APOLLO EARTHMOVERS LIMITED

OPERATING INSTRUCTION & WORKSHOP MANUAL FOR SENSOR PAVER & EXTEND - A - PAVE SCREED

(MODEL: AP550/600)

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- **Shortest lead time industries,**
- **Active vendor participation,**

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INDEX

TRACTOR UNIT

EXTEND-A-PAVE SCREED

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SECTION A:

UNLOADING INSTRUCTIONS

The operator should thoroughly familiarize himself with the instruments and controls provided for operation.

INSTRUCTION FOR UNLOADING WITH A OVERHEAD CRANE:

The best and easiest method to unloading the paver is by overhead crane if one is available. It must have a capacity of at least 15,000 kgs hook and the cables or chains for the lifting as shown in the figure.

INSTRUCTION FOR UNLOADING FROM A SEMI-TRAILER:

1. Ramps or blocking should be supplied to provide for proper screw conveyor clearance from ground during unloading.
2. Recommended ramp/blocking angle is 8-1/2 degrees or 1.75 inches per foot (14.5% grade). If the pitch exceeds this the front of the paver will not clear, or the spreading screws may be damaged as the paver comes off the ramp. (Refer to Ramp Diagram)
3. Ramps or blocking should be capable of supporting an empty paver weight of 15,000 kgs.
4. Check the following items before unloading.
   a. Check the fuel supply.
   b. Check engine oil level.
   c. Check hydraulic oils level.
   d. Check coolant level in radiator.
   e. Remove all shipping brace blocks, Chains, exhaust.

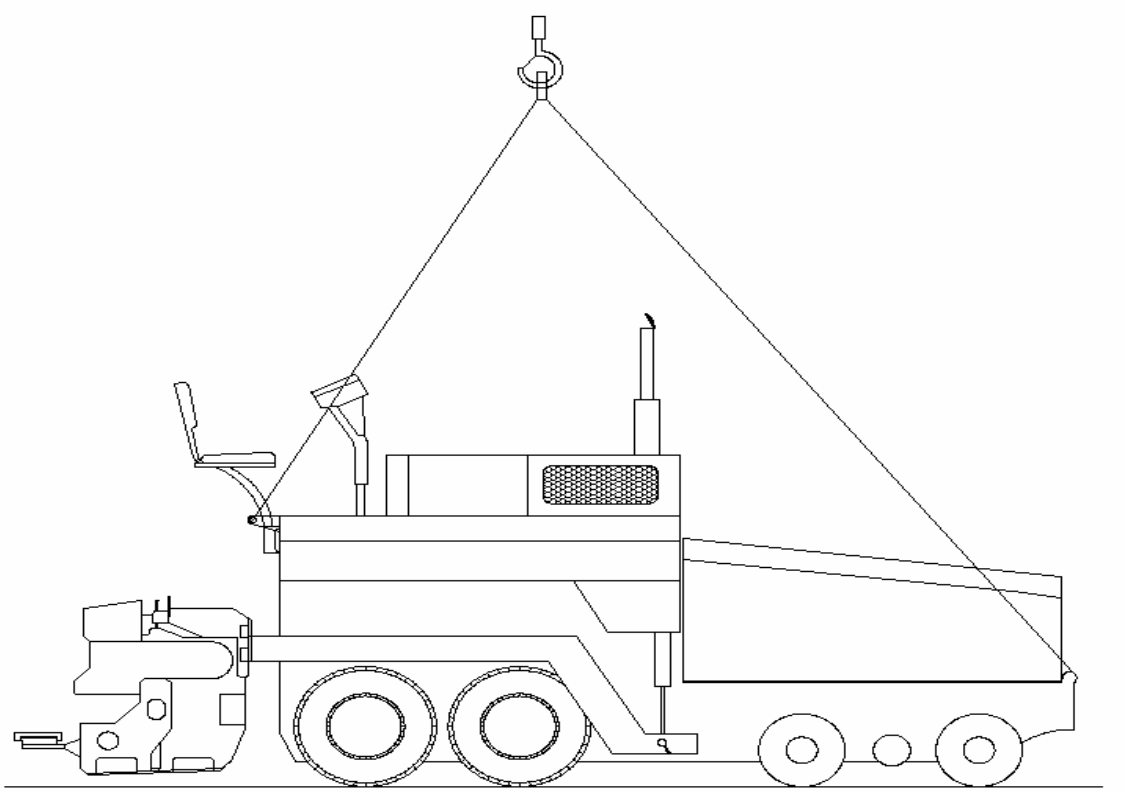
5. The PAVE/TRAVEL rotary switch located at console panel should be in the LOW or PAVE position.

   CAUTION: NEVER shift the PAVE/TRAVEL lever while the machine is moving. The High/Low switch can be switched anytime.

   CAUTION: For grades of 6% or more, operate paddle brake before shifting the PAVE/TRAVEL Lever. Place the PAVE/TRAVEL lever in PAVE and the High/Low Switch in Low position.

   NOTE: Before starting engine, place START/STOP switch in ‘STOP’ position

6. Turn on keyed main power switch.
7. Start engine with key and allow sufficient time for warm up. Then increase throttle to full open position.
8. Raise hoppers for better visibility and to decrease paver width.
9. Raise screed with screed lever in the up position. Paving position is the extreme down position (float position).



NOTE: The lever has a lock in the hold position. To disengage from the hold position, pull the lever out.

NOTE: Screed will have to be raised enough to allow the locks to be placed under screed arms.

10. Move screed lock lever in board located under the operator's seat.
11. Lower screed on to locks with screed lift lever placed in the float position.
12. For unloading in reverse direction, switch the Forward/Reverse switch in the reverse position.
13. Place the start-stop Switch in the start position.
14. Slowly turn the speed dial to the desired speed.
15. For unloading in the forward direction. Place the forward/reverse switch in the forward position.
16. Activating the engine stop switch located on operator's console will stop the engine.

PAVER OPERATING CAUTIONS:

1. Place all operating control switches in the off position before starting engine.
2. To start engine, throttle should be in the idle position.
3. Before moving machine, release the emergency brake and go to full throttle.
4. Activating the engine stop switch will stop the engine.
5. The PAVE/TRAVEL switch should be in LOW position for grades in excess of 6%.
6. DO NOT shift the PAVE/TRAVEL lever while the paver is moving.
7. The high/low switch can be shifted while the paver is moving.

SECTION B:

USE OF CONTROLS:

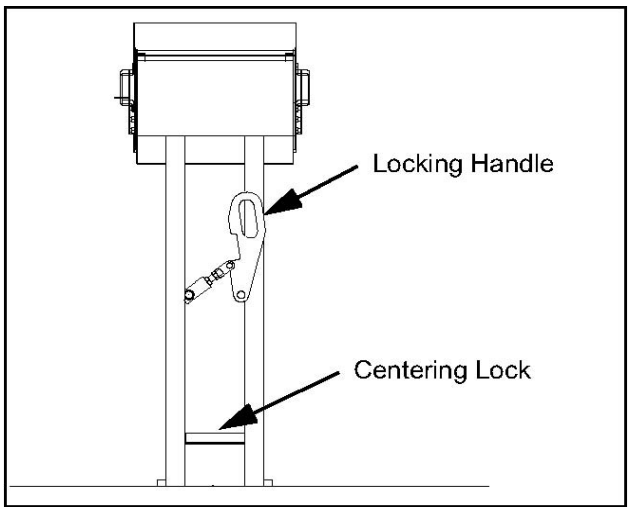
BEFORE STARTING ENGINE:

Check the following items to avoid possible damage.

1. RADIATOR - Should be filled with water/anti-freeze solution.
2. CRANKCASE - Check oil level, oil should be up to level indicated on dipstick.
3. BATTERY - Check water level, water should cover plates.
4. FUEL - Check for fuel.
5. VISUAL INSPECTION - A visual inspection should be made to see that all grease points have been lubricated, that the fluid levels are correct and that the paver is ready for operation. (Refer to the lubrication chart on rear covers of machine and in this manual)
6. Refer to Engine Manufacturer's Manual for procedure.
7. See TRAVEL PROCEDURE instructions (listed in later part of this section) for proper switch settings.

Swinging Console

The swinging console can be positioned so that the paver can be operated from the left or right seat. To reposition the operator's control:

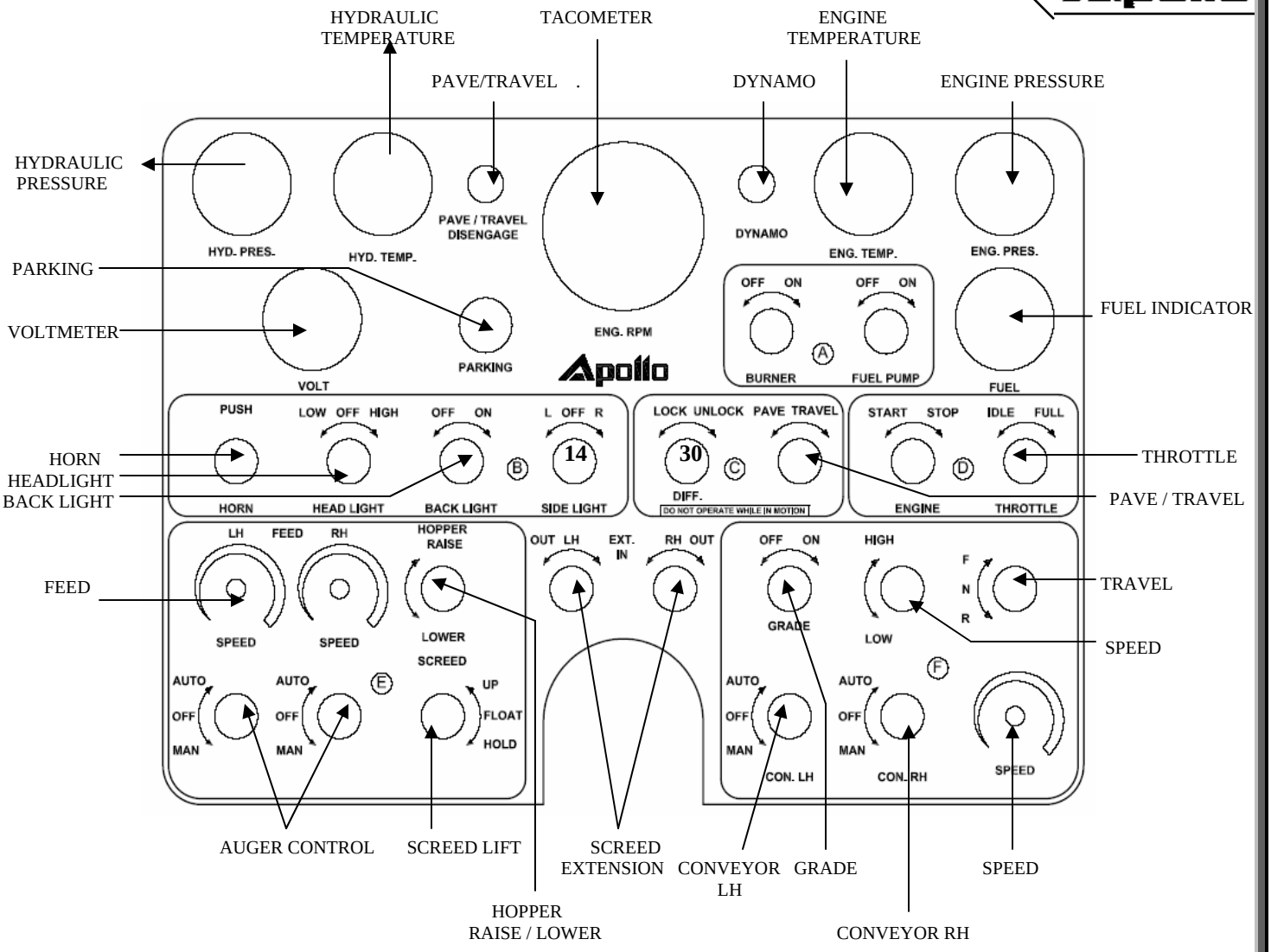


1) Lift the locking handle to release the console.

2.) Pull the operator's console towards the center of the paver. When the console is positioned vertically lock it with the centering lock.

3) Step on the centering lock to release the console and position the console to the desired side of paver.

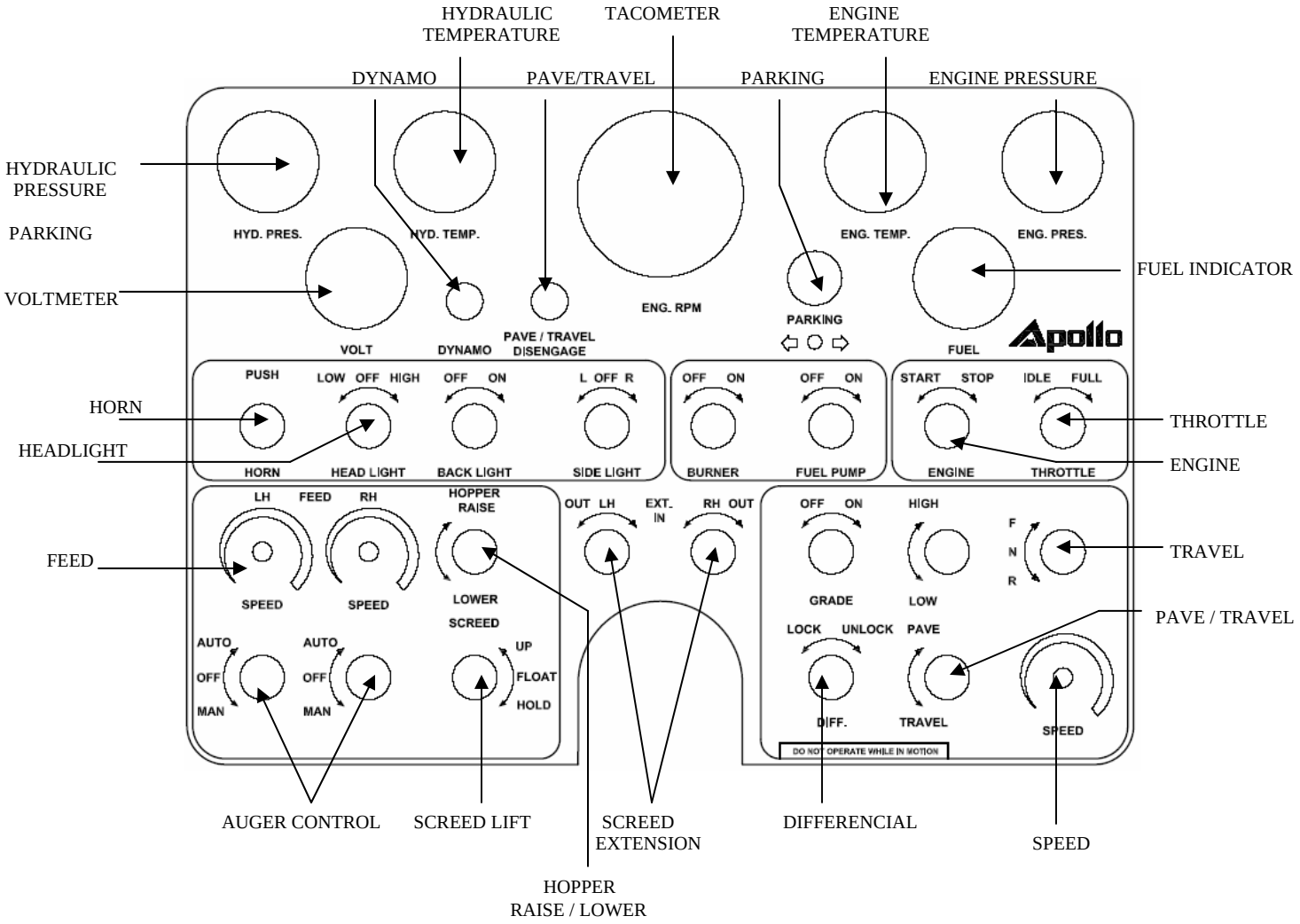
Figure 2 – 18 Reposition operators' control



Operator Console Swinging (AP 600) Figure B-3

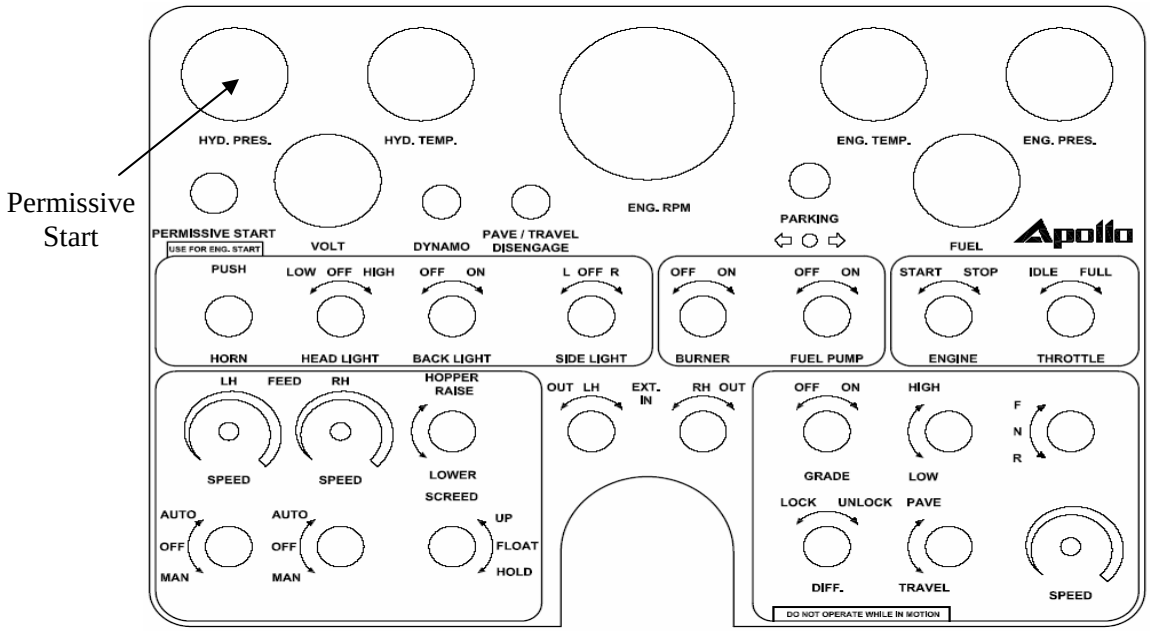
1	Hyd.Oil pressure	11	Horn	22	Screed Extension LH
2	Volt meter	12	Light	23	Screed Extension RH
3	Hyd.Oil .temp	13	Back light	24	Grade Control
4	Engage/Disengage Indicator	14	Side light	25	High/Low
		15	Burner	26	Forward/Reverse
5	Heater	16	Diesel Pump	27	Con LH
6	Engine Temp	17	Engine Start	28	Con RH
7	Fuel Indicator	18	Throttle	29	Screed
8	Engine Pressure	19	Con.Speed Lh	30	Differential
9	Dynamo indicator	20	Con.Speed Rh	31	Pave/travel
10	Engine Rpm	21	Hopper	32	Travel Speed

Note: - The console above is same for 6R1080T & Ashok Leyland is same.

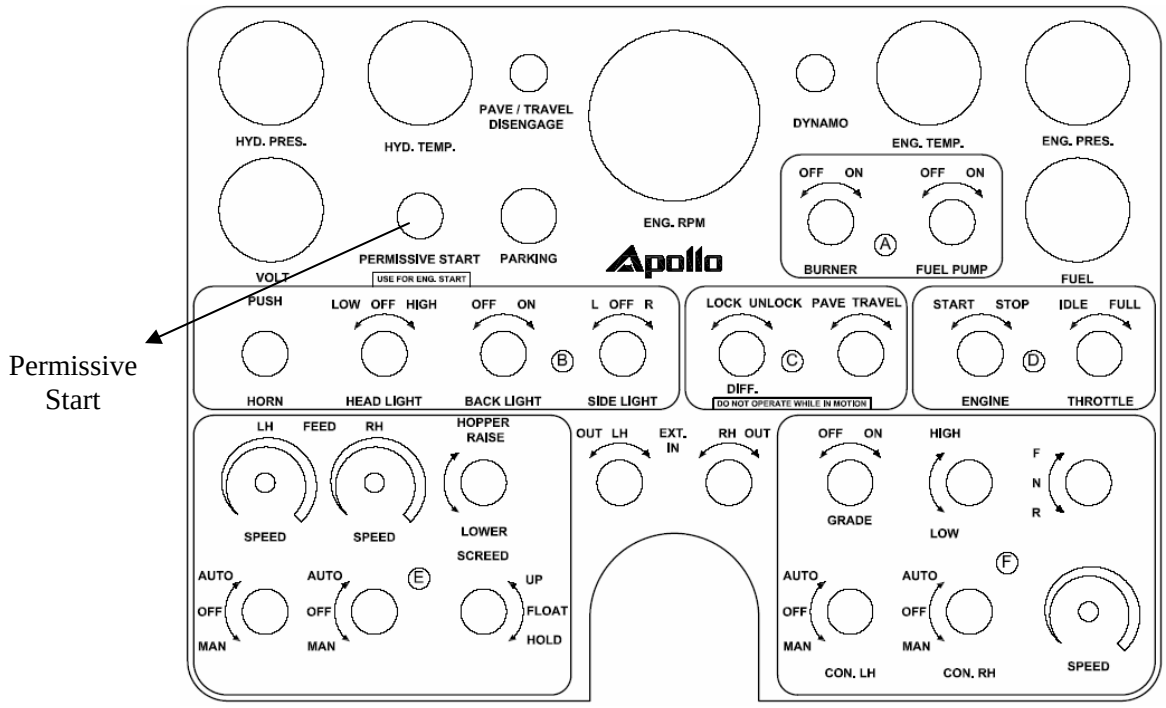


Operator Console Swinging (AP 550)

Note: - The console above is same for 6R1080T & Ashok Leyland is same.



Operator's console AP550 for CUMMINS Engine



Operator's console AP600 for CUMMINS Engine

1)Hydraulic Oil Pressure-
Hydraulic oil filter clogging warning meter
It reaches 3 bar when hydraulic oil filter is clogged.

2) Voltmeter –
Indicates battery and alternator condition (Table 2.1)

Reading On Voltmeter	Engine Not Running or Running at idle	Engine running at full throttle
Less than 10 V	Dead or Disconnected Battery	Dead or Disconnected Battery
10 V to 12 V	Low battery charge. Constant reading in this area may indicate problems with the charging system.	A voltmeter reading below 12 volts means that the current being drawn for light, charging the battery, solenoid, etc. exceeds the output of the alternator. Check for a defective battery or a short in the wring.
12 V to 13 V	Well charged battery in good condition.	When the engine is started the pointer may stay in this area temporarily but should gradually rise above 13 volts as alternator reaches normal output.
13 V to 15 V	Reading in this area while the engine is not running indicates defective voltmeter.	This is where the reading should be when the alternator and battery are in good condition and functioning properly.
Above 15 V	Reading in this area while the engine is not running indicates defective voltmeter.	When the pointer goes above 15 volts, the alternator is putting out too much voltage and should be checked. Continued operation of the engine in this range will damage the battery and solenoid valves.

Table 2.1 Voltmeter Indication

3) Hydraulic oil temperature
For normal working, the pointer must be around 95°C.
If more high temperatures are reached, we suggest stopping the engine and let the machine cooling.

4) Pave/Travel disengage
Lights on when shifting mode from pave to Travel is not fully engage light should be in off position

5) Heater-Engine heater

6) Engine Temperature Gauge-Indicates engine coolant temperature
Normal operating temperature = 205^0 F.
Engine will shut down if engine coolant temperature exceeds 223^0 F

7) Fuel level gauge

8) Engine Oil Pressure Gauge - Indicates engine oil pressure. Minimum oil pressure= 5PSI. Engine will shut down if engine oil pressure falls below 5PSI and the permissive start switch is not engaged.

9) Dynamo

10) RPM meter –
Indicates engine RPM's and operating hours Full throttle engine speed =2100 RPM, Idle Speed = 950 RPM

11) Horn –
Push up to sound the horn. When the switch is released, it will return to the "Off" position.

12) Lights –
Push on to turn headlights on down for off.

13) Back Light-
Push on to turn rear on down for off.

14) Side Light
Push left to turn sidelights on left side push right to turn sidelight on right side and neutral for off position

15) Burner
Push on to turn main burner on down for off.

16) Diesel Pump
Push on to turn pump on down for off.

17) Engine Start –
The engine will start only if the brakes are engaged, the travel lever/switch is in neutral, permissive start switch is engaged, and the Master key is "On".

18) Throttle –
The engine has only two speeds. Use "Idle" to start and warm up the engine, hydraulic oil, and screed. Use "Full" position for all other function. Switch to "Full" only after engine and hydraulic oil have warmed up.

19) Conveyor LH Speed –
This dial is used to govern the maximum conveyor speed of the auger and chain. The speed knob provides variable speed up to the setting on the speed dial.

20) Conveyor RH Speed –
This dial is used to govern the maximum conveyor speed of the auger and chain. The speed knob provides variable speed up to the setting on the speed dial.

21) Hopper – The hopper rise switch is spring loaded to automatically return to the neutral position when released. It must be held in the “Rise” or “Lower” position to control the hopper wing.

22) Screed Extension LH– Use on Extend-A-Pave model screeds to extend or retract the extension.

23) Screed Extension LH– Use on Extend-A-Pave model screeds to extend or retract the extension.

24) Grade Control
Push on to turn Grade system on down for off.

25)High/Low - The range switch has two position; “High” and “Low” This selection may be done during travel but it is advisable to stopped paver before changing

26) Forward/Reverse switch – Moving the Forward/Reverse / switch forward or back move the paver in the desired direction.

27) Conveyor LH – This is a 3-Position switch (“Man”, “Off”, “Auto”). If the conveyor switch is set to “Man”, the feeder speed can be varied by rotating the conveyor speed dials mounted on the driver’s console or the pile height dial on the feed controller. When the conveyor switch is in the “Auto” position, electronic sensors regulate the material feed system to keep a consistent head of material in front of the screed.

28) Conveyor RH – This is a 3-Position switch (“Man”, “Off”, “Auto”). If the conveyor switch is set to “Man”, the feeder speed can be varied by rotating the conveyor speed dials mounted on the driver’s console or the pile height dial on the feed controller. When the conveyor switch is in the “Auto” position, electronic sensors regulate the material feed system to keep a consistent head of material in front of the screed.

29) Screed Lift – Push up to “Rise” the screed, down to “Lower” the screed, or center for “Neutral”. After the screed is raised to the desired height and the switch is released, it returns to the hold position. The screed is hydraulically locked at the height. While paving, the switch must be set in the “Lower” float position.

30) Differential Lock/Unlock – In wet or slick condition one wheel may lose traction and begin to spin. By activating the Optional differential lock switch, both rear wheels will rotates at the same speed regardless of how much traction each wheel has.(Do not operate this switch while machine is under Motion)

31) Pave/Travel - The range switch on has two position; “Travel” and “Pave”. Select the “Travel” position for roading or traveling around the job site. The paver must be stopped before changing from “Travel” to “Pave” or “Pave” to “Travel”. . (Do not operate this switch while machine is under Motion)

32) Max Paver Speed – This dial is used to govern the maximum travel speed of the paver. The travel lever provides variable speed up to the setting on the speed dial. Maximum speed is 18 km/hour.

33) Permissive Start – This is an optional button for CUMMINS engine. This button is used to start the engine.

SCREED TRAVEL LOCK LEVER:

Located under the operator's seat to hold screed in the up position for travel.

1. Raise screed with screed lift lever in the up position, enough to allow locks to be placed under the screed leveling arms.
2. Move screed lock lever inboard.
3. Lower screed on to locks with the screed lift lever is in the float position.

TRAVEL PROCEDURE:

The paver has four ranges, Pave (LOW) and Travel (HIGH); and the hydraulic transmission switch, HIGH/LOW, (HIGH) for maximum speed and (LOW) for maximum torque.

The braking system, if properly maintained, is effective for stopping the machine, fully loaded on a typical highway grade.

1. The switches/levers located on the OPERATORS CONSOLE are to be in the following positions:

NAME		QTY. / CONSOLE	POSITION
A.	Feeder switches	2	Off
B.	Screed Drive	1	Off
C.	Hopper switch	1	Lower
D.	Screed Lift switch	1	Down
E.	FORWARD/REV, Switch	1	Forward or Rev.
F.	HIGH/LOW Switch	1	Low
G.	Differential lock switch	1	Unlock
H.	Speed Dial	1	Zero
I.	Start / Stop Switch	1	Stop

2. The PAVE/TRAVEL lever, located to the right of the operate console should be in the HIGH or TRAVEL position unless the pave is on a grade of 6% or more, then the lever should be in the low or pave position.

   CAUTION: Never shift the PAVE/TRAVEL lever while the machine is moving. The HIGH/ Lo switch can be switched any time.

   CAUTION: For grades of 6% or more, operate paddle brake before shifting the PAVE/TRAVEL lever. Place the PAVE/TRAVEL lever in pave and HIGH/LOW switch in Lo position.

3. Turn on keyed main power switch.
4. Start engine and allow sufficient time for warm up. Then increase throttle to full open position.
5. Raise screed with screed lift lever in the up position.

   NOTE: Screed will have to be raised enough to allow locks to be placed under screed arms.

6. Move screed block levers inboard. Located under the operator's seat on both side of the machine.
7. Lower screed onto locks with screed lift lever placed in the Down position.

8. Raise hoppers for better visibility and to decrease paver width.
9. Place Forward/Reverse switch into desired mode.
10. Place the Start/Stop switch in the start position.
11. Slowly turn speed dial to desired speed.

BRAKING SYSTEM:

The braking system, if properly maintained, is effective for stopping the machine, fully loaded, on typical highway grades. Please be sure you understand and adhere to the instructions regarding these procedures, in order to avoid possible accidents.

SECTION C:

GRADE AND SLOPE CONTROLS

Figure C1

1. **Auxiliary pump**
2. **Servo/Solenoid valves;**
3. **Grade/Slope control rams;**
4. **Leveling arm**

AUXILIARY PUMP: (Fig. C-1, item 1):

The cap end of the SBS pump has built in flow divider supplying 3.6 GPM to the grade control system. A built in relief valve is set at 750 psi (42 Bar). There is a pressure test port located in the line near the filter (Refer fig C-1)

FILTER:

The grade control system has a 10-micron filter.

DIRECTION CONTROL VALVE:

The dump valve, when de-energized, allows oil to flow through the manifold to tank. When the valve is energized, it blocks the flow forcing it into the servo/solenoid valves. Pressing the manual override has the same effect as energizing the dump valves.

SERVO/SOLENOID VALVE: (Fig C-1, item 2)

These valves provide oil to the grade control rams (item 6), and control the direction and speed of the stroke. The manual override buttons (fig E-3) give full speed function in one direction. There are two servo valves that control their respective leveling arm lift cylinders. Grade or slope control may be connected to either one for a specific paving job.

GRADE/SLOPE CONTROL RAMS: (Fig C-1, item 3)

The control rams controls the relationship between the tow point and the external grade reference when used for grade control. When used for sloping it controls the relationship between the leveling arms producing the slope called for on the remote set point or Control Box. (Item 15) There is a manual valve located on each ram that can be closed to lock the ram in position.

MASTER GRADE/SLOPE SWITCH: (operator console)

The master switch supplies power to both the grade and slope circuits and the direction control valve circuit. (Refer to electrical schematic in back of this book) The switch will supply power to the grade and slope circuit with the ignition off.

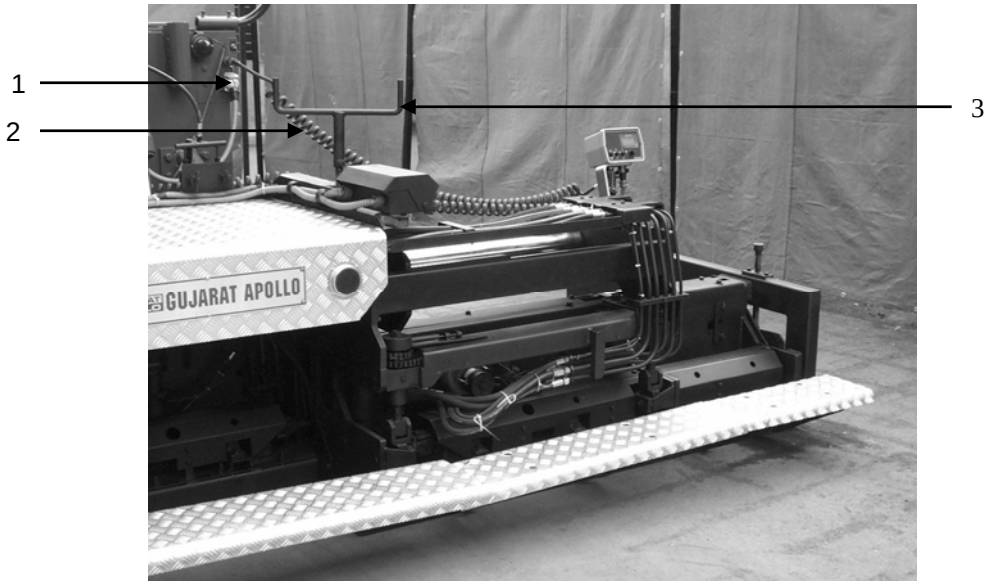


Figure C2

1. **Cannon plug pin connector;**
2. **Power cable;**
3. **Thickness control**

CANON PLUG PIN CONNECTOR: (Fig C-2, item 1)

These plugs supply quick and secure connection for the power cables from the tractor to the grade or slope units.

POWER CABLES: (Fig C-2, item 2)

The power cables are interchangeable between grade and slope units. They supply power from the tractor to the units by supply power controlling by toggle switch located at rear side of tractor unit. When we use sensor keep switch in up (Auto) position.

TRANSVERSE BEAM:

The transverse beam is a bridge between the two leveling arms. The slope control mounts on the beam and controls one leveling arm through the grade/slope ram to maintain the percent of slope called for by the remote set point.

LEVELING ARMS: (Fig C-1, item 4)

The leveling arms connect the tractor tow point to the screed.

THICKNESS CONTROL: (Fig C-2, item 3)

The thickness control screws control the angle of attack on each side of the screed.

GRADE CONTROL BEAM:

The grade control beam is used to position the grade control with respect to the paver. It is available in different lengths. When the horizontal adjustment is loosened the beam can be extended or retracted. When the pivot clamp is loosened the beam may be rotated around the post.

SECTION D:

PAVING OPERATION

The first step before the paving operation is to decide what mat width to lay, and to prepare the machine with the proper extensions, cut-off shoes, and other attachments as required.

The standard paver with the use of cut-off shoes, can be set up to lay pavement from the basic width of the machine and decreased in 75 mm increments for a total 600 mm decrease.

By adding extensions, single or in pairs, the laying width can be increased in from the basic width of the machine to the maximum machine capability.

From these possibilities, knowing the net width of the pavement to be laid, figure out equal width strips.

The following points must kept in mind:

1. Allow at least 100 mm clearance between the outside of the screed and a straight curb, for steering. Otherwise the paver may become locked against the curb, necessitating backing up and marking the mat surface.
2. When laying multiple passes, subtract the overlaps, (approximately 50mm) at each matched joint.
3. On pavement where multiple passes are required, the cut-off strip should be laid prior to the final pass. Then on the last pass the paver can be used standard for whatever width it is set up for.
4. The cut-off shoe, when used, should be opposite the matching side.

Depending on the specific operation, the following points should be considered:

- Do not overlaps excessively at either end of the screed or improper compaction, bridging and tearing may result. Overlap should be held to a minimum at all times.
- On wide streets it is sometimes desirable to lay a middle pass first to be sure the crown is in the center of the street.
- On streets with curbs and gutters, the screed can overhang the gutter on the top course. On the binder course, the gutter flange should be treated as a straight curb. It is often better to lay full width passes even if there is some hand spreading required at the curbs, in comparison to laying narrow width passes that come out exactly right.
- In highway paving, of narrow roads, there may not be clearance on the shoulder to overhang the screed on the cut-off side. Either make the first strip narrow width or when desirable to maintain crown in center of road, match with cut-off shoe riding on the previously laid mat.

SETTING UP MACHINE FOR PAVING:

INSTALL AUTOMATIC GRADE AND SLOPE CONTROLS

(For full automatic paving) refer to Section for grade and slope set-up.
(In case of TOPCON sensor, refer separate product manual)

ALIGNING MACHINE:

Drive the paver into position to start paving. Adjust the steering guide to line up with the edge of the roadway, grade line or whatever line has been established for the edge of the mat.

If optional cut-off shoes are to be used for the first pass, place the shoes on the inside edge to provide a better finished outside edge.

END PLATES:

End plates are provided for installation at each end of the spreader screws to hold material within the laying width of the paver and to form edges of the mat being laid. End plates are standard equipment and always necessary except when bleeding material out to the side (Refer to screed Section for installation)

PRE-HEAT SCREED (Refer to screed section)

SET CROWN (Refer to screed section)

To provide a specification crown, the center of the screeds is adjusted to whatever amount is required. This can be quickly done without stopping the paver, if so desired.

SET MAT THICKNESS

Place two wood blocks, of approximately 20 to 25% greater thickness than the compacted mat required. Place the blocks under the screed near each end and lower the screed so that its entire weight rests on the blocks.

EXAMPLE: If the mat is to be laid 50 mm thick compacted, the blocks should be about 60 mm thick and approximately 60 cm long, placed lengthwise in the direction of travel.

The blocks are required thicker than the finished compacted mat to allow for additional compaction by rollers in back of the paver.

THICKNESS CONTROLS (Refer to Figure D-1)

The thickness controls increase or decrease the depth or thickness of the material being laid.

1. Turn thickness controls to the null or “slack” position, with the screed FLAT on the blocks. Recheck the first control. The null position can be “felt” when turning the thickness controls with the screed resting on blocks. The controls will turn very easy with no drag for approximately ½ turn when the null position has been reached.
2. Turn thickness control screws so that the front edge of the screed is about 1/16 inch above the top of the wood blocks. As the screed slides off the blocks it will move on to partially compacted material of the same depth as the block thickness.
3. To increase the depth, turn controls to the right or clockwise.

4. To decrease the depth, turn the controls to he left or counter wise.
5. A lock is provided to secure the position of the controls.

DUMPING TRUCK:

1. To start operation, the hopper gates should be set about 1/3 open.
2. With feeders and screws operating, have the tuck back up to the paver so that the wheels engage the rollers on the front of the paver. Care should be taken during paving operations to prevent the truck from dumping the paver when it is standing still as this will mark the mat surface.
3. The truck brake should be set slightly as it starts to dump the load so that it will not roll away from the paver. Control of the dumping should be such that none of the mix will spill out in front of the paver.

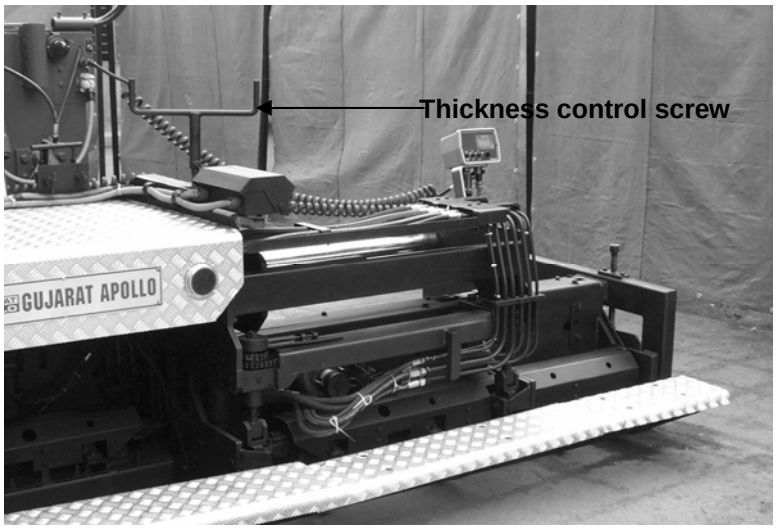


Figure D-1

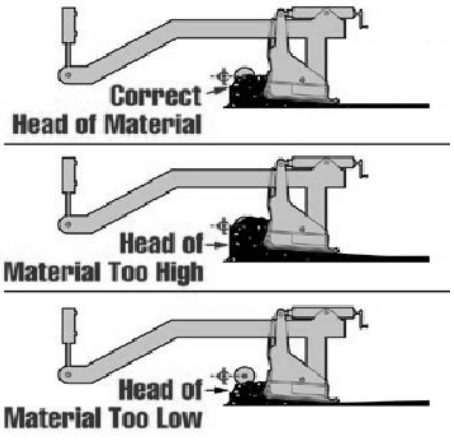
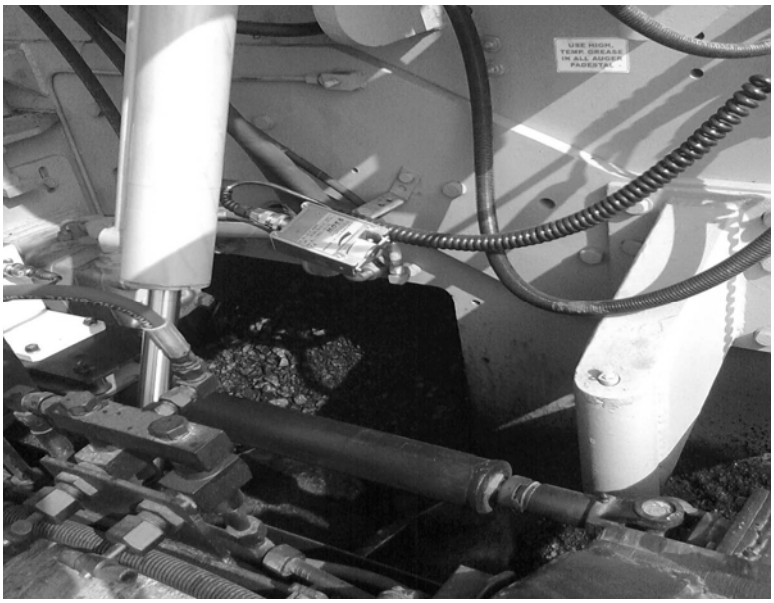


Figure D-3

4. When the material has been carried back into the feeder tunnel and has been discharged and spread uniformly ahead of the screed turn off the feeder switches.

SONIOC SENSORS

There are two sonic sensors are used in our machines
1) For chain conveyor speed:



2) For auger conveyor speed:

FEEDER CONTROLS (Standard) (Refer to Figure D-2):

Position and set the automatic feeder control paddles at the minimum position where they will actuate the control to feed more material. The paddles should be turned at a slight angle to the spreading screw. As the material is moved across the screws, it raised the paddles stopping the feeders and screws.

This adjustment is with paddle tip hanging just above the bottom of the screw conveyor and with the controls positioned just out board of the end of the screw conveyor.

NOTE: With the paddle arm in the vertical position, (Figure D-2) the feeder bars should run at maximum. Final adjustment of the automatic feeder control paddles is made after the paver has started paving and is moving at a uniform rate of speed.

NOTE: When a screw extension is used, the paddle should be moved outward to ensure the proper amount of materials is conveyed to the extension.

HOPPER FLOW GATES (Refer to Figure D-3)

The adjustable flow gates are located on the back of the hopper in front of the tunnel. They regulate the amount of material onto the feeder screws, which in turn distributes the material evenly in front of the screed. The flow gates are controlled by adjustment handles located at the rear of the machine. They should be adjusted to a height, which will maintain a level material height in the screw chamber (Refer to Figure D-3)

STARTING PAVING OPERATION

1. Spray down machine. Spray hopper area, push rollers, feeders and screw. This keeps material from sticking to cold metal. Refer to spray cleaning at the end of this chapter for more information on spray down operation.

   WARNING: Keep open flames, sparks, torches etc. away from the paver when using the spray.

2. Transmission switch is in LOW
3. Screed drive switch is in the ON position
4. Engine is at full throttle
5. Left right feeder switches. Hold in MANUAL position to fill the screw chamber with material
6. Left and right feeder switches now set to AUTO position
7. If full AUTOMATIC screed control is being used place both grade and slope control in RUN position (Refer to Grade Reference and Control Set-up section for set up.)
8. Parking/Emergency brake lever is in the OFF position
9. Slowly turn the Speed Dial to the desired paving speed
10. Screed man should adjust the vibrator speed
11. The hopper gates should be set so the material is evenly distributed in front of the screw conveyors
12. Check the adjustment of the auto feeder control paddles and the adjustable gates. The gates are used to regulate the capacity of the feeders and to control the material feed.
13. Screed man should check mat thickness after paving has began.

    NOTE: This check should be made at several points across the width of the mat before changing adjustment of the thickness controls because the depth gauge may contract a depression or high slop, giving an inaccurate indication of mat thickness.

HOT JOINT MATCHING/TANDEM:

To match mat already laid, the edge of the screed is kept flush with the un-compacted mat surface properly overlapping an inch or two upon the joint. When compacted, the two will be properly bound together.

JOINT MATCHING TO A FULLY COMPACTED MAT:

To match, already laid and compacted, the edge of the screed is kept above the compacted mat surface (20-25% higher) and overlapping an inch or two so that after rolling, the joint surface will be flush.

ENDING A MAT:

In order to make a good transverse joint one must know the proper method for ending a strip. It is generally agreed that when ending a strip, a square, vertical edge should be left to accomplish a good bond in the transverse joint.

There are several methods used to square off and end a mat to insure a good transverse joint.

1. One method commonly used is to place a piece of lumber, the same thickness as the compacted mat just before the end of the mat. Towards the end of any mat, the

operator should run the feeders and screws so that the material is spread evenly across the front of the screed. Then stop the feeders and move the paver forward. As soon as any part of leading edge of the screed becomes exposed, stop t he paver and raise the screed. An opening is then raked square across the mat and piece of lumber placed in this opening. Material is then pushed against the board to hold if firmly in place. After the mat has been rolled and set up, the board may be removed. This leaves a square, vertical edge to ensure a good transverse joint when the next strip is joined to it.

2. Another method commonly used for ending a mat or to get a roller onto the mat at the beginning of the mat, is to square up and rake an opening, then firm the end and lay rosin paper in the opening. The rosin paper is then covered with material and formed into a ramp for the roller.

3. A rope can be laid down near the end of the mat and the mat laid cover it. When the mat is rolled a mark is left across the mat. The material, at the extreme end of the mat, opposite the rope mark is cleared away and the end firmed up by hand.

TRANSVERSE JOINT: (Un-compacted Mat)

- If the paver is going to be brought back to make a joint before the asphalt has cooled appreciably, keep the roller off the last two yards of the mat.
- Then when making the joint, back the raised screed over the mat until three or four inches of the mat can be seen in front of the screed. Lower the screed onto the mat, fill the screws with material and proceed with normal paving.
- Be sure the thickness controls are in the same position that they were before ending the joint. If the position has been changed, adjust the thickness controls with the screed resting on the mat (Refer to Thickness Control Adjustment)

TRANSVERSE JOINT: (Compacted Mat)

If the joint is to be matched to a compacted mat, start off the paver as above, only be sure to allow additional mat thickness, of 20-25% for roller compaction.

PAVING OVER A MANHOLE:

With either method the manhole should be covered with burlap so excess material can be easily removed after the paver has passed. Mark the curb or gutter so the manhole can be found.

FIRST METHOD:
1. On the first pass, pave up to the manhole until the screed is almost touching, then raise the screed and mover over the manhole.
2. Lower the screed on the other side.
3. Take the material left by raising the screed into place around the manhole.

ANOTHER METHOD:
1. Use a block of wood or mark a shallow angle ramp of asphalt on both sides.
2. When the last lift is made the screed will ride up and over the manhole.
3. The paver should be operated very slowly to insure sufficient reaction time of the screed and auto grade controls, if they are being used.

PUTTING THE PAVER OUT OF EACH DAY OPERTION:

- Clean the paving elements before putting the paver out of operation
- Drive the paver on an appropriate parking yard
- Lower the screed to the base
- Carry out necessary maintenance work
- Do not turn off the engine when it is running at the full speed operation load, but let it idle for approx 5 minutes for cooling down before shut off
- Turn off the engine and lock the control panel

SPRAY CLEANING:

The spray cleaner is used when cleaning the machine after operation.

The following areas should be thoroughly cleaned of all hardened material. Many paving troubles can be traced to improper cleaning.

WARNING: Keep open flames, sparks, torches etc., away from electrical connections cables and heated screed.

DANGER: Keep hands feet and clothing away from operating flights and screw conveyors while spray-cleaning operation is being performed.

AREA TO BE CLEANED:

1. The entire hopper area.
2. Push roller assembly.
3. Flight chains and guards-while flights are running.
4. Raise foot shaft covers and clean loose material from frame; then spray shafts and rollers while flights are running.
5. On the back of the tractor, spray the center screw drive, screw conveyors, housing, rear drag pans and sprockets-spray while flights are running.
6. Clean, spray and check bottom of screed and end plates.
7. Clean, spray and check bottom of screed.
8. Spray roller chains with diesel fuel, periodically.
9. Inspect and clean the neat chambers on the screed for build-up of material. Material must be removed for efficient screed plate heating and minimize the danger of a screed fire.

SECTION E:

MAINTENANCE AND ADJUSTMENT

GENERAL REMARKS

Old oil, send, dirt and chipping in the hydraulic system will not only influence the functioning and service life of the hydraulic unit negatively but will lead to a total breakdown sooner or later.

ATTENTION:

On principle all works connected with the hyd. System such as tightening of screw connections, change of oil, replacing fitting, and filters Etc. should only be I]k=8+effected when there is no pressure in the system. If hosed and tubes are to be removed always use clean plastic caps or stoppers to close the free ends. When replacing hydraulic pump or motor care must be taken to ensure that the leak oil cavities are actually filled with clean hyd. fluid before these units start to work again. Use a clean funnel for filing the oil in the leak oil connections.

ENGINE:

Sound service and maintenance practice will insure that the engine continues to meet requirement. Service internals must be observed & service and maintenance work carried out as per operating manual.

MAINTENANCE:

Stop the engine down before carrying out maintenance or repair work. When the work is complete be sure to reinstall safety services that may have been removed.

ELECTRICAL SYSTEM:

The paver finisher is equipped with 12V DC two batteries.
Two combined batteries out put 24V DC volt is used for starting the engine and other electrical function is based on 12V DC only.

For safety reason always remove first the clamps from the negative terminals and only than that one from positive pole. After recharging battery, proceed in reverse order to ensure correct damping.

WELDING WORK

Before carrying out electric welding work on the machine, switch off the –

- Leveling system
- Other electric components
- Battery

When welding, keep the earth terminal as near to the welding seam as possible. Never put negative lead of welding over the bearing.
After welding, connect the equipment in reverse orders.

BATTERY MAINTENANCE:

When required to park the paver for more than 10 days, disconnect the ground terminals so the battery will not discharge due to parasitic electrical load. When starting the paver, do not crank

the engine longer than 30 seconds. Wait at least 2 minutes before trying again. The alternator is supposed to begin recharging the battery once the engine is running. The battery indicator must read above 12 V (14.5 max). Less than 12V indicate a defective alternator, worn pulleys or loose belts. Maintain the electrolyte level above the plates and below the vent cap openings. Never allow the electrolyte to drop below the top of the plates. A low electrolyte level can cause a battery to be constantly undercharged.

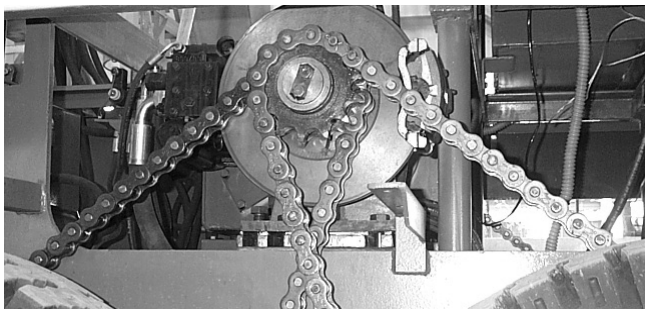


Figure E-1

WHEEL DRIVE CHAIN ADJUSTMENT (Fig. E-1)

There are two wheel drive chains on the paver that runs from the wheel drive differential to the wheel hub sprockets.

To adjust Drive Chains: (fig. E-1)

1. Loosen bolts, 2 each side as shown in the figure.
2. Turn jack screws, 2 each side near hold down bolt, until there is 25 mm of movement in the chain at the mid-point of the return span.
3. Install required amount of shims to fill gap.
4. Release jacks screws and tightens holding bolts.

DIFFERENTIAL OIL LEVEL

1. Check the oil level with dip-stick.
2. Ensure that proper oil level is maintained.

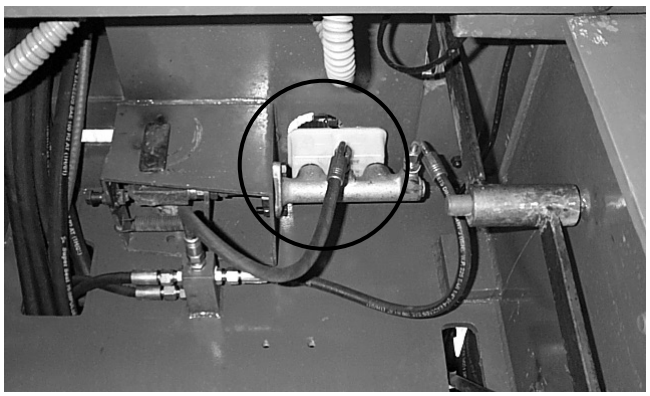


Figure E-2

BLEEDING BRAKES (fig. E-2)

Check to see that Master Cylinder reservoir, as shown in the figure (located under operator's seat), is full. Use filler to push rod. Fill if necessary.

CAUTION: Maintain full level in master cylinder reservoir during and after the bleeding process. NEVER reuse brake fluid.

TIRES

The tires on the double axle pavers are pneumatic 9.00 X 20 (or 10.00 X 20) tube type radials.
The tires on the single axle pavers are pneumatic 12.00 X 20 tube type radials.
Tire Pressure: 85 PSI.

LIFTING THE TRACTOR FOR TIRE CHANGING:

The rear of the tractor may be lifted using the screed by following the procedure below. Caution must be used when working under the paver making sure the tractor is properly blocked.

1. Remove all screed crowns. The screed must be flat.
2. Raise screed as high as possible.
3. Place blocks under screed, directly beneath and centered under each screed lift cylinder.
4. Swap the screed lift cylinder hoses. Without swap in mobile control valve

   CAUTION: The hold position on the screed lift lever will not work, the screed must be held in the raise position.

5. Operate engine at normal RPM. Raise paver using the screed lift lever.

6. Place blocks under rear of tractor mainframe. DO NOT rely on the hydraulic system to support paver.
7. Remove screed lifting arm sections to facilitate tire removal.
8. Change tire, reverse above procedures. Don't forget to reverse the screed lift cylinder hoses. (Not required for mobile valve connection)

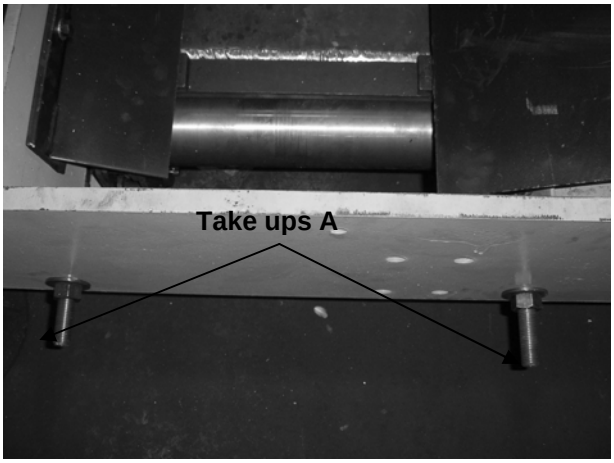


Figure E-3

FEEDER CHAIN TAKE-UP ADJUSTMENT (Fig. E-3)

The feeder chains are adjusted with four take-up screws, two for each feeder, located at front plate of main frame.

The feeder chains should be adjusted so there is very little slack on the return run bars under the hopper. This is desirable to reduce wear on the bars and two prevent the chain from climbing over the teeth on the drive sprockets.

TO ADJUST CHAIN:

1. Lift the front hopper apron plate to provide access to guide rollers.
2. Adjust both guide roller evenly by means of tightened the nuts.
3. Repeat the procedure for the other feeder.
4. Put the hopper apron in its original position.

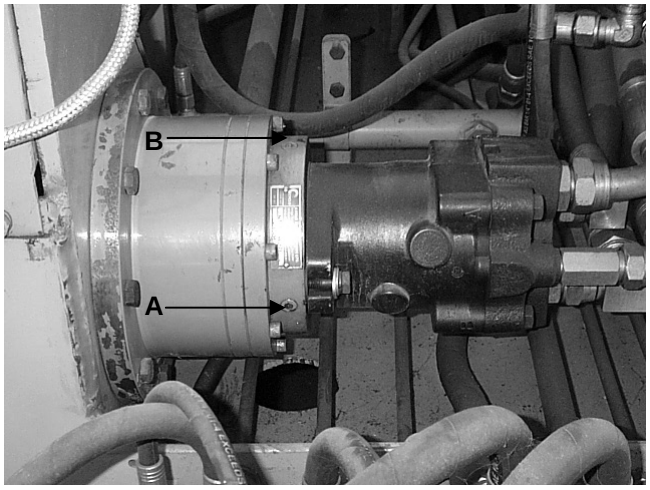


Figure E-4

FEEDER PLANETARY OIL LEVEL (fig E-4)

1. Remove 1/2" bolt (A), level should be to bottom of bolt-hole.
2. Remove top plug (B) and bring level to bottom of bolt-hole.
3. Replace plug and bolt.

NOTE: Drain plug located on bottom of planetary.

Optional

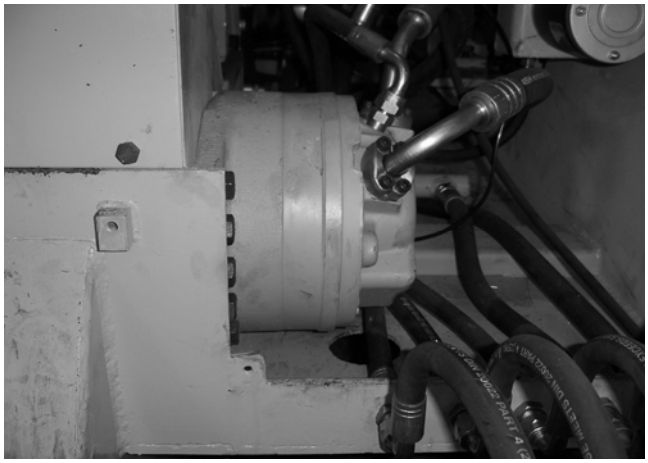


Figure E-4a

Planetary with Hyd. Motor are replaced by direct driven hyd. Motor. **(fig E-4a)**

DO NOT follow step 1 to 3 as mention in feeder planetary oil level section.

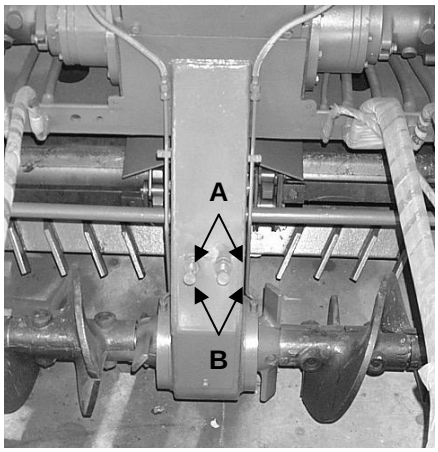


Figure E-5

FEEDER AND AUGER DRIVE CHAIN ADJUSTMENT(AP550) (fig E-5):

The feeder and auger drive chain should be adjusted until the auger cannot be turned by hand.

1. Loosen lock nut (A).
2. Adjust bolt (B) until the auger cannot be turned by hand.
3. Back off adjustment bolt 1/2 to 1 turn.
4. Tighten lock nut (A).
5. Repeat above steps for other side.

Sliding Plate Assembly

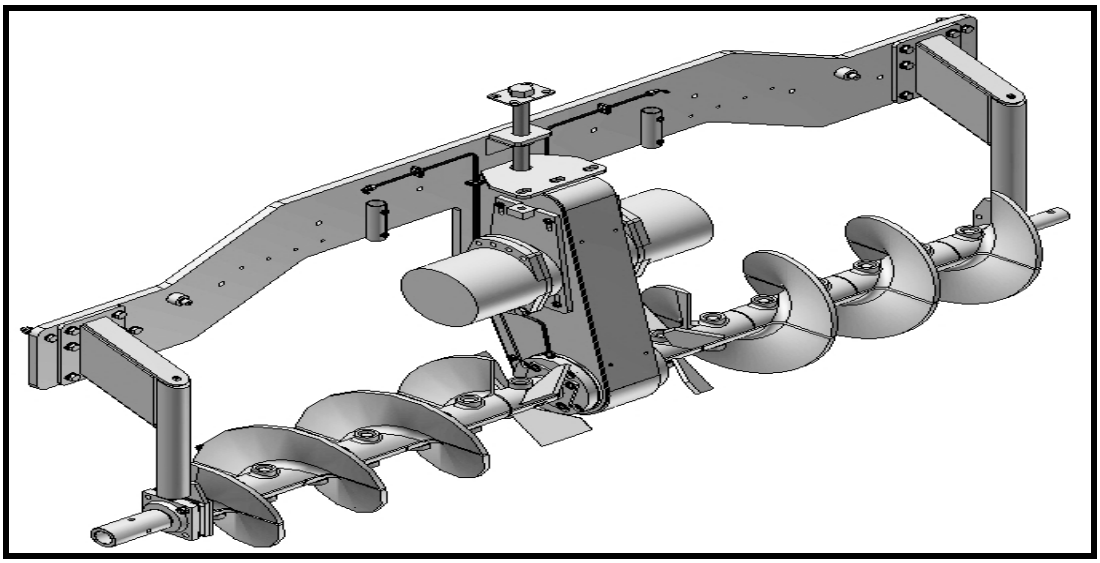


Figure 2 – 2 sliding plate assembly

Sliding plate assembly provides flexibility to change the mat size +/- 50.8mm. It comes with factory setting of 177.8mm height from ground to auger center, which makes mat size of 300mm.

HYDRAULIC SYSTEM:

GENERAL REMARKS:

During maintenance work on the hydraulic system, special attention must be paid to extreme cleanliness. The ingress or dirt results in serve damage to the hydraulic components and even to the total failure of the hydraulic system.

HIGH-PRESSURE FILTER CHANGE:

The cartridge in the high-pressure filter for leveling cylinders must be changed after 50 operating hrs. for the first time and then after every 500 operating hrs. but at least once a year.

CHANGE HYDRAULIC FILTER:

The hyd. oil is filtered by a feed & return line filters. The filters are not equipped with a bypass which means that if the filter is blocked, no unfiltered oil is fed into the closed hyd. circuit. If the filter is contaminated, the filter cartridge must be immediately replaced.

The cartridge must be replaced after 50 operating hrs. for the first time and then after every 250 operating hours but at least once a year.

CAUTION:

Be careful with the hot oil risk of burns

Hold filter cartridge with strap wrench and unscrew by hand.

Let the oil in the filter drain OFF. Never pour it into the tank.
Collect the oil emerging.
Lightly oil the rubber seal of the new filter cartridge. Clean sealing surface.
Screw in the filter cartridge by hand until the seal is in position.
Tighten with another half-turn.
Check sealing during a trial run.
Dispose off used filter cartridge.

Maintenance work to the hydraulic system may only be performed by trained personnel.

CLEANING HYD. OIL & WATER COOLER

OIL COOLER

If there is small amount of dirt on the coolers:
Blow out hyd. Oil & water cooler from the inside outward without dismantling it. Do not aim air at the fan.
Blow out cooling air plates from the inside outwards against the direction of flow with compressed air (max. 7 bar) at a distance or 20 cm.

To insure proper cooling of the oil & water cooler on the diesel engine, they should be cleaned every 150 hrs. of operation.

If there is a higher amount of dirt, first apply solvent and let it work in to loosen the dirt. Then follow the procedure mentioned above.

ADDING / REPLENISHING THE HYDRAULIC FLUID

Check hydraulic oil level:
Oil level should be up to maximum level of sight glass when hydraulic oil is cold.
If oil is insufficient, top up through air breather

Replenish hydraulic oil:
Open engine cover
Open the air breather on hyd. tank
Replenish hydraulic oil through filter
Mount air breather

PRESERVATION MEASURE FOR EXTENDED STANDING TIMES (CONSERVATION)

IF THE PAVER FINISHER IS NOT IN USE FOR MORE THAN 2 MONTHS:

Thoroughly lubricate all lubrication points
Replace engine oil with rust inhibiting oil
Add 10% rust inhibiting oil to the fuel. Fill the fuel tank up to the level. Let the engine run for a few minutes at idle speed.
Apply a thick layer of rust inhibiting grease to exposed cylinder piston rods and chrome tubes
Dismantle the battery, store it at protected safe area and recharge it regularly
Seal the air filter intake Hose and exhaust opening with standby filter rail and adhesive tape

BEFORE STARTING UP AGAIN:

Check hyd. Oil level
Drain rust inhibiting oil and pour in engine oil
Replace hyd. Oil if the paver finisher has been out of service for more than 1 year
Remove rust inhibiting grease
Install battery
Open air filter intake hose and exhaust

FILLING OIL QUANTITIES:

	Grade	Qty	Check	Change
Pump Distributor Gear box	Servo/HP140	5 Liters	Daily	150 operating hrs. for the first time then after every 750 hrs.
Differential Gear box	Servo/HP140	15 Liters	Daily	150 operating hrs. for the first time then after every 1500 hrs.
Planetary Gear box	Servo/HP140	1Ltr each side	Weekly	150 operating hrs. for the first time then after every1000 hrs.
Engine oil	20W40	15 Liters	Daily	As per Engine Operating manuals.
Engine coolant	Heavy duty coolant with water	10 Liters	Daily	Every 500 Operating hrs.
Brake fluid	Brake oil	0.8 Liters	Weekly	Every 1500 Operating hrs.
Hyd. oil	Servo system 100	190 Liters	Daily	Every1500 Operating hrs or at least once a year.

The Filling Quantities indicated are reference values. The dipstick, check screw or oil sight glass etc. are always decisive.

SECTION F:

GRADE REFERENCE AND CONTROL SETUP
(This section is only for SAUR-SUNDSTRAND make sensors)

GRADE REFERENCE AND CONTROL SET-UP

STRING LINE SET-UP: (Refer to Fig. F-1)

The string line is used primarily where it is necessary to hold the grade of a road with in strict tolerances. Any high quality 57 kg test line may be used. A minimum line off set is desired, with 165 mm being the closest to the edge of the screed the line may be set.

INSTALLING STRING LINE:

1. Set stakes next to the grade stakes and 75 to 150 mm higher then finished grade. These stakes should be from 165 to 600 mm (depending on sensor mounting location) from the edge of the surface to be paved and no more than 7500mm apart.
   NOTE: The quality of the finished road grade will depend on the accuracy used in setting the stakes.
2. Being laying the line by staking it in to the ground and stretching it evenly over the tops of the stakes. With 57 kgs test, it should be stretched to no less than 40 kgs. Do not set line any further than 60 to 90 mtr. Since a temperature rise or fatigue can cause the line to sag.
3. For even greater accuracy, supports may be placed between the stakes to keep the line from sagging.
   NOTE: The string line must be kept dry to prevent sagging. If it does get wet or stands all night it must be re-tightened. It is also possible to use wire, or cable, which is stretched very tight. Support may be needed every 15 mtr. With this type of setup. Regardless of the material used as a reference line, the results of the job will be no better than the care exercised in placing and supporting the line to minimize sag between supports. At the other extreme, the grade line might be set at such a height that the leveling cylinder would exceed its stroke. The problem could be corrected by slowly turning the thickness control screw up, while the machine is moving, until the cylinder is once again in the center of its working range. When this situation occurs, the mat is generally so thick on one side that there will be an error in the finished grade due to uneven compaction by the rollers. For this type of job, it would be much better to lay two average thickness lifts, rather than trying to bring the road to grade with only one course. If the job specifications only call for minimum tonnage, the grade is not too critical and only a improved riding surface is desired, it is possible to string a line down the center of the road to be used as a reference for paving. This will give good results and an improved riding surface, remembering you are not building a road to a predetermined profile.

LEVELER:

The leveler is a computer-determined arrangement of 'sleds' and beans that provide optimum reference response. It is made of rugged, lightweight aluminum. All components are pivot-pin connected for the best sensitivity easy disassembly and transportation. The sensor wand rides the mid-point of the leveler producing a mean average of the surface to be paved. Example: A normal 9 mtr. leveler riding over a 25-

mm error at the tow point will reflect approximately 3-mm correction to the sensor. The leveler is towed from a pivot arm attached to the paver steering gauge. The rear is held in place by a pivot are attached to the rear of the screed. The normal leveler comes in a 9 mtr. Length for more accuracy a 12 mtr. Length is available.

(REFER TO LEVELER ASSEMBLY INSTRUCTIONS)

MATCHING SHOE:

The matching shoe mounted on the grade controller in place of the wand is designed primarily to accurately match a previously laid adjoining mat. It may also be used to match the surface of the base course an accurate curb or gutter line. It should not be allowed to ride on uneven surfaces, as the sensitivity of the system will cause these uneven spots to be duplicated in the finished surfaced.

MAT MATCHER: (Refer to Fig. F-2)

The mat machine may be mounted on either the left or right side of the machine, with the hub and follower outward. The mounting surface must be approximately 180mm above the reference surface during operation.

MOUNTING THE MAT MATCHER:

The unit is mounted with the mounting plate on top, and the Run/standby switch and connector toward the machine. The flat surface of the hub must be horizontal when the pointer points to the index mark on the unit's case. Four mounting holes are provided for mounting. Use a right angle follower skate assembly and ski assembly for contract with the reference surface. Mount the follower at a 45-degree angle. When mounting the unit on the right side of the paver, remove the rubber 'O' ring from the follower arm. This will allow the follower to be mounted at a 45 degree angle, trailing. The mat matcher mounts in the same area as the normal grade control. (Forward of the leading edge of the screed. Approximately in line with the centerline of the spreading screws.)

START UP PROCEDURE

1. Place the Run/Standby switch in the standby position and the auto leveling control switch in 'ON' position.
2. With the paver at the correct grade and the follower resting on the reference surface adjust the position of the mat matcher until the needle is centered on the index line.
   NOTE: For models with lights out, lock the matcher into position.
3. Set the gain potentiometer. Turn full counterclockwise approximately 1/4 turn.

GRADE REFERENCE SET-UP

When choosing the type of external reference to use with system, it should be remembered that the paver would only pave to accuracy of the reference. Location of the grade sensor unit MUST BE forward of the leading edge of the screed at all times. Generally, it is located between the screw conveyor and the rear skirt of the tractor for optimum leveling. Influence on sensor comes from two sources: the screed and the tow points and which source we are trying to control determines the location of the grade sensor. e.g. "Skin lifts" (12mm or less lifts) are best controlled with sensor close to tow point.

SET-UP FOR GRADE CONTROL PRIOR TO PAVING

1. Pre-heat the screed (Refer to screed section of the operator's handbook for procedure).
2. Center the tow point in the guide using the jog switch then shut the valve on the grade control cylinder. Set screed on joint if starting from previous days paving or block screed up to desired thickness for new mat.

   REMEMBER: Starting block thickness should be equal to required mat thickness plus, to allow for mat compaction after rolling.

3. Adjust thickness control screws.
4. Install grade control unit on the side of the paver that will reference the grade, i.e. string line, ski of matching shoe. Use connecting cable furnished with unit. (Refer fig F-3)
5. The sensor unit must be located forward of the leading edge of the screed at all times. Generally it should be located between the screw conveyor and the rear skirt of the tractor for optimum leveling. If using a leveler, it must be positioned next to the paver so the sensor rests on the string or wire at the Center Point of the leveler.
   NOTE: You must match the leveler to the sensor position not the sensor to the leveler position.
6. Set control unit to standby (refer fig F-4)
7. Set the gain potentiometer. Turn full counterclockwise approximately 1/4 turn.
8. Turn auto-leveling control switch, located on the instrument panel, ON. This will supply power to the system.
9. Establish the head of material in the screw chamber and up the screed.
10. With the Run-Standby switch is STANDBY, adjustment the vertical slide adjustment until the meter is centered with the line sensor, string line, ski, or matching shoe on an adjacent mat. (Fig F-5)
11. Make sure the nylon screw on the side post is engaged in the slot. This keeps the post from twisting (fig F-3)
    NOTE: On controls with lights, null is with both lights outs. Normal sensitivity is number 4 on the dial.
    NOTE: With twin grade control units follow the above procedures for the additional unit.

LINE SENSOR TENSION (fig F-5)

The line sensor must be tensioned properly to achieve an accurate reading from the line.

1. Adjust the tension by loosening the knurled knob on the pivot point.
2. Move the adjustment counterclockwise for more tension and clockwise for less tension.
   NOTE: The normal position of the knob is at 5'O clock (fig F-5)

SET-UP FOR SLOPE CONTROL PRIOR TO PAVING: (fig F-6)

INITIAL CALIBRATION OF THE SLOPE CONTROL:
(If grade & slope are to be used together)

The slope control must be calibrated when the unit is initially installed on the paver and should be checked anytime there is question on the calibration of the machine.

1. Center the grade control rams using the jog switches. Then shut the valves on the rams so they cannot move, next remove the crown, level the screed and turn the thickness control

screws to the "neutral" or "slack" position. (Refer to Section E Setting Up Machine For paving in the Operator's handbook.)
2. Turn Auto Grade Control Master Switch, located on the main console, ON. Allow a warm up period of 2 minutes.
3. Adjust gain to maximum. (Full Clockwise) (Refer to Figure F-6)
4. Place Run-Standby in Standby.
5. Dial in 0% slop on the remote set point. (Refer to Figure F-6)
6. Remove the cover from the pendulum section of the slope control. Loosen the mounting clip on the pendulum housing and rotate the housing until the meter is centered. (Figure F-7)
7. Tighten pendulum-mounting clip, and replace cover.
8. Check the remote set point and slope control as a unit with the following procedure:
   A. With the gain set to maximum (Full clockwise) place the run-standby switch in STANDBY.
   B. Turn the remote set point to 3/10 of 1% (Each small mark on the dial is 1/10%. With this setting the needle should deflect into the red area.
   C. Turn the gain adjust full counterclockwise to (Minimum gain) position, and then turn clockwise 1/4 turn.

The set-up of the slope control, after the initial calibration, is the same as set-up for the grade control except for the following: (Refer to grade Control Set-up)

1. Install slope Control to the mounting plate on the transverse beam. (Fig.F-8). The slope control will function with the grade control mounted on either side of the paver. Select desired side by plugging the control cable in to the left or right hand junction box.
2. Connect the cable from Remote Set Point to the Slope Control.
3. Block screed to desired slope.
4. With the Run-Standby switch in STANDBY, adjust the remote set point unit until the meter is centered. (Both lights outs on models with lights). The percent slope of the remote set unit and the actual slope of screed should now correspond. (Refer to slope Conversion Table)
5. With the throttle at full speed open the valve on the grade control ram. (Figure F-9). The cylinder may have a tendency to drift up or down very slowly. Ignore this if the movement is very slow, less than 1 inch per minute. If movement is more than this, the servo valve may have to be re-centered.
6. Start paving as per instruction in Section E of the Operators Manual.

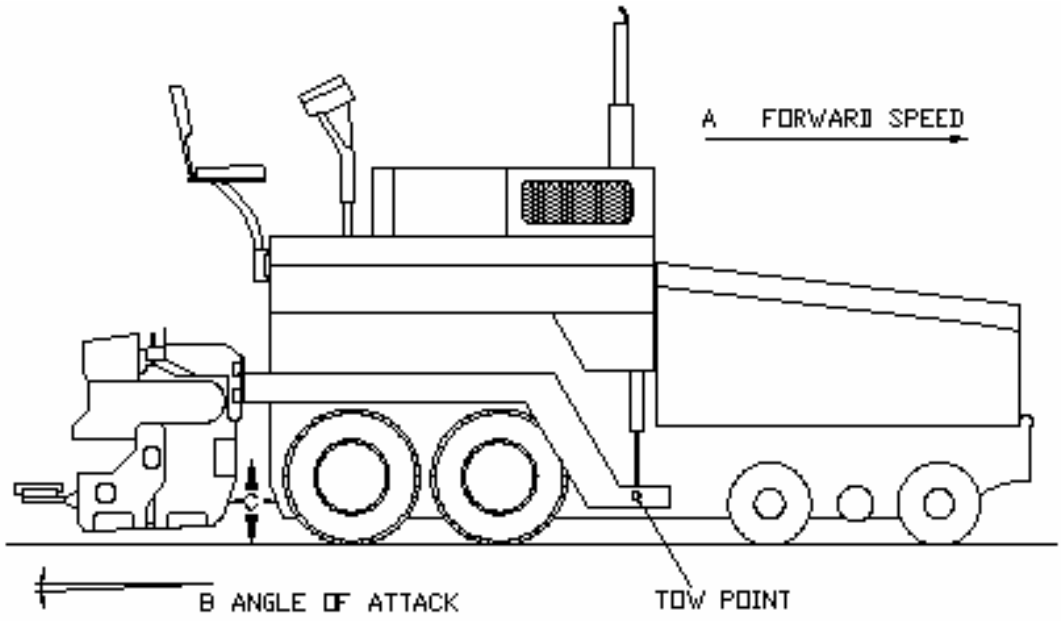


FIGURE C-1

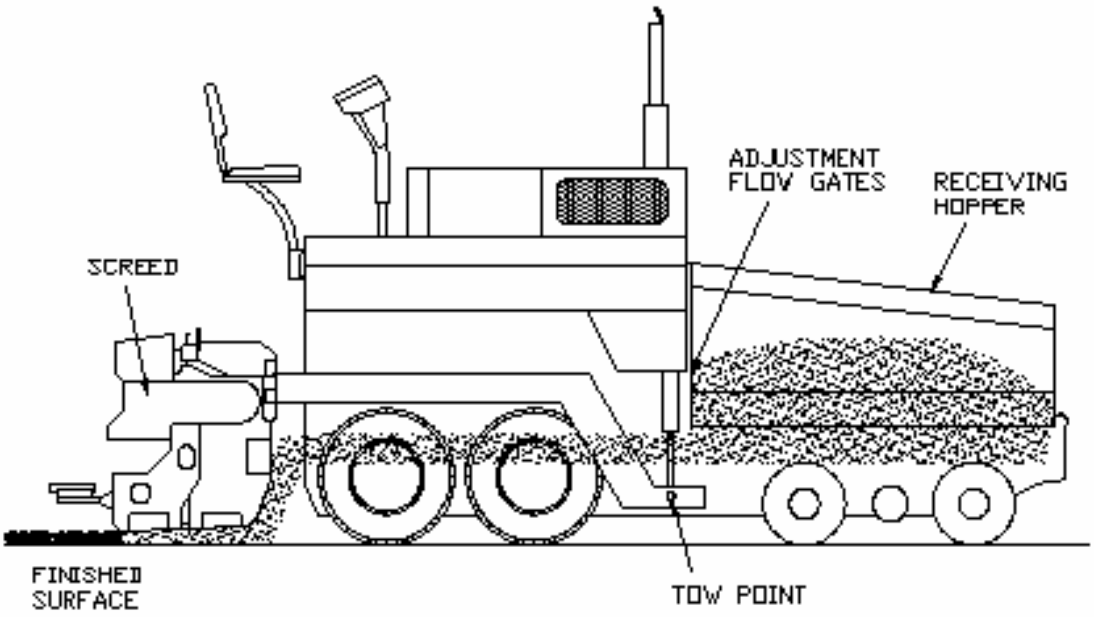


FIGURE C-2

CURVE TRANSITIONS:

When paving into a curve transition, the slope should be changed at a rate consistent with the rate of change of the transverse slope. By watching the results and looking ahead, adjustments can be made with the hand crank, on the slope control, with satisfactory results. To achieve the desired results it is imperative that you have the design slope information available and staked out, from the engineers.

NOTE: Always takes into consideration screed reaction time when changing slope or grade.

BUYING BACK CYLINDER (Refer to Figure F-10)

The leveling arms have a full travel of 180mm. With the system properly nulled out, there should be approximately 90mm of up and down movement. If a cylinder approaches the point of either bottoming out or topping out, it is necessary to "buy back" cylinder.

PROCEDURE:

If a cylinder is about to top out, buy back cylinder by turning the thickness control screw in the UP diagram. (Fig F-10). If a cylinder is about to bottom out, buy back cylinder by turning the thickness control screw in the DOWN direction. (Fig F-10)

LEVELER ASSEMBLY INSTRUCTIONS (Fig. F-11)

The leveler grade reference has been designed to improve the mat surface finish in conjunction with the automatic screed controls. The leveler must be assembled in the proper order to enable the leveler to function as designed.

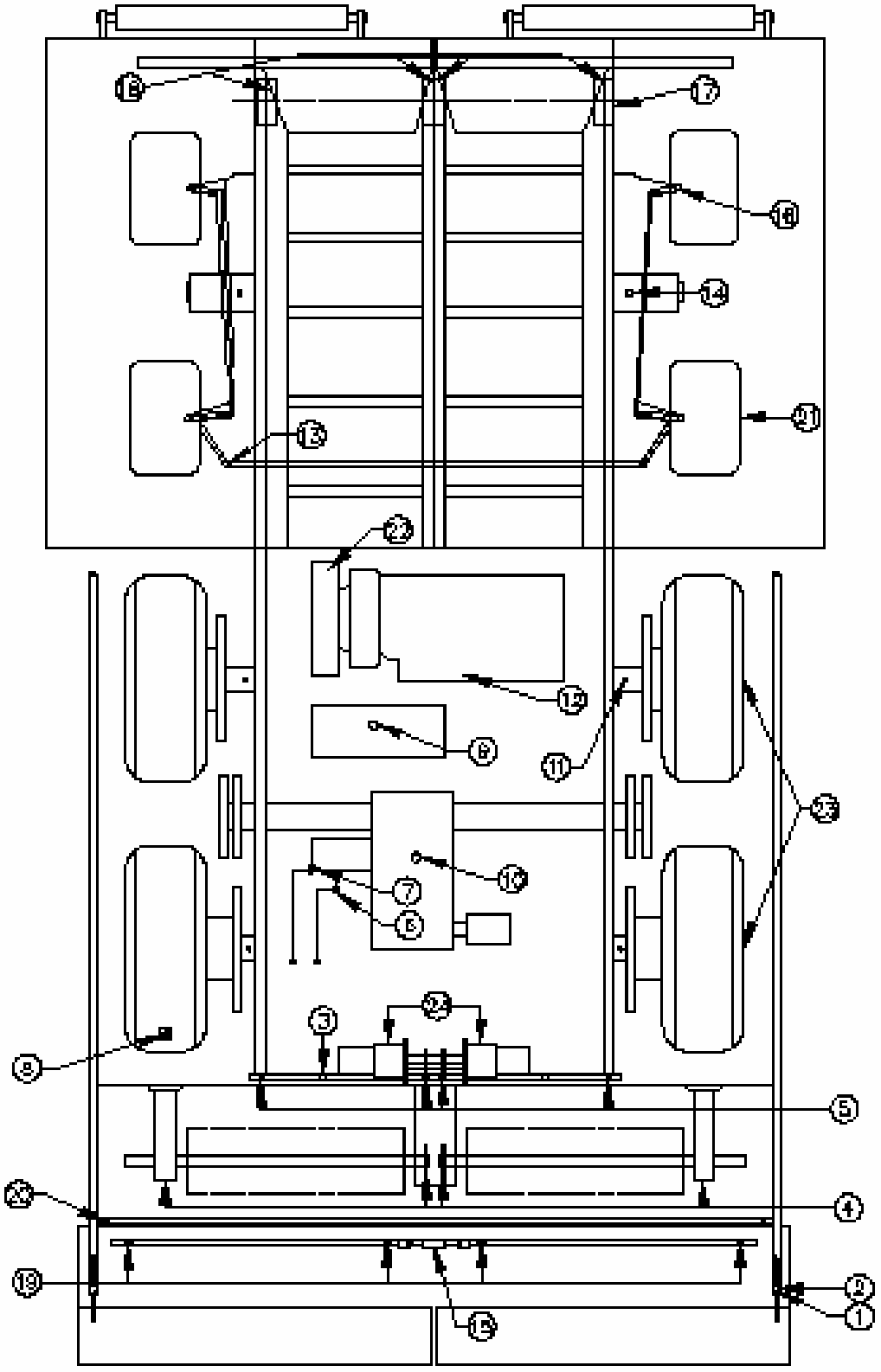
1. Near the top center of each beam is a letter designation CD, CC, E, etc. This designates the first letter of the part number of each beam. It is necessary, when assembling, to following for proper assembly. Note that the center beam has a G or H letter designation meaning this beam can be replaced for various lengths. G for 30 ft leveler and H for 40 ft leveler.
2. The number (1) designation, of fig. F-11 denotes adjustable towing brackets. These brackets can be adjusted to fit all pavers using automatic grade controls simply by adjusting the brackets to locate the sensor on the center of the string line. Towing arm (2) and rear guide (3) can be located on either side of the adjustable bracket (1) to allow the leveler to be used on either side of the paver.
3. Beams CD, CC, and D, although shown disassembled in fig. F-11 will come from the factory assembled. However, if in the event they or do not or are disassembled for some reason, be sure to reassemble in the sequence shown. Pivot pad-connecting pins (4) must be coated with Never-Suez. Do not over torque attachment bolts (5), as the pivot pads must be free to pivot.
4. Check all runners, on footpads, for surface contract by straddling each pad over a piece of 2X6", loosening the U-bolts, contacting the runners with the surface and retighten the U-bolts.

ASSEMBLY PROCEDURE

Using the part number designation on the beam, fig. F-11; assemble the leveler as follows,

1. Beam CC is the front of the leveler. Beam CC attaches to beam E at point 6.
2. Beam CD attaches to Beam E at point 7.
3. Beam E attaches to Beam G or H at points 8.
4. Beam G or H attaches to Beam F at point 9.
5. Beam C attaches to Beam F at point 10.
6. Beam D attaches to Beam F at point 11.

PAVER LUBRICATION PLAN



PAVER LUBRICATION PLAN

INTERY HOURS	POS. NO.	IDENTIFICATION	NO OF POINTS	TYPE OF LUBE.	QTY.	6.1.1.1.1.1.1 REMARK
10	4	SCREW CONVEYOR BEARING	4	HTG	50 GRAM	GREASE WHILE HOT
	18	FEEDER FOOT SHAFT BEARING	4	HTG	50 GRAM	GREASE WHILE HOT
	9	HYDRAULIC OIL TANK	1	SERVO 100		CHECK LEVEL AT SIGHT GAUGE
	5	FEEDER HEAD SHAFT BUSH	4	HTG	50 GRAM	GREASE WHILE HOT
	3	FEEDER HEAD SHAFT	2	HTG	50 GRAM	GREASE WHILE HOT
50	1	THICKNESS CONTROL SPINDLE (THD BODY)		HTG	50 GRAM	
	2	THICKNESS CONTROL SPINDLE (U JOINT)		HTG	50 GRAM	
	8	BRAKE MASTER CYLINDER		SDB		FILL IF LOW LEVEL
	24	FEEDER DRIVE MOTOR REDUCER		SERVO 140	500 ML	1 EACH SIDE
	13	STEERING CON. ROD ENDS		HTG	100 GRAM	
	10	DIFFERENTIAL		SERVO 140		CHECK LEVEL
	12	ENGINE		CASTRO L 20W40		CHECK LEVEL
	14	BOGIE WHEEL FRAME PIVOT		HTG	300 GRAM	1 EACH SIDE
	6	PAVE/ TRAVEL LEVER		HTG	50 GRAM	
	7	LOCK/UNLOCK LEVER		HTG	50 GRAM	

HTG – SERVO GEM GREASE NO. 2 & 3 SDB –SUPER DUTY BRAKE FLUID DOT – 3						

PAVER LUBRICATION PLAN

INTERY HOURS	POS NO.	IDENTIFICATION	NO OF POINTS	TYPE OF LUBE.	QTY.	REMARK
	16	BOGIE WHEEL KING PIN	8	HTG	200 GRAM	2 EACH WHEEL
	17	FEEDER FOOT SHAFT TAKE UP SLIDES	4	HTG		COAT WITH GREASE
50	22	PUMP DRIVE GEAR BOX	1	SERVO 140		CHECK LEVEL
	15	VIBRATOR SLIP SHAFT & U JOINT	2	HTG	100 GRAM	
	19	VIBRATOR SHAFT BEARING CROSS BAR	4	HTG	200 GRAM	
	20	REAR WHEEL DRIVE HUB	2	HTG	50 GRAM	
	23	BATTERY & RADIATOR	4	HTG	400 GRAM	1 EACH HUB
		DRIVE CHAIN				CHECK LEVEL
						COAT WITH USED OIL
250		HYDRAULIC OIL FILTERS	ALL			REPLACE 1 ST 50 HRS EVERY 250 HRS THEREAFTER
500	11	WHEEL DRIVE AXLE BEARING	4	HTG	50 GRAM	COAT WITH GREASE
	24	**FEEDER DRIVE MOTOR REDUCER**	2	SERVO 140	1000 ML	**DRAIN FLUSH & REFILL DO NOT PRESSURE FILL**
	22	PUMP DRIVE GEAR BOX	1	SERVO 140	5.6 LTR	DRAIN FLUSH & REFILL
1000 OR SEA - SONAL	9	HYDRAULIC OIL TANK	1	SERVO 100	190 LTR	DRAIN FLUSH & REFILL. CLEAN STRAINER
	10	DIFFERENTIAL	1	SERVO 140	15 LTR	DRAIN FLUSH & REFILL
	21	BOGIE WHEEL BEARINGS	4	HTG		CLEAN & REPACK
		DRIVE CHAIN				
		BATTERY & RADIATOR				COAT WITH USED OIL CHECK LEVEL
HTG – SERVO GEM GREASE NO. 2 & 3 SDB –SUPER DUTY BRAKE FLUID DOT – 3						

EXTEND-A-PAVE SCREED

INDEX

SECTION A:

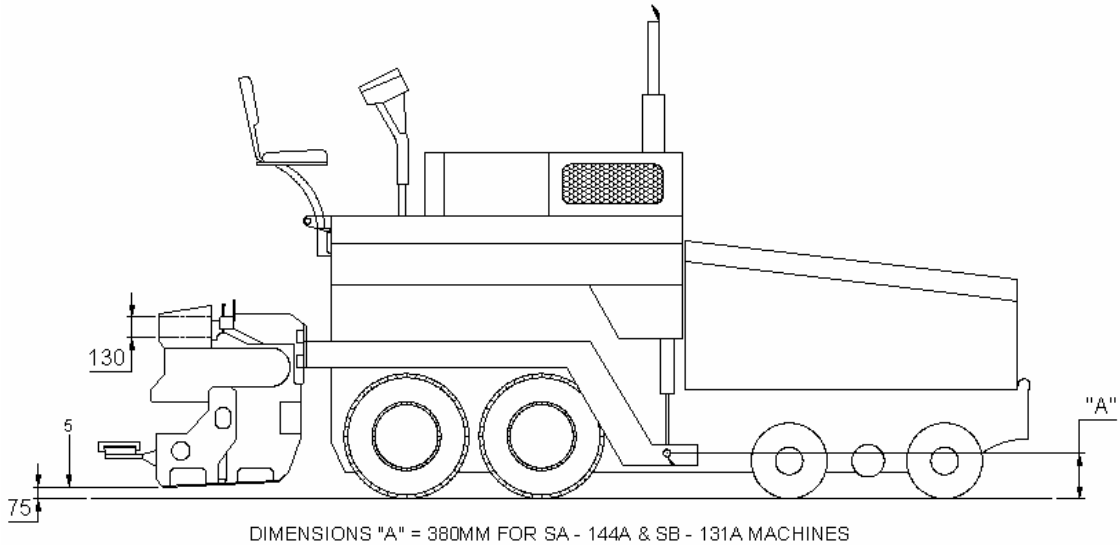
INTRODUCTION

The APOLLO EXTEND-A-PAVE unit was designed as a variable width screed paving unit for paving any width from 2.5 mtrs. To 4.50 mtrs. With out the need of bolt-on extensions.

It is important to keep the level of asphalt in the screw conveyor chamber at the same level with he least amount of variation; the head of material (asphalt) will make any screed unit rise or fall in direct ration to the amount of material. The weight of the extend-a-pave results in more rapid changes to the mat surface, as a result of varying pressure from the asphalt in the screw chamber.

The pressure of the EXTEND-A-PAVE on the asphalt surface varies as the unit is extended or retracted. The variation result in the screed unit rising when going wider width and dropping when being retracted. Changing the extender vertical height and tow point setting will correct the above condition but his requires experience to avoid changing mat thickness or marking the finished mat.

IMPORTANT INSTRUCTIONS PRIOR TO PUTTING MACHINE TO WORK:



DIMENSIONS "A" = 380MM FOR SA - 144A & SB - 131A MACHINES

FIGURE A - 1

SCREED SET UP PROCEDURE (See Fig. A1) STANDARD APPLICATION:

Upon receipt from the factory and prior to commencing laying operations, several checks on the screed assembly should be carried out. (The following also applies when reinstalling an Extend-a-pave to a paver)

1. Position the tractor unit on a flat surface and lower the screed. (Fig. A1)
2. Set the tow point cylinders to Dimension A and set the gauge at 75 mm.
3. With basic screed plate flat, i.e. no leading edge crown and no trailing edge crown, zero crown gauge and operate through full range.

4. A. Set thickness screws to a distance of 130 mm. between trunnion (Fig. A1 & A2).

   B. Set trailing screeds + 5 mm. above basic screed using height adjust ratchet (Fig. A3)

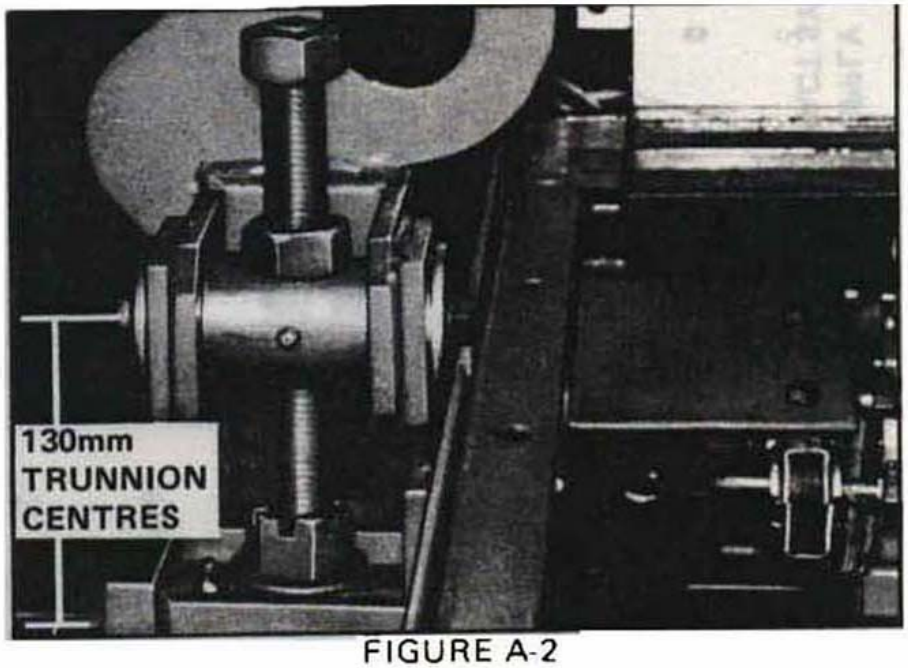


FIGURE A-2

SPECIAL APPLICATION:

The screed is pre-set at the factory and should be suitable for most mat thickness, should it be necessary to change the angle of attack when laying maximum or minimum thickness, this is obtained by: To increase Angle of Attack (max. thickness) (Fig. A2). Rotate both thickness screws clockwise equally until mat thickness required is achieved.

To reduce Angle of Attack (min thickness), rotate thickness screws anti-clockwise equally until mat thickness required is achieved (Fig. A2). With steps and guards in position, extend and retract screed over full width checking for foul conditions and ensuring that the “loop” hoses are nesting neatly and are not crimped when fully retracted. Also check that screed retracts down to 2.5 m max. Run services for 60 minutes and check all bolts for tightness. Check tamper/vibrator bearing temperature (Max 100° C, Normal 50° C).

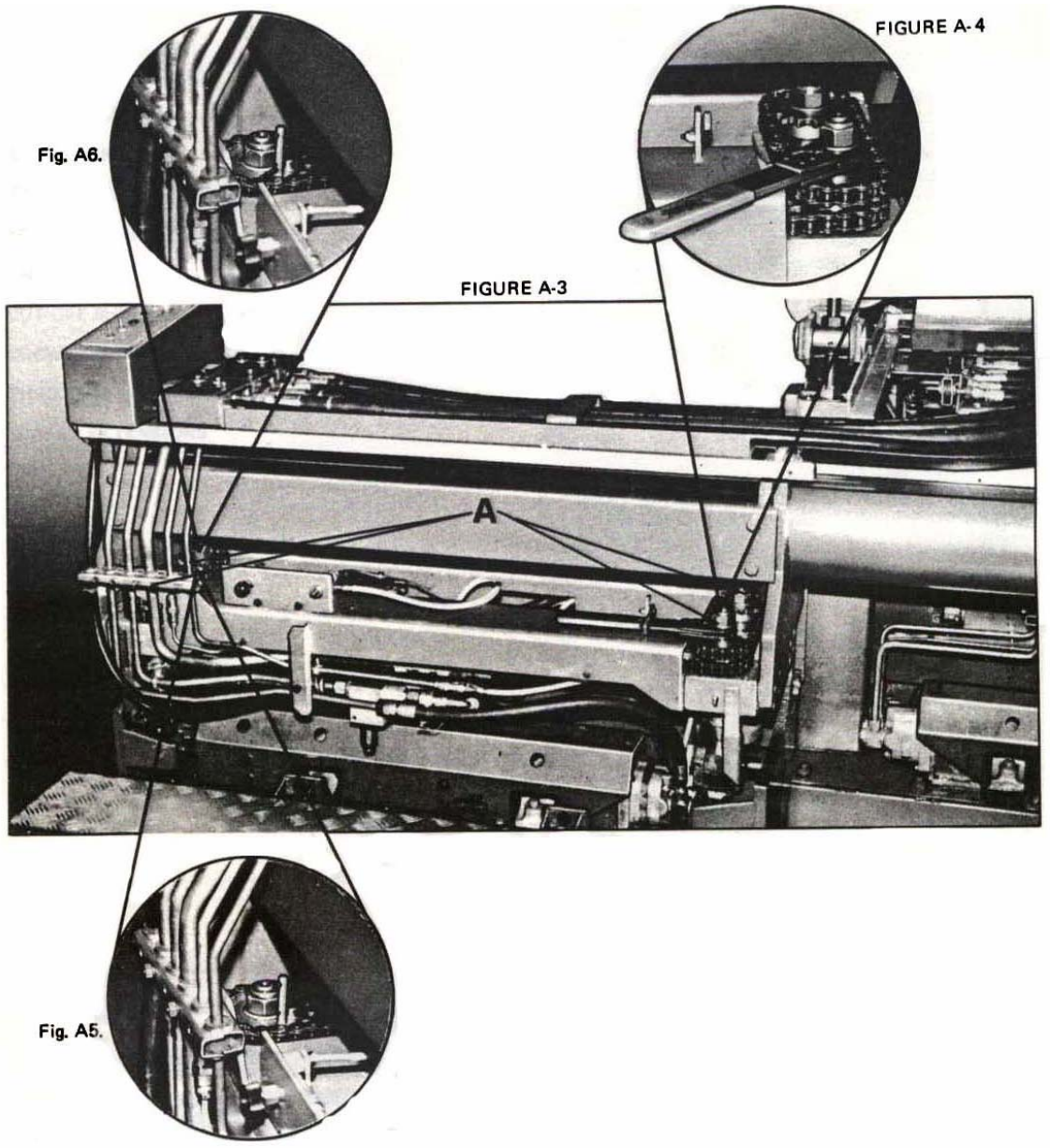
NOTE: Ensure screed is always lifted off travel locks before adjusting the tow point.

HEIGHT ADJUSTMENT (Fig. A3)

To adjust for variation in angle of attack whilst the screeds is in operation a height adjuster raises or lowers the extending screed with relation to the basic screed. A reversible ratchet (Fig. A4) drives via a chain four individual adjusters (Fig. A3, item A). The chain drive is arranged so that pairs of adjusters, inboard or outboard can be adjusted separately to facilitate initial setting of the screed and to enable the extending screed to be crowned relative to the basic screeds. Maximum height of extending screed above the basic screed is 30 mm. maximum extending screed is 4% indicator scales are provided to show the extending screed position relative to the basic screed. Item B.

Fig-A3-illustrating connecting pin. DISENGAGED enable inboard adjusters to be adjusted up or down for additional crown or realignments.

Fig-A6-illustrating connecting pin. ENGAGED enable four individual adjusters to raised or lowered equally normal position.



SECTION B:

SPECIFICATIONS:

The "Extend-a-pave" screed consists of a basic or main screed with integral compacting mechanism to which two hydraulically extendable screed sections are attached. These extendable portions allow the screed to be adjusted from the basic width to the maximum specified width and are mounted one each side on the trailing edge of the basic or main screed. Each extending units incorporates a separate compacting mechanism and therefore, as the adjustment in width can be made both whilst the power is stationary and whilst moving, it is nor necessary to utilize additional bolt on conventional extensions for paving operations within the specified operating widths of the screed. Paving width in excess of the maximum of two one either side can be fitted.

SCREED CONTROLS:

Two control boxes are fitted, one on the outside edge of each extendable unit. They each contain switches to control the extension and retraction of the unit; the tow-point thickness control rams, the heater blower motor; the ignition plug; tampers, and vibrators.

MAIN SCREED:

SCREED PLATE:
One-piece screed plate of 12 mm. high-grade abrasion resistant steel is mounted on heavy-duty screed frame and is reversible for additional life.

CROWN CONTROL:
Crown control assembly allows profiles of from 4.5% positive to 1.0% negative to be undertaken.

VERTICAL HEIGHT ADJUSTMENT:
Each extendable unit is suspended on four adjustable posts. All four posts are interconnected by roller chains so that changes in vertical height in relation to the main screed are achieved by the operation of a single ratchet lever.

TAMPING MECHANISM:
Two direct coupled hydraulic motors give an eccentric shaft on each mainframe half extension giving a positive 5mm. vertical stroke tamper speed is interlocked to the basic screed tamper. See Fig. G8.

SCREED HEATING:
Basic screed is heated by hot gas produced by a diesel spray heating system. The blowers and burners are mounted centrally in each half of the screed plate. A blower unit is included in each burner system. A manual valve is fitted for diesel flow control.

EXTENDING UNITS:

EXTENDING MECHANISM:
Two rigid large diameter telescopic tubes support each extendable unit and also move them in and out in response to the operation of a lever. The rams are hard chrome plated steel. They are fitted with bronze and acetyl bearings and nitride seals.

SCREED PLATE:
Each extending unit has a 12 mm. thick screed plate of high abrasion resistant steel.

TAMPING MECHANISM:

A direct coupled hydraulic motor drives an eccentric shaft on each extending unit. Giving a positive 5mm. vertical stroke. Tamper speed is infinitely variable to allow extending units and main screed tampers to be run in unison. Refer speed chart section 00.

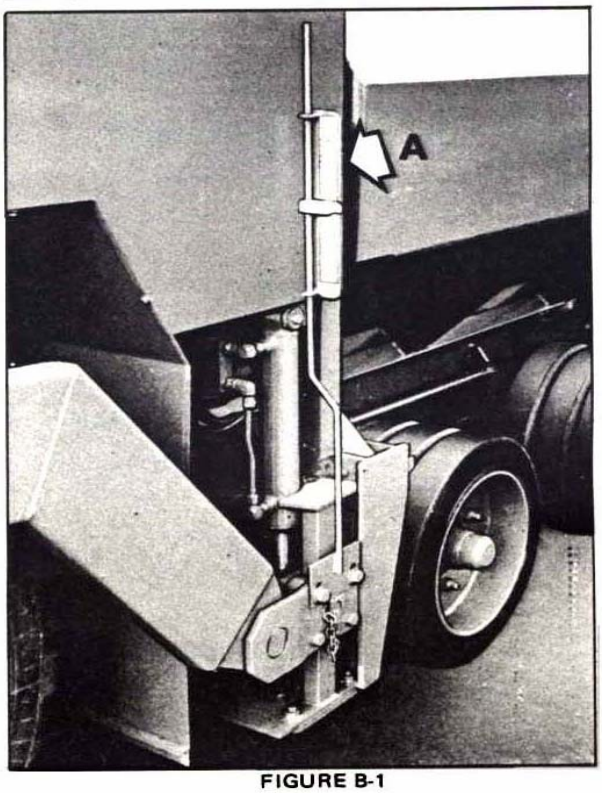


FIGURE B-1

SCREED HEATING:
Diesel spray heating system is mounted on each unit. A blower unit is included in each burner system. A manual valve is fitted for diesel flow control.

SCREED EXTENSIONS:
Bolt-on extensions are available to increase laying width to 5.5 m. Each extension is 500 mm. wide and incorporates tamper assembly and front deflector. Screed plates are reversible. When these are fitted to Extend-a-pave then the laying width can be varied from 3.5 m. to 5.5 m.

TAMPER MECHANISM:

The tamper mechanism is made up for the hydraulic tamper drive, temper eccentric shaft, tamer frame tamper bars and deflector plate. The tamper eccentric shafts are directly driven from the hydraulic motors. These shafts produce a 5mm. vertical stroke at a step-less variable speed as follows: The tamper shafts are synchronized to ensure uniform speed. Replaceable tamper bars are bolted to the tamper frames, which are connected to the eccentric shafts, the tamper strikes off and compacts the material and the screed plates, immediately behind complete the smoothing or ironing of the surface. The deflector plate, mounted ahead of the tamper assembly, holds the tamper in the correct position relative to the forward edge of the screed plate and deflects any excess material back to the spreader screws.

SCREED HEATERS:
The basic screed is heated by two burners. Diesel from the separate diesel tank is fed to the burner through a flexible hose. Combustion air is supplied by externally mounted 12-volt blowers. Baffles in the heater chambers permit even distribution of heat over the full area of the screed. Each hydraulically extending screed is equipped with separate burner installation, which also heats the bolt-on extensions. Control of all heater functions, i.e. glow plug, and blower is by electrical switches located in the respective control boxes.

END PLATES:
End plates are provided to be installed at each end of the screed to retain the material within the width of the machine at the desired laying width.

CUTT-OFF SHOES:
One 250mm. and one 500mm. cut-off shoe are provided to reduce the laying width up to 500mm. in 75mm. in increments as stands equipment.

CROWN CONTROL:
Changes in transverse profile of the surface being laid are made by adjustment of the single crown control mechanism allowing surface profile to be laid within range 4.5% positive and 1.0% negative.

THICKNESS CONTROL:
Change in mat thickness is accomplished by moving the leveling tow point by means of hydraulic cylinders. When operating manually the cylinder direction is controlled by jog switches located at each screed operator's console, actuating servo/solenoid valves. When automatic screed controls are in use these solenoids are actuated by the grade and slope controllers, ensuring a finished surface to correct specification. A mat thickness indicator is located at each tow point (Fig. B-1, item A).

SCREED EXTENSIONS:
The screed extensions (each of 500 mm) are available in kit form consisting of the necessary parts to extend the deflector plate, tamper bar and screed plate. This will increase laying width to a total width of 5.5 Mtr. on the 2.5 Mtr. Screeds.

SECTION C:

SCREED

The Extend-a-pave uses the self-leveling screed principle to obtain a smooth riding and level mat, free of any sharp depressions that cause a rough riding surface. It has the ability to fill in the low spots and over the high sports to level out rough roads. The screed is free to float up the down independent of the tractor and only uses the tractor to two it along and to meter material to it as is needed. Two leveling arms, one on each side of the tractor are used to tow the screed behind the tractor. Where the leveling arms attach to the tractor is referred to as the tow point. The rearward ends of the leveling arms are attached to the screed. This is called the pivot. The pivot is preset in the factory and the setting is suitable or normal mat thickness. When laying at maximum or minimum mat thickness some adjustment may be necessary Ref. Section A Fig. A1. Three forces that effect mat thickness are: (Fig. C1)

A. Forward speed
B. Angle of Attack
C. Head of Material
D. Variable Width of Extenders

If any one of these forces varies, it will affect the mat thickness or mat quality and texture.

A. Forward Speed (Fig. C1):

Forwarding motion is required to move the screed forward, which forces the material under the screed. To vary the forward motion without compensating for the other forces will change the mat thickness. For Example, paving a mat two inches thick at 25 F.P.M. Now if the paving speed is increased to 50 F.P.M., covering the same distance, the same amount of material can not pass under the screed, so to compensate for this, the angle of attack will have to be increased accordingly, to permit more material to pass under the screed to maintain the two inches mat thickness. A momentary change in the speed of the finisher, such as trucks holding their brake then releasing it, will change the mat texture and thickness.

B. Angle of Attack (Fig. C1):

Angle of attack is introduced into the screed by the use of the tow point rams. The more the angle is induced the thicker the mat will be. The less the angle is induced the thinner the mat. So to obtain the best riding surface, the row point rams should not be changed once correct mat depth is reached. When paving correction causes over old pavement will result. The self-leveling screed has the ability to shave the right spots and fill in the low sports. To try to maintain the same thickness would leave no better riding surface than the road being surfaced.

C. Head of material Fig. C1:

The head of material is the amount or mass of mix that is metered and pushed ahead of screed. The mass of material ahead of the screed exerts pressure in four directions. (Fig. C1). The head of material should remain constant in order to obtain a good bump free riding surface. The factors that control the head of material are the proper adjustment of the flow gates and the automatic feeder paddle feeder speed, in conjunction with the dept, width and paving speed.

D. Variable Width of Extenders Fig. C1:

It is important to keep the level of asphalt in the screw conveyor chamber at the same level with the least amount of variation. The head of material will (asphalt) will make any screed unit rise or fall in direct ration to the amount of material. The weight of the Extend-a-pave results in more pressures from the asphalt in the screw chamber.

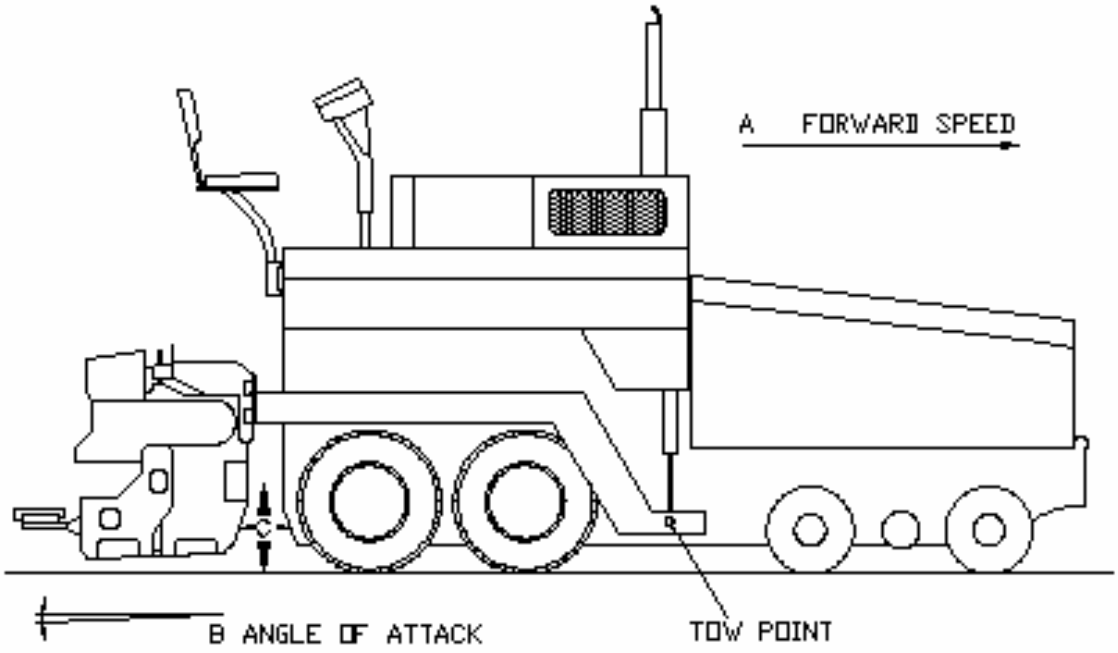


FIGURE C-1

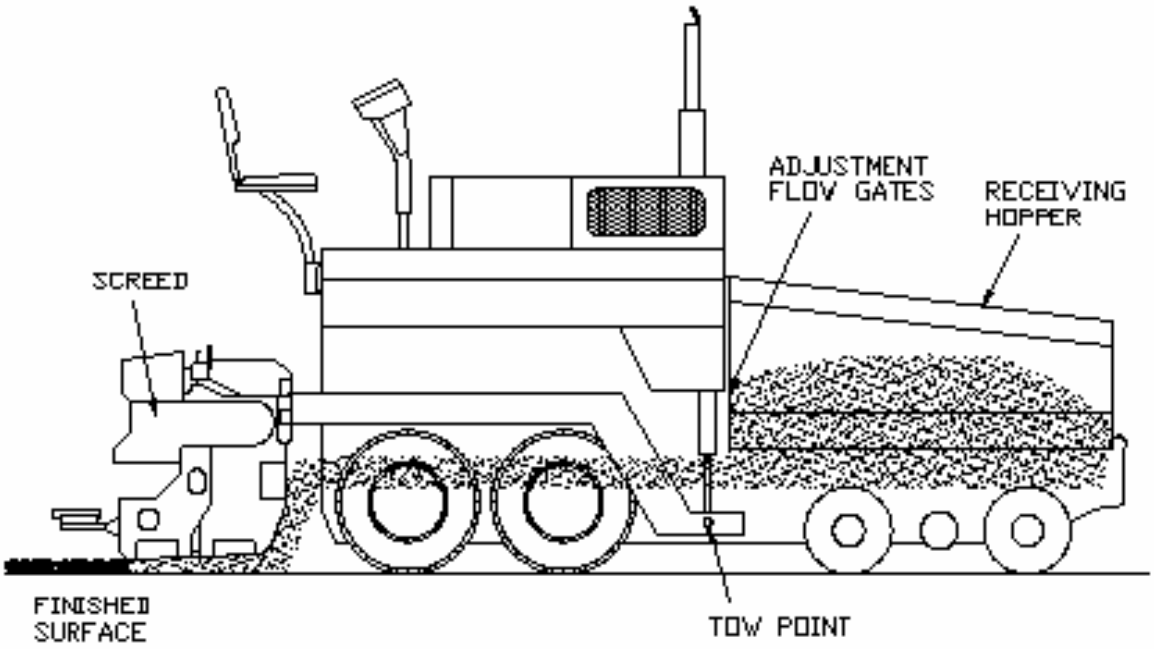


FIGURE C-2

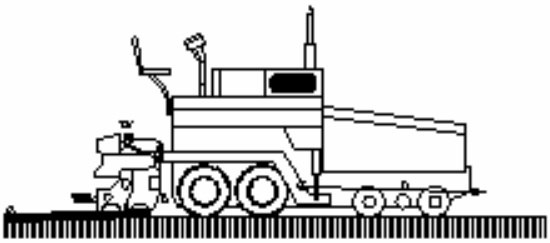


FIGURE C-3

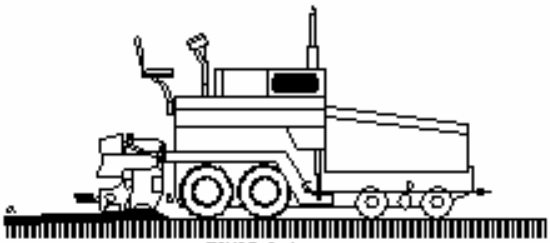


FIGURE C-9

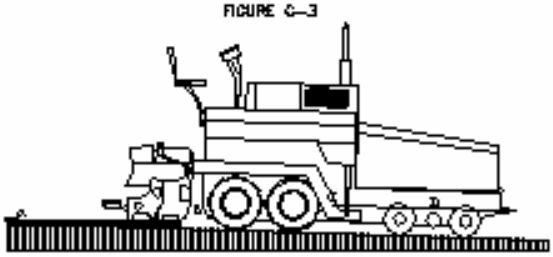


FIGURE C-4

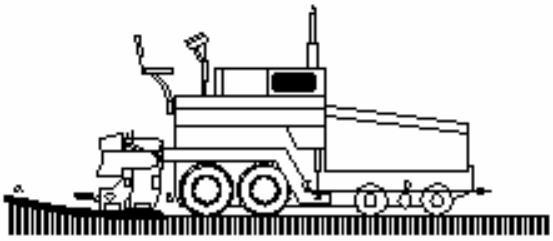


FIGURE C-10

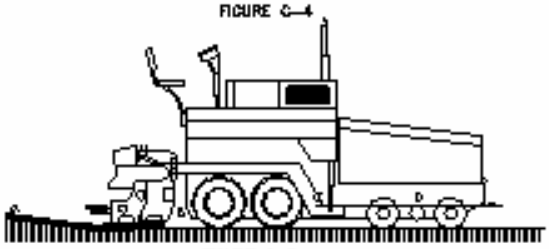


FIGURE C-5

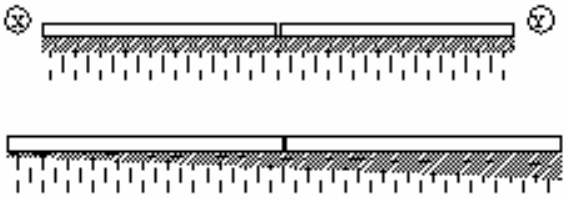


FIGURE C-11

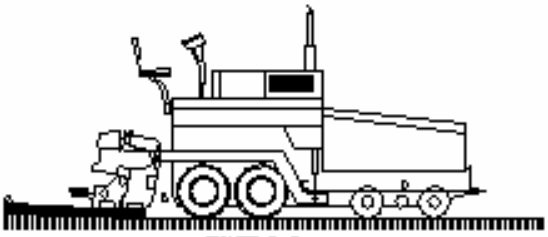


FIGURE C-6

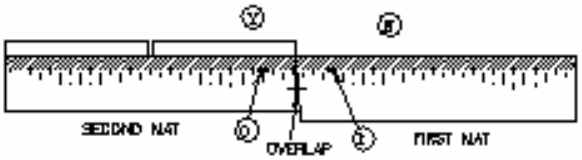


FIGURE C-12

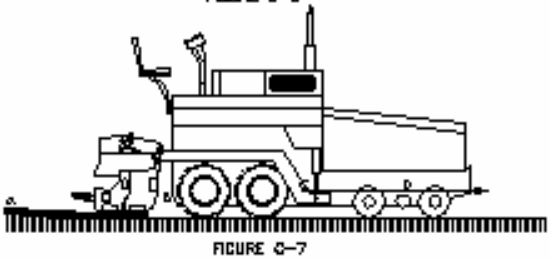


FIGURE C-7

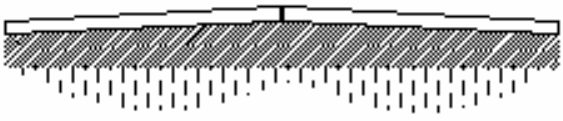


FIGURE C-13

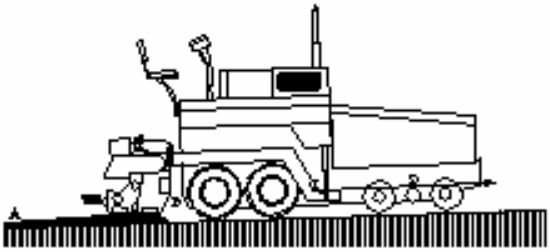


FIGURE C-8

THE FINISHER AS A UNIT (Fig. C2)

In order to understand the principle of the Apollo self-leveling finisher, it is necessary to have a clear picture of the flow of material through the machine and general sequence of operation. (Fig. C2)

LEVELING:

A brief explanation of the principle of leveling will aid in understanding the operation of the finisher. To illustrate and explain the principle of leveling a series of small drawings are used. The tractor unit travels on road base and pulls the screed. (Fig. C2). In operation we will assume the base is level and see how the screed controls the thickness of mat laid. The basic principle of the Finisher is: The screed when pulled into the material will automatically ride up or down to seek the level where the bottom (AB) (Fig. C3) or the road surface becomes parallel to the direction of the pull (CD) and screed alignment is charged. By changing tow point position, (Fig. C2) the screed is tilted and rides to a new level. To illustrate and explain the principle of leveling a series of small drawings are used. The tractor unit travels on road base and pulls the screed, Fig. 2 in operation we will assume the base is level and see how the screed controls the thickness of mat laid. The basic principle of the finisher is: The screed when pulled in to the material will automatically ride up or down to seek the level where the bottom (AB) (Fig.C3), or the road surface becomes parallel to the direction of the pull (CD) and continues parallel, laying a definite thickness unit the screed alignment is changed. For example: To increase thickness the tow point is raised, the screed is titled up and gradually rides up a higher level, (Fig. C4) until line (AB) again becomes parallel to direction of pull (CD) (Fig. C5)

NOTE: The sketches have shown here (Fig. C3) through C10, must necessarily be exaggerated. Actually the initial tilt of the screed is relatively so small it cannot be observed in the finished pavement.

To decrease thickness, the tow point is moved down; the screed is tilted down, (Fig. C6) and it will gradually travel to a lower level until (AB) again becomes parallel to (CD) (Fig. C7) changing the level gradually, or over considerable distance, prevents sudden adjustment or steps that destroy the smooth riding surface. This is a very important foolproof feature. The importance of this characteristic will be seen as we see how it produces a smooth surface when the base is uneven.

Assume the screed is adjusted for a given thickness of mat, and the wheels or track travel up to higher level on the base (Fig. C8). The screed plate bottom (AB) is automatically tilted up.

The screed will then travel up to where line (AB) is parallel to (CD) (Fig. C9).

When the finisher encounters a depression, the reverse action takes place, as the wheels or track travel into the depression or to a lower level; the screed tilts down, (Fig. C9)

The screed will then travel down to a lower level where (AB) is again parallel to (CD) (Fig. C10)

The Apollo leveling feature depends upon time or distance, instead of mechanical ratio. The wheels may change level, but it takes time before the screed has climbed to the new level. The wheel may be up and over the short bump, holes, manholes, etc.,

before the screed has had time to noticeably react, thereby leaving a level surface behind. Thus a mat is laid and compacted on an irregular base with bumps and depressions automatically filled up, producing a smooth riding surface.

If the control is moved too much without giving the machine time to act, the result is over adjustment with a resultant over-correction in the road surface.

CONTROL OF SCREED:

Now let us look at the area of screed unit and note how each side can be controlled independently.

If the corner (Y) (Fig. C11), of the screed is raised tow point raised producing a slight warping in the whole screed surface, this will gradually come up and level out to the new setting, and the finished mat is thicker on one side as shown.

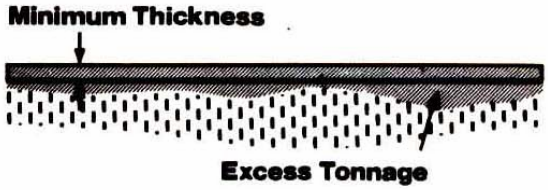


FIGURE C-14

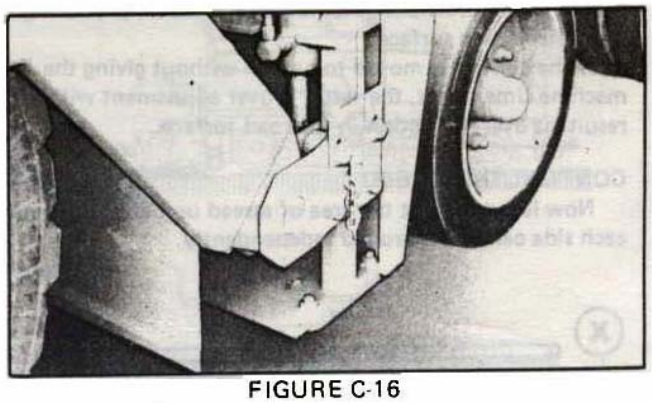


FIGURE C-16

MATCHING JOINT (Fig. C12)

To match mat (N), already laid, the edge of screed (Y) is kept practically flush with surface of (N) preferably overlapping it an inch or two. When the joint is compacted, the two mats are properly bound together.

In operation, the level of screed at (Y) follows the surface level of mat (N) because the wheel (O) that controls this end runs close to where wheel (P) previously ran.

SETTING CROWN (Fig. C13)

To provide a specification crown, the center of the screed is adjusted (Fig. C13) to whatever amount is required. This can be quickly done without stopping the machine, if so desired.

YIELD (Fig. C14)

Due to this degree of leveling control, we have occasionally encountered this problem in the field. The contractor is required to lay over an irregular base a mat of a definite minimum thickness. Tonnage has been figured over the entire area at the same thickness as the minimum. When laying a surface over an irregular base, where the thickness must necessarily be an average, it is physically impossible to hold to a minimum thickness on the high spots and not overrun the tonnage figured on the minimum thickness. Either the minimum thickness or minimum tonnage must be sacrificed; otherwise the resurfaced area will be no smooth than the base on which it was laid. This is clarified by (Fig. C14).

The finisher is designed to level automatically and when once set for proper thickness and left alone it will produce a much better surface than when manually controlled.

Too much emphasis cannot be placed on the importance of being careful of over adjustment of the tow point control switch (Fig. E3&E4).

Allow machine to operate and travel sufficiently approximately 3 Mtr. before checking results of new setting and making another adjustment.

NOTE: Tow Point Operation (Fig. C16). Before operating tow point control switch (Fig. E3&E4) ensure grade control switch “A” is switched ON; otherwise tow point ram will not operate. Let the finisher give a riding surface that will be true under the straight edge and be careful of over adjustment of thickness controls in trying to follow a certain set thickness in the mat. The ideal operation produces a true riding surface and an average thickness of mat.

ADJUSTMENT

There are five major areas to adjust on the finisher to give the best production, quality and life. These five areas are:

1. Flow Gates
2. Feeder Control Switches
3. Feeder Speed
4. Screed Drive Speed
5. Paver Speed

CONVEYOR AND SCREWS:

These components convey the material from the hopper back to the front of and across the full width of the screed in a uniform manner for placement under the screed. An important adjustment in the correct feeding of material in front of the screed is the Automatic Feeder Control Switches. Refer to Feeder Controls Section for proper adjustment (Fig. H5).

FLOW GATES:

The adjustable flow gates are located at the back of the hopper in front of the tunnel (Fig. C19). They regulate the flow or amount of material onto the feeder screws, which in turn distributes the material evenly in front of the screed. The flow gates are hydraulically adjusted (Fig. C28) and should be adjusted to a height which will allow the conveyors and screws to operate 80% or 6 to 8 times per minute. The ends of the screws should not be filled too full of material.

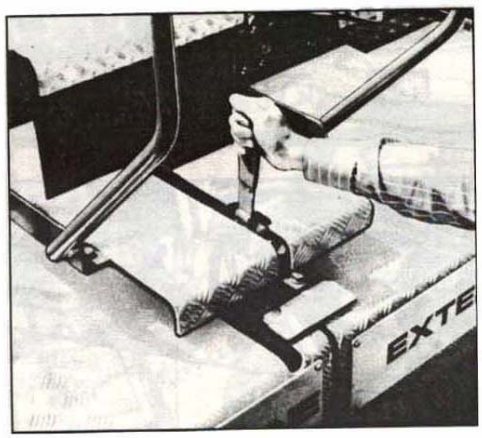


FIGURE C-20

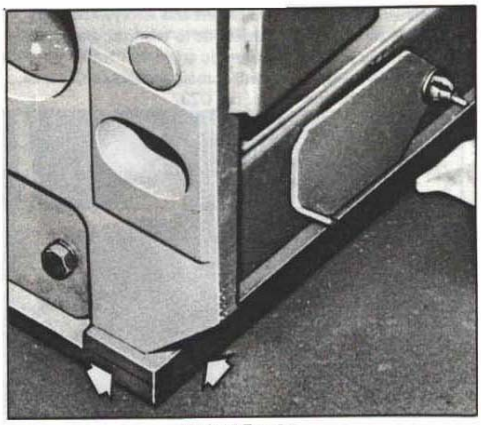


FIGURE C-21

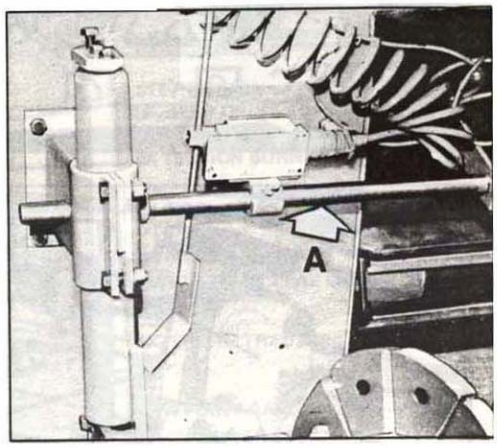


FIGURE C-22

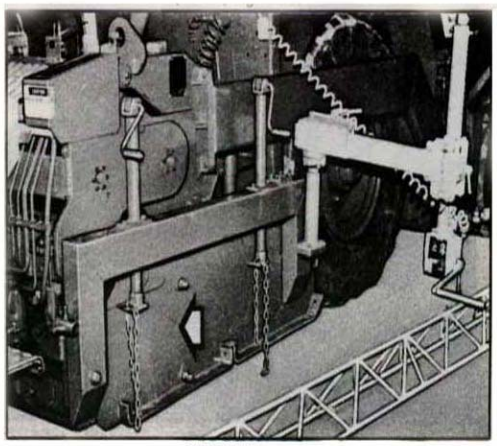


FIGURE C-23

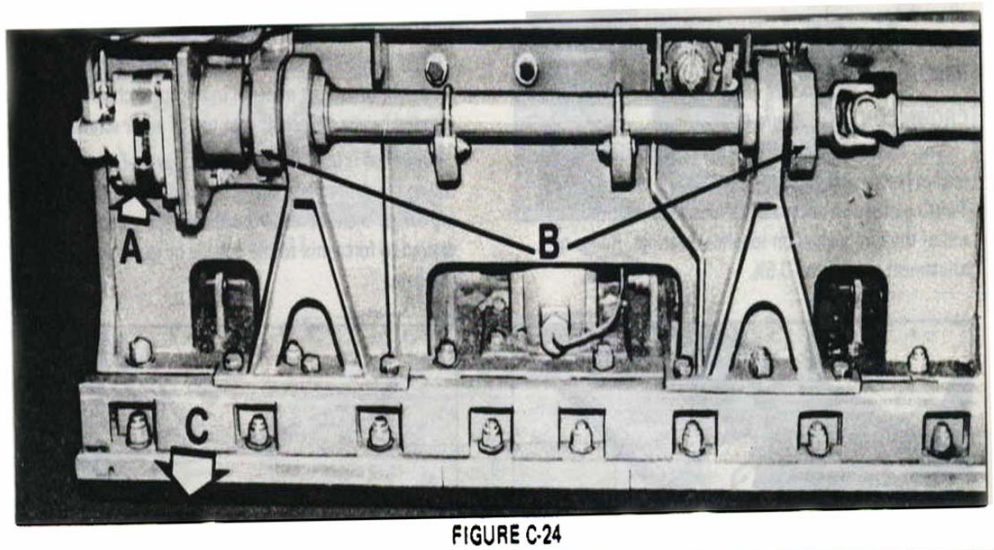


FIGURE C-24

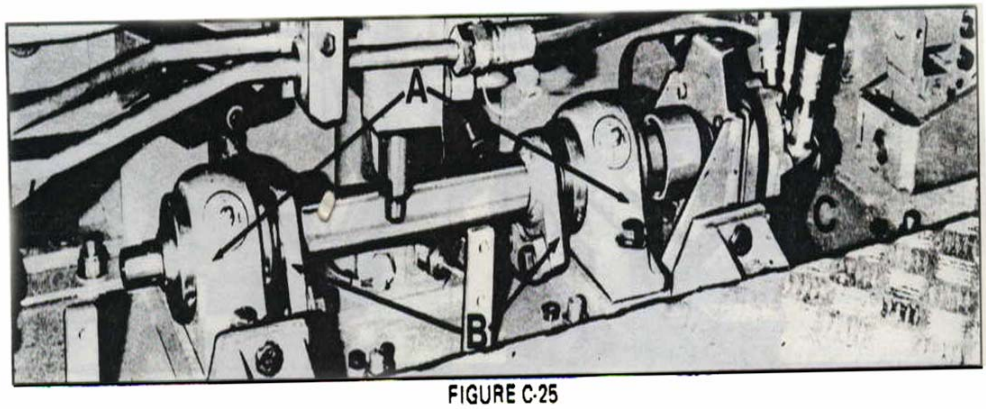


FIGURE C-25

CROWN CONTROL (Fig. C20):
Two crown turnbuckles are operating by use of spanner and coupled together by a chain drive. Twisting of the screed plate is allowed for by mounting each end of the turnbuckles on spherical bearings. Rang of adjustment is + 5% to –0.5%.

BASIC SCREED PLATES (Fig. C21):
The screed plate is of single piece construction 12mm. thick alloy steel. The plates may be reversed for maximum wear.

FEEDER CONTROLS (Fig. C22):
This switch is used for automatic feeders to maintain a set height of asphalt material in the augur chambers. Recommended height of asphalt is to top of augur screw.

Slide rod is used for wide width paving (A). Move sliding rod to the desired position to the outboard side of the bearing hanger then set feeder paddle to desired height of mix desired to force mix to the outside or to the inside edge of end gate.

END PLATES (Fig. C23):
End plates are provided to be installed at each end of the speared screws to hold material within the laying width of the machine and to form the edges of the mat being laid. End plates are

standard equipment and always necessary except when bleeding material out to the side, (Fig. C23). The end gates slide into the guide bar on the end
plate main frame. The chains provided permit adjustment of their position by mean of the chain hooks which fasten to clips of the adjustable screws.

TAMPERS (Fig. C24):
Positive eccentrics operate the tampers producing a vertical stroke of 5mm. Tamper drive is by hydraulic motors. “A” one on each half of basic screed driving a common shaft and one on each extending tamper speeds. Anti-friction bearings are fitted throughout “B”. Tamper bars “C” are accurately machined and are of heat treated alloy steel for long life. Bars bolt to a tamper frame and are easily replaced in the field.

VIBRATORS (Fig. C25):
Vibrator shafts are mounted on heavy duty pillow block bearing “A” with eccentric adjust weight “B” providing the vibrating force. Vibrator drive is by hydraulic motors “C” one on each half of basic screed and one on each extending screed. The system couples, hydraulically, basic and extending vibrator speeds.

SECTION D:

HYDRAULICS

HYDRAULIC SYSTEM (Fig. D1)

Hydraulic oil for the extensions, tamper, vibrator and extension drive motors is provided by the tractor unit hydraulic system.

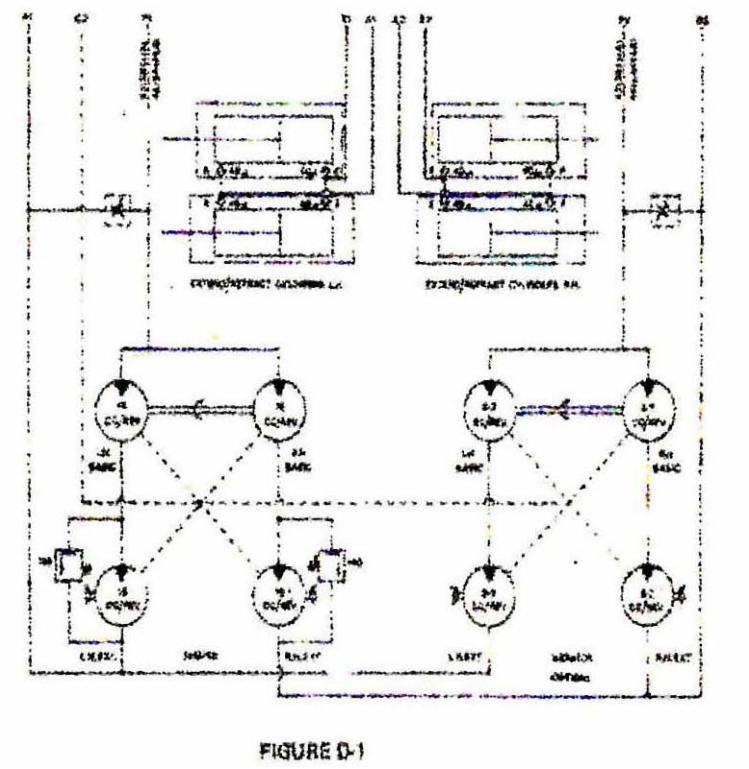


FIGURE D-1

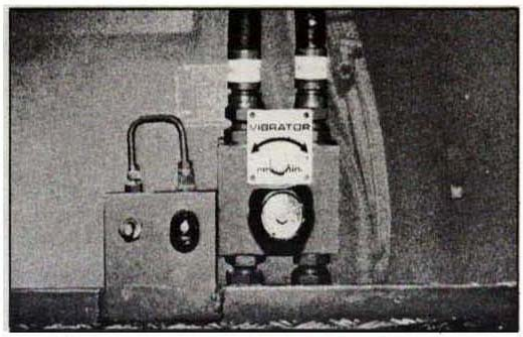


FIGURE D-2

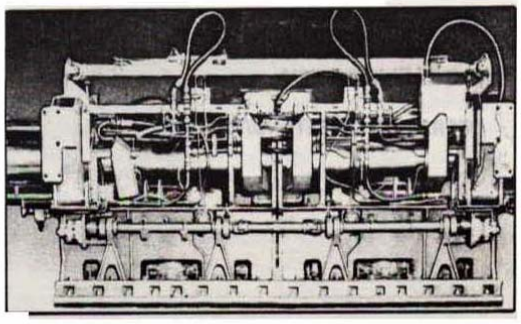


FIGURE D-3

a) Vibrator & Tampers:

The hydraulic motor on the basic screed comes under power when the control solenoid valve is actuated by the ON/OFF switch on the operator's console, and in addition is controlled by an interlock circuit with the tractor propel system.

The motor speed is controlled by bleeding off flow from the pressure line of the motor to the return line. Rotate the Control (control valve located on LH & RH basic screed, Fig. D2) clockwise to increase speed. Rotate counter-clockwise to reduce speed. Tamper drive is by hydraulic motors one on each half of the basic screed (Fig. D3) is driving a common shaft and one on each extending screed.

The basic tamper and vibrator motors are gear type fixed displacement motors. The available oil supply is equally dividend within the motors and passes from both outlet ports to the tamper motors on the left and right hand extending screed sections, returning via the tractor hydraulic system to hydraulic tank. The speed of the basic screed motor determines the speed of the extension motors. Maximum operating pressure is controlled by the relief valve (tamper or vibrator circuit) in tractor hydraulic circuit. (Refer to tractor operation and service manual). All oil return via the tractor hydraulic system to the hydraulic tank.

OPERATION OF EXTEND/RETRACT:
Control valve block mounted in rear of tractor. Operated by levers at right of operator's seat.

SEQUENCE OF OPERATION:
Refer to appropriated tractor hydraulic schematic.

The system is regenerative on the extend cycle, i.e. oil being displaced from the rod end of the cylinder is fed back into the head end in addition to pump flow so increasing the speed of extension.

EXTEND RETRACT RH – LH (Ref Fig.B-2 of Tractor unit):
Move mobile control valve lever operating for extend or retract RH – LH

EXTEND/RETRACT:
Extension and retraction is by double acting hydraulic cylinder on each half of the screed operated by levers.

SECTION E:

SCREED HEATING:

Screed heating is by diesel burning system with single tank feed with four combustion units, one on each half of the basic screed and one on each extending screed. A 12Volts DC electric blower, see (Fig. E1) for the basic screed burner and (Fig. E2) for the extending screed burners. Each combustion unit (Fig. E1&2) is fitted with a blower/damper 'A' glow 'B' plug ignition and flame failure value 'C'. Hot air is evenly distributed over screed plate area by means of a heat distribution box. Tamper bars are heated by conduction through the screed plate and heating chamber. The hot gases are directed by an internal deflector towards the tamper area thus ensuring uniform heating of both tamper bars and screed plates. "Bolt on" extensions are heated via the extending screed.

SCREED BURNERS:
Fuel can be regulated by means of shut-off valve for each burner. Check valves for positive shut off, check supply lines for freedom from leaks.

EXTENDING SCREED BURNER CONTROLS:
The blower and glow plug switches are located in the operator's consoles mounted on the left and right hand extending screed (Fig. E3).
Blower A and Glow plug B switches are duplicated on either side of basic screed.
Blower and Extender circuit breakers for basic and extender units are located on the Control Box.

To start the burner:
1. Turn ON diesel supply & individual burner shut of valve (Fig. E5 & E2, Item D).
2. Depress glow plug switch for 10-20 seconds (Fig.E3 &E4)
3. Depress flame failure valve and burner ignition. (Keep flame failure valve depressed until it remains open on its own, approximately 15 seconds) (Fig.E5, item A & Fig. E2, Item E).
4. Switch on blower and regulate air, if necessary.
5. On start up running burners for 20 min. should be adequate.

   Ignition procedure is the same for all four burner units. If burners fail to ignite, operate blowers for 30 seconds to purge gases and repeat 1-4 abode.

To stop the burner:
Turn off individual burner. Shut off valves and allow blowers to run for a few minutes to disperse gases (Fig. E6 Exhaust parts basic screed). The heating system is supplied with two regulators and feed lines for use with diesel tank feeds. The regulator is set at 1.38 BAR (20 PSI).

IMPORTANT:
Use no lubricants on these threaded connections.
(Fig. E7)
When operating without bolt on extensions the heater escape vents should be left "A" open or inadequate heating will result. These are located on step level at the outer edges of each mainframe. When bolt on extensions are added the escape vent on the extender unit should be left open and the cover plate 'B' at the end of the extending screed should be moved and relocated at the outer edge of the bolt-on extension.

SECTION F:

EXTENSIONS:

The screed extensions (each of 500 mm.) (Fig. F1) supplied in kit form consisting of the necessary parts to extend the deflector plate, tamper bar and screed plate. This will increase laying width to a total width of 5.5 Mtr. on the 2.5 Mtr. screeds. Bolt on extensions are not handed.

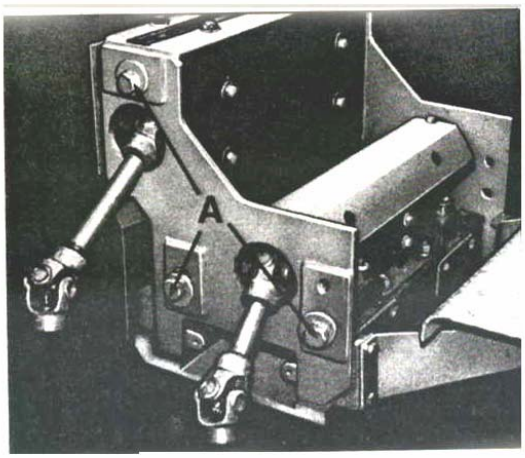


FIGURE F-1

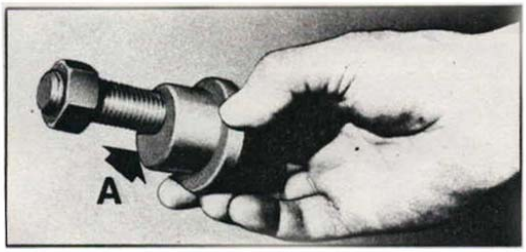


FIGURE F-2

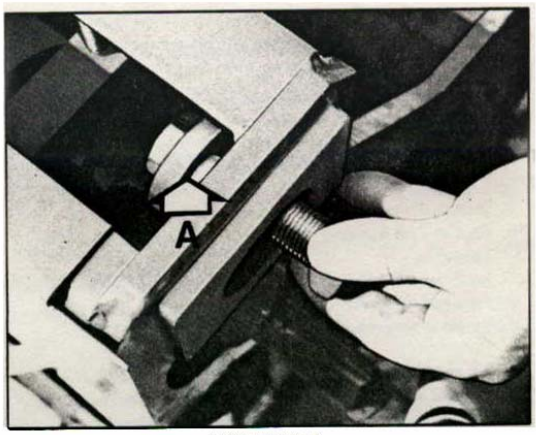
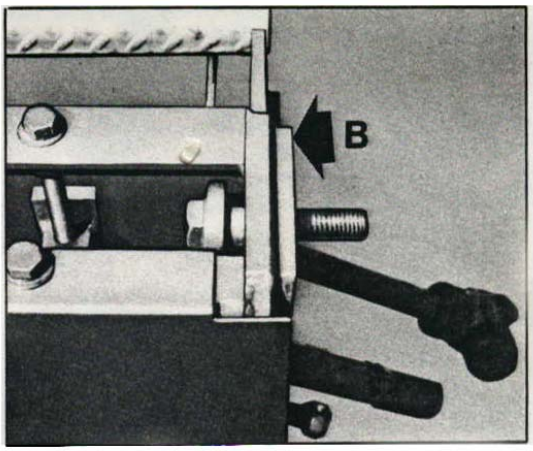


FIGURE F-3



FIGUR F-4

INSTALLATION:

1. Rest the basic and extending screed on timbers, allowing adequate timber to project from the extending screed to support the bolt on extension.
2. Remove crown (i.e. screed plate horizontal). Check indicator is at zero on scale. Rectify it in error.
3. Remove and plate and support, also heater chamber end plate ‘B’ (Fig. E7)
4. Clean accumulated material from screed edge and all mating faces.
5. Position bolt on extension ready to install eccentric securing bolts Ref. A and (Fig.F2 & F3) and insert tamper drive coupling (Fig. F1 & F4).

6. Slightly tighten securing bolts and align screed plate front edge, using eccentric securing bolts ‘A’. Ensure plates are flush at joint ‘B’
7. Complete tightening of securing bolts.

SECTION G:

MAINTENANCE AND ADJUSTMENT:

If the screed unit of the paver vibrates excessively the operator should immediately locate the cause and carry out any necessary adjustments. If allowed to continue severe damage to the screed structure may result. The major causes of screed damaging vibrations are:

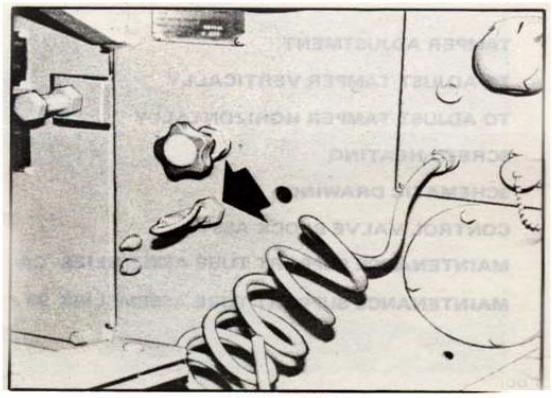


FIGURE G-1

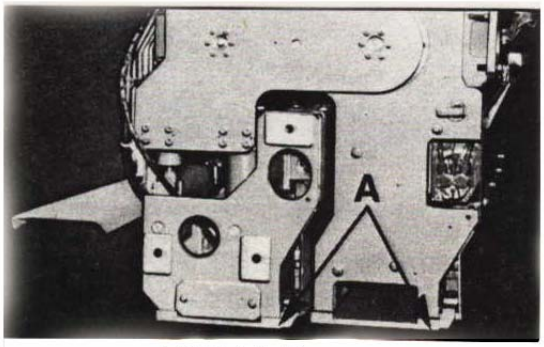


FIGURE G-2

1. High tamper or vibrator speeds on extremely thin mats.
2. Failure to adequately clean the screed on completion of laying daily (Fig. G1). Excess mix should be cleaned off the screed everyday and not allowed to accumulate and harden. The most important areas are between the tamper frame and the screed also on the heating chambers. Damage to the tamper eccentric shaft and tamper frame will occur should there be a build-up of materials behind the tamper. Each week allow the deflector and tamper frames to swing free from the screed plate and remove the accumulation of mix. Each day allow t he tampers to slowly run and spray fuel on into the area in the front and rear of tamper frames. Ensure newly laid asphalt is not damaged by fuel oil.
3. Tamper in excess of desired R.P.M.
4. In correct Tamper clearance. If the tamper bar (Fig. G2) clearance is insufficient, galling of the tamper bars and screed front edge will result causing excessive vibration and wear in this assembly. There should be a clearance of 0.38mm. to 0.46mm. (See notes on tamper adjustment).

TAMPER ADJUSTMENT:

For the best laying result and maximum machine performance a definite relation between tamper bars and screed plate both vertically and horizontally must be maintained. The tamper should be set so that at the bottom of the stroke, it is approximately 0.4mm. to 1.4mm. Below the leading edge of the screed plate. See item A (Fig. G2). Tamper bars too far below the screed plate allow material to adhere to the plate surface immediately behind the tamper and produce a scuffing effect, particularly on wearing glosses. If the tamper is set too high i.e. at the extreme bottom of the stroke the tamper bar does not protrude below the leading edge of the plate and may produce tearing in the mat being laid. A simple “rule of thumb” method for checking this setting is as follows: With the tamper at the bottom of the stroke, if you can just hook your thumb nail on the bottom edge of the tamper - this is approximately 0.4mm.

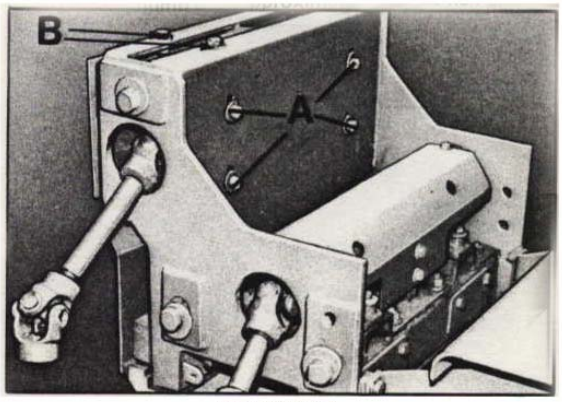


FIGURE G-3

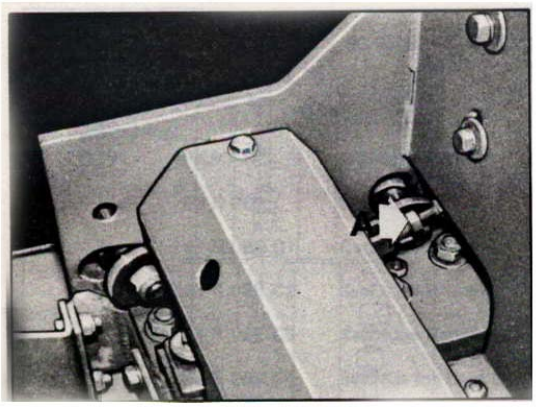


FIGURE G-4

TO ADJUST TAMPER VERTICALLY:

1. Turn the tamper eccentric shaft, (Fig. G3) so that the eccentric bearings are down. This positions the tamper at the bottom of the stroke.
2. Slacken the hexagon bolts (A) on both bearings of shaft being adjusted. Take care not to displace any shims behind the bearing. Slacken lock nut at adjusting bolt (B).
3. Rotating adjusting bolt clockwise, bearing shaft and tamper frame will move downwards until the tamper bar is 0.4mm. below the screed surface.
4. Tighten the bearing securing bolts and adjusting bolt lock nuts. Re-check the tamper vertical clearance 'A' (Fig. G2).

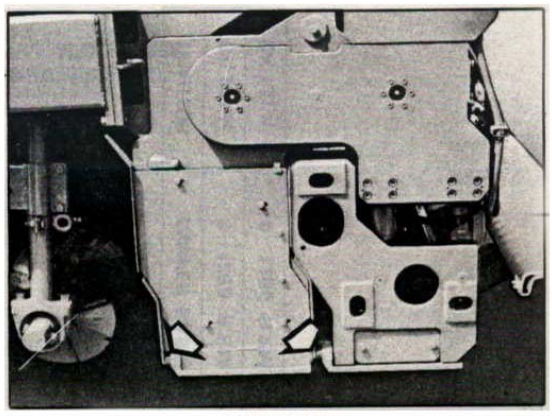


FIGURE G-5

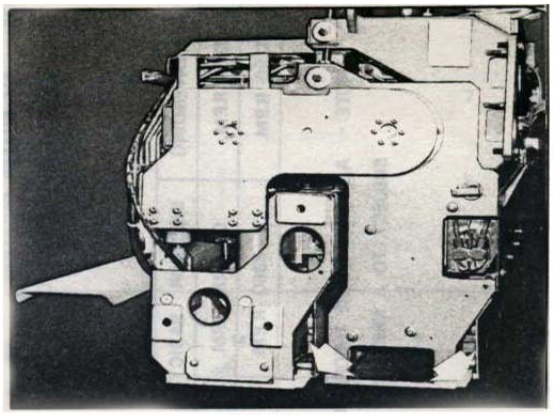


FIGURE G-6

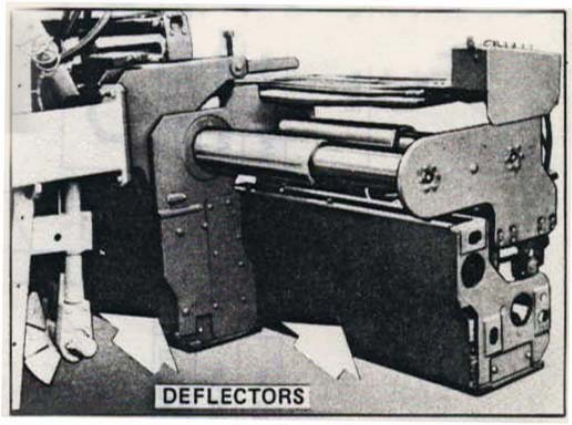


FIGURE G-7

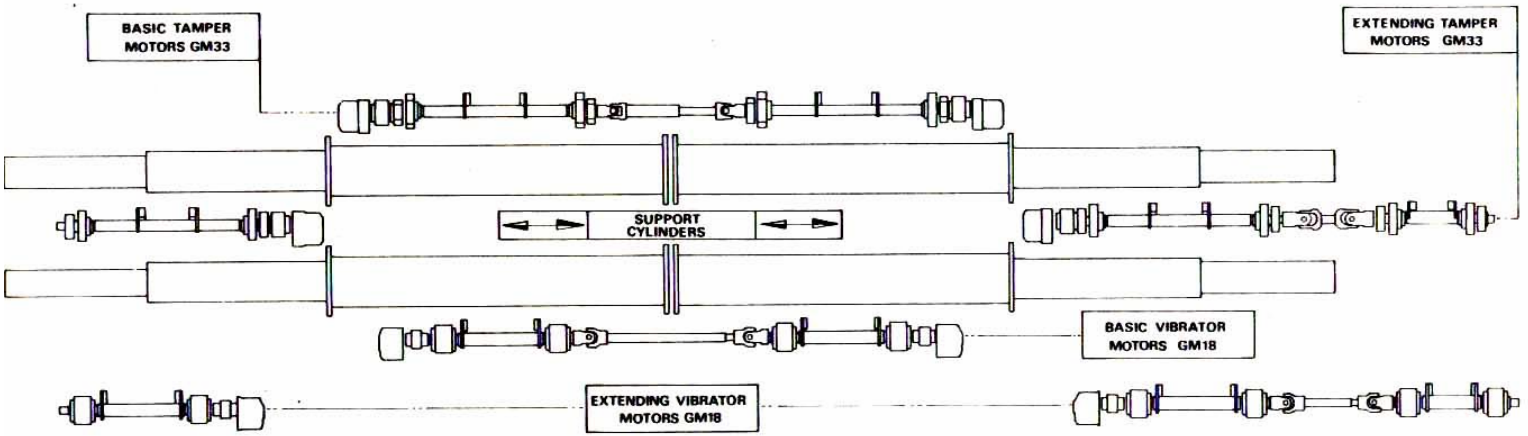


FIGURE G-8

NOTE:- ALL SHAFTS ROTATING CLOCKWISE
LOOKING ON R.H. END OF SCREED.

TRACTOR	TAMPER BASIC	TAMPER EXTENDING	VIBRATOR BASIC	VIBRATOR EXTENDING	EXTENDING TIME	RETRACT TIME
SA 144 A	0 - 1380 R.P.M.	0 - 1380 R.P.M.	0 - 2525 R.P.M.	0 - 2525 R.P.M.	45 SEC.	45 SEC.
SA 131 A	0 - 1290 R.P.M.	0 - 1290 R.P.M.	0 - 2360 R.P.M.	0 - 2360 R.P.M.	48 SEC.	48 SEC.

NOTE:- ALL SPEEDS ARE THEORETICAL AND ARE SUBJECT TO A VARIATION OF $^{+5\%}_{-10\%}$

EXTENDAMAT 2 SPEED CHART 876E-6602 ISSUE 2

TO ADJUST TAMPER HORIZONTALLY:

1. Rotate tamper shaft to bring tamper to the bottom of the stroke (Fig. G4)
2. With a feeler gauge check horizontal clearance over half of the basic screed length clearance should be 0.38mm. to 0.46mm. Fig. G5 between deflector and tamper bar.
3. To increase clearance slackens locknuts (A) at rear of Fig. 4 mainframe support and rotate adjusting nut anti-clockwise: this increase the length of bolt and moves the deflector blade away from tamper bar (Fig. G6). Check clearance if correct secure locknuts
4. To decrease clearance slackens locknuts (A) Fig. G4 at rear of mainframe support and rotate adjusting nut clockwise this decreases the length of bolt and moves the deflector blade, Fig. G7 towards the tamper bar. Check clearance. If correct secure locknuts.
5. With screed on wooden blocks run the tamper for approximately ten minutes the recheck horizontal clearance. It is advisable to check the horizontal and vertical clearance on the screed extensions periodically.

SCREED HEATING (Ref. section E):

The screed-heating unit performs the function of warming the screed plates and is not intended for re-heating cold material. Do not operate the screed heater continually as damage to the screed plates may result. On start-up 20 to 30 minutes should be adequate, depending on the ambient temperature to bring the screed to operating temperature. When this temperature is reached, close the fuel valve and leave the blower running to provide hot air flow to the screed. Never switch off the blower when the burner is in operation. On start-up use caution and prevent the possibility of explosion. Remember the fire risk.

SECTION H:

USE OF CONTROLS:

Refer to the operation and service manual supplied with the paver.

HEAT SCREED:

It is assumed the screed has the required bolt-on extensions, end plates and supports installed together with any accessories required for the job in hand. The first step is to heat the screed in preparation for laying bituminous material. On C.T.B. (Cement Treated Base) and similar type materials screed heating is not required.

NOTE: That when operation without bolt-on extensions the heater escape vents should be left open (Fig. E6, Section E) or inadequate heating will result. These are located at step level and at the outer edges of each mainframe (extenders only).

When a bolt-on extension is added, the escape vent on the extending screed should be closed and that on the bolt-on opened. Also, the cover plate at the end of extending screed should be removed and relocated at the end of the bolt-on section. The escape vent on the basic screed does not have a cover. This area should be cleared daily of any asphalt.

WHEN TO USE HEAT ON SCREED:

In general the only reason for heating the screed is to keep the asphalt or material from striking to it, which causes what is known as “drag” or “tear”. The exception to this is heating the screed to put more heat into materials the finisher is laying. For example if a truckload or several truck loads or material have cooled down for some reason so as to become unworkable the screed heater may be utilized to add heat to save dumping this material. This is the only time the screed heater should be operated continuously. If the material is arriving at the finisher under the specified temperature, the trouble should be corrected at the asphalt mixing plant. However, if mix specification requires heat on the screed at all times, the burner should be kept as low as possible to prevent overheating the screed and screed components.

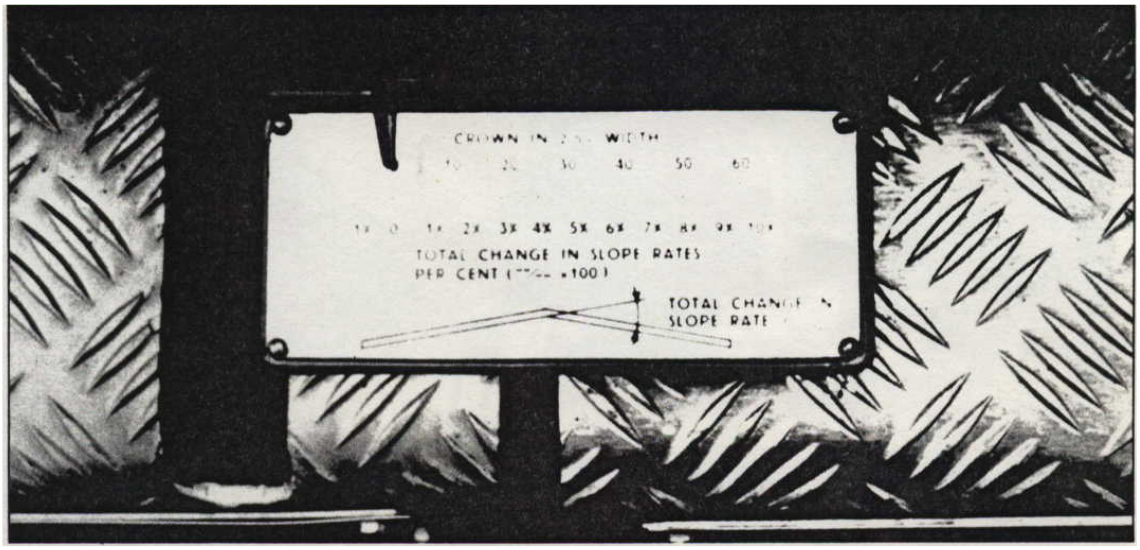


FIGURE H-1

SET THE SCREED TO CROWN REQUIRED (Fig. H1):

1. The amount of crown may vary depending upon the relation between base crown and the crown required on the finisher surface of the material to be laid. If the finished surface is to have a definite crown regardless of the base set up screed to the amount required. If the new surface is to have less crown than the base a sufficient depth of material should be maintained, so that the old crown in the base does not come through the new surface at the center of the screed.
2. A check on the amount of crown may be made raising the screed and stretching a string or using a straight edge across the width of the screed from one side to the other at the rear. The indicator on the rear edge gives the amount of crown adjustment available from 5% positive to 0.5% negative in millimeters. The screed crown in percentage is indicated on the lower edge of the screed. Fig. H1.

ALIGN MACHINE:

1. Run the machine into position to start laying, with the steering gauge property lined up with a guideline.
2. If the cut-off plate is to be used for the first strip aligns the machine so that the cut-off shoe is on the inside to provide a better finished outside edge.

SETTING THICKNESS (Refer to INTRODUCTION):

The mat thickness is controlled by adjustments at two places.

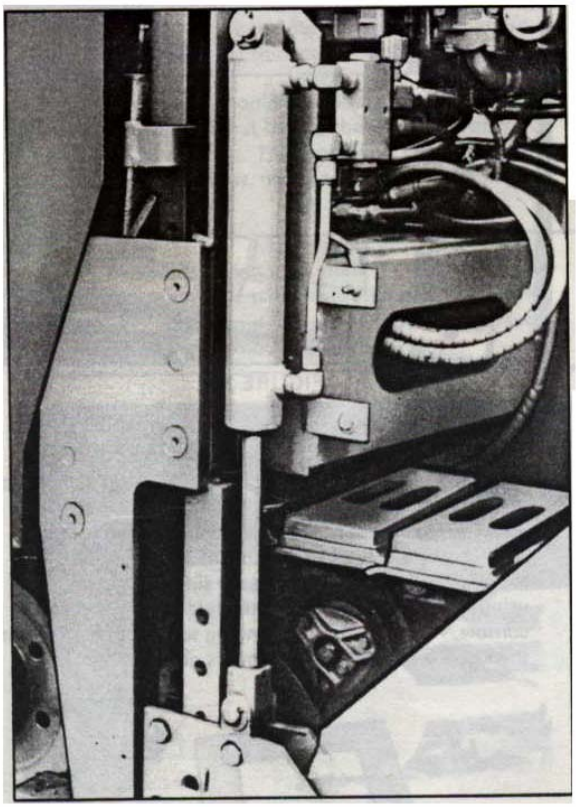


FIGURE H-2

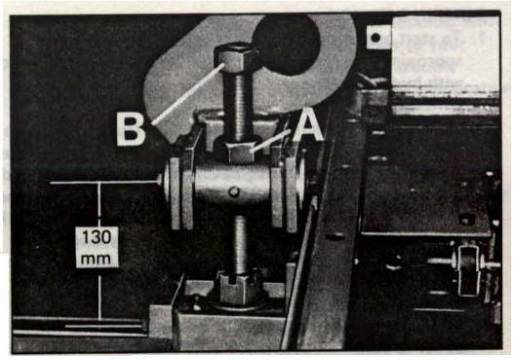


FIGURE H-3

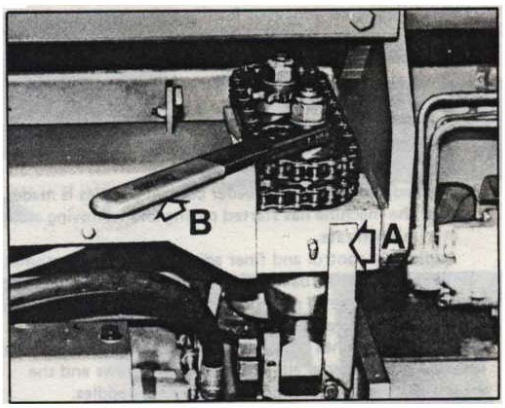


FIGURE H-4

a) By movement of the tow point cylinder (Fig. H2)
b) By adjustment of the height adjuster screw, Fig. H3 should it not be possible to obtain the required mat thickness, factory setting is 130mm. between trunnions. Fig. H3. It is possible to buy back tow point cylinder movement by see Fig. H3. Loosen nut 'A'. Rotate height adjuster screw 'B' clockwise until the required amount of cylinder movement is achieved. Both height adjuster screws should be adjusted the same.

NOTE: Screed should always be lifted off travel locks before adjusting tow point.

To see thickness, place wooden blocks under the basic screed only of thickness approximately 20% greater than compacted mat required. Adjust the tow point indicator to read un-compacted mat thickness (i.e. the thickness of the blocks) by operating the tow point switches. Adjust the height of the extending screeds so that they are 5mm. higher than the basic screed, as indicated by the scale adjacent to the height adjustment screws. (Fig. H4, Item A). Paving can now commence and a check made on mat thickness and fine adjustment made to eliminate slight level difference between basic and extending screeds by adjustment of height adjustments screws (Fig. H4, Item B). Variation of mat thickness is obtained by operation of the tow point cylinders within the limit of stroke of the cylinders. If an increased depth is required, a slight adjustment can be made to the height adjustment screw, increase the mat thickness.

DUMPING TRUCK:

1. To start operation the hopper gates should be set at approximately 150mm. opening. (On machines equipped with hydraulically operated hopper gates use control switch at operator's console).
2. With feeders and screws operating, have truck back up to the paver until the truck wheels engage the rollers on the front of the paver. (During paving operation care should be taken to prevent the truck from bumping the machine when it is standing still as this will mark the mat surface).
3. The truck brake should be set slightly on as it starts to dump the load so t hat it will not roll away from the paver. Control of the truck dumping should be such that none of the mix will spill out in front of the machine.
4. The adjustable corner plates of the hopper wings should be set to accommodate truck discharge.
5. When the material has been carried back into the feeder tunnel and has been discharged and spread uniformly ahead of the tamper across the width of the basic and extending screeds turn off the feeders.

SET AUTOMATIC FEEDER CONTROL PADDLES AND ADJUST MATERIAL FEED:

1. Position and set the automatic feeder control paddles, controlling the basic screw conveyor on tractor or end plate support frame depending on laying width and the plate support frame depending on laying width and the extending screw conveyor (optional feeder control paddle switches Fig. H5). The optional control switch when additional material is required at the extensions. The basic screw conveyor will run immediately depending on material requirements.

2. Refer to the operation and service manual provided with the paver as different model machines have proportional or “ON/OFF” controls.
3. Final adjustment of the feeder control paddles is made after the machine has started paving and is moving along at a uniform rate.

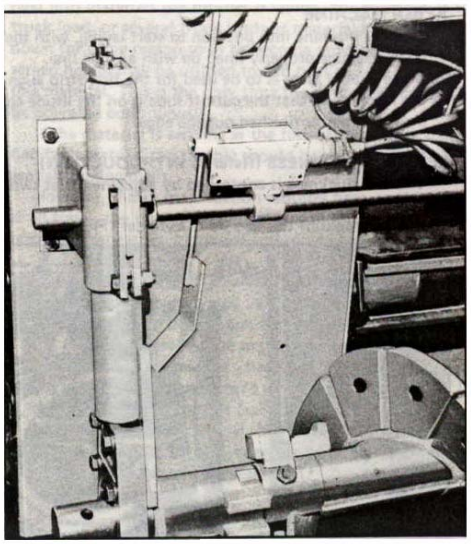


FIGURE H-5

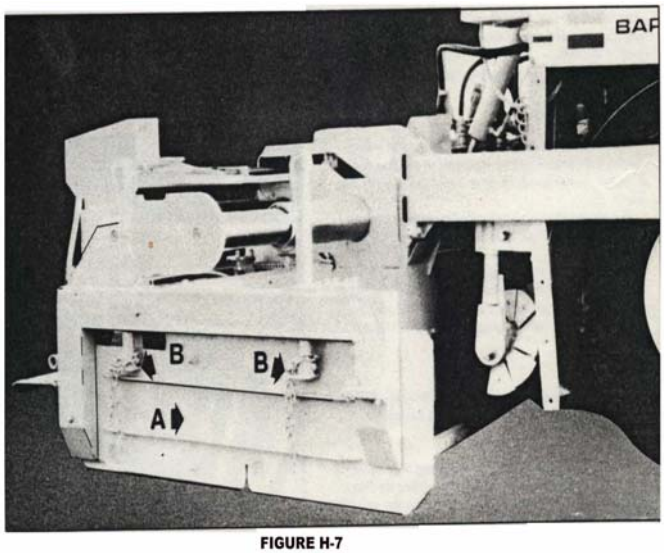


FIGURE H-7

Additional control and finer adjustment of the automatic feeder operation can be made by adjusting the hopper gates to feeder the volume of material in proportion to the operation of the automatic feeder. This can be determined after the paving operation has been started by observing the amount and depth of material along the speeder screws and the operation of the automatic feeder control paddles. On machines equipped with on/off feeder controls the switch actuation is approximately 6 to 8 times per minute. It is better to start at a low setting or volume and work up to the proper control than to have too much material flooding and overloading the screws. If, with hopper gates set at full volume, more material is required, reduce the laying speed. After the automatic feeder control paddles have been set and material has been spread uniformly ahead of the to a depth just above the center of the spreading screws and uniformly across the width of machine, including extending screed, the paving operation can be started.

ADJUST THICKNESS:

1. It is assumed that the machine is being operated with manual control of the mat thickness, without automatic screed controls. After the paver has paved approximately two leveling arm lengths, the screed operator should carefully check the depth of material laid at each side of the mat and using jog switches located at the left and right hand console (Fig. E3&E4) on the extending screed adjust the mat thickness until the proper depth is obtained.

IMPORTANT:

When the end plates (Item A, Fig. H7) are jacked down using the foot on the jacking post “B”. Unless this is raised again when the end plate rides up on a high spot in the existing surface, it will take weight of the screed.

EXTENDING AND RETRACTING THE EXTENDING SCREED:

Changes in screed width may be carried out during laying. The operator should carefully observe the volume of material in front of the extending screed is adequate to maintain the correct mat thickness.

NOTE: This check should be made at several points across the width of mat before changing adjustment of the thickness controls. The probe may contact a depression or high spot giving an inaccurate indication of the mat thickness.

NOTE: When laying thick mats it may not be possible to retract the screed with the end plates down and the plates should be raised above the surface of the mat to allow smooth retraction.

Refer to the operation and service manual supplies with the machine for further information applicable to your machine when putting your machine to work trouble shooting mat problems and information on roller application.

SCREED PLATE (Basic Screed):
The screed plate front and read edges are identical. When wear to the rear edge becomes severe the plate may be reversed and used again prior to replacement. The screed plate is reversible.

TO REVERSE THE PLATE:
1. Remove screed assembly from leveling arms and thoroughly clean accumulated material from screed plate edges.
2. Dismantle extending screed sections from basic screed (Remove bolt-on extensions if installed).
3. Remove basic screed plate from screed mainframe.
4. Rotate the plate 180° and reassemble.
5. Tighten securing bolt.
6. Reset screed as per section A1 putting the machine to work.

SECTION I:

TAMPERS AND VIBRATORS:

SYSTEM:

Line shaft with eccentrics. Extra bolt on weights fitted. Shafts supported in pillow block bearings bolted to the screed frame.

BASIC SCREED:

One shaft on each half of screed connected by splinted coupling shaft, driven from each end by hydraulic gear motor through 3 piece coupling (Fig. C24, Item A2; Fig. C25, Item C).

EXTENDER SCREED RH & LH:

One shaft driven at inboard end by hydraulic gear motor through 3-piece coupling (Fig. C25 & C26).

500 mm. EXTENSION:

One shaft driven from extender screed by coupling shaft (Fig. E1)

HYDRAULIC DRIVE (Fig. D1):

Hydraulic oil is taken from the second screed drive service of the tractor hydraulic system. The flow is divided between the two motors on the basic screed. The outlet ports of the RH & LH motors are connected to the inlets of the RH & LH extenders respectively and the back to tank. The speed of the system is controlled by a needle valve, which bleeds oil from the pressure line across to the return line. The speed of the extender screeds is dependant on the speed of the basic. The control valve is fitted on the basic screed (Fig. D2)

OPERATION:

The Combination EXTEND-A-PAVE may be operated with tampers and vibrators running separately or simultaneously at step less variable speed.

The tamper and vibrator electrical circuits are interlocked into the Stop-Start circuit. Moving the Stop –Start switch to stop will interrupt the tamper and vibrator circuits. This switch arrangement prevents mat indentation due to screed drive operation when the finisher is stationary.

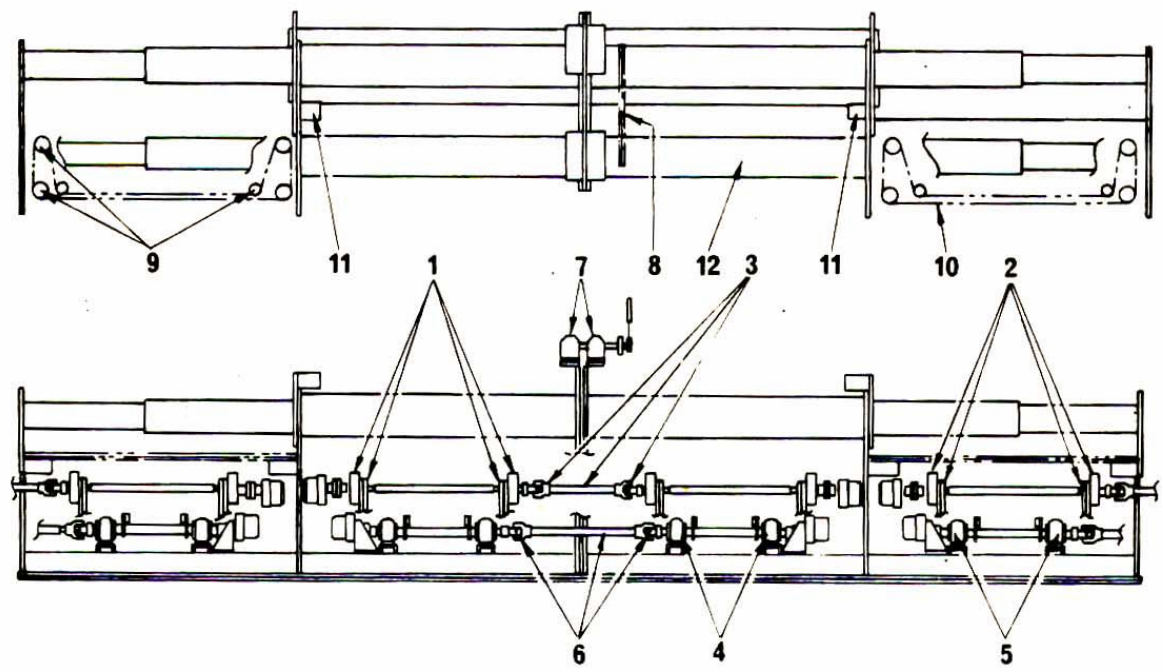
SPEED:

When laying, switch on the required screed drive circuit(s), control the tamper and vibrator speed by setting the flow control valve (Section D). Control vibrator speed by setting the flow control valve located on the screed (Fig. D3).

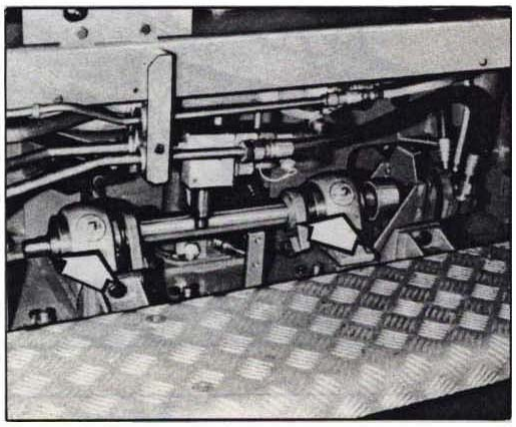
HYDRAULIC SYSTEM: (Ref. section D)

Tampers: A functional description is contained in Section B
Vibratos & tampers: The hydraulic motor on the basic screed comes under power when the control solenoid, located in tractor hydraulic system is actuated by the ON/OFF switch on the operator's console and in addition is controlled by an interlock circuit with the tractor propel system. The motor speed is controlled by bleeding off

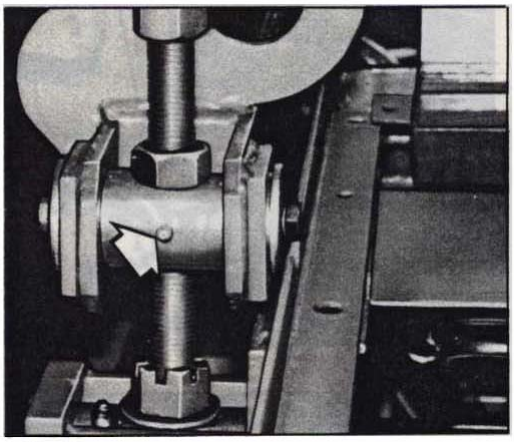
flow from the pressure line of the motor to the return line. The basic vibrator motors are gear type fixed displacement motors. The available oil supply is equally divided within the motors and passes from the both outlet ports to the vibrator motors on the left and right hand extending the screed sections, returning via the tractor hydraulic tank. The speed of the basic screed motor determines the speed of the extension motor. Maximum operation pressure 138 BAR tamper, 155 BAR vibrator is controlled by relief valves in the tractor hydraulic circuit. (Refer to tractor operation and service manual)



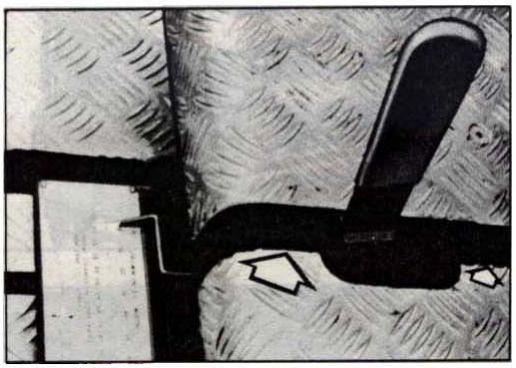
LUBRICATION CHART – EXTENDAMAT 2 SCREED						
INTERVAL HOURS	PT NO.	IDENTIFICATION	NO OF POINTS	TYPF OF LUB.	QUAN.	REMARKS
50	1	Tamper Shaft Basic Screed	8	HTG	2 Shots	
	2	Tamper Shaft Ext. Screeds	8	HTG	2 Shots	
	3	Tamper Slip Shaft	3	HTG	1 Shot	
	4	Vibrator Brgs. Basic Screed	4	HTG	2 Shots	
	5	Vibrator Brgs. Ext Screeds	4	HTG	2 Shots	
	6	Vibrator Slip Shaft	3	HTG	1 Shot	
	7	Crown Control	4	HTG	2 Shots	
	8	Crown Control Chain	1			Spray with Diesel
	9	Vertical Height Adjuster	16	HTG	2 Shots	
	10	Height Adjuster Chain	2			Spray with Diesel
	11	Thickness Adjuster	4	HTG	1 Shot	
	12	Extending Scrd. Support Tube	4			Clean & Regrease Large Outer Dia.
NOTE – When Extensions are fitted lubrication of Tampers and Vibrators is the same as 1–6 on main Screed.						
HTG – Shell Retinax 'A' High Pressure or Equivalent Grease. A-46E-9071						



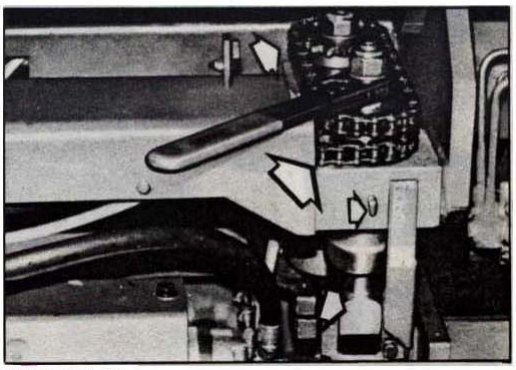
ITEMS 5 & 4



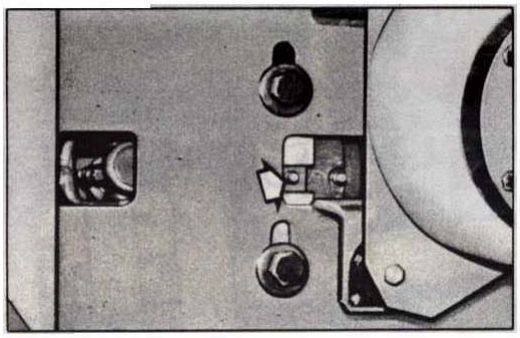
ITEM 11



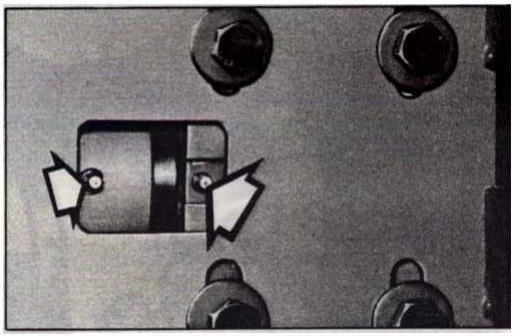
ITEMS 7 & 8



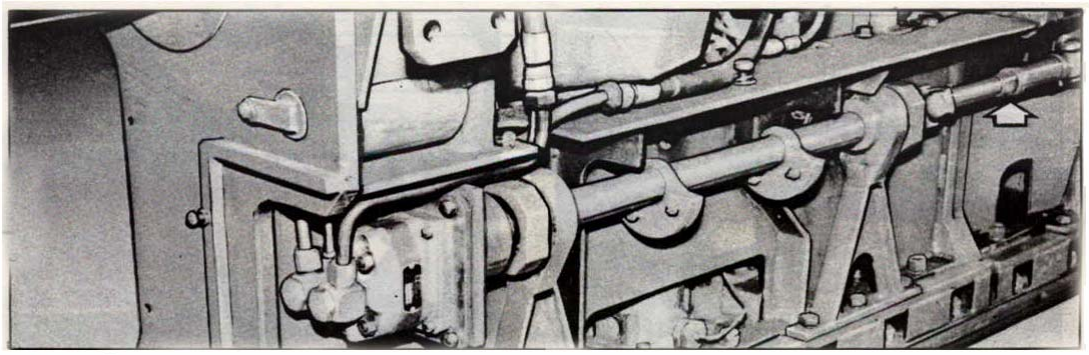
ITEMS 9 & 10



ITEM 1



ITEM 2



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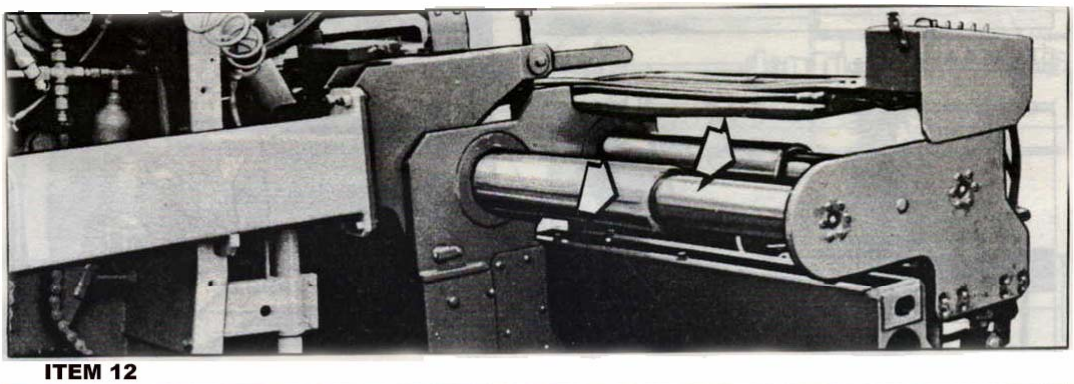
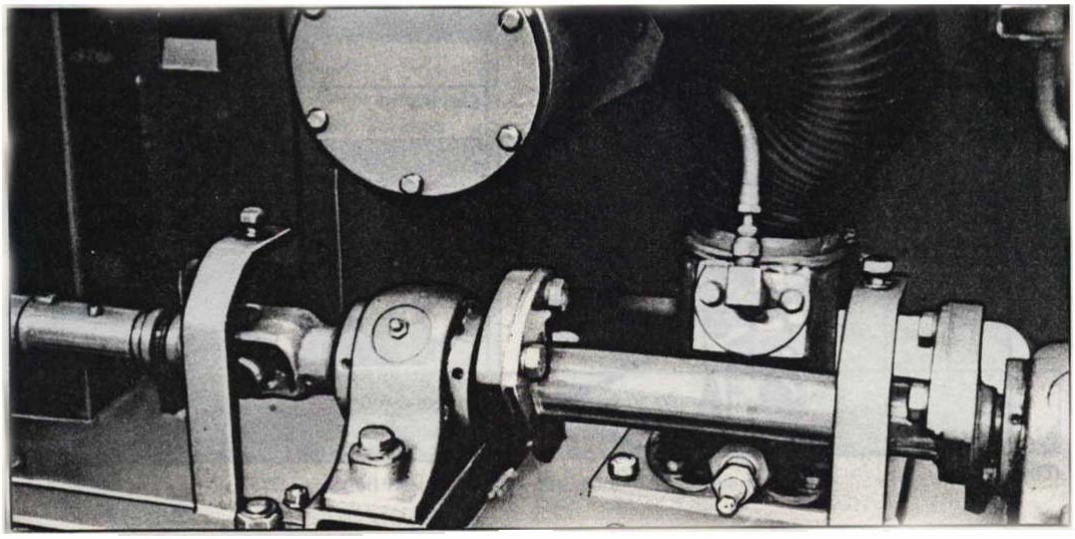


ITEM 12



ITEM 6

Customer's Name & Address:

Paver Number:

Note: With Apollo's policy of continually improving products, specifications are subject to change without notice. Actual dimensions, clearness, weight & other specifications may vary due to fabrication variables, options of custom engineering.