

CLARK

FORM 2386

OIL COOLER PRESSURE DROPS FOR CURRENT PRODUCTS

| <u>MODEL</u> | <u>NORMAL</u> | <u>MAXIMUM</u> |
|--------------|---------------|----------------|
| 35C | 20 PSI (1,4) | 30 PSI (2,1) |
| 45C | 20 PSI (1,4) | 30 PSI (2,1) |
| 55C | 20 PSI (1,4) | 30 PSI (2,1) |
| 75C | 10 PSI (0,7) | 25 PSI (1,7) |
| 125C | 10 PSI (0,7) | 30 PSI (2,1) |
| 175C | 10 PSI (0,7) | 30 PSI (2,1) |
| 275C | 20 PSI (1,4) | 55 PSI (3,9) |
| 475C | 15 PSI (1,0) | 35 PSI (2,4) |
| 475CT | 15 PSI (1,0) | 30 PSI (2,1) |
| 675C | 10 PSI (0,1) | 35 PSI (2,4) |
| 280B | 10 PSI (0,1) | 30 PSI (2,1) |
| 380B | 15 PSI (1,0) | 35 PSI (2,4) |
| 664D | 10 PSI (0,7) | 30 PSI (2,1) |
| 665D | 10 PSI (0,7) | 30 PSI (2,1) |
| 666D | 10 PSI (0,7) | 30 PSI (2,1) |
| 667D | 10 PSI (0,7) | 30 PSI (2,1) |
| 668C | 10 PSI (0,7) | 30 PSI (2,1) |

CLARK

Service gram

July 15, 1964

SG-244

SUBJECT: Cooling System Maintenance
All Models of the MICHIGAN Line

The cooling systems in the MICHIGAN Line of construction machinery equipment serves the engine, torque converter and transmission components of the drive line. The cooling system is just as important to the engine as is the lubricating system or the fuel system. It also serves to cool the oil in the torque converter and transmission hydraulic system by virtue of an oil cooler located at the bottom of the radiator.

It pays to keep the cooling system in good condition because neglect will result in expensive repair bills and downtime. Complete failure of the cooling system will ruin an engine within a very few minutes. Nobody would purposely operate an engine without water, but many engines, converters and transmissions are being damaged slowly each day by cooling systems which are only 50% to 75% efficient due to lack of proper maintenance. To keep the cooling system efficient it is necessary to do the following:

1. Keep the Cooling System Clean
2. Insure Coolant Circulation
3. Keep the Cooling System Full
4. Prepare for Seasonal Operation
5. Practice Preventive Maintenance

To accomplish the above the following practice is recommended:

DAILY OR SHIFT:

1. Check coolant level in radiator and refill as required with clean soft water.

EVERY 50 HOURS OF OPERATION:

1. Check Cooling System for Leaks. Check radiator, hoses, oil cooler, water pump, engine block and head, and drain cocks for leaks. Institute corrective measures where necessary. Loss of coolant due to ruptured or collapsed hoses, loose clamps, leaking or faulty water pumps and drain cocks can and will result in expensive repairs or replacement.

2. Inspect all belts for servicable condition and proper tension. Neglect and improper tension often leads to inadequate cooling, bearing failure of the driven part and short belt life. Belts should be just tight enough to drive the moving parts without slipping. Always replace belts as matched sets.
3. Whenever air temperature is 32° F. or lower, or when there is danger of water freezing in the cooling system, use a hydrometer to check freezing point of solution (permanent type anti-freeze) when system is at operating temperature. If necessary add additional anti-freeze according to manufacturer's instructions to maintain a safe level beyond the freezing point (See Preparation for Seasonal Operation).

EVERY 500 OPERATING HOURS (Or oftener where operating conditions warrant):

1. Clean Radiator Core. External surfaces of radiator core must be kept clean, straight and unobstructed to prevent blocking the air flow and causing overheating.

Flying objects such as sand, dust, leaves, twigs, bugs or other debris that plug the core or adhere to water or oil streaks impair the cooling efficiency.

Use compressed air, steam or a high pressure water stream and remove such objects opposite the air flow through the core assembly. Oil streaks should be removed using a solvent non-harmful to hoses and wiring insulation. Source of oil leakage should be investigated and corrected as soon as possible. If left unattended to, additional oil loss adhering to radiator fins will only serve to collect dust and dirt impairing cooling. Straighten bent fins being careful not to puncture or enlarge the openings.

PREPARATION FOR SEASONAL OPERATION:

1. Twice a year the cooling system should be completely drained, flushed and refilled with clean soft water. Consult applicable engine operators manual for detailed instructions on flushing, cleansing, addition of rust inhibitors, water conditions and filters.

* * * * *

REMEMBER A STITCH IN TIME SAVES NINE. A LOOSE \$1.25 HOSE CLAMP CAN RUIN A ENGINE, CONVERTER OR TRANSMISSION COSTING THOUSANDS OF DOLLARS.

CLARK

Service gram

April 5, 1971

MICHIGAN SG-292A
Group Ref. No. 1700

(This bulletin supersedes and replaces SG-292, dated 6-28-68.

REASON: To incorporate Supplement No's. 1 & 2 and update listing of approved anti-freezes).

SUBJECT: Use of Permanent Type Anti-freeze (Ethylene Glycol Base) in Engine Cooling Systems of All Models in the MICHIGAN Line when shipped from the Factory

Machines are shipped from the Factory to all points on the globe. Since ambient temperatures at destinations and in regions through which they must pass while in transit are an unknown factor, the following practice has been adopted at the Factory. On a year around basis, all machine shipped will have the cooling systems filled with a 50-50 solution of Ethylene Glycol Base Permanent Type Anti-freeze. This affords a protection against freezing to approximately -35°F.

The brand of anti-freeze used at the Factory is Valvoline Permanent Anti-freeze and Coolant manufactured and marketed by the Valvoline Oil Co., Division of Ashland Chemical Co. This brand of anti-freeze is compatible with the chromate element used in the cooling system filters described below.

The anti-freeze solution added to the cooling system at the factory should be retained in the system in areas where there is danger of freezing, or may be drained, if desired, in areas where ambient temperatures do not approach the freezing point at any time. When system is drained, it should be thoroughly flushed and refilled with clean soft water. Consult applicable engine operators manuals for detailed instructions on flushing, cleansing, addition of rust inhibitors, water conditioners and filters. If anti-freeze solution is left in the system, it should be drained, system flushed and refilled with a fresh fill on a minimum basis of once a year. This is required since the rust inhibitors in any anti-freeze do wear out due to contamination and use.

All Cummins powered machines are equipped with the Cummins Corrosion Resistor. On G. M. powered machines the Perry Water Filter is available as optional equipment. Both of these types of water filters perform the function of treating the coolant to resist oxidation and corrosion, to reduce electrolysis in the system and to mechanically filter the coolant. Both types utilize a Chromate element as standard equipment with a Borate or P.A.F. element available as an option for use with permanent type anti-freezes. Both types of water filters, however, presently permit the use of the Chromate element with ethylene

glycol base anti-freezes provided such anti-freeze is wholly compatible with the chromate filter system. Many ethylene glycol base anti-freezes have been found to be compatible with this system.

Recently a number of anti-freeze manufacturers have incorporated into their product the addition of a "Stop-Leak" or "Anti-Leak" compound.

An investigation has been made into the effect of usage of such stop-leak anti-freezes in conjunction with both of the water filters mentioned previously. Both Cummins Engine Co. and the R.M. Hollingshead Corp. (manufacturers of the Perry Water Filter) definitely do not recommend the use of any stop leak compounds, whether the stop-leak is in the anti-freeze or added to the coolant. The same rule applies for the use of soluble oil whether it is in the anti-freeze or added to the coolant. The following comments are given:

1. Stop-Leak and anti-leak compounds both contain solid particles which will build up on the water filter element and eventually stop the flow through the filter.
2. Soluble oils will form a film on the sacrificial plate and ion exchange resin of the filter and thus render both incapable of performing their function in protecting the system.
3. If a customer insists he wants to try to stop a leak in his cooling system with a stop-leak compound, he should shut-off the water filter before adding the stop-leak. After a short operating interval to give the stop-leak time to work, he should then turn on the water filter to remove the excess particles from the coolant. Needless to say, he will then have to change the water filter element and clean the sump to provide effective coolant filtration.

In view of the above, we recommend you advise your customers not to use anti-freezes with stop-leak additives in machines in the MICHIGAN line equipped with either the Cummins Corrosion Resistor or the Perry Water Filter.

The following is a list of anti-freezes which have been tested by the manufacturer of these water filters, to be found chemically compatible, and are approved for use with the Chromate element in these filters:

| <u>Manufacturer</u> | <u>Brand Name or Designation</u> |
|-------------------------------|----------------------------------|
| American Better Chemicals | Formula No. 7120 |
| Autoline Oil Company | Autoline Antifreeze |
| Cato Oil and Grease Co., Inc. | Wanda Permanent Antifreeze |
| Cities Service Oil Co. | Citgo Premium Antifreeze |
| Dow Chemical Company | Dowtherm 209 Coolant |
| | Sentinel Antifreeze Coolant |
| | Formula No. 769 |
| | Formula No. 777 |
| | Dow Super Coolant Antifreeze |
| | Dow Weather Set |

Manufacturer

Dreyden Oil Co., Inc.
E. I. Dupont DeNemours & Co.

Farmers Union Central Exchange
Firestone Tire and Rubber Co.
General Tire Co.
George Senn, Inc.
Getty Oil Company
Gulf Oil Company
Houston Chemical Co.
J. D. Street Co., Inc.

Jefferson Chemical Co.
Kendall Refining Co.
Mutual Dealers Wholesale, Inc.
Northern Petrochemical Co.

Olin Mathieson Corp.

Pennsylvania Refining Co.
Quaker Oil Corp.
Quaker State Oil and Refining Co.
Sears and Roebuck Co.
Shell Oil Company
Standard Oil Company

Sun Oil Co.
Superb Oil Co.
Texaco Inc.
Tichenor Chemical Co.
Union Carbide Corp.

Union Oil Co. of Calif.

Valvoline Oil Co. (Div. of
Ashland Oil & Refining Co.)
White Motor Corp.
Wyandotte Chemical Corp.

Brand Name or Designation

Dreyden Permanent Antifreeze
Telar
Zerex (without stop-leak)
Co-Op Antifreeze Year Round Coolant
Frigitone Antifreeze
General Tire Antifreeze
Permanent Antifreeze
Flying A Quality Antifreeze
Gulf Antifreeze and Summer Coolant
Formula Number 701
Zephyr Permanent Antifreeze and
Summer Coolant
JC-30
Kendall Antifreeze
Worthmore Permanent Antifreeze
Peak Antifreeze
All Weather Antifreeze
Subzero Antifreeze
Formula Number OM 75B
Formula Number OM 91B
Formula Number OM 93B
Formula Number OM 96
Penn Drake Permanent Antifreeze
Quaker Maid Permanent Antifreeze
Quaker State Antifreeze
Sears Antifreeze
Shell Antifreeze and Coolant
Atlas Perma-Guard
Kyso Antifreeze
Sunco Multi-Season Antifreeze
Superb Permanent Antifreeze
Startex P.F.
Sno-Flo Monocol 500
Formula G-300
Winter Flo (without anti-leak)
Formula 376
Formula 386
Union-76 Year Round Antifreeze
and Coolant
Valvoline Permanent Antifreeze
and Coolant
White Antifreeze
Code No. 241-0 (0A548a11)
Code No. 241-5 (U3034 CW)
Code No. 241-7 (0A548c11)
Code No. 241-9 (U4347CC-CD)

Canadian Antifreeze Brands Compatible With Chromate

| <u>Manufacturer</u> | <u>Brand Name or Designation</u> |
|---|--|
| B. P. Canada Ltd. Canadian Tire Corp. Ltd. | B. P. Antifreeze Perma-fill Super Antifreeze and Summer Coolant Polar Antifreeze |
| Durol Antifreeze Sales | Durol "concentrated" Permanent Antifreeze |
| Gulf Oil Canada Ltd. Home Oil Distributors Ltd. Imperial Oil Ltd. Standard Chemical Ltd. Standard Oil of B.C. Ltd. Sun Oil Co., Canada Ltd. Supertest Petroleum Corp. Ltd. Texaco Canada Ltd. Union Carbide Canada Ltd. | Gulf Antifreeze and Summer Coolant Home Exel Antifreeze Esso-Rad Stan Gard Antifreeze and Coolant Chevron Antifreeze Sunco Custom Quality Antifreeze Supertest All-Canadian Antifreeze Startex Antifreeze Coolant (P.F.) Formula G-375 Prestone Ucar |
| Warren Packaging Ltd. | Dual Duty Antifreeze and Summer Coolant |

CLARK

Service gram

22 November 1978

MICHIGAN SG-735
Group Ref. No. 1500

SUBJECT: Installation of Radiator Sand Grid Kits
Model 175B, 275B, 280-IIIA, 380-IIIA & 475B

Radiator sand grid kits are available for installation on Model 175B, 275B & 475B tractor shovels and 280-IIIA & 380-IIIA tractor dozers. Sand grids are installed to give protection to the radiator from the sandblasting effect caused by sand and grit particles in the air flow of the fan.

If it is necessary to install a sand grid kit, make an order for the correct kit from the list below. Send all orders for sand grid kits to Construction Machinery Division, Sales Department, Benton Harbor, Michigan 49022. Install the sand grid kit as shown in this bulletin.

PARTS LIST FOR ONE MACHINE:

- 1 - 2521718 Sand Grid Kit 175B S/N 427C & 438C consisting of:
 - 1 - 2521401 Sand Grid Assembly
 - 1 - 2521345 Bracket
 - 1 - 2521716 Bracket
 - 2 - 2521715 Bracket
 - 10 - 18C-416 Bolt
 - 8 - 18C-412 Bolt
 - 18 - 4E-04 Lockwasher
 - 10 - 25E-13 Washer

- 1 - 1518388 Sand Grid Kit 275B S/N 425C & D and 479A consisting of:
 - 1 - 1518386 Sand Grid Assembly
 - 12 - 18C-508 Bolt
 - 12 - 4E-05 Lockwasher
 - 5 - 17C-624 Bolt
 - 18 - 25E-18 Washer

PARTS LIST FOR ONE MACHINE CONTINUED:

- 1 - 2521342 Sand Grid Kit 280-IIIA S/N 460C consisting of:
 - 1 - 2521239 Sand Grid Assembly
 - 1 - 2521345 Bracket
 - 1 - 2521344 Bracket
 - 8 - 18C-408 Bolt
 - 14 - 4E-04 Lockwasher
 - 6 - 18C-416 Bolt
 - 6 - 17C-520 Bolt
 - 6 - 25E-13 Washer

- 1 - 1518388 Sand Grid Kit 280-IIIA S/N 456B consisting of:
 - 1 - 1518386 Sand Grid Assembly
 - 12 - 18C-508 Bolt
 - 12 - 4E-05 Lockwasher
 - 5 - 17C-624 Bolt
 - 18 - 25E-18 Washer

- 1 - 2521066 Sand Grid Kit 380-IIIA S/N 434A consisting of:
 - 1 - 2519701 Sand Grid Assembly
 - 2 - 2519700 Bracket Assembly
 - 2 - 2520229 Tapped Block
 - 8 - 18C-616 Bolt
 - 4 - 25E-22 Washer
 - 16 - 25E-18 Washer
 - 4 - 4E-08 Lockwasher
 - 12 - 60D-6 Locknut
 - 4 - 18C-620 Bolt
 - 4 - 18C-816 Bolt

- 1 - 2519547 Sand Grid Kit 380-IIIA S/N 418A, B, C & D consisting of:
 - 1 - 2519358 Sand Grid Assembly
 - 2 - 2519700 Bracket Assembly
 - 2 - 2520229 Tapped Block
 - 4 - 18C-816 Bolt
 - 4 - 619029 Washer
 - 4 - 4E-08 Lockwasher
 - 12 - 17C-516 Bolt
 - 4 - 18C-620 Bolt
 - 8 - 656672 Washer
 - 4 - 60D-6 Locknut

PARTS LIST FOR ONE MACHINE CONTINUED:

- 1 - 2521067 Sand Grid Kit 380-111A S/N 418E consisting of:
 - 1 - 2519701 Sand Grid Assembly
 - 2 - 2519699 Bracket Assembly
 - 2 - 2520229 Tapped Block
 - 8 - 18C-616 Bolt
 - 4 - 25E-22 Washer
 - 16 - 25E-18 Washer
 - 4 - 4E-08 Lockwasher
 - 12 - 60D-6 Locknut
 - 4 - 18C-620 Bolt
 - 4 - 18C-816 Bolt

- 1 - 1546929 Sand Grid Kit 475B S/N 421G, H & J and 420B consisting of:
 - 1 - 1546928 Sand Grid Assembly
 - 2 - 2523437 Bracket Assembly
 - 2 - 1548581 Tapped Block
 - 4 - 18C-820 Bolt
 - 4 - 17C-629 Bolt
 - 4 - 25E-22 Washer

INSTALLATION:

1. See the correct installation drawing and install the sand grid kit as shown. Use Figure 1 for Model 175B S/N 427C and 438C. Use Figure 2 for Model 275B S/N 425C & 425D, 479A and 280-111A S/N 456B. Use Figure 3 for 280-111A S.N 460C. Use Figure 4 for 380-111A S/N 418A, 418B, 418C and 418D. Use Figure 5 for 380-111A S/N 418E and 434A. Use Figure 6 for 475B S/N 421G, 421H, 421J and 420B.

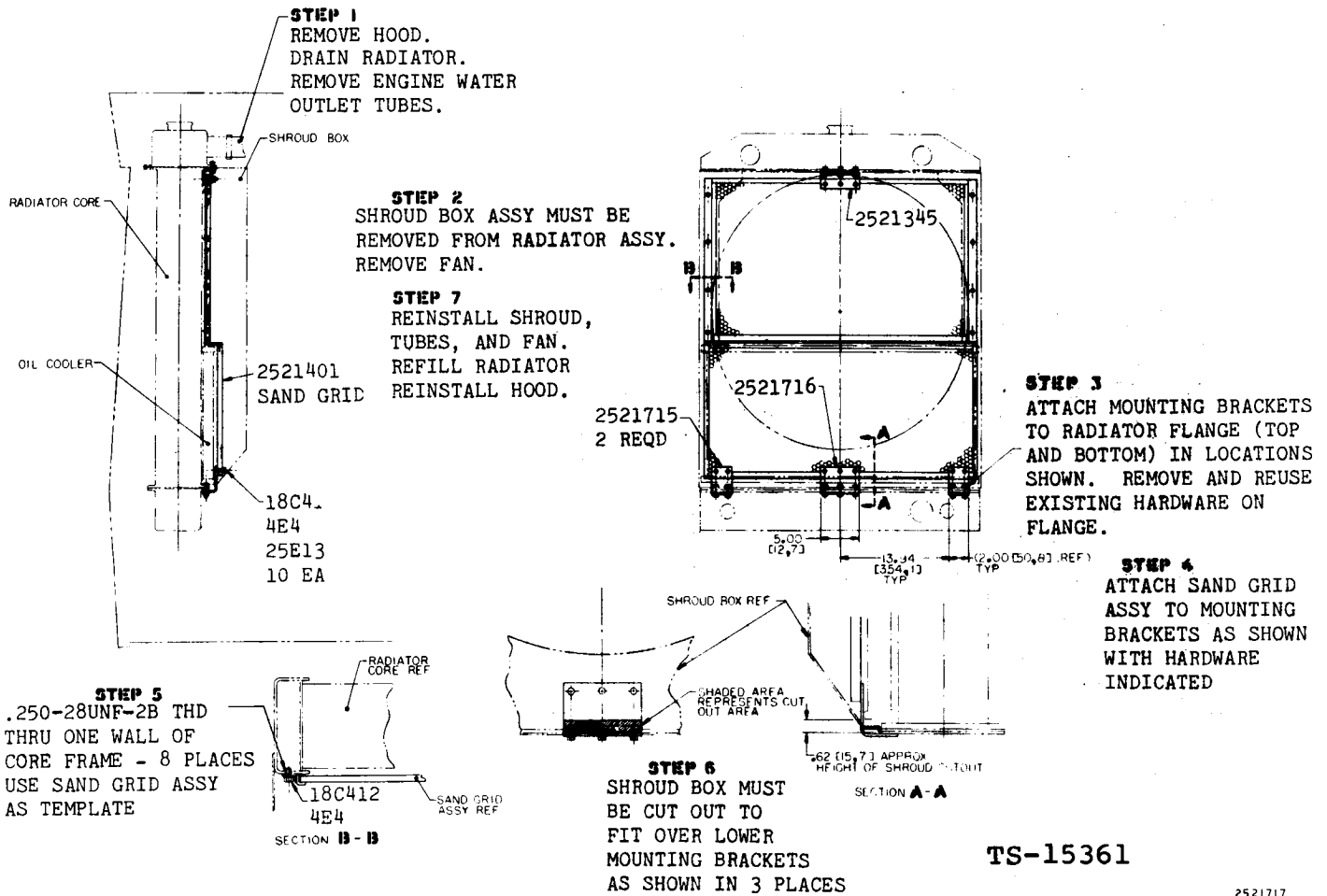


Figure 1. Installation of Radiator Sand Grid Kit for Model 175B, S/N 427C & 438C.

INSTALLATION INSTRUCTIONS

1. REMOVE RADIATOR SHROUD & THE 5 CAPSCREWS SHOWN FROM THE RADIATOR
2. INSTALL SAND GRID ASSY POSITIONING BY INSERTING THE 5 CAPSCREWS AS NOTED
3. LOCATE & TAP THE 12 THREADED HOLES NOTED INSTALL THE 12 CAPSCREWS
4. REINSTALL RADIATOR SHROUD. NOTE THE 2 TOP CAPSCREWS MAY HAVE TO BE REMOVED BEFORE INSTALLING SHROUD.

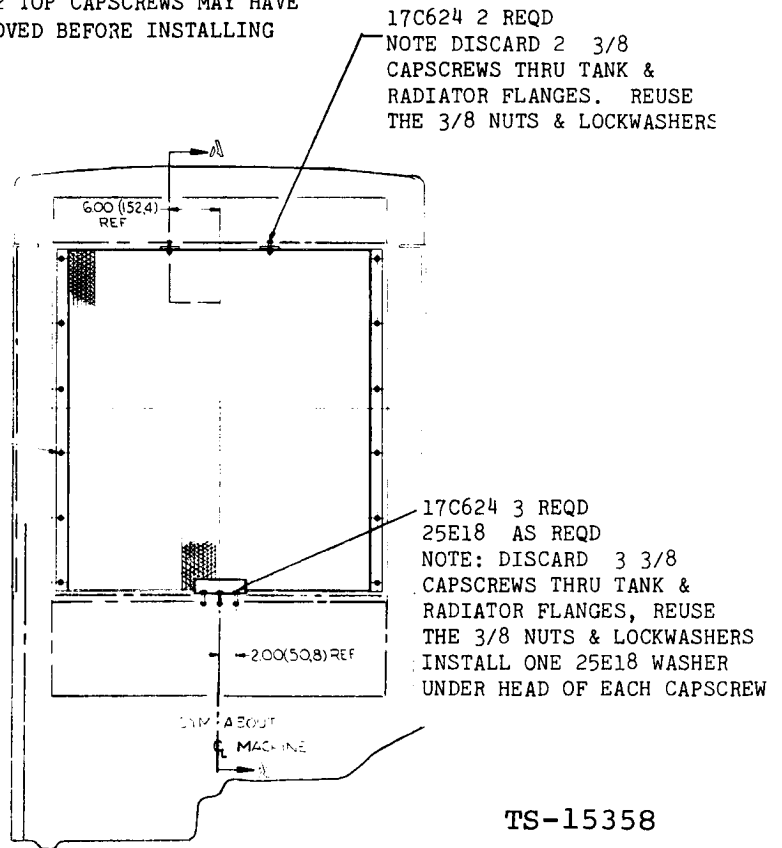
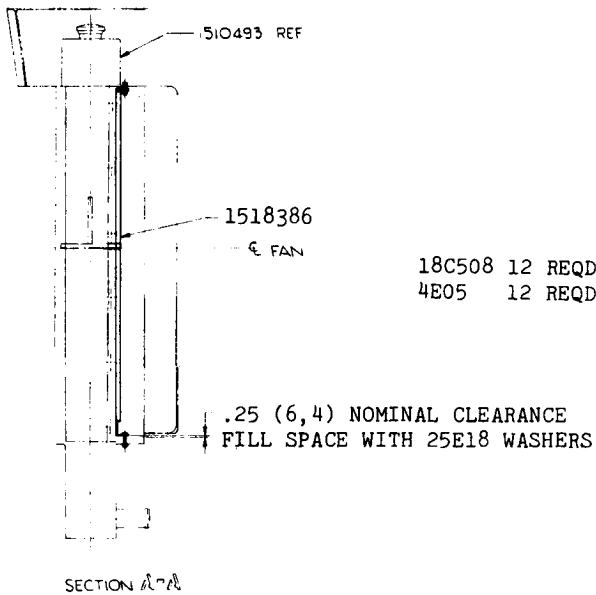
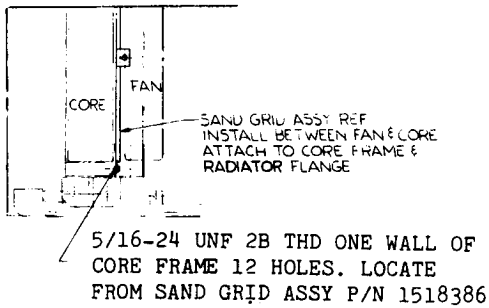


Figure 2. Installation of Radiator Sand Grid Kit for Model 275B; S/N 425C, 425D & 479A and Model 280-111A S/N 456B

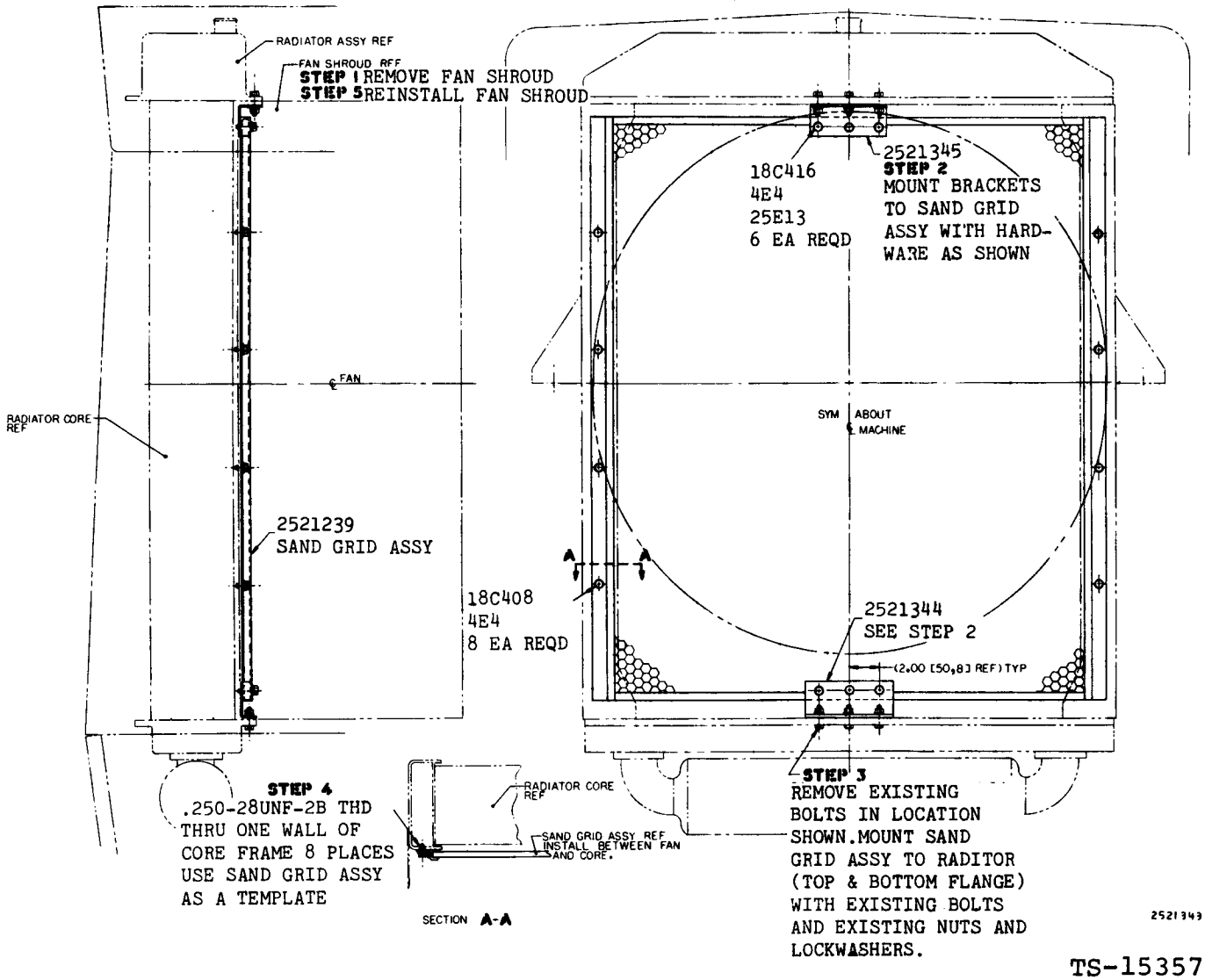
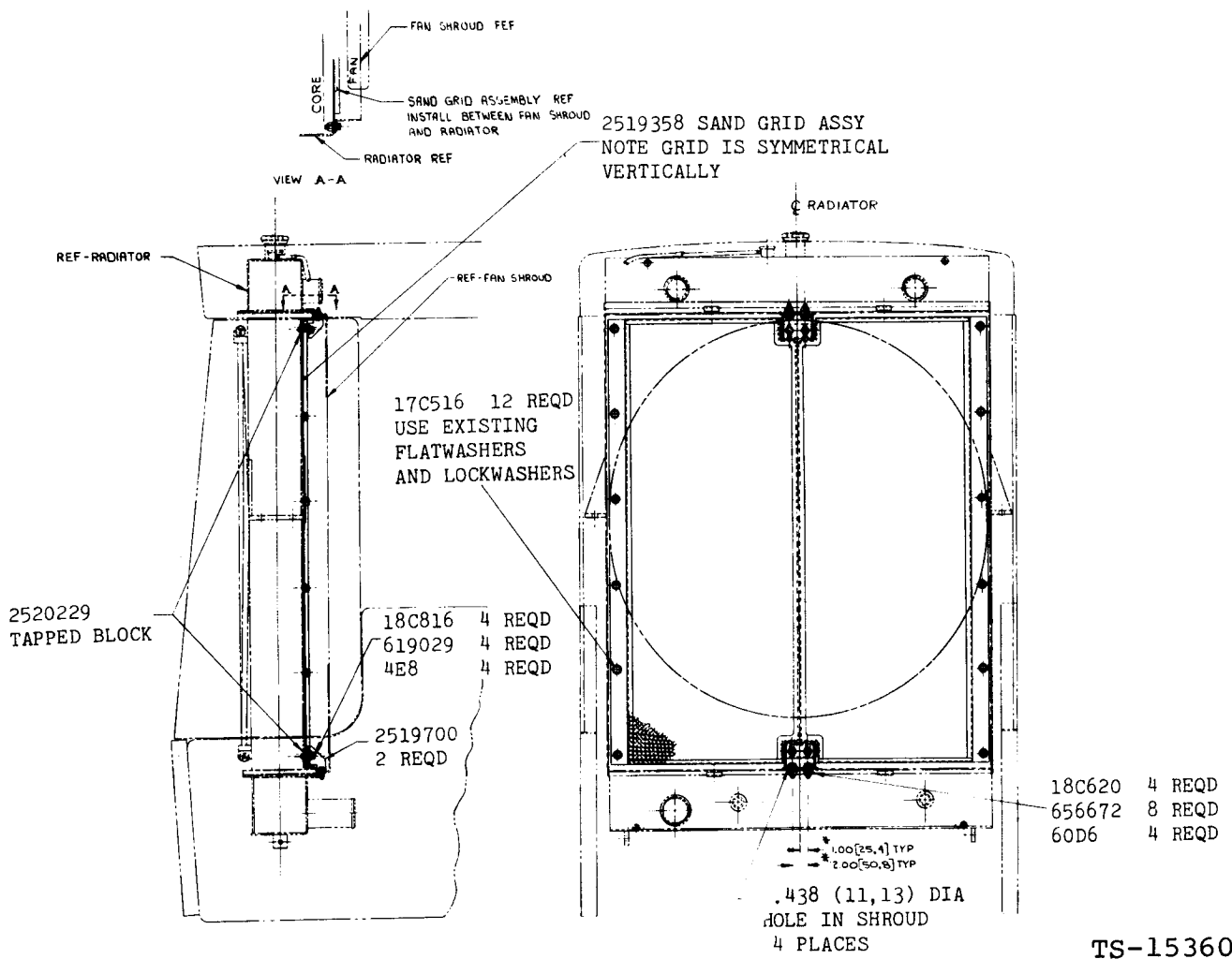


Figure 3. Installation of Radiator Sand Grid Kit for Model 280-111A S/N 460C



2520226

Figure 4. Installation of Radiator Sand Grid Kit for Model 380-111A S/N 418A, 418B, 418C and 418D.

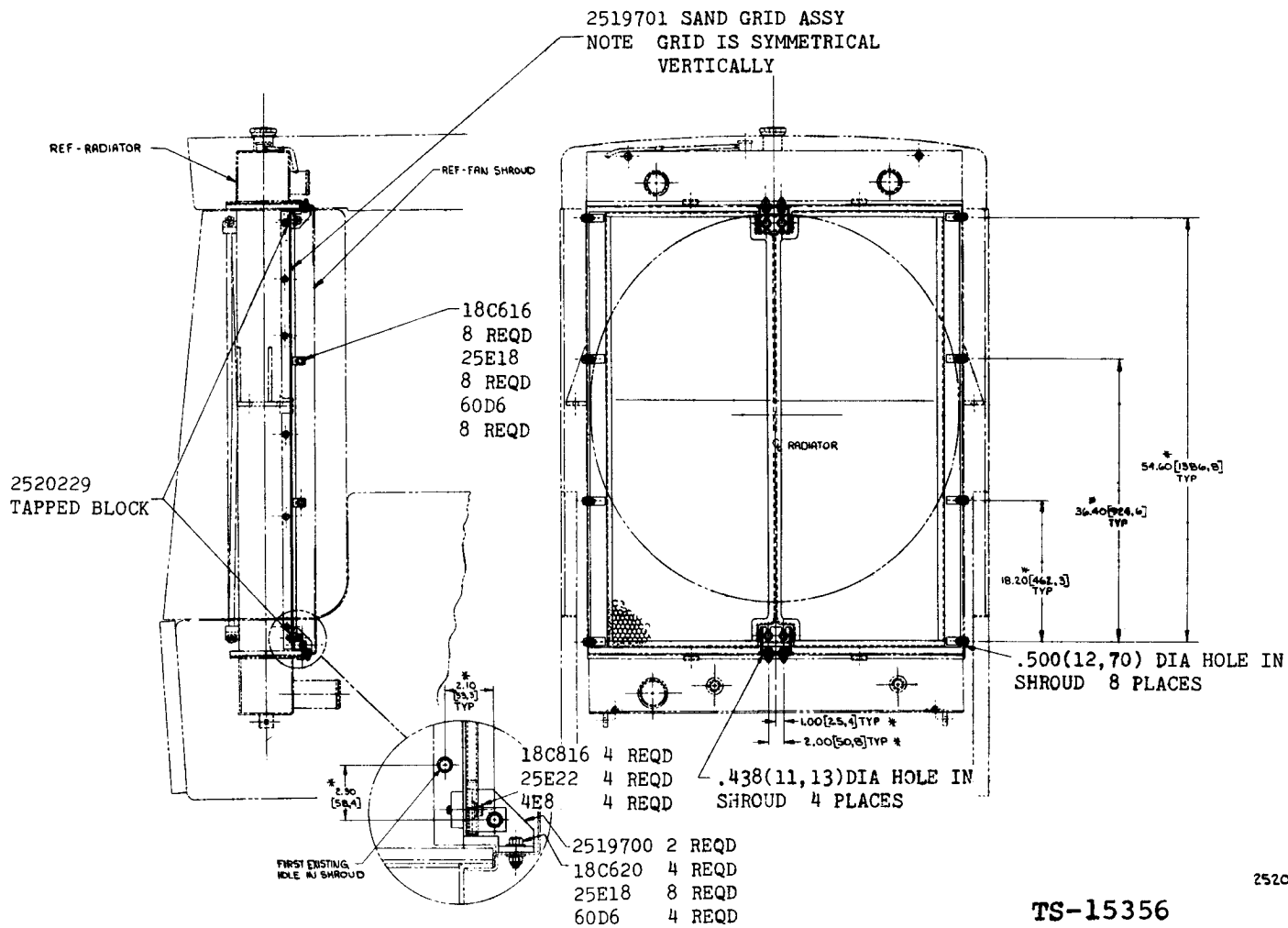


Figure 5. Installation of Sand Grid Kit for Model 380-IIIA S/N 418E and 434A

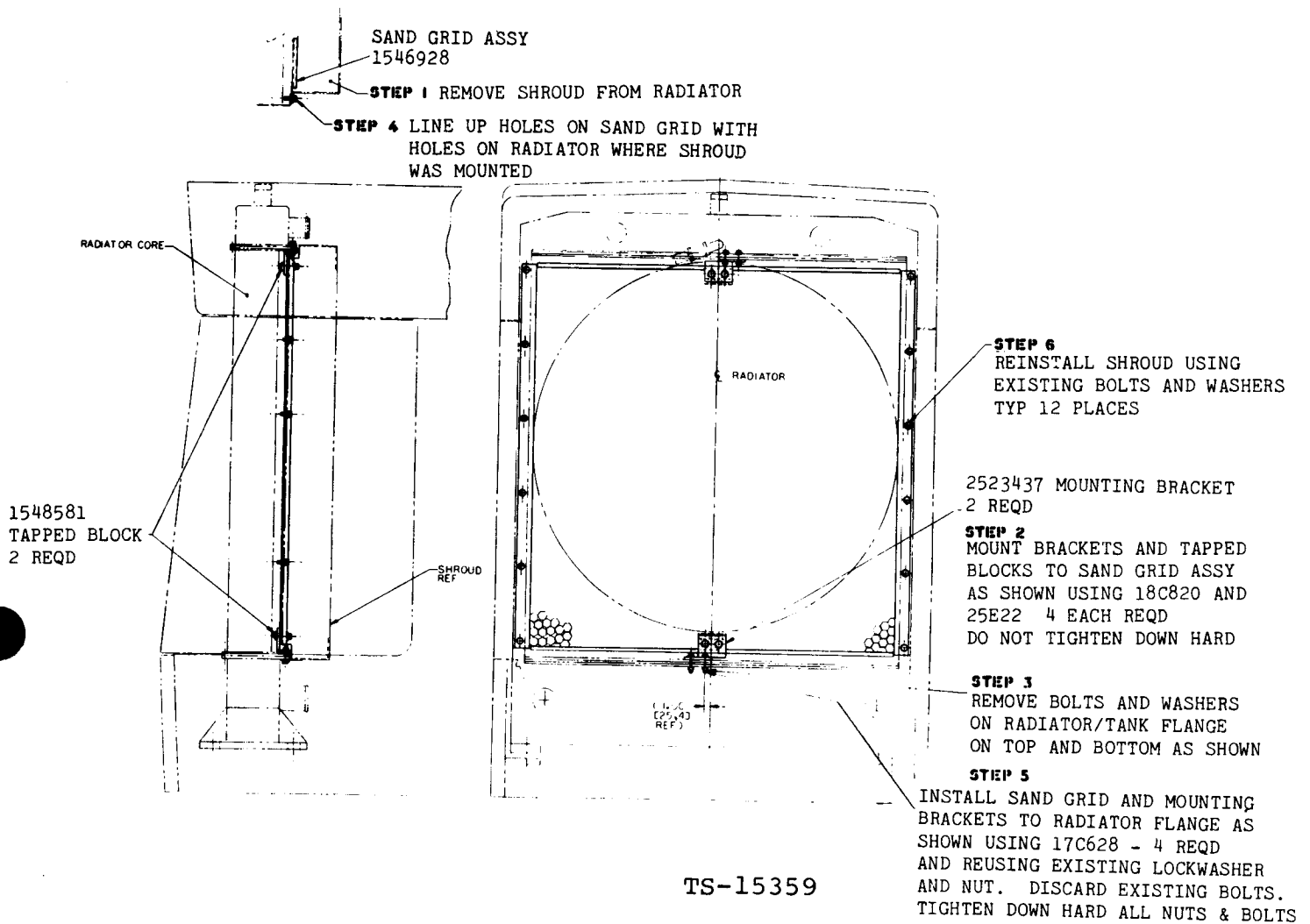


Figure 6. Installation of Sand Grid Kit for Model 475B S/N 421G, 421 H, 421J and 420B.