

# Goltens Miami Service

## GE No 3 block repair



Repaired August 2010  
Clipper Caribe  
Houston  
Texas

# Scope of Work

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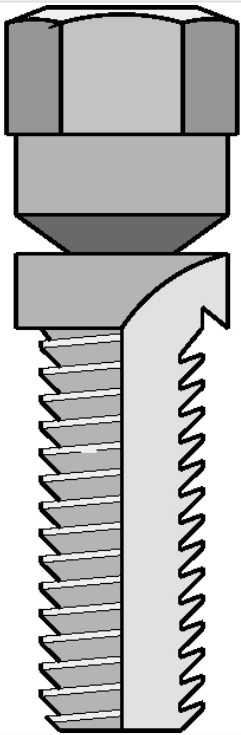
- ❑ Mr. Ed Mulvihill traveled to Houston Texas to inspect the damaged engine block onboard the vessel for damage.
  - ❑ Magnetic particle and dye-penetrant methods were used to inspect for additional damage and/or cracks.
  - ❑ Found block broken out on side. Upon further inspection he found a piston spray nozzle mounting boss had broken off. No further damage was discovered.
  - ❑ Collected all of the broken pieces and returned them to the LNS shop in California to be oven welded back together to form a single, solid piece to fit back into hole in the block.
  - ❑ The welding process involved high temperature fusion welding to produce a single stress free piece that required a 1500 degree preheat.
  - ❑ The sections were welded using gray cast iron welding rod.
  - ❑ The repaired section was returned to the ship with Mr. Mulvihill.
  - ❑ The damaged piston cooler mounting boss was repaired by installing a large C4 plug.
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# Scope of work cont.

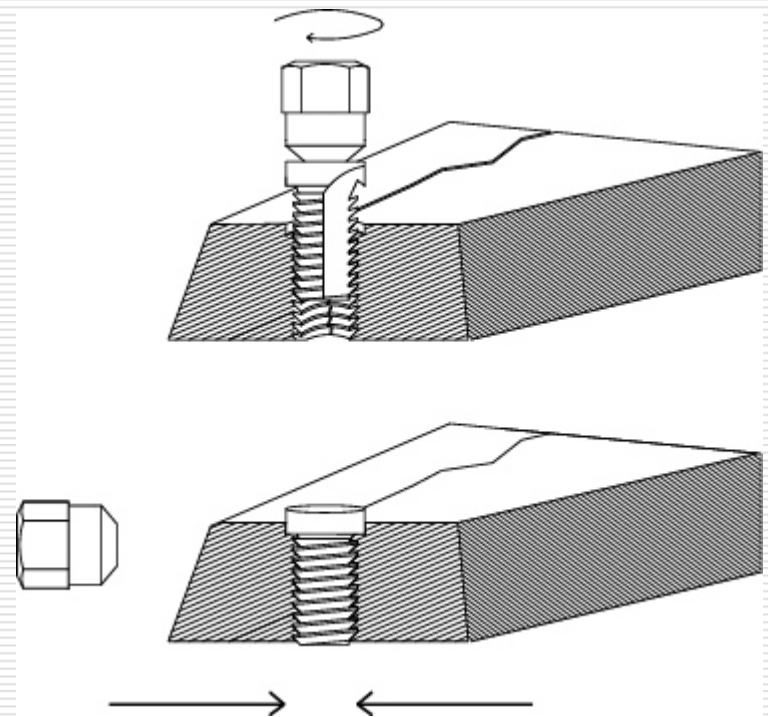
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- ❑ The plug was installed by drilling and tapping to install the special plug to replace the missing boss.
  - ❑ The locating hole was then drilled for the pin.
  - ❑ Next the edges of the hole were hand ground and the edges of the patch were ground to accept the repaired patch to fit snugly into the hole.
  - ❑ This was a slow process as the patch needed to fit as perfectly as possible because we only had one chance to fit it in.
  - ❑ Once the fitting was complete the joint of the patch to the block was filled and sealed using the LNS patented metal stitching process. (See next slide.)
  - ❑ The upper section of the inspection window door opening was then machined flat to match the original surface.
  - ❑ Once all of the pins were installed and the gaps filled in the inside and outside surfaces were hand ground to original contours.
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# CASTMASTER® Stitching Pins



**CASTMASTER stitching pins have the unique ability to draw the sides of a crack together when tightened into the drilled, Spotfaced and tapped hole.**



# Scope of work cont.

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- ❑ Four L15 Locks were installed to add additional strength close to the inspection window. (see slide 16 for Lock information)
  - ❑ Two of the 10mm bolt holes were plugged and re-drilled in the proper locations for the window door.
  - ❑ Drill and tap 4 each 10mm bolt holes.
  - ❑ The area was cleaned and as much shavings as possible were removed from the inside surfaces of the block and the surrounding work area.
  - ❑ The equipment was packed and prepared to ship to LNS.
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# Making patch for engine block

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The broken pieces from the damaged engine block sent LNS to be fusion welded.



# Fusion welding process pre-heat

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Blow  
torch pre-  
heating  
broken  
pieces.



# Fusion Welding process

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# Post Heat

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# Ready for hand finish

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# Finished repaired patch

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The patch after the  
Fusion welding  
Process.



# Fitting the patch

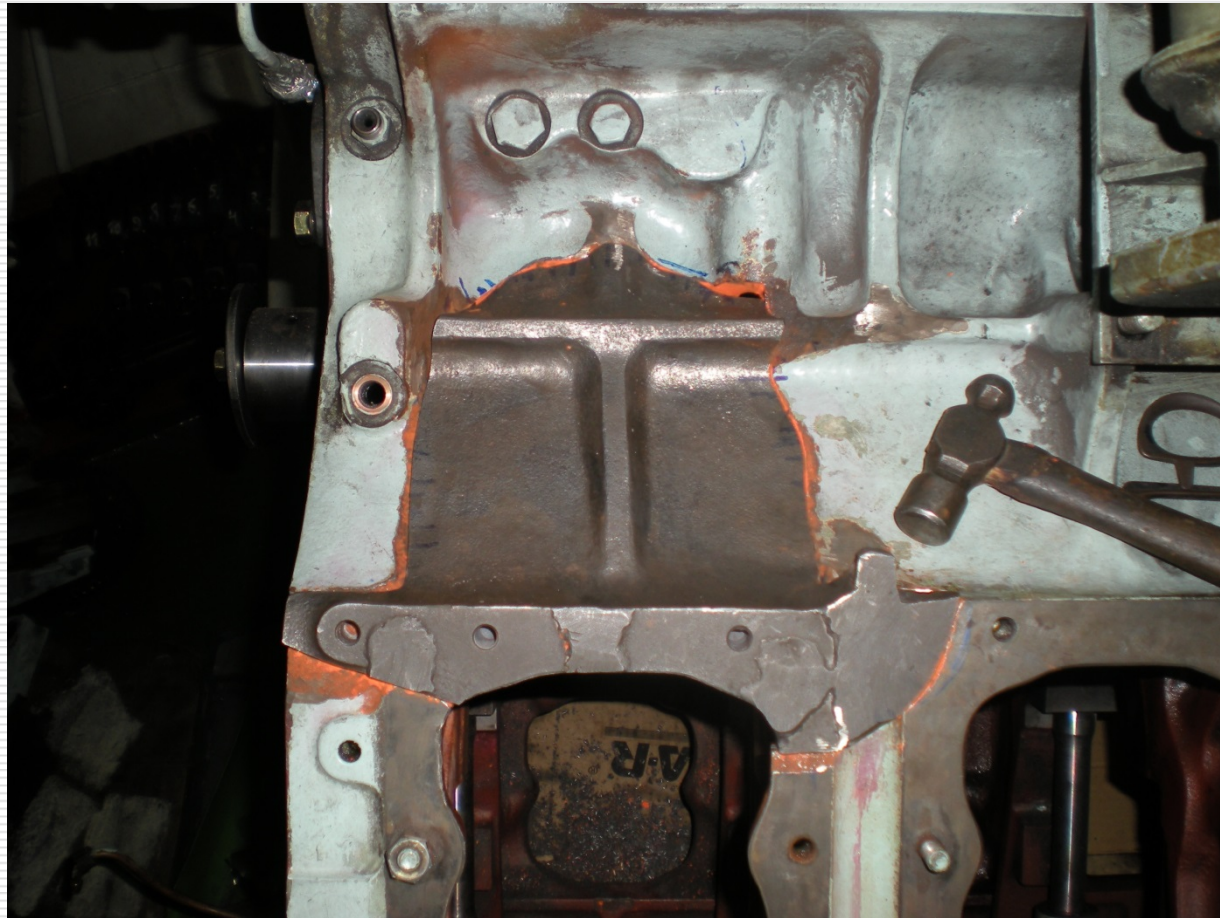
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Patch being fitted in  
Damaged area of  
Engine block.



# Fitting Patch

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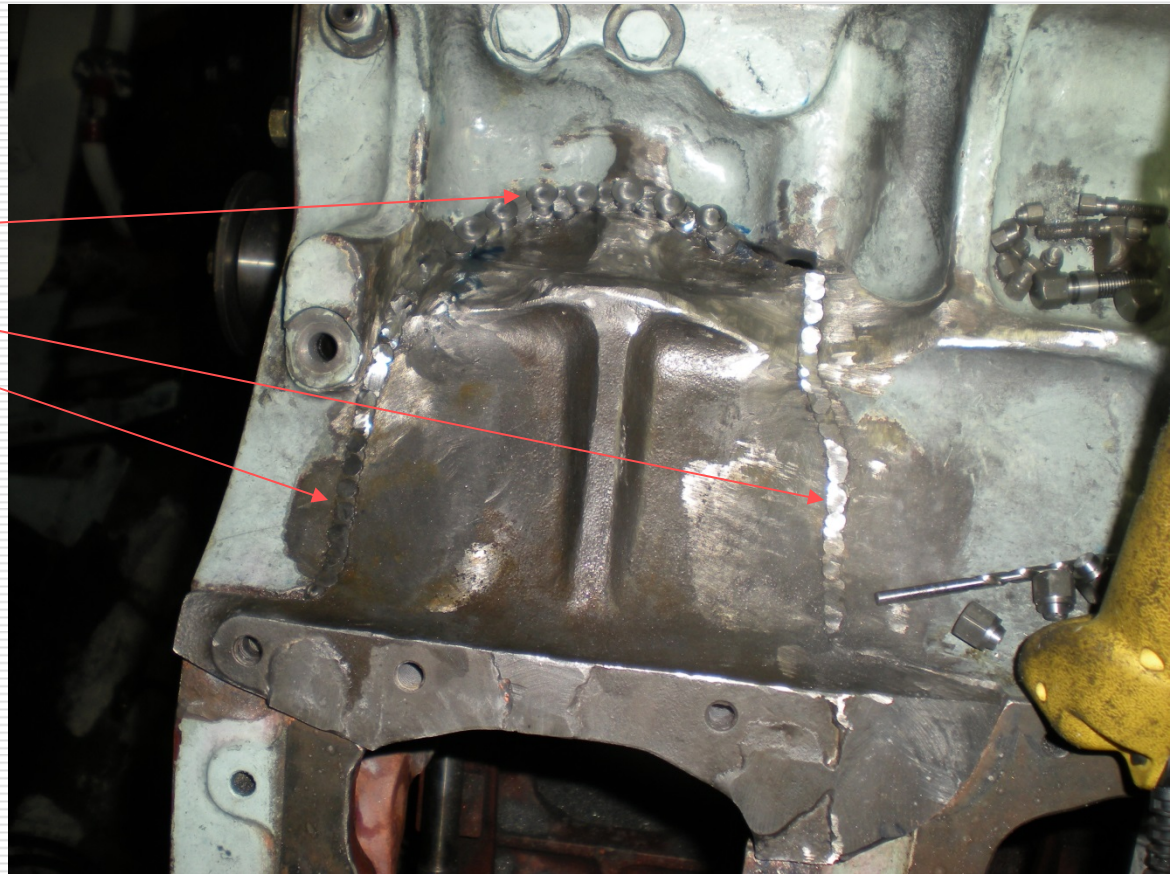


# Installing the stitching pins

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CASTMASTER stitching pins were installed along the crack.

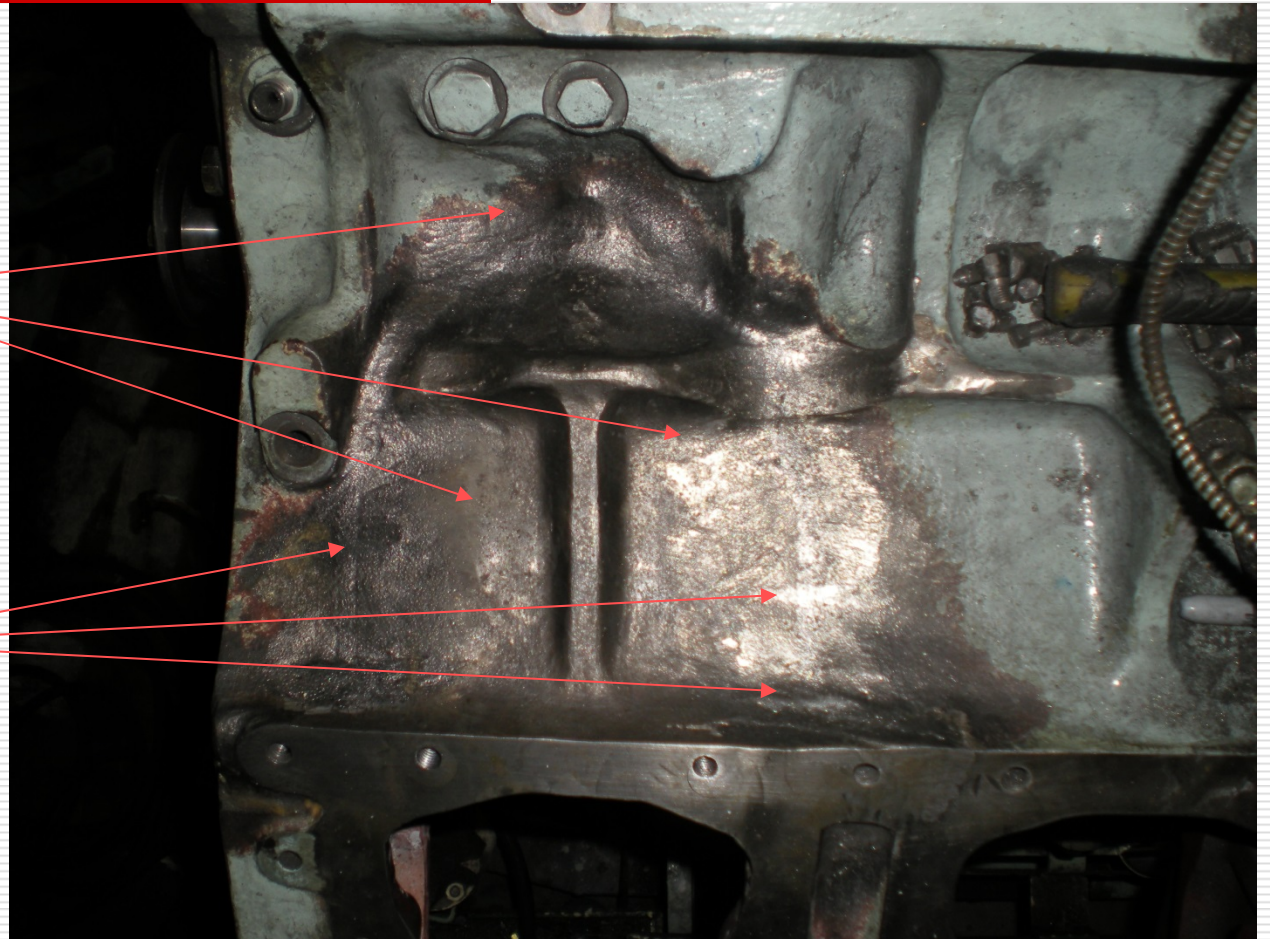
These special stitching pins have our patented Spiral hook threads that add strength and high pressure seal.



# Finished repair on blow-out hole

Repair complete and no sign of the cracks.

L15 Locks where Installed to add Additional Strength.



# About Locks

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- ❑ Locks are primarily used in industrial repairs although there are some automotive applications. Locks are used to add strength across a crack. They are used to stabilize the fracture site and to prevent expansion of the crack.
  - ❑ Special drill jigs are used to create a precision hole pattern in the casting. The locks are then driven into these patterns in a laminated fashion.
  - ❑ All of the *LNS* locks have an ability to pull the sides of the crack together. This is not done to close the crack but rather to prevent any spreading pressure from being applied to the repair site.
  - ❑ *LNS* locks are punched or wire EDM cut from aircraft quality 4130 steel plate. The locks are intended to be stacked or laminated to a depth of 80% of the thickness of the material being repaired. Bottom locks are thin and are stacked into the casting first. Surface locks are thicker and are intended to serve as a final "cap" on top of a stack of bottom locks. Surface locks are particularly useful when repairing uneven surfaces.
  - ❑ Use locks whenever the utmost strength is required. Always use the largest locks possible. Locks can NOT be bent around corners or curves. They must be installed flat. Use [C Series](#) pins on curves. It is often easiest to use [L Series](#) pins next to the locks and then continue the repair with C Series pins. The use of locks and CASTMASTER™ pins will produce the strongest repair possible.
  - ❑ *To read about the capabilities of the different sizes of locks, please read [Locks](#). Or you can go to the [Products](#) page and see a capsule review of all our products.*
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