

TRIPLE ROLLER TUBE PAVERS

TRTP265



SAFETY & OPERATIONS MANUAL

Manual Part #: 076279 | Revision: B
Language: English | Original Instructions



ALLEN
CONCRETE PAVERS

Triple Roller Tube Paver

SAFETY & OPERATIONS MANUAL

This manual covers the products listed below:

<u>Part No.</u>	<u>Description</u>
075449	ASSY, 265 12' TRTP WITH HATZ POWER
075450	ASSY, 265 14' TRTP WITH HATZ POWER
075451	ASSY, 265 16' TRTP WITH HATZ POWER
075452	ASSY, 265 18' TRTP WITH HATZ POWER
075453	ASSY, 265 20' TRTP WITH HATZ POWER
075454	ASSY, 265 22' TRTP WITH HATZ POWER
075455	ASSY, 265 24' TRTP WITH HATZ POWER
075456	ASSY, 265 26' TRTP WITH HATZ POWER
075457	ASSY, 265 28' TRTP WITH HATZ POWER
075458	ASSY, 265 30' TRTP WITH HATZ POWER
075459	ASSY, 265 32' TRTP WITH HATZ POWER
075460	ASSY, 265 34' TRTP WITH HATZ POWER

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Allen Products are covered under one or more of the following patent numbers:

U.S. Design Patents: 6,857,815; 6955404; 7,108,449; 7,114,876; 7,316,523; 7,690,864; 8,360,680; 9,068,301; 10,100,537; 11,619,010.

Printed in U.S.A.

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GENERAL INFORMATION

Limited Warranty

I. LIMITED WARRANTY & LIMITATION OF LIABILITY

Allen Engineering Corporation ("Allen") warrants its products to be free of defects in material or workmanship for:

TWO YEARS FROM END USER'S DATE OF PURCHASE, SUBJECT TO THE EXCEPTIONS AND SHORTER WARRANTY PERIODS DESCRIBED HEREIN.

The warranty period begins on the date of purchase by the End User of the product. All warranty is based on the following limited warranty terms and conditions, including the disclaimer of all implied warranties of any type and the disclaimer of consequential damages.



1. Allen's obligation and liability under this warranty are limited to repairing or replacing parts if, after Allen's inspection, there is determined to be a defect in material or workmanship. Allen reserves the choice to repair or replace.
2. All warranty-related parts must be purchased in advance through an Allen dealer. The parts will be made available to the Allen Distributor, Dealer, or Rental Center from whom the End User purchased the product.
For machines being prepared, a warranty request form and/ or RGA request form must be submitted to AEC after the repairs are completed.
3. Replacement warranty parts, installed in the product, are warranted only for the remainder of the warranty period of the product as though they were the original parts.
4. BATTERY POWERED PRODUCTS ARE WARRANTED FOR ONE YEAR FROM END USER'S DATE OF PURCHASE.
5. Allen does not warranty engines or batteries. Engine warranty claims should be made directly to an authorized factory service center for the particular engine manufacturer. Batteries are not warranted due to unknown treatment during transport, etc., and any battery claims should be directed to the battery manufacturer.
6. Allen's warranty does not cover the normal maintenance of products or their components (such as engine tune-ups and oil & filter changes). The warranty also does not cover normal wear and tear items (such as belts, tires, blades, pans and other consumables).
7. Hydraulic Component's are required to be maintained per Allen's mandatory service intervals in each machine's owner's manual. OEM Allen hydraulic filters and consumables are required to service machines during the warranty period. Failure to use OEM Allen hydraulic filters will result in denied warranty.
8. Allen's warranty will be void if it is determined that the defect resulted from operator abuse, failure to perform normal maintenance on the product, modification to product, alterations, or repairs made to the product without the written approval of Allen. Allen specifically excludes from warranty any damage to any trowels resulting from a drop or impact to the rotors.
9. Impact damage to gearboxes is not covered under the Allen warranty and is deemed customer abuse.
10. Impact damage to trowels in any way is not covered under the Allen Warranty and is deemed customer abuse. (Example: Dropping a machine)
11. Allen will pay shop labor on warranty items at the Allen Shop Labor Rate in existence on the date of the warranty claim. An Allen labor chart will determine the time allowed to complete a repair and will govern the shop labor hours that will be allowed.
12. Allen will credit the cost of ground freight on warranty replacement parts after approval of the warranty claim. No warranty replacement parts will be shipped air-freight at the expense of Allen. Allen does not pay any inbound freight.
13. ALLEN ENGINEERING CORPORATION'S WARRANTY POLICY WILL NOT COVER THE FOLLOWING: TAXES; SHOP SUPPLIES; ENVIRONMENTAL SURCHARGES; AIR FREIGHT; TRAVEL TIME; LOSS OF TIME; INCONVENIENCE; LOSS OF RENTAL REVENUE; RENTAL COSTS OF EQUIPMENT USED TO REPLACE THE PRODUCT BEING REPAIRED; LOSS OF USE OF THE PRODUCT; COMMERCIAL LOSS; OR ANY OTHER CHARGES WHATSOEVER OR ANY LIABILITIES FOR DIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGE OR DELAY.
14. ALLEN ENGINEERING CORPORATION MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED. THIS LIMITED WARRANTY IS IN LIEU OF THE WARRANTY OF MERCHANTABILITY AND FITNESS. THERE ARE NO OTHER WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THIS DOCUMENT.
15. No Allen employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by an officer of Allen Engineering Corporation.
16. Warranty claims must be submitted within 30 days from the date of failure.
17. Once a warranty claim has been submitted, AEC has up to 90 business days to process the request.
18. Standard service part warranty will not exceed 90 days from the date of purchase. Exceptions to this are:
#1 Gearboxes: 1 year warranty from date of purchase.
#2 Electrical Components: 30 day warranty from date of purchase. This applies to wiring harnesses, transmitters, ECUs, display screens, and toggle switches.
19. All purchased components are subject to the inspection and warranty of the respective manufacturer. This inspection may extend beyond 90 days.
20. If warranty is suspected do not disassemble any hydraulic or electrical components. Failure to comply with this instruction will lead to denial of a warranty claim.



This manual provides information and procedures to safely operate and maintain the Allen Machine.

For your own safety and protection from personal injury, carefully read, understand, and observe the safety instructions described in this manual. Keep this manual or a copy of it with the machine at all times.

Always operate this machine in accordance with the instructions described in this manual. A well maintained piece of equipment will provide many years of trouble free operation.

This manual is divided into the following sections:

SECTION 1 SAFETY

SECTION 2 OPERATIONS

SECTION 3 SERVICE

Complete any warranty requirements as specified by the engine manufacturer in their instructions found inside the manual box located on the operator's control panel.

Your engine is not manufactured by Allen Engineering Corporation, Inc, and therefore is not covered under Allen Engineering Corporation, Inc warranty.

Your engine manufacturer should be contacted if you wish to purchase a parts manual or a repair manual for your engine.

Refer to enclosed owners engine manual for complete O&M instructions. See your battery manufacturer for battery warranty.

GENERAL INFORMATION

Dealer Information

Your Dealer has Allen Engineering Corporation trained mechanics and original Allen replacement parts. Always contact the Allen Dealer who sold you this machine for Allen Certified repairs and replacement parts.

Place Allen Dealer information below for future reference.

Dealer Name: _____

Phone #: (____) - ____ - _____

Address: _____

City: _____ State: _____ Zip: _____

Salesman: _____ Mobile Phone _____

Additional Comments: _____

The PARTS Manual contains illustrated parts lists for help in ordering replacement parts for your machine. Follow the instructions below when ordering parts to insure prompt and accurate delivery:

1. All orders for service parts - include the serial number for the machine. Shipment will be delayed if this information is not available.
2. Include correct description and part number from the PARTS Manual.
3. Specify exact shipping instructions, including the preferred routing and complete destination address.
4. DO NOT return parts to AEC without receiving written authorization from AEC. All authorized returns must be shipped pre-paid.
5. When placing an order, please contact the AEC dealer nearest you.



All information, specifications, and illustrations in this manual are subject to change without notice and are based on the latest information at the time of publication.

GENERAL INFORMATION

Model Number & Unit Identification

Manufacturer's Codes:

When ordering parts or requesting service information, you will always be asked to specify the model and serial numbers of the machine. The legends below specifically defines each significant character or group of characters of the Model Number and Serial Number codes.

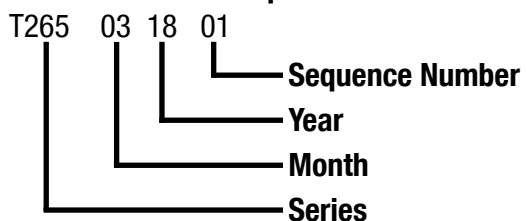
Model Number: 265

Serial Number

The serial number found on the identification plate is a ten digit format. The model number identifies your machine and will ensure that you receive the correct replacement parts.

Serial Number Example

T265 03 18 01



Sequence Number

Year

Month

Series

Unit Identification Plate Location:

An identification plate listing the model number and the serial number is attached to each unit and is located on the top left corner of the operator end handle. See image below for serial number plate location. This plate should not be removed at any time.

Please record the information found on this plate below so it will be available should the identification plate become lost or damaged. When ordering parts or requesting service information, you will always be asked to specify the model and serial numbers of the machine.

FILL IN FOR FUTURE REFERENCE

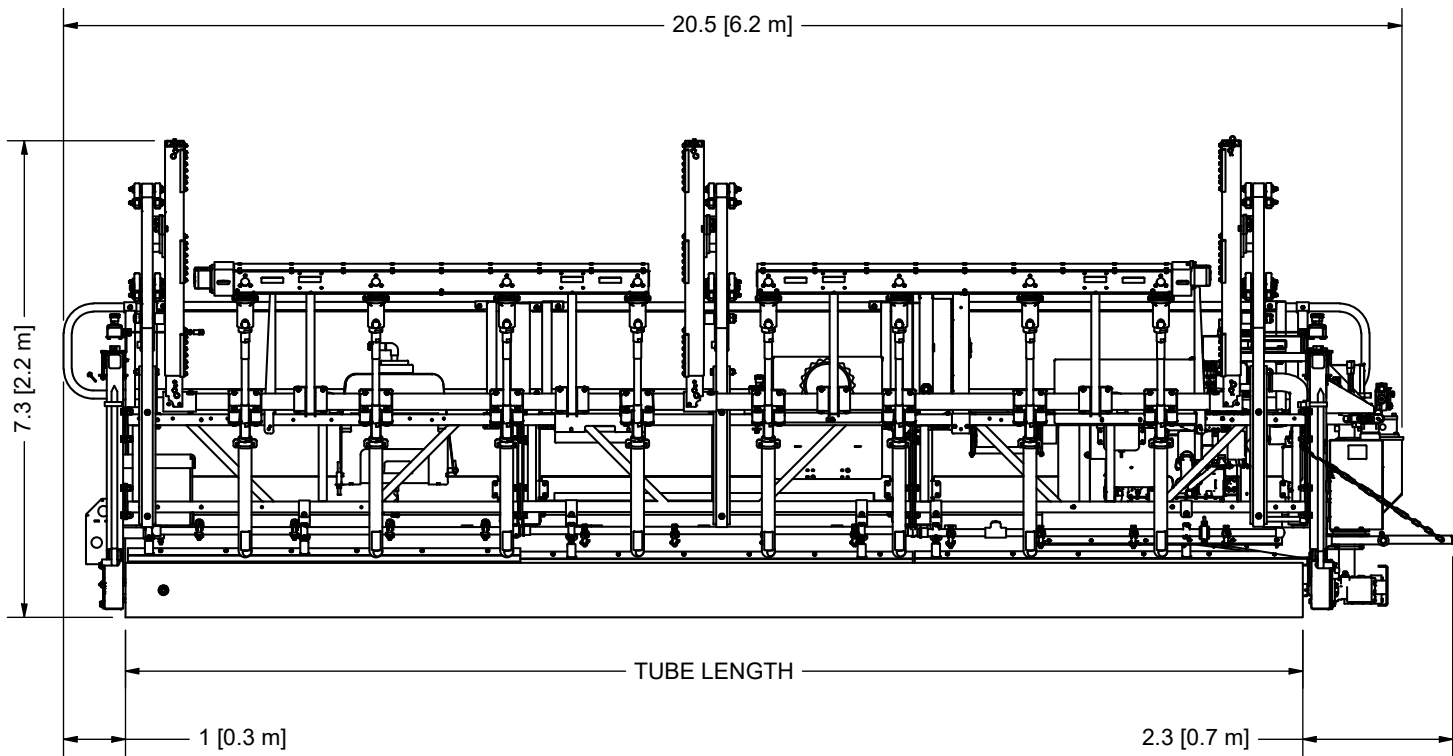
Model Number: _____

Serial Number: _____

Date Purchased: _____

Purchased From: _____

18' SETUP SHOWN



GENERAL INFORMATION

Technical Specifications

DESCRIPTION	TRTP265
ENGINE	HATZ 4H50TIC (T4F)
HORSEPOWER	74 HP (55.2 KW)
FUEL TYPE	DIESEL
WIDTHS AVAILABLE (2 FT INCREMENTS)*	12 - 34 FT (3.7-10.4 M)
WEIGHT AT 22 FT	8,700 LB (3,946 KG)
ROLLER TUBE DIAMETER	10 IN (25.4 CM)
TUBE WEIGHT PER FT	27 LB (12 KG)
FUEL TANK	10.4 GAL (39 L)
HYDRAULIC OIL TANK	30 GAL (114 L)
HYDRAULIC SPRAY SYSTEM	STANDARD
HYDRAULIC STEERING LEG	STANDARD
VIBRATOR DEPTH	24" BELOW GRADE
VIBRATOR FREQUENCY	11,000 VPM

*NOTE: THE TRTP WILL NEED TO BE AT LEAST 2FT WIDER THAN THE PAVING WIDTH.

FEATURES:

- Sectional frame length for ease of machine length change over.
- Ø10" Counter Ballast Tube
- 5 Emergency Stop Push Button Switches (2 at operator end, 2 on power unit end and in the 1 center rear of the machine)
- Strobe light

Engine Specifications

GENERAL INFORMATION

HATZ 4H50TIC TECHNICAL DATA

TYPE	LIQUID COOLED 4 STROKE ENGINE
ENGINE OUTPUT (MAX)	73.8 HP
INJECTION SYSTEM	DIRECT INJECTION
BORE X STROKE	3.31 X 3.47 IN
DISPLACEMENT	119.12 CU IN
COMPRESSION RATIO	17.5:1
OIL CAPACITY	MAX - 7.4 QTS
	MIN - 6.3 QTS
LOWEST IDLE SPEED	900 RPM
ENGINE RPMS	1500, 1800, 2300, 2800 RPM
WEIGHT**	562 LB
DIMENSIONS** - L X W X H	35.2 X 27 X 31.8 IN

** OPEN POWER UNIT MODEL

Crankcase breather filter

Oil filler

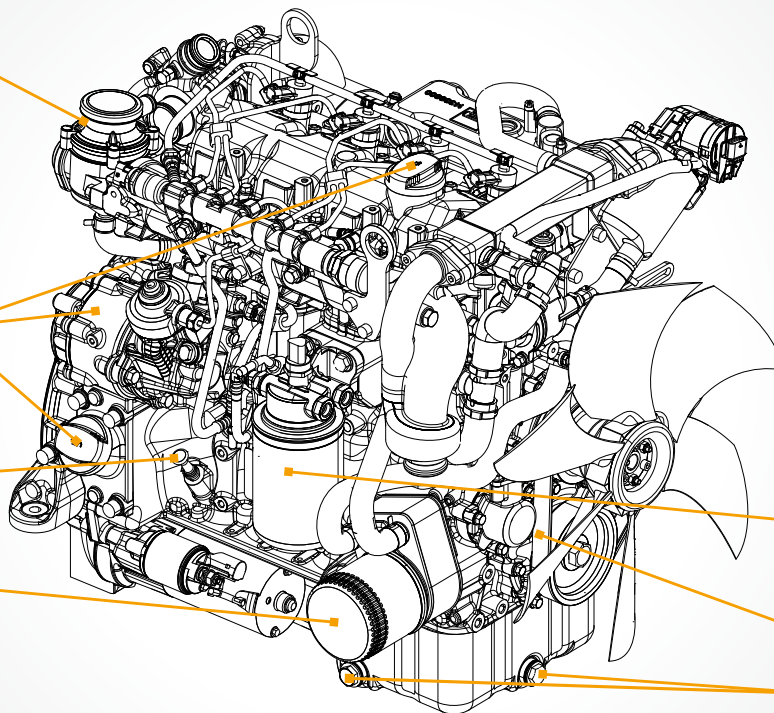
Oil dipstick

Engine oil filter

Fuel main filter

Poly-V-belt

Oil drain plug



PENDING INFORMATION

Extended Declaration of Incorporation EC Machinery Directive 2006/42/EC

The manufacturer: **Motorenfabrik Hatz GmbH & Co.KG**
Ernst-Hatz-Straße 16
D-94099 Ruhstorf a. d. Rott

hereby declares that the incomplete machine: product description: **Hatz diesel engine**

Type designation and as of serial number:

3H50TIC = 13510, 3H50TI = 16310

4H50TIC = 13610, 4H50TI = 16110

satisfies the following basic safety and health protection requirements in acc. with Annex I to the above-mentioned Directive.

- Annex I, General principles no. 1
- Nr. 1.1.2., 1.1.3., 1.1.5., 1.2.1., 1.2.2., 1.2.3., 1.2.4.1., 1.2.4.2., 1.3.1., 1.3.2., 1.3.3., 1.3.4., 1.3.7., 1.3.8.1., 1.4.1., 1.5.1., 1.5.2., 1.5.8., 1.5.9., 1.6.1., 1.6.2., 1.6.4., 1.7.

All relevant basic safety and health protection requirements down to the interfaces described

☒ in the manual for diesel engine

☒ in the enclosed data sheets

☒ in the enclosed technical documents

have been complied with.

The special technical documents in acc. with Annex VII B of the Directive 2006/42/EC have been prepared.

Conformity with the provisions of the following, other EC Directives, i.e.

- **2014/30/EU Electromagnetic Compatibility (EMC)**, dated 26.02.2014
(was tested in association with a generator)

The following standards have been used (completely or partially):

- EN 1679-1: 092011
- EN ISO 12100: 032011
- EN ISO 13857: 062008
- EN 60204-1: 062007
- EN ISO 13849-1: 062016

The manual for diesel engine has been enclosed to the incomplete machine and the Assembly Instructions have been provided to the customer electronically together with the order confirmation.

Commissioning has been prohibited until it has been established, if applicable, that the machine into which the above-mentioned incomplete machine is to be incorporated, satisfies the provisions of the Machinery Directive.

Wolfgang Krautloher / see "Manufacturer"

Name / address of EC documentation officer

03.07.2017

Date

Krautloher / Directives official

Signature and information on the undersigned



Signature

PENDING INFORMATION

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SECTION 1

SAFETY

Federal Respiratory Hazards

WARNING

SILICOSIS WARNING

Grinding/cutting/drilling of masonry, concrete, metal and other materials with silica in their composition may give off dust or mists containing crystalline silica. Silica is a basic component of sand, quartz, brick clay, granite and numerous other minerals and rocks. Repeated and/or substantial inhalation of airborne crystalline silica can cause serious or fatal respiratory diseases, including silicosis. In addition, California and some other authorities have listed respirable crystalline silica as a substance known to cause cancer. When cutting such materials, always follow the respiratory precautions mentioned above.

WARNING

RESPIRATORY HAZARDS

Grinding/cutting/drilling of masonry, concrete, metal and other materials can generate dust, mists and fumes containing chemicals known to cause serious or fatal injury or illness, such as respiratory disease, cancer, birth defects or other reproductive harm. If you are unfamiliar with the risks associated with the particular process and/or material being cut or the composition of the tool being used, review the material safety data sheet and/or consult your employer, the material manufacturer/supplier, governmental agencies such as OSHA and NIOSH and other sources on hazardous materials. California and some other authorities, for instance, have published lists of substances known to cause cancer, reproductive toxicity, or other harmful effects.

Control dust, mist and fumes at the source where possible. In this regard use good work practices and follow the recommendations of the manufacturers or suppliers, OSHA/NIOSH, and occupational and trade associations. Water should be used for dust suppression when wet cutting is feasible. When the hazards from inhalation of dust, mists and fumes cannot be eliminated, the operator and any bystanders should always wear a respirator approved by NIOSH/MSHA for the materials being used.

Proposition 65 Warning

WARNING

CALIFORNIA — Proposition 65 Warning

Engine exhaust and some of its constituents, and some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm. Some examples of these chemicals are:

- Lead from lead-based paints.
- Crystalline silica from bricks.
- Cement and other masonry products.
- Arsenic and chromium from chemically treated lumber.

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: **ALWAYS** work in a well ventilated area, and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles.

SECTION 1 SAFETY

Safety Information

Do not operate or service the equipment before reading the entire manual. Safety precautions should be followed at all times when operating this equipment. Failure to read and understand the safety messages and operating instructions could result in injury to yourself and others.

SAFETY NOTES

The four safety notes shown below will inform you about potential hazards that could injure you or others. The safety notes specifically address the level of exposure to the operator and are preceded by one of four words: DANGER, WARNING, CAUTION or NOTICE.



Indicates a hazardous situation which, if not avoided, **will** result in death or serious injury.



Indicates a hazardous situation which, if not avoided, **could** result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Addresses practices not related to personal injury.

Potential hazards associated with the operation of this equipment will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety notes.

Symbol	Safety Hazard
	Lethal exhaust gas hazards
	Explosive fuel hazards
	Burn hazards
	Rotating parts/crush hazards
	Pressurized fluid hazards
	Hydraulic fluid hazards

SECTION 1 SAFETY

General Safety Information

- **NEVER** operate this equipment without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.
- **NEVER** operate this equipment when not feeling well due to fatigue, illness or when under medication.
- **NEVER** operate this equipment under the influence of drugs or alcohol.
- **NEVER** use accessories or attachments that are not recommended by AEC for this equipment. Damage to the equipment and/or injury to user may result.
- **ALWAYS** avoid wearing jewelry or loose fitting clothes that may snag on the controls or moving parts as this can cause serious injury.
- **ALWAYS** know the location of the nearest fire extinguisher.
- **ALWAYS** know the location of the nearest first aid kit.
- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the equipment is in operation.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children and unauthorized personnel.
- **DO NOT** use the equipment for any purpose other than its intended purposes or applications.
- No one other than the operator is to be in the working area when the equipment is in operation.
- This equipment should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult to read.
- AEC does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties.

- **ALWAYS** know the location of the nearest phone or keep a phone on the job site. Also, know the phone numbers of the nearest ambulance, doctor and fire department. This information will be invaluable in the case of an emergency.
- **ALWAYS** keep clear of rotating or moving parts while operating the paver.
- **NEVER** operate the equipment in an explosive atmosphere or near combustible materials. An explosion or fire could result
- **NEVER** disconnect any emergency or safety devices. These devices are intended for operator safety. Disconnection of these devices can cause severe injury, bodily harm or even death. Disconnection of any of these devices will void all warranties.
- **NEVER** operate the engine with heat shields or guards removed.
- **NEVER** run engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service air filter frequently to prevent engine malfunction.
- **NEVER** tamper with the factory settings of the engine or engine governor. Damage to the engine or equipment can result if operating in speed ranges above the maximum allowable.



- Engine fuel exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and can cause death if inhaled.
- The engine of this equipment requires an adequate free flow of cooling air. Never operate this equipment in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause injury to people and property and serious damage to the equipment or even causing severe bodily harm or even death.

SECTION 1 SAFETY

General Safety Information Continued



- **DO NOT** start the engine near spilled fuel or combustible fluids. Fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **DO NOT** fill the fuel tank while the engine is running or hot.
- **DO NOT** overfill tank, since spilled fuel could ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- **DO NOT** smoke around or near the equipment. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with flammable liquids.
- **NEVER** use fuel as a cleaning agent.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.



- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **DO NOT** expose the battery to open flames, sparks, cigarettes, etc. The battery contains combustible gases and liquids. If these gases and liquids come into contact with a flame or spark, an explosion could occur. The battery contains acids that can cause injury to the eyes and skin.
- **DO NOT** charge battery if frozen. Battery can explode. When frozen, warm the battery to at least 61°F (16°C).
- **ALWAYS** wear safety glasses when handling the battery to avoid eye irritation.
- **ALWAYS** keep the battery charged. If the battery is not charged, combustible gas will build up.
- Use well-insulated gloves when picking up the battery.

NOTICE

Regular maintenance of the hydraulic system is important. These machines operate with high oil pressure. Minor damage or a crack in a hose or connection can have devastating consequences. Bear in mind that hydraulic hoses are made of rubber, which means that they age over time and that this can cause cracks to start forming. If there is the least doubt about the durability of hoses, or if damage is detected caused by mechanical wear, replace the hoses using genuine AEC hoses. Never store hoses for excessively long periods: hoses need to be used while still relatively new.

WARNING

- **ALWAYS** keep the machine in proper running condition. Fix damage to machine and replace any broken parts immediately.
- **ALWAYS** disconnect the battery before servicing the equipment.
- **NEVER** lubricate components or attempt service on a running machine.
- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing equipment.
- **DO NOT** place hands or fingers inside engine compartment when engine is running.
- **DO NOT** remove the engine oil drain plug while the engine is hot. Hot oil will gush out of the oil tank and severely scald any persons in the general area of the paver.
- **DO NOT** attempt to loosen or disconnect any hydraulic lines, hoses or fittings without first relieving hydraulic circuit pressure. Also, be careful not to touch any hydraulic components that have been in recent operation, because they can be extremely hot and can cause burns.

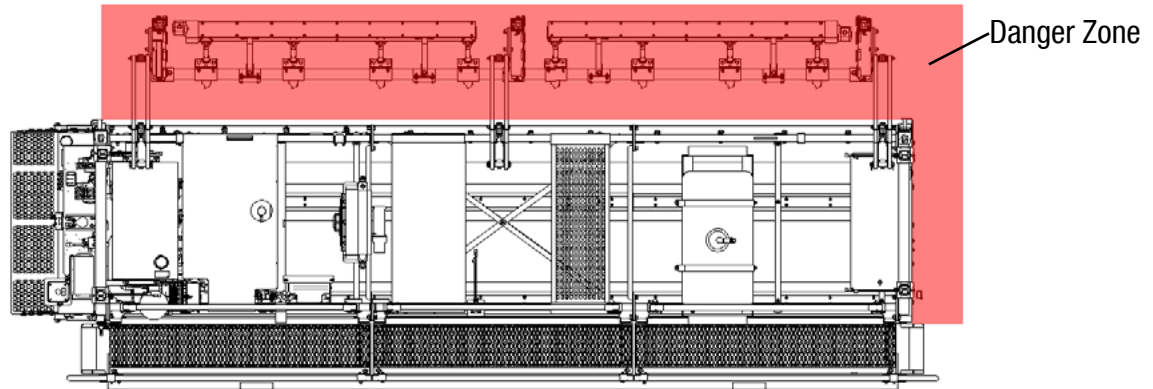
DANGER

- If applicable, never use your hand to find hydraulic leaks. Use a piece of wood or cardboard. Hydraulic fluid injected into the skin must be treated by a knowledgeable physician immediately or severe injury or death can occur.

SECTION 1 SAFETY

Operational Safety

Before starting up and during operation of the paver, the operator must make sure that there are no persons in the “danger zone”. All persons that are in the vicinity of the paver must be informed of the dangers that can result from the operation of the paver.



- Only mount or dismount the machine while the machine is stationary. Use the handles and retaining fixtures provided.
- The operator must look in the direction of travel and must always have a clear view of the route ahead. Especially when operating in the reverse direction, he must ensure that his path and the working area are clear.
- Do not attempt to operate the paver unless fully trained in the machine operation, only authorized personnel should operate the paver. All instructions provided in this manual and on the machine operating and warning decals must be followed to prevent damage to the equipment and/or injury to operating personnel.
- Check paver for proper functioning of controls before operating. Observe all gauges and instruments, and correct any malfunctions before operating.
- Always wear personal protective equipment (PPE) appropriate for the job and working conditions. Hard hats, safety glasses, protective shoes, gloves, reflective vests, respirators and ear protection are examples of types of equipment that may be required. Do not wear loose-fitting clothing, long hair, jewelry or loose personal items while operating or servicing the paver.
- Always check the job site for obstructions and bystanders.
- Always perform a daily inspection of the paver before using it. Look for damage, loose or missing parts, leaks, etc.
- Walk around the paver and warn all nearby personnel before starting the paver.
- Pressing the **emergency stop button** (e.g. when someone enters the danger zone, when the machine is no longer under control, etc.) causes the drive motors, the screed motor and the steering system to be switched off. The paver brakes to a standstill. Before the paver can be started up again, the cause of the malfunction must be determined and the malfunction eliminated. The machine must then be started up again as described in the Starting Instructions.

Before driving, make sure your vehicle maintenance and trailer maintenance are current. This is very important because towing puts additional stress on the tow vehicle.

- Check and correct tire pressure on the tow vehicle and trailer, including the spare tire.
- Make sure the wheel lug nuts/bolts on the tow vehicle and trailer are tightened to the correct torque.
- Be sure the hitch, coupler, draw bar and other equipment that connect the trailer and the tow vehicle are properly secured and adjusted.
- Make sure the safety chains are properly criss-crossed and connected, not touching the road but with enough slack to make turns.
- Check that the wiring is properly connected; not touching the road, but loose enough to make turns without disconnecting or damaging the wires.
- Make sure all running lights, brake lights, turn signals and hazard lights are working.
- Verify that the brakes on the tow vehicle and trailer are operating correctly.
- Ensure the breakaway system lanyard is connected to the tow vehicle but not to the safety chains or ball mount.
- Be sure the trailer jack, tongue support and any attached stabilizers are raised and locked in place.
- Check load distribution to make sure the tow vehicle and trailer are properly balanced front to back and side to side.
- Check side and rear-view mirrors to make sure you have good visibility.
- Check routes and restrictions on bridges and tunnels.
- Make sure you have wheel chocks and jack stands.
- Match the maximum trailer weight allowed for the tow vehicle to the GVWR of the trailer.
- Match the hitch weight carrying capacity of the tow vehicle with the loaded tongue weight of the trailer. This is generally 10% of GVWR on tag models and 20% of GVWR on 5th wheels and Goosenecks. Tag models may require a weight distributing hitch with sway controls. Contact your hitch specialist to properly set up your tow vehicle/trailer combination.
- Match the size of the brake controller to the number of braking wheels on your trailer. These are sold usually as 2 to 4 wheel brake or 2 to 6 wheel brake units. For proper controller adjustment, see your brake controller manual.
- Match the wiring of the tow vehicle to the wiring code on the trailer. Ensure your tow vehicle does have a ground wire running from the receptacle to the frame.
- Match the ball size to the coupler size.
- Match your Fifth Wheel or Gooseneck trailer to a correct and compatible hitch provided by your hitch specialist. Then consult your hitch specialist for proper maintenance of the hitch assembly.
- Match your rear vehicle suspension to the loaded hitch weight of the rear axle of the tow vehicle. All marginal situations should be corrected for safe trailering. Remember, you are the one that will be trying to control a large combination of weight and size at high speeds. It is your responsibility to set up tow vehicle/trailer properly. Contact or confirm your set up with a local hitch company professional.

SECTION 1 SAFETY

Lifting Safety

Safe systems of work

The following safe systems of work must be in place prior to carrying out any lifting operation.

- Pre-site inspection – Ground stability conditions / access / egress, weather conditions etc.
- Suitable cranes – Lifting accessories.
- Pre-Inspection of the lifting equipment / testing / examination / certification.
- Risk assessment / method statement.
- Lift plan.

Before lifting heavy loads, reference relevant lifting codes and standards. i.e. BS 7121

Requirements for lifting equipment

The employer shall ensure that lifting equipment provided for use at work is safe, i.e. that it is:

- Sufficiently strong, stable and suitable for the proposed use.
- Positioned or installed to prevent the risk of injury, e.g. from the equipment or the load falling or striking people
- Visibly marked with any appropriate information to be taken into account for its safe use, e.g. safe working loads. Accessories, e.g. slings, clamps etc., should be similarly marked
- Where equipment is used for lifting people it is marked accordingly, and it should be safe for such a purpose, e.g. all necessary precautions have been taken to eliminate or reduce any risk.

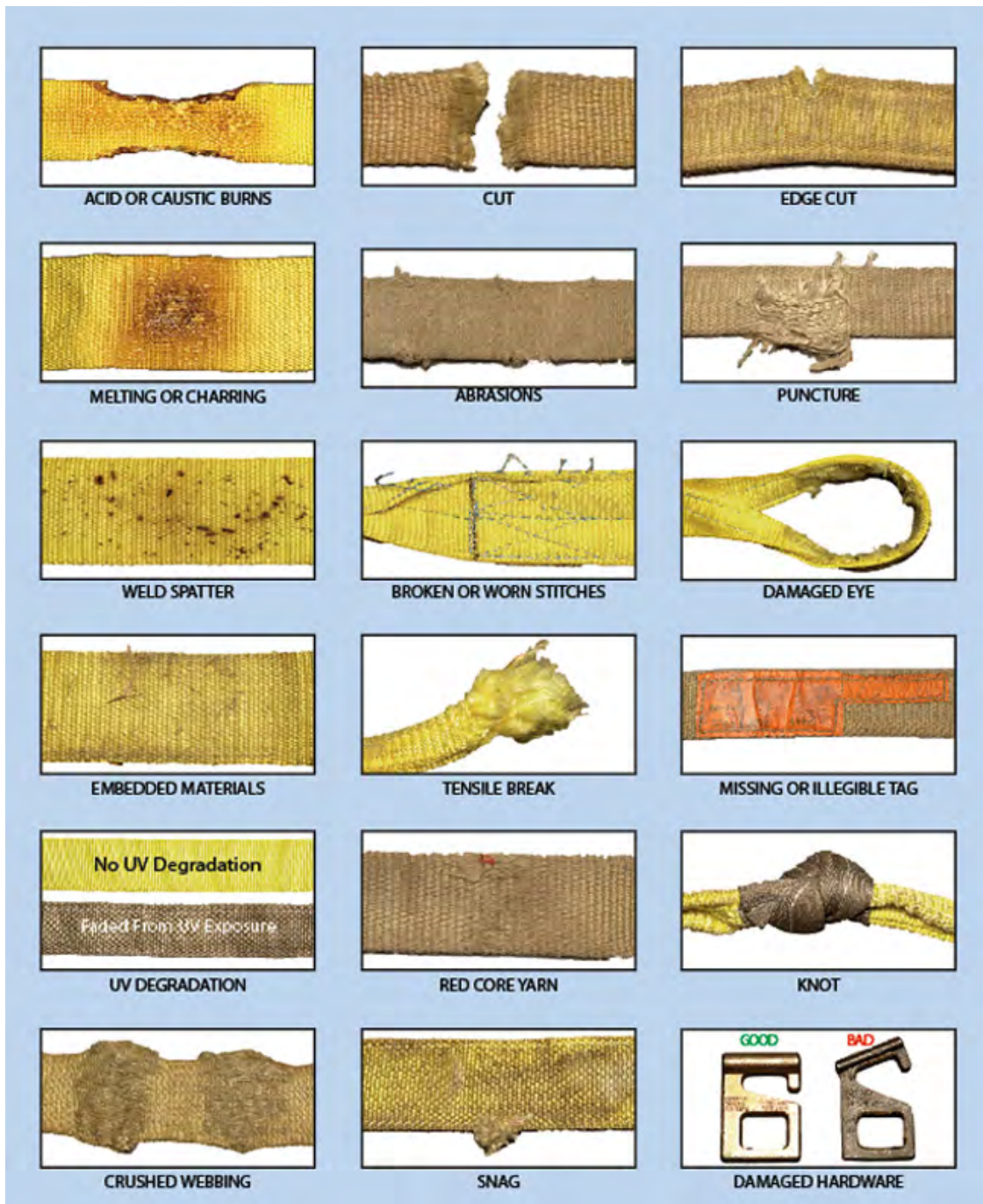
OSHA has set forth guidelines which detail the use of Rigging Equipment for Material handling. This guideline is found under

OSHA Standard Number: 1926.251

Please read and follow all guidelines found in this standard.

Removal from service.

Synthetic web slings shall be immediately removed from service if any of the following conditions are present:

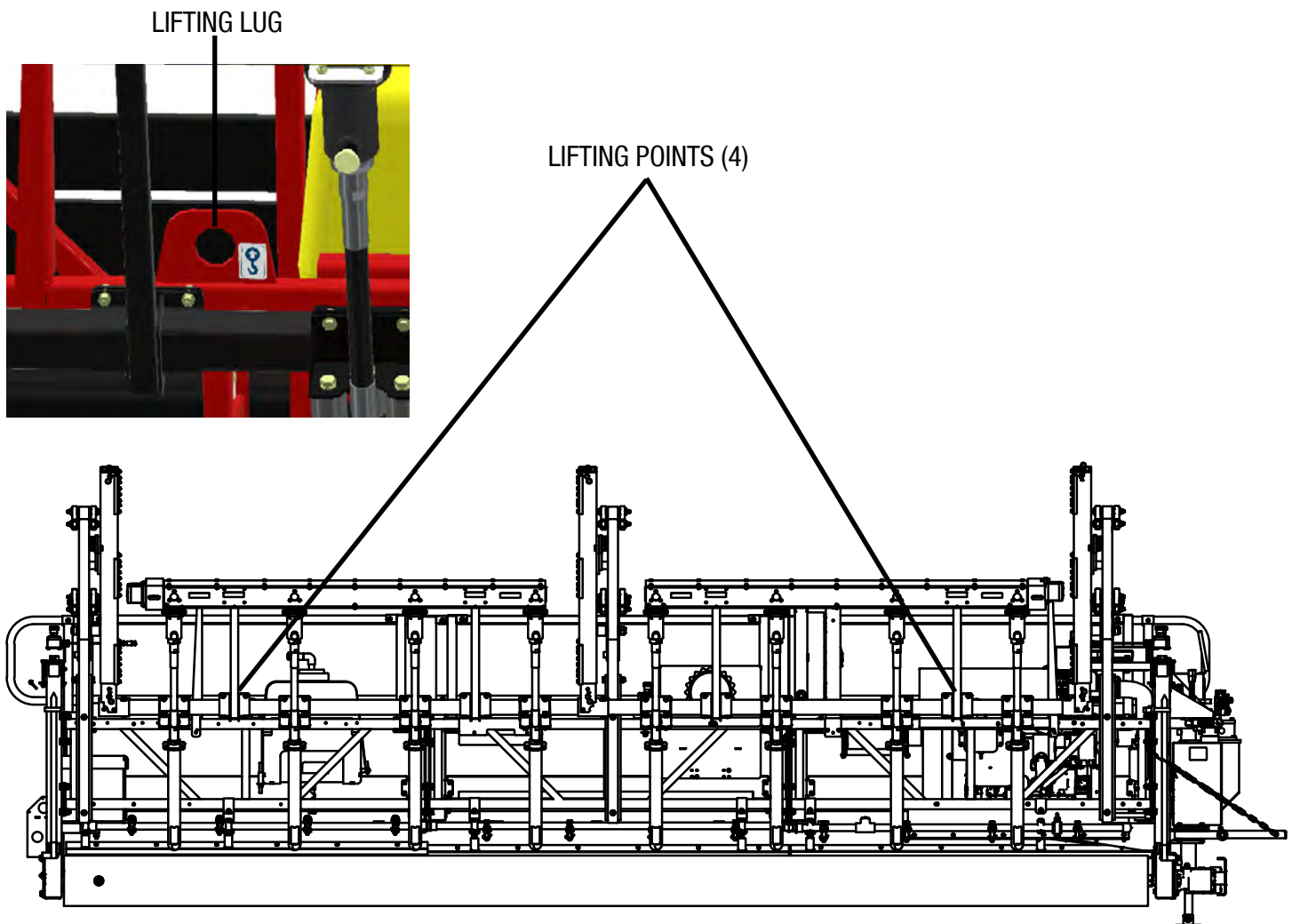


SECTION 1 SAFETY

Lifting Safety

When Lifting the TRTP:

- Always lift the machine using the **lifting lugs** [4 per machine], see the figures below
- Always check the sling angle, preferably ensure that the sling angle is as close to 90° as possible, or preferably no less than 60°
- Always ensure that the lifting components are of sufficient load bearing capacity
- Never use damaged slings or ropes
- Avoid sharp bends, pinching and crushing the sling
- Make sure that the areas underneath and around the load are clear at all times



Use of Shackles and Hooks

Lifting Hooks:

Inspect hooks daily before use and frequently during use. Remove a hook from service when any of the following conditions exist:

- Missing or illegible manufacturer identification
- Cracks, nicks, or gouges
- Damage from heat
- Unauthorized repairs
- Improper operation and locking of self-locking hooks
- Any Distortion or wear on hook



Lifting Shackles:

Inspect shackles daily before use and frequently during use.

- Excessive pitting or corrosion
- Body spread including: bent, twisted, distorted, stretched, elongated, cracked, or broken load bearing components
- Excessive nicks or gouges
- incomplete pin engagement, shoulder of pin is not flush with shackle body
- Excessive thread damage



NOTICE

The rated capacity of shackles only applies when they are symmetrically loaded and the included angle between two sling legs is a maximum of 120°. Shackle capacity must be reduced when the angle is greater than 120°.

Never allow the shackle to be pulled at an angle

SECTION 2

OPERATIONS

Before operation each day ensure the following:

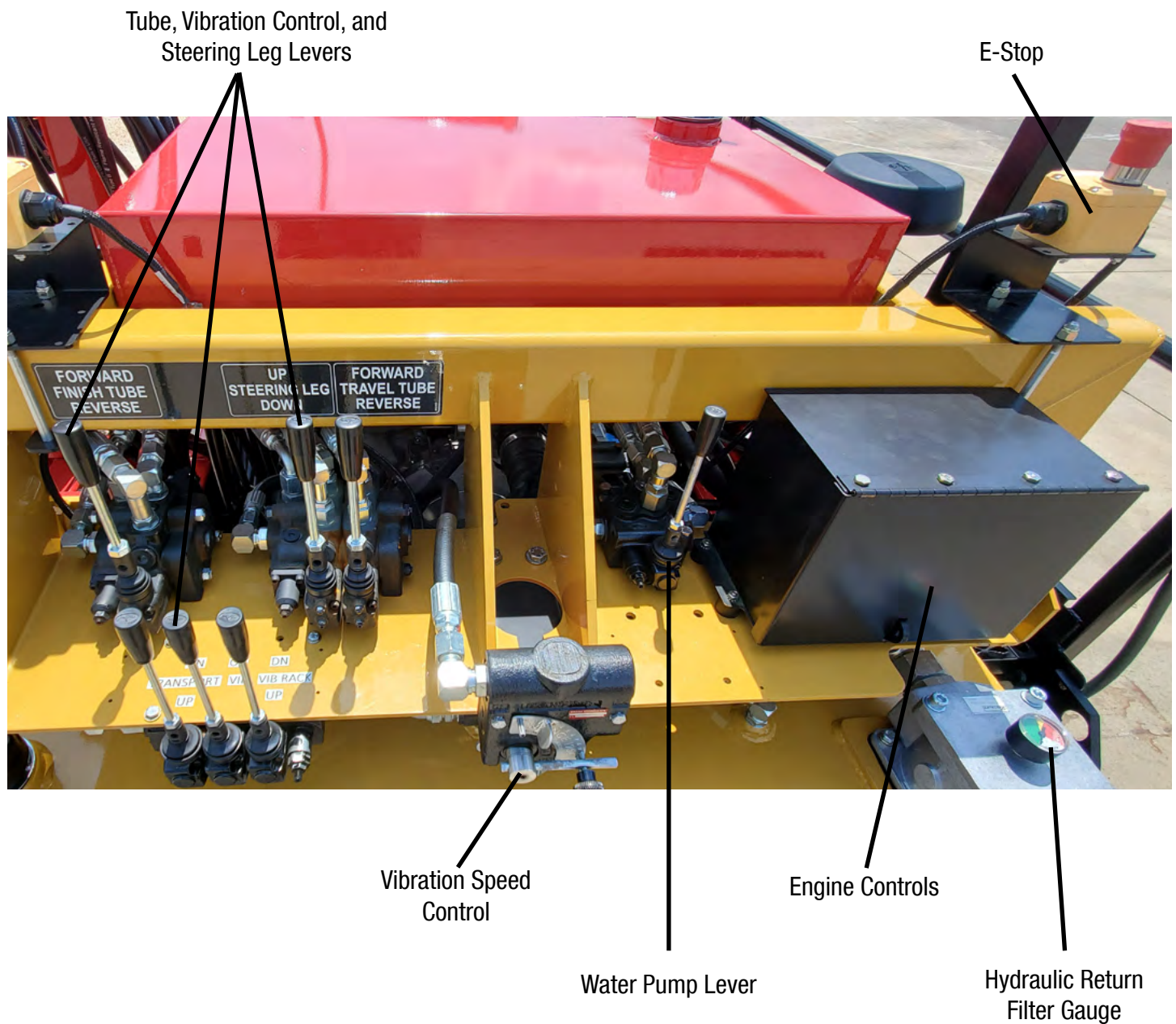
- All guards, side screens and panels are in place.
- All safety and information signs are in place and legible.
- Engine and hydraulic oil levels are correct.
- Check battery level
- Check for hydraulic leaks.
- Check all operating controls for proper operation and adjustment.
- Check speed control operation before and after starting engine for proper operation.
- Remove loose objects that could interfere with operation.

Note: If there is any indication that faulty equipment exists, shutdown safely, inform the proper authority and **DO NOT** operate the paver until the problem has been fixed.

SECTION 2 OPERATIONS

Operator Controls

Shown below is the layout of the operator controls:



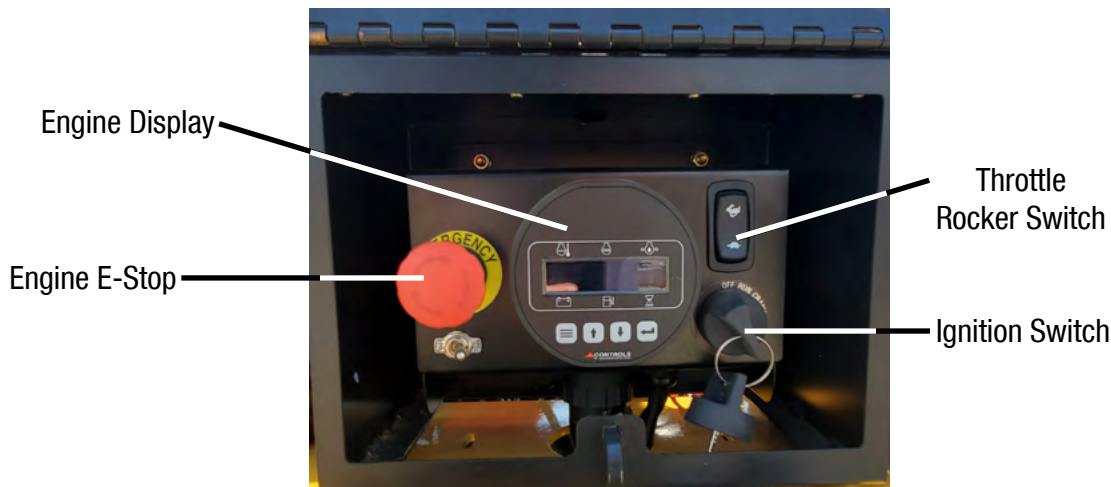
Starting the Engine

NOTE: If temperature is below 0°C (32°F), it may be necessary to use cold weather starting aids.

1. Perform all pre operation instructions outlined page 31
2. Ensure that the controls are in the OFF or NEUTRAL position before starting the Paver.
3. Turn the ignition switch to the RUN or I position before fully starting the engine

The ignition switch is a three position start switch. Where “0” is the OFF position, “I” is the operation or RUN position, and “II” is the start or CRANK position.

- To start the engine turn the switch clockwise to the “I” position, indicators will light up.
- Wait until the Engine Pre-glow Indicator light turns off (a horizontal curl), then turn the key start switch clockwise “II” position to crank the engine.
- When the engine starts, release the key switch so that it returns to the “I” position.



Do not operate the starter for more than 20 SECONDS at a time. To do so may overheat the starter. If the engine does not start the first time, wait at least 2 minutes before trying again. If engine does not start see the Troubleshooting section in this manual and the OEM manual.

If the key switch is released before the engine starts, wait until the starter and the engine stop turning before trying again. This will prevent possible damage to the starter and/or flywheel.

4. Set the engine speed by using the rocker switch,
 - For slow speed, press the lower half of rocker switch (indicated by turtle symbol)
 - For fast speed, press the upper half of rocker switch (indicated by rabbit symbol)
5. After engine starts, idle engine at a low RPM until warm.

SECTION 2 OPERATIONS

Engine Controls

Stopping the Engine

1. Stop the machine and return the movement controls to their neutral position.
2. Set the Speed Select Rocker Switch to low idle
3. Run engine at a reduced speed and load for at least 5 minutes to cool.
4. Turn ignition switch to “0” or Off position to stop the engine.

Restarting Engine After Emergency Shutdown

In the event of an emergency engine shutdown, the following procedures are required to restart the engine.

1. Correct the condition causing the emergency shutdown
2. Perform relevant Pre-Start procedures, return all switches to their neutral position, and set the engine speed to slow.

For ALL emergency shutdowns, the controller must be reset before the engine can be restarted. Recycle the key switch to reset the controller.

3. Recycle the key start switch (F) as follows:
 - a. Turn ignition switch off.
 - b. Wait 15 seconds.
 - c. Turn ignition switch clockwise to the “I” or operation position, when the pre-glow indicator goes out start the engine.
4. Before operating the paver let the engine run at a no more than 1200 RPM, and check all displays and for normal engine operation.

Vibration Controls

There are three levers to control the vibration rack. Reference the Figure: Vibration Controls (Decal) below.

- Vibrator Rack Lever A: Controls the extension and retraction of the vibration racks
- Vibration Lever B: Turns the vibrators on and off
- Vibration Lever C: Raises and Lowers the vibrators

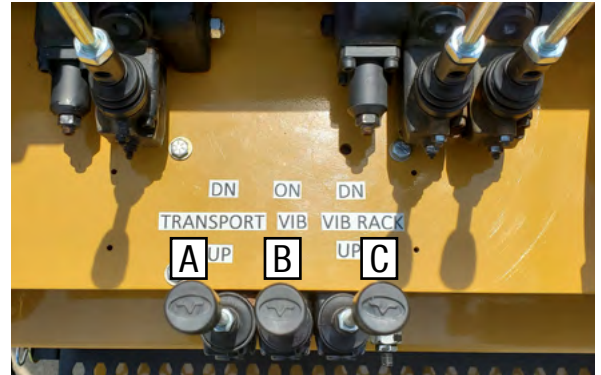
Vibrator Operation

1. Start the engine normally as described on page 33.
2. Bring the engine to Full Operating RPM.
3. Use the Vibration Rack DN/UP lever to lower the vibrators into the concrete and raise them out.
4. Use the Vibrator ON/OFF lever to turn the vibrators “on” when entering concrete and “off” when exiting concrete.



Leaving the vibrators on out of concrete for more than 3 minutes can cause internal damage due to overheating.

5. Use the Vibrator Speed Control to control the amount of VPM's into the concrete



Vibration Control Levers



Vibration Speed Control

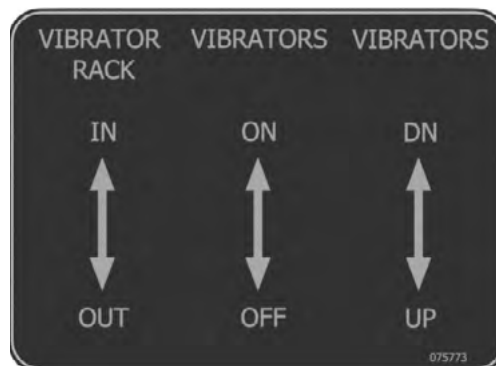


Figure: Vibration Controls (Decal)

NOTICE

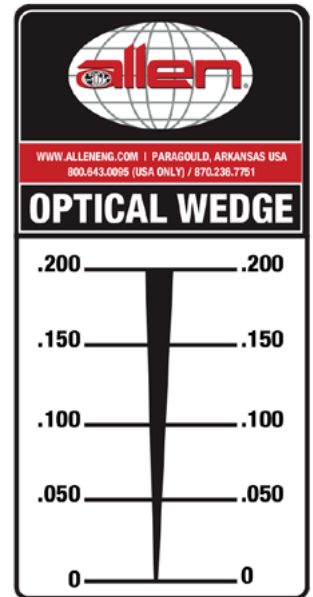
It is not uncommon for a pendulum type vibrator head to fail to vibrate when the motor is switched on or started. If the vibrating head does not start vibrating immediately, tap the tip of the vibrator head sharply with a rubber mallet.

SECTION 2 OPERATIONS

Vibration Amplitude Inspection

To check the amplitude of the vibration, follow the directions below:

- Attach the optical wedge decal to the barrel of the vibrator as close to the nose as possible
- Hang vibrator vertically in the air
- Run vibrator and observe the optical wedge
(The image on the wedge will change with the pointed end of the wedge become pale and appearing to visually move up the scale)
- Touch optical wedge with a pen where wedge image turns from pale to dark. Stop vibrator and note the measurement
- The measurement will reflect the full wave amplitude in inches



Finish Tube Height Adjustment

To raise or lower the front finish tube do the following:

- Remove the tube adjustment lock(A) from the end handle. Fastened by 1/4" bolt.
- To raise the tube, turn the adjustment nut (1-1/2") (B) in a clockwise rotation.
- To lower the tube, turn the adjustment nut (B) counter-clockwise.

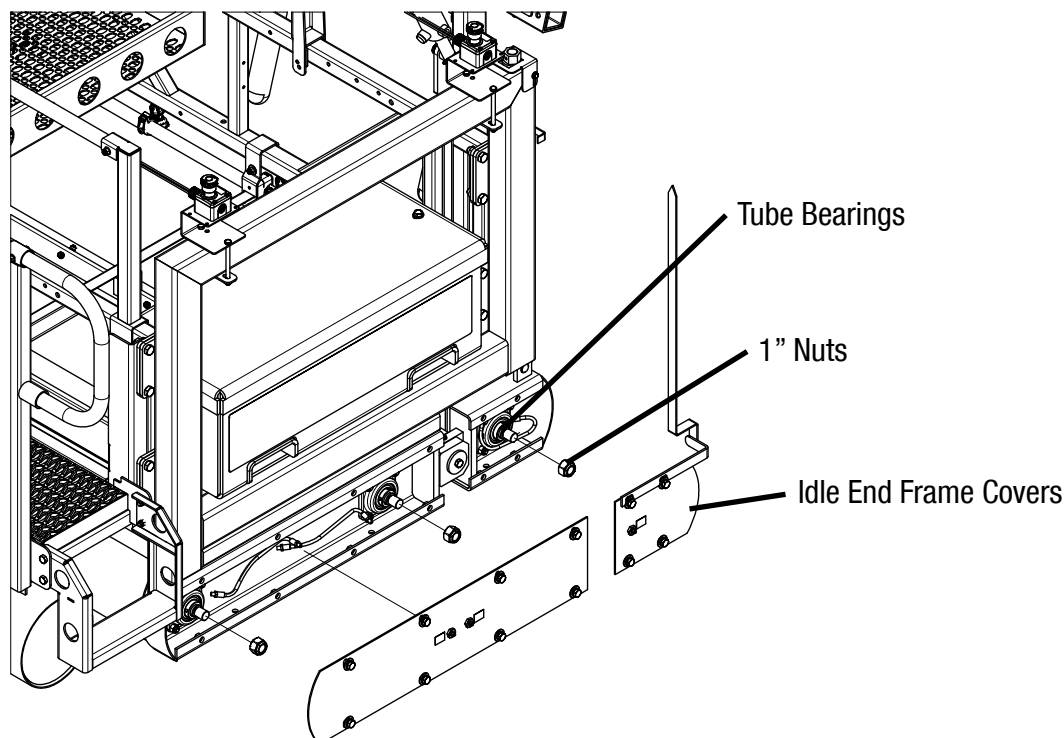
NOTE: The factory sets this tube at 1/8" above grade. There is a scribe line on the motor and idle end handles at the point where the tube is set. See Fig 2.3.4



SECTION 2 OPERATIONS

Tube Changing Procedure

Idle End



To Remove the Tubes - Idle End:

1. Remove the cover off of the idle end frame. Fastened by 12 HHCS 1/2"-13 X 1".

NOTE: There are grease lines attached to the end frame covers and bearings, if necessary unfasten the grease lines.

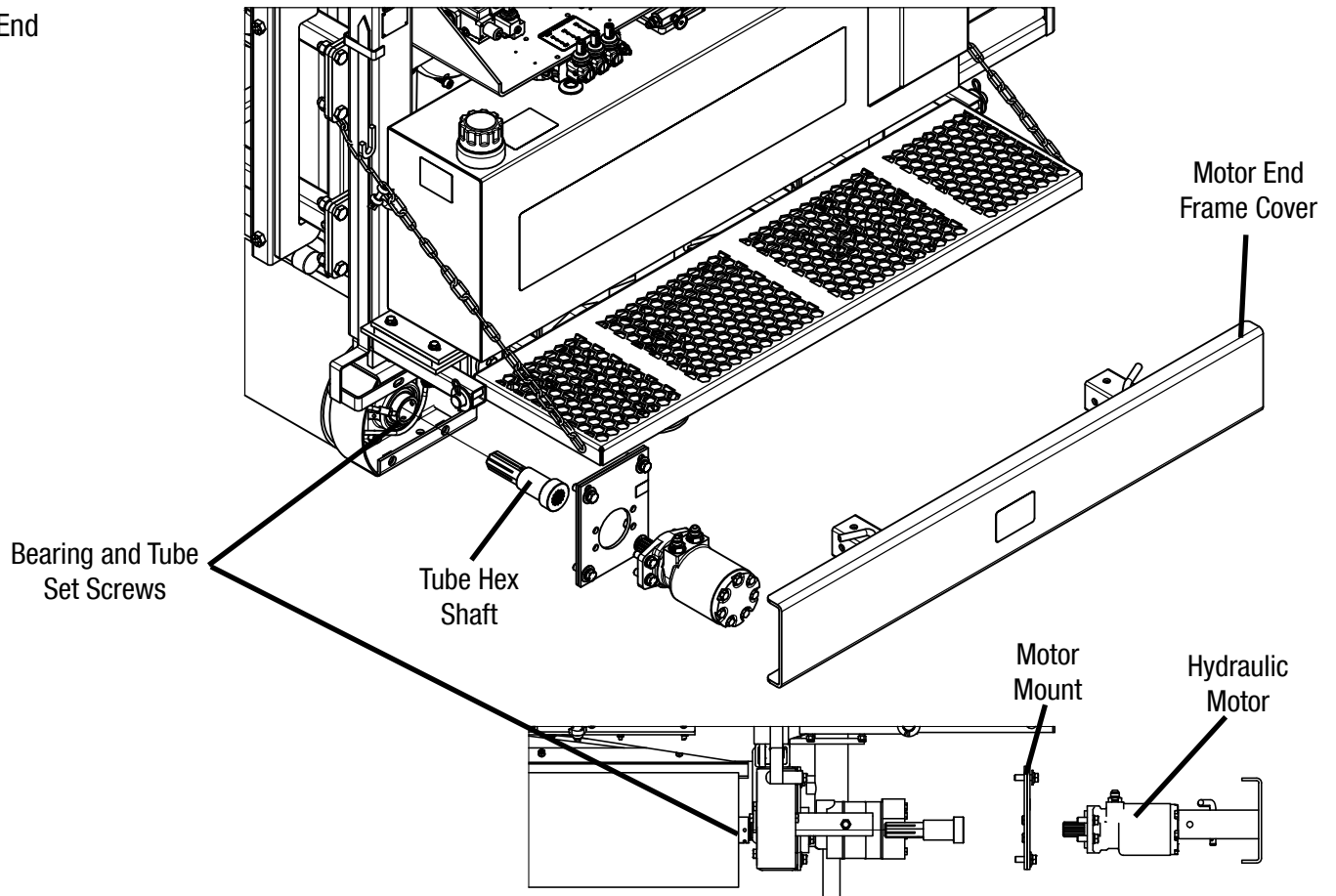
2. Take the 1" nuts off of the idle end tube shafts.
3. Loosen the set screws on bearings
4. Then take the 16 bolts off the idle end frame that connect the framework to the end frame to remove the idle end frame. See page 40.



NOTE: Make sure that the framework is supported by a crane to insure that the framework does not collapse. **Please see additional note on pg 39**

5. See page 39 for the motor end steps

Motor End



To Remove the Tubes - Motor End:

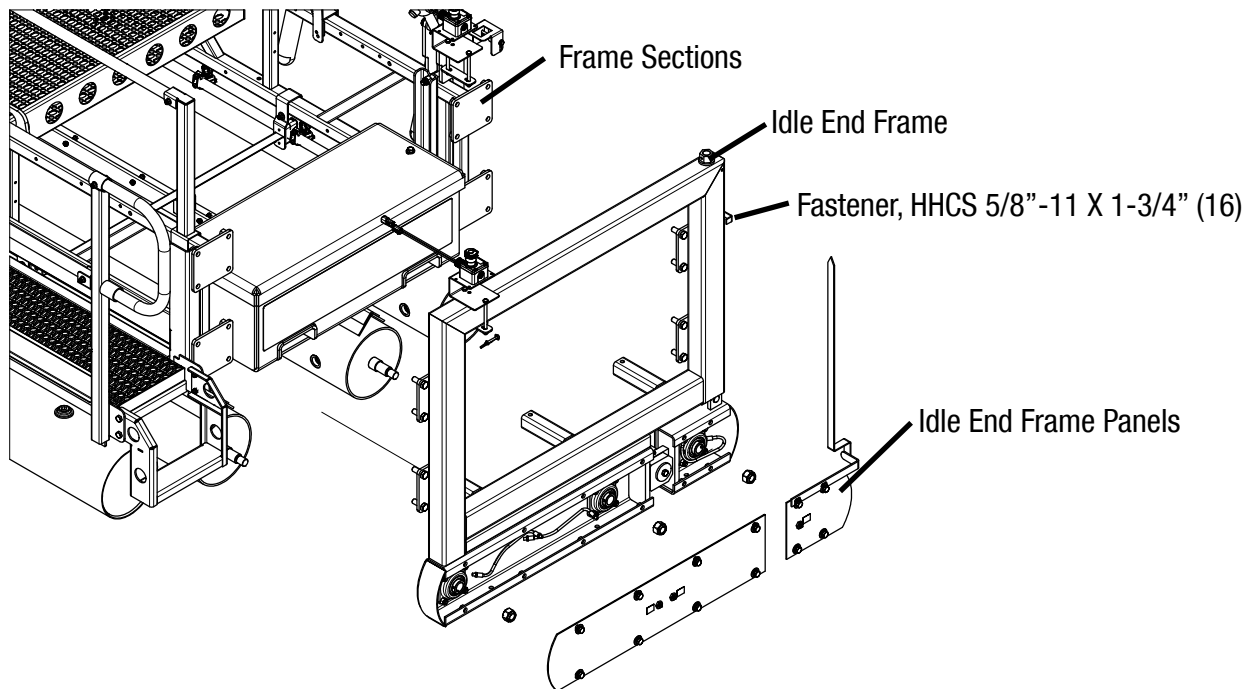
1. Remove the cover off of the motor end frame. Fastened by 2 pins.
2. Unfasten the hydraulic motors (3). Fastened by (4) 1/2" bolts. If necessary remove the motor mounting plates. Fastened by (4) 1/2" bolts
3. Loosen the set screws on the bearings and the tube connection.
4. If only the tubes need to be changed at this point the tubes can be removed. Tube removal may be easier if the motor end frame is removed, follow step 4 on pg 38.

NOTICE

Removing the End Frames and Frame Sections will affect the Hydraulic Hoses, Electrical Wiring, and the Vibration Racks. Contact Customer Service for help, 870.236.7751 EXT. 3

SECTION 2 OPERATIONS

Tube Changing Procedure



To change the frame sections:

1. Complete the steps 1-3 on page 38 and 39.
2. Take the 16 bolts off the end frames that connect the framework to the end frames.



NOTE: Make sure that the framework is supported by a crane to insure that the framework does not collapse.

3. Remove the idle and motor end frames.
4. Using the same method as in step 1, take the framework apart or add to section by section until the desired length is achieved.

NOTICE

Removing the End Frames and Frame Sections will affect the Hydraulic Hoses, Electrical Wiring, and the Vibration Racks. Contact Customer Service for help, 870.236.7751 EXT. 3

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SECTION 3

SERVICE

SERVICE CHECKLIST				
TASK	DAILY	EVERY 20 HRS	EVERY 50 HRS	EVERY 500 HRS
Inspect				
Check external hardware	✓			
Check hoses & fittings for leaks	✓			
Check fuel, engine oil, hydraulic oil levels	✓			
Check the cooling systems (hydraulic & engine) for blockage on radiator, wear, leaks	✓			
Check air and hydraulic filters	✓			
Check steering leg for corrosion, pitting or wear			✓	
Check hydraulic motors for normal operation, abnormal temps. or noise			✓	
Action				
Grease tube bearing (See pg 46)		✓		
Change engine oil*				✓
Change engine oil filter				✓
Change fuel filters				✓
Change hydraulic fluid**				✓

* SEE HATZ ENGINE OWNERS MANUAL FOR DETAILED SERVICE INSTRUCTIONS

** As a precaution the hydraulic fluid should be changed annually, the fluid should be checked regularly for contamination and/or tested for the right chemical makeup.

SECTION 3 SERVICE

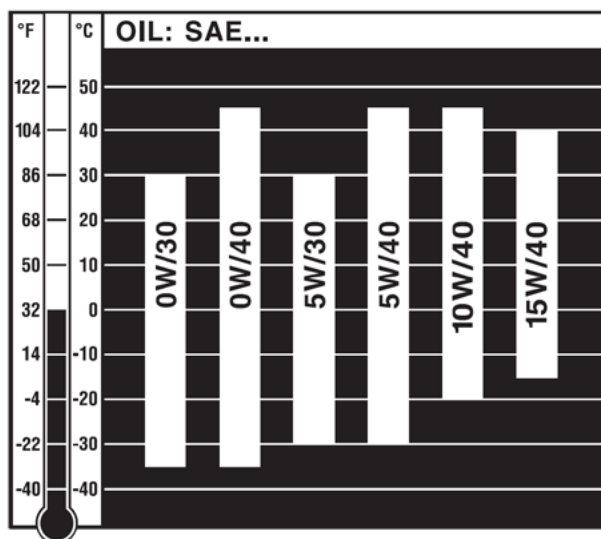
Oil and Filter Replacement

Engine Oil

Oil Quality, Use oil that follows at least one of the specifications listed below. (Oil Capacity 6.3-7.4 QTS, see pg 11)

- ACEA E6
- ACEA E9
- ACEA C3/C4 (HTHS ≥ 3.5 MPAS)
- API CJ-4

Use the graph below to select oil viscosity based on the ambient temperature.



Engine Oil

- Change the type of engine oil according to the ambient temperature.
- When using oil of different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil.
- For general use 15W/40 oil is recommended (6.3 Qts or up to ~7.4 Qts). Ensure that the engine oil meets Hatz engine oil specifications

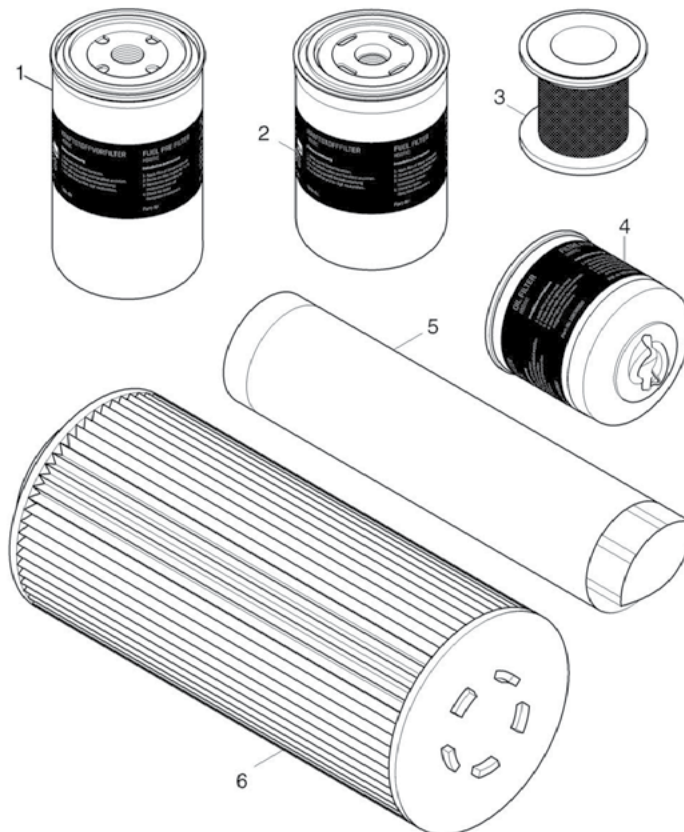
Hydraulic Oil

Replace hydraulic fluid with Hydraulic oil 46 (DTE 25) or equivalent, 30 GAL (114 L) tank.

HYDRAULIC FILTERS:

- TMF-10-5, 1-1/4" x 0.75" [(4) Hyd. tank outlet filters]
- TMF-25-5, 2" x 1.25" [(1) Hyd. tank outlet filter]
- TMF-05-5 PART NUMBER: 049358 [(1) Hyd. tank return line filter]

Service Replacement Parts



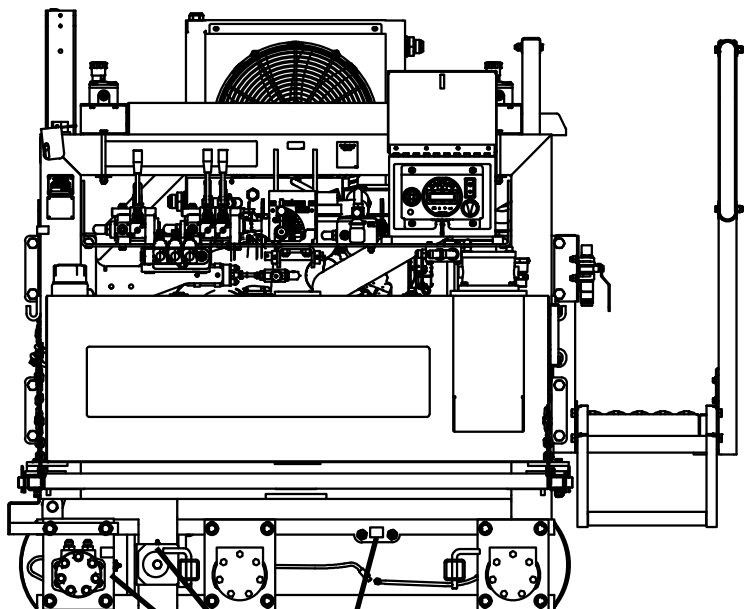
Replacement Filters			
Item	Part #	Description	Qty
1	065851	Pre-Fuel Filter	1
2	065852	Fuel Filter	1
3	065853	Oil Separator	1
4	065854	Oil Filter	1
5	065855	Air Filter - Secondary	1
6	065856	Air Filter - Primary	1

SECTION 3 SERVICE

Grease Tube Bearings

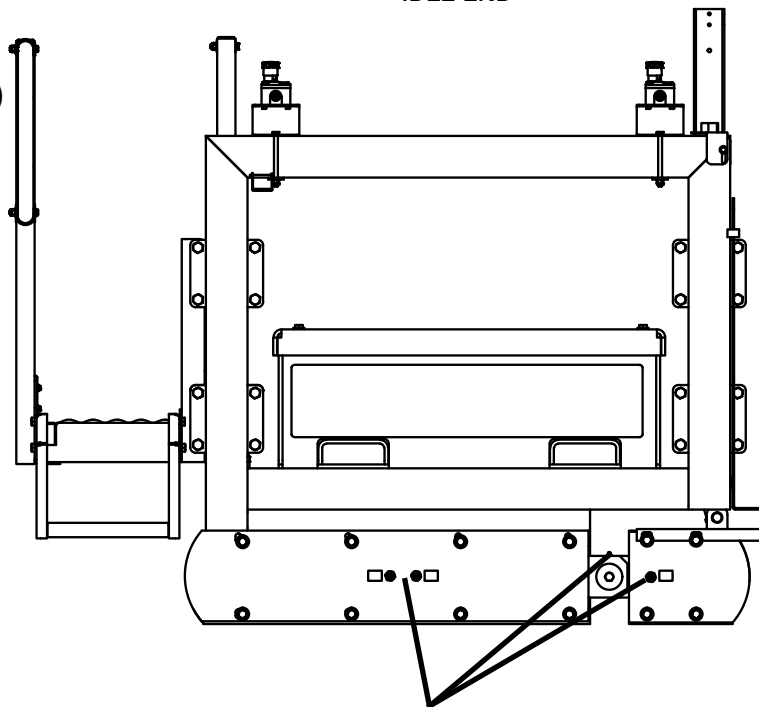
MOTOR END

*Parts Removed for Clarity



GREASE POINTS (APPROXIMATELY EVERY 20HRS)

IDLE END



GREASE POINTS (APPROXIMATELY EVERY 20HRS)

Area	Malfunction	Possible Cause	Corrective Measure	Ref.
Engine	Engine does not start, or is difficult to start	Battery is discharged	- Add battery fluid - Charge the battery - Replace the battery	
		Battery cable is disconnected	- Connect battery cable	
		Blown fuse	- Replace fuse	
		Bad connection or breakage in the wiring	- Contact your AEC dealer	
		Out of fuel	- Fill fuel	
		Air is in fuel	- Contact your AEC dealer	
		Engine fouled	- Wait a while and try starting again	
		Insufficient or wrong oil	- Fill or change oil	
		Dirty or damaged spark plug	- Clean or replace spark plug	
		Contamination in fuel system	- Contact your AEC dealer	
		Other (other than above)	- Contact your AEC dealer	
	Engine stalls	Out of fuel	- Fill fuel	
		Cold engine	- Warm up the engine	
		Other (other than above)	- Contact your AEC dealer	
	Engine stops abruptly	Out of fuel	- Fill fuel	
		Piston seizure due to insufficient or bad oil	- Contact your AEC dealer	
		Other (other than above)	- Contact your AEC dealer	
	Engine does not stop	Electrical malfunction	- Contact your AEC dealer	
		Other (other than above)	- Contact your AEC dealer	
	Idling is not stable	Insufficient intake air (clogged air cleaner)	- Clean or replace the air cleaner	
		Other (other than above)	- Contact your AEC dealer	
	Poor power or acceleration	Bad fuel	- Change fuel	
		Wrong oil (improper viscosity)	- Change to suitable oil	
		Accelerator (throttle) is not properly adjusted	- Contact your AEC dealer	
		Insufficient intake air (clogged air cleaner)	- Clean or replace the air cleaner	
		Excessive load	- Reduce load	
		Loose drive belt	- Adjust	
		Other (other than above)	- Contact your AEC dealer	
	Irregular noise or vibration from or around the engine		- Contact your AEC dealer	
	Excessive oil consumption		- Contact your AEC dealer	
	Engine overheats	Insufficient amount of engine oil	- Fill oil	
		Cooling fan is clogged or blocked	- Clean	
		Other (other than above)	- Contact your AEC dealer	
	Excessive fuel consumption	Clogged air cleaner	- Clean or replace air cleaner	
		Other (other than above)	- Contact your AEC dealer	

SECTION 3 SERVICE

Troubleshooting Continued

Area	Malfunction	Possible Cause	Corrective Measure	Ref.
Engine	Black smoke comes out of exhaust	Bad fuel	- Change fuel	
		Clogged air cleaner	- Clean or replace the air cleaner	
		Choke is not fully open	- Open the choke fully	
		Other (other than above)	- Contact your AEC dealer	
	White or blue smoke comes out of exhaust	Engine oil level is too high	- Adjust the oil level	
		Other (other than above)	- Contact your AEC dealer	
Safety Devices	Lamp does not light	Blown bulb	- Replace	
		Blown fuse	- Replace	
			- Check light electrical plug, make sure it plugged in the right orientation.	
		Other (other than above)	- Contact your AEC dealer	
Hydraulic System	Pump does not work	Insufficient or deteriorated hydraulic fluid	- Add or change fluid	
		Other (other than above)	- Contact your AEC dealer	

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
29	3	Signal Range Check High for APP2	If the signal exceeds the applicable threshold APP_uRaw2SRCHigh_C (2388mV) a signal range violation is detected after the debouncing.	Wiring Harness or Component
	4		If the signal is below the applicable threshold APP_uRaw2SRCLow_C (280mV) a signal range violation is detected after debouncing.	
91	3	Signal Range Check High for APP1	If the signal exceeds the applicable threshold APP_uRaw1SRCHigh_C 4775mV) a signal range violation is detected after debouncing.	
	4		If the signal is below the applicable threshold APP_uRaw1SRCLow_C (740mV) a signal range violation is detected after the debouncing.	
	11	In case of dual analog accelerator pedal, it is the plausibility check between APP1 and APP2 and in case of potentiometer switch accelerator pedal, it is the plausibility check between APP1 and idle switch	If the permitted maximum for the difference of both the input signals APP_uDiffMax_mp is exceeded this is reported in the DFC_st.DFC_Syn-cAPP via the DSM.	
95	3	SRC High for Environment Pressure	The sensor raw value is lesser than or equal to FI_SRCFuelP.uMax_C	
	4	SRC low for Environment Pressure	The sensor raw value is lesser than or equal to FI_SRCFuelP.uMin_C	
	17	Low fuel pressure error monitoring	Engine speed Epm_nEng greater or equal to FI_nStrtMonFuelP_C, and Fuel pressure value FI_pFuelP is lesser than the curve output FI_pFuel-Spd_CUR	fuel tank empty, fuel filter blocked, wiring harness or pre supply pump itself defective
97	15	Water in Fuel Detected		Water in Fuel Detected
	17	Fuel Level Un-plausible		Wiring Harness or Component
100	0	Maximum Oil Pressure Error in Plausibility Check	The oil temperature Oil_tSwmp is equal to or greater than the limit Oil_tLimP_C and the oil pressure Oil_pSwmp is greater than the threshold Oil_pMaxP_mp.	
	1	Minimum Oil Pressure Error in Plausibility Check	The oil pressure Oil_pSwmp is less than the threshold Oil_pMinP_mp.	
	3	Oil_uRawPSwmp < Oil_SRCPSwmp.uMax_C (4772mV)	Oil_uRawPSwmp > Oil_SRCPSwmp.uMax_C (4772mV)	
	4	Oil_uRawPSwmp < Oil_SRCPSwmp.uMin_C (234mV)	Oil_uRawPSwmp < Oil_SRCPSwmp.uMin_C (234mV)	
102	0	Physical Range Check high for air pressure at the upstream of intake valve sensor	If the signal Air_pSensPlntkVUs is greater than Air_PhysRngPlntkVUs.Max_C for a duration DDRC_DurDeb.Air_tiPhysRngHiPlntkVUsDebDef_C, then a physical range check high error is reported.	Over boost condition, Possible Blocked Waste Gate
	1	Physical Range Check low for air pressure at the upstream of intake valve sensor	If the signal Air_pSensPlntkVUs is less than Air_PhysRngPlntkVUs.Min_C for a duration DDRC_DurDeb.Air_tiPhysRngLoPlntkVUsDebDef_C, then a physical range check low error is reported.	Under Boost, Possible Turbo-Charger Defective
	3	Diagnostic fault check for SRC high in air pressure upstream of intake valve sensor	The sensor raw signal Air_uRawPlntkVUs (voltage) is above Air_SRCPlntkVUs.uMax_C	Wiring Harness or Component
	4	Diagnostic fault check for SRC low in air pressure upstream of intake valve sensor	The sensor raw signal Air_uRawPlntkVUs (voltage) is below Air_SRCPlntkVUs.uMin_C	

SECTION 3 SERVICE

Troubleshooting, Fault Codes

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
105	0	Physical Range Check high for Charged Air cooler down stream temperature		Physical Range Check high for Charged Air cooler down stream temperature
	1	Physical Range Check low for Charged Air cooler down stream temperature		
	3	The sensor raw signal Air_uRawTCACDs (voltage) is above Air_SRCTCACDs.uMax_C (4803mV).	The sensor raw signal Air_uRawTCACDs (voltage) is above Air_SRCTCACDs.uMax_C (4803mV).	wiring harness or component
	4	The sensor raw signal Air_uRawTCACDs (voltage) is above Air_SRCTCACDs.uMax_C (318mV).	The sensor raw signal Air_uRawTCACDs (voltage) is above Air_SRCTCACDs.uMax_C (318mV).	
107	3	SRC High for Controller Mode Switch		Wiring Harness or Component
	4	SRC Low for Controller Mode Switch		Wiring Harness or Component
	14	Error Path for Clog Detection in Air Filter		Air Filter Clogged / Sensor Value Okay?
108	0	Ambient Air Pressure Sensor Range Check Max-Error		
	1	Ambient Air Pressure Sensor Range Check Min-Error		
	3	Fault Check Max Signal Range Violated for Ambient Air Pressure Sensor		
	4	Fault Check Min Signal Range Violated for Ambient Air Pressure Sensor		
110	0	Physical Range Check High for CEngDsT	The sensed sensor signal CEngDsT_tSens is greater than CEngDsT_PhysRng.Max_C	Wiring Harness or Component
	1	Physical Range Check Low for CEngDsT	The sensed sensor signal CEngDsT_tSens is less than CEngDsT_PhysRng.Min_C	
	3	The Sensor Raw Signal: CEngDsT_uRaw (Voltage) is Above CEngDsT_SRC.uMax_C (4957mV)	The sensor raw signal CEngDsT_uRaw (voltage) is above CEngDsT_SRC.uMax_C.	
	4	The Sensor Raw Signal: CEngDsT_uRaw (Voltage) is Below CEngDsT_SRC.uMin_C (359mV)	The sensed raw voltage value CEngDsT_uRaw is less than CEngDsT_SRC.uMin_C.	
	15	Engine Coolant Temp Too High Plausibility Error	An "ERROR" is reported if the engine coolant temperature CEngDsT_t is greater than an threshold CEngDsT_tMaxT_C.	Less Cooling Water, Water Pump Defective, Water Cooler Blocked
	17	Defect Fault Check for Absolute Plausibility Test	coolant temperature did not reach the threshold temperature	Sensor Value Problem
	18	Defect Fault Check for Dynamic Plausibility Test	rise in coolant is not reached the minimum rise of coolant temperature	
111	17	Low Coolant Level Error	If the Coolant Level is Low, i.e. if the message ClntLv_st is set.	Low Coolant Level; Coolant Level Sensor Defective; Wiring Harness Defective

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
157	3	Sensor Voltage Above Upper Limit	If the raw sensor voltage RailP_uRaw exceeds the limiting value RailP_SRC.uMax_C (4662,30mV) a fault will be detected. If the uncorrected raw sensor voltage RailP_uRawNoCor_mp exceeds the limiting value RailP_AdcMaxVal_C (4900mV) a fault will be detected.	Wiring Harness or Component
	4	Sensor Voltage Below Lower Limit	If the raw sensor voltage RailP_uRaw falls below the limiting value RailP_SRC.uMin_C (250mV) a fault will be detected.	
168	0	Physical Range Check High For Fuel Temperature	The sensor raw signal BattU_uRaw (voltage) is above BattU_uHiBatt_C.	High Engine Load with Low Fuel Level and High Ambient Temperature
	1	Physical Range Check Low For Fuel Temperature	The sensor raw signal BattU_uRaw (voltage) is below BattU_uLoBatt_C.	Very Cold Ambient Temperature
	3	SRC High for Fuel Temperature Sensor	The sensor raw signal BattU_uRaw (voltage) is above BattU_uSRCTMax_C.	Wiring Harness or Component
	4	SRC Low for Fuel Temperature Sensor	The sensor raw signal BattU_uRaw (voltage) is below BattU_uSRCTMin_C.	
174	0	Physical Range Check High for Fuel Temperature	The sensed sensor signal FuelT_tSens is greater than FuelT_PhysRng.Max_C	High Engine Load with Low Fuel Level and High Ambient Temperature
	1	Physical Range Check Low for Fuel Temperature	The sensed sensor signal FuelT_tSens is less than FuelT_PhysRng.Min_C	Very Cold Ambient Temperature
	3	SRC High for Fuel Temperature Sensor	The sensor raw signal voltage FuelT_uRaw is above FuelT_SRC.uMax_C (4933mV).	Wiring Harness or Component
	4	SRC Low for Fuel Temperature Sensor	The sensor raw signal FuelT_uRaw (voltage) is below FuelT_SRC.uMin_C (310mV).	
175	0	Physical Range Check High for Oil Temperature	If the signal Oil_tSensSwmp is greater than Oil_PhysRngT.Max_C for a duration DDRC_DurDeb.OilT_tPhysRngHiTDebDef_C , then a physical range check high error is reported	Too high load on engine; Sensor mis-adjusted or wiring harness
	1	Physical Range Check Low Oil Temperature	If the signal Oil_tSensSwmp is smaller than Oil_PhysRngT.Min_C for a duration DDRC_DurDeb.OilT_tPhysRngLoTDebDef_C , then a physical range check low error is reported	Sensor Mis-adjusted or Wiring Harness
	3	SRC High for Oil Temperature	The sensor raw signal Oil_uRawTSwmp (voltage) is above Oil_SRCT.uMax_C (5200.4mV)	Wiring Harness or Component
	4	SRC Low for Oil Temperature	The sensor raw signal Oil_uRawTSwmp (voltage) is below Oil_SRCT.uMin_C (0mV)	
	15	Oil Temperature too High Plausibility Error	The Oil temperature Oil_tSwmp is greater than the threshold Oil_tMax-T_C .	oil extremely hot, maybe missuse of engine (tuning) wiring harness or component

SECTION 3 SERVICE

Troubleshooting, Fault Codes

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
190	2	DFC for camshaft offset angle exceeded	DFC for camshaft offset angle exceeded	Wiring Harness or Camshaft Sensor Defect or Wrong Mounting Position or Tone Wheel Mis-adjusted
	8	In between of several camshaft revolutions there are too many or too less camshaft edges present or the distance or the series of the camshaft edges is unplausible. The defect debounce counter EpmCaS_ctErrSigDef is incremented at each inplausible camshaft revolution, reaches the counter the threshold EpmCaS_numErrSigDef_C the error is set. If the monitoring range is left, the debounce counter is reseted.	In between of several camshaft revolutions there are too many or too less camshaft edges present or the distance or the series of the camshaft edges is unplausible. The defect debounce counter EpmCaS_ctErrSigDef is incremented at each inplausible camshaft revolution, reaches the counter the threshold EpmCaS_numErrSigDef_C the error is set. If the monitoring range is left, the debounce counter is reseted.	Tone Wheel Defective
	12	In between of several crankshaft revolutions there is not any camshaft edge present. The defect debounce counter EpmCaS_ctNoSig reaches the threshold EpmCaS_numNoSigDef_C. If the monitoring range is left, the debounce counter is reseted.	In between of several crankshaft revolutions there is not any camshaft edge present. The defect debounce counter EpmCaS_ctNoSig reaches the threshold EpmCaS_numNoSigDef_C. If the monitoring range is left, the debounce counter is reseted.	Wiring Harness or Component
652	3	General Short Circuit	Short Circuit of an Injector	Wiring Harness or Injector Cylinder
	3			
653	5	Open Load	Open Load Error of an Injector (Interruption of an electric connection)	Wiring Harness or Injector Load Drop Cylinder
654	3	General Short Circuit	Short Circuit of an Injector	Wiring Harness or Injector Cylinder
	5	Open Load	Open Load Error of an Injector (interruption of an electric connection)	Wiring Harness or Injector Load Drop Cylinder
677	3	Short Circuit to Battery Error		Wiring Harness or Component
	4	Short Circuit to Ground Error		
	5	No Load Error		
	6	Over Temperature Error on ECU Power-stage for Starter		Over Temperature Error on ECU Power-stage for Starter
976	2	Diagnostic fault check non plausibility of COM message	The sensed raw value PTOSwt_uSens is less than the minimum threshold MoFPTO_uThresCalMsgA[n] or PTOSwt_uSens is more than the maximum threshold MoFPTO_uThresCalMsgA[n+1] (wherein n=0,2,4,6), whenever MoFPTO_swtSigSelCalMsg is equal to 0.	Wiring Harness or Component
	3	Diagnostic fault check for max error of COM message	The sensed raw value PTOSwt_uRaw is more than PTOSwt_SRC.uMax_C when MoFPTO_swtSigSelCalMsg is equal to 0.	
	4	Diagnostic fault check for min error of COM message	The sensed raw value PTOSwt_uRaw is less than PTOSwt_SRC.uMin_C when MoFPTO_swtSigSelCalMsg is equal to 0.	

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
1076	5	Open Load of Metering Unit Input	Detecting on Open Load Fault in the Metering Unit	Wiring Harness or Component
	12	Over Temperature of Device Driver of metering Unit	Detection of a Metering Unit Power Stage Over-temperature	Output Stage of ECU Defect or Wiring Harness
	15	Short Circuit to Battery in the High Side of the MeUn		Wiring Harness or Component
	16	Short Circuit to Battery of Metering Unit Output	Detecting a Short Circuit Low Side to Battery Voltage in the Metering Unit	
	17	Short Circuit to Ground in the High Side of the MeUn		
	18	Short Circuit to Ground of Metering Unit Output	Detecting a Short Circuit Low Side to Ground in the Metering Unit	
1108	15	Diagnostic Fault Check to Report the Error Due to Cooling Injection in Over Run	Error in the plausibility of Current Energizing Time when Over Heat Protection Injection Active with maximum Permitted Energizing Time	ECU Internal Fault
	16	Diagnostic Fault Check to Report the Error Due to Over Run	The current energizing time is greater than the maximum permitted energizing time after overrun demand by the driver.	ECU Internal Fault
1109	11	Injection Cut Off Demand (ICO) for Shut Off Coordinator	The un-debounced defect detection takes place in the standard ICO mode (EnglICO_stMode_C=0) with an ICO (Mo_stlCOMsg) requested and an engine speed Epm_nEng greater than EnglICO_nCtOffStdICO_C (1700rpm). The un-debounced defective detection takes place in the comfortable ICO mode (EnglICO_stMode_C = 1) with requested ICO (Mo_stlCOMsg) and an engine speed Epm_nEng greater than EnglICO_nCtOffCmfllCOHard_C (1700rpm).	ECU Internal Defect
1136	3	SRC high for ECU temperature sensor	The Sensed raw voltage value TECU_uRaw_[%] is greater than TECU_SRC%.uMax_C	ECU Internal Fault
	4	SRC low for ECU temperature sensor	The Sensed raw voltage value TECU_uRaw_[%] is less than TECU_SRC%.uMin_C	
1244	3	Signal range check low error of pressure control valve AD-channel		Wiring Harness or Component
	4	signal range check high error of pressure control valve AD-channel		
	5	open load of pressure control valve output		
	11	Over speed detection in component engine protection		
	12	Over temperature of device driver of pressure control valve		
	15	Short circuit to battery in the high side of the pressure control valve		
	16	Short circuit to battery of pressure control valve output		
	17	Short circuit to ground in the high side of the pressure control valve		
	18	Short circuit to ground of the pressure control valve output		

SECTION 3 SERVICE

Troubleshooting, Fault Codes

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
1769	11	Over-speed Detection in Component Engine Protection	Exceeding of the Engine-Speed Threshold EngPrt_nOvrSpd_C	Over-speed Caused By Driver
2791	13	DFC for Valve Position Sensor Voltage SRC High		
	14	DFC for Valve Position Sensor Voltage SRC Low		
	16	Permanent Governor Deviation for Valve	The negative limit for the governor deviation EGRVlv_GovDvtMonCal.rDvtMin_C has been exceeded and the governor deviation has been persistent longer than the applicable time from EGRVlv_tiDebGovDvt-Def_CUR. - The control valve has not been detected as jammed. - The position governor is active. - The control valve is not set to a mechanical stop. - No system error is reported, i.e. the bit DINH_stFld.Fld_EGRVlvGovOn.5 is set.	ECR Valve Dirty or Defective
	18	Permanent Governor Deviation for Value	The negative limit for the governor deviation EGRVlv_GovDvtMonCal.rDvtMin_C has been exceeded and the governor deviation has been persistent longer than the applicable time from EGRVlv_tiDebGovDvt-Def_CUR. - The control valve has not been detected as jammed. - The position governor is active. - The control valve is not set to a mechanical stop. - No system error is reported, i.e. the bit DINH_stFld.Fld_EGRVlvGovOn.5 is set.	EGR Valve Dirty or Defective
	20	DFC for Valve Position Sensor Physical SRC High	$EGRVlv_SensCal.uRawMaxOpn_C / EGRVlv_SensCal.uRawMaxClsd_C < EGRVlv_uRaw < EGRVlv_SensCal.uMax_C$	EGRVlv Mis-adjusted or Dirty
	21	DFC for Valve Position Sensor Physical SRC Low	$EGRVlv_SensCal.uRawMinClsd_C / EGRVlv_SensCal.uRawMinOpn_C > EGRVlv_uRaw > EGRVlv_SensCal.uMin_C$	
2802	11	EEP Read Error Based on the Error for more Blocks	If Selector Erase (Only Flash) Cannot be performed or successfully completed an error will be registered	ECM Fault
3509	2	Error Sensor Supplies 1	The sensor supply voltage is monitored by an HW comparator. If the sensor supply voltage lies outside of the switching thresholds a fault is output. The detection thresholds are defined by the hardware and cannot be calibrated.	1.) Wiring harness 2.) Component defect 3.) ECU internal defect
3510	2	Error Sensor Supplies 2	The sensor supply voltage is monitored by an HW comparator. If the sensor supply voltage lies outside of the switching thresholds a fault is output. The detection thresholds are defined by the hardware and cannot be calibrated.	1.) Wiring harness 2.) Component defect 3.) ECU internal defect
3511	2	Error Sensor Supplies 3	The sensor supply voltage is monitored by an HW comparator. If the sensor supply voltage lies outside of the switching thresholds a fault is output. The detection thresholds are defined by the hardware and cannot be calibrated.	1.) Wiring harness 2.) Component defect 3.) ECU internal defect
3597	3	Short Circuit to Battery Error at Actuator Relay		ECU Internal Fault
	4			
3598	3			
	4			

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
5324	11	Array of DFC's for Failure in i+1 th Glow Plug		Glowing Problems
5325	4	Array of DFC's for Short Circuit in i+1 th Glow Plug		
	11	Array of DFC's for Failure in i+1 th Glow Plug		
5326	4	Array of DFC's for Short Circuit in i+1 th Glow Plug		
	11	Array of DFC's for Failure in i+1 th Glow Plug		
5327	4	Array of DFC's for Short Circuit in i+1 th Glow Plug		
	11	Array of DFC's for Failure in i+1 th Glow Plug		
20201	19	SPI/COM-Errors of the Cy320	When Any Peripheral Monitoring Function Reports an Error	ECU Internal Fault
20220	2	Diagnostic Fault Check to Report the NTP Error in ADC Monitoring	Error in the check with the No-Load Test Pulse Operation.	
	11	Diagnostic Fault Check to Report the ADC Test Error	Implausible ADC test errors It is checked whether MoCADC_ctDebTst > = MoCADC_ctDebTst_C (15 Events). If yes the error is set. The diagnosis is carried out in the 40-ms interval.	
	14	Diagnostic Fault Check to Report the Error in Voltage Ratio in ADC Monitoring	It is checked whether MoCADC_ctDebVltgRatio > = MoCADC_ctDebVltgRatio_C (15 Events). If yes the error is set. The diagnosis is carried out in the 40-ms interval.	
20221	11	Diagnostic Fault Check to Report Errors in Query-/Response-Communication	If there is no active shut-off path test (MoCSOP_stRdyMsg == TRUE) and the error counter MoCCom_ctErrMM or MoCCom_ctErrFC is >= MOCCOM_MM_STATUS_LIMIT_ERRORS (5) there is an undebounced defect detection	
20222	11	Diagnostic Fault Check to Report Errors in SPI-Communication	If there is no active shut-off path test (MoCSOP_stRdyMsg == TRUE) and the error counter MoCCom_ctErrMM or MoCCom_ctErrFC is >= MOCCOM_MM_STATUS_LIMIT_ERRORS (5) there is an undebounced defect detection	
20223	11	Diagnostic Fault Check to Report Multiple Error While Checking the Complete ROM-Memory	If multiple errors are detected while testing the complete ROM-memory (irreversibles error bit 2 in MoCMem_st is set) there is an undebounced defect detection.	
20224	11	Diagnostic Fault Check to Report the Accelerator Pedal Position Error	Implausible accelerator pedal voltage. The two voltage values (ADC_VAL1 ADC_VAL2) detected by the accelerator pedal are not plausible to each other.	
20225	11	Diagnostic Fault Check to Report the Engine Speed Error	Implausible engine speed. The engine speed value calculated in level 2 (MoFESpd_nEngL2_mp) and Epm_nEngLRes (engine speed from level 1) are not plausible to each other.	
20226	11	Diagnostic Fault Check to Report the Plausibility Error Between Level 1 Energizing Time and Level 2 Information	Implausible injection quantity. It is tested if MoFlnjDat_ctDebETerr >= MoFlnjDat_ctDebETerr_C (5 Events). In case of this the error is set. This diagnosis is processed in the 40ms interval.	
20227	11	Diagnostic Fault Check to Report the Error Due to Plausibility Between the Injection Begin v/s Injection Type	Implausible start of energizing angles. It is tested if MoFlnjDat_ctDebPhiErr >= MoFlnjDat_ctDebPhiErr_C (5 Events). In case of this the error is set. This diagnosis is processed in the 40ms interval.	

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SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
20228	11	Diagnostic Fault Check to Report the Error Due to Non-Plausibility in ZFC	Implausible energising times. The energising times of the zero fuel quantity calibration ZFC MoFlnjDat_tiPi-11ZFCETCorMoFlnjDat_tiPi12ZFCETCor and MoFlnjDat_tiPi13ZFCETCor are tested on their plausible value ranges.	ECU Internal Fault
20229	11	Diagnosis Fault Check to Report the Demand for Normal Mode Due to an Error in the Pol2 Quantity	Implausible Pol2 efficiencies. The efficiency of Pol2 MoFMode_facPol2Eff_mp is tested of its plausible value range. Or an unplausibility is detected during monitoring of the operation mode resp. ramp time counter transgression.	
	14	Diagnosis Fault Check to Report the Error to Demand for an ICO Due to an Error in the Pol2 shut-off	Error in the Pol2 shut-off. The quantity MoFQntCor_qPol2 is tested of its shut-off value in normal mode.	
20230	11	Diagnosis Fault Check to Report the Error to Demand for an ICO due to an error in the Pol3 Efficiency Factor	Implausible Pol3 efficiencies. The efficiency of Pol3 MoFlnjDat_facPol3EffSet is tested of its plausible value range.	
20231	11	Diagnostic Fault Check to Report the Error Due to Injection Quantity Correction	Implausible wave correction parts of the injection quantity correction. The plausibility is displayed by the measuring points MoFQntCor_stPi1ErrAct_mp MoFQntCor_stM11ErrAct_mp and MoFQntCor_stPol2ErrAct_mp.	
20232	11	Diagnostic Fault Check to Report the Plausibility Error in Rail Pressure Monitoring	The rail pressure of level 1 is checked after a calibratable ramp debounce of MoFRailP_ctRmp_C (240ms) in case of a SRC error. If the value lies outside a calibratable window an irreversible error is detected and reported to the DSM after an error debouncing of MoFRailP_ctDebErr_C (760ms). Also in case of a rail pressure gradient error reported by the level 1 The error is reported after a debounce time MoFRailP_ctDebGradMax_C (2550ms). Additionally the error will be reported after a debounce time MoFRailP_ctDebGradMax_C if level 2 detects a gradient error and level 1 is not reporting it.	
20233	11	Diagnostic Fault Check to Report the Error Due to Torque Comparison	FStSys_stStrtRIsCAN_mp = TRUE).	
20234	11	Diagnosis of Curr Path Limitation Forced by ECU Monitoring Level 2	The setpoint path of the rail pressure control (PthLead_trqInrCurr) is limited by the limitation torque (EngTrqPtd_trqLim) of the functional control unit monitoring.	
	20	Diagnosis of Lead Path Limitation Forced by ECU Monitoring Level2	The setpoint path of the air system (PthLead_trqInrLead) is limited by the limitation torque (EngTrqPtd_trqLim) of the functional control unit monitoring.	
	21	Diagnosis of set Path Limitation Forced by ECU Monitoring Level 2	The quantity setpoint path (PthLead_trqInrSet) is limited by the limitation torque (EngTrqPtd_trqLim) of the functional control unit monitoring.	
20238	3	Diagnostic Fault Check to Report "ABE Active" Due to over-voltage detection	In the case of a non active shut-off path test (MoCSOP_stActMsg == FALSE) whose debounce OCWDA_CTDEBSOPNOTACTV* 10ms has expired (counter OCWDA_ctDebSOPNotActv = 0) and an active ABE wire due to over-voltage a defect detection takes place.	
	4	Diagnostic Fault Check to Report "ABE Active" due to under-voltage detection	In the case of a non active shut-off path test (MoCSOP_stActMsg == FALSE) whose debounce OCWDA_CTDEBSOPNOTACTV* 10ms has expired (counter OCWDA_ctDebSOPNotActv = 0) and an active ABE wire due to undervoltage there is an undebounced defect detection after the battery voltage BattU_u keeps greater than OCWDA_uBattMin_C (8V) longer than the debounce time OCWDA_CTUBATMX(100ms).	
	11	Diagnostic Fault Check to Report "WDA Active" due to Errors in Query-/Response Communication	In the case of a non active shut-off path test (MoCSOP_stActMsg == FALSE) whose debounce OCWDA_CTDEBSOPNOTACTV* 10ms has expired (counter OCWDA_ctDebSOPNotActv = 0) and an active WDA wire a defect detection takes place.	

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
20238	14	Diagnostic Fault Check to Report "WDA/ ABE Active" due to unknown reason	In the case of a non active shut-off path test (MoCSOP_stActMsg == FALSE) whose debounce OCWDA_CTDEBSOPNOTACTV* 10ms has expired (counter OCWDA_ctDebSOPNotActv = 0) and an active ABE wire due to undervoltage there is an undebounced defect detection after the battery voltage BattU_u keeps greater than OCWDA_uBattMin_C (8V) longer than the debounce time OCWDA_CTUBATTMX (100ms).	ECU Internal Fault
20251	11	Visibility of Software Resents in DSM	The evaluation of the reset reason will be done after every reset. Depending on the configured visibility of the current reset one of the fault checks in the array will be set.	
	20		The evaluation of the reset reason will be done after every reset. Depending on the configured visibility of the current reset one of the fault checks in the array will be set.	
	21		The evaluation of the reset reason will be done after every reset. Depending on the configured visibility of the current reset one of the fault checks in the array will be set.	
20276	11	Diagnostic Fault Check to Report the Remote Accelerator Pedal Position Error	Implausible accelerator pedal voltage. The two voltage values (ADC_VAL1, ADC_VAL2), detected by the accelerator pedal, are not plausible to each other. If RMTAPP with LIS is used, defect is detected if there is a implausibility with LIS and RMTAPP1 voltage.	
20282	3	Short Circuit to Battery on Out1 Error for H-Bridge	Short Circuit to Battery at Out1 of TLE7209/CJ230 Error	Wiring Harness or Component
		Short Circuit to Battery on Out2 Error for H-Bridge	Short Circuit to Battery at Out2 of TLE7209/CJ230 Error	
	4	Short Circuit to Ground on Out1 Error for H-Bridge	Short Circuit to Ground at Out1 of TLE7209/CJ230 Error	
		Short Circuit to Ground on Out2 Error for H-Bridge	Short Circuit to Ground at Out2 of TLE7209/CJ230 Error	
	5	Open Load Error for Power-stage	Open Load Error Monitoring for TLE7209/CJ230	Wiring Harness Component for ECU Internal Fault
	12	Over Temperature Error for H-Bridge	Over Temperature Error Monitoring for TLE7209/CJ230	
20288	2	DFC for Coding Error when Different Coding Words were Received in a coding cycle		Glowing Problems
		No Load Error for Low Voltage System		
	3	Short Circuit to Battery Error for Low Voltage System		
	4	Short Circuit to Ground Error for Low Voltage System		
	5	Over Temperature Error on ECU Power-stage for Glow Plug Low voltage System		
	14	DFC for T30 Missing Error in GCU-T		
	21	DFC for Coding Error when Selected Coding is not working		
	22	DFC for faulty Diagnostic Data Transmission or Protocol Error		
	23	DFC for glow Module Error in GCU-T		

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Troubleshooting, Fault Codes

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
20290	3	Diagnostic Fault Check to Report the Error in Over-Voltage Monitoring	Irreversible error bit 2 set in MoCSOP_st (counter MoCSOP_ctDebPSDia >= MoCSOP_ctDebPSDia_C (2 Events) during over voltage detection of the SOP test).	ECU Internal Fault
	11	Loss of Synchronization Sending Bytes to the MM from CPU	Irreversible error bit 5 set in MoCSOP_st (counter MoCSOP_ctErrMMRespByte > MOCSOP_MM_RESPBYTE_RESET_ERROR(10) within the SOP test) and state MOCSOP_STEP_ERROR reached due to time out.	
	20	DFC to set a Torque Limitation once an Error in Detected Before MoCSOP's Error Reaction is set	If an error was found by the SOP test but additionally the injector diagnose reported an error (Fld_Mo-CSOPInjDiagErr or Fld_MoCSOPInjDiagDeb are blocking) then only the test flag of every MoCSOP DFC will be set. Besides the error bits of DFC_MoCSOPErrNoChk will be set.	
	21	Wrong Set Response Time	Irreversible error bit 8 set in MoCSOP_st (counter MoCSOP_ctErrRespTime > MOCSOP_MM_RESPTIME_RESET_ERRORS(2) within the SOP test) and state MOCSOP_STEP_ERROR reached due to time out.	
	22	Too Many SPI Errors During CoCSOP Execution	Irreversible error bit 6 set in MoCSOP_st (counter MoCSOP_ctErrSPI >= MOCSOP_SPI_RESET_ERRORS(16) within the SOP test) and state MOCSOP_STEP_ERROR reached due to time out.	
	23	Diagnostic Fault Check to Report the Error in Under-voltage Monitoring	Irreversible error bit 3 set in MoCSOP_st (counter MoCSOP_ctDebPSDia >= MoCSOP_ctDebPSDia_C during under voltage detection of the SOP test).	
		Diagnostic Fault Check to Report that WDA is not working correct	Irreversible error bit 1 set in MoCSOP_st (for example counter MoCSOP_ctDebSOPtst >= MoCSOP_ctDebSOPtst_C (66 Events) or (MoCSOP_ctDebPSDia < MoCSOP_ctDebPSDia_C (2 Events)) AND (MoCSOP_ctCylNum >= MoFlnjDat_numCyl_C (4)) during the MM SOP test).	
	25	OS Timeout in the Shut Off Path Test. Failure Setting the Alarm Task Period	Irreversible error bit 7 set in MoCSOP_st (counter MoCSOP_ctErrOSTimeout > MOCSOP_MM_OSTIMEOUT_RESET_ERRORS(2) within the SOP test) and state MOCSOP_STEP_ERROR reached due to time out.	
		Diagnostic Fault Check to Report that the Positive Test Failed	Irreversible error bit 10 set in MoCSOP_st (bit MOCSOP_RSLTRDY_BP(0) of the return value from InjVlv_SOPTst() set to one, and bit MOCSOP_SUCCESS_BP(1) set to zero).	
		Diagnostic Fault Check to Report the Timeout in the Shut Off Path Test	Irreversible error bit 0 set in MoCSOP_st (counter MoCSOP_ctDebSOPtst > MoCSOP_ctDebSOPtst_C (66 Events) during SOP test).	
22040	19	Timeout Error on CAN-Receive-Frame TSC1TE	Timeout of TSC1_TE message. The message is not received for 40 ms (TimeoutCount = 4, selected task cycle = 10 ms, FRMSCH_RXMODE1) and the defect debouncing time DDRC_DurDeb.Com_tiTSC1TET0DebDef_C is passed and the TSC1 message is enabled and there is no busoff (i.e Com_stSAEJ1939RxEnbl[12].6 is set to 1)	CAN Transmitter DPF System
22058	19	Reported SPI and COM-Errors of a Cy146		ECU Internal Fault
23350	4	Short Circuit	Short circuit in injection bank 0 (all injectors of the same bank can be affected)	Wiring Harness or Injector Short Circuit
23352	4	Short Circuit	Short circuit in injection bank 1 (all injectors of the same bank can be affected)	
23354	12	CY33X is Defect	Chip Error in the CY33x Power Stage Component	ECU Internal Fault
23550	12	Defective T50 Switch	The debounced signal is high (T50_st == 1) for a period longer than DDRC_DurDeb.T50_tiErrDebDef_C (50ms)	Switch Defective or is Active for a Long time

SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
23613	0	Maximum Positive Deviation of Rail Pressure Exceeded	If the rail pressure governor deviation Rail_pDvt exceeds the limiting value based on the engine speed Rail_pMeUnDvtMax_CUR an error will be detected.	1. Leakage in the high pressure section 2. Injection nozzle stuck in open position 3. Worn high pressure pump 4. Worn injector (to high injector back flow quantity) 5. Fuel filter clogged up 6. PSP (electric pre-supply pump) output too low
	1	If the rail pressure governor deviation Rail_pDvt falls below the limiting value Rail_pMeUnDvtMin_CUR and if the CP3 delivery quantity MeUn_dvolSet falls to the threshold Rail_MeUnMon.dvolSetMin_C (-350 mm ³ /s) an error will be detected.	If the rail pressure governor deviation Rail_pDvt falls below the limiting value Rail_pMeUnDvtMin_CUR and if the CP3 delivery quantity MeUn_dvolSet falls to the threshold Rail_MeUnMon.dvolSetMin_C an error will be detected.	1. Metering unit is stuck in open position 2. Zero delivery throttle clogged up 3. Metering unit without power due to electrical error. 4. Pressure after zero-delivery throttle too high.
	2	If the rail pressure RailP_pFit exceeds the limiting value Rail_MeUnMon.pFitMax_C (1.750.000 hPa) an error will be detected.	If the rail pressure RailP_pFit exceeds the limiting value Rail_MeUnMon.pFitMax_C an error will be detected.	1. Metering unit is stuck in open position 2. Zero delivery throttle clogged up 3. Metering unit without power due to electrical error. 4. Pressure after zero-delivery throttle too high.
	24	Leakage is detected based on fuel quantity balance	If the high pressure pump delivery quantity (MeUn_dvolSet) exceeds the plausibility limit of the volume flow balance (evaluated over the product life and supplemented to include tolerances) Rail_dvolMonMax_mp, an error will be detected.	Maladjusted rail pressure sensor, defective high pressure pump, leakage, Possible error in the low pressure stage, Back flow too low

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SPN Code	FMI Code	Fault Check Description	Fault Detection Condition	Possible Causes
23614	0	Maximum Rail Pressure Exceeded		Maximum Rail Pressure Exceeded
	1	Maximum Rail Pressure Exceeded (Second Stage)		Maximum Rail Pressure Exceeded (Second Stage)
	20	Maximum Positive Deviation of Rail Pressure Exceeded		Maximum Positive Deviation of Rail Pressure Exceeded
	22	Maximum Negative Rail Pressure Deviation with Closed Pressure Control Valve Exceeded		Maximum negative Rail Pressure Deviation with Closed Pressure Control Valve Exceeded
23895	13	Check of Missing injector Adjustment Value Programming	Detection if the monitoring for missing or faulty programming of the injector adjustment values is active and: - the checksum of the injector adjustment code words is not correct or - the basic correction quantity in at least one injector checkpoint has exceeded the admissible limits or - no injector adjustment values could be read due to faulty EEPROM access.	IMA not programmed
23896	13	Check Of Missing Injector Adjustment Value Programming		IMA Not Programmed
23897	13			
23898	13			
23906	3	Short Circuit to Battery of Pre-Supply Pump Output		Wiring Harness or Component
	4	Short Circuit to Ground of Pre-Supply Pump Output		
	5	Open Load of Pre-Supply Pump Output		Wiring harness or Component
	12	Over Temperature Error on ECU Powerstage for Pre-Supply Pump		ECU Internal Fault
24000	0	Error Path SPN1 Matching of DM1DCU Message	The error is set in this DFC if received SPN number match with Com_numDM1DCUSPN1_CA	CAN Transmitter
	11	Function Monitoring: Fault in the Monitoring of the Start Control		ECU Internal Fault

This is not an exhaustive list of the error codes that are available. If an alternate code is shown that is not on this list, please contact Allen Engineering Service Department for details.

Machine Cleaning Procedure

When cleaning the machine, please adhere to the following information to ensure proper cleaning and to keep the machine in the best condition possible.

Power Washing Procedure:

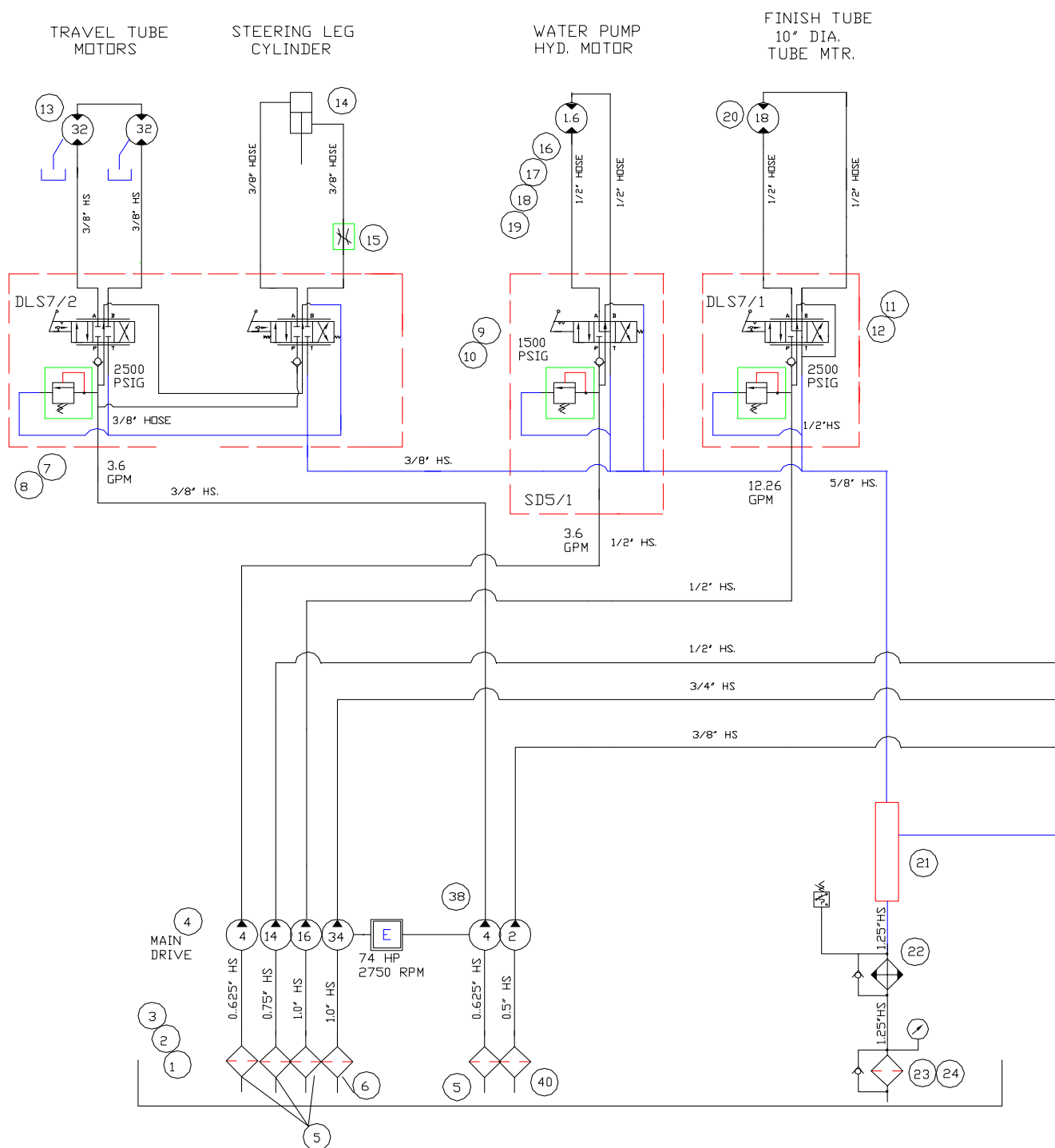
NOTICE

- Ensure that the water pressure is below 2000 PSI (14 MPa)
- Always keep the water temperature below 180°F (80°C)
- Use a spray nozzle with at minimum 40° wide spray angle
- Keep the nozzle at least 1 foot (300mm) away from the machine
- Avoid spraying water on the engine and electronic components. Examples include electronic displays, lights, switches, wiring, etc. The electronic components may be damaged if water is sprayed on them.
- Keep a perpendicular angle (90°) when cleaning over a decal.
 - Holding nozzle of a pressure washer at an angle different from 90° may lift the decal from the machine.
- Recommended using a safe cement dissolver, **BACK-SET** or similar, to remove hardened concrete.
- It is **NOT** recommended to use chemicals such as:
 - Muriatic Acid
 - Hydrochloric Acid
 - Hydrofluoric Acid
 - Sulfuric Acid
 - Phosphoric Acid
- To prevent build-up of concrete on the machine, use **BODY GUARD** or similar protection wax.

Filter Cleaning Procedure:

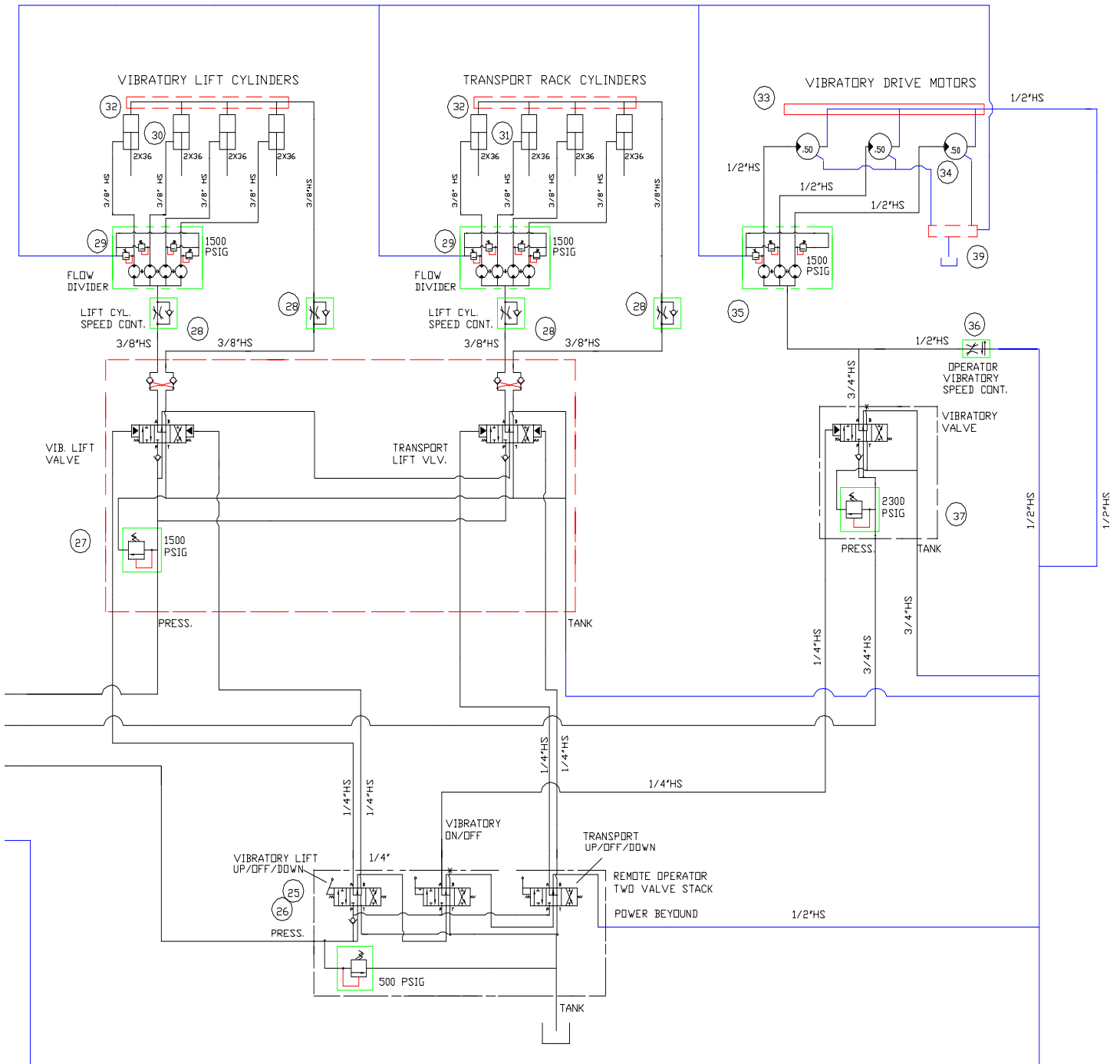
- Remove air filters and blow out with compressed air, **NOT** to exceed 80 PSI.

Hydraulic Schematic for 32 to 34 ft



Hydraulic Schematic for 32 to 34 ft

SECTION 3 SERVICE



SECTION 3 SERVICE

Hydraulic Schematic Parts List for 32 to 34 ft

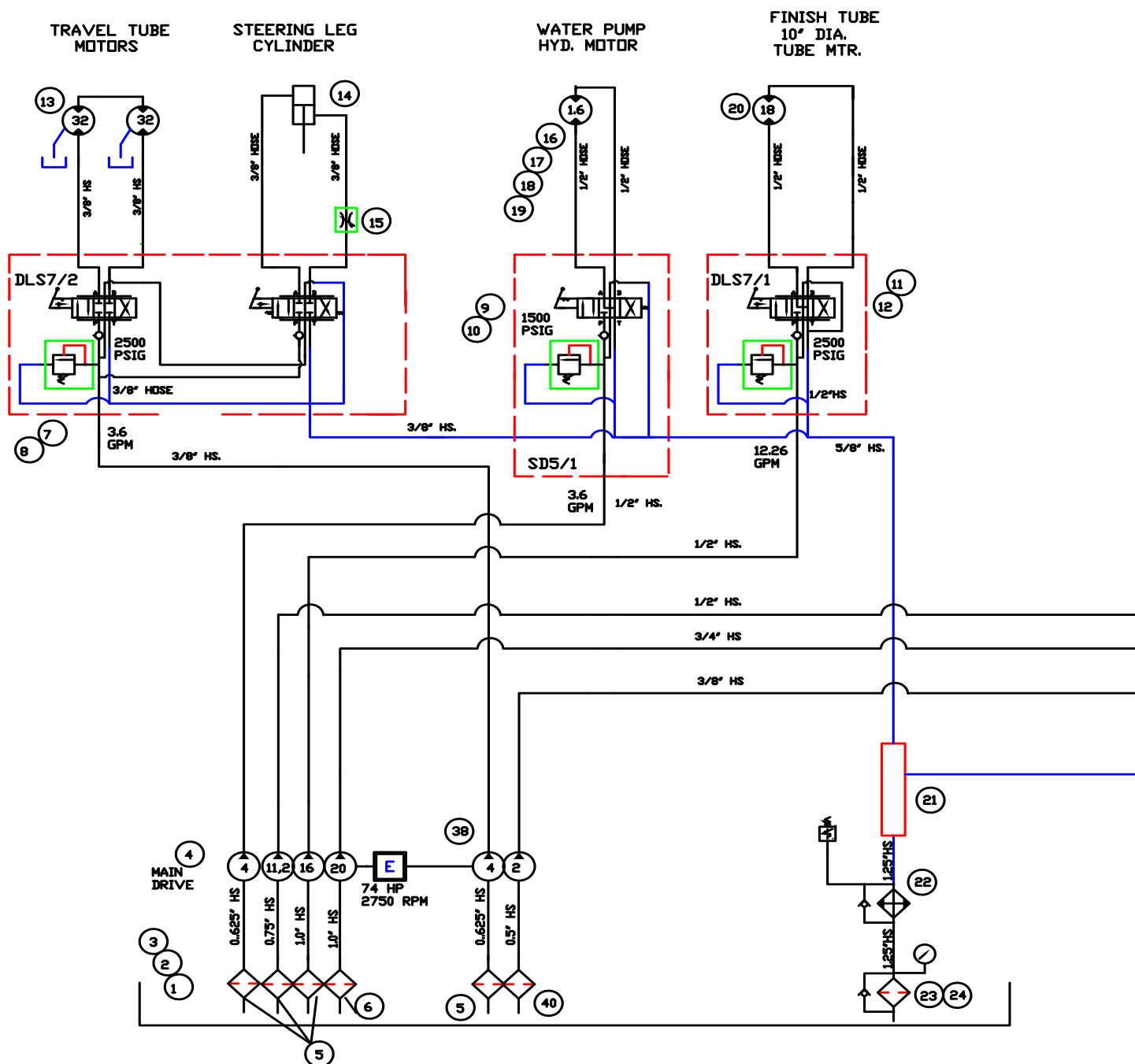
ITEM	PART #	DESCRIPTION	QTY
1	032960	WELD RING	2
2	032268	FILTER BREATHER ASSEMBLY	2
3	042844	TEMP/LEVEL GAUGE ASSEMBLY	1
4	078133	HYDRAULIC QUAD PUMP	1
5	040073	TMF-10-5 SUCTION STRAINER	4
6	049357	TMF-25-5 SUCTION STRAINER	1
7	040066	TWO VALVE STACK, TRAVEL/STEERING LEG	1
8	040074	CONTROL HANDLE M10X150	2
9	040063	CONTROL VALVE, WATER SPRAY	1
10	055078	CONTROL HANDLE M8X150	1
11	040058	SINGLE VALVE STACK, FINISH TUBE	1
12	040074	CONTROL HANDLE M10X150	1
13	044652	HYDRAULIC TRAVEL MOTORS	2
14	029238	STEERING LEG CYLINDER	1
15	029232	STEERING NEEDLE VALVE	1
16	040065	HYDRAULIC SPRAY MOTOR	1
17	040059	FOOT BRACKET	1
18	040060	COUPLING HALVES	2
19	040061	COUPLING INSERT	1
20	029231	HYDRAULIC FINISH MOTOR	1
21	049358	HEADER MANIFOLD	1
22	077632	HYDRAULIC COOLER	1
-	066143	TEMPERATURE SWITCH	1
-	055127	CONNECTOR, FOR TEMP. SWITCH	1
23	077633	FILTER, RETURN LINE ASSEMBLY	1
24	-	FILTER GAUGE	1
24A	046241	FUEL TANK LEVEL GAUGE	1
24B	029413	RELIEF VALVE, FOR SPRAY	2
24C	047412	THREE WAY BALL VALVE	1
25	077634	THREE STATION PILOT CONTROL VALVE, VIB/RACK LIFT/ TRANSPORT LIFT	1
26	055078	CONTROL HANDLE M8X120	3
27	077635	LIFT/TRANSPORT CYLINDER VALVE STACK	1

Hydraulic Schematic Parts List for 32 to 34 ft

SECTION 3 SERVICE

28	049089	FLOW CONTROL VALVES	4
29	077994	FLOW DIVIDER, FOUR SECTION	2
30	049366	VIBRATION LIFT CYLINDER	4
31	068172	TRANSPORT RACK CYLINDER	3
31A	068172-SP	TRANSPORT RACK CYLINDER, ADD. ROD END PORT	1
32	055686	MANIFOLD CYLINDER HEADER	2
33	068171	HEADER MANIFOLD	1
34	049367	VIBRATION MOTOR	3
35	077996	FLOW DIVIDER, THREE SECTION	1
36	050451	VIBRATION BYPASS FLOW CONTROL	1
37	049360	VIBRATION MOTOR CONTROL VALVE	1
38	077637	HYDRAULIC TANDEM GEAR PUMP	1
39	068814	CASE DRAIN TANK HEADER MANIFOLD	1
40	040072	TMF-05-5 SUCTION STRAINER	1

Hydraulic Schematic for 18 to 30 ft



SECTION 3 SERVICE



SECTION 3 SERVICE

Hydraulic Schematic Parts List for 18 to 30 ft

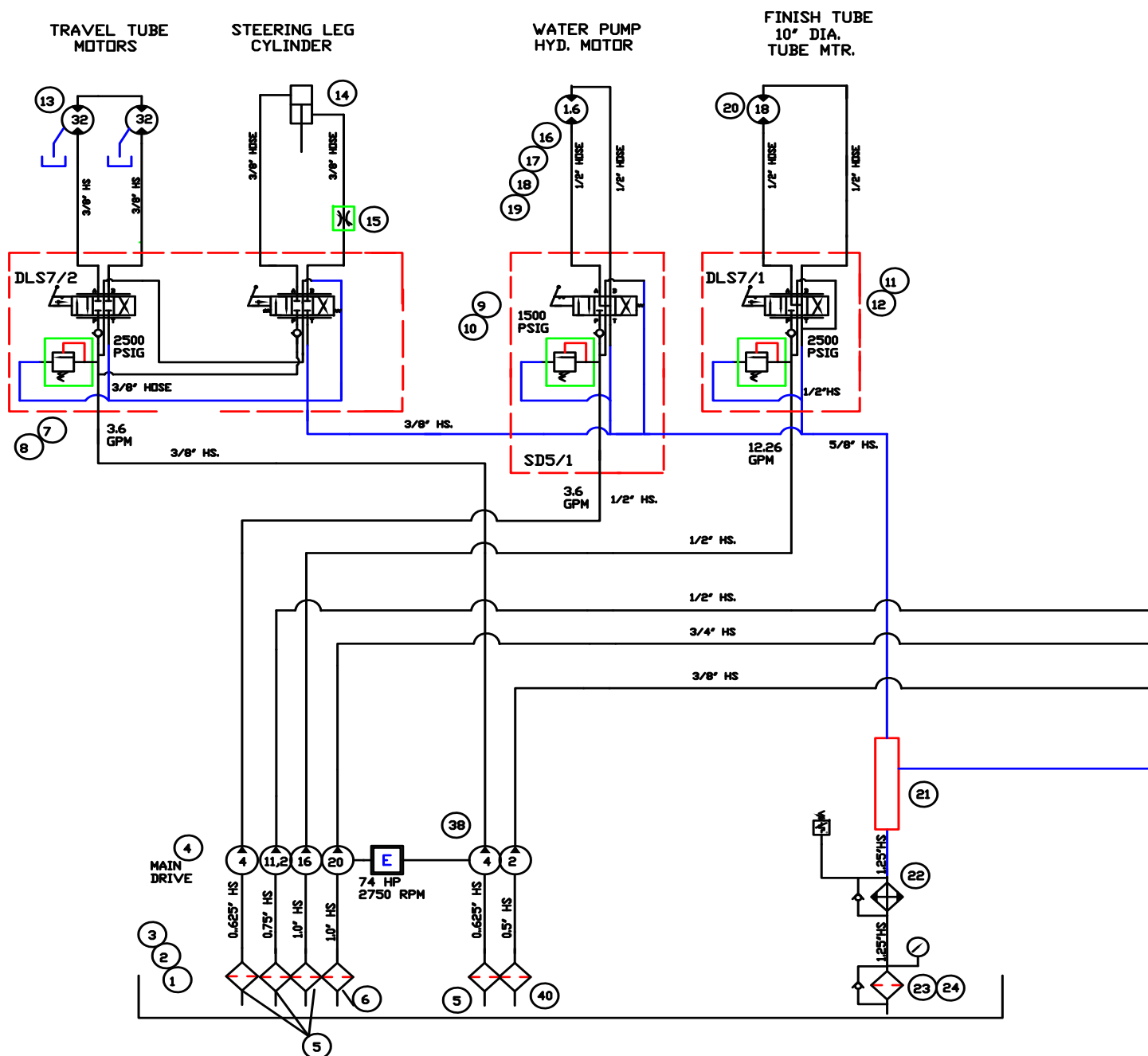
ITEM	PART #	DESCRIPTION	QTY
1	032960	Weld ring	2
2	032268	Filter Breather assembly	2
3	042844	Temp/Level Gauge assembly	1
4	078133	Hydraulic Quad Pump	1
5	040073	TMF-10-5 Suction Strainer	4
6	049357	TMF-25-5 Suction Strainer	1
7	040066	Two Valve Stack, travel/steering leg	1
8	040074	Control Handle M10x150	2
9	040063	Control Valve, Water Spray	1
10	055078	Control handle M8x150	1
11	040058	Single Valve Stack, finish tube	1
12	040074	Control Handle M10x150	1
13	044652	Hydraulic Travel Motors	2
14	029238	Steering leg Cylinder	1
15	029232	Steering Needle Valve	1
16	040065	Hydraulic Spray motor	1
17	040059	Foot bracket	1
18	040060	Coupling Halves	2
19	040061	Coupling insert	1
20	029231	Hydraulic Finish motor	1
21	049358	Header Manifold	1
22	077632	Hydraulic Cooler	1
-	066143	Temperature Switch	1
-	055127	Connector, for temp. switch	1
23	077633	Filter, Return line assembly	1
24	-	Filter Gauge	1
24A	046241	Fuel Tank level Gauge	1
24B	029413	Relief Valve, for spray	2
24C	047412	Three way ball valve	1
25	077634	Three station pilot control valve, Vib/rack lift/ transport lift	1
26	055078	Control handle M8x120	3
27	077635	Lift/Transport Cylinder Valve Stack	1
28	049089	Flow Control Valves	4
29	077994	Flow Divider, four section	2
30	049366	Vibration lift cylinder	3

Hydraulic Schematic Parts List for 18 to 30 ft

SECTION 3 SERVICE

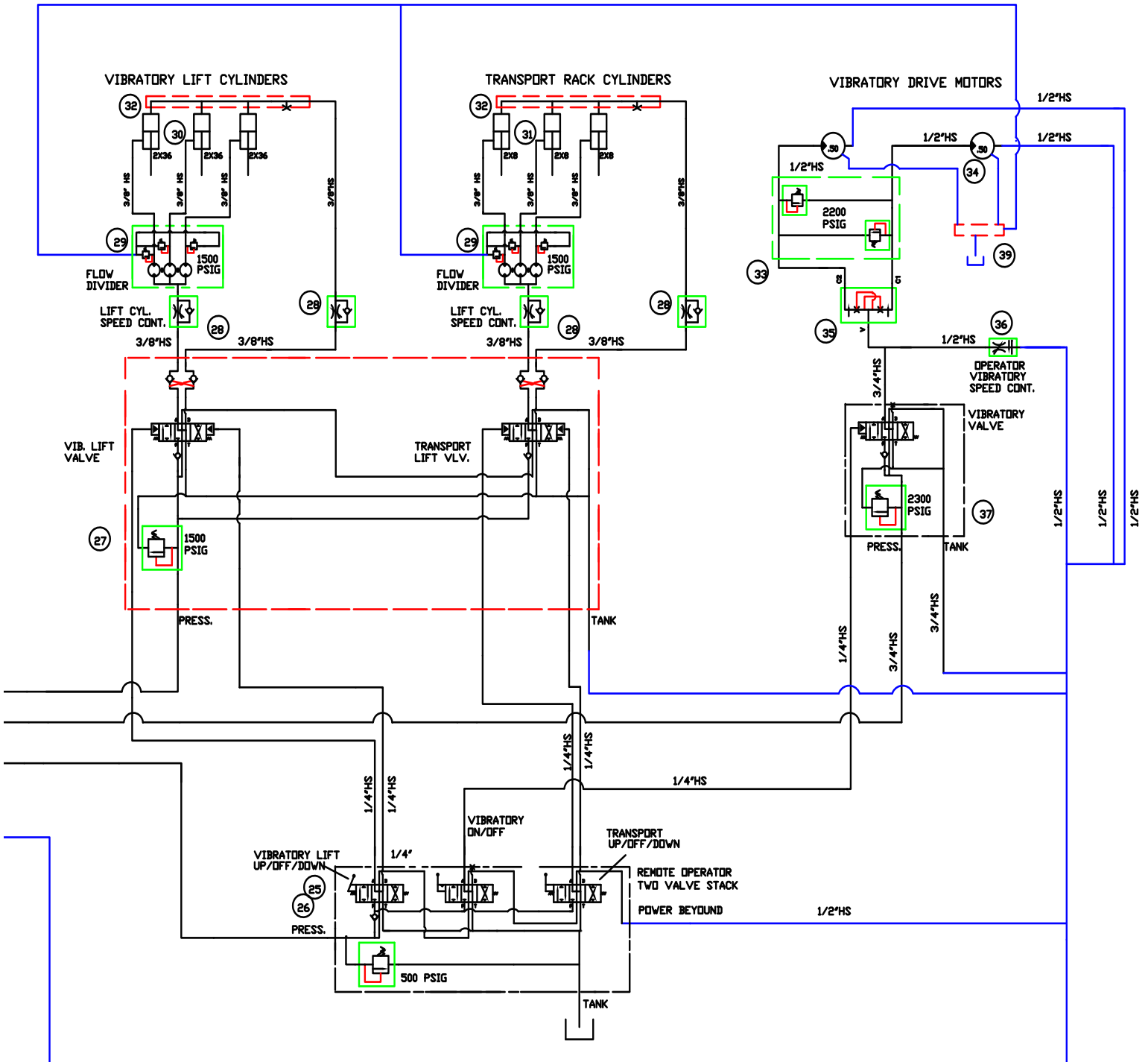
ITEM	PART #	DESCRIPTION	QTY
31	068172	Transport Rack Cylinder	3
32	055686	Manifold Cylinder Header	2
33	068171	Header manifold	1
34	049367	Vibration Motor	2
35	077996	Flow Divider, three section	1
36	050451	Vibration Bypass flow control	1
37	049360	Vibration Motor Control valve	1
38	077637	Hydraulic Tandem Gear pump	1
39	068814	Case drain tank header manifold	1
40	040072	TMF-05-5 Suction Strainer	1

Hydraulic Schematic for 12 to 16 ft



Hydraulic Schematic for 12 to 16 ft

SECTION 3 SERVICE



SECTION 3 SERVICE

Hydraulic Schematic Parts List for 12 to 16 ft

ITEM	PART #	DESCRIPTION	QTY
1	032960	Weld ring	2
2	032268	Filter Breather assembly	2
3	042844	Temp/Level Gauge assembly	1
4	078133	Hydraulic Quad Pump	1
5	040073	TMF-10-5 Suction Strainer	4
6	049357	TMF-25-5 Suction Strainer	1
7	040066	Two Valve Stack, travel/steering leg	1
8	040074	Control Handle M10x150	2
9	040063	Control Valve, Water Spray	1
10	055078	Control handle M8x150	1
11	040058	Single Valve Stack, finish tube	1
12	040074	Control Handle M10x150	1
13	044652	Hydraulic Travel Motors	2
14	029238	Steering leg Cylinder	1
15	029232	Steering Needle Valve	1
16	040065	Hydraulic Spray motor	1
17	040059	Foot bracket	1
18	040060	Coupling Halves	2
19	040061	Coupling insert	1
20	029231	Hydraulic Finish motor	1
21	049358	Header Manifold	1
22	077632	Hydraulic Cooler	1
-	066143	Temperature Switch	1
-	055127	Connector, for temp. switch	1
23	077633	Filter, Return line assembly	1
24	-	Filter Gauge	1
24A	046241	Fuel Tank level Gauge	1
24B	029413	Relief Valve, for spray	2
24C	047412	Three way ball valve	1
25	077634	Three station pilot control valve, Vib/rack lift/ transport lift	1
26	055078	Control handle M8x120	3
27	077635	Lift/Transport Cylinder Valve Stack	1
28	049089	Flow Control Valves	4
29	077994	Flow Divider, four section	2
30	049366	Vibration lift cylinder	2
31	068172	Transport Rack Cylinder	2

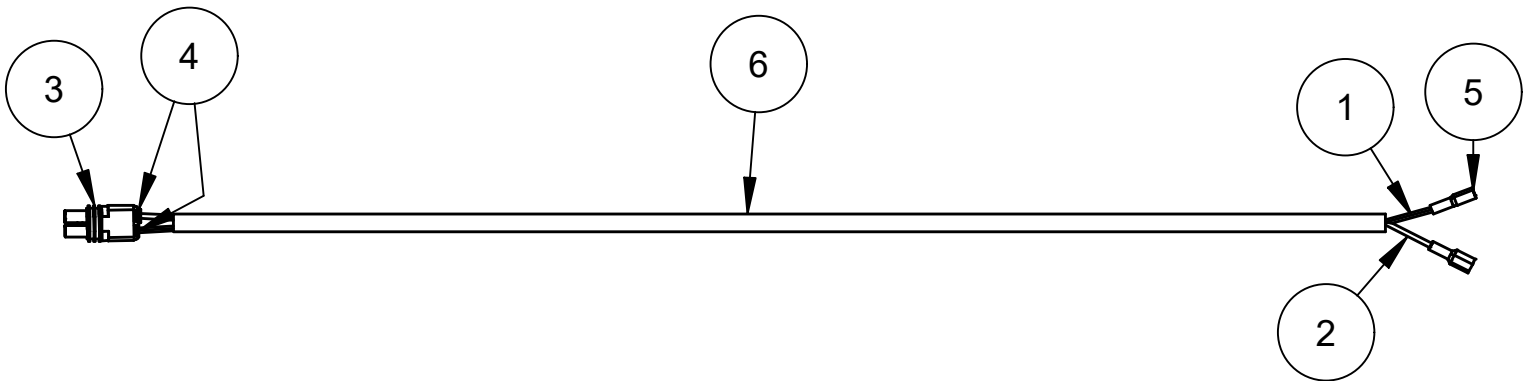
Hydraulic Schematic Parts List for 12 to 16 ft

SECTION 3 SERVICE

ITEM	PART #	DESCRIPTION	QTY
32	055686	Manifold Cylinder Header	2
33	068171	N/A	-
34	049367	Vibration Motor	1
35	077996	N/A	-
36	050451	Vibration Bypass flow control	1
37	049360	Vibration Motor Control valve	1
38	077637	Hydraulic Tandem Gear pump	1
39	068814	Case drain tank header manifold	1
40	040072	TMF-05-5 Suction Strainer	1

SECTION 3 SERVICE

Harness, 23' Gang TRTP Strobe Light



ITEM	PART #	DESCRIPTION	QTY
1	036928	WIRE, 16 AWG RED	21'
2	036931	WIRE, 16 AWG BLACK	21'
3	038641	HOUSING, FEMALE TERM 2 CONTACT	1
4	038648	CAVITY SEAL F/ 16-14 GREY	2
5	039160	SPADE, SMALL FEMALE 18-22 GA INS	2
6	056552	LOOM, 1/4" EASY OPEN WRAP	23'

Manual Revision Details

GENERAL INFORMATION

MANUAL REVISION DETAIL

REVISION #	REVISION DATE	REVISION REFERENCE #	REVISION BY
-	7/23	Initial Release	MK
A	02/26	Updated warranty policy 2026. Add 18-30ft, 12-16ft hyd schematics.	MK
B	10/26	Added Troubleshooting Fault Code details	MK



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