ELECTRO-MOTIVE

M.I. 550
*Rev. A

MAINTENANCE INSTRUCTION

# LOCOMOTIVE RADIATOR ASSEMBLY AND INSTALLATION

## RADIATOR BANK ASSEMBLY

Due to the construction of locomotive radiators, particularly the bonding of the tubes to the core headers, it is imperative that radiators be properly assembled and installed so that the cores will be properly supported and have no induced stresses.

The assembly of radiator cores affects reliability and performance. The following instructions apply to conventional soldered radiators as well as mechanical construction radiators. Single length core refers to cores that are approximately 686 mm (27") long. Multi-length core refers to cores that are approximately twice the length of single length cores. Soldered radiators have oblong tube ends while mechanical radiators have round tube ends. Refer to Fig. 1 for radiator nomenclature.

To ensure alignment of the side baffles and the side supports of the cores of the radiator banks it is suggested that assembly be done on a fixture similar to that shown in Fig. 2. It is imperative that the side baffle rails of the fixture be straight and also create a flat surface across the two rails. The core stops of the fixture must also be in a straight line at 90° to the lower side baffle rail.

A core handling fixture is a necessity. A fixture will minimize deflections of the cores and minimize the stress induced in the radiator cores and damage to the core headers. A fixture capable of handling single and multi-length cores is illustrated in Fig. 3. Radiator cores should always be stored and handled in the horizontal position or as close to the horizontal as possible.

Prior to assembly, the core headers and side baffles should be straightened to eliminate any damage that had occurred during shipment. This will allow proper clamping of the gasket between the headers, ensure uniform support of the core and minimize air leakage around the core.

To minimize core alignment problems and to optimize radiator performance, radiator banks should consist of cores all from the same manufacturer. Additionally, new and rebuilt cores should not be mixed within a bank assembly since rebuilt cores generally have a much shorter service life than new cores. Radiators for locomotives with cold side fans should be constructed of cores that are fitted with rod supports. The part numbers of these double length, 6-row cores, are 8462344 and 3027016.

Radiator assembly is governed by the number and lengths of the cores in the assembly.

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## ALIGNMENT OF RADIATOR CORES IN BANK ASSEMBLIES

The radiator cores must be aligned so that there is a minimum of bending or twisting on any core in the assembly. Therefore, all the cores in the assembly must be aligned so that the *core's mounting surfaces are aligned rather than aligning the core header bolt holes.* The alignment of the core mounting surfaces is accomplished by the bank assembly fixture, Fig. 2.

*This bulletin is revised and supersedes previous issues of this number.
Areas of change are indicated by vertical bars.

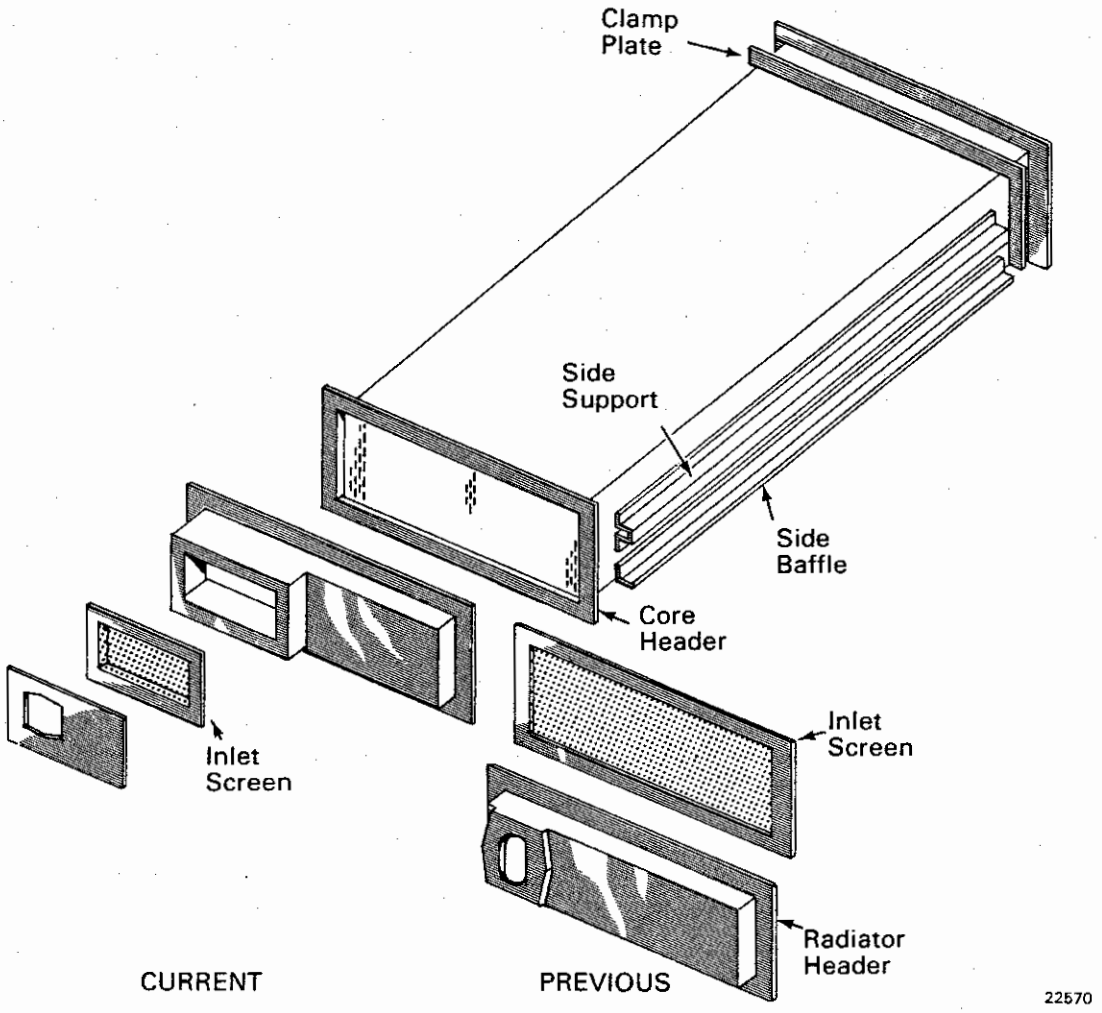



Fig.1 – Radiator Core Nomenclature

When assembling cores into banks, align multi-length cores as shown in Fig. 4. When old style single length cores which have separate bolted on side baffles are used (8206685 or 8490482), align per Fig. 5. The newer style single length cores with built-in side baffles and side supports are aligned per Fig. 4.

When the radiators for a bank are aligned, install a gasket between the core headers.

**NOTE**

Dress gasket with a coating of light oil to improve the seating capability and ease future gasket removal.

Apply the clamp bars and install the fasteners finger tight.

## FINAL ASSEMBLY

To protect radiator cores from contamination they are fitted with inlet screens. Older locomotives require a screen that covers the entire end of the core. This screen must be installed between 2 gaskets before the header is applied. On newer locomotives, the screen may be installed after the header has been installed.

**NOTE**

Dress gasket with a coating of light oil to improve the seating capability and ease future gasket removal.

The radiator headers must be installed so that the water inlet will be properly positioned to match the locomotive piping. The side of the cores that was next to the core stops in the fixture will rest in the locomotive long hood channel, refer to Fig. 7.

Before torquing the fasteners it is suggested that a piece of cardboard or a thin piece of wood be placed on the radiator finning to prevent damage to the finning as a result of contact with the hand tools. The clamp plates should be moved as close to the core as possible on both the width and height. It is necessary that the clamp plate be 1 mm (1/32") above the side baffle and 1 mm (1/32") within the

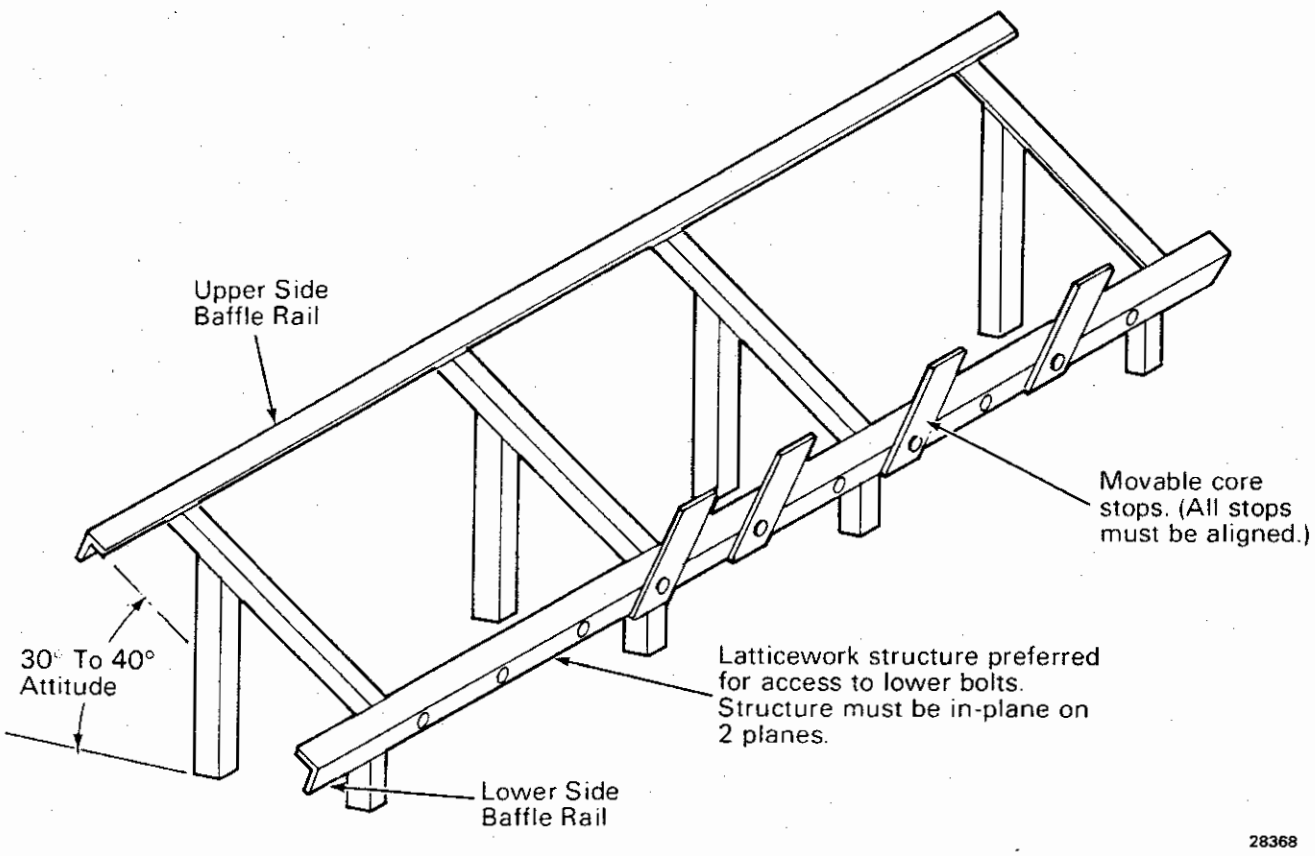



Fig.2 – Radiator Bank Assembly Fixture

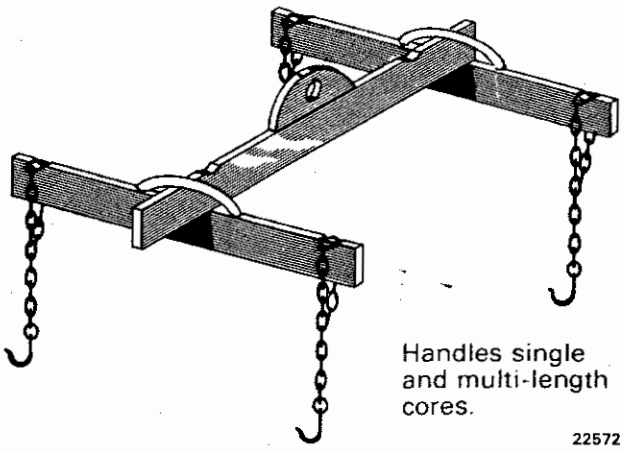



Fig.3 – Core Handling Fixture

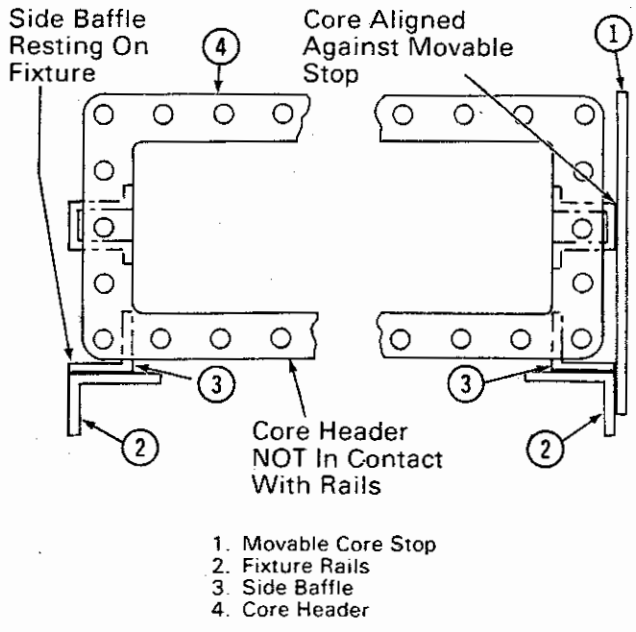



Fig.4 – New Style Single Length Core And Mutli-Length Core Alignment On Assembly Fixture

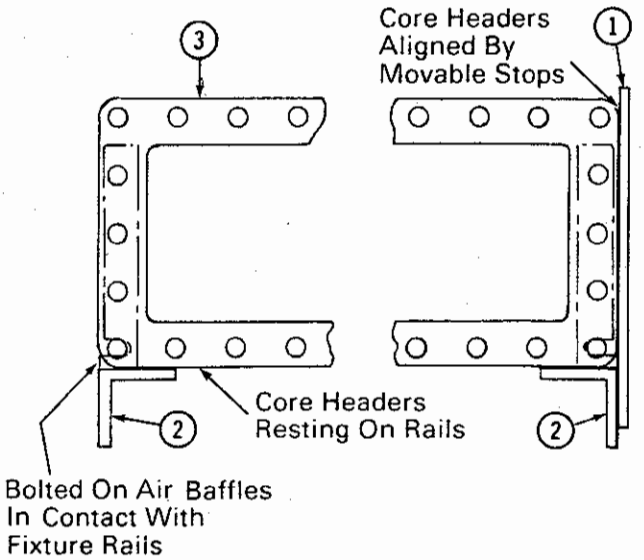



Fig.5 - Old Style Single Length Core Alignment On Assembly Fixture

the side support, refer to Fig. 6. The fasteners should be torqued to 102 N·m (75 ft-lbs). The fasteners should be tightened starting at the center of the core and working to the outside.

With the bank assembled, fittings should be installed to apply water pressure to the entire assembly. If water pressure at 414 kPa (60 psi) is not available, a method of applying air pressure to a flooded radiator should be devised to raise the pressure to 414 kPa (60 psi). After the last leak has been stopped the bank assembly should hold pressure for a minimum of ten minutes. Due to the relation of the gasket material it may be necessary to reapply the torque to the fasteners in the leaking area. With the radiator bank assembly completed and pressure tested it is ready for installation in the locomotive.

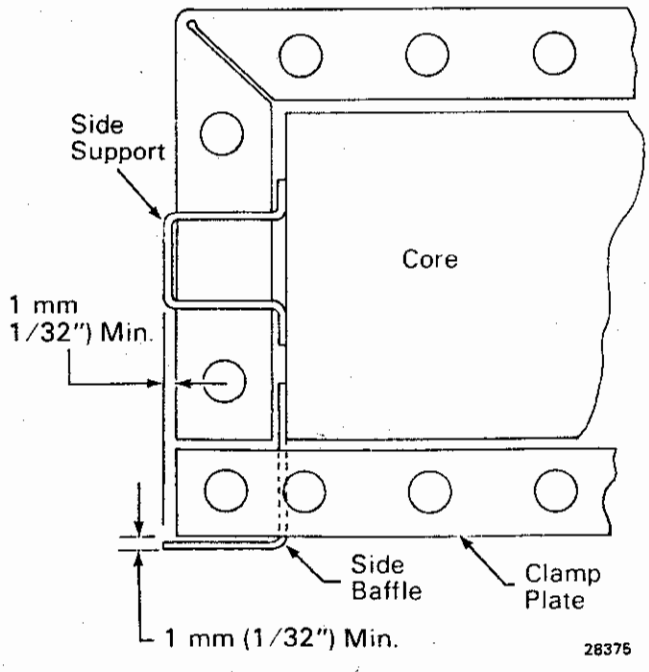



Fig.6 - Clamp Plate Clearances

# RADIATOR INSTALLATION

Refer to Fig. 7 for long hood nomenclature.

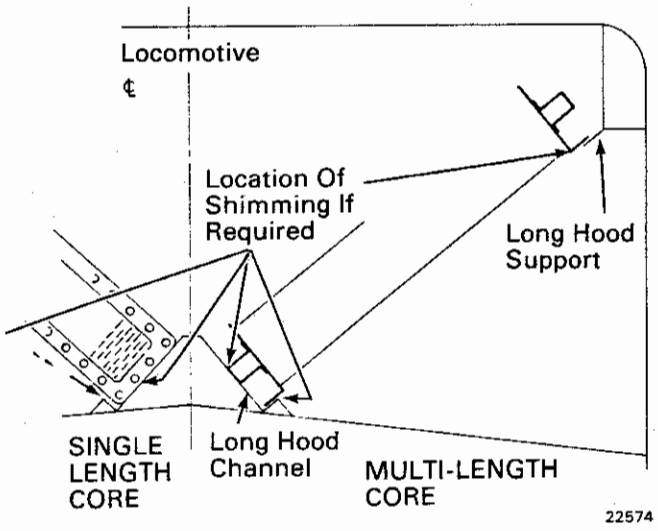



Fig.7 - Long Hood Nomenclature And Core Support

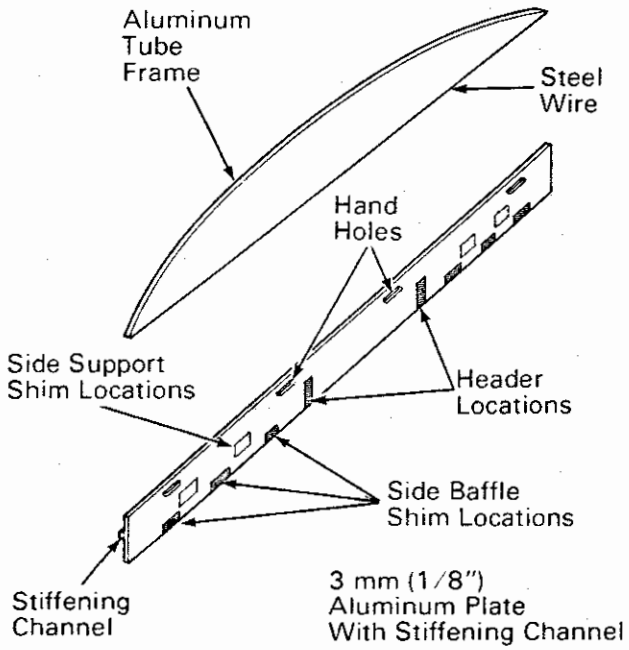
Prior to installation, it is necessary to check the condition of the long hood structure. The long hood channel of the locomotives should be cleaned of all debris that may have accumulated in it. The flatness of the long hood channel should be checked with a long straight edge or by stretching a wire along its length where the radiator support members will rest. This entails checking three surfaces: the long hood support, the inside of the long hood channel where the side baffles will rest, and the area of the long hood channel where the side supports will rest. Long hood channels that are not flat enough to provide adequate support of the cores must have corrections made by the installation of shimming. Two types of shimming are available.

## STEEL SHIMS

To support the radiator, the side baffles of each multi-length core must be in contact with the long hood channel at a minimum of three places with each being not less than 76 mm (3") in length. The free

header of a single length core must also be in contact with the channel. The side supports need two areas of contact that are not less than 76 mm (3") in length. The side of the free header of a single length core must also be in contact with the channel. Shims should not be laminated. Once the proper amount of shimming has been determined it should be tack welded to the channel and support of the long hood.

For ease of assembly and labor savings it is suggested that a fixture with a steel wire be constructed or a rigid gauge made of aluminum or a similar light material be constructed. The gauge should show the installation location of the side baffles, shims, and header locations. Ideally such a fixture would be constructed for each locomotive type being serviced. See Fig. 8 for an illustration of such fixtures. Figs. 9 and 10 show typical locations of core and header shimming.




Typical gauge for bank assembly of (1) single length core between (2) multi-length cores.

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Fig.8 - Straightness Fixture

## RUBBER SHIMS

The second method of shimming applies a rubber strip to the long hood channel and support of the locomotive. The rubber shim is held in place with an adhesive. This method eliminates the need for determining the flatness of where the side baffles rest but steel shims are still required to support the core side supports and the side of the header of a single length core that does not have another header bolted to it. Before installing the rubber shims, all existing metal shims and closure strips must be removed. The channel and the support should be cleaned and degreased before applying the adhesive. On locomotives that previously have not had rubber shimming, it is likely that some minor alteration to the long hood fan hatch flashing, pipe flange openings, and header mounting bolt locations may be necessary.

## RADIATOR ASSEMBLIES CONSISTING OF TWO OR MORE SINGLE LENGTH CORES

Each header should be in contact with the long hood support and the two surfaces of the long hood channel. Refer to Figs. 7 and 10 for illustrations of how the core is supported in the long hood.

## RADIATOR ASSEMBLIES CONSISTING OF ONE SINGLE LENGTH AND ONE MULTI-LENGTH CORE

The multi-length core should be supported at the baffle and side supports. The older style single length core header, at the joint between the two cores, must be shimmed on both sides of the core header to prevent lateral motion of single length core. No shimming is required under the single length core header. The single length core header should be used to attach the radiator assembly to the carbody.

## RADIATOR ASSEMBLIES CONSISTING OF ONE SINGLE LENGTH CORE BETWEEN TWO OR MORE MULTI-LENGTH CORES

The multi-length cores should be shimmed as above. No attempt should be made to shim the headers between the single and multi-length cores.

## RADIATOR ASSEMBLIES CONSISTING OF ONE OR MORE MULTI-LENGTH CORES

Each multi-length core should be shimmed as above.

# RADIATOR APPLICATION

Prior to placement of the radiator assembly into the locomotive radiator, finning that has been bent should be straightened with a fin comb. This is particularly important for the side of the radiator that will be facing the shutters of the locomotive.

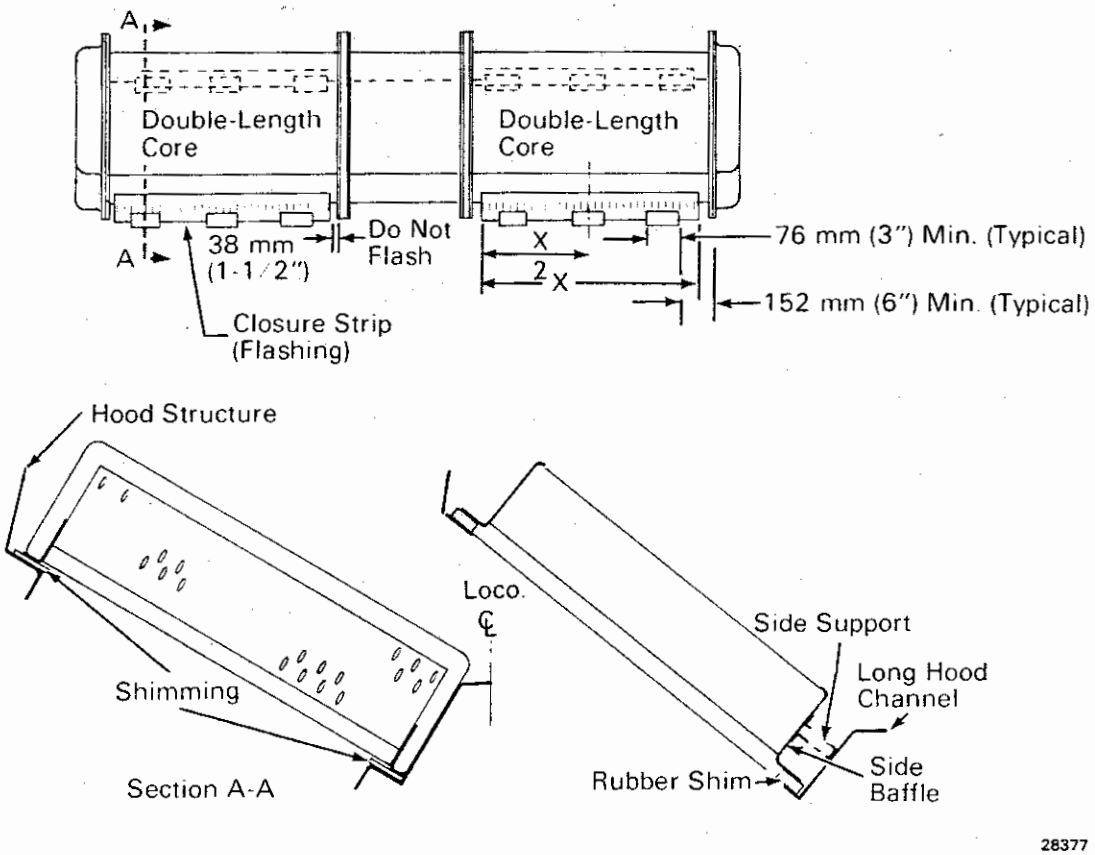



Fig.9 – Typical Shim And Flashing Locations

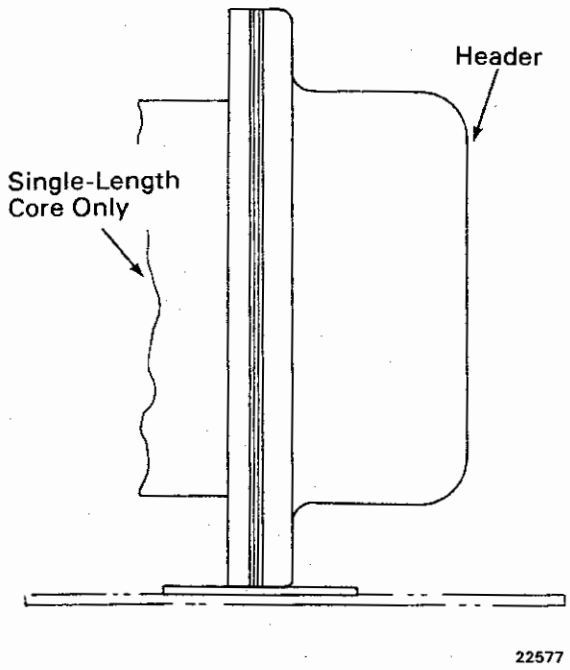



Fig.10 – Single Length Core Header Shimming

Once the radiator is installed access to the fins will be difficult. Once the radiator is in place the fins facing the top of the unit should be straightened with a fin comb.

With the long hood properly shimmed either with steel or rubber, the bank assemblies can be installed using a fixture similar to that shown in Fig. 11. During installation into the long hood care should be taken to avoid damage to the radiator finning.

## CLOSURE STRIPS

If steel shimming was used it is recommended that the installation be inspected for air gaps between the radiator side baffles and the long hood structure to determine the extent and size of the openings between the baffles and the supporting long hood structure. Openings larger than 3 mm (1/8") will allow an excessive amount of air to bypass the radiator assemblies, decreasing their performance. To prevent this, closure strips or flashing of 25 mm x 25 mm x 3 mm (1" x 1" x 1/8") angles or a 25 mm x 3 mm (1" x 1/8") strip should be welded to the long hood to restrict the flow of air through the openings, Fig. 12.

The flashing should be installed around the entire radiator assembly but should not be installed in the area between the header and the end of the side baffles at the end of each core, Fig. 9. Secure the flashing by tacking 38 mm (1-1/2") welds on 152 mm (6") centers. The use of rubber shimming eliminates the necessity for the flashing.

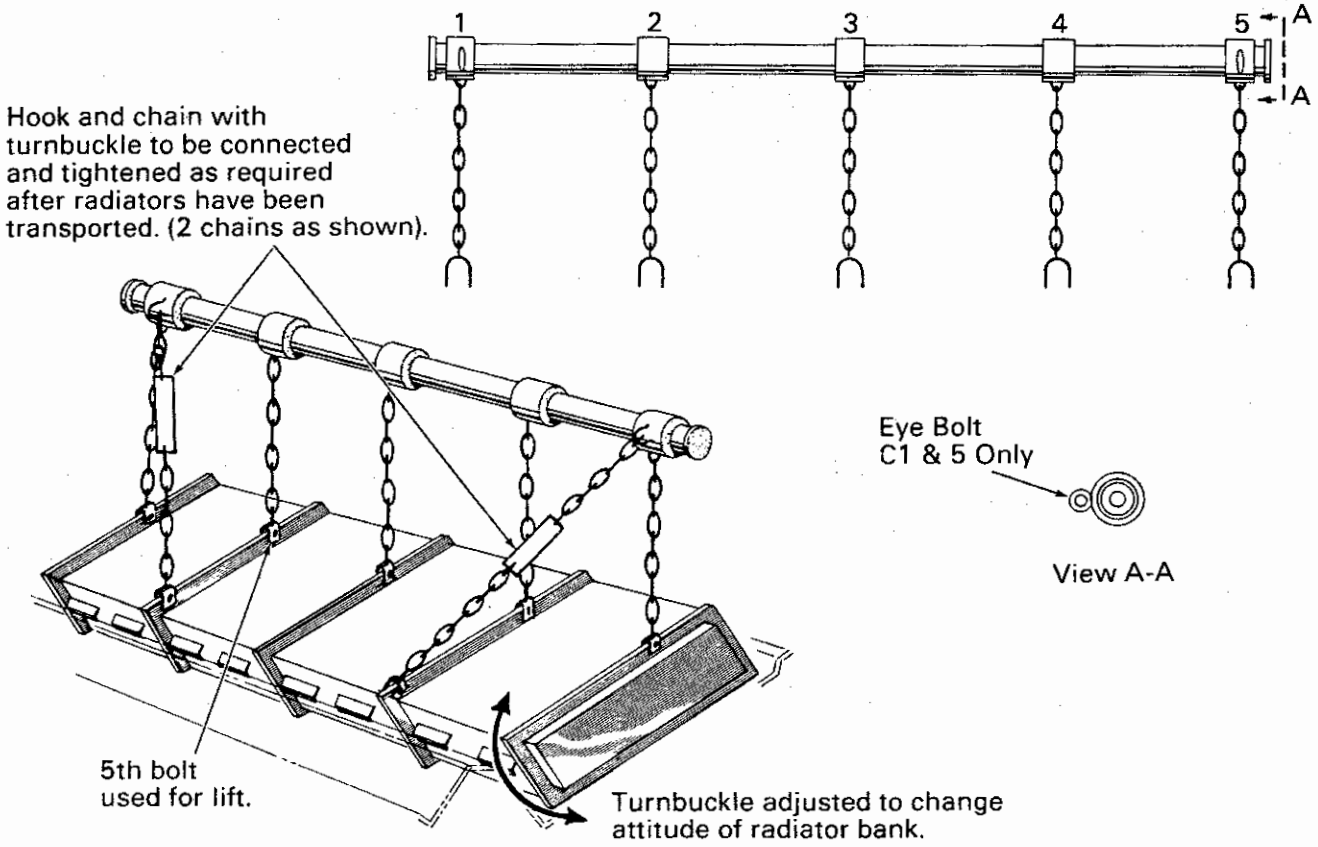
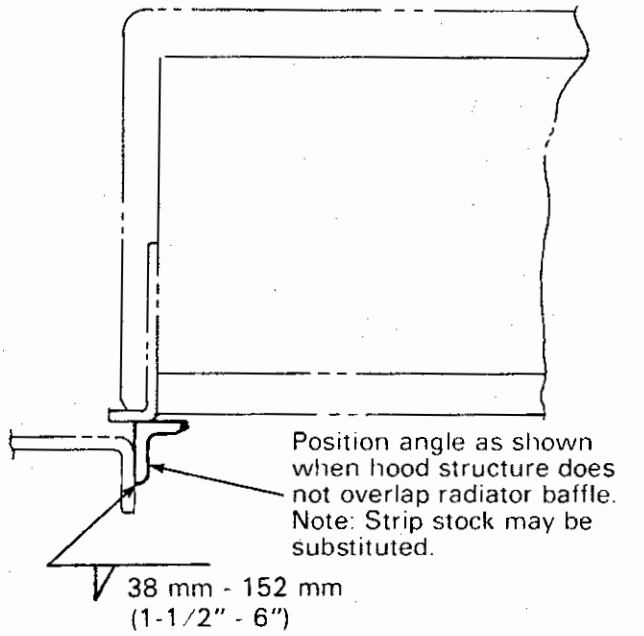



Fig.11 – Lifting Fixture



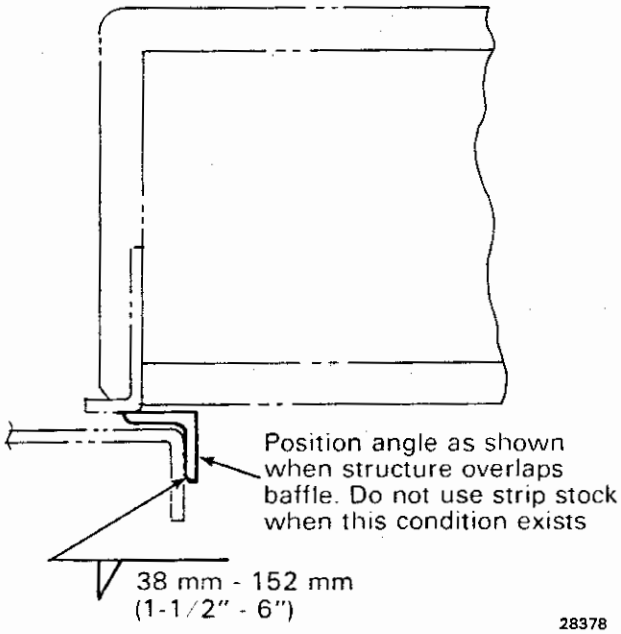




Fig.12 – Flashing Application

# SERVICE DATA

## SPECIFICATIONS

Bolts:

| | |
|---|---|
| Core to Core Fastening Header to Core | 102 N·m (75 ft-lbs) |

Fins Per Inch

| | Fin/Inch |
|---|---|
| Part No. 8127126 and 3129239 (SW1, NW2, F7A and B, FP7A, GP7L and R) | 9 |
| All Others | 10 |

Fin Combs Available From:

Watsco
1800 W. 4th Avenue
Hialeah, Florida 33010

Radiator Shimming

| | Part No. |
|---|---|
| 16 GA | 8325697 |
| 14 GA | 8325696 |
| 11 GA | 8157772 |
| 1/8″ | 8138268 |
| 1/4″ | 8117788 |
| Rubber | 9529026 |
| Adhesive | 8255268 |

Radiator Bank Lifting Fixture . . . . . Fig. 11

The following drawings detail the construction of lifting fixture. They are available from the Service Department.

| Model | |
|---|---|
| GP35, SD35, GP38, SD38, GP39, SD39, GP40, SD40 | File 700 |
| SD45, F45 | File 701 |