HEAVYSHOP DEPARTMENT

| MODULE | TRAINING OBJECTIVES |
|---|---|
| H 1<br>Welding | MANUAL - ARC WELDING<br>1. Identify, set up, operate and maintain arc welding equipment.<br>2. Weld ferrous metals in all positions to specifications.<br>3. Arc cut ferrous and non-ferrous metals.<br><br>GAS WELDING AND CUTTING<br>1. Make fusion, flame braze, braze weld and stelliting ferrous and non-ferrous metals in all positions by oxy-acetylene and other oxy-fuel gas process according to specification.<br>2. Flame cut ferrous metals by using oxy-acetylene and other oxy-fuel gases with and without using guides.<br>3. General safety in relation to welding and cutting.<br><br>METALLIC - INERT GAS WELDING<br>1. Assemble, operate, care and maintain equipment.<br>2. Select correct type of wires, gases to weld ferrous and non-ferrous metals to specifications.<br>3. Select correct types of wires for hardsurfacing.<br><br>TUNGSTEN INERT GAS WELDING<br>1. Assemble, operate, care and maintain equipment.<br>2. Select and use the correct type of tungsten electrodes, filler wire and gases to weld ferrous and non-ferrous metals in all positions to specifications.<br><br>SUBMERGED ARC WELDING<br>1. Assemble, operate and maintain machine.<br>2. Select and use correct types of wires, granular flux to weld metals to specifications.<br>3. Set correct welding speed, welding current and voltage.<br>4. Hardsurface metals on flat and cylindrical surfaces.<br><br>PLASMA - ARC WELDING<br>1. Assemble, operate and maintain machine.<br>2. Select and use the correct type of tungsten electrodes and gases.<br>3. Weld ferrous and non-ferrous metals in all position to specifications. |

| MODULE | TRAINING OBJECTIVES |
|---|---|
| | PLASMA - ARC CUTTING<br>1. Assemble, operate and maintain machine.<br>2. Set correct gas pressures and currents to cut ferrous and non-ferrous metals in all positions.<br>3. Safety when cutting.<br><br>AUTOMATIC OXY-ACETYLENE CUTTING<br>1. Assemble, operate and maintain machine.<br>2. Set correct cutting speeds, gas pressures and size of nozzle to cut various thicknesses of metals to finished size.<br>3. General safety in cutting.<br><br>METAL SPRAYING<br>1. Assemble, operate and maintain equipment.<br>2. Set gas pressure and speed of feed.<br>3. Preparing surface of metals by grit blasting and machining.<br>4. Metal spray worn out articles and filling blow-holes of castings.<br>5. Safety in metal grit blasting and spraying.<br><br>SPOT AND SEAM RESISTANCE WELDING<br>1. Assemble, operate and maintain machine.<br>2. Set correct welding current, voltage and timer and electrodes to join ferrous and non-ferrous metals.<br><br>NON-DESTRUCTIVE TEST<br>1. Assemble, operate and maintain machine.<br>2. Set up articles to be tested to specification.<br>3. Diagnose weld faults.<br>4. Safety when handling equipment (Equipment and personal).<br><br>DESTRUCTIVE TEST<br>1. Assemble, operate and maintain machine.<br>2. Set up weld specimens to be tested.<br>3. Diagnose weld faults.<br>4. Safety when handling equipment (Equipment and personal). |

| MODULE | TRAINING OBJECTIVES |
|---|---|
| H2<br>Forging | 1. Set up gas fired or electrical operated furnace, for heating various types of ferrous metals to the required temperature.<br>2. Set, operate, maintain forging operation.<br>3. Forge steel to the required shape and specification.<br>4. Measure, test and rectify finished steel to their specification. |
| H3<br>Foundry | 1. Identify, select, and prepare mould & core by using moulding machine, template and pit moulding.<br>2. Plan and construct different types of gating system risers and the usage of foundry tool.<br>3. Set, operate, maintence different types of furnaces.<br>4. Melt, pour, charge and control different types of molten metal into various types of mould.<br>5. Clean and finish to specification. |
| H4<br>Heat Treatment | 1. Set, operate maintained gas fired or electrical operated furnace to various temperature for heating various types of ferrous metals.<br>2. Carry-out various heat-treatment process for<br>a) Annealing<br>b) Bright annealing<br>c) Carburising<br>d) Case-Hardening<br>e) Through Hardening<br>f) Nitriding<br>g) Normalizing<br>h) Precipitation Hardening<br>i) Solution Heat Treatment<br>j) Spheroidizing<br>k) Stress Relieving<br>l) Tempering<br>m) Spline tempering<br>n) Local induction hardening<br>o) Case hardening of long bars and rods.<br>3. Test, measure finished product according to appropriate process.<br>4. Analyse and rectify faults where appropriate. |
| H5<br>Die Casting | 1. Set, operate and maintain die casting (aluminium, zinc type) machine and accessories.<br>2. Set, operate and maintain die casting furnaces.<br>3. Identify and measure die casting products to specified quality.<br>4. Plan, and trim, die casting product. |

| MODULE | TRAINING OBJECTIVES |
|---|---|
| H6<br>Investment Casting | 1. Identify, select and prepare dies for produce the wax pattern.<br>2. Set, operate, maintance different types of investment casting process machine.<br>3. Identify, select and melt ferrous and non-ferrous metal for investment casting to specification.<br>4. Plan, remove, melt and pour metal into the mould.<br>5. Clean, finish and inspect to specification. |
| H7<br>Rubber Moulding Technique | 1. Set up, operate, maintance the rubber moulding machine (Injection type) and accessories.<br>2. Identify, rectify and control rubber moulding process for temperature, flow and discharge.<br>3. Select type of rubber samples to specification.<br>4. Measure, test and inspect rubber products.<br>5. Apply trimming process. |
| H8<br>Plastic Moulding Technique | 1. Set up, operate, maintance the plastic moulding machine (Injection type) and accessories.<br>2. Identify, rectify and control plasting moulding process for temperature, flow and discharge.<br>3. Select type of plastic granular to specification.<br>4. Measure and inspect plastic product.<br>5. Apply trimming process. |

ELECTRICAL AND ELECTRONIC DEPARTMENT

| MODULE | TRAINING OBJECTIVES |
|---|---|
| EE1<br>Relay Engineering | 1. Supply various range of voltage both AC + DC, single phase and 3 phase by using Power Distribution Panel.<br>2. Operate various control system on Power Distribution Panel.<br>3. Control and stabilize Voltage for testing purposes.<br>4. Measure electrical voltage, current Power, frequency and Power factor.<br>5. Determine impedance.<br>6. Test remote control system.<br>7. Operate and repair and usage of various types of electronic equipments. |
| EE2<br>Relay control maintenance and repair. | 1. Check, clean, identify and determine the main component service and repair of Power Distribution power.<br>2. Identify and Determine the components and service 3 phase and single phase ohmic load.<br>3. Connect and determine the phase reference of the mains supply.<br>4. Operate and locate the cable faults. |
| EE3<br>Advanced Elmotor Service & Repair | 1. Identify the various types of A.C and D.C Voltage to suitable equipment.<br>2. Service, repair and maintain the equipment, control system set and accessories.<br>3. Trace fault, carry out remediel, action on elmotor control equipment and accessory by using various kind of detector.<br>4. Trace dynamic, static imbalance, stator, rotor and any dynamic accessories. |

| MODULE | TRAINING OBJECTIVES |
|---|---|
| EE4<br>Motor Trouble Analysis | 1. Identify, analyze, measure the variable speed of the motor-generator set.<br>2. Test and measure the losses and no-load and short-circuit test.<br>3. Identify and determine, the regulation and working principle of automatic ward-leornard system.<br>4. Identify, determine and connect thyristor control for speed and over load protection.<br>5. Connect, measure and determine the speed of A.C single phase and three phase motor by means of triac control.<br>6. Operate, test and determine the armature and stator by means of Growler set.<br>7. Operate and study the balancing armature and rotor.<br>8. Operate, measure and test on transformer and various type of motor.<br>9. Operate, service, repair and test motor-generator set. |
| EE5<br>Motor Testing | 1. Determine dismantle and re-assemble various parts of A.C and D.C machine.<br>2. Analized, operate and maintain the testing equipment control system and accessories related.<br>3. Test motor windings.<br>i) Continuty Test<br>ii) Insulation Test<br>iii) Polarity Test<br>4. Operate, and balanced the armature rotors and dynamic accessories.<br>5. Connect and Operate the motor control system. |
| EE6<br>Advanced Radio Service and Repair. | 1. Identify, assemble and connect AM/FM and communication radio systems.<br>2. Measure and test radio receiver and transmitter.<br>3. Analyze, align, service and repair radio AM/FM and communication system.<br>4. Operate and use radio test and measuring equipments. |

| MODULE | TRAINING OBJECTIVES |
|---|---|
| EE7<br>Inter-Office, Communication Service and Repair. | 1. Identify and operate main types of office communication equipments.<br>2. Analyse, maintain, service and repair office communication equipments.<br>3. Set-up, install and maintain CCTV and sound systems.<br>4. Service and repair CCTV and sound systems.<br>5. Operate and use electronic test and measuring equipments. |
| EE8<br>Advanced Television Service and Repair. | 1. Identify, assemble and connect modern television systems.<br>2. Measure and test television and related communication systems.<br>3. Analyze, align, service and repair television.<br>4. Operate and use television test and measuring equipments. |
| EE9<br>Electrical/Electronic Office Equipment Service and Repair. | 1. Identify, Operate and maintain office electrical/electronic equipments.<br>2. Analyze, measure, test, service and repair office equipments.<br>3. Maintain, service and repair high speed printers and electronic typewriters.<br>4. Operate and use test and measuring equipments. |

## INSTRUMENTATION AND AUTOMATIC CONTROL DEPARTMENT

| MODULE | TRAINING OBJECTIVES |
|---|---|
| Module I1<br>Process Measurements | 1. Assemble and Dissable various measuring instruments.<br>2. Measure temperature, pressure, level, flow, Displacement, weight and humidity by using appropriate measuring instruments.<br>3. Repair, maintain and calibrate instrument to specification.<br>4. Install and test performance of instruments. |
| Module I2<br>Industrial Instruments. | 1. Assemble and dissable various preumatic instruments.<br>2. Test detecting element transmitters, recorders, controllers, valves, and air supply pneumatic instruments.<br>3. Repair, maintain and calibrate pneumatic instruments to specification.<br>4. Install and test performance of pneumatic instruments.<br>5. Install, operate, test adjust electronic relay switch and solid state device. |
| Module I3<br>Electrical (Hydraulic) Control | 1. Assemble and dismantle fault-find relay, solenoid valve, motor valves and SRC control.<br>2. Assemble and dismantle Hydraulic Control.<br>3. Repair, maintain and calibrate hydraulic control.<br>4. Test hydraulic control. |

FABRICATION DEPARTMENT

| MODULE | TRAINING OBJECTIVES |
|---|---|
| F1<br>Metal Fabrication | 1. Assemble, operate and maintain bending, forming, hollowing, stiffenning machine.<br>2. Select blade, wheel size to bend, form, hollow and stiffen jobs to specifications.<br>3. Assemble, operate and maintain shearing machine.<br>4. Adjust front and back gauge to cut metals to specification.<br>5. Assemble, operate and maintain appropriate welding machine.<br>6. Analyse and test fabricated metal.<br>7. Carry out safety precautions when operating machines and materials. |
| F2<br>Structural Metal Preparer and Erector | 1. Assemble, operate and maintain drilling machines.<br>2. Select correct size of drill, drill speeds, lubricants to drill non-ferrous and ferrous metals.<br>3. Assemble, operate and maintain bending and straightening machines.<br>4. Bend bars, flats and pipes of ferrous and non-ferrous metals to specification.<br>5. Straighten distorted heavy sections of metals.<br>6. Assemble, operate and maintain cutting machines.<br>7. Set up and cut solid bars to specifications.<br>8. Assemble operate and maintain appropriate welding machines.<br>9. Analyse and test fabricated metal.<br>10. Carry out safety precaution when handling machines and materials. |
| F3<br>Presswork | 1. Assemble, operate and maintain power press, rolling, cutting and drilling machines.<br>2. Select and use correct size of blades and rollers.<br>3. Cut, bend, roll and form on ferrous and non-ferrous metals.<br>4. Stamping, punching, blaking and drawing ferrous and non-ferrous metals.<br>5. Cold straightening of heavy sections of metals by hydraulic system.<br>6. Drill thick sections ferrous and non-ferrous metals. |

## TESTING AND INSPECTION UNIT

| TYPES OF TESTING & INSP. | NAME OF EQUIPS. | TRAINING OBJECTIVE |
|---|---|---|
| 1. Flatness Test | Universal Monochromatic Light Unit | 1. Determine the flatness of surface by using monochromatic light unit. Such as onto finished lappling process or gauges. |
| 2. Surface Test | Surf test | 1. Determine finishing surface according to specification given either by using lathe, milling, boring, lapping, etc. |
| 3. Diamension Test | 1. Floating Carriage Diameter Measuring Machine | 1. Measure onto round object having two centre point such as parallel bar, tapper, thread, effective diameter, core diameter. |
| | 2. Tool Makers Microscope | 2. Use and measure small object which is difficult to measure by other equipment, such as to measure thread, pitch, length, diameter and angles. |
| | 3. Mu - Checker | 3. Measure height, flatness, high and lower spot, roundness, etc. |
| 4. Gear Teeth Test | Gear Testing Machine | 1. Measure profile, essentricity gear and etc. |
| 5. Profile Test | Contour Profile Projector | 1. Take general measurement such as angle length, roundness, height, tapper and etc. |
| 6. Non Destructives Test | 1. Die Penetrant | 1. Check the surface flow. |
| | 2. Magnaflux | 2. Check the surface crack of ferrous metal. |
| | 3. Letroflux | 3. Check the surface flaw of ferrous and non-ferrous metal. |
| | 4. Ultrasonic | 4. Check the internal defects. |
| | 5. X-Ray | 5. Same as para '4'. |
| | 6. Gamma- Ray | 6. Same as para '4' and '5'. |
| 7. Mechanical Inspection Physical Test | 1. Universal Testing Machine | 1. Test the tenscle, compression, bending transverse strength, etc. |
| 8. Impact Test | Impact Tester M/C | Impact strength. |

| TYPES OF TESTING & INSP. | NAME OF EQUIPS. | TRAINING OBJECTIVE |
|---|---|---|
| 9. Hardness Test | Rockwell M/C | Test the hardness onto ferrous and non-ferrous metal. |
| 10. Metallurgical Inspection, Visual Structure Test and Micro-structure Test | Metallurgical Inspection Equip. | 1. Check the composition of metal in welded joint. |
| 11. Composition Test of Raw Material | Composition Test Machine | 1. Analise alloying element such as carbon, manganese, chromium, nickel, silver, silicon, phospuorus, sulphur and etc. |

5. Major Equipment Required for each department Provided by Malaysia (For discussion only)

## MAJOR EQUIPMENT REQUIRED FOR INSTRUMENT DEPARTMENT

II - Electrical/Electronic Instrument Engineering (major equipments)

| | Equipment | Capabilities |
|---|---|---|
| 1. | General electronics bench sets with built-in instrument | Required for experiment lesson and source of D.C. and A.C. variable regulated power supply. |
| 2. | Single pen and two pen x - y graph recorder sets | To monitor mechanical or physical parameter. |
| 3. | Process control simulator sets | To simulate a multi-stage process and 3-term controller operating on a condensed timescale to show dynamic control features of typical industrial processes. |
| 4. | Large steam power plant simulator sets | Intended to train the students to operate, maintain a large fueled power generating station. This simulator has a pictorial of the system major component and high-lighted by meters and indicators which also dynamically show the controlling element in a power system. |
| 5. | Air quality control system sets | Required for training device simulating an actual air quality control system. The system is pictorially present the operating meter monitoring parameter. |
| 6. | Graphic bench-top computer | To analyze graphic in process control. |

MAJOR EQUIPMENT REQUIRED
FOR
INSTRUMENT DEPARTMENT

I2 - Pneumatic Instrument Engineering

| Equipment | Capabilities |
|---|---|
| 1. Pneumatics Laboratory Trolley (complete)<br>- compressor unit<br>- cabinet for storage<br>- plugboard for assembling valves, cylinders and fluid passage<br>- pressure gauge | Demonstration practical practice and movable. |
| 2. Pneumatic Cutaways (complete) | Teaching aids. |

MAJOR EQUIPMENT REQUIRED
FOR
INSTRUMENT DEPARTMENT

## I3 - Hydraulic Instrument Equipment

| | Equipment | Capabilities |
|---|---|---|
| 1. | Power unit with built-in pressure control unit (complete) | Required for experiment lesson and source of oil pressure. |
| 2. | Valve tables with built-in control blocks | Required for experiment lesson in placing various valves according to circuit drawn. |
| 3. | (a) Directional Poppet hydraulic operated<br>(b) Directional Proportional Valves<br>(c) Directional Servo Valve | Intended to train trainees to operate and know the flow direction of pressure oil. |
| 4. | Hydraulic experimenter assembly boards 12 exercise complete | To train trainees to place and assemble various purpose valves, cylinder fluid passage, (double acting and single acting) according to their functions or position required. |
| 5. | Hydraulic operated control blocks (various uses) | For controlling spindle press drive, winch unit, capstan brake, control press cylinders, fuse protection models for open circuit to control a down stroke unit.<br>Plastic injection moulding machine to control all standard function etc. |
| 6. | (a) Overhead projector<br>(b) Transparencies<br>(c) Transparencies for polarizied light<br>(d) Rotating polarizing filter<br>(e) Universal holder for polarizing filter<br>(f) Transparent various types of valves | Teaching aids. |
| 7. | Fluid Hydrostatic System | - Determination of density and specific gravity.<br>- Verification of the principle of floatation.<br>- Verification of Archimedes law |

## I3 - Hydraulic Instrument Equipment

| Equipment | Capabilities |
| --- | --- |
| | - The function and use of a hydrometer.<br>- Demonstration of fluid upthrust (Pascal law).<br>- Study of Capillarity.<br>- Measurement of viscosity.<br>- Measurement of hydrostatic pressure on a plane surface.<br>- Determining the position of the centre of pressure.<br>- Measurement of fluid levels by vernier point guage.<br>- Stability and periodicity of a floating body. |

MAJOR EQUIPMENT REQUIRED
FOR
MACHINE OPERATION AND DIEMAKING DEPARTMENT

MD1 - Tool and Diemaking

| | Equipment | Capabilities |
|---|---|---|
| 1. | Automatic Copy Milling Machine complete with Programmable Trace Command Controller - Die Sinking Machine | 3 dimensional automatic copy, bed type vertical milling machine which performs copy milling of relatively large metal moulds, cams etc. It has a highly rigid machine body construction and incorporates a powerful spindle head and a highly sensitive tracer unit. |
| 2. | Electro Discharge Machine | Fine cutting, mould making, intricate shape cutting, finishing |
| 3. | Vertical Spindle Die Sinking (Tool Master) | Single spindle, variable speed. Used to machine shape in dies for pressing, forming, bending, forging moulds for plastic and rubber products.<br>x and y axis - electrical or manual control<br>2 axis - hydraulically control with 2D synchro trace machine. |

MAJOR EQUIPMENT REQUIRED
FOR
MACHINE OPERATION AND DIEMAKING DEPARTMENT

MD2 - Tool, Fixture and Jig Boring

| Equipment | Capabilities |
|---|---|
| 1. Universal Milling Machine. | All angle head, single spindle, table surface 1235 mm x 460 mm. Milling head cylindrical, with adjustable milling head (rotation 0° - 260°) work on x, y, z axis, the x and y axis is used with a procession optical read out with graduation on both axis.<br>1. press tool<br>2. jigs<br>3. dies and fixtures |
| 2. Vertical Spindle Milling | A single spindle, variable speed, with belt driver motor. Spindle head can be tilted along one axis x and y axis - electrically and manually controlled<br>z axis - spindle head - manual control.<br>For general milling, dividing head work and drilling.<br>1. small jobs |
| 3. Tool Makers Lathe | General turning, capable producing British and metric threads, RH tap and LH taps internal boring, taper turning. |
| 4. Form Relieving Lathe | General turning all type of threads, internal and external boring, taper turning.<br>Used for largest jobs of tooling. |

MAJOR EQUIPMENT REQUIRED
FOR
MACHINE OPERATION AND DIEMAKING DEPARTMENT

MD3 - Precision Grinding

| | Equipment | Capabilities |
|---|---|---|
| 1. | Centreless Grinder Machine | Four (4) working methods which can be applied on this grinder depending on the shape and length of the workpiece.<br>1. Plunge and cross compound grinding<br>2. End grinding<br>3. Plunge grinding<br>4. Cross grinding |
| 2. | Hydraulic Surface Grinder | Hydraulically operated for grinding large press tool and dies as well as having machine tool parts. Hydraulic operated longitudinal transverse, electro-mechanical cross transverse and auto-downfaced of wheel head. |
| 3. | Universal Hydraulic Cylindrical Grinder | Required for internal grinding job and satisfy the high precision requirements, provided with hydraulic control system. Characteristi c of their wide versalility is vertically adjustable grinding wheel head which allows the centre height to be adapted to the swing.<br>1. Cylindrical grinding<br>2. Face grinding<br>3. Internal grinding |
| 4. | Crankshaft Grinder | Grinding and fine finishing of journal of crankshafts. |
| 5. | Crankshaft Grinder | Grinding the crankshaft lobe to correct lift and fine finishing. |
| 6. | Control and Rocker for Reconditioning Machine | Resizing of engine connecting rod ends and reconditioning of rocker arms. Double ended machines. |
| 7. | Cylinder Head Re-Manufacturing Machine | Valve seat recessing for replacement seat rings.<br>Drilling, for installation of thin wall valve guides on cylinder heads with integral valve guides. |
| 8. | Hoing Machine | Cylindrical shape. |

| Equipment | Capabilities |
| --- | --- |
| 9. Hydraulic Cylindrical Grinding Machine | Universal, swing type machine with a die, cylindrical shaft and internal bore grinding. The double swivel back slide, produces precision ground finished on cylindrical and tapered tool and gauge component, also grind faces of internal borer. |

MAJOR EQUIPMENT REQUIRED
FOR -
MACHINE OPERATION AND DIEMAKING DEPARTMENT

MD4 - Specialized Machining

| Equipment | Capabilities |
|---|---|
| 1. NC Milling (vertical and horizontal) | Surface finish general milling work<br>profile cut<br>radius cut<br>Gives surface finish general turning work. |
| 2. NC Turning | |
| 3. Plug-Board Turning Machine | Automatic sequence-programme general tool attachment. |
| 4. Gear Hobbing Machine | Contains process on gear making. |
| 5. Gear Shaving | - do - |
| 6. Broaching | 1. Straight spline<br>2. Involute "<br>3. Single "<br>4. Square, rectangular slot |
| 7. Centre Lathe | |

MAJOR EQUIPMENT REQUIRED
FOR
AUTOMATIVE DEPARTMENT

A1 - Specialised Petrol/Diesel Engine Service

| | Equipment | Capabilities |
|---|---|---|
| 1. | Alternator Tester Machine | Testing for fuel load, rotor, current, rectifier operation and voltage regulation. |
| 2. | Tappet Refacing Machine | To enable the face of cam followers, tappets and valve lifters, to be ground with either a flat surface or to be selected radius. |
| 3. | Decarbonising Brushes Universal Set | For cleaning surfaces. |
| 4. | Injector Impact Extractor | Getting a stubborn injector out of an engine. |
| 5. | Auto Electrical Puller Press | Removal and replacement of bearing bushes, starter drives, gear and slip rings. |
| 6. | MICA Under Cutter | To undercut armature insulation, ensures uniformity in depth of cut and eliminates the possibility of damage to risers or windings. |
| 7. | Armature Testing Growler | For testing the windings and commutators of generators, short circuit, open circuit and incorrect coil spacing. |
| 8. | Electrical Test Bench | To test for dynamos and starters for those fitted to large coaches and commercial vehicles for the testing of distrubutors and magnetoes. |

MAJOR EQUIPMENT REQUIRED
FOR
AUTOMATIVE DEPARTMENT

A2 - Fuel Injection System Service

| | Equipment | Capabilities |
|---|---|---|
| 1. | Electronic Fuel Pump Injector Pump Test Bench | To test fuel pump for phasing and calibrating. |
| 2. | Injector Test Unit | To test fast and accurate result for injectors. |
| 3. | Nozzle Reconditioning Machine | For precision grinding of angles and concentrate core or taps and needle seats. |
| 4. | DPA-Fuel Pump - Overhaul and Testing Unit | For dismentling and re-assembling CAV, distributor type fuel injector pump. |
| 5. | Injector Dismantling Fig | To provide a quick and easy method of dismantling injector without the damage. |
| 6. | Diesel Fuel Pump Vice | Rapid positive locking and release of fuel pump. |

MAJOR EQUIPMENT REQUIRED
FOR
AUTOMATIVE DEPARTMENT

A3 - Engine Trouble Analysis

| Equipment | Capabilities |
|---|---|
| 1. Electronic Tuning | Completely equipped for fast engine diagnosis. |
| 2. Combustion Tester | Check by analysing a simple of exhaust gas and the condition of the whole carburation system. |
| 3. Dwell Vots Tester | To provide essential information on distributor condition, record engine speed and voltage. |
| 4. Volt-Ampere Tester | To test voltage and current regulators. |
| 5. Distributor Tester | To diagnose faults in all types of distributors. |
| 6. Alternator Tester | For testing the exciter and output diodes. |
| 7. Exhaust Gas Analyzer | To provide a means to measure the toxic Co content of exhaust gases from gasoline engine. |
| 8. Portable Cylinder Leakage Tester | To indicate the loss of compressed air in an engine combustion chamber - in order to determine the condition of manifold gasket, cylinder head gasket in each cylinder, piston rings and valves. |
| 9. Vacuum and Feed Pump Tester | For engine vacuum test, suction pressure test of fuel pump, discharge pressure test of fuel pump. |

MAJOR EQUIPMENT REQUIRED
FOR
AUTOMATIVE DEPARTMENT

A4 - Engine Testing

| Equipment | Capabilities |
| --- | --- |
| 1. Engine Dynamometer | To diagnose the vehicle speed and brake horsepower. |

MAJOR EQUIPMENT REQUIRED
FOR
AUTOMATIVE DEPARTMENT

A5 - Vehicle Inspection

| Equipment | Capabilities |
|---|---|
| 1. Chassis Dynamometer | To diagnose the whole of the vehicles. |
| 2. Battery Starter Tester | For testing all types and size of automobile batteries under operating condition. |
| 3. Electronic Wheel Alignment Analyzer | For checking alignment on dual front axle of a vehicle. |
| 4. Electronic Wheel Balancing Machine | To balance dynamically and statically all types and wheel assembly. |
| 5. Shock Absorber Tester | To test shock absorber efficiency on the car. |
| 6. Electro Mechanical Two Post Lift | For the lifting of truck and buses vehicle-washing, under care treatment, service and repair can be carried out with a time-saving. |

MAJOR EQUIPMENT REQUIRED
FOR
AUTOMATIVE DEPARTMENT

A6 - Construction and Assembly

| Equipment | Capabilities |
|---|---|
| 1. Chassis Wheel Alignment Jig | To straighten up the chassis according to the specification. |
| 2. Clutch Aligning Tool Set | For aligning single clutch. |

MAJOR EQUIPMENT REQUIRED
FOR
AUTOMATIVE DEPARTMENT

A7 - Specialised Vehicle Body Repair Work

| | Equipment | Capabilities |
|---|---|---|
| 1. | Universal Body Alignment and Working Bench | A strong working height bench on which distorted car bodies can be aligned with precision using standard dozer and jacking equipment. |
| 2. | Portable Body and Frame Straightener | Instant chain lock device on pivot arm for easy positioning and fast hock ups. |
| 3. | Press Outfits Equipment | To control hydraulic ram movement to a wide range of body chassis. |
| 4. | Spray Painting Equipment | For fast work on medium size finishing and painting jobs. |

MAJOR EQUIPMENT REQUIRED
FOR
ELECTRICAL & ELECTRONIC DEPARTMENT

EEi - Relay Engineering

| Equipment | Capabilities |
|---|---|
| 1. Power Distribution Panel (high voltage) complete set | The power supply includes three phase, and single phase as well as general services line. Besides, measurements of general character, on Asynchonis motors and D.C. machines, the following tests can be carried out:<br><br>1) Asynchonous motor:<br>a) measuring winding resistance, no load test, short circuit test, circulator diagram, and generation characteristic, test with dynamo as a mechanical load and load characteristic.<br><br>2) Dynamo:<br>b) determining winding resistance magnetization, characteristic with separate excitation external characteristic, series, and compound. Determining mechanical losses and from losses, no load test on motors and generator, forming a Ward Leonard set. |
| 2. Three-Phase A.C. Voltage Stablilzers | To stabilize the output compare the controlled voltage with a reference voltage proportional to voltage required. |
| 3. Positioning Servo-mechanism System | Differential servo system for remote position control with dials indicating input and output angle. |

MAJOR EQUIPMENT REQUIRED
FOR
ELECTRICAL & ELECTRONIC DEPARTMENT

EE2 - Relay Control Maintenance and Repair

| | Equipment | Capabilities |
|---|---|---|
| 1. | Power Distribution Panel (high voltage) complete set | The power supply includes three phase and single phase as well as general service line beside measurement of general character on Asynchonois motor and D.C. machine. |
| 2. | 3-phase and single phase Ohmic load | to use as dummy load (temporary loading). |
| 3. | Electronic Beach Top Multimeter | For multi-purpose of measuring voltage, amphere and Ohmic valve. |
| 4. | Electronic Frequency Counter | To rectify the supply frequency and time periodic. |
| 5. | Phase Sequence Meter | To rectify the phase sequence. |
| 6. | Oscilloscope | To observe, check and measure electrical wave-form. |
| 7. | Cable Tester | To check the cable continuity. |
| 8. | Wattmeter | To identify the wattage of the load. |

MAJOR EQUIPMENT REQUIRED
FOR
ELECTRICAL & ELECTRONIC DEPARTMENT

EE3 - Advanced Elmotor Service and Repair

| | Equipment | Capabilities |
|---|---|---|
| 1. | Power Supply Panel (complete set) | Source of three phase and single phase and D.C. |
| 2. | Thyristor Control System Sets | To control the speed of the D.C. motors. |
| 3. | Triac Control System Set | To regulate the speed of the A.C. motors (series and squirrel cage) |
| 4. | Growler Set | External and internal type with meter for testing short, open circuit, grounds light resistance and corrects turns in armature, and corrects turns in stators. |
| 5. | Electronic Balancer Sets | Used for balancing the wheel shaft of the rotors. |
| 6. | Digital Counter | To check the running speed of the rotors. |

MAJOR EQUIPMENT REQUIRED
FOR
ELECTRICAL & ELECTRONIC DEPARTMENT

EE4 - Motor Trouble Analysis

| Equipment | Capabilities |
|---|---|
| 1. Motor Generator Sets | Consists of a synchronous generator (alternator) and D.C. generator (dynamo), both coupled to each shaft-end. The alternator and the dynamo can be set in rotation either contemperaneously.<br><br>To test on synchronous machine<br><br>To measure the resistances of stator and rotor windings, no load test, short circuit test, determine the characteristic for purely reactive load, determine under-load characteristic, determine the efficiency with direct and indirect method, controlling wave forms and distortions.<br><br>To test on D.C. machines<br><br>To determine resistance of windings magnetization characteristic with separate, excitation, external characteristic with separate, series and compound excitation, determine mechanical losses and iron losses of dynamo use as motor. |
| 2. Ward Leonard Control System Sets | To regulate the D.C. motor voltage. |
| 3. Thyristor Control System Sets | To regulate the speed of the D.C. motor. |
| 4. Triac Control System Sets | To regulate the speed of the A.C. motors. |
| 5. Growler Set | To determine the internal (rotor) and external (stator), short circuit, open circuit, and correct turns. |
| 6. Electronic Balancing Sets | Used for balancing the shaft of the rotors. |
| 7. Motor and Transformer Testing Bench | Used to test the motor and transformer single and three phase. |

MAJOR EQUIPMENT REQUIRED
FOR
ELECTRICAL & ELECTRONIC DEPARTMENT

EE5 - Motor Testing

| Equipment | Capabilities |
|---|---|
| 1. Motor Generator Sets | Consists of a synchrous generator (alternator) and D.C. generator (dynamo), both coupled to each shaft-end. The alternator and the dynamo can be set in rotation either contemperaneously.<br><br>To test on synchronous machine<br><br>To measure the resistances of stator and rotor windings, no load test, short circuit test, determine the characteristic for purely reactive load, determine under-load characteristic, determine the efficiency with the direct and indirect method, controlling wave forms and distortions.<br><br>To test on D.C. machine<br><br>To determine resistance of windings, magnetization characteristic with separate excitation, external characteristic with separate, series and compound excitation, determine mechanical losses and iron losses of dynamo use as motor. |
| 2. Ward Leonard Control System Sets | Required to regulate the voltage for the D.C. motor. |
| 3. Thyristor Control System Sets | To control the speed of the D.C. motors. |
| 4. Triac Control System Sets | To regulate the speed of the A.C. motor (series and squirrel cage) |
| 5. Growler Sets | To determine the internal (rotor) and external (stator), short circuit, open circuit and correct turns. |
| 6. Electronic Balancing Sets | Used for balancing the shaft of the rotors. |

MAJOR EQUIPMENT REQUIRED
FOR
ELECTRICAL & ELECTRONIC DEPARTMENT

EE6 - Advanced Radio Service and Repair

| | Equipment | Capabilities |
|---|---|---|
| 1. | Radio Trainers (complete) | Consists of various panels displaying diagrams of electronic circuits and components of radio. Each panel allows to: illustrate the circuit, demonstrate the studied phenomena. connect instruments to the circuit during theoretical explanations, and possibility of simulating faults and their location in the circuits. |
| 2. | Servicing Trainers, complete set | To give students practice in using test instruments and applying the techniques of logical analysis and deductive reasoning to the solution of fault auditions in malfunctioning electronic equipment. It must consist of power supply, amplifier and tuner. |
| 3. | Communication Trainers, complete set | Designed to develop skill in circuit, in circuit analysis, schematic tracing, parts identification and trouble-shooting of modern two-way communications systems. It consists of transmitter, receiver and power supply section. |
| 4. | Spectrum Analyzers | To measure, check and align the various frequencies response in radio. |
| 5. | Digital Multimeter | To measure and test D.C. and A.C. voltages, currents and resistances. |
| 6. | Sweep Marker Generators AM/FM | For alignment of radio AM/FM. |
| 7. | Oscilloscopes | To measure, observe and check frequencies and wave forms. |
| 8. | Function Generators | For testing audio signals. |
| 9. | Digital Frequency Counters | Used for counting frequencies and period of wave forms. |
| 10. | RF Signal Generators | Used in aligning radios AM and FM sets. |
| 11. | Millivolt Meter | Measurement of radio's output. |

MAJOR EQUIPMENT REQUIRED
FOR
ELECTRICAL & ELECTRONIC DEPARTMENT

EE7 - Inter-Office Communication Service and Repair

| | Equipment | Capabilities |
|---|---|---|
| 1. | Electronic Telephone Exchange | Allows direct introduction to telephony, offering a possiblility to 'interfere' with the fundamental circuits upon which telephone exchange are based. Either crossbar or electronic gates type. |
| 2. | Multichannel Intercommunication System | For communication in between departments. Should be electronic and multichannel private type. |
| 3. | Universal Computer System | For data processing communication network in between departments. |
| 4. | Data Communication Tester | For locating problems and faults in data communication networks. |
| 5. | Logic Analyzer | For locating problems and faults in microprocesser based equipments. |
| 6. | General Purpose Oscilloscope System | Used in analysis and troubleshooting electronic equipments. |
| 7. | Multichannel Tape Recorder | Allow high quality multichannel recording and playback. |
| 8. | Closed Circuit Television System | For monitoring activities in departments. |
| 9. | Cable Testers | To locate trouble and faults in communication cables. |
| 10. | Function Generators | Used in locating faults in the audio section of electronic equipments. |
| 11. | Wow and Flutter Meters | Used in design laboratory, to identify and quantity unwanted speed variations in audio and video tape recorders. |
| 12. | LF Sweep Generators | Used in response testing of amplifiers, filters and servo loops. |
| 13. | Multichannel Audio Mixers | Used in recording and public address system. |
| 14. | Distortion Meters | To measure distortion in tape recorders and amplifiers. |

MAJOR EQUIPMENT REQUIRED
FOR
ELECTRICAL & ELECTRONIC DEPARTMENT

EE8 - Advanced TV Service and Repair

| | Equipment | Capabilities |
|---|---|---|
| 1. | Television Trainer | Consists of various panels displaying diagrams of electronic circuits and components of televisions. Each panel allows to, illustrate the circuit, demonstrate, the studied phenomena, connect instruments to the circuit during theoretical explanations, and possibility of simulating faults and their location in the circuits. |
| 2. | B/w and Colour Pattern Generator | Producing patterns for checking the television sets. |
| 3. | Television Sweep/ Motor Generator | For aligning and checking television response. |
| 4. | Oscilloscopes | For measurement, observing, alignment and checking television signals. |
| 5. | Television Analysis | Used in trouble-shooting faults of television receivers. |
| 6. | Digital Multimeter | Measurement of D.C. and A.C. voltages, currents and resistances. |
| 7. | Vectorscope | For analyzing colour distribution in television. |
| 8. | Spectrum Analyzer | To measure, check and align the various frequencies response in television. |
| 9. | 40 kv Probe Meters | For measurement of high voltages in television. |
| 10. | Curved Tracers | Can deliver compreheneive information about a multitude of semiconductors devices and integrated circuits in television. Showing what happens between specified points in graph curve, providing the valuable performance data necessary for accurate design, analysis and evaluation. |
| 11. | Capacitor Checker | For checking and analysis of the value of capacitor and working conditions. |

MAJOR EQUIPMENT REQUIRED
FOR
ELECTRICAL & ELECTRONIC DEPARTMENT

EE9 - Electrical and Electronic (Office) Equipment

| | Equipment | Capabilities |
|---|---|---|
| 1. | Universal Micro Computer Development System | It offers software development facilities and true real-time emulation capability. |
| 2. | Data Analysis System | For locating problems and faults in computer-based equipments. |
| 3. | Wave Form Processing Oscilloscope | Displaying real time and stored wave form of a computer separately or simultaneously. Used in analyzing and trouble-shooting computer system. |
| 4. | Electronic Counters | Used in analyzing and trouble-shooting electronic equipment. |
| 5. | Pulse Generators | For testing and measuring electronic components of a computer base equipment. |
| 6. | Four Chained Oscilloscope | In trouble-shooting and observation of faults in memory systems, communications units, simultaneous checks on two twisted pairs of balanced lines, and examination of four parallel activities of electronic equipments. |
| 7. | Computer Display Terminals | To be used with the computer system displaying alphanumerics and graphics. |
| 8. | High Speed Printer | To be used with computer system in printing displayed characters on the display terminals. |

MAJOR EQUIPMENT REQUIRED
FOR
HEAVYSHOP DEPARTMENT

H1 - Specialized Welding

| | Equipment | Capabilities |
|---|---|---|
| 1. | Complete Arc Welding Plant | For welding steels such as plates, bars and pipe. |
| 2. | Complete Gas Welding cutting plant | Flame brazing, braze welding, fusion welding, stelliting of common engineering materials. |
| 3. | MIG Welding complete | High speed welding of low carbon steel alloy, alloy steel, stainless steel, aluminium alloys. |
| 4. | TIG Welding complete | - do - |
| 5. | Submerged Arc Welding complete (transverse and cylindrical) Surfaces | High speed quality steel including hard surfacing for reclamation. |
| 6. | Metal Spray complete (powder and metal) | Manual hard facing and rebuilding work on cast iron and various grades of steel. |
| 7. | Plasma Arc Welding complete | High quality welds on all ferrous and non-ferrous metals. |
| 8. | Plasma Arc Cutting complete | Cutting aluminium and its alloys, stainless steels, brass, copper and copper alloys and cast iron. |
| 9. | Automatic Oxy-Acetylene Electronic Cutting Machine (profile cutter) | Precision cutting of plates. |
| 10. | Grit Blasting | Removal of heavy rust, scale on the component, prior to painting or phosphating. This process is by using nozzle, air, abrasives or grit. |

MAJOR EQUIPMENT REQUIRED
FOR
HEAVYSHOP DEPARTMENT

H2 - Forging

| Equipment | Capabilities |
|---|---|
| 1. Banding Hammer (close die forging) | Requires of dies, hydraulic, pneumatic drop process.<br>1. Availability of betterment in strength<br>2. Reduction of weight<br>3. To withstand high tension abrasion corrosion<br>4. Better accuracy<br>5. Uniformity |
| 2. Masonry Hammer Clear Space pneumatic power (open die forging) | Round, square, rectangular, hexagon and various shapes required. |
| 3. Billet Furnace (gas and elect. fired) | Electrical operated plant. Setting required temperature before forging process. |
| 4. Tempering Bar Furnace | Tempering forging product. |
| 5. Forging Roll Machine (hot process) | Forming to various shapes. |

MAJOR EQUIPMENT REQUIRED
FOR
HEAVYSHOP DEPARTMENT

H3 - Foundry

| | Equipment | Capabilities |
|---|---|---|
| 1. | Induction Melting Furnaces | To melt ferrous and non-ferrous metal. |
| 2. | Core Sand Mixture Machine | Making core, floor space occupied with water. |
| 3. | Sand Mixer Muller | Giving moulding sand high bond strength. |
| 4. | Shot Blasting Machine | To debur all casting sharp edges. |
| 5. | Turn over Moulding Machine | Making mould by automatic system. |

MAJOR EQUIPMENT REQUIRED
FOR
HEAVYSHOP DEPARTMENT

H4 - Heat Treatment

| Equipment | Capabilities |
|---|---|
| 1. Controlled Atmosphere Gas Fired Furnace | Heat treatment of metal components of size up to the working space of the baths and furnaces. Available process includes:<br>a. Annealing<br>b. Bright annealing<br>c. Barburising<br>d. Case Hardening<br>e. Through Hardening<br>f. Vitriding<br>g. Normalizing<br>h. Precipitation Hardening<br>i. Solution heat treatment<br>j. Spherodizing<br>k. Stress Relieving<br>l. Tempering |
| 2. Box Tempering Furnace | |
| 3. Temper Furnace | |
| 4. Vacuum Furnace | |
| 5. Induction Unit with Bar Rig Furnace | |
| 6. Quench Tank Oil | |
| 7. Quench Tank Water | |
| 8. Quench Tank Brine | |
| 9. Carbon Compound Tank | |
| 10. Salt Bath Furnace | |

MAJOR EQUIPMENT REQUIRED
FOR
HEAVYSHOP DEPARTMENT

H5 - Die-Casting (Aluminium & Zinc) Technique

| | Equipment | Capabilities |
|---|---|---|
| 1. | Hot Chamber Pressure Die-Casting Machine | Precision die casting of light non-ferrous alloys<br>Closer tolerance.<br>Shapes not forteable. |
| 2. | Aluminium and Zinc Melting Pot Furnace | To melt non-ferrous alloy. |

MAJOR EQUIPMENT REQUIRED
FOR
HEAVYSHOP DEPARTMENT

H6 - Investment Casting (Precision Casting) Technique

| | Equipment | Capabilities |
|---|---|---|
| 1. | Rotary Slurry Mixer | Ensure through coating surface. |
| 2. | Fluidize Bed | Container. |
| 3. | Vibro-Energy Separator | To revive Zircon sand and Zircon floor to required grade. |
| 4. | Ammonia Cabinet | To cure/harden/dry the completed pattern. |
| 5. | Wire Injection Press Machine | Injection of wire into a die. |
| 6. | Boiler Clave | Used for the dewaxing of wax from a mould shell. |
| 7. | Induction Melting Furnace | To melt metal. |
| 8. | Shot Blast | Debur. |
| 9. | Bench Saw | |

MAJOR EQUIPMENT REQUIRED
FOR
HEAVYSHOP DEPARTMENT

H7 - Rubber Moulding Technique

| Equipment | Capabilities |
|---|---|
| 1. Rubber Injection Moulding Machine fully automatic | Demonstrate injection technique for rubber product |
| 2. Auto Clave (Vulcanising Boiler) | Curing rubber product. |

MAJOR EQUIPMENT REQUIRED
FOR
HEAVYSHOP DEPARTMENT

H8 - Plastic Moulding Technique

| Equipment | Capabilities |
| --- | --- |
| 1. Plastic Injection Moulding Machine | To demonstrate plastic injection product. |

MAJOR EQUIPMENT REQUIRED
FOR
FABRICATION DEPARTMENT

F1 - Metal Fabrication

| | Equipment | Capabilities |
|---|---|---|
| 1. | Folding Machine Box and Pan Brake, manually operated | Folding, bending and forming box and pan, trays and pan. |
| 2. | Cold Forming Machine | Cold bending and forming. |
| 3. | Buffing Machine | For polishing. |
| 4. | Guillotine Shears power operated | Cutting blank. |
| 5. | Rolling and Curving Machine | Rolling and curving of sheet metal to form cylinders, cones and corner section. |
| 6. | Nibbling Machine | Contour cutting and louvre cutting. |
| 7. | Spot Welding Machine | Riveting, trimming |
| 8. | Seam Welding Machine | Joining cylindrical items. |

MAJOR EQUIPMENT REQUIRED
FOR
FABRICATION DEPARTMENT

F2 - Structural Metal Preparer and Erector

| | Equipment | Capabilities |
|---|---|---|
| 1. | Radial Drilling Machine | Drilling thick section of material (metal). |
| 2. | Pipe and Bar Bending Machine | For bending flats, bars and hollow pipes of ferrous and non-ferrous metals. |
| 3. | Profile Cutting Automatic Oxy-Acetylene (forward and transverse) | Cutting. |
| 4. | TIG, MIG, Plasma Arc Welding and Cutting respectively) | Welding and cutting. |
| 5. | Complete set of heavy duty Cutting and Super Heating Torch | Pre-heating cutting. |
| 6. | Air-Hammering Equipment | Straightening. |
| 7. | Band Saw (heavy duty Cutting Machine) | Cutting. |
| 9. | TIG, MIG Plasma Welding, complete | Weld ferrous and non-ferrous metals. |
| 9. | Non-Destructive Test, Magnetic Flux Type, Dye Penetrant Type, Ultrasonic Flaw Detector X-ray and Gamma ray | Inspection on internal and external weld faults. |
| 10. | Universal Testing Machine | Tensile compression and shear stress and strain. |
| 11. | Impact Testing Machine | Strength and toughness of material. |

MAJOR EQUIPMENT REQUIRED
FOR
FABRICATION DEPARTMENT

F3 - Presswork

| | Equipment | Capabilities |
|---|---|---|
| 1. | Guillotine Shear power operated | For shearing. |
| 2. | Power Press (Universal) 15 tons, 60 tons, capacity | Blanking, stamping, punching, forming and cutting. |
| 3. | Universal Bending Equipment (power operated) | Bending work. |
| 4. | Punch and Shearing Machine | Punching and shearing work. |

6. Major Equipment Required for each department Provided by the Japanese Team (For discussion only)

PEDAGOGY TRAINING AND SUPERVISORY SKILL TRAINING

1. Overhead Projector
2. Slide Projector
3. 16m/m Projector
4. 8m/m Camera
5. 8m/m Projector
6. 35m/m Camera
7. Copy Stand
8. Close-up Equipment
9. Enlarger
10. Video Tape Recorder
11. Color Video Camera
12. Monitor Television
13. Video controller system
14. Lighting Kit
15. Video projection system
16. Radio cassette recorder
17. Small offset press
18. Electrotype process
19. Sorter
20. Bookbinder
21. Electronic Copying Machine
22. Electric Typewriter
23. Drafting Machine
24. Tracing Board
25. Equipment for Mirror Drawing Task
26. Equipment for Tracking Task
27. Equipment for Two Hand Coordination Task
28. Video Motion Analyser
29. Transducers Pickups for Motion Analysis
30. Polygraph Systems
31. Equipment for Memory Test and Maze Tracking Test
32. Flicker Tester
33. Eye Mark Recorder
34. Tools to make a model for teaching aids.

## INSTRUMENTATION COURSE

| No | Description |
|---|---|
| 1. | Thermocouple Training Device |
| 2. | Resistance Bulb Training Device |
| 3. | Press, Measurement Training Device |
| 4. | Pump Press, Control Training Device |
| 5. | Level Measurement Training Device |
| 6. | Water Flow Training Device |
| 7. | Air Flow Training Device |
| 8. | 3-Tanks Level Training Device |
| 9. | Final Control Elements for Miscellaneous Training Device |
| 10. | Orifice Plates |
| 11. | Signal Conditioner |
| 12. | Strain Gauge |
| 13. | Weight Type Press, Gauge |
| 14. | Pneumatic Different, Press, Transmit |
| 15. | Pneumatic Indicating Transmitter |
| 16. | Pneumatic Indicating Controller |
| 17. | Pneumatic Controller |
| 18. | Pneumatic Indicating Recorder |
| 19. | Pneumatic Recorder |
| 20. | Temperature Transmitter |
| 21. | Integrator |
| 22. | Pneumatic Analog Computer |
| 23. | Pneumatic-to-Electronic Convertor |
| 24. | Pneumatic Indicator |
| 25. | Control Station |
| 26. | Alarm Set Station |
| 27. | Control Relay |
| 28. | Pneumatic Buoyancy Transmitter |
| 29. | Pneumatic Position Transmitter |
| 30. | Seal Valve |
| 31. | Pressure Switch |
| 32. | Pressure Regulator |
| 33. | 3-Valves Manifold |
| 34. | Electronic Different, Press, Transmitter |
| 35. | Electronic Indicat. Transmitter |

| No. | Description |
|---|---|
| 36. | Electronic Pressure Transmitter |
| 37. | Electronic Indicat. Controller |
| 38. | Electronic Programable Indicating Controller |
| 39. | Electronic Recorder |
| 40. | Manual Station |
| 41. | Indicator |
| 42. | Electronic Intigrator |
| 43. | Electronic Converter |
| 44. | Electronic Alarm Unit |
| 45. | Electronic Programable Computing Unit |
| 46. | Electronic Integrator |
| 47. | Distributor |
| 48. | Power Supply Unit |
| 49. | Programmer |
| 50. | Program Setter |
| 51. | Annunciator |
| 52. | Dead Time Unit |
| 53. | Process Simulator |
| 54. | Pneumatic Process Simulator |
| 55. | Servo Mechanism Training Device |
| 56. | Control Valve Training Device |
| 57. | Plant Model |
| 58. | Hydraulic Control Training Device |
| 59. | Packaged Control System |
| 60. | Calibration Set |
| 61. | Resistor |
| 62. | Wheatstone Bridge |
| 63. | Insulation Tester |
| 64. | Earth Tester |
| 65. | AC Universal Bridge |
| 66. | Flatbed 2-Pen Recorder |
| 67. | X-Y Recorder |
| 68. | DC Voltage, Current Standard |
| 69. | Digital Manometer |
| 70. | Function Generator |
| 71. | DC Stabilized Power Source |
| 72. | Microprocessor |
| 73. | Device for Air Supply |

MAJOR EQUIPMENT REQUIRED
FOR
AUTOMATIVE DEPARTMENT

1. Fuel injection pump tester
2. Engine analyser
3. Vehicle inspection line facility *
4. Frame straighter
5. Engine dynamometer

   * include following things -

   3 - 1 Chassis dynamo meter

   3 - 2 Brake tester

   3 - 3 Head light tester

   3 - 4 Side Slip tester

   3 - 5 Exhaust emission analyzer
6. Conrod Aligner
7. Pinhole honing machine
8. Piston heater
9. Valve seat grinder
10. Valve refacer
11. Hydraulic braking foot press gauge
12. Car washer
13. Parts washer
14. Magnetic flow detector
15. Armature tester
16. Valve spring tester
17. Nozzle tester
18. Regulator tester
19. Coil condenser tester
20. Dwell tacho tester
21. Battery starter tester
22. Spark plug cleaner tester
23. Air filter tester
24. Timing light
25. Diesel smoke meter
26. Diesel timing tester
27. Diesel tacho meter
28. Engine scope
29. Alotanator scope
30. Distributor tester
31. Wheel aligment Indicator
32. Wheel balancer
33. Road meter
34. Cylinder boring machine
35. Cylinder horning machine
36. Surface grinder

37. Universal test bench
38. Brake drum lathe
39. Brake shoe grinder
40. Air Compressor
41. Battery quick charge
42. Auto lift (2 post type)
43. Lift master (4 post type)
44. Fender tool set
45. Painting booth for automobile
46. Paint color matching system
47. Infrared dryer
48. Air transformer
49. Spray gun

MAJOR EQUIPMENT REQUIRED
FOR
MACHINE OPERATION & DIEMAKING DEPT.

1. Precision lathe
2. Jig boring machine
3. Upright drilling machine
4. Bench drilling machine
5. Shaping Machine
6. Vertical Shaping machine
7. Universal milling machine
8. Vertical milling machine
9. Profile milling machine
10. NC lathe
11. NC milling machine
12. Engraving machine
13. Electric discharge machine
14. Wire cut electrical discharge machine
15. Power press
16. Vertical band sawing machine
17. Hack sawing machine
18. Universal cylindrical grinding machine
19. Surface grinder
20. Forming surface grinder
21. Profile grinding machine
22. Bench grinder
23. Universal tool & cutting grinder
24. Drilling grinder
25. Cemented carbide grinder
26. Surface measuring instrument
27. Toolmakers microscope
28. Level
29. Roundness tester
30. Hardness tester
31. NC Tape perforator
32. Screen projector
33. Air compressor
34. Drafter & drawing instrument
35. Granite surface plate
36. Block gauge

HEAVYSHOP DEPARTMENT

1. Air Hummer
2. Automatic Sawing Machine
3. Duplex Head Grinding Machine
4. Optical Pyrometer
5. Tempering Furnace
6. Dissociate Furnace
7. Metal Cleaning Tank
8. Shot Blast Machine
9. Rochwell Hardness Tester
10. Brinell Hardness Tester
11. Vickers Hardness Tester
12. Upright Drilling Machine
13. High Speed Grindstone Cutting Machine
14. Die Casting Machine
15. Gas Soft Nitriding & Carbrizing Furnace
16. Rubber Molding Test Press Machine
17. Mixing Test Roll Machine (Rubber)
18. Rubber Cutter Press
19. Rubber strength tester
20. Rubber Aging Oven
21. Rubber Abrasion Tester
22. Rubber Hardness Tester
23. Plastic Injection Molding Machine
24. Mold Temperature Regulator
25. Tumble Mixer
26. Drying Equipment (plastic)
27. Hopper Loader (plastic)
28. Coloring Tumbler (plastic)
29. Plastic tensile strength Tester
30. Heat Distortion Tester
31. Color & Color Difference Meter
32. High Frequency Induction Furnace
33. Heavy oil Furnace
34. Pot Type Electric Furnace
35. Sand Biender
36. Sand Mill Machine
37. High Speed Mixer
38. Wax Injection Machine
39. Wax Melting Tank
40. Wax Tempering Tank
41. Hot plate
42. Fludizer Bed
43. Auto clave for Dewaxing

44. Bake-out Furnace
45. Laddle Furnace
46. Runner Cutting Machine
47. Bader Machine

## FABRICATION DEPARTMENT

1. TIG Arc Welder
2. MIG Arc Welder
3. $CO_2$ Arc Welder
4. Arc Air Gouging Welder
5. Engine Driven Welder
6. Plasma Cutting Machine
7. Automatic Gas Cutting Machine
8. Welding Positioner
9. Electrode Dryer
10. Universal Testing Machine
11. Welding Joint Bending Machine
12. Metallugical Microscope
13. Magnetic Testing Machine
14. Magnetic testing test pieces
15. Ultrasonic Flaw Detector
16. Test pieces (Ultrasonic test)
17. X ray Inspection Apparatus
18. Crank Press (25 ton, 60 ton)
19. Lever Shear
20. Contour Machine
21. Brake Press
22. Shearing Machine ( 6mm, 13mm)
23. Testing Apparatus of Press
24. Upright Drilling Machine
25. Shaping Machine
26. Bending Roll
27. Vibrating Shear
28. Automatic Sawing Machine
29. Pipe Bender
30. Pipe Screw Machine
31. Foot Shear
32. Sharp Cutter Press
33. Universal Deep Drawing Testing Machine
34. Fork lifter

## ELECTRIC AND ELECTRONIC DEPARTMENT

1. Power Distribution Panel
2. Insulation Testing Equipment
3. Thyrister Control System
4. Triac Control System
5. Testing Transformer
6. Induction Regulator
7. Induction Motor
8. Saturable Reactor
9. Motor Generator
10. Balancing Load, 3 phase
11. Sequence Control Trainer
12. Hydraulic Serro Trainer
13. Aircompressor
14. Balance Testing Machine
15. AC Watt Meter
16. AC Current Meter
17. AC Volt Meter
18. DC Volt Meter
19. DC Current Meter
20. Frequency Indicator
21. Three Phase Power-Factor Meter
22. Megger
23. Oscilloscope
24. X-Y. T. Recorder
25. Electric Dinamometer
26. Electronic Load Equipment
27. Theoretical Circuit Training Panel
28. Electronic Circuit Training Panel
29. Semiconductor Training Panel
30. Equipment of Printed Circuit Board
31. Automatic Voltage Regulator
32. D.C Stabilizer
33. Low Frequency Generator
34. Signal Generator
35. Pulse Generator
36. Stereophonic Signal Generator
37. Functional Generator
38. Reflection Sweep Signal Generator
39. Phase Meter
40. Alignment Scope
41. Transmission Characteristic Measuring of Amplifier
42. Variable High-level Filter
43. Transistor Tester

44. Curve Tracer
45. I.C Tester
46. Spectrum Analyzer
47. Frequency Counter
48. Electronic Voltage Meter for AC
49. Distortion Factor Meter
50. SSB Radiotelephone
51. Standard Microphone
52. Field Strength Meter
53. Pattern Generator
54. T.V. Testing Transmitter
55. Micro Computer

## 7. マレーシアにおける日本人専門家の生活状況について

### 1. 住宅事情

#### A. 住宅を決める方法

(1) 先任者の居住していた住宅を引き続いて借りる方法

この場合，最近の傾向として家賃は１０％位の割合で上昇しているが，うまく交渉すると据置き契約も可能である。

初めての赴任者には，一番無難な方法といえる。

(2) マレーシア政府（関係機関）等現地事情に詳しい知人に条件に合致した住宅を探してもらう方法

(3) 現地のエージェント（不動産屋）を通じて探す方法

この場合，現地には幾多のエージェントがあるが，外国人を狙った悪徳不動産屋も多いのでリスクが伴う。それに赴任してしばらくの間は，ホテル等に一時の仮住いを余儀なくされる。

(4) 新聞広告を利用する方法

英字新聞には連日貸家の広告が出ているし，適当な物件がなければ，こちらから「求む，貸家」の広告を出せば必ず反応がある。ただし，不動産屋がからんでくる場合が多いので要注意。

いづれにしても，複数の物件を自分の目で確かめ比較検討し，慌てずにじっくり探すことがコツである事は日本と変わらない。

#### B. 貸家の種類

(1) バンガロー・ハウス（一戸建て）

独立家屋，庭付，一階又は二階建て

(2) ディタッチド（又はリンク）・ハウス（長屋式）

一棟を棟割にした庭付の家

(3) セミ・ディタッチド・ハウス（テラス・ハウス）

一棟を２戸で割った庭付きの家

(4) フラット（集合住宅）

日本のマンション，中層プレハブが多い。

(5) ルーム・シェア（間借り）

通常，食事付の下宿方式をとるが数は少い。

いづれの家も，家具付きと家具なしがあるが，家具付を借りること。家具付の標準仕様は，ベッド（主寝室），戸棚類，ロッカーダンス，応接セット，鏡台，食器戸棚，冷蔵庫，オーブン付ガステーブル，食堂のテーブル，椅子一式，クーラー（一戸に一台）になっている。これにカーテン，テレビ，洗濯機，ジュータン等を好みでアレンジして

いくが，入居当初に充分注文を出し，交渉する。

冷蔵庫は，出来るだけ大型のものが良く，現在日本で使っていて，当地で捨てられるものがあればエキストラとして持ち込むのも一つの方法である。ただし，電圧が異るので（230～240V，50Hz），トランスやプラグを忘れずに。

テレビは方式が違うので，日本で使っていたものは役に立たない。テレビや洗濯機はレンタルのものがあるので，現在，専門家はこれに頼っている。

家具の類は，一通り売っているが高価で中古品がなく，日本へ帰国の際に始末に困ることになるので，出来るだけ手を出さない方が賢明である。

C．需要と供給

一般的に住宅事情は年々悪化している。しかし，クアラルンプールの近郊開発が進んで居るので数量的には充分まかなえるだろう。特に，ペタリンジャヤ（K.Lとシャアラムの中間），シャアラムは一連の開発途上にあり，都市計画に基づいて整然と開発されているので，旧K.L地区に住むよりも，物価，交通事情，医療保健，教育事情等の点で有利である。現在，日本人が一番多く住んで居る地区はペタリンジャヤである。住宅の賃貸契約は大体2年更新で，契約金（Deposit，日本の敷金）が1～2ケ月分の家賃相当額，電気・水道の負担金がM$500位を必要とする。

契約の際に「外国人特権」（Diplomatic Break Clause）を忘れずに入れておくこと。これを怠ると契約金や負担金の精算が行われず丸損になる。詳しくは赴任の際，JICA事務所から説明されることになっており，着任すれば現地のJICA職員が相談にのってくれる。

現在，実際に当地で働いている専門家の例を次に示す。

(1) A氏（1号専門家） 単身赴任 K.L在住，一戸建
敷地200M²，建坪（延）100M²，2LDK（家具付）
家賃 M$1600／月

(2) B氏（特2号専門家） 夫婦赴任 K.L在住，フラット
居住面積74M²，1LDK（家具付）
家賃 M$1900／月

(3) C氏（2号専門家） 家族赴任（子供2人） K.L在住，一戸建
敷地850M²，建坪（延）145M²，2LDK（家具付）
家賃 M$1300／月

(4) D氏（5号専門家） 単身赴任 ペタリンジャヤ在住，一戸建
広さなど不明，3LDK（家具付）
家賃 M$1200／月

(5) E氏（3号専門家） 夫婦赴任 ペタリンジャヤ在住，一戸建

敷地600M²，建坪（延）89M²，3LDK（家具付）

家賃 M$1300／月

2. 子弟教育

日本人の子弟の教育については，「日本人学校」（K.Lにあるがペタリンジャヤ寄りに位置する）を利用している者が圧倒的に多い。この他に英語系の学校もあるので教育方針によってはこれを利用してもよい。

日本人学校は在マレーシア日本大使館の附属施設として設置され，現在，マレーシア・クアラルンプールには幼稚園（60名），小学校・中学校（400名）が，ペナンには小学校がある。いずれもスクールバスが巡回しているので通学は安全である。ペタリンジャヤは日本人住宅区になっているため，スクールバスの重点配備地区になっており，これに隣接するシャーアラムも早晩ペタリンジャヤ同様日本人が多く住むことになると思われるので子供の教育は心配ないだろう。

学校に要する費用は現在次の通りである。

| | | |
|---|---|---|
| 日本人学校 | 入学金 | M$80 |
| | 授業料 | M$200／月 |
| | 学校債 | M$1000～ |
| | スクールバス | M$50／月 |
| 英語系の学校 | 日本人学校より幾分安いと思われる。 | |

いづれも学校給食はない。文房具類は比較的豊富にあるが質は良くない。

3. 使用人など

日本人は大体お手伝さんを雇っている。給料はピンからキリまであり，掃除，洗濯を担当する通いのお手伝さんでM$100／月，一切全部の家事を任せる中国人になるとM$400／月（住込）になる。総じて若い人は定着性が悪く，中年者の方が安定していて良く働く。

庭師は庭の広さ等によって異るが，M$40／月位で週に一回庭の手入をする。

運転手はM$500／月位で，お手伝さんと運転手を同時に雇うとかなり苦しくなる。いづれの場合も身元のしっかりした者を雇わないと危険にさらされるので注意。

4. 自動車（交通事情）

クアラルンプールを中心に鉄道，バスは発達しているが，いづれもマレーシア語か中国語を解せないと利用は困難（ただし，少し馴れてくると結構日本人が利用しているケースが多い）。タクシーはすぐ拾えるが日本人と見ると法外な料金をふっかける運転手がいるので油断ができない。

したがって自動車は少くとも日本人専門家にとっては生活必需品になる。ただし，日本で現在使用中の車両を持ち込むのは考えものである。日本の国内の車両基準が厳しく，例

えば，排ガス装置は全く違う。だから，エンジントラブルが起ると即修理不能，使用不能という事態が起る。

マレーシアで人気のある車両はニッサン・サニー，トヨタ・カローラで中古車になっても値段が崩れない。近頃ではこれにホンダ・アコードが加わって日本御三家になっている。従って，日本でこれら三車種の型式のできるだけ旧い車両（要するに乗れれば良い）を捜し出して，マレーシアで乗り潰すつもりで持ち込むと案外得をするかも知れない。運転免許を新しく現地で取得するのは難しく，免許証は日本でとって，日本の免許（国際免許証ではない）を持って行くこと。

保険関係は日本の保険会社も数社入っており相談に応じてくれる。

5. 消費生活

日本人の住んで居る地域にはスーパー・マーケットやショッピング・センターがあり，品物も豊かに揃えている。日本商品（例えば梅干し，味噌，しょう油）も，かなり輸入されており，また，シンガポール産の日本商品が出まわっている。クアラルンプール市内には，日本商品を中心に品揃えしたスーパー・マーケットも一軒ある。ただし，日本から輸入された純日本商品（？）は，やはり日本に比べて高価で，約3倍位の値段がついた品物もある。

肉，野菜，卵，魚，果物以外の加工食品はほとんどが輸入品でオーストラリアを筆頭に，日本，カナダ，アメリカ，シンガポール，上海……といたるところの商品が並んでいる。野菜，果物は新鮮で安価（バナナが一房で200円，マンゴーが1ケ150円見当）であるが，これらはスーパーで買うよりも行商人の露店で買うのがこつとか。馴れてくると結構楽しく安価に生活できるらしい。

スーパーと青空市場をのぞいてみたが，日本人の食卓に供されるものは大体揃っていた。なかったのは山芋とタコぐらいなものか。日本酒まであったのには驚いた。値段的には知識が乏しいので断言はできないが，生鮮食料品は東京の2／3以下であろうと思われる。しかし，2，3年前に比べて物価上昇は激しいようだ。ただ国が国だけに季節感は全くない。米は現地産米があったが日本の米とは異っており質が悪い（握り飯が崩れないそうである）。

日本人は「日本クラブ」（Japan Club）でオーストラリア産米を共同購入をしている。

日本食のレストランは，クアラルンプール市内に「大黒」，「竹葉亭」，「勘八」，「葵」，「日本クラブ」の5軒があり，例えば「葵」を例にとると，ランチタイムサービスで「天婦羅定食」M$8（約800円），夜でM$12（約1200円）位で食べられる（日本レストランは，外食産業の中では一番高価である）。

衣料品については，仕立てその他安価であるが，縫製技術は雑でできるだけ日本で整えた方が賢明のようだ。特に，婦人の装飾肌着（ブラジャーやガードルの類）は数を余計に

準備するとよいだろう。それから子供の衣類が馬鹿に高い。紳士の背広やワイシャッは身に合ったものを日本で整えておくべきだが，背広はあまり着用しないので1着あれば充分だろう。マレーシアではサファリジャケットの上下が通常の仕事着で，これは現地で1着M$100位で仕立ててくれる。公式な宴席は長袖のバディックがまかり通るので，これまた現地で好みのものを求めれば良い（大体1枚M$15～M$50）。

その他，耐久消費材を含めて消費生活に必要なものはあらゆるものが豊富に市販されている。カメラ等は，免税店で現地調達した方が日本より安い場合がある（ポラロイド，コダックの製品は安かった）。

6. 光熱，水道

A. 電　　力

クアラルンプールを中心とする西部地域は国営電力局（NEB）のデーゼル発電によって家庭用230～240V（50Hz），工業用400～415V（50Hz）で供給されている。停電は多いが時間は比較的短い。スコールによる落雷を伴った停電は復旧が遅れる。供給電圧は安定しているとは云い難い。

家庭用ソケットは3ッ穴（1つはアース）で，差し込みは丸型と角型の2種類。電気料金の支払いを延滞すると情け容謝なく供給を止められる。

B. 家庭用燃料

プロパンガスと電気を利用するが，プロパンガスが安価で便利。ボンベは保証金を入れれば借りられるし，事故が多いのも日本と変らない。

C. 水　　道

上水道の普及は目を見張るものがあるが断水が多い。また，工事に無理があるためか水圧が低く，満足に出ない地区があるので要注意。生水は飲まない方が無難。下水道は普及が遅れている。激しいスコールが来ると低地は床下浸水の見舞を受けるので家選びの際には御要心。水道料の支払いも遅れるとたちまち水を止めに来る。

7. 保 健 衛 生

気候は一年中夏。雨季と乾季の区別は地元の人達に尋ねても明確な答は返ってこない。毎日律儀に表わせないスコールが一時間ばかりやってくる。傘はおよそ役に立たない。落雷が激しいのでスコールの中は出歩かない方が安全。湿度は低いので日本の夏と違って割合に楽である。年平均気温は28℃位で1月から12月まで一律。四季がないため，日本人は人によっては南洋ボケを起す。風邪をひき易く，夏風邪で全快しにくいので注意すること。

サソリやグリーンスネークという毒害虫が多いので草むらには入らない方が良い。緑色の細い紐を見たら用心すること。猛毒をもった蛇であることが多い。昔は靴をよく振ってから履けと云われた。サソリの用心のためであるが，今はそれ程神経質にならなくてもよ

い。しかし，用心はした方がよいだろう。

A. 医療施設

クアラルンプールやペタリンジャヤには総合病院が整っている。特にペタリンジャヤのマラヤ大学病院は規模も大きく，水準も高い。クアラルンプールには九大医学部を出た日本語を解する中国人医師（内科）が開業している。歯科医については日本人が２人開業しているし，出産の安全性は高い（日本人で出産した例も多い）。薬局は新薬，漢方とりまぜて色々あり，処方してくれる。日本の薬（例えば仁丹，サロンパス，目薬etc）も販売されている。

急病の場合は，救急車を呼ぶことも出来る。

B. 理容，美容

床屋は露天営業からエア・コン付店舗まで沢山ある。値段もM$１からM$１０まで色色で，一般にインド系が安く，中国系は高い。放っておくと勝手に店の都合の良いデザインにされるので細く注文をつけること。ホテルの床屋（大体，高いがM$10前後）は比較的安心してまかせられる。チップを渡す（始める前に…）と仕事が丁寧になる。

美容については残念ながら調査ができなかった。しかし，店舗の数はかなり多く目についた。今の処，薬品にまけたとか，禿坊主になったという事故は出ていないようである。

8. 娯　　楽

ゲームセンターは日本と同じようなものがクアラルンプール市内の目抜きにあった。パチンコはない。映画は盛んなようで夜の開演を待つ人の行列ができていた。フィルムは欧米，香港，台湾，インド，日本と国際色豊かに揃っている。

テレビは現在，国営（ラジオマレーシア）で２chの電波を出しており，パル方式でカラーが楽しめる。ただし，１日のうちの限られた時間のみで，近頃は時間帯の幅が拡がりつつある。

マレーシアは観光国でもあり，ペナン等の保養地があるため，日本人は割合にバカンスを楽しんでいるようである。シンガポールへの出入国は手続さえすれば割合簡単に行えるため，ショッピングに出かける人も多い。

# KERAJAAN SERI PADUKA BAGINDA
## MALAYSIA

## GENERAL CIRCULAR NO. 1 OF 1979

## TERMS AND CONDITIONS FOR FOREIGN EXPERTS SERVING IN MALAYSIA

### I. Introduction

The purpose of this Circular is to revise the existing terms and conditions provided to foreign experts in Malaysia. This revision is necessary in the light of experience gained in the past years and to effect general improvements in the administration of technical assistance programmes as a whole. This Circular will thus supersede General Circular No. 1 of 1969.

2. The provisions of this Circular will come into effect as from 1st January, 1979 and will be applicable to experts recruited and assigned to Malaysia after this date. Experts assigned to State Governments, Public Authorities and other Agencies such as Malaysian Industrial Development Authority, Federal Agricultural Marketing Authority, Malaysian Industrial Development Finance Limited, University of Malaya etc. will be governed by the provisions of this Circular. The payment of allowances and other remuneration to experts so assigned will be the responsibility of the respective agencies.

### II. Definition and Categories of Technical Assistance Experts or Projects

3. In general, the term 'expert' in this Circular refers to suitably qualified and experienced personnel provided under the Colombo Plan and other bilateral programmes to carry out specific assignments requested by the Malaysian Government. The terms of this Circular will not be applicable to those experts for which separate agreements between the Malaysian Government and other Countries/Agencies concerned have already been entered into e.g. the United Nations Development Programme and other United Nations Specialised Agencies, the Ford Foundation, the International Executive Service Corps, etc.

4. Three broad categories of technical assistance experts/projects are distinguished and covered by this Circular. These are:

(a) provision of a long-term expert defined as an expert whose period of assignment in Malaysia is not less than six months;

(*b*) provision of a short-term expert defined as an expert whose period of assignment is less than six months;

(*c*) provision of consulting services and surveys involving a single or a team of experts with final responsibility resting on the chosen consulting firm or appropriate body.

## III. Allowances and Other Privileges of Experts

### A. LONG-TERM EXPERTS

5. The allowances and other privileges provided to long-term experts serving in Malaysia are as follows:

(1) *Installation Grant*

A lump sum installation grant will be paid to meet the initial settling-in cost of the expert for the first 14 days of his arrival in Malaysia. Thereafter the expert will be paid housing and subsistence allowances as specified in (2) below with payment for the month following the first 14 days being calculated on a *pro rata* basis. The rates of installation grant are as follows—

| | |
|---|---|
| Single (or unaccompanied by wife) ... | $ 780 |
| Married and accompanied by wife ... | $1,100 |
| Married and accompanied by wife and one or two children not exceeding 18 years of age ... ... ... ... ... ... | $1,500 |
| Married and accompanied by wife and more than two children not exceeding 18 years of age ... ... ... ... ... | $1,900 |

The installation grant is a once-for-all payment appropriate to the expert's circumstances at the time of arrival and no other claims can be made following the arrival of his family or when an expert returns from overseas leave on extension of his assignment.

(2) *Housing and Subsistence Allowances*

The Malaysian Government will not be responsible for providing the expert with accommodation. However, at the request of the expert, the Agency to which the expert is assigned will assist him in finding suitable private accommodation for rental. In lieu of housing the expert will be paid the appropriate rates of housing allowances as set out below.

An expert assigned to Sabah or Sarawak may be given accommodation provided there are available unoccupied Government quarters. In such a case no housing allowance will be paid to the expert nor will he be charged the normal government rental on the quarters. The expert will, however, be responsible for payment of water, electricity and other charges incurred while in occupation of such premises.

Subject to the above paragraphs the rates of housing and subsistence allowances payable to an expert depending on his family status are set out as follows—

| | *Allowances for* | | *Total per month* |
|---|---|---|---|
| | *Housing* | *Subsistence* | |
| Single (or unaccompanied by wife) ... ... ... | $500 | $300 | $ 800 |
| Married and accompanied by wife ... ... ... | 550 | 500 | 1,050 |
| Married and accompanied by wife and one or two children not exceeding 18 years of age ... ... | 650 | 650 | 1,300 |
| Married and accompanied by wife and more than two children not exceeding 18 years of age ... ... | 650 | 750 | 1,400 |

NOTE:

(i) At the request of the donor Government/Agency, the housing and subsistence allowances may be combined and considered as a single allowance.

(ii) The housing allowance is viewed as a subsidy and payment will be effected through the donor Government/Agency.

(iii) For the purpose of payment of subsistence allowance, an expert who is married without children and is not accompanied by his wife will be deemed as if he is single.

(iv) Where both husband and wife are assigned as experts they will be paid housing and subsistence allowances as for an expert accompanied by wife plus an additional sum of $300 per month.

(v) Changes in the family circumstances of an expert should be reported immediately to the Head of Department concerned to permit adjustments to be made in respect of the expert's entitlement to allowances under this category. In cases of doubt the Department will refer the matter to the Economic Planning Unit (E.P.U.) for a decision which will be final.

(3) *Mileage and Other Allowances While on Duty*

Mileage allowances will be paid at the normal rates for journeys performed on official duties in accordance with the existing regulations governing transport and travelling claims in the State/Public Authority to which the expert is assigned. No claim is permitted for travelling between house and office. An expert who does not own or use a personal car for official duties will be reimbursed for the cost of actual transportation used and in conformity with existing rules applicable to Government officers. An expert on duty tour away from his Headquarters is eligible for a Day Allowance/Subsistence Allowance in the same way as Government Group A officers. The payment is governed by the relevant

regulations currently in force and at the rates applicable in Peninsular Malaysia, Sabah and Sarawak and of the Authority to which he is assigned.

For purposes of calculating an expert's claim for mileage and other allowances while on duty, an expert's salary will be deemed to be within the range of either $1,006-$1,804 or $1,805-$2,865 depending on the salary of his Malaysian counterpart in the State/Agency to which the expert is assigned.

(4) *Conveyance Advance*

An expert is eligible to apply for a loan for the purchase of a motor car. The terms for the granting of this loan are as follows—

(i) the loan is granted only once in the whole tenure of the expert including all extensions of his assignment;

(ii) the amount of loan applied for should not exceed the value of the vehicle to be purchased subject to a maximum amount of $7,000. The terms of the loan will be in accordance with existing regulations enforced in each of the States of Malaysia or as amended from time to time. If a second hand car is purchased a valuation certificate on the car must be attached with the application;

(iii) the loan is to be repaid in monthly instalments and to be settled in full before the expert departs from Malaysia. At the time of making the application for the loan the expert is requested to submit his proposal for the repayment of the loan;

(iv) during the period of the loan the expert is requested to ensure that the car is adequately covered by insurance and he is not permitted to sell or transfer his motor car without the prior permission of the Government;

(v) provision of sureties for the loan is not required but the Head of Department to which the expert is assigned should ensure that the Registration Card of the car is stamped with the words "Ownership Claimed by the Government" until the full loan has been repaid.

Application for motor car loan should be made in the usual forms and clearly identified with the words "EXPERT" for submission to and approval by the Secretary General to the Ministry/Head of Department/State/Public Authority concerned which will also ensure that the various conditions set out above have been and will be satisfactorily met.

(5) *Local Leave*

Local leave at the rate of 25 days a year will be granted to an expert. However, an expert assigned to an educational institution will not be eligible for leave other

than the normal school or college terminal holidays or with the prior permission of the authorities concerned. Such leave may be accumulated throughout the expert's tour of duty in Malaysia and may also be taken outside Malaysia. All local leave shall be taken within the period of the expert's assignment in Malaysia and an expert will not be permitted to accumulate his leave immediately prior to the completion of his assignment thereby in effect bringing forward his date of departure from Malaysia.

The Head of Department to which the expert is assigned or the officer designated by him is the approving authority for such leave and application for leave must be made in the usual form.

(6) *Medical Attention*

During his assignment in Malaysia, an expert and his family will be eligible for free medical and dental attention at Government hospitals. A letter of identity for this purpose will be issued to an expert seeking medical attention or dental attention.

No reimbursement will be made by the Government if the expert or his family elects to be treated by private practitioners. If admitted at a Government hospital the expert will be required to pay ward charges as laid down in Government regulations applicable to his Malaysian counterpart in the State/Department/Public Authority where the expert is assigned.

For purposes of determining class of ward, an expert's salary will be deemed to be within the range of either $1,006—$1,804 or $1,805—$2,865 depending on the salary of his Malaysian counterpart in the State/Department/Public Authority to which the expert is assigned. If an expert requests to be admitted to a higher class of ward than that to which he is eligible, he will be billed accordingly as is laid down in government regulations. Head of Departments must ensure that the appropriate hospital bills incurred by an expert are promptly settled.

(7) *Exemption from Income Tax*

An expert is exempted from Malaysian income tax on his official emoluments in respect of the period of assignment in Malaysia. An expert filling a cadre post will be required to pay taxes on the local portion of the salary paid to him.

(8) *Exemption from Customs Duty/Excise Duty and Sales Tax*

(*a*) Subject to the conditions enumerated in sub-paragraph (*d*), an expert will be exempted from the payment of customs duty/excise duty and sales tax in respect of bona fide personal effects and essential basic household equipment brought into or purchased in Malaysia for his own use or the use of

his dependents provided that such personal effects and equipment are brought into Malaysia or purchased locally within the period of six months from the date of his arrival in Malaysia. For the purpose of facilitating customs clearance of the said personal effects and equipment a list thereof must be presented to the Head of Department to which the expert is assigned;

(*b*) In addition and also subject to the conditions in sub-paragraph (*d*), an expert is exempted from the payment of *ad valorem* registration fee and customs duty/excise duty and sales tax in respect of one motor car only brought into Malaysia or purchased locally in Malaysia, provided that—

(i) such imported motor car has been used by the expert concerned in his country of orgin or the country of last posting, or

(ii) the motor car is purchased locally within the period of six months from the date of his arrival in Malaysia

(*c*) Any expert desiring to make purchases of duty free locally manufactured/assembled items must in the first instances apply for the approval of the customs through the Head of Department. Such purchases are only permitted if orders are placed with the manufacturers and delivery made from bonded warehouses. These purchases are allowed only in the first six months of the expert's stay in the country;

(*d*) The exemptions in sub-paragraphs (*a*), (*b*) and (*c*) are given subject to the following conditions—

(i) the aforesaid exemptions are given only once irrespective of whether the expert's assignment in Malaysia is extended beyond the original period of his assignment;

(ii) each expert is confined to only one unit or set or a reasonable number of any bona fide personal effects to be imported or purchased locally;

(iii) the personal effects and household equipment for which the aforesaid exemptions are given, if imported, should be from the country of origin or the country of last posting or acquired from any other country while on transit to Malaysia;

(iv) the personal effects and household equipment or motor car in respect of which the aforesaid exemptions are given will be cleared by and delivered from the Customs upon presentation there to of a Certificate of Exemption prepared and duly signed by the Head of Department to which the expert is assigned;

(v) the Head of Department to which the expert is assigned shall maintain a complete record of all the personal effects, household equipment and motor car so cleared and shall make such records available upon request for inspection by the Customs or other appropriate Government authority;

(vi) any personal effects or household equipment or motor car in respect of which the aforesaid exemptions are given, if disposed of in Malaysia during or at the end of the period of an expert's assignment in Malaysia shall be subject to the normal customs duty or other charges at the rate in force on the date the exemption was given and on the value at the time of disposal.

## B. SHORT-TERM EXPERT

6. A short-term expert will be paid an all-inclusive per diem allowance of $70 per day. He is not entitled to the allowances and privileges stated in paragraph 5, items (1), (2) and (4). He is however eligible to the facilities provided under paragraph 5, items (3), (5), (6), (7) and (8).

7. The despatch of an expert or mission by the donor Country/Agency to evaluate any project or request will not be considered as falling within the scope of this Circular and therefore no payment of allowancs or other privileges will be made to such expert besides the normal reception and other arrangements for his programme of visits, discussions, etc.

## C. CONSULTING SERVICES AND SURVEYS

8. Consulting services normally involve the provision of a team of experts from the donor Government, other bodies and firms for the purpose of carrying out feasibility, management and specific projects. The fee for such services will be paid by the donor Government/Agency and that individual experts provided under this arrangement will not therefore be eligible to any other allowances from the Government.

9. The Government will, however, provide the Consultants with local facilities including reasonable transport, office accommodation which are necessary in carrying out the assignment. All reports and materials obtained in the course of their assignment remain the property of the Government which has absolute discretion as to their use or disposal.

### IV. Equipment Associated with Provision of Experts and Services

10. All equipment brought into Malaysia associated with the assignment of the expert and consulting services will be exempted from customs and other duties. The Head of the Department/Authority concerned will ensure that such equipment is speedily cleared at the port of discharge. A Certificate for Exemption from

customs duty under this category, to facilitate customs clearance, is to be issued by the Head of Department/Public Authority concerned and copies of such Certificates are to be extended to the Treasury, Customs and E.P.U. A condition of this exemption is that the equipment is not to be resold in Malaysia but may be re-exported or left behind as a gift to the Government/Public Authority.

## V. General

11. An expert is not immune from the laws and regulations prevailing in Malaysia including communication regarding classified matters/documents. In the exercise of his duties he is required to give due regard to these laws. In the event of any legal action arising from the performance of his official duties he will be entitled to legal assistance in the same manner as a Government officer.

12. The Government of Malaysia will have the right after due consultation with the donor Government/Agency to request the recall of any expert whose work or conduct is unsatisfactory.

13. The terms of this Circular are subject to review from time to time in accordance with policy and regulations and they may be modified, amended or terminated by the Government.

TAN SRI DATO' ABDULLAH BIN AYUB,
*Chief Secretary to the Government,*
*Malaysia*

ECONOMIC PLANNING UNIT,
PRIME MINISTER'S DEPARTMENT,
KUALA LUMPUR,
*31st July, 1979*

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JABATAN CETAK KERAJAAN, KUALA LUMPUR

68083—27-7-79.

KERAJAAN SERI PADUKA BAGINDA
MALAYSIA

## AMENDMENT TO GENERAL CIRCULAR NO. 1 OF 1979

### TERMS AND CONDITIONS FOR FOREIGN EXPERTS SERVING IN MALAYSIA

The following amendments are to be incorporated in General Circular No. 1 of 1979 of 31st July, 1979 and effective from 1st January, 1979:

(i) Delete "ad valorem registration fee and" in paragraph 5 (8) (*b*).

(ii) Paragraph 5 (8) (*d*) (vi) now reads as follows—

"the goods of which the aforesaid exemptions are given cannot be sold or otherwise disposed of within a period of 3 months from the date of import or 6 months from the date of (local) purchase, provided that in the case of a motor vehicle if sold or otherwise disposed of shall be subject to the normal duties as the rate in force on the date the exemption was given and on the value at the time of disposal".

(iii) Last sentence of paragraph 6 now reads as follows—

"He is, however, eligible to the facilities provided under paragraph 5, items (3), (5), (6), (7), (8) (*a*) and (8) (*b*) (i) subject to item (8) (*d*)".

TAN SRI DATO' ABDULLAH BIN AYUB,
*Chief Secretary to the Government,*
*Malaysia*

ECONOMIC PLANNING UNIT,
PRIME MINISTER'S DEPARTMENT,
KUALA LUMPUR.
*1st November, 1979*

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