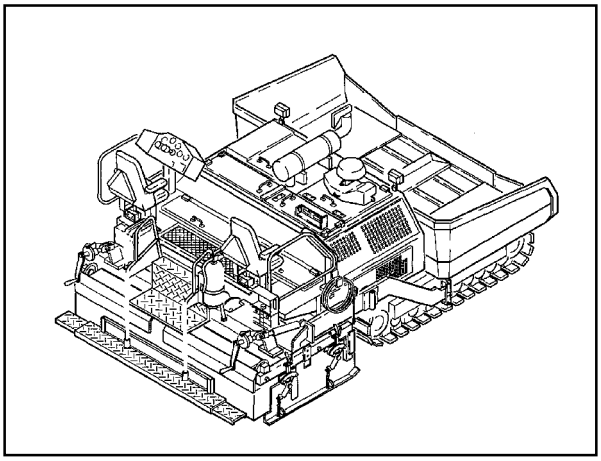
TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL



PAVING MACHINE, BITUMINOUS MATERIAL, CRAWLER MOUNTED, DIESEL ENGINE DRIVEN NSN 3895-01-379-1102 END ITEM CODE (EIC: E47)

INGERSOLL-RAND COMPANY
MODEL 780T
CONTRACT NUMBER DAAE07-93C-0501

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HEADQUARTERS, DEPARTMENT OF THE ARMY **1 FEBRUARY 1996**

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TM 5-3895-373-20
WASHINGTON, D.C.

HEADQUARTERS
DEPARTMENT OF THE ARMY
1 FEBRUARY 1996

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CONTRACT NUMBER DAAE07-93C-0501

REPORTING OF ERRORS

Reporting Errors and Recommending Improvements. You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publication and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Tank-automotive and Armaments Command, AMSTA-IM-MMAA, Warren, MI 48397-5000. A reply will be furnished to you.

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HOW TO USE THIS MANUAL

This manual provides Preventive Maintenance Checks and Services, diagnostic procedures, and task-oriented maintenance procedures authorized for use by Unit level maintenance personnel by the Maintenance Allocation Chart (MAC) in Appendix B.

The front cover includes a quick reference index of important topics. The pages that cover a topic listed in this index have a black tab in line with the index block. Thumb through the manual to find the related pages. An alphabetical index is provided at the back of the manual, as well as at the start of each chapter. Special indexes are provided in the diagnostics section to help you locate specific flowcharts quickly.

Use the diagnostic section to troubleshoot failed electric and/or hydraulic equipment functions. Electrical and hydraulic foldout schematics are located at the back of the diagnostic section for convenient reference.

When mechanical equipment failures are found or reported, refer to the related Functional Group in the MAC, Appendix B, before looking for an applicable repair procedure. The MAC will quickly indicate if an appropriate repair action is authorized at the Unit level. Some equipment repair actions are authorized at the Direct and/or General Support level, and will not be found in this manual.

Each authorized maintenance task is preceded by a task summary. The task summary lists the tools, materials, equipment, and personnel required to perform the task. Using the task summary as a check list, make sure that you have all the tools, materials, and assistance required before travelling to an equipment repair site or starting the task.

CHAPTER 1

INTRODUCTION

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1.1. SCOPE.

a. Type of Manual: Unit Maintenance.

b. Model Number and Equipment Name: Ingersoll-Rand Company Model 780T Crawler Mounted, Diesel Engine Driven, Bituminous Material Paving Machine, NSN 3895-01-379-1102.

c. Purpose of Equipment: The Paving Machine is used to repair damaged or worn landing pads, airfields, taxiways, roads and parking areas in combat-related facilities, as well as maintenance and new road construction. The paving machine will also be used to construct extensions to existing facilities, roads, airfields, and taxiways.

1.2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System.

1.3. CORROSION PREVENTION AND CONTROL.

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problem be reported, so the problem can be corrected and improvements can be made to prevent the problem in the future.

While corrosion is typically associated with rusting of metals, it also includes the deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may indicate a corrosion problem.

If a corrosion problem is identified, report it using an SF 368, Product Quality Deficiency Report. Completed forms should be submitted to the address specified in DA PAM 738-750. Use of key words such as "corrosion", "rust", "deterioration", or "cracking" will ensure the information is identified as a CPC problem.

1.4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Procedures for destruction of Army materiel to prevent enemy use are listed in TM 720-244-6.

1.5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If the Paving Machine needs improvement, let us know. Send us your EIR. You, the user, are the only one who can tell us what you do not like about the equipment. Let us know why you don't like the design. Put it on SF 368 (Product Quality Deficiency Report). Mail it to: Commander, U.S. Army Tank-automotive and Armaments Command, Attn: AMSTA-TR-E/MPA, Warren, MI 48397-5000.

1.6. WARRANTY INFORMATION.

The Paving Machine warranty is detailed in Warranty Technical Bulletin (WTB), TB 5-3895-373-14.

1.7. OFFICIAL NOMENCLATURE.

This list provides a cross-reference between the nomenclature used in the manual and the nomenclature specified in the Repair Parts and Special Tools List (RPSTL). Nomenclature Cross- Reference List

Manual Nomenclature	Official Nomenclature
Paving Machine	780T Bituminous Asphalt Paving Machine
Screed	Hydraulic Vibratory Extendable Screed, ES-80 (Diesel)
Hopper	Aggregate Feeder
Hopper Wing	Aggregate Feeder
Auger	Screw Conveyor
Flashing	Solid Rubber Sheet
Dipstick	Liquid Gauge Rod-cap
Bendix	Electric Engine Drive
Coolant Temperature Sensor	Thermostatic Switch
Hydraulic Oil Temperature Sensor	Thermostatic Switch
Hemi Auger Flight	Screw Conveyor Auger
Quarter Auger Flight	Screw Conveyor Auger
Sound Foam	Sound Control Batten
Alternator	Engine AC Generator
Latch	Pawl Fastener
Fuel/Water Separator	Fluid Filter
Fuel Spray Wand Assembly	Nozzle and Hose Assembly
Pump Drive Gearbox	Angle Drive Unit
Speed Reduction Gearbox	Speed Gear Assembly

1.8. USE OF METRIC UNITS.

The equipment described herein contains metric components and requires metric common tools. Therefore, metric units are used for components or systems which are metrically dimensioned, and no U.S. standard unit is applicable. In all other situations, U.S. standard units and metric units are both referenced.

1.9. PREPARATION FOR STORAGE OR SHIPMENT.

Instructions are provided in Chapter 2.

1.10. LUBRICATION ORDER.

For lubrication intervals and instructions, refer to Lubrication Order, LO 5-3895-373-12.

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1.11. CHARACTERISTICS, CAPABILITIES, AND DATA.

The paving machine is a turbosupercharged, 4-cylinder, diesel powered, hydraulically driven tracked vehicle. The engine is coupled to a dual main pump drive gearbox which drives two propulsion pumps in tandem with two auxiliary pumps and one auxiliary vibration pump. The propulsion pumps supply hydraulic pressure to the track drive motors. The auxiliary hydraulic pumps are used to operate all controls and cylinder drive functions.
Control handles on the operator control panel control each track drive motor located on the undercarriage of the paving machine. Paving speed is from 0 to 135 fpm (O to 41 mpm) with travel speed (switch selected) of 0 to 3.2 mph (O to 5, 2 kph). Hydraulic cylinders automatically maintain tension on the 12-inch wide steel track pad. A high wear-resistant rubber pad is attached to each track pad. Spring applied hydraulically released disc brakes are located between the hydraulic drive motors and torque hubs. In the event that hydraulic pressure or electrical power is lost, the brakes are automatically applied.

Push rollers are located in front of the material hopper and are designed to ride against the rear wheels of the paving material haul truck. The push rollers allow the paving machine to push the haul truck forward, while continuing to receive material into the hopper and spread the paving material at the same time. Hopper wings are hydraulically raised and lowered from the operator control console. Dual slat conveyors move the paving material from the hopper to the auger, and are independently controlled from the operator control console. Two electric actuators control flow gates that meter the amount of material conveyed to the augers. Two 12-inch (304 mm) augers spread the paving material in front of the screed.

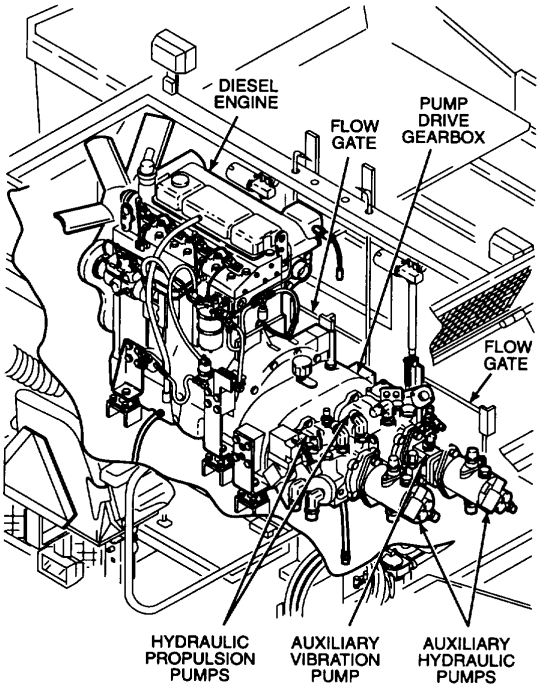
Four diesel fuel-fired burners are located on the screed. The burners heat the screed plates to approximately 300°F (150°C) to prevent paving material from sticking to the screed plates. The screed is hydraulically extendable from 8 to 14 feet (2, 4 to 4, 3 m) and can be extended further to 16 feet (4, 9 m) with bolt-on screed and auger extensions. Mechanical adjustments on the screed control the thickness, slope, and crown of the paving material. The screed vibrator provides the initial compaction of the paving material. The amount of compaction is controlled by the frequency and amplitude of vibration. Vibration is controlled by the screed vibration control valve, located underneath the operator platform on the rear tractor bulkhead.

1.12. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

The following provides the location and description of major paving machine components maintained by the organizational maintenance activity.

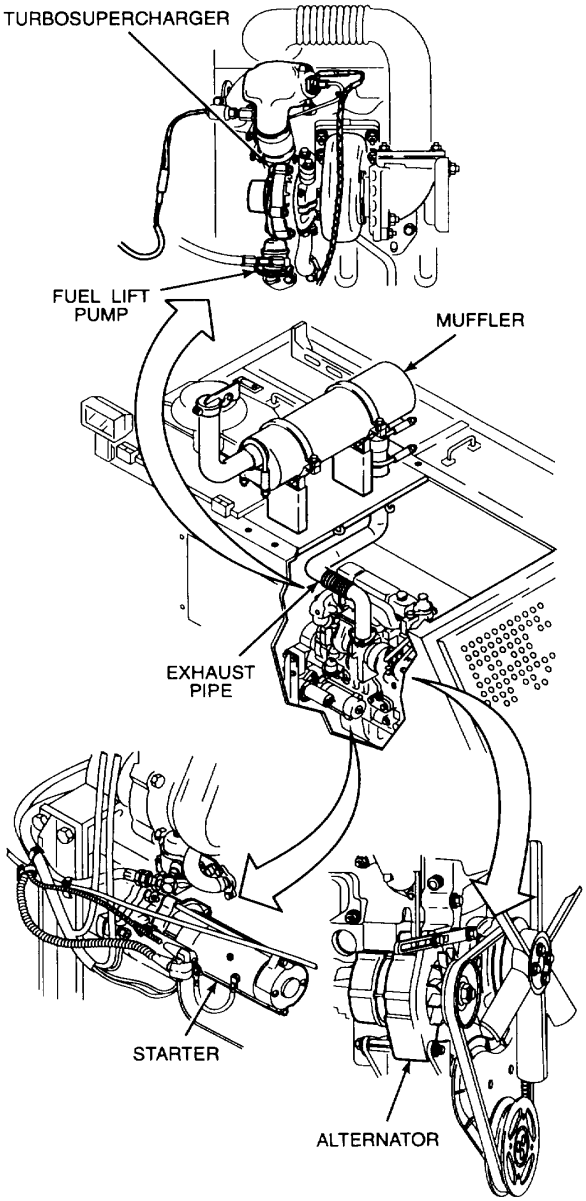
1.12.1. Engine Compartment. The engine compartment houses the paving machine drive system and hydraulic power components, air cleaner, filters, radiator, hydraulic oil cooler, exhaust system, and flow gates. These components are described as follows:

a. Drive System and Hydraulic Power. The paving machine drive system includes a turbosupercharged diesel engine with a pump drive gearbox adapted to the engine flywheel. Directly coupled to the gearbox drives are two main hydraulic propulsion pumps. The propulsion pumps provide hydraulic power to the left and right track drive motors. Two auxiliary hydraulic pumps, and one vibration pump are connected to the propulsion pumps in tandem. These pumps provide hydraulic power to non-propulsion hydraulic functions needed to operate the paving machine.



b. Engine Fuel Filter and Fuel Injection Pump. The fuel filter removes particulate from the fuel supply before it enters the fuel injection pump. The injection pump distributes equal amounts of high pressure fuel to the engine's fuel injection system prior to engine internal combustion cycle.

c. Fuel Lift Pump. The fuel lift pump is a cam shaft driven mechanical transfer pump. The lift pump transfers diesel fuel from the fuel tank to the fuel injection pump.



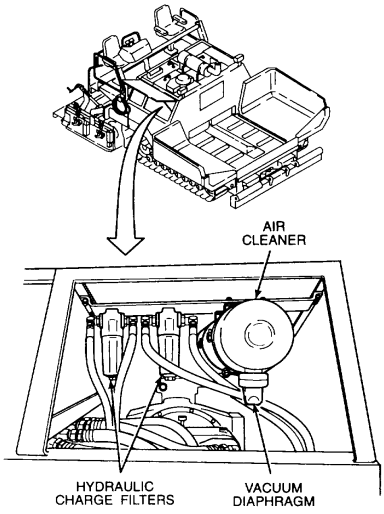
d. Turbosupercharger. The turbosupercharger forces compressed air into the combustion chamber for improved combustion, fuel efficiency, and horsepower. The turbosupercharger is driven by waste exhaust gas energy.

e. Alternator. The alternator produces a +24 VDC 45 amp output to operate the paving machine's electrical systems and keep the batteries charged.

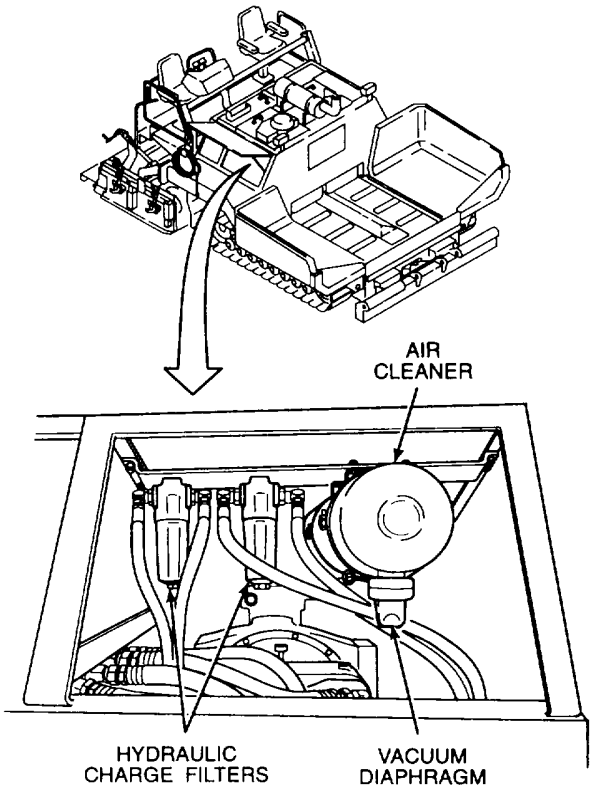
f. Starter. The starter uses a +24 VDC, high amperage supply to turn over the engine, starting the engine combustion cycle.

g. Exhaust pipe and muffler. The exhaust pipe is a flexible duct attached to the exhaust output of the turbosupercharger. The muffler is clamped to the output of the exhaust pipe and mounted to a removal support bracket over the engine compartment. The exhaust pipe and muffler are easily removed as a unit from the paving machine.

h. Air Cleaner. The air cleaner contains a replaceable filter element. Air being supplied to the turbosupercharger and engine is drawn in from outside the engine compartment through the filter element. The air cleaner has an internal dust seal preventing large dirt particles from entering the filter element. This collected dirt and dust is vented out of the air cleaner through a vacuum diaphragm.

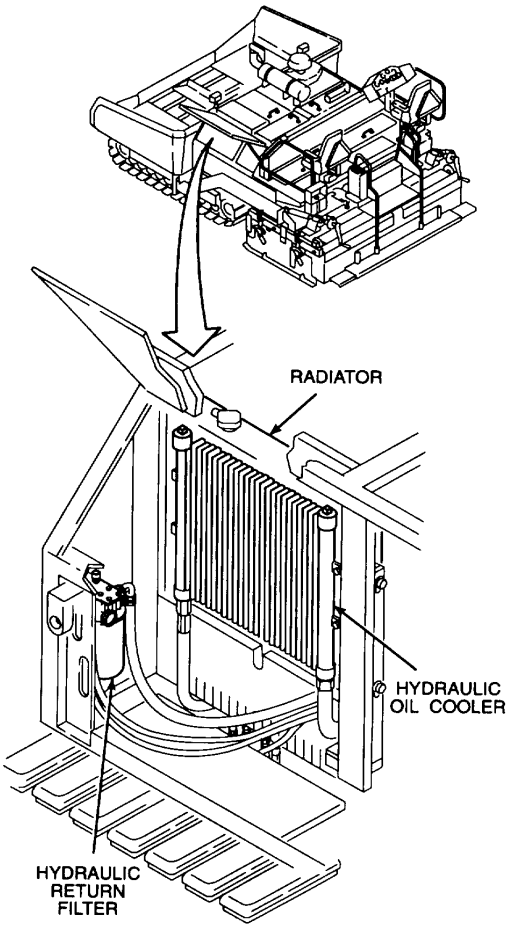


i. Hydraulic Charge Filters. Two hydraulic charge filters are located above the hydraulic pumps. Charge pressure oil from the propulsion intake is routed into the charge filters and back to the propulsion pumps. The charge filters service the high pressure side of the hydraulic system. The filters remove contaminants from the hydraulic oil prior to the oil being sent to the return manifold and other hydraulic systems.



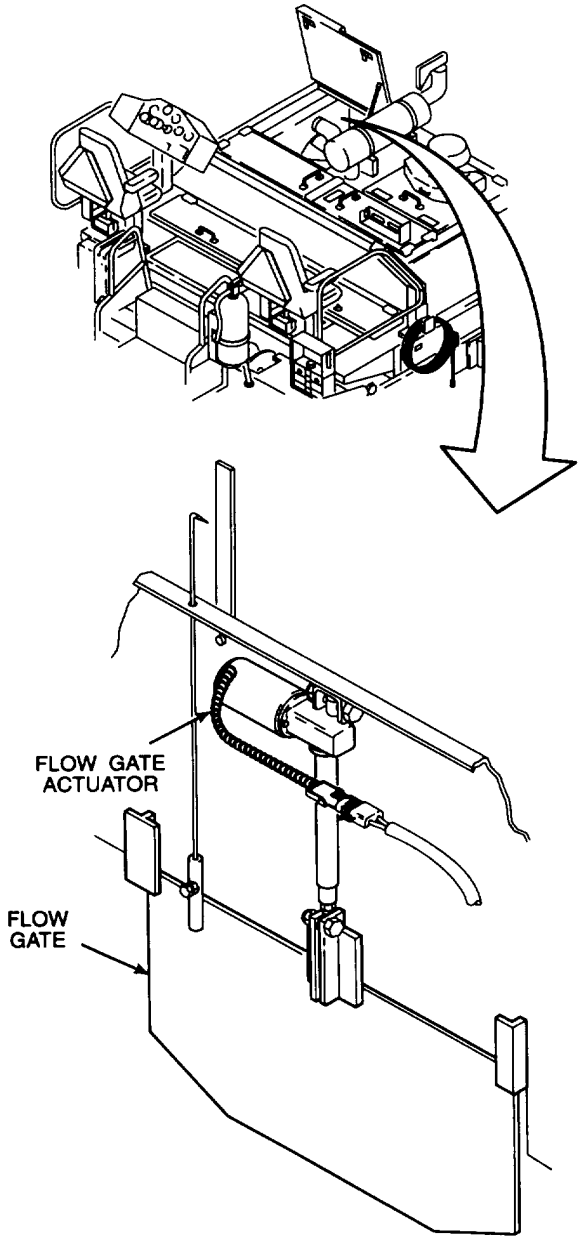
j. Radiator. The radiator absorbs heat from the engine coolant circulating through its coils. A flow of outside air is forced between the radiator coils to maintain normal engine operating temperature.

k. Hydraulic Oil Cooler. Hydraulic oil passes through the hydraulic oil cooler before entering the hydraulic reservoir. The oil cooler removes heat from the oil, protecting it against thermal breakdown.



l. Hydraulic Return Filter. The return filter is on the low pressure, return side of the hydraulic system. Oil from separate hydraulic circuits is returned to the hydraulic reservoir by way of the hydraulic return manifold. All oil from the return manifold passes through the return filter. The return filter protects against contamination. A pressure gauge on the filter housing displays filter pressure at the input to the return filter. This gauge indicates a clogged filter by registering an above normal system pressure.

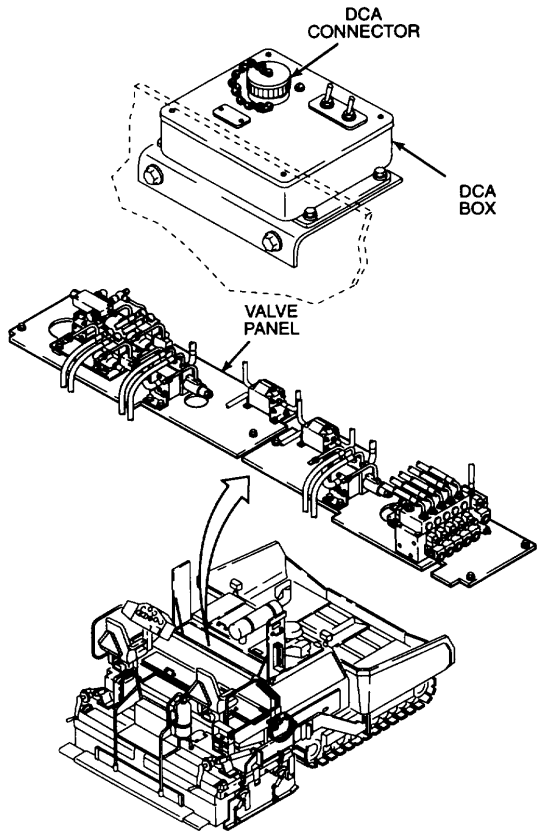
m. Flow Gates. Two flow gates are located on the front engine compartment bulkhead. Position of the flow gates control the amount of paving material that passes from the hopper to the screed. The flow gates are raised and lowered by separate +12 volt DC actuators. The actuators can be run from the operator switch panel or from the screed control panels.



1.12.2. <u>Valve Panel Compartment.</u> The valve panel compartment is located behind the engine compartment. The hydraulic oil reservoir and fuel tank are located underneath the valve panel. Major paving machine components found in the compartment are as follows:

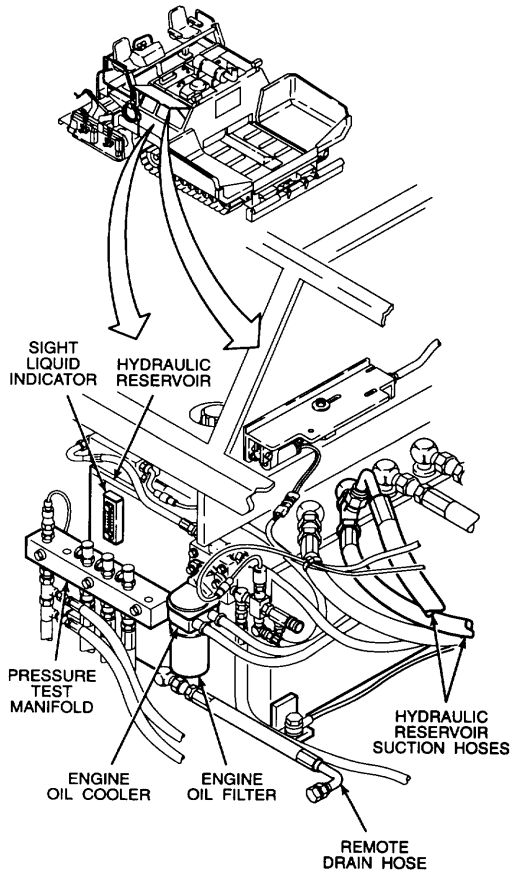
a. Valve Panel. The valve panel is the mounting location for all major control valves for the propulsion system, auger/ conveyor system, tow point control system, vibration system, stack valve, and major system flow dividers.

b. Diagnostic Connector Assembly (DCA) Box and Connector. The paving machine is equipped with STE/ICER transmitters to monitor machine systems. Wiring from the transmitters is routed to the DCA connector in the DCA box. The DCA connector provides the interface for hookup and operation of a STE/ICE-R test set.



c. Hydraulic Reservoir. The hydraulic reservoir is the only hydraulic oil reservoir on the paving machine. The reservoir includes a fill cap, sight liquid indicator measuring oil level and temperature, and remote drain hose. A removable reservoir cover is fitted with four suction ports and four return ports. The suction ports are fitted with strainer elements inside the reservoir.

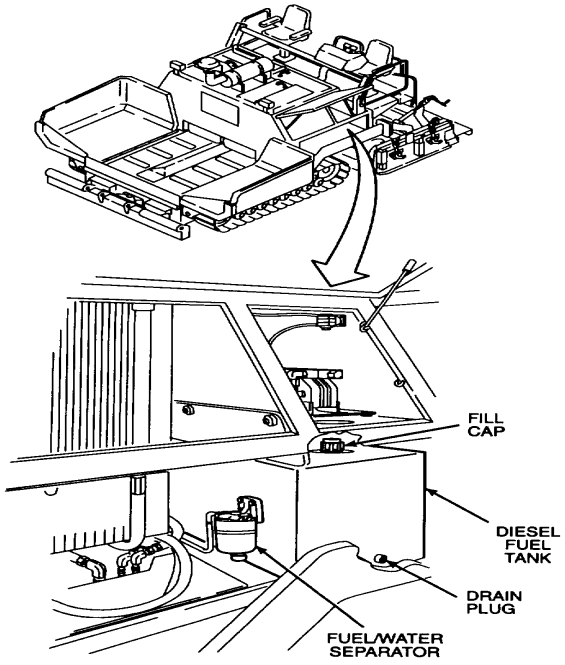
d. Engine Oil Cooler and Filter. Hot engine oil returning to the oil reservoir is routed through the engine oil cooler and engine oil filter mounted on the hydraulic reservoir. Engine coolant circulates in the oil cooler head to remove excess heat from the oil. The engine oil filter has a disposable filter element that removes contaminating particles from the oil.



e. Pressure Test Manifold. The pressure test manifold has four active test ports. The test ports allow DS/GS personnel to check the hydraulic oil pressure in the left and right auxiliary pump circuits and in the hydraulic brake release circuit with a quick disconnect pressure gauge.

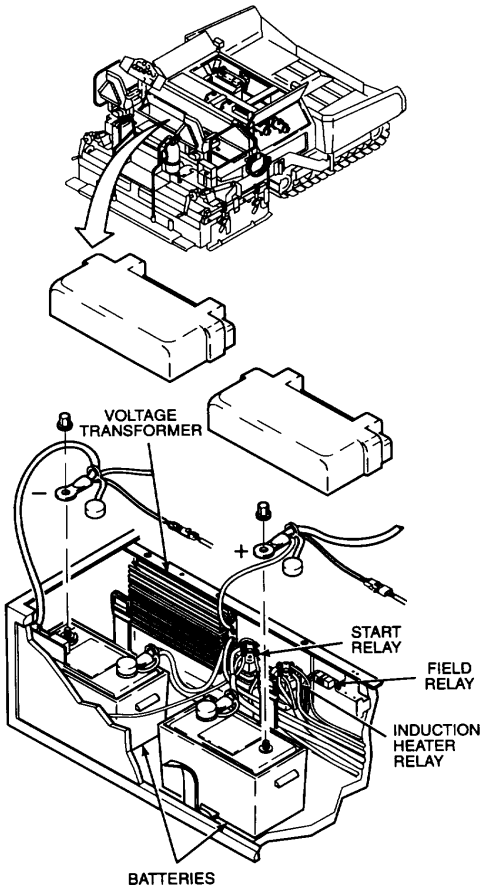
f. Diesel Fuel Tank. The diesel fuel tank is the fuel reservoir for the engine, screed burner, and washdown fuel systems. The tank is equipped with a fill cap, fill port strainer, drain plug, and float-type fuel level transmitter. The tank fuel level is displayed on an electric fuel gauge on the operator gauge panel.

g. Fuel/Water Separator. The fuel/water separator removes moisture from diesel fuel being pumped to the engine, and is located on the front side of the fuel tank. Fuel input to the separator is directly from the fuel tank. The separator output is the supply line to the fuel lift pump.



1.12.3. <u>Battery and Toolbox Storage Compartments</u>. The battery and tool storage compartments are just behind and below the valve panel. Paving machine components found in the compartment are as follows:

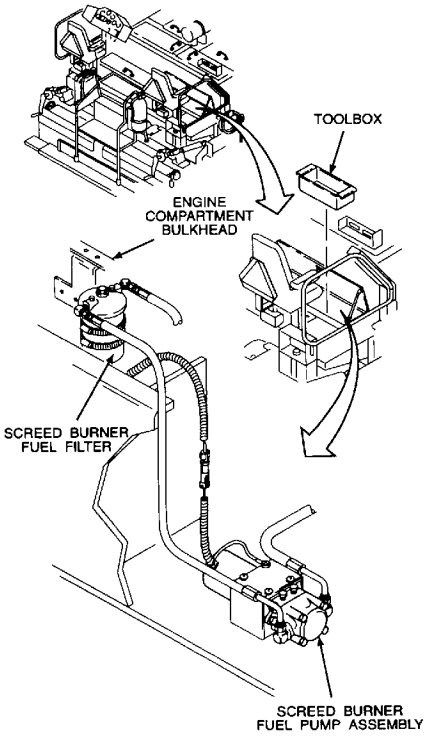
a. Batteries and Voltage Transformer. The paving machine uses two maintenance free 12 VDC storage batteries connected in series. Each battery is housed in a separate battery box. The battery charging circuit is routed through a voltage transformer which regulates voltage to operate both paving machine 12 VDC and 24 VDC electrical systems. A start relay, induction heater relay, and field relay are mounted next to the voltage transformer.



b. Toolbox. The removable toolbox contains the tools needed by the paving machine crew to change paving widths.

A grease gun is included in the toolbox for completing the daily lubrication requirements.

c. Screed Burner Fuel Pump Assembly and Filter. The screed burner fuel pump assembly is mounted under the toolbox. The fuel filter is mounted on the engine compartment bulkhead. The fuel filter removes particulates from the fuel supply before they can reach the screed burner fuel pump assembly. The fuel pump assembly includes a 12 VDC motor, flexible coupling, and replaceable pump. The pump output is routed to the screed burner fuel lines. The screed burner fuel pump assembly is turned on and off at the left hand screed control panel.

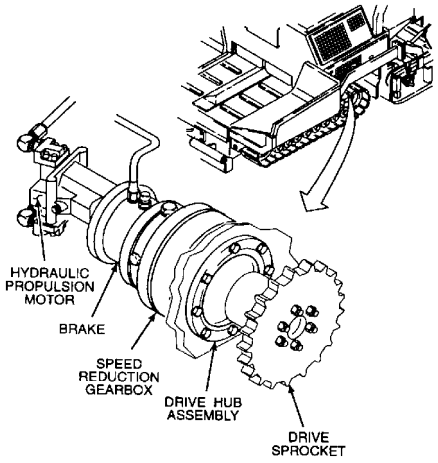


1.12.4. **Track Drive System**. The track drive system propels the paving machine. The track drive system is a parallel system driving both left and right tracks. Main components of the track drive system are as follows:

a. Hydraulic Propulsion Motor. The hydraulic propulsion motor is a two speed fixed displacement motor. High or low speed selection is made by a moveable internal port plate. The high or low speed port plate position is controlled by a solenoid valve activated by the travel switch on the operator gauge panel. The motor shaft mates with the speed reduction gearbox. Hydraulic power to drive the motors is provided by the hydraulic propulsion pumps.

b. Speed Reduction Gearbox and Brake. The speed reduction gearbox is mounted to the drive hub assembly from inside the paving machine frame. The gearbox converts a high speed, low torque input to a low speed, high torque output. An integral spring applied hydrostatically released brake engages whenever hydraulic power is lost, or the control handles are placed in the neutral position.

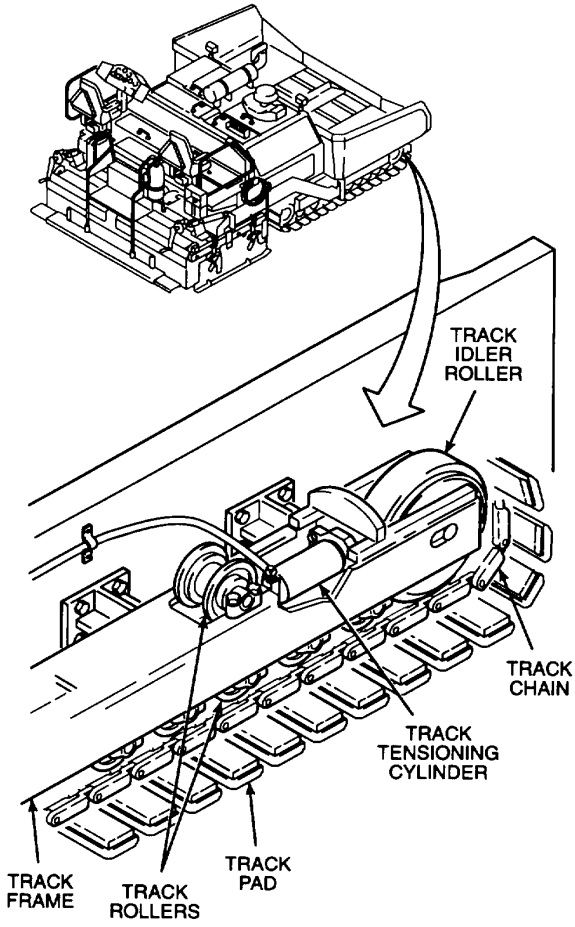
c. Drive Sprocket Gear. The drive sprocket gear is directly attached to the drive hub axle internal to the drive hub assembly and connected to the speed reduction gearbox. The axle spins on two sets of conical bearings. The drive sprocket gear is bolted to the outboard face of the drive hub assembly.



d. Track Idler Roller and Tensioning Cylinder. The track idler roller slides forward and backward in the track frame. During operation, the track tensioning cylinder keeps a constant load on the idler roller, removing slack from the track chain.

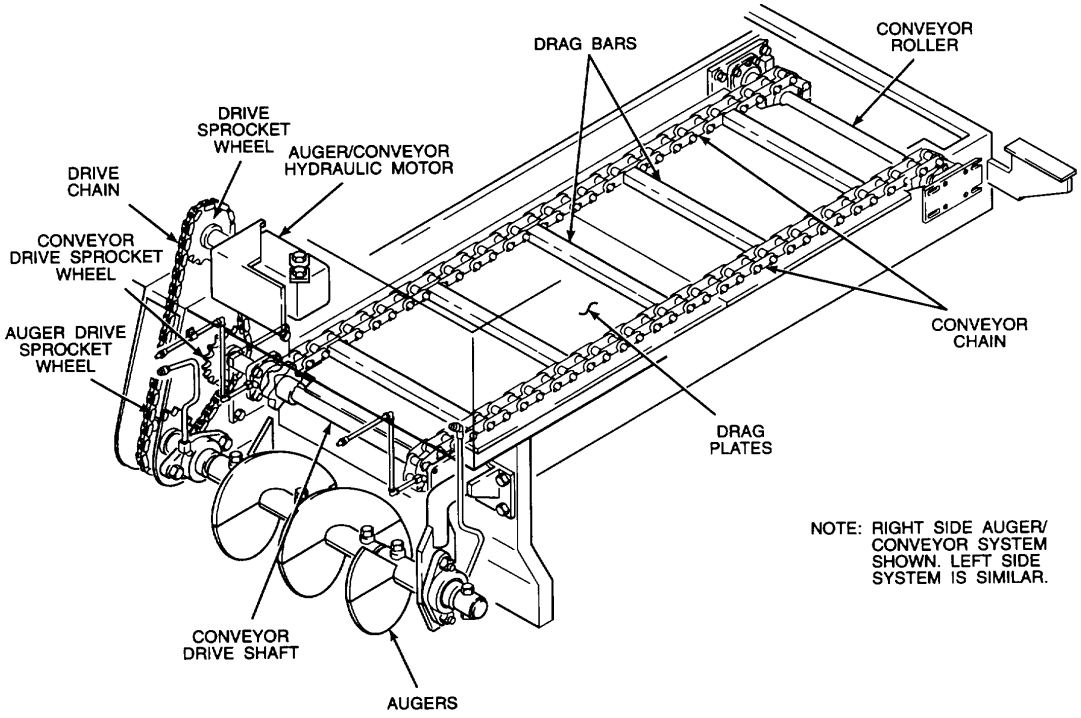
e. Track Rollers. Track rollers support the track chain. Two track rollers are mounted to the top of the track frame, and eight are mounted to the bottom of the track frame.

f. Track Chain. The track chain consists of interconnected links where each link has a track guide and hardened rubber track pad. This provides a large surface contact area with the ground. The track chain provides the travelling surface for the paving machine and creates traction to allow movement.



1.12.5. Hopper Auger/Conveyor Systems. The paving machine is equipped with right and left independently controlled auger/conveyor systems. Each system is driven by a hydraulic motor mounted on the main frame bulkhead. The main auger/conveyor system components are as follows:

a. Conveyors. There are two conveyors located in the hopper. Each conveyor consists of conveyor rollers, drive shafts, conveyor chains with drag bars, conveyor drive sprocket wheels, and drag plates. When the auger/conveyor system is turned on, the conveyors pull paving material from the hopper back to the augers in front of the screed.

b. Augers. Two spiral augers are used to move the paving material deposited by the conveyors. When the auger/conveyor drive is turned on, the spiral augers spread paving material evenly across the width of the screed.

c. Auger/Conveyor Drive System. The conveyors and augers are driven by two hydraulic motors. The hydraulic motors are turned on and off at the operator switch panel or at the screed control panels. Reverse control switches on the switch panel allow each conveyor and auger to be run in reverse. Speed control valves can be manually adjusted to speed up or slow down conveyor and auger rotation. Each motor is connected to a drive sprocket wheel and drive chain. The drive chain engages with the conveyor drive sprocket wheel and auger drive sprocket wheel. The position of the motors and sprocket wheels is adjustable for maintaining chain tension.