

TB100, TB110, TB120, TB120 MUDDER REPAIR MANUAL COMPLETE CONTENTS

SECTION 00 - GENERAL	2
SECTION 10 - ENGINE	3
SECTION 18 - CLUTCH	7
SECTION 21 - TRANSMISSION SYSTEMS	8
SECTION 23 - FRONT AXLE TRANSFER BOX	10
SECTION 25 - FRONT AXLE - FOUR WHEEL DRIVE	10
SECTION 27 - MECHANICAL REAR WHEEL DRIVE	11
SECTION 31 - POWER TAKE-OFF	12
SECTION 33 - BRAKING SYSTEM	12
SECTION 35 - HYDRAULIC SYSTEM	13
SECTION 41 - STEERING SYSTEM	15
SECTION 44 - FRONT AXLE - TWO WHEEL DRIVE	16
SECTION 55 - ELECTRICAL SYSTEMS	16

The following pages are the collation of the contents pages from each section and chapter of the TB100, TB110, TB120, and TB120 Mudder Tractor Repair manual. Complete Repair part # 87046217.

The sections used through out all New Holland product Repair manuals may not be used for each product. Each Repair manual will be made up of one or several books. Each book will be labeled as to which sections are in the overall Repair manual and which sections are in each book.

The sections listed above are the sections utilized for the TB100, TB110, TB120, and TB120 Mudder Tractors.

SECTION 00 - GENERAL

BOOK 1 - 87046218

Chapter 1 - General

CONTENTS

Description	Page
HEALTH AND SAFETY PRECAUTIONS	2
ACIDS AND ALKALIS	3
ADHESIVES AND SEALERS - see Fire	3
ANTIFREEZE - see Fire, Solvents e.g. Isopropanol, Ethylene Glycol, Methanol.	3
ARC WELDING - see Welding.	4
BATTERY ACIDS - see Acids and Alkalis.	4
BRAKE AND CLUTCH FLUIDS (Polyalkylene Glycols) - see Fire.	4
BRAZING - see Welding.	4
CHEMICAL MATERIALS - GENERAL - see Legal Aspects.	4
DO'S	4
DO NOTS	5
CORROSION PROTECTION MATERIALS - see Solvents, Fire.	5
DUSTS	5
ELECTRIC SHOCK	5
EXHAUST FUMES	6
FIBRE INSULATION - see Dusts.	6
FIRE - see Welding, Foams, Legal Aspects.	6
FIRST AID	6
FOAMS - Polyurethane - see Fire.	6
FUELS - see Fire, Legal Aspects, Chemicals - General, Solvents.	7
GAS CYLINDERS - see Fire.	7
GENERAL WORKSHOP TOOLS AND EQUIPMENT	8
LEGAL ASPECTS	8
LUBRICANTS AND GREASES	8
PAINTS - see Solvents and Chemical Materials - General.	9
SOLDER - see Welding.	9
SOLVENTS - see Chemical Materials - General Fuels (Kerosene), Fire.	10
SUSPENDED LOADS	10
WELDING - see Fire, Electric Shock, Gas Cylinders.	10

SECTION 10 - ENGINE

BOOK 1 - 87046218

Chapter 1 - Diesel Engines

CONTENTS

Section	Description	Page
	Specifications	3
	Lubricants	11
	Torque Values	12
	Special Tools	13
	Grease and Sealants	13
	Fault Finding	14
	Description and Operation	19
	Cylinder Head Assembly	19
	Camshaft Assembly	19
	Crankshaft Assembly	19
	Connecting Rods	19
	Pistons	19
	Manifolds	20
	Cylinder Block Assembly	20
	Timing Gears	20
	Lubrication System	21
	Diesel Engine Strip-down	23
	Separating the Tractor	24
	Disassembly and Overhaul	32
	Cylinder Head	37
	Rocker Shaft	37
	Valve and Spring Assembly	38
	Valve Inserts	40
	Valve Guides	42
	Valve Springs	43
	Rocker Shaft	44
	Cylinder Head	45
	Engine Front Cover and Timing Gear	46
	Timing Gear	47
	Oil Pan	53

SECTION 10 - ENGINE

BOOK 1 - 87046218

Chapter 1 - Diesel Engines (Continued)

CONTENTS

Section	Description	Page
	Connecting Rods, Bearings, Pistons, and Rings	53
	Connecting Rod Bushings	56
	Cylinder Block	58
	Cylinder Bore	60
	Sleeves	62
	Balancer	66
	Main Bearings	66
	Flywheel	66
	Crankshaft	66
	Balancer	67
	Main Bearing	69
	Flywheel	70
	Rear Cover Plate	71
	Oil Pump	73
	Oil Filter Support Assembly	75
	Crankshaft	77, 80
	Balancer Gear	78
	Timing Gear	79
	Camshaft	82
	Camshaft Bearings	83
	Intake Manifold	84, 85
	Exhaust Manifold	84, 86
	Engine Testing	87
	Compression Test Procedure	87
	Compression Test Readings	87
	Engine Break-in (Low Hp Application)	87
	Engine Break-in (Other Than Low Hp Application)	88

SECTION 10 - ENGINE

BOOK 1 - 87046218

Chapter 2 - Engine Cooling System

CONTENTS

Section	Description	Page
	Specifications	2
	Fault Finding	3
	Description and Operation	4
	Cooling System Overhaul	5
	Radiator	6
	Thermostat	8
	Temperature Warning Sender	8
	Water Pump	9

SECTION 10 - ENGINE

BOOK 1 - 87046218

Chapter 3 - Air Cleaning System

CONTENTS

Section	Description	Page
	Specifications	2
	Torque Values	2
	Fault Finding	2
	Description and Operation	3
	Air Cleaner Assembly Filters	4
	Inner Element	6

SECTION 10 - ENGINE

BOOK 1 - 87046218

Chapter 4 - Fuel System

CONTENTS

Section	Description	Page
	Specifications	2
	Torque Values	3
	Special Tools	3
	Fault Finding	4
	Diesel Engines	4
	Description and Operation	8
	Fuel System	8
	Injectors	17
	Fuel Injection Pump – Adjustments	17
	Idle Speed Adjustment	18
	Maximum No-load Speed Adjustment	19
	Special Tools	21
	DP203 Series Fuel Injection Pump	23
	DP203 Series Fuel Injection Pump Shaft Lock Timing	27
	Installation	30
	Fuel Injectors	31
	Overhaul	31
	Fuel Injector Testing	33
	Inspection and Repair	36
	Electric Lift Pump	39

SECTION 10 - ENGINE

BOOK 1 - 87046218

Chapter 5 - Turbocharger

CONTENTS

Section	Description	Page
	Specifications	2
	Fault Finding	3
	Turbocharger	6
	Overhaul	8

SECTION 18 - CLUTCH

BOOK 1 - 87046218

Chapter 1 - Single Clutches

CONTENTS

Section	Description	Page
	Specifications	2
	Torque Values	2
	Special Tools	3
	Fault Finding	3
	Description and Operation	5
	Overhaul	7
	Inspection and Repair	8
	Installation	9
	Adjustments	9

SECTION 18 - CLUTCH

BOOK 1 - 87046218

Chapter 2 - Servicing Clutch Associated Parts

CONTENTS

Section	Description	Page
	Clutch Pilot Bearing	2

SECTION 21 - TRANSMISSION SYSTEMS

BOOK 1 - 87046218

Chapter 1 - 8 x 2 Transmission

CONTENTS

Section	Description	Page
	Specifications, Tightening Torques and Special Tools	2
	8 x 2 Non-synchromesh Transmission	2
	Torque Values	2
	Special Tools	3
	Ground Speed	3
	Transmission – Description and Operation	6
	Introduction to Transmission Overhaul	8
	Gear Shift Levers and Covers – Overhaul	8
	Neutral Start Switch	10
	Transmission Front End – Overhaul	10
	Complete Transmission Overhaul	13
	Inspection and Repair	16

SECTION 21 - TRANSMISSION SYSTEMS

BOOK 1 - 87046218

Chapter 2 - 16 x 4 Dual Command (Dual Power) Transmission

CONTENTS

Section	Description	Page
	Specifications	2
	Torque Values	2
	Special Tools	2
	Fault Finding	3
	Dual Command Transmission – Description and Operation	5
	Under-Drive Clutch	9
	Planetary Gear Set – Overhaul	10
	Disassembly	12
	Planetary Gear Set Shimming Procedure	17

SECTION 21 - TRANSMISSION SYSTEMS

BOOK 1 - 87046218

Chapter 3 - Reduction Gearbox Assembly

CONTENTS

Section	Description	Page
	Specifications, Tightening Torques, and Special Tools	2
	Reduction Gearbox – Description and Operation	3
	Reduction Gearbox Overhaul	5

SECTION 23 - FRONT AXLE TRANSFER BOX

BOOK 1 - 87046218

Chapter 1 - Front Axle Transfer Box

CONTENTS

Section	Description	Page
	Specifications	2
	Clearances and Tolerances	2
	Shim Thickness Available	2
	Oil Capacity	2
	Special Tools	2
	Torque Values	2
	Description and Operation	3
	Overhaul	5

SECTION 25 - FRONT AXLE-FOUR WHEEL DRIVE

BOOK 1 - 87046218

Chapter 1 - Four Wheel Drive

CONTENTS

Section	Description	Page
	Specifications	2
	Clearances and Tolerances	2
	Shim Thickness Available	2
	Oil Capacity	3
	Special Tools	3
	Torque Values	3
	Description and Operation	4
	Adjustment	6
	Track Width	8
	Hub and Planetary Reduction Gear Assembly - Overhaul	9
	Axle Shafts - Overhaul	17
	Steering Swivel Pin Bearings - Overhaul	21
	Steering Cylinder and Track Rods – Overhaul	26
	Front Axle – Removal and Installation	30
	Differential Crown Wheel and Pinion Assembly – Overhaul	33
	Drive Shaft - Overhaul	46

SECTION 27 - MECHANICAL REAR WHEEL DRIVE

BOOK 2 - 87046219

Chapter 1 - Rear Axle

CONTENTS

Section	Description	Page
	Specifications	2
	Rear Axle Shaft Bearing Pre-load Spacers	2
	Differential Bearing Pre-load Spacers	2
	Clearances and Tolerances	2
	Torque Values	3
	Oil Capacity	3
	Special Tools	4
	Maximum Rear Axle Loading	4
	Fault Finding	5
	Description and Operation	6
	Final Reduction Gear Assembly (Planetary Gear)	8
	Rear Axle Shaft Assembly – Overhaul	9
	Planetary Gear Assembly and Axle Housing – Overhaul	13
	Differential and Differential Lock Assembly – Overhaul	16
	Differential Lock Control Linkage – Overhaul	19
	Drive Pinion Assembly – Overhaul	21
	Adjustments	24
	Rear Axle Assembly Final Reduction Drop Trumpet (Drop Box) – Component Overhaul	28
	Manual Adjust Rear Wheels (Where Installed)	35

SECTION 31 - POWER TAKE-OFF

BOOK 2 - 87046219

Chapter 1 - Power Take-Off System

CONTENTS

Section	Description	Page
	Specifications	2
	Clearances and Tolerances	2
	Shim Thickness Available	2
	Torque Values	2
	Special Tools	3
	Description and Operation	4
	PTO Clutch - Overhaul	10
	PTO Shafts and Gears - Overhaul	16
	Single Speed Shafts and Gears - Overhaul	16
	Two-speed Shafts and Gears - Overhaul	19

SECTION 33 - BRAKING SYSTEM

BOOK 2 - 87046219

Chapter 1 - Braking System

CONTENTS

Section	Description	Page
	Description and Operation	3
	Disc Brake Assembly - Overhaul	4
	Brake Adjustment	5

SECTION 35 - HYDRAULIC SYSTEM

BOOK 2 - 87046219

Chapter 1 - Hydraulic Circuits

CONTENTS

Section	Description	Page
	Specifications	2
	Special Tools	4
	Clearances and Tolerances	5
	Torque Values	6
	Fault Finding	7
	Description and Operation	9
	Hydraulic Component – General Description	32

SECTION 35 - HYDRAULIC SYSTEM

BOOK 2 - 87046219

Chapter 2 - Hydraulic Pumps

CONTENTS

Section	Description	Page
	Fixed Displacement Transmission Mounted (Tandem Gear) Type Pump	2
	Description and Operation	2
	Overhaul	4
	Fixed Displacement Engine Mounted (Single Gear) Type Pump	11
	Description and Operation	11
	Overhaul	12

SECTION 35 - HYDRAULIC SYSTEM

BOOK 2 - 87046219

Chapter 3 - Remote Control Circuit

CONTENTS

Section	Description	Page
	Description and Operation	2
	Remote Valve Circuit Oil Flow	3
	Remote Control Valve – Overhaul	22
	Remote Control Valve Coupler – Overhaul	30

SECTION 35 - HYDRAULIC SYSTEM

BOOK 2 - 87046219

Chapter 4 - Component Overhaul

CONTENTS

Section	Description	Page
	Oil Cooler – Overhaul	2
	Pressure Regulating Valve – Overhaul	2
	Hydraulic Lift Cover – Overhaul	6
	Disassembly	14
	Inspection and Repair	19
	Assembly	20

SECTION 35 - HYDRAULIC SYSTEM

BOOK 2 - 87046219

Chapter 5 - Adjustments and Testing

CONTENTS

Section	Description	Page
	Hydraulic Power Lift (HPL) 3-Point Internal Control Linkage Adjustments	2
	Main Draft Spring Adjustment	5
	Draft Control Linkage Adjustment	6
	Position Control Linkage Adjustment	11
	Remote Control Valve External Linkage Adjustment	14
	Pressure Testing Hydraulic Pumps	14
	Low-Pressure and Lubrication Circuit Pressure Tests	17
	Remote Valve Detent Pressure Test	20

SECTION 41 - STEERING SYSTEM

BOOK 2 - 87046219

Chapter 1 - Hydrostatic Steering System

CONTENTS

Section	Description	Page
	Specifications	2
	Fault Finding	5
	Description and Operation	6
	Oil Flow	7

SECTION 41 - STEERING SYSTEM

BOOK 2 - 87046219

Chapter 2 - Component Overhaul

CONTENTS

Section	Description	Page
	Steering Motor	2
	Steering Column Removal and Installation	13
	Steering Cylinder – Two Wheel Drive	15
	Steering Cylinder – Four Wheel Drive	21
	Flow Control Valve – Power Steering Pump (Where Installed)	25
	Transmission Mounted Tandem Pump	26
	Steering System Testing	32

SECTION 44 - FRONT AXLE-TWO WHEEL DRIVE

BOOK 2 - 87046219

Chapter 1 - Two Wheel Drive

CONTENTS

Section	Description	Page
	Specifications	2
	Clearances and Tolerances	2
	Special Tools	2
	Torque Values	2
	Front Axle Track Adjustment	2
	Shim Thickness Available	2
	Description and Operation	3
	Adjustments	4
	Track Width Adjustment	6
	Wheel Hub and Bearing - Overhaul	7
	Wheel Spindle - Overhaul	9
	Front Axle Center Beam - Overhaul	11

SECTION 55 - ELECTRICAL SYSTEMS

BOOK 2 - 87046219

Chapter 1 - Electrical System and Components

CONTENTS

Section	Description	Page
	Specifications	2
	Fault Finding	4
	Electrical System	7
	Precautionary Statements	7
	Description and Operation	7
	Wire Harnesses	8
	Component Location	11
	Instrument Panel Description	20
	Electrical Components - Operation and Overhaul	22

SECTION 55 - ELECTRICAL SYSTEMS

BOOK 2 - 87046219

Chapter 2 - Alternator and Charging System

CONTENTS

Section	Description	Page
	Description and Operation	2
	Alternator – Overhaul	6
	Inspection and Repair	8
	Assembly	9
	Installation	10
	Alternator – Testing	10

SECTION 55 - ELECTRICAL SYSTEMS

BOOK 2 - 87046219

Chapter 3 - Starting Motor and System

CONTENTS

Section	Description	Page
	Description and Operation	2
	Starting System Testing	2
	Starting System Circuit Resistance Test	3
	Starting Motor – Overhaul	4

SECTION 55 - ELECTRICAL SYSTEMS

BOOK 2 - 87046219

Chapter 4 - Battery, Servicing and Testing

CONTENTS

Section	Description	Page
	Description and Operation	2
	Inspection and Servicing	5

GENERAL INSTRUCTIONS

IMPORTANT NOTICE

All maintenance and repair operations described in this manual should be carried out exclusively by New Holland authorised workshops. All instructions should be carefully observed and special equipment where indicated should be used.

Anyone who carries out service operations described without carefully observing these prescriptions will be directly responsible for any damage caused.

NOTES FOR EQUIPMENT

Equipment which NEW HOLLAND proposes and shows in this manual is:

- studied and designed expressly for use on NEW HOLLAND tractors;
- necessary to make a reliable repair;
- accurately built and strictly tested to offer efficient and long-lasting working life.

NOTICES

The words "front", "rear", "right hand", and "left hand" refer to the different parts as seen from the operator's seat oriented to the normal direction of movement of the tractor.

HEALTH AND SAFETY

CONTENTS

Description	Page
HEALTH AND SAFETY PRECAUTIONS	2
ACIDS AND ALKALIS	3
ADHESIVES AND SEALERS - see Fire	3
ANTIFREEZE - see Fire, Solvents e.g. Isopropanol, Ethylene Glycol, Methanol.	3
ARC WELDING - see Welding.	4
BATTERY ACIDS - see Acids and Alkalis.	4
BRAKE AND CLUTCH FLUIDS (Polyalkylene Glycols) - see Fire.	4
BRAZING - see Welding.	4
CHEMICAL MATERIALS - GENERAL - see Legal Aspects.	4
DO'S	4
DO NOTS	5
CORROSION PROTECTION MATERIALS - see Solvents, Fire.	5
DUSTS	5
ELECTRIC SHOCK	5
EXHAUST FUMES	6
FIBRE INSULATION - see Dusts.	6
FIRE - see Welding, Foams, Legal Aspects.	6
FIRST AID	6
FOAMS - Polyurethane - see Fire.	6
FUELS - see Fire, Legal Aspects, Chemicals - General, Solvents.	7
GAS CYLINDERS - see Fire.	7
GENERAL WORKSHOP TOOLS AND EQUIPMENT	8
LEGAL ASPECTS	8
LUBRICANTS AND GREASES	8
PAINTS - see Solvents and Chemical Materials - General.	9
SOLDER - see Welding.	9
SOLVENTS - see Chemical Materials - General Fuels (Kerosene), Fire.	10
SUSPENDED LOADS	10
WELDING - see Fire, Electric Shock, Gas Cylinders.	10

HEALTH AND SAFETY PRECAUTIONS

Many of the procedures associated with vehicle maintenance and repair involve physical hazards or other risks to health. This section lists, alphabetically, some of these hazardous operations and the materials and equipment associated with them. The

precautions necessary to avoid these hazards are identified.

The list is not exhaustive and all operations and procedures and the handling of materials, should be carried out with health and safety in mind.

ACIDS AND ALKALIS – see Battery acids, e.g. caustic soda, sulfuric acid.

Used in batteries and cleaning materials.

Irritant and corrosive to the skin, eyes, nose and throat. Causes burns.

Avoid splashes to the skin, eyes and clothing. Wear suitable protective gloves and goggles. Can destroy ordinary protective clothing. Do not breathe mists.

Ensure access to water and soap is readily available for splashing accidents.

ADHESIVES AND SEALERS – see Fire

Highly Flammable, Flammable, combustible.

Generally should be stored in “No Smoking” areas; cleanliness and tidiness in use should be observed, e.g. disposable paper covering benches; should be dispensed from applicators where possible; containers, including secondary containers, should be labelled.

Solvent based Adhesives/Sealers – See Solvents.

Follow manufacturers instructions.

Water based Adhesives/Sealers

Those based on polymer emulsions and rubber lattices may contain small amounts of volatile toxic and harmful chemicals. Skin and eye contact should be avoided and adequate ventilation provided during use.

Follow manufacturers instructions.

Resin based Adhesives/Sealers – e.g. epoxide and formaldehyde resin based.

Mixing should only be carried out in well ventilated areas as harmful or toxic volatile chemicals may be released.

Skin contact with uncured resins and hardeners can result in irritation; dermatitis and absorption of toxic or harmful chemicals through the skin. Splashes can damage the eyes.

Provide adequate ventilation and avoid skin and eye contact. Follow manufacturers instructions.

Anaerobic, Cyanoacrylate and other Acrylic Adhesives

Many are irritant, sensitizing or harmful to the skin. Some are eye irritants.

Skin and eye contact should be avoided and the manufacturers instructions followed.

Cyanoacrylate adhesives (super-glues) must not contact the skin or eyes. If skin or eye tissue is bonded cover with a clean moist pad and get medical attention. do not attempt to pull tissue apart. Use in well ventilated areas as vapours can cause irritation of the nose and eyes.

For two-pack systems see Resin based adhesives/sealers.

Isocyanate (Polyurethane) Adhesives/Sealers – see Resin based Adhesives.

Individuals suffering from asthma or respiratory allergies should not work with or near these materials as sensitivity reactions can occur.

Any spraying should preferably be carried out in exhaust ventilated booths removing vapours and spray droplets from the breathing zone. Individuals working with spray applications should wear supplied air respirators.

ANTIFREEZE – see Fire, Solvents e.g. Isopropanol, Ethylene Glycol, Methanol.

Highly Flammable, Flammable, Combustible.

Used in vehicle coolant systems, brake air pressure systems, screenwash solutions.

Vapours given off from coolant antifreeze (glycol) arise only when heated.

Antifreeze may be absorbed through the skin in toxic or harmful quantities. Antifreeze if swallowed is fatal and medical attention must be found immediately.

ARC WELDING – see Welding.

BATTERY ACIDS – see Acids and Alkalies.

Gases released during charging are explosive. Never use naked flames or allow sparks near charging or recently charged batteries.

BRAKE AND CLUTCH FLUIDS (Polyalkylene Glycols) – see Fire.

Combustible.

Splashes to the skin and eyes are slightly irritating. Avoid skin and eye contact as far as possible. Inhalation of vapour hazards do not arise at ambient temperatures because of the very low vapour pressure.

BRAZING – see Welding.

CHEMICAL MATERIALS - GENERAL – see Legal Aspects.

Chemical materials such as solvents, sealers, adhesives, paints, resin foams, battery acids, antifreeze, brake fluids, oils and grease should always be used with caution and stored and handled with care. They may be toxic, harmful, corrosive, irritant or highly inflammable and give rise to hazardous fumes and dusts.

The effects of excessive exposure to chemicals may be immediate or delayed; briefly experienced or permanent; cumulative; superficial; life threatening; or may reduce life-expectancy.

DO'S

Do remove chemical materials from the skin and clothing as soon as practicable after soiling. Change heavily soiled clothing and have it cleaned.

Do carefully read and observe hazard and precaution warnings given on material containers (labels) and in any accompanying leaflets, poster or other instructions. Material health and safety data sheets can be obtained from Manufacturers.

Do organise work practices and protective clothing to avoid soiling of the skin and eyes; breathing vapours/aerosols/dusts/fumes; inadequate container labelling; fire and explosion hazards.

Do wash before job breaks; before eating, smoking, drinking or using toilet facilities when handling chemical materials.

Do keep work areas clean, uncluttered and free of spills.

Do store according to national and local regulations.

Do keep chemical materials out of reach of children.

DO NOTS

Do Not mix chemical materials except under the manufacturers instructions; some chemicals can form other toxic or harmful chemicals; give off toxic or harmful fumes; be explosive when mixed together.

Do Not spray chemical materials, particularly those based on solvents, in confined spaces e.g. when people are inside a vehicle.

Do Not apply heat or flame to chemical materials except under the manufacturers' instructions. Some are highly inflammable and some may release toxic or harmful fumes.

Do Not leave containers open. Fumes given off can build up to toxic, harmful or explosive concentrations. Some fumes are heavier than air and will accumulate in confined areas, pits etc.

Do Not transfer chemical materials to unlabelled containers.

Do Not clean hands or clothing with chemical materials. Chemicals, particularly solvents and fuels will dry the skin and may cause irritation with dermatitis. Some can be absorbed through the skin in toxic or harmful quantities.

Do Not use emptied containers for other materials, except when they have been cleaned under supervised conditions.

Do Not sniff or smell chemical materials. Brief exposure to high concentrations of fumes can be toxic or harmful.

Clutch Fluids – see Brake and Clutch Fluids.

Clutch Linings and Pads – see Brake and Clutch Linings and Pads.

CORROSION PROTECTION MATERIALS – see Solvents, Fire.

Highly flammable, flammable.

These materials are varied and the manufacturers instructions should be followed. They may contain solvents, resins, petroleum products etc. Skin and eye contact should be avoided. They should only be sprayed in conditions of adequate ventilation and not in confined spaces.

Cutting – see Welding.

De-Waxing – see Solvents and Fuels (Kerosene).

DUSTS

Powder, dusts or clouds may be irritant, harmful or toxic. Avoid breathing dusts from powdery chemical materials or those arising from dry abrasion operations. Wear respiratory protection if ventilation is inadequate.

ELECTRIC SHOCK

Electric shocks can result from the use of faulty electrical equipment or from the misuse of equipment even in good condition.

Ensure that electrical equipment is maintained in good condition and frequently tested.

Ensure that flexes, cables, plugs and sockets are not frayed, kinked, cut, cracked or otherwise damaged.

Ensure that electric equipment is protected by the correct rated fuse.

Never misuse electrical equipment and never use equipment which is in any way faulty. The results could be fatal.

Use reduced voltage equipment (110 volt) for inspection and working lights where possible.

Ensure that the cables of mobile electrical equipment cannot get trapped and damaged, such as in a vehicle hoist.

Use air operated mobile equipment where possible in preference to electrical equipment.

In cases of electrocution:-

- switch off electricity before approaching victim
- if this is not possible, push or drag victim from source of electricity using dry non-conductive material
- commence resuscitation if trained to do so
- SUMMON MEDICAL ASSISTANCE

EXHAUST FUMES

These contain asphyxiating, harmful and toxic chemicals and particles such as carbon oxides, nitrogen oxides, aldehydes, lead and aromatic hydrocarbons. Engines should only be run under conditions of adequate extraction or general ventilation and not in confined spaces.

Gasolene (Petrol) Engine

There may not be adequate warning properties of odour or irritation before immediate and delayed toxic or harmful effects arise.

Diesel Engine

Soot, discomfort and irritation usually give adequate warning of hazardous fume concentrations.

FIBRE INSULATION – see Dusts.

Used in noise and sound insulation.

The fibrous nature of surfaces and cut edges can cause skin irritation. This is usually a physical and not a chemical effect.

Precautions should be taken to avoid excessive skin contact through careful organisation of work practices and the use of gloves.

FIRE – see Welding, Foams, Legal Aspects.

Many of the materials found on or associated with the repair of vehicles are highly flammable. Some give off toxic or harmful fumes if burnt.

Observe strict fire safety when storing and handling flammable materials or solvents, particularly near electrical equipment or welding processes.

Ensure before using electrical or welding equipment but that there is no fire hazard present.

Have a suitable fire extinguisher available when using welding or heating equipment.

FIRST AID

Apart from meeting any legal requirements it is desirable for someone in the workshop to be trained in first aid procedures.

Splashes in the eye should be flushed with clean water for at least ten minutes.

Soiled skin should be washed with soap and water.

Inhalation affected individuals should be removed to fresh air immediately.

If swallowed or if effects persist consult a doctor with information (label) on material used.

Do not induce vomiting (unless indicated by manufacturer).

FOAMS - Polyurethane – see Fire.

Used in sound and noise insulation. Cured foams used in seat and trim cushioning.

Follow manufacturers instructions.

Unreacted components are irritating and may be harmful to the skin and eyes. Wear gloves and goggles.

Individuals with chronic respiratory diseases, asthma, bronchial medical problems or histories of allergic diseases should not work with or near uncured materials.

The components, vapours, spray mists can cause direct irritation, sensitivity reactions and may be toxic or harmful.

Vapours and spray mists must not be breathed. These materials must be applied with adequate ventilation and respiratory protection. Do not remove respirator immediately after spraying, wait until vapour/ mists have cleared.

Burning of the uncured components and the cured foams can generate toxic and harmful fumes.

Smoking, open flames or the use of electrical equipment during foaming operations and until vapours/mists have cleared should not be allowed. Any heat cutting of cured foams or partially cured foams should be conducted with extraction ventilation (see Body Section 44 Legal and Safety Aspects).

FUELS – see Fire, Legal Aspects, Chemicals – General, Solvents.

Used as fuels and cleaning agents.

Gasolene (Petrol).

Highly flammable.

Swallowing can result in mouth and throat irritation and absorption from the stomach can result in drowsiness and unconsciousness. Small amounts can be fatal to children. Aspiration of liquid into the lungs, e.g. through vomiting, is a very serious hazard.

Gasolene dries the skin and can cause irritation and dermatitis on prolonged or repeated contact. Liquid in the eye causes severe smarting.

Motor gasolene may contain appreciable quantities of benzene, which is toxic upon inhalation and the concentrations of gasolene vapours must be kept very low. High concentrations will cause eye, nose and throat irritation, nausea, headache, depression and symptoms of drunkenness. Very high concentrations will result in rapid loss of consciousness.

Ensure there is adequate ventilation when handling and using gasolene. Great care must be taken to avoid the serious consequences of inhalation in the event of vapour build up arising from spillages in confined spaces.

Special precautions apply to cleaning and maintenance operations on gasolene storage tanks.

Gasolene should not be used as a cleaning agent. It must not be siphoned by mouth.

Kerosene (Paraffin)

Used also as heating fuel, solvent and cleaning agent.

Flammable.

Irritation of the mouth and throat may result from swallowing. The main hazard from swallowing arises

if liquid aspiration into the lungs occurs. Liquid contact dries the skin and can cause irritation or dermatitis. Splashes in the eye may be slightly irritating.

In normal circumstances the low volatility does not give rise to harmful vapours. Exposure to mists and vapours from kerosene at elevated temperatures should be avoided (mists may arise in de-waxing). Avoid skin and eye contact and ensure there is adequate ventilation.

Gas-Oil (Diesel Fuel) – see Fuels (Kerosene).

Combustible.

Gross or prolonged skin contact with high boiling gas oils may also cause serious skin disorders including skin cancer.

GAS CYLINDERS – see Fire.

Gases such as oxygen, acetylene, carbon dioxide, argon and propane are normally stored in cylinders at pressures of up to 2000 lb/sq. in. (13,790 kn/m²) and great care should be taken in handling these cylinders to avoid mechanical damage to them or to the valve gear attached. The contents of each cylinder should be clearly identified by appropriate markings.

Cylinders should be stored in well ventilated enclosures, and protected from ice and snow, or direct sunlight. Fuel gases (e.g. acetylene and propane) should not be stored in close proximity to oxygen cylinders.

Care should be exercised to prevent leaks from gas cylinders and lines, and to avoid sources of ignition.

Only trained personnel should undertake work involving gas cylinders.

Gases – see Gas Cylinders.

Gas Shielded Welding – see Welding.

Gas Welding – see Welding.

GENERAL WORKSHOP TOOLS AND EQUIPMENT

It is essential that all tools and equipment are maintained in good condition and the correct safety equipment used where required.

Never use tools or equipment for any purpose other than that for which they were designed.

Never overload equipment such as hoists, jacks, axle and chassis stands or lifting slings. Damage caused by overloading is not always immediately apparent and may result in a fatal failure the next time that the equipment is used.

Do not use damaged or defective tools or equipment, particularly high speed equipment such as grinding wheels. A damaged grinding wheel can disintegrate without warning and cause serious injury.

Wear suitable eye protection when using grinding, chiselling or sand blasting equipment.

Wear a suitable breathing mask when using sand blasting equipment, working with asbestos based materials or using spraying equipment.

Glues – see Adhesives and Sealers.

High Pressure Air, Lubrication and Oil Test Equipment – see Lubricants and Greases.

Always keep high pressure equipment in good condition and regularly maintained, particularly at joints and unions.

Never direct a high pressure nozzle at the skin as the fluid may penetrate to the underlying tissue etc. and cause serious injury.

LEGAL ASPECTS

Many laws and regulations make requirements relating to health and safety in the use of materials and equipment in workshops. Some of these laws which apply in the U.K. are listed. Similar laws exist for other territories:-

- The Factories Act (1961).

- The Asbestos Regulations (1969).
- Highly Flammable Liquids and Liquefied Petroleum Gases Regulations (1972).
- Deposit of Poisonous Waste Act (1972).
- Control of Pollution Act (1974).
- Health and Safety at Work Act (1974).
- The Packaging and Labelling of Dangerous Substances Regulations (1978).
- Control of Lead Regulations (1981).

Workshops should be familiar, in detail, with these and associated laws and regulations. Consult local factory inspectorate if in any doubt.

LUBRICANTS AND GREASES

Avoid all prolonged and repeated contact with mineral oils, especially used oils. Used oils contaminated during service (e.g. routine service change sump oils) are more irritating and more likely to cause serious effects including skin cancer in the event of gross and prolonged skin contact.

Wash skin thoroughly after work involving oil. Proprietary hand cleaners may be of value provided they can be removed from the skin with water. Do not use petrol, paraffin or other solvents to remove oil from the skin.

Lubricants and greases may be slightly irritating to the eyes.

Repeated or prolonged skin contact should be avoided by wearing protective clothing if necessary. Particular care should be taken with used oils and greases containing lead. Do not allow work clothing to be contaminated with oil. Dry clean or launder such clothing at regular intervals. Discard oil soaked shoes.

Do not employ used engine oils as lubricants or for any application where appreciable skin contact is likely to occur. Used oils may only be disposed of in accordance with local regulations, e.g. in the U.K., the Control of Pollution Act.

There are publications describing the problems and advising on precautionary measures. For the U.K. these include:

- SHW 295: Effects of mineral oil on the skin
- SHW 295A: Cancer of the skin caused by oil
- SHW 397: Cautionary notice: Effects of mineral oil on the skin

Noise Insulation Materials - see Foams, Fibre Insulation.

PAINTS - see Solvents and Chemical Materials - General.

Highly Flammable, Flammable.

One Pack. Can contain harmful or toxic pigments, driers and other components as well as solvents. Spraying should only be carried out with adequate ventilation.

Two Pack. Can also contain harmful and toxic unreacted resins and resin hardening agents. The manufacturers instructions should be followed and the section of page 05-2 on resin based adhesives, isocyanate containing Adhesives and Foams should be consulted.

Spraying should preferably be carried out in exhausted ventilated booths removing vapour and spray mists from the breathing zone. Individuals working in booths should wear respiratory protection.

Those doing small scale repair work in the open shop should wear supplied air respirators.

Paint Thinners - see Solvents.

Petrol - see Fuels (Gasolene).

Pressurised Equipment - see High Pressure Air, Lubrication and Oil Test Equipment.

Resistance Welding - see Welding.

Sealers - see Adhesives and Sealers.

SOLDER - see Welding.

Solders are mixtures of metals such that the melting point of the mixture is below that of the constituent metals (normally lead and tin). Solder application does not normally give rise to toxic lead fumes, provided a gas/air flame is used. Oxy-acetylene flames should not be used, as they are much hotter and will cause lead fumes to be evolved.

Some fumes may be produced by the application of any flame to surfaces coated with grease etc. and inhalation of these should be avoided.

Removal of excess solder should be undertaken with care, to ensure that fine lead dust is not produced, which can give toxic effects if inhaled. Respiratory protection may be necessary.

Solder spillage and filing should be collected and removed promptly to prevent general air contamination by lead.

High standards of personal hygiene are necessary in order to avoid indigestion of lead or inhalation of solder dust from clothing.

SOLVENTS - see Chemical Materials - General Fuels (Kerosene), Fire.

e.g. Acetone, white spirit, toluene, xylene, trichlorethane.

Used in cleaning materials, de-waxing, paints, plastics, resins, thinners etc.

Highly Inflammable, Flammable.

Skin contact will degrease the skin and may result in irritation and dermatitis following repeated or prolonged contact. Some can be absorbed through the skin in toxic or harmful quantities.

Splashes in the eye may cause severe irritation and could lead to loss of vision.

Brief exposure to high concentrations of vapours or mists will cause eye and throat irritation, drowsiness, dizziness, headaches and in the worst circumstances, unconsciousness.

Repeated or prolonged exposures to excessive but lower concentrations of vapours or mists, for which there might not be adequate warning indications, can cause more serious toxic or harmful effects.

Aspiration into the lungs (e.g. through vomiting) is the most serious consequence of swallowing.

Avoid splashes to the skin, eyes and clothing. Wear protective gloves, goggles and clothing if necessary.

Ensure good ventilation when in use, avoid breathing fumes, vapours and spray mists and keep containers tightly sealed. Do not use in confined spaces.

When the spraying material contains solvents, e.g. paints, adhesives, coatings, use extraction ventilation or personal respiratory protection in the absence of adequate general ventilation.

Do not apply heat or flame except under specific and detailed manufacturers instructions.

Sound Insulation - see Fibre Insulation, Foams.

Spot Welding - see Welding.

SUSPENDED LOADS.

There is always a danger when loads are lifted or suspended. Never work under an unsupported suspended or raised load, e.g. jacked up vehicle, suspended engine, etc.

Always ensure that lifting equipment such as jacks, hoists, axle stands, slings, etc. are adequate and suitable for the job, in good condition and regularly maintained.

Never improvise lifting tackle.

Underseal - see Corrosion Protection.

WELDING - see Fire, Electric Shock, Gas Cylinders.

Welding processes include Resistance Welding (Spot Welding), Arc Welding and Gas Welding.

Resistance Welding

This process may cause particles of molten metal to be emitted at high velocity and the eyes and skin must be protected.

Arc Welding

This process emits a high level of ultraviolet radiation which may cause eye and skin burns to the welder and to other persons nearby. Gas-shielded welding processes are particularly hazardous in this respect. Personal protection must be worn, and screens used to shield other people.

Metal spatter will also occur and appropriate eye and skin protection is necessary.

The heat of the welding arc will produce fumes and gases from the metals being welded and from any applied coatings or contamination on the surfaces being worked on. These gases and fumes may be toxic and inhalation should always be avoided. The use of extraction ventilation to remove the fumes from the working area may be necessary, particularly in cases where the general ventilation is poor, or where considerable welding work is anticipated. In extreme cases where adequate ventilation cannot be provided, supplied air respirators may be necessary.

Gas Welding

Oxy-acetylene torches may be used for welding and cutting and special care must be taken to prevent leakage of these gases, with consequent risk of fire and explosion.

The process will produce metal spatter and eye and skin protection is necessary.

The flame is bright and eye protection should be used, but the ultra-violet emission is much less than that from arc welding, and lighter filters may be used.

The process itself produces few toxic fumes, but such fumes and gases may be produced from coatings on the work, particularly during cutting away of damaged body parts and inhalation of the fumes should be avoided.

In brazing, toxic fumes may be evolved from the metals in the brazing rod, and a severe hazard may arise if brazing rods containing cadmium are used. In this event particular care must be taken to avoid inhalation of fumes and expert advice may be required.

SPECIAL PRECAUTIONS MUST BE TAKEN BEFORE ANY WELDING OR CUTTING TAKES PLACE ON VESSELS WHICH HAVE CONTAINED COMBUSTIBLE MATERIALS, E.G. BOILING OR STEAMING OUT OF FUEL TANKS.

White Spirit – see Solvents.

SECTION 00 - GENERAL - CHAPTER 1

FEDERAL EMISSIONS WARRANTY

(North America Only)

(California owner's emissions warranty is covered elsewhere)

New Holland warrants that your new 1996 and later heavy-duty off-road diesel engine was designed, built, and equipped to conform to applicable U.S. Environmental Protection Agency regulations for a period of use of five years or 3,000 hours of operation, whichever occurs first.

The new model year, class of diesel engine, and emission application determination for your engine are identified on the emission control information label affixed to the top of your engine's rocker arm cover. The warranty period begins on the date the new equipment is sold to the first retail purchaser.

Any emission control system parts which are proven defective during normal use will be repaired or replaced during the warranty period. The warranty repairs and service will be performed by any authorized New Holland dealer at the dealer's place of business, with no charge for parts or labor (including diagnosis).

As the engine owner, you are responsible to perform all the required maintenance listed in your owner's manual. New Holland will not deny an emission warranty claim solely because you have no record of maintenance; however, a claim may be denied if your failure to perform maintenance resulted in the failure of a warranted part. Receipts covering regular maintenance should be retained in the event of questions and these receipts should be passed on to each subsequent owner of the engine.

It is recommended replacement parts used for maintenance or repairs be New Holland Service Parts to maintain the quality originally designed into your emission certified engine. The use of non-New Holland parts does not invalidate the warranty on other components unless the use of such parts causes damage to warranted parts.

New Holland wishes to assure the emission control systems warranty is being properly administered. If you believe you have not received the service entitled to under this warranty, you should contact the nearest New Holland Branch Office for assistance.

Service Department
New Holland North America, Inc.
500 Diller Avenue
New Holland, PA 17557
(717) 355-1121

Please note that the Emission Warranty does not cover:

1. Systems and parts that were not first installed on the new equipment or engine as original equipment by New Holland.
2. Part malfunctions caused by abuse, misuse, improper adjustment, modification, alteration, tampering, disconnection, improper or inadequate maintenance, or use of non-recommended fuels and lubricating oils.
3. Accident caused damage, acts of nature, or other events beyond New Holland's control.
4. Replacement of expendable items made in connection with scheduled maintenance.
5. Parts requiring replacement, inspection or adjustment maintenance intervals for reasons other than being defective.
6. Parts which are not New Holland Service Parts.
7. Loss of time, inconvenience, loss of use of equipment/engine or commercial loss.
8. Equipment with altered or disconnected hourmeter where the hours cannot be determined.
9. Equipment normally operated outside the United States.
10. Non-defective parts replaced by other than New Holland dealers.

Coverage

This emission control system warranty applies to the following emission control parts.

Fuel Injection Pump
Fuel Injectors
Turbocharger
Intake Manifold
Exhaust Manifold
Boost Pressure Tubing-connection to Aneroid Device ON F.I.P.