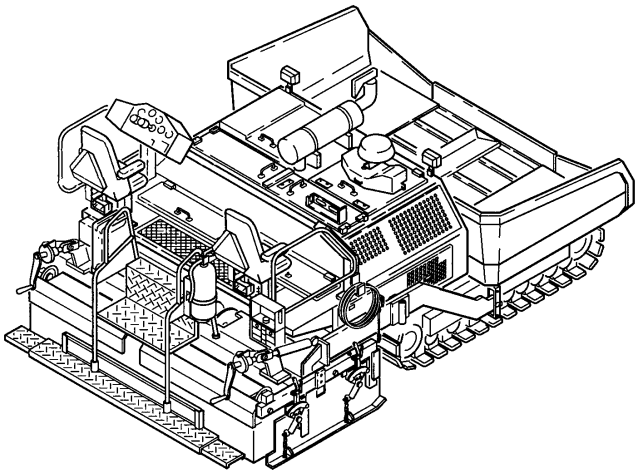
TECHNICAL MANUAL

OPERATOR'S MANUAL PAVING MACHINE



BITUMINOUS MATERIIAL;
CRAWLER MOUNTED,
DIESEL ENGINE DRIVEN
NSN 3895-01-379-1102
END ITEM CODE (EIC)': E47

INGERSOLLI-RAND COMPANY
MODEL 780T
CONTRACT NUMBER DAAEO7-93C-0501

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

TECHNICAL MANUAL
TM 5-3895-373-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 1 FEBRUARY 1996

TECHNICAL MANUAL
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PAVING MACHINE, BITUMINOUS MATERIAL;
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INGERSOLL-RAND COMPANY, MODEL 780T
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, Ml 48397-5000. A reply will be furnished to you.

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HOW TO USE THIS MANUAL

This manual contains instructions to operate the 780T Asphalt Paving Machine. You must familiarize yourself with the entire operation of the paving machine before operating it. Pay special attention to all Notes, Cautions, and Warnings when performing any operation or maintenance procedure.

Use the front cover locators and "marked" pages to quickly find the parts of the manual shown on the cover. Simply spread the pages on the right edge of the manual until the printed blocks can be seen. Open the manual where the block on the edge of the page lines up with the selected topic printed on the front cover block. These portions of the manual were chosen because they are used often. Inside, the manual has been divided into chapters, sections, and paragraphs, which are all numbered sequentially.

When first receiving the 780T Asphalt Paving Machine, start at the front of the manual and read all the way through to the back. Become familiar with every part of the manual and the paving machine. As a paving machine operator, you are responsible for the operation and maintenance of the machine. Read through the following example on using the manual.

1. *Need to know how to operate the screed burner system. How do you start?*
   Turn to the cover of your manual.
   On the right side you will find a listing for **"SCREED CREW CONTROLS AND INDICATORS"**. To find that section quickly, open the manual by using the black tab on the side of the manual that lines up with the **"SCREED CREW CONTROLS AND INDICATORS".**

2. *How do you operate the burners?*
   Read through paragraph 2.16, Screed Burner Operation. Refer to paragraph 2.2 Screed Crew Controls and Indicators to familiarize yourself with the controls.

3. *Screed burners give off black smoke. What type of problems do you have?*
   Open your manual to page 3-2.
   In the "Malfunction Index", find the listing for the equipment malfunction "Screed burners give off black smoke". Look to the right of the malfunction index for the page number for the troubleshooting procedure for "Screed burners give off black smoke".

4. *How do you determine what is causing your problem?*
   Turn to page 3-15.
   You will find there the troubleshooting procedure you need. The procedure has columns with headings: "Malfunction", "Test or Inspection", and "Corrective Action". Starting at Step 1, each step tells you what to do. Let's assume you check to see if the screed blower air control plates are properly adjusted. The Corrective Action tells you to loosen the thumbscrew and adjust screed blower air control plate until you see an orange/white screed burner combustion flame and hear a loud combustion roar.

   You are able to adjust the combustion flame properly, but you still have black smoke. Go to Step 2. Let's assume you check the screed plates for clogged exhaust vents on screed trailing edge. The Corrective Action tells you to clean the exhaust vents. To clean the exhaust vents, Step 2 tells you to perform the maintenance procedure per paragraph 3.3.7.

5. *How do you fix the problem?*
   Refer to paragraph 3.3.7.
   This is the maintenance procedure for fuel spray washdown. This procedure is designed to ensure all areas of the paving machine requiring a spray washdown are covered. Read through the procedure on how to perform a washdown and clean the area of the paving machine causing the problem.

CHAPTER 1

INTRODUCTION II

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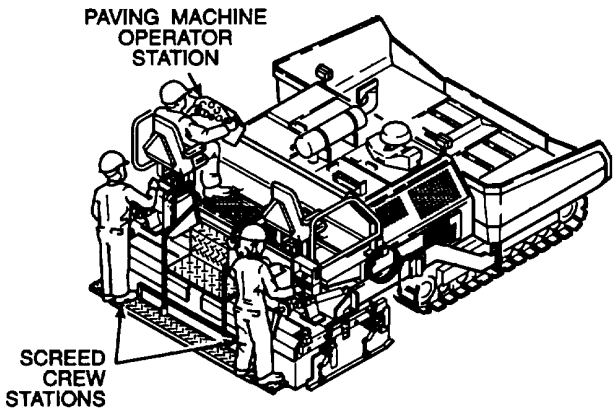
SECTION I. GENERAL INFORMATION

1.1 SCOPE.

a. Type of Manual. This operator's manual gives c crew members the information needed to operate the paving machine under usual and unusual conditions. The manual also contains the data needed to check the paving machine for proper operation and to keep it serviceable. Special information for the moveable operator station, two fixed screed crew stations, and bolt-on screed accessories are included.

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 and maintain damaged or worn landing pads, airfields, taxiways, roads, and parking areas in combat-related facilities as well as in new road construction. The paving machine may be used to construct extensions to existing facilities such as roads, airfields, and taxiways.



1.2 MAINTENANCE FORMS AND PROCEDURES.

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 (CPC).

Corrosion Prevention and Control (CPC) of Army material 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, 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 tank-automotive materiel to prevent enemy use are listed in TM 750-244-6.

1.5 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

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

1.6 WARRANTY INFORMATION.

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

1.7 REFERENCE INFORMATION.

This listing includes the nomenclature cross-reference list, list of abbreviations, and explanation of terms (glossary) used in this manual.

a. Nomenclature Cross-Reference List.

Common Name	Official Nomenclature
Ignition Switch	Sensitive Switch
Paving Machine	Bituminous Material
Paving	Machine
Hopper Wing	Aggregate Feeder
Screed	ES-80 (Diesel) Hydraulic Vibratory Extendable Screed
Tow Arm	Finisher Arm
Hopper	Aggregate Hopper
Flashing	Solid Rubber
Auger	Screw Conveyor
Latch	Pawl Fastener
Stud Weld Nut	
Fuel/Water Separator	Fuel Filter
Fuel Spray Wand Assembly	Nozzle and Hose Assembly
Pump Drive Gearbox	Angle Drive Unit
Speed Reduction Gearbox	Speed Gear Assembly
Auger Flight	Screw Conveyor

b. List of Abbreviations/Acronyms.

Auto	Automatic
F/R	Forward/reverse
MAN	Manual
MAX	Maximum
N	Neutral
rpm	Revolutions per minute
fpm	Feet per minute
mph	Miles per hour
vpm	Vibrations per minute

c. Glossary.

Bituminous Asphalt	Dense-graded asphalt concrete material consisting of a uniform or continuous aggregate grading with an asphalt cement binder.
Eccentric Shaft	A shaft which is geometrically unbalanced, designed to produce an oscillating motion.
Feeder	Combination of conveyor and augers, collectively.
Hydrostatic	Hydraulic fluid in a hydraulic system where fluid at rest or under pressure exerts or transmits a force.

1.8 USE OF METRIC UNITS.

The equipment described herein contains metric components and requires metric common and special tools. Therefore, metric units are used when a metric part is referenced. U.S. standard units are used when a U.S. standard part is referenced. Equipment gauges are dual scale U.S. standard and metric common. All references to equipment data and operating parameters appear both in U.S. standard and metric units.

SECTION II. EQUIPMENT DESCRIPTION

1.9 EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

1.9.1 Characteristics.

a. Diesel engine powered hydrostatic propulsion system provides power to rubber padded steel crawler tracks.

b. Multiple disc brakes engage automatically in the event of pressure loss or electrical failure.

c. Moveable operator control console provides operator with fingertip command of paving machine functions.

d. Hopper is independently hydraulically-operated to maintain material supply.

e. Hydrostatically driven conveyor system is a high capacity, dual conveyor feeder system with variable speed control. Conveyors reverse direction to unjam conveyor chain.

f. Heavy-duty 4.82 in. (14, 8 cm) pitch crawler track. Undercarriage features low maintenance components. Hydraulic track adjusters, consisting of the track tensioning cylinders and accumulator, maintain track tension and impact relief. Each track can be counter rotated.

g. Hydraulically extendable vibratory screed provides a high degree of material compaction.

h. Box type screed frame structure provides maximum rigidity to screed plates.

i. Tractor tows screed with two vertically adjustable floating tow points.

j. Screed is furnished with left and right side screed crew control boxes.

1.9.2 Capabilities.

a. Maximum paving depth of 8 in. (20, 3 cm).

b. Paving width is 8 ft (2, 4 m); hydraulically extendable to 14 ft (4, 3 m); bolt-on screed and auger extensions increase paving width to 16 ft (4, 9 m).

c. Hopper capacity is 7.4 tons (6, 7 metric tons) of paving material.

d. Maximum paving grade is 15%.

e. Maximum side slope paving angle is 12°.

f. Maximum speed:
Paving: 135 fpm (41, 2 m/m)
Traveling: 3.2 mph (5, 1 kph)

1.9.3 Features.

a. Paving width decreases to 6 ft (1, 8 m) with the use of bolt-on cutoff shoes.

b. Operator control console is mounted on a guide shaft allowing the control console to be positioned from side to side on the paving machine.

c. Operator control console and screed crew control boxes have protective covers.

d. A toolbox is provided on the paving machine.

e. The paving machine has easy access panels. Guards, walkways, and cover plates are easily removed.

1.10 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

1. SCREED CREW CONTROL BOXES. Contain major screed and feeder system control functions.

2. PAVING MACHINE OPERATOR CONTROL CONSOLE. Provides controls for operating the paving machine, conveyors, flow gates, and augers.

3. NATO SLAVE RECEPTACLE. It is the connecting point for the slave cable used to slave start the vehicle from an external source.

4. ENGINE COMPARTMENT. Location of diesel engine, hydraulic pumps, hydraulic reservoir, and fuel tank.

5. TRACK DRIVES. Provide a large, stable surface area to support the weight of the paving machine. The track drives are hydraulically powered.

6. SCREED TOW ARMS. Connect the tractor to the screed and allow the tractor to pull the screed.

7. FUEL SPRAY WAND ASSEMBLY. Used to wash down areas of the paving machine constantly exposed to paving material. Hose has a quick disconnect coupling, and wand is trigger activated.

8. ENDGATE ASSEMBLIES. Prevent outward movement of paving material to control paving width. Provide the edge to the paving material.

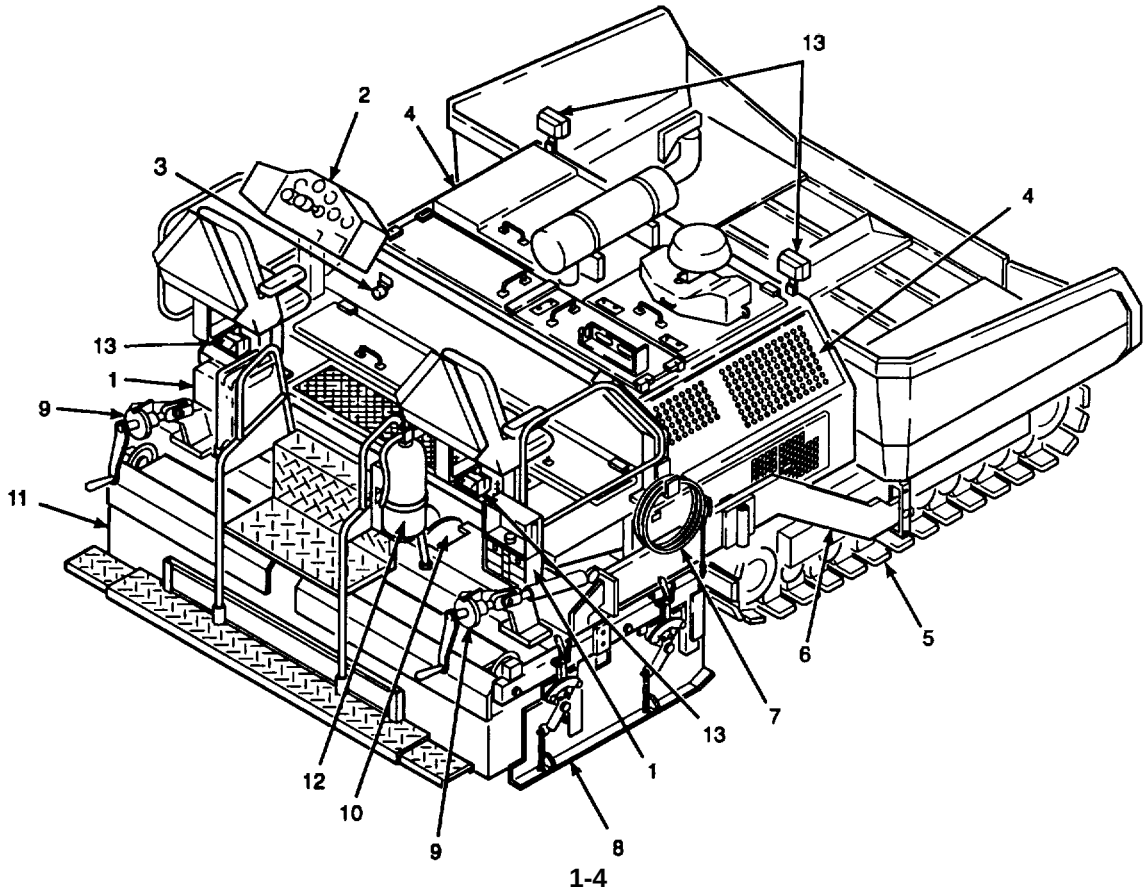
9. THICKNESS CONTROLS. Control the amount of material passing under the screed.

10. AUGERS. Spread paving material evenly across the width of the screed.

11. SCREED. Controls the thickness and provides initial finish and compaction of paving mat.

12. FIRE EXTINGUISHER. Portable fire extinguisher for use on all classes of fires.

13. WORK LIGHTS. Illuminate areas of the paving machine during night operation. Two additional lights located below main operator's deck directly under operator's seat.



14. HOPPER WINGS. Raise to dump paving material to conveyors. Lower to increase volume of the hopper.

15. CONVEYORS. Move paving material from hopper to augers.

16. DIESEL ENGINE AIR INTAKE. Provides air supply to diesel engine.

17. EXHAUST MUFFLER. Dissipates heat and reduces noise level of diesel exhaust.

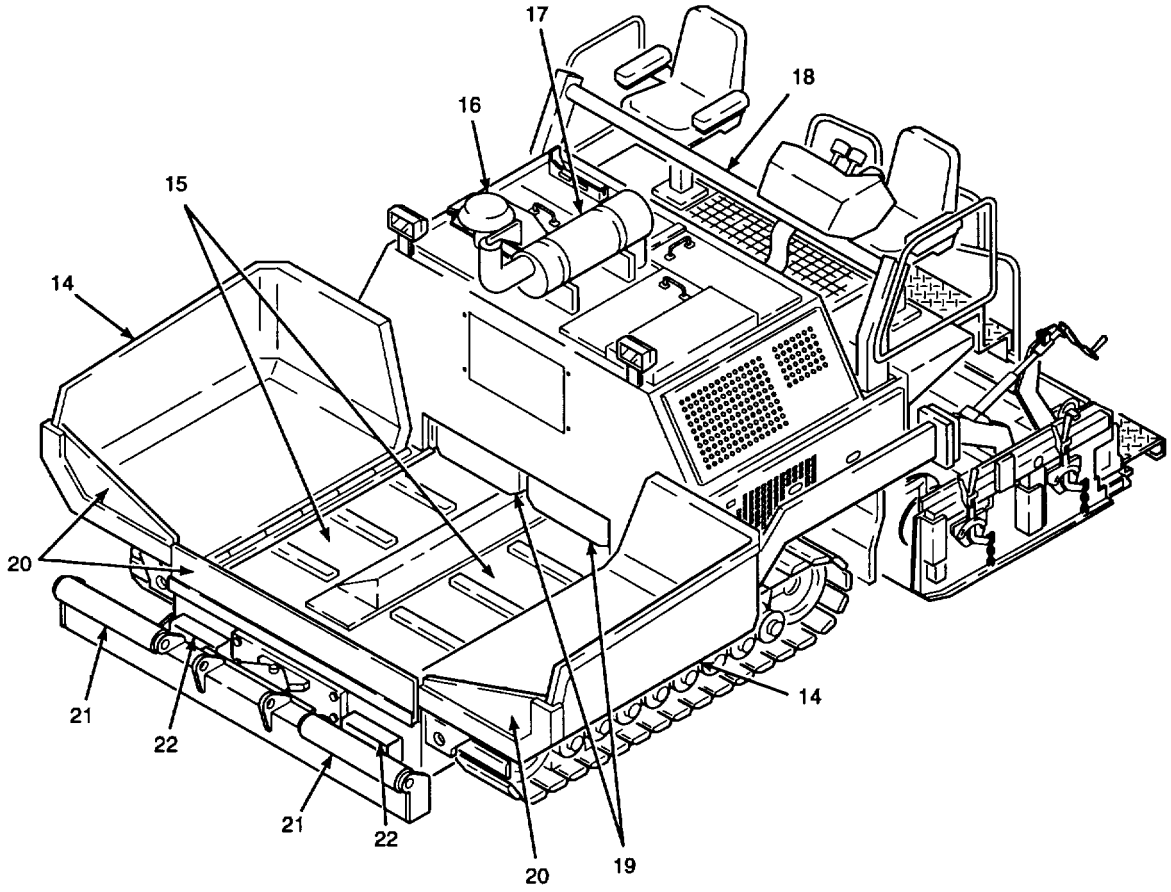
18. CONSOLE GUIDE SHAFT. Allows tractor operator to move operator control console from side to side.

19. FLOW GATES. Control the amount of paving material flowing to the augers.

20. RUBBER FLASHINGS. Prevent paving material from spilling out of the hopper.

21. PUSH ROLLERS. Maintain contact with the haul truck wheels allowing paving machine to push the haul truck.

22. COUNTERWEIGHT. Increases stability of paving machine during travel.



1.11 EQUIPMENT DATA.

GENERAL

Weight (operational)	21, 200 lbs. (9624, 8 kg)
Weight (shipping)	19, 900 lbs. (9034, 6 kg)
Length	16.0 ft (4, 9 m)
Height	8.42 ft (2, 6 m)
Width (hopper up)	8.67 ft (2, 6 m)
Width (hopper down)	10.83 ft (3, 3 m)
Hopper Capacity	135 cu ft (3, 8 cu m)
Personnel Capacity	3
Fuel Tank Capacity	28 gals. (106 9)
Engine Motor Oil Capacity	7.7 qts. (7, 3 Q)
Engine Coolant Capacity	6.5 gals (24, 6 1)
Hydraulic Reservoir Capacity	32 gals (121, 1)
Fire Extinguisher	One, Class A, Size II Class B and C, Size In

OPERATION

Paving Thickness	0 to 8 in. (0 to 20 cm)
Crown (positive)	2 in. (50 mm)
Crown (negative)	1 in. (25 mm)
Paving Speed	0 to 135 fpm (0 to 41, 2 m/m)
Travel Speed	0 to 3.2 mph (0 to 5, 2 km/h)
Traveling Range	25 mi. (40, 2 km)
Gross Horsepower-to-weight Ratio	9.62 hp/ton

SCREED

Main Screed Plate	14 in. x 8 ft (356 mm x 2, 4 m)
Extension Screed Plates (each)	14 in. x 36 in. (356 mm x 915 mm)

SCREED - Continued

Plate Thickness	3/8 in. (10 mm)
Burners	4 diesel
Vibrators	4
Vibrator (frequency)	0 to 2200 vpm (0 to 36, 6 Hz)

ENGINE

Make and Model	Perkins T4.236
Displacement	236 cu in. (3, 9 01
Type	4 Cylinder
Fuel	Diesel
Gross Horsepower	102 hp (76.1 kW) @ 2600 rpm

ELECTRICAL SYSTEM

Alternator Amps	105 amp
Alternator Volts	24 volt
System Volts	12 volt
Crank Motor Volts	24 volt
Storage Batteries (2)	12 volt

RUNNING GEAR

Track Type	Steel, with detachable rubber track pads
Track Width	12 in. (30, 5 cm)
Track Length (ground contact)	6.5 ft. (1, 98 m)
Ground Pressure (operational unloaded)	12 psi. (82, 7 kPa)
Ground Pressure (operational loaded)	20.6 psi. (142, 04 kPa)

SECTION III. PRINCIPLES OF OPERATION

1.12 PAVING MACHINE.

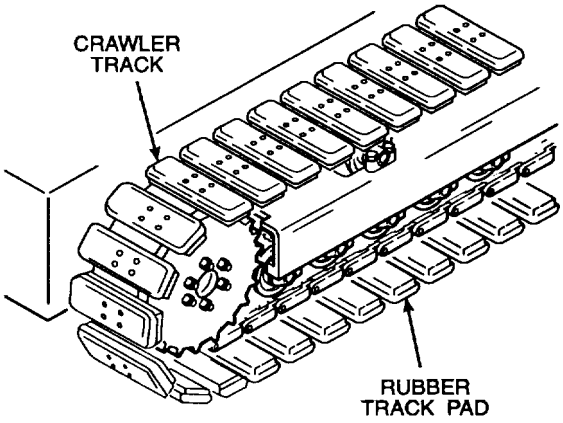
The paving machine consists of the tractor and screed. It is normally manned with one paving machine operator and two screed crew members. The tractor unit pushes a haul truck while the haul truck unloads paving material into the tractor hopper. The twin dual slat conveyor system on the tractor unit carries the paving material from the hopper to the augers. Two electrically-controlled flow gates, mounted behind the hopper, regulate the amount of material fed to the augers at the back of the tractor. The augers spread the paving material evenly along the length of the leading edge of the screed. As the tractor unit moves forward, it tows the screed over the paving material. Burners on the screed heat the screed plate and maintain its temperature equal to that of the paving material to prevent sticking. The screed is equipped with a vibrating screed plate, which provides a high degree of compaction to the paving material passing underneath it.

Both the tractor and screed units are equipped with controls that impact the paving operation. The paving machine operator can operate virtually all machine functions. The screed crew control boxes contain controls limited to paving functions.

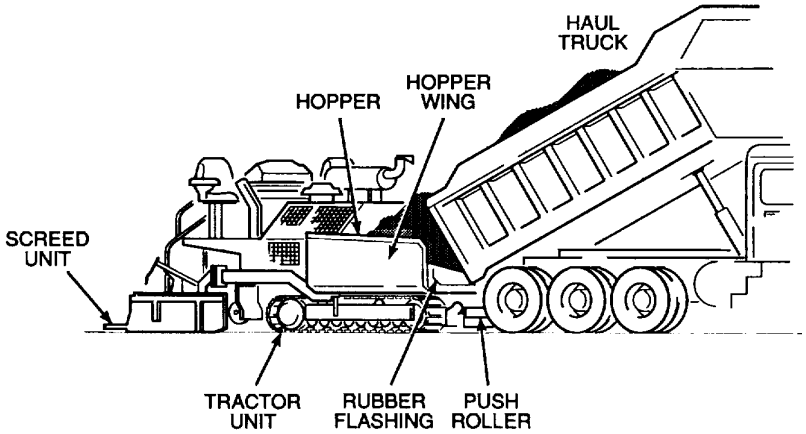
1.13 TRACTOR.

The tractor is powered by a Perkins T4.236 turbocharged diesel engine coupled to a pump drive gearbox that provides power to five hydraulic pumps. Two hydraulic propulsion pumps are attached to the gearbox and provide hydraulic oil pressure to drive the propulsion motors mounted on the track frame. Two hydraulic auxiliary pumps and a hydraulic auxiliary vibration pump are attached in tandem to the propulsion pumps. These pumps provide hydraulic oil power to auger/conveyor motors, vibration motors, and all hydraulic cylinder functions on the paving machine. Additional components such as push rollers, hopper wings, and flow gates are discussed in the following paragraphs.

1.13.1 Track Drive. The paving machine is mounted on steel crawler tracks equipped with rubber track pads mounted on steel track pad plates. The hydraulically-powered track drive evenly distributes and supports the weight of the paving machine for greater stability. The tracks operate individually in the forward and reverse directions at variable speeds. The tracks can be counter-rotated for quick turning maneuvers.



1.13.2 Push Rollers. The push rollers are located on the front of the paving machine. The push rollers contact the tires of the haul truck and allow the tractor to push it while receiving paving material. To compensate for misalignment between tractor and haul truck, the push rollers are mounted on a pivoting bumper.



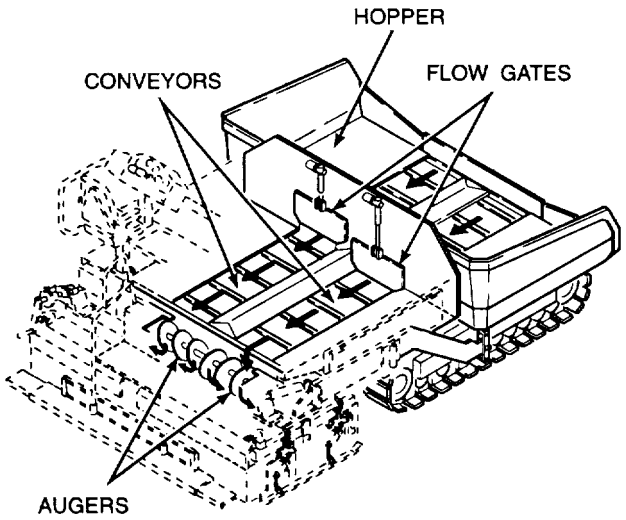
1.13.3 Hopper. The paving machine hopper receives and temporarily holds the paving material from the haul truck. The hopper wings move inward to facilitate dumping paving material onto the conveyors and outward to receive paving materials. Heavy rubber flashing mounted on the hopper reduces the amount of paving material that could spill from the hopper. The paving machine operator controls the hopper wing movement from the operator control console.

1.13.4 Auger/Conveyor System. The conveyors move paving material from the hopper to the augers located on the back of the tractor. The right and left auger/conveyor systems operate independently of each other. The paving machine operator selects manual or automatic control of each separate auger/conveyor system. The augers move the paving material outward from the conveyors, distributing it evenly to the screed. Reversing direction of the conveyors empties the hopper toward the front of the paving machine.

Operation of the left and right auger/conveyor systems can also be controlled from the screed crew control boxes. The left control box controls the left auger/conveyor system, and the right control box controls the right auger/conveyor system.

1.13.5 Flow Gates. Two flow gates are mounted at the back of the hopper, one on either side. Each can be independently raised or lowered from the operator control console. The position of the flow gates controls flow of the paving material to the augers.

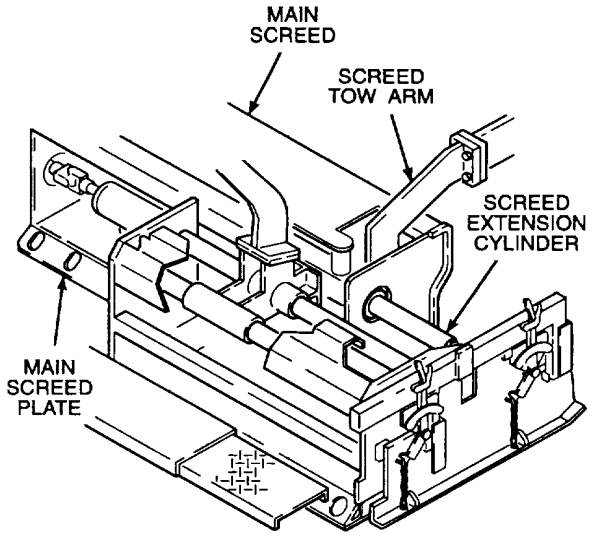
Operation of the left and right flow gates can also be controlled from the left and right screed crew control boxes. The left control box can control only the left flow gate, and the right control box can control only the right flow gate.

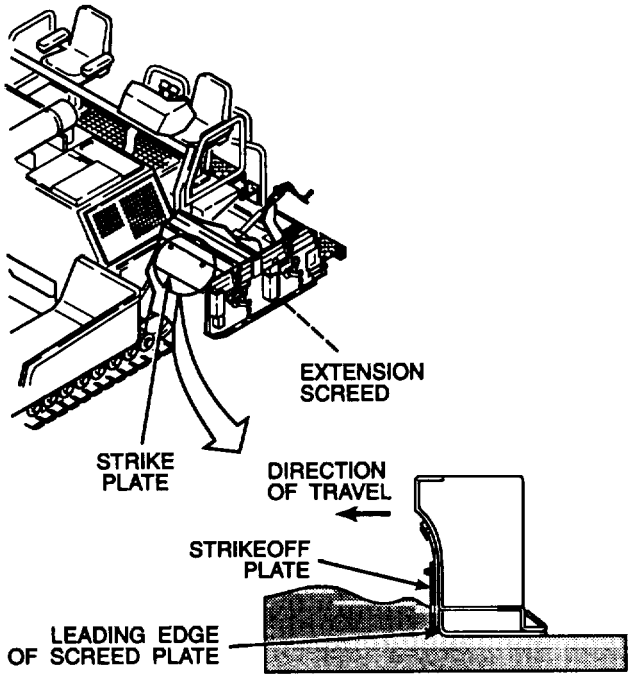


1.14 SCREED.

The screed is towed by and receives paving material from the tractor. As the tractor moves forward, the screed is towed over the paving material. The screed provides the initial compaction through vibration and lays paving material to the desired thickness and finish.

1.14.1 Main Screed. The main screed provides the structural rigidity for the screed and is attached to the tractor by two screed tow arms. The main screed plate, bolted to the bottom of the main screed, rides on top of the paving mat and creates a smooth finish. The weight and vibration of the main screed provides initial compaction of the mat. Screed extension cylinders mounted inside the main screed extend and retract the extension screeds. The paving machine operator controls the operation of the main screed from the operator control console.

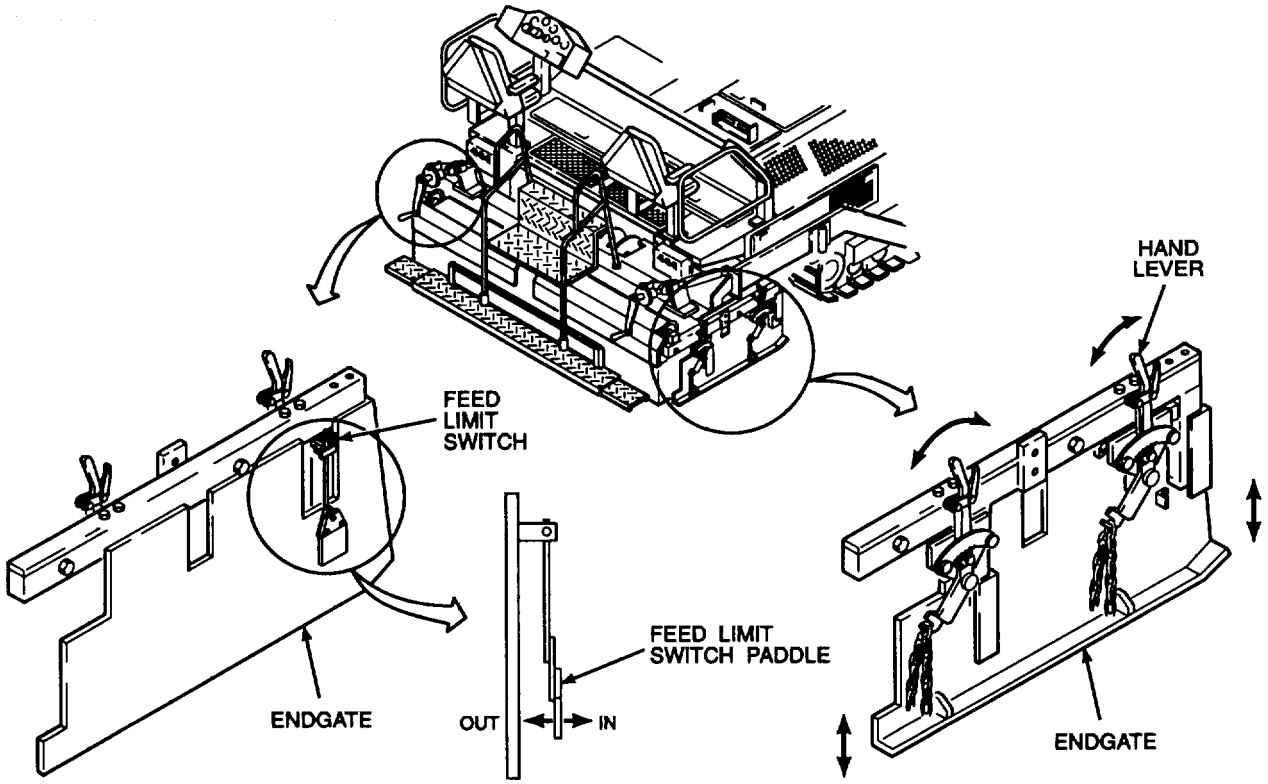


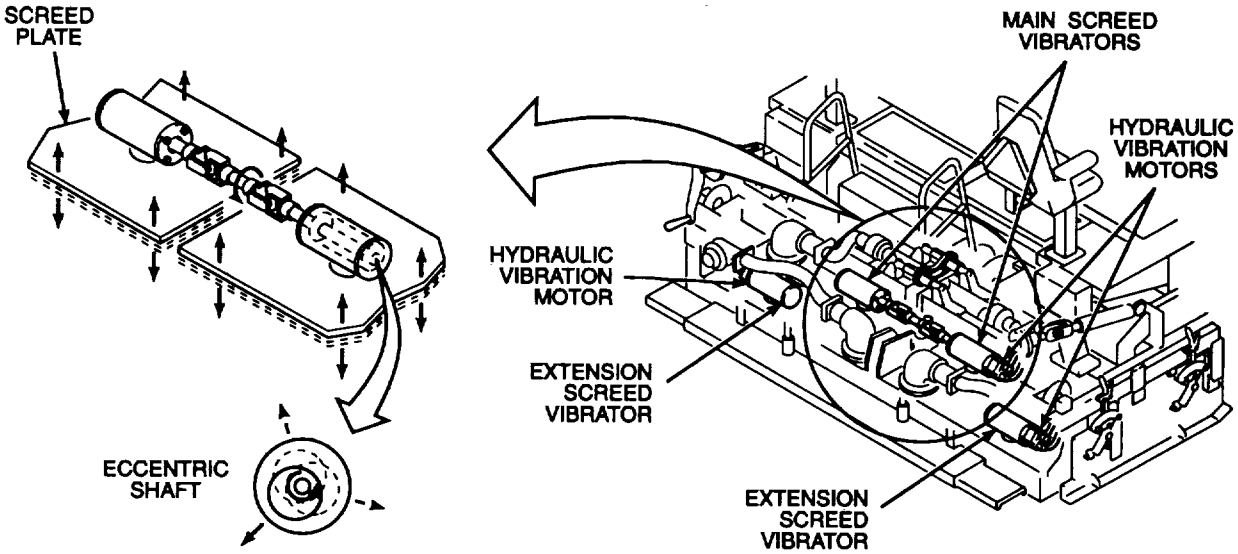


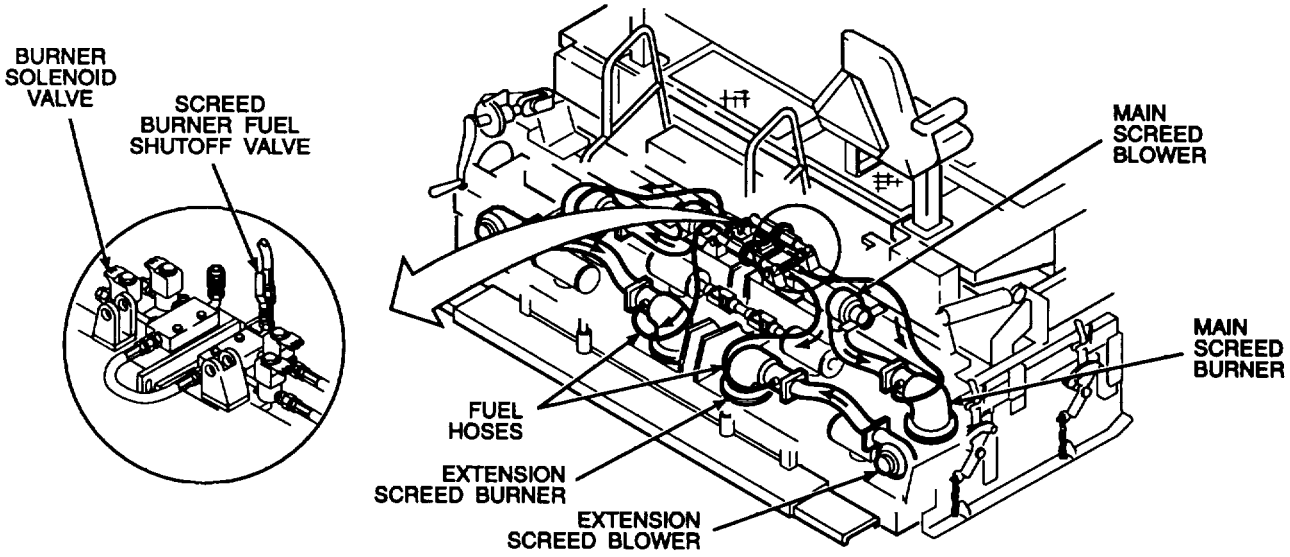
1.14.2 Strikeoff Plates. Strikeoff plates attach to the main screed and extension screeds. The strikeoff plates regulate the amount of paving material that reaches the leading edge of the TM 5-3895-373-1 0 main and extension screed plates. When the extension screed is hydraulically extended, the strikeoff plates extend the full width of the extension screed.

1.14.3 Endgates. An endgate is attached to each side of the screed to prevent the outward movement of paving material beyond the material mat being laid. The endgates provide the finished edge to the paving material. Each endgate is equipped with two hand levers that are used to adjust the position of the endgate. The hand levers are attached to the bottom of the endgates by a chain. When the hand levers are moved backward, the endgate is lowered. When the hand levers are moved forward, the endgate is raised. Each hand lever can be moved independently forward or backward for specific material applications.

1.14.4 Feed Limit Switches. The feed limit switches are located on the inside of the endgates, forward of the screed leading edge. The feed limit switches maintain a constant level of paving material in front of the screed when the auger/conveyor system is in automatic mode. When the amount of material falls below the desired amount, the paddle portion of the limit switch will move inward. This movement causes the auger/conveyor system to start and pulls more material back to the screed. The paving material level rises until the paddle moves outward. This action stops the auger/conveyor system.





1.14.5 Screed Vibrators. The screed is equipped with four hydraulic vibrators: two main screed vibrators and two extension screed vibrators. The vibrators compact the paving material. A single hydraulic vibration motor drives both main screed vibrators. Each extension screed is equipped with a separate vibrator and hydraulic vibration motor. The vibrators vibrate at a frequency set by the paving machine operator. As the eccentric shaft in each vibrator spins, the eccentric weight in the shaft causes vibrations due to its off-center weight. The vibrators mount directly to the screed plate and cause the plate to vibrate with them. This vibrating motion provides the initial compaction to the paving material beneath the screed.

1.14.6 Screed Burners/Blowers. The main and extension screeds are equipped with burner/blower pairs. Each burner/blower pair operates together to increase the temperature of the screed plates to 300°F (150°C). Each half of the main screed, and each extension screed, is equipped with an individual burner/blower pair. Diesel fuel sprays into the burners and ignites from the heat of a glow plug. The blower evenly distributes the heat from the burner across the screed plate. Each screed crew control box contains control switches for the burners and blowers. The left control box has the only control for the screed burner fuel pump. Both the right and left control boxes include controls for the burner