V2500 International Aero Engines

V2500 Propulsion System — Nacelle

# SERVICE BULLETIN

SB No. V2500-NAC-78-0105
Revision No. 1

Subject: Nacelle Service Bulletin No. V2500-NAC-78-0105
Revision No. 1, dated August 8, 1995

This is a partial revision. Please insert the attached pages into your copy of the Bulletin. Destroy the superseded pages so that the resultant contents are in accordance with the following list of effective pages.

| PAGE NO. | REVISION NO. | DATE |
|---|---|---|
| 1,4 | 1 | August 8, 1995 |
| 2,3,5 thru 18 | Basic | July 15, 1995 |

NOTE: A copy of this notice should be filed as a permanent record with each copy of subject Service Bulletin revision and with any future revisions.

Reason for Revision:

Revise approval statement.

Effect of Revision on Prior Compliance:

None.

Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

V2500 International Aero Engines

V2500 Propulsion System — Nacelle

# SERVICE BULLETIN

NACELLE - EXHAUST - BOLT CUPS, EXHAUST CONE - INSTALLATION OF DOUBLERS; REWELD OF

MODEL APPLICATION

V2500-D5

BULLETIN INDEX LOCATOR

78-10-00

Compliance Category Code

6

Internal Reference No.

BC/JG/AC 94VN007A

July 15, 1995
August 8, 1995

V2500-NAC-78-0105



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

1. Planning Information

A. Effectivity

(1) Aircraft: MD90

(2) V2500-D5 Exhaust cones prior to Cum number/serial number 0141001 and serial numbers 0143002, 0147002.

B. Reason

(1) Condition

Cracking of the weld between bolt recess and outer skin on the acoustically treated exhaust cone has occurred on V2500-D5 exhaust cones.

(2) Background

The potential for exhaust cone cracking has been determined to be the result of a manufacturing process. The manufacturing process has been corrected for exhaust cone serial numbers 0141001 and subsequent, excluding unit serial numbers 0143002 and 0147002.

(3) Objective

The objective of this service bulletin will be met by utilizing one and/or two parts of the Accomplishment Instructions:



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

Option 1: Weld doublers to exhaust cone perforated skin and/or bolt cups; or

Option 2: Remove and replace existing bolt cup welds.

(4) Substantiation

Options 1 and 2 of this repair were successfully performed and tested on a sample exhaust cone. Stress analysis and test program verified that the doublers and/or rewelds correct the manufacturing defects identified on exhaust cones prior to serial number 0141001, 143002, and 147002.

(5) Impact of Bulletin on Workshop Procedures:

| | |
|---|---|
| Removal/Installation | Not Affected |
| Dissassembly/Assembly | Not Affected |
| Cleaning | Not Affected |
| Inspection/Repair | Not Affected |
| Repair | Not Affected |
| Testing | Not Affected |

(6) Supplemental Information

None



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

C. Description

The change introduced by this Bulletin is provided with two options as follows:

Option 1 of the Accomplishment Instructions - Gas tungsten arc weld doublers to perforated skin and to bolt cups on exhaust cones.

Option 2 of the Accomplishment Instructions - Remove existing welds and fusion weld cups with gas tungsten arc welding process.

D. Approval

Incorporation of this Service Bulletin must be accomplished only in conjunction with Douglas Aircraft Company Service Bulletin MD90 78-003 which has received exclusive FAA approval for MD-90 Series aircraft.

E. Compliance

Category 6

Accomplish when the nacelle subassembly (i.e. accessories, components) is disassembled sufficiently to afford access to the affected part and to all affected spare parts.



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

F. Manpower

Estimated Manhours to incorporate the full intent of this Bulletin:

| | VENUE | ESTIMATED MANHOURS |
|---|---|---|
| (1) | In Service | Not Applicable |
| (2) | At Overhaul | |
| | (a) To embody (Option 1 of SB) | 8.00 M/HRS |
| | (b) To embody (Option 2 of SB) | 8.00 M/HRS |
| | (Option 1 of SB) Total | 8.00 M/HRS |
| | (Option 2 of SB) Total | 8.00 M/HRS |

G. Material Cost and Availability

The parts to accomplish this Service Bulletin are available from the suplier as kit V2578096-551 (For option 1 of Service Bulletin) at no cost to the operator.

Operators with units listed in Paragraph 1.A should submit a no-charge purchase order for the applicable quantity of kits. The purchase order must specify this service bulletin number and only the parts listed herein. Operators will have one year from the issue date of the Service Bulletin to place an order. After one year, kits will no longer be available and Operators will have to order parts individually at catalog prices, if they desire to incorporate the change.

Direct Purchase order to:

Rohr Inc.
P.O. Box 878
Chula Vista, CA 91912
U.S.A.
Attn: Airline Support Manager - Bldg. 107A
(Ref. Service Bulletin No V2500-NAC-78-0105)



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

H. Tooling Cost and Availability

None required.

I. Weight and Balance

(1) Weight change .....No effect

(2) Moment arm .....No effect

(3) Datum .....Engine Front Mount Centerline

.....(Power Plant Station PPS 95.1)

J. Electrical Load Data

Not affected.

K. References

| | Chapter/Section |
|---|---|
| MD-90/V2500-D5 Engine Manual | 78-11-12 |
| V2500 Standard Practices/Processes Manual | 70-09-00<br>70-11-01<br>70-23-01<br>70-23-05<br>70-31-13 |

L. Other Publications Affected

| | |
|---|---|
| MD-90/V2500-D5 Engine Illustrated Parts Catalog | 78-11-12 |



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

2. Accomplishment Instructions

NOTE: The accomplishment instructions for this service bulletin have been written in two parts. Option 1 provides instructions to weld a doubler at bolt cup locations. Option 2 provides instructions to remove existing welds and fusion weld bolt cup locations. It is the option of the operator to use the most desirable procedure based on welding capability and experience.

A. Prerequisite Instructions

None.

B. Rework or Modification Instructions - Inspection Requirements

NOTE: For exhaust cone bolt recess cracks which extend into the perforated skin, the crack in the perforated skin must be repaired in accordance with MD90/V2500-D5 Engine Manual, Repair VRS2204. Option 2 cannot be used.

(1) Do a visual inspection of the area around the (13) bolt cups on the 290-1501-501 exhaust cone with a 10 power magnification glass. If there are cracks, refer to MD90/V2500-D5 Engine Manual, Repair VRS2204.

C. Rework or Modification Instructions - Cone Assembly Doubler Installation - Option 1

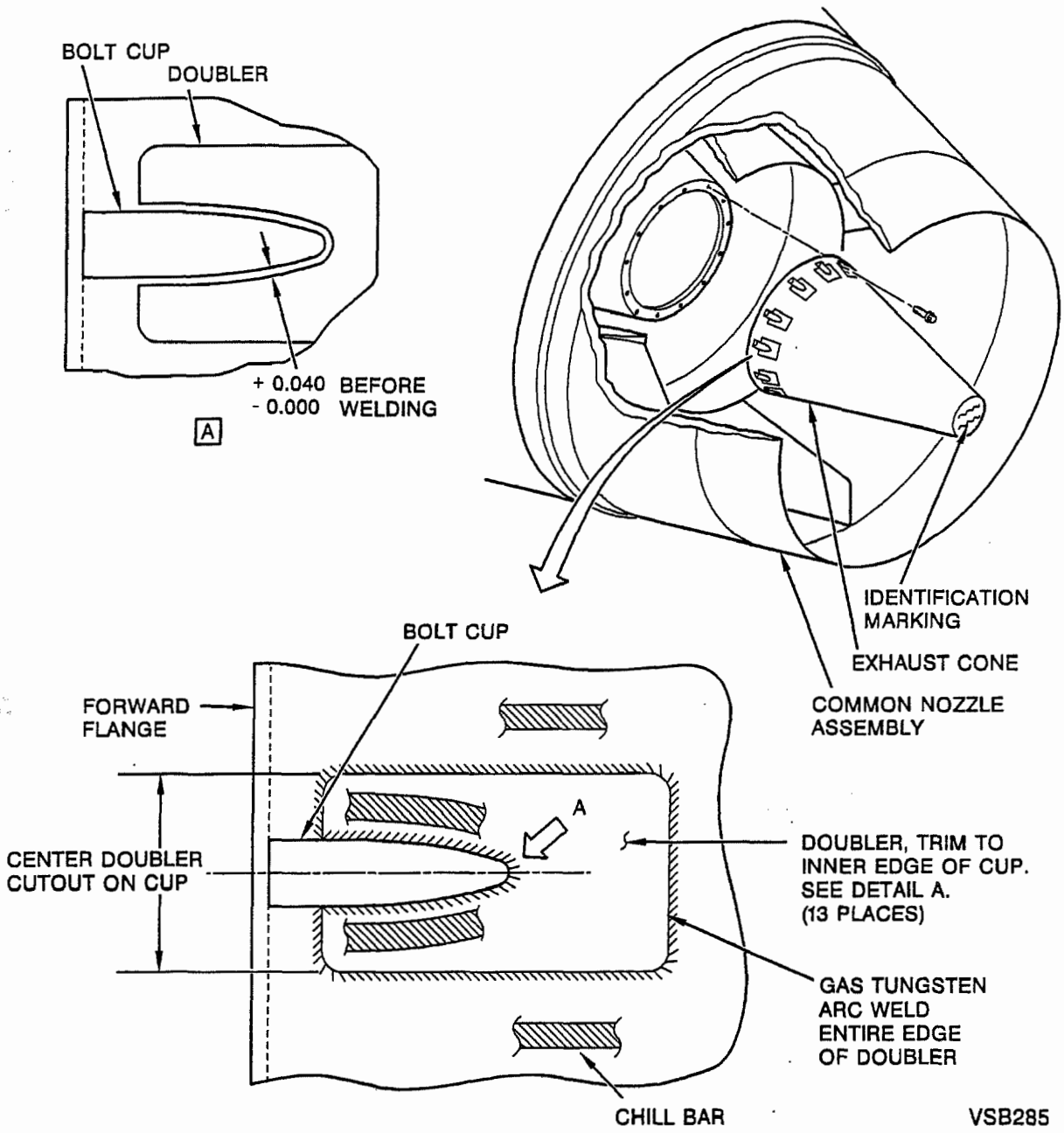
(1) Cut doublers as required to fit around bolt cups. Refer to Figure 1 to make sure of correct placement of doubler around bolt cup cutout.

(2) Put the doublers around the bolt cups. Bend doublers to align with tail cone assembly contour. Make sure doubler makes a continuous surface with tail cone assembly for welding.

(3) Remove oxides/contaminates from weld areas with a stainless steel wire brush.



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).




Cone Assembly Bolt Cup Doubler Installation
Figure 1



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

WARNING: METHYL ETHYL KETONE (MEK) IS FLAMMABLE AND VAPOR IS HARMFUL. USE IN A WELL-VENTILATED AREA. AVOID PROLONGED BREATHING OF VAPORS OR PROLONGED OR REPEATED CONTACT WITH SKIN. HIGH CONCENTRATIONS MAY CAUSE IMPAIRED JUDGEMENT. PROTECTIVE GLOVES SHOULD BE WORN DURING USE. MAY CAUSE DERMATITIS BY REMOVING SKIN OILS. PRIOR TO USE OF THIS PRODUCT, READ THE "MATERIAL SAFETY DATA SHEET" AND FOLLOW ALL LISTED SAFETY AND HEALTH PRECAUTIONS.

(4) All weld surfaces and edges must be fully cleaned to remove all oil, grease, dirt, or other contaminants. Use CoMat 02-099 lint free cloth moist with CoMat 01-076 methyl ethyl ketone. Wipe surface dry before solvent becomes dry.

NOTE: Do welding with the cone in a horizontal position and the weld area in the up position.

CAUTION: TOO MUCH HEAT MAY DAMAGE THE ATTACH FLANGE AND BEND THE CONE BODY. TO AVOID TOO MUCH HEAT, KEEP TO A LIMIT EACH CONTINUOUS WELD TO APPROXIMATELY 3 INCHES IN LENGTH AND CHANGE DIRECTION OF WELDING FROM END TO END. WELD EACH THIRD DOUBLER LOCATION IN A SEQUENCE TO PREVENT DISTORTION OF ATTACH FLANGE. ALLOW EACH WELD TO COOL BEFORE THE START OF NEXT WELD.

(5) Put the doublers around the bolt cups and weld in position. Refer to V2500 Standard Practices/Processes Manual, Chapter 70-31-13. Use CoMat 03-287 welding filler wire (AMS5837). Use copper chill bars around the weld areas to decrease heat in weld area.



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

NOTE: Tack welds can be used to keep damage to a minimum and align the parts. Tack welds must be apart equally along the weld joint. Tack welds must be the correct size and length to let the joint be welded. The tack weld must hold the detail parts together so that they do not have a crack when the first weld is applied. Weld beads must fully cover tack welds.

(6) Use florescent penetrant method to inspect the weld. Refer to V2500 Standard Practices/Processes Manual, Chapter 70-23-01. No cracks are permitted. Do a visual inspection of areas next to perforated skin with 10 power magnification glass. Florescent penetrant inspection can not be done in these areas because of skin perforations.

D. Rework or Modification Instructions - Modification of Bolt Cup Welds - Option 2

(1) Clean the surface of the exhaust cone around the attach bolt relief cups. Use an abrasive or stainless steel wool pad to remove any oxidation or discoloration.

WARNING: 1,1,1 TRICHLOROETHANE VAPORS ARE HARMFUL. USE IN A WELL-VENTILATED AREA. AVOID PROLONGED BREATHING OF VAPOR AND PROLONGED OR REPEATED CONTACT WITH SKIN. OVEREXPOSURE MAY CAUSE HEADACHE, DIZZINESS OR DROWSINESS. VAPOR IS HEAVIER THAN AIR AND MAY REPLACE OXYGEN IN A CONFINED AREA. SMOKING AND ARC WELDING SHOULD BE AVOIDED WHEN USING THIS SOLVENT; VAPORS OF DECOMPOSITION MAY CAUSE SERIOUS BODILY HARM. PROTECTIVE GLOVES SHOULD BE WORN DURING USE. MAY CAUSE DERMATITIS BY REMOVING SKIN OILS. PRIOR TO USE OF THIS PRODUCT, CAREFULLY READ THE APPLICABLE 'MATERIAL SAFETY DATA SHEET' AND FOLLOW ALL LISTED SAFETY AND HEALTH PRECAUTIONS.

(2) Use a clean (CoMat 02-099) lint-free cloth and (CoMat 01-001) 1.1.1. trichlorethane to clean area around cups. If facilities are available, vapor degrease the exhaust cone. Refer to Standard Practices/Processes Manual, Chapter 70-11-01.



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

(3) Cut the existing weld with a hand motor and cutting disk. The edge of the cut should be at least 0.032 inch (0.813 mm) away from the edge of the cup, to prevent thinning of the cup below the surface of the exhaust cone and no wider than .090 inch (2.286 mm). The cut should extend 1.0-1.25 inches (25.4-31.75 mm) on each side of the apex. See Figure 2.

(4) Trim any remaining material at the apex of the cup with a drill or hand held motor and small diameter router bit. The finished cut should appear as shown in Figure 2.

NOTE: The following step is optional. It is recommended for gaps larger than 0.090 inch (2.286 mm) and is optional for any gap width. The thickness and height of the filler strip also are the option of the rework shop.

(5) Fabricate an (CoMat 03-287) Inconel 625 filler strip, to be placed in the cut out slot, allowing the weld to bridge the gap between the cup and the perforated skin.

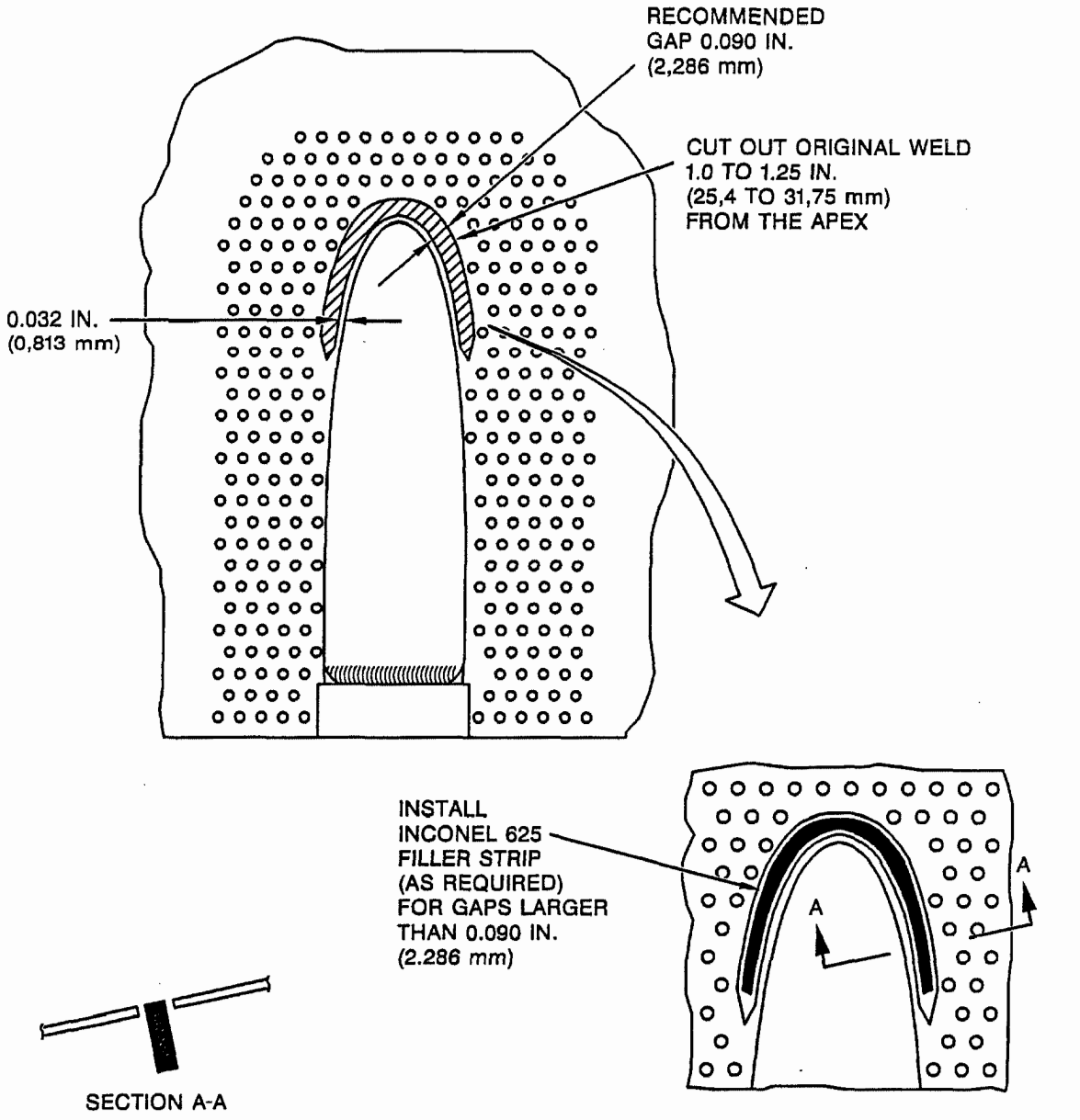
(6) Use a clean (CoMat 02-099) lint-free cloth and (CoMat 01-001) 1.1.1. trichlorethane to clean area around cups.

(7) Place a copper heat sink on the surface of the exhaust cone, adjacent to the rework area, and insert a copper heat sink in the cavity of the cup. The heat sinks must be in contact with the part to be effective. Attach the heat sinks with clamps or tape. Take care to keep any tape or adhesives away from the weld area. The recommended heat sink configuration is shown in Figure 3.

CAUTION: TOO MUCH HEAT MAY DAMAGE THE ATTACH FLANGE AND BEND THE CONE BODY. TO AVOID TOO MUCH HEAT, KEEP TO A LIMIT EACH CONTINUOUS WELD TO APPROXIMATELY 3 INCHES IN LENGTH AND CHANGE DIRECTION OF WELDING FROM END TO END. WELD EACH THIRD DOUBLER LOCATION IN A SEQUENCE TO PREVENT DISTORTION OF ATTACH FLANGE. ALLOW EACH WELD TO COOL BEFORE THE START OF NEXT WELD.



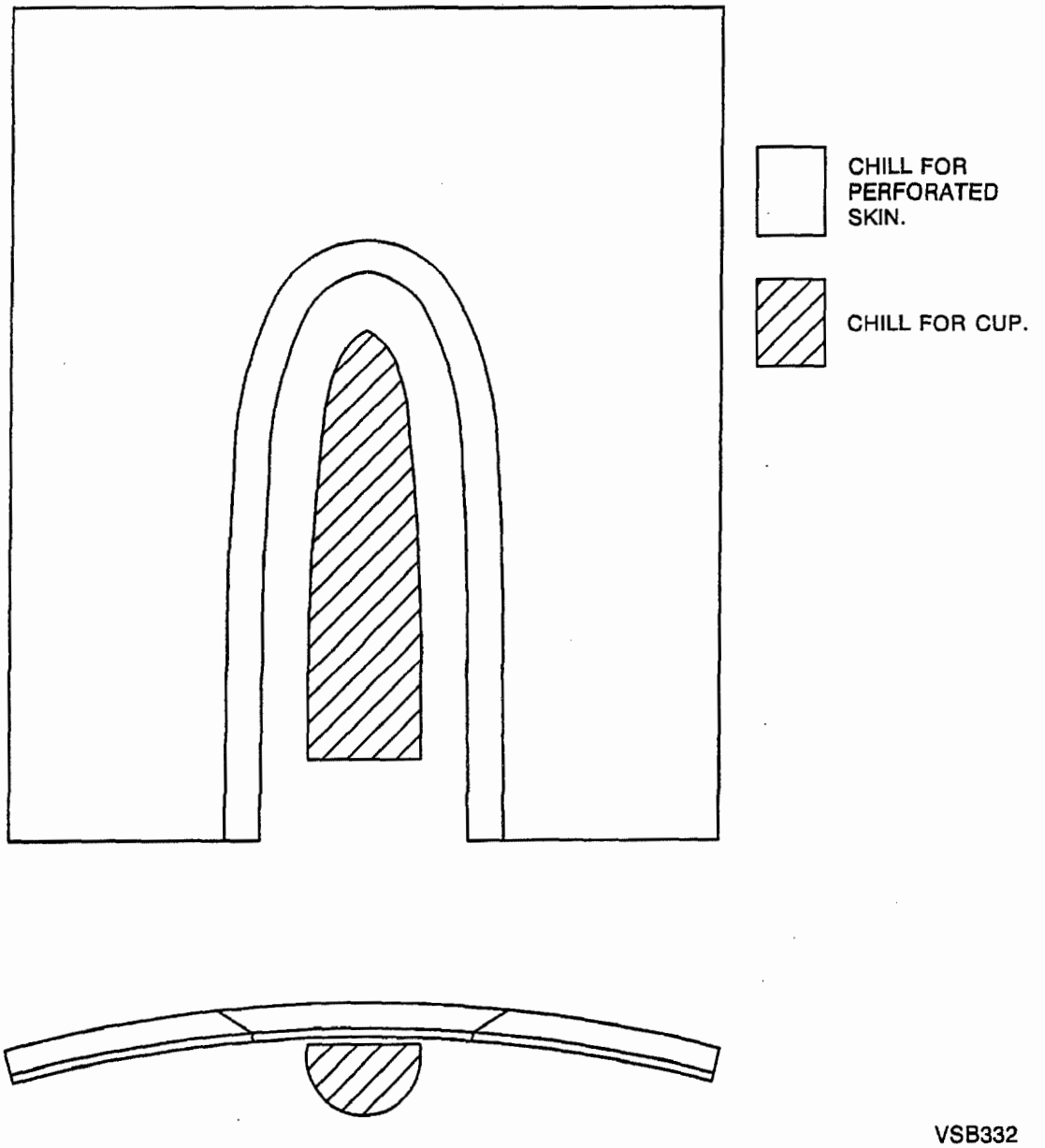
Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).




BOLT CUP PREPARATION FOR RE-WELDING
FIGURE 2



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).




RECOMMENDED HEAT SINK CONFIGURATION
FIGURE 3



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

(8) Fusion weld the cup using the gas tungsten arc welding process (GTAW). Start the weld at the apex of the cup, moving toward the flange. Weld the entire length of the cup including the area left un-cut. Repeat the procedure for each side of the cup. Add (CoMat 03-287) Inconel 625 filler wire as needed to fill the gap and produce a smooth weld crown (face side weld bead reinforcement). Refer to the Standard Practices/Processes Manual, Chapter 70-31-13.

(9) Repeat the welding process for each cup in the sequence shown in Figure 4 to prevent heat distortion of the exhaust cone.

CAUTION: TO AVOID FURTHER REPAIR, DO NOT GRIND THE EXHAUST CONE MATERIAL SURROUNDING THE BOLT CUP.

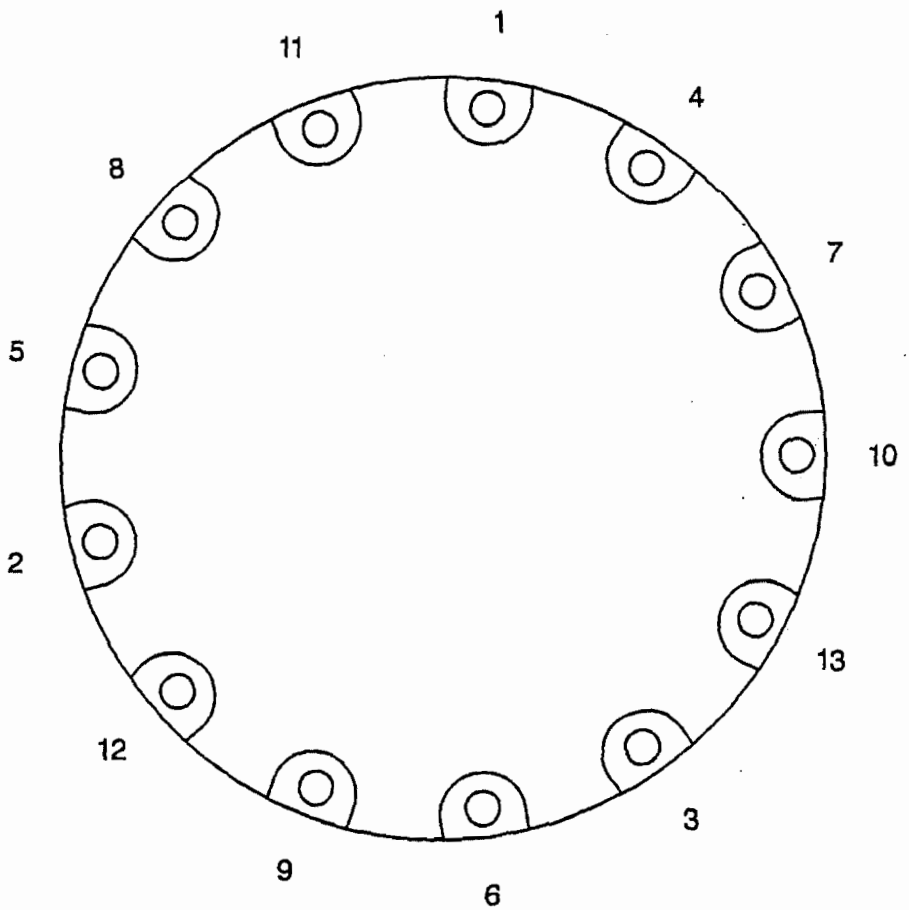
(10) Grind the weld bead only the minimum necessary to meet the 0.032 inch (0.813 mm) aero-smoothness requirements. Grinding may be accomplished with a hand held motor and sanding disk. Use care to avoid contact with surrounding exhaust cone material.

(11) Do a visual inspection of the area around the (13) bolt cups on the exhaust cone with a 10 power magnification glass. If there are cracks, refer to MD90/V2500-D5 Engine Manual, Repair VRS2204.

(12) Florescent dye penetrant inspect the welds. Apply penetrant locally and/or mask skin perforations, to prevent fluid entrapment through the skin perforations. Refer to Standard Practices/Process Manual, Chapter 70-23-05.



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).




VSB333

WELDING SEQUENCE
FIGURE 4



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

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(13) Use a clean (CoMat 02-099) lint-free cloth and (CoMat 01-001) 1.1.1. trichlorethane to clean area around cups to remove any residual dye penetrant, tape adhesive or other debris.

E. Post -requisite Instructions

None.

F. Recording Instructions

(1) A record of accomplishment is necessary. Write in aircraft log and electro-etch or vibro-peen on aft end of exhaust cone that Service Bulletin V2500-NAC-78-0105 has been done. Refer to IAE V2500 Standard Practices/Processes Manual, Chapter 70-09-00.



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

3. Material Information

Applicability: For each V2500-D5 Exhaust Cone to incorporate this Bulletin

A. Kits associated with this Bulletin:
(Option 1 of SB)

| | | |
|---|---|---|
| V2578096-551 | 1 | Kit |
| Consisting of: | | |
| 745M0001-1 | 13 | Doubler |

B. Parts affected by this Bulletin:
(Option 1 of SB)

| NEW PART NO. (ATA NO) | QTY | EST'D UNIT PRICE ($) | KEYWORD | OLD PART NO. (IPC NO.) | INSTR/ DISPOS |
|---|---|---|---|---|---|
| 745M0001-1 (78-11-12) | 13 | RQ | Doubler | --- (01-40) | (A)(B) |

C. Instructions/Disposition Code Statements:

(A) Part supplied as a detail of the kit.

(B) Not available as spare for replenishment purposes.



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).

D. These materials are to be procured by the Operator or obtained from his stock:

| Part Number | Keyword | Quantity | Source | Code |
|---|---|---|---|---|
| Methyl Ethyl Ketone | Solvent | AR | Commercially Available | --- |
| AMS5837 | Filler Wire | AR | Commercially Available | --- |
| 1.1.1.Trichloroethane | Solvent | AR | Commercially Available | --- |
| - - - | Lint Free Cloth | AR | Commercially Available | --- |



Not subject to the EAR per 15 C.F.R. Chapter 1, Part 734.3(b)(3).