DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

INSPECTION AND REPAIR FOR T55 SERIES ENGINE RESET PROGRAM (T55-L-712 AND T55-GA-714A)

Headquarters, Department of the Army, Washington, D. C.

15 June 2005

NOTE

THIS PUBLICATION IS EFFECTIVE UNTIL RESCINDED OR SUPERSEDED.

1. Purpose. This bulletin is to be used as guidance for the restoration of performance to T55 engines that have been operating in Southwest Asia (SWA). These engines are susceptible to damage and accelerated performance degradation because of their exposure to the hostile sand and dirt environment of SWA. Equipment in use (including Equipment in Supply or Maintenance Activities below Depot Level and Equipment in Administrative Storage) will be inspected as soon as practical.

2. Priority Classification. This technical bulletin is classified as **ROUTINE**.

3. End Items to be Inspected.

NOMENCLATURE	PART NUMBER	NATIONAL STOCK NUMBER
T55-L-712	2-001-020-23	2840-01-030-4890
T55-GA-714A	2-001-020-39	2840-01-458-5361

4. Modules (Components, Assemblies, and Subassemblies) to be inspected. Not applicable.

5. Parts to be Inspected. As indicated in paragraph 7 below.

6. Application.

a. Level of Maintenance Aviation Unit Maintenance (AVUM)/Aviation Intermediate Maintenance (AVIM).

*This TB supersedes TB 1-2840-265-23 dated 30 January 2004.

NOTE

Anytime during the performance of this inspection that damage to the engine is determined exceeding AVIM level of repair and authorization, proceed to paragraph 7d.

b. Engines operated in the SWA Theater of Operation, perform the following actions:

(1) Wash engines in accordance with (IAW) TM 55-1520-240-23, Task 4-144.

(2) Download DECU- T55-GA-714A only (Task 1-81) update engine historical records and fax a printout copy to the respective logistical points of contact listed in paragraph 11b.

(3) Remove engines from the airframe IAW TM 1-1520-240-23.

(a) Remove Quick Change Assembly (QCA) from engines in accordance with TM 55-1520-240-23-3, Task 4-11. Retain QCA with the airframe. Repair or replace as necessary.

(b) Perform inspection procedures in paragraph 7 below.

7. Inspection Procedures.

a. Compressor Section

(1) Inspect engines for obvious damage (T55-GA-714A & T55-L712). Visually inspect the compressor section with a suitable flashlight through the inlet housing and the 6th stage trailing edge through the Bleed Band cavity. Use inspection criteria in TM 55-2840-254-23, Task 2-33 and figures 1 & 2 below to determine serviceability for both engine types (T55-L712 and T55-GA-714A). If the inspection reveals that more than 50 compressor blades need to be replaced, then proceed to paragraph 7d. If inspection reveals damage not exceeding the 50 blade replacement and/or detected damage is determined to be within the unit's capability and repair authorization, continue with inspection procedures.

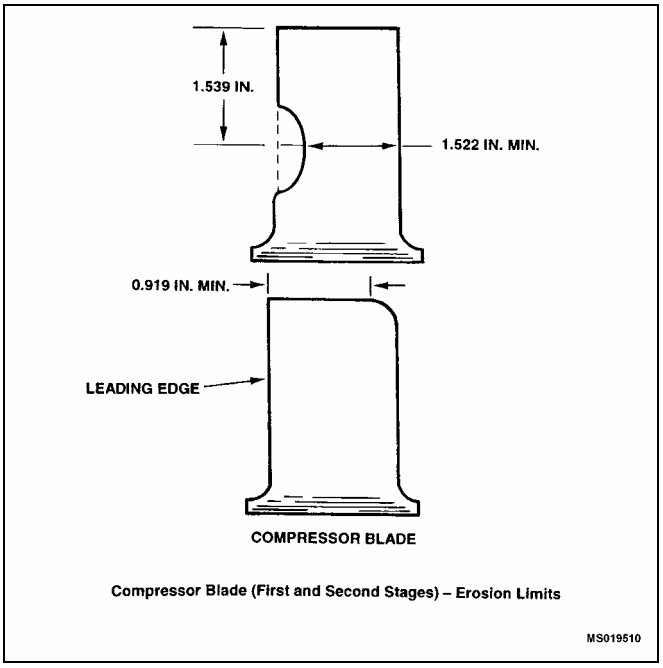

Figure 1- Compressor Blade Erosion Limits

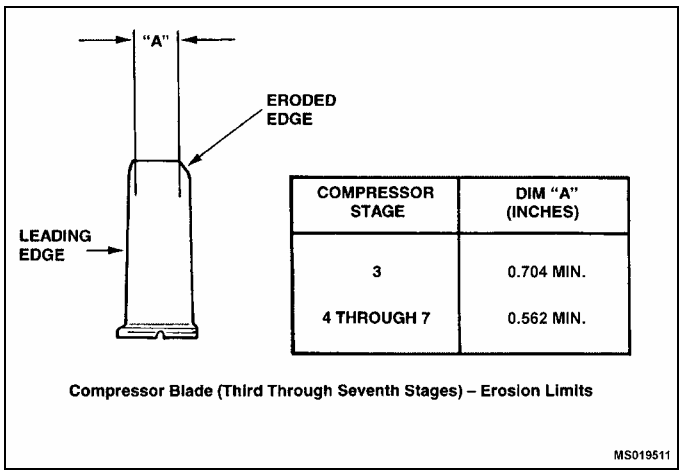

Figure 2- Compressor Blade Erosion Limits

(2) Remove upper compressor housing (case-half) in accordance with respective engine tech manual.

(a) T55-GA-714A only: Inspect compressor case-halves for evidence of rubbing as follows:

NOTE

Determine the amount of 1st stage blade rub associated with the case-halves. The following procedure should only be performed if visual inspection of the compressor inlet has noticeable evidence of 1st stage compressor rubbing.

1) Inspect the corresponding set of blades for damage and repair or replace as necessary.

2) Measure the compressor housing damage with wire feeler gauges, NSN 5220-01-145-7448 or equivalent. Place straight edge perpendicular to damage and determine groove depth with appropriate wire gauge.

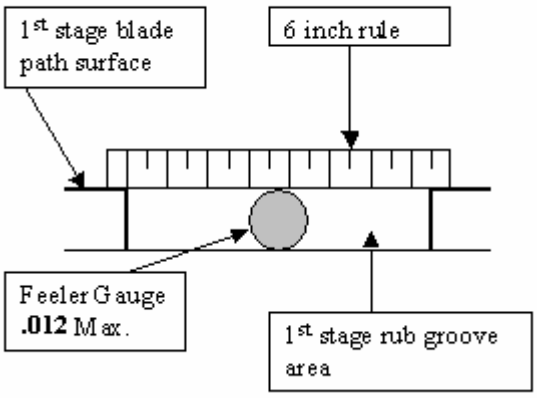

Figure 3- Measurement Compressor Groove Depth

a) Alternate method: Measure the compressor housing groove damage using Impression Material, Dental Material (Vinylpolysiloxane), NSN 6520-01-406-6663 or equivalent as follows:
   (i) Mix Base and Catalyst on a 1:1 ratio into a suitable pallet. Ensure the product is completely mixed. After the product is mixed, apply within two minutes.
   (ii) Allow build-up of at least 0.125 inch above the flow-path contour for ease of handling following cure process. Allow 6 minutes to ensure the mold has fully set.
   (iii) Remove the mold and slice the mold perpendicular to the rub.
   (iv) Measure the depth of the rub, using a Vernier Caliper or equivalent precision measuring device from the bottom of the groove to the path surface.

b) If metal damage depth is greater than 0.012 inch, replace compressor case halves. If the metal damage depth is less than 0.012 inch contact a technical POC listed in paragraph 11a.

(b) T55-L712: Clean and inspect compressor housing (case-halves) IAW, Tasks 2-21 and 2-22 respectively.

(3) Inspect Stator Vanes on both engine types (T55-L712 & GA-714A) for erosion, IAW (Figure 4) below and for Foreign Object Damage (FOD) IAW TM 1-2840-265-23&P, Task 2-24 and TM 55-2840-254-23, Task 2-28 respectively.

EROSION LIMITS		
VANE STAGE	DIM.	MINIMUM WIDTH (INCHES)
1	F	0.58
2	G	0.70
3	H	0.70
4	I	0.52
5	J	0.52
6	K	0.52
7	L	0.44

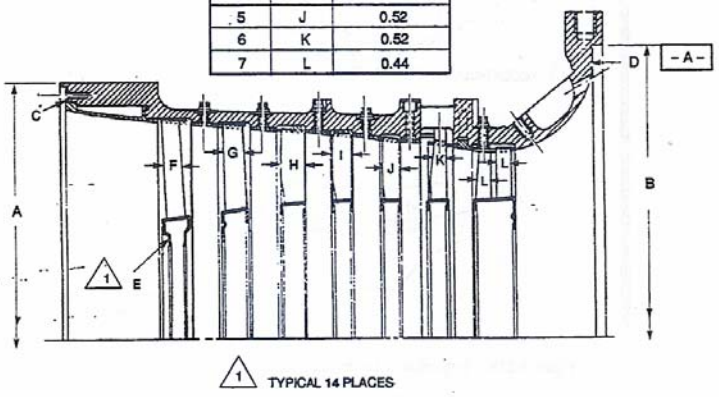

Figure 4- Erosion Limitations

(4) Inspect compressor blades (T55-GA-714A & T55-L712) reference TM 1-2840-265-23&P, Task 2-30 and TM 55-2840-254-23, Task 2-33 respectively, and figures 1 & 2 above.

NOTE

T55-GA-714A only- Discard any removed locking plates, and retain shims for reinstallation of 1st stage compressor blades.

(5) Reassemble compressor section IAW applicable TMs.

b. Air Bleed Actuator- T55-L712 & T55-GA-714A. Refer to applicable T55 engine manuals (TM 1-2840-265-23&P (EM 0186) or TM 55-2840-254-23) and paragraphs below:

(1) If the combined cracks [between the gusset support area 4 (refer to Task 2-4 in TM 1-2840–265-23&P) and the bracket], exceeds half of the length of gusset support, stop drill cracks as necessary.

(2) Inspect bracket (3); refer to Task 2-4 in TM 1-2840-265-23&P. There shall be no cracks within 1/2 inch of one another, such that if connected, it would result in a piece of the bracket separating.

(3) Test the air bleed actuator IAW TM 1-2840-265-23&P or as follows: (reference figure 5 below)

(a) Check for internal leakage in interstage airbleed actuator (1) as follows:

1) Install tube cap (2) on P3 port tee (3).

2) Install tube cap (4) on Pressure Manifold (PM) port tee (5).

3) Attach pressure gauge tube assembly (see Appendix E) (6) to direct reading 0-100 psig pressure gauge (7).

4) Connect free end of pressure gauge tube assembly (see Appendix E) (6) to PM tee (5).

5) Connect hose (8) of compressed air source (9) to P3 tee (3) and ensure valve (10) and regulator (11) are shut off.

6) Open valve (12) of compressed air source (9) and adjust regulator (11) to read 50 psig on gauge (13).

7) Open valve (10) and ensure no air leakage at tees (3 and 5). Pressure gauge (7) shall indicate less than 45 psig. If pressure is greater than 45 psig, replace actuator.

(b) Remove test equipment from Interstage airbleed actuator (1) as follows:

1) Shut off compressed air source (9) by closing valve (12).

2) Loosen cap (2) and alternately press center stem to release air pressure until gauge (13) reads 0 psig.

3) Remove tube caps (2 and 4).

4) Remove pressure gauge tube assembly (see Appendix E) (6) from direct reading 0 to 100 psig pressure gauge (7) and PM tee (5).

5) Remove hose (8) from P3 tee (3).

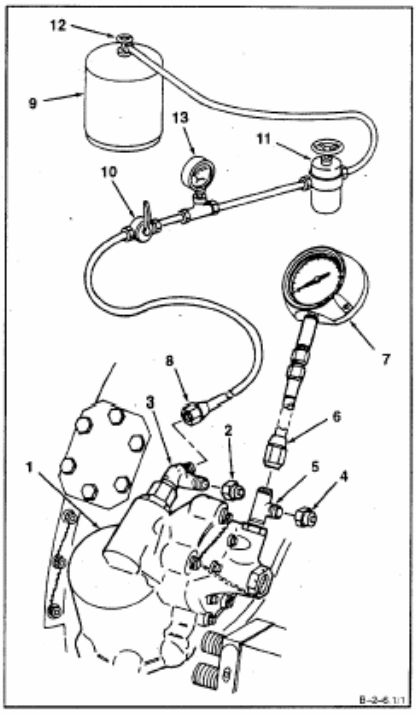

Figure 5- Test Set Installation

c. Hot End Assembly

(1) T55-L712 procedures:

(a) Disassemble, clean and inspect hot section IAW TM 55-2840-254-23, Task 1-93- steps 1 thru 25. Disassembly of the power turbine is not required unless indicated or required due to inspection results. Continue with Task 1-93- step 35, a thru c, and perform the following steps:

1) Visually inspect the Flow Divider Bracket IAW Task 6-44.

2) Visually inspect and test Thermocouple Assembly IAW Tasks 4-22 and 4-24 respectively. Replace thermocouples with evidence of erosion, corrosion, or burn through damage.

3) Inspect the Combustion Chamber Vane Assembly IAW Task 3-14.

4) Inspect Combustion Chamber Liner IAW Task 3-17.

5) Inspect Combustion Chamber Housing IAW Task 3-20.

6) Remove, clean, inspect and install Fuel Drain Valves IAW Tasks 3-1, 3-2, 3-3 & 3-4.

7) Remove, clean and inspect Left & Right Hand Fuel Manifold Assemblies IAW Tasks 6-16, 6-17 & 6-18.

8) Inspect the 4^{th} Stage Power Turbine Rotor IAW Task 4-35.

9) Inspect Fourth Stage Power Turbine Nozzle IAW Task 4-47.

10) Inspect 3rd Turbine Nozzle IAW Task 4-29. Contact a technical POC listed in paragraph 11a, for erosion criteria.

11) Inspect 3rd Stage Power Turbine Rotor IAW Task 4-51.

(b) Remove and visually inspect the 1st Stage GP Assembly IAW TM 55-2840-254-23 Tasks 4-53, 4-54, 4-55, 4-57 and 4-59 and 2nd GP Assembly IAW TM 55-2840-254-23 Tasks 4-62, 4-64, 4-67, and 4-69. Inspect Gas Producer Rotor Disk cooling holes for signs of blockage. No blockage is allowed. If blockage is present, but can be cleared and the debris flushed out, reuse the components. However, if the cooling holes can not be cleared and flushed with shop air, replace defective disk set. Contact a technical POC listed in paragraph 11a for the Gas Producer Blade erosion criteria.

(c) Remove and inspect Diffuser Curl Assembly IAW TM 55-2840-254-23, Task 4-73.

(d) Remove and inspect Air Diffuser for erosion IAW TM 55-2840-254-23, Task 2-36 and 2-38 respectively.

(2) T55-GA-714A procedures:

(a) Gas Producer Section procedures IAW TM 1-2840-265-23&P.

1) Remove Combustion Section and Power Turbine Assembly IAW Task 3-5.

2) Remove, clean and inspect 2nd Stage Turbine Disk Assembly IAW Tasks 4-54, 4-55 and 4-56.

3) Remove, clean and inspect 2nd Gas Producer Nozzle Assembly IAW Tasks 4-58, 4-59 & 4-60.

NOTE

Replace the First Gas Producer Cylinder if Thermal Barrier Coating is missing or chipped in excess of 0.050 at the trailing edge and/or 0.025 inch at the leading edge, through 360 degrees circumferentially.

If coating is missing, inspect for rounding of the 1st GP rotor blades leading edge tip. If found contact a technical POC for disposition instructions.

4) Remove, clean and inspect 1st Stage Turbine Disk Assembly IAW Tasks 4-63, 4-64 and 4-65.

5) Remove, clean and inspect 1st Stage Nozzle IAW Tasks 2-78, 2-79 and 2-80.

6) Remove, clean and inspect Diffuser Curl IAW Task 2-78, 2-83 and 2-84.

7) Remove, clean and inspect Air Diffuser IAW Task 2-96, 2-97 & 2-98 for erosion on the leading edge not to exceed 0.094 inch; see figure 6 below.

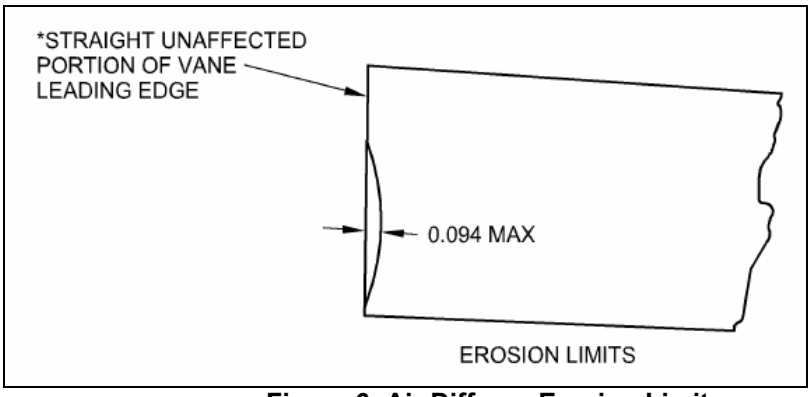

Figure 6- Air Diffuser Erosion Limits

8) Reassemble Gas Producer Section IAW TM 1-2840-265-23&P.

(b) Combustion Section

1) Remove, clean, inspect and install Fuel Drain Valves IAW Task 3-1. 3-2, 3-3 & 3-4.

2) Remove, clean and inspect Left & Right Hand Fuel Manifold Assemblies IAW Tasks 6-16, 6-17 & 6-18.

3) Remove, clean and inspect Start Fuel Nozzles IAW Tasks 6-25, 6-26 & 6-28.

4) Remove, clean and inspect Igniters IAW Tasks 7-6, 7-7, 7-8 and 7-10.

5) Inspect and test Thermocouple Harness Assemblies IAW Task 4-22 and 4-24. Additionally, visually inspect the thermocouples for signs of burn through or sand erosion damage.

(c) Hot End Assembly (AVIM). (References TM 1-2840-265-23&P)

1) Inspect the Flow Divider Bracket IAW Task 6-48.

2) Inspect the Combustion Chamber Vane Assembly IAW Task 3-14.

3) Inspect Combustion Chamber Liner IAW Task 3-17.

4) Inspect Combustion Chamber Housing IAW Task 3-20.

5) Inspect the 4th Stage Power Turbine Rotor IAW Task 4-35.

6) Inspect Fourth Stage Power Turbine Nozzle IAW Task 4-48.

7) Inspect 3rd Turbine Nozzle IAW Task 4-29. Contact a technical POC listed in paragraph 11, for erosion criteria.

8) Inspect 3rd Stage Power Turbine Rotor IAW Task 4-52.

(d) Reassemble and install Combustion Section & Power Turbine Assembly IAW TM 1-2840-265-23&P.

(e) Inspection of the Overspeed Drive Sump Cover Assemble Strainer on Engines Serial Numbers GA-75XXX as follow:

1) Insure engine oil system is drained IAW TM 1-2840-265-23&P.

2) Inspect the Over-speed Sump for presence of the Over-speed Sump Strainer, part number 2-060-280-01.

a) If a suitable borescope is available, remove the accessory drain hose assembly, IAW TM 1-2840-265-23&P, figure 57, item 2, or the Overspeed Sump tube, PN 2-060-440-04, connected to the Tank Outlet Cover Assembly. Insert borescope probe through the attachment fitting, (see figure 57, item 3) or the Outlet Cover tube cavity, and inspect for the presence of the Overspeed Sump Strainer.

b) If a borescope is not available, remove Over-speed and Tank Outlet Cover Assembly Cover, PN 2-060-260-12, figure 32, item 17, and visually inspect for the presence of the Over-speed Sump Strainer.

c) If no oil sump screen is present contact a logistical POC referenced in paragraph 11b.

(f) Reassemble engine in accordance with TM 1-2840-265-23&P (EM 0186) or TM 55-2840-254-23.

(g) Run engine in FEDS/METS, where available or install on airframe IAW TM 1-1520-240-23 and perform Maintenance Test Flight.

d. Depot Maintenance. Turn-in engine in accordance with guidelines below.

(1) Germany: Engines and components that require depot level repairs will be turned in as a supply transaction (receiving turn-in credit through a Reset fund site) and a replacement engine should be ordered. Unserviceable engines shall be shipped via airfreight to BR4 (Red River). The following information must be e-mailed to the IMMC Logistical POC in paragraph 11b.(1), and Earl Hildebran, Fort Stewart/Fort Bragg POC: Shipping document number, engine serial number, known maintenance requirements, all DA Form 2410 data elements, and a copy of the DECU download.

(2) Fort Campbell: Perform R3 repairs as authorized. Engines and components requiring overhaul/repair beyond the Fort Campbell ESRA scope of work will be turned in as a supply transaction and shipped via airfreight to BR4. Contact the IMMC Logistical POC in paragraph 11b.(1) and Earl Hildebran, Fort Stewart/Fort Bragg POC, who will provide appropriate shipping instructions to the DLA warehouse (ADL).

(3) Fort Hood/ Fort Lewis/ Hawaii: Engines that require repairs beyond AVIM capabilities will be shipped to the ESRA Facility at Ft. Campbell using TAC Code “A1ML”. Contact Fort Campbell’s Reset Manager, Alice Reno, at DSN 635-9932 for shipping instructions. Components requiring repairs beyond the AVIM capability should be turned in as a supply transaction. The following information must be provided to Earl Hildebran, Fort Stewart/Fort Bragg POC: Shipping document number, engine serial number, known maintenance requirements, all DA Form 2410 data elements, and a copy of the DECU download.

(4) Fort Stewart: Engine repairs beyond the site's scope of work will be shipped to the ESRA Facility at Fort. Campbell using TAC Code "A1ML". Contact Fort Campbell's Reset Manager, Alice Reno, at DSN 635-9932 for shipping instructions. Components requiring repairs beyond the AVIM capability should be turned in as a supply transaction. The following information must be provided to Earl Hildebran, Fort Stewart/Fort Bragg POC: Shipping document number, engine serial number, known maintenance requirements, all DA Form 2410 data elements, and a copy of the DECU download.

(5) Fort Bragg: Engines and components requiring overhaul/repair beyond the Fort Bragg ALMD scope of work will be shipped to the ESRA Facility at Fort Campbell using TAC Code "A1ML". Contact Fort Campbell's Reset Manager, Alice Reno at DSN 635-9932 for shipping instructions. Components requiring repairs beyond the AVIM capability should be turned in as a supply transaction. The following information must be provided to Earl Hildebran, Fort Stewart/Fort Bragg POC: Shipping document number, engine serial number, known maintenance requirements, all DA Form 2410 data elements, and a copy of the DECU download.

(6) All other Reset sites contact a logistical POC in paragraph 11b.

8. Supply/Parts and Disposition.

a. Parts required to accomplish this Technical Bulletin. Not applicable.

b. Parts Disposition. Not applicable.

c. Expendable Supplies. As required.

9. References.

a. TM 55-2840-254-23, Aviation Unit and Aviation Intermediate Maintenance Manual, Engine, Gas Turbine.

b. TM 1-2840-265-23&P, (EM0186) Aviation Unit and Intermediate Maintenance and Repair Parts and Special Tools List Manual, Engine, Aircraft, Gas Turbine.

c. DA PAM 738-751, Functional Users Manual for the Army Maintenance Management System–Aviation (TAMMS-A).

d. TB 55-8100-200-24, Maintenance of Specialized Reusable Containers for Aircraft Equipment.

e. TM 55-1520-240-23, Aviation Unit and Aviation Intermediate Maintenance Manual for CH-47D Helicopter.

10. Recording and Reporting Requirements. Per DA PAM 738-751.

11. Points of Contact. Questions regarding this TB should be addressed to the U.S. Army Aviation and Missile Command, AMSAM-MMC-AV-CEB, Bldg. 5678, Redstone Arsenal, AL 35898.

a. Technical points of contact for this TB are:

(1) Mr. Steven Cahill, AMSRD-AMR-AE-P-E, DSN 645-0746; Commercial (256) 955-0746. E-mail: steven.cahill@us.army.mil.

(2) Mr. Curtis Stevens, AMSRD-AMR-AE-P-E, DSN 645-0480; Commercial (256)955-0480. E-mail: curtis.stevens@us.army.mil.

b. Logistical points of contact for this TB are:

(1) Mr. Ruben Burgos, AMSAM-MMC-AV-CEB; DSN: 897-3350; Commercial (256) 313-3350; E-mail: Ruben.Burgos@peoavn.redstone.army.mil.

(2) Mr. Mike Dotson (Ft. Campbell & Germany); DSN 645-7190; Commercial (256) 955-7190; E-mail: Michael.Dotson@redstone.army.mil.

(3) Mr. Harlie Clark (Ft. Hood); DSN 645-8725; Commercial (256) 955-8725; E-mail: Harlie.Clark@redstone.army.mil.

(4) Mr. Earl Hildebran (Ft. Stewart & Ft. Bragg); DSN 897-7141; Commercial (256) 313-7141; E-mail: Earl.Hildebran@redstone.army.mil.

(5) Mr. Sam Burns (Ft. Lewis, Hawaii & NG); DSN 645-8862; Commercial (256) 955-8862; E-mail: Sammy.Burns@redstone.army.mil.

(6) Mr. Steven R. Geaschel (Shipping Containers): DSN 746-0284: Commercial (256) 876: Email: Steven.Geaschel@us.army.mil.

12. Reporting of Errors and Recommending Improvements. You can improve this TB. If you find any mistakes or if you know of a method to improve these procedures please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also provide DA Form 2028 information to AMCOM via e-mail, fax, or the World Wide Web. Our fax number is: DSN 788-6546 or commercial (256) 842-6546. Our e-mail address is: 2028@redstone.army.mil. Instructions for sending an electronic 2028 may be found at the back of this manual. For the World Wide Web, use: https://amcom2028.redstone.army.mil.

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