qualifications : Intermediate or Elementry School Certificate

b: No I2 Trainees

DURATION :- Three Months

DATE OF COMMENCEMENT : I6:7:I988

LANGUAGE : Arabic

Ibrahim Mohammed Abdo

.../Asia

FINAL REPORT ABOUT THE PRINCIPLES AND PRACTICE OF DRIVE SYSTEM ALIGNMENTS TRAINING PROGRAMME (No. 2) FOR ASSALAYA SUGAR COMPANY (28 JAN. - 01 FEB. 1989)

TO: THE D.G., N.S.T.C. DATE: 1st February 1989.

Dear Sir,

With great pleasure I would like to report to you about the successful conducted Training Programme for A.S.C the following events took place as follows:

27.1.89 - As per agreement, Syd/Mouhagob should have appeared at Wad Elhadad till 4:00 O'clock! He wasn't on Time!

- 5:20 Arrival to A.S.C.

28.1.89 - 7:00 Meeting with the Factory Manager and with the Chief Mechanical Engineer together with Mr. D. Banks and Syd/Moubarak, the Engineering Training Officer. Subjects being discussed are concerning the necessary prepartions to conduct the T.P. A class room is being provided with all the necessary facilities of Training needs. (8) Participants are released ready to share in the P.

- 8:15 Introduction to the Training Programme.

- Distribution of the personal qualifications and experience forms to be filled by the Trainees.

- 10:00 Alignments of Flexiable couplings (Theory).

- 11:00 Assembling and Aligning of a Molasse Stork Pump. (In-Plant)

- 18:00 Arrival of Syd/Eltaybe as agreed before.

29.1.89 - 7:15 Discussion in the class room. The main subject was the previous in -plant practice.

- 8:00 In-plant Alignment of a disassembled Deaerator transfer pump.

- 13:00 In-plant Demonstrations of different Alignments to OTHER FACTORY SUPERVISORS. A tour in the Factory Departments is arranged to observe the Misalignments between the Drivers and the Drivens. Improvement of the final performance is kindly being asked after these Discussions. The Chief M.T. was present during these in-plant sessions.

30.1.89 - 7:15 Theory of Aligning V - Belts.

2/...

- 10:00/14:00 In-plant Aligning of V - Belts. More than three Pumps are being aligned. The Trainees are being kindly requested to reset the Alignments of some on-duaty pumps. However, some pumps in the Process House and in the Boilers House are being diagnosed and aligned.

31.1.89 - 7:30 Theory of Aligning Sprockets and chains.

- 10:00/14/00 A tour in the Process House to notify the Misalignments.

- In-plant Discussions.

1.2.89 - 7:00 Summary of the previous lessons.

- 8:00 Final Test

- 10:00 Evaluation Forms filled by the Trainees.

- Distribution of Certificates.

- 11:30 Meeting with the Production Manager, Mr. D. Banks and Syd/Moubarak. Items being discussed concerning the Final Results of the Training Programme together with the Factory Training needs during this crush season. Mr. D. Banks will convey these informations to you.

- 4:30 Departure to N.S.T.C.

It is a great disappointment that Syd/Mouhagob did not participate in this valuable Training Programme. I have been expecting a Telex Message to give at least an acceptable excuse of his Absence. Such absence was the cause of replanning a new Time-table.

I would like to add that Syd/Eltaybe was a hard worker all through the days of the Programme. He worked quite perfectly and with great interest.

Best Regards.

OSMAN ELTAHIR,
T/CO-ORDINATOR.

C.C. : Mr. Jack Bye ✓

Mr. Lygdman

Assalaya Sugar Company
Assalava.

The Centre Manager
National Training Centre.
Senna.

26th November 1988.

Dear Sir,

Alignment Course for Factory Fitters Assalaya

I would confirm acceptance of your offer to run an in plant training course of one week in Alignment for factory fitters at Assalaya.

In order for training to take place,the factory must be crushing so that sufficient numbers of fitters can be released to run a viable course.

The factory is presently in out of crop maintenance with the anticipated start up date on 15th December 1988

Given two weeks for the factory to run and production to settle into a steady routine,I would suggest a preferred starting date for this course on 29th December 1988.

I should be grateful if you would either confirm the above date or a date suitable to your staff and inform me of any preparations required with regard to equipment or facilities which will be needed prior to the instructors arrival at Assalaya.

Yours Faithfully

D Banks
M A T S Engineering Training Officer
For the General Manager

cc
General Manager.
Administrative Manager.
MATS Team Leader.
Factory Manager.

AGRIC. EQUIPMENT & MOTOR VEHICLE SECTION

To : The General Director

Subject : Light Vehicle Preventive Maintenance Training Programme

The above Programme was held from 10.12.1988 to 19.1.1989 on purpose of testing the (MES) System and the training materials involved.

The head of the dept. Did the Programme Plan and general supervision Instructor Eltayb Elshiek conducted the Course. Instructor Awad Shgag assisted in preparing and transilating the learning elements he also did some lessons. The expert Eddy Pauli was giving advice from the beginning to the end of the Programme, he also participated with a lesson on steering alignment.

PARTICIPANTS

Five trainees from Sennar mill and one from the training Centre. At the end of the course the trainees had undergone theoretical and practical tests, and were given certificates.

The trainees were given a chance to evaluate the course in writting by filling evaluation forms, and through open disussion.

In brief they were satisfied with theortical Knowledge they have achieved, but they complained from the short of practice and the abscence of new Equipments and training materials.

DISCUSSION

1: The time allotted for prepration was very short for the learning elements were to be studied before application.

2: Shortage of photocopy paper didn't help on prepairing the handouts planned to be given to the trainees. Short notes written on the Blackboard were given instead.

3: Lack of training materials didn't help Trainees to develop the necessary Skill needed to carry the preventive Maintenance. Lack of training materials also let most of the course to be theoretical rather than practical and sometimes it deviated from maintenance to repair for the same reason.

4: Looking through the learning elements of the (ILO), they depend to a great extend on the availability of training materials and equipments.

CONCLUSION

The trainees have gained some Knowledge, but not much of an employable Skill.

Regarding the test of the system it is very difficult to rely on this programme's result.

Ibrahim Mohamed Abdo
Acting Head of Dept.

CC TO : Mr. Jack Bye
" " " Eddy Pauli

Asia/:::

NATIONAL SUGAR TRAINING CENTRE - SENNAR

AGRIC. EQUIPMENT & MOTORVEHICLE SECTION

BASIC LIGHT VEHICLE TRAINING COURSE

FOR MECHANICS

PROGRAMME TITLE	: Light vehicles preventive maintenance.
DURATION	: Six weeks. From 10.12.1988 to 19.1.1989.
AIM	: To provide the trainee with knowledge and skill necessary for carrying out light vehicle preventive maintenance.
LOCATION	: The National Sugar Training Centre - Sennar.
PARTICIPANTS	: Sixteen Auto-mechanics from the four (4) public sector Sugar Mills (4 each).
ENTERY REQUIREMENTS	: The trainee should be able to read and write and should have a minimum of two years experience. He should physically be fit.
OBJECTIVE	: At the completion of the programme the trainee will be able to understand and execute safely and correctly preventive maintenance on light vehicles. He will also be able to use basic tools correctly respecting safety measures while carrying out preventive maintenance as recommended by the manufacturer.

Modular Unit Titles / Descriptions

1/ Light Motor Vehicle General-

Informations :-

Identification of light Motorvehicle,Motor Vehicle general designs and Engine Operating cycle .

2/ Checking and Servicing Engine cooling system.

3/ Checking and Servicing Engine Lubriciation system.

4/ Checking and Servicing Engine Fuel system .

5/ Checking and Adjusting Engine Valves Clearnance.

(Inlet & Exchaust) .

6/ Checking and Adjusting the clutch pedal free Travel .

Checking and Bleeding clutch Hydraulic system .

7/ Checking Topping & Chengine the Transission Oil (Gear-Boor & Transfer Case) .

8/ Checking the Operation of the propeller shaft drive .

Greasing : Universal Joint Crosses , splined sleeves & centre Bearing .

9/ Servicing the Steering system :-

Checking the steering wheel play Checking and topping up the oil level in the steering rod joints.

10/ Servicing the Brake system :

Checking topping & Bleeding the Break Hydraulic system .

Adjusting Breaks & Changing Break Shoes .

11/ Checking the Running Gear .

Examne Visually the frame .main and auxiliary Springs, Shock absorbers , and wheels .

Checking and Adjusting the toe - in of the front wheels.

Check the caster camber at front wheel .

Greasing of the suspension joints .

AGR. EQUIPMENT & MOTOR VEHICLE SECTION

LIGHT VEHICLE PREVENTIVE MAINTENANCE PROGRAMME
week no :(1) from 10.12 to 15.2.1988

Time	Sat.	Sun.	Mon.	Tue.	Wed	Thur
7:00 to 9:00	Adminstraftion	Motor Vehicle main parts Theory Slides	Engine main parts &'Function Theory	Operation of 4- stroke I.C Eng. Theory	Valve Opera mechanism Valve Timing Checking valve Theory	Identify lifting Devices & support stands Lifting up Cars using mobile Jacks Theory
	BREAKE FAST : ONE HOUR					
10:00 to 11:45	Introduction Meaing of maintenance Safety	Motorvehicle main parts Practice	Practice	Practice	Prac ce	Practice
	Breake ½ Hour					
12:00 to 1:30	Adminstration	Adminstration	Practivce	Practice	Practice	Practice
1:30 to 2:00	Cleaning and tyiding up workshop and Class -					

AGRC. EQUIPMENT & MOTOR VECHICLE SECTION
LIGHT VEHICLE PREVENTIVE MAINTTENANCE PROGRAMME
WEEK NO. (2)1 7.12 TO 22.12.1988

Time	Sat.	Sun.	Mon.	tue.	wed.	thur.
7 To 9:00	Removing & inst alling Valve cover adjusying valve adjusying valve Clearance theory	Review Engine Theory	Cooling System Theory	Cleaning radi- Checking & Topping coolant level checking System for tighting	V-belts adju- Thermostat design and function	lubrication Principles
	Break Fast					
10:00 To 11:45	Practice Theory	Valve Practice	Draining & refill Hoses	Practice	Cooling System Review	Open discussion Clean shop
	Break					
12:00 To 1:3	Practice	Practice	Practice	Practice	Practice	
1:30	Cleaning and tyiding up workshop and Class					

Asia/:::

AGR. EQUIPMENT & VEHICLE SECTION
LIGHT VEHICLE PREVENTIVE MAINTENANCE PROGRAMME
WEEK NO. (3) FROM 24.12. TO 29.12.1988

Time	Sat.	Sun.	Mon.	Tue.	Wind.	Thur.
7:00 To 9:00	Engine Oils Sae viscosity Classa Ficetion	CHRISTMAS	Engine lubrication System. Thedory	Changing/Topping up Engine oil Checking oil Pressure	Changing/Toping up transmission oil Chassis lubrication Checking Propeller shaft	Engine Lubrication System Review
	Break fast one Hour					
10:00 To	Practice		Practice	Engine oil filters Replacing/Cleaning Oil filters Practice	Practice	Practice
	Break					
12:00 To 1:>0	Practice		Practice	Practice	Practice	
CLEANING & TYIDING UP WORKSHOP & CLASS						

Asia

AGR. EQUIPMENT & MOTOR VEHICLE SECTION
LIGHT VEHICLE PREVENTIVE MAINTENANCE PROGRAMME
WEE NO (4) FFROM 31.12.1988 To 5.1.1989

Time	Sat.	Sun.	Mon.	Tue.	Wind.	Thur.
7:00 To 9:00	Fueld System Petrol & Diesel Theory		Cleaning the Fuel tank and fuel lines Practice	Bleeding the diesel engine fuel system (line pump) Practice	Removing Car Air Filters Installing Car Air Filters Practice	Review
		BREAK FAST ONE HOUR				
10:00 To 11:45	Practice	INDEPENDENCE	Cleaning/Replacing diesel fuel filter Practice	Bleeding the Diesel engine Fuel system (elistributor pump) Practice	Dry Air Filters Servicing	Open disccusion Cleaning Shop
		Break				
12:00 To 1:30	Practice		Practice	Practice	Oil Bath Air Filters Servicing	
1:30 to 2:00	Cleang and tyiding up workshop and Class					

Asia/:::

AGR. EQUIPMENT & MOTOR VEHICLE SECTION

LIGHT CHECLE PREVENTIVE MAINTENANCE PROGAMME

WEEK NO.(5)FROM 7.1. To 12.1.1989

Time	Sat.	Sun.	Mon.	Tue.	Wed.	Thur.
7:00 to 9:00	Removing and futting wheels Practice	Adjusting parking brakes Practice	Topping up brake fluid Practice	Adjusting wheel bearing drum brakes Practice	Adjusting wheel bearings Practice	Changing brake fluid in the hydrallic brake Practice
Brake Part One Hour						
10:00 to 11:45	Practice	Practice	Practice	Practice	Practice	Practice
		Brake				
12:00 1:30	Practice	Practice	Practice	Practice	Practice	Practice
30 to 2:00	Cleaning and tyiding up workshop and clwas .					

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AGR. EQUIPMENT & MOTOR VEHICLE SECTION

LIGHT VEHICLE PREVENTIVE MAINTENANCE PROGRAMME

WEEK NO.(6) 14.1. To 19.1.1989

Time	Sat.	Sun.	Mon.	Tue.	Wed.	Thur.
7:00 To 9:00	Engine Lab. System Review Theory	Brake/system Practice	Air filters Maintenance	Test Theory	Practical Test	Filling Evaluation forms by the Trainees
Breake Fast One Hour						
10:00 To 12:00	Changing Engine Oil & Filter Practice Breake 1 Hour	Brake system Practice	Valve adjustment Reviw Practice	Test Theory	Practical Test Theory	Diecession
1215 To	Cooling system Review	Adjusting Clutch Free	Valve adjuste- Review	_____	Practice Test	_____
1:30 To 2:00		Cleaning and Tyiding up workshop and close				

1/1

AGRIC. EQUIPMENT AND MOTOR VEHICLE SECTION

To : The General Director

Subject : Light Vehicle Preventive Maintenance Training Programme

The above Programme was held from 10.12.1988 to 19.1.1989 on purpose of testing the (MLS) System and the training materials involved.

The head of the dept. Did the Programme Plan and general supervision Instructor Fitayt Elshiek conducted the Course. Instructor Awad Shgag assisted in preparing and translating the learing elements he also did some lessons. The expert Eddy Pauli was giving advice from the beging to the end of the Programme, he also participated with a lesson on steering alignment.

PARTICIPANTS

Five trainees from Sennar mill and one from the training Centre. At the end of the course the trainees had undergone theoretical and practical tests, and were given certificates.

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CONCLUTION

The trainees have gained some Knowledge, but not much of an employable Skill.

Regarding the test of the system it is very difficult to rely on this programme's result.

Ibrahim Mohamed Abdo
Acting Head of Dept.

CC TO : Mr. Jack Bye
" " " Eddy Pauli

Asia/:::

NATIONAL SUGAR TRAINING CNETRE - SENNAR

AGR. EQUIPMENT & MOTORVEHICLE SECTION

AUTO ELECTRICIAN COURSE

PROGRAMME TITLE	:	Maintenance of Ignition System.
DURATION	:	Three weeks
AIM	:	To provide the trainee with knowledge and skills necessary for servicing car ignition systems.
LOCATION	:	The National Sugar Training Centre - Sennar
PARTICIPANTS	:	Auto-electric fitters - two from each Mill.
LANGUAGE	:	Arabic
OBJECTIVE	:	At the completion of the programme the trainee will be able to check safely and correctly the ignition system and service its more common components and adjust them according to the manufacturer's settings.

MODULAR UNIT TITLES/DESCRIPTION:

1: Ignition system theory.

2: The ignition system components and their function how the ignition system works.

3: Testing ignition coils.
Operating principle of ignition coil - primary & secondary coils tests - output test.

4: Testing condensers
condensers faults - testing for leakage - testing for capacity series resistance test.

5: Distributor service
Distributor function - distributor cap & rotor - advance mechanisms - contact points service - dwell angle

6: Spark plugs
Identifying types of spark plugs - checking, cleaning and gapping spark plug.

LEARNING ELEMENTS:

- safety
- spanners, wrenches - kinds and sizes (B.E.M.P.)
- using spanners/wrenches (E.M.P.)
- engine - main parts and function
- operation of 4-stroke petrol engine
- ignition system
- applying electro magnetism theory to the ignition system
- coil and condenser
- ballested ignition system
- distributor contact breaker dwell angle.
- distributor cap, rotor and high tension cables
- spark plug
- removing and installing spark plugs
- analysing spark plug face
- replacing and selecting spark plugs
- cleaning and gapping spark plugs
- distributor - vacuum advance mechanism
- distributor - mechanical advance mechanism
- removing, cleaning and installing high tension cables
- checking coil polarity
- ignition timing using control lamp
- simple method of locating faults in the ignition system
- servicing contact breaker points
- checking high tension circuit
- setting points gap with a dwell angle tester
- checking ignition coil
- checking and replacing condenser
- replacing contact breaker of the ignition system
- checking contact breaker arm tension

EVALUATION:

The trainee's performance will be evaluated in theory and practice. A practical and theoretical test will be held by the end of every week during the course.

TIME TABLE:

The attached time table shows the activities during the working hours. Evening sessions not shown are optional. Trainees can come in the evening for revision and practice, under the condition that they are not entitled to extra payment.

AGR. EQUIPMENT & MOTOR VEHICLE SECTION

AUTO-ELECTRICIAN PROGRAMME

WEEK NO. (1)

TIME	SAT. 4	SUN. 6	MON. 7	TUS. 8	WED 9	THUR. 10
07:00 TO 09:00	Administration	Engine - Main Parts & Function	Electrs. Magnet-ism Theory	Ballested Ignition System	Distributor Mechanical Advance	Practice
10:00 TO 11:45	Safety	Operation of 4 Stroke Petrol Engine	Coil & Condser	Distributor ((B)) DA	Distributor Vaccum Advance	Practice
12:00 TO 01:45	Tools	Ignition System	Review	Distributor Cap. Rotor and HT	Practice	Test
01:45	CLEANING/TYIDING UP WORKSHOP & CLASS ROOM					

AGR. EQUIPMENT & MOTOR VEHICLE SECTION

AUTO-ELECTRICIAN PROGRAMME

WEEK NO. (2)

TIME	SAT. 12	SUN. 13	MON. 14	TUE. 15	WED. 16	THUR. 17
07:00 TO 09:00	- Spark Plug - Removing and installing Spark Plugs.	- Replacing and selecting Spark Plugs. - Cleaning and gapping Plugs.	- Removing Cleaning and installing HT Cables. - Checking Coil Polarity.	Ignition Timing using Control Lamb.	Simple method of locating Faults in the Ignition System	Practical Test
10:00 TO 11:45	Practice	Practice	Practice	Practice	Practice	Practical Test
12:00 TO 01:45	Practice	Practice	Practice	Practice	Practice	Test Theory
01:45	CLEANING/TYIDING UP WORKSHOP & CLASS ROOM					

AGR. EQUIPMENT & MOTOR VEHICLE SECTION
AUTO. ELECTRICIAN PROGRAMME
WEEK NO. (3)

TIME	SAT.19	SUN.20	MON.21	TUE.22	WED.23	thur.24
7:00 To 8:00	Servicing Contact Breaker Points Replacing Contact Breaker of the Ignition System	Setting Points Gap Checking Contact Breaker Arm tension	CheckingHT Circuit Checking Ignition Coil	Checking& Replaci Condenser	Review	Test
10:00 To 11:45	Practice	Practice	Practice	Practice	Review d timingl Rractical	Discussion
12:00 to 1:45	Practice	Practdice	Practice	Pracxtic	Practice	
1:45 10	CLEANING7TYIDIDNG UP WORKSHOP & CLASS ROOM					

NATIONAL SUGAR TRAINING CENTRE

AGR. EQUIPMENT & MOTOR VEHICLE SECTION

LIGHT VEHICLE DRIVER/OPERATOR COURSE

PROGRAMME TITLE	:	Safely loading, unloading and operating light vehicles.
DURATION	:	Two weeks
PARTICIPANTS	:	8 drivers, two from each Sugar Company.
ENTRY REQUIREMENTS	:	Physically fit (good eye sight and hearing, no movement impediments or illnesses). Being able to read and write, 2 years experience with a general driving licence.
OBJECTVE	:	After completing successfully this training course the trainee will be able to: A. Clean the vehicle totally inside and outside in the recommended manner. B. Check his own vehicle before and after use following the recommended procedures. C. Load and unload the vehicle safely and correctly distribute the load according to weight, volume and nature of goods. D. Drive the vehicle safely, correctly and economically.
LIST OF LEARNING ELEMENTS	:	Safety - vehicle knowledge - washing vehicle body - cleaning the underneath - cleaning car interior - cleaning engine compartment - loading goods. Vehicle economical driving - braking distance - stopping the engine - daily inspection - tyres.
NOTE	:	A. The course is designed in a modular unit system. B. Eye and reaction test are introduced the first day. C. Practical and theoretical tests covering the course contents will be held in the last two days. D. Handouts will be given to the trainees.

LIST OF MATERIALS

(OPERATOR TRAINING PROGRAMME)

QTY	DESCRIPTION
5	Shampoo bottle
10	Soft brush
10	Wire brush
10	Spraytin graphite
3	Roll of insulation tape
15	Toilet soap
5	Vacuum cleaner
6	Buckets
5	Vinyl cleaner
10	Meters cloth
5	Plastic bags
5	Furniture polish
1	Compressor Air hand pump
6	Lamp 220 V
6	Electric switch
1	Roll of electric wire
3	Vehicles for practice sessions
1	Green wood paint (small)
1	Red wood paint (small)
1	Yellow wood paint (small)
1	Black wood paint
1	Stopwatch

AGRIC EQUIPMENT & MOTOR VEHICLE SACTION

MOTOR VEHICLE - DRIVERS / OPEARTORS TRAINING

PROGRAMME

4.2 - 9.2.1989

Time	Sat.	Sun.	Mon.	Tus.	Wen.	Thu.
7:00 To 9:00	Adminsteation	Vehicle Knowldge Theory	Vehicle Check Theory	Driving Theory	Driving Practice	Driving Vehicfle Practice
10:00 To 12	Eye test and reaction Test	Vehicle Knowldge Practice	Check List Forms Duplicat	Washing Vehicle Theory	Cleaning Car interior Theory	Cleaning Engine Theory
12:15 To 1:30	Safety	Vehicle Knowldge Practice	Check List Froms duplicat	Washing Vehicle Practice	Cleaning Car interior Practice	Cleaning Engine Practice
1:30	Cleaning & Tyding Workshop and Class					

Asia/:::

AGRIC. EQUIPMENT & MOTOR VEHICLE SECTION

MOTOR VEHICLE DRIVERS - OPEARTORS TRAINING PROGRAMME

FROM 10.2 to 16.2.1989

Time	Sat.	Sun.	Mon.	tus.	Wen.	thu.
7:00 To 9:00	Tyre Pressure Theory	Brake Distance Theory	Loading Unloading Theory	Parking Vehicle Theory	Theoratical Test	Open Discussion
10:00 to 12	Practice	Brake Distance Practice Practice	Loading & Unloading Practice	Parking Vehicle Stop the engine Practice	Practice Test	Discussion
12:15 1:30	Cleaning & Checking The engine Practice	Vehicle Checking Practice	Practice	Practice	Practice Test	
1:30	CLEANING & TYDING WORKSHOP AND CLASS					

Asia/:::

F. Computer Training Programme

(List of Participants)

NATIONAL SUGAR TRAINING CENTRE.

COMPUTERMAN TRAINING CENTRE.

COURSE TITLE: SPECIAL COMPUTER TRAINING PROGRAMME FOR SUGAR INDUSTRY

LIST OF PARTICIPANTS

Ser.	Name	Position	Company
01	Badr Eldein Elamin Mohd.	Agri.Inspector	Sennar
02	Ahmed Hamad Mohd.	Mech. Enginner	Sennar
03	Babker Mohmd Elhassan	Lab. Incharge	Sennar
04	Abd Elwahd Mohd. Farah	Purchasing office	Assalaya
05	Abd Elrhman Elnoor`	Cost Accountant	Assalaya
06	Ibrahim Ishag Eltaher	Mech. Engineer	Assalaya
07	Suaad Eltyeb Osman	Accountant	Gunied
08	Gasim Ahmed A/Alla	Accountant	Gunied
09	Abd Elgadir Ahmed	Accountant	Gunied
10	Ahmed Babker Mohmed	Accountant	Sennar
11	Mona Ahmed Husain	Clerk	N.Halfa
12	Asia Elgasim M/Ahmed	Typist	N.S.T.C
13	Husain Abd Elaziz	Clerk	N.Halfa
14	Hamed Elneil Husb Elrsool	Accountant	N.Halfa
15	Abd Elhfiz Abuzaid	Cheif Insp.	N.Halfa
16	Adam Bahr Eldein	Accountant	Guneid
17	Mahgoub Elhadi Khalid	Tr. Officer	Guneid
18	Elsanosi Mohd. Ali	Lab. Tech.	N.Halfa
19	Mohmed Elhassan Ali	Accountant	N.S.T.C.

COMPUTERMAN TRAINING CENTRE

FINAL RESULT

Starting from 12/11/1988 **SENNAR SUGAR - TRAINING CENTER**

N A M E	LOTUS	OPER.	INTRO.	AVERAGE	GRADE
1. IBRAHIM ISHAG ELTAHIR	60	97	89	82	VERY GOOD
2. GASIM AHMED ABDALLA	80	87	76	81	VERY GOOD
3. BADRELDIN ELAMIN	92	73	73	79	VERY GOOD
4. ABDELGADIR AHMED	82	67	91	80	VERY GOOD
5. HUSSEIN A/AZIZ HUSSEIN	65	92	79	79	VERY GOOD
6. SASONI MOHAMED ALI	68	69	75	71	GOOD
7. MAHGOUB ALHADI KHALIL	52	89	70	70	GOOD
8. MONA AHMED HUSSEIN	50	90	69	70	GOOD
9. SUAAD ELTAYEB OSMAN	57	60	50	56	PASS
10. ABDELGADIR ELNOUR	42	59	68	56	PASS
11. HAMAD ELNIEL HASB ELRASOOL	43	65	50	53	PASS
12. BABIKER MOHAMED	42	58	58	53	PASS
13. AHMED HAMMAD MOHAMED	18	66	70	51	PASS
14. ABDELWAHID MOHAMED	22	56	75	51	PASS
15. MOHAMED ELHASSAN	45	50	46	47	PASS
16. ABDELHAFIZ ABUZEID	37	58	20	38	FAIL
17. AHMED BABIKER MOHAMED	25	35	40	33	FAIL
18. ASIA ALGASIM MOHAMED	03	60	35	33	FAIL
19. ADAM BADRELDIN	00	38	26	21	FAIL

DR. ABUBAKER MUSTAFA,
DIRECTOR GENERAL.

G. Second Staff Development Training Programme

SYLLABUS

PROGRAMME: STAFF DEVELOPMENT

COURSE: INSTRUCTIONAL SYSTEMS DEVELOPMENT

LOCATION: THE NATIONAL MANPOWER TRAINING CENTRE, SENNAR

DATE/TIME: 11 DEC 89 [illegible] MAR 89, 0700-1400.

TARGET GROUP : [illegible] TRAINING OFFICERS AND [illegible] UNITS.

LANGUAGE: [illegible] WILL BE IN ENGLISH.

OBJECTIVES:

To provide a standardized approach to the design and development of all training programmes conducted for the National Manpower Council. On the completion of the course, each participant will be able to:

- a. Conduct a training needs analysis
- b. Perform a job analysis
- c. Validate job requirements
- d. Design a learning element
- e. Prepare a written criterion-referenced test
- f. Prepare a performance test
- g. Validate a training program
- h. Prepare and administer instruments
- i. Manage a training program

COURSE OUTLINE:

1.0 Introduction

1.1 Why train?
1.2 Why do organizations not train?
1.3 The cost effectiveness of training.
1.4 ISD overview
1.5 Definitions

2.0 Analysis

2.1 Determining training needs
2.2 Analyzing needs data
2.3 Conducting Job Analyses
2.4 Validating Job Requirements

3.0 Design

3.1 Job Specifications
3.2 Preparing modular learning packages

- o methodology
- o writing objectives
- o preparing criterion-referenced tests
- o writing trainee centered learning activities
- o writing instructor/trainer guides
- o preparing A/V materials
- o preparing demonstration modules/equipment

4.0 Validate

4.1 Train-the-Trainer/instructor

- o methodology
- o presentation techniques
- o testing and evaluating trainees
- o managing the training

4.2 Conduct pilot programme
4.3 Revise program as necessary

5.0 Implementation

5.1 Schedule training
5.2 Notify target population
5.3 Prepare workshop/facility
5.4 Conduct the training
5.5 Test trainees
5.6 Report results

6.0 Evaluation

- 6.1 Trainer evaluation
- 6.2 Trainee evaluations
- 6.3 OJT progress reports
- 6.4 Supervisor verification
- 6.5 Certification

7.0 Administration

- 7.1 Trainee records
- 7.2 Class rosters
- 7.3 Attendance records
- 7.4 Test results
- 7.5 Reporting

JOB DESCRIPTION

SF/SUD/86/003/11-03/Rev. 5

Post title	Industrial Training Expert in Training Methodologies Techniques and Curriculum Development
Duration	
Date required	
Duty Station	Sennar, Sugar Training Center (SSTC), Sennar, Sudan, with travel to other sugar estates
Responsible to:	UNIDO Chief Technical Advisor
Purpose of project	To strengthen the training capability of the Sennar Sugar Training Centre in training methodology and curriculum development through the implementation of a modern training system that is modular based, performance-oriented and criterion referenced, which upgrades the technical and supervisory skills of trainers and instructors of the Sennar Sugar Training Center and the sugar estates.
Duties	The training expert will work in close co-operation with other UNIDO experts and the national staff and he will: (a) Focus on increasing the effectiveness of the training activity by strengthening the industrial training capability of the SSTC.

Applications and communications regarding this Job Description should be sent to:

Project Personnel Recruitment Section, Industrial Operations Division

UNIDO, VIENNA INTERNATIONAL CENTRE, P. O. Box 300, Vienna Austria

He will provide training to national counterparts on implementation of a modular system of performance-oriented criterion referenced training.

(b) Plan, organize and conduct appropriate training courses for national counterparts and instructional personnel which meet expressed needs and focus on:

- Assessment and analysis of training needs

- Methods and procedures for designing performance oriented training programmes which result in increasing trainee performance.

- Training methods, techniques and curriculum development applicable to industrial trainers and instructors.

- Evaluation of programmes, trainers, instructors and students

- Assist in designing overseas training programmes for training officers, trainers and instructors.

(c) Advise the national director, CTA and design architect during their consultations to convert the development strategies into prioritised development schedules for the physical facilities.

(d) Assist training officials of the four sugar estates in implementing approved training policies and procedures

(e) Prepare progress reports upon request and a final technical report at the end of the assignment(s).

Qualifications

(a) Academic qualifications:

Appropriate university studies, preferably a degree in education/pedagogy as well as extensive experience in developing and implementing training of trainers programmes with special emphasis on performance oriented criterion referenced training activities.

(b) Professional qualifications:

- Ability and experience to develop and conduct training programmes for trainers and instructor training courses which increase the effectiveness of industrial trainers including skills of curriculum development, training methods and techniques.

- Possess knowledge of theory as it relates to presentation methods and techniques for industrial instructors, modular training systems and training equipment utilization.

- At least three years of related training methodology and curriculum development and training of trainers experience in developing countries.

Language English, a working knowledge of Arabic will be an advantage

Background Information:

The former Public Sector of the Sugar Industry in Sudan consists of factories and sugar cane estates with a joint rated output of 374,000 tons per annum.

The industry is currently being developed under a World Bank Rehabilitation Scheme.

UNIDO has responsibility for assisting with the development of needed training facilities on behalf of the Sudan Government to support the Rehabilitation Programme.

The Sugar Training Center (STC) has recently been incorporated to be responsible for the development of a comprehensive training service for the Sudan Sugar Industry.

It is a strategy formulating body responsible to the Sugar Project Implementation Committee (SPIC) representing the Government of Sudan and the Sugar Industry. Management of the Centre is the responsibility of the Sudanese National Director who reports to SPIC.

A detailed assessment and analysis of training needs has been made by UNIDO. International funding for the project has been agreed to as part of the overall Sudan Sugar Rehabilitation Programme.

Funding is under the control of the World Bank and includes substantial contributions from other sources such as the Arab Fund.

As the climatic and natural conditions are favorable for expanding its Sugar Industry, the Sudan is aiming at becoming self-sufficient for internal consumption of sugar.

Later it intends to become an exporter of sugar, particularly to the oil-producing Arab countries. Therefore, in its development, priority has been given to the development of this sector. The essential characteristics of the SSTC programme will be:

(a) A training of trainers programme for:

- training officers
- technical trainers/instructors (full-time)
- instructors (part-time)

(b) A programme for engineers, senior technicians and supervisory personnel.

(c) Practical training programme for vocational personnel and operators.

① **JOB DESCRIPTION** **Page:** ..... **of** .....

Job Title: Instructor/Trainer **Occupational Area:** Training

Job No./Code: .....

Company: Sennar Sugar Training Center **Field of Work:** Instruction

Department: Instruction

② **Description of Functions:**

Performs job and task analysis on occupations in field of instruction. Designs and develops training programmes based on the job analysis. Teaches or trains others in a formalclassroom or on-the-job in order to help them to improve their job performance. Maintains effective communications with supervisory and management personnel in their field of instruction.

③ **Organisational Pattern: (Responsible to/Responsible for)**

Responsible to the department head. Responsible for all instruction in his field.

④ **Conditions of Work/Standards:**

Works at Sennar Sugar Training Center or at one of the public sugar estates as assigned.

Designs, develops and conducts all training to international standards.

⑤ **Entry Requirements:**

Must be able to communicate effectively in Arabic. Ability to read and write English is desireable.

Should be able to develop, design and conduct training programmes in the field of instruction in a timely manner.

① **JOB DESCRIPTION** **Page:** ..... **of** .....

Job Title: Department Head **Occupational Area:** Training

Job No./Code: .....

Company: Semar Sugar Training Center **Field of Work:** Curriculum Development

Department: Training Programme Development Department for Training

② **Description of Functions:**

As the head of Training Programme Development Department, the department head should be familiar with and have practical experience in

(1) determining organizational training needs
(2) job and task anlysis
(3) curriculum development and training methodology
(4) training of trainers
(5) evaluation of training and
(6) managment and administrative information retrival systems

③ **Organisational Pattern: (Responsible to/Responsible for)**

Reports directly to the National Director ofthe sugar training center. Responsible for all curriculum development at the Center and the sugar estates.

④ **Conditions of Work/Standards:**

Works with the public sugar estates and must maintain close contact estate managers and training personnel, insures all curriculum developed at the Center and at each sugar estate is not only rlevant to an occupation, but meets international standards for job training.

⑤ **Entry Requirements:**

Must be able to read and write in English and Arabic. Must be familiar with a system and modular approach to training.

Should be able to design and implement courses for trainers and instructors.

PROFILE OF PARTICIPANT

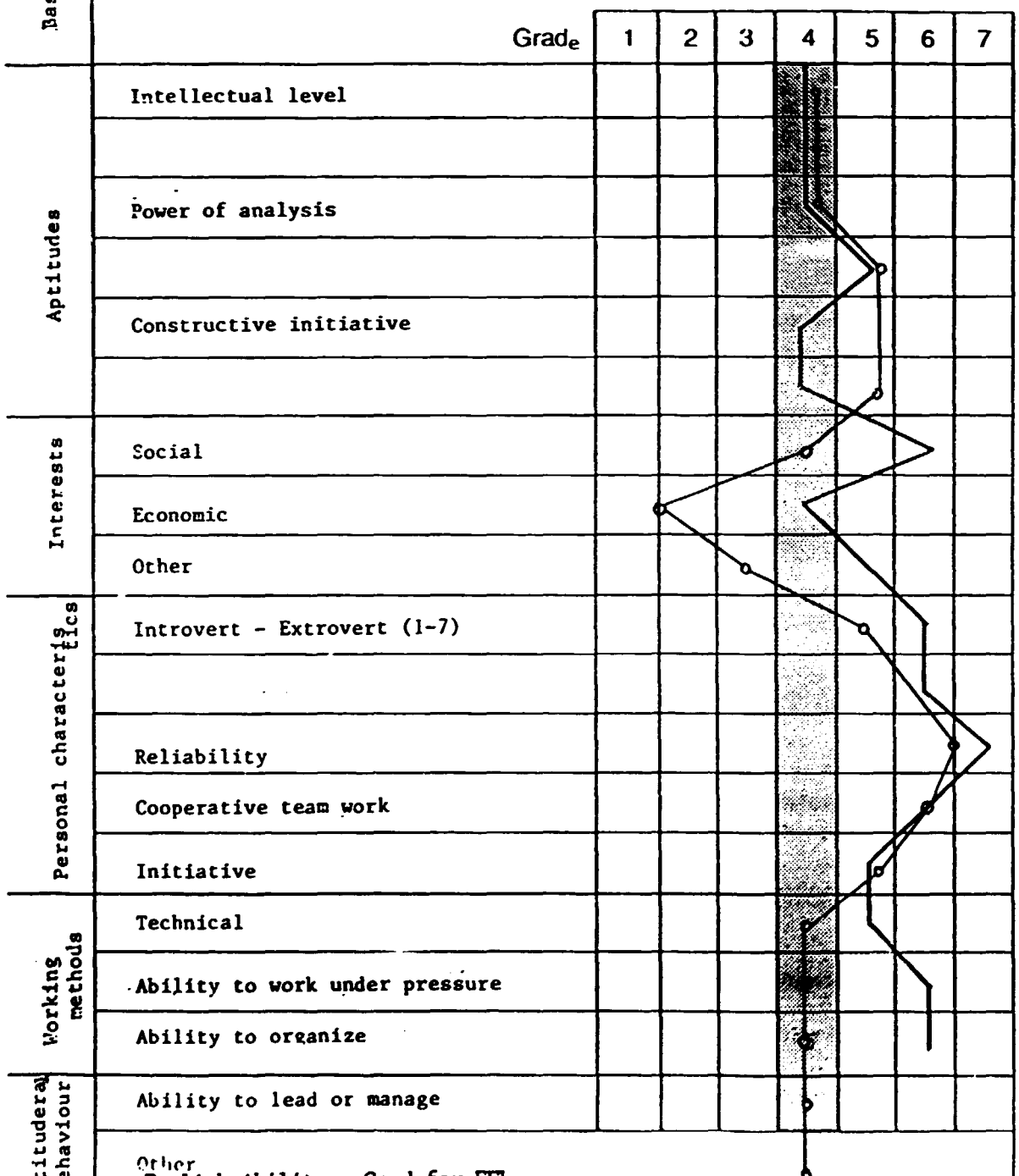
NAME Semar Instructional Staff POST New Recruits Group 1 (2 Individuals)

AGE 25 - 30

SEX MALE

ACADEMIC BACKGROUND: Polotechnic Graduate or Equiv.

GENERAL APPEARANCE: Good



Observations Instructional staff not provided with proper safety clothing for construction ie: safety shoes, overalls, etc.

Years of relevant experience 3 - 10 years

Present functions: Semar Sugar Training Center Instructors

PROFILE OF PARTICIPANT

NAME Sennar Instructional Staff

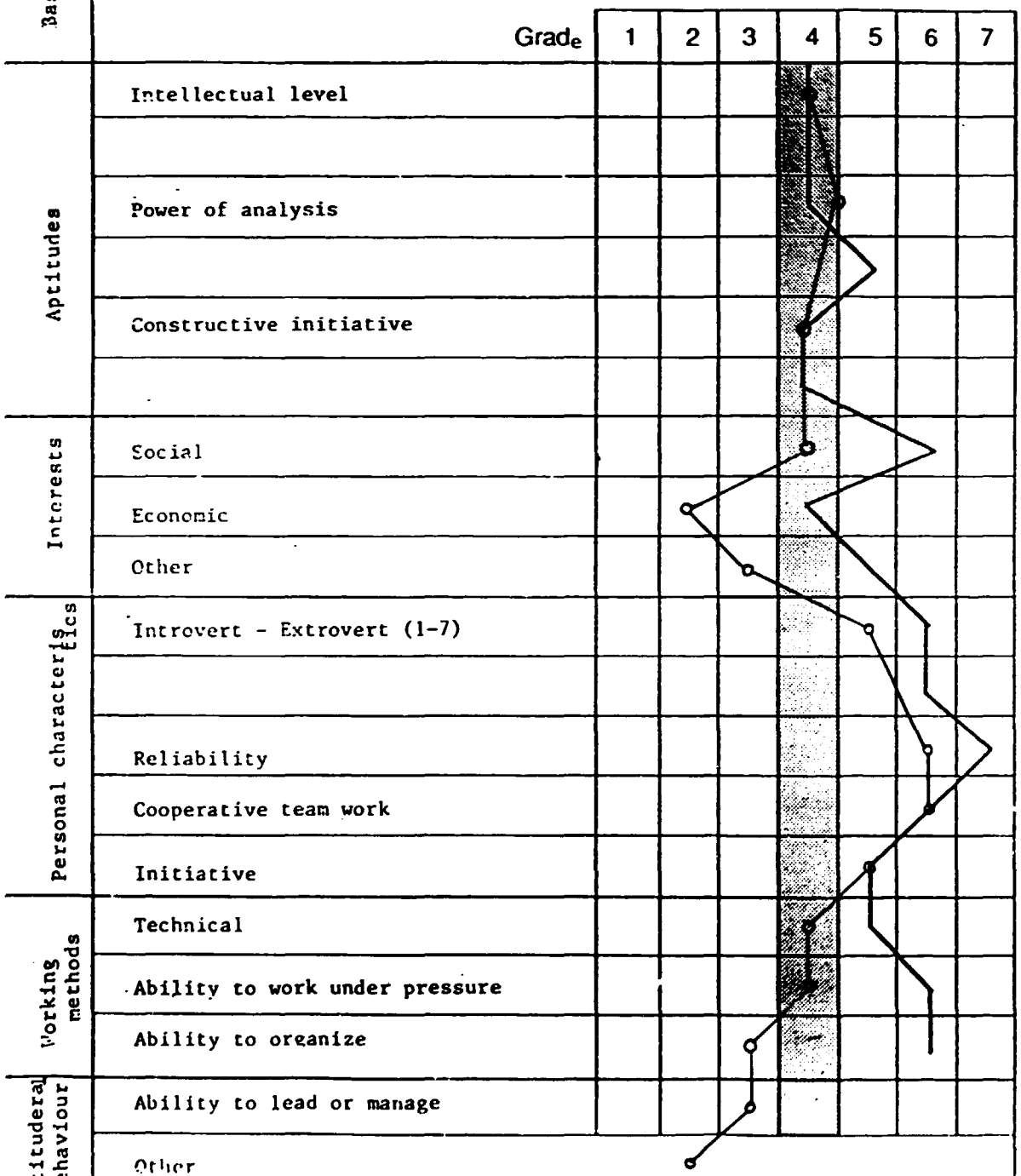
POST New Recruits
Group 2 (4 Individuals)

AGE 25 - 42

SEX Male

ACADEMIC BACKGROUND: Polotechnic Graduate or Equiv.

GENERAL APPEARANCE: Good



English Ability-Poor, Must have further English training

Observations Instructional staff not provided with proper safety clothing for workshop instruction, i. e.: safety shoes, overalls, etc.

Years of relevant experience 5 - 20

Present functions: Sennar Sugar Training Center Instructors

PROFILE OF PARTICIPANT

NAME Semnar Instructional Staff

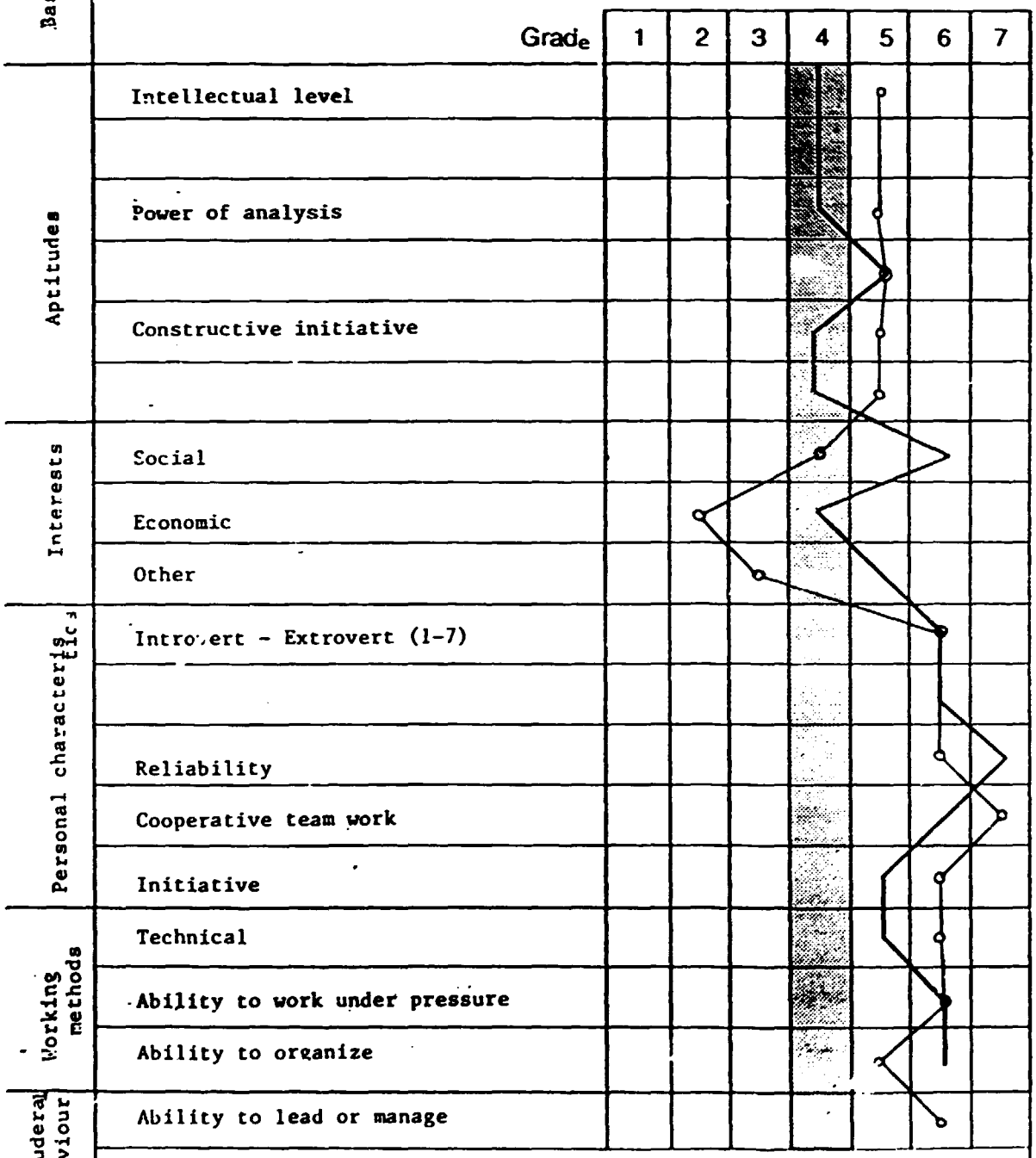
POST Training Staff
Group 3 (9 Individuals)

AGE 23 - 28

SEX Male

ACADEMIC BACKGROUND: Polotechnic Graduate or Equiv.

GENERAL APPEARANCE: Good



Observations Some Instructors have bought own workshop clothing for safety, i. e.: safety shoes, overalls, etc.

Years of relevant experience 5 - 20

Present functions: Semnar Sugar Training Center Staff

PROFILE OF PARTICIPANT

NAME Sugar Estates Training Officers

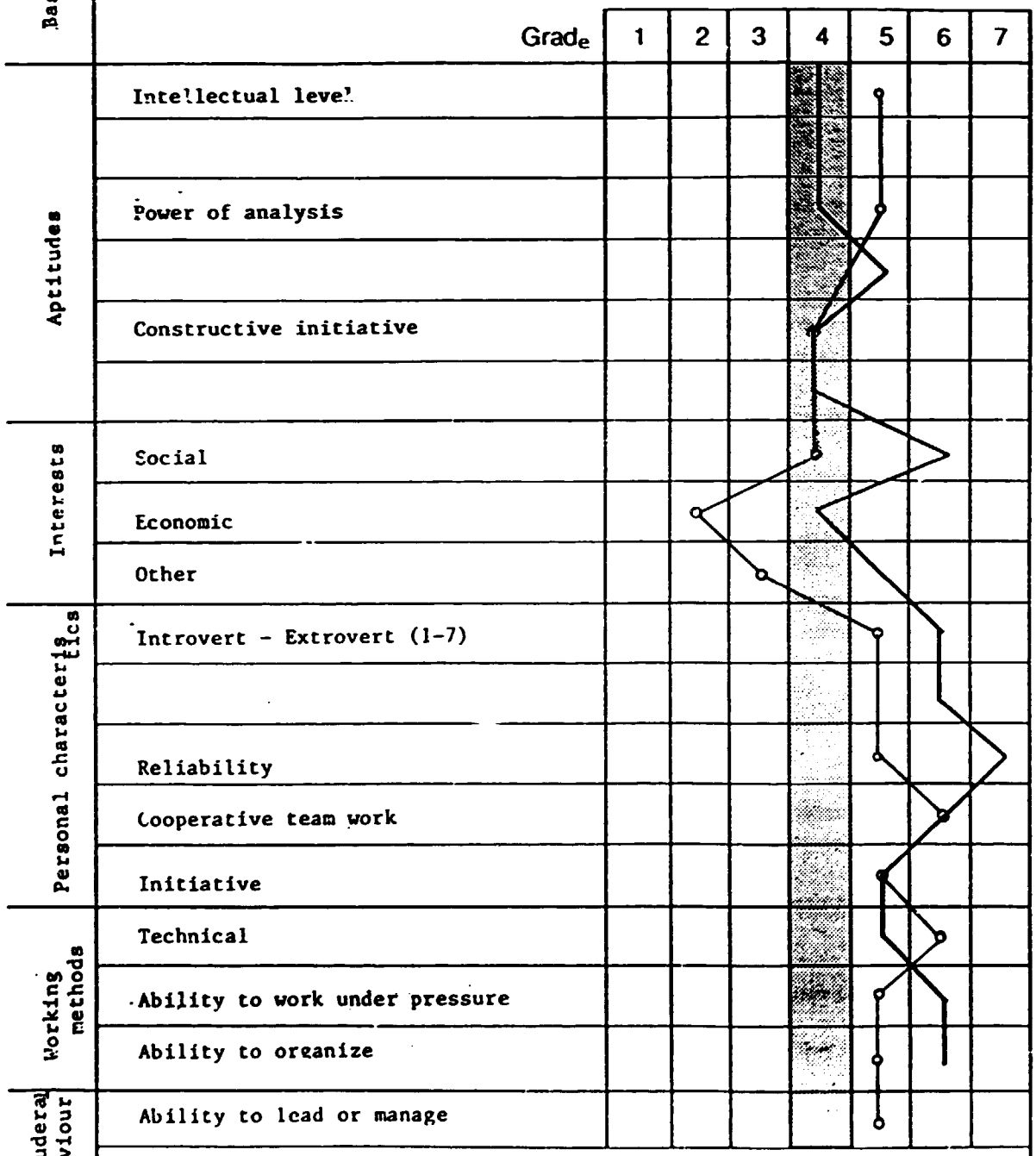
POST Guneid and Assalaya trainii Coordinators Group 4 (3 individuals)

AGE 25 - 35

SEX Male

ACADEMIC BACKGROUND: Polotechnic Graduate or Equiv.

GENERAL APPEARANCE: Good



Observations

Years of relevant experience 5 - 15

Present functions: Training Coordination at Sugar Estates

MODULAR UNIT LEARNING ELEMENT REFERENCE CHART

National Sugar Training Centre, Sennar.

Occupational Area: Mechanical Engineering

Field of Work: Bench Fitting

M.U. Title: EXAMPLE

M.U. Code:

Chart No: 1 Page: 3

LEGEND 1 = CATAGORY - 3 = LEARNING ELEMENT

Steps of Work.

LEARNING ELEMENTS IDENTIFIED ACCORDING TO ANALYSIS.

— SAMPLE SHEET —

WORKSHOP DEMONSTRATION FOR THE ANALYSIS OF STEPS OF WORK.

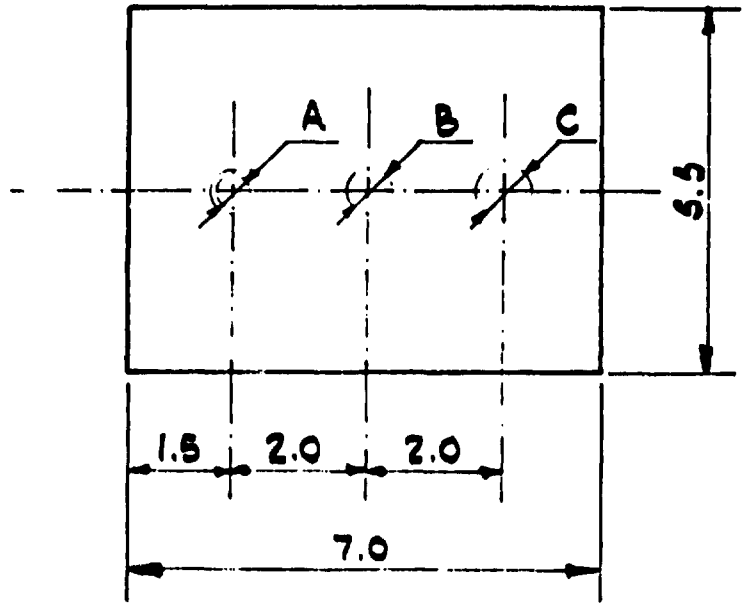
PART OF PRACTICAL EXERCISE AND EXAMPLES PRESENTED BY J. B/C FOR SECOND STAFF DEVELOPMENT TRAINING PROGRAMME.

Standard Chart Format - Developed by I.L.O. Geneva for the M.E.S. System.

Oct. 1988.

National Sugar Training Centre. Sennar

Workshop Exercise - Identifying Steps of Work.



	Details
A	Tap M8
B	Drill 8 mm
C	Drill 8mm clear.

All Dimensions in Cm.

Mild Steel Test Plate	Mat! - Black Mild Steel x 8mm thick.	Scale ~ 1 : 1.
Remove burrs and sharp edges	Finish as Standard	Drawn Feb 89

Appendix III

QUANTITATIVE ASSESSMENT OF TRAINING NEEDS

A proposal for the development of the training facilities at the National Sugar Training Centre, Sennar

Part 1. A quantitative assessment of the training needs of the Sugar Industry of Sudan which are to be met by the N.S.T.C., Sennar

Part 2. A summary of the present training accommodation and an indication of the additional requirements

Part 1. A quantitative assessment of the training needs of the Sugar Industry of Sudan which are to be met by the N.S.T.C., Sennar

Introduction

This document is intended to provide a guide to assist in defining the types of training accommodation needed at the N.S.T.C. in order that a genuine impact may be made towards satisfying the training needs of the Sugar Industry of Sudan - both short-term and long-term.

The basis for this assessment has been taken from the data prepared by UNIDO following the initial missions to Sudan to prepare a project document for the Training Component of the Sudan Sugar Rehabilitation Project and from which the present Project Document SF/SUD/86/003 was derived.

The time lapse between the collection of the data and the present time is of little consequence to this assessment since it is realistic to assume that whilst over a period of time the numbers of persons in permanent employment within the Sugar Industry may fluctuate, the general proportions in Occupational Areas and Fields of Work will remain far more constant.

The influence of any variation will simply result in changing the time required to reach the initial objective, i.e. providing basic training throughout the industry.

Since it is essential to base any proposed structural additions to the Training Centre upon facts and figures it is also then of equal importance to provide the training facilities within them to meet the specific needs. - Some progress has already been made in attempting to collect data for a qualitative assessment of the training needs but the information available at this time is still incomplete.

1.0 The following figures indicate the numbers in permanent employment and for whom training programmes of personal skills improvement must be made available at N.S.T.C.. The large number of seasonal employees may be offered a short period of training on-the-job and in this respect, it will be the responsibility of N.S.T.C. to provide training for the necessary Instructors.

2.0 The training needs of Middle and Top Level Management will be addressed separately since the facilities provided may not be suitable, therefore, whilst this aspect of training will also be the responsibility of N.S.T.C., it would be more appropriate to conduct the training programmes elsewhere.

3.0 **Occupational Areas, Fields of Work and numbers of Employees to be trained.**

3.1

Mechanical Technicians	No.
Mechanical Harvesters	5
Vehicles	4
Agricultural Implements	33
Crawlers	4
	46
Welding and Fabrication	4
Advanced Workshop Practice	42
Draughtsmen	8
	54
Total	100

3.2

Mechanical Artisans/Craftsmen	No.
Wheeled Tractors	186
Vehicles	99
Agricultural Equipment	91
	376
Workshop Practice	218
Factory Maintenance	72
Factory Workshop	118
	408
Total	784

3.3

Electrical/Instrumentation Techns	No.
Electricians	48
Telephone	4
Instrument	4
Total	56

3.4

Electrical/Instrument Artisans	No.
Electricians	104
Instruments	20
Power House	60
Total	184

3.5

Building and Construction Trades	No.
Various Fields of Work	160
Total	

3.6

Vehicle Operation	No.
Light Vehicles	145
Loader Operators	141
Wheeled Tractors	612
Crawler Tractors	98
Graders/Heavy Vehicles	40
Trucks	84
Total	1120

3.7

Plant Operation/Quality Control	No.
Laboratory	96
Plant Operation	156
Total	252

3.8

Business Admin. and Management	No.
Administration Personnel	668
Supervisors - Administration	88
Supervisors - Plant	234
Total	990

3.9

Agriculture	No.
Various Occupational Areas, Fields of Work and Categories	600
Total	600

NOTE: A request to follow-up an earlier contact with Guneid Sugar Cane Research Station and establish a "Training Interface" covering common interests for co-operation and future development, dated 17 Nov. 1988 has not produced any response to date, i.e. 17 Dec.1988

4.0 **A Training Strategy**

4.1 In order to attempt to make an impact on the training needs "across the board", it would be of considerable advantage to establish 3 categories, grades or levels of competence (training)

4.2 For Vocational Trades Skills Areas - i.e. Artisan level of employment, these can be readily identified as:

4.2.1 Basic Artisan Skills

4.2.2 Intermediate Level of Skills

4.2.3 Advanced Skills Level

4.3 All personnel within each occupational area will be required to participate in and successfully complete a basic programme of training modules

4.4 At least 60% of the participants can then be selected for further training to Intermediate Level

4.5 Then at least 60% of those successful at the Intermediate Level training modules may be selected for further training to Advanced Level or Technician

4.6 Further selection can then be made according to ability, skill, aptitude and attitude for:

4.6.1 Continuing as a Highly Skilled Craftsman or

4.6.2 Further training in Supervisory Skills or

4.6.3 Further training to be an Instructor or

4.6.4 Eventually further training in Management Skills

4.7 Figure 1 shows a Progressive Training Structure for Artisan/Craftsman Training based upon the Modular Concept

4.8 Figure 2 shows a similar Progressive Training Structure for Technicians

4.9 Again in the case of Administrative appointments, it is desirable to establish 3 levels of training requirement in order that a progressive training programme can be established and related to identifiable levels of attainment or competence necessary for professional advancement.

4.7 For various Fields of Work: Artisans/Craftsmen.

All Staff:

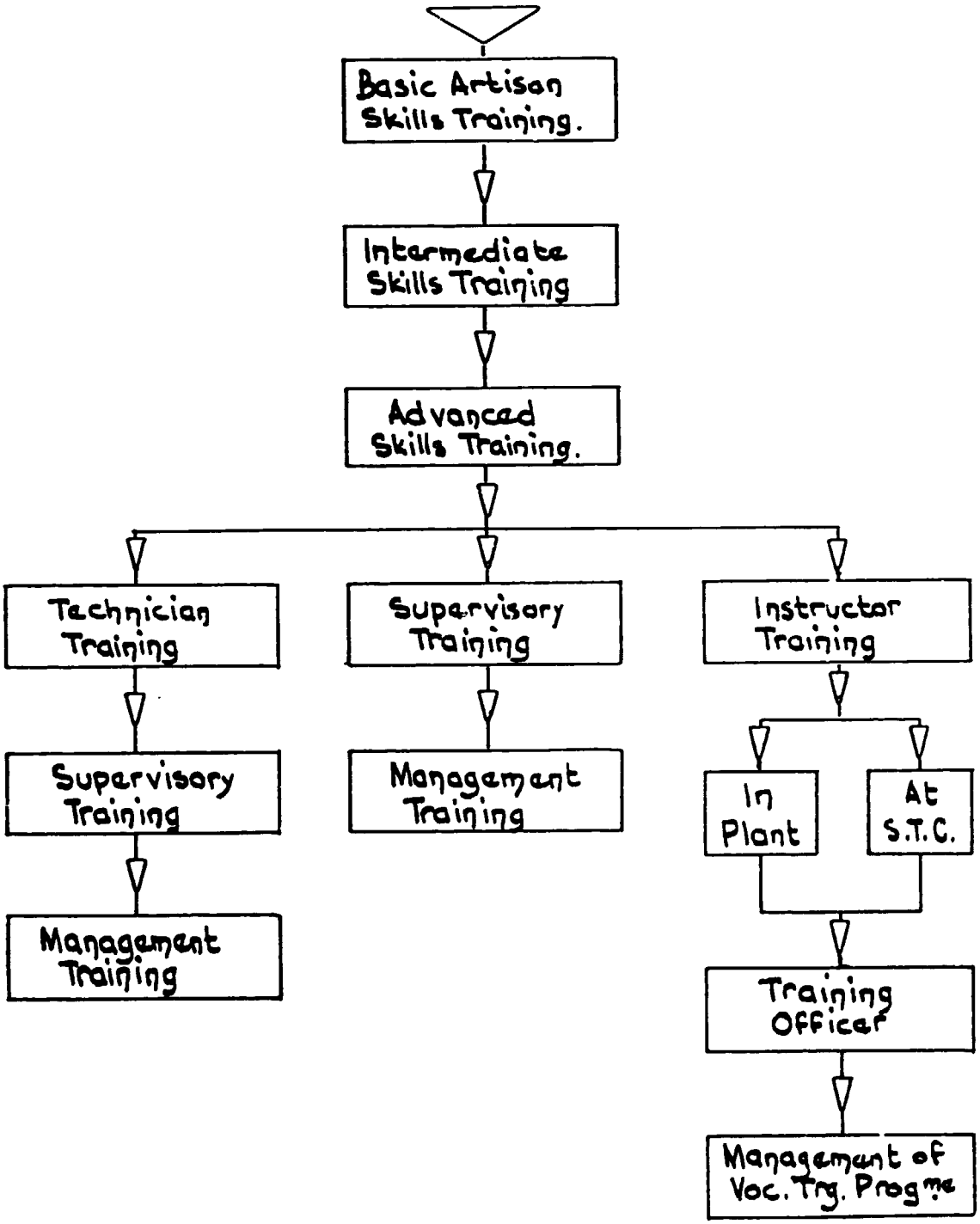


Figure 1

4.8 For various Fields of Work: Technicians.
All Staff

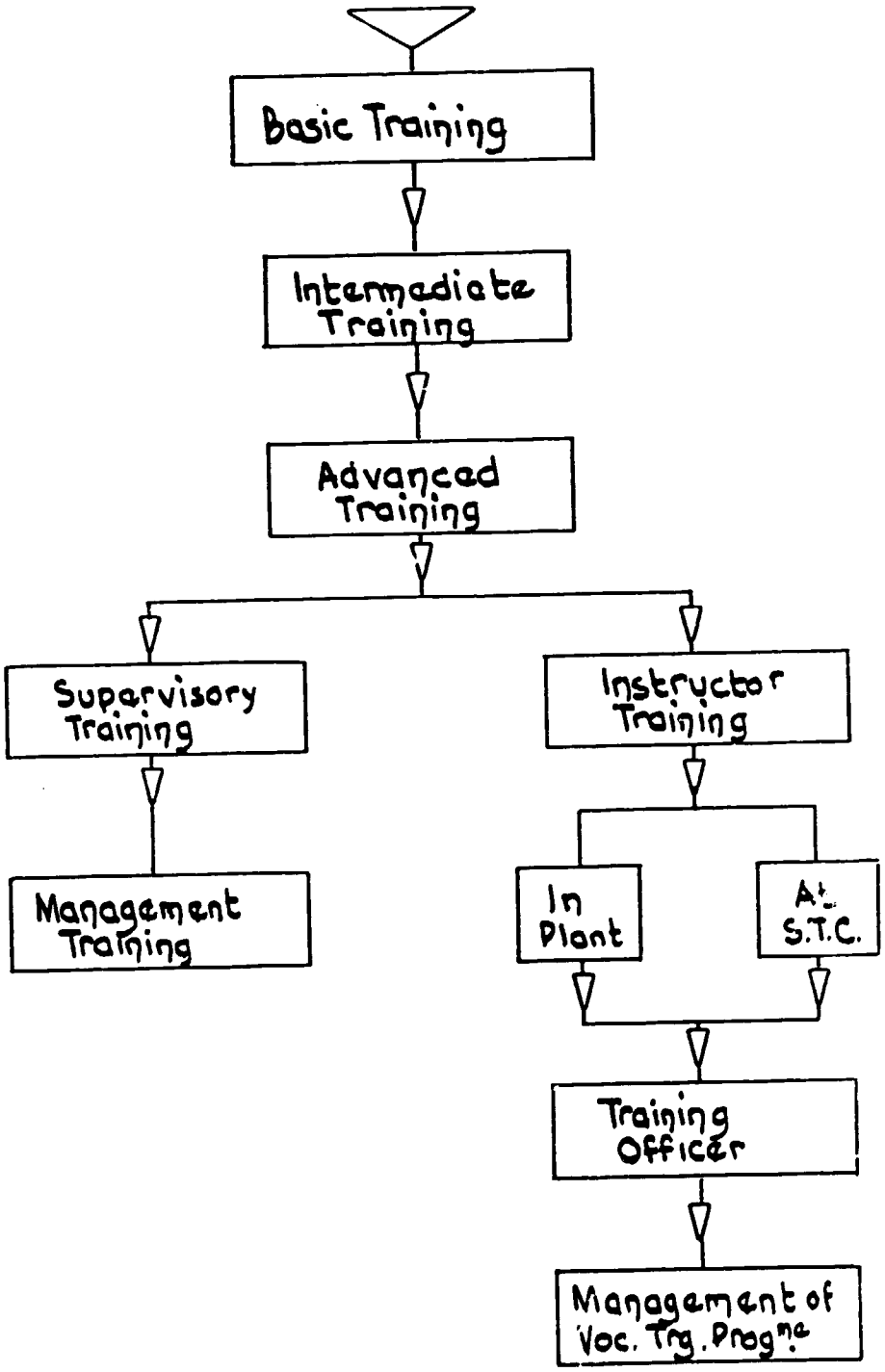


Figure 2

5.0 Training commitment necessary by the N.S.T.C. based upon a progresseive training structure

5.1

Mechanical Artisans/Craftsmen		No.
Vehicle	- Basic Artisan Skills	376
	- Intermediate Skills	227
	- Advanced Skills	136
	Total	730
	X 12 weeks =	8760 T/w
Factory	- Basic Artisan Skills	408
	- Intermediate Skills	245
	- Advanced Skills	148
	Total	801
	X 12 weeks =	9612 T/w

5.2

Mechanical Technicians		No.
Vehicle	- Basic - 46 + 136/4	80
	- Intermediate	48
	- Advanced Skills	29
	Total	157
	X 12 weeks =	1884 T/w
Factory	- Basic - 54 + 148/4	91
		55
		33
	Total	179
	X 12 weeks =	2148 T/w

5.3

Electrical Instrument Artisan		No.
Basic Artisan		184
Intermediate		110
Advanced		66
	Total	360
	X 12 weeks =	4320 T/w

5.4

Electrical Instrument Technician	No.
Basic - 56 + 66/4	73
Intermediate	44
Advanced	26
Total	143
X 12 weeks =	1716 T/w

5.5

Building and Construction	No.
Basic Artisan	160
Intermediate	96
Advanced	58
Total	314
X 12 weeks =	3768 T/w

5.6

Plant Operation/Quality Control	No.
Operatives - Basic Artisan	156
- Intermediate	94
- Advanced	56
Total	306
X 12 weeks =	3672 T/w
Control Technicians 96 + 56/4 - Basic	110
- Inter	94
- Adv.	56
Total	216
X 12 weeks =	2592 T/w

5.7

Business Admin. and Management	No.
Staff Training - Level 1	668
- Level 2	400
- Level 3	240
Total	1308
X 8 weeks =	1046 T/w
Supervisors - 322 + $\frac{248}{4}$	382
X 4 weeks =	1528 T/w

5.8

Agricultural Operatives	No.
Various - Basic Artisans	600
- Intermediate	360
- Advanced	216
Total	1176
X 8 weeks =	9408 T/w

5.9

The total number of Trainee/Weeks indicated above amounts to US$ 59,872 rounded for convenience in future calculations to 60,000 Trainee/weeks

5.10.1 To assume the extraordinarily ambitious utilisation of the training facilities for 48 working weeks each year, the above figure may then be resolved to a base of 1250 Trainees.

5.10.2 In order to meet this initial requirement only and standing still rather than countering the increasing demand for training AND supposing all the necessary facilities, accommodation and Instructors were available immediately, the actual training commitment is shown below in tabular form.

5.10.3 Table 1 showing daily attendance necessary for 48 weeks each year against time reuqired to meet initial objective (and not allowing for a slow start and build up to capability)

Years			Trainees
3	with a daily attendance of		417
4	"		312
5	"		250
6	"		208
7	"		179
8 *	"	*	156

* The present Trainee Accommodation capacity after considerable mainenance and repair

5.10.4 AN ALTERNATIVE VIEWPOINT - With maximum utilisation of the TRAINING FACILITIES now available - i.e. a maximum of 40 Trainees IT WILL REQUIRE 32 YEARS TO MEET THE ORIGINALLY IDENTIFIED OBJECTIVE

5.11 The above figures do not include Vehicle Operation/Driver Training since the great majority of the instruction will not be conducted in an enclosed space. However, the requirement for a suitable number of Instructors is evident at the Training Centre and at various working locations (on-the-job) since a training commitment of 1110 dirvers x 2 weeks, i.e. 2236 Trainee/weeks is anticipated

5.12 As previously indicated - para 2.0 - the training needs of Middle and Top Level Management will be met by arranging appropriate training programmes outside N.S.T.C.

6.0 Conclusion

6.1 It is beyond question that the present training facilities and accommodation at the National Sugar Training Centre, Sennar, are totally inadequate to make even the slightest impact on the needs of the Industry and therefore, high priority must be given to the provision of considerable extension to the existing premises.

6.2 The initial approach must be the complete rehabilitation of the existing training facilities (and this can only be partially accomplished within the Budget for Phase I).

6.3 The development of facilities must be phased to impact the most demanding areas first, i.e. the most critical requirement being Basic Artisan Skills Development in all Occupational Areas and Fields of Work.

6.4 The attempt to provide sufficient training facilities and residential accommodation will need to be accompanied by a serious recruitment programme to attract suitably qualified and experienced Instructors to participate in further training programmes in readiness for completion and commissioning of new buildings and training equipment.

Part 2. A summary of the present training accommodation and an indication of the additional requirements

Introduction

A. The major cost in the rehabilitation of the existing accommodation will be encountered in the replacement of many electrical fixtures, fittings and appliances.

All the workshop areas require complete re-wiring in order to raise the safety standards to an acceptable level which would also include the complete replacement of the distribution panels and the installation of overhead bus bars.

B. The reference to short-term requirements indicates thta the accommodation is planned to deal with initial training only. The figures quoted are for "first-time" training only and do not take into account the proposed Progressive Training Structure

C. A further item for consideration, once the initial training programmes are in operation, will be the possible introduction of a ONE-YEAR OFF-THE-JOB APPRENTICESHIP TRAINING SCHEME which would be a major influence on the long-term objective of progessively raising the levels of competence of Craftsmen and Technicians in certain key occupations.

Sugar Training Centre, Sennar

1.0 Existing Accommodation

1.1

OFFICE AND STOREROOMS		
	Dimensions (m)	Area m^2
General Office	8.50 x 8.0	68.0
Directors Office	4.5 x 4.5 + 3x3	29.25
Training Office	4x6 + 3x3	33.0
General Store	8.5 x 8.0	68.0
Parts Store	4.5 x 7.0	31.5
Sub Store	2.5 x 6.0	15.0
	TOTAL	244.75

1.2

MECHANICAL WORKSHOPS		
	Dimensions (m)	Area m^2
Machine Shop	8.5 x 25.0	212.5
Fabrication Shop	8.5 x 12.5	106.25
Welding Shop	8.5 x 6.5	55.25
	TOTAL	374.0

1.3

VEHICLE WORKSHOPS		
	Dimensions (m)	Area m^2
Garage	8.5 x 11.0	93.5
Auto Electrics	8.5 x 6.0	51.0
Classroom	5.0 x 5.0	26.0
Workroom	3.5 x 5.0	17.5
Store	8.5 x 8.0	68.0
	TOTAL	255.0

1.4

INSTRUMENTATION		
	Dimensions (m)	Area m^2
Laboratory	6.0 x 3.0	18.0

1.5

CLASSROOMS		
	Dimensions (m)	Area m^2
No. 1	8.5 x 9.0	76.5
No. 2	8.5 x 10.0	85.0
No. 3	8.5 x 9.0	76.5
No. 4	8.5 x 10.0	85.0
	TOTAL	323.0

TOTAL AREA = 1214.75 SQ.M. (Excluding kitchen and toilets)

Sugar Training Centre, Sennar

Proposed additional accommodation

2.0 Mechnical - Short-term requirement for:

8 Instructors

60 Technicians

400 Artisans

2.1

Workshop/Room	Dimensions (m)	Area m^2
Basic Fitting Shop	10.0 x 7.5	75.0
Advanced Fitting Shop	10.0 x 7.5	75.0
Advanced Machine Shop	10.0 x 20.0	200.0
Plumbing/Pipe Fitting	10.0 x 10.0	100.0
General Maintenance	10.0 x 15.0	150.0
Tool and Metal Store	5.0 x 5.0	25.0
Tool and Parts Store	5.0 x 5.0	25.0
Classroom	10.0 x 75.	75.0
Classroom	10.0 x 7.5	75.0
	TOTAL	800.0

3.0 **Electrical/Instrumentation - Short-term requirement for:**

5 Instructors

60 Technicians

180 Artisans

3.1

Workshop/Room	Dimensions (m)	Area m^2
Domestic Installation	10.0 x 10.0	100.0
Industrial Installation	10.0 x 10.0	100.0
Electrical M/C Maintenance	10.0 x 10.0	100.0
Instruments and Control	10.0 x 10.0	100.0
Parts and Tool Store	5.0 x 5.0	25.0
Instrument Store	5.0 x 5.0	25.0
Classroom	10.0 x 7.5	75.0
	TOTAL	525.0

4.0 **Vehicles - Short-term requirement for:**

8 Instructors
50 Technicians
370 Artisans
1120 Drivers

4.1

Workshop/Room	Dimensions (m)	Area m^2
Engines	10.0 x 10.0	100.0
Transmission	10.0 x 10.0	100.0
Chassis	10.0 x 10.0	100.0
Electrics	10.0 x 7.5	75.0
Diesel	6.0 x 6.0	36.0
Hydraulics	6.0 x 6.0	36.0
Heavy Plant	10.0 x 15.0	150.0
Fitting Shop	10.0 x 7.5	75.0
Classroom	10.0 x 7.5	75.0
	TOTAL	742.0

4.2

Covered Area	Dimensions (m)	Area m^2
Tractors	12.5 x 10.0	125.0
Harvesters	12.5 x 15.0	187.5
Heavy Plant	12.5 x 15.0	187.5
Trucks and Trailers	10.0 x 20.0	200.0
Light Vehicles	10.0 x 20.0	200.0
	TOTAL	900.0

5.0 **Building and Construction - Short-term requirement for:**

1 Instructor
160 Artisans

5.1

	Dimensions (m)	Area m^2
Carpentry Shop	10.0 x 10.0	100.0

6.0 **Chemistry - Short-term requirement for:**

2 Instructors
96 Lab + 156 Plant

6.1

Room	Dimensions (m)	Area m^2
Laboratory	15.0 x 25.0	375.0
Lecture Room	10.0 x 7.5	75.0
Pilot Plant	10.0 x 20.0	200.0
	TOTAL	650.0

7.0 **Businees Administration and Management - Short-term::**

3 Instructors
90 Supervisors (Admin.)
240 Supervisors (Plant)
670 Administrative Staff

7.1

Room	Dimensions (m)	Area m^2
Board Room	10.0 x 10.0	100.0
Classroom	10.0 x 10.5	100.0
Classroom	10.0 x 7.5	75.0
Classroom	10.0 x 7.5	75.0
Store	10.0 x 5.0	50.0
	TOTAL	500.0

8.0 Training Department - To be located in existing accommodation.

3 Instructors/Lecturers

8.1

Room	Dimensions (m)	Area m^2
Classroom	8.5 x 9.0	76.5
Classroom	8.5 x 10.0	86.0
Trg.Mat.Dev^t and A.V. Prep.	8.5 x 9.0	76.5
Reprographics Room	8.5 x 8.0	68.0
Materials Store	6.0 x 3.0	18.0
	TOTAL	324.0

9.0 Agricultural Department - A request for information relating to Policy Decisions concerned with the establishing of this Department and its location has not yet been dealt with.

10.0 Additional Accommodation

Library 13.0 x 15.5

Lecture Theatre 13.0 x 15.5

Administration Section - as originally proposed on drawings for new extension, i.e. - Reception, 9 offices and store 9.0 x 12.0

Total additional area approximately 5660 SQ.M.

OUTLINE TRAINING DIRECTORY

This directory identifies over 90 specific jobs within the Sugar Industry.

The jobs thus identified require further (on site) analysis to place them within the precise context of the Sudanese Sugar Industry according to the principles established during Phase I of the Project. Each description requires translating into a Job Specification by identifying the various Modular Units which must be completed in order that the Trainee may carry out the various tasks efficiently and effectively.

As a preface to the directory, an example is included which was prepared at the National Sugar Training Centre, Sennar by the C.T.A.

① **JOB DESCRIPTION** **Page:** ..... **of** .....

Job Title: Estate Electrician Grade I
Job No./Code: .....
Company: Sudan Sugar Industry
Department: Electric and Instrument Departments.

Occupational Area: Electrical Engineering
Field of Work: Domestic Electrical Installation

② **Description of Functions:**

- Installs electrical lighting and power circuits in domestic dwellings, apartment blocks and other types of buildings.
- Examines building drawings, electrical diagrams and other specifications.
- Selects, positions and fixes distribution boards and fuse boxes, mounts switches, light fixtures, socket outlets and power points.
- Selects and installs cables/conduits onto or into masonry surfaces.
- Connects distribution boards and protective fusing.
- Connects the different electrical circuits in accordance with the diagrams.
- Connects domestic electrical appliances to the electrical supply.
- Connects signal circuits.
- Performs basic tests on completed electrical installation.
- Observes safety precautions and rules.

③ **Organisational Pattern: (Responsible to/Responsible for)**

- Responsible to the Estate Supervisor in charge of electrical installations.

④ **Conditions of Work/Standards:**

- Works on housing maintenance and new constructions.
- Works to national standards and specifications required for domestic electrical installations.

⑤ **Entry Requirements:**

- Must be able to read and write English texts of learning elements.
- Must be able to add, subtract, divide and multiply.
- Should possess normal physique and eye sight (with or without spectacles), no colour blindness and must be able to develop logical, step-by-step work procedures.

⑥ Job Title: Building Electrician Job No./Code: _____ Page: ____ of ____

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
1. **MARKING OUT INSTALLATION LAYOUTS IN BUILDINGS** Examines building drawings to identify the layout to be marked. Selects the tools and equipment required and marks out the cable/conduit runs of the installation onto the walls and ceilings of the different rooms of the building. Observes all necessary safety precautions and rules.	± 2 cm	Rules, tapes, straight edges, chalk lines plumbobs, pencil spirit levels, crayons, ladders, safety clothes.
2. **MARKING OUT POSITIONS OF COMPONENTS AND FIXTURES IN BUILDINGS** Examines buildings drawings and diagrams to determine type, sizes and positions of component and fixtures to be mounted. Selects and prepares tools and equipment required for this work and marks out position of components and fixtures on walls and ceilings. Observes all necessary safety precautions and rules.	± 2 cm	Rules, tapes, spirit levels, pencil, crayons, hammers, masonry drill, garnish awls, ladders, safety clothes.
3. **MOUNTING COMPONENTS AND FIXTURES ONTO WOODEN SURFACE** Selects and examines components and fixtures to determine positions of component/fixtures to be mounted. Selects threaded fastener for wood and washers. Selects and prepares tools and equipment and prepares mounting holes and mounts components and fixtures to wooden surfaces. Observes all necessary safety precautions and rules.	± 2 cm	Rules, tapes, pencils, garnish awls, gimlets, hammers, screwdrivers, ladders, safety clothes.
4. **MOUNTING COMPONENTS AND FIXTURES ONTO MASONRY SURFACES** Selects and examines components and fixtures to determine positions of components/fixtures to be mounted. Selects wall plugs, threaded fasteners for wood, washers and masonry bolts and plaster if required. Selects and prepares tools andequipment and prepares mounting holes; sets wall plugs and mounts components and fixtures. Observes all necessary safety precautions and rules.	± 2 cm	Rules, tapes, masonry cutters, masonry chisels, hammers, portable electric drills, portable electric hammers, spirit level screwdrivers, trowels, plaster, ladders, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: _____ Page: ____ of ____

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
5. **MOUNTING COMPONENTS AND FIXTURES INTO MASONRY SURFACES** Selects and examines components, fixtures, markout positions on masonry surfaces into which components are to be mounted. Selects mounting material, fasteners and plaster, and prepares mounting holes and recesses. Selects tools and equipment and mounts components and fixtures into masonry surfaces. Observes all necessary safety rules and precautions.	± 2 cm	Rules, tapes, masonry cutters, masonry chisels, hammers, portable electric drills, portable electric hammers, spirit levels, screwdrivers, trowels, plaster ladders, safety clothes.
6. **MOUNTING OF FUSING/DISTRIBUTION CENTRES ONTO SURFACES** Selects required fusing/distribution centre and examines mounting instructions. Selects fasteners and mounting material, required tools and equipment and prepares holes for mounting position. Assembles fusing/distribution centre and mounts centre to surface. Observes all necessary safety precautions and rules.	According to national standards and specifications for domestic electrical installations.	Rules, tapes, pencil, crayons, garnish awls, hammers, gimlets, masonry drills, masonry chisel, portable electric drills, cement, small trowel, screwdrivers, spanners, wrenches, safety clothes.
7. **MOUNTING OF FUSING/DISTRIBUTION CENTRES INTO SURFACES** Selects required fusing/distribution centre and examines mounting instructions. Prepares recess for mounting and checks its dimensions. Reads assembly instructions and assembles fusing/distribution centre. Selects tools and equipment and mounts centre into masonry surface. Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencil, crayons, garnish awls, hammers, gimlets, masonry chils, masonry chisels, portable electric drills, cement, small trowel, screwdriver, spanners, wrenches, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
8. MOUNTING OF HOUSE CONNECTION BOXES Examines marked-out position for house connection box. Prepares mounting holes, selects tools and equipment, fasteners and mounting material. Prepares house connection box for mounting and mounts it to the surface. Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, crayons, garnish awls, hammers, gimlets, masonry drills, masonry chisels, portable electric drills, cement, small trowel, screwdrivers, spanners, wrenches, safety clothes.
9. MOUNTING OF ELECTRIC METERS Examines marked-out position for electric meter box. Prepares mounting holes; select tools and equipment, fasteners and mounting materials. Prepares electric meter box for mounting and mount it to the surface. Observe all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, garnish awls, gimlets, masonry drills, masonry chisels, wood drills, metal drills, screwdrivers, Spanners, wrenches, safety clothes.
10. INSTALLING CABLES ONTO WOODEN SURFACE USING CLIPS AND SADDLES Reads architectural and circuit diagrams to determine types, quantities and dimensions of cables required. Selects cables, clips, saddles and fasteners. Selects tools and equipment and marks-out spacing for clips and saddles and mounts them to the wooden surface. Prepares and installs cable runs. Observes all necessary safety precautions and rules.	According to national standards and specifications for domestic electrical installations.	Rules, tapes, pencils, garnish awls, hammers, screwdrivers, diagonal cutting pliers, electrician knives, ladders, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
11. INSTALLING CABLES ONTO MASONRY SURFACES USING CLIPS AND SADDLES		
Reads architectural and circuit diagrams to determine types, quantities and dimensions of cables required. Selects cable, clips, saddles and fasteners. Selects tools and equipment and marks-out spacing for clips and saddles and sets wall plugs, mounts clips and saddles to masonry surfaces. Prepares and installs cable runs. Observes all necessary safety precautions and rules.	See above.	Rules, tapes, pencils, hammers, masonry drills, portable electric drills, screwdrivers, diagonal cutting pliers, electrician knives, ladders, safety clothes.
12. PREPARING RIGID PVC CONDUIT FOR INSTALLATION		
Reads architectural and circuit diagrams to determine types, quantities and dimensions of PVC conduit required. Selects and cuts to length conduit pieces as required. Removes burrs and sharp edges on conduit and selects accessories such as bends, coupling joints, etc. in sizes and quantities required. Observes all necessary safety precautions and rules.	Cut PVC conduit to ± 2 mm accuracy.	Rules, tapes, pencils, crayons, hacksaws, electrician knives, different files, safety clothes.
13. BENDING RIGID PVC CONDUIT		
Reads architectural diagrams to determine/calculate bends to be made. Mark out position of bends, select tools and equipment and bend PBV conduit to required dimensions. Observe all necessary safety precautions and rules.	To bend PVC conduit to ± 2 mm accuracy.	Rules, tapes, pencils, special radius gauges, bending spring, plugs, sand, heating equipment to warm-up conduit for bending, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
14. INSTALLING RIGID PVC CONDUIT ONTO MASONRY SURFACES Examines marked-out layouts and conduit pieces/accessories prepared for installation. Selects clips, saddles, wall plugs, tools and equipment and marks-out position for wall plugs. Sets wall plugs, mounts clips/saddles and assembles/ installs conduit. Observes all necessary safety precautions and rules.	According to national standards and specifications for domestic electrical installations.	Rules, tapes, pencils, crayons, centre punch, hammers, masonry drills, portable electric drills, screwdrivers, ladders, safety clothes.
15. INSTALLING RIGID PVC CONDUIT INTO MASONRY SURFACES Examines marked-out layouts and conduit pieces/accessories prepared for installation. Selects tools and equipment and cuts grooves/channels for the conduit. Assembles and installs conduit in grooves and closes the grooves by plastering. Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, crayons, masonry chisels, hammmer, electrician knives, trowels, plaster bowl, plaster, electric masonry cutters, ladders, safety clothes.
16. FEEDING WIRES INTO CONDUIT Examines circuit diagrams and installation layouts to determine types, sizes, colours and quantities of wire required. Inspects conduit installation for sharp edges, narrow bends, clears passages and removes sharp edges if necessary. Prepares wires, steel/spiral tapes and feeds wires into conduit. Observes all necessary safety precautions and rules.	According to national regulations for colour coding of electrical wiring.	Tapes, diagonal cutting pliers, combination pliers, electrician knives, steel/ spiral tapes, ladders, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
17. **CONNECTING WIRE AND CABLE END TO SCREW-ON AND PUSH-ON TERMINALS IN ELECTRICAL INSTALLATIONS (Up to 6 square mm)**		
Reads and examines diagrams of the particular lighting, signal, power or control circuits to be interconnected as specified in the respective modular unit dealing with the connection of such circuits. Examines components, fixtures, wires and cables to be interconnected. Selects tools and equipment and prepares wire and cable ends for connection. Connects wire and cable ends to screw-on or push-on terminals. Observes all necessary safety precautions and rules.	± 2 mm	Rules, tapes, pencils, combination pliers, diagonal cutting pliers, wire stripping tools, electrician knives, screwdrivers, safety clothes.
18. **CONNECTING WIRE AND CABLE ENDS TO SOLDER-ON TERMINALS (Up to 6 square mm)**		
Reads and examines diagrams of the particular lighting, signal, power or control circuits to be interconnected as specified in the respective modular unit dealing with connection of such circuits. Examines components, fixtures, wires and cables to be interconnected. Selects tools and equipment and prepares wire and cable ends for connection. Prepares and checks soldering equipment. Connects wire and cable ends to solder-on terminals. Observes all necessary safety precautions and rules.	± 2 mm	Rules, tapes, pencils, combination pliers, diagonal cutting pliers, wire stripping tools, electrician knives, soldering guns, soldering materials, safety clothes.
19. **CONNECTING LIGHTING CIRCUITS WITH ONE-WAY SWITCHES**		
Reads and examines the diagrams of a one-way circuit to be connected. Selects tools and equipment and connects the circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on, and Push-on Terminals". Observes all necessary safety precautions and rules.	Check function of circuit without error.	Rules, tapes, pencil, combination pliers, wire/cable stripping tool, electrician knives, screwdriver, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: _____ Page: ____ of ____

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
20. CONNECTING POWER CIRCUIT WITH SINGLE PHASE SOCKET OUTLET		
Reads and examines the diagrams of a single phase power circuit to be connected. Selects tools and equipment and connects the circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necssary safety precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tool, electrician knives, screw-drivers, safety clothes.
21. CONNECTING LIGHTING CIRCUIT WITH TWO-WAY SWITCHES		
Reads and examines the diagrams of a two-way circuit to be connected. Selects tools and equipment and connects the circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tool, electrician knives, screw-drivers, safety clothes.
22. CONNECTING LIGHTING CIRCUITS WITH MULTI-CIRCUIT SITCHES		
Reads and examines the diagram of a multi-switch circuit to be connected. Selects tools and equipment and connects circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necessary safety precautions and rules.	As abobe.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tools, electrician knives, screw-drivers, safety clothes.

⑥ Job Title: Building Electrician Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used
23. **CONNECTING LIGHTING CIRCUITS WITH INTERMEDIATE SWITCHES** Reads and examines the diagrams of an intermediate circuit to be connected. Selects tools and equipment and connects circuits as specified in the modular unit "Connecting Wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tools, electrician knives, screw-drivers, safety clothes.
24. **CONNECTING LIGHTING CIRCUITS WITH FLUORESCENT LAMPS** Reads and examines the diagram of a circuit with fluorescent lamp to be connected. Select tools and equipment and connect the circuits as specified in the modular unit "Connecting wire and Cable Ends to Screw-on and Push-on Terminals". Observes all necessary safety precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tools, electrician knives, screw-drivers, safety clothes.
25. **CONNECTING SIGNAL CIRCUITS WITH ELECTRIC BELLS, CHIMES AND BUZZERS** Reads and examines the diagrams of different types of signal circuits to be connected. Select tools and equipment and connect circuits, as specified in the modular unit "Connecting wire and Cable Ends to Screw-on and Push-on Terminals". Observe all necessary safet precautions and rules.	As above.	Rules, tapes, pencils, combination pliers, wire/ cable stripping tools, electrician knives, safety clothes.

① **JOB DESCRIPTION** **Page: ..... of .....**

Job Title: ..... **Occupational Area:** .....

Job No./Code: ....

Company: ..... **Field of Work:** .....

Department: ....

② **Description of Functions:**

③ **Organisational Pattern: (Responsible to/Responsible for)**

④ **Conditions of Work/Standards:**

⑤ **Entry Requirements:**

⑥ Job Title: ..... Job No./Code: ..... Page: ..... of .....

List and Description of Modular Units Performed Within Job

Modular Unit Titles/Descriptions	Performance Standards	Tools/Equipment Used

JOB DESCRIPTION:

JOB TITLE: Maintenance Engineer (Mills)

REPORTS TO: Engineering Manager.

BASIC FUNCTIONS: Plan and control the maintenance of all Milling Operations to ensure that these are carried out effeciently and that production targets are met.

JOB DESCRIPTION.

JOB TITLE: Shift Maintenance Superintendent.

REPORTS TO: Maintenance Engineer (Mills)

BASIC FUNCTIONS: On a shift responsible for the smooth operation of the Mill steam generation plant to ensure that both are run of optimum performance and to agreed parameters. To implament maintenance activities and running repairs on mechanical plant, process euipment boilers and associated pipework as required.

JOB DESCRIPTION.

JOB TITLE: Day Engineering Superintendent (Mills)

REPORTS TO: Section Maintenance Engineer (Mills)

BASIC FUNCTIONS: Under the direction of the Milling Maintenance Engineer, to ensure the implementation of the planned maintenance schedules and preparation of the necessary replacement spare parts for the section.

JOB DESCRIPTION

JOB TITLE: Maintenance Supervisor Milling Plant. Days.

REPORTS: Maintenance Engineer Mills Section.

BASIC FUNCTIONS: To Supervise a multi-discipline team of tradesmen responsible for the day to day maintenance both planned and breakdown, for the pre-milling and the mills sections of plant.

JOB DESCRIPTION

JOB TITLE: Maintenance Supervisor. Powerhouse & Turbines.Days.

REPORTS TO: Maintenance Engineer Mills Section.

BASIC FUNCTIONS: To supervise a team of skilled tradesmen responsible for the running, planned and breakdown maintenance of the steam turbines, diesel engines and compressors in the mills section.

JOB DESCRIPTION

JOB TITLE: Mill Operations Supervisor. Shifts.

REPORTS: Shift Engineering Superintendant.

BASIC FUNCTION: To supervise the cane handling, preparation and milling operations. Also the routine running maintenance and cleaning of the plant during the eight hour shift.

JOB DESCRIPTION

JOB TITLE: Grade 1 Fitter.

REPORTS TO: Section Supervisor (Mills)

BASIC FUNCTION To carry out bench fitting repair work, including manufacturing of components to within given tolerances and times as directed by the Workshop Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Fitter Grade 2.

REPORT TO: Section Supervisor (Mills)

BASIC FUNCTIONS: To carry out fitting repair work including manufacture of components on factory plant as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Welder Grade 3.

REPORT TO: Section Supervisor (MIlls)

BASIC FUNCTION: To carry out welding and fabrication repair work including manufacture of components on factory plant as directed by the section chargehand.

JOB DESCRIPTION

JOB TITLE: Mill Console Operator. Shifts.

REPORTS TO: Mill operations Supervisor. Shifts.

BASIC FUNCTION: To keep the No.1 mill correctly fed by regulation of the speed of the cane carriers and to ensure that the intercarriage and mill bed pumps are operated to suit mill operations at all times.

JOB DESCRIPTIONS

JOB TITLE: Feed Table Operator

REPORTS TO: Mill Operations Supervisor.

BASIC FUNCTION: The operation of the cane unloading equipment and feedtable.

JOB DESCRIPTION

JOB TITLE: Mill Platforms Attendant.Shifts.

REPORTS TO: Mill operations Supervisor. Shifts.

BASIC FUNCTION: To monitor the cane flow through the mills and control the intercarriers, mill speed and imbibition supplies accordingly.

JOB DESCRIPTION

JOB TITLE: Mill Bed Attendant (Shift)

REPORTS TO: Mill Operations Supervisor.

BASIC FUNCTION: To ensure a smooth flow of inbibition juices through the maceration system.

JOB DESCRIPTION

JOB TITLE:	Maintenance Engineer (Boilers)
REPORTS TO:	Engineering Manager.
BASIC FUNCTION:	Plan and control the maintenance of all Water Treatment and Boiler Operations to ensure that these are carried out efficiently and that production targets are met.

JOB DESCRIPTION

JOB TITLE:	Day Engineering Superintendant (Boilers)
REPORTS TO:	Section Maintenance Engineer (Boiler)
BASIC FUNCTION:	Under the direction of the Section Maintenance Engineer, to ensure the implementation of the planned maintenance schedules and prepartion of the necessary replacement spare parts for the section.

JOB DESCRIPTION

JOB TITLE:	Boiler Mason. Days.
REPORTS TO:	Boiler Maintenance Chargehand. Days.
BASIC FUNCTION:	Maintenance and repair of boiler refractory work, boiler lagging and insulation, pipework lagging and all ancillary plant foundations.

JOB DESCRIPTION

JOB TITLE: Grade 1 Fitter.

REPORTS TO: Section Chargehand.(Boilers)

BASIC FUNCTION: To carry out bench fitting repair work, including manufacturing of components to within given tolerances and times as directed by the Workshop Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Grade 1 Welder.

REPORTS TO: Section Chargehand (Boilers)

BASIC FUNCTION: To carry out welding and Fabrication repair work on factory plant including manufacturing of components to within given tolerances and times as directed by the Workshop Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Welder Grade 2.

REPORTS TO: Section Chargehand (Boilers)

BASIC FUNCTION: To carry out welding and Fabrication repair work including manufacture of components on factory plant as directed by the section Chargehand.

JOB DESCRIPTION

JOB TITLE: Fitter Grade 2.

REPORTS TO: Section Chargehand (Boilers)

BASIC FUNCTION: To carry out fitting repair work including manufacture of components on factory plant as directed by the section Chargehand.

JOB DESCRIPTION

JOB DESCRIPTION:	Fitter Grade 3.
REPORTS TO:	Shift Section Chargehand.(Boilers)
BASIC FUNCTION:	To assist skilled tradesmen in carrying out fitting repair work and manufacture of components as directed by the section Chargehand.

JOB DESCRIPTION

JOB TITLE:	Begasse System Attendant. - Shifts.
REPORTS TO:	Bagasse store Headman directly. Boiler Supervisor indirectly.
BASIC FUNCTION:	To continuouly inspect the bagasse system checking on the condition of the plant and the supply of bagasse to the boilers.

JOB DESCRIPTION

JOB TITLE:	Pumps and Compressors Attendant - Shifts.
REPORTS TO:	Boiler Chargehand directly. Boiler Supervisor indirectly.
BASIC FUNCTION:	Responsiblity for the condition of the pumps and compressors for the shift duration.

JOB DESCRIPTION

JOB TITLE:	Chemical Dosing Attendant.- Shifts.
REPORTS TO:	Boiler Chargehand directly. Boiler Supervisor indirectly.
BASIC FUNCTION:	To continually monitor the quality of the boiler feed water and the water in each boiler so as to maintain the required quality.

JOB DESCRIPTION

JOB TITLE: Bagasse Store Headman.- Shifts.

REPORTS TO: Boiler Supervisor.

BASIC FUNCTION: To orginize the daily paid employees on shift into groups for ash removal and bagasse backfeeding.

JOB DESCRIPTION

JOB TITLE: Boiler Attendant.- Shifts.

REPORTS TO: Boiler Operator directly
Boiler Chargehand indirectly.

BASIC FUNCTION: To assist the boiler operator in the safe and efficient operation of the boiler.
To maintain the boiler and its surrounds in a Clean state.

JOB DESCRIPTION

JOB TITLE: Boiler Operator.- Shifts.

REPORTS TO: Boiler Preparations Chargehand directly.
Boiler Operations Supervisor indirectly.

BASIC FUNCTION: To operate without direct supervision a Bagasse Fired steam Boiler safely and efficiently, performing maintenance tasks on the boiler when required.

JOB DESCRIPTION

JOB TITLE: Boiler Operations Chargehand - Shifts.

REPORTS TO: Boiler Operations Supervisor.

BASIC FUNCTION: To work under the direction of, and assist the Boiler Operations Supervisor in the safe,efficient and ecomomic operation of the steam generation plant.

JOB DESCRIPTION

JOB TITLE:	Maintenance Engineer (Process).
REPORTS TO:	Engineering Manager.
BASIC FUNCTION:	Plan ans control the maintenance of all process operations in the factory to ensure that the plant operates efficiently and that production targets are met.

JOB DESCRIPTION:

JOB TITLE:	Day Engineering Superintendant (Process)
REPORTS TO:	Section Maintenance Engineer (Process)
BASIC FUNCTION:	Under the direction of the Section Maintenance Engineer, to ensure the implentation of the planned maintenance schedules and prepartion of the necessary replacement spare parts for the section.

JOB DESCRIPTION

JOB TITLE:	Maintenance Supervisor Sugar House Days.
REPORTS TO:	Maintenance Engineer Process
BASIC FUNCTION:	To supervise a multi-discipline team of tradesmen responsible for the day to day maintenance both planned and breakdown, for the Crystallisation Section of the Factory.

JOB DESCRIPTION

JOB TITLE:	Maintenance Supervisor Boiler Section Day
REPORTS TO:	Maintenance Engineer Boilers.
BASIC FUNCTION:	To lead a team of skilled trademen with the responsibility of carrying out the maintenance. Planned and preventive, in the Boiler section of the Factory.

JOB DESCRIPTION

JOB TITLE:	Juice Treatment Maintenance Chargehand.
REPORTS TO:	Shift Maintenance Engineer
BASIC FUNCTION:	To ensure, by practical involvement, that all repair and maintenance jobs in the section are carried out correctly, safely and efficiently.

JOB DESCRIPTION

JOB TITLE:	Sugar House Maintenance Chargehand.
REPORTS TO:	Shift Maintenance Engineer
BAIS FUNCTION:	To ensure, by practical involvemant that all repair and maintenance jobs in the section are carried out correctly, safely and efficiently.

JOB DESCRIPTION

JOB TITLE:	Grade 1 Fitter
REPORTS TO:	Section Supervisor (Process maintenance)
BASIC FUNCTION:	To carry out bench fitting repair work, including manufacturing of components to within given tolerances and times as directed by the section Supervisor.

JOB DESCRIPTION

JOB TITLE:	Grade 1 Welder.
REPORTS TO:	Section Supervisor (Process maintenance)
BASIC FUNCTION:	To carry out Welding and Fabrication repair work on factory plant including manufacturing of components to within given tolerances and times as directed by the section Supervisor.

JOB DESCRIPTION

JOB TITLE:	Fitter Grade 2.
REPORTS TO:	Section Supervisor/Shift Chargehand (Process Maintenance)
BASIC FUNCTION:	To carry out fitting repair work including manufacture of comonents on factory plant as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE:	Welder Grade 3.
REPORTS TO:	Section Chargehand (Process Maintenance)
BASIC FUNCTION:	To carry out welding and fabrication repair work including manufacture of components on factory plant as directed by the Section Supervisor.

JOB DESCRIPTION

JOB TITLE:	Greaser. Shifts GRD3
REPORTS TO:	Operations Supervisor Shifts.
BASIC FUNCTION:	Inspection and Iubrication of all items of mechanical plant during the eight hour shift.

JOB DESCRIPTION

JOB TITLE:	Electrical and Instruments Engineer.
REPORTS TO:	Engineering Manager.
BASIC FUNCTION:	To plan, implement and control the operations of electrical and instrumentation; such operations to be performed within an agreed budget and consistent with legal and Company safety requirements.

JOB DESCRIPTION

JOB TITLE:	Electrical Supervisor (Days)
REPORTS TO:	Electrical and Instruments Engineer
BASIC FUNCTION:	To work as directed by the Electrical and Instruments Engineer in carrying out and orginising tasks in installation and repair maintenance of electrical equipment installed in factory equipment.

JOB DESCRIPTION

JOB TITLE:	Electrical Supervisor (Shift)
REPORTS TO:	Electrical and Instruments Engineer
BASIC FUNCTION:	To work as directed by the Electrical and Instruments Engineer in carrying out and orginising tasks in installation and repair maintenance of electrical equipment installed in factory equipment.

JOB DESCRIPTION

JOB TITLE: Electrical Supervisor (Estate)

REPORTS TO: Electrical and Instruments Engineer

BASIC FUNCTION: To work as directed by the Electrical and Instruments Engineer in carrying out and orginising tasks in installation and repair maintenance of electrical of electrical equipment installed in the housing area and the estate.

JOB DESCRIPTION

JOB TITLE: Switchboard Attendant

REPORTS TO: Electrical Supervisor (Electrical Section)

BASIC FUNCTION: Work as directed by the Shift Supervisor to maintain power supplies to the factory residential areas as required while observing standard operating procedures.

JOB DESCRIPTION

JOB TITLE: Electrician Grade 1

REPORTS TO: Electrical Supervisor.

BASIC FUNCTION: To carry out fault finding and repair maintenance work as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Electrician Grade 2.

REPORTS TO: Electrical Supervisor.

BASIC FUNCTION: To carry out fault finding and repair maintenance work as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Electrician Grade 3

REPORTS TO: Electrical Supervisor.

BASIC FUNCTION: To assist in carrying out fault finding and repair maintenance work under supervision as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Refgrigeration Fitter Grade 1

REPORTS TO: Electrical Supervisor. (Electrical Section).

BASIC FUNCTION: To work as directed by the Day Supervisor in carrying out the repair and maintenance of the air conditioning and refrigeration equipment.

JOB DESCRIPTION

JOB TITLE: Refrigeration Fitter Grade 2.

REPORTS TO: Electrical Supervisor.(Electrical Section).

BASIC FUNCTION: To work as directed by the Electrical Supervisor in carrying out basic repairs and maintenance of the air conditioning and refrigeration equipment.

JOB DESCRIPTION

JOB TITLE:	Refrigeration Fitter Grade 3.
REPORTS TO:	Electrical Supervisor. (Electrical Section).
BASIC FUNCTION:	To work as directed by the Electrical Supervisor in assiting grade 1 fitters in carrying out basic repairs and maintenance of the air conditioning and refrigeration equipment.

JOB DESCRIPTION

JOB TITLE:	Rewind Workshop Supervisor
REPORTS TO:	Electrical Engineer (Electrical Section)
BASIC FUNCTION:	To allocate, orginise and check the work of the rewind workshop to ensure motors are rewound to the best possible standard and within the prescribed time scale as directed by the Electrical Engineer.

JOB DESCRIPTION

JOB TITLE:	Motor Rewind Grade 1.
REPORTS TO:	Rewind Workshop Supervisor.
BASIC FUNCTION:	To work as directed by the Section Supervisor in carrying out theory and practical work necessary to rewind all forms of electrical motor coils etc.

JOB DESCRIPTION

JOB TITLE: Motor Rewinder Grade 2.

REPORTS TO: Motor Rewind Supervisor (Elect Section)

BASIC FUNCTION: To work as directed by the Section Supervisor to carry out and motor repair and rewinding duties.

JOB DESCRIPTION

JOB TITLE: Motor Rewinder Grade 3

REPORTS TO: Motor Rewind Supervisor.(Elect Section)

BASIC FUNCTION: To work as directed by the Section Supervisor in assisting grade 1 rewinders in carrying out and motor repairs and rewinding duties.

JOB DESCRIPTION

JOB TITLE: Chargehand (Welding & Fabrication)

REPORTS TO: Supervisor (Factory Workshop)

BASIC FUNCTION: To allocate, orginise and carry out welding, fabrication and maintenance repair work as directed by the Supervisor.

JOB DESCRIPTION

JOB TITLE: Sheetmetal Worker 3.

REPORTS TO: Section Chargehand.(Factory Workshop)

BASIC FUNCTION: To assist skilled tradesmen in carrying out sheetmetal development repair work as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Sheetmetal Worker Grade2.

REPORTS TO: Section Chargehand (Factory Workshop)

BASIC FUNCTION: To carry out Sheetmetal development work and maintenance repair work on factory plant as directed by the section Chargehand.

JOB DESCRIPTION

JOB TITLE: Grade 1 sheet Metal Worker

REPORTS TO: Section Chargehand.(Factory Workshop)

BASIC FUNCTION: To carry out sheet metal, development work and repair/maintenance work to within given tolerances as and when directed by the Workshop Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Carpenter Grade 2

REPORTS TO: Workshop Engineer.(Factory Workshop)

BASIC FUNCTION: To assist the senior carpenter manufacture and effect repairs on factory plant and buildings items requiring carpentry work including the manufacture of wooden patterns for the foundry as and when directed by the Workshop Engineer or workshop Supervisor.

JOB DESCRIPTION

JOB TITLE: Carpenter Grade 1

REPORTS TO: Workshop Engineer.(Factory Workshop)

BASIC FUNCTION: To manufacture and effect repairs on factory plant and buildings items requiring carpentry work including the manufacture of wooden patterns for the foundry as and when directed by the Workshop Engineer or Workshop Supervisor.

JOB DESCRIPTION

JOB TITLE: Foundryman Grade 1

REPORTS TO: Supervisor.(Factory Workshop)

BASIC FUNCTION: To manufacture sand moulds and operate the foundry furnace for the production of non ferrous castings to replace worn items of factory plant as directed by the workshop Supervisor and Workshop and Workshop Engineer.

JOB DESCRIPTION

JOB TITLE: Foundryman grade 2

REPORTS TO: Supervisor.(Factory Workshop)

BASIC FUNCTION: To assist in the manufacture of sand moulds and to operate the foundry furnace for the production of non ferrous castings to replace worn items of factory plant as directed by the workshop Supervisor and Workshop Engineer.

JOB DESCRIPTION

JOB TITLE: Grade 1 machinist.

REPORTS TO: Section Chargehand.(Factory Workshop)

BASIC FUNCTION: To carry out machining operations and processes on repair work, including manufacturing of components to within given tolerances as directed by the Workshop Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Chargehand (Machinist)

REPORTS TO: Supervisor (Factory Workshop)

BASIC FUNCTION: To carry out maintenance and repair work using machine shop equipment and assist in allocating and progressing work as directed by the Workshop Supervisor.

JOB DESCRIPTION

JOB TITLE: Machinist Grade 2.

REPORTS TO: Section Chargehand (Factory.Workshop)

BASIC FUNCTION: To carry out machining operations on repair work including manufa. ture of components for factory plant as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Machinist Grade 3.

REPORTS TO: Section Chargehand.(Factory Workshop)

BASIC FUNCTION: To assist skilled tradesmen in carrying out Machine Shop operations on repair work and menufacture of components for factory plant as directed by the section Chargehand.

JOB DESCRIPTION

JOB TITLE: Fitter Grade 3.

REPORTS TO: Section Chargehand.(Factory Workshop)

BASIC FUNCTION: To assist skilled tradesmen in carrying out fitting repair work and manufacture of components as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Grade 1 Fitter.

REPORTS TO: Section Chargehand.(Factory Workshop)

BASIC FUNCTION: To carry out bench fitting repair work, including manufacturing of components to within given tolerances and times as directed by the Workshop Section Charghand.

JOB DESCRIPTION

JOB TITLE: Fitter Grade 2.

REPORTS TO: Section Chargehand (Factory Workshop)

BASIC FUNCTION: To carry out fitting repair work including manufacture of components on factory plant as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Chargehand (Fitting Section)

REPORTS TO: Supervisor (Factory Workshop)

BASIC FUNCTION: To carry out fitting maintenance repair work in the Factory Workshop and assist the Workshop Supervisor in allocating and progressing work as directed by the Workshop Supervisor.

JOB DESCRIPTION

JOB TITLE: Welder Grade 3.

REPORTS TO: Section Chargehand (Factory Workshop)

BASIC FUNCTION: To assist skilled tradesmen in carrying out Welding and Fabrication operations on repair work and manufacturing of components for factory plant as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Welder Grade 2.

REPORTS TO: Section Chargehand (Factory Workshop)

BASIC FUNCTION: To carry out welding and fabrication repair work including manufacture of components on factory plant as directed by the Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Grade 1 Welder.

REPORTS TO: Section Chargehand (Factory Workshop)

BASIC FUNCTION: To carry out Welding and Fabrication repair work on factory plant including manufacturing of components to within given tolerances and times as directed by the Workshop Section Chargehand.

JOB DESCRIPTION

JOB TITLE: Supervisor

REPORTS TO: Workshop Engineer.(Factory Workshop)

BASIC FUNCTION: To allocate and progress maintenance and repair work in all sections of the Factory Workshop in accordance to the requirements of the Workshop Engineer within prescribed timescales, methods and acceptable quality.

JOB DESCRIPTION

JOB TITLE: Workshop Engineer

REPORTS TO: Engineering Manager

BASIC FUNCTION: To plan and control the services of the Factory Workshop consistent with the requirements of maintenance and repair functions and at a cost within prescribed budget and to ensure maximum recovery from discarded or damaged plant.

JOB DESCRIPTION

JOB TITLE: Civil Engineer (Buildings)

REPORTS TO: Factory Manager

BASIC FUNCTION: Provision of building maintenance of estate houses, factory and office buildings and civil works, water riticulation systems.

JOB DESCRIPTION

JOB TITLE: Civils Engineering Draughtsman

REPORTS TO: Civil Engineer.

BASIC FUNCTION: To prepare engineering drawings as directed by the Civil Engineer and ensure that all Factory civil engineering drawings, technical brochures and technical publications are stored and filed in a filling system and are kept in good condition.

JOB DESCRIPTION

JOB TITLE: Supervisor Plumbing/Painting

REPORTS TO: Civil Engineer

BASIC FUNCTION: To supervise the plumbing and painting section ensuring that water reticulation systems are kept in good repair including new installation where necessary and that refurbishing of existing or new structures is decorated to high standards.

JOB DESCRIPTION

JOB TITLE: Chargehand Painter

REPORTS TO: Supervisor Plumbing/Painting

BASIC FUNCTION: To supervise the refurbishment to the fabric of housing and estate buildings including internal and external decorations.

JOB DESCRIPTION

JOB TITLE: Painter Grade 5

REPORTS TO: Chargehand Painter

BASIC FUNCTION: To carry out refurbishment of walls, woodwork and other structurers as required on estate buildings both internal and external.

JOB DESCRIPTION

JOB TITLE: Chargehand Plumbing

REPORTS TO: Supervisor Plumbing/Painting

BASIC FUNCTION: To supervise in the repair and construction of water reticulating systems, domestic drainage in buildings on the estate.

JOB DESCRIPTION

JOB TITLE: Plumber Grade 1

REPORTS TO: Chargehand Plumbing

BASIC FUNCTION: To repair and construct water reticulating systems and domestic drainage in buildings on the estate.

JOB DESCRIPTION

JOB TITLE: Plumber Grade 2

REPORTS TO: Chargehand Plumbing

BASIC FUNCTION: To repair and construct water reticulating systems and domestic drainage in buildings on the estate.

JOB DESCRIPTION

JOB TITLE: Plumber Grade 3

REPORTS TO: Chargehand Plumbing

BASIC FUNCTION: To assist in repair and installing water reticulating systems and domestic drainage in buildings on the estate.

JOB DESCRIPTION

JOB TITLE: Chargehand Carpentry

REPORTS TO: Supervisor Carpentry Building

BASIC FUNCTION: To allocate, organise and carry out carpentry and maintenance repair work in the building section as directed by the Supervisor.

JOB DESCRIPTION

JOB TITLE: Carpenter Grade 1 (Civils)

REPORTS TO: Chargehand Carpentry Civils

BASIC FUNCTION: To manufacture and effect repairs on jornery to buildings and items requiring carpentry work in the civil engineering section.

JOB DESCRIPTION

JOB TITLE: Carpenter Grade 2 (Civils)

REPORTS TO: Chargehand Carpentry Civils

BASIC FUNCTION: To assist in the manufacture and repairs on joinery work to buildings and items requiring carpentry work in the civil engineering section.

JOB DESCRIPTION

JOB TITLE: Carpenter Grade 3 (Civils)

REPORTS TO: Chargehand Carpentry Civils

BASIC FUNCTION: To assist under the direct supervision of a Grade 1 craftsman in the manufacture and repairs on joinery work to buildings and items requiring carpentry work in the civil engineering section.

JOB DESCRIPTION

JOB TITLE: Supervisor Building/Carpentry

REPORTS TO: Civil Engineer

BASIC FUNCTION: To supervise and assist in the construction and manufacture of foundations, structures and blockwork, including all the carpentry content of new building and repair work on the estate housing, factory and offices.

JOB DESCRIPTION

JOB TITLE: Chargehand Building

REPORTS TO: Supervisor Building/Carpentry

BASIC FUNCTION: To supervise and assist in the constructing and manufacture of foundations, structures and blockwork.Erect walls and where necessary use reinforced wire, shutters and moulds.

JOB DESCRIPTION

JOB TITLE: Mason Grade 1

REPORTS TO: Chargehand Building

BASIC FUNCTION: Construct and manufacture foundations, structures and blockwork,erect walls using reinforced wire, shutters and moulds.

JOB DESCRIPTION

JOB TITLE: Mason Grade 2

REPORTS TO: Chargehand Building

BASIC FUNCTION: Construct and manufacture foundations, structures and blockwork, erect walls using reinforced wire, shutters and moulds.

JOB DESCRIPTION

JOB TITLE: Mason Grade 3

REPORTS TO: Chargehand Building

BASIC FUNCTION: Assist a Grade 1 tradesman to construct and manufacture foundations, structures and blockwork, erect walls using reinforced wire, shutters and moulds.