DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CONTINENTAL MODELS AV-1790 AND AO-895 AND GMC MODELS 6V53/6V53T AND 8V71T SERIES ENGINES: REPAIR OF ALUMINUM OIL COOLERS

Headquarters, Department of the Army, Washington, D. C.,
15 March 1971

1. Purpose. This bulletin provides general support, depot, and contractor maintenance personnel with instructions for repair of aluminum oil coolers by welding or brazing.

2. Scope. This bulletin applies to all GS, depot, and contractor repair of Continental Model AV-1790 and AO-895 and GMC 6V53/6V53T and 8V71T engines.

3. Equipment required. *a*. Arc welding machine for inert gas shielded tungsten arc (Heliarc, Argon-arc) or inert gas shielded metal arc consuming electrode process.

b. Class 4043 electrode, conforming to specification QQ-R-556A or MIL-E-16053.

c. ALCOA No. 33 torch brazing flux or equivalent.

d. ALCOA No. 718 or 716 brazing alloy or equivalent, 1/16 and l/8-inch diameter.

4. Repair Procedure. *a*. Degrease coolers, using vapor or liquid solvents. Dry with compressed air.

WARNING

Degrease vapors may produce phosgene gas.

Do not place coolers into alkali strip tanks.

b. Prepare surface by removing all foreign matter from area to be welded by use of stainless steel wire brush, drill, burring tool, approved chemical process, or steam cleaning.

c. Preparation of cracks, fractures, and areas having metal missing:

(1) Use dye method to determine length of crack, if not visible.

(2) Drill 3/16-inch stop holes at ends of the crack or fracture.

(3) Mill or grind out cracks to provide a "V" aperture.

d. Housing welding procedure.

CAUTION

Use extreme care in welding aluminum coolers to prevent damage to fins and tubes. Refer to TM 9-237 for preliminary instructions on welding of aluminum.

NOTE

An interpass temperature of 250° F to 395° F, measured two inches from the weld, will be maintained until the joint is completely welded.

(1) When preheat temperature of 350° F plus or minus 35 F has been reached, position housing in the most advantageous welding position. Cover all but the area to be repaired with asbestos blankets to maintain heat.

(2) Weld the milled groove, assuring a good root weld; then, apply fillet welds until groove is filled and closed.

(3) Remove blankets and allow to cool to room temperature.

e. Machine the repaired surfaces back to original configuration. Repaired bolt holes must be properly located, drilled, and threaded to original size and thread pitch.

f. Replacement of Header Tube:

(1) Clean in accordance with *a* above.

(2) Plug all parts to prevent entrance of contaminants.

(3) Saw-cut each end of header tank.

(4) Saw-cut each end of tube for removal.

(5) Remove remainder of tube by reaming.

(6) Saw-cut one end, as shown in Figure 1, to

*This Bulletin supersedes TB 9-288, 10 November 1959.

provide clearance to insert new tubes.

(7) Insert new tubes and weld, in accordance with *d* above, using aluminum alloy 6061, 1100, or 3003.

NOTE

Tube size, material, and configuration must be equal to original.

g. Repair of leak in tube, using torch brazing process:

(1) Using torch, preheat work area to approximately 900° F or until flux melt. Apply flux and continue heating locally until brazing temperature (1080° F) is reached. Apply filler at brazing temperature.

(2) Apply brazing alloy.

(3) Immediately after brazing, quench work in water heated to a minimum of 180° F. Additional washing in hot water and acid is necessary to remove corrosive flux.

5. Test. *a*. Using air, nitrogen, or inert gas, test cooler for leaks under water at 400 psi.

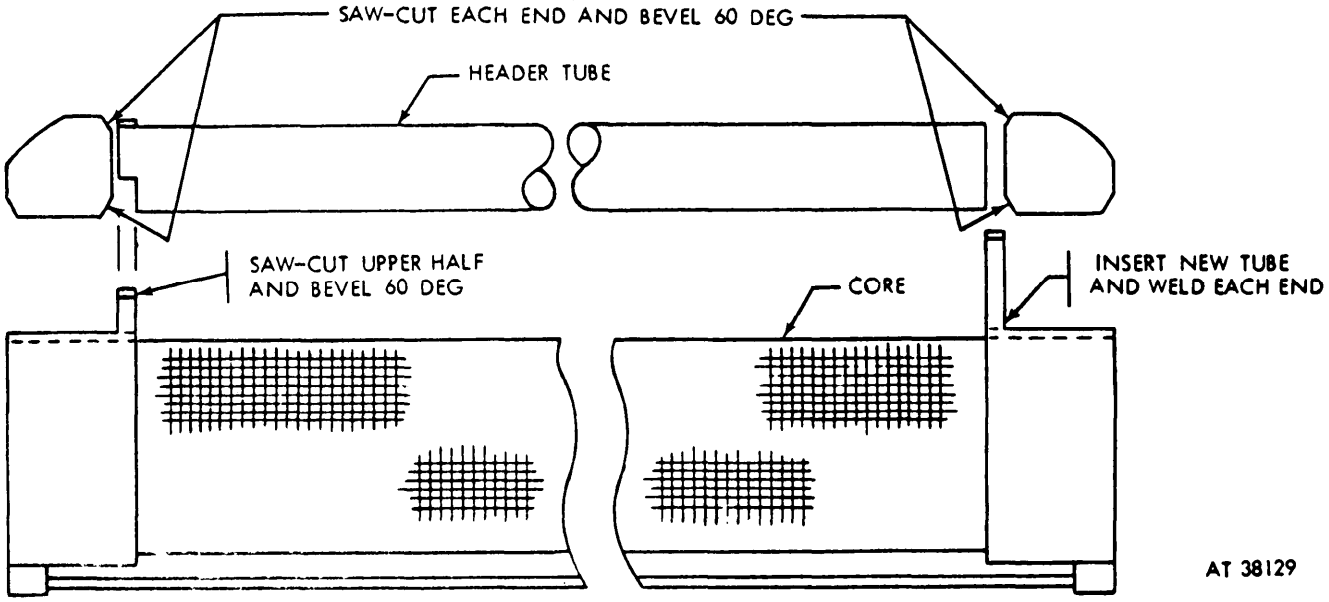

Figure 1. Tube replacement details.

b. Dry thoroughly with compressed air.

6. Surface conditioning. Apply chemical treatment (Alodine).

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

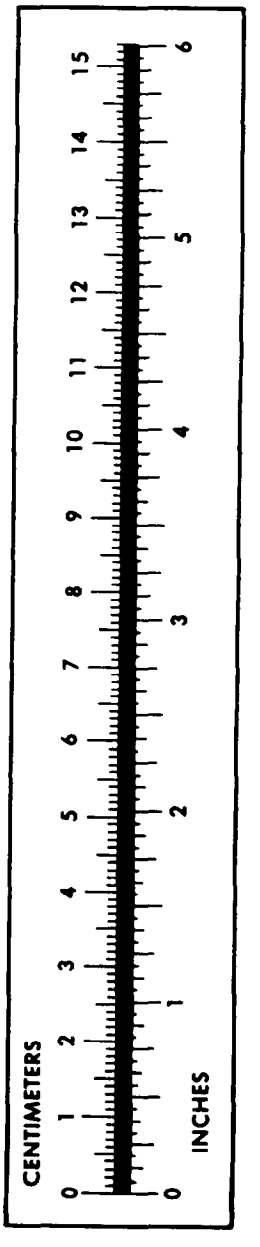
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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