

LIST OF TRADE COMMITTEE MEMBERS FOR HEAT ENGINE TRADE GROUP
COMMON BASIC TRAINING PROGRAMME

Members & Designation

1. Shri.V.U.Purushothaman,
Joint Director(CT)
2. Shri.C.Venkataraman,
Works Manager
3. Shri.M.Srinath,
Service Engineer,
4. Shri.V.Mahadevan,
Service Engineer
5. Shri.R.Srinivasan,
Superintendent(Service)
6. Shri.P.R.Subramaniam,
Director.
7. Shri.Anbalagan,
Divisional Manager,
(Operations-North)
8. Shri.R.Janakiraman

Representing

Directorate of Employment &
Training, Madras-600005.

Govt. Automobile Central Workshop,
Motor Vehicle Maintenance,
Organisation, Madras-600032.

M/s. Greaves Cotton Company,
Limited, Madras-600001.

M/s.Mahindra & Mahindra Ltd.,
Madras-600002.

M/s. Motor Industries Ltd.,
Madras-600002.

Shri.Ramakrishna Mission
Technical Institute, Mylapore,
Madras-600004.

Pallavan Transport Corporation
Ltd., (Metro)
Madras-600002.

Retired Assistant Engineer,
M/s.Pallavan Transport,
Corporation, Madras-600002.

Secretary:

Shri.V.M.Raghavan,
Regional Director.

Regional Directorate of
Apprenticeship Training
Programme, Madras-600032.

Invitees:

1. Shri.M.K.Gayan,
Vice Principal
2. Shri.S.Kunjithapadam,
Deputy Director
3. Shri.V.V.Narayanan,
Training Officer

Central Training Institute,
Madras-600032.

Regional Directorate of
Apprenticeship Training
Programme, Madras-600032.

Regional Directorate of
Apprenticeship Training
Programme-Madras-600032.

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1 week all India Trade Test for standardisation of specialisation

MOJIB
TRAINING
ON
SELECTIVE
BASIC
EMPLOYMENT

Second year Training would be on modular system. The trainees could opt for different modules of specialisation on selective basis. Appendix III (a) The Design/Testing and certification of standard modules would be controlled by Board apart from this the Institutes could organise modules of local relevance for which testing and certification has to be done by local authorities.

48 weeks

3 weeks vacations

1 week all India Trade Test

BASIC TRAINING
(Uniform rotation in the 8 skill areas listed opposite)

48 weeks

BASIC MILLING

6 weeks

PLANT ENGINEERING

6 weeks

MACHINERY

4 weeks

DIESEL ENGINES

6 weeks

SHEET METAL
HAND FORMING
& WELDING

8 weeks

TRANSMISSION SYSTEMS

6 weeks

BASIC ELECTRICITY

6 weeks

SUSPENSION STEERING & BRAKE

6 weeks

RESTRUCTURED TRAINING FOR HIGHER TRADES GROUP AS INDUSTRIAL TRAINING INSTITUTES

Major Trade Group

Minor Trade Area: BASIC FORTIFICATION

Module: 1

Brief Course Content

Training period: 48 weeks
Training Period: 6 weeks.

Week Practical

Trade Theory

Induction Training

1. Orientation with shop layout machinery used in the trade - safety equipment-their use - safe handling of tools and equipment in the shop. Exercise on marking out. Location of the position of holes, scribing lines on chalked surfaces with the help of steel rule, dividers, hermaphrodite calipers and scribers. Dot punching the lines and holes. Drilling the holes. Importance of safety and general precautions. Linear measurements and its units. - scribers-method of scribing with the help of steel rule. Construction of dividers, calipers-inside & outside, hermaphrodite, their use and care. Centre punch and dot punch, construction and use. Use of marking media-hammers-types and use.
2. Exercises on chipping and filing flat and square to faces marking out for saw cuts with the help of hermaphrodite-calipers. Sawing along the lines with certain limits of straightness. Removing of sawn strips. Filing and cleaning to complete and finish the gap to dimensions. Measuring with calipers and steel rule. Hacksaw frame and back-saw blades their construction, description, use and care. Surface gauge, vee-blocks, marking off table, engineers square, bench vice and vice clamps.
3. Exercises on Marking out according to simple blue prints, using surface gauge, steel rule, engineers square and marking off table. Finding the centre of a round bar with the help of "V" blocks and surface gauge. Marking out lines by parallel edges. Chipping suitably in vice jaws for sawing to dimensions. Sawing various metals of different sections. Practicising blind hammering. Chisels-types and use. Files-types, grade, cut, section and lengths. Care and use of various common files. File cards and its use. Convexity of files, its reasons. Proper speed for steady and accurate filing, right method of fixing file handle. Angle plates, parallel blocks their uses in marking out practice.
5. Chipping and filing the edges flat and square to the faces. Checking up with engineers square. Filing square the four edges. Use of vice-clamps and checking up overall dimensions with outside calipers and steel rule. Exercise on preparation of one of the flat surface as master surface. Filing two of the adjoining sides square to the master surface as well as between each other. Surface plate-construction, use and care "C" clamps and parallel clamps. Vernier caliper and Vernier height gauge-their construction. Principle-least count. Care and maintenance. Drills and drilling Drill and its terms-types as per shanks, flutes and system of size Drill angles and their importance. Drill coolant used for drilling. Drill angle gauge, construction and use. Special type drills.



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| <p>1. Filing flat the work piece, squaring edges in relation to the master face. Marking out the position of drill holes to tapping sizes and dot punching. Deepening the points with centre punch and checking up concentricity for true drilling. Internal threading with threading taps. Cutting of external threads with threading dies. Preparing insert and fitting a slot. Working to close tolerances. Checking and measuring with Vernier calipers and outside micrometer. Identification of threads-use of thread gauge.</p> | <p>3. Cutting-speeds and feed for efficient drilling. Setting of correct speeds for proper drilling on drill machine. Combination set sq 1. Square head 2. Protractor head 3. Centre head and their use in marking out, checking and setting job Taps, size of taps, tapping, tapping of blind holes-reasons for broken taps, external threading-Dies-types commonly used-solid and split. Types of stocks and handles. Method of threading with stock and die. Threading lubricants. Setting the threading die. micrometer outside-its description and use. Application of V threads and use of ThreadGauges inside micrometer. Depth gauge their constructional features use and care. Brief description of dial test indicator-various uses of checking the truth of flat and round surfaces.</p> |
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6. Practice on grinding chisels, drill and dot punches. Exercises involving preparation of one of the flat surfaces as master surface, filing two of the adjoining sides, square marking out with vernier height gauge-drilling open and file fitting of finished pieces against opening. Use of Vernier caliper and micrometer for checking. Selection of tools-use of different types of Pullers, spanners-stud extractor stud remover, Pliers and screw Drivers

ACHIEVEMENTS

- On completion of this module, the trainee should be able to
1. Use Fitters hand tools
 2. Do marking out according to blue prints
 3. Do filing, Hack sawing-chipping and drilling and simple fitting
 4. Read and use precision instruments as prescribed in the syllabus
 5. Use protractor head to an accuracy of 1 degree and File and finish to an accuracy of ± 0.1 mm



COMMON BASIC TRAINING PROGRAMME

Major Trade Group: Heat Engine Trade
 Minor Trade Area: Measurements

Training Period: 48 weeks
 Training period: 4 weeks

Module II

TRIAL COURSE CONTENTS

Week No. Practical	Trade Theory
1. Measuring lengths and diameter of objects, using steel rule, outside and inside calipers-finding centre of round bar marking line on flat piece-drawing parallel lines to the given plate edge-marking square on cylindrical objects and marking keyways on shafts using Jenny calipers & scribing block & combination set (objects to be chosen: kingpins/ Shackle pins/ Shackle bushes/ Axle Shafts/ Flat pieces/ Round bar.	Introduction to : - Measuring of objects and their importance in the trade-measuring standards normally used-measurements of Units CGS, FPS and MKS system steel construction and use of steel rule graduations in metric and inch-Description of try square, dividers Jenny calipers, Calipers, combination set and scribing block-function and uses-Care and maintenance of the marking tools.
2. Measuring diameters of journals and pins using outside micrometer-checking error on Micrometer with standard length pieces-Measuring inside diameters of bores using inside micrometers-Measuring depth of stepped bores-using depth micrometer and flatness using dial micrometer(object to be chosen: Crank pins/Main journals/king pins/cylinder liners/cylinder bores/wheel cylinder bore/Connecting rod and main bearing parent bore/valve guide/combustion chambers	Micrometers-internal & external-construction and types-their importance in measuring objects-depth micrometer,Dial micrometer-their description and use-errors on micrometers and rectification-methods - care and maintenance of micrometers to maintain accuracy
3. Measuring diameter of cylinder bores using vernier calipers-measuring dimensions of crank pins and main journals using O.C calipers and vernier calipers-measuring angles using vernier Bevel protractor (Valve angles can be measured) Measuring water pump shafts with vernier micrometer (outside) and valve guide bores using vernier Micrometer (inside)	Vernier calipers-Description and function and use-importance of vernier scales and graduations of inch and metric-Vernier micrometer -construction graduation & its application-vernier Bevel protractor - construction function & use.Different applications care and maintenance of the above to maintain accuracy.



Week No. Practical

Theory

4. Measuring wear in cylinder Bore using cylinder bore gauge & telescopic gauge - Measuring wear in journals of cam shaft with dial Test Indicator.
 Measuring depth of valve port and height of valve guides in cylinder head using vernier depth gauge - Measuring taper bore using small hole gauge - measuring timing distance in flange mounted single cylinder F.I pump using depth gauge

Importance of dial test indicator - description and function and its use - care and maintenance
 Vernier depth gauge and ordinary depth gauge - description - function and use - care and maintenance

Use of small bore gauge in measuring small bores in cylinder block - care and maintenance

ACHIEVEMENTS

On completion of the Module the trainees should be able to

1. Use steel rule and calipers and measure objects
2. Measure precision objects with the help of vernier instruments
3. Measure precision objects with the help of Micrometer
4. Use depth gauges and dial test indicators & small bore gauges in measuring objects.



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COMMON BASIC TRAINING PROGRAMME

Major Trade Group: Heat Engine Trade Training Period 48 weeks
Minor Trade Area: Sheet Metal and Forging & Welding Training Period: 8 weeks

Module III Brief Course Content

Week No.	Practical	Trade Theory
1.	Introduction to the Trade-Importance of acquiring skill Practice in reading steel rule (Metric & English) Scribing of straight lines, bisecting of straight lines (on sheet metal) using marking tools.	Importance of safety and general precautions. Importance of the trade & what is related instructions-metals and non-metals. Classification and uses of sheet metals.
2.	Practice in drawing simple geometrical shapes. Practice in cutting sheet metal to these shapes. Practice in marking and cutting of sheets to various angles.	Mild steel and non-ferrous metals. Marking and layout tools-dividers, trammels.
3.	Lap joints-cutting with different types of snips, cutting of notches, inside and outside curves.	Various types of snips & shears and their uses-Table model shears Description-care and maintenance
4.	Soldering of joints & Sleeves on pipes-use of soldering flux flaring of small tubes/pipes with pipe flaring tool. Cutting and bending of pipes-joining pipes-fitting unions and sleeves on pipes.	Sheet metal workers tool bench vice, soft jaws, clamps, pliers bench stakes, holders-various types and their uses.
5.	Bending sheet metal to 90 degrees using wooden mallet, clamps On bench. Practice in filing, joining parts of a box bending sheet metal to angles other than 90 degrees practice in rivetting plates and joints.	Files-various types, cut, grade, length and classification. Files used on soft metals. Bending of solder-use of fluxes their effects on different metals. Rivets Types-riveted joints-uses.
6.	Preparation of forge-lighting maintenance and up-keep of forge, method of heating iron. Use of various fire zones, hammering practice forging sq. to sq. (Use of hand tools and anvil)	Bellows-blowers & their working-Forge Parts and their uses. Anvil & other common hand tools-brief description, their use and maintenance.



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| <p>1. 2.</p> <p>7. Introduction to welding
types of jobs made by the tra-
inees-safety in handling tools
Equipment setting gas appara-
tus-lighting and adjustment
of oxyacetylene flame & fusion
runs with and without filler
rod on 2 to 3 mm thick MS sheet
in flat position (Gas)
IS 1393-1961- IS 817-1966
IS 818-1968 -IS 1175-1967</p> <p>8. Edge joint with or without
filler rod on MS sheet (2 to
3mm) Square Joint MS sheet
(1.6mm) -Open corner joint
MS sheet 2 to 3 mm in flat
position gas
IS 1393-1961</p> | <p>3.</p> <p>Introduction to the welding trade-
importance of welding in industrial
development</p> <p style="text-align: right;">-safety</p> <p>procedures in gas welding-elementa-
ry knowledge of first aid.
Description and use of welding
tools and equipment-methods of
shaping & joining metal-Riveting
Bolting, soldering, brazing & welding</p> <p>Basic concept of welding-fusion
pressure-surface Bonding-welding
methods-types of welding joints
and positions-welding process and
basic requirements-source of heat
Electric Arc and Gas welding-diffo-
rences and their application in
automobile-gas flame combination-
flame temperature and application
system of oxy-acetylene welding-
Brief description of gas cylinders
Regulators and blowers</p> |
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ACHIEVEMENTS- On completion of this module

Trainees should be able to

1. Use various hand tools
2. Mark off, cut sheet metals and make joints
3. Solder the joints
4. Bend sheet metal with hand tools
5. Do simple rivetting
6. Make square through forging
7. Do simple welding (gas) in flat position.



Major Trade Group: Heat Engine Trade Training Period: 48 weeks.
 Minor Trade Area: Basic Electricity Training Period: 6 weeks.
 Module: IV

BRIEF COURSE CONTENT

Week No.	Practical	Trade Theory
1.	Orientation, familiarization with shop layout, hand tools & machines - safety precautions & first aid-making joints on single & stranded conductors	Safety precautions and first aid - care and maintenance of tools. Common terms used in the trade - conductors and insulators - Selected symbols and signs used in Electrical Technology.
2.	Soldering practice on wire joints, soldering and crimping of lugs with wire ends, verification of Ohm's law.	Types of solders and fluxes required for soldering aluminium & Copper conductors - Introduction to equipments used for soldering - Ohm's Law and its application - Simple problems on Ohm's law.
3.	Formation of simple electrical circuits-series circuits and parallel circuits - Measuring insulation resistance and earth resistance.	Simple electrical circuit - essential requirements of any electrical circuit. Series and parallel circuits - different types of resistance & fuses - earthing - Fuses as protective devices.
4.	Measurement of current, voltage power and energy by using Voltmeter, ammeter, Wattmeter.	Work power and energy, their calculations in simple electrical circuits - simple problems. Identification of AC-DC motors.
5.	Practice in fixing & connecting electrical accessories such as switches, holders, fuses plug sockets on T.W. boards. Making a simple testing board.	Types - grades and sizes of insulated wires and cables, their proper selection and use. Materials used in simple domestic wiring.
6.	Practice in removing and fitting the batteries - Cleaning and maintenance of Batteries - Testing the Batteries with Hydrometer & cell Tester - Topping up Battery with Distilled water - Connect Batteries for Charging -	Common electrical terms such as AC DC Inductance, capacitance, frequency, phases - Battery - specifications and constructional details - Description of batteries - care and maintenance of batteries.

Achievements:

- On completion of this module, the trainees should be able to:
1. Protect himself from electrical shock and observe electric safety precautions while working on machines.
 2. Form simple electrical circuits, operate basic controlling protective electrical devices e.g. Main switches fuses - select and connect common electrical accessories.



COMMON BASIC TRAINING PROGRAMME

Major Trade Group: Best Engine Trades
 Minor Trade Area: Petrol Engines

Training period 48 weeks
 Training Period 6 weeks

MODULE V

BRIEF COURSE CONTENT

Week No. Practical

Trade Theory

1. Familiarisation with the hand tools, machinery and type of work done in the trade. Safety precautions in the use of hand tools and equipment on shop floor. Safety equipment and its use.

Introduction to the trade safety and general precautions to be observed in the trade in storing and handling fuels, brake fluids, oil, greases. Description of safety equipment, its purpose and use. Elementary first aid.

2. Use of jacks, hoist & horses in the shop. Selection of materials for gaskets & packings. Locking devices and their uses in the trade. Checking fuel-oil and water in petrol engines and changing engine oil.

General description, working principle, classification and characteristics of petrol engines. Comparison between petrol & diesel engines types of materials used in packings and gaskets - types of locking devices their places of use in petrol engines.

3. Identifying various petrol engines auxiliaries. Practice on starting and stopping of the engine. Adjusting speeds in idling and running conditions. Running the engine on load and checking temperature, fuel, oil pressure and speed. Testing engine compression and vacuum with gauges.

Precautions in starting, running and stopping a petrol engine. Difference between 2 stroke and four stroke engines. Brief description of engine auxiliaries and functions of various gauges used with the engine.

4. Dismantling an old 2 stroke petrol engine. Examine its parts their materials and other working details. Assemble the engine.

engine details cylinder heads, cylinder and cylinder liners, their materials, wear and causes. Methods of reconditioning worn cylinders. Pistons piston rings, types-functions and maintenance.



Week no. Description

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| <p>5. Dismantling an old 4 stroke petrol engine. Examine inner details of moving parts, their materials and other working details. Assemble the engine.</p> | <p>Brief functions of fly wheel and clutch assembly. Valve & valve operating system, valve timing diagram cam Shaft & timing diagram, camshaft & timing gears and importance of timing-mark. Pappets and valve guides. Importance of correct tappet clearance.</p> |
| <p>6. Clean spark plugs, adjust correct gaps and refit, service oil filters, air cleaner and change oil in engine. Start the engine and carryout minor adjustments on carburetter.</p> | <p>Ignition system of petrol engines purpose of induction coil, distributor and spark plug. Elementary functions of the Carburetter and adjustments. Importance of correct air-fuel mixture on the engine performance</p> |

ACHIEVEMENTS

On completion of the Module the trainees should be able to:-

1. Identify various engine parts and auxiliaries.
2. Dismantle and assemble old 2 & 4 stroke petrol engines
3. Start and stop engine and carryout minor adjustments repairs and servicing of the engine



Week.No.	Practical	Trade Theory
6.	Dismantling & assembling oil pump, servicing oil filters, air cleaners-changing oil in engine, repairs to oil flow pipe lines and unions. Flushing of cooling system in Engine.	Types of fuel filters, cleaning and replacement, procedure of removing air lock from diesel line, maintenance procedure and maintaining engine log book.

Achievements:

On completion of this Module the trainees should be able to:-

1. Clean, lubricate and ~~check~~ check different assemblies.
2. Decarbonise the cylinder head. Adjust tappets and start the engine.
3. Measure cylinder wear, piston clearances
4. Service oil filters, air cleaners, oil pump, cooling system
5. I dismantle and assemble engine components

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Week.No.	Practical	Trade Theory
6.	Dismantling & assembling oil pump, servicing oil filters, air cleaners-changing oil in engine, repairs to oil flow pipe lines and unions. Flushing of cooling system in Engine.	Types of fuel filters, cleaning and replacement, procedure of removing air lock from diesel line, maintenance procedure and maintaining engine log book.

Achievements:

On completion of this Module the trainees should be able to:-

1. Clean, lubricate and ~~check~~ check different assemblies.
2. Decarbonise the cylinder head. Adjust tappets and start the engine.
3. Measure cylinder wear, piston clearances
4. Service oil filters, air cleaners, oil pump, cooling system
5. 1 dismantle and assemble engine components

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COMMON BASIC TRAINING PROGRAMME

Major Trade Group: Heat Engine Trades
Minor Trade Area: Suspension, Steering
& Brakes

Duration: 12 weeks
Duration: 6 "

Module: VII

PAINT COURSE CONTENT

Week No.	Practical	Trade Theory
1.	Practice in Jacking up the Vehicle - removing wheel assembly - Dismantling, cleaning, reassembling and refitting Wheel assembly - Checking and retatching puncture in a tube - Checking and inflating tyres to recommended pressure - rotating wheels in a vehicle - care and Lubrication of front suspension Units.	General description of conventional suspension system - wheels and tyres and tubes - sizes and applications - leaf and coil springs - shock absorbers - description and function - care and maintenance.
2.	Checking alignment of frame, wheel base and track - removing and refitting a leaf spring as assembly in a vehicle - changing rubber bushes of shock absorbers and independent front suspension Lower & Upper Arms - removing, cleaning, lubricating, and adjusting front wheel bearings.	Definition of wheel base and track - description of frame - types and functions I.F.O systems - types - Description and functions care and maintenance.
3.	Inspection, Lubrication, and adjusting of steering Linkages for wear and play - removing, cleaning, refitting and adjusting. Tie rod ends. Removing and refitting steering boxes from Vehicle - checking and refilling oil in steering box.	Lay out of steering Assembly and linkages in different vehicles - name & function of each part - description and function of steering boxes - Lubrication of Linkages & Steering box.
4.	Checking & adjusting camber angle and Toe in - checking of king pin angle and castor angle with wheel alignment gauge - checking and adjusting steering wheel play, rack lash - and steering column and play.	Steering geometry - ackerman angle - castor, camber, king pin inclination - Toe in - Toe out on turns - Description and purpose - checking and correcting with instruments - common steering troubles and remedy.



5. Checking and adjusting hand brakes and pedal play in foot brakes -Topping up master cylinder-Removing, dismantling, cleaning, reassembling and adjusting wheel brake Assembly

General Layout of Braking system-Mechanical and Hydraulic Brakes - Purpose of hand brakes - Description, function and care and maintenance of each part of the braking system.

6. Removing a Master cylinder and wheel cylinder from a vehicle-Dismantling, cleaning, reassembling with new replacement kit and testing on Bench-refitting the same in the vehicle, bleeding and balancing brakes.

Principle of Hydraulic Brakes-Description and working of Master Cylinder and types in use - Purpose of check valve and compensating port-description and working of wheel cylinder and types in use -Common troubles in brake system and their remedy.

Achievements On completion of this module-

The trainee should be able to :-

1. Jack up a vehicle and remove and refit wheel assembly
2. Repair a puncture in a tube and refit the tube in the tyre
3. Check alignment of front wheels and frame
4. Remove and refit steering box and lubricate steering joints
5. Check and adjust hand and foot brakes
6. Dismantle Master cylinder and wheel cylinder units and reassemble them.



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COMMON BASIC TRAINING PROGRAMME

Major Trade Group: Heat Engine Trades

Duration: 48 weeks

Minor Trade Area: Suspension, Steering
& Brakes

Duration: 6 "

Module: VII

BRIEF COURSE CONTENT

Week No.	Practical	Trade Theory
1.	Practice in Jacking up the Vehicle - removing wheel assembly - Disassembling cleaning, reassembling and refitting wheel assembly - Chocking and jacking puncture in a tube - Checking and inflating tyres to recommended pressure - rotating wheels in a vehicle - care and Lubrication of front suspension Uprts.	General description of conventional suspension system - wheels and tyres and tubes - sizes and applications - leaf and coil springs - shock absorbers - description and function - care and maintenance.
2.	Checking alignment of frame, wheel Base and track - removing and refitting a leaf spring as assembly in a vehicle - changing rubber bushes of shock absorbers and independent front suspension Lower & Upper Arms - removing cleaning, lubricating, and adjusting front wheel bearings.	Definition of wheel base and track - description of frame - types and functions I.E.S. systems - types Description and functions care and maintenance.
3.	Inspection, Lubrication, and adjusting of steering Linkages for wear and play - removing, cleaning, refitting and adjusting. Tie rod ends. Removing and refitting steering boxes from Vehicle - checking and refilling oil in steering box.	Lay out of steering Assembly and linkages in different vehicles - name & function of each part - description and function of steering Boxes - Lubrication of Linkages & Steering box.
4.	Checking & adjusting camber angle and Toe in - checking of king pin angle and caster angle with wheel alignment gauge - checking and Adjusting steering wheel play, Rack lash - and steering column and play.	Steering geometry - ackerman angle - caster, camber, king pin inclination - Toe in - Toe-out on turns - Description and purpose - checking and correcting with instruments - common steering troubles and remedy.



COMMON BASIC TRAINING PROGRAMME

Major Trade Group: Heat Engine Trades

Duration: 48 weeks

Minor Trade Area: Transmission systems

Duration: 6 weeks

Module: VIII

BRIEF COURSE CONTENT

Week No.	Practical	Trade Theory
1.	Dismantling a clutch assembly, clean and inspect parts for wear and damage. Changing pressure plate and fly wheel relining a clutch plate.	Description of single plate and multiplate clutches, functions of different parts of the clutch assembly. Material for linings. Bonded linings and rivetted linings. Precautions while relining the clutch plates.
2.	Assembling of pressure plate, assembly with springs, testing the springs for uniform tension, adjusting the fingers and aligning clutch with flywheel.	Purpose of Damper springs in the clutch plate, freoplay in the operation of clutch. Function of the pilot (spigot) bearing. Causes and remedies of clutch troubles.
3.	Stripping a 4 speed and 3 speed sliding mesh gear box, cleaning, inspecting and assembling.	Purpose of the gear box, gear ratios and function of a sliding mesh gear-box. Common troubles and their remedies. Lubrication system in a gear box.
4.	Stripping a synchromesh gear box, cleaning and inspecting parts. Assembling and testing for correct functioning.	Description and advantage of (1) Constant mesh gear box (2) Synchromesh gear box. Common troubles and remedies. Types of synchromesh gear box and their special features.
5.	Cleaning, assembling gear shift mechanism, changing oil in the gear box. Studying different types of oil seals and bearings used in the gear boxes. Studying the gear ratios in the gear box.	Functioning of the gear shift lever. Type of lubricating oil used in gear boxes. Types of seals and bearings used in gear boxes. Material used for gears, back lash of gears. Inspection of old gears for determining their usage.



Week No.	Practical	Trade Theory
6.	Removing, cleaning and refitting U joints. Propeller shaft. Dismantling an old final drive/rear axle-assembly. Clean & inspect parts. Cut packings and gaskets. Remove crown wheel pinion and bearings, clean parts. Check tooth contact in the crown and pinion and adjust backlash. Assemble rear axle assembly and study its functioning.	Working of a rear axle. Its lubrication and reasons for oil in the wheel drums. Description and function of final drive. Functioning of differential gears. Tooth contact and backlash adjustments in rear axle assembly. Introduction to power take off systems, common troubles in the transmission system and remedies.

Achievements: On Completion of this module

The trainee should be able to:

1. Refine a clutch plate and adjust clutch play.
2. ^{Do} Minor repairs to clutch, gear box and rear axle.
3. Check oil seals, bearings and gears for their serviceability.
4. Check differential tooth contact and backlash.
5. Follow safety precautions while performing the above jobs.

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