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Technical Report

No. 13511

M151 1/4-TON TRUCK CORROSION TEST PROGRAM (U)

NOVEMBER 1990

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The M151 1/4-ton truck corrosion program was initiated to evaluate the corrosion protection provided by state-of-the-art materials and coating systems, as advanced by the automotive industry to provide a warranty against vehicular rust-thru perforation for up to ten years.

Evaluation thru field testing in Puerto Rico and Hawaii (in cooperation with the National Guard) was carried out, using the M151A2 jeep body as a test bed. The primary coating system evaluated for Army application consisted of double-galvanized steel (G-90), E-coat epoxy primer, and a Chemical Agent Resistant Coating (CARC) topcoat, using the standard jeep body as a control.

The results of the three and one-half years of field tests reveal that: (1) double-galvanized steel (G-90) effectively prevents rust-thru perforation (two of five standard

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19. ABSTRACT (continued)

jeep bodies perforated within one and one-half years in the Puerto Rico test; none of the 16 double-galvanized bodies perforated after three and one-half years in the field): (2) rustproofing (MIL-C-62218) offers no additional corrosion protection when using double-galvanized steel sheet metal and CARC system; and (3) E-coat epoxy primer is superior to two-part epoxy primer (MIL-P-53022A) in protecting the underlying metal from corrosion.

Based on these results to meet current Corrosion Prevention and Control (CPC) performance requirements in tactical vehicular production contracts, including also NDI contracts, recommendations are that: (1) double-galvanized steel (G-90) be used in combination with the CARC paint system; (2) E-coat epoxy primer be used when possible rather than two-part epoxy primer (MIL-P-53022A); (3) when using double-galvanized steel, or its equivalent, the rustproofing requirement (MIL-C-62218) be omitted. This has been a long standing RD&E goal, stated in TACOM Reg 700-90, page D-5, paragraph 5.

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M151 1/4-Ton Truck Corrosion Test Program

1.0 Introduction

The M151 1/4 ton Truck results from a 20,000 mile durability-corrosion test performed in 1983 at Transportation Research Center (TRC), in Ohio, were inconclusive in demonstrating that galvanized steel, in combination with a corrosion- resistant primer and a CARC-approved topcoat, has superior corrosion resistance over that of conventional rustproofing. This included 450 passes through salt fording pit, having a 5% salt concentration. A more conclusive test is necessary to establish which system offers the more superior corrosion resistance. Corrosion testing is required to determine if state-of-the-art advances in corrosion protection made by the automotive industry can be cost-effectively applied to the tactical wheeled vehicle fleet. Corrosion continues to be a serious problem in Army equipment, with the current corrosion protection, and is receiving attention at the highest levels.

It is well known that accelerated corrosion testing can yield misleading or incorrect predictions of how effectively a promising coating system protects the underlying metal against corrosion under field service conditions. In order to make a more accurate assessment, this program was designed to evaluate the corrosion protection offered by promising coating systems under actual field service conditions. In particular, the system being evaluated--precoated sheet steel (double-galvanized) in combination with state-of-the-art primer and topcoat--is one which the automotive industry is basing its extended warranty, of up to ten years, against rust-thru perforation. The purpose of this study was to determine if application of corrosion-prevention technology to Army tactical vehicles can significantly decrease the impact of corrosion in reducing the useful life expectancy of tactical vehicles relying on sheet metal steel in the design/materials selection.

This program was initiated in 1985, when General Richard H. Thompson, Commander, AMC Headquarters, declared "war against corrosion." The sites selected for testing and evaluation were Puerto Rico, Hawaii, and Panama, which represent tropical environments where Army tactical vehicles have sustained severe corrosion damage.

2.0 Field Test Objective

Because it has a history of being corrosion-prone, the M151A2 was selected as a test bed to evaluate the corrosion protection offered by select state-of-the-art materials and coating systems. To make the evaluation, two classes of vehicles were utilized: "test" and "control."

2.1 Test Vehicle Parameters

The coating systems, utilized in the "test" vehicles, consisted of precoated double-galvanized steel (G-90) in combination with epoxy primer, either

E-coat primer according to the Pittsburg Plate and Glass Company, PPG, process utilized in the automotive industry or two-part epoxy primer (MIL-P-53022A), presently used by the Army, and CARC topcoat (MIL-C-46168). Also, some test vehicles were rustproofed per MIL-C-62218 and some were not, to determine if rustproofing provided additional corrosion protection.

2.2 Control Vehicle Parameters

The "control" vehicles in the program utilized standard sheet metal M151A2 bodies, which were painted according to Army specifications. In 1985, when this program was initiated, the Army was in the process of changing over to the CARC paint system from that used previously, which was the Alkyd paint system. In response to this change, the control bodies in the Puerto Rico test were painted with the CARC paint system and in the Hawaii test with the alkyd paint system. Because the Puerto Rico National Guard did not, then, have CARC paint facilities, the standard jeep bodies were painted at New Cumberland Army Depot and then shipped to Puerto Rico after approval by TACOM.

2.3 Initiation of Field Testing

Field testing was initiated during the second/third quarters of FY87. The initial distribution of the test/control vehicles in the program is shown in Table 2-1. Field inspections by TACOM were carried out in the second/third quarters of FY87. One of the purposes was to provide the Puerto Rico National Guard and the Hawaii National Guard, under whose auspices the tests were conducted, with Field Inspection Pamphlets, that were to guide the users in carrying out inspections for corrosion (see Appendix A). (The Panama test was terminated in 1988 and is not included in this report). Of note, the frequency of TACOM field inspection trips were adjusted in accordance with funding.

2.4 Field Test Evaluation Methodology

To assist the evaluation process, classification of rust damage and body inspection areas were defined in Appendix A, page A-23 of the Field Inspection Pamphlet. Following the initial inspections at Puerto Rico and Hawaii during the second/third quarters in FY87, close-out on site inspections were made in Sep-Oct 90 at the two test sites. The users furnished TACOM with corrosion inspection reports. Data was supplied by Puerto Rico in Jun 88, and semi-annually by Hawaii up to the Oct 90 close-out inspection (see Results section).

To insure the validity of the evaluation process in the close-out, on-site inspections at Puerto Rico and Hawaii, the following sampling criteria were adopted, referring primarily to Puerto Rico; (1) to limit as much as possible the vehicles to be inspected to those that were inspected by TACOM in 1987; (2) to further limit the sampling size to those for which prior reports had been received (Puerto Rico, Jun 88); (3) to include those identified with little or no corrosion damage in the initial TACOM survey in 1987. The

intent here was to insure, as much as possible, that the results would not be biased by including in the vehicles sampled those that could have been severely damaged thru shipping, crating, uncrating, and body installations (body swaps prior to fielding). To the extent possible, these criteria were adhered to for the Hawaii close-out inspection.

3.0 Field Test Results

The vehicular corrosion data obtained from the on-site inspections, as well as prior user-supplied inspection report(s), are summarized for Puerto Rico in Appendix B and for Hawaii in Appendix C. A more detailed accounting of these observations follows.

3.1 Puerto Rico Test Data

The corrosion data, shown in Appendix B, has been condensed into a format, Table 3-1., which summarized the corrosion damage observed in Puerto Rico for each class of vehicles in the program. The corrosion data listed represents 21 vehicles, using as selection criteria the methodology discussed in para 2.4. The data shown in Table 3-1., may further be condensed into corrosion incidents per vehicle, as shown in Table 3-2.

In the Puerto Rico test, answers were sought to three questions:

a. Does the use of double-galvanized steel provide effective protection against rust-thru perforation? The data in Table 3.1. has been reorganized into Table 3-3., which summarizes the corrosion damage observed for five standard jeep bodies and 16 double-galvanized jeep bodies, respectively. The data in Table 3-3. can be further organized into a format showing corrosion damage incidents per vehicle, Table 3-4., which is useful for answering the above question. Clearly, double-galvanized steel is shown to be necessary in preventing rust-thru perforation, whether the primer is E-coat epoxy or two-part epoxy, referring to Table 3-4.

b. Does commercial rustproofing (MIL-C-62218) provide additional corrosion protection for double-galvanized jeep bodies? To answer this question, the data in Table 3-1. has been reorganized into the formats shown in Table 3-5., where the data has been totalled to show ten rustproofed and six nonrustproofed double-galvanized jeep bodies, and in Table 3-6., where the corresponding data has been normalized. The data in Table 3-6. shows no advantage in preventing corrosion by rustproofing, referring to stage 2 and stage 1 incidents being nearly equivalent.

c. Finally, how does E-coat epoxy primer compare with two-part epoxy in preventing corrosion of the underlying metal? The data shown in Tables 3-7. and 3-8., obtained from Table 3.1., shows that E-coat primer more effectively protects the underlying metal against surface corrosion than two-part epoxy primer does. However, there is a need for improvement in the adhesion properties of the E-coat epoxy primer, as shown in the number of stage 2 incidents per vehicle, 0.80 and stage 1 incidents per vehicle, 0.50.

3.2 Hawaii Test Data

The corrosion data, shown in Appendix C, has been condensed as previously stated, in Tables 3-9. and 3-10., which in turn summarize the corrosion damage observed in Hawaii for each class of vehicles in the program. The distribution of vehicles between "control" and "test" vehicles, and among the "test" vehicles, differ from those in Puerto Rico. The corrosion data presented represents 19 vehicles (12 at Oahu, 4 at Kauai, and 3 at the island of Hawaii). As shown in Table 3-10., which normalizes the corrosion data in Table 3-9., all the vehicles have held up well during the three year test period, showing no rust perforation and minimal surface corrosion (stages 2 or 1).

As in the Puerto Rico test, the results in Tables 3-9. and 3-10., show no advantage in applying commercial rustproofing (MIL-C-62218) to the double-galvanized jeep bodies in providing additional corrosion protection.

3.3 Control Vehicle Sample Size

For the Puerto Rico test, the control sample size consisted of five CARC-painted M151A2 jeep bodies, where two of the five jeep bodies showed significant rust-thru perforation prior to one and one-half years of field service life. In the Hawaii test, there was only one alkyd painted control vehicle which, like the double-galvanized jeep bodies, showed minimal corrosion damage after three years in the field.

3.4 Environmental Impact

Less vehicular corrosion damage was observed in the Hawaii test (three years) than in the Puerto Rico test (three and one-half years). This difference can be explained partly, or possibly completely, by environmental differences; the Puerto Rico environment presents a more aggressive environment (in terms of temperature, humidity, and ocean salt spray) than Hawaii in causing corrosion.

4.0 Conclusions

The conclusions are based primarily on the Puerto Rico test results, due to Puerto Rico being a more aggressive tropical environment than Hawaii in causing corrosion during the time span the study took place. These conclusions are discussed more specifically in the following paragraphs.

4.1 Rust-thru Perforation

The results in Tables 3-5. and 3-4., show the effectiveness of double-galvanized steel in preventing rust-thru perforation. While two of five standard jeep bodies, painted with CARC and rustproofed, perforated within one and one-half years of fielding, none of the 16 double-galvanized jeep bodies, whether painted with E-coat or two-part epoxy primer and CAF topcoat, showed any perforation after being fielded for three and one-half years. These results are consistent with a GM study, reported at TACOM in

985, titled "Land Vehicle Corrosion Management" by R. F. Steirmayer; this study suggests "that the cathodic primer (E-coat) was inadequate for perforation protection, and the zinc coating was mandatory on the inner surfaces."

4.2 Commercial Rustproofing (MIL-C-62218)

The results in Tables 3-5. and 3-6 show that, in terms of stage 2 or stage 1 corrosion, commercial rustproofing (MIL-C-62218) does not provide additional corrosion protection. (This result is consistant with the fact that the automotive companies do not require commercial rustproofing to honor their extended warranties against rust-thru perforation, rather, these warranties are based on "designed-in" corrosion protection.)

4.3 E-coat versus Two-part Epoxy Primer

While the results in Tables 3-7. and 3-8. show E-coat is more effective than two-part epoxy primer in diminishing surface corrosion (stages 2 or 1), there is still a need for improvement as discussed in paragraph 3.1.C. These differences show up more in a Puerto Rico like environment than in the less aggressive Hawaii environment.

5.0 Recommendations

a. Double-galvanized steel (G-90) be used to the maximum extent to meet current CPC performance requirements in Production and Spare Parts Contracts for tactical vehicles. Performance specs for future NDI vehicle acquisitions will continue to specify requirements for design, materials, and coatings selection that achieve no-rust thru perforation for the initial ten years of service life.

b. E-coat epoxy primer replace two-part epoxy primer (MIL-P-53022A) to the maximum extent on future tactical vehicles.

c. The rustproofing requirement be eliminated when using the corrosion prevention requirement in paragraphs 5a and 5b for tactical vehicle procurements.

d. The test program be continued in Hawaii at no cost to TACOM for another two years to:

(1) Determine whether the ten year non-perforation requirements in present contracts can be met with present corrosion prevention technology.

(2) Establish a better CPC test data base for discussions at military and industrial conferences.

(3) Demonstrate TACOM's continued commitment to using proven coating systems to prevent rust-thru perforation.

DISTRIBUTION/CONFIGURATION OF TEST/CONTROL VEHICLES

SITE	NO.	BODY TYPE		PRIMER			TOPCOAT		COMMENTS
		STEEL	GALVANIZE	ALKYD	EPOXY	E-COAT	ALKYD	CARC	
HAWAII	20		YES		2	18		YES	50% RUSTPROOFED TEST VEHICLES
HAWAII	10	YES		YES			YES		USER SUPPLIED CONTROL VEHICLES 100% RUSTPROOF
PANAMA	28		YES		2	26		YES	50% RUSTPROOFED TEST VEHICLES
PANAMA	14	YES		YES				YES	USER SUPPLIED CONTROL VEHICLES 100% RUSTPROOF
PUERTO RICO	48		YES		2	46		YES	50% RUSTPROOFED TEST VEHICLES
PUERTO RICO	24	YES		YES	YES			YES	USER SUPPLIED CONTROL VEHICLES 100% RUSTPROOF

x MOD CONTRACT TO PRODUCE 100 CONTROL M151A2 JEEP BODIES SIGNED MARCH 1985 FOR $395,000 (END OF REG PROD RUN)
xx PRODUCTION COMPLETED OCT 1985
xxx BODIES SHIPPED OCT 1985
xxxx 4 CONTROLS REC'D AT TACOM

Table 2-1. Distribution/Configuration of Test/Control Vehicles

Table 3-1. Puerto Rico Test Results Totalled

PUERTO RICO

TEST RESULTS TOTALLED * (SEP 90)

Body Type	Number of Vehicles	Perforation Incidents	Stage 2 Incidents	Stage 1 Incidents
Standard Body	5	9**	4	10
Galvanized Body two-part epoxy primer w/rustproofing	1	0	1	1
Galvanized Body two-part epoxy primer w/o rustproofing	1	0	6	1
Galvanized Body E-coat primer, w/o rustprcofing	5	0	1	3
Galvanized Body E-coat primer, w/rustproofing	9	0	10	4

* Test initiated - Apr 87

** Repairs made in Sep 88 when rollover preventing apparatus installed on jeeps after one and one-half years of service life

*** Mileage not included due to defective odometers

Table 3-2. Puerto Rico Test Results Normalized

PUERTO RICO

TEST RESULTS NORMALIZED* (SEP 90)

Body Type	Perforation Incidents per Vehicle	Stage 2 Incidents per Vehicle	Stage 1 Incidents per Vehicle
Standard Body	1.8	0.8	2.0
Galvanized Body two-part epoxy primer w/rustproofing	0	1.0	1.0
Galvanized Body two-part epoxy primer w/o rustproofing	0	6.0	1.0
Galvanized Body E-coat primer, w/o rustproofing	0	0.2	0.60
Galvanized Body E-coat primer, w/rustproofing	0	1.1	0.44

* Length of test (Apr 87 - Sep 90) for 3-1/2 years Odometers in a number of vehicles faulty; hence need to assume average mileage driven for each category is similar.

Table 3-3. Puerto Rico Test Results Totalled
(Compare Standard Bodies with Double-Galvanized Bodies)

PUERTO RICO

TEST RESULTS TOTALLED * (SEP 90)

(Compare standard bodies with double-galvanized bodies)

Body Type	Number of Vehicles	Perforation (Stage 4) Incidents	Stage 2 Incidents	Stage 1 Incidents
Standard Body***	5	9**	4	10
Double-galvanized Body*** with either two-part epoxy primer w/wo rustproofing; or E-coat primer w/wo rustproofing	16	0	18	9

* Field test initiated Apr 87; close-out inspection Sep 90

** Repairs made in Sep 88 when rollover preventing apparatus installed on jeeps after 1-1/2 years of service life

*** Significant number of odometers defective

Table 3-4. Puerto Rico Test Results Normalized
(Compare Standard Bodies with Double-Galvanized Bodies)

PUERTO RICO

TEST RESULTS NORMALIZED* (SEP 90)

(Compare standard bodies with double-galvanized bodies)

Body Type	Perforation Incidents per Vehicle	Stage 2 Incidents per Vehicle	Stage 1 Incidents per Vehicle
Standard Body***	1.8	0.8	2.0
Double-galvanized Body*** with either two-part epoxy primer w/wo rustproofing; or E-coat primer w/wo rustproofing	0	1.1	0.56

Table 3-5. Puerto Rico Test Results Totalled
(Compare Double-Galvanized Vehicles without Rustproofing with those rustproofed)

PUERTO RICO

TEST RESULTS TOTALLED* (SEP 90)

(Compare double-galvanized vehicles without rustproofing with those rustproofed)

Body Type	Number of Vehicles	Perforation (Stage 4) Incidents	Stage 2 Incidents	Stage 1 Incidents
Double-galvanized Body with either primer and no rustproofing	6	0	7	4
Double-galvanized Body with either primer, with rustproofing	10	0	11	5

* Test conditions, as in Table 3-2

Table 3-6. Puerto Rico Test Results Normalized
(Compare double-galvanized vehicles without rustproofing with those rustproofed)

PUERTO RICO

TEST RESULTS NORMALIZED*

(Compare double-galvanized vehicles without rustproofing with those rustproofed)

Body Type	Perforation Incidents per Vehicle	Stage 2 Incidents per Vehicle	Stage 1 Incidents per Vehicle
Double-galvanized Body with either primer and no rustproofing	0	1.2	0.67
Double-galvanized Body with either primer, with rustproofing	0	1.1	0.50

* Test conditions, as in Table 3-2

Table 3-7. Puerto Rico Test Results Totalled
(Compare two-part Epoxy Primer with E-coat Primer)

PUERTO RICO

TEST RESULTS TOTALLED*

(Compare two-part Epoxy primer with E-coat primer)

Body Type	Number of Vehicles	Perforation Incidents	Stage 2 Incidents	Stage 1 Incidents
Double-galvanized Body with two-part Epoxy Primer w/o rustproofing	2	0	7	2
Double-galvanized Body with E-coat primer w/o rustproofing	14	0	11	7

* Test conditions, see Table 3-2

Table 3-8. Puerto Rico Test Results Normalized
(Compared two-part Epoxy Primer with E-coat Primer)

PUERTO RICO

TEST RESULTS NORMALIZED*

(Compare two-part Epoxy primer with E-coat Primer)

Body Type	Perforation Incidents per Vehicle	Stage 2 Incidents per Vehicle	Stage 1 Incidents per Vehicle
Double-galvanized Body with two-part Epoxy primer w/o rustproofing	0	3.5	1.0
Double-galvanized Body with E-coat primer w/o rustproofing	0	0.80	0.50

* Test conditions, see Table 3-2

Table 3-9. Hawaii Test Results Totalled

HAWAII

TEST RESULTS TOTALLED * (OCT 90)

Body Type	Number of Vehicles	Total Miles	Perforation Incidents	Stage 2 Incidents	Stage 1 Incidents
Standard Body	1	4765	0	1	0
Galvanized Body two-part epoxy primer CARC Topcoat w/rustproofing	1	108	0	0	0
Galvanized Body two-part epoxy primer CARC Topcoat w/o rustproofing	1	2484	0	0	0
Galvanized Body E-coat primer, CARC Topcoat w/o rustproofing	9	16517	0	1	0
Galvanized Body E-coat primer, CARC Topcoat w/rustproofing	7	9160	0	0	0

Table 3-10. Hawaii Test Results Normalized

HAWAII

TEST RESULTS NORMALIZED (OCT 90)

Body Type	Miles per Vehicle	Perforation Incidents per Vehicle	Stage 2 Incidents per Vehicle	Stage 1 Incidents per Vehicle
Standard Body	4765	0	1.0	0
Galvanized Body two-part epoxy primer CARC Topcoat w/rustproofing	108	0	0	0
Galvanized Body two-part epoxy primer CARC Topcoat w/o rustproofing	2484	0	0	0
Galvanized Body E-coat primer, CARC Topcoat w/o rustproofing	1835	0	0.11	0
Galvanized Body E-coat primer, CARC Topcoat w/rustproofing	1309	0	0	0

APPENDIX A

M151A2 GALVANIZED BODY

FIELD TEST INSPECTION

PAMPHLET

M151A2 GALVANIZED BODY FIELD TEST INSPECTION PAMPHLET

Section I. INTRODUCTION

1-1. PURPOSE: The purpose of this inspection pamphlet is to provide a means for logging data, by the user test sites, required for TACOM evaluation of the M151A2 galvanized body test program.

1-2. SCOPE: This pamphlet provides procedures, data entry forms, photographs, and other information required for user test sites to properly perform the specific provisions outlined in the approved memorandum of agreement (MOA) between TACOM and user test sites. This pamphlet does not identify all responsibilities of the user test sites, but covers those items necessary to provide TACOM with information required for analyzing results.

This pamphlet will act as a historical record of events for each test vehicle.

A separate pamphlet will be maintained for each vehicle. Inspection pamphlets and completed worksheets will become a permanent record of each tested vehicle and must be retained until completion of the program.

Provided in each pamphlet are a sufficient number of data entry forms for the entire test life.

1-3. CORRESPONDENCE: All correspondence which is required by the instructions of this pamphlet, to be sent to the TACOM point of contact (POC) shall be addressed to the following:

Commander
U.S. Army Tank-Automotive Command
Attn: AMSTA-RCKM (Mr. Irving Warshawsky)
Warren, MI 48397-5000

Any deviation from the requirements of this pamphlet must have prior approval from the TACOM POC. Contacts by phone may be made at Autovon 768-8721, Commercial (313) 574-8721.

Section II. PROCEDURES

2-1. RUSTPROOFING: All standard bodies and half the galvanized bodies must be rustproofed. Rustproofing to be applied in accordance with TB 43-0123. Fill out data entry form, part IV, during application and send copy of form to POC. Instructions for this form, as well as a completed sample, are provided in appendix A. Blank forms are in back of this pamphlet. The number of bodies rustproofed at each test site is as follows:

SITE	STANDARD	GALVANIZED W/E-COAT	GALVANIZED W/EPOXY
Hawaii	10	9	1
Panama	14	13	1
Puerto Rico	24	23	1

2-2. VEHICLE IDENTIFICATION

A. BODY IDENTIFICATION: Three different body types are being evaluated in this test. Identification of these bodies can be made as follows:

BODY TYPE	IDENTIFICATION
Standard	None
Galvanized w/E-coat primer	Decal on instrument panel indicating galvanized body
Galvanized w/2-part epoxy primer	Decal on instrument panel indicating galvanized body and letters stenciled in black above passenger grab handle "epoxy".

B. IDENTIFICATION STICKER: Vehicle identification stickers are provided by TACOM to be applied to each vehicle before test start-up. The sticker will facilitate identification of test vehicles by users and TACOM inspection teams. Stickers will be applied to the right side of dash panel above grab handle as follows:

COLOR	BODY TYPE
Red	Galvanized body, E-coat primer, w/rustproofing
White	Galvanized body, 2-part epoxy primer, w/rustproofing
Blue	Galvanized body, E-coat primer, w/o rustproofing
Grey	Galvanized body, 2-part epoxy primer, w/o rustproofing
Yellow	Standard body

2-3. PAINT REPAIRS: Paint repairs may be required before test start-up, due to damage incurred during shipping or installation, and at various times throughout the test life. Upon these repairs, fill out a repair painting data form. This form should also be filled out after body repairs are made. Samples of photographic coverage are found in appendix E, and instructions for filling out this form, as well as a completed sample, are found in appendix B. Blank forms are provided in back of this pamphlet. Send copy of completed forms and photographs to the TACOM POC. Alkyd paint repairs shall be per TM 43-0139. CARC paint repairs per appendix C.

2-4. BODY INSPECTIONS.

NOTE

- Vehicles shall be cleaned using high pressure water before body inspection. Solvents and/or steam must not be used as these will cause damage or removal of rustproofing compound.

- Adequate lighting must be provided for underbody inspection.

Body inspections shall be made every six months after test start-up. These intervals may be arranged to coincide with semi-annual PMCS. Fill out a body inspection worksheet at these intervals. Instructions for filling out this form, as well as a completed sample, are found in appendix D. Blank forms are provided in back of this pamphlet. Send copy of completed forms and photographs to the TACOM POC.

2-5. PHOTOGRAPHIC COVERAGE: As indicated on the various data/inspection forms, a photographic record of all repairs, inspections, damaged areas, etc., is required. Photos should be as clear/concise as possible. Each photo will have the vehicle USA number and date of photograph clearly indicated in the view. See samples shown in appendix E.

2-6. PREPARATION FOR TACOM VISITS: Periodically TACOM teams will make field visits to assess the test vehicles, ensure test requirements, instruct users, and resolve questions and problems. The TACOM POC will advise the user test sites in advance of these visits so that the following arrangements can be made by user test sites before arrival:

— Photographer availability

— Access to vehicles by TACOM personnel

— Cargo bay or other appropriate inspection facilities are available

— Support personnel are available for cleaning vehicles and providing other tasks to enhance TACOM inspections.

2-7. FINAL INSPECTION: Upon completion of the test period, a final inspection will be made by the user test sites and TACOM teams. A final inspection worksheet, with photographs will be completed. Prior to this inspection, loose rustproofing will be removed to enhance evaluation of corrosion damage.

APPENDIX A
DATA ENTRY FORM INSTRUCTIONS

I. PURPOSE: Provide instructions for completion of the data entry form. The information contained on the form establishes the baseline for data analysis during the test program.

II. IDENTIFICATION REQUIREMENTS:

A. INSPECTING UNIT: Fill in complete address of unit performing inspection.

B. INSPECTOR: Complete name, grade, unit and autovon of person performing the inspection.

C. VEHICLE USA #: Self-explanatory.

III. RUSTPROOFING: To assure uniformity of results at each test site, only a single manufacturer rustproofing compound shall be utilized for all vehicles in the test program. The test sponsor should be advised as soon as possible if this condition cannot be met, and in that case, the rustproofing compound will be supplied by the sponsor. Two wet film gages are supplied to each site. These are to be used to measure wet film thickness only. Inspection shall be done in accordance with the table below:

Table A-1

TEST	SAMPLE SIZE	PROCEDURE	REWORK CRITERIA
Wet film thickness	All	Follow TB 43-0123 for the proper application of the rustproofing compound. Using the wet film gage, check three areas on each vehicle and record each reading on the data entry form. The readings should be taken on a relatively flat surface. The same areas should be checked on all test vehicles to assure uniformity. The minimum of three readings must equal or exceed 10.0 mil.	Apply another coating of rust-proofing until minimum thickness is met.

A. RUSTPROOFING MANUFACTURER: Specify the rustproofing compound manufacturer and product I.D. number (exp. — Tuffkote Dinol TK2220).

B. WET FILM THICKNESS MEASUREMENTS: Record the three final rustproofing thickness measurements in mils.

DATA ENTRY FORM

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

PART I, PAINT THICKNESS TESTS

A. **PRIMER SPECIFICATION:** _____

THICKNESS MEASUREMENTS: _____

B. **TOPCOAT SPECIFICATION:** _____

THICKNESS MEASUREMENTS: _____

PART II, PAINT ADHESION TEST

A. TEST RESULTS: _____ PASS _____ FAIL

B. IF FAILURE OCCURRED, BETWEEN WHICH SURFACES:

_____ METAL TO PRIMER FAILURE _____ PRIMER TO TOPCOAT FAILURE

C. REMARKS/COMMENTS:

SAMPLE

PART III, VISUAL APPEARANCE

A. SURFACE CONDITION: _____ ACCEPTABLE _____ UNACCEPTABLE

B. REMARKS/COMMENTS:

PART IV, RUSTPROOFING

A. RUSTPROOFING MANUFACTURER: TUFFCOAT - DYNAL

B. WET FILM THICKNESS MEASUREMENTS: 11 12 10

APPENDIX B
REPAIR PAINTING DATA FORM INSTRUCTIONS

I. PURPOSE. Provide instructions for completion of the repair painting data form. The form documents all supplementary painting which the vehicle receives during the course of the test program.

II. IDENTIFICATION REQUIREMENTS:

A. INSPECTING UNIT: Fill in complete address of unit performing inspection.

B. INSPECTOR: Complete name, grade, unit and autovon of person performing the inspection.

C. VEHICLE USA #: Self-explanatory.

MILES: Annotate miles at time of inspection.

DATE: Annotate date of inspection.

III. REPAIR LOCATION: Record one of the nine areas noted on the body inspection worksheet.

IV. APPROXIMATE AREA OF REPAIR: Record the approximate area in square inches of the spot requiring repair painting.

V. PAINT FINISH APPLIED: The extent of the inspection will be determined by the size of the spot/repair painted area. If the area requiring painting is less than or equal to nine square inches, only visual inspection for uniformity and coverage is required. For areas greater than nine square inches, the following test will be conducted:

TEST	SAMPLE SIZE	PROCEDURE	REWORK CRITERIA
1. Paint thickness	One spot/ repaired area per vehicle	I	A. FOR WASH PRIMER ONLY. If the thickness exceeds the maximum limit, remove the coating and reapply. B. FOR ALL COATINGS. If less than the minimum allowable, apply additional coating. C. FOR ALL COATINGS OTHER THAN WASH PRIMER. If more than maximum allowable, note results on repair painting data form, but DO NOT rework.

PROCEDURE I: Paint film thickness shall be determined with the magnetic, pull-off gage supplied by the test sponsor. See table 1 for thickness range. The gage shall be calibrated daily prior to use following the instructions supplied with the gage. For the vehicles receiving a paint thickness test, the three readings for each coating shall be recorded on the data entry form. The test area should be a large, flat surface. As the paint buildup is cumulative, the same area of the vehicle should be used to determine pre-treatment, primer and topcoat thicknesses.

COATING THICKNESS REQUIREMENTS

COATING TYPE	SPECIFICATION	THICKNESS
I. Pre-treatment	DOD-P-15328 (blue wash primer)	0.3 - 0.5 mil (.0003 - .0005 in.) — Dry —
II. Primer	a. Preferred for CARC MIL-P-53022 (epoxy primer for ferrous/non-ferrous surfaces)	1.0 - 1.5 mil — Dry —
	b. Alternate for CARC MIL-P-52192 (epoxy primer for ferrous surfaces)	1.0 - 1.5 mil — Dry —
	c. Alternate for CARC MIL-P-53030 (epoxy primer for ferrous/non-ferrous surfaces)	1.0 - 1.5 mil — Drv —
	d. For complete alkyd system: TT-P-636 (wood and ferrous metal alkyd primer coating)	1.0 - 1.5 mil — Dry —
III. Top coat	a. CARC MIL-C-46168 (chemical agent resistant, aliphatic polyurethane coating)	1.8 - 8.0 mil — Dry —
	b. Alkyd: MIL-E-2798 (camouflage alkyd enamel)	1.8 - 8.0 mil — Dry —
IV. Rustproofing	MIL-C-62218 (cold application, corrosion preventive compound)	10 mil minimum — Wet —

Table-1

For areas greater than nine square inches, the following test will be conducted:

TEST	SAMPLE SIZE	PROCEDURE	REWORK CRITERIA
2. Paint adhesion	One spot/ repaired area per vehicle	II	It is not necessary to rework if adhesion test fails. Note results in repair painting data form.

NOTE

For final finish, cure time is dependent on temperature, humidity and paint manufacturer. Full cure may require up to two weeks based on these factors.

PROCEDURE II: The paint adhesion test shall be conducted after the entire paint finish has completely cured. Scribe the painted surface with a sharp metal blade in the shape of a "V" approximately two inches in length and approximately one-half inch between edges at the widest point. Press a length of PPP-T-60, pressure sensitive tape supplied by the test sponsor firmly over the scribed "V", rubbing out all air bubbles. Allow approximately ten seconds for the test surface to return to ambient temperature. Grasp a free end of the tape and at a rapid speed strip it from the painted surface by pulling the tape back upon itself at 180 degrees. Removal of the top coat and primer, or top coat-primer-surface pre-treatment constitutes test failure. Removal of overspray does not constitute test failure. After completion of the test, the scribe marks shall be feathered into the area with sandpaper and touched up with MIL-C-46168. For alkyd paint finish, scribing the surface is not required to conduct the adhesion test. Record test results on the data entry form for only those vehicles actually tested. NOTE: To assure adhesion of the paint to galvanized surfaces, strict adherence to procedures is required. If the galvanized surface has been damaged or removed, obtain direction from the TACOM test coordinator, AMSTA-RCKM.

A. CLEANING TYPE: Circle all applicable cleaning methods used to prepare the surface for painting.

B. PRE-TREATMENT SPECIFICATION AND DRY FILM THICKNESS: Record the specification of the product used to pre-treat or condition the surface after cleaning. If the repair area is greater than nine square inches, record three dry film thickness measurements. Follow the coating thickness requirements table for requirements.

C. PRIMER TYPE AND DRY FILM THICKNESS: Record the specification of the product used to prime the pre-treated surface. Record the dry film thickness measurements as necessary.

D. TOP COAT SPECIFICATION AND DRY FILM THICKNESS: Record the specification of the product used to top coat the primed surface. Record the dry film thickness measurements as necessary.

VI. PAINT ADHESION TEST: This section is to be completed only if the repair area is greater than nine square inches. Put an "X" in the appropriate space for portions A and B.

VII. VISUAL APPEARANCE: Place an "X" in the appropriate space.

VIII. PHOTO BEFORE REPAIR: Photograph the area requiring repair prior to any rework operations other than surface cleaning to remove surface dirt.

IX. PHOTO AFTER REPAIR: Photograph the repaired area before release to the field.

X. REMARKS/COMMENTS: Self-explanatory.

REPAIR PAINTING DATA FORM

INSPECTION UNIT: 782 ND. MAINT. BN. APO N.Y. 09186 **VEH USA #:** NB09MF

INSPECTOR: 01682-55622 **MILES:** 8,500

SSG JOHN BOMAN 782ND. MAINT BN. 01682-55622

DATE: 24 MARCH 1987

1. REPAIR LOCATION: LEFT FRONT SIDE-BODY-PANEL

2. APPROXIMATE AREA OF REPAIR: 4"x 12" (48 SQ. IN.)
(If any single area is greater than nine square inches, dry film thickness and adhesion tests are required.)

3. PAINT FINISH APPLIED:

   A. CLEANING TYPE: ✓ ABRASIVE ____ ALKALINE ✓ SOLVENT

   B. PRE-TREATMENT SPECIFICATION: TT-C-490 TYPE III (WASH PRIMER DOD-P-15328)

   DRY FILM THICKNESS: 0.3 MILS | 0.3 | 0.4

   C. PRIMER SPECIFICATION: MIL-P-53030

   DRY FILM THICKNESS: 1.3 MILS | [illegible] | 1.5

   D. TOP COAT SPECIFICATION: [illegible] 46168

   DRY FILM THICKNESS: [illegible] MILS | 3.4 | 2.3

SAMPLE

4. **PAINT ADHESION TEST**

   A. RESULTS: ____ PASSED ✓ FAILED

   B. IF FAILURE OCCURRED, BETWEEN WHICH SURFACES:

   ✓ METAL TO PRIMER FAILURE ____ PRIMER TO TOP COAT FAILURE

5. VISUAL APPEARANCE: (AFTER REWORK, SEE REMARKS)

   ✓ ACCEPTABLE ____ UNACCEPTABLE

	YES	NO
6. PHOTO BEFORE REPAIR:	✓	
7. PHOTO AFTER REPAIR:	✓	

8. REMARKS/COMMENTS: AFTER TEST FAILURE, REPAIRED ONLY THE PULLED OFF AREA, RESANDED AND TOUCHED UP WITH PRIMER # MIL-P-53030 AND PAINT # MIL-C-46168.

APPENDIX C
SPOT PAINTING CHEMICAL AGENT RESISTANT COATING (CARC)

1-1. INTRODUCTION.

A. The purpose of this document is to provide advance guidance to users in spot painting CARC pending revision and publication of TM 43-0139, painting instructions for field use. It is not intended to present precise and unerring instructions, because application of any paint is a practiced art, not an exact science. As in any painting operation, there is no substitute for experience and initial experimentation.

B. This guidance is oriented toward brush or roller application only, as influenced by letter, Office of the Surgeon General (TSG), DA, 22 Feb 85, Subject: Occupational Health Requirements in Support of Painting Operations in the Army. Spray application of CARC using small hand-held sprayers incurs the use of respiratory protection prescribed in the referenced OTSG letter.

2. GENERAL.

A. THE CARC SYSTEM CONSISTS OF THE FOLLOWING:

(1) For external surface applications, polyurethane paint (CARC) is the top coat applied over an epoxy primer.

(2) For internal surface applications, the coating is an epoxy enamel over an epoxy primer.

B. The CARC and epoxy primer/enamel are supplied as two-component kits. When the components of either the CARC or epoxy primer/enamel are mixed together, a terminal chemical reaction commences. When applied to equipment, the chemical reaction together with evaporation of solvents forms a coating which is superior to alkyd coatings in durability, service life, and chemical resistance.

3. CARC APPLICATION CHARACTERISTICS. CARC is more complicated to apply than the alkyd system. Simply stated, there is "more to go wrong", and persons painting with CARC will require a working understanding of the following:

A. RATIOS AND MIXING. Accurate mixing of components in strict accordance with instructions provided with the kit is crucial. Graduated containers should be used when mixing only small amounts from each component. All mixing containers must be absolutely dry and clean.

B. POT LIFE. Simply stated, once the components of CARC or the epoxy primer/enamel (EPE) are mixed, "the painter either uses it or loses it". At room temperature, the average pot life of CARC is approximately eight hours; the average pot life of EPE is approximately 15 hours. However, the higher the environmental temperature, the shorter the pot life. At temperatures approaching 100° F, the average pot life of CARC is approximately two hours, and the average pot life of EPE is approximately six hours. Thorough cleanup of equipment used for mixing and applying CARC/EPE within these times is mandatory. Unserviceable CARC/EPE admix must be discarded as a hazardous waste in accordance with IAW AR420-47, Solid and Hazardous Waste Management. Note that these unstable admixes are defined as hazardous wastes, by the Resource Conservation and Recovery Act of 1976 (RCRA), because they contain ignitable solvents (see para. 9B below).

C. SHELF LIFE. Guaranteed shelf life of CARC and EPE is one year, which is the expected catalytic potency of the component "B", CARC and EPE. The shelf life can be extended several years, given optimum storage containers and conditions.

D. STORAGE TEMPERATURE. CARC and EPE must be stored at temperatures between 32° F and 120° F to ensure proper application consistency and maximum shelf life.

E. Substrate temperature and painting environment temperature. The surface to be painted should be no less than 60° F and no more than 100° F during and for at least four hours, preferably six hours, after application. Minimum substrate temperature of 50° F is necessary for good adhesion. CARC top coat will cure at temperatures down to 20° F, but very slowly.

F. COMPONENT "B", CARC

(1) The polyisocyanate component of CARC is hydroscopic; that is, it will absorb moisture from the air. Once a container is opened, it should be used that day. Partially-used containers must be kept sealed when not is use.

(2) Serviceable contents appear as a clear white to pale yellow liquid. If the contents have thickened and appear crystalline in consistency, the containers must be resealed and processed as a hazardous waste, IAW AR 420-47. Unserviceable component "B" CARC is a hazardous waste, RCRA, due to ignitable solvent content, not because it contains hexamethylene disocyanate (HDI) (see para. 9B below).

G. SURFACE PREPARATION. It is imperative that the surface to be painted is absolutely free of all moisture and clean; i.e., no sanding debris, carbon deposit, grease, wax, salt, oil, diesel fuel, solvents, or hydraulic/transmission fluid contamination, including fingerprints. After application, the painted surface should not be subjected to driving rain or pressurized wash water for at least four hours, preferably six hours

4. PLANNING CONSIDERATION. The effect of the CARC application characteristics is to require the spot painting of CARC be conducted as a well-supervised and planned event; that is, a company and/or battalion motor stable. Factors which will influence the scheduling of the spot painting motor stables are the following:

A. In accordance with letter OTSG, DA, 22 Feb 85, Subject: Occupational Health Requirements in Support of Painting Operations in the Army, the volume of work for one painter using brush or roller indoors or outdoors, cannot exceed one quart per day per vehicle/item of equipment at any one time. The intent of the OTSG guidance is to preclude a soldier spot-painting more than one quart of CARC per day and to preclude more than one soldier painting a vehicle at one time.

B. A delay of up to 90 days may be experienced initially in requesting CARC through normal supply channels. National stock numbers are the following:

(1) CARC topcoat, specification MIL-C-46168, quart kit

* GREEN 383 — NSN 8010-01-160-6741
* BROWN 383 — NSN 8010-01-160-6744
* BLACK — NSN 8010-01-141-2419
SAND — NSN 8010-01-141-2416

* Comprises the woodland, three-color camouflage system:
Any one vehicle will be approximately 44% green 383, 41% black, and 15% brown 383

(2) Epoxy primer, ferrous and non-ferrous surfaces, specification MIL-P-53022A, quart kit

NSN 8010-01-193-0516

(3) Epoxy enamel, interior application, white, specification MIL-C-22750, two quart kit

NSN 8010-01-053-2647

(4) Thinner, specification MIL-T-81772

One gallon — NSN 8010-00-181-8080
Five gallon — NSN 8010-00-181-8079

C. A mixed gallon kit of CARC top coat or EPE will cover in brush application approximately 400 square feet; a mixed quart will coat approximately 100 square feet.

D. Approximate dry and cure times are the following, given substrate and environmental temperature maintained at approximately 75° F:

(1) Epoxy primers:

(A) Dry-to-touch — 20 to 30 minutes

(B) Suitable for overcoating with CARC — 30 minutes

(2) Polyurethane paint top coat:

(A) Dry-to-touch — 20 to 30 minutes

(B) Dry through — 4 to 6 hours

(C) Dry for impact resistance (e.g., walking on it) — 6 to 8 hours

(D) Cured throughout — 7 to 14 days

5. SURFACE PREPARATION.

A. Scratches or other light damage to the CARC top coat will require buff sanding confined to the immediate blemished area.

B. Damage or corrosion extending to the substrate will require sanding, cleaning (reference DOD-P-15328) and repriming. All evidence of corrosion must be abraded from the substrate. The surface immediately surrounding the exposed substrate should then be sanded, utilizing the featheredging technique. That is, sand away the paint film (primer and top coat) in such a fashion that the thickness of the film is smoothly tapered from the bare metal/substrate to the top of the paint film.

WARNING

Persons using rags wetted with MIL-T-81772 thinner must wear rubber gloves to preclude absorption and defatting of the hands caused by the thinner.

C. Sanding of any type is followed by wiping down the exposed area to be painted using a clean rag wetted with MIL-T-81772 thinner to remove all loose sanding debris, mill scale, grease, oil (including fingerprints), and diesel/gasoline residue. Do not use other petroleum or alcohol-based thinners or cleaning agents of any kind. The surface to be spot-painted is then wiped down with a clean and dry rag to ensure removal of all moisture.

6. MIXING.

WARNING

Mixing operations must be conducted in a well-ventilated area away from open flame, welding torches, and combustion heaters (see para. 8C below). Personnel doing the mixing must wear eye protection (i.e., safety glasses, splash goggles, or face shield) and clothes providing full skin coverage, especially gloves. Droplets of mixed CARC and EPE on the skin harden quickly and are difficult to remove.

WARNING

Use of an electric drill may present an ignition hazard. The drill and metal paint containers must be electrically grounded before use.

A. Component "A" of the EPE will require stirring to ensure even distribution of all ingredients. Component "A" CARC must be thoroughly agitated by shaking or stirring for up to 30 minutes to ensure solids settled to the bottom of the container are again placed into suspension as a smooth homogenous liquid. If mechanical paint shakers are not available, a paint stirring accessory for the 3/8-inch drill should be used.

B. Components "A" and "B", EPE, and CARC must be mixed together in strict accordance with instructions provided with the kit. Containers used for mixing must be clean and dry. Recommend the following plastic disposable pails:

(1) For mixing a one-quart kit — pail, five pint, NSN 7420-00-889-3785

(2) For mixing a one-gallon kit — pail, five quart, NSN 7420-00-061-1163

CAUTION

Do not use any other thinner.

C. Component "B" should be slowly stirred into component "A" in mixing either EPE or CARC. The blended contents of or admix should be stirred tired (i.e., about 15 minutes) until the mixed contents form a smooth homogeneous liquid. The EPE or CARC admix should be thinner only if necessary, to a viscosity permitting smooth application with MIL-T-81772 thinner. The EPE admix must then be allowed to stand 30 minutes prior to use; the CARC admix 15 minutes.

WARNING

Persons cleaning these accessories must wear eye protection and rubber gloves to preclude absorption and defatting of the hands caused by the thinner.

D. Immediate cleanup of mixing and painting accessories using MIL-T-81772 thinner is necessary to preclude their loss and contaminating future mixing and painting of CARC.

7. APPLICATION.

WARNING

Spot painters applying EPE and/or CARC by brush or roller must wear clothing and gloves affording full skin coverage.

A. GENERAL. Applications must be in accordance with letter, OTSG, DA, 22 Feb 85, Subject: Occupational Health Requirements in Support of Painting Operations in the Army. Note that the OTSG guidance applies to all paints/coatings.

B. EPOXY PRIMER. Apply evenly in one coat over exposed substrate; apply over portions of exposed original primer coat utilizing "feathering-in technique"; i.e., tapering off quantity applied to a fine edge. After application, ensure immediate cleanup of all equipment.

C. POLYURETHANE PAINT (CARC):

(1) GENERAL.

(A) Ensure surface over which CARC is applied is dry and clean; that it is free of all contaminants such as water or petroleum residue and granular debris of any kind.

(B) CARC is a high solids coating. Apply evenly to ensure conformance with the original coat surrounding the painted area utilizing the feathering-in technique. Too much CARC may inhibit proper drying/curing of the CARC coat and the epoxy primer.

(2) APPLICATION OVER EPOXY PRIMER (EP). Allow the primer coat to air dry a minimum of 20 minutes or until dry to touch before top coating with CARC. EP, which has been allowed to dry more than 24 hours (especially when "baked" by hot sun) may require light scuff sanding to ensure proper CARC adherence.

(3) APPLICATION OVER CARC. Recoating may be performed when original coating is tacky. Once the original CARC coat has cured for 14 days or more (especially when "baked" by hot sun), light scuff sanding may be required to ensure proper adherence.

(4) SPOT PAINTING OVER ALKYD. CARC can be applied over a well-cured (i.e., 90 days) alkyd paint. The alkyd coating must be sound (e.g., no corrosion, no substrate showing) and absolutely free of absorbed or deposited carbon, salt, diesel fuel, gasoline, oils, hydrualic/transmission fluids, solvents, wax, etc.

CAUTION

CARC cannot be applied over lacquer coatings or vinyl.

(5) APPLICATION OVER LACQUER. The lacquer must be completely removed necessitating repriming with epoxy primer and application of CARC top coat.

8. MISCELLANEOUS.

A. CARC should not be spot-painted over surfaces such as exhausts, mufflers, and turbochargers which will be subjected to temperatures in excess of 400°F. Heat resistant paint must be used.

B. Welding of CARC-painted surfaces will require abrading away the CARC down to the substrate in the immediate area to be welded. And, if a CARC painted surface is on the backside of the weld spot, it must also be abraded to the substrate prior to welding. After welding is completed, all grazed surfaces should be abraded away to ensure condensation formed on and below the surface of the substrate is eliminated prior to epoxy repriming and CARC overcoating.

C. CARC admix has a flash point of around 38°F. This low flash point is due exclusively to the incorporation of methyl ethyl ketone (MEK) in the formulation.

D. The primary method of identifying CARC-painted equipment is to look for the word "CARC" stenciled in close vicinity to the data plate. A field expedient method of identifying a CARC, vis-a-vis an alkyd painted surface, is to thoroughly wet a rag with acetone (i.e., fingernail polish remover) and briskly rub the painted surface for twenty seconds. Evidence of actual paint removal from the painted surface onto the rag indicates an alykd painted surface.

9. TECHNICAL REFERENCES.

A. Questions regarding personnel safety issues should be referred to the local preventive medicine activity, local medical support facility.

B. Questions regarding environmental issues such as waste disposal should be directed to the Environmental Coordinator, Directorat for Engineering and Housing, Local Supporting Installation.

C. Questions and/or comments regarding this application guidance should be directed to:

Commander
U.S. Army Troop Support Command
ATTN: AMSTR-WN
4300 Goodfellow Blvd.
St. Louis, MO 63120-1798

APPENDIX D
BODY INSPECTION WORKSHEET INSTRUCTIONS

I. PURPOSE: Provide instructions for completion of the body inspection worksheet. This form identifies the major areas of the body most susceptible to corrosion and provides a means of identifying the progression of paint deterioration and corrosion throughout the test program.

II. IDENTIFICATION REQUIREMENTS:

A. INSPECTING UNIT: Fill in complete address of unit performing inspection.

B. INSPECTOR: Complete name, grade, unit and autovon of person performing the inspection.

C. VEHICLE USA #: Self-explanatory.

D. MILES: Annotate miles at time of inspection.

E. DATE: Annotate date of inspection.

III. REPAIR LOCATION: Refer to figures D-1 through D-7 to identify the locations specified on the worksheet.

IV. TYPE OF PAINT DAMAGE: Six types of paint damage are noted (refer to figs. D-10 through D-14). It is requested that every effort be made to identify the specific type of damage by circling all applicable types of damage noted. If there is no paint damage, circle "none". To assist in the inspection process, reference photographs are provided for the first five types of damage.

V. EXTENT OF CORROSION: For galvanized and standard bodies where a paint failure occurs, the galvanized and standard surface will be exposed. The photographs will serve to document this form of corrosion, compare the actual corrosion to the color reference photographs and circle the appropriate level on the form.

VI. PHOTO: If either paint damage and/or corrosion appear on the vehicle, a photograph of the specific area is required.

BODY INSPECTION WORKSHEET

INSPECTION UNIT: 782 NB. MAINT. BN. APO N.Y. 09186 01CF2-55622 **VEH USA #:** N30SMF

INSPECTOR: **MILES:** 8,510

DATE: SFC TOM FRANKS 782 NB. MAINT BN. 01CF2-55622 24 MARCH 1986

	LOCATION	TYPE OF PAINT DAMAGE	EXTENT OF CORROSION	PHOTO YES	PHOTO NO
1.	Front of vehicle Figure D-1	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III, IV	✓	
2.	Rear of vehicle Figure D-2	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III, IV	✓	
3.	Right side of vehicle Figure D-3	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III, IV		
4.	Left side of vehicle Figure D-4	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III, IV		
5.	Passenger compartment Figure D-5	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III, IV	✓	
6.	Engine compartment Figure D-6	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III, IV		
7.	Underbody front Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III, IV		
8.	Underbody middle Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III, IV	✓	
9.	Underbody rear Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III, IV		

SAMPLE

CLASSIFYING RUST DAMAGE

As an aid in evaluating rust damage and planning rust repair actions, rust has been classified into four stages. Refer to figure D-8 for standard bodies, and to figure D-9 for galvanized bodies.

NOTE

White corrosion will appear on galvanized body only.

STAGE 1 — Red, black, or white corrosion deposits on surface accompanied by minor etching and pitting. Base metal is sound.

STAGE 2 — Powdered granular or scaled condition, resulting in erosion of material from the surface. Base metal is sound.

STAGE 3 — Surface condition and corrosion deposits are similar to stage 2 except that metal in the corroded areas is unsound and small pin holes may be present.

STAGE 4 — Corrosion has advanced to a point where the surface has been penetrated. No metal remains at point of severest corrosion. there are rust holes in the surface area or metal is completely missing along the edge.

NOTE

Stages of rust damage are determined by visual examination and by use of probes, spring-loaded punches, or similar devices to determine metal soundness.

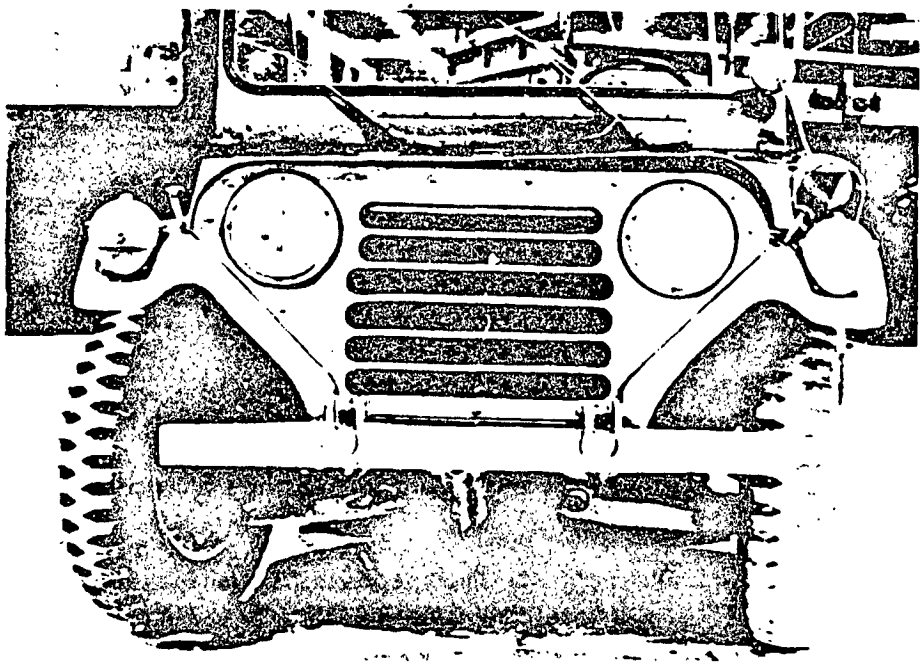


Figure D-1

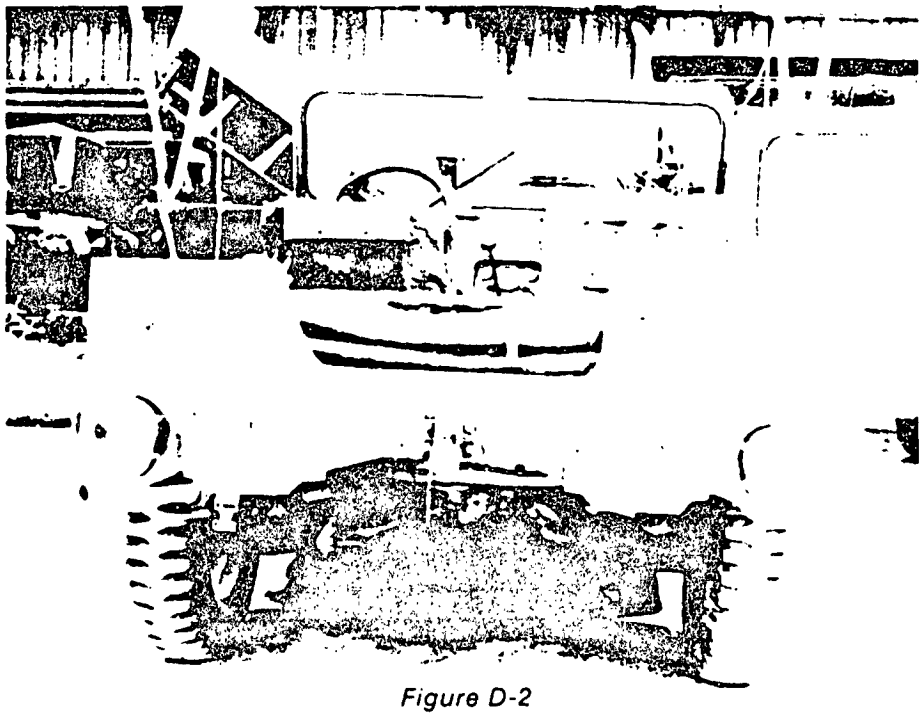


Figure D-2

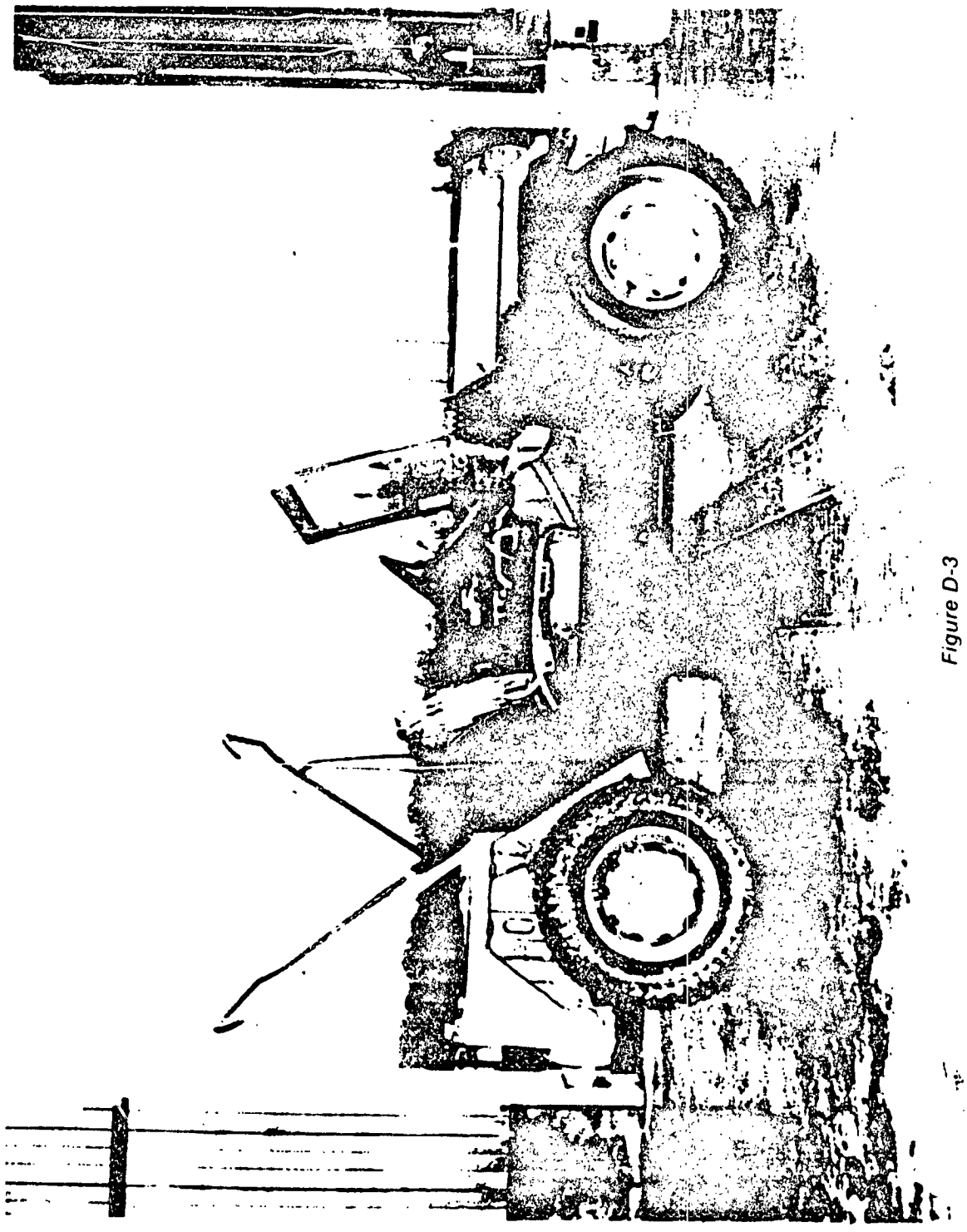


Figure D-3

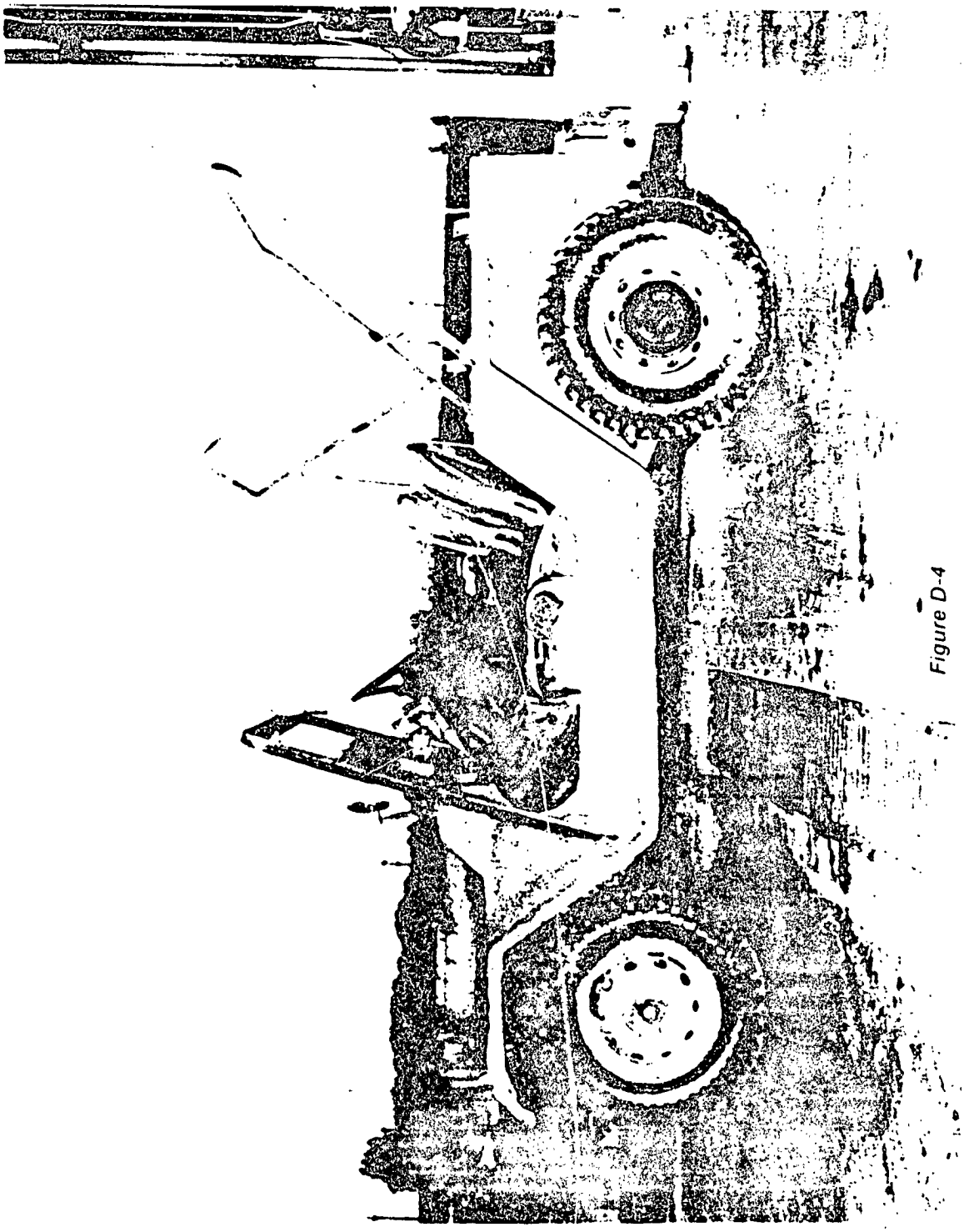


Figure D-4

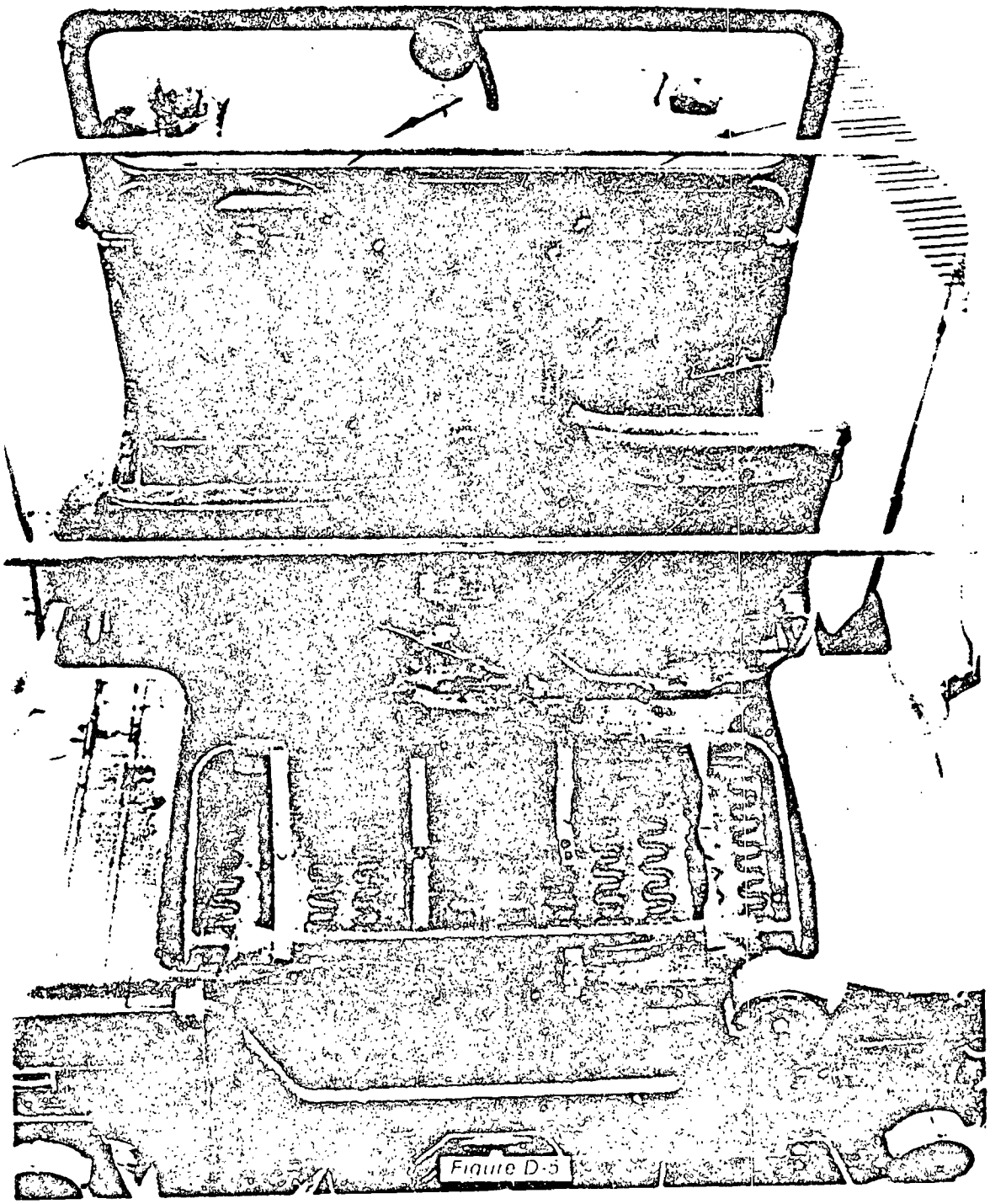


Figure D-5

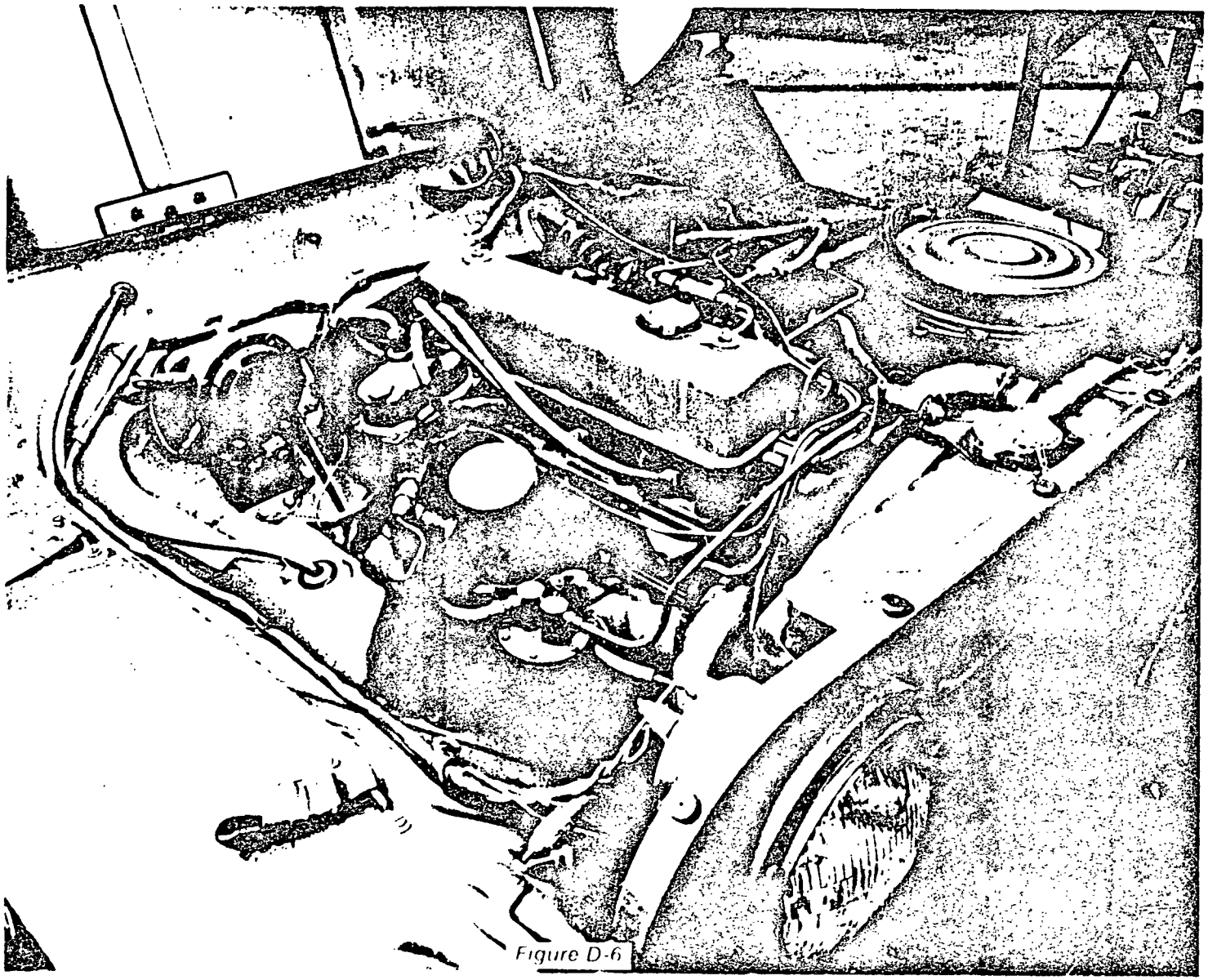


Figure D-6

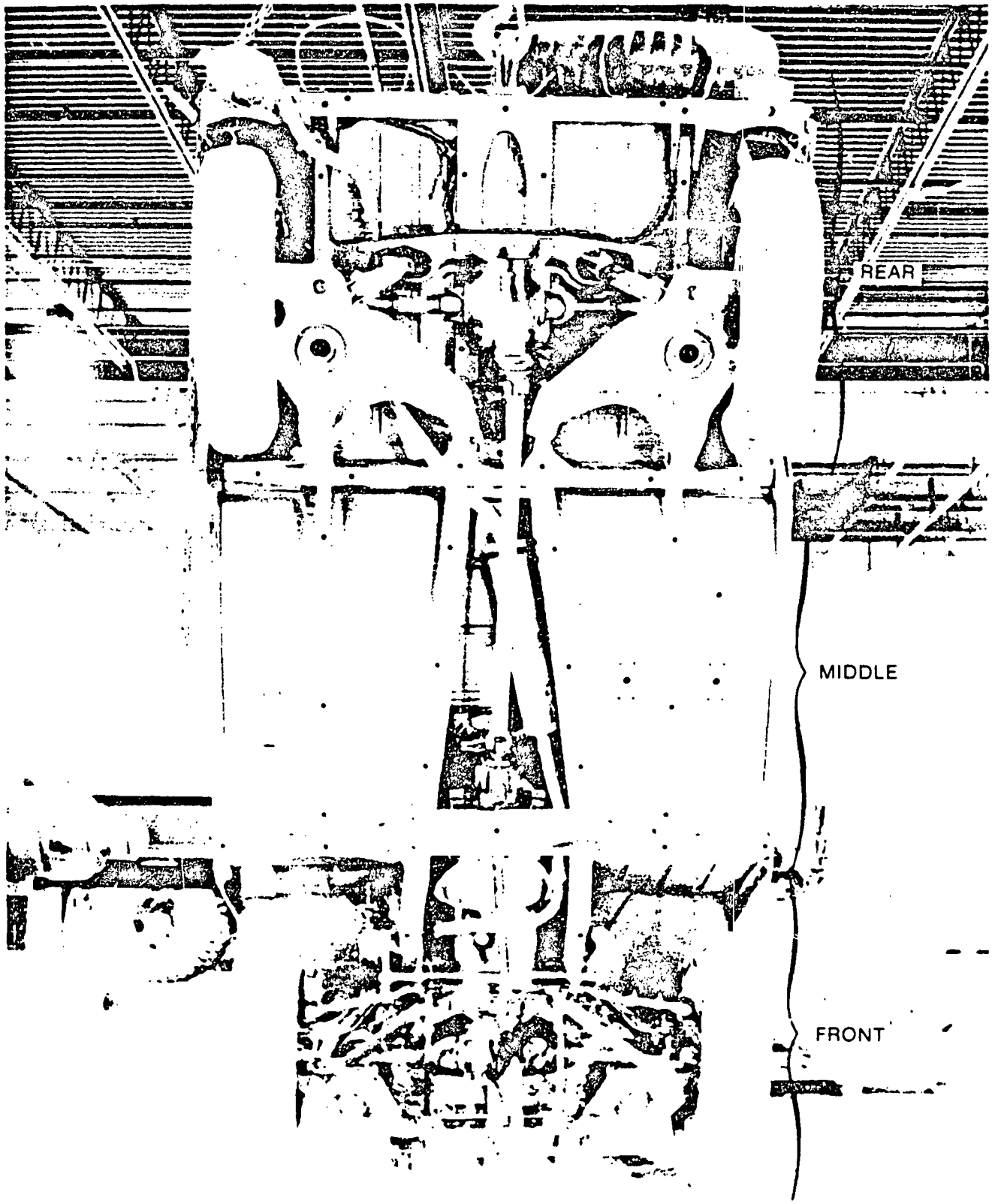
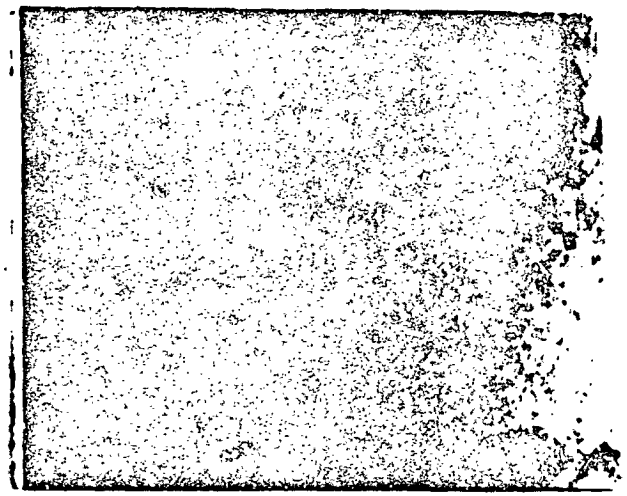
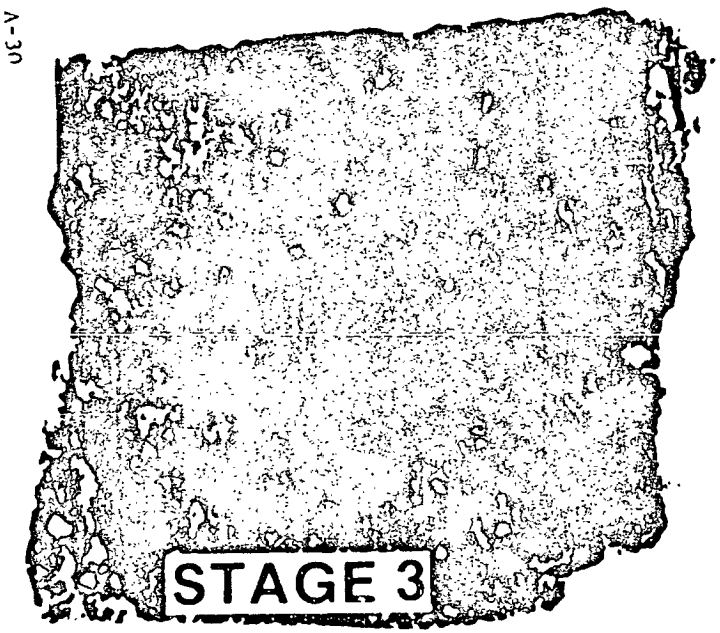


Figure D-7

STAGE 1



STAGE 2



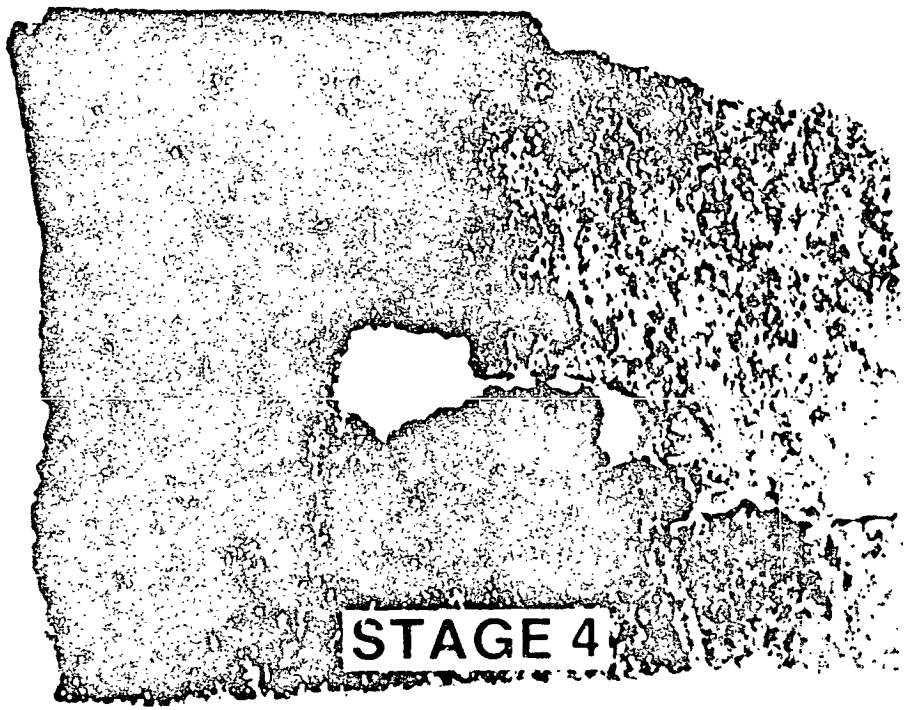
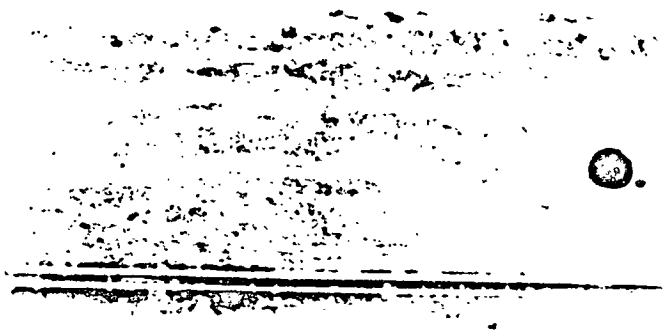
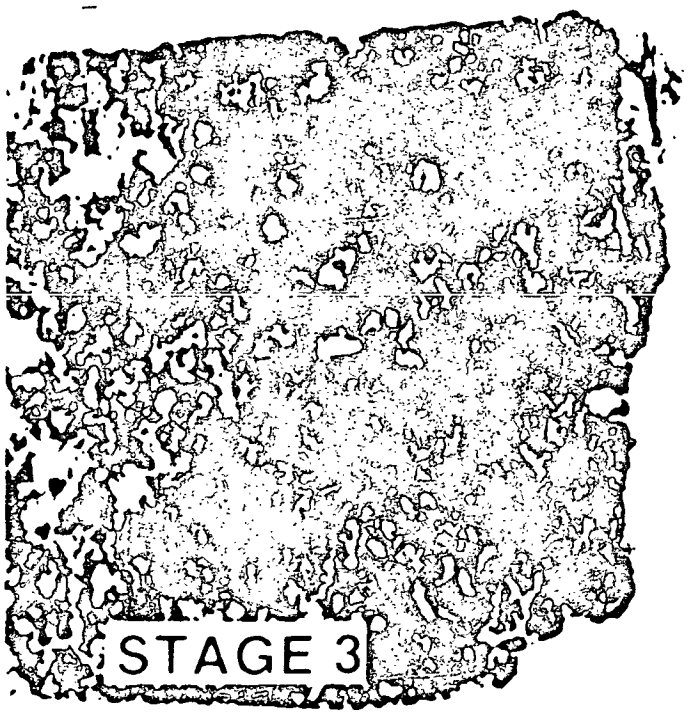


FIGURE D-8. STANDARD BODY STAGES OF CORROSION

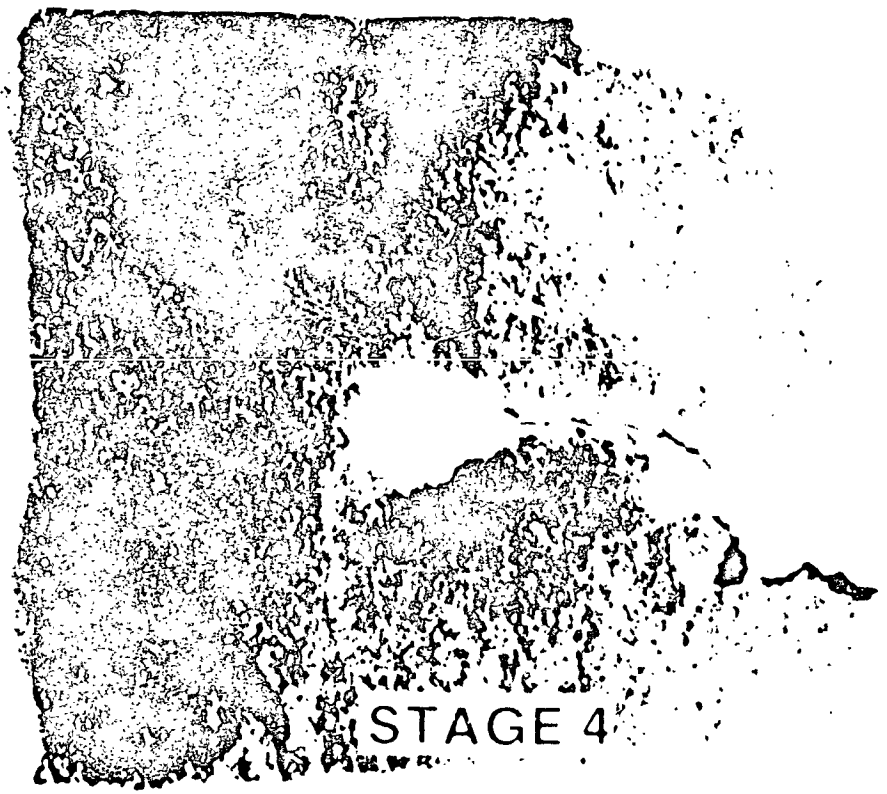


STAGE 1

STAGE 2



STAGE 3



STAGE 4

FIGURE D-9. GALVANIZED BODY STAGES OF CORROSION

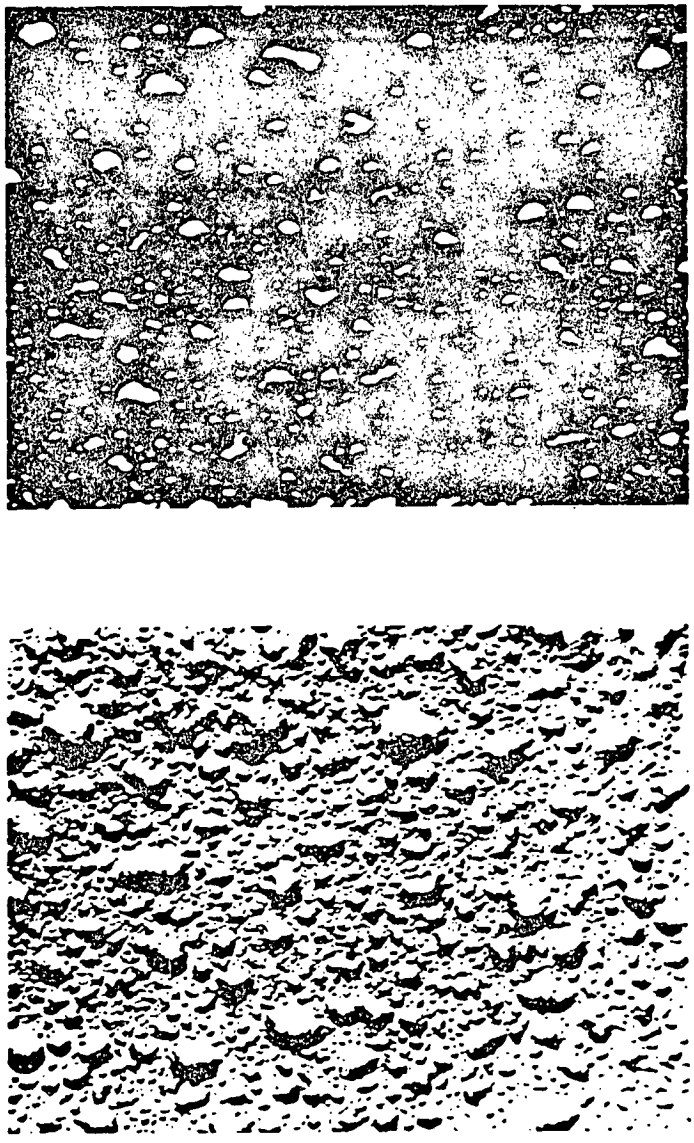


Figure D-10. Paint Blistering

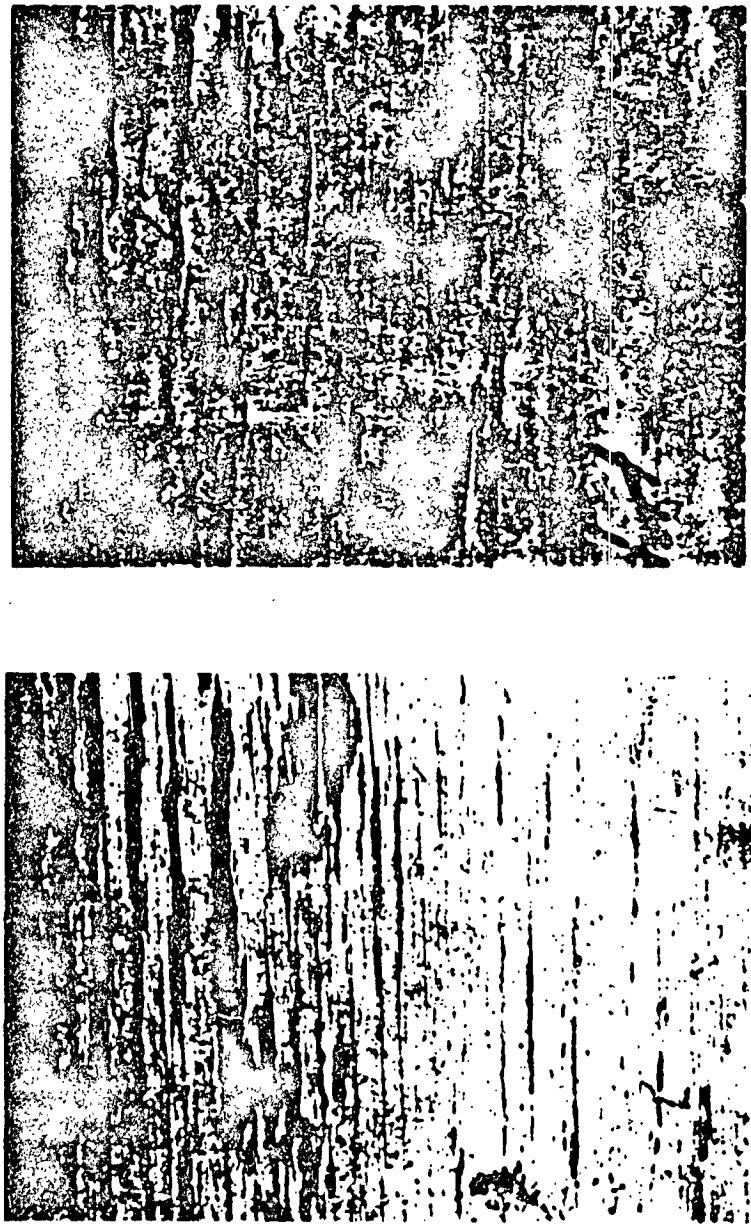


Figure D-11. Paint Peeling/Flaking

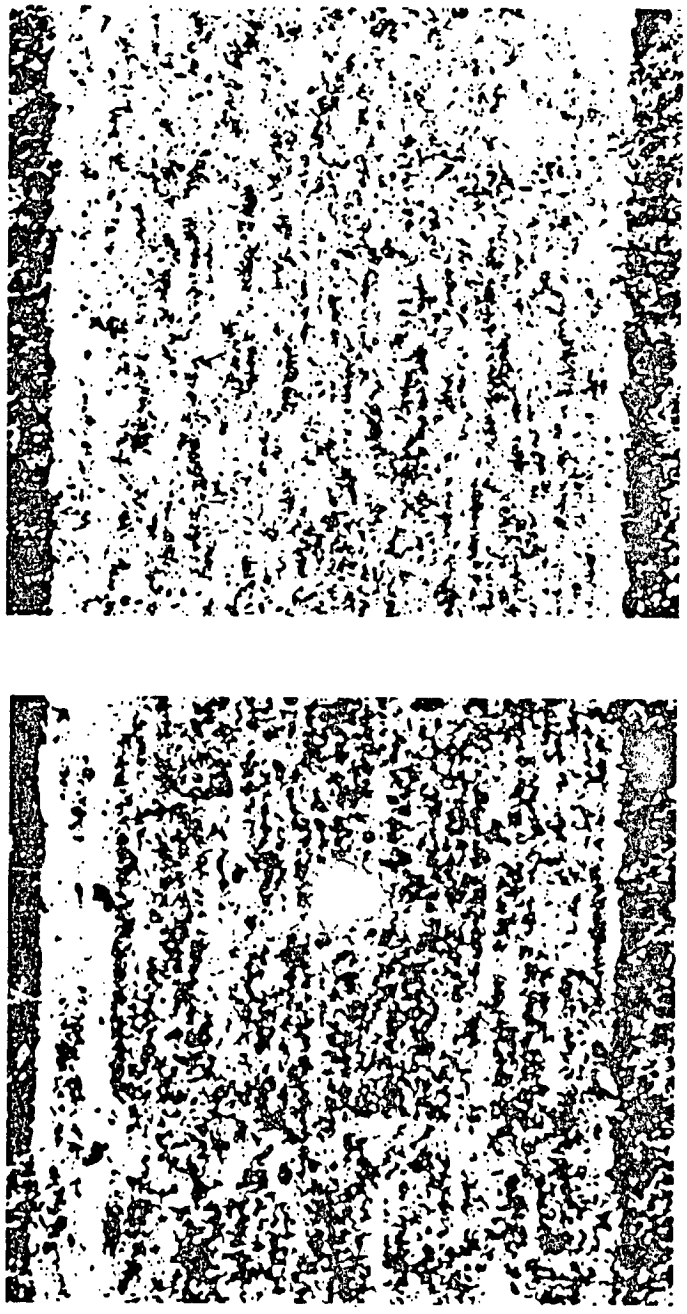


Figure D-12. Paint Abrasion Erosion

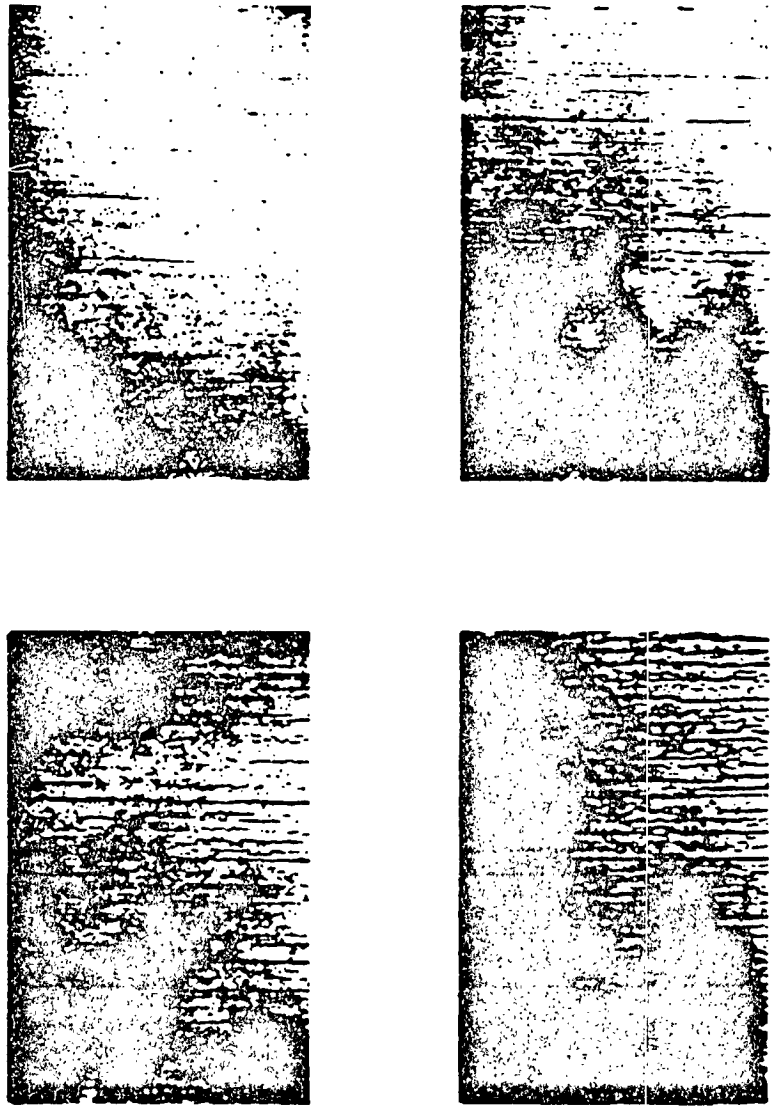


Figure D-13. Paint Cracking

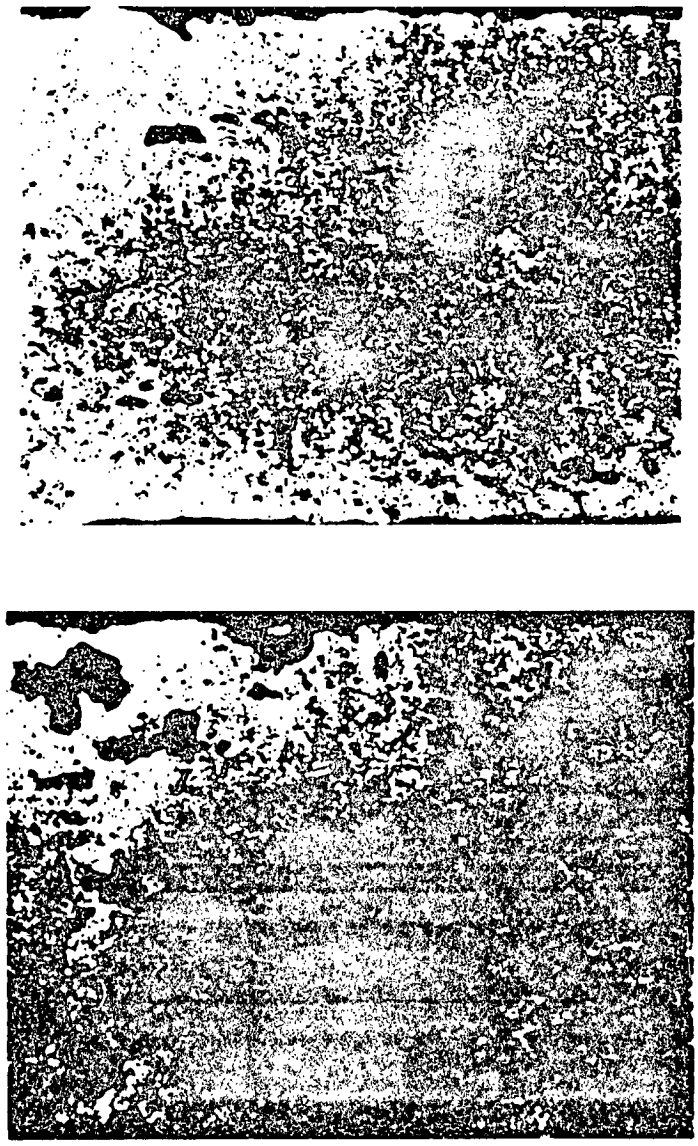
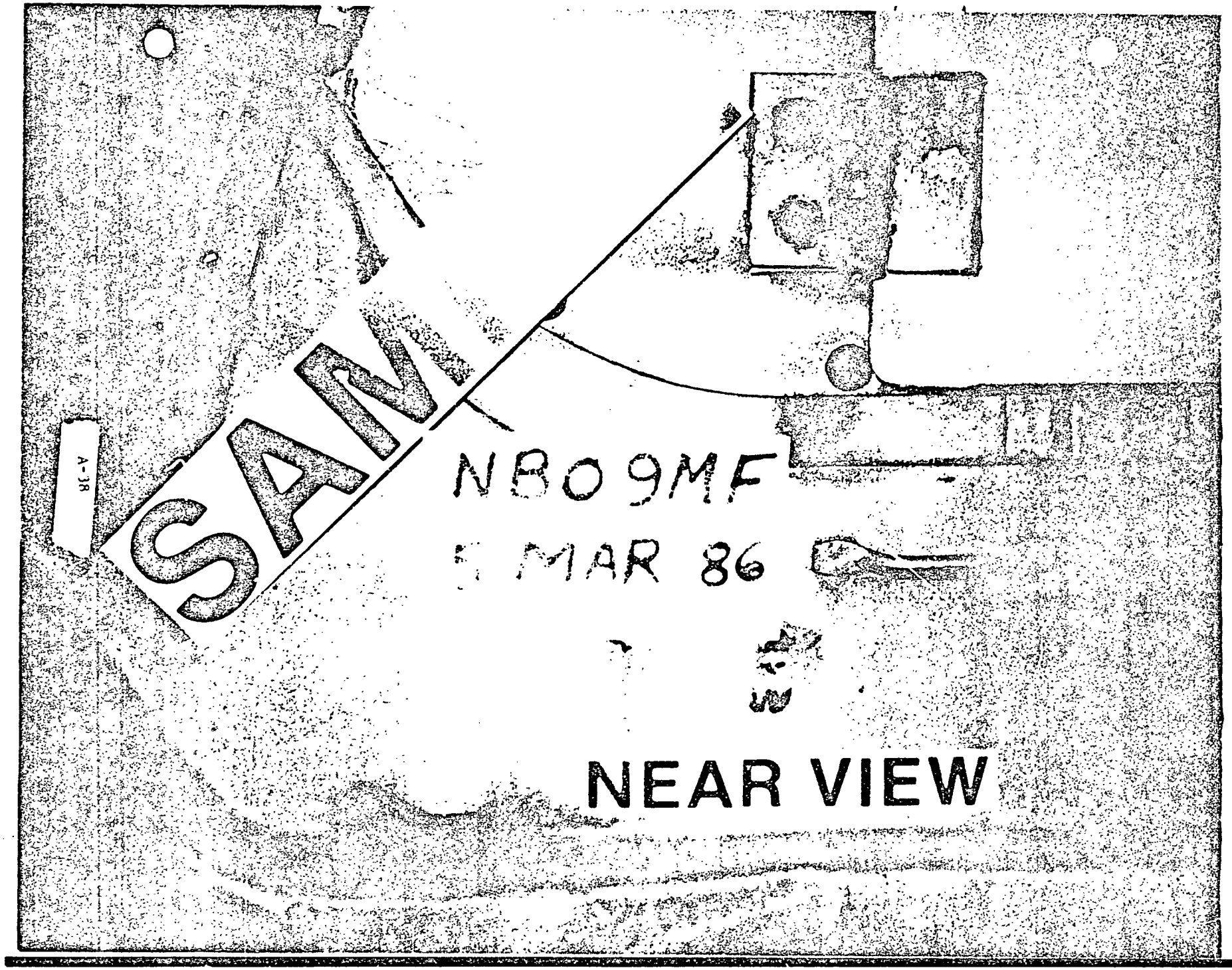
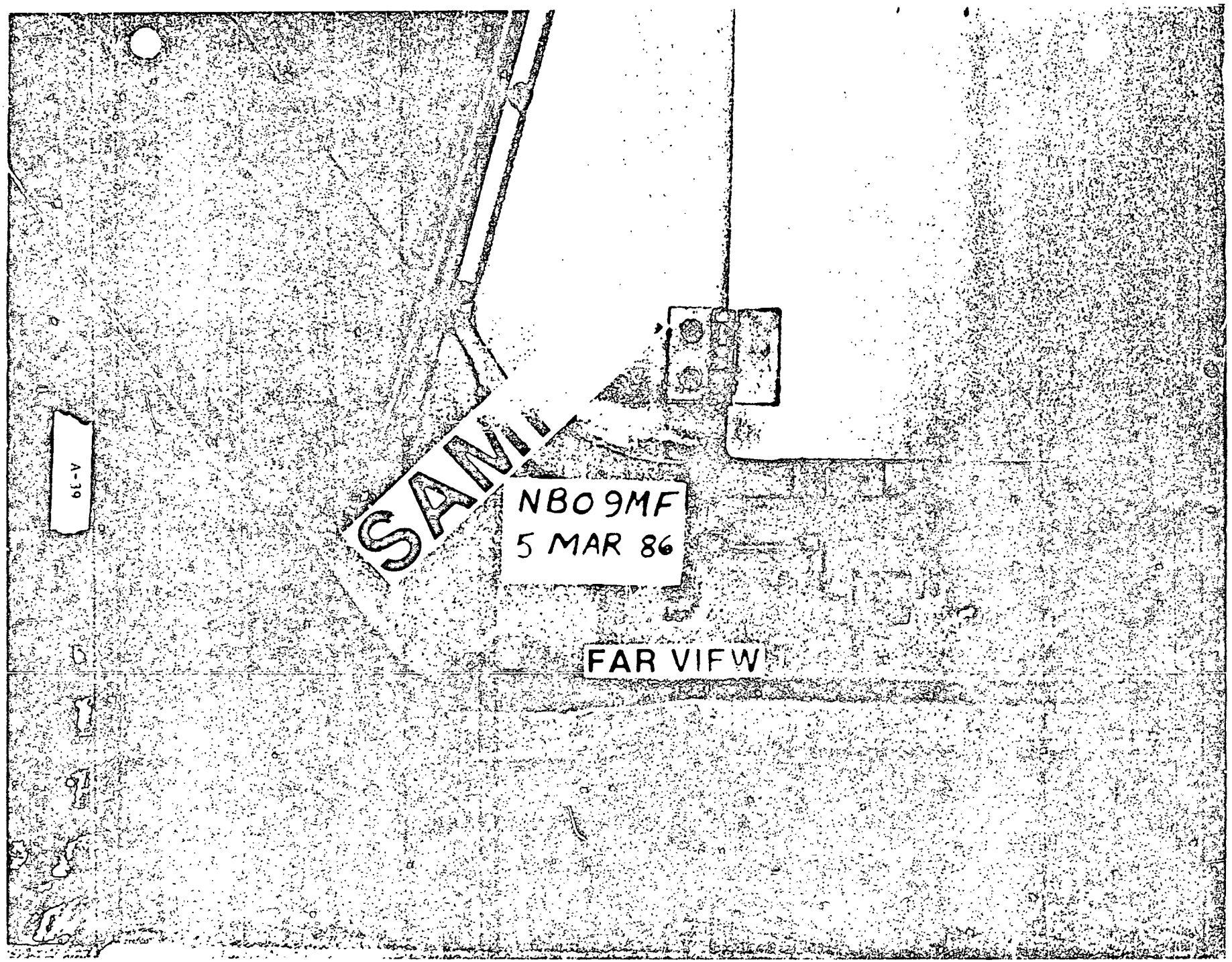


Figure D-14. Paint Chipping

APPENDIX E
SAMPLES OF PHOTOGRAPHIC COVERAGE


SAM
A-3R
NBO9MF
MAR 86
NEAR VIEW


A-16
SAN
NB09MF
5 MAR 86
FAR VIEW

DATA ENTRY FORM

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

PART I, PAINT THICKNESS TESTS

A. PRIMER SPECIFICATION: _____

THICKNESS MEASUREMENTS: _____

B. TOPCOAT SPECIFICATION: _____

THICKNESS MEASUREMENTS: _____

PART II, PAINT ADHESION TEST

A. TEST RESULTS: _____ PASS _____ FAIL

B. IF FAILURE OCCURRED, BETWEEN WHICH SURFACES:

_____ METAL TO PRIMER FAILURE _____ PRIMER TO TOPCOAT FAILURE

C. REMARKS/COMMENTS:

PART III, VISUAL APPEARANCE

A. SURFACE CONDITION: _____ ACCEPTABLE _____ UNACCEPTABLE

B. REMARKS/COMMENTS:

PART IV, RUSTPROOFING

A. RUSTPROOFING MANUFACTURER: _____

B. WET FILM THICKNESS MEASUREMENTS: _____ _____ _____

DATA ENTRY FORM

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

PART I, PAINT THICKNESS TESTS

A. PRIMER SPECIFICATION: _____

THICKNESS MEASUREMENTS: _____

B. TOPCOAT SPECIFICATION: _____

THICKNESS MEASUREMENTS: _____

PART II, PAINT ADHESION TEST

A. TEST RESULTS: _____ PASS _____ FAIL

B. IF FAILURE OCCURRED, BETWEEN WHICH SURFACES:

_____ METAL TO PRIMER FAILURE _____ PRIMER TO TOPCOAT FAILURE

C. REMARKS/COMMENTS:

PART III, VISUAL APPEARANCE

A. SURFACE CONDITION: _____ ACCEPTABLE _____ UNACCEPTABLE

B. REMARKS/COMMENTS:

PART IV, RUSTPROOFING

A. RUSTPROOFING MANUFACTURER: _____

B. WET FILM THICKNESS MEASUREMENTS: _____ _____ _____

REPAIR PAINTING DATA FORM

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

1. REPAIR LOCATION:

2. APPROXIMATE AREA OF REPAIR:
(If any single area is greater than nine square inches, dry film thickness and adhesion tests are required.)

3. PAINT FINISH APPLIED:

   A. CLEANING TYPE: _____ ABRASIVE _____ ALKALINE _____ SOLVENT

   B. PRE-TREATMENT SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

   C. PRIMER SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

   D. TOP COAT SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

4. **PAINT ADHESION TEST:**

   A. RESULTS: _____ PASSED _____ FAILED

   B. IF FAILURE OCCURRED, BETWEEN WHICH SURFACES:

      _____ METAL TO PRIMER FAILURE _____ PRIMER TO TOP COAT FAILURE

5. VISUAL APPEARANCE:

   _____ ACCEPTABLE _____ UNACCEPTABLE

	YES	NO
6. PHOTO BEFORE REPAIR:	_____	_____
7. PHOTO AFTER REPAIR:	_____	_____

8. REMARKS/COMMENTS:

REPAIR PAINTING DATA FORM

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

1. REPAIR LOCATION:

2. APPROXIMATE AREA OF REPAIR:
(If any single area is greater than nine square inches, dry film thickness and adhesion tests are required.)

3. PAINT FINISH APPLIED:

   A. CLEANING TYPE: _____ ABRASIVE _____ ALKALINE _____ SOLVENT

   B. PRE-TREATMENT SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

   C. PRIMER SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

   D. TOP COAT SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

4. **PAINT ADHESION TEST:**

   A. RESULTS: _____ PASSED _____ FAILED

   B. IF FAILURE OCCURRED, BETWEEN WHICH SURFACES:

      _____ METAL TO PRIMER FAILURE _____ PRIMER TO TOP COAT FAILURE

5. VISUAL APPEARANCE:

   _____ ACCEPTABLE _____ UNACCEPTABLE

	YES	NO
6. PHOTO BEFORE REPAIR:	_____	_____
7. PHOTO AFTER REPAIR:	_____	_____

8. REMARKS/COMMENTS:

REPAIR PAINTING DATA FORM

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

1. REPAIR LOCATION:

2. APPROXIMATE AREA OF REPAIR:
   (If any single area is greater than nine square inches, dry film thickness and adhesion tests are required.)

3. PAINT FINISH APPLIED:

   A. CLEANING TYPE: _____ ABRASIVE _____ ALKALINE _____ SOLVENT

   B. PRE-TREATMENT SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

   C. PRIMER SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

   D. TOP COAT SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

4. **PAINT ADHESION TEST:**

   A. RESULTS: _____ PASSED _____ FAILED

   B. IF FAILURE OCCURRED, BETWEEN WHICH SURFACES:

      _____ METAL TO PRIMER FAILURE _____ PRIMER TO TOP COAT FAILURE

5. VISUAL APPEARANCE:

   _____ ACCEPTABLE _____ UNACCEPTABLE

	YES	NO
6. PHOTO BEFORE REPAIR:	_____	_____
7. PHOTO AFTER REPAIR:	_____	_____

8. REMARKS/COMMENTS:

REPAIR PAINTING DATA FORM

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

1. REPAIR LOCATION:

2. APPROXIMATE AREA OF REPAIR:
(If any single area is greater than nine square inches, dry film thickness and adhesion tests are required.)

3. PAINT FINISH APPLIED:

   A. CLEANING TYPE: _____ ABRASIVE _____ ALKALINE _____ SOLVENT

   B. PRE-TREATMENT SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

   C. PRIMER SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

   D. TOP COAT SPECIFICATION: _____

      DRY FILM THICKNESS: _____ _____ _____

4. **PAINT ADHESION TEST:**

   A. RESULTS: _____ PASSED _____ FAILED

   B. IF FAILURE OCCURRED, BETWEEN WHICH SURFACES:

      _____ METAL TO PRIMER FAILURE _____ PRIMER TO TOP COAT FAILURE

5. VISUAL APPEARANCE:

   _____ ACCEPTABLE _____ UNACCEPTABLE

	YES	NO
6. PHOTO BEFORE REPAIR:	_____	_____
7. PHOTO AFTER REPAIR:	_____	_____

8. REMARKS/COMMENTS:

BODY INSPECTION WORKSHEET

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

	LOCATION	TYPE OF PAINT DAMAGE	EXTENT OF CORROSION	PHOTO YES	PHOTO NO
1.	Front of vehicle Figure D-1	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
2.	Rear of vehicle Figure D-2	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
3.	Right side of vehicle Figure D-3	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
4.	Left side of vehicle Figure D-4	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
5.	Passenger compartment Figure D-5	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
6.	Engine compartment Figure D-6	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
7.	Underbody front Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
8.	Underbody middle Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
9.	Underbody rear Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____

BODY INSPECTION WORKSHEET

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

	LOCATION	TYPE OF PAINT DAMAGE	EXTENT OF CORROSION	PHOTO YES	PHOTO NO
1.	Front of vehicle Figure D-1	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
2.	Rear of vehicle Figure D-2	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
3.	Right side of vehicle Figure D-3	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
4.	Left side of vehicle Figure D-4	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
5.	Passenger compartment Figure D-5	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
6.	Engine compartment Figure D-6	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
7.	Underbody front Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
8.	Underbody middle Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
9.	Underbody rear Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____

BODY INSPECTION WORKSHEET

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

	LOCATION	TYPE OF PAINT DAMAGE	EXTENT OF CORROSION	PHOTO YES	PHOTO NO
1.	Front of vehicle Figure D-1	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
2.	Rear of vehicle Figure D-2	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
3.	Right side of vehicle Figure D-3	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
4.	Left side of vehicle Figure D-4	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
5.	Passenger compartment Figure D-5	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
6.	Engine compartment Figure D-6	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
7.	Underbody front Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
8.	Underbody middle Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
9.	Underbody rear Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____

BODY INSPECTION WORKSHEET

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

	LOCATION	TYPE OF PAINT DAMAGE	EXTENT OF CORROSION	PHOTO YES	PHOTO NO
1.	Front of vehicle Figure D-1	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
2.	Rear of vehicle Figure D-2	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
3.	Right side of vehicle Figure D-3	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
4.	Left side of vehicle Figure D-4	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
5.	Passenger compartment Figure D-5	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
6.	Engine compartment Figure D-6	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
7.	Underbody front Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
8.	Underbody middle Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
9.	Underbody rear Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____

BODY INSPECTION WORKSHEET

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

	LOCATION	TYPE OF PAINT DAMAGE	EXTENT OF CORROSION	PHOTO YES	PHOTO NO
1.	Front of vehicle Figure D-1	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
2.	Rear of vehicle Figure D-2	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
3.	Right side of vehicle Figure D-3	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
4.	Left side of vehicle Figure D-4	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
5.	Passenger compartment Figure D-5	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
6.	Engine compartment Figure D-6	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
7.	Underbody front Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
8.	Underbody middle Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
9.	Underbody rear Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____

BODY INSPECTION WORKSHEET

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

	LOCATION	TYPE OF PAINT DAMAGE	EXTENT OF CORROSION	PHOTO YES	PHOTO NO
1.	Front of vehicle Figure D-1	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
2.	Rear of vehicle Figure D-2	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
3.	Right side of vehicle Figure D-3	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
4.	Left side of vehicle Figure D-4	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
5.	Passenger compartment Figure D-5	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
6.	Engine compartment Figure D-6	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
7.	Underbody front Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
8.	Underbody middle Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
9.	Underbody rear Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____

BODY INSPECTION WORKSHEET

INSPECTION UNIT: **VEH USA #:**

INSPECTOR: **MILES:**

DATE:

	LOCATION	TYPE OF PAINT DAMAGE	EXTENT OF CORROSION	PHOTO YES	PHOTO NO
1.	Front of vehicle Figure D-1	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
2.	Rear of vehicle Figure D-2	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
3.	Right side of vehicle Figure D-3	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
4.	Left side of vehicle Figure D-4	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
5.	Passenger compartment Figure D-5	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
6.	Engine compartment Figure D-6	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
7.	Underbody front Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
8.	Underbody middle Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____
9.	Underbody rear Figure D-7	Blistering, flaking/peeling, abrasion/erosion, cracking, chipping, paint discoloration none	None, I, II, III,IV	____	____

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APPENDIX B

PUERTO RICO FIELD

TEST DATA

PUERTO RICO CLOSE OUT INSPECTION FOR CORROSION

COATING SYSTEM: Std Body, CARC Paint System, Rustproofing

CATEGORY: Yellow

BY: On Site

VEH NO.	MILES	FIRST INSPECTION P DATE JUNE 1988 BODY LOCATION CORROSION DAMAGE	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R
				2ND INSPECTION DATE Sept 1990 BODY LOCATION (CORROSION DAMAGE SITE)								
02F64 872	31590	NONE										N.
NBON PPC151 04937	3350	NONE (Floor Driver Corner, Paint Flaking)	6782	1	0	2	0	2	0	0	1*	0
NBOSLF C151 0548	4456	D-5(1) FRONT Floor Boards Rusting/ Paint Flaking	5829 (1373)	0	1*	1	1*	2*	0	0	0	0
NBONPM C151 04835	4017	NONE	5076 (1059)	1 weld seam	1	1	0	2	0	0	0	0
02H5 7870 32787	20,647	D-5(2) mislabeled (Blue)										N.I
NBO NPM C151 04835	?	?	12683	0	0	4 repair**	1	4	4	4 Fire Wall (inside)	4 replace Panel Battery corner	0
02C1 4372 11878	2652	None	5620)	1	0	4 repair**	4 repair**	4 repair**	0	0	4 repair**	0

* Paint Peeling

N.A. → Not Available

** repairs Sept '88 (rollover protection installed)

PUERTO RICO CLOSE OUT INSPECTION FOR CORROSION

COATING SYSTEM: Double Gabu., 2-part Epoxy, Polyurethane topcoat, Rustproofing

CATEGORY: White

BY: On site

VEH NO.	FIRST INSPECTION MILES	FIRST INSPECTION BODY LOCATION CORROSION DAMAGE	2ND INSPECTION MILES	BODY LOCATION (CORROSION DAMAGE SITE) D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R
NBO 540	45,326	D-5 (III) Paint Peeling	4166	0 Paint over	0	1	0	2*	0	0	0	0

DATE JUNE 1988

2ND INSPECTION DATE Sept 1990

* Paint Peeling, Flaking

PUERTO RICO CLOSE OUT INSPECTION FOR CORROSION

COATING SYSTEM: Double-Galv, 2part Epoxy, Polyurethane topcoat

CATEGORY: Gray

BY: On Site

	FIRST INSPECTION												
	DATE JUNE 1988			2ND INSPECTION DATE Sept '90									
				BODY LOCATION (CORROSION DAMAGE SITE)									
VEH NO.	MILES	BODY LOCATION CORROSION DAMAGE	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R
NBO 5G6	6403	D-2 C(1) D-4 (i) D-5 (iii) Paint Peeling	6842 (439)	2*	2*	2*	2*	2*	2*	0	1	0
NBO** MZ8 C151 03944	2	2 Possibly Mislabelled as Blue	6025	2**	2**	2**	2**	2**	2**	2**	2**	2**

X = Paint Peeling, Flaking

XX = Mislabelled as Blue, awaiting confirmation from PPG analysis (results: Not included in analysis)

123/CPC-PR/DISK1

PUERTO RICO CLOSE OUT INSPECTION FOR CORROSION

COATING SYSTEM: Double Galv, E-coat, Polyurethane topcoat

CATEGORY: Blue

BY: On Site

	FIRST INSPECTION			2ND INSPECTION DATE Sept 1990										
	DATE JUNE 1988			BODY LOCATION (CORROSION DAMAGE SITE)										
VEH NO.	MILES	BODY LOCATION CORROSION DAMAGE	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R	
NB077	80059	NONE											N.I
02D4 7372	22138	NONE	22619 (481)	0	0	0	0	0	0	0	0	1 Paint peel Fender	
02D69 072	13427	NONE	9742*	0**	1	0**	1**	2**	0	0	0	0	
02C11 872 11853	49220	NONE											N.I
N.B0P4P	2474	NONE	2478*	0	0**	0	0	0	0	0	0	0	
02A79 372 10605	62535	NONE	62539 (4)	0	0	0	0	0	0	0	0	0** Cross-member	
026 54372	2	2	16504	0	0	0	0	0	0	0	0	0	

* = Odometer defective

xx = Paint Peeling

123/CPC-PR/DISK1

PUERTO RICO CLOSE OUT INSPECTION FOR CORROSION

COATING SYSTEM: Double-Galv, E-coat, Polyurethane topcoat, Rustproofing

CATEGORY: Red

BY: On Site

	FIRST INSPECTION			2ND INSPECTION DATE Sept 1990									
	DATE JUNE 1988			BODY LOCATION (CORROSION DAMAGE SITE)									
VEH NO.	MILES	BODY LOCATION CORROSION DAMAGE	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R	
02D69 E D72	13427	NONE											N.A
02D4 3872 13175	43634	NONE											N.A
NBO 854 85U	17864	NONE	18315	O	O	O	O	O	O	O	O	O	
NBO 271 29203	43226	NONE	44466	O	O	O	O	O	O	O	O	O	
025M D,71 37467	7192	NONE											N.A
02D6 2772 13364	50487	NONE	51892	O	O	O	O	O	O	O	O	O	
02B 55P H297	57653	None	58513	O	O	O	O	O	O	O	O	O	

Note: Rustproofing of Middle Compt (D-7M) largely worn off

123/CPC-PR/DISK1

PUERTO RICO CLOSE OUT INSPECTION FOR CORROSION

COATING SYSTEM: Double Galv, E-Coat, Polyurethane topcoat, Rust proofing

CATEGORY: Red (Cont)

BY: On Site

	FIRST INSPECTION												
	DATE JUNE 1988												
								2ND INSPECTION DATE Sept 1990					
						BODY LOCATION (CORROSION DAMAGE SITE)							
VEH NO.	MILES	BODY LOCATION CORROSION DAMAGE	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R	
B06HD 34220	15168	NONE											N.A
02D40 9772 13146	21176	NONE						1					N.A
NB093B 37239	30258	NONE	31674	0	0	0	0	2	0	1* both Genders	2* under battery tray	1*	
02KK 3771 37300	45772	NONE	47472	0	0	2	2	0	0	0	0	0	
02KH* 5471 37119	14074	NONE	15886	0	0	2 door sill	0	2	0	0	0	0	
NB0 88F	40629	NONE	40629	0	0	0	0	0	0	0	0	0	
02C1** 4372 11878	2652	NONE Mislabelled	Mislabelled → See Yellow										

* = Paint Peeling (both Genders)

** = See yellow

123/CPC-PR/DISK1

PUERTO RICO CLOSE OUT INSPECTION FOR CORROSION

COATING SYSTEM: Double Galv, E-coat, Polyurethane topcoat, Rustproofing

CATEGORY: Red. (analyze to verify)

BY: Onsite

	FIRST INSPECTION			2ND INSPECTION DATE Sept 1990									
	DATE JUNE 1989			BODY LOCATION (CORROSION DAMAGE SITE)									
VEH NO.	MILES	BODY LOCATION CORROSION DAMAGE	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7H	D-7R
DBO 93P 37251	?	?	62412	2 S	0	1	1 Hinge lip	0	0	2 * both fenders	2 * S	2 *

* = Paint Peeling

S = Sample for analysis

APPENDIX C

HAWAII FIELD

TEST DATA

123/CPC-H/DISK1

HAWAII CLOSE OUT INSPECTION FOR CORROSION

CATEGORY: Yellow

BY: ON Site

VEH NO.	PRIOR INSPECTIONS DAMAGE MILES (9/87)	DAMAGE MILES (11/88 / 11/89)	DAMAGE MILES (5/90)	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R	
				FINAL INSPECTION DATE 10/90	BODY LOCATION (CORROSION DAMAGE SITE)									
02896 173	NONE 20705	NONE NONE 24549	D-5(2) 24958	25470	0	0	0	0	2 tool Compt	0	0	0	0 Paint chipping	[Rust proofing removed]

C-3

123/CPC-H/DISK1

HAWAII CLOSE OUT INSPECTION FOR CORROSION

CATEGORY: White

BY: ON Site

	PRIOR INSPECTIONS													
	DATE				FINAL INSPECTION DATE_____									
	9/87	11/88 / 7/89			BODY LOCATION (CORROSION DAMAGE SITE)									
VEH NO.	DAMAGE MILES	DAMAGE MILES	DAMAGE MILES	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R
02A6 0873	Accid Fender 42132 D-6 Paint chip	NONE Done 42207	NONE 42280	42301	0	0	0	0	0 Paint erosion	0	0	0	0

123/CPC-H/DISK1

HAWAII CLOSE OUT INSPECTION FOR CORROSION

CATEGORY: Gray

BY: On Site

PRIOR INSPECTIONS — DATE: 9/87 | 11/88 7/89 | 5/90

FINAL INSPECTION DATE 10/90

BODY LOCATION (CORROSION DAMAGE SITE)

VEH NO.	DAMAGE MILES	DAMAGE MILES	DAMAGE MILES	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R
02LE 8371	D-5 D-6 paint chip 27311	D-5 ↓ No damage 11/89 29491	D-5(2) floor D-5(1) floor 29758	29795	0	0	0	0	0 paint erosion	0	0	0	0

C-5

123/CPC-H/DISK1

HAWAII CLOSE OUT INSPECTION FOR CORROSION

CATEGORY: Blue

BY: Note (1) - Defects noted in 9/87 inspection, due to damage from shipping, corrected (accd to LTC Kaneshi).
ON Site

PRIOR INSPECTIONS — DATE: 9/87 | 11/88 11/89 | 5/90

FINAL INSPECTION DATE 10/90

BODY LOCATION (CORROSION DAMAGE SITE)

VEH NO.	DAMAGE MILES	DAMAGE MILES	DAMAGE MILES	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R
02LD 9271	D-5 R/Front Floor chip 39776	D-5 same, None 11/89 41538	D-5(2) galv showing 41663	41663	0	0	0	0	0 Paint erosion	0	0	0 Paint Flaking	0
02LN 0171	D-4 Alt D-5 Paint chip 22959	D-7, D-9 chip CNOIVG 27566	D-5 galv erosion 28184	29105	0	0	Accident 2 door sill	0	0	0	0	0	0
02LE 1171	D-4 Paint chip 21839	NONE NONE 23772	NONE 23798	23937	0	0	0	0	0 Drivers side Paint Erosion	0	0	0	0
02LN 0371	D-5 flake peel 5830	NONE NONE 6383	NONE 6399	7433	0	0	0	0	0 some bacteria	0	0	0	0
02LE 0971	D-4 Paint chip 32094	NONE NONE 32761	NONE 32781	32779	0	0	0	0	0	0	0	0	0
02LC 9771	D-4 Paint chip 38996	NONE NONE 39578	NONE 39603	40061	0	0	0	0	0 some paint, Erosion	0	0	0	0
02LD 9771	NONE (1)	NONE 1625 NONE 3039	D-5 galv erosion 3962	4228	0	0	0	0	0 Paint erosion Driver side	0	0	0	0

D-4 Paint chip. (accident repair)

C-6

123/CPC-H/DISK1

HAWAII CLOSE OUT INSPECTION FOR CORROSION

CATEGORY: Blue

BY: On Site

FINAL INSPECTION DATE 10/90

VEH NO.	PRIOR INSPECTIONS DATE: 9/87 — DAMAGE MILES	DATE: 11/88 11/89 – 5/90 — DAMAGE MILES	DAMAGE MILES	MILES	BODY LOCATION (CORROSION DAMAGE SITE) D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R
02AS 4473	NONE	NONE NONE	NONE										
	30842	31609	31620	32501	0	0	0	0	0 paint erosion	0	0	0	0
02LE 0471	NONE	NONE NONE	NONE										
	22357	22492	22502	22485	0	0	0	0	0	0	0	0	0

123/CPC-H/DISK1

HAWAII CLOSE OUT INSPECTION FOR CORROSION

CATEGORY: Red

BY: Note(1) - Defects noted in 9/87 inspection, due to damage from shipping, Corrected (accdt to LTC Kaneshi)

		PRIOR INSPECTIONS DATE				FINAL INSPECTION DATE 10/90 BODY LOCATION (CORROSION DAMAGE SITE)									
	VEH NO.	DAMAGE MILES 9/87	DAMAGE MILES 11/85 11/89	DAMAGE MILES 5/90	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R	
K	02LD 7271	D-1 D-3 D-5 35165	NONE NONE 36855	NONE 36891	36892	0	0	0	0	0 paint erosion	0	0	0	0	rustproofing Removed, Steamed (Enamel's solvent)
→	02LC 5571	NONE	NONE NONE 16002	Army Unit 17432	17487	0	0	0	0	0	0	0	0	0	repainted
K	02LD 2471	D-5 paint chip 24081	NONE NONE 24451	NONE 24537	24550	0	0	0	0	0 paint erosion	0	0	0	0	
→	02LE 1871	NONE	NONE NONE 23701	Army Unit 24064											A.V. N.A.
	02LE 0471	D-1 dents, chip 19307	NONE NONE 19797	NONE 19809	20694	0	0	0	0	0 Paint erosion	0	0	0	0	
	02LD 9871	NONE	NONE NONE 31,969 32196	NONE 32218	32239	0	0	0	0	0	0	0	0	0	
	02LN 3071	D-4 dents, chip 20619	NONE NONE 21392	~~NONE~~ (Army Unit)											AV N.A.

A.V. → assigned to Army Unit, not available

K → Kaui

H → Hawaii

123/CPC-H/DISK1

HAWAII CLOSE OUT INSPECTION FOR CORROSION

CATEGORY: Red

BY: On Site

VEH NO.	PRIOR INSPECTIONS DATE: 9/87	PRIOR INSPECTIONS DATE: 11/88 & 1/89	PRIOR INSPECTIONS DATE: 5/90	MILES	D-1	D-2	D-3	D-4	D-5	D-6	D-7F	D-7M	D-7R
	FINAL INSPECTION DATE: 10/90				BODY LOCATION (CORROSION DAMAGE SITE)								
02LE 2071	NONE	NONE NONE	NONE										
	16193	16639	16639	17015	0	0	0	0	0	0	0	0	0
02LE 4171	NONE	NONE NONE	NONE										
(8461)	20265	23525	23585	33555 X	0	0	0	0	0	0	0	0	0

repainted (mileage discrepancy)

C-9

X → Milage discrepancy (milage not counted)

APPENDIX D

TACOM REGULATION 700-90

DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY TANK-AUTOMOTIVE MATERIEL READINESS COMMAND
AND
HEADQUARTERS, US ARMY TANK-AUTOMOTIVE RESEARCH & DEVELOPMENT COMMAND
Warren, Michigan 48090

TARCOM/TARADCOM Regulation No. 700-90

26 JUN 1979

Logistics

CORROSION PREVENTION AND RUSTPROOFING FOR TACTICAL/COMMERCIAL VEHICLES

1. Purpose. This regulation prescribes criteria, policy, and responsibilities for corrosion prevention and rustproofing of tactical/commercial vehicles.

2. Scope. This regulation applies to all TARCOM/TARADCOM organizations including project/product managers and systems project officers assigned to TARCOM/TARADCOM, who have responsibilities for vehicle types shown in paragraph 1 above.

3. Policy. It is the policy of TARCOM/TARADCOM to design, develop, produce, and maintain tactical and related vehicles so that required life expectancies are attained regardless of the corrosion hazards encountered in the military environment. Accordingly, such vehicles shall be protected from such hazards by appropriate design measures including manufacturing techniques and materials and, if necessary, by application of rustproofing compounds after manufacture. Particular attention must be given to body/cab/frame and other critical areas of the vehicle.

4. Definitions. a. Corrosion. Corrosion is the deterioration of a metal by a chemical reaction with its environment.

b. Corrosion hazard environment. Corrosion hazard environment is an environment in which high humidity, high temperature, and chemical contaminants accelerate the rate of corrosion.

c. Corrosion prevention. Corrosion prevention is an overall process involving design details, ventilation, location of drainage holes and selection of metals, alloys, coatings, platings, paint, primer, and similar materials to be used during production so as to effectively reduce damage due to corrosion.

d. Rust. Rust is the corrosion product formed on iron or steel when in contact with water and oxygen and consists primarily of iron oxides.

e. Rustproofing. Rustproofing is the technique involved in applying a rustproofing compound to body/cab/frame areas of a vehicle after production or overhaul.

f. Rustproof compound. Rustproof compound is a petroleum based flexible semi-drying material applied to a metallic surface to improve its resistance to rust formation.

5. Responsibilities. a. Director of Tank-Automotive Systems Laboratory (TARADCOM) will:

(1) Assure that technical data packages for tactical vehicles, Product Improvement Program (PIP) vehicles, etc., provide adequate requirements for corrosion prevention and rustproofing, if required.

(2) Conduct studies and investigations leading to improved methods, techniques, and materials for corrosion prevention so as to make rustproofing, after manufacture, unnecessary.

(3) Promote corrosion prevention as a major design objective for all new concept vehicles.

(4) Maintain liaison with industry associations and committees concerned with design efforts pertaining to automotive corrosion prevention.

b. Director of Product Assurance (TARADCOM) will:

(1) Review technical data packages on tactical and PIP vehicles for corrosion prevention and rustproofing requirements. Prepare quality assurance provisions, when required.

(2) Review and comment on quality assurance provisions pertaining to corrosion prevention as shown in specification and other publications for tactical and PIP vehicles.

(3) Assist new development and PIP weapon system managers and contractors in development of new corrosion preventive designs and rustproofing application and inspection techniques.

(4) Assure compliance by new development, PIP, and pre-transition contractors to corrosion prevention and rustproofing contractual requirements.

c. Director of Engineering (TARCOM) will:

(1) Assure that technical data packages for production vehicles provide adequate requirements for corrosion prevention and rustproofing, if required.

(2) Direct and assist production contractors in development of suitable corrosion prevention and/or rustproofing procedures.

(3) Participate with TARADCOM in joint efforts to develop improved corrosion prevention materials, methods, and techniques with the ultimate objective of achieving a vehicle design which can effectively resist corrosion damage.

(4) Prepare specifications and related engineering documentation pertaining to corrosion prevention and rustproofing.

d. Director of Maintenance (TARCOM) will:

(1) Prepare and maintain technical field manuals and bulletins pertaining to rust repair and rustproofing of overhauled tactical vehicles.

(2) Monitor field and depot operations pertaining to corrosion prevention and rustproofing.

(3) Assure that vehicles shipped to corrosion hazard environments from reserve and contingency stock are adequately rustproofed.

e. Director of Product Assurance (TARCOM) will:

(1) Prepare product assurance provisions pertaining to corrosion prevention and rustproofing for specifications, technical data packages, and maintenance publications.

(2) Maintain surveillance of production contractors conformance to requirements for corrosion prevention and rustproofing and initiate actions to assure compliance with such requirements.

(3) Investigate new techniques for improved quality control measures.

The proponent agencies of this publication are the US Army Tank-Automotive Materiel Readiness Command, Director of Engineering and US Army Tank-Automotive Research & Development Command, Director of Tank Automotive Systems Laboratory. Users are invited to send comments to the Commander, ATTN: DRSTA-G and/or DRDTA-R, Warren, MI 48090

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