Ministry of Defence

Defence Equipment and Support
Secretariat
#2043 Maple 0a
Ministry of Defence
Abbey Wood
Bristol BS34 8JH

Email: DES SEC-PolSec LE-JSC-WPNS@mod.uk

[redacted]

Our Reference:
FOI2022/08434
Date:
25 August 2022

Dear [redacted],

I am writing about your email of 12 July 2022, in which you requested the following information:

"Please can I have a copy of AESP 2350-T-220-524?"

Your request has been handled in accordance with the Freedom of Information (FOI) Act 2000.

A search has been carried out of Ministry of Defence (MOD) records and it is confirmed that information related to your request is held. This is attached as follows:

- Army Equipment Support Publication (AESP) 2350-T-220-524 – Combat Vehicle, Reconnaissance, Full Tracked, CVR(T) (D), Common Items, Maintenance Instructions (June 2006) (Amendment 12 January 2018) (REDACTED)

Some of the information you have requested falls within the scope of the absolute exemption provided for in Section 40 (personal data) and qualified exemptions Section 26 (Defence), Section 27 (International Relations), Section 38 (Health and Safety) and Section 41 (Breach of Confidence) of the FOI Act and has been withheld.

Section 40(2) has been applied to personal information as governed by the General Data Protection Regulations (GDPR). Section 40 is an absolute exemption and there is therefore no requirement to consider the public interest in making a decision to withhold the information.

Sections 26, 27, 38 and 41 are qualified exemptions and subject to public interest testing which means that the information requested can only be withheld if the public interest in doing so outweighs the public interest in disclosure.

Section 26(1)(b), Section 27(1) and Section 38(1) have been applied to some of the information because it contains details which are operationally sensitive and would prejudice the capability and effectiveness of the Armed Forces, prejudice the relations between the United Kingdom and another state, and compromise the health and safety of Armed Forces personnel.

Section 41 applies to information obtained from any other person, including another public authority, where release would constitute an actionable breach of confidence (where the provider or a third party would have the right to take the MOD to court).

The balance of public interest was found to be in favour of withholding the information under these exemptions. Therefore, I have set the level of prejudice against release of the exempted information at the higher level of ‘would’ rather than ‘would be likely to’.

If you have any queries regarding the content of this letter, please contact this office in the first instance. If you wish to complain about the handling of your request, or the content of this response, you can request an independent internal review by contacting the Information Rights Compliance team, Ground Floor, MOD Main Building, Whitehall, SW1A 2HB (e-mail CIO-FOI-IR@mod.gov.uk). Please note that any request for an internal review should be made within 40 working days of the date of this response.

If you remain dissatisfied following an internal review, you may raise your complaint directly to the Information Commissioner under the provisions of Section 50 of the Freedom of Information Act. Please note that the Information Commissioner will not normally investigate your case until the MOD internal review process has been completed. The Information Commissioner can be contacted at: Information Commissioner’s Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF. Further details of the role and powers of the Information Commissioner can be found on the Commissioner's website at https://ico.org.uk/.

Yours sincerely,

DE&S Secretariat

CONDITIONS OF RELEASE

1 ~~This information is released by the UK Government for Defence purposes only.~~

2 ~~This information must be afforded the same degree of protection as that afforded to information of an equivalent security marking originated by the recipient Government or as required by the recipient Government's security regulations.~~

3 ~~This information may be disclosed only within the Defence Department of the recipient Government, except as otherwise authorized by the Ministry of Defence (Army).~~

4 This information may be subject to privately owned rights.

COMBAT VEHICLE, RECONNAISSANCE,

FULL TRACKED, CVR(T) (D) – COMMON ITEMS

MAINTENANCE INSTRUCTIONS

~~THIS DOCUMENT IS THE PROPERTY OF HER BRITANNIC MAJESTY'S GOVERNMENT, and is issued for the information of such persons only as need to know its contents in the course of their official duties. Any person finding this document should hand it to a British forces unit or to a police station for its safe return to the MINISTRY OF DEFENCE (Dsy (Pol)), MAIN BUILDING, WHITEHALL, LONDON SW1A 2HB with particulars of how and where found. THE UNAUTHORIZED RETENTION OR DESTRUCTION OF THIS DOCUMENT MAY BE AN OFFENCE UNDER THE OFFICIAL SECRETS ACTS OF 1911-1989. (When released to persons outside Government service, this document is issued on a personal basis and the recipient to whom it may be entrusted in confidence, within the provision of the Official Secrets Acts 1911-1989, is personally responsible for its safe custody and for seeing that its contents are disclosed only to authorized persons).~~

Sponsored for use in the

UNITED KINGDOM MINISTRY OF DEFENCE AND ARMED FORCES

by

[redacted]

AMENDMENT RECORD

Amdt No.	Incorporated By (Signature)	Date
1	INCORPORATED	10/06
2	INCORPORATED	04/07
3	INCORPORATED	10/07
4	INCORPORATED	07/08
5	INCORPORATED	11/08
6	INCORPORATED	11/10
7	INCORPORATED	03/13
8	INCORPORATED	05/13
9	INCORPORATED	10/13
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PRELIMINARY MATERIAL Page

MAINTENANCE INSTRUCTIONS

Chapter

PREFACE

Sponsor: Refer to Table 1, Serial 1
File ref: Pubs 2285
Publication Authority: Refer to Table 1, Serial 1

INTRODUCTION

1 Users should forward any comments on this publication using the AESP Form 10 and the accompanying guidance which can be accessed and downloaded from the Joint Asset Management and Engineering Solutions (JAMES) Portal (via Hot Topics – Forms) or from Technical Documentation Online (TDOL) Viewer (Search: FORM10).

2 AESPs are issued under Defence Council authority and where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to Para 3 below.

3 The subject matter of this publication may be affected by Defence Instructions and Notices (DINs), Standing Operating Procedures (SOPs) or by local regulations. When any such instruction, order or regulation contradicts any portion of this publication it is to be taken as the overriding authority.

4 The installation of Bowman communications equipment may affect procedures contained in this publication. Refer to [redacted] for information concerning any Bowman equipment fitted to CVR(T).

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

5 The Octad for the subject equipment consists of the publications below. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index (see AESP 0100-A-001-013).

Category/Sub-category			Information Level			
			1 User/ Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	101	*	*	*
	1	Equipment Support Policy Directives	111	*	*	*
2	0	Operating Information	201	*	*	*
	1	Aide-Memoire	211	212	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	302	*	*
4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	201	*	*	*
	2	Maintenance Instructions	201	522	523	524
	3	Inspection Standards	*	532	532	532
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	601	*	*
7	1	Illustrated Parts Catalogues	711	711	*	*
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	*	*	*
	5	Complete Equipment Schedule, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	*	*	*
	3	Service Engineered Modification Instructions (RAF only)	*	*	*	*

*Category/Sub-category not published

Associated publications

6

Reference	Title
EMER Test and Measurement A028 series	Material Quality Assessment – Principles and Practices in REME
AESP 1005-S-100-101	Rarden Cannon L21A2
EMER Armament B412 series	Ordnance 30 mm Gun L21A1/L21A2
AESP 2350-R-110-532	Combat Vehicle, Reconnaissance, Full Tracked, CVR(T) – Scimitar
AESP 0200-A-210-013	Coil Thread Inserts – Helicoil Type
AESP 0200-A-221-013	Painting of Land Equipment
AESP 0200-A-283-013	Guide to Stress Corrosion Cracking and Related Defects in High Strength Aluminium Armour
AESP 2350-T-210-811	Combat Vehicle, Reconnaissance, Full Tracked (CVR(T)) All variants - Modification Instructions and Index
AESP 2350-T-210-812	Combat Vehicle, Reconnaissance, Full Tracked (CVR(T)) All variants - Modification Instructions and Index
AESP 2350-T-210-821	Combat Vehicle, Reconnaissance, Full Tracked (CVR(T)) All variants - General Instructions and Index
[redacted]	[redacted]
AESP 0200-A-093-013	Land Equipment User Maintenance Standards
AESP 0200-A-201-013	Welding, Cutting and Brazing
Defence Standard 03-32	Pre-treatment and Painting of Vehicles, Engineering Equipment and Components (Issue 4 - Jul 05)
British Standard European Norm ISO 9934	Non-destructive testing Magnetic particle testing General principles

REFERENCE ORGANIZATIONS AND ADDRESSES

7 The organizations listed in Table 1 are referred to throughout this AESP.

TABLE 1 REFERENCE ORGANIZATIONS AND ADDRESSES

Serial (1)	Organization (2)	Address (3)
1	Vehicle Support Team – Armoured Tracks Portfolio (VST-ATP)	[redacted]

WARNINGS

(1) HAZARDOUS SUBSTANCE. GOGGLES AND RUBBER GLOVES MUST BE WORN WHEN USING PAINT REMOVER.

(2) HAZARDOUS SUBSTANCE. IF PAINT REMOVER IS ACCIDENTALLY SPLASHED INTO THE EYES, WASH IMMEDIATELY WITH COLD WATER AND SEEK MEDICAL ATTENTION. SPLASHES ON THE SKIN MUST BE REMOVED BY THOROUGHLY WASHING IN COLD WATER.

(3) HAZARDOUS SUBSTANCE. ALL RAGS AND WIPING CLOTHS CONTAMINATED WITH PAINT REMOVER SHOULD BE COLLECTED AND DISPOSED OF THROUGH THE NORMAL CHANNELS FOR HAZARDOUS CHEMICAL WASTE.

(4) HAZARDOUS SUBSTANCE. ONLY THE MINIMUM QUANTITY OF SOLVENT NECESSARY TO REMOVE THE LAST TRACES OF PAINT SHOULD BE USED.

(continued)

WARNINGS (continued)

(5) SOLVENT FUMES. HOT AIR BLOWERS ARE NOT TO BE USED DURING THE SOLVENT CLEANING STAGE.

(6) HAZARD TO HEALTH, ACETONE SOLVENT. AVOID BREATHING IN OR SKIN CONTACT. DO NOT INGEST. ACETONE SOLVENT CAN IRRITATE EYES, NOSE, THROAT AND LUNGS. GOGGLES AND RUBBER GLOVES ARE TO BE WORN WHEN USING ACETONE SOLVENT.

(7) EXPLOSION HAZARD. WELDING IS NOT TO BE ATTEMPTED IN THE FUEL TANK CAVITY.

(8) LETHAL VOLTAGES. DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT. WHEN CARRYING OUT WORK ON ANY BOWMAN RADIO EQUIPMENT DURING FAILURE DIAGNOSTICS, REFER TO [redacted]

(9) FIRE HAZARD. BOWMAN EQUIPMENT MAY CAUSE FLAMMABLE SUBSTANCES TO IGNITE AT REFUELLING POINT. BOWMAN SYSTEM MUST BE TURNED TO STANDBY DURING REFUELLING.

(10) PERSONNEL INJURY. BOWMAN ANTENNAS MAY TRANSMIT AT ANY TIME. SHOULD A CREW MEMBER GRAB AN ANTENNA WHILST TRANSMITTING THEY MAY SUFFER RF BURNS. UNDER NO CIRCUMSTANCES MUST AN ANTENNA BE TOUCHED WHEN FITTED TO THE VEHICLE UNLESS EQUIPMENT IS TURNED TO STANDBY.

(11) PERSONNEL INJURY. CARE MUST BE TAKEN WHILST MOVING THE VEHICLE WITH THE ANTENNAS FITTED. TOUCHING OF OVERHEAD CABLES MAY INDUCE HIGH VOLTAGES INTO THE VEHICLE CAUSING POSSIBLE ELECTROCUTION OF CREW MEMBERS.

(12) PERSONNEL INJURY. WHEN CARRYING OUT ANY TYPE OF WORK ON A CVR(T) (BOWMAN) VEHICLE, ATTENTION MUST BE MADE TO THE VARIOUS SAFETY NOTICES WHICH ARE POSITIONED THROUGHOUT THE VEHICLE.

(13) CADMIUM PLATING. THE EQUIPMENT COVERED BY THIS PUBLICATION CONTAINS COMPONENTS INCORPORATING CADMIUM PLATED MATERIAL WHICH IS A POTENTIAL SAFETY HAZARD. THIS MATERIAL, IN ITSELF, IS SAFE EXCEPT IN CIRCUMSTANCES WHEN IT IS HEATED, CORRODED, OR WORKED. POTENTIAL HAZARDS ARISE WHEN:

(13.1) CADMIUM PLATING MATERIAL OR COMPONENTS ARE FILED AND THE RESULTING DUST IS INHALED.

(13.2) TOXIC FUMES ARE INHALED WHEN CADMIUM IS HEATED.

(13.3) CADMIUM SALTS FORMING AS A RESULT OF CORROSION ARE ABSORBED INTO THE BODY TISSUES THROUGH SKIN, MOUTH, OR WOUND.

REFER TO JSP 515 FOR THE RELEVANT MSDS AND CONDUCT A RISK ASSESSMENT I.A.W. JSP 375, VOL 2, LEAFLET 5 OR AESP 0200-A-093-013 PRIOR TO ACTIVITIES.

(14) PERSONAL INJURY. WHEN CARRYING OUT REPAIRS AND MAINTENANCE, THERE MAY BE A RISK OF SHARP EDGES AND METAL SPLINTERS, ENSURE WHEN CARRYING OUT THESE TASKS THAT CARE IS TAKEN, AND ADEQUATE PROTECTIVE EQUIPMENT IS USED.

(continued)

WARNINGS (continued)

(15) SILICA. TOXIC SUBSTANCE. ANY ACCUMULATED SAND ON THE VEHICLE MAY CONTAIN SILICA DUST WHICH MUST BE REGARDED AS HAZARDOUS TO HEALTH. PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN TO PREVENT INHALATION OF DUST WHEN CLEANING OR WORKING ON THE VEHICLE. REMOVE ANY SAND AND DUST DEPOSITS FROM THE VEHICLE BEFORE COMMENCING WORK. ALL PERSONAL PROTECTIVE EQUIPMENT MUST BE CLEANED AFTER EACH USE IN A DESIGNATED AREA TO PREVENT THE RISK OF DUST INHALATION BY UNPROTECTED PERSONNEL.

(16) HAZARDOUS MATERIAL. OIL OMD 90 IS A HAZARDOUS MATERIAL. THE USE OF OIL OMD 90 IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH (COSHH) AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(17) HAZARDOUS MATERIAL. LOCTITE 574 IS A HAZARDOUS MATERIAL. THE USE OF LOCTITE 574 IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(18) HAZARDOUS MATERIAL. LOCTITE 241 IS A HAZARDOUS MATERIAL. THE USE OF LOCTITE 241 IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(19) HAZARDOUS MATERIAL. LOCTITE 641 IS A HAZARDOUS MATERIAL. THE USE OF LOCTITE 641 IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(20) HAZARDOUS MATERIAL. SEALING COMPOUND JC5A IS A HAZARDOUS MATERIAL. THE USE OF SEALING COMPOUND JC5A IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(21) HAZARDOUS MATERIAL. HYLOMAR (DTD 900/4586a) IS A HAZARDOUS MATERIAL. THE USE OF HYLOMAR (DTD 900/4586a) IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(22) HEAVY ITEM. THE FINAL DRIVE RIGHT HAND WEIGHS 100 KG (220 LBS). DUE CONSIDERATION SHOULD BE GIVEN TO THE REGULATIONS GOVERNING THE LIFTING OF HEAVY WEIGHTS. ALL PERSONS UNDERTAKING MANUAL HANDLING SHOULD UNDERGO APPROPRIATE TRAINING IAW REGULATIONS.

(23) HEAVY ITEM. THE FINAL DRIVE LEFT HAND WEIGHS 100 KG (220 LBS). DUE CONSIDERATION SHOULD BE GIVEN TO THE REGULATIONS GOVERNING THE LIFTING OF HEAVY WEIGHTS. ALL PERSONS UNDERTAKING MANUAL HANDLING SHOULD UNDERGO APPROPRIATE TRAINING IAW REGULATIONS.

CAUTIONS

(1) LIMITED APPLICATION. Ensure that paint remover is not applied to areas painted with epoxy paint.

(2) LIMITED APPLICATION. Where the removal of paint is required using this procedure, paint remover must not be used.

(3) PROHIBITED PENETRANT. Thixotropic Dye Penetrant is not to be used on any crack that may subsequently require welding. Dye Penetrant is virtually impossible to remove and may cause porosity and blowholes if present in a crack which is subjected to welding.

(4) WELD CONTAMINATION. Dye penetrants are not to be used during the initial inspection unless specifically authorised.

(5) UNSATISFACTORY WELD. Copper bar must not be used as a backing bar during welding.

(6) EQUIPMENT DAMAGE. Do not overtighten nut on bolt, such that dishing of the Repair Plate occurs.

(7) PLATE CONTAMINATION. Dressing of plate surfaces should be carried out using power driven aluminium oxide (Alumina) abrasive discs. Silicone Carbide discs (Carborundum) must not be used.

(8) PLATE DAMAGE. Do not attempt to correct any plate distortion as cold setting will result in high residual stress and the use of heat would be detrimental to the ballistic properties of the plate.

(9) EQUIPMENT DAMAGE. A high standard of cleanliness must be maintained at all times. The functioning of a unit will be seriously affected by contamination and dirt.

ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
AESP	Army Equipment Support Publication
Amdt	Amendment
AQL	Acceptable Quality Level
BER	Beyond Economical Repair
BLR	Beyond Local Repair
Cd	Cadmium
Chap	Chapter
COSHH	Control of Substances Hazardous to Health
°C	Degrees Centigrade
DMC	Domestic Management Code
EMER	Electrical and Mechanical Engineering Regulations
FV	Fighting Vehicle
IAW	In Accordance With
ID	Inner Diameter
IN	Inch
JAMES (L)	Joint Asset Management Engineering Solutions, LAND
Kg	Kilogram
lbs	Pounds
LH	Left Hand
LRU	Line Replaceable Unit
MoD	Ministry of Defence
MPI	Magnetic Particle Inspection
NATO	North Atlantic Treaty Organisation
No.	Number
NSN	NATO Stock Number
OEM	Original Equipment Manufacturer
Para	Paragraph
Qty	Quantity
RA	Repair Authority
RD	Round
Ref	Reference
RH	Right Hand
rpm	revolutions per minute
S&TE	Support and Test Equipment
SPIS	Services Packaging Instruction Sheet
THK	Thick
TKD	Tracked
VEHS	Vehicles
W	Wide/Width

CHAPTER 4-0

TRANSMISSION

CONTENTS

Chapter

CHAPTER 4-1

FINAL DRIVE, RIGHT HAND

CONTENTS

INTRODUCTION

WARNINGS

(1) CADMIUM PLATING. THE EQUIPMENT COVERED BY THIS PUBLICATION CONTAINS COMPONENTS INCORPORATING CADMIUM PLATED MATERIAL WHICH IS A POTENTIAL SAFETY HAZARD. THIS MATERIAL, IN ITSELF, IS SAFE EXCEPT IN CIRCUMSTANCES WHEN IT IS HEATED, CORRODED, OR WORKED. POTENTIAL HAZARDS ARISE WHEN:

(1.1) CADMIUM PLATING MATERIAL OR COMPONENTS ARE FILED AND THE RESULTING DUST IS INHALED.

(1.2) TOXIC FUMES ARE INHALED WHEN CADMIUM IS HEATED.

(1.3) CADMIUM SALTS FORMING AS A RESULT OF CORROSION ARE ABSORBED INTO THE BODY TISSUES THROUGH SKIN, MOUTH, OR WOUND.

REFER TO JSP 515 FOR THE RELEVANT MSDS AND CONDUCT A RISK ASSESSMENT I.A.W. JSP 375, VOL 2, LEAFLET 5 OR AESP 0200-A-093-013 PRIOR TO ACTIVITIES.

(2) PERSONAL INJURY. WHEN CARRYING OUT REPAIRS AND MAINTENANCE, THERE MAY BE A RISK OF SHARP EDGES AND METAL SPLINTERS, ENSURE WHEN CARRYING OUT THESE TASKS THAT CARE IS TAKEN, AND ADEQUATE PROTECTIVE EQUIPMENT IS USED.

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(9) HEAVY ITEM. THE FINAL DRIVE RIGHT HAND WEIGHS 100 KG (220 LBS). DUE CONSIDERATION SHOULD BE GIVEN TO THE REGULATIONS GOVERNING THE LIFTING OF HEAVY WEIGHTS. ALL PERSONS UNDERTAKING MANUAL HANDLING SHOULD UNDERGO APPROPRIATE TRAINING IAW REGULATIONS.

CAUTION

EQUIPMENT DAMAGE. A high standard of cleanliness must be maintained at all times. The functioning of a unit will be seriously affected by contamination and dirt.

NOTES

(1) With regard to reference documents or supplementary material provided in this instruction, any references to mixtures or preparations, including any brand names of such, must be ignored, and current local working practices followed, preceded by an appropriate risk assessment. If the outcome of the risk assessment concludes that not enough information exists to proceed safely, the OEM should be consulted in all cases.

(2) When referring to AESP 2350-T-220-711, serials annotated Cd denote items that are Cadmium Plated or contains Cadmium.

(3) Annex A references Drawing FV969530, Sheet 1, Issue 3 and should be referred to when undertaking the repair.

General

1 This chapter details the Repair Specification for the Final Drive, RH at base workshops. This repair specification provides the Acceptable Quality Level (AQL) to meet service standards.

1.1 BAE Systems Part No.: FV969530.

1.2 DMC (Army): 9CVT.

1.3 NSN: 2520-99-761-1142.

Reference documents

2 In addition to Annexes A to D of this chapter, the following reference documents should be referred to in conjunction with this chapter:

2.1	AESP 2350-T-220-522	Repair Instructions Level 3.
2.2	AESP 2350-T-220-711	Illustrated Parts Catalogue.
2.3	AESP 2350-T-220-601	Maintenance Schedule.
2.4	Defence Standard 03-32.	Pre-treatment and Painting of Vehicles, Engineering Equipment and Components (Issue 4 - Jul 05).
2.5	British Standard European Norm ISO 9934	Non-destructive testing. Magnetic particle testing. General principles.

INSPECT, TEST AND REPAIR PROCEDURES

Support and test equipment

3 The S&TE required for this procedure is listed in Table 1.

TABLE 1 SUPPORT AND TEST EQUIPMENT

Serial (1)	NSN (2)	Item (4)	Qty (5)
1	H1/8030-99-220-2370	Jointing compound	A/R
2	9150-99-991-1124	OMD 90 oil	A/R
3	H1/8030-99-220-1024	Sealing compound	A/R
4	LV9CVT/5120-99-819-1776	Ring nut spanner	1
5	Local manufacture	Planet carrier tool	1
6	H1/6850-99-002-1141	Cleaning compound, solvent	A/R
7	H1/8030-99-220-2495	Sealing compound, JC5A	A/R
8	H1/8030-99-224-8992	Loctite 241	A/R
9	G2/9505-99-960-6751	Lockwire	A/R
10	H1/8030-99-225-1152	Loctite 641	A/R
11	H1/8030-99-225-3058	Loctite 574	A/R

Physical inspection standard

4 The RA is to create a comprehensive overhaul report for each Final Drive undergoing repair. The document must contain but is not limited to:

4.1 Date of Overhaul.

4.2 Overhauling organisation (Commercial entity with contact information).

4.3 A unique strip report serial number.

4.4 The modification state (at receipt and on completion).

4.5 Final Drive serial number (at receipt and on completion).

4.6 Planet carrier serial number (at receipt and on completion).

4.7 Drive plate serial number (at receipt and on completion).

4.8 Inspection comments against all items listed in Annex D of this chapter.

4.9 Details of any failed item listed in Annex D of this chapter, with potential root cause analysis. The failed item is to be quarantined and the repair manager informed.

5 A copy of the Overhaul Report is to be forwarded to the CVR(T) Upkeep Manager at the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication) on completion of the repair and retained until the next major overhaul of the Final Drive or the Final Drive is scrapped (whichever comes first).

6 The physical inspection is detailed below:

6.1 Visually inspect the Final Drive, RH as follows:

6.1.1 Surfaces must be clean, dry and free from grease or debris. Painted surfaces must not be blistered, peeling or flaking.

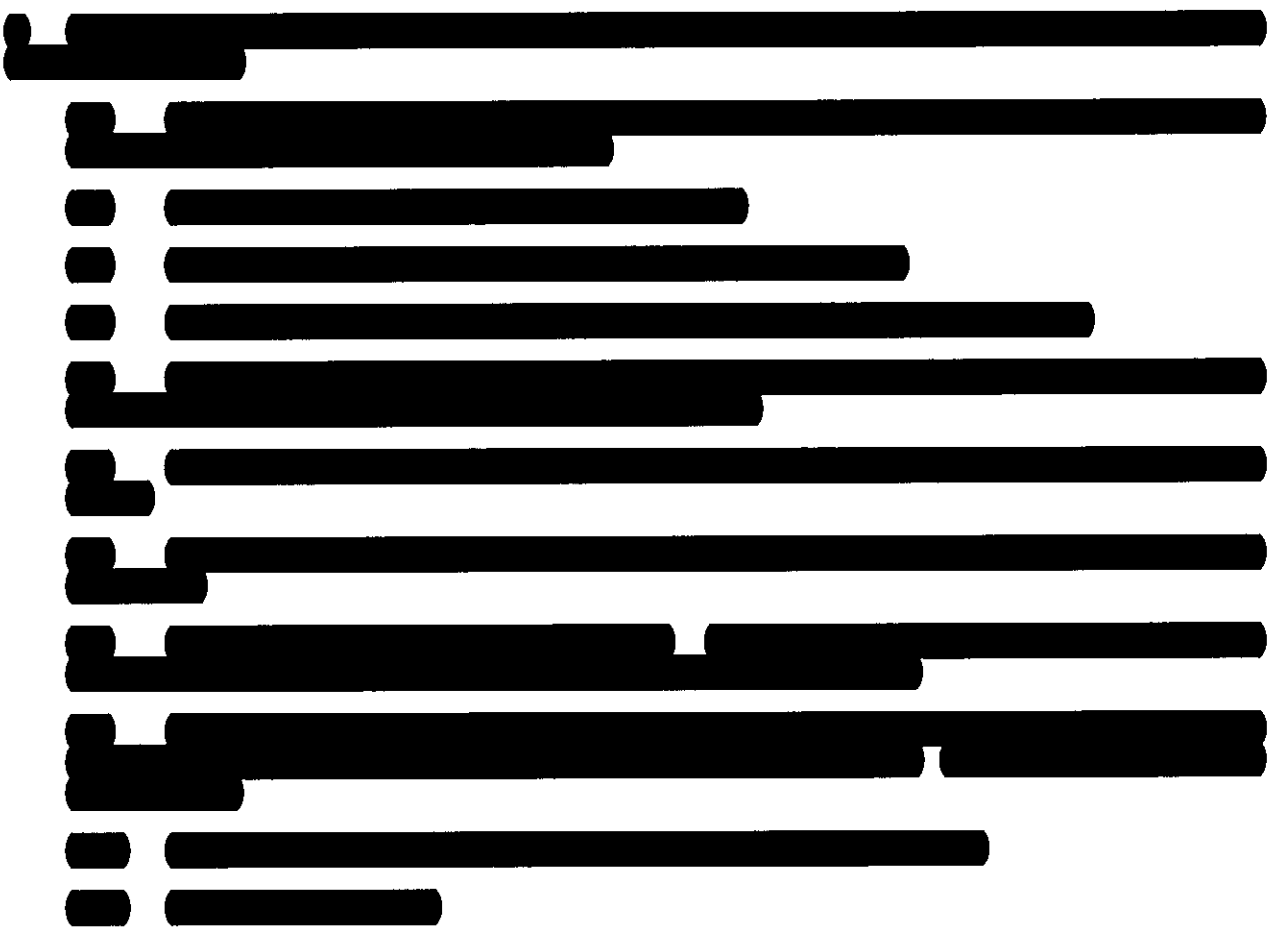
6.1.2 Oil leaks.

6.1.3 Missing end caps.

6.2 Any faults or defects found during the physical inspection, including any modification updates, should be noted and rectified during Para 8.

6.3 All Final Drives will be stripped down and inspected IAW Annexes A and D of this chapter.

Strip down instructions (Fig 1)



[redacted]

Inspection and repair instructions

8 Inspect and repair the Final Drive, RH as follows:

8.1 Inspect the Final Drive, RH IAW Annex D of this chapter. Any components found to be outside of the Acceptable Quality Limit (AQL) should be discarded.

8.2 Carry out a Magnetic Particle Inspection (MPI) on all gears and shafts IAW British Standard European Norm ISO 9934, Para 15. The MPI shall be completed in both directions (longitudinal and transverse). 100% inspection shall be carried out. The acceptance criteria is for **zero** surface cracks and defects.

8.3 Discard the used items listed in Annex B of this chapter and any unserviceable items found during inspection.

8.4 Record the serial number, manufacturer and date of manufacture for the following items for JAMES (L) update when unit has passed out inspection and testing (applying the procedure for the relevant scenario for each item):

8.4.1 Planet Carrier (FV717958) and Drive Plate (FV770151).

8.4.1.1 Scenario 1. The Planet Carrier and Drive Plate already have a serial number and have been inspected and deemed fit for purpose to be re-built into a Final Drive. The RA is to log the serial number of the Planet Carrier on JAMES (L) with rebuild date and the initials A1.

8.4.1.2 Scenario 2. The Planet Carrier and Drive Plate are 'used', have no markings on and have been inspected and deemed fit for purpose to be re-built into a Final Drive. The RA is to mark these sub-assemblies in line with the associated detailed drawings. The RA is then to log the serial number, date of rebuild and the initials A1 on JAMES (L).

8.4.1.3 Scenario 3. The Planet Carrier and Drive Plate are 'new', have no markings on and have been inspected and deemed fit for purpose to be re-built into a Final Drive. The RA is to mark these sub-assemblies in line with the associated detailed drawings. The RA is then to log the serial number, date of rebuild and the word 'NEW' entered on JAMES (L).

8.4.1.4 Scenario 4. The Planet Carrier and Drive Plate are 'new', have a serial number on and have been inspected and deemed fit for purpose to be re-built into a Final Drive. The RA is to log the serial number of the Planet Carrier on JAMES (L) with the rebuild date and the word 'NEW' entered on JAMES (L).

8.4.2 Final Drive (FV969530).

8.4.2.1 Scenario 1. The Final Drive already has a serial number and the part has been inspected and deemed fit for purpose to be re-built. The RA is to log the serial number of the Final Drive on JAMES (L) with rebuild date along with the serial number of the Planet Carrier it contains.

8.4.2.2 Scenario 2. The Final Drive has no markings on and has been inspected and deemed fit for purpose to be re-built. The RA is to mark the outside face of the Stub Axle (FV2138209) in the position shown on the drawing. The RA is then to log the serial number of the Planet Carrier it contains.

8.5 Clean off and inspect all components. Replace as necessary.

NOTE

Only approved parts detailed in AESP 2350-T-220-711 are to be used.

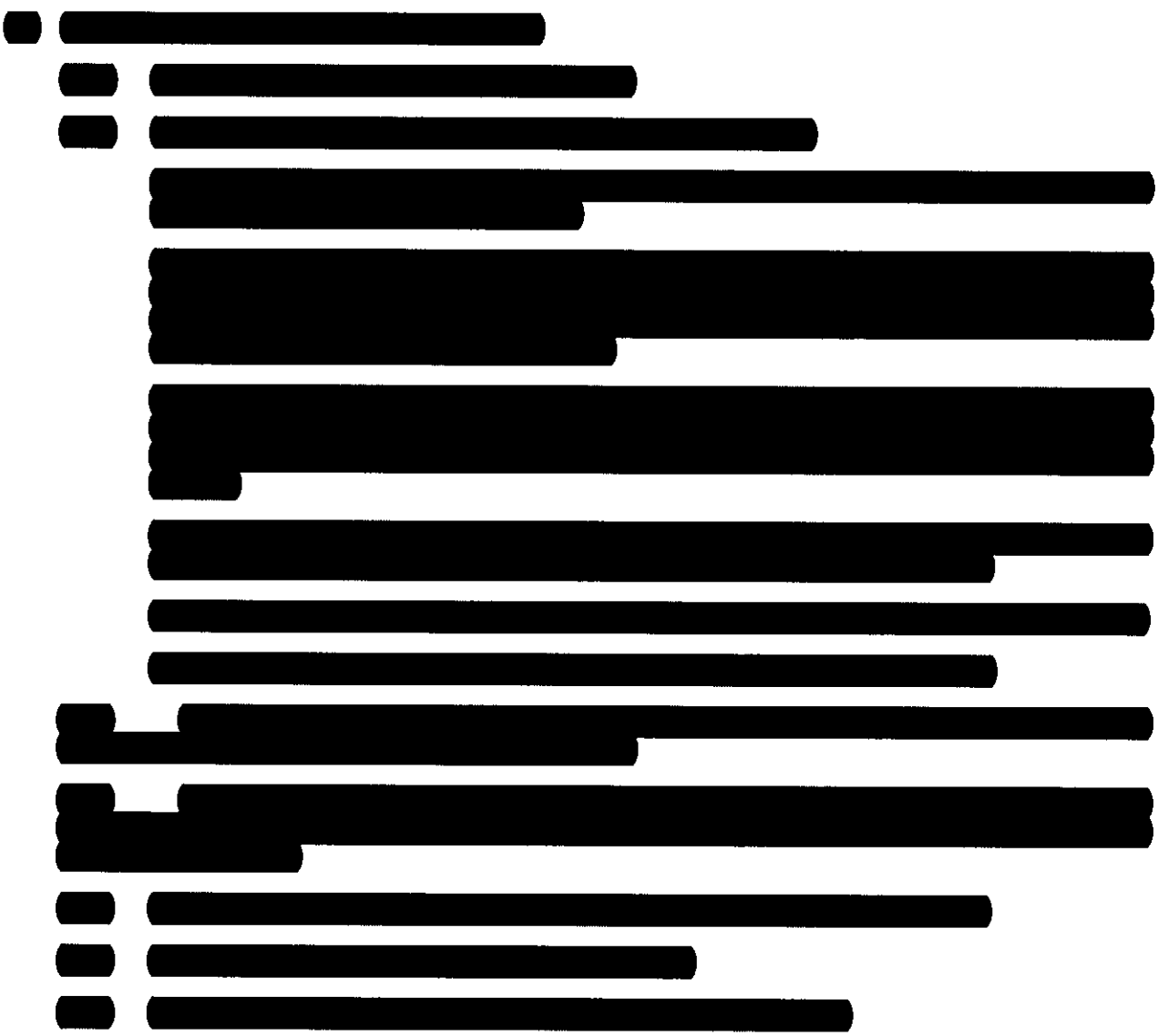
8.6 Install all new parts removed at Sub-para 8.3 (listed in Annex B of this chapter).

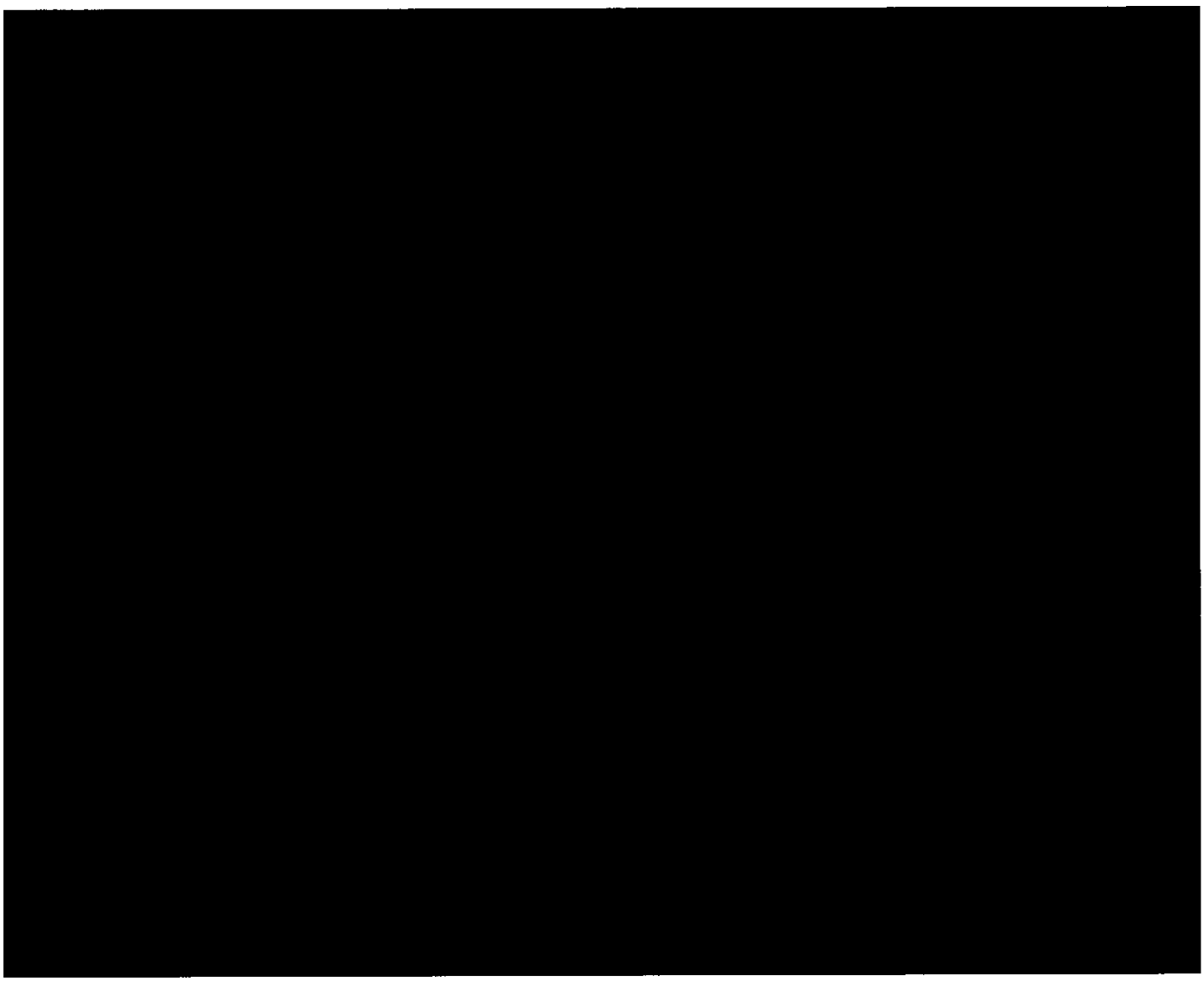
8.7 If further items are required, repair by replacement using parts detailed in AESP 2350-T-220-711.

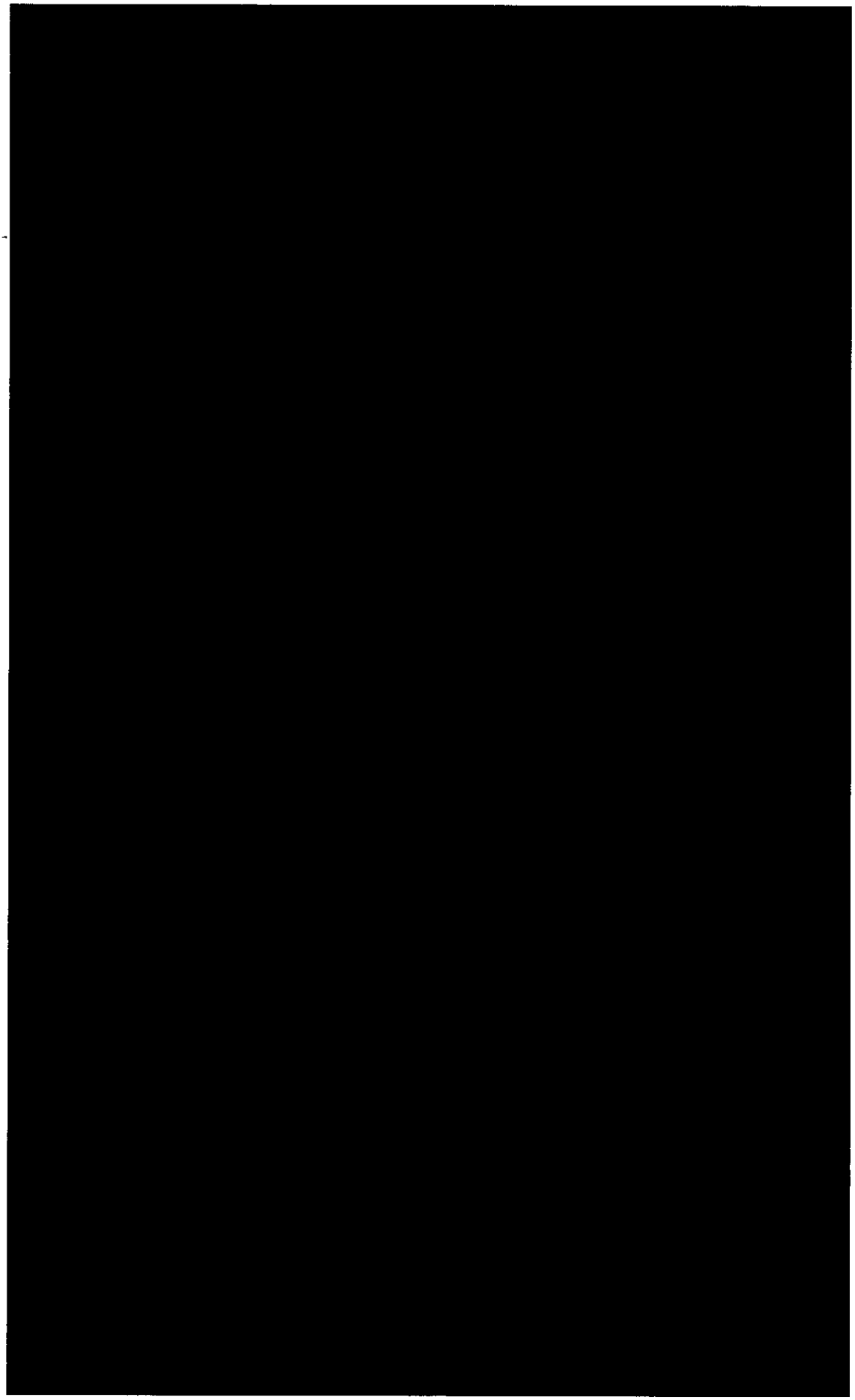
One-piece oil seal removal (Fig 1)

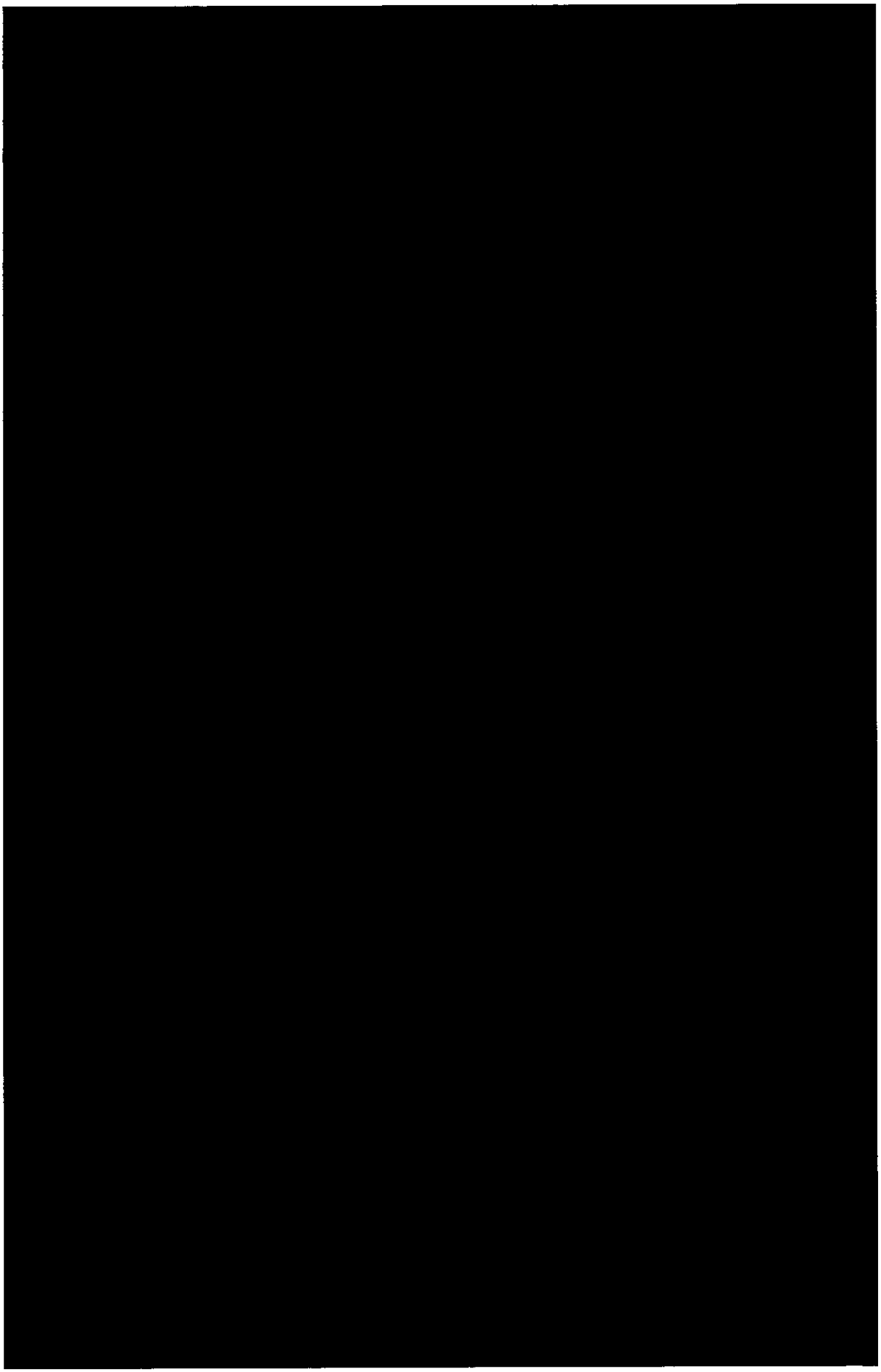
9 To remove the one-piece oil seal (Fig 1 (28)), prise the oil seal away from its seating, taking care not to damage or mark the surrounding area.

Re-assembly instructions (Figs 1 to 4)









Output test specification

11 The Final Drive RH needs to be subjected to a **NO LOAD** test for a period of 45 minutes in both forward and reverse directions to observe for oil leaks, excessive noise and recording of oil temperature (not to exceed 120°C). Oil level should be IAW AESP 2350-T-220-601. Test rig should be run at 600 rpm.

11.1 If the Final Drive, RH passes the output test specification then the unit is to be declared serviceable. Proceed to Para 16, declare the unit A1 and return it to the stores system.

11.2 If the Final Drive, RH fails the output test specification, proceed to Para 7 and conduct further investigation.

NOTE

If the Final Drive, RH continues to fail the output test specification, refer to Para 12.

Beyond Local Repair (BLR)

12 Equipment is classified BLR if the LRU cannot be repaired to an A1 condition, due to any of the following circumstances:

12.1 Lack of diagnostic equipment.

12.2 Lack of correct S&TE.

12.3 Lack of technical information.

13 The repairing organisation must declare the LRU BLR and seek MoD permission to backload to OEM or discard.

Beyond Economical Repair (BER)

14 An LRU is considered BER if the expected cost of repair exceeds 80% of the procurement cost of a replacement item or items. Repair agencies must request disposal instructions from the MoD when any repair is expected to exceed 80% of the total procurement cost.

Parts catalogue

15 Parts catalogue information is detailed within AESP 2350-T-220-711.

Required packing level

16 The required packaging information for this item is given within Annex C of this chapter.

CHAPTER 4-1 ANNEX A

FV969530, SHEET 1 ISSUE 3 – ARRANGEMENT FINAL DRIVE, RH

INTRODUCTION

1 Fig 1 references Drawing FV969530, Sheet 1, Issue 3 and should be referred to when undertaking the repair.

CHAPTER 4-1 ANNEX B

FINAL DRIVE, RH, 100% REPLACEABLE PARTS LIST

INTRODUCTION

1 This Annex contains information extracted from AESP 2350-T-220-711.

TABLE 1 100% REPLACEABLE PARTS LIST

Serial (1)	NSN (2)	Item (3)	Drawing/Item or Part No. (4)	Qty (5)
1	3120-99-410-9795	Bearing, sleeve; s/lead, bz, 1-1/4 in bore x 1-13/32 in od x 1 in lg	91060037 P7000997	1
2	3110-99-810-9365	Bearing, tapered roller; 3-3/4 in bore x 5-27/32 in od cup x 1-1/4 in lg (inner)	42375/42584 P7001997	1
3	5330-99-828-8125	Packing, preformed; synthetic rubber, 54mm od, 37.4mm id, 9.5mm o/a h (dowty shaft input)	AS30215 P7003215	1
4	3110-99-815-0579	Bearing, ball, journal; 75mm bore dia, 115mm od, 20mm w, normal group	FV2060533 P7006966	1
5	2530-99-258-1737	Disc, brake; steel, 12 in dia, 1-13/16 in h, splined bore 6 splines	FV2138203 P7007780	1
6	5330-99-311-2993	Seal; 0.875 in w, 6.074 in max od, (shoulder dia) rotary lipped shaft seal	FV2138211 P7007783	1
7	2520-99-813-6198	Pivot pin; steel, 2.650 in lg, 0.7874 in dia, counter sunk ends 1/8 in deep, 0.687 in dia	FV684188 P7008952	3
8	3110-99-813-6186	Ring bearing, inner; steel, 3.1496 in od, 2.9528 in id, 1.723 in lg	FV684191 P7008953	1
9	5306-99-778-9937 5306-99-822-5635 Superseded NSN in 711	Bolt, machine; unf, hex hd, zn plated, 3/8 in 1-1/2 in lg, class 2a thd, w/2-3/64 in dia holes thro hd (sun wheel housing to stub axle)	FV969496 P7009714	12
10	5315-99-823-4132	Pin, straight, headless; steel, ½ in dia, 1.286 in lg, 2 holes 0.125 in dia	FV769961 P7009732	1
11	5330-99-815-0577	Seal, plain; synthetic rubber element, steel reinforced, 80mm id, 100mm od, 10mm w (gearshaft)	G ANGUS NO DPSM8 P7010818	1
12	3110-99-946-9271	bearing, tapered roller; 3-1/2 in x 5-1/8 in x 1-1/8 in, mnfr Timken no.lm117949/lm117910 (outer)	LM117949 LM117910 P7011119	1
13	5365-99-346-9330	Circlip, bevelled	N1 402 0293 APP P7011807	1

(continued)

TABLE 1 100% REPLACEABLE PARTS LIST (continued)

Serial (1)	NSN (2)	Description (3)	Drawing/Item or Part No. (4)	Qty (5)
14	3110-99-815-0578	Bearing, needle roller, journal; single row, 80mm bore x 100mm od x 30mm lg	RNA4914 P7012297	1
15	5340-99-810-7639	Plastic breather recess cap	33081 P7015032	2
16	2520-99-778-7941	Breather pipe assembly, rh	FV968749 AVP added	1
17	2520-99-778-7940	Breather pipe assembly, lh	FV840998 AVP added	1
18	5330-99-813-6190	Gasket; fibre, rd, 2-1/4 in od, 1.260 in id, 0.006 in thk	FV684169 AVP added	2
19	5360-99-813-6466	Spring, helical, compression; steel, 9 active turns, 0.3 in od, 0.9 in free lg (dowty shaft input)	FV679047 AVP added	1
20	2520-99-813-6462	Plunger (dowty shaft input)	FV679046 AVP added	1
21	5315-99-371-8426	Pin, cotter, split; cres (dowty shaft input)	AVP added	2
22	5310-99-135-6286	Washer, flat; p-bz, rd hole, 0.793 in min 0.801 in max dia, 1.9 in od, 0.063 in max 0.061 in min thk	WASHERFT 0.797RD1.9 00CUSNNO AVP added	6
23	5310-99-823-4134	Washer, flat; cu, rd, rd hole, 0.875 in id, 1.062 in od, 0.060 in thk (plug)	FV770147 AVP added	3
24	5310-99-881-2459	Gasket; copper, hydraulic chassis fitting (girling)	378711 AVP added	1
25	5330-99-813-6460	Gasket; fibre, rd, 4.625 in od, 2.750 in id, 0.006 in thk, 4 holes 0.313 in dia	FV718112 AVP added	1
26	2910-99-850-0504	Pipe clip (breather pipe)	900402	1

CHAPTER 4-1 ANNEX D

INSPECTION CRITERIA TABLE FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND)

INTRODUCTION

1 This Annex contains the Inspection Criteria Table for Legacy Final Drives (Left Hand & Right Hand).

NOTE

All dimensions in Table 1 are imperial unless otherwise stated.

TABLE 1 INSPECTION CRITERIA FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND)

Serial	Part No.	Description	Item Ref on FV718088	Detail	Drawing Dimensions (H/L) *Inches*	Acceptable Quality Limit (AQL) Inches
1	FV684162	Sunwheel Housing	2	ID for bearing *(Bearing ball, journal 75mm x 115mm x 20mm)*	4.5283/ 4.5271	4.5283/ 4.5271
				ID for bearing *(Bearing needle roller 80mm x 100mm x 30mm Loctite 641 to be used when ID is between 3.9380 and 3.9405)*	3.9376/ 3.9368	3.9405/ 3.9368
2	FV684170	Race Retainer	24	ID for bearing *(For bearing detail see serial 1.1)*	4.533/ 4.528	4.533/ 4.528
				Depth of recess for bearing *(Inner face of plate to be flat within 0.002)*	0.256/ 0.254	0.256/ 0.254
3	FV718300	End Cap – Speedo	16	OD for wormwheel housing *(Diameters to be concentric within 0.001)*	1.2496/ 1.2480	1.2496/ 1.2480
				ID for bush in retainer	0.5941/ 0.5934	0.5941/ 0.5934
				ID of bush to accept gearshaft wormwheel	0.501/ 0.500	0.501/ 0.500
4	FV745497	Worm Wheel – Speedo Drive	15	Measurement over teeth using 0.09375 dia rollers	1.0799/ 1.0755	1.0788/ 1.0740
				Backlash when mated with worm gear *(See serial 10)*	0.015/ 0.011	0.020/ 0.012
5	FV718301	Adaptor, Speedo	18	OD for wormwheel housing	1.2496/ 1.2480	1.2496/ 1.2480
				ID for bush in retainer	0.5941/ 0.5930	0.5941/ 0.5930
				ID of bush to accept gearshaft wormwheel *(See serial 4)*	0.500	0.501/ 0.500
6	FV2138205	Shaft, Sunwheel	7	OD of shaft to accept bearing sleeve *(See serial 7)*	2.9533/ 2.9528	2.9533/ 2.9520
			Gear Detail	Measurement over teeth using 0.2969 dia rollers	3.5167/ 3.5119	3.517/ 3.511
				Backlash when mated with planet gear *(See serial 8)*	0.014/ 0.009	0.016/ 0.009
				Arc tooth thickness	0.3058/ 0.3033	0.3058/ 0.3033
			Internal involute spline detail	Major dia	1.7500/ 1.7680	1.7500/ 1.7680
				Minor dia	1.5054/ 1.5104	1.5110/ 1.5054
				Measurement over 0.216 dia pins	1.3014	1.3020/ 1.2947

(continued)

TABLE 1 INSPECTION CRITERIA FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND) (continued)

Serial	Part No.	Description	Item Ref on FV718088	Detail	Drawing Dimensions (H/L) *Inches*	Acceptable Quality Limit (AQL) Inches
7	FV684191	Inner Bearing Race	10	ID to suit gearshaft spur *(See serial 6)*	2.9528/ 2.9522	2.953/ 2.952
				OD to suit bearing *(For bearing details see serial 1.3)*	3.1440/ 3.1420	3.1496/ 3.1491
8	FV684185	Planet Gear	Part of FV718175	Arc tooth thickness at pitch line of 2.333	0.3058/ 0.3033	0.3058/ 0.3033
				Measurement over teeth using 0.2969 dia pins	2.8425/ 2.8370	2.8425/ 2.8370
				Backlash when mated with gear internal *(See serial 9)*	0.014/ 0.009	0.016/ 0.009
9	FV684163	Annulus	3	Spigot dia on gear	8.9994/ 8.9982	8.9994/ 8.998
				OD of gear to suit axle stub *(See serial 21)*	9.1994/ 9.1982	9.1994/ 9.1980
				Backlash when mated with planet gear *(See serial 8)*	0.014/ 0.009	0.016/ 0.009
10	FV745496	Worm – Speedo Drive	14	Depth of tooth	0.1175/ 0.1125	0.1175/ 0.1125
				ID to suit gearshaft spur *(See serial 6)*	2.9553/ 2.9535	2.9553/ 2.9535
				Chordial thickness	0.0638/ 0.0618	0.0633/ 0.0623
				Backlash when mated with gearshaft wormwheel *(See serial 4)*	0.015/ 0.011	0.020/ 0.012
				Width of keyway *(Check for chatter)*	0.0128/ 0.0126	0.0128/ 0.0126
11	FV2138203	Main Brake Disc	8	Major dia *(See serial 6.5)*	3.050/ 3.034	3.050/ 3.034
				Minor dia	2.7015/ 2.7000	2.7015/ 2.7000
				Width of groove	0.750/ 0.748	0.750/ 0.748
				OD of disc	12.010/ 11.960	12.010/ 11.960
				Width of disc *(Max run out of disc 0.004)*	1.130/ 1.100	1.130/ 1.100
12	FV769967	Input Shaft	26	Major dia	3.846/ 3.841	3.846/ 3.841
				Minor dia	3.596/ 3.578	3.596/ 3.578
		Involute spline, large		Measurement over 0.240 dia pins	4.1097/ 4.1072	4.1094/ 4.1070
				Major dia	1.721/ 1.716	1.721/ 1.716
		Involute spline, small		Minor dia	1.471/ 1.453	1.471/ 1.453
				Measurement over 0.240 dia pins	1.9660/ 1.9645	1.9660/ 1.9645
				Dia of bore to accept plunger on large spline	0.510/ 0.500	0.510/ 0.500
13	FV679046	Plunger	50	Major OD	0.499/ 0.498	0.499/ 0.498
				Minor OD	0.375/ 0.374	0.375/ 0.374
14	FV679047	Spring, Helical Compression	64	Free length	0.9	0.910/ 0.800
				Load to compress to 0.45	2.25/ 2.11 lbf	2.25/ 2.11 lbf

(continued)

TABLE 1 INSPECTION CRITERIA FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND) (continued)

Serial	Part No.	Description	Item Ref on FV718088	Detail	Drawing Dimensions (H/L) *Inches*	Acceptable Quality Limit (AQL) Inches
15	FV717958	Planet Carrier Assy	Part of FV718175	Major dia	2.3522/ 2.3472	2.3522/ 2.3472
				Minor dia	2.0960/ 2.0780	2.0960/ 2.0780
		External involute spline detail		Measurement over 0.240 dia pins	2.6169/ 2.6149	2.6169/ 2.6149
				ID for bearing sleeve *(See serial 16)*	1.4078/ 1.4062	1.4078/ 1.4062
				ID for shaft shouldered *(See serial 19)*	1.0314/ 1.0310	1.0314/ 1.0310
				Dia of holes to suit pin straight headless *(See serial 17, holes to be parallel to each other)*	0.7866/ 0.7859	0.7866/ 0.7859
16	FV769353	Bush – Glacier	42	OD	To fit 1.4078 max dia in Carrier	1.409/ 1.4078
				ID *(See serial 19)*	1.2500/ 1.2516	1.252/ 1.250
17	FV684188	Pivot Pin	Part of FV718175	OD	0.7874/ 0.7870	0.7874/ 0.7870
18	FV769961	Pin, Input Shaft	67	OD *(See serial 19)*	0.5	0.510/ 0.495
				Distance between hole centres	0.791/ 0.781	0.791/ 0.781
				Dia of holes to suit roll pin	0.129/ 0.124	0.129/ 0.124
19	FV769968	Propeller Drive Shaft	35	Major dia	1.721/ 1.716	1.721/ 1.716
				Minor dia	1.471/ 1.453	1.471/ 1.453
		Large involute spline detail		Measurement over 0.240 dia pins	1.9660/ 1.9645	1.966/ 1.960
				Major dia	1.2210/ 1.2160	1.2210/ 1.2160
		Small involute spline detail		Minor dia	0.9710/ 0.9530	0.9710/ 0.9530
				Measurement over 0.240 dia pins	1.4646/ 1.4632	1.464/ 1.463
				Dia of shaft to suit bearing sleeve *(See serial 16)*	1.2480/ 1.2464	1.248/ 1.246
				Dia of hole at large spline end to suit pin straight headless *(See serial 18)*	0.525/ 0.515	0.525/ 0.515
20	FV684186	Thrust Washer	Part of FV718175	OD *(Faces to be flat and parallel to within 0.005)*	1.900	1.900
				ID	0.801/ 0.793	0.801/ 0.793
				Thickness	0.063/ 0.061	0.063/ 0.061

(continued)

TABLE 1 INSPECTION CRITERIA FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND) (continued)

Serial	Part No.	Description	Item Ref on FV718088	Detail	Drawing Dimensions (H/L) *Inches*	Acceptable Quality Limit (AQL) Inches
21	FV2138209	Stub Axle	1	OD for inner bearing *(Bearing tapered roller 3.75 ID x 1.25 wide)*	Same Dimension – M/c Finish 32	3.7498/ 3.7488
				OD for outer bearing *(Bearing tapered roller 3.5 ID x 1.125 wide)*	3.4998/ 3.4988 – M/c Finish 32	3.4998/ 3.4985
				ID for gear internal *(See serial 9)*	9.2018/ 9.2000	9.2018/ 9.2000
				OD of spigot	13.250/ 13.248	13.250/ 13.248
				ID for ring seal	Seal mating dia 4.270/ 4.262 – M/c Finish 48	
22	FV770151	Drive Plate	27	Major dia	2.393/ 2.3750	2.393/ 3.3750
				Minor dia	2.130/ 2.1250	2.130/ 2.1250
		Involute spline detail		Measurement between 0.216 dia pins	1.9413 max	1.942/ 1.941
				OD of spigot to suit hub	5.127/ 5.126	5.127/ 5.126
				OD to suit end plate	4.753/ 4.751	4.753/ 4.751
23	FV2138210	Hub Assy	41	ID for inner bearing	5.8427/ 5.8407	5.8427/ 5.8410
				ID for outer bearing	5.124/ 5.122	5.1245/ 5.1220
				ID of counterbore for drive plate	5.130/ 5.128	5.130/ 5.126
				Depth of counterbore	0.580	0.590/ 0.570
				Dia of sprocket fixing holes	0.625	0.625 (H7 fit)
24	FV745649	Hardened Ring	65	OD	4.125	4.135/ 4.115
				ID	3.531	3.541/ 3.521

CHAPTER 4-2

FINAL DRIVE, LEFT HAND

CONTENTS

INTRODUCTION

WARNINGS

(1) CADMIUM PLATING. THE EQUIPMENT COVERED BY THIS PUBLICATION CONTAINS COMPONENTS INCORPORATING CADMIUM PLATED MATERIAL WHICH IS A POTENTIAL SAFETY HAZARD. THIS MATERIAL, IN ITSELF, IS SAFE EXCEPT IN CIRCUMSTANCES WHEN IT IS HEATED, CORRODED, OR WORKED. POTENTIAL HAZARDS ARISE WHEN:

(1.1) CADMIUM PLATING MATERIAL OR COMPONENTS ARE FILED AND THE RESULTING DUST IS INHALED.

(1.2) TOXIC FUMES ARE INHALED WHEN CADMIUM IS HEATED.

(1.3) CADMIUM SALTS FORMING AS A RESULT OF CORROSION ARE ABSORBED INTO THE BODY TISSUES THROUGH SKIN, MOUTH, OR WOUND.

REFER TO JSP 515 FOR THE RELEVANT MSDS AND CONDUCT A RISK ASSESSMENT I.A.W. JSP 375, VOL 2, LEAFLET 5 OR AESP 0200-A-093-013 PRIOR TO ACTIVITIES.

(2) PERSONAL INJURY. WHEN CARRYING OUT REPAIRS AND MAINTENANCE, THERE MAY BE A RISK OF SHARP EDGES AND METAL SPLINTERS, ENSURE WHEN CARRYING OUT THESE TASKS THAT CARE IS TAKEN, AND ADEQUATE PROTECTIVE EQUIPMENT IS USED.

(3) HAZARDOUS MATERIAL. OIL OMD 90 IS A HAZARDOUS MATERIAL. THE USE OF OIL OMD 90 IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH (COSHH) AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(4) HAZARDOUS MATERIAL. LOCTITE 574 IS A HAZARDOUS MATERIAL. THE USE OF LOCTITE 574 IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(5) HAZARDOUS MATERIAL. LOCTITE 241 IS A HAZARDOUS MATERIAL. THE USE OF LOCTITE 241 IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(6) HAZARDOUS MATERIAL. LOCTITE 641 IS A HAZARDOUS MATERIAL. THE USE OF LOCTITE 641 IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(7) HAZARDOUS MATERIAL. SEALING COMPOUND JC5A IS A HAZARDOUS MATERIAL. THE USE OF SEALING COMPOUND JC5A IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(8) HAZARDOUS MATERIAL. HYLOMAR (DTD 900/4586a) IS A HAZARDOUS MATERIAL. THE USE OF HYLOMAR (DTD 900/4586a) IS TO BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL RISK ASSESSMENT AND THE MANUFACTURER'S COSHH AND DATA SHEET (NOT PROVIDED WITHIN THIS DOCUMENT). REFER TO THE MANUFACTURER'S DATA SHEET AND COSHH ASSESSMENT PRIOR TO USE.

(9) HEAVY ITEM. THE FINAL DRIVE LEFT HAND WEIGHS 100 KG (220 LBS). DUE CONSIDERATION SHOULD BE GIVEN TO THE REGULATIONS GOVERNING THE LIFTING OF HEAVY WEIGHTS. ALL PERSONS UNDERTAKING MANUAL HANDLING SHOULD UNDERGO APPROPRIATE TRAINING IAW REGULATIONS.

CAUTION

EQUIPMENT DAMAGE. A high standard of cleanliness must be maintained at all times. The functioning of a unit will be seriously affected by contamination and dirt.

NOTES

(1) With regard to reference documents or supplementary material provided in this instruction, any references to mixtures or preparations, including any brand names of such, must be ignored, and current local working practices followed, preceded by an appropriate risk assessment. If the outcome of the risk assessment concludes that not enough information exists to proceed safely, the OEM should be consulted in all cases.

(2) When referring to AESP 2350-T-220-711, serials annotated Cd denote items that are Cadmium Plated or contains Cadmium.

(3) Annex A references Drawing FV718088, Sheet 1, Issue 2 and should be referred to when undertaking the repair.

General

1 This chapter details the Repair Specification for the Final Drive, LH at base workshops. This repair specification provides the Acceptable Quality Level (AQL) to meet service standards.

1.1 BAE Systems Part No.: FV718088.

1.2 DMC (Army): 9CVT.

1.3 NSN: 2520-99-815-9342.

Reference documents

2 In addition to Annexes A to D of this chapter, the following reference documents should be referred to in conjunction with this chapter:

2.1	AESP 2350-T-220-522	Repair Instructions Level 3.
2.2	AESP 2350-T-220-711	Illustrated Parts Catalogue.
2.3	AESP 2350-T-220-601	Maintenance Schedule.
2.4	Defence Standard 03-32.	Pre-treatment and Painting of Vehicles, Engineering Equipment and Components (Issue 4 - Jul 05).
2.5	British Standard European Norm ISO 9934	Non-destructive testing. Magnetic particle testing. General principles.

INSPECT, TEST AND REPAIR PROCEDURES

Support and test equipment

3 The S&TE required for this procedure is listed in Table 1.

TABLE 1 SUPPORT AND TEST EQUIPMENT

Serial (1)	NSN (2)	Item (4)	Qty (5)
1	H1/8030-99-220-2370	Jointing compound	A/R
2	9150-99-991-1124	OMD 90 oil	A/R
3	H1/8030-99-220-1024	Sealing compound	A/R
4	LV9CVT/5120-99-819-1776	Ring nut spanner	1
5	Local manufacture	Planet carrier tool	1
6	H1/6850-99-002-1141	Cleaning compound, solvent	A/R
7	H1/8030-99-220-2495	Sealing compound, JC5A	A/R
8	H1/8030-99-224-8992	Loctite 241	A/R
9	G2/9505-99-960-6751	Lockwire	A/R
10	H1/8030-99-225-1152	Loctite 641	A/R
11	H1/8030-99-225-3058	Loctite 574	A/R

Physical inspection standard

4 The RA is to create a comprehensive overhaul report for each Final Drive undergoing repair. The document must contain but is not limited to:

4.1 Date of Overhaul.

4.2 Overhauling organisation (Commercial entity with contact information).

4.3 A unique strip report serial number.

4.4 The modification state (at receipt and on completion).

4.5 Final Drive serial number (at receipt and on completion).

4.6 Planet carrier serial number (at receipt and on completion).

4.7 Drive plate serial number (at receipt and on completion).

4.8 Inspection comments against all items listed in Annex D of this chapter.

4.9 Details of any failed item listed in Annex D of this chapter, with potential root cause analysis. The failed item is to be quarantined and the repair manager informed.

5 A copy of the Overhaul Report is to be forwarded to the CVR(T) Upkeep Manager at the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication) on completion of the repair and retained until the next major overhaul of the Final Drive or the Final Drive is scrapped (whichever comes first).

6 The physical inspection is detailed below:

6.1 Visually inspect the Final Drive, LH as follows:

6.1.1 Surfaces must be clean, dry and free from grease or debris. Painted surfaces must not be blistered, peeling or flaking.

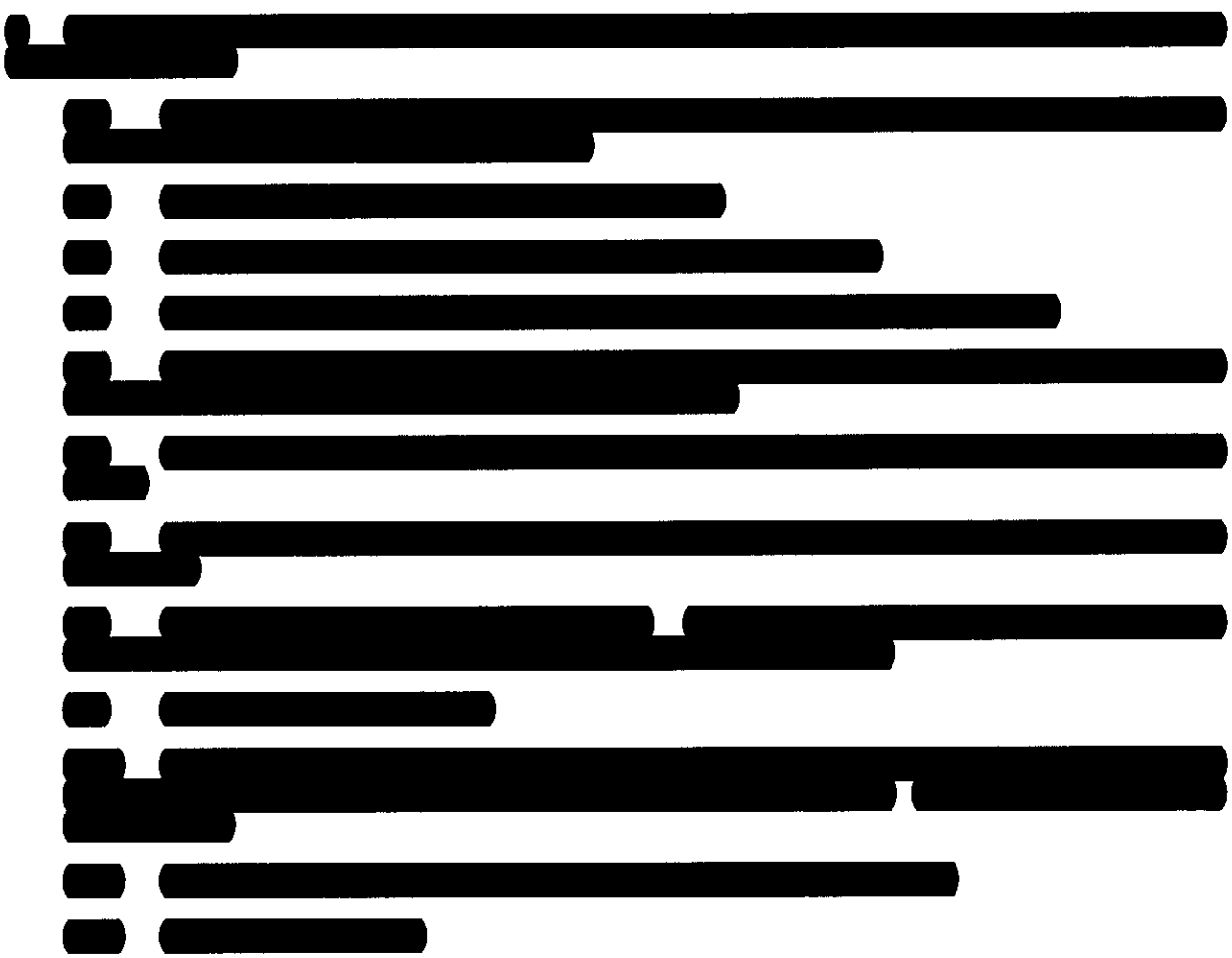
6.1.2 Oil leaks.

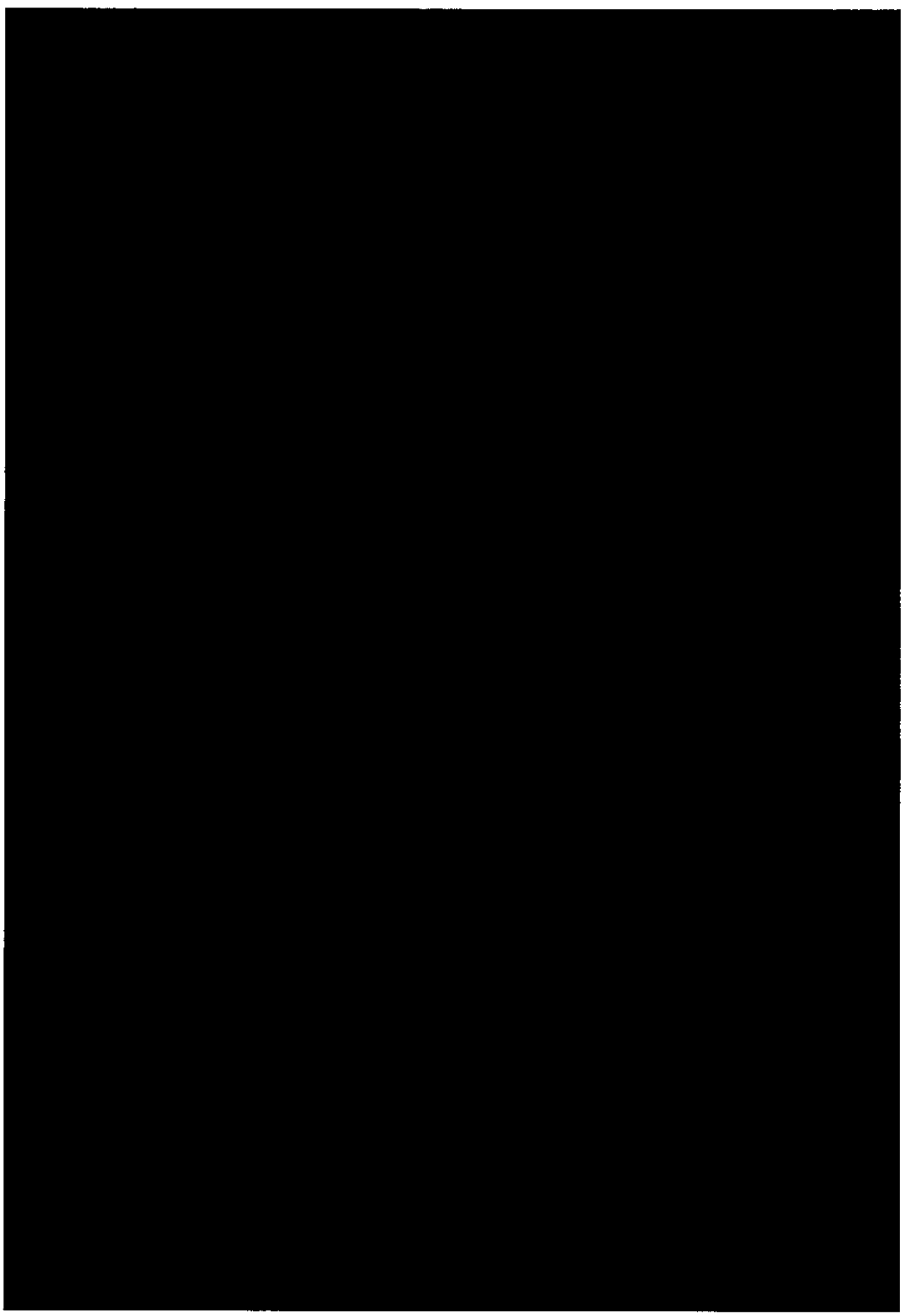
6.1.3 Missing end caps.

6.2 Any faults or defects found during the physical inspection, including any modification updates, should be noted and rectified during Para 8.

6.3 All Final Drives will be stripped down and inspected IAW Annexes A and D of this chapter.

Strip down instructions (Fig 1)





Inspection and repair instructions

8 Inspect and repair the Final Drive, RH as follows:

8.1 Inspect the Final Drive, RH IAW Annex D of this chapter. Any components found to be outside of the Acceptable Quality Limit (AQL) should be discarded.

8.2 Carry out a Magnetic Particle Inspection (MPI) on all gears and shafts IAW British Standard European Norm ISO 9934, Para 15. The MPI shall be completed in both directions (longitudinal and transverse). 100% inspection shall be carried out. The acceptance criteria is for **zero** surface cracks and defects.

8.3 Discard the used items listed in Annex B of this chapter and any unserviceable items found during inspection.

8.4 Record the serial number, manufacturer and date of manufacture for the following items for JAMES (L) update when unit has passed out inspection and testing (applying the procedure for the relevant scenario for each item):

8.4.1 Planet Carrier (FV717958) and Drive Plate (FV770151).

8.4.1.1 Scenario 1. The Planet Carrier and Drive Plate already have a serial number and have been inspected and deemed fit for purpose to be re-built into a Final Drive. The RA is to log the serial number of the Planet Carrier on JAMES (L) with rebuild date and the initials A1.

8.4.1.2 Scenario 2. The Planet Carrier and Drive Plate are 'used', have no markings on and have been inspected and deemed fit for purpose to be re-built into a Final Drive. The RA is to mark these sub-assemblies in line with the associated detailed drawings. The RA is then to log the serial number, date of rebuild and the initials A1 on JAMES (L).

8.4.1.3 Scenario 3. The Planet Carrier and Drive Plate are 'new', have no markings on and have been inspected and deemed fit for purpose to be re-built into a Final Drive. The RA is to mark these sub-assemblies in line with the associated detailed drawings. The RA is then to log the serial number, date of rebuild and the word 'NEW' entered on JAMES (L).

8.4.1.4 Scenario 4. The Planet Carrier and Drive Plate are 'new', have a serial number on and have been inspected and deemed fit for purpose to be re-built into a Final Drive. The RA is to log the serial number of the Planet Carrier on JAMES (L) with the rebuild date and the word 'NEW' entered on JAMES (L).

8.4.2 Final Drive (FV718088).

8.4.2.1 Scenario 1. The Final Drive already has a serial number and the part has been inspected and deemed fit for purpose to be re-built. The RA is to log the serial number of the Final Drive on JAMES (L) with rebuild date along with the serial number of the Planet Carrier it contains.

8.4.2.2 Scenario 2. The Final Drive has no markings on and has been inspected and deemed fit for purpose to be re-built. The RA is to mark the outside face of the Stub Axle (FV2138209) in the position shown on the drawing. The RA is then to log the serial number and date of rebuild on JAMES (L) along with the serial number of the Planet Carrier it contains.

8.5 Clean off and inspect all components. Replace as necessary.

NOTE

Only approved parts detailed in AESP 2350-T-220-711 are to be used.

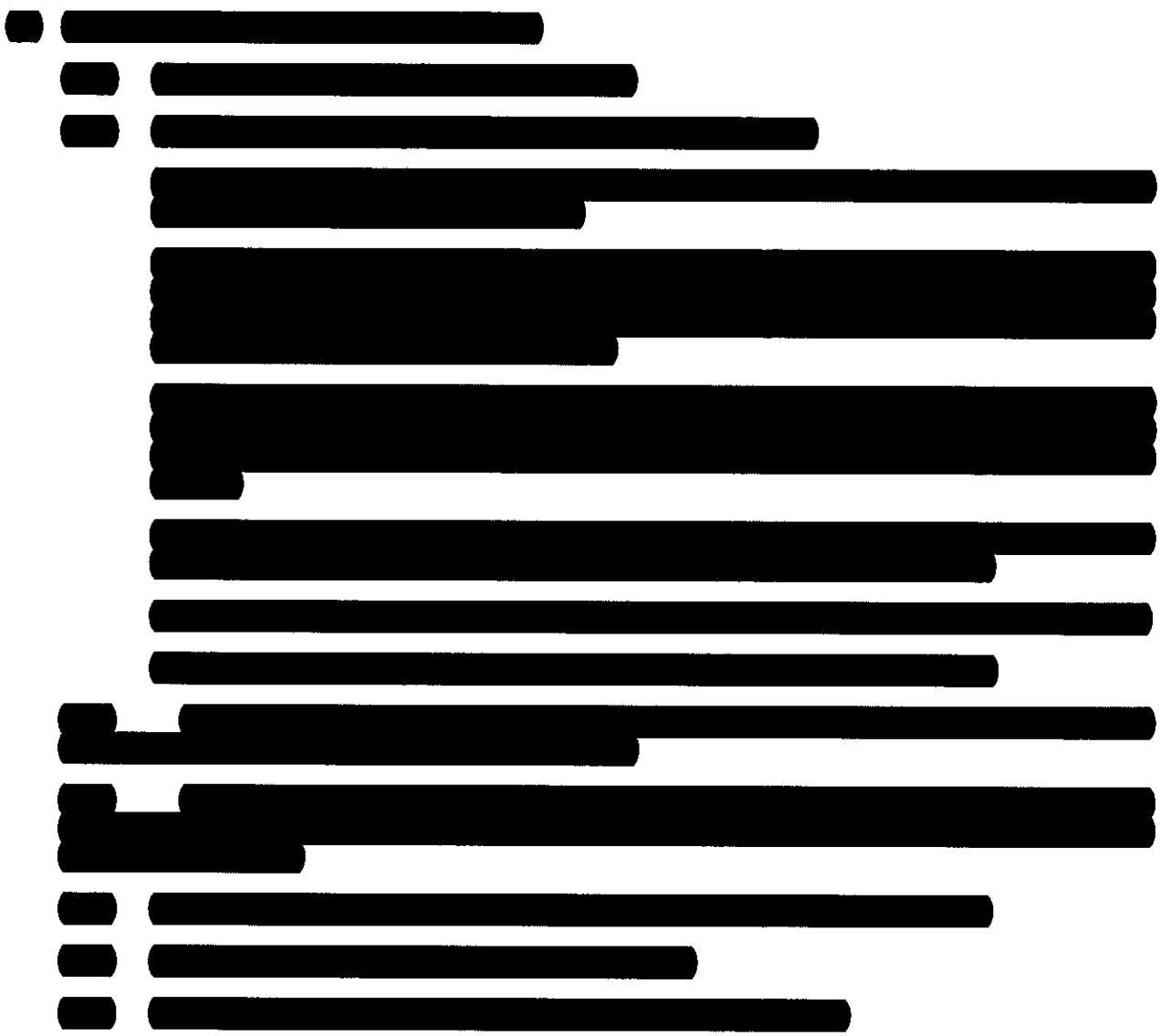
8.6 Install all new parts removed at Sub-para 8.3 (listed in Annex B of this chapter).

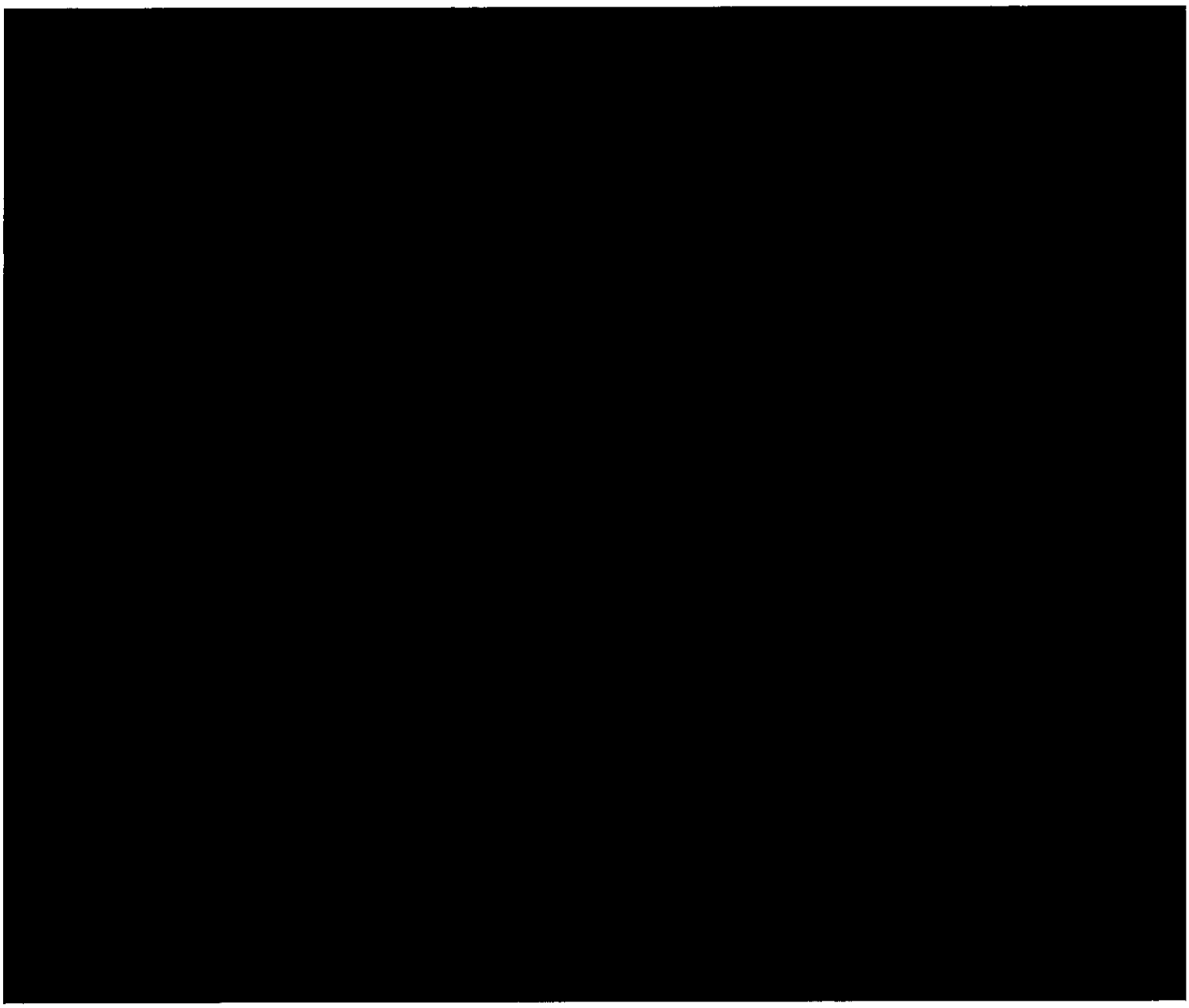
8.7 If further items are required, repair by replacement using parts detailed in AESP 2350-T-220-711.

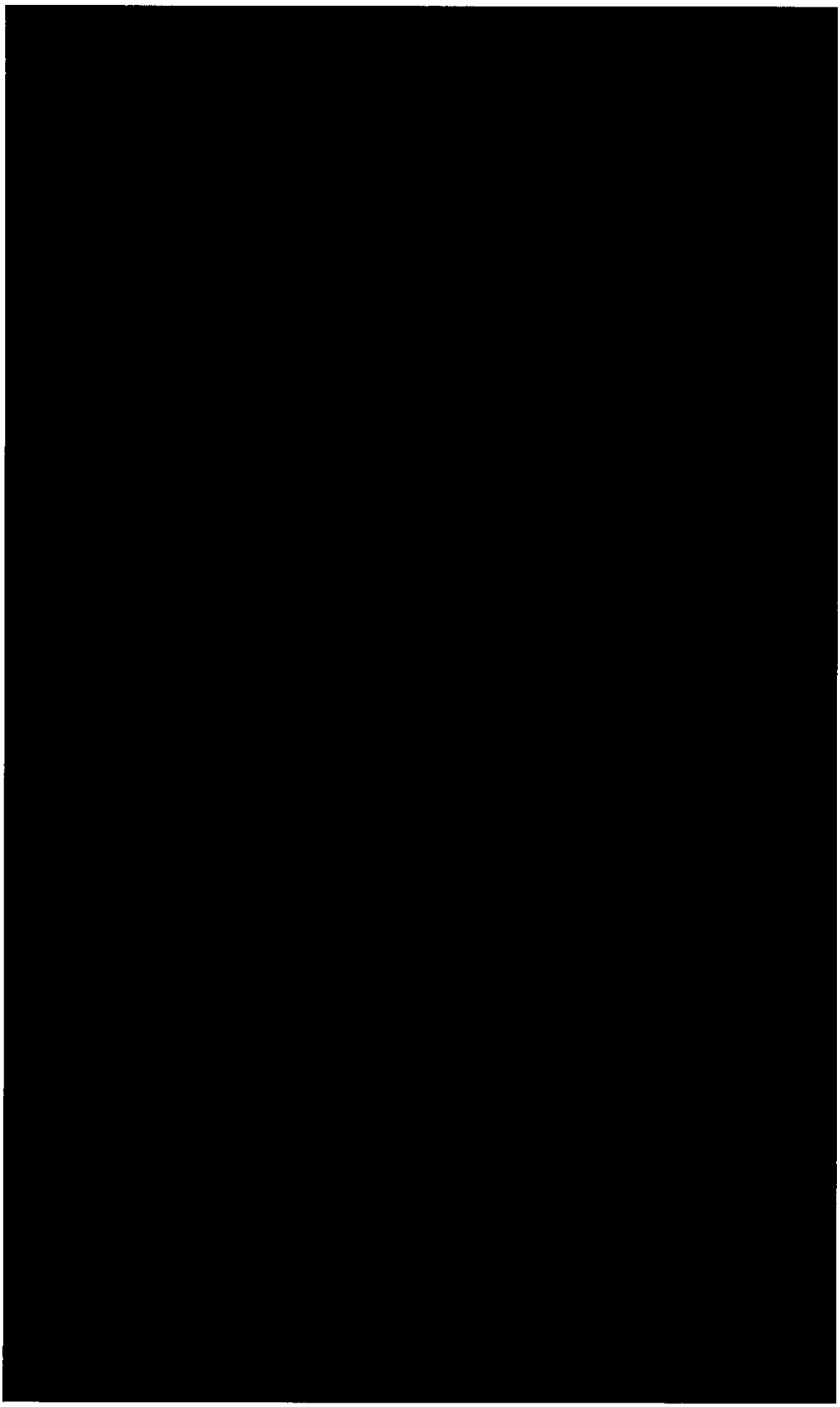
<u>One-piece oil seal removal</u> (Fig 1)

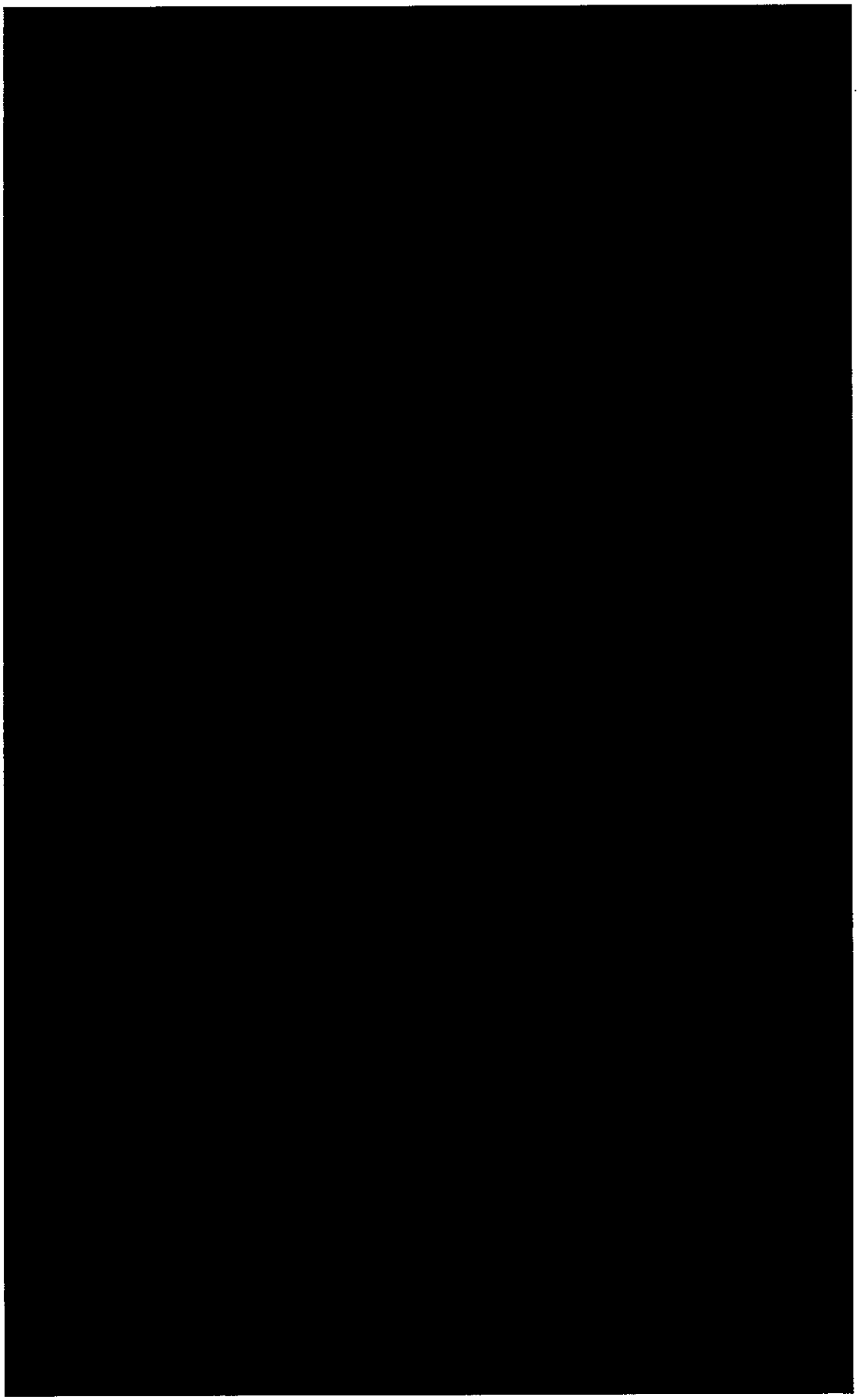
9 To remove the one-piece oil seal (Fig 1 (28)), prise the oil seal away from its seating, taking care not to damage or mark the surrounding area.

Re-assembly instructions (Figs 1 to 4)









Output test specification

11 The Final Drive LH needs to be subjected to a **NO LOAD** test for a period of 45 minutes in both forward and reverse directions to observe for oil leaks, excessive noise and recording of oil temperature (not to exceed 120°C). Oil level should be IAW AESP 2350-T-220-601. Test rig should be run at 600 rpm.

11.1 If the Final Drive, LH passes the output test specification then the unit is to be declared serviceable. Proceed to Para 16, declare the unit A1 and return it to the stores system.

11.2 If the Final Drive, LH fails the output test specification, proceed to Para 7 and conduct further investigation.

NOTE

If the Final Drive, LH continues to fail the output test specification, refer to Para 12.

Beyond Local Repair (BLR)

12 Equipment is classified BLR if the LRU cannot be repaired to an A1 condition, due to any of the following circumstances:

12.1 Lack of diagnostic equipment.

12.2 Lack of correct S&TE.

12.3 Lack of technical information.

13 The repairing organisation must declare the LRU BLR and seek MoD permission to backload to OEM or discard.

Beyond Economical Repair (BER)

14 An LRU is considered BER if the expected cost of repair exceeds 80% of the procurement cost of a replacement item or items. Repair agencies must request disposal instructions from the MoD when any repair is expected to exceed 80% of the total procurement cost.

Parts catalogue

15 Parts catalogue information is detailed within AESP 2350-T-220-711.

Required packing level

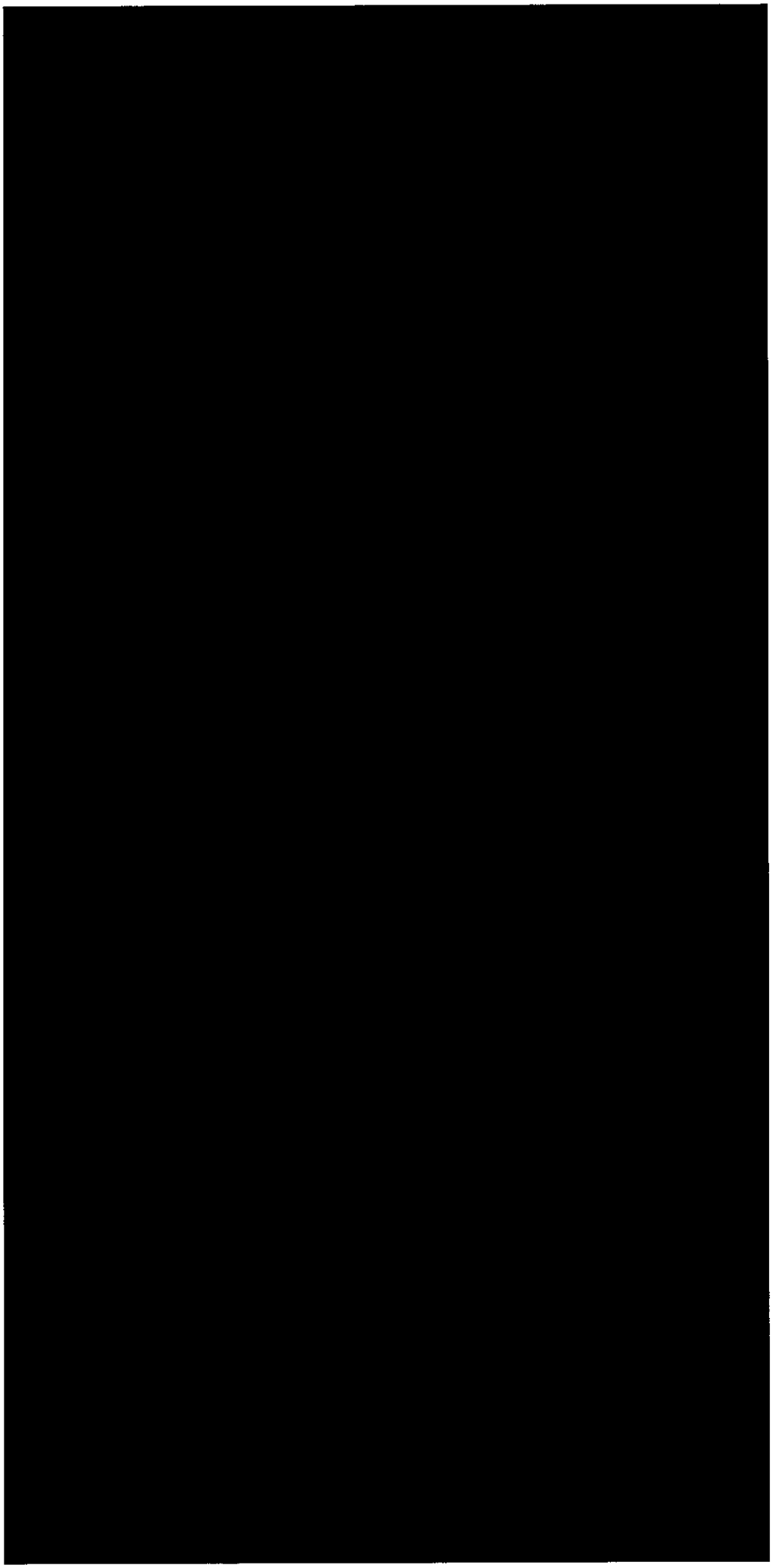
16 The required packaging information for this item is given within Annex C of this chapter.

CHAPTER 4-2 ANNEX A

FV718088, SHEET 1 ISSUE 2 – ARRANGEMENT FINAL DRIVE, LH

INTRODUCTION

1 Fig 1 references Drawing FV718088, Sheet 1, Issue 2 and should be referred to when undertaking the repair.



CHAPTER 4-2 ANNEX B

FINAL DRIVE, LH, 100% REPLACEABLE PARTS LIST

INTRODUCTION

1 This Annex contains information extracted from AESP 2350-T-220-711.

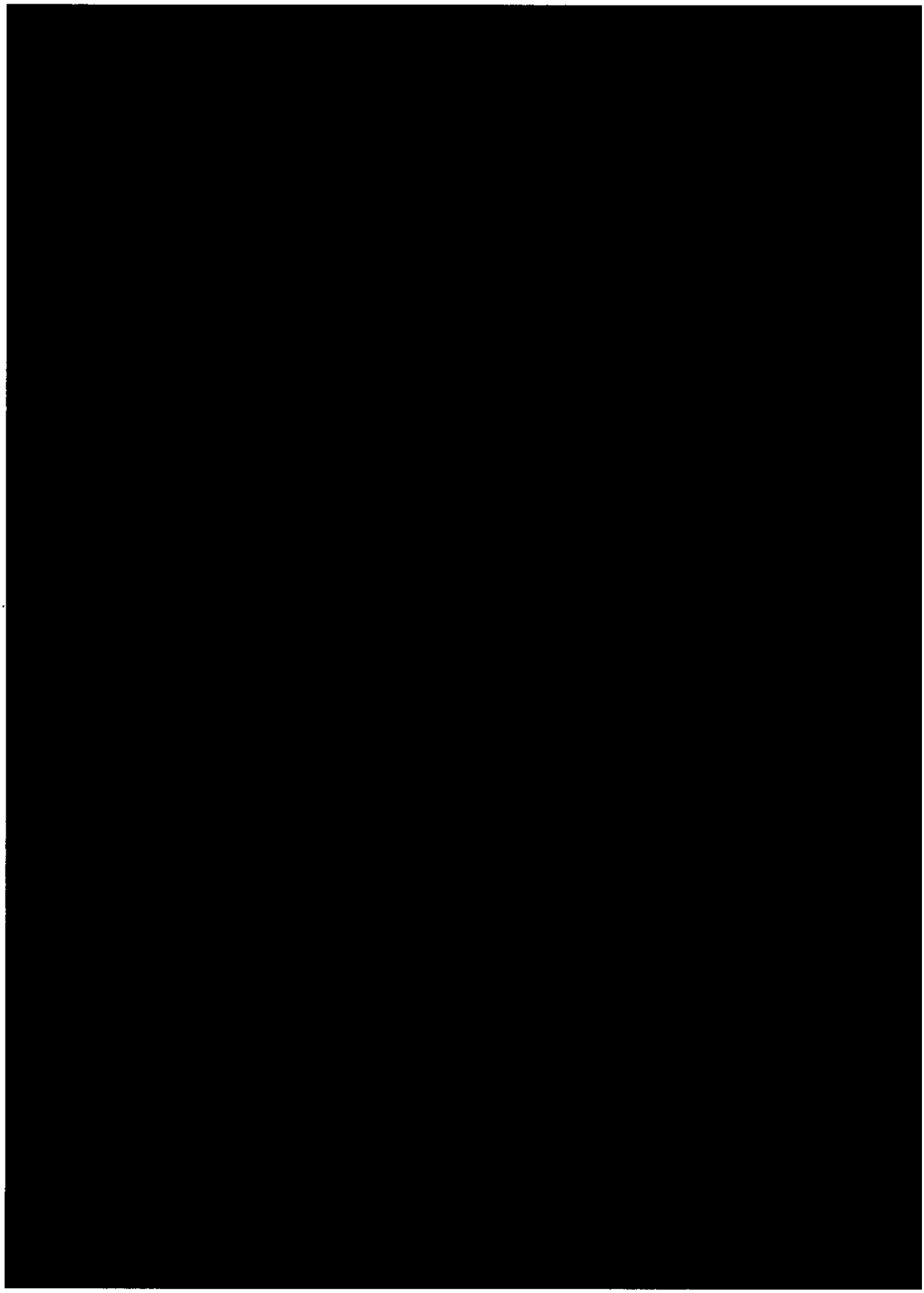
TABLE 1 100% REPLACEABLE PARTS LIST

Serial (1)	NSN (2)	Item (3)	Drawing/Item or Part No. (4)	Qty (5)
1	9CVT 2520-99-813-6191	Adaptor assembly, speedometer	FV718301	1
2	9CVT 2520-99-813-6198	Pivot pin; steel	FV684188	3
3	9CVT 5340-99-813-6462	Plunger (dowty shaft input)	FV679046	1
4	2530-99-258-1737	Disc, brake; steel	FV2138203	1
5	6MT7 3110-99-790-2679	Retainer & rollers	BTLS K20X28X20C	6
6	6MT7 3110-99-810-9365	Bearing, tapered roller	42375/42584	1
7	9CVT 3110-99-813-6186	Ring bearing	FV684191	1
8	6MT7 3110-99-815-0578	Bearing, needle roller	RNA4914	1
9	6MT7 3110-99-815-0579	Bearing, ball	FV2060533	1
10	6MT7 3110-99-946-9271	Bearing, tapered roller	LM117949-LM117910	
11	6MT1 3120-99-410-9795	Bearing, sleeve	4008	
12		Not used		
13	NP	Adaptor, hydraulic chassis fitting	MERITOR 64473617	
14	9CVT 2520-99-778-7940	Breather, pipe assy, lh	FV840998	1
15	9CVT 5305-99-135-6285	Screw, machine unc	FV684197	6
16	G1 5315-99-371-8426	Pin, cotter, split		2
17	5306-99-778-9937	Bolt, machine, unf, hex	FV969496	12
18	9CVT 5310-99-135-6286	Washer, flat	WASHERFT0.797RD1 .900CUSNNO	6
19	9CVT 5310-99-816-6182	Washer, key; steel	FV745650	1
20	9CVT 5330-99-311-2993	Seal, rotary lipped shaft seal	FV2138211	1
21	6MT1 5330-99-801-7178	Seal, plain, encased	11P17512525	1
22	9CVT 5330-99-813-6190	Gasket, fibre, rd	FV684169	2
23	46MT1 5330-99-815-0577	Seal, plain synthetic	G ANGUS NO DPSM8 010010/SV75 VITO	1
24	6MT1 5330-99-828-8125	Packing, preformed	AS30215	1
25	2910-99-850-0504	Pipe clip (breather pipe)	900402	1
26	9CVT 5360-99-813-6466	Spring, helical, compression	FV679047	1

(continued)

TABLE 1 100% REPLACEABLE PARTS LIST (continued)

Serial (1)	NSN (2)	Description (3)	Drawing/Item or Part No. (4)	Qty (5)
27	9CVT 5365-99-346-9330	Circlip, bevelled	N1 402 0293 APP	1
28	6MT1 5325-99-910-8248	Ring, retaining; steel	43897	1
29	6MT1 5365-99-942-7984	Plug, machine thread	AS31316	2
30	9CVT 5310-99-823-4134	Washer, flat	FV770147	3
31	5340-99-810-7639	Cap	33081	1
32	5310-99-881-2459	Washer	P22 &378711	1
33	5310-99-943-4392	Washer, fibre 0.375"x0.625"	BSF640.375"X0.625"	1
34	9CVT 5315-99-823-4132	Pin, straight, headless	FV769961	1
35	9CVT 5330-99-813-6460	Gasket fibre	FV718112	1
36	46MT1 5365-99-813-7526	Plug, screwed, steel	FV840458	3



CHAPTER 4-2 ANNEX D

INSPECTION CRITERIA TABLE FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND)

INTRODUCTION

1 This Annex contains the Inspection Criteria Table for Legacy Final Drives (Left Hand & Right Hand).

NOTE

All dimensions in Table 1 are imperial unless otherwise stated.

TABLE 1 INSPECTION CRITERIA FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND)

Serial	Part No.	Description	Item Ref on FV718088	Detail	Drawing Dimensions (H/L) *Inches*	Acceptable Quality Limit (AQL) Inches
1	FV684162	Sunwheel Housing	2	ID for bearing *(Bearing ball, journal 75mm x 115mm x 20mm)*	4.5283/ 4.5271	4.5283/ 4.5271
				ID for bearing *(Bearing needle roller 80mm x 100mm x 30mm Loctite 641 to be used when ID is between 3.9380 and 3.9405)*	3.9376/ 3.9368	3.9405/ 3.9368
2	FV684170	Race Retainer	24	ID for bearing *(For bearing detail see serial 1.1)*	4.533/ 4.528	4.533/ 4.528
				Depth of recess for bearing *(Inner face of plate to be flat within 0.002)*	0.256/ 0.254	0.256/ 0.254
3	FV718300	End Cap – Speedo	16	OD for wormwheel housing *(Diameters to be concentric within 0.001)*	1.2496/ 1.2480	1.2496/ 1.2480
				ID for bush in retainer	0.5941/ 0.5934	0.5941/ 0.5934
				ID of bush to accept gearshaft wormwheel	0.501/ 0.500	0.501/ 0.500
4	FV745497	Worm Wheel – Speedo Drive	15	Measurement over teeth using 0.09375 dia rollers	1.0799/ 1.0755	1.0788/ 1.0740
				Backlash when mated with worm gear *(See serial 10)*	0.015/ 0.011	0.020/ 0.012
5	FV718301	Adaptor, Speedo	18	OD for wormwheel housing	1.2496/ 1.2480	1.2496/ 1.2480
				ID for bush in retainer	0.5941/ 0.5930	0.5941/ 0.5930
				ID of bush to accept gearshaft wormwheel *(See serial 4)*	0.500	0.501/ 0.500
6	FV2138205	Shaft, Sunwheel	7	OD of shaft to accept bearing sleeve *(See serial 7)*	2.9533/ 2.9528	2.9533/ 2.9520
			Gear Detail	Measurement over teeth using 0.2969 dia rollers	3.5167/ 3.5119	3.517/ 3.511
				Backlash when mated with planet gear *(See serial 8)*	0.014/ 0.009	0.016/ 0.009
				Arc tooth thickness	0.3058/ 0.3033	0.3058/ 0.3033
			Internal involute spline detail	Major dia	1.7500/ 1.7680	1.7500/ 1.7680
				Minor dia	1.5054/ 1.5104	1.5110/ 1.5054
				Measurement over 0.216 dia pins	1.3014	1.3020/ 1.2947

(continued)

TABLE 1 INSPECTION CRITERIA FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND) (continued)

Serial	Part No.	Description	Item Ref on FV718088	Detail	Drawing Dimensions (H/L) *Inches*	Acceptable Quality Limit (AQL) Inches
7	FV684191	Inner Bearing Race	10	ID to suit gearshaft spur *(See serial 6)*	2.9528/ 2.9522	2.953/ 2.952
				OD to suit bearing *(For bearing details see serial 1.3)*	3.1440/ 3.1420	3.1496/ 3.1491
8	FV684185	Planet Gear	Part of FV718175	Arc tooth thickness at pitch line of 2.333	0.3058/ 0.3033	0.3058/ 0.3033
				Measurement over teeth using 0.2969 dia pins	2.8425/ 2.8370	2.8425/ 2.8370
				Backlash when mated with gear internal *(See serial 9)*	0.014/ 0.009	0.016/ 0.009
9	FV684163	Annulus	3	Spigot dia on gear	8.9994/ 8.9982	8.9994/ 8.998
				OD of gear to suit axle stub *(See serial 21)*	9.1994/ 9.1982	9.1994/ 9.1980
				Backlash when mated with planet gear *(See serial 8)*	0.014/ 0.009	0.016/ 0.009
10	FV745496	Worm – Speedo Drive	14	Depth of tooth	0.1175/ 0.1125	0.1175/ 0.1125
				ID to suit gearshaft spur *(See serial 6)*	2.9553/ 2.9535	2.9553/ 2.9535
				Chordial thickness	0.0638/ 0.0618	0.0633/ 0.0623
				Backlash when mated with gearshaft wormwheel *(See serial 4)*	0.015/ 0.011	0.020/ 0.012
				Width of keyway *(Check for chatter)*	0.0128/ 0.0126	0.0128/ 0.0126
11	FV2138203	Main Brake Disc	8	Major dia *(See serial 6.5)*	3.050/ 3.034	3.050/ 3.034
				Minor dia	2.7015/ 2.7000	2.7015/ 2.7000
				Width of groove	0.750/ 0.748	0.750/ 0.748
				OD of disc	12.010/ 11.960	12.010/ 11.960
				Width of disc *(Max run out of disc 0.004)*	1.130/ 1.100	1.130/ 1.100
12	FV769967	Input Shaft	26	Major dia	3.846/ 3.841	3.846/ 3.841
				Minor dia	3.596/ 3.578	3.596/ 3.578
		Involute spline, large		Measurement over 0.240 dia pins	4.1097/ 4.1072	4.1094/ 4.1070
				Major dia	1.721/ 1.716	1.721/ 1.716
		Involute spline, small		Minor dia	1.471/ 1.453	1.471/ 1.453
				Measurement over 0.240 dia pins	1.9660/ 1.9645	1.9660/ 1.9645
				Dia of bore to accept plunger on large spline	0.510/ 0.500	0.510/ 0.500
13	FV679046	Plunger	50	Major OD	0.499/ 0.498	0.499/ 0.498
				Minor OD	0.375/ 0.374	0.375/ 0.374
14	FV679047	Spring, Helical Compression	64	Free length	0.9	0.910/ 0.800
				Load to compress to 0.45	2.25/ 2.11 lbf	2.25/ 2.11 lbf

(continued)

TABLE 1 INSPECTION CRITERIA FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND) (continued)

Serial	Part No.	Description	Item Ref on FV718088	Detail	Drawing Dimensions (H/L) *Inches*	Acceptable Quality Limit (AQL) Inches
15	FV717958	Planet Carrier Assy	Part of FV718175	Major dia	2.3522/ 2.3472	2.3522/ 2.3472
				Minor dia	2.0960/ 2.0780	2.0960/ 2.0780
		External involute spline detail		Measurement over 0.240 dia pins	2.6169/ 2.6149	2.6169/ 2.6149
				ID for bearing sleeve *(See serial 16)*	1.4078/ 1.4062	1.4078/ 1.4062
				ID for shaft shouldered *(See serial 19)*	1.0314/ 1.0310	1.0314/ 1.0310
				Dia of holes to suit pin straight headless *(See serial 17, holes to be parallel to each other)*	0.7866/ 0.7859	0.7866/ 0.7859
16	FV769353	Bush – Glacier	42	OD	To fit 1.4078 max dia in Carrier	1.409/ 1.4078
				ID *(See serial 19)*	1.2500/ 1.2516	1.252/ 1.250
17	FV684188	Pivot Pin	Part of FV718175	OD	0.7874/ 0.7870	0.7874/ 0.7870
18	FV769961	Pin, Input Shaft	67	OD *(See serial 19)*	0.5	0.510/ 0.495
				Distance between hole centres	0.791/ 0.781	0.791/ 0.781
				Dia of holes to suit roll pin	0.129/ 0.124	0.129/ 0.124
19	FV769968	Propeller Drive Shaft	35	Major dia	1.721/ 1.716	1.721/ 1.716
				Minor dia	1.471/ 1.453	1.471/ 1.453
		Large involute spline detail		Measurement over 0.240 dia pins	1.9660/ 1.9645	1.966/ 1.960
				Major dia	1.2210/ 1.2160	1.2210/ 1.2160
		Small involute spline detail		Minor dia	0.9710/ 0.9530	0.9710/ 0.9530
				Measurement over 0.240 dia pins	1.4646/ 1.4632	1.464/ 1.463
				Dia of shaft to suit bearing sleeve *(See serial 16)*	1.2480/ 1.2464	1.248/ 1.246
				Dia of hole at large spline end to suit pin straight headless *(See serial 18)*	0.525/ 0.515	0.525/ 0.515
20	FV684186	Thrust Washer	Part of FV718175	OD *(Faces to be flat and parallel to within 0.005)*	1.900	1.900
				ID	0.801/ 0.793	0.801/ 0.793
				Thickness	0.063/ 0.061	0.063/ 0.061

(continued)

TABLE 1 INSPECTION CRITERIA FOR LEGACY FINAL DRIVES (LEFT HAND & RIGHT HAND) (continued)

Serial	Part No.	Description	Item Ref on FV718088	Detail	Drawing Dimensions (H/L) *Inches*	Acceptable Quality Limit (AQL) Inches
21	FV2138209	Stub Axle	1	OD for inner bearing *(Bearing tapered roller 3.75 ID x 1.25 wide)*	Same Dimension – M/c Finish 32	3.7498/ 3.7488
				OD for outer bearing *(Bearing tapered roller 3.5 ID x 1.125 wide)*	3.4998/ 3.4988 – M/c Finish 32	3.4998/ 3.4985
				ID for gear internal *(See serial 9)*	9.2018/ 9.2000	9.2018/ 9.2000
				OD of spigot	13.250/ 13.248	13.250/ 13.248
				ID for ring seal	Seal mating dia 4.270/ 4.262 – M/c Finish 48	
22	FV770151	Drive Plate	27	Major dia	2.393/ 2.3750	2.393/ 3.3750
				Minor dia	2.130/ 2.1250	2.130/ 2.1250
		Involute spline detail		Measurement between 0.216 dia pins	1.9413 max	1.942/ 1.941
				OD of spigot to suit hub	5.127/ 5.126	5.127/ 5.126
				OD to suit end plate	4.753/ 4.751	4.753/ 4.751
23	FV2138210	Hub Assy	41	ID for inner bearing	5.8427/ 5.8407	5.8427/ 5.8410
				ID for outer bearing	5.124/ 5.122	5.1245/ 5.1220
				ID of counterbore for drive plate	5.130/ 5.128	5.130/ 5.126
				Depth of counterbore	0.580	0.590/ 0.570
				Dia of sprocket fixing holes	0.625	0.625 (H7 fit)
24	FV745649	Hardened Ring	65	OD	4.125	4.135/ 4.115
				ID	3.531	3.541/ 3.521

CHAPTER 10

ALUMINIUM ALLOY ASPECTS

CONTENTS

(continued)

CONTENTS (continued)

(continued)

CONTENTS (continued)

INTRODUCTION

1 This chapter details repairs to Aluminium Alloy Aspects (A^3) for Combat Vehicle Reconnaissance Full Tracked (CVR (T)) range of vehicles at base workshops.

2 Information on A^3 repairs at Unit level is given in Category 522 Chapter 10. Repairs at Field Level are not designated.

3 Only approved repairs, authorised by the Design Authority are to be carried out. These are given in Annexes B to E of this chapter.

4 Details of Inspection and Repair work carried out is to be reported on Inspection and Repair Report Form (LT70) as detailed in Annex A.

5 For any cracks or other damage not covered by the repair methods and schemes in Annexes B to E, repair instructions are to be requested using the Non Standard Repair Procedure detailed in Para 8.

6 When considering the type or method of repair to be used, preference should always be given to a mechanical repair rather than repair by welding. If in doubt, advice should be sought through the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication).

7 Approved repair schemes given in Annexes B to E have been grouped under headings by cause of damage, as follows:

7.1 Annex B – Stress Corrosion

7.2 Annex C – Accident Damage

7.3 Annex D – Battle Damage

7.4 Annex E – Structural Damage

NON STANDARD REPAIR PROCEDURE

8 A revised procedure for initiation and processing of requests from nominated base workshops, for repair schemes to aluminium armour has been introduced.

9 This revised scheme is designed to provide the quickest response to requests, with the aim of having Repair Schemes completed by the Design Authorities within 14 days of receipt of the request.

10 The request is to be initiated using a photocopy of Fig 1 Request for Repair Scheme – Aluminium Armour, which is to be completed in accordance with Fig 2 REME Repair Methods – Procedure charts.

WARNINGS AND CAUTIONS

11 Warnings and Cautions are to be observed for the safety of personnel and to prevent damage to the equipment. These are included throughout this publication where appropriate. Refer to Page (viii) for a full list of Warnings and Cautions.

Wksp Ref/Job No

REQUEST FOR REPAIR SCHEME - ALUMINIUM ARMOUR

1. REME Workshop

   Tel Contact

2. Vehicle Series/Variant

   Veh Reg No/Serial No

   Date of Manufacture

   Mileage

3. Repair Scheme required for *

   Accident damage

   Battle damage

   Structural defect

   Stress Corrosion Cracking (SCC)

   * Delete as appropriate

4. Description of damage (Main areas)

   Photoprint/Sketch/'In' Inspection (SCC)

   Workshop Identification

Date

Signed

for Commanding Officer

Distribution

DA
VST-ATP – Attn Lt A D & M Gp

Fig 1 Specimen - Request for repair scheme

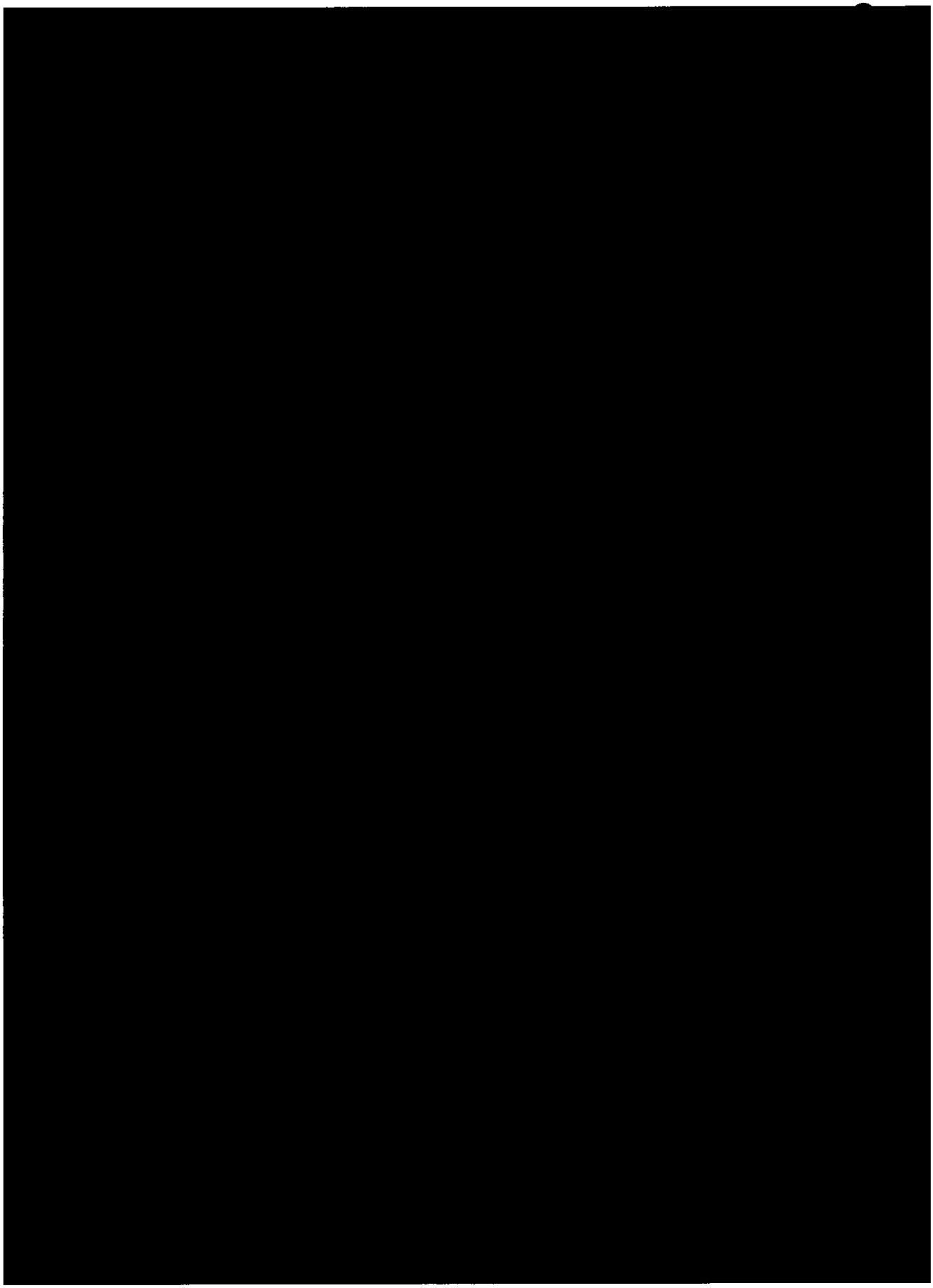
ASSOCIATED PUBLICATIONS

12 The following publications are associated with aluminium alloy aspects and may need to be read in conjunction with this chapter.

EMER Test and Measurement A 028 Series	Material Quality Assessment – Principles and Practices in REME.
AESP 1005-S-100-Series	Rarden Cannon L21A2
AESP 0200-A-210-013	Coil Thread Inserts – Helicoil Type.
AESP 0200-A-283-013	Guide to Stress Corrosion Cracking and Related Defects in High Strength Aluminium Armour.
AESP 0200-A-201-013	Welding, Cutting and Brazing
AESP 0200-A-221-013	Painting of vehicles, equipment and stores.
AESP 2350-T-210-811	Combat Vehicle, Reconnaissance, Full Tracked (CVR(T)) All variants Modification Instructions and Index.
AESP 2350-T-210-821	Combat Vehicle, Reconnaissance, Full Tracked (CVR(T)) All variants General Instructions and Index.

SPECIAL TOOLS AND TEST EQUIPMENT

13 Special tools and test equipment requirements are included throughout this publication.



CLEANING OF HULLS/TURRETS (PRIOR TO INSPECTION)

General

14 Before an inspection it is imperative that the areas of the hull and turret to be inspected are cleaned down to the parent metal.

15 All insulation and non-epoxy paint should be removed from all items to be inspected. It is recommended that all epoxy paint is removed, but it is permitted to only partially remove the epoxy paint using the criteria and techniques details in paras 17 to 21.

Procedure for paint removal (non-epoxy paint)

WARNINGS

(1) HAZARDOUS SUBSTANCE. GOGGLES AND RUBBER GLOVES MUST BE WORN WHEN USING PAINT REMOVER.

(2) HAZARDOUS SUBSTANCE. IF PAINT REMOVER IS ACCIDENTALLY SPLASHED INTO THE EYES, WASH IMMEDIATELY WITH COLD WATER AND SEEK MEDICAL ATTENTION. SPLASHES ON THE SKIN MUST BE REMOVED BY THOROUGHLY WASHING IN COLD WATER.

(3) HAZARDOUS SUBSTANCE. ALL RAGS AND WIPING CLOTHS CONTAMINATED WITH PAINT REMOVER SHOULD BE COLLECTED AND DISPOSED OF THROUGH THE NORMAL CHANNELS FOR HAZARDOUS CHEMICAL WASTE.

(4) HAZARDOUS SUBSTANCE. ONLY THE MINIMUM QUANTITY OF SOLVENT NECESSARY TO REMOVE THE LAST TRACES OF PAINT SHOULD BE USED.

Equipment required

16 The stores required to remove non-epoxy paint are:

16.1 Paint remover H1/8010-99-220-3489.

16.2 Pad scouring impregnated nylon H1B/7920-99-220-2953 9 in. x 6 in. (228.5 mm x 152 mm) or Pad Scotchbrite 100 mm x 50 mm H1B/7920-99-225-3394.

16.3 Paint brush.

Method of removal

CAUTION

LIMITED APPLICATION. Ensure that paint remover is not applied to areas painted with epoxy paint.

17 Remove non-epoxy paint as follows:

17.1 Using a paintbrush as the applicator, apply a generous amount of paint remover to the surface of the paint.

17.2 Allow to soak for five to ten minutes.

17.3 Remove the paint remover/paint mixture by hosing down with water.

17.4 Use an abrasive pad to remove stubborn deposits.

17.5 Using a cloth, clean the surface and remove any residue of the paint remover/paint mixture. After cleaning place the used cloths in a suitable container.

17.6 Thoroughly clean the stripped area using approved cleaning methods.

PROCEDURE FOR LIMITED PAINT REMOVAL (EPOXY PAINT)

General

18 This procedure is only applicable to the epoxy paint used on the floor plate and adjacent surfaces of the FV100 series vehicles. It may not be used on other vehicles or where other paint has been applied.

Vaqua D process

CAUTION

LIMITED APPLICATION. Where the removal of paint is required using this procedure, paint remover must not be used.

Equipment required

19 Equipment required for Vaqua D process is as follows:

19.1 Vaqua D Sump Unit.

19.2 Air compressor - maximum capacity 120 lbf/in^2. Minimum continuous working pressure at nozzle of 70 lbf/in^2.

Stores required

20 Virgin brown fused grit Alumina 30/40 mesh.

Method

21 Instructions for use of the Vaqua D Sump Unit are contained with the unit. Additional instructions for the removal of paint are as follows:

21.1 The minimum distance between nozzle and plate should be 4 in. at an impingement angle of 45 deg.

21.2 Occasional stubborn spots can be removed by shortening the nozzle distance and returning the impingement angle to 90 deg.

INSPECTION

General

22 Repairing workshops are to inspect all vehicles received, to determine the extent of the defects and the repairs required. The inspection will be a visual inspection and is to be recorded on the Inspection and Repair Form (LT70) as detailed in Annex A.

23 The visual inspection will be carried out after the removal of paint and padding (refer to para 14 for paint removal). Conductivity tests are to be carried out prior to the visual examination (refer to para 26 for conductivity testing). In specified cases the visual inspection will be supported by Non-Destructive Testing (NDT).

24 A decision on the most appropriate repair for each specific crack/cracked area will be made on the information presented in the Report Form (LT70). It is imperative therefore, that this visual inspection is carried out with care and that recording is accurate.

Inspection procedures

25 To confirm repairs required, a visual inspection supported by NDT techniques, is to be carried out as follows:

25.1 Strip hulls and turrets to be inspected (less those awaiting casting decision) of all major assemblies, components and padding.

25.2 Remove adhesive and paint using paint remover and 'Vaqua D' respectively. Ensure that areas cleaned include all plate edges, area up to 4 in. either side of a weld, and all blast reinforcing strips.

25.3 Allow to dry and remove all foreign matter.

25.4 Using the Conductivity Test (described in para 26), test the hull plates as required on page 1 of the Inspection and Repair Report Form (LT70), and record the readings.

25.5 Visually inspect internal and external faces of all plate material against the existing crack record.

25.6 Visually inspect all exposed short traverse edges.

25.7 Identify those areas to be repaired by welding. Those to be welded may include cracks in the floorplate, in areas covered by Armour Repair Plates (ARPs), and exfoliation gutters within the criteria detailed in Annex B, Appendix 4.

25.8 Identify those cracks/defects to be repaired by Metalock or filler.

25.9 Record on the Inspection and Repair Report Form (LT70), all new cracks and crack extensions.

25.10 Using Eddy Current techniques (refer to para 34 for NDT), locate the exact length and position of all cracks which will be repaired by welding.

NOTE

Dye penetrants are not to be used during this initial examination.

25.11 Inspect the mantlet as detailed in AESP 2350-R-110-532 (Scimitar).

CONDUCTIVITY TESTING

26 Conductivity testing is carried out to assess plate susceptibility to long transverse Stress Corrosion Cracking (SCC). The test is carried out after the vehicle has been stripped and paint and padding removed.

27 Conductivity tests are required on the rolled plates of the CVR(T) hull as listed on page 1 of the respective Inspection and Repair Report Form (LT70). Testing will be carried out using the areas shown in Fig 3.

28 Examination should be carried out on the surface of plates, not closer than 25 mm (1 in.) to any edge, corner or crack and not closer than 50 mm (2 in.) to any weld on either side of plate.

Equipment required

29 Provide the following equipment and materials:

29.1 Novamho 101 conductivity meter, with high and low calibration samples.

29.2 Probe, as supplied with instrument.

29.3 Aluminium armour test piece.

29.4 Thermometer, to measure temperature at work area.

29.5 Emery cloth, medium grade.

29.6 Paper wipes or clean rag.

Vehicle preparation

30 The vehicle preparation as follows:

30.1 Allow vehicle to acclimatise in work area, preferably at 20 deg. in a draught free area.

30.2 Select test points as shown on Fig 3, on plates to be tested.

30.3 Lightly abraid test points with emery cloth, to ensure surface is clean and flat.

30.4 Wipe surface with rag or paper wipe to remove debris.

Instrument calibration

31 Check the instrument calibration as follows:

31.1 Calibrate instrument in accordance with manufacturer's instructions, ensuring that probe and calibration samples are clean.

31.2 Allow instrument adequate time to stabilise and record temperature of work area.

31.3 Ensure that in all tests the probe is held on the material squarely and firmly for the minimum time required.

31.4 Check conductivity of Aluminium Armour Test Piece and record this.

NOTE

The reading may differ significantly from the value marked on the test piece. Do NOT attempt to alter the instrument settings to coincide with the value marked on the test piece.

31.5 Recheck calibration of instrument.

Method of testing

32 Method of testing is as follows:

32.1 Using the locations shown in Fig 3, take conductivity readings on the vehicle plates.

32.2 Record readings obtained on Inspection and Repair Report Form (LT70).

32.3 Restrict use of the instrument to periods not exceeding 2 hours.

32.4 Re-check calibration of instrument at half-hourly intervals.

Recording and reporting

33 Record the temperature of the work area, the conductivity reading of the test piece and the conductivity reading of each plate on the Inspection and Repair Report Form (LT70).

NON-DESTRUCTIVE TESTING (NDT)

General

34 NDT on Aluminium armour is only to be used where it has been decided to repair cracks found during the visual inspection.

35 Two methods of NDT have been approved:

35.1 Eddy Current Crack Detection.

35.2 Thixotropic Dye Penetrant.

36 If the crack is to be repaired by welding, the limits of the crack will be determined using Eddy Current Crack Detection techniques.

37 If the crack is to be repaired by a mechanical technique, the limits of the crack can be determined using a Thixotropic Dye Penetrant technique.

CAUTION

PROHIBITED PENETRANT. Thixotropic Dye Penetrant is not to be used on any crack that may subsequently require welding. Dye Penetrant is virtually impossible to remove and may cause porosity and blowholes if present in a crack which is subjected to welding.

38 For a full description of crack detection, refer to EMER Test and Measurement A028 - Non Destructive Testing (NDT) Eddy Current Crack Detection Chap 014. For a full description of flaw detection, refer to EMER Test and Measurement A028 - Non Destructive Testing (NDT) Dye Penetrant Flaw Detection Chap 11.

Eddy current crack detection

39 Eddy current crack detection is used to determine the exact length and position of all cracks that are to be repaired by welding.

Equipment required

40 Provide the following equipment:

40.1 Halec Eddy Current Crack Detector.

40.2 Non-Ferrous Pencil Probe.

40.3 Non-Ferrous Test Block.

NOTE

The above equipment has been supplied to nominated workshops.

Preparation

41 All surfaces to be examined are to be wiped clean.

Instrument check

42 Check instrument is functioning correctly using manufacturer's instructions and the non-ferrous test block.

Procedure

43 To carry out Eddy current crack detection, proceed as follows:

43.1 Balance instrument on vehicle plate by rotating SET ZERO control to set meter pointer a few divisions above zero on the upper scale. The instrument should be rebalanced at each change of probe location.

43.2 Sensitivity setting should be adjusted according to surface condition being examined. Reduce sensitivity on rough surfaces and increase sensitivity on smoother surfaces.

43.3 Scan the areas to be inspected keeping the probe vertical and moving it along a zig-zag path. Half inch zig-zag movements of the probe should be used.

43.4 A crack will be indicated by a sharp positive deflection which will flick sharply back if the probe crosses the crack or will stay up if the probe is travelling along the crack.

43.5 When a crack is located, scan the material in a zig-zag mode until the needle ceases to be deflected and remains in the original set zero position. This ensures that the end of the crack has been covered.

Thixotropic dye penetrant

44 Thixotropic Dye Penetrant crack detection is used to determine the exact length and position of all cracks that are to be repaired by Metalock.

Equipment required

45 Provide the following equipment and materials:

45.1	Ardrox 9VF1(T) Penetrant.	
45.2	Ardrox 9PR3(T) Emulsifier.	4A/6850-99-224-1601
45.3	Ardrox 9D6 Solvent Developer.	
45.4	Sign writer size paint brush.	
45.5	Lint free cloth or paper tissues.	
45.6	Solvent cleaner.	
45.7	Ultra violet lamp (W7/6240-99-632-0790).	

Safety precautions

46 No special measures are necessary but the basic safety precautions of ensuring adequate ventilation and avoiding prolonged contact with the skin and clothing are to be observed.

Preparation

47 Thoroughly clean the surface to be examined with recommended cleaner and allow to dry.

Procedure

48 To use Thixotropic dye penetrant proceed as follows:

48.1 Cover the area to be examined with a liberal coating of penetrant. This is best applied with a small sign writing type paint brush.

48.2 Contact time will be dependant on:

48.2.1 Sensitivity required.

48.2.2 Size of crack.

NOTE

It is recommended that a maximum of 15 mins contact time is allowed.

48.3 Remove excess penetrant by wiping surface with lint free cloth or paper tissue.

48.4 Apply a generous coating of emulsifier and allow to remain on the surface for approximately one minute.

48.5 Remove excess emulsifier and traces of penetrant using lint free cloth or paper tissue.

48.6 Wipe area with a water moistened cloth or paper tissues, and then dry by wiping.

48.7 Repeat operations (48.4 to 48.6) until all traces of excess penetrant have been removed. Inspection with the aid of the Ultra Violet Lamp will assist in this operation.

48.8 Apply solvent developer; a light coating should be applied if results are to be viewed with the aid of the Ultra Violet Lamp, a heavier coating should be applied if viewing is to be in the visible red mode.

48.9 Leave for contact time of 10 minutes.

48.10 Inspect for exact length and position of crack.

REPAIR

General

49 Approved repair methods are given in Annexes B to E inclusive.

PREVENTIVE MEASURES

General

50 Preventive methods are used to protect in-service vehicles from corrosion. Peening is employed to protect against Stress Corrosion Cracking (SCC) and painting is employed to protect against Exfoliation Corrosion. Additionally, during assembly, interface sealants are used to prevent Electrolytic or Galvanic corrosion (Dissimilar metal corrosion).

Interface sealing

51 Interface sealing is carried out on metal to metal joints or where steel bolts, nuts or studs are used to join alloy components. The sealant prevents metal to metal contact between two dissimilar metals or metals which may be at different potential difference and also excludes moisture from the joint. Interface sealants can be of the setting or non-setting type. The type of sealant to be used will be detailed in the assembly instructions.

Approved interface sealants

52 Approved interface sealants are as follows:

52.1		Sealant, dissimilar metals JC5A	(H1ATS/8030-99-168-8255).
52.2	DTD 900/4573	Hermetite Red	(H1/8030-99-225-0242).
52.3	XG 279	Grease	(H1/9150-99-220-2418).
52.4	Loctite Nutlock 242		(H1ATS/8030-99-225-0248).

NOTE

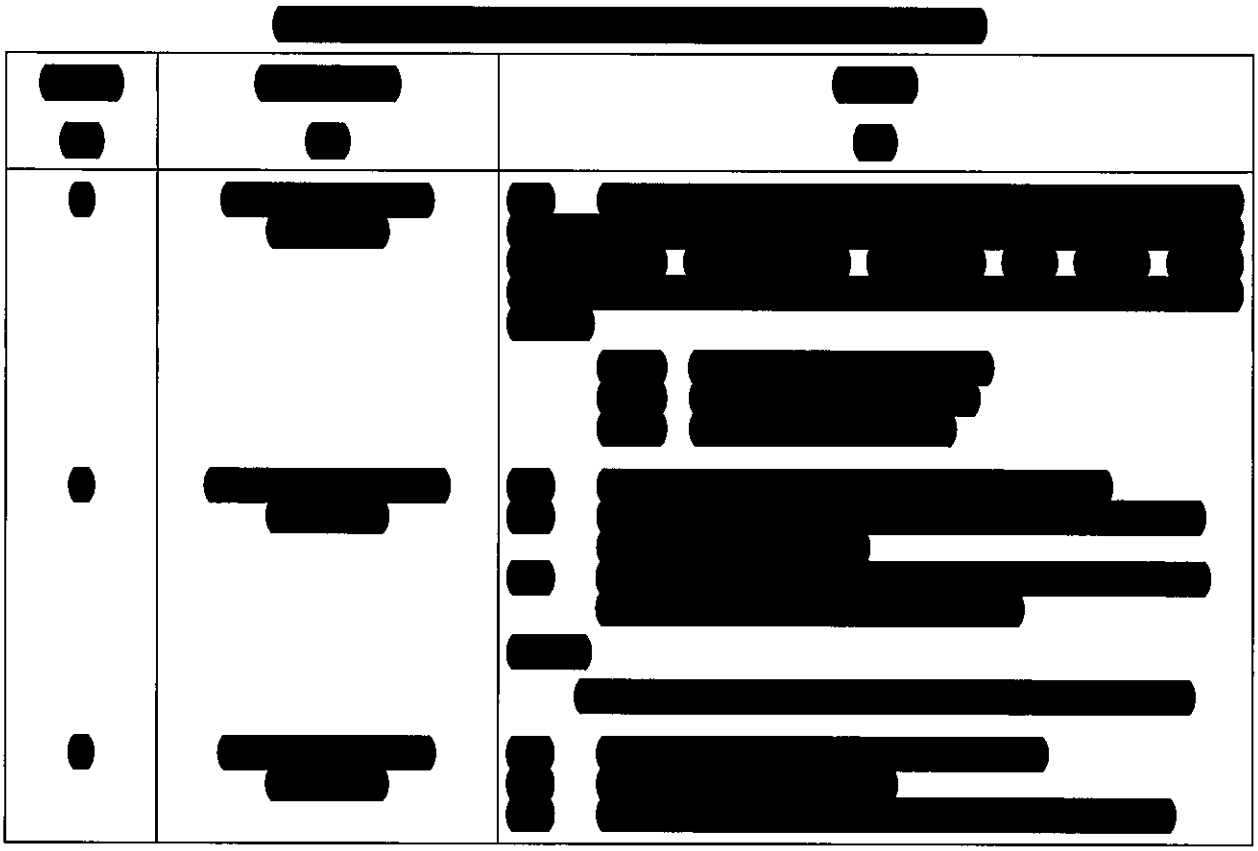
There are no acceptable alternatives to 52.1 and 52.2.

Peening

53 Peening is the most suitable in-service means of preventing Stress Corrosion Cracking (SCC). There are three peening techniques currently available, all inducing a high level of compressive stress in the surface of the material. This eliminates one of the conditions required for the initiation of SCC. For information on SCC refer to AESP 0200-A-283-013, Guide to Stress Corrosion Cracking and Related Defects in High Strength Aluminium Armour.

54 Peening must be carried out until saturation is reached, it is better to over-peen rather than leave some areas under high residual tensile stress.

55 Table 1 lists the three techniques and the areas in which a particular technique should be used.



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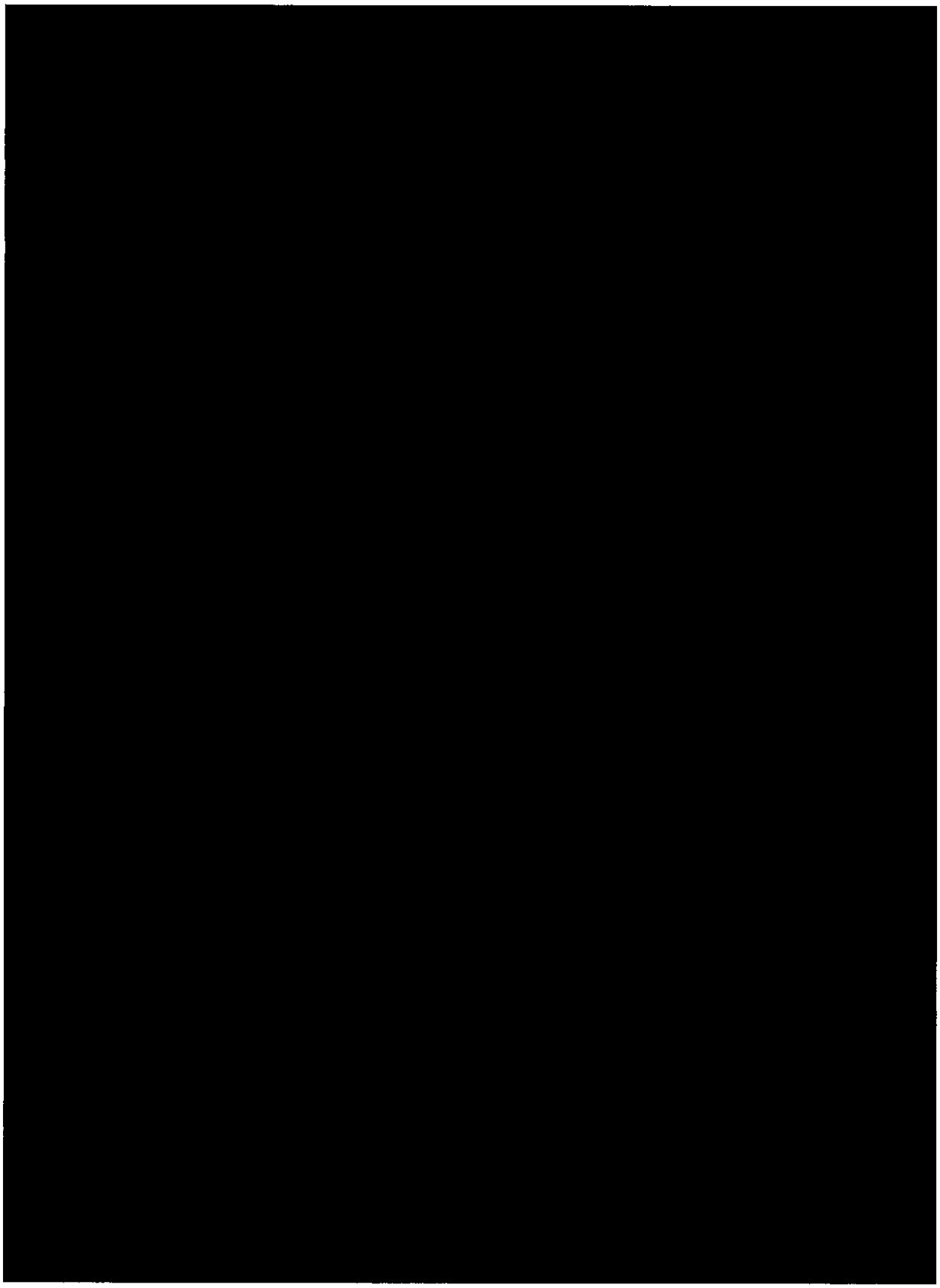


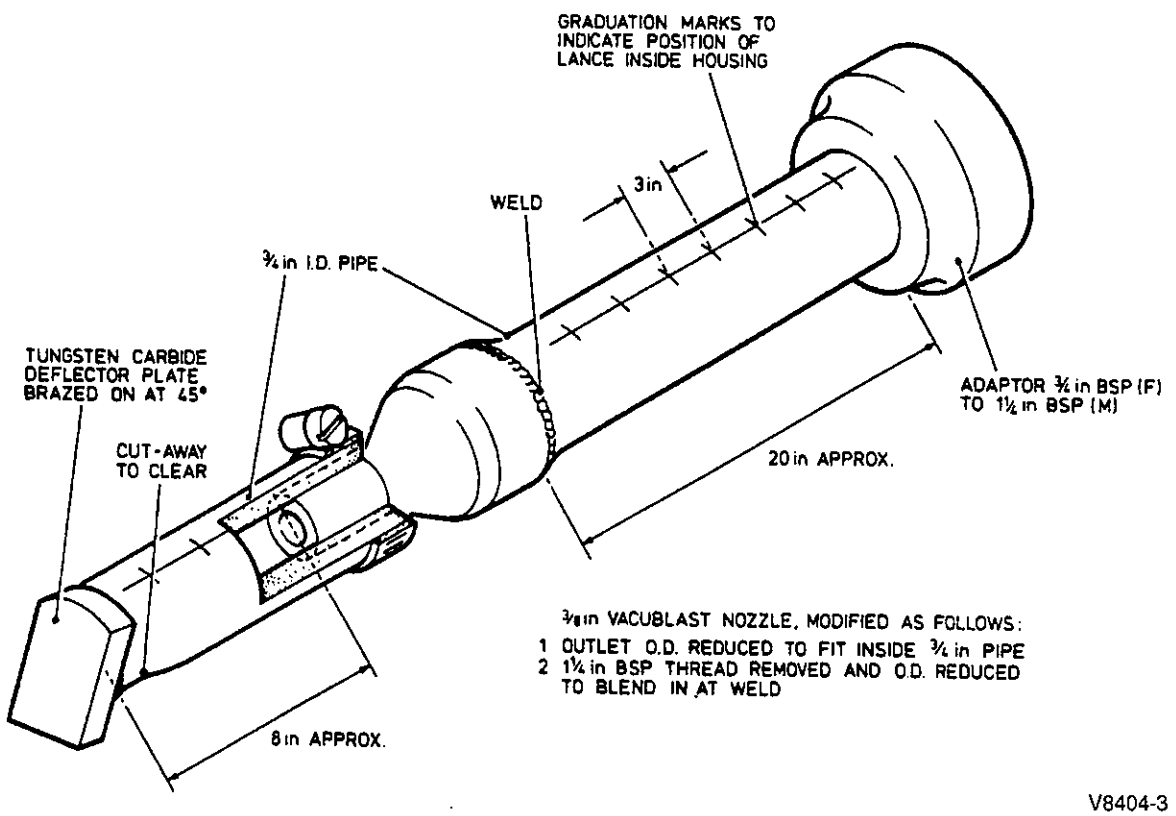
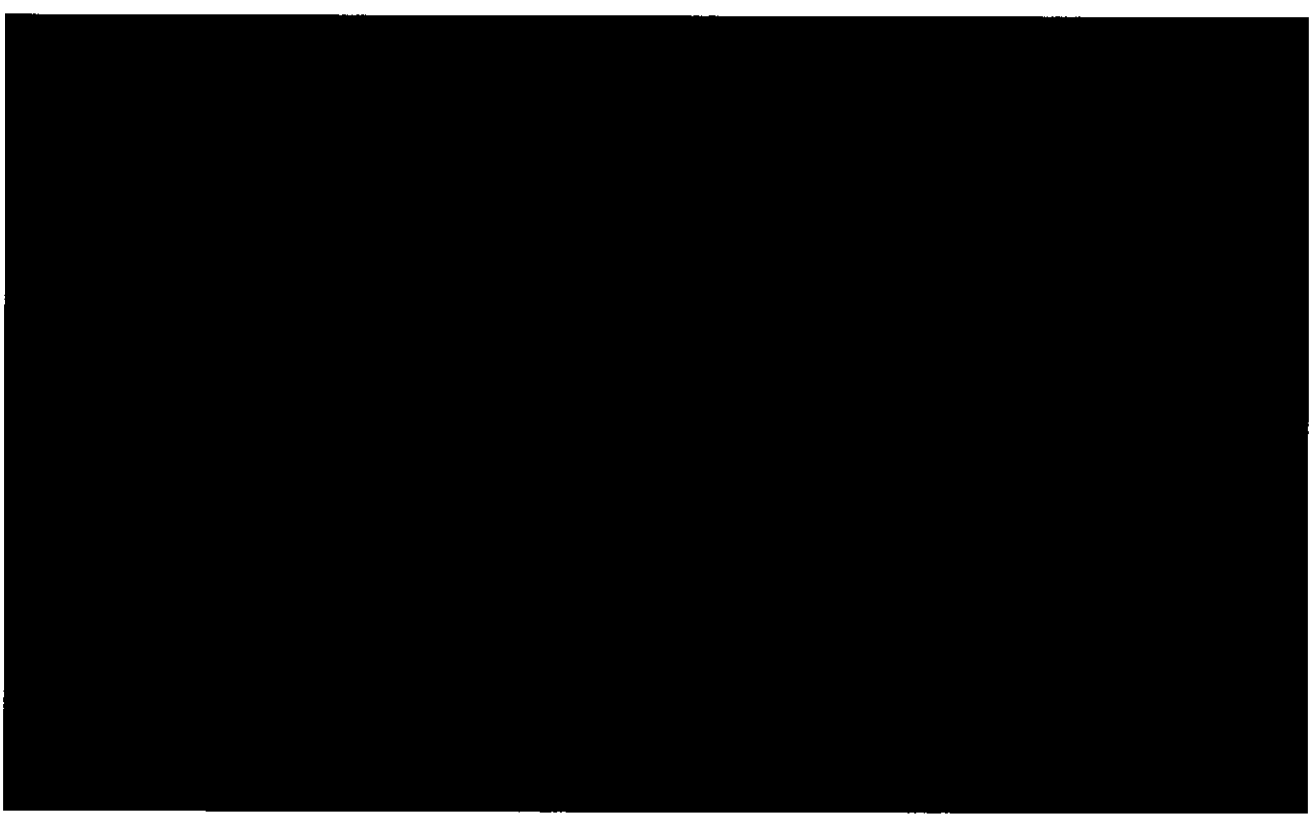


Fig 5 Shot peening torsion bar housing – Lance

Procedure

[redacted]



[redacted]

Roto-peening (Fig 7)

General

88 Roto-peening is used when peening of close tolerance bores is required, or for peening bores and apertures which are blanked off during the shot peening process. After roto-peening, bores and apertures must be plugged to protect the surfaces during shot peening.

Equipment required

89 The following equipment will be required to carry out roto-peening:

89.1 Power drill, pneumatic, 3/8 in. chuck, 3000 rev/min.

89.2 Roto-peen mandrel 7211 with 1 in. dia spacer bushes.

89.3 Roto-peen flaps, 1 in. x 2 in.

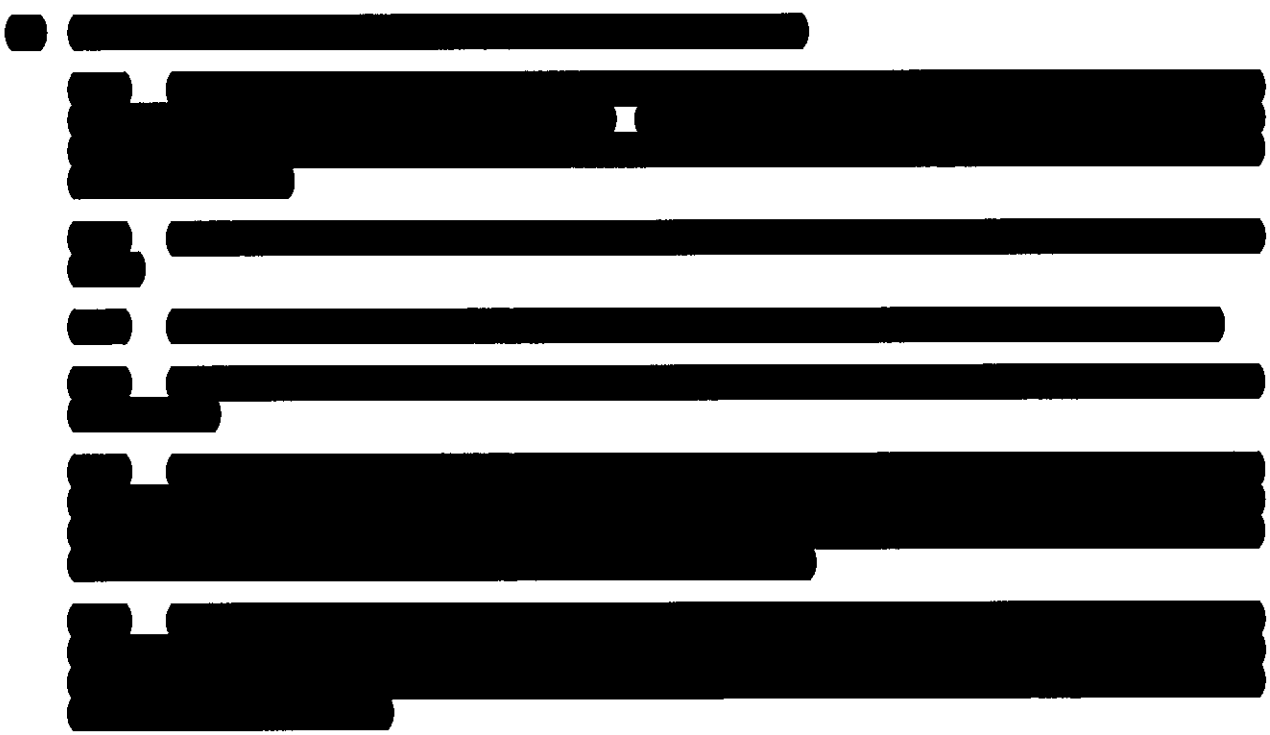
89.4 Magnifying glass, small.

89.5 Compressed air supply, 90 lbf/in^2 min, controllable up to 120 lbf/in^2 at a free delivery flow of 7 ft^3/min.

Process parameters

90 The air pressure is to be maintained at 90 lbf/in^2.

Procedure



Stainless steel wire brush peening of plate edges

General

92 This temporary protection process is to be applied only to plate edges when the seven day limitation for the application of the permanent protection cannot be met.

93 This process is not authorised for use in extending the 30 day limitation for the application of shot peening to the surfaces of extrusions and forgings within 100 mm of welds.

94 This process must be applied to the susceptible plate edge within seven days of initial susceptibility resulting from welding or machining.

95 The permanent protective treatment must be applied within 30 days of initial susceptibility.

Equipment required

96 76 mm (3 in.) diameter rotary wire brush, 12.7 mm (1/2 in.) wide x 12.7 mm (1/2 in.) bore filled with 33 SWG stainless steel crimped wire.

97 76 mm (3 in.) diameter rotary brush eyelet type, 12.7 mm (1/2 in.) bore filled with 33 SWG stainless steel crimped wire.

NOTE

The above brushes are to be used only on aluminium and should be kept specifically for this operation.

98 Power tool (air or electric powered) to suit above brushes.

Procedure

[redacted]

100 Apply the brush to the area to be treated using sufficient pressure to cause moderate deflection of the wire bristles. (Excessive pressure will result in rapid disintegration of the brush).

101 Wherever possible wire brush in two directions at 90 deg to each other to ensure complete coverage.

102 In recesses use the thin eyelet brush to ensure that the re-entrant corners at the bottom of grooves are treated.

103 If it is found necessary to repeat the wire brushing operation due to welding within 100 mm of the treated area, then a witness coating of marking blue must be applied to the area prior to the second wire brushing operation to enable the coverage of the second wire brushing operation to be confirmed.

104 Using an illuminated 10X magnifying glass, examine the wire brushed surface for the following:

104.1 100% coverage of the surface must be achieved (complete obliteration of the original surface).

104.2 The treated surface should have a faint 'orange peel' appearance.

105 The permanent SCC preventive treatment must be applied to the edge within 30 days of initially becoming susceptible.

PAINTING

106 The most effective method of preventing Exfoliation Corrosion is by application of paint to those parts of the vehicle where moisture can collect. An epoxy paint, resistant to fuel contamination, is used on the flooring, and aluminium flame resisting paint is used on all other internal horizontal surfaces. Both paint schemes are preceded by the application of one coat of paint, pre-treatment.

107 Painting is to be carried out as soon as possible after peening.

108 After peening, all shot and dust is to be removed from the vehicle. It is essential for the paint scheme to be fully effective that the surfaces are not contaminated after peening. Contact with bare hands on the surfaces to be painted must be avoided. Any oil, grease or other contamination is to be removed using White Spirit, H1/8010-99-942-7564 (5 gallon drum).

109 The paint scheme for the floor plate is to extend up the hull side and end plates for a minimum of 50 mm (2 in.). The scheme for all other internal horizontal surfaces is to extend up the side plates for a distance of 25 to 32 mm (1 to 1 1/4 in.).

Paint schemes

110 Paint schemes are to be read in conjunction with AESP 0200-A-221-013 Painting of Land Equipment. Special paint and anti-corrosion schemes may be applied to specific areas, see Annex F.

Pre-treatment - all internal horizontal surfaces

111 One coat of Paint, Pre-treatment Primer (Etching Primer) is to be applied to the internal horizontal surfaces which require painting.

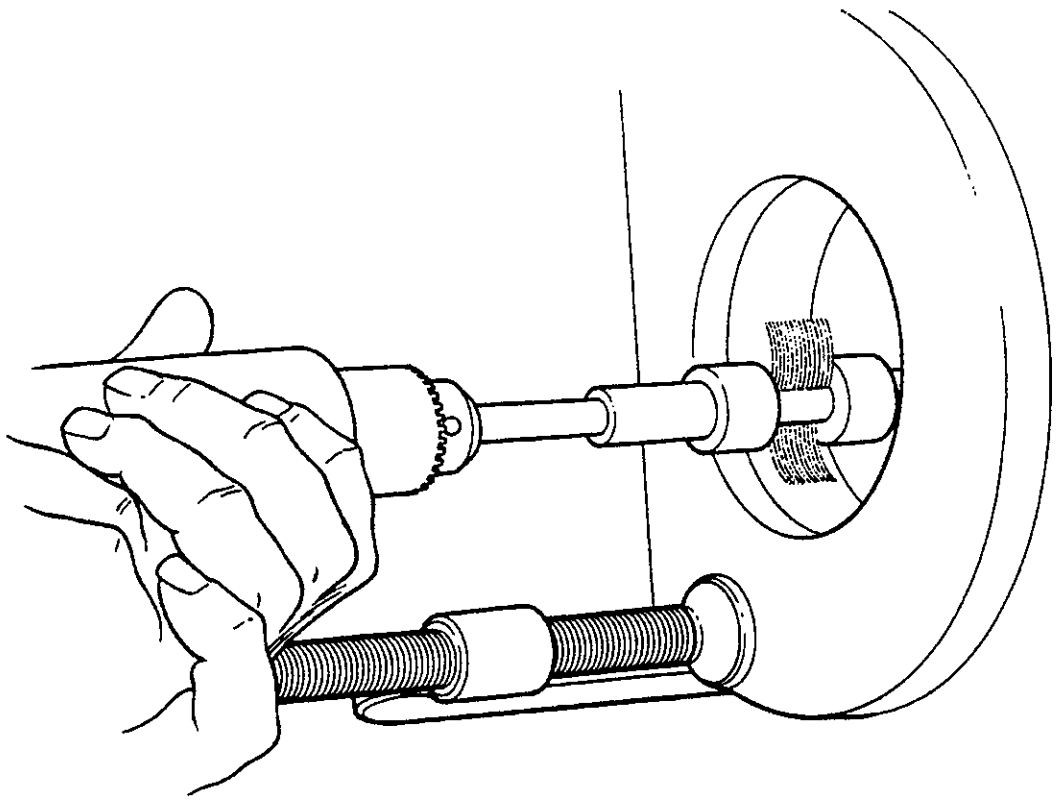


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Fig 7 Roto-peening

Paint required

112 The paint required is as follows:

112.1	Spraying	H1/8010-99-220-4527, Base, Etching Primer. H1/8010-99-220-4529, Acid Solution, Etching Primer.
112.2	Brushing	H1/8010-99-220-4527, Base, Etching Primer. H1/8010-99-220-4528, Acid Solution, Etching Primer.

Procedure

113 To apply the paint proceed as follows:

113.1 Thoroughly mix the base and acid components in the proportions specified on the containers.

113.2 Apply the paint as one continuous film, applying one coat only.

NOTE

The paint has poor opacity; no attempt should be made to build up more than one coat to give a solid opaque film.

113.3 Allow the paint to dry (drying time, 2 to 6 hours).

PAINTING – FLOOR PLATE

114 The floor plate is to be painted with epoxide paint. The paint is applied as one coat of primer, one coat of undercoat, and two coats of finishing gloss. The floor plate is to be pre-treated with etching primer as detailed in para 111.

Epoxide primer

115 Epoxide primer can be used for up to 8 hours after mixing. Application by spraying is preferred. Brushing should be limited to small areas where it is impractical to spray.

Paint required

116 The paint required is as follows:

116.1 8010-99-616-7710 (three part pack, 4 litre set).

116.2 33B/8010-99-224-2080 (three part pack, 15 litre).

Procedure

117 To apply the paint proceed as follows:

117.1 Thoroughly mix the components in accordance with the instructions on the containers.

117.2 Apply one coat of paint as one continuous coat.

117.3 Allow the paint to dry (drying time is not less than 4 hours or more than 24 hours).

117.4 Thoroughly clean spray guns, pots and brushes with thinners (H1/8010-99-943-3046) immediately after use.

Epoxide undercoat (filler) - white

118 Epoxide undercoat (filler) can be used for up to 8 hours after mixing. Application by spraying is preferred. Brushing should be limited to small areas where it is impractical to spray.

Paint required

119 The paint required is as follows:

119.1 H1/8010-99-224-2077 (three part pack, 1 1/2 litre).

119.2 H1/8010-99-224-2078 (three part pack, 15 litre).

Procedure

120 To apply the paint proceed as follows:

120.1 Thoroughly mix the components in accordance with the instructions on the containers.

120.2 Apply one coat of paint as one continuous coat.

120.3 Allow the paint to dry (drying time is not less than 4 hours or more than 24 hours).

120.4 Thoroughly clean spray guns, pots and brushes with thinners (H1/8010-99-943-3046) immediately after use.

Epoxide finishing coat - white gloss

121 Epoxide finishing coat can be used for up to 8 hours after mixing. Application by spraying is preferred. Brushing should be limited to small areas where it is impractical to spray. Two coats are to be applied, the second coat is to be applied within 24 hours of the first coat. The second coat is to be allowed to dry for 48 hours before the application of padding adhesive.

Paint required

122 H1/8010-99-220-4725 (two part pack, 2 pint).

Procedure

123 To apply the paint proceed as follows:

123.1 Thoroughly mix the components in accordance with the instructions on the containers.

123.2 Apply the first coat of finishing paint as one continuous coat.

123.3 Allow the first coat of paint to dry (drying time is not less than 4 hours or more than 24 hours).

123.4 When first coat of paint is dry and within 24 hours of applying first coat, apply second coat of finishing paint as one continuous coat.

123.5 If, under exceptional circumstances, the first coat of paint has been permitted to dry for more than 24 hours prior to applying the second coat, then the surface is to be lightly abraded with abrasive paper (Grade 320) before applying the second coat.

123.6 Allow the second coat of paint to dry (normal drying time is not less than 4 hours). If padding adhesive is to be applied, allow the paint to dry for 48 hours before applying adhesive.

123.7 Thoroughly clean spray guns, pots and brushes with thinners (H1/8010-99-943-3046) immediately after use and certainly within 8 hours of contact with epoxide paint.

Painting – horizontal surfaces (excluding floor plate)

124 Internal horizontal surfaces, with the exception of the floor plate, are to be painted with two coats of aluminium, flame resisting paint. The surfaces to be painted are to be pre-treated with etching primer as detailed in para 111.

Paint required

125 The paint required is as follows:

125.1	Spraying	H1/8010-99-942-5990 (five gallon).
125.2	Brushing	H1/8010-99-942-5989 (five gallon).

Procedure

126 To apply the paint proceed as follows:

126.1 Apply the paint as one continuous coat.

126.2 Allow to dry for 48 hours.

126.3 Apply a second coat of paint, as one continuous coat.

126.4 Allow to dry for 48 hours.

Repainting after limited removal of epoxy paint

Preparation prior to painting

127 Following the inspection and any necessary repairs the following preparation shall take place:

WARNING

SOLVENT FUMES. HOT AIR BLOWERS ARE NOT TO BE USED DURING THE SOLVENT CLEANING STAGE.

127.1 All oil, grease etc should be removed using an approved solvent.

127.2 Remaining areas of epoxy paint should be lightly abraded using approved abrasive pads.

127.3 All bare metal areas should be abrasively cleaned to remove the oxide film using an approved method.

127.4 All residue formed during Sub-Paras 127.2 and 127.3 above should be cleaned and washed out, preferably using hot washing methods. Plain water should be used without any detergents.

127.5 Any excess water should be mopped up and the hull left to dry.

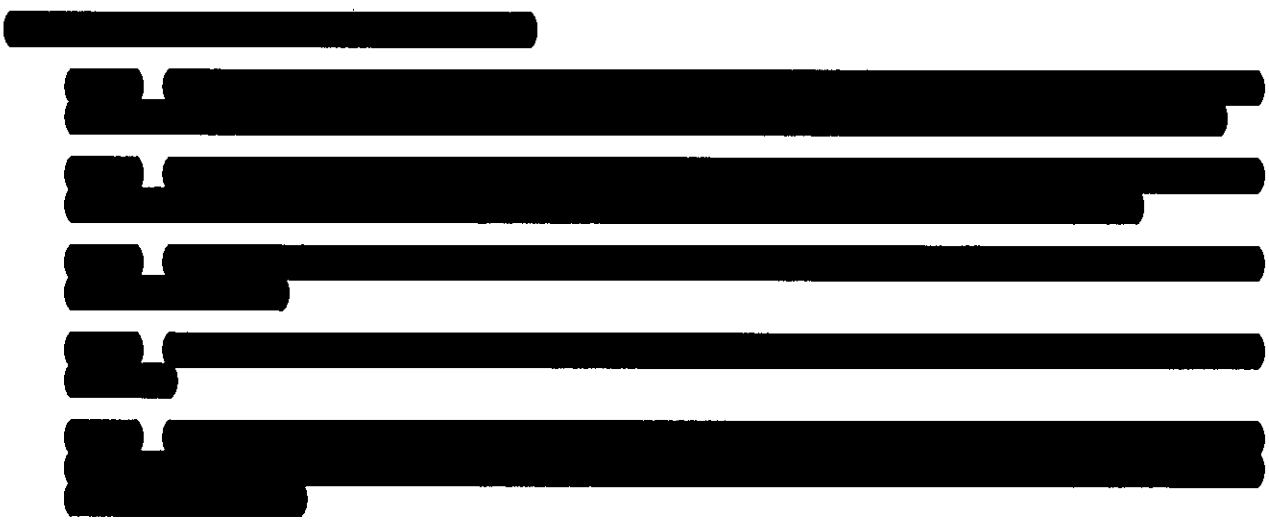
NOTE

Hot air blowers may be used to speed up drying of the hull and may also be used to prewarm the hull prior to preparation.

Paint scheme

128 The following scheme should be applied where described within the limits defined in the standard paint scheme. All paints used are those specified in the standard scheme and the same methods of application and drying time should be used.

129 The first stage of the scheme should be applied with minimum delay to the dry prepared surfaces and certainly within 4 hours of the abrasive cleaning.



CHAPTER 10 ANNEX A

INSPECTION AND REPAIR REPORT FORMS LT 70

CONTENTS

INTRODUCTION

1 Inspection and Repair Report Forms (LT70) for all variants are included as appendices to this annex as detailed in the contents list.

2 The Inspection and Repair Report Forms provide a record and history for each vehicle and are used as a reporting form for initial inspection and requests for repair authorisation. The forms will also assist in the quality control of the work during repairs and rebuild programmes.

3 The form provides headings for the results of detailed visual examinations and conductivity tests on the floorplate, sponsons, sideplates, rearplate and roofplates to be recorded.

4 The left hand side of the forms provide for the details of the inspections to be recorded, and the right hand side of the forms are used to record repair details.

INSPECTION

CAUTION

WELD CONTAMINATION. Dye penetrants are not to be used during the initial inspection unless specifically authorized.

5 The inspection is to be carried out on all locations listed on form (LT70) ensuring that all of the following cracks are reported.

Floors and sponsons

6

6.1 Mountings/Jig plugs. Locations cracked or 'guttered', not previously reported and cracks deviating from the location (e.g. away from a mounting towards a bulkhead).

6.2 Other areas. Longitudinal cracks which have extended since last inspection and cracks in open plate (i.e. more than 100 mm (4 in.) from a weld).

All other material

7 Hull and turret. All cracks in plates, extrusions and welds not previously reported, giving location and length.

Mantlet

8 All cracks, giving locations and lengths.

REPAIR

9 After any repair work is carried out details of the repair method and procedure used is to be recorded on form (LT70).

10 Any residual defects and the authority for a sub-standard repair together with any comment is to be recorded on form (LT70).

CHAPTER 10 ANNEX A APPENDIX 1

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

Workshop/Unit

Workshop VID Number .....

Date of this Inspection .....

VEH REG

Date Repairs Completed .....

CONDUCTIVITY READING OF TEST PIECE .....

TEMPERATURE AT WORK AREA .....

CONDUCTIVITY READING (%IACS):-

1.	FLOOR PLATE	=.....	6.	SIDEPLATE LOWER LH	=.....
2.	SPONSON LH	=.....	7.	SIDEPLATE LOWER RH	=.....
3.	SPONSON RH	=.....	8.	REAR PLATE UPPER	=.....
4.	SIDEPLATE UPPER LH	=.....	9.	ROOFPLATE FRONT	=.....
5.	SIDEPLATE UPPER RH	=.....	10.	ROOFPLATE REAR	=.....

LIFE MILEAGE .....

EFFECTIVE FULL CHARGES .....

SERIAL NUMBERS:

HULL .....

TURRET .....

MANTLET .....

HAVE ANY OF THE FOLLOWING BEEN REPLACED?
IF SO GIVE DETAILS:

	YES	NO	OLD SERIAL NO.
HULL			.....
TURRET			.....
MANTLET			.....

CHAPTER 10 ANNEX A APPENDIX 1

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

REPAIRS

KEY:-

E1-6	External ARPs
I1 & 2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
1 Floorplate Transmission Compartment Mounting							
G1							
G2							
G3							
Others							
P1							
P2							
Apertures							
K1							
K3							
Welds							
H4							
H5							
H14							
H15							
H16							
2 Floorplate Engine Compartment Mountings							
E1							
E2							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
2 Cont Mountings (cont) E3 E4 E5 E6 Others Bulkhead Corner (BHC) H1 P8 Apertures K2 Welds H6 H7 H8 H15							
3 Floorplate Driver's Compartment Mountings C3 C4 C5 C6 C7 C8 C9 C10 C11 Others Bulkhead							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
3 Cont Others (cont) Landing Strip (BLS) P7 H2 Welds H6 H7 H8 H14							
4 Floorplate Fighting Compartment Mountings B1 B2 B3 B4 B5 B6 J1 J2 S11 S12 T1 T2 T3 T4 T5 Others P11 P12							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
4 Cont Others (cont) H3 Welds H9 H10 H11 H12 H13 H14 H15							
5 Fuel Compartment Jig Plugs P16 P17 Welds H14 H15 H17 H20							
6 Sponson LH, Transmission Compartment Mountings C1 C2 Others P3 R1 R2 Weld H14							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
7 Sponson LH, Driver's Compartment Mountings C12 D1 D2 D3 D4 D5 D6 D7 D8 S1 S2 Others P5 R3 Weld H14							
8 Sponson LH, Fighting Compartment Mountings N1 N2 S3 S4 S7 S8 S9 S10 S14							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
8 Cont Mountings (cont) S15 S16 S17 Others P9 P13 P15 R4 Weld H14							
9 Sponson RH, Transmission Compartment Others P4 V1 V2 Weld H15							
10 Sponson RH, Engine Compartment Mountings A1 A2 Others P6 L1 L2 L3							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

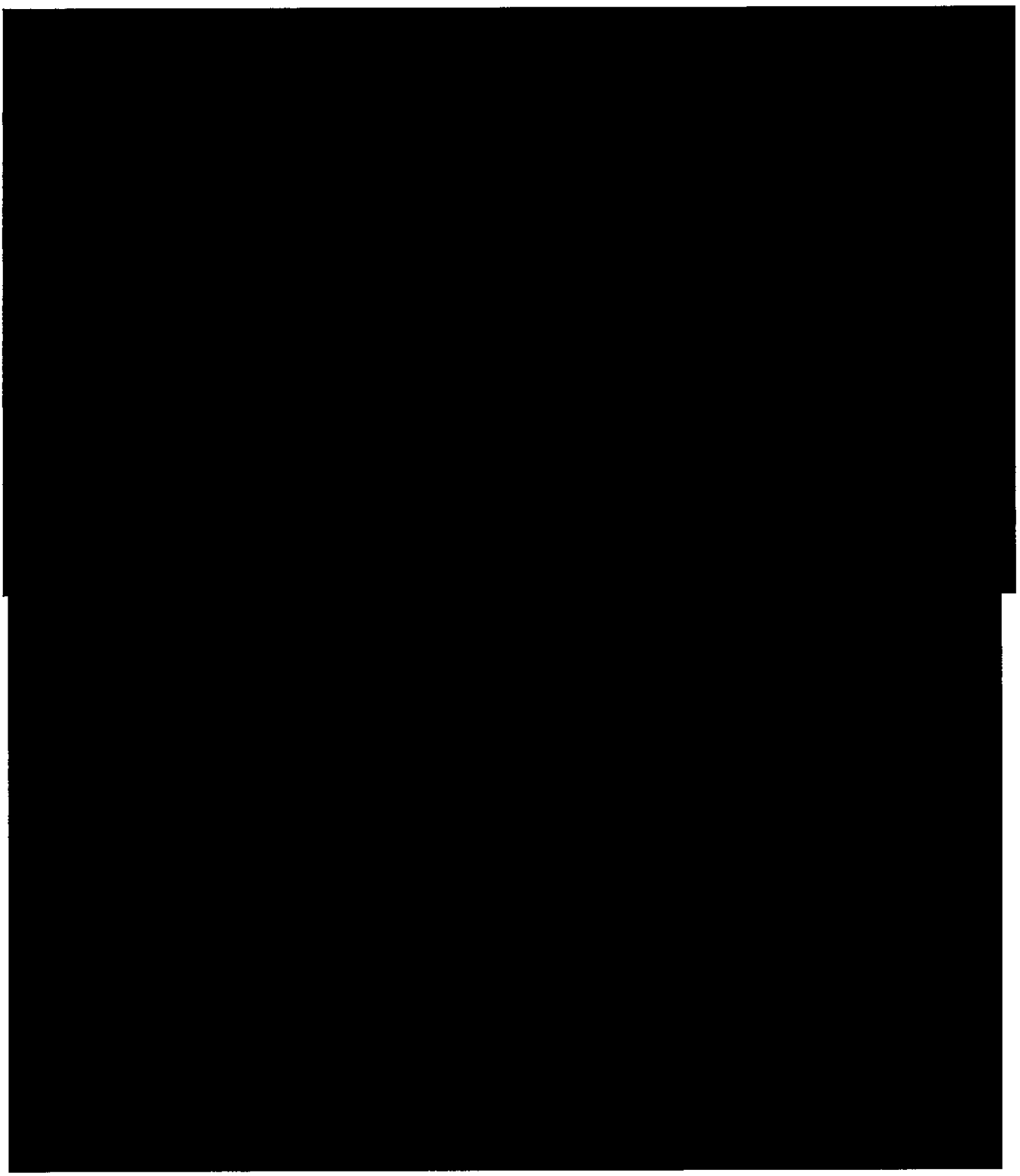
FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
10 Cont Others (cont) L4 V3 Weld H15							
11 Sponson RH, Fighting Compartment Mountings N3 N4 S5 S6 S13 S18 S19 Others P10 P14 P18 V4 Welds H15 H18 H19							
12 Wading Screen LH Upper RH Upper Front Rear							



SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

HULL

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

REPAIRS

KEY:-

E1-6	External ARPs
I1&2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
1 Side Upper LH (1) (2) (3)							
2 Side Lower LH (1) (2) (3)							
3 Side Upper RH (1) (2) (3)							
4 Side Lower RH (1) (2) (3)							
5 Rear Upper (1) (2) (3)							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

HULL

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
6 Rear Centre (1) (2) (3)							
7 Rear Lower (1) (2) (3)							
8 Roofplate Front (1) (2) (3)							
9 Roofplate Rear (1) (2) (3)							
10 Frontplate Upper (1) (2) (3)							
11 Frontplate Lower (1) (2) (3)							

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

TURRET

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

REPAIRS

KEY:-

E1-6	External ARPs
I1&2	Internal ARPs
S1-10	Screw-ups
W	weld
F	Filler
M	Metalock

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
1 Plate A (1) (2)							
2 Plate B (1) (2)							
3 Plate C (1) (2)							
4 Plate D (1) (2)							
5 Plate E (1) (2)							
6 Plate F (1) (2)							
7 Plate G (1) (2)							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

TURRET

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
8 Plate H (1) (2)							
9 Plate J (1) (2)							
10 Plate K (1) (2)							
11 Plate M (1) (2)							
12 Plate N (1) (2)							
13 Plate O (1) (2)							
14 Plate P (1) (2)							
15 Sill Plate Q (1) (2) (3) (4) (5) (6)							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

TURRET

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
16 Top Plate R (1) (2) (3) (4)							
17 Top Front Plate S (1) (2) (3)							
18 Top Rear Plate T (1) (2)							
19 Top Front LH Plate X (1) (2)							
20 Top Front RH Plate W (1) (2)							
21 Cheekplate LH V (Front) (1) (2)							
22 Cheekplate RH U (Rear) (1) (2)							

SALAMANDER (SCORPION) & SCIMITAR

INSPECTION AND REPAIR REPORT FORM LT70

TURRET

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
23 Cheekplate RH U (Front) (1) (2)							
24 Cheekplate RH U (Rear) (1) (2)							
25 Cheekplate Trunnion Hole LH (1) (2)							
26 Cheekplate Trunnion Hole RH (1) (2)							
27 Top Frontplate Sidepiece LH L (1) (2)							
28 Top Frontplate Sidepiece RH Y (1) (2)							

CHAPTER 10 ANNEX A APPENDIX 3

SPARTAN

INSPECTION AND REPAIR REPORT FORM LT70

Workshop/Unit

Workshop VID Number .....

Date of this Inspection .....

VEH REG

Date Repairs Completed .....

CONDUCTIVITY READING OF TEST PIECE .....

TEMPERATURE AT WORK AREA .....

CONDUCTIVITY READING (%IACS):-

1.	FLOOR PLATE	=.....	6.	SIDEPLATE LOWER LH	=.....
2.	SPONSON LH	=.....	7.	SIDEPLATE LOWER RH	=.....
3.	SPONSON RH	=.....	8.	REARPLATE	=.....
4.	SIDEPLATE UPPER LH	=.....	9.	ROOFPLATE FRONT	=.....
5.	SIDEPLATE UPPER RH	=.....			

LIFE MILEAGE .....

HULL SERIAL NUMBER .....

CHAPTER 10 ANNEX A APPENDIX 3

SPARTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

REPAIRS

KEY:-

E1-6	External ARPs
I1&2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
1 Floorplate, Transmission Compartment Mountings G1 G2 G3 Others P1 P2 Apertures K1 K3 Welds H4 H5 H14 H15 H16							
2 Floorplate, Engine Compartment Mountings E1 E2							

SPARTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
2 Cont Mountings (cont) E3 E4 Others Bulkhead Corner (BHC) H1 P8 S25 Aperture K2 Welds H6 H7 H8 H15							
3 Floorplate, Driver's Compartment Mountings C3 C4 C5 C6 C7 C8 C9 C10 C11 Others P7 H2							

SPARTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
3 Cont Welds H6 H7 H8 H14							
4 Floorplate Section Compartment Mountings S12 S13 S14 S15 S16 S26 Others P11 P12 P16 P17 Welds H9 H10 H11 H12 H13 H14 H15 H20							

SPARTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
5 Floorplate LH Transmission Compartment Mountings C1 C2 Others P3 R1 R2 Welds H14							
6 Sponson LH, Driver's Compartment Mountings B7 B8 C12 D1 D2 D3 D4 S1 S2 Others P5 R3 Weld H14							

SPARTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
7 Sponson LH, Section compartment Mountings S3 S4 S5 S6 S7 S8 S9 S10 S11 Others P9 P13 P15 Weld H14							
8 Sponson RH, Transmission Compartment Other P4 V1 V2 Welds H15							
9 Sponson RH, Engine Compartment Mountings A1 A2							

SPARTAN

INSPECTION AND REPAIR REPORT FORM LT70

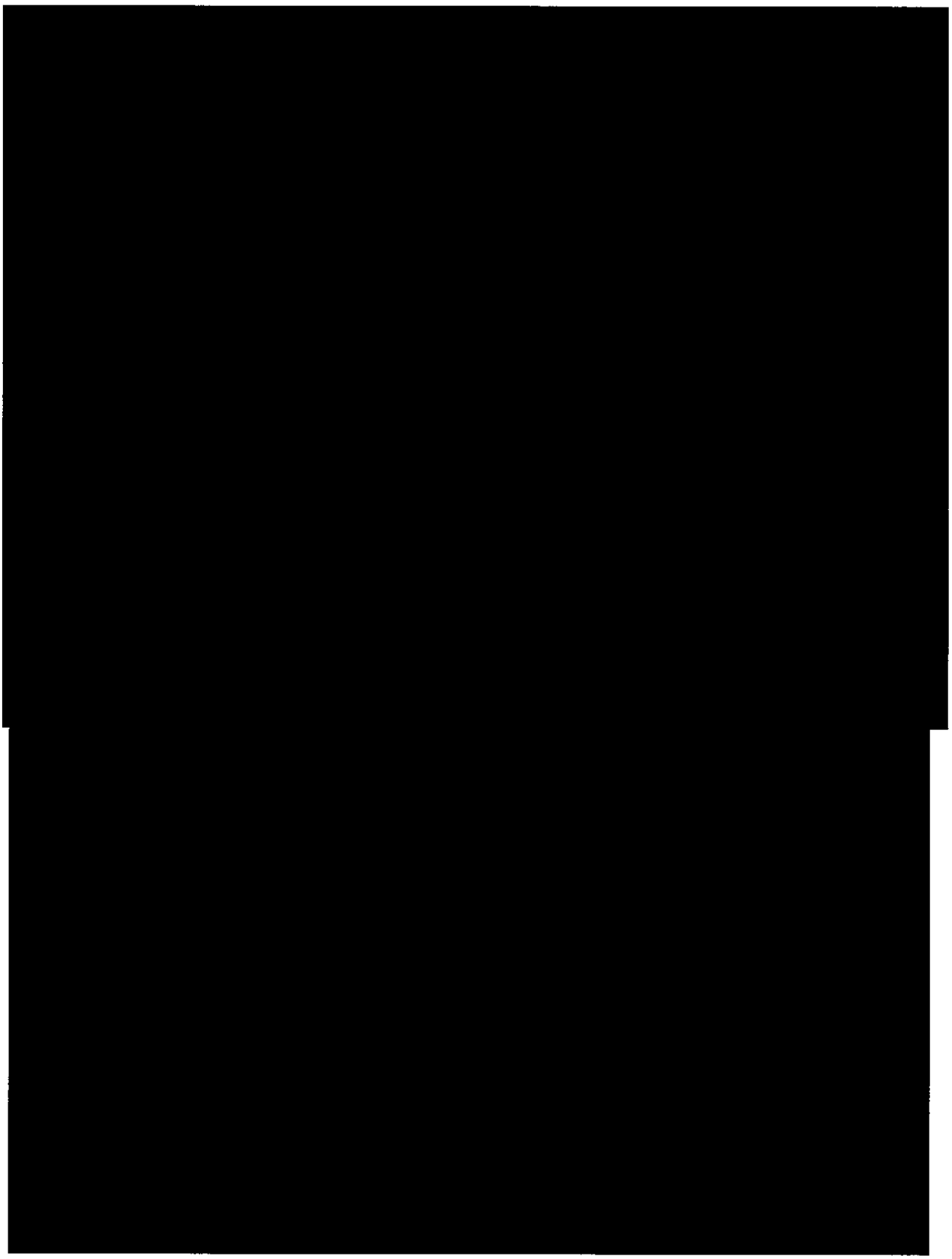
FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
9 Cont Mountings (cont) L2 L3 Others P6 V3 Weld H15							
10 Sponson RH, Section Compartment Mountings S17 S18 S19 S20 S21 S22 S23 S24 Others P10 P14 P18 Welds H15							



SPARTAN

INSPECTION AND REPAIR REPORT FORM LT70

HULL

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)
1 Side Upper LH (1) (2) (3)					
2 Side Lower LH (1) (2) (3)					
3 Side Upper RH (1) (2) (3)					
4 Side Lower RH (1) (2) (3)					
5 Rear (1) (2) (3)					

REPAIRS

KEY:-

E1-6	External ARPs
I1 & 2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

REPAIR METHOD USED	REMARKS

SPARTAN

INSPECTION AND REPAIR REPORT FORM LT70

HULL

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
6 Roofplate (1) (2) (3)							
7 Frontplate Upper (1) (2) (3)							
8 Frontplate Lower (1) (2) (3)							

CHAPTER 10 ANNEX A APPENDIX 4

SAMARITAN

INSPECTION AND REPAIR REPORT FORM LT70

Workshop/Unit

Workshop VID Number .....

Date of this Inspection .....

VEH REG

Date Repairs Completed .....

CONDUCTIVITY READING OF TEST PIECE .....

TEMPERATURE AT WORK AREA .....

CONDUCTIVITY READING (%IACS):-

1.	FLOOR PLATE	=.....	6.	SIDEPLATE LOWER LH	=.....
2.	SPONSON LH	=.....	7.	SIDEPLATE LOWER RH	=.....
3.	SPONSON RH	=.....	8.	REARPLATE	=.....
4.	SIDEPLATE UPPER LH	=.....	9.	ROOFPLATE FRONT	=.....
5.	SIDEPLATE UPPER RH	=.....	10.	ROOFPLATE REAR	=.....

LIFE MILEAGE.....

HULL SERIAL NUMBER .....

CHAPTER 10 ANNEX A APPENDIX 4

SAMARITAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

REPAIRS

KEY:-

E1-6	External ARPs
I1&2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
1 Floorplate, Transmission Compartment Mountings G1 G2 G3 Others P1 P2 Apertures K1 K3 Welds H4 H5 H14 H15 H16							
2 Floorplate, Engine Compartment Mountings E1 E2							

SAMARITAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
2 Cont Mountings (cont) E3 E4 S25 Others Bulkhead Corner (BHC) H1 P8 Aperture K2 Welds H6 H7 H8 H15							
3 Floorplate, Driver's Compartment Mountings C3 C4 C5 C6 C7 C8 C9 C10 C11 Others P7 H2							

SAMARITAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
3 Cont Welds H6 H7 H8 H14							
4 Floorplate Casualty Compartment Mountings B21 B22 S111 S112 Others P11 P12 P16 P17 Welds H9 H10 H11 H12 H13 H14 H15 H20							
5 Sponson LH, Transmission Compartment Mountings C1							

SAMARITAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
5 Cont Mountings (cont) C2 Others P3 R1 R2 Weld H14							
6 Sponson LH, Driver's Compartment Mountings C12 D1 D2 D3 D4 S1 S2 B7 B8 Others P5 R3 Weld H14							
7 Sponson RH Casualty Compartment Mountings S117 S118							

SAMARITAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
7 Cont Others P9 P13 P15 Welds H14							
8 Sponson RH, Transmission Compartment Mountings A1 A2 L2 L3 S110 Others P4 P6 V1 V2 V3 Weld H15							
9 Sponson RH, Casualty Compartment S113 S114 S115 S116 S119 S120							

SAMARITAN

INSPECTION AND REPAIR REPORT FORM LT70

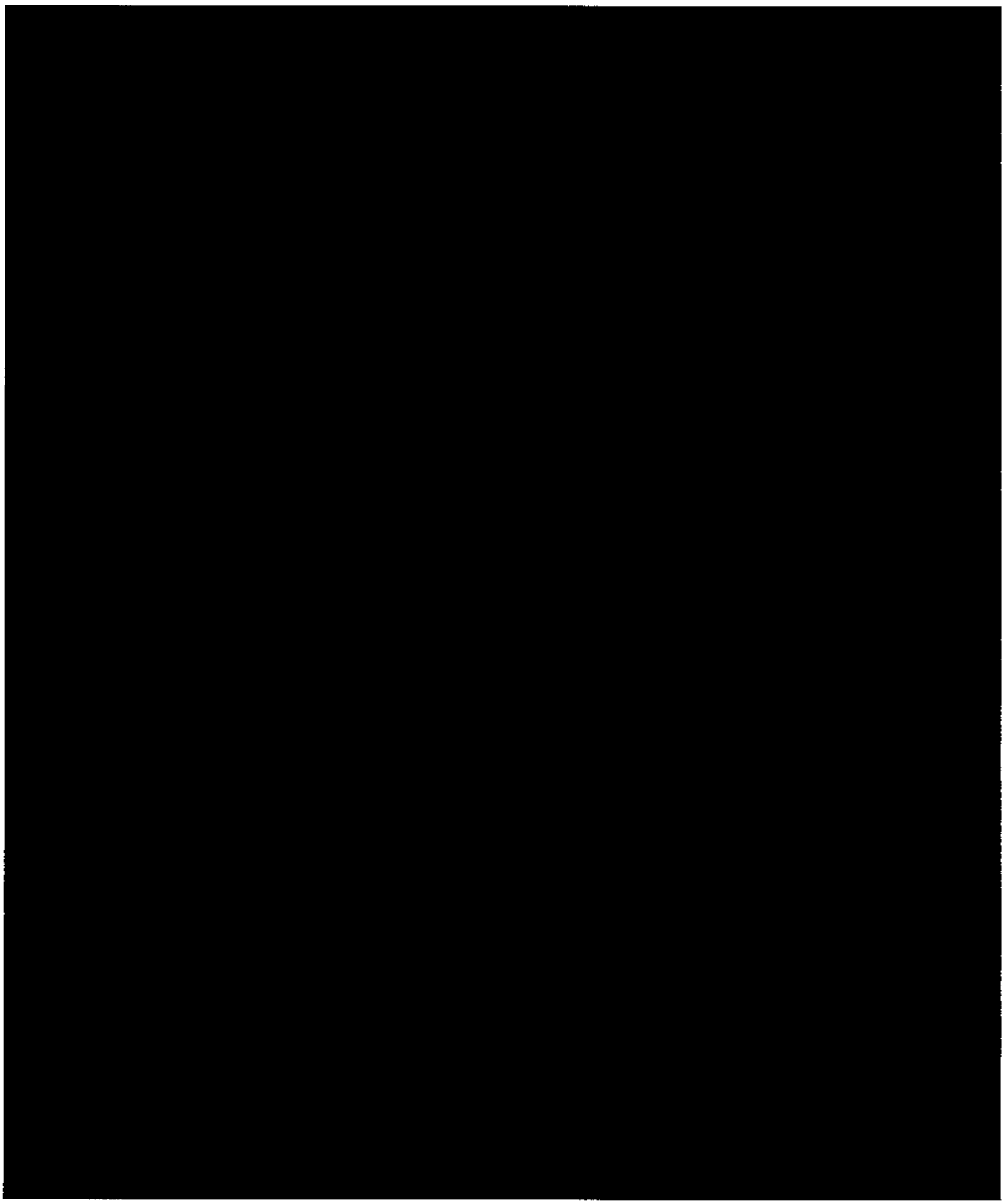
FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
9 Cont Others P10 P14 P18 Welds H15							



SAMARITAN

INSPECTION AND REPAIR REPORT FORM LT70

HULL

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)
1 Side Upper LH (1) (2) (3)					
2 Side Lower LH (1) (2) (3)					
3 Side Upper RH (1) (2) (3)					
4 Side Lowe RH (1) (2) (3)					
5 Rear Plate (1) (2) (3)					

REPAIRS

KEY:-

E1-6	External ARPs
I1&2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

REPAIR METHOD USED	REMARKS

SAMARITAN

INSPECTION AND REPAIR REPORT FORM LT70

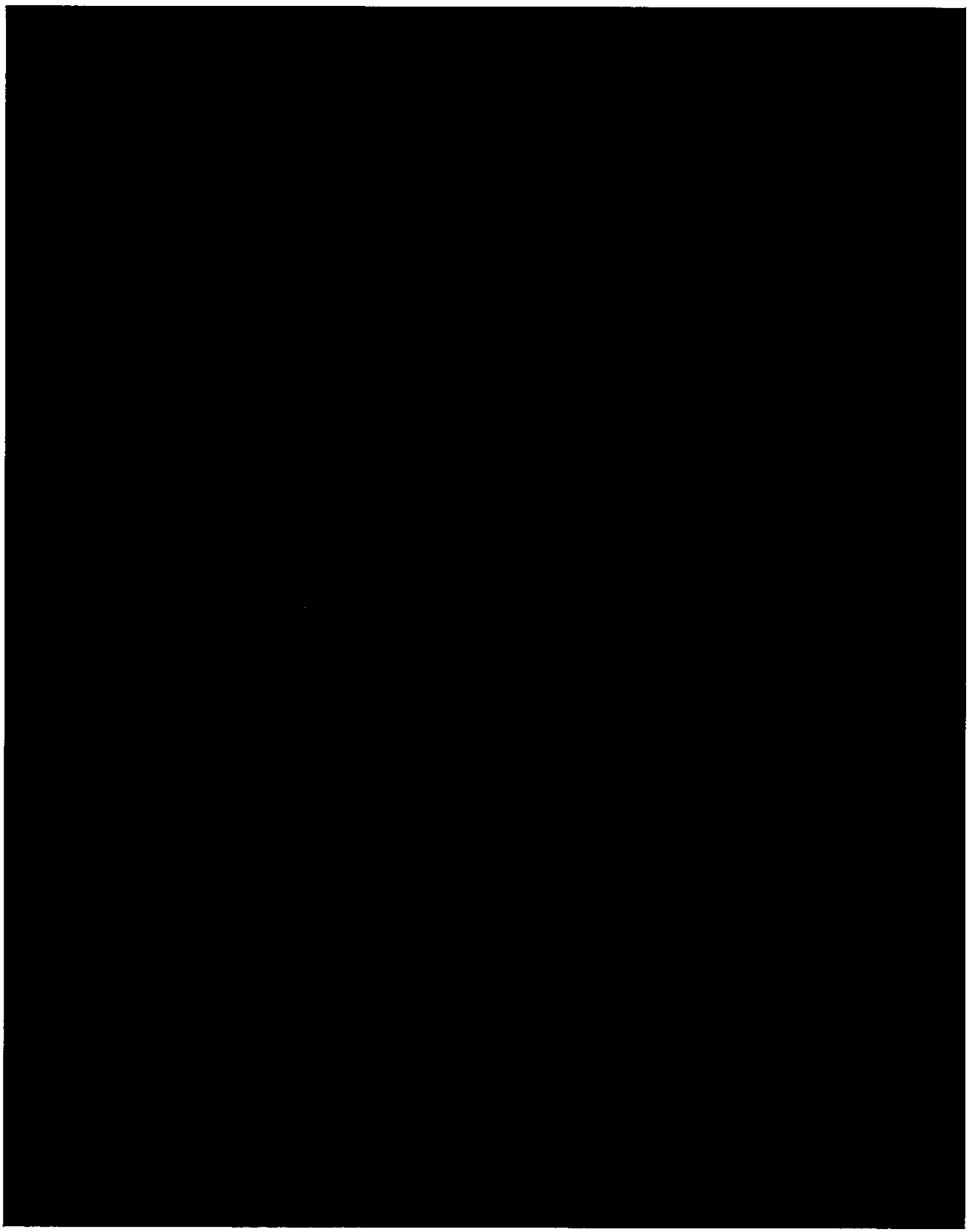
HULL

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
6 Roofplate Front (1) (2) (3)							
7 Roofplate Rear (1) (2) (3)							
8 Frontplate Upper Sloping (1) (2) (3)							
9 Frontplate Upper (1) (2) (3)							
10 Frontplate Lower (1) (2) (3)							



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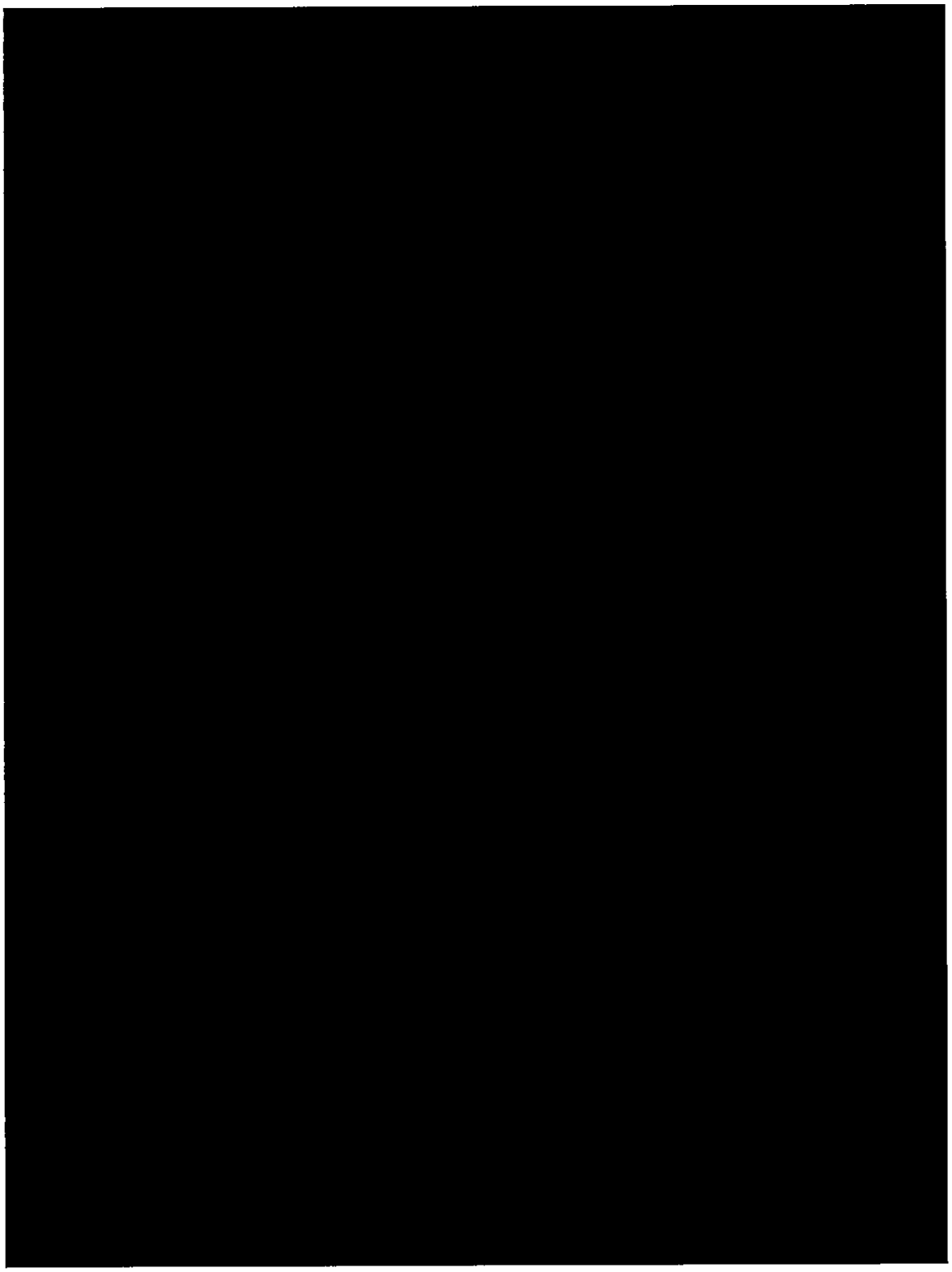

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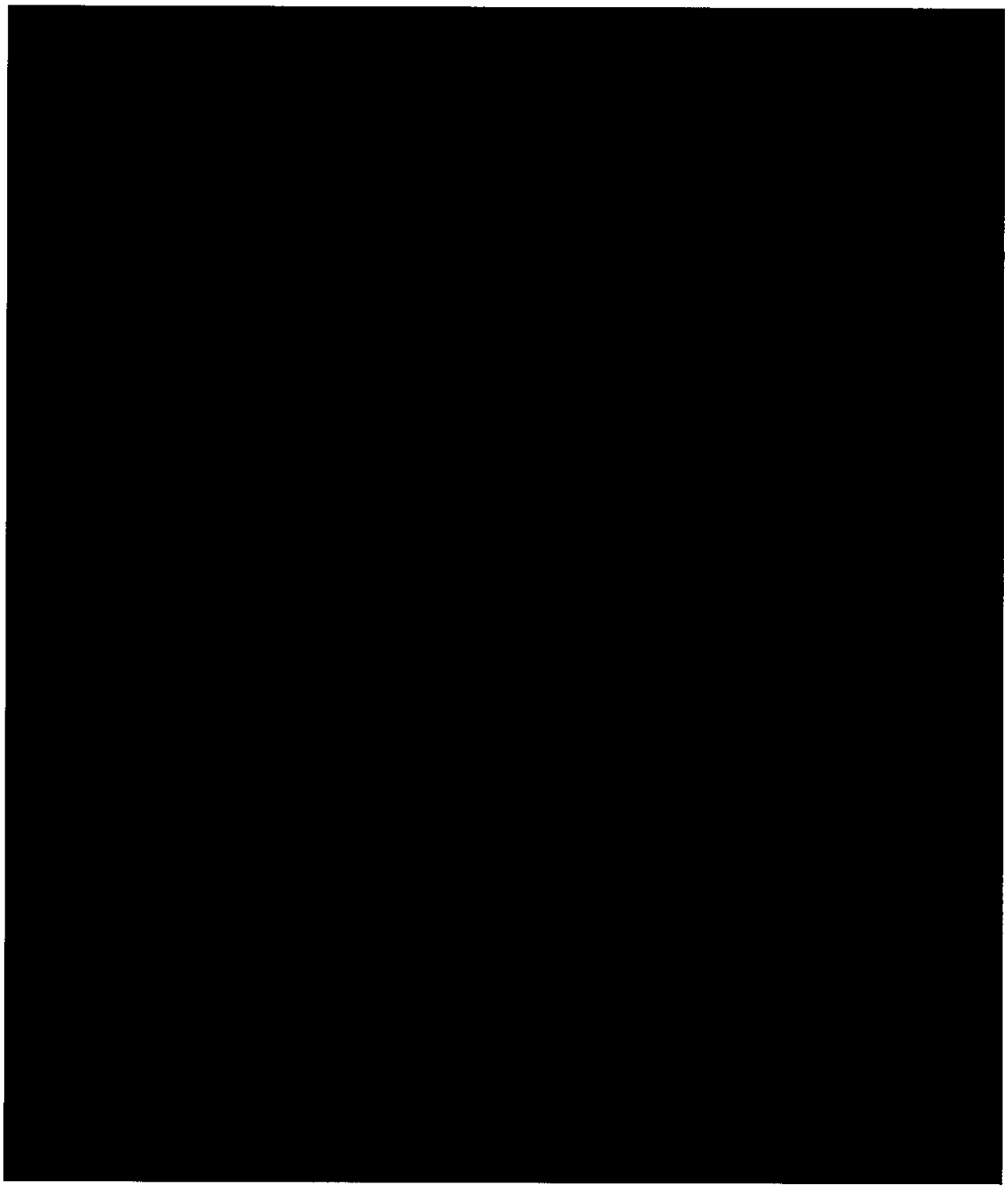


CHAPTER 10 ANNEX A APPENDIX 5

SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

Workshop/Unit

Workshop VID Number .....

Date of this Inspection .....

VEH REG

Date Repairs Completed .....

CONDUCTIVITY READING OF TEST PIECE .....

TEMPERATURE AT WORK AREA .....

CONDUCTIVITY READING (%IACS):-

1.	FLOOR PLATE	=.....	6.	SIDEPLATE LOWER LH	=.....
2.	SPONSON LH	=.....	7.	SIDEPLATE LOWER RH	=.....
3.	SPONSON RH	=.....	8.	REARPLATE	=.....
4.	SIDEPLATE UPPER LH	=.....	9.	ROOFPLATE FRONT	=.....
5.	SIDEPLATE UPPER RH	=.....	10.	ROOFPLATE REAR	=.....

LIFE MILEAGE .....

HULL SERIAL NUMBER .....

CHAPTER 10 ANNEX A APPENDIX 5

SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

REPAIRS

KEY:-

E1-6	External ARPs
I1&2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
1 Floorplate, Transmission Compartment Mountings							
G1							
G2							
G3							
Others							
P1							
P2							
Apertures							
K1							
K3							
Welds							
H4							
H5							
H14							
H15							
H16							
2 Floorplate, Engine Compartment Mountings							
E1							
E2							

SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
2 Cont Mountings (cont) E3 E4 S25 Others Bulkhead Corner (BHC) H1 P8 Aperture K2 Welds H6 H7 H8 H15							
3 Floorplate, Driver's Compartment Mountings C3 C4 C5 C6 C7 C8 C9 C10 C11 Others P7 H2							

SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
3 Cont Welds H6 H7 H8 H14							
4 Floorplate Command Compartment Mountings F2 F3 S70 S71 S72 S73 S74 S75 S76 S77 S78 S79 S80 S81 S82 S88 S89 S90 S91 B11 B12							

SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
4 Cont Others P11 P12 P16 P17 Welds H9 H10 H11 H12 H13 H14 H15 H20							
5 Sponson LH, Transmission Compartment Mountings C1 C2 Others P3 R1 R2 Weld H14							
6 Sponson LH, Driver's Compartment Mountings C12 D1							

SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
6 Cont Mountings (cont) D2 D3 D4 S1 S2 B7 B8 Others P5 R3 Weld H14							
7 Sponson LH, Command Compartment Mountings S83 S84 S85 S86 S87 B9 B10 N11 N12 N13 N14 Others P9 P13 P15							

SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
7 Cont Weld H14							
8 Sponson RH, Transmission Compartment Mountings A1 A2 L2 L3 Others P4 P6 V1 V2 V3 Weld H15							
9 Sponson RH, Command Compartment Mountings S92 S93 S94 S95 S96 S97 S98 S99 S100 S101							

SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

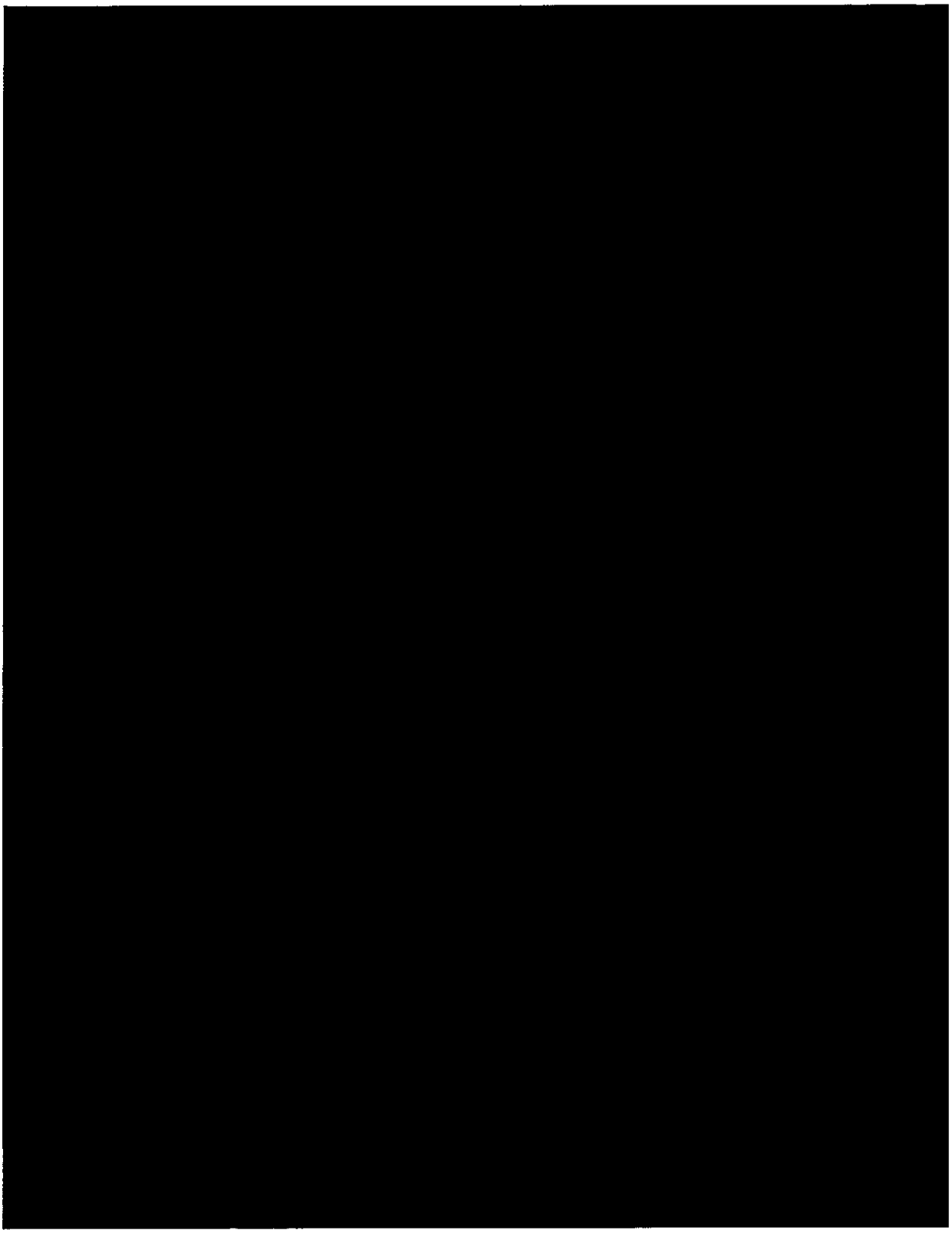
FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
9 Cont Mountings (cont) S102 S103 B13 B14 B15 B16 B17 B18 B19 B20 Others P10 P14 P18 Weld H15							



SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

HULL

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

REPAIRS

KEY:-

E1-6	External ARPs
I1&2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
1 Side Upper LH (1) (2) (3)							
2 Side Lower LH (1) (2) (3)							
3 Side Upper RH (1) (2) (3)							
4 Side Lower RH (1) (2) (3)							
5 Rear Plate (1) (2) (3)							

SULTAN

INSPECTION AND REPAIR REPORT FORM LT70

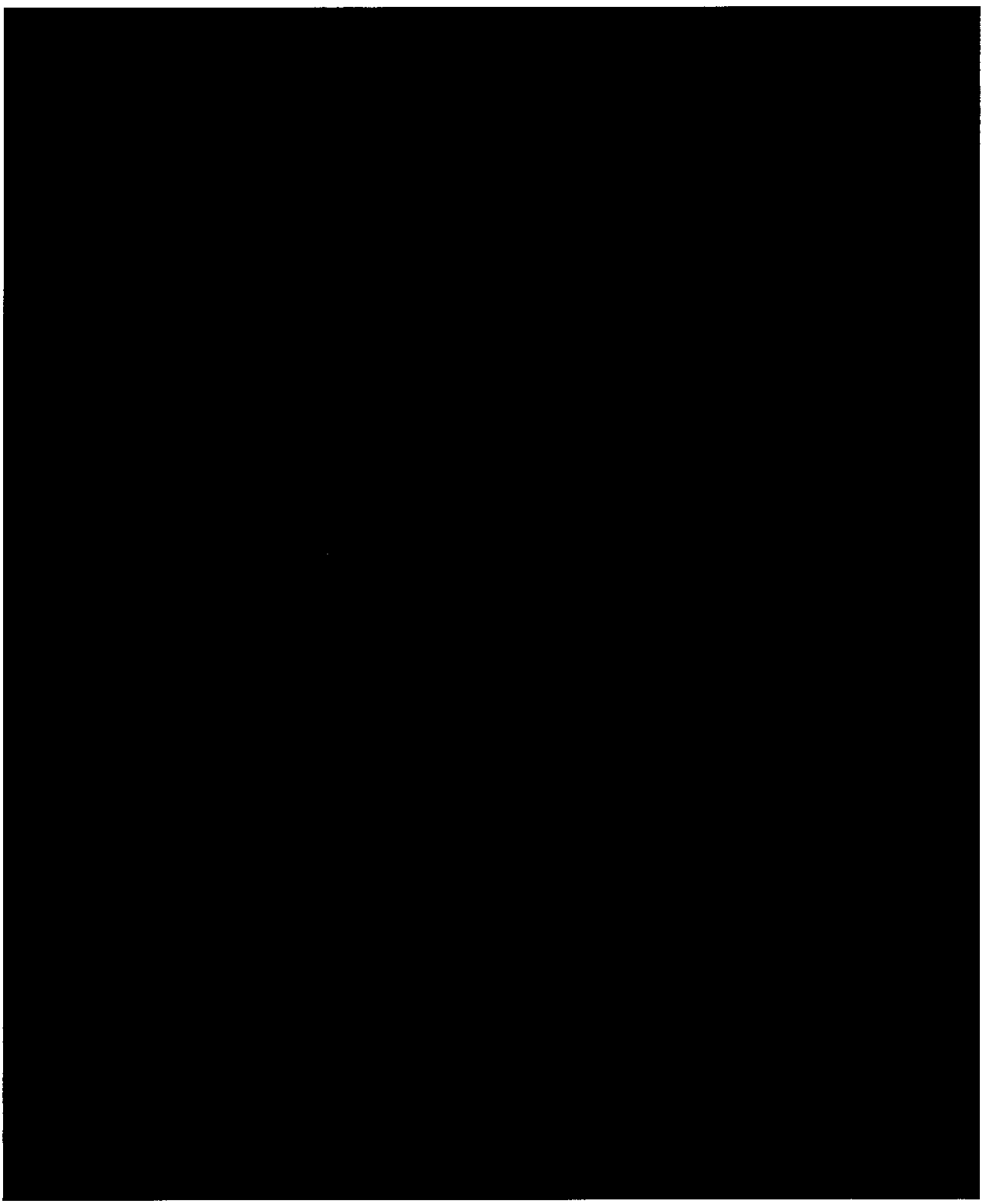
HULL

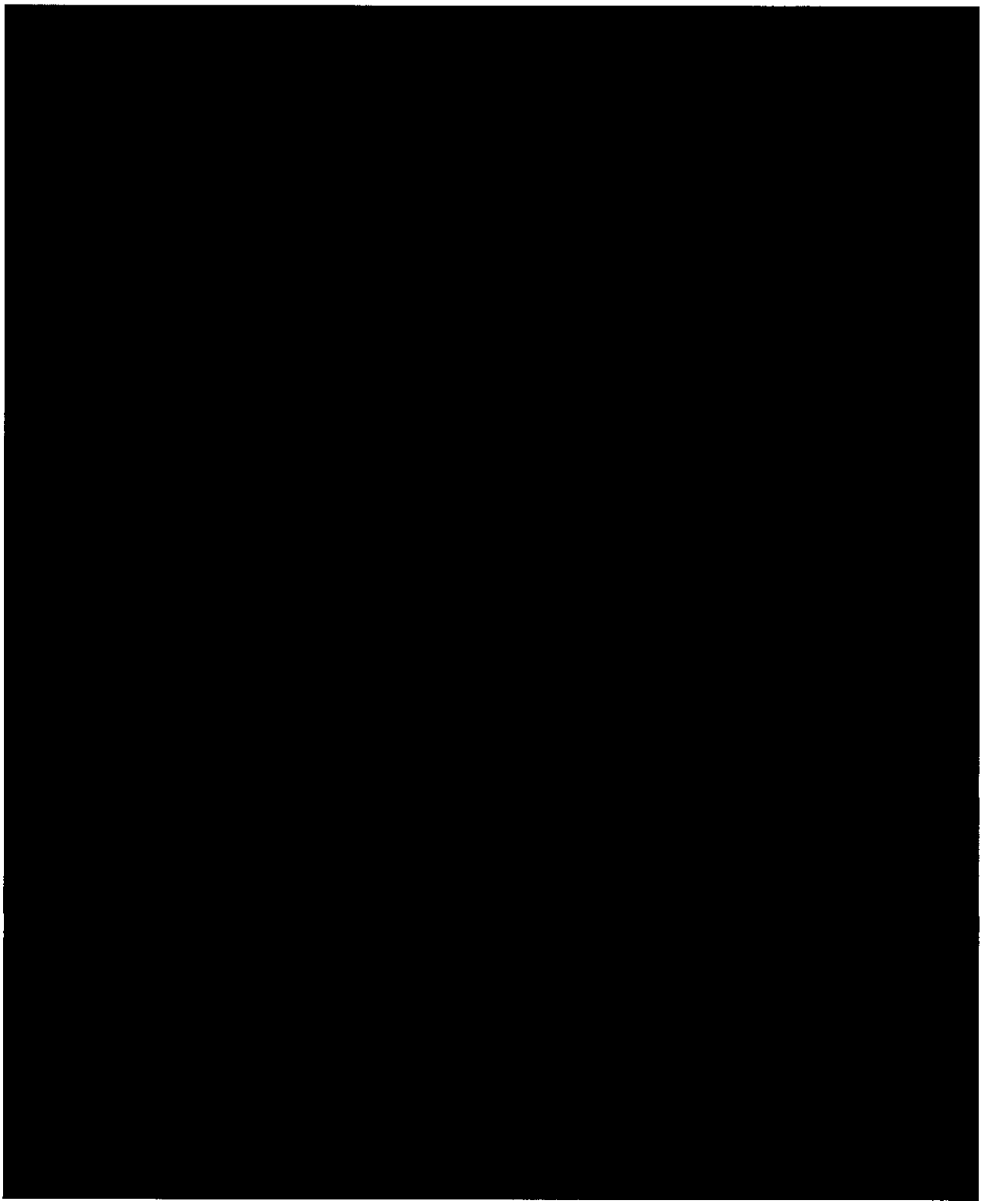
Date of this Inspection .....

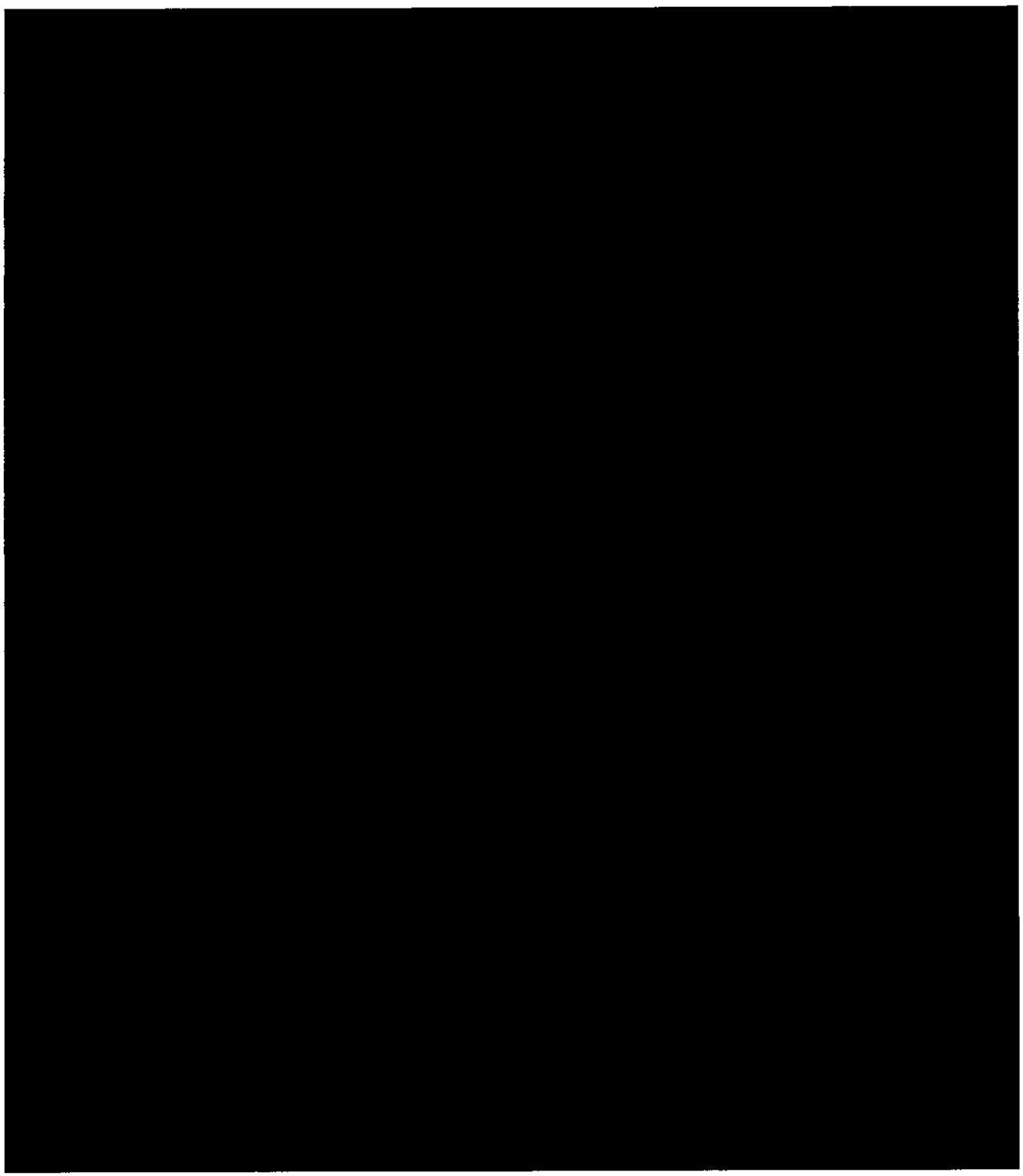
Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
6 Roofplate Front (1) (2) (3)							
7 Roofplate Rear (1) (2) (3)							
8 Frontplate Upper Sloping (1) (2) (3)							
9 Frontplate Upper (1) (2) (3)							
10 Frontplate Lower (1) (2) (3)							







CHAPTER 10 ANNEX A APPENDIX 6

SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

Workshop/Unit

Workshop VID Number .....

Date of this Inspection .....

VEH REG

Date Repairs Completed .....

CONDUCTIVITY READING OF TEST PIECE .....

TEMPERATURE AT WORK AREA .....

CONDUCTIVITY READING (%IACS):-

1.	FLOOR PLATE	=.....	6.	SIDEPLATE LOWER LH	=.....
2.	SPONSON LH	=.....	7.	SIDEPLATE LOWER RH	=.....
3.	SPONSON RH	=.....	8.	REARPLATE	=.....
4.	SIDEPLATE UPPER LH	=.....	9.	ROOFPLATE	=.....
5.	SIDEPLATE UPPER RH	=.....			

LIFE MILEAGE .....

HULL SERIAL NUMBER .....

CHAPTER 10 ANNEX A APPENDIX 6

SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

REPAIRS

KEY:-

E1-6	External ARPs
I1&2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
1 Floorplate, Transmission Compartment Mountings G1 G2 G3 Others P1 P2 Apertures K1 K3 Welds H4 H5 H14 H15 H16							
2 Floorplate, Engine Compartment Mountings E1 E2							

SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
2 Cont Mountings (cont) E3 E4 Others Bulkhead Corner (BHC) H1 P8 S25 Aperture K2 Welds H6 H7 H8 H15							
3 Floorplate, Driver's Compartment Mountings C3 C4 C5 C6 C7 C8 C9 C10 C11 Others P7 H2							

SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
3 Cont Welds H6 H7 H8 H14							
4 Floorplate Recovery Compartment Mountings B23 B24 B25 B26 F4 F5 F6 F7 F8 S134 S135 S136 S137 S138 S139 S140 S141 Others P11 P12 P16 P17							

SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
4 Cont Welds H9 H10 H11 H12 H13 H14 H15 H20							
5 Sponson LH, Transmission Compartment Mountings C1 C2 Others P3 R1 R2 Weld H14							
6 Sponson LH, Driver's Compartment Mountings B7 B8 C12 C13 D1 D2 D3							

SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
6 Cont Mountings (cont) D4 S1 S2 Others P5 R3 Weld H14							
7 Sponson LH, Recovery Compartment Mountings S3 S4 S5 S6 S7 S8 S130 S131 S132 S133 Others P9 P13 P15 Weld H14							

SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
8 Sponson RH, Transmission Compartment Others P4 V1 V2 Weld H15							
9 Sponson RH, Engine Compartment Mountings A1 A2 L2 L3 Others P6 V3 Weld H15							
10 Sponson RH, Recovery Compartment Mountings S17 S18 S19 S20 Others P10 P14 P18							

SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

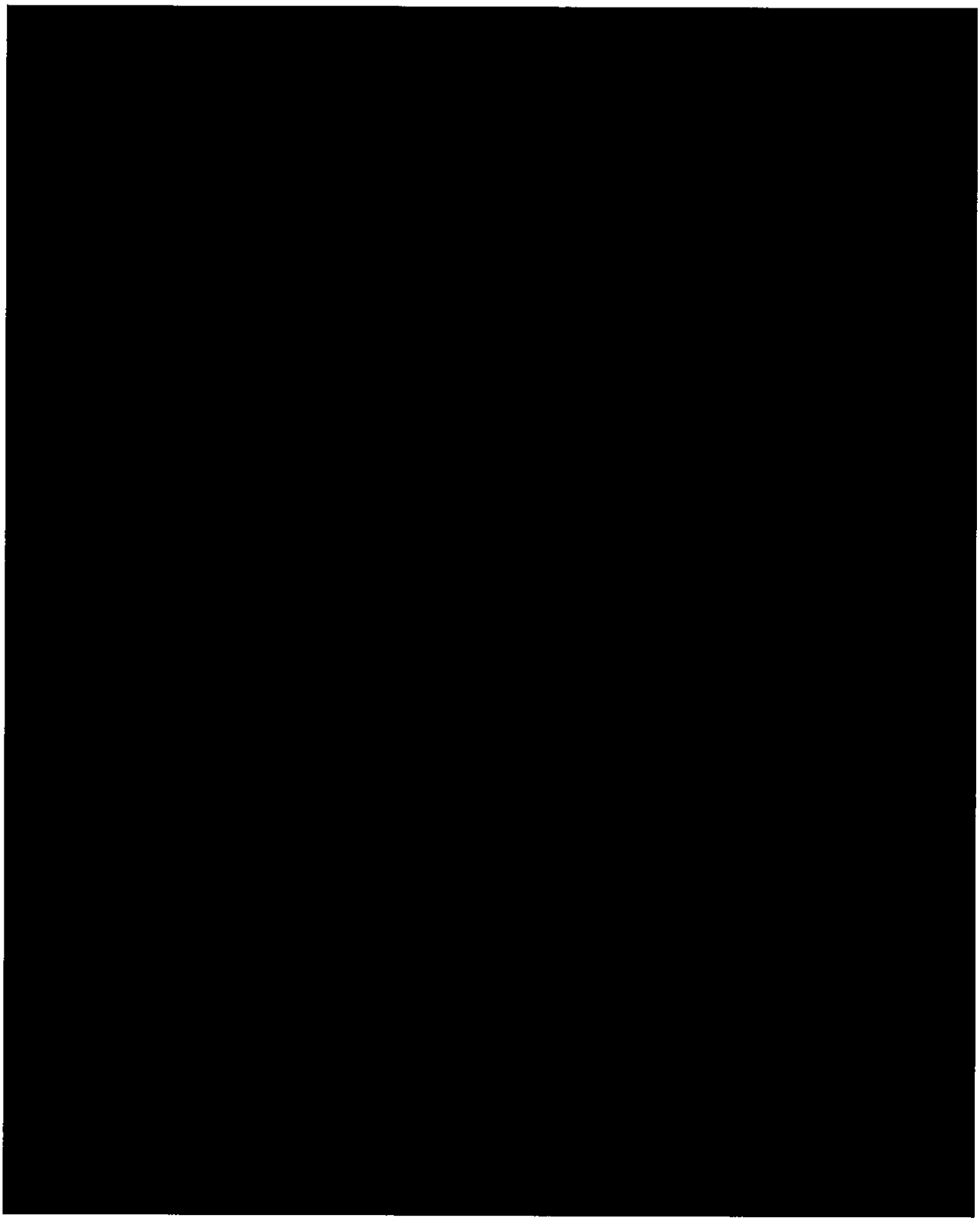
FLOORPLATE & SPONSONS

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
10 Cont Weld H15							



SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

HULL

Date of this Inspection .....

Date Repairs Complete .....

VEH REG

INSPECTION

KEY:-

S	SCC
WE	Weld (Edge)
WC	Weld (Centre)
E	Exfoliation

REPAIRS

KEY:-

E1-6	External ARPs
I1&2	Internal ARPs
S1-10	Screw-ups
W	Weld
F	Filler
M	Metalock

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
1 Side Upper LH (1) (2) (3)							
2 Side Lower LH (1) (2) (3)							
3 Side Upper RH (1) (2) (3)							
4 Side Lower RH (1) (2) (3)							
5 Rear (1) (2) (3)							

SAMSON

INSPECTION AND REPAIR REPORT FORM LT70

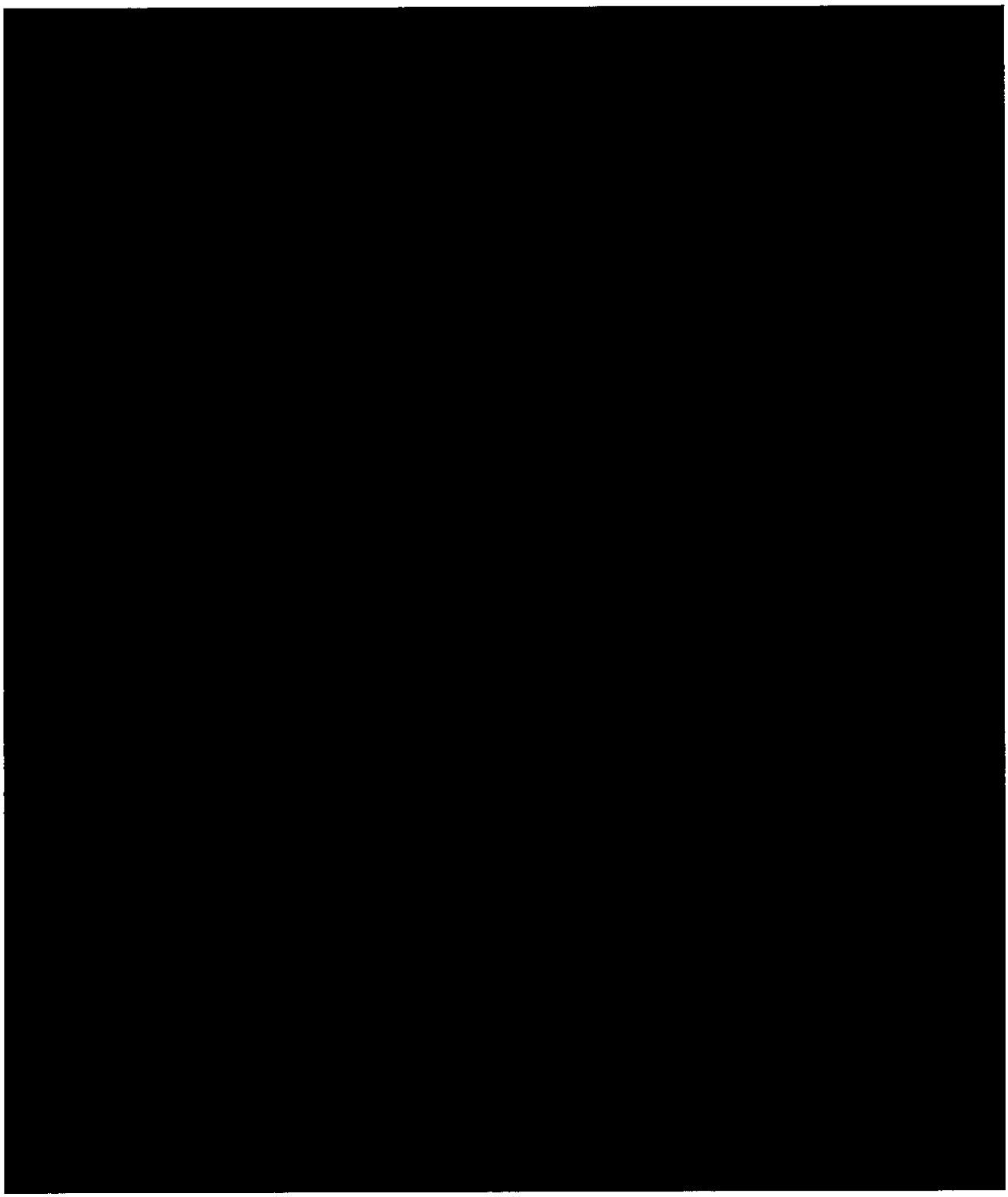
HULL

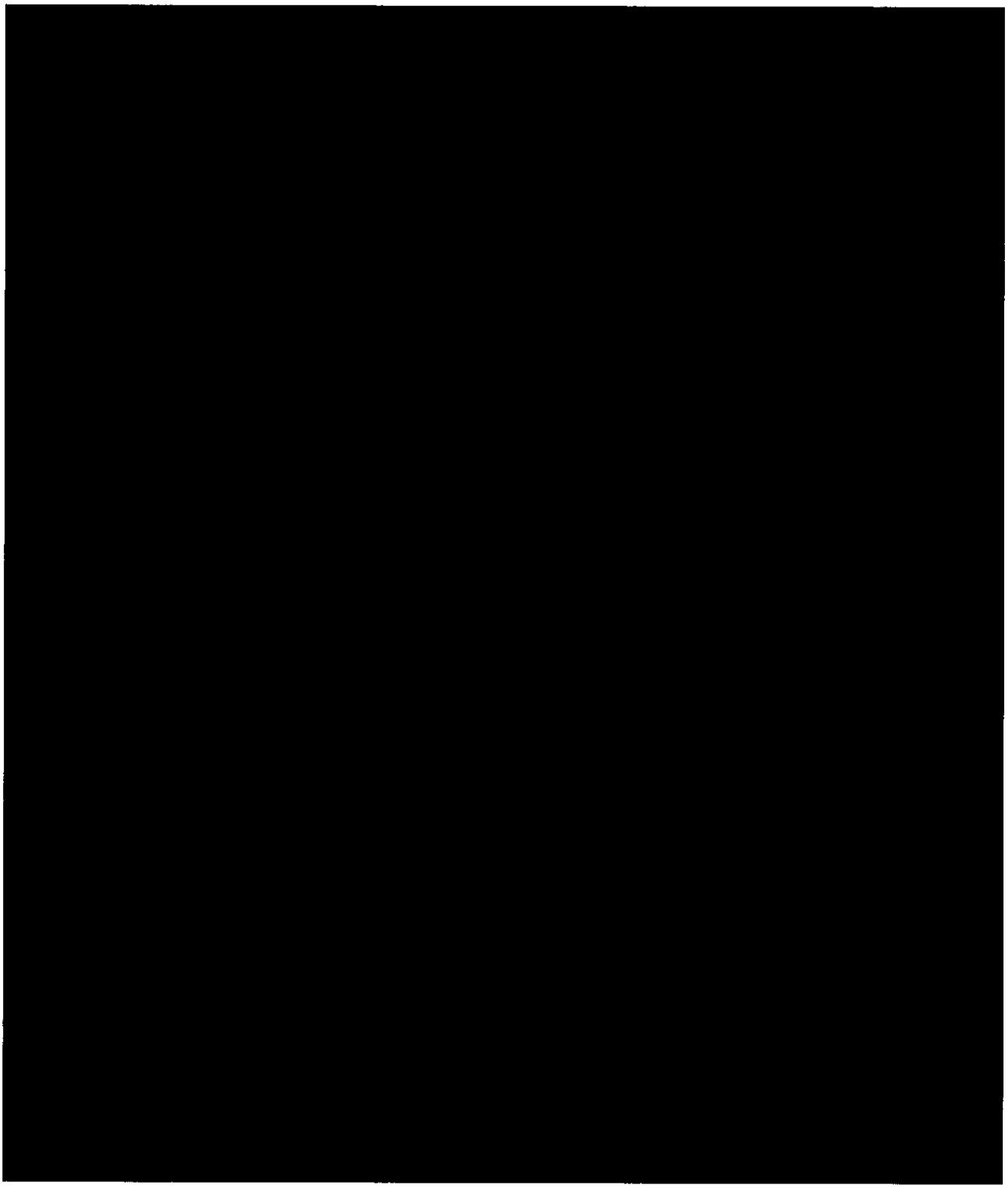
Date of this Inspection .....

Date Repairs Complete .....

VEH REG

LOCATION	CRACKS THIS INSP	(S)	(W) (E)	(W) (C)	(E)	REPAIR METHOD USED	REMARKS
6 Roofplate (1) (2) (3)							
7 Frontplate Upper (1) (2) (3)							
8 Frontplate Lower (1) (2) (3)							





CHAPTER 10 ANNEX B

STRESS CORROSION

CONTENTS

(continued)

CONTENTS (continued)

Appendix

INTRODUCTION

1 Annex B contains approved repair techniques and repair schemes for the treatment of aluminium armour which is subject to Stress Corrosion Cracking (SCC).

2 The Annex is presented in the form of Appendices. Appendices 1 to 8 detail repair techniques and the applicability of the techniques. Appendices 9 to 56 commence with an explanation of the applicability of the scheme.

WARNINGS AND CAUTIONS

3 Specific warnings and cautions are given in the text of the appendices, when required.

CHAPTER 10 ANNEX B APPENDIX 1

STRESS CORROSION – PROCEDURE FOR WELDING REPAIRS TO ALUMINIUM ARMOUR

CONTENTS

PROCEDURE FOR WELDING REPAIRS TO ALUMINIUM ARMOUR

Introduction

1 Repair by welding has, in certain circumstances, been approved as an acceptable procedure to rectify defects caused by SCC. Repair by welding is, however, to be kept to a minimum, and preference given to the alternative types of repair, where applicable.

GENERAL COMMENTS

2 For the welding of aluminium (particularly the solution heat treated, artificially aged, alloys of the Al Zn Mg family) to be carried out satisfactorily and efficiently, there must be a clear understanding of the problems involved.

Oxide film

[redacted]

4 The original oxide film formed at elevated temperatures during plate manufacture will have been removed prior to vehicle fabrication. The film which forms on the surface at ambient temperatures can be satisfactorily removed by diligent/vigorous wire brushing - either rotary machine or hand operated. The area scoured should extend at least 50 mm (2 in.) on either side of the weld zone. In order to prevent contamination, only stainless steel wire brushes are to be used. They should not have been used for any other purpose.

5 New plate for patches, test pieces etc., will first require special chemical or abrasive cleaning, details of which are obtainable through the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication).

Surface condition

6 When material has been shot peened in the course of initial production, some additional difficulty will be experienced in the welding operation due to lack of 'wetting' caused primarily by increased surface area affected by oxide films. However, satisfactory welds can be made providing that the recommended preparation and welding parameters are followed.

Cleanliness

WARNING

HAZARD TO HEALTH, ACETONE SOLVENT. AVOID BREATHING IN OR SKIN CONTACT. DO NOT INGEST. ACETONE SOLVENT CAN IRRITATE EYES, NOSE, THROAT AND LUNGS. GOGGLES AND RUBBER GLOVES ARE TO BE WORN WHEN USING ACETONE SOLVENT.

7 It is essential that, after wire brushing and immediately prior to welding, the surface around the area to be welded is wiped with solvent cleaner, Acetone (H1C1/6810-99-220-0846) using clean rag for each application.

Thermal conductivity

[redacted]

THE WELDING OPERATION

Preparation

9 Before welding, any exfoliation, paint or other contamination must be cleaned from the surrounding area for at least 150 mm (6 in.) either side of the weld line. The oxide film must then be removed as detailed in para 4 and the surface cleaned as given in para 7.

Process – MIG

10 Aluminium material in excess of 6 mm thick is to be welded using the METAL INERT GAS (MIG) process.

Equipment description

11 The equipment consists mainly of:

11.1 A power source (400 amperes - 100% duty cycle).

11.2 A drive unit for the welding wire.

11.3 A supply for the shielding gas.

11.4 A water cooled welding torch.

11.5 Protective clothing etc. for the operator.

12 The power source provides a dc output, either from a motor generator or by using rectified ac.

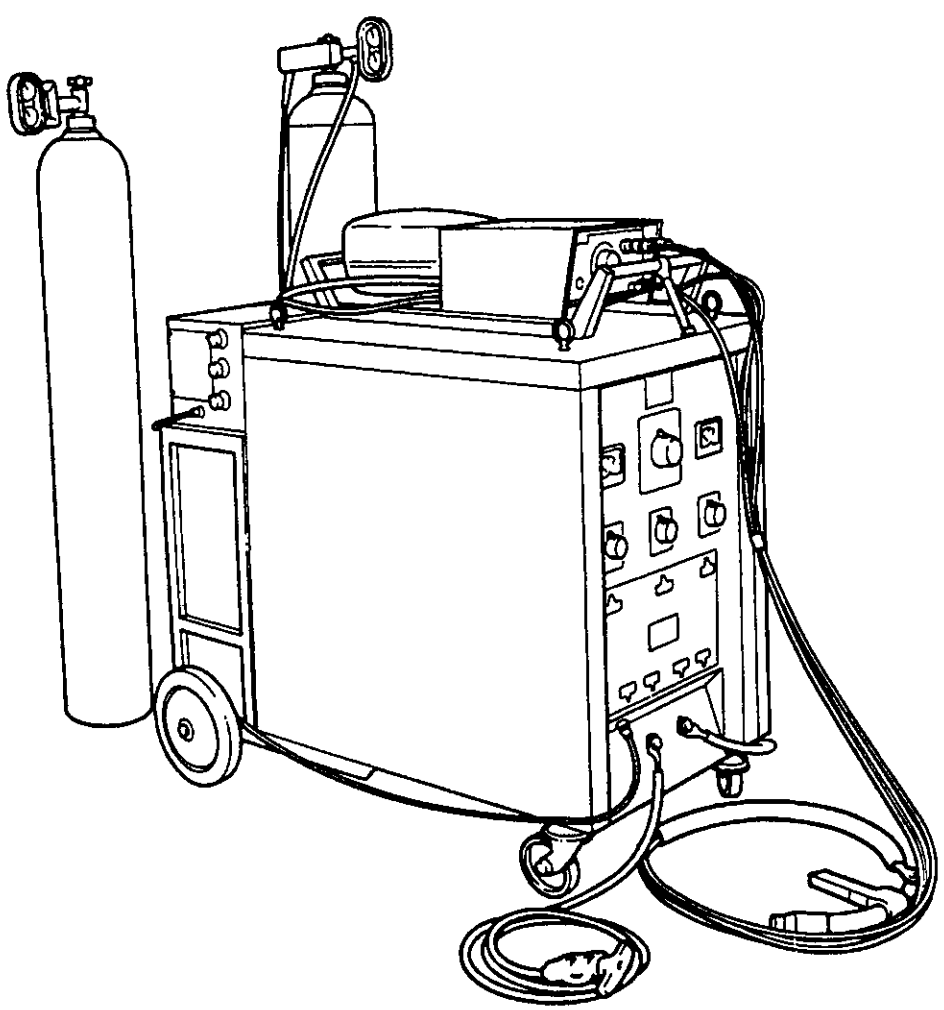
13 The welding wire is fed to the welding gun by a wire drive unit through a nylon or PTFE liner in a cable assembly. Within the cable assembly is the shielding gas supply tube and recirculating water cooling facility essential for the efficient operation of the welding torch at the currents needed for welding of thick aluminium plate.

14 The arc is self-compensating which maintains the arc length against slight movements of the welders hand. The welding equipment and accessories shall comply with BS 638.

Workshop conditions

15 The following conditions are to be maintained in the workshop:

[redacted]



V8404-51

Fig 1 Typical welding equipment

15.2 The work shall be protected adequately from draughts during welding.

15.3 Cleanliness and prevention of contamination is of paramount importance and precautions must be taken to ensure that the area in which the welding is carried out meets these conditions.

Techniques

16 The welding operation must be carried out by a REME approved welder, experienced in the MIG welding process, with an appreciation of the particular techniques necessary to achieve sound welds in thick aluminium structures and with a demonstrated capability of consistently applying those techniques. The importance of using the correct welding parameters and sound welding techniques cannot be stressed too highly. The MIG welding process can produce certain defects if steps are not taken to produce consistently sound welds.

16.1 Cold start. Once the arc has been struck and before the molten pool has become fully established, welding wire will be fed into the arc at between 100 – 150 mm/s (250 – 350 in/min). The high thermal conductivity of the parent material delays the formation of the molten pool, consequently the start of the weld within the first 12 mm (1/2 in.) will contain some weld metal not fully fused with the parent material, hence the term 'Cold Start'. Tack welds used for construction must not therefore be welded over, but removed before the construction weld is made.

16.2 Crater/End of Run Cracks. The most common defect in the MIG welding of aluminium is shrinkage and/or crater cracks at the end of the weld. The defects fall into two categories:

16.2.1 Cracks in starved craters. This is due to incorrect welding practice when a weld is stopped at the end of a weld run. The correct technique is to change direction of the welding arc by going back over the molten pool filling the crater before breaking the welding arc.

16.2.2 Shrinkage cracks. The only way the deposition of weld metal into the molten pool can be stopped in the semi-automatic MIG welding process is for the arc to be broken sharply. The weld pool is suddenly deprived of the heat source and exposed to the atmosphere. As a consequence, rapid cooling of the molten pool takes place and a shrinkage crack will appear at the end of the weld. Such cracks must be gouged out to leave sound material. They must not be welded over or obscured by peening as they may propagate in service life.

Buttering

17 Buttering is the coating of an edge with a layer of weld metal. The layer shall be at least 3 mm thick in the form of beads deposited by weaving from side to side of the edge or land in transverse direction. Longitudinal beads are not to be used. The buttering may leave an exposed edge or land not more than 6 mm wide.

18 Cleaning is to be carried out in accordance with para 7 and welding parameters given in para 19 are to be applied.

Typical welding parameters

[redacted]

20 Currents and voltages used will vary depending on the relative thicknesses of the components to be welded, size of weld, joint preparation, welding position etc. Typical parameters for welds likely to be encountered in the repair of CVR(T)'s are given in Table 1.

TABLE 1 TYPICAL WELDING PARAMETERS

Application (1)	Welding Parameters					Ahead/Behind Leading Arc (7)
	Type (2)	Current [Notes 2 & 4] (3)	Arc Voltage [Note 5] (4)	Terminal Voltage [Notes 2, 5 & 6] (5)	Gas flow m^3/hr (ft^3/hr) (6)	
Pad and Boss Attachments	Single Pass	340-350	28-29	36-37	1.13 (40)	12° - 15°
Exfoliation Gutters	Single Pass	330-340	27-28	35-36	1.13 (40)	12° - 15°
Crack 'V' Preparation (para 25)	Root Pass (1)	310-320	27-28	35-36	1.13 (40)	12° - 15°
	Capping Pass	310-320	27-28	35-36		
Crack - Slot with Backing Bar (para 27)	Root Pass	310-320	27-28	35-36	1.13 (40)	12° - 15°
	Capping Pass	310-320	28-29	36-37		
Buttering	Single Pass	250-260	27-28	35-36	1.13 (40)	12° - 15°

NOTES

(1) Initial Root Pass to be removed with rotary cutters if heavily contaminated with corrosive debris and Root Pass repeated.

(2) Amp/Volt meters to be calibrated.

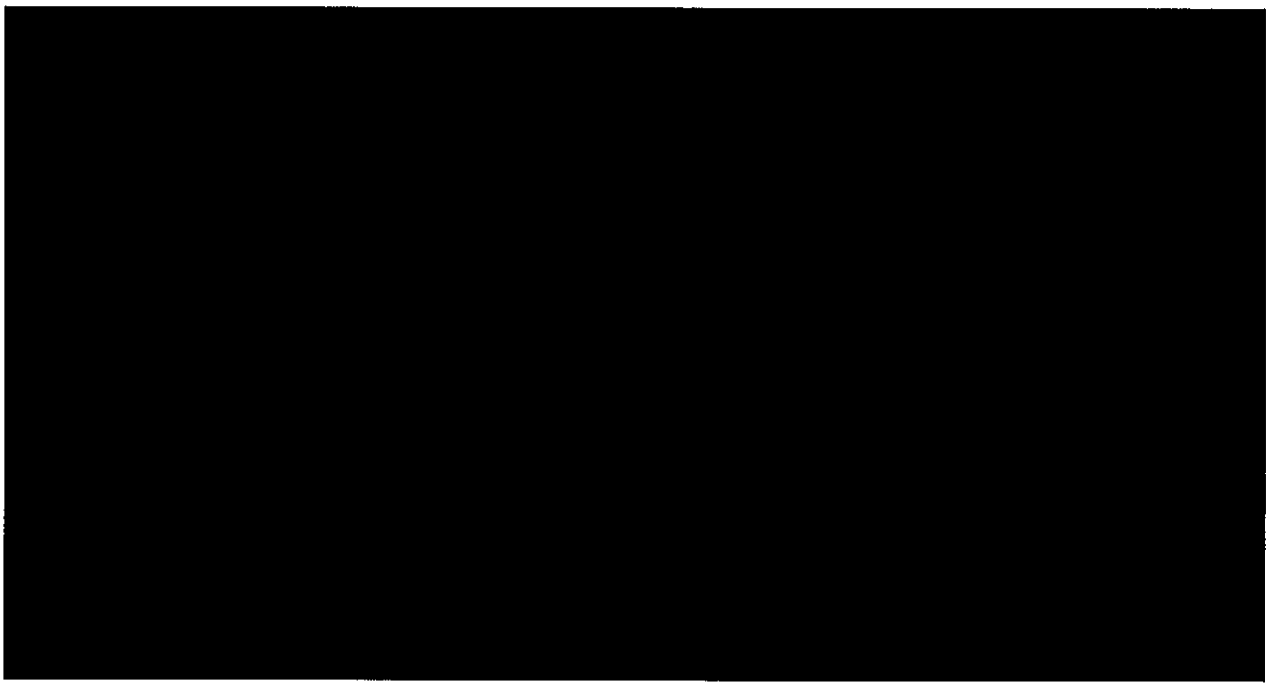
(3) Argon shielding gas to be high purity 99.999%.

(4) Welding wire 1.6 mm NG6 or NG61 shaved, layer wound on spools and protected from contamination by oil, moisture, etc.

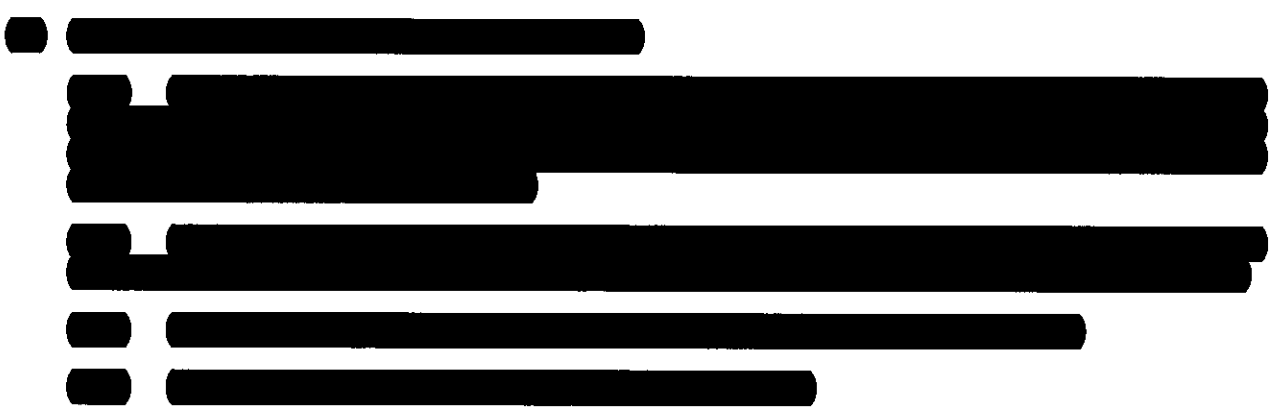
(5) Arc voltage is critical – terminal voltage depends on voltage drop in cable and machine and it is strongly recommended that the volt drop for each set of equipment is measured on high quality instruments from as close to the contactor tip as possible.

(6) Voltages quoted are for cable lengths of approx 5 metres (15 ft).

(7) In repair welding operations, the final adjustment of current and voltage depends on joint conditions (adequacy and accuracy of preparation), joint position and operator capability. In all situations the sound of the arc is indicative of good welding conditions. A good arc emits a very distinctive sharp 'frying' sound.



APPROVED LOCATIONS FOR WELD REPAIRS



22 Even if it is thought that welding is the appropriate repair technique for other damage, a special repair scheme must be requested (see Chap 10, para 8).

PROCEDURE

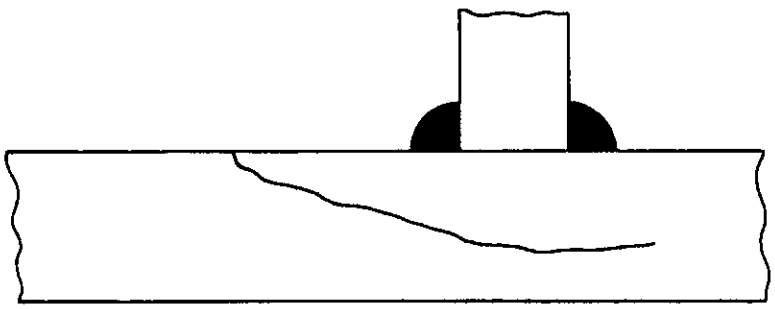
Pre-welding inspection

CAUTION

DYE PENETRANT. Dye penetrant is not to be used on any crack that may subsequently require welding. Dye penetrant is virtually impossible to remove and may cause porosity and blowholes if present in a crack subject to welding.

23 Determine the extent of the crack using an eddy current test. (Dye penetrant tests must not be used prior to welding).

24 Determine direction of crack by a thumb nail check. The material surface will tend to lift above the direction of crack propagation.



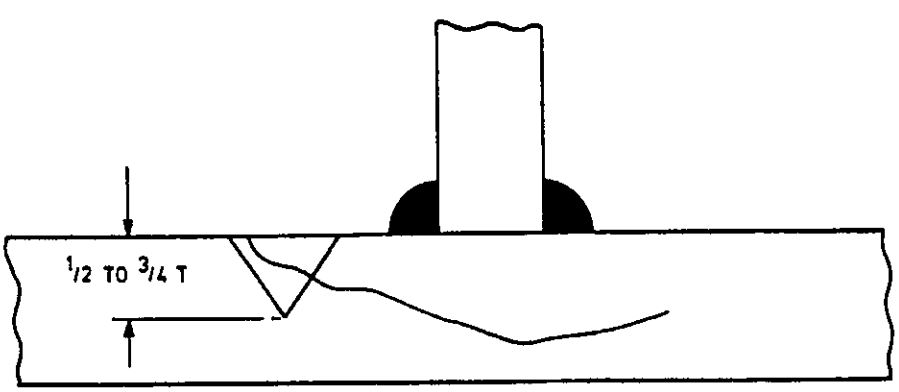
V8404-53

Fig 3a Typical oblique crack path

Crack path oblique to plate surfaces

25 Preparation. Prepare for welding as follows, (where T = Plate Thickness).

25.1 Cut back from inside surface to provide a welding Vee 80° to 90° included angle to a depth of 1/2 to 3/4 T minimum, using rotary cutters, hand tools or Alumina (AlO_2) grinding discs.



V8404-54

Fig 3b Vee preparation

26 Welding. Carry out welding procedure as follows:

26.1 Make root pass using recommended parameters (see Table 1), adjusted to suit local conditions.

26.2 Remove this weld pass using rotary cutters, since this weld will be very porous and will contain corrosive debris. The original preparation should be substantially achieved.

26.3 Make second pass in order to fill 1/2 to 3/4 of depth of Vee preparation.

NOTE

Again remove weld if weld metal still unsound.

26.4 Make capping pass to recommended welding parameters to provide slight reinforcement to weld run.

Crack path perpendicular to plate surface (Fig 4a)

V8404-55

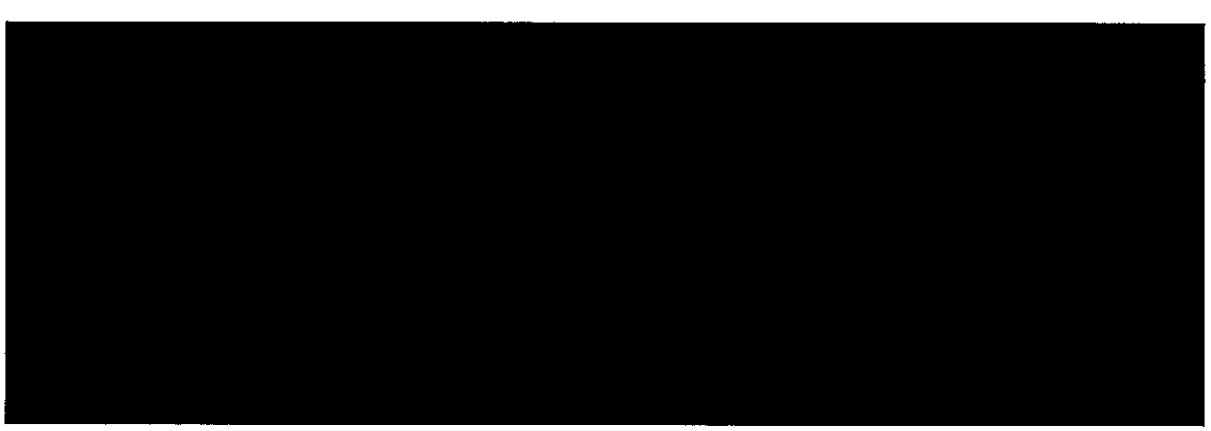
Fig 4a Typical through crack path

27 Preparation. Prepare for welding as follows, (where T = Plate Thickness).

27.1 Two methods of producing the slot are given, method used will depend on equipment available.

27.1.1 Drill 1/4 in. dia holes through plate along line of crack ensuring the holes overlap one another and that the line of holes extends at least 6 mm (1/4 in.) beyond the visible ends of the crack. Link up holes with each other to provide a slot 6 mm (1/4 in.) minimum width.

27.1.2 OR, machine out a slot 6 mm (1/4 in.) minimum width along the path of the crack, through the plate extending at least 6 mm (1/4 in.) beyond the visible ends of the crack.



27.2 Cut out a welding Vee at 90° to a width equal to the plate thickness (T).

27.3 Wire brush and clean plate surface for 50 mm (2 in.) either side of weld preparation (see paras 3 and 7).

27.4 Position steel backing bar (Fig 4c).

CAUTION

UNSATISFACTORY WELD. Copper bar must not be used as a backing bar during welding.

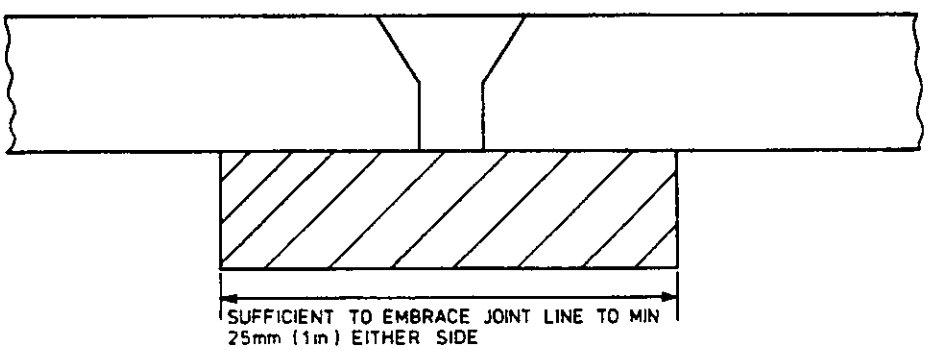


Fig 4c Backing bar

28 Welding. Carry out welding procedure as follows:

28.1 Make root pass using recommended parameters (see Table 1), adjusted to suit local conditions.

28.2 If found to be heavily contaminated with corrosive debris, remove weld using rotary cutters.

28.3 Make intermediate and capping passes using the recommended parameters, (adjusted to suit local conditions), to provide slight reinforcement.

28.4 Remove backing bar and dress plate surface previously covered by bar.

Pad or boss attachments

29 For some ARPs, pads or bosses need to be welded into position before fitting to hull. The welding parameters for this operation are given in Table 1.

30 Bosses up to 50 mm (2 in.) across are to be welded continuously and the end of run crater filled. Shrinkage cracks are to be removed.

31 Pads and bosses in excess of 50 mm (2 in.) are to be quartered in accordance with Fig 5 (A and B) and welded in an opposed welding sequence as shown on Fig 5.

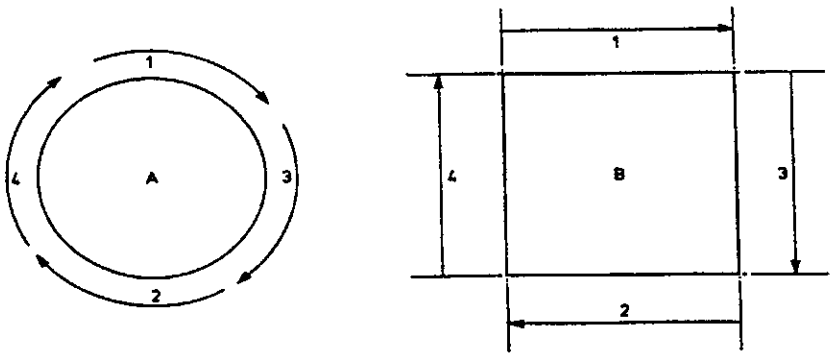


Fig 5 Opposed welding sequence

Post welding inspection

32 Welds are to be free from the following defects:

32.1 Cracks – crater, transverse and longitudinal.

32.2 Insufficient weld size.

32.3 Continuous undercut in excess of 10% of plate thickness.

32.4 Reinforcement in excess of 40% of plate thickness.

32.5 Root concavity or shrinkage groove in excess of 1.25 mm (0.005 in.) in butt welds or where backing bar has been used. At no point should the weld be thinner than the parent plate.

33 The surrounding plate surface for 100 mm (4 in.) either side of the weld is to be checked for cracks using the eddy current test.

Post welding treatments

34 The areas in Table 2 are to be treated as shown with the exception of internal bulkheads and torsion bar covers which do not require treatment.

TABLE 2 POST WELDING TREATMENTS

Area (1)	Type of Treatment [Note 1] (2)	Application (3)	Treatment Interval [Note 2] (4)
Short Transverse Edges within 1.5T of the weld (Note 3)	a. Buttering b. Shot peening c. Needle peening d. Roto peening	a. Preferred treatment b. Where buttering is not suitable c. Alternative to shot peening, especially for small areas. d. For close tolerance bores.	As short as possible up to a maximum of 7 days. (Note 4)
Surfaces within [redacted] of the weld. (Note 5)	a. Shot peening b. Needle peening	a. Preferred treatment b. Alternative to shot peening, especially for small areas.	As short as possible up to a maximum of 30 days

NOTES

(1) See Chapter 10, para 53 for details of methods.

(2) The maximum time allowed between the welding and the application of the treatment.

(3) Treatment also required if machining produces an edge within 1.5T of any weld. Treatment interval shall be measured from time of machining.

(4) If the treatment cannot be applied within 7 days, the susceptible are must be brush peened within this period, and the permanent treatment carried out within 30 days of the original welding or machining.

(5) This applies to both sides of the plate, even though the welding may only be on one side.

CHAPTER 10 ANNEX B APPENDIX 2

STRESS CORROSION – PROCEDURE FOR THE USE OF EPOXY FILLERS

CONTENTS

PROCEDURE FOR THE USE OF EPOXY FILLERS

General

1 These procedures are not to be used in areas subject to direct ballistic attack.

2 Any machining of the hull plate must be carried out prior to shot peening and the filler applied after shot peening.

3 It is imperative that the surface to which the filler is to be applied is free from oil, grease, moisture and debris. Degrease if necessary using an approved method.

Approved epoxy fillers

4 The following epoxy fillers are approved for use, they are listed in order of preference relative to the life of the repair.

4.1 Mazel Plastic filler, aluminium or silica filled (not iron) – 6MTI5/4940-99-965-9086.

4.2 Border Chemicals, Epophen Putty EP14 plus Hardener EP14.

4.3 Loctite, Aluminium filled epoxy putty – special for aluminium based alloys – A831/8030-99-772-7344.

Applications

5 Epoxy filler is used in the following situations.

For filling gaps in excess of 6.35 mm (1/4 in.) wide

5.1 For filling gaps in excess of 6.35 mm (1/4 in.) wide in the following locations:

5.1.1 Between ARPs.

5.1.2 Between ARPs and the hull structure.

5.1.3 In trepanned holes around bosses.

NOTE

Gaps less than 6.35 mm (1/4 in.) wide will have been filled with interface material.

5.2 Prior to filling, excess interface material is to be cleaned from the gap by scraping with a wooden or plastic instrument and then wiping with a cloth soaked in methylated spirits.

For filling cracks and voids

5.3 For filling cracks and voids in the joint between the turret cheek plates and the bottom spacer rail. In some turrets the welded joint design at the above point was inadequate and subsequent machining either revealed the joint line or left only a thin layer of metal over the joint line, which cracked. Prior to peening, gouge out the crack or void sufficiently to allow the filler to be applied. After peening, clean the surface and apply the epoxy filler (do not use fluidiser in this application). After curing for at least four hours, dress off the excess material to give a smooth surface, level with the parent plate.

Re-establishment of faces

5.4 Re-establishment of faces for bolt up repairs where turret roller mounting blocks, battery mountings etc, have become completely detached (see appendices 20, 21 and 23).

NOTE

This is only to be implemented on authority from the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication).

5.5 In some cases attachments welded to the hull floor may be found to be completely detached, or so undermined by cracking and subsequent corrosion deposits that it is impossible to use the repairs specified in appendices 20, 21 and 23). In such cases gouge out all corroded material, shot peen, clean and fill cavity to re-establish surface.

5.6 After curing for at least four hours, dress off the excess material to give a smooth surface, level with the parent plate. A new attachment should then be fitted, e.g. turret roller mounting block, or battery mounting block, using backing disc Part No. FV839787 and the method given in the relevant appendix.

NOTE

In order to remove the corrosion debris (Appendix 4, Fig 1) it is most important that the surface with which the epoxy filler will be in contact is cut back using a rotary burr or similar tool. Wire brushing is not adequate. If corrosion debris is left beneath epoxy filler, the corrosion reaction may continue and if so, the filler will be lifted out of the cavity.

5.7 In some instances it may be acceptable to use this procedure to fill cracks which have no mechanical significance and for which no other repair is possible. Authority for such repairs is to be obtained through the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication).

Technique for use of Mazel filler

6 Mix together equal proportions of parts A and B until there is no variation in colour.

7 Working life of the mixture is limited and dependant upon the ambient temperature, therefore mix no more material than can be used within one hour. Filler should not be mixed in quantities in excess of 100 g as the reaction between parts A and B is exothermic and the heat generated in large bulks of the mixture drastically reduces the working life. Flexible polythene containers make ideal mixing vessels.

8 Where the filler is to be applied to horizontal surfaces, it is permissible to add Fluidiser. This improves the consistency of the mixture and facilitates the filling of deep crevices or very shallow depressions, which are sometimes difficult to fill by trowelling if a 'stiff' mixture is used.

9 The epoxy filler should be allowed to set for at least four hours before any attempt is made to dress off the surface or carry out any machining operation on it.

CHAPTER 10 ANNEX B APPENDIX 3

STRESS CORROSION – METALOCK REPAIRS

CONTENTS

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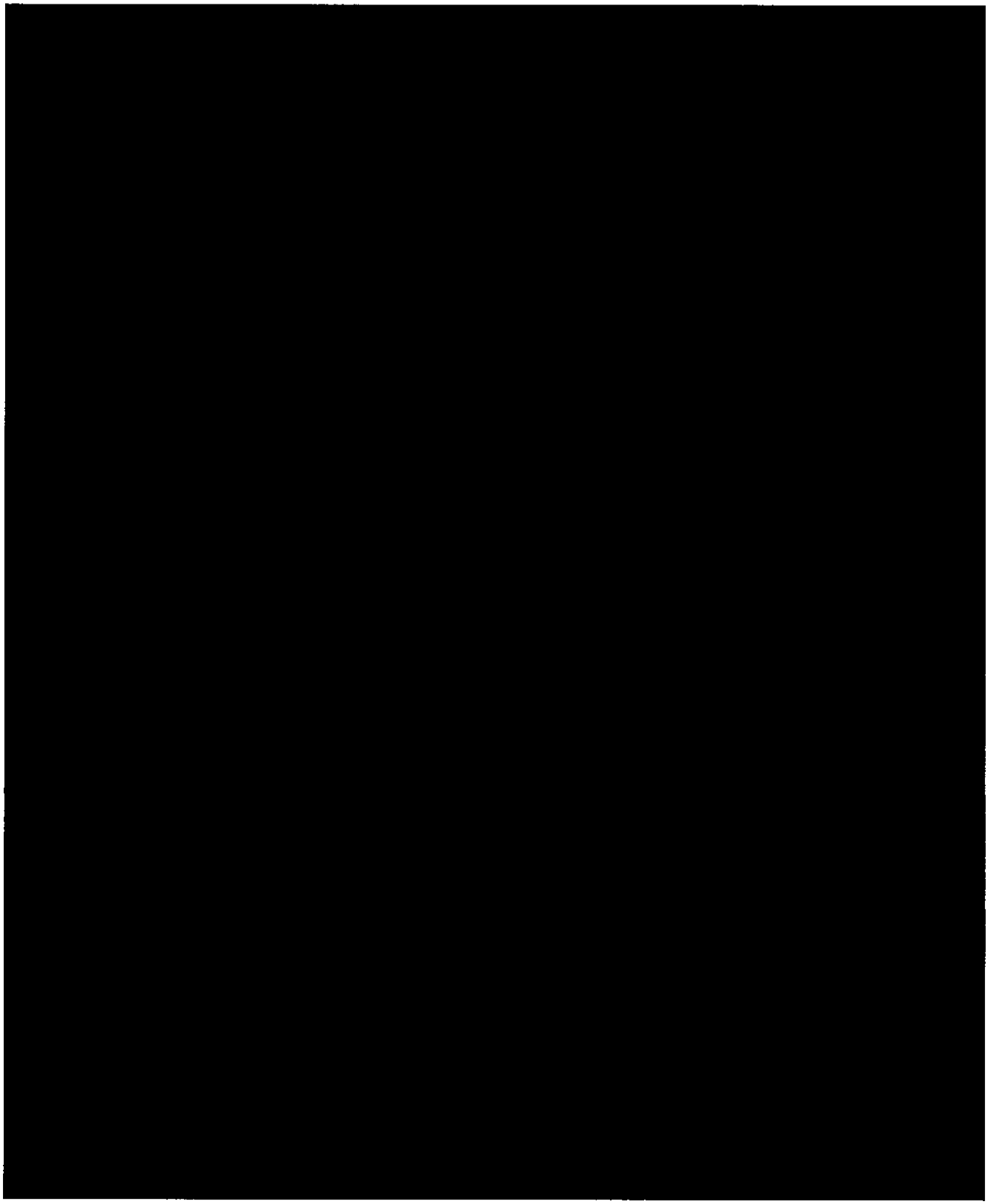


CHAPTER 10 ANNEX B APPENDIX 4

STRESS CORROSION – PROCEDURE FOR THE REPAIR OF EXFOLIATION CORROSION GUTTERS

CONTENTS

PROCEDURE FOR THE REPAIR OF EXFOLIATION CORROSION GUTTERS

General

1 The repair of exfoliation corrosion gutters is not a cosmetic exercise. It is essential that all corroded material is removed, otherwise the corrosion reaction will continue and the subsequent repair and/or protection will not be fully effective.

2 To remove the corroded material, the gutter is to be cut back using a rotary burr, similar tool or approved grinding wheel. Wire brushing is not sufficient.

NOTE

Where corrosion occurs in the fuel compartment area, it may be removed by peening.

3 As shown in Fig 1, the corrosion tends to penetrate sideways into the plate along the line of the grain. The gutter may therefore require cutting back further in width than it is increase in depth.

SELECTION OF REPAIR PROCEDURE

4 The procedure is selected on the basis of the maximum depth of gutter after cleaning, in relation to the plate thickness (T). (T = thickness of plate).

Depth less than T/5

5 When depth of gutter is less than T/5, clean out corrosion, shot peen and paint.

Depth greater than T/5 around welded attachments

6 When depth of gutter around a welded attachment is greater than T/5, use a standard repair scheme. If no standard repair scheme is available follow para 7 or 8.

Depth greater than T/5 and less than T/3

7 When depth of gutter is greater than T/5 and less than T/3, clean out corrosion, shot peen, fill gutter in accordance with Appendix 2 and paint.

Depth greater than T/3

8 When depth of gutter is greater than T/3 an external repair plate is required a special repair scheme should be applied for in accordance with Chap 10 para 8.

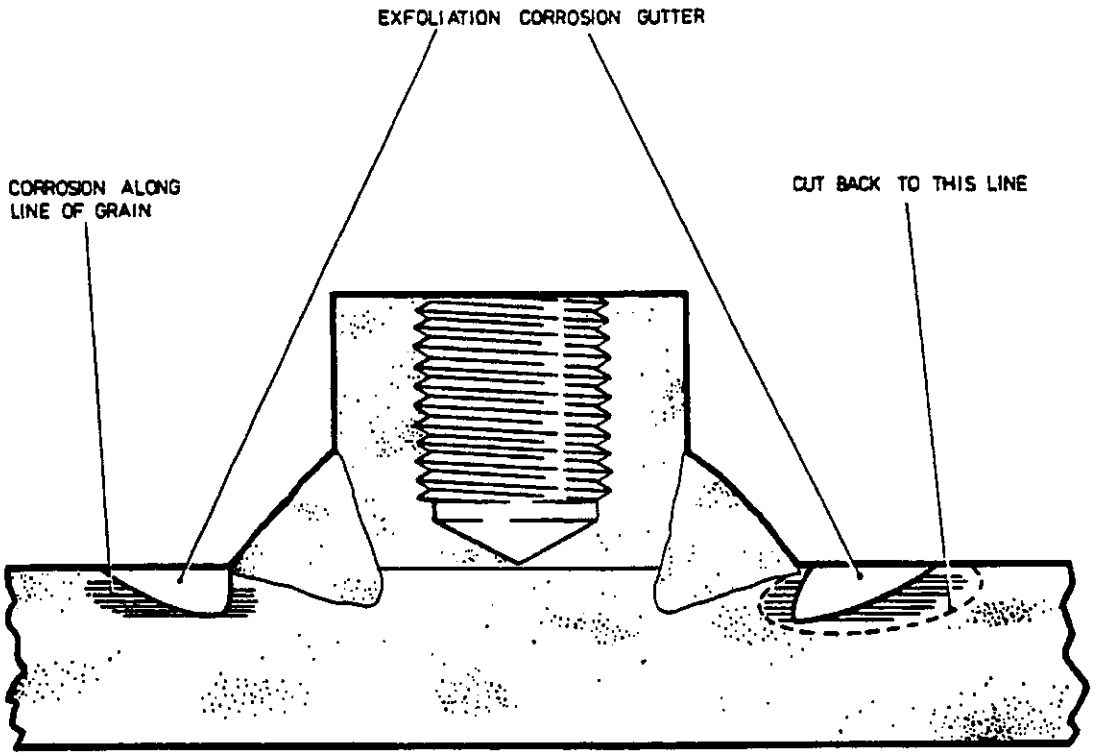
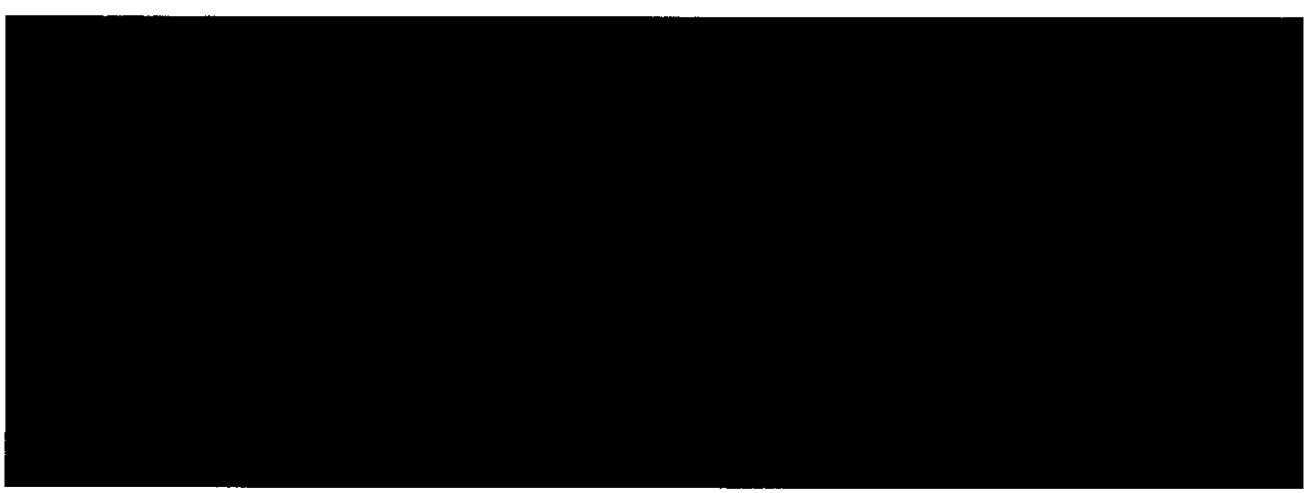


Fig 1 Cross section through typical corrosion gutter

CHAPTER 10 ANNEX B APPENDIX 5

STRESS CORROSION – SCREW/BOLT REPAIRS FOR SHORT TRANSVERSE CRACKING

CONTENTS



CHAPTER 10 ANNEX B APPENDIX 6

STRESS CORROSION – BOSSES

CONTENTS

To be published

CHAPTER 10 ANNEX B APPENDIX 7

STRESS CORROSION – BULKHEAD REPAIR BY GUSSET

CONTENTS

To be published

CHAPTER 10 ANNEX B APPENDIX 8

STRESS CORROSION – PLUGGED TOOLING HOLES

CONTENTS

CHAPTER 10 ANNEX B APPENDIX 9

STRESS CORROSION – TORSION BAR COVERS

CONTENTS

To be published

CHAPTER 10 ANNEX B APPENDIX 10

STRESS CORROSION – GEARBOX MOUNTING BRACKETS (FV 684616 AND FV 684617)

CONTENTS

GEARBOX MOUNTING BRACKETS (FV 684616 AND FV 684617)

Application

1 This repair method is to be used for the repair of cracks starting from the 1/2 in. UNC helicoiled holes in the mating faces of the gearbox mounting brackets. The repair need not be applied in full in all cases. It is permissible to omit certain of the 3/8 in. UNC countersunk socket headed screws, dependent upon the position and extent of the cracking. If the cracking is present in only one of the matting faces of a bracket, a bar nut need be fitted only at the cracked location, together with such compression screws as dictated by the extent and location of the cracking.

Drawing reference – FV 840365

Synopsis of method

2 Remove helicoils from holes affected by cracking. Fit Jig J 76365 to inboard face of affected mounting and secure through tooling holes in the mounting. Fit drill stand and drill to the appropriate drill stand location bush. Fit 11.1 mm (7/16 in.) diameter drill bush and drill though 11.1 mm (7/16 in.) diameter. Repeat operation using 20.2 mm (51/64 in.) diameter drill bush and drill and then 20.6 mm (13/16 in.) drill bush and drill. If a burr is thrown up at the edge of the drilled hole, fit 34.5 mm (1 3/8 in.) diameter spot face cutter and cut back to plate surface.

3 Remove Jig J 76365 and Jig J 76366 to inboard face of the mounting. Fit drill stand and drill to the appropriate drill stand location bush. Fit 8.1 mm drill bush at location to be drilled and drill through 8.1 mm (0.3189 in.) diameter. Countersink (or back countersink) at 80° included angle to 19.8 mm (0.781 in.) diameter on side of mounting nearest to the line of the crack. Counter bore 9.53 mm (3/8 in.) diameter to the depth of the crack from the counterbored side. Hand tap to 3/8 in. UNC. Repeat at other compression screw positions as indicated by the location and extent of cracking and the instructions given on drawing FV 840365 and Instruction Sheets.

4 If shotpeening facilities are available, peen bracket all over. If shotpeening facilities are not available, needle peen both mating faces and the rear edge of the bracket.

5 Fit bar nuts and compression screws using Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 as an interfacing medium and torque load all compression screws to 34 Nm (25 lbf ft).

6 Fit gearbox mounting cap, adjusting radial position of bar nuts as necessary, and then centre punch in four positions on the joint line between the bar nut and the mounting to retain.

NOTES

(1) When drilling the bar nut holes, frequent clearance of the drill is necessary when the original tapped hole is cut through to prevent 'seizure' of the drill.

(2) 'Elk' type drills are preferred as these give better swarf clearance and less torque load on the drill.

(3) If edge cracking has also occurred in regions of the mounting bracket not covered by this repair method, then the procedure for screw/bolt repairs for short transverse cracking, given in Appendix 5 can be applied in addition to this repair method.

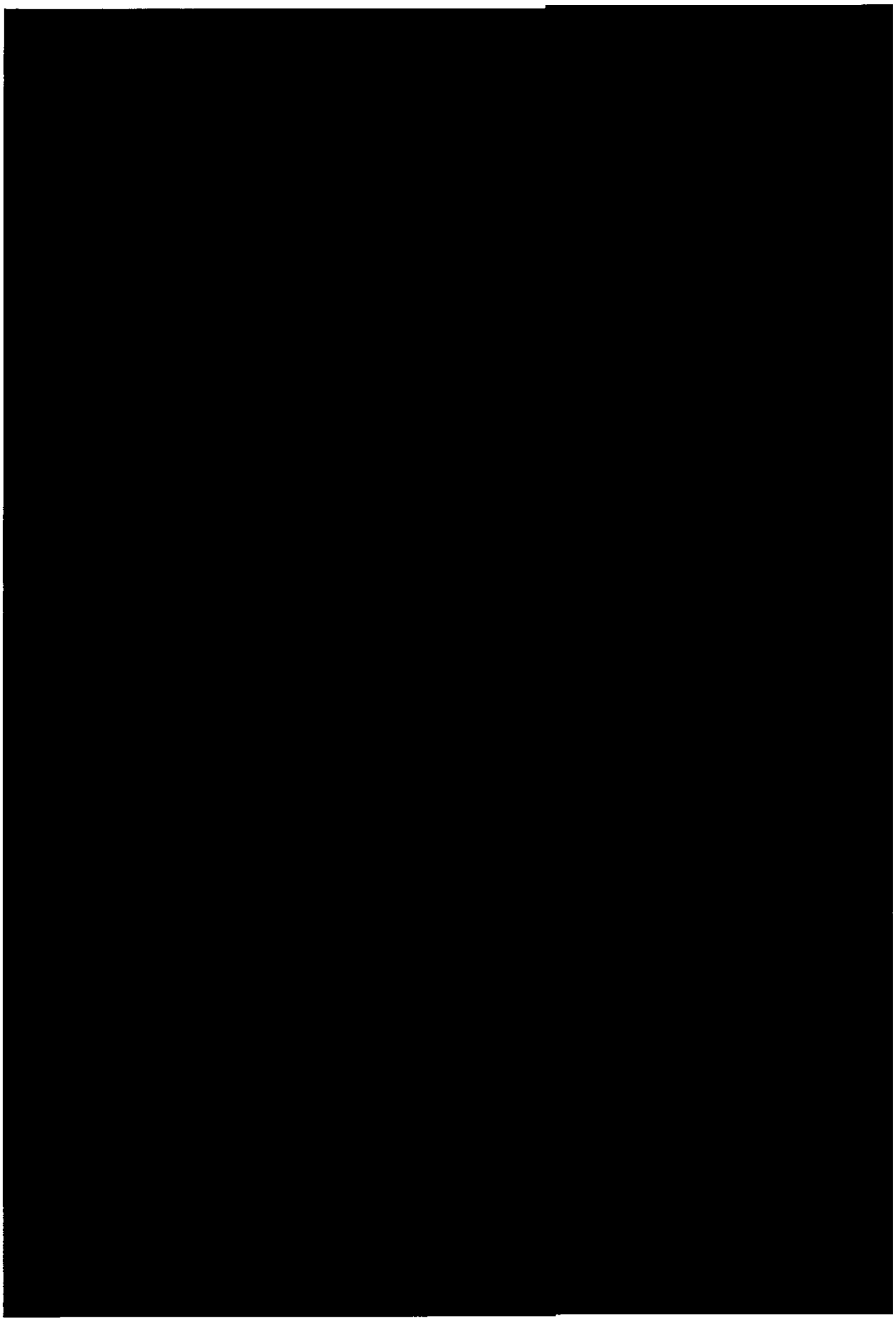


TABLE 1 REPAIR METHOD – GEARBOX MOUNTING FIXED BRACKETS

DRG. NO. FV 840365

Op. No. (1)	Operation (2)	Machine (3)	Tools (4)	Components (5)
1	Inspect joint faces of fixed brackets for cracks.			
1.1	On joint faces where cracking has occurred; the helicoil is to be removed and a bar nut fitted.			
1.1.1	On horizontal joint face where cracking has occurred: screws 'X' and 'X_1' are not to be fitted unless crack extends into area between centre line of bolt hole and inner diameter. Screw 'x_2' is only to be fitted if crack extends more than 38 mm (1 1/2 in.) down rear edge.			
1.1.2	On angle joint face where cracking has occurred; screw 'Z' is not to be fitted unless crack extends from centre line of bolt hole towards front of vehicle. Screw 'Z_1' is not to be fitted unless crack extends more than 1 in. down inner diameter. Screw 'Y' is not to be fitted unless crack is in 15 mm (0.6 in.) width hatched area, Fig 1.			
1.1.3	Apart from screw 'Y', screw heads to be in face nearest to crack.			
1.1.4	All threads to be relieved 9.53 mm (3/8 in.) dia to depth of crack.			
2	Machining for bar nuts where cracking has occurred in joint face.			
2.1	Using pointed tool, lever out leading thread of helicoil and remove helicoil using long nosed pliers.			
3	Horizontal joint faces, left hand and right hand.			
3.1	Position drill jig to inside face (recessed face) of fixed mounting bracket and locate with two clamping pins, lock up jig clamps.		Drill Jig J76365 Drill Stand Bracket J 76368	
	Position drill stand bracket and pistol drill into jig location bush and engage locking pin. Load in 11 mm (7/16 in.) dia drill and bush, and lock up chuck. Drill one hole 11 mm (7/16 in.) dia through. Change to 20.2 mm (51/64 in.) dia drill and bush. Drill through 20.2 mm (51/64 in.) dia. Change to 20.6 mm (13/16 in.) dia drill and bush.	Pistol Drill J 76367	11 mm (7/16 in.) dia S/Shank Drill 20.2 mm (51/64 in.) Drill ST 47765 20.6 mm (13/16 in.) dia Drill ST 47768 34.5 mm (1 3/8 in.) dia Spot face Cutter ST 42555	

(continued)

TABLE 1 REPAIR METHOD – GEARBOX MOUNTING FIXED BRACKETS (continued)

DRG. NO. FV 840365

Op. No. (1)	Operation (2)	Machine (3)	Tools (4)	Components (5)
	Drill through one hole 20.6 mm (13/16 in.) dia. NOTE Good finish required. Change to 34.5 mm (1 3/8 in.) dia spotface cutter. Spotface 34.5 mm (1 3/8 in.) dia to clean up. Repeat Op. 3.1 for opposite side, if required.			
3.2	Repeat 3.1 for angle joint faces, left hand and right hand, if required.			
4	Machining for screwing up cracks which have occurred in fixed mounting brackets. Where necessary delete holes not required.			
	Horizontal joint faces left hand and right hand. Position drill jig to inside face (recessed face) of mounting bracket. Fit location and clamping bolts and lock up. Lock up jig clamps.	Pistol Drill J 76367	Drill Jig J 76366 Drill Stand J 76368	
4.1	Hole marked 'X', if required. Position drill stand into jig location. Bush and lock up.			
	Load in 8.1 mm dia drill and bush. Drill one hole 8.1 mm (0.3189 in.) dia through. Ascertain side nearest to crack line.		8.1 mm dia Drill ST 47766 C'sk Tool ST 47764	
	Change to countersink or back countersink tool.		Back C'sk Tool ST 47763	
	[redacted] on side nearest to crack line.		C'bore Tool ST 47767	
	Change to Counterbore tool. Counterbore 9.53 mm (3/8 in.) dia to crack depth on countersunk side. Remove drill stand and drill.			
	Hand tap 3/8 in. – 16 UNC-2b through from counterbored side.		3/8 in. – 16 UNC-2b Tap	

(continued)

TABLE 1 REPAIR METHOD – GEARBOX MOUNTING FIXED BRACKETS (continued)

DRG. NO. FV 840365

Op. No. (1)	Operation (2)	Machine (3)	Tools (4)	Components (5)
4.2	Hole marked 'X_1', if required. Repeat as Op. No. 4.1. Note Counterbore and countersink may be in either side of bracket as crack determines.			
5	Angled joint faces left hand and right hand. Position drill jig to inside face (recessed face) of mounting bracket. Fit location and clamping bolts and lock up. Lock up jig clamps.	Pistol Drill J 76367	Drill Jig J 76366 Drill Stand J 76368	
5.1	Hole marked 'Z', if required. Position drill stand into jig location, bush and lock up. Load in 8.1 mm dia drill and bush. Drill one hole 8.1 mm (0.3189 in.) dia through. Ascertain side nearest to crack line. Change to countersink or back countersink tool. [redacted]on side nearest crack line. Change to counterbore tool. Counterbore 9.53 mm (3/8 in.) dia to crack depth on countersunk side. Remove drill stand drill. Hand tap 3/38 in. – 16 UNC-2b through from counterbored side.		8.1 mm dia Drill ST 47766 C'sink Tool ST 47764 Back C'sk Tool ST 47763 C'bore Tool ST 47767 3/8 in. – 16 UNC-2b Tap	
5.2	Hole marked 'Z1' if required. Repeat as for Op No. 5.1. Note Counterbore and countersink may be in either side as crack determines.			
5.3	Hole marked 'Y', if required. Drill flat bottom hole 8.1 mm dia to depth of rebate, then proceed as Op. No. 5.1. Note Counterbore and countersink are in outside face only. (Opposite to recessed face).		8.1 mm dia End Mill ST 47798	

(continued)

TABLE 1 REPAIR METHOD – GEARBOX MOUNTING FIXED BRACKETS (continued)

DRG. NO. FV 840365

Op. No. (1)	Operation (2)	Machine (3)	Tools (4)	Components (5)
5.4	Blank off all holes for screwing up cracks using slave screws as follows: Socket head countersunk 3/8 in. UNC x 1 12/ in. As required Max. 5 per bracket. Socket head countersunk 3/8 in. UNC x 1 in. As required max. 1 per bracket. Torque tighten screws to 34 Nm (25 lbf ft). Blank off bar nut holes using slave bolts as follows: Bolt 1/2 in. UNF x 2 1/2 in. As required. Washer plain 1/2 in. As required. Nut 1/2 in. A/F As required. Max 2 bolts per bracket.		7/32 in. Hex Drive Key Torque Wrench	Screws: As required (see Op column) Bolts: As required (see Op column)
6	Needle peen joint faces and rear end face. OR If shotpeening facilities are available carry out Op. Nos. 7, 8 and 9.	Needle peen		
7	Wash.	Wash		
8	Shotpeen all over.	Shotpeen		
9	Wash.	Wash		
10	Inspect and ensure all shot has been removed from hull.	Inspection		
11	Remove all slave blanking screws and bolts etc and fit socket head countersunk screws 3/8 in. UNC x 1 in. and 3/8 in. UNC x 1 1/2 in., after coating screw threads and underside of screw heads with JC5A. Torque tighten to 34 Nm (25 lbf ft).		7/32 in. Hex Drive Key Torque Wrench	Screws: 3/8 in. UNC x 1 in. lg. Skt hd C'sk (Zinc plate,passivated) As required 3/8 in. x 1 1/2 in. lg. Skt hd C'sk (Zinc plate, passivated) As required JC5A

(continued)

TABLE 1 REPAIR METHOD – GEARBOX MOUNTING FIXED BRACKETS (continued)

DRG. NO. FV 840365

OP. NO. (1)	OPERATION (2)	MACHINE (3)	TOOLS (4)	COMPONENTS (5)
12	Fit bar nuts (FV 840530) as required, after coating bar nuts with JC5A. Ensure that threads line up with hole in joint faces and bar nut end faces are flush with fixed bracket faces. (Thread offset in bar nut).			Bar nut FV 840530 As required Max 2 per bracket
	Refit existing top bracket and bolts and lock up to 68 Nm (50 lbf ft).		3/8 in. A/F Hex Skt. Torque Wrench	
	Centre pop bar nuts in four places on inside face to retain.			
13	Inspect.	Inspection		

CHAPTER 10 ANNEX B APPENDIX 11

STRESS CORROSION - REPAIRS TO GEARBOX MOUNTING/NOSE PLATE – BOLTED CVR(T) ALL VARIANTS

CONTENTS

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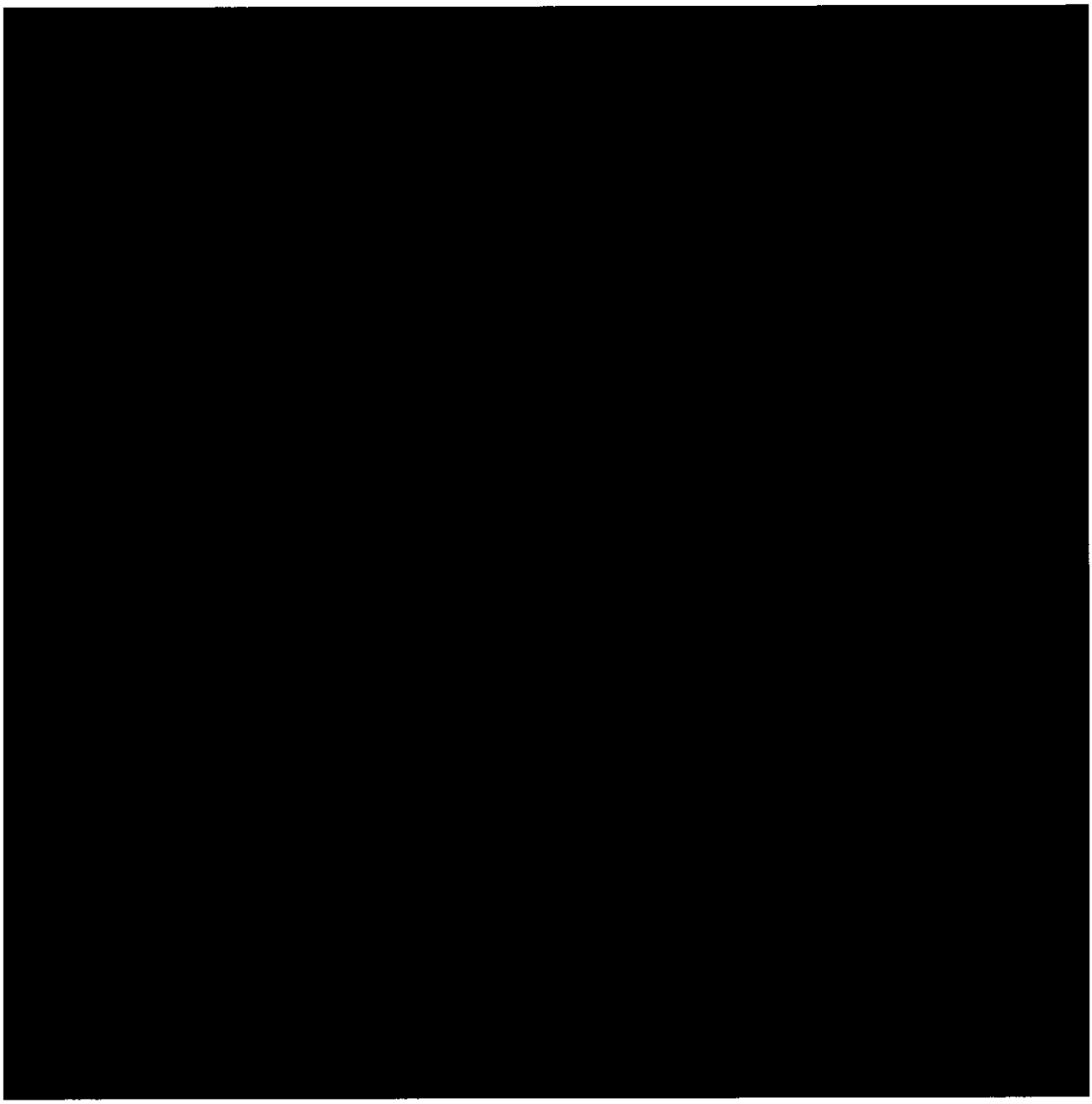

CHAPTER 10 ANNEX B APPENDIX 12

STRESS CORROSION – GEARBOX MOUNTING/NOSEPLATE – WELDED

CONTENTS

To be published

CHAPTER 10 ANNEX B APPENDIX 13

STRESS CORROSION – GEARBOX MOUNTING/FLOORPLATE – (BOLTED, WITH REPAIR PLATE)

CONTENTS

FLOOR – GEARBOX MOUNTING – METHOD E1

Application

1 All CVR(T). This repair is to be used where floor plate cracks are present around one or both of the gearbox mounting brackets.

2 Where cracks are also present at the gearbox mounting bracket/nose plate interface, Appendix 11 should be applied prior to this repair.

3 Where a crack is present in the floor plate around the Driver/Engine compartment bulkhead rail (FV 813506), repair at Appendix 18 should be applied prior to repair method in this appendix.

Drawing reference – FV 839781

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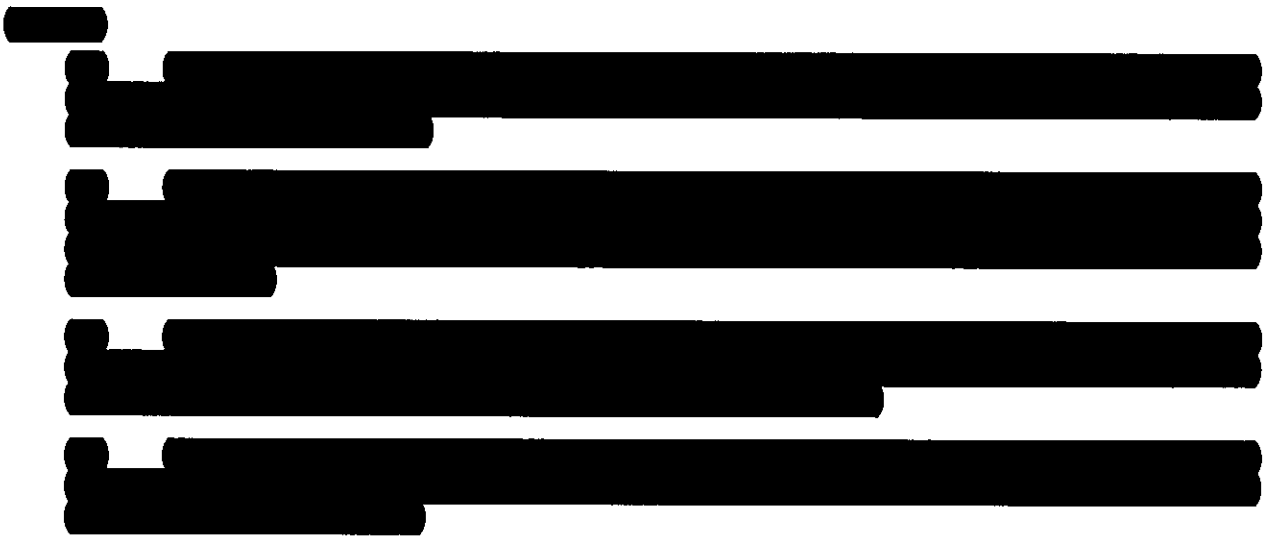


Parts required

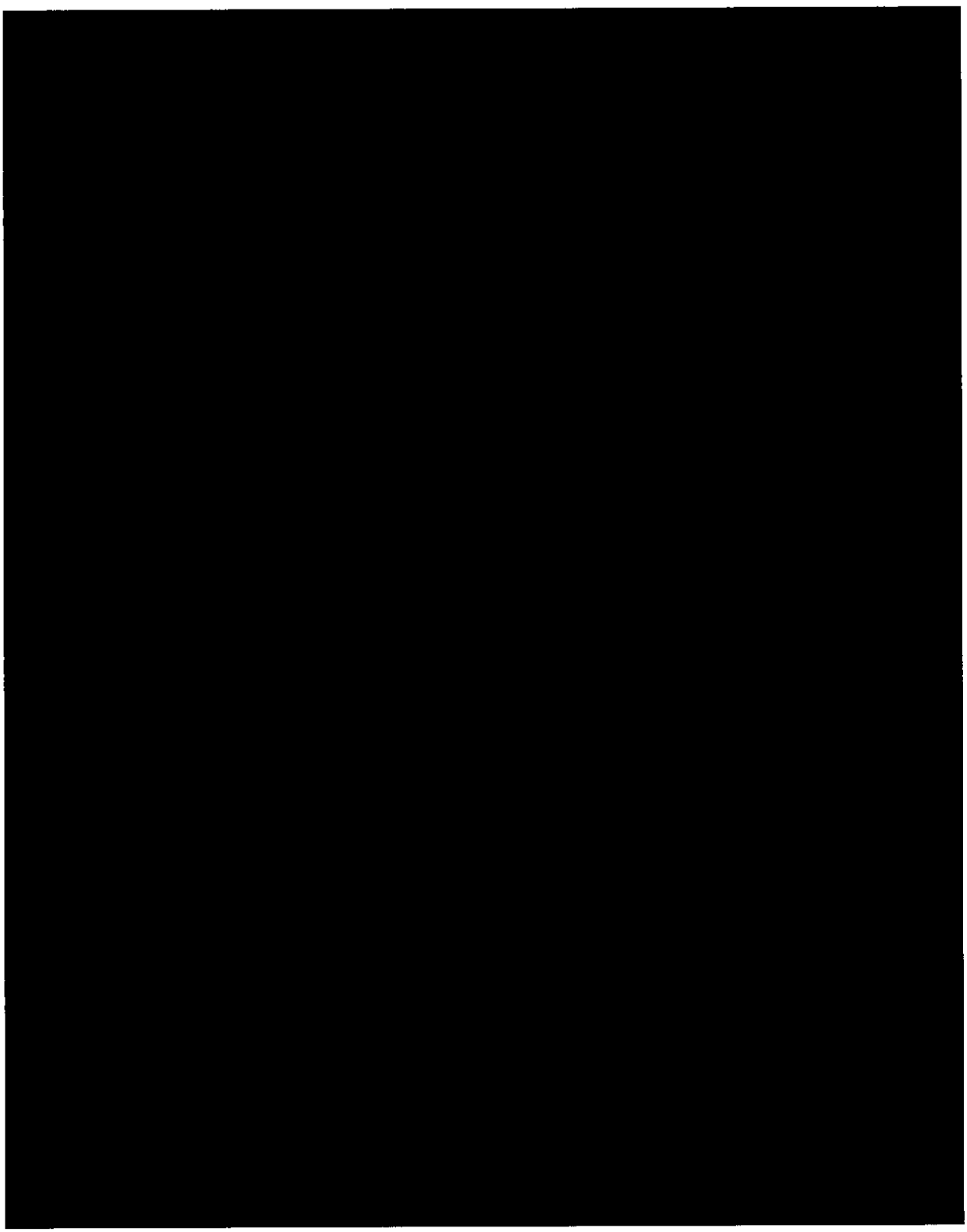
6 Parts required as follows:

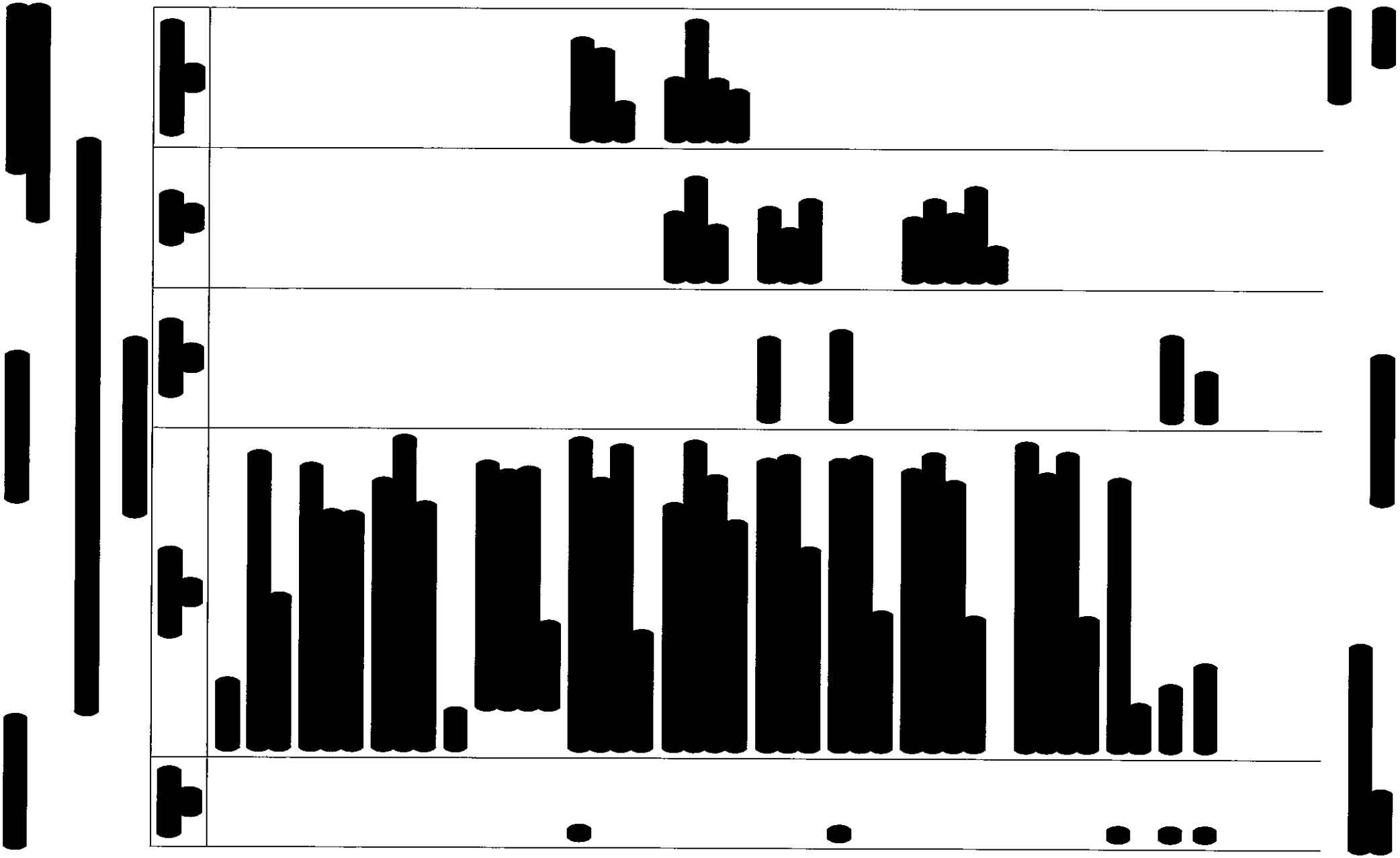
6.1	Repair Plate FV 839780	9CVT/2510-99-829-9430	1 off
6.2	Screw C' sk Skt Head (Zinc plate, passivated) 3/8 in. UNC x	G1B/5305-99-500-0000	28 off (Note 1)
6.3	Screw C'sk Skt Head (Zinc plate, passivated) 3/8 in. UNC x		8 off (Note 1)
6.4	Screw Hex Head (Zinc Plated) 5/16 in. UNC x 1 in. lg.		3 off (Note 2)
6.5	Special Washer FV 840185	9CVT/2510-99-829-9431	1 off (Optional)
6.6	Hermetite Jointing Compound (DTD 900/4573)	H1b/8030-99-225-0242	As required
6.7	Sealant, dissimilar metals JC5A	H1ATS/8030-99-168-8255	As required

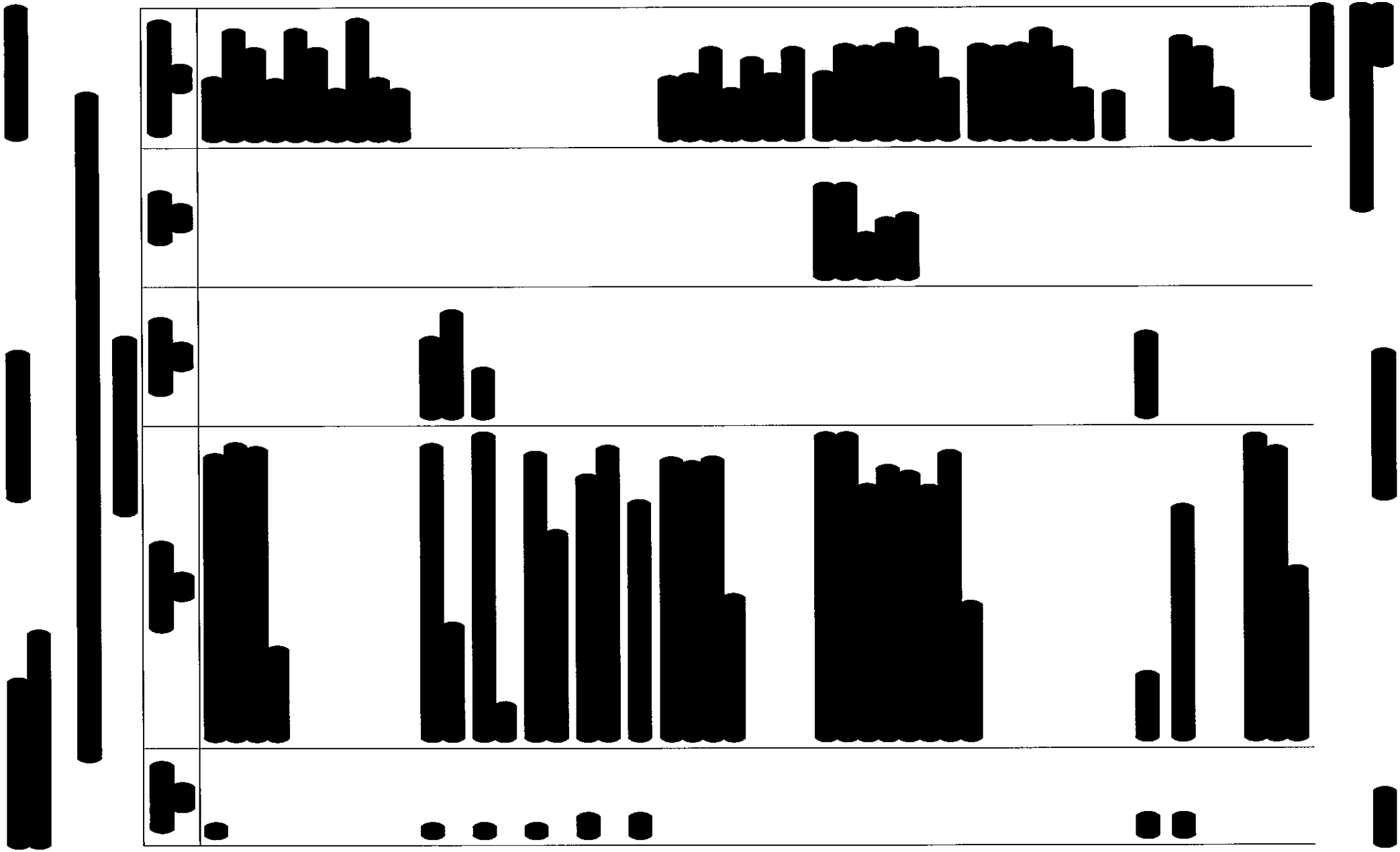
NOTES

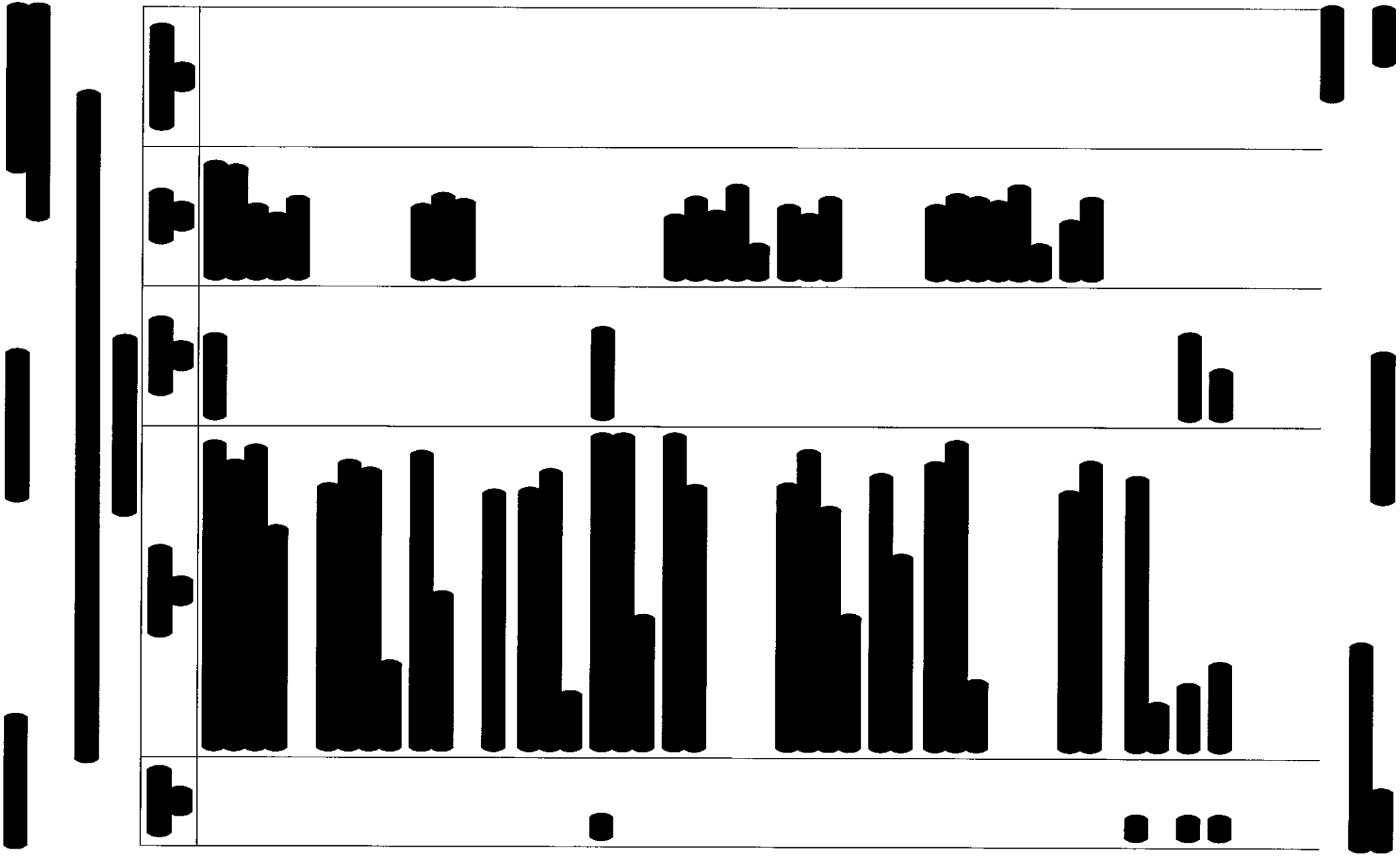
(1) Includes slave screws to be fitted during peening operation and replaced with remaining used screws. If the vehicle does not require peening, only half the quantity of screws will be needed.

(2) Slave screws to be fitted during peening operation. If the vehicle does not require peening, these will not be required.









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CHAPTER 10 ANNEX B APPENDIX 14

STRESS CORROSION – GEARBOX MOUNTING/FLOORPLATE – BOLTED

CONTENTS

To be published

CHAPTER 10 ANNEX B APPENDIX 15

STRESS CORROSION – GEARBOX MOUNTING/FLOORPLATE – WELDED

CONTENTS

To be published

CHAPTER 10 ANNEX B APPENDIX 16

STRESS CORROSION – FLOOR - ENGINE MOUNTINGS

CONTENTS

FLOOR - ENGINE MOUNTINGS

Application

1 All CVR(T). This repair is to be carried out if cracks are present in the floor plate around any of the engine mountings. If the floor plate is free of cracks around either, both front engine mountings or, both rear engine mountings, then the Repair Plate FV2328580 may be cut at the split line scribed on the plate and the required half only fitted.

2 The boss used to secure the pipe for the Ki-gas pump (marked BB on drawing FV 839785) is not required. If found to be fitted, it is to be removed from the Repair Plate as indicated in the operation sheet.

3 By fitting the complete or the rear half of the repair plate on Salamander (Scorpion) and Scimitar vehicle access to enable the repair of the RH front battery mounting (marked DD on drawing FV 839785) is denied. This repair is facilitated within operation numbers 5 and 13 and 35 and 43 respectively of this appendix.

Drawing reference – FV 839785

Synopsis of method

4 This repair utilises a repair plate to which engine mounting bosses and the boss for the Ki-gas pump have been welded. The welded assembly is fitted to the underside of the floor plate so that the new mounting bosses protrude through holes in the floor plate produced by cutting out the original bosses. The positioning of the Repair Plate is critical and datums are given in the operating instructions to facilitate accurate fitting.

5 Hermetite Jointing Compound is used between the repair plate and the hull and all of the screws are fitted using Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255.

NOTES

(1) If, completion of the repair, gaps are present between the Repair Plate and the lower side plates of the hull, or between it and any other Repair Plate and these gaps are in excess of 6 mm, then they are to be filled using Epoxy filler as detailed in Appendix 2.

(2) If the gaps are less than 6 mm wide, they are to be filled with Hermetite Jointing Compound.

Parts required

6 Parts required as follows:

6.1	Repair Plate FV2328580		Off
6.2	Screw C'sk Skt Head (Zinc plate, passivated) 3/8 in. UNC x [redacted]	[redacted]	Salamander (Scorpion) & Scimitar (Note 1) 40 off (see Note 2) or 20 off (see Notes 3 & 4) Other variants (Note 1) 44 off (see Note 2) or 20 off (see Note 3) or 24 off (see Note 4)
6.3	Screw C'sk Skt Head (Zinc plate, passivated) 3/8 in. UNC x [redacted]	[redacted]	Salamander (Scorpion) & Scimitar 4 off (see Notes 2 & 4)
6.4	Hermetite Jointing Compound	H1b/8030-99-225-0242	As required.
6.5	Sealant, dissimilar metals JC5A	H1ATS/8030-99-168-8255	As required.
6.6	Epoxy metal filler		As required.

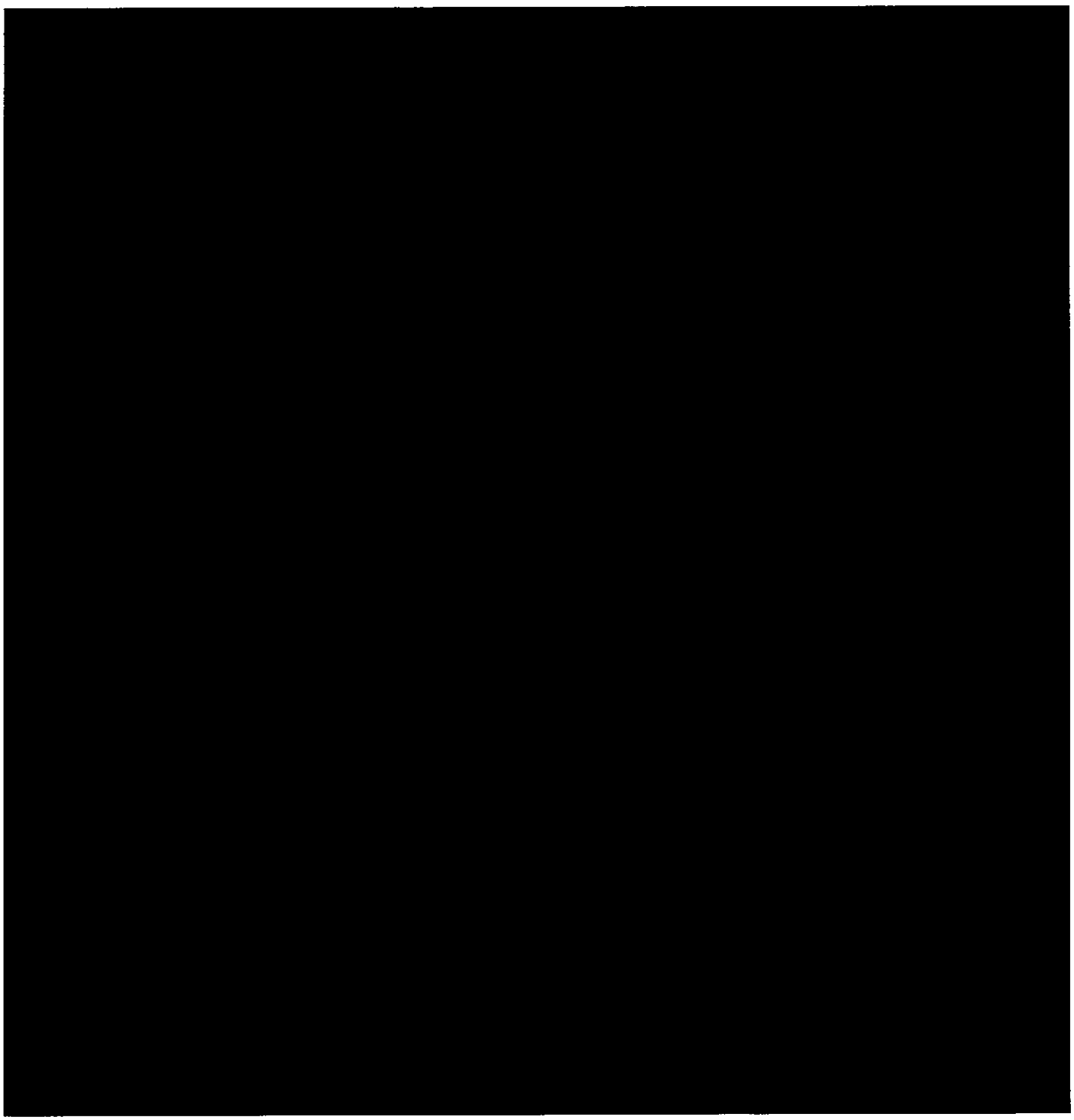
NOTES

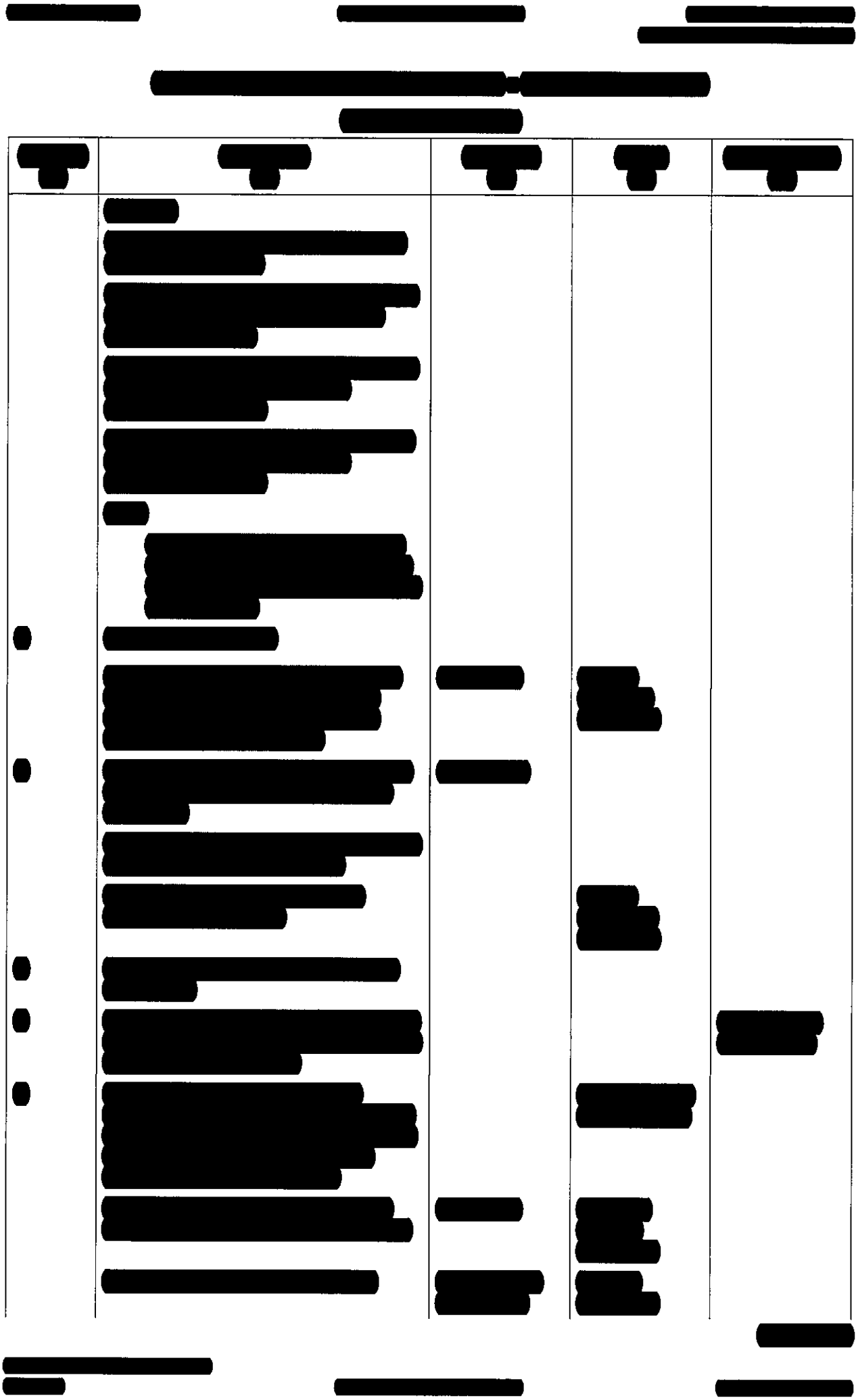
(1) Includes slave screws to be fitted during peening operation and replaced with remaining used screws. If the vehicle does not require peening, only half the quantity of screws will be needed.

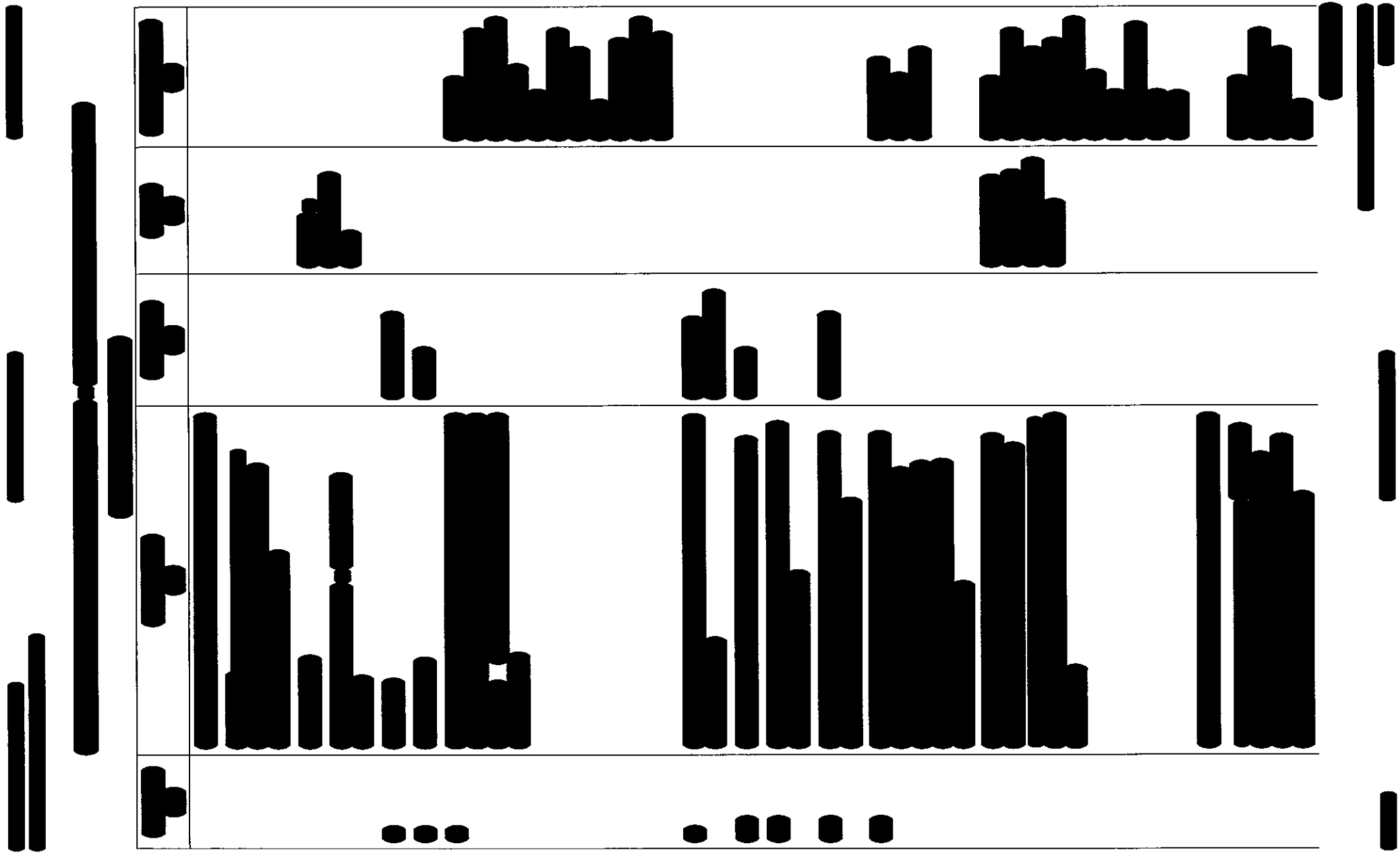
(2) Quantity required if complete Repair Plate is to be fitted.

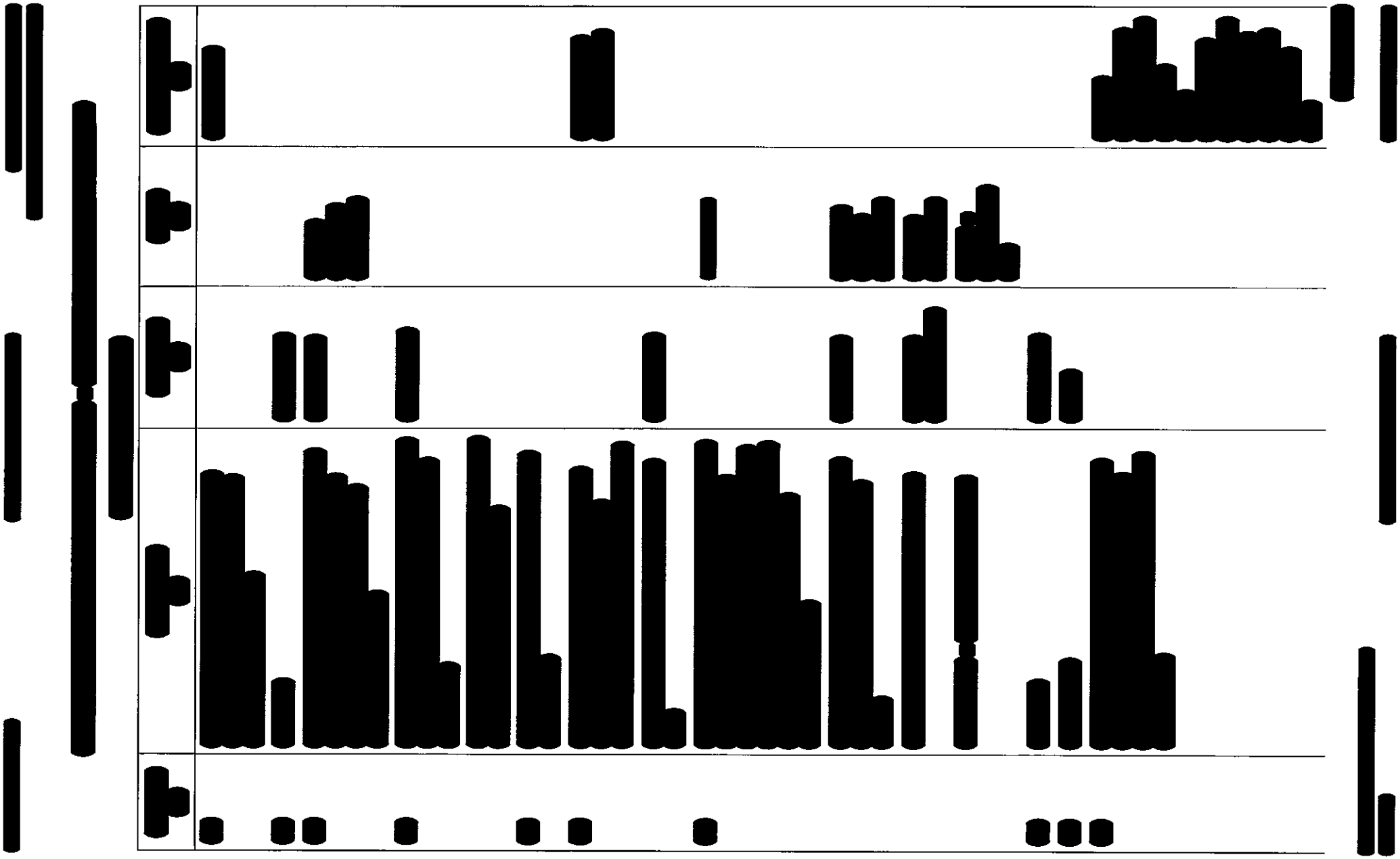
(3) Quantity required if front section only of Repair Plate is to be fitted.

(4) Quantity required if rear section only of Repair Plate is to be fitted.









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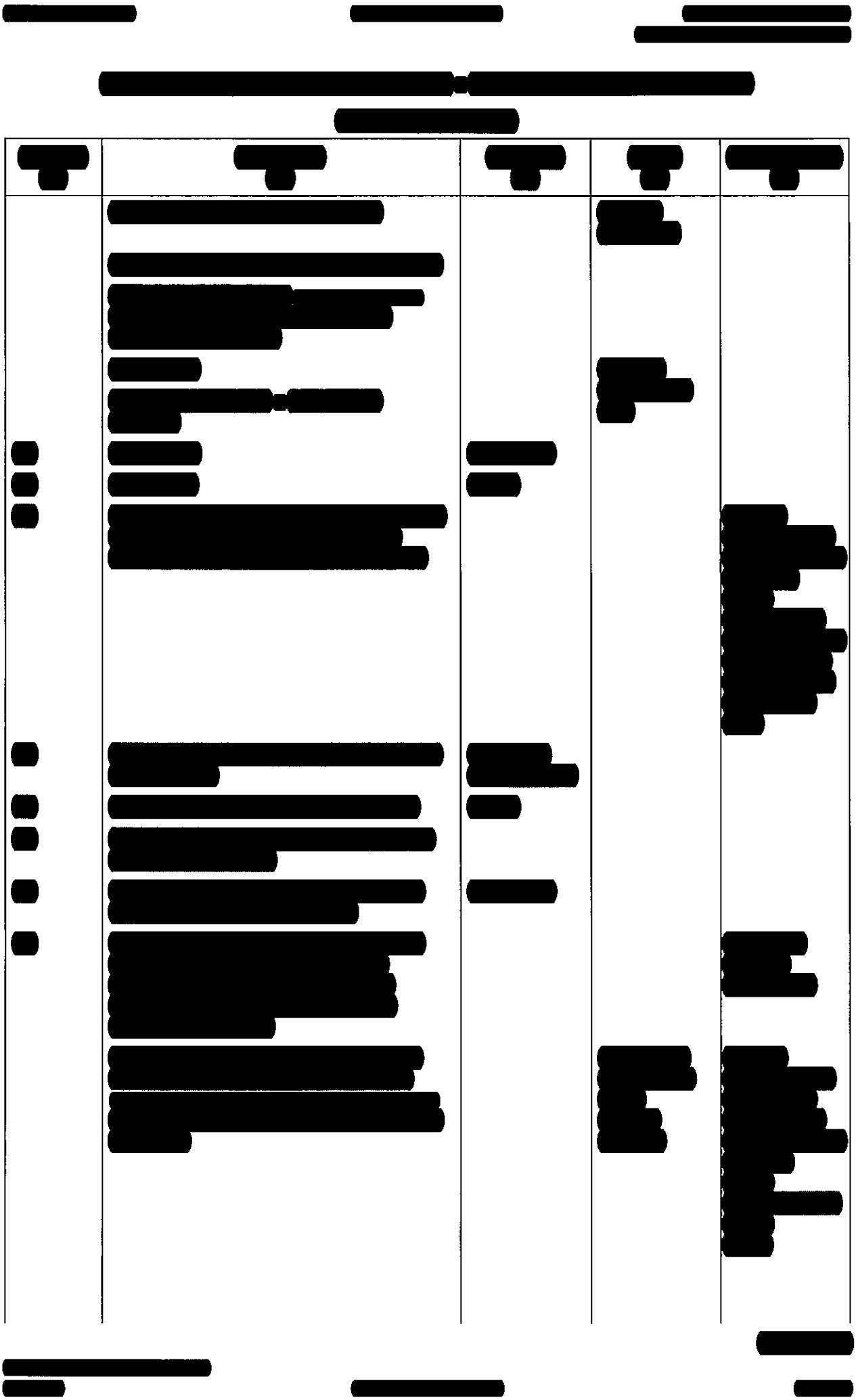

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CHAPTER 10 ANNEX B APPENDIX 17

STRESS CORROSION – FLOOR-DRIVER'S CONTROLS MOUNTINGS

CONTENTS

FLOOR-DRIVER'S CONTROLS MOUNTINGS

Application

1 This repair method is to be used if cracks are present in the floor plate around one or more of the bosses welded to the hull floor and used for mounting the driver's controls.

Drawing reference – FV 839783

Synopsis of method

2 Remove the existing bosses from the hull floor in the driver's foot well and fit an internal Repair Plate containing all of the holes required for mounting the driver's controls. Secure the repair plate with countersunk, socket headed screws, inserted from the underside of the floor.

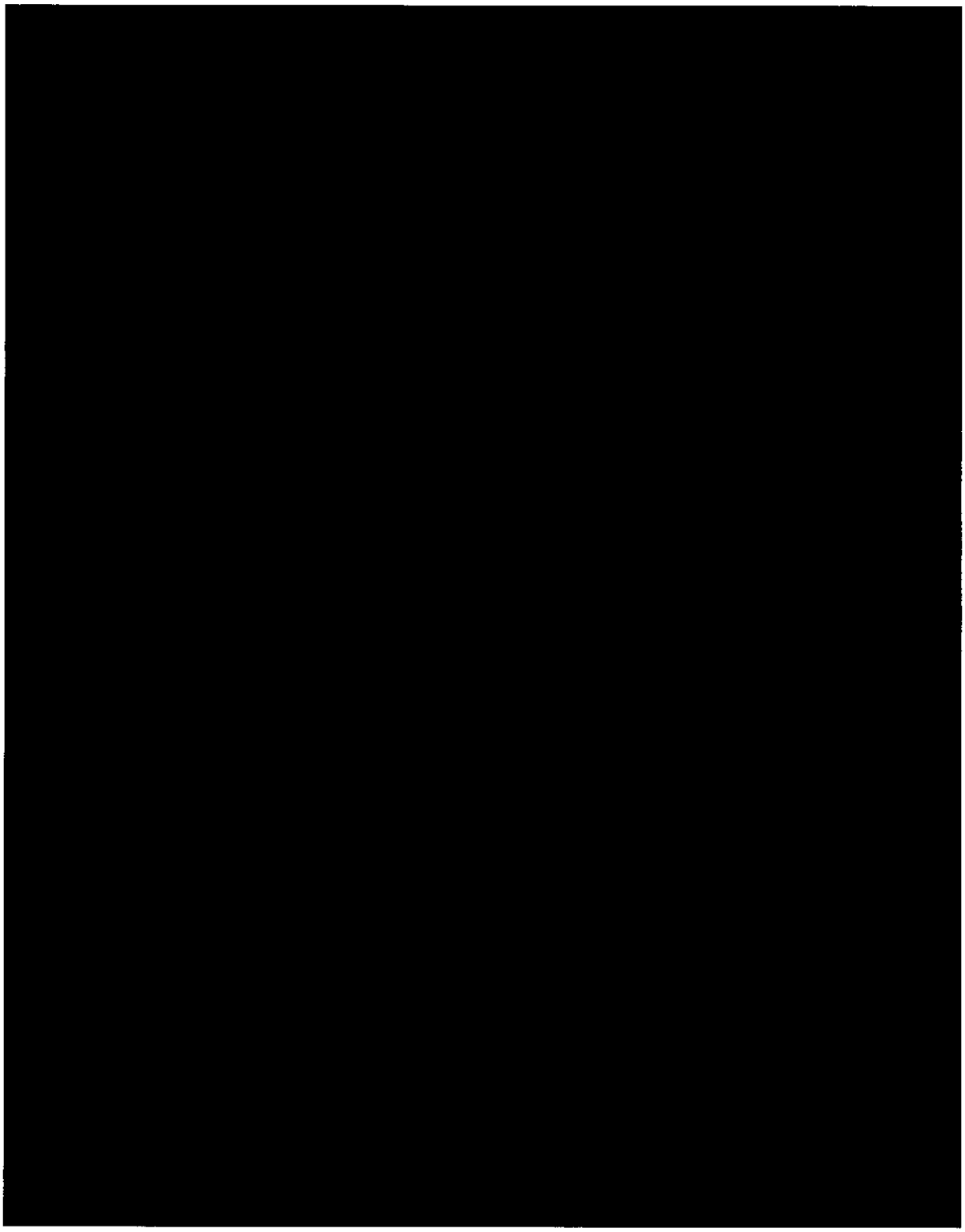
3 Hermetite Jointing Compound is used between the Repair Plate and the hull floor and all screws are fitted using Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255.

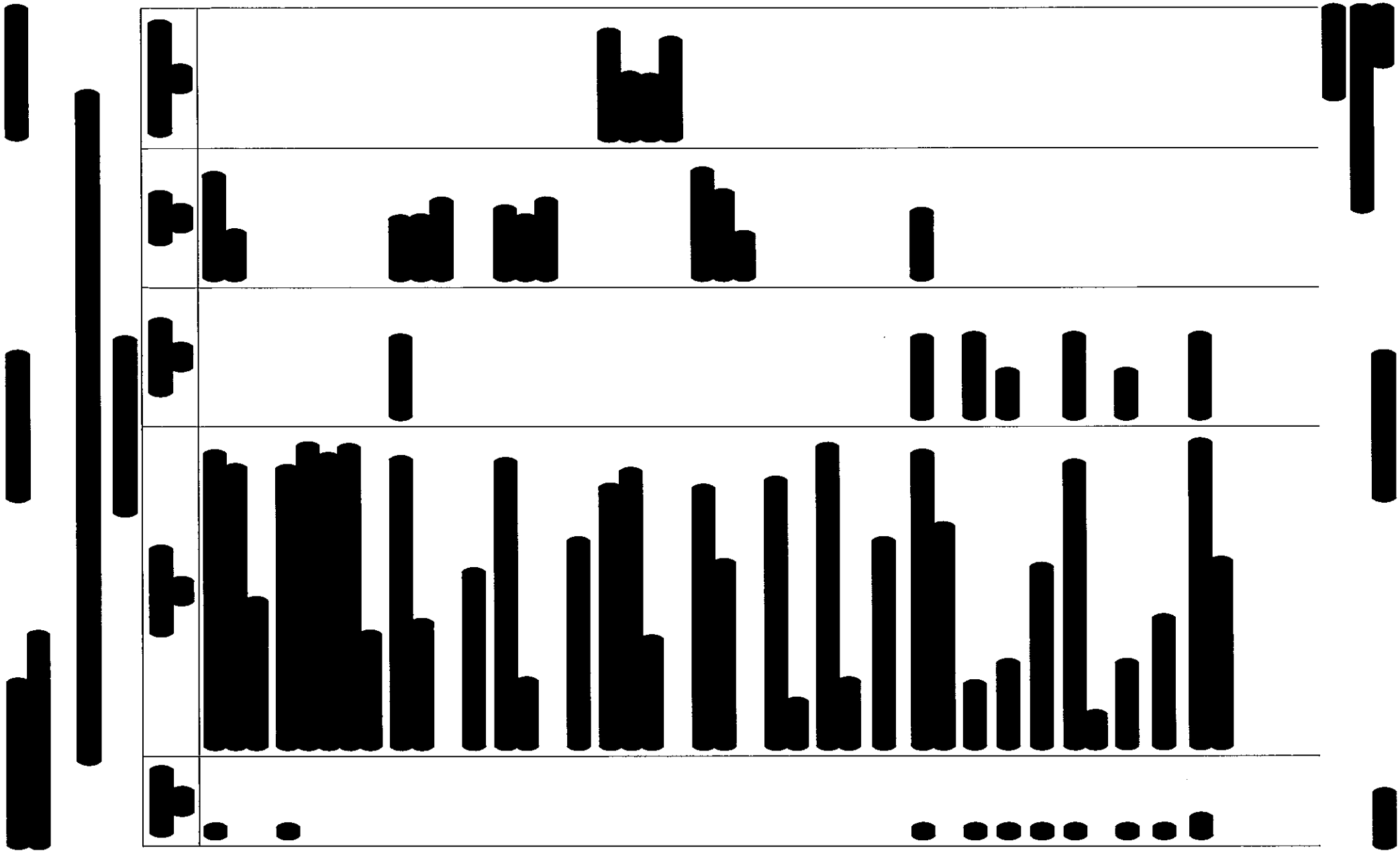
NOTES

(1) The gap around the edge of the Repair Plate is to be filled with Hermetite Jointing Compound.

(2) In order to obtain sufficient clearance for the master cylinders it is necessary to use four Zinc plate, passivated, mild steel washers at the points marked X on drawing FV 839783.

(3) During re-assembly of the vehicle, the pockets machined into the Repair Plate FV 839782 are to be filled with silicone grease to Specification XG 250 before fitting the master cylinders.





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CHAPTER 10 ANNEX B APPENDIX 18

STRESS CORROSION – FLOOR - DRIVER/ENGINE COMPARTMENT BULKHEAD RAIL

CONTENTS

FLOOR - DRIVER/ENGINE COMPARTMENT BULKHEAD RAIL

Application

1 This repair is to be applied when cracks are present in the floor plate around the drive/engine compartment bulkhead rail.

Drawing reference – Nil. (See Fig 1).

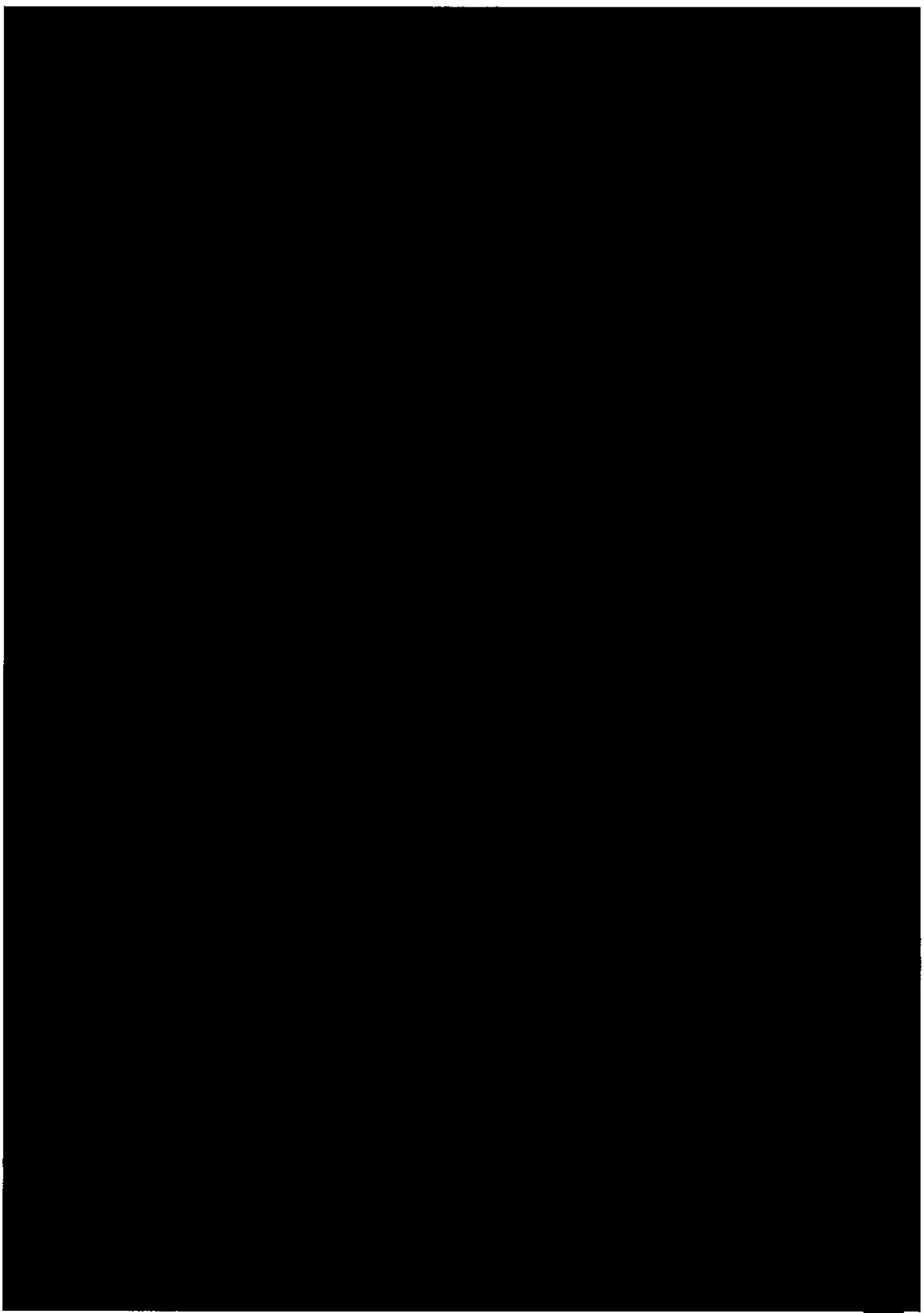
Synopsis of method

2 Insert a screw from the underside of the floor plate (through the mine plate) and into the driver/engine compartment bulkhead rail, to pull the rail down to the hull floor. Cut back the edge of the crack sufficiently to give a suitable land for welding. The amount of cutting back necessary will depend upon the angle at which the crack intersects the plate surface. Details of welding technique are given in Appendix 1.

NOTES

(1) It is anticipated that one screw placed in the position shown in Fig 1 will be adequate to hold the rail in position for the welding operation, but if the cracking is very extensive, it is permissible to insert a further screw (or screws) as necessary.

(2) Slave screws should be used prior to peening and these should be replaced with new screws, using Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 on the threads and underside of head, after peening. When more than one screw is used, the slave screws should be removed and renewed one at time.



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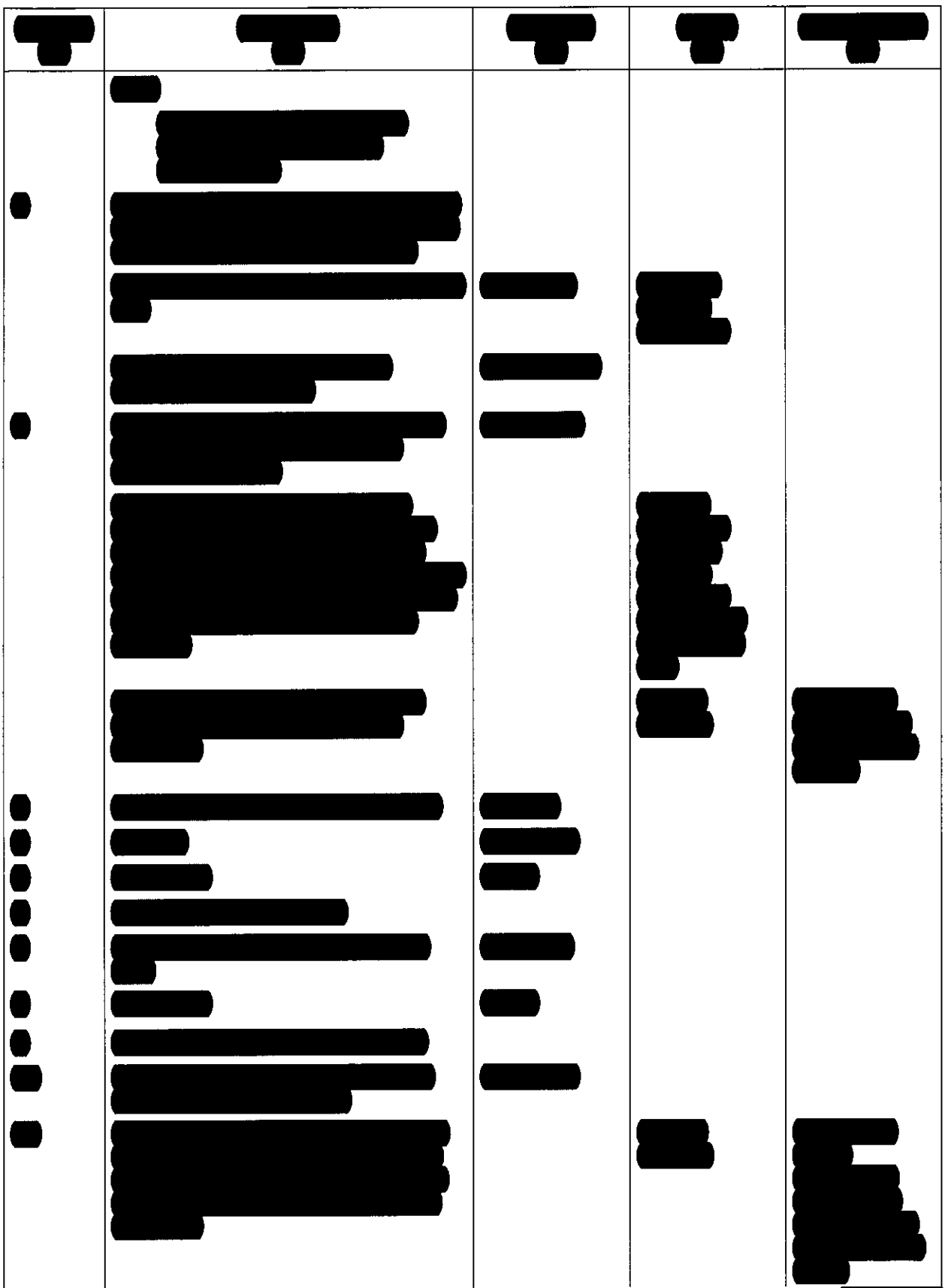
DRG. NO. NIL



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[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]			
[redacted]	[redacted]	[redacted]		

[redacted]

CHAPTER 10 ANNEX B APPENDIX 19

STRESS CORROSION – TURRET BASKET SKIRT/FLOORPLATE

CONTENTS

To be published

CHAPTER 10 ANNEX B APPENDIX 20

STRESS CORROSION – FLOOR - TURRET BASKET ROLLER BLOCKS

CONTENTS

FLOOR-TURRET BASKET ROLLER BLOCKS

Application

1 This repair method is to be used if the floor plate around one or more of the turret basket roller blocks is cracked.

2 Only at those positions where cracking is present should this method be implemented.

Drawing reference – FV 839788

Synopsis of method

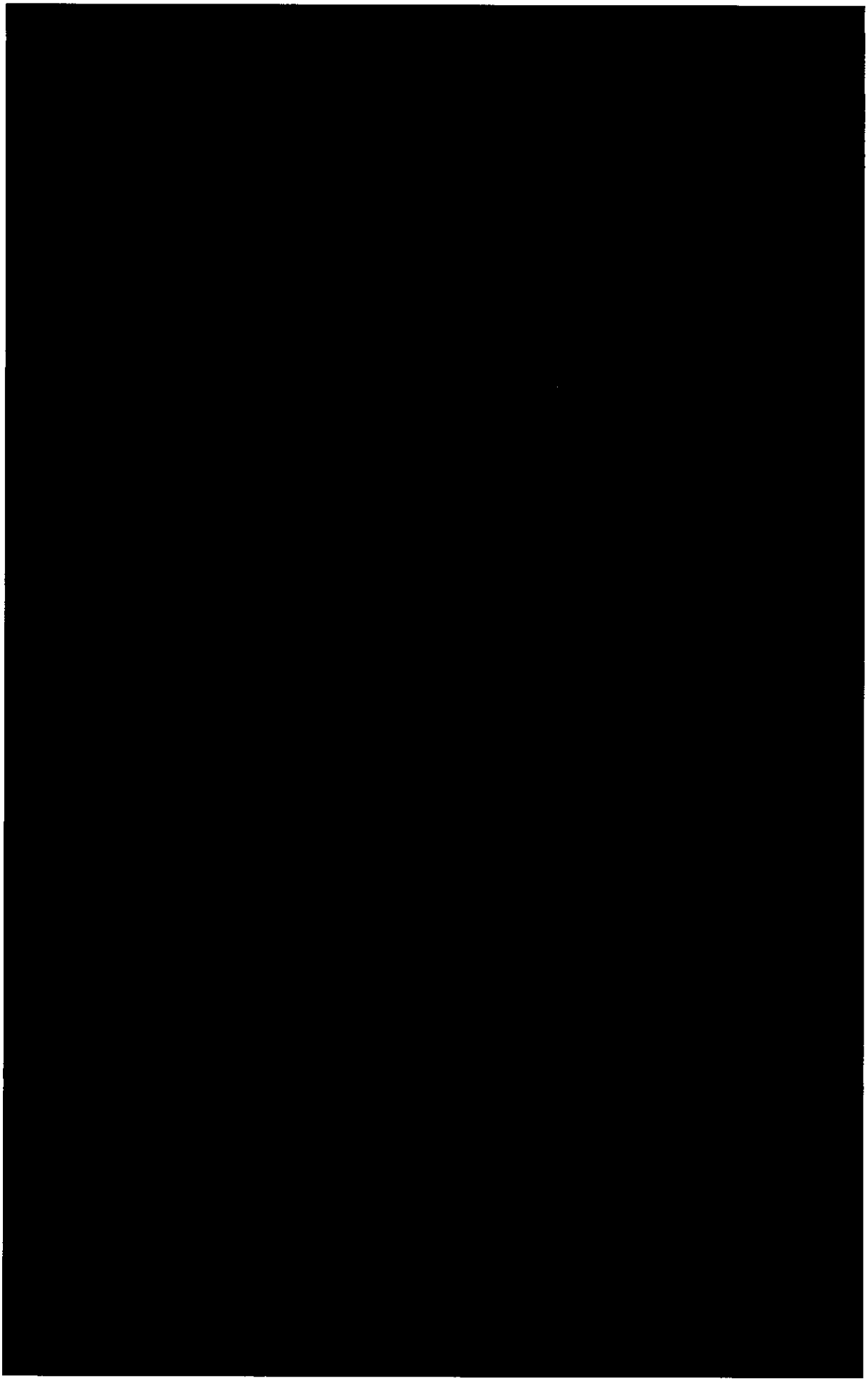
3 Screw backing disc, Part No. FV 839787 to the underside of the floor plate beneath the block to be repaired. The backing disc should be placed in an optimum position to cover all (or as much as possible) of the cracked area, consistent with fitting the securing screws through the backing disc and into the turret basket roller block.

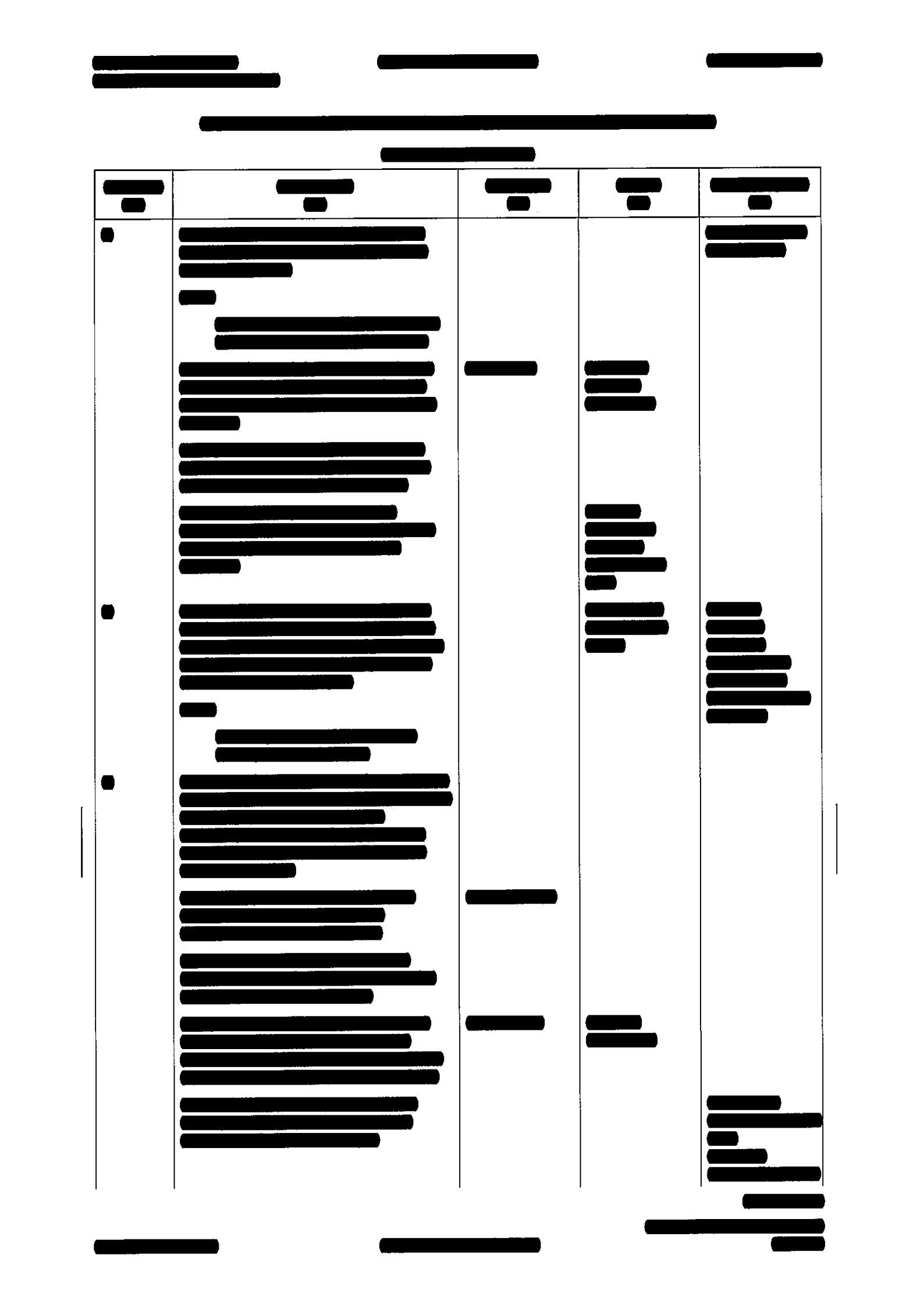
4 When repairing the blocks situated close to the side of the vehicle it will be necessary to cut a section from the backing disc to clear the lower side plate and its associated weld to the floor plate.

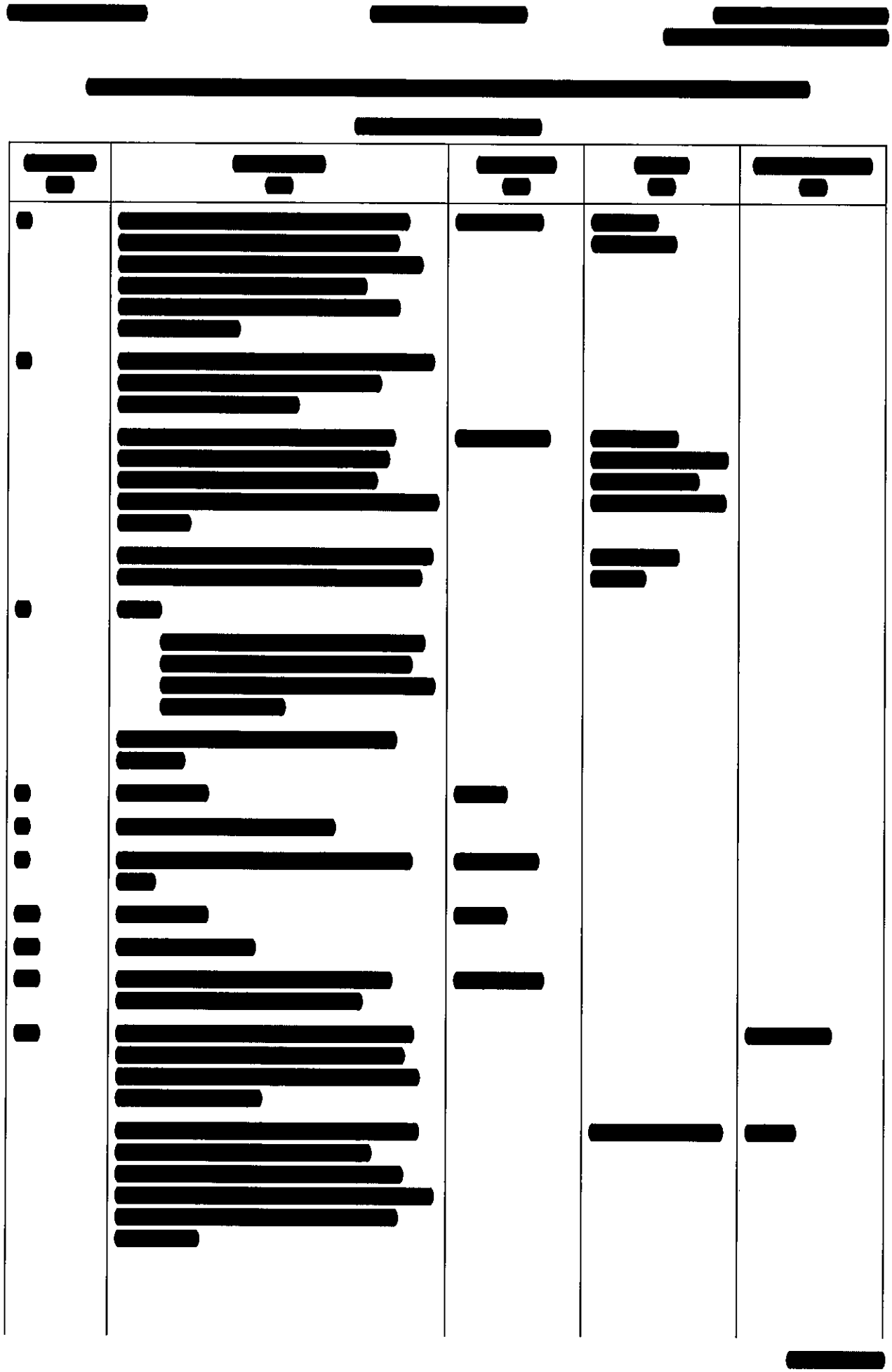
5 Hermetite Jointing Compound is to be used between the backing disc and the hull floor and all screws are to be fitted using Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255.

NOTE

In some cases turret basket roller mounting blocks may be found to be completely detached, or so undermined by cracking and subsequent corrosion, that the block cannot be pulled back by the screws into its original position. In these cases authority is to be requested from the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication) for the use of epoxy fillers (refer to Appendix 2). A new mounting block Part No. 718470 will then be required.







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CHAPTER 10 ANNEX B APPENDIX 21

STRESS CORROSION – FLOOR – RBJ CABLE GUARD

CONTENTS

FLOOR – RBJ CABLE GUARD

Application

1 This method is to be applied if cracks are present in the floor plate around the Rotary Base Junction (RBJ) cable guard brackets.

Drawing reference – FV 839790

Synopsis of method

2 Remove the original welded brackets and replace them with a cable guard mounting bracket block (Part No. FV 839789).

3 Fit backing disc FV 839787 to the hull floor externally and insert screws through the backing disc and the hull floor into the cable guard mounting block.

NOTES

(1) When fitting the backing disc it should be placed in an optimum position to cover the maximum amount of cracking, consistent with fitting the screws into the backing disc and the mounting block.

(2) Hermetite Jointing Compound is used as an interface seal between the cable mounting block and the floor and the backing disc and the floor.

(3) All screws are to be fitted using Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255.

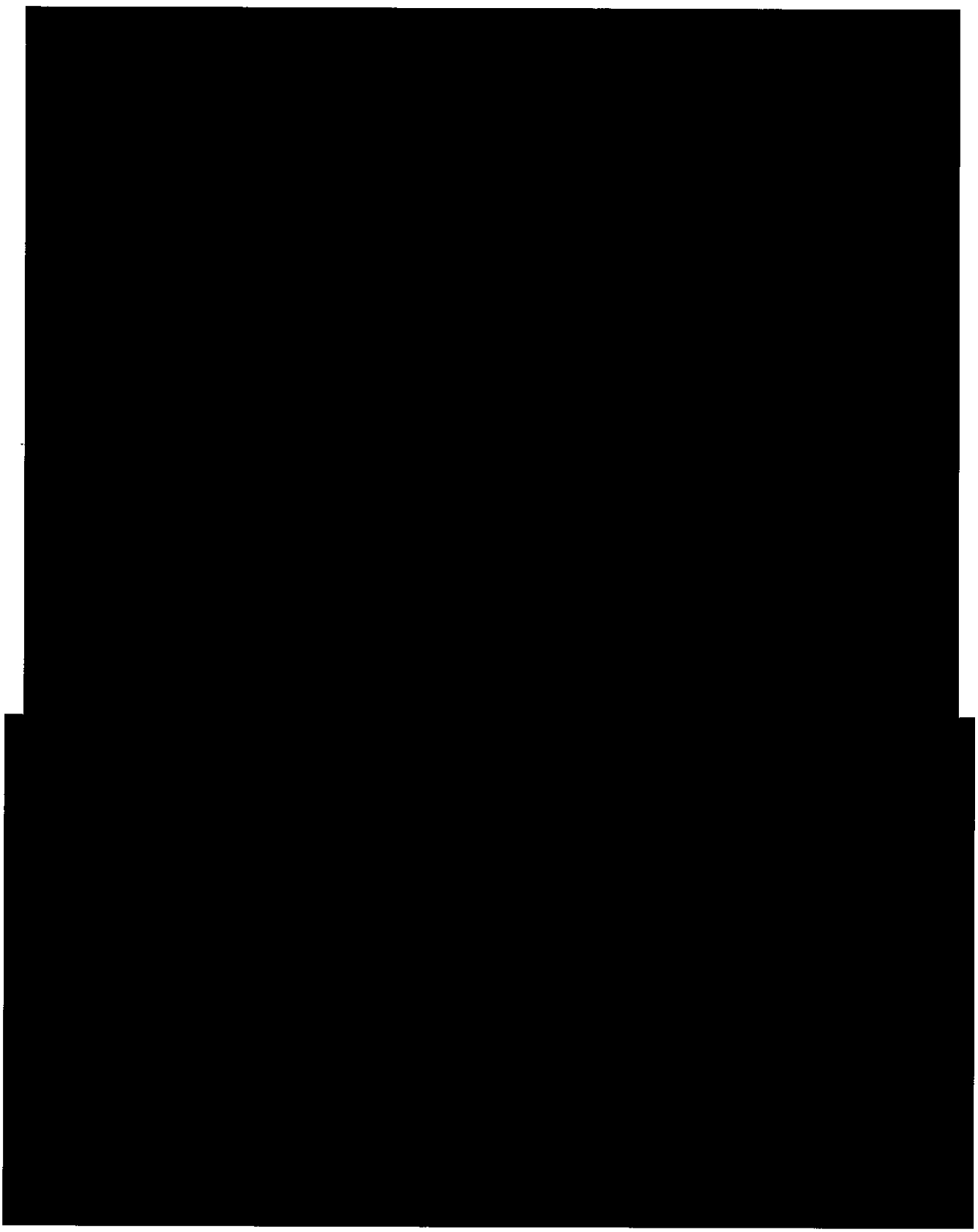


TABLE 1 REPAIR METHOD FOR CABLE GUARD MOUNTING

DRG. NO. FV 839790

Op. No. (1)	Operation (2)	Machine (3)	Tools (4)	Components (5)
1	Position hull on floor. Chisel off the two cable guard mounting brackets and dress flush with floor.			
2	Position backing disc (FV 839787) centrally over the cracks.			Backing Disc FV 839787
	Spot drill five holes 9.53 mm (3/8 in.) dia onto floor plate.	Pistol Drill	9.53 mm (3/8 in.) Twist Drill	
	Remove backing disc.			
	Drill through five holes 8.1 mm (0.3189 in.) dia and tap 3/8 in. – 16 UNC-2b through.		8.1 mm Twist Drill 3/8 in. – 16 UNC-2b Tap	
3	Reposition backing disc on exterior surface. Fit five 3/8 in. UNC x [redacted] countersunk socket head screws and lock up tight. Note Backing disc to be removed during later operation.		7/32 in. A/F Hex Socket Drive	Screws: 3/8 in. x [redacted] (Zinc plate, passivated) 5 off
4	On internal surface, position Cable Guard Mounting Block (FV 839789) to 0.8 in. and 20 in. dimensions.			Cable Guard Mounting Block FV 839789
	Spot drill two holes 8.1 mm (0.3189 in.) dia through block to floor plate.	Pistol Drill	8.1 mm Twist Drill	
	Remove mounting block and drill two holes 10.32 mm (13/32 in.) dia through floor plate and backing disc.		10.32 mm (13/32 in.) Twist Drill	
5	Remove backing disc and retain screws.			
6	Position backing disc on table with chamfer uppermost and countersink two holes 19.8 mm (0.781 in.) dia at 80°.	Radial	80° C'sink Cutter	
7	Wash hull.	Wash		
8	Blank off all tapped holes.			
9	Shotpeen and remove all shot from the hull.	Shotpeen		
10	Wash hull.	Wash		
11	Remove blanks.			

(continued)

TABLE 1 REPAIR METHOD FOR CABLE GUARD MOUNTING (continued)

DRG. NO. 839790

Op. No. (1)	Operation (2)	Machine (3)	Tools (4)	Components (5)
12	Inspect and ensure that shot has been removed from all holes.	Inspection		
13	Coat interface of backing disc with Hermetite Jointing Compound and reposition disc on hull.			Hermetite
	Using screws removed in OP. 5, coat the screwthreads and underside of the screw heads with JC5A and secure backing disc to hull. Torque tighten screws to 34 Nm (25 lbf ft).		7/32 in. A/F Hex Socket Drive Torque Wrench	JC5A
14	Coat interface of Guard Block with Hermetite Jointing Compound.			Hermetite
	Position Block in hull and secure using two 3/8 in. UNC x [redacted] countersunk socket head screws, after coating the screwthreads and the underside of the screw heads with JC5A. Torque tighten screws to 34 Nm (25 lbf ft).		7/32 in. A/F Hex Socket Drive Torque Wrench	JC5A
15	Inspect.	Inspection		
16	Paint to requirement of Chap 10, para 106.	Paint		
17	Final Inspection.	Inspection		

CHAPTER 10 ANNEX B APPENDIX 22

STRESS CORROSION – FLOOR – RBJ ANTI-ROTATION STOPS

CONTENTS

FLOOR – RBJ ANTI-ROTATION STOPS

Application

1 This repair is to be used for the replacement of RBJ anti-rotation stops which have become detached, or where stress corrosion cracks are present around more than 1/4 of the circumference of the attachment (see Note 2).

Drawing reference – FV 839800

Synopsis of method

2 Remove the RBJ stops as necessary (see Note 1) and dress flush with the plate surface. Mark out and machine slots to accept the new RBJ.

3 Fit repair disc assembly FV 839801 to underside of hull floor using five socket head countersunk screws 3/8 in. UNC x [redacted]

4 Clearance holes are provided in the repair disc assembly and tapped holes must be produced in the hull floor.

[redacted]

6 On re-assembly, secure earth wire from RBJ unit to the 10 UNC hole in the floor using a Zinc plate, passivated 10 UNC x 3/8 in. long screw and washer.

NOTES

(1) If only one RBJ stop is in need of repair, the unwanted stop on the Repair Plate may be removed, and the repair carried out on one stop only.

(2) If cracking is around less than 1/4 of the circumference of the attachment, weld repair in accordance with Appendix 1 may be carried out.

(3) Hermetite Jointing Compound is to be used between the repair disc and the hull floor, and to fill the gaps around the new RBJ stops.

(4) All screws are to be fitted using Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255.

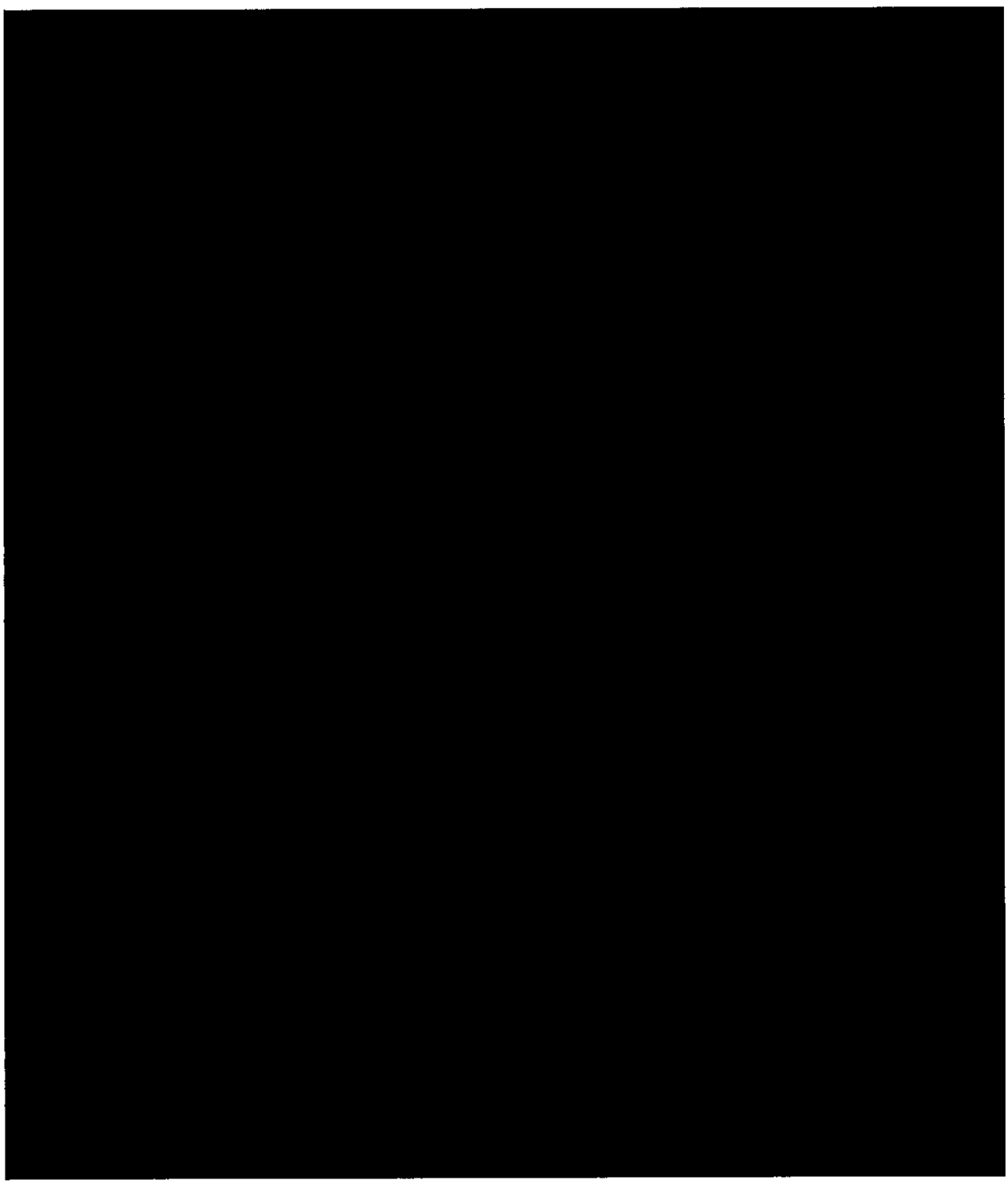


TABLE 1 REPAIR METHOD FOR RBJ STOPS

DRG. NO. FV 839800

Op. No. (1)	Operation (2)	Machine (3)	Tools (4)	Components (5)
1	Remove RBJ Stops as necessary using a hammer and chisel and dress areas flush with floor.			
	Mark out four holes at 78 mm (3.07 in.) dimensions forward and to the rear of dimple in floor, and 33.3 mm (1.312 in.), 62 mm (2.438 in.) centres to left of vehicle centreline looking forward and centre pop.			
	Drill through four holes 9.53 mm (3/8 in.) dia through.	Pistol Drill	9.53 mm (3/8 in.) Twist Drill	
	Centre pop for two holes inside each pair of holes drilled.			
	Drill four holes 7.94 mm (5/16 in.) dia through.		7.94 mm (5/16 in.) Twist Drill	
	Using rotary file in Pistol Drill, remove metal to form two slots 38.1 mm (1.5 in.) x 9.53 mm (0.375 in.).		Rotary file	
	Remove burrs from slots.			
2	To external floor surface, remove burrs from the two slots.			
	Position Repair Disc Assembly FV 839801 with tapped lug forward.	Radial Drill	9.53 mm (3/8 in.) Twist Drill	Repair Disc Assembly FV 839801
	Centralise lugs in slots and spot drill five holes 9.53 mm (3/8 in.) dia.			
	Remove Repair Disc, drill five holes 8.1 mm (0.3189 in.) dia through and tap 3/8 in. – 16 UNC-2b through.		8.1 mm Twist Drill 3/8 in. – 16 UNC-2b Tap	
3	Wash hull.	Wash		
4	Blank off all tapped holes.			
5	Shotpeen and remove all shot from hull.	Shotpeen		
6	Wash hull.	Wash		
7	Remove blanks.			
8	Inspect and ensure that shot has been removed from all holes.	Inspection		
9	Coat interface of Repair Disc with Hermetite Jointing Compound and position disc on hull ensuring that the lug with a tapped hole is to the front.			

(continued)

TABLE 1 REPAIR METHOD FOR RBJ STOPS (continued)

DRG. NO. FV 839800

Op. No. (1)	Operation (2)	Machine (3)	Tools (4)	Components (5)
	Secure disc, using 3/8 in. UNC x [redacted] long countersunk socket head screws, after coating the screwthreads and the underside of the screw heads with JC5A. Torque tighten to 34 Nm (25 lbf ft).			Screws: 3/8 in. UNC x [redacted] C'sk skt hd. (Zinc plate, passivated) 5 off JC5A
10	Fill slots with Hermetite Jointing Compound, flush with floor.			Hermetite
11	Carry out conductivity test between RBJ Stop and hull floor. If resistance is greater than 0.005 ohms, Op. 12 is to be carried out.	Electrician	Evershed & Vignoles Conductivity Tester	
12	If necessary, (see Op 11), mark out 3.07 in. and 0.5 in. dimensions from turret centre mark on hull floor and centre pop.			
	Drill one hole 3.9 mm (0.1535 in.) dia [redacted] and tap No. 10 UNC-24 UNC-2b [redacted]	Pistol Drill	3.9 mm Twist Drill No. 10 UNC Tap	
	Blank off redundant hole in front lug using No. 10 UNC screw.			Screw No. 10 UNC 1 off
13	Inspect.	Inspection		
14	Paint to requirement of Chap 10, para 106.	Paint		
15	Final inspection.	Inspection		

CHAPTER 10 ANNEX B APPENDIX 23

STRESS CORROSION – FLOOR – BATTERY MOUNTINGS

CONTENTS

FLOOR – BATTERY MOUNTINGS

Application

1 This method is to be used for the repair of cracks in the floor plate around battery box mountings.

2 The method offers levels of repair dependent on the severity of cracking present around individual mountings.

Drawing reference – FV 839830

Synopsis of method

3 Insert two screws from the underside of the hull floor into the existing battery box mountings. This method is to be used where the cracking is not extensive, i.e. not more than half way round the mounting.

4 If extensive cracking is present, the method shown in Appendix 20 for the repair of turret basket roller mountings using a backing disc, is to be used.

5 If the battery box mounting has become completely detached or if the cracking and subsequent corrosion is so extensive that it is impossible to pull the mounting down to its original position, then the mounting and any loose pieces of plate are to be removed and the procedure given in Appendix 2, para 5.4 is to be used, together with a backing disc and a new battery box mounting.

6 Authority for this repair is to be obtained from the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication).

NOTES

(1) The floor plate in the vicinity of the battery box mountings is one area where exfoliation corrosion may be expected to be present and particular attention is to be given to cleaning in this area.

(2) Repair to the RH front battery box mounting bracket has been carried out if the vehicle has been repaired to method detailed in Appendix 16.

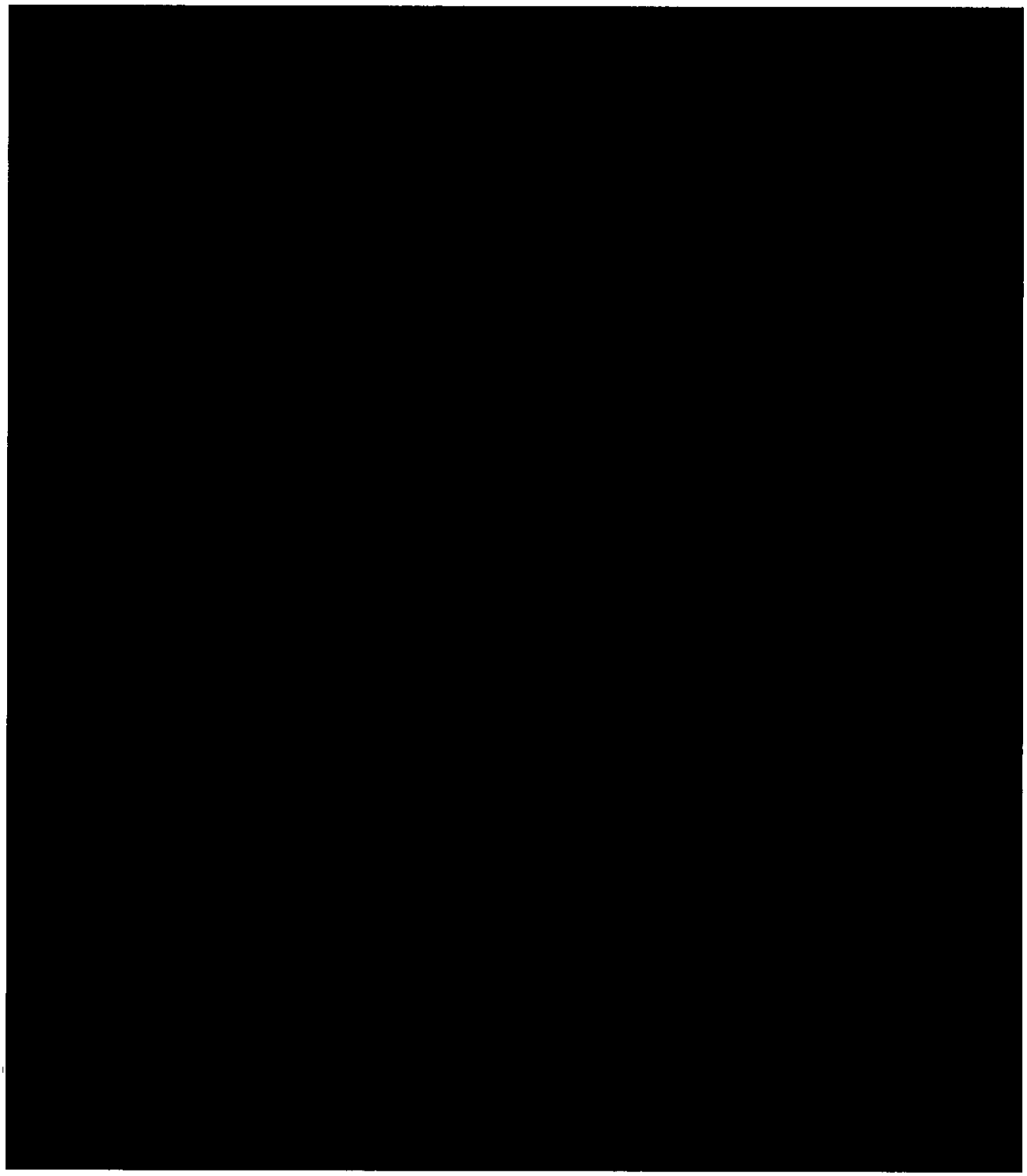


TABLE 1 REPAIR METHOD FOR BATTERY MOUNTINGS

DRG. NO. FV 839830

Op. No. (1)	Operation (2)	Machine (3)	Tools (4)	Components (5)
	Notes (1) This repair only applies to five bosses if Appendix 16 is used. (2) If bosses are completely detached, backing disc repair is to be used as detailed in Appendix 20.			
1	Mark out six bosses for drilling and centre pop.			
2	Drill two holes in each boss 8.1 mm (0.3189 in.) dia. through.	Pistol Drill	8.1 mm Twist Drill	
3	From external surface, countersink twelve drilled holes to [redacted] using piloted countersink cutter.		Piloted 80° C'sk Cutter	
	Tap twelve holes 3/8 in. – 16 UNC-2b through.		3/8 in. – 16 UNC-2b Tap	
4	Wash hull.	Wash		
5	Blank off all tapped holes.			
6	Shotpeen and remove all shot from hull.	Shotpeen		
7	Wash hull.	Wash		
8	Remove blanks.			
9	Inspect and ensure that shot has been removed from all holes.	Inspection		
10	Fit twelve 3/8 in. UNC x [redacted] countersunk socket headed screws, after coating screwthreads and underside of screw heads with JC5A. Torque tighten to 34 Nm (25 lbf ft).		7/32 in. A/F Hex. Skt. Drive Torque Wrench	Screws: 3/8 in. UNC x 1 1/4 in. lg. C'sk skt hd. (Zinc plate, passivated) 12 off
11	Inspect.	Inspection		
12	Paint to requirement of Chap 10, para 106.	Paint		
13	Final inspection.	Inspection		

CHAPTER 10 ANNEX B APPENDIX 24

STRESS CORROSION – SPONSON – LH EXTERNAL

CONTENTS

SPONSON – LH EXTERNAL

Application

1 This repair is to be used if cracking is present in the LH Sponson of Salamander (Scorpion) or Scimitar vehicles. Repair Plate FV 839822 is supplied as a common item and may be used 'as supplied' for Salamander (Scorpion) Vehicles. If required for use on Scimitar vehicles, four bosses (Part No. FV 840152) must be welded at pre-marked locations on the plate.

2 Separate reference drawings and instruction sheets are provided for Salamander (Scorpion) and Scimitar vehicles.

Drawing reference – FV 839821 (Salamander (Scorpion))
FV 840163 (Scimitar)

Synopsis of method

3 Machine out boss locations shown in the relevant drawing by trepanning or boring. Remove any attachments from the Sponson which are associated with cracks. Secure Repair Plate FV 839820 in position on the external surface of the Sponson using countersunk socket headed screws inserted from the external surface. Secure internal bulkheads with gussets using packing pieces as necessary to clear the original welds. Fit replacement Net Anchor Strips etc., as necessary using screw fixings.

4 This method may be 'tailored' to suit the cracking present in the Sponson plate, i.e. bolt on attachments need not be fitted where the Sponson around the corresponding welded attachment is crack free.

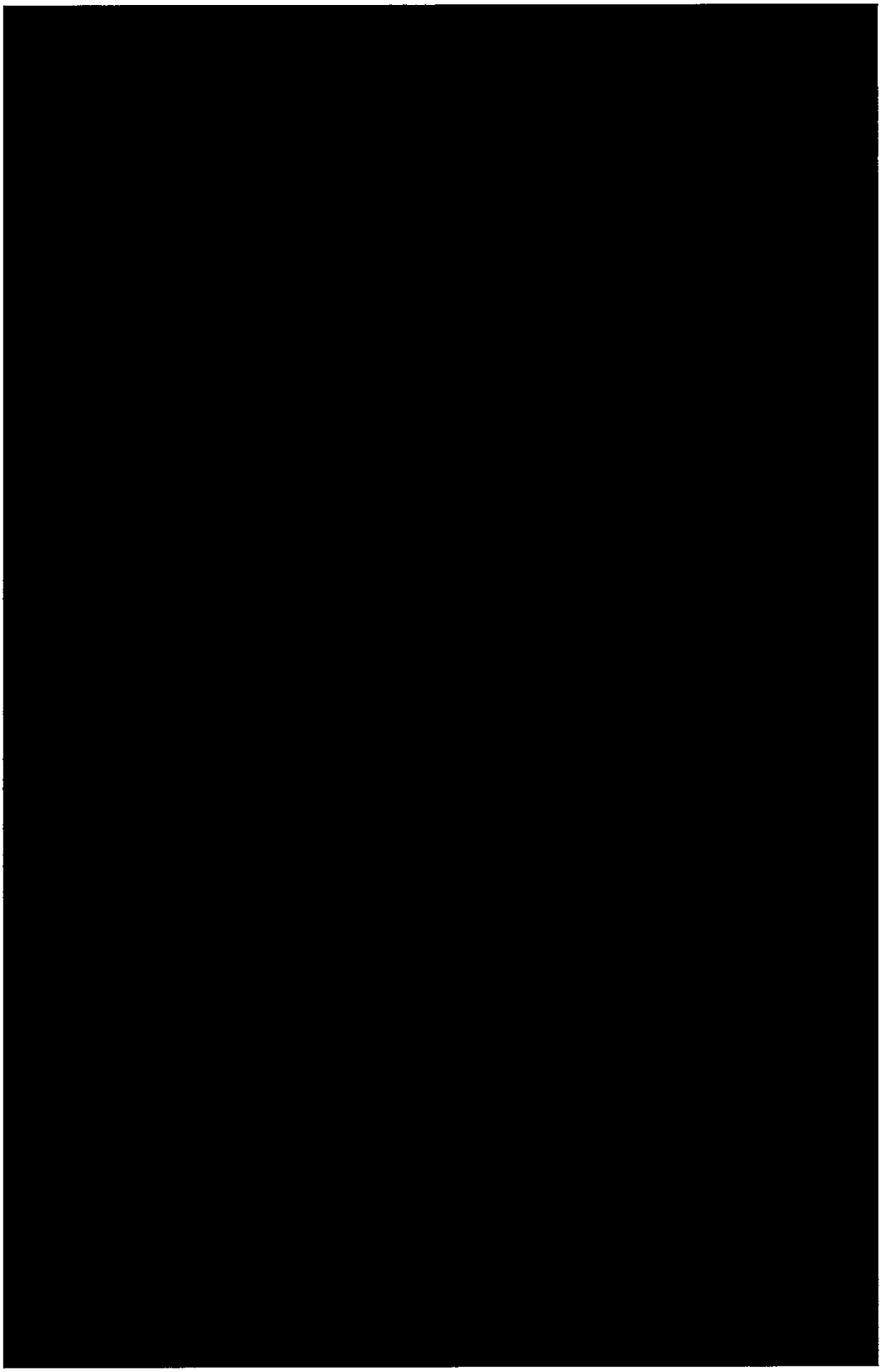
NOTES

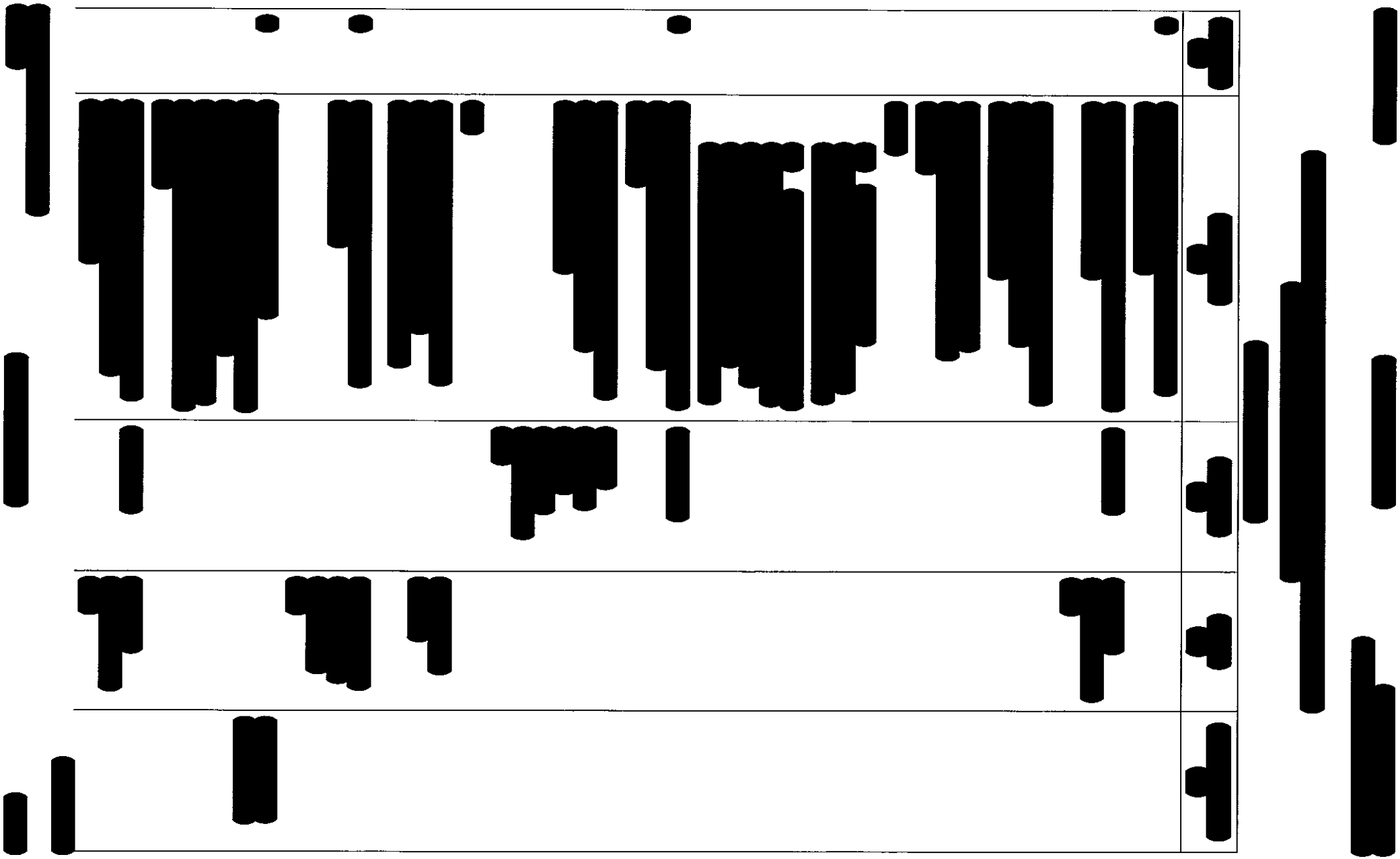
(1) Where bosses on the Repair Plate protrude through the holes in the Sponson and the gap is less than 1/4 in. between the boss and the edge of the hole, the gap is to be filled with jointing compound. If the gap is in excess of 1/4 in. then Epoxy filler is to be used, as detailed in Appendix 2.

(2) The gussets and packing pieces are supplied in complete lengths and should be cut to size as required.

(3) If the Sponson – LH front internal repair Appendix 26 is carried out then a packing piece must be used beneath the gusset shown in Section FF on drawings FV 839821 and FV 840163.

(4) Hermetite Jointing Compound is to be used between the Repair Plate and the Sponson and Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 is to be supplied to all screws prior to fitting.





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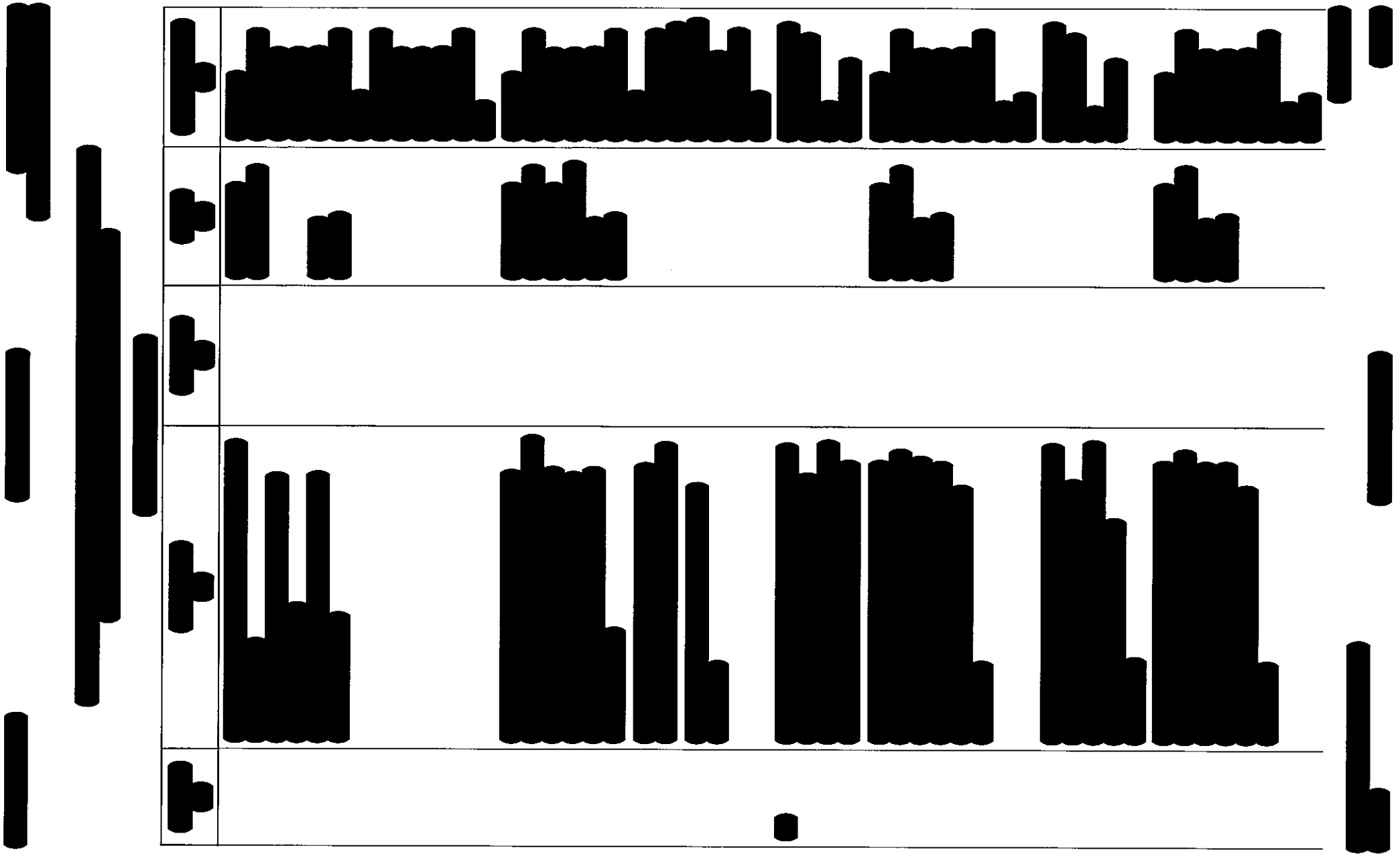

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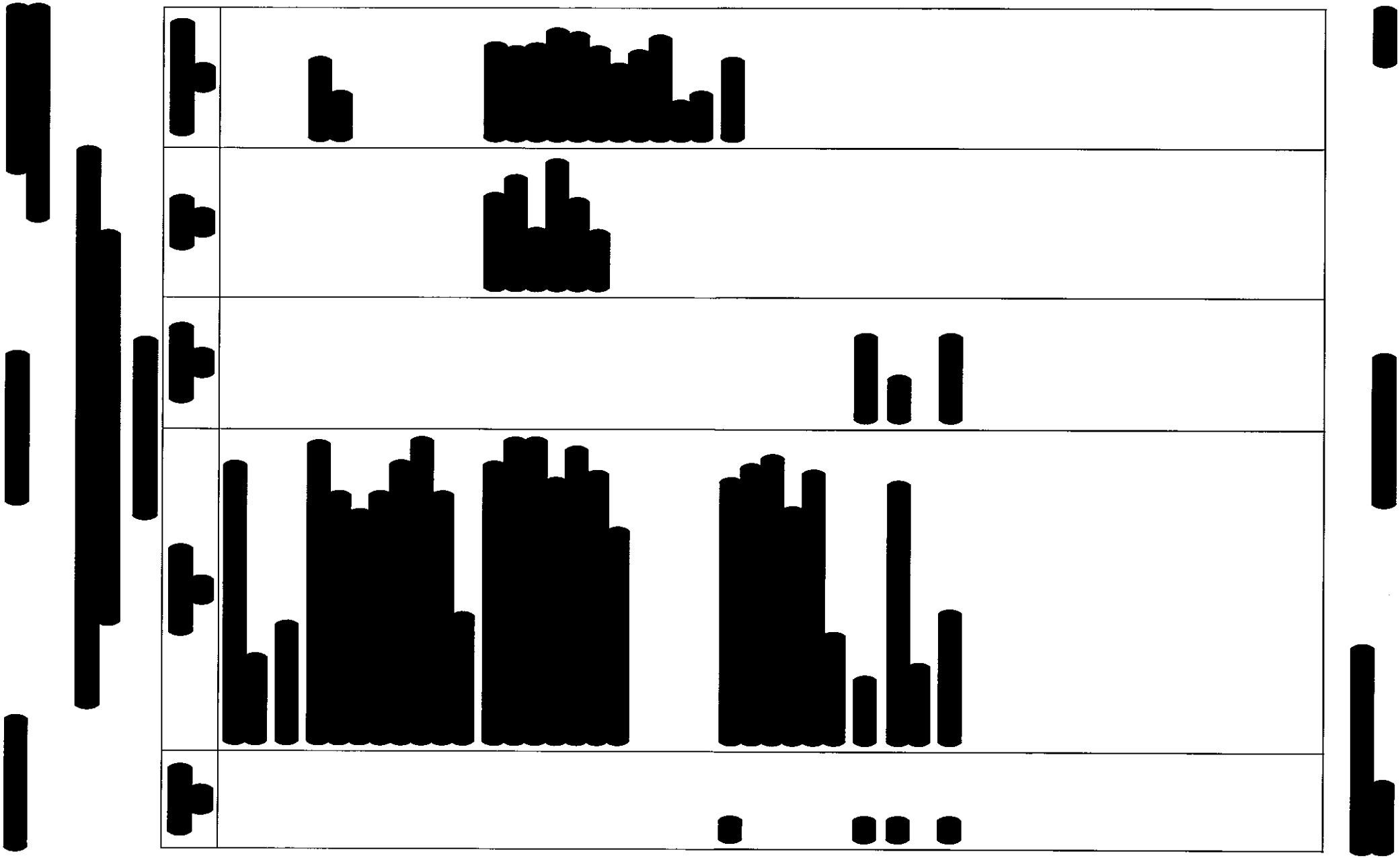

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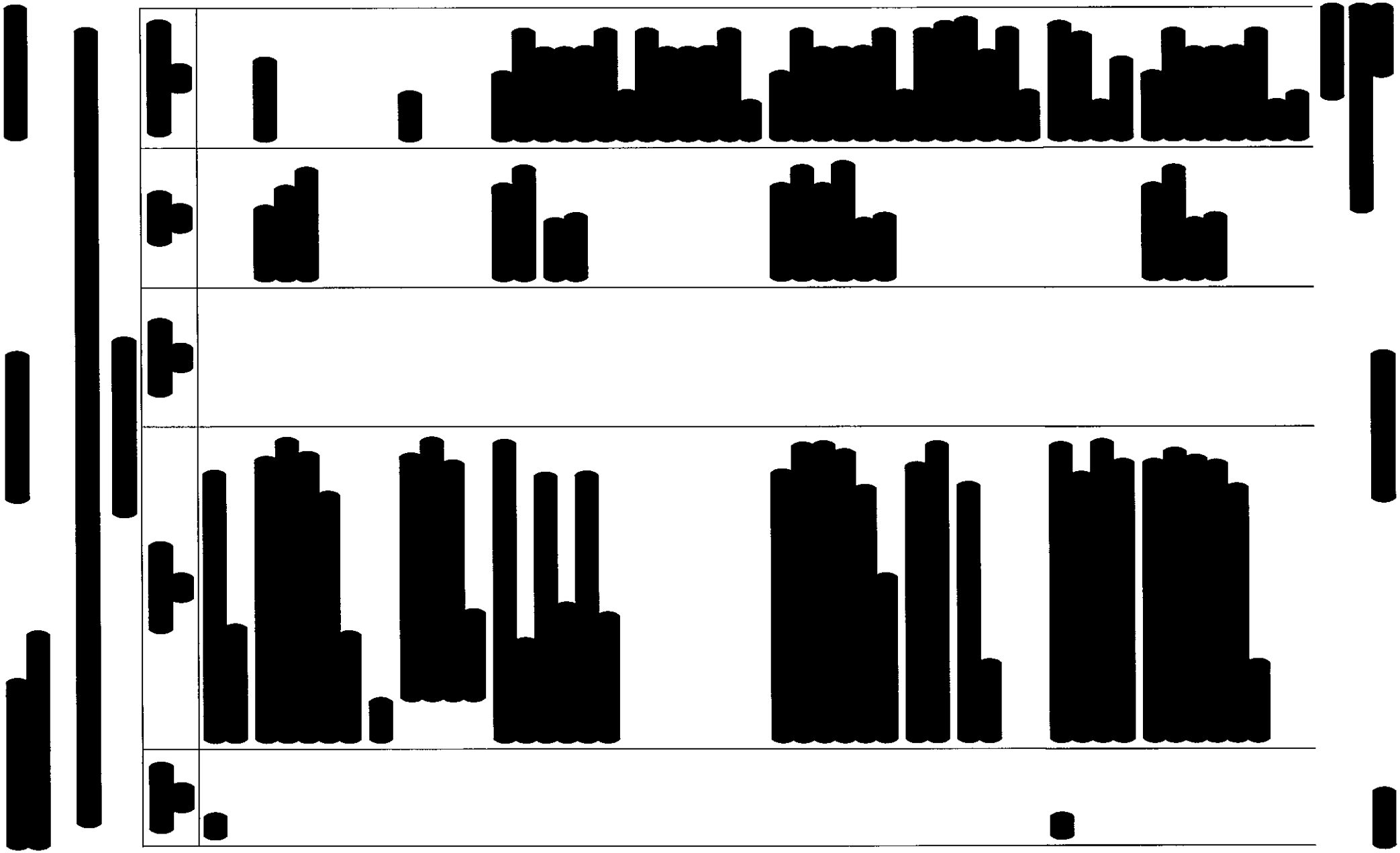

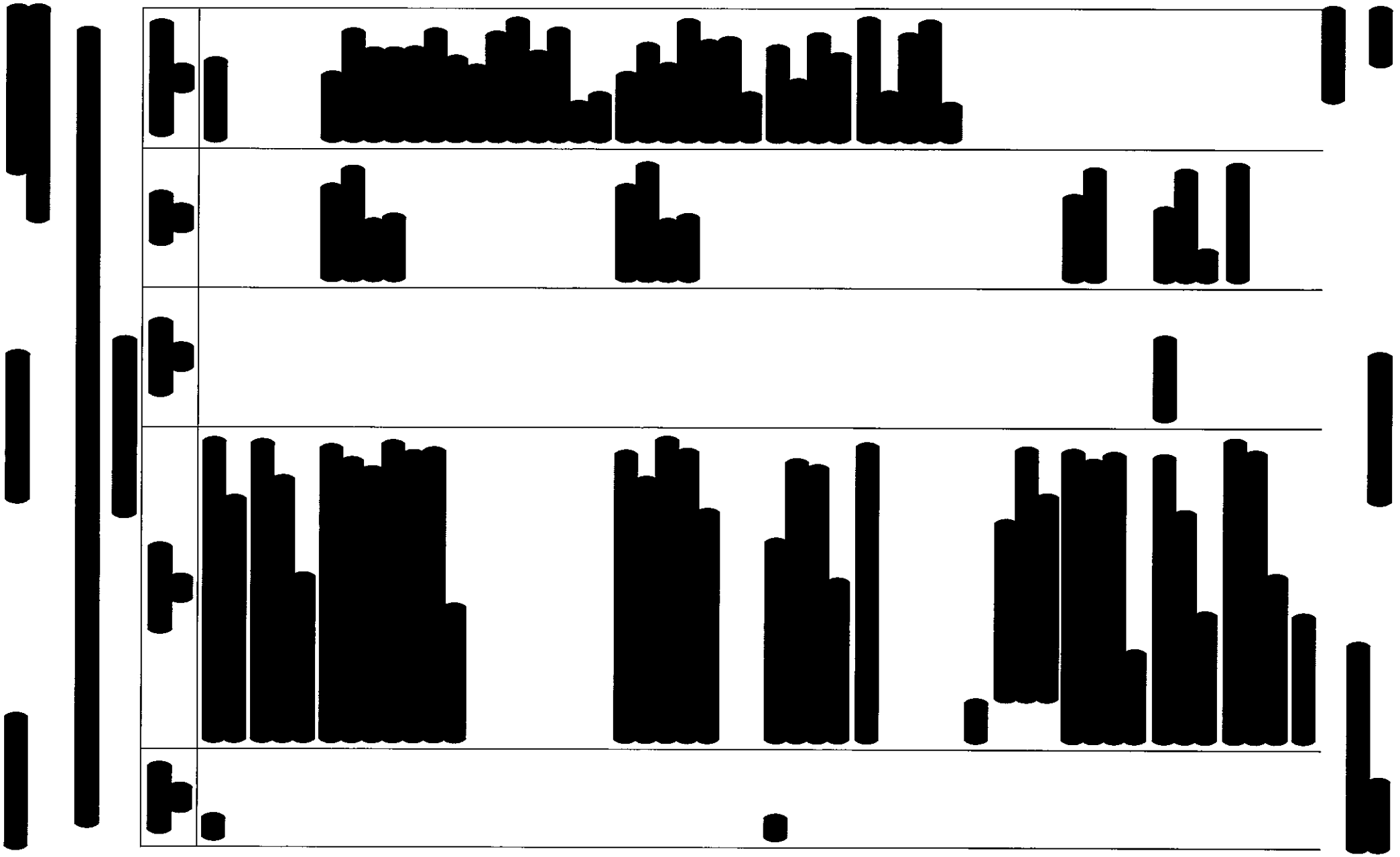

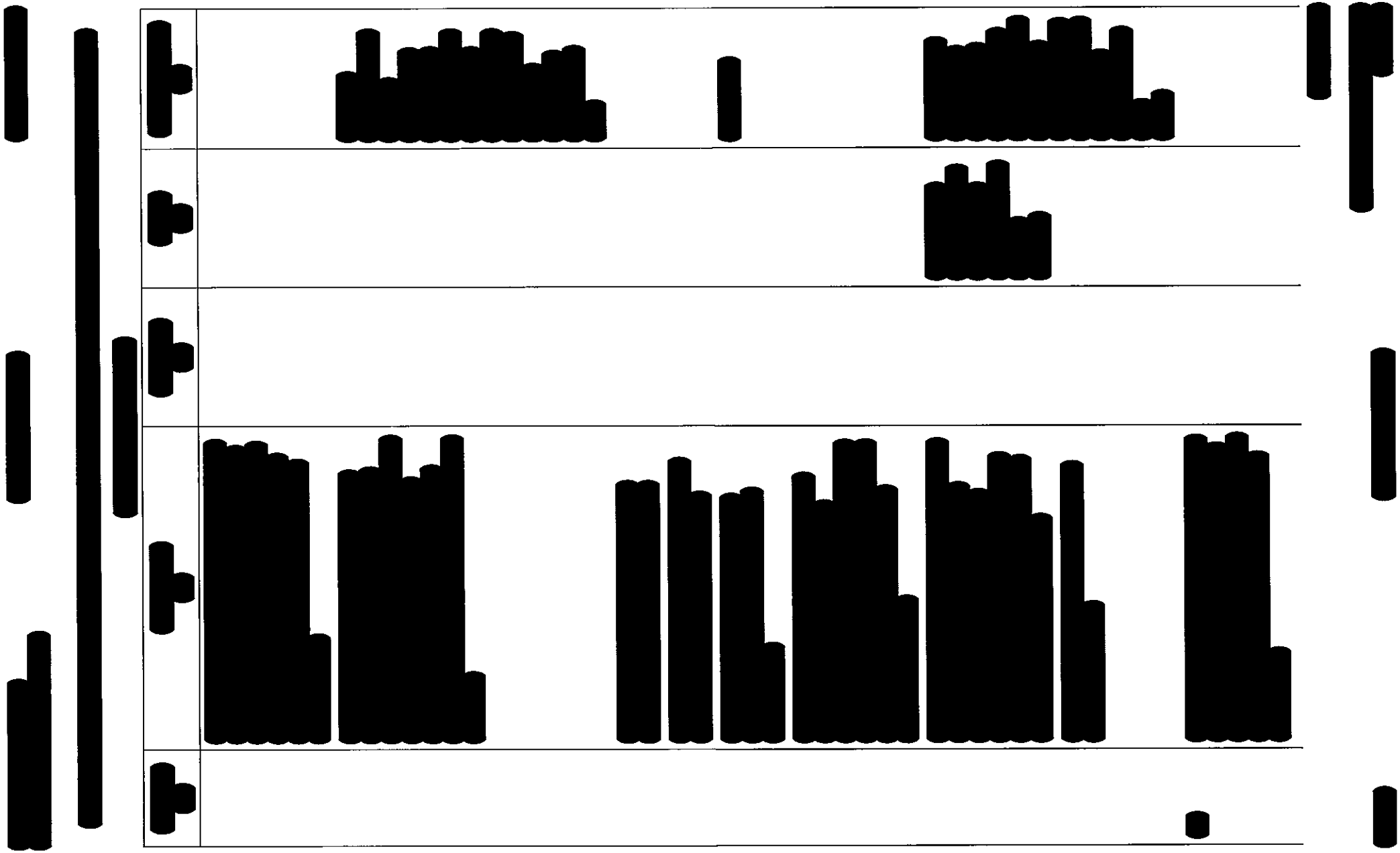

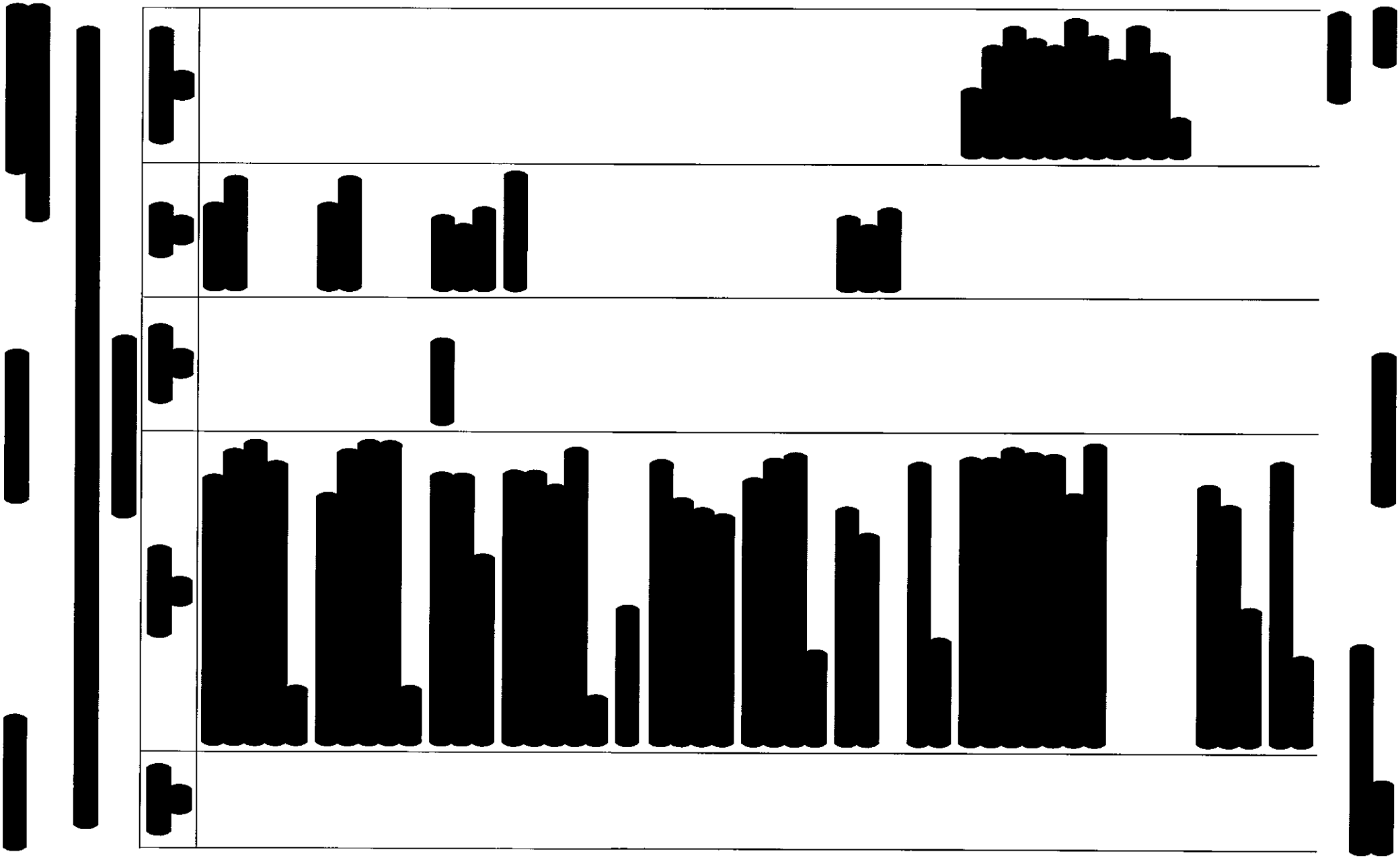

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CHAPTER 10 ANNEX B APPENDIX 25

STRESS CORROSION – SPONSON - RIGHT HAND EXTERNAL

CONTENTS

Para

Table Page

SPONSON – RIGHT HAND EXTERNAL

Application

1 This repair is to be used if cracking is present in the right hand Sponson on Salamander (Scorpion) or Scimitar vehicles. Repair Plate FV 840140 is supplied as a common item for both vehicles and in either case two bosses (Part No. FV 839816) shown on drawings FV 839823 Salamander (Scorpion) and FV 840164 (Scimitar) must be welded to the Repair Plate in pre-marked positions to make the Repair Plate specific to either Salamander (Scorpion) or Scimitar.

2 Separate Instruction Sheets are provided for Salamander (Scorpion) and Scimitar vehicles.

Drawing reference – FV 839823 (Salamander (Scorpion))
FV 840164 (Scimitar)

Synopsis of method

3 Weld the bosses required to make the Repair Plate specific to either Salamander (Scorpion) or Scimitar to the pre-marked locations on Repair Plate FV 839822. Bore (or Trepan) holes in the Sponson Plate to allow bosses welded to the Repair Plate to protrude through the Sponson Plate. Secure the Repair Plate beneath the Sponson Plate with Countersunk Socket Headed screws. Secure the internal bulkheads with Gusset Pieces, using distance pieces to clear the original welds if necessary.

4 If the Sponson Plate is cracked around the welded attachments (e.g. cooker rack, stowage net fixing etc,) the attachment shall be removed and replaced with the screw on fixing.

5 Using Hermetite Jointing Compound between the Repair Plate and the Sponson Plate and fit all screws, using Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255.

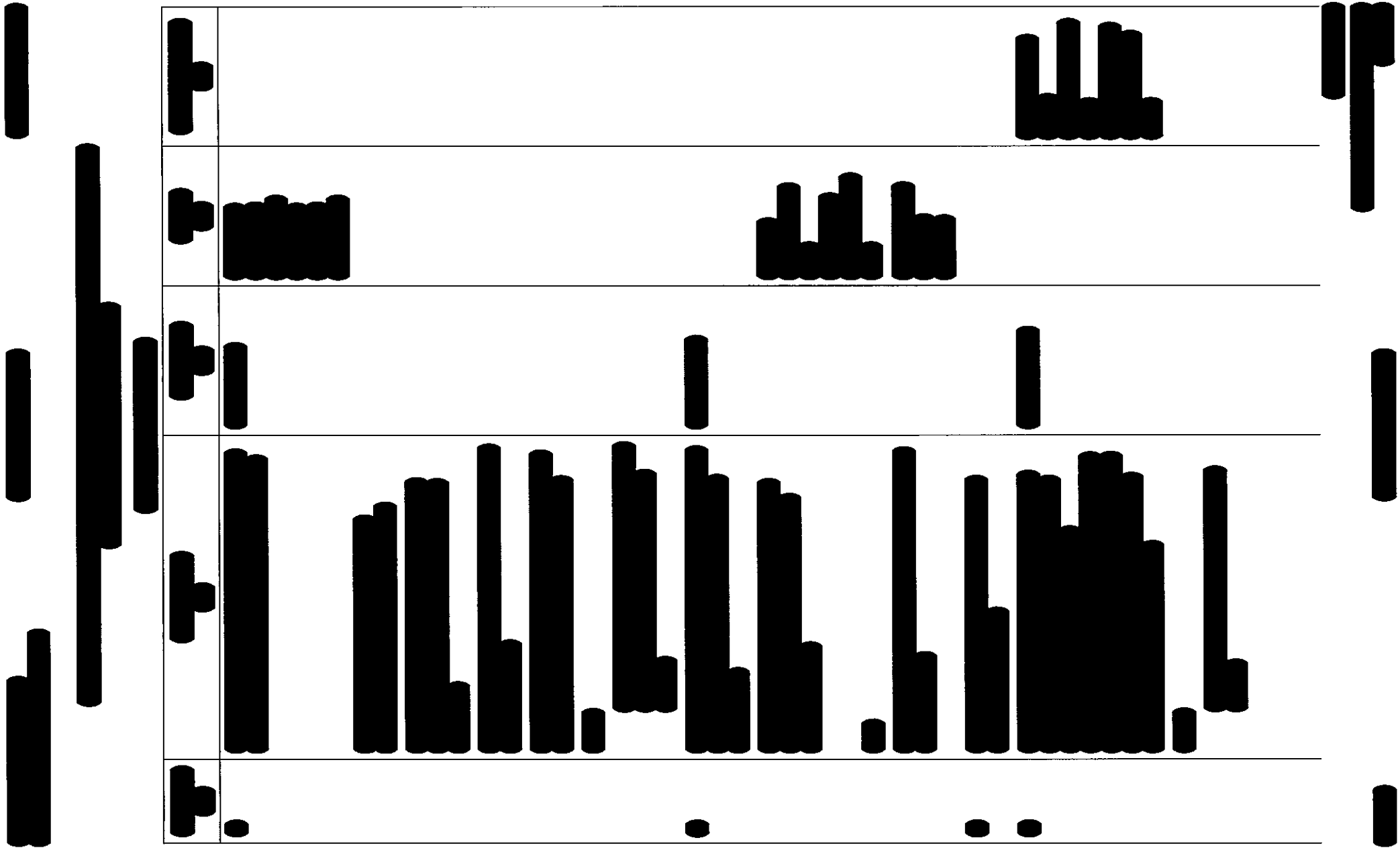
NOTES

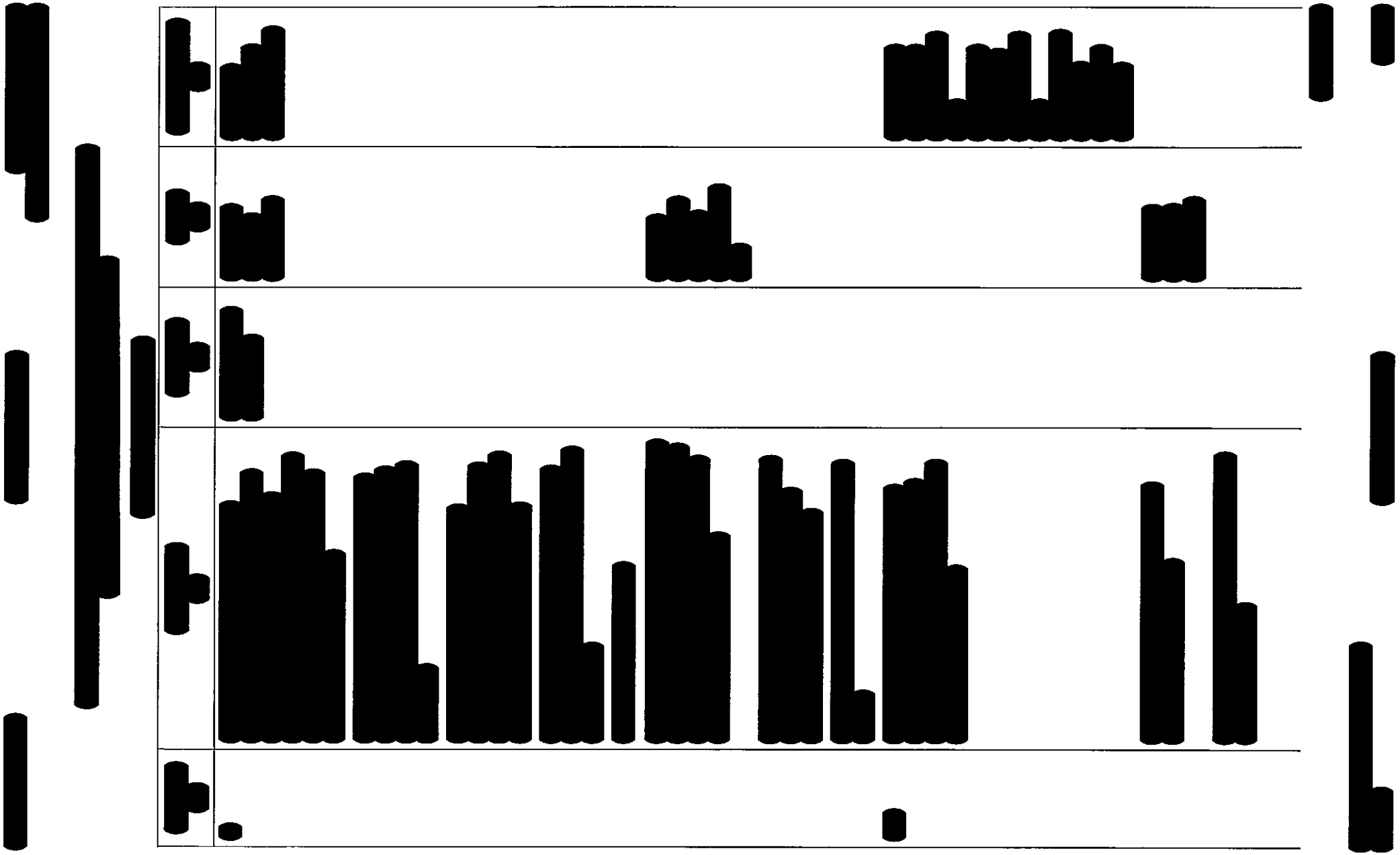
(1) To facilitate accurate positioning of the shell rack bosses a jig is provided which should be clamped between the bosses on the RH and LH Sponsons prior to drilling the securing holes.

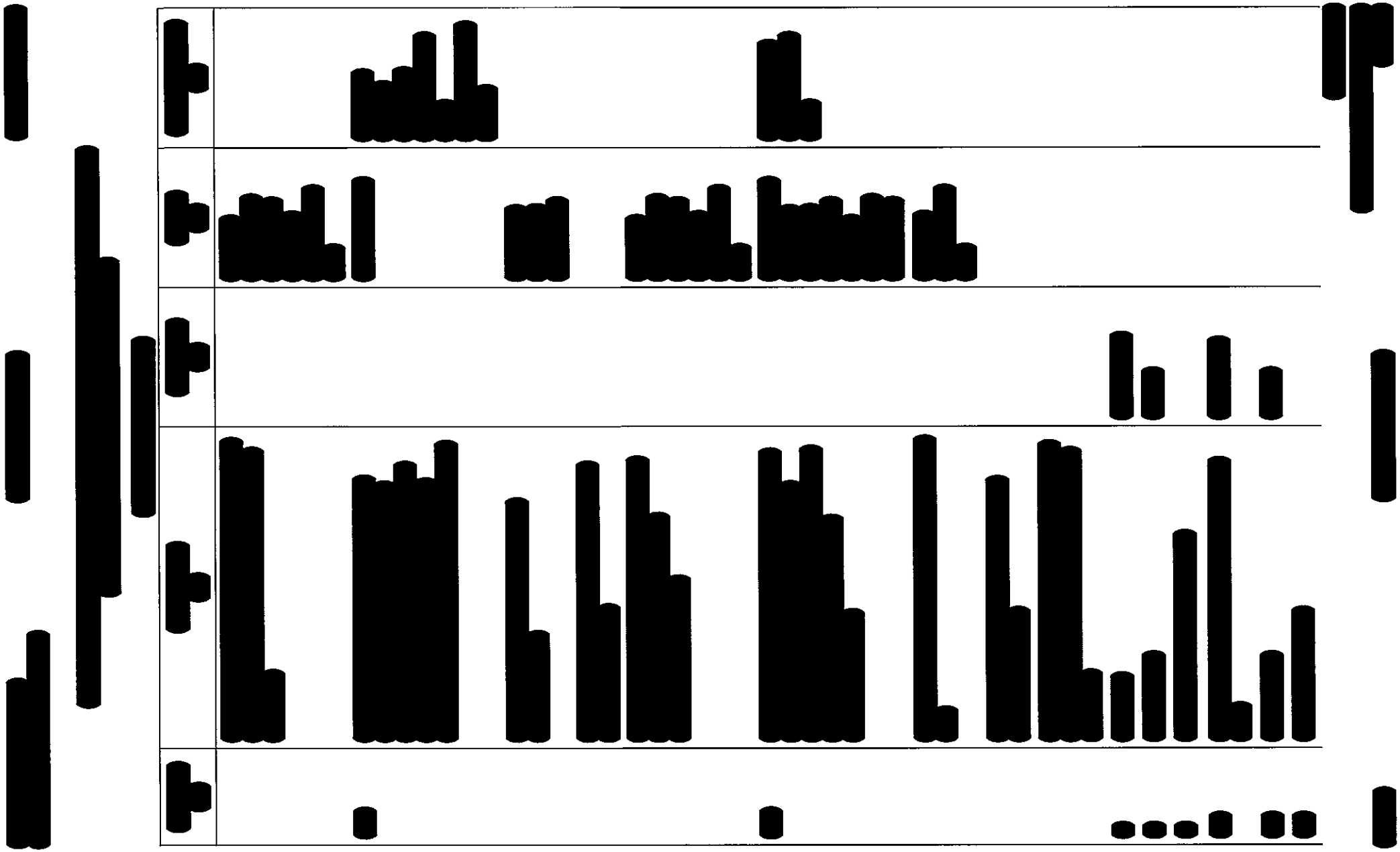
(2) Where no cracking is present around a particular welded attachment then it is not essential that the attachment is replaced.

(3) If a weld repair is necessary to the front of the Sponson, then it must be made before the Repair Plate is fitted.

(4) Where bosses welded to the Repair Plate protrude through holes in the Sponson and the gap between the boss and the edge of the hole is less than 6.35 mm (1/4 in.) then it is to be filled with the jointing compound. If the gap is more than 6.35 mm (1/4 in.) then Epoxy filler is to be used as instructed in Appendix 2.







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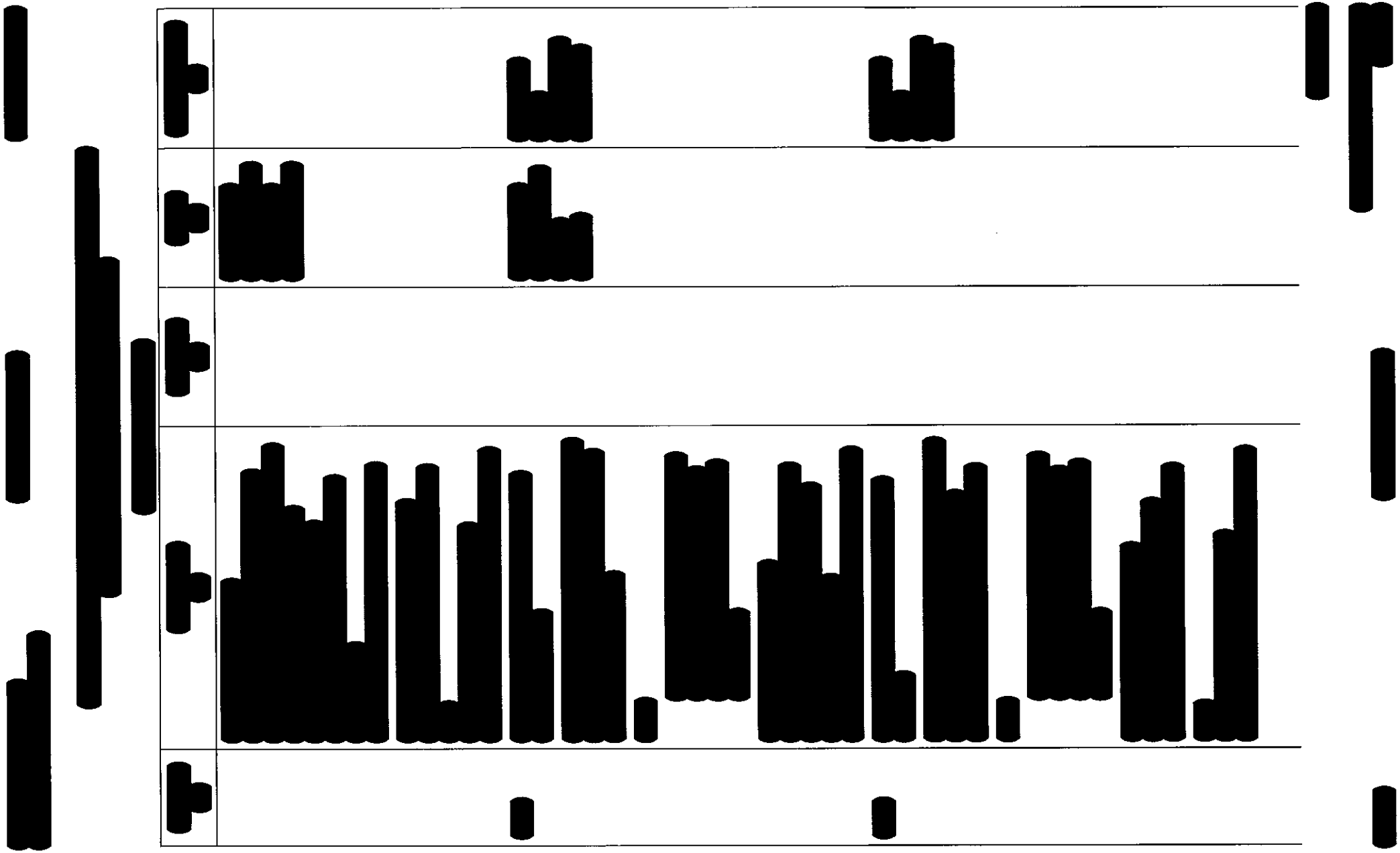

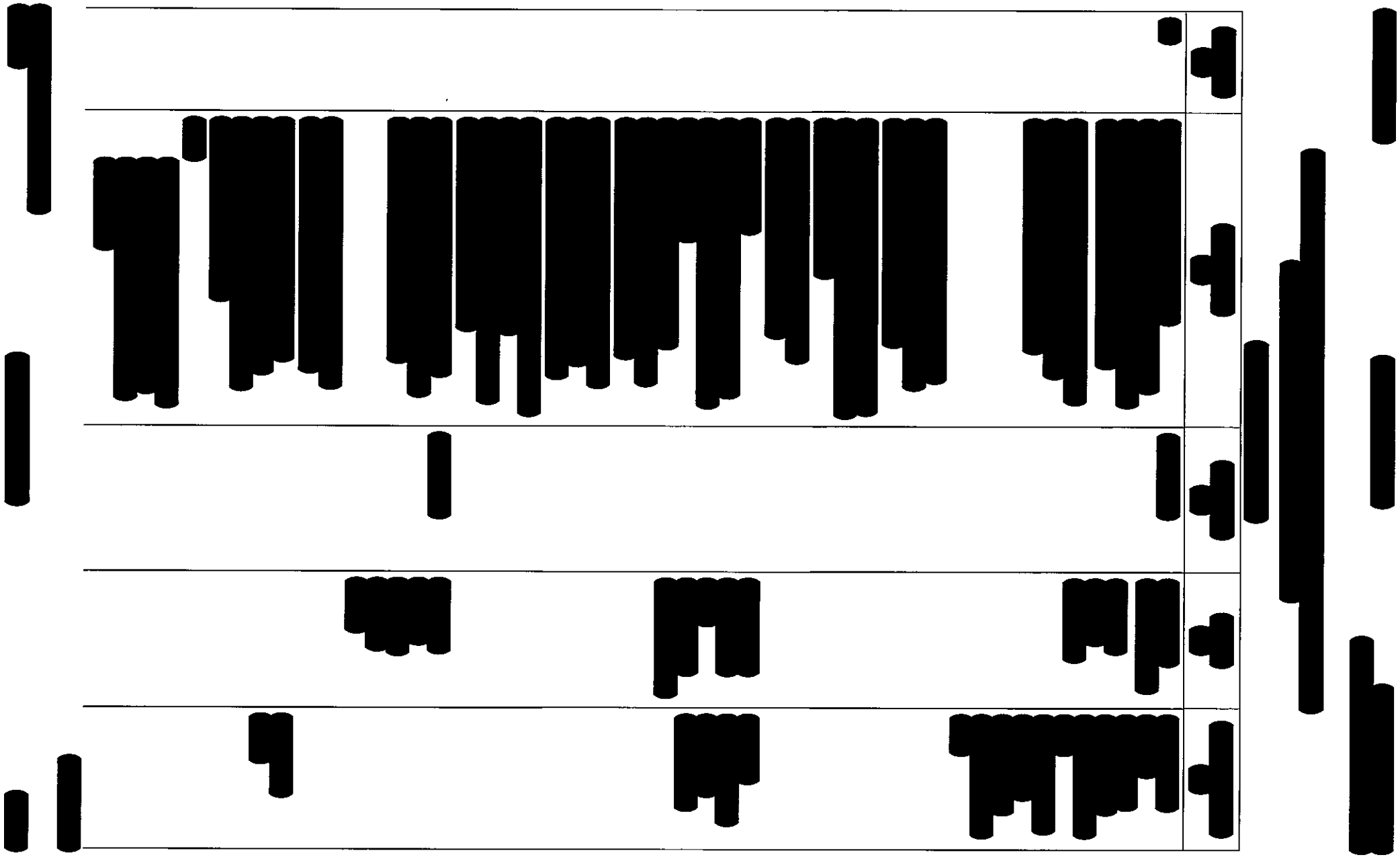

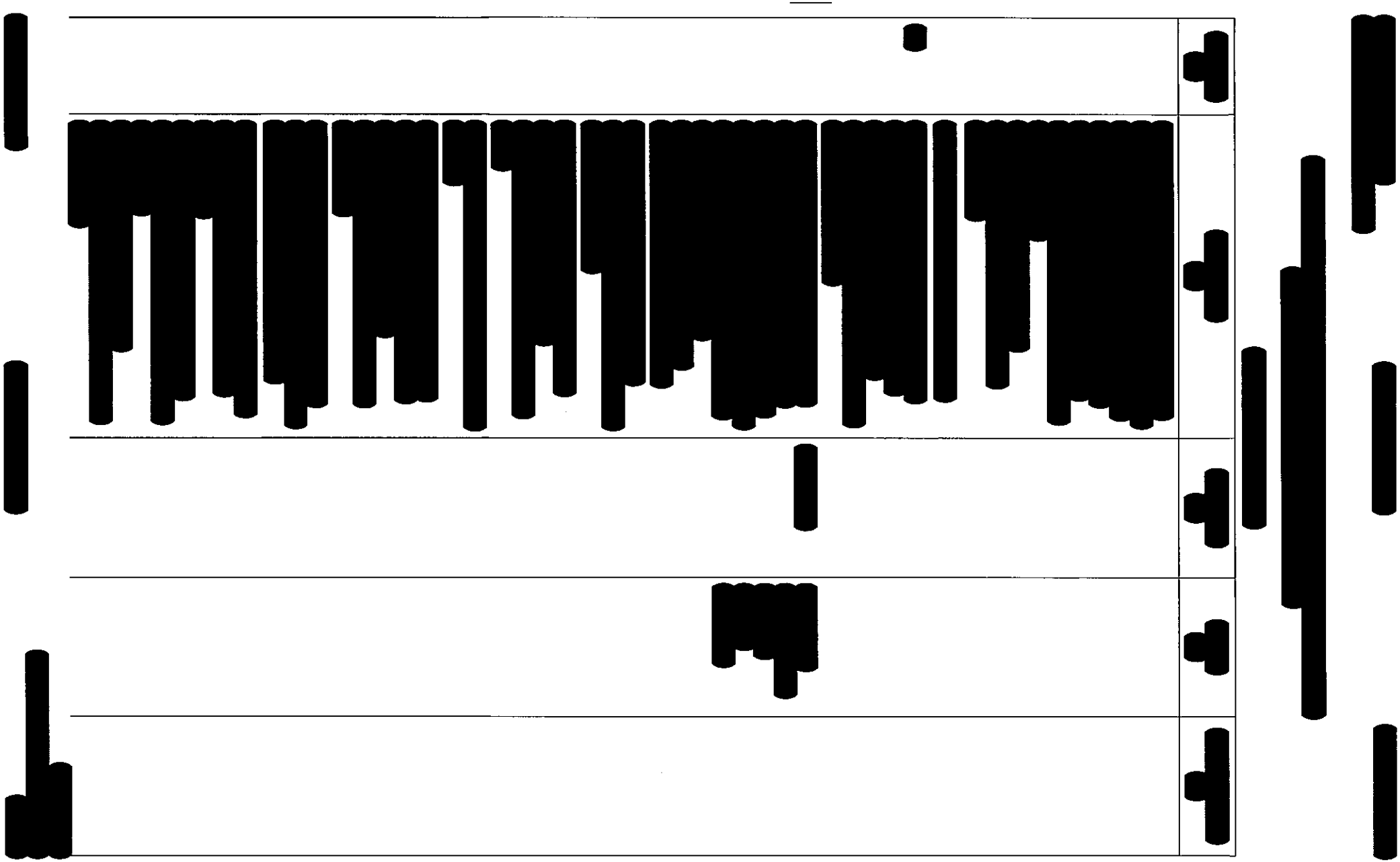

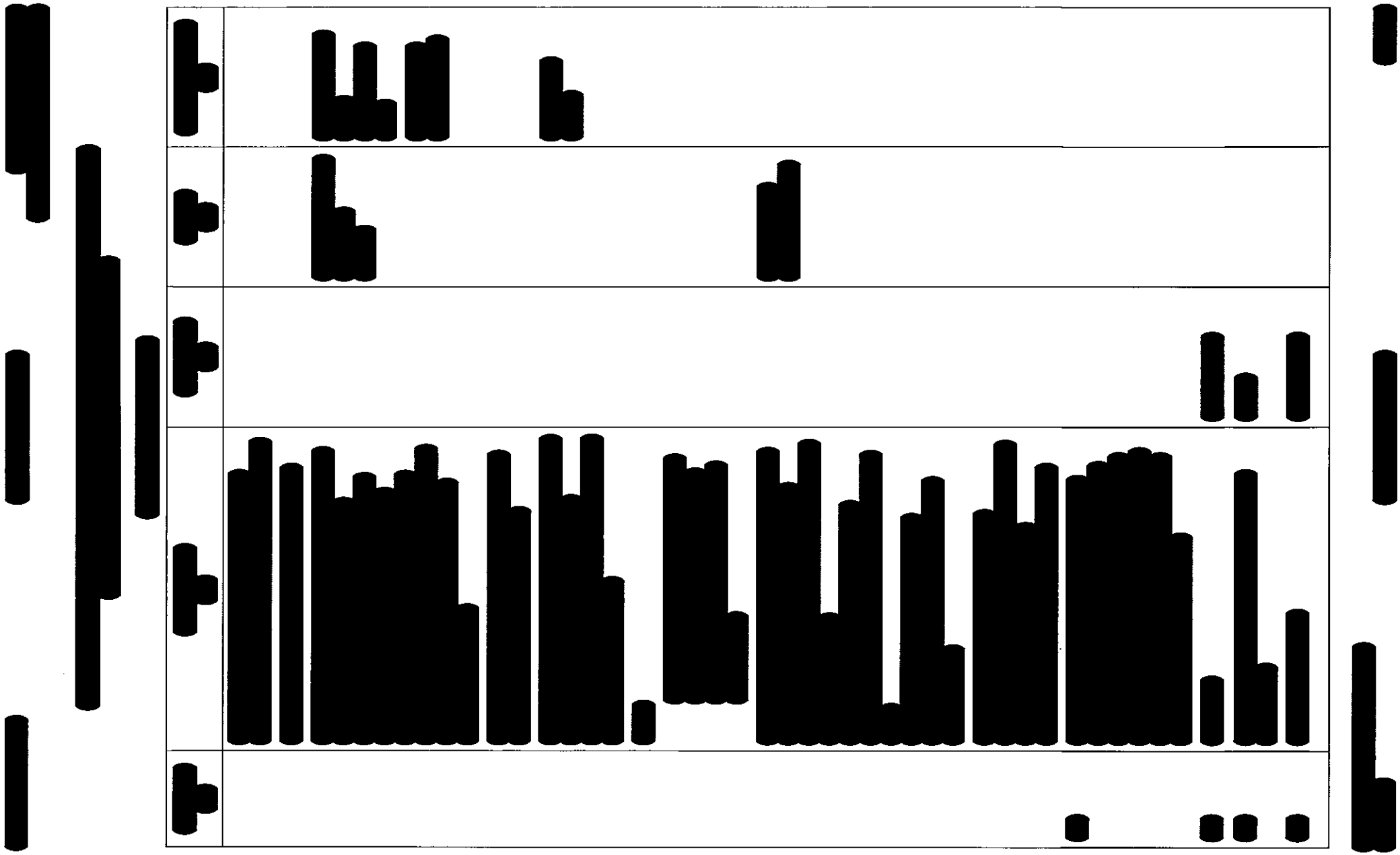

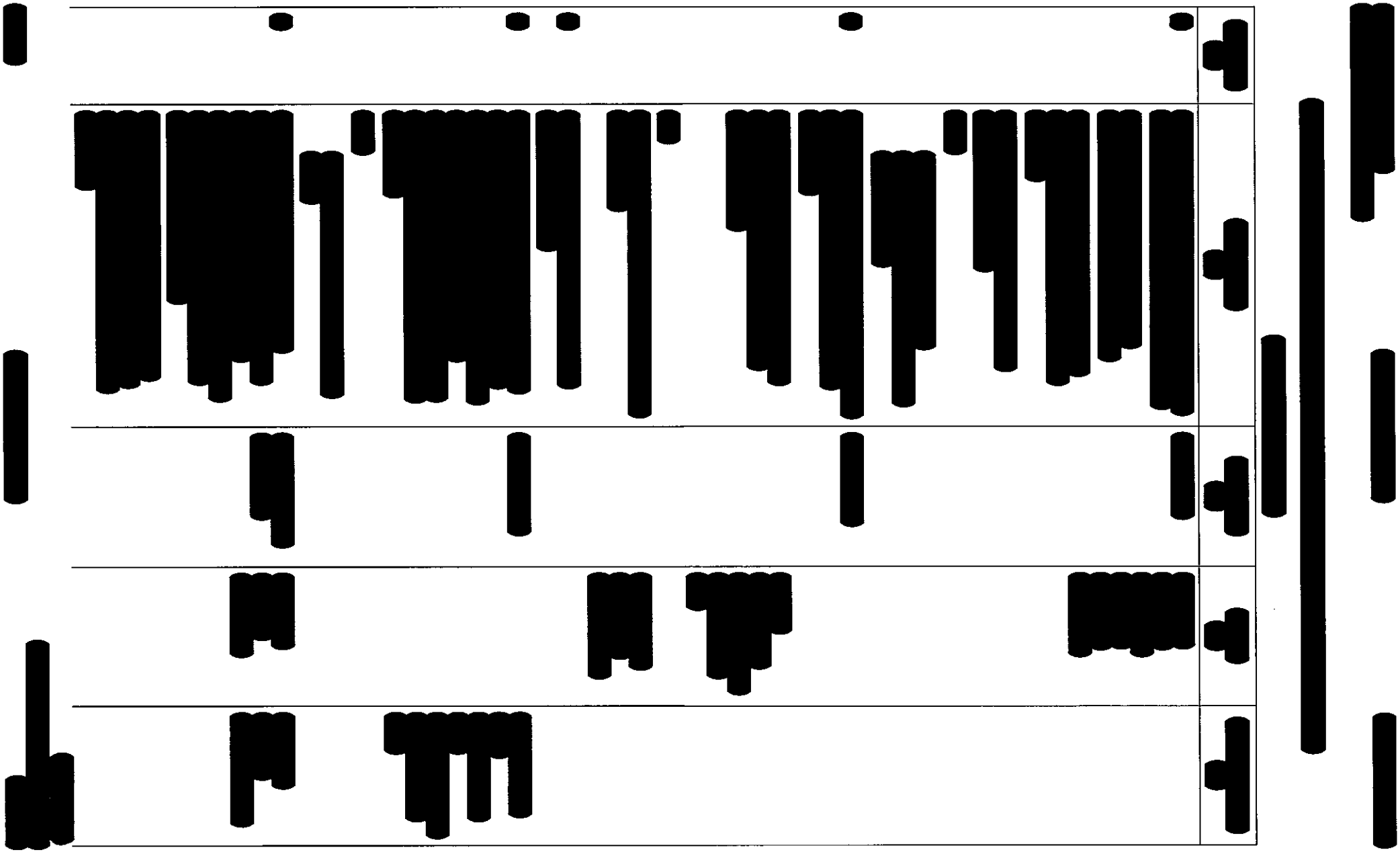

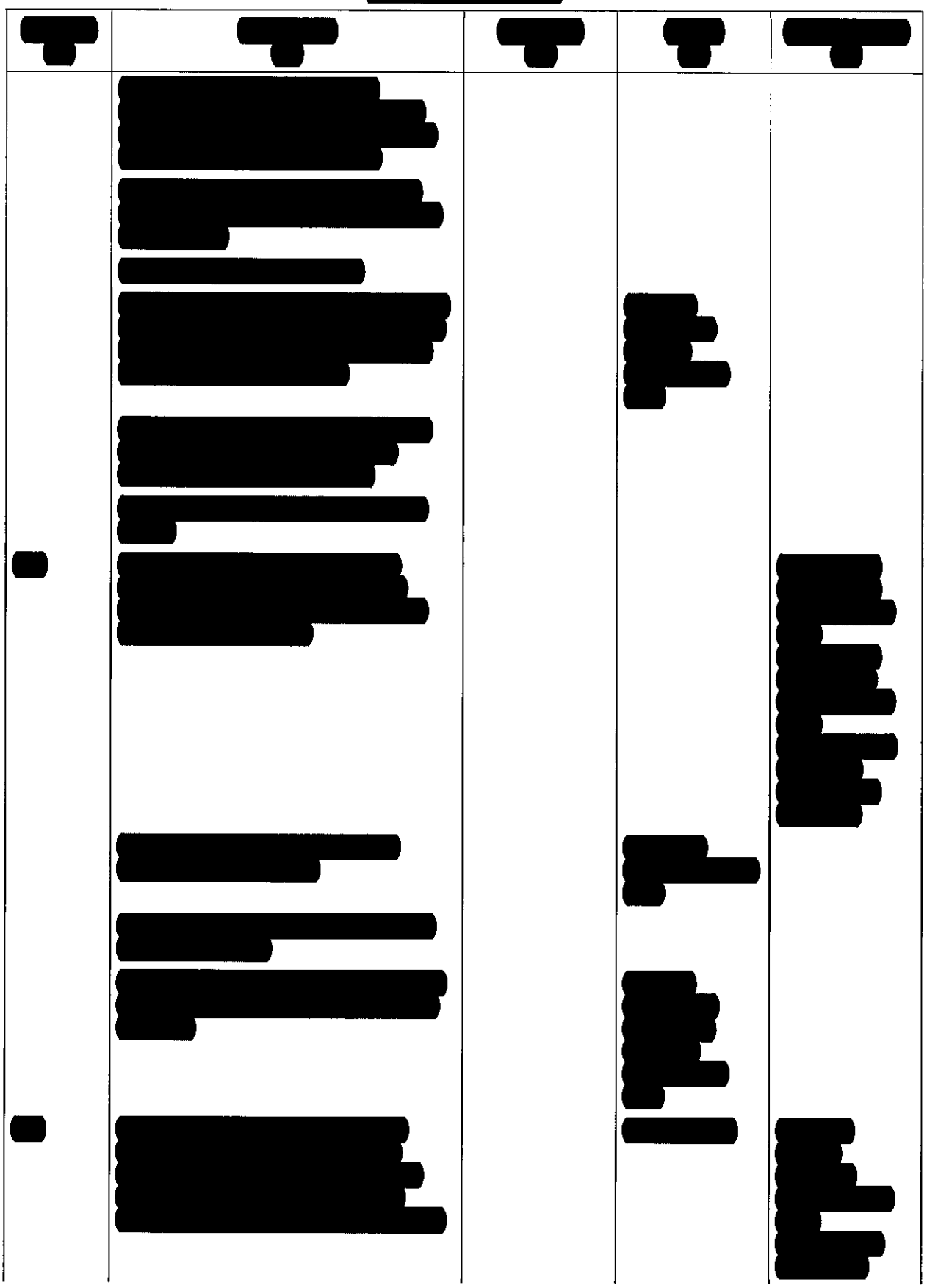

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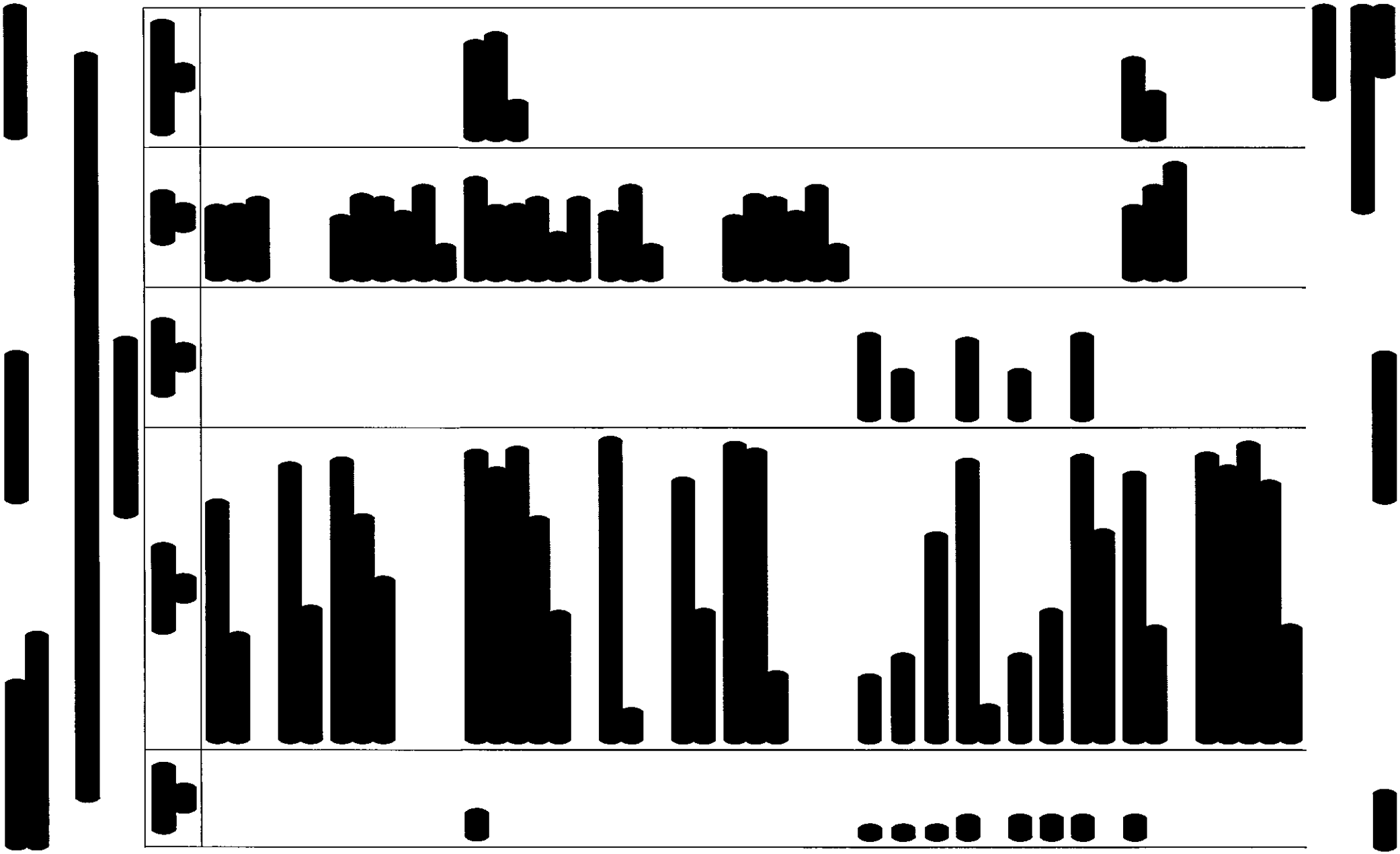

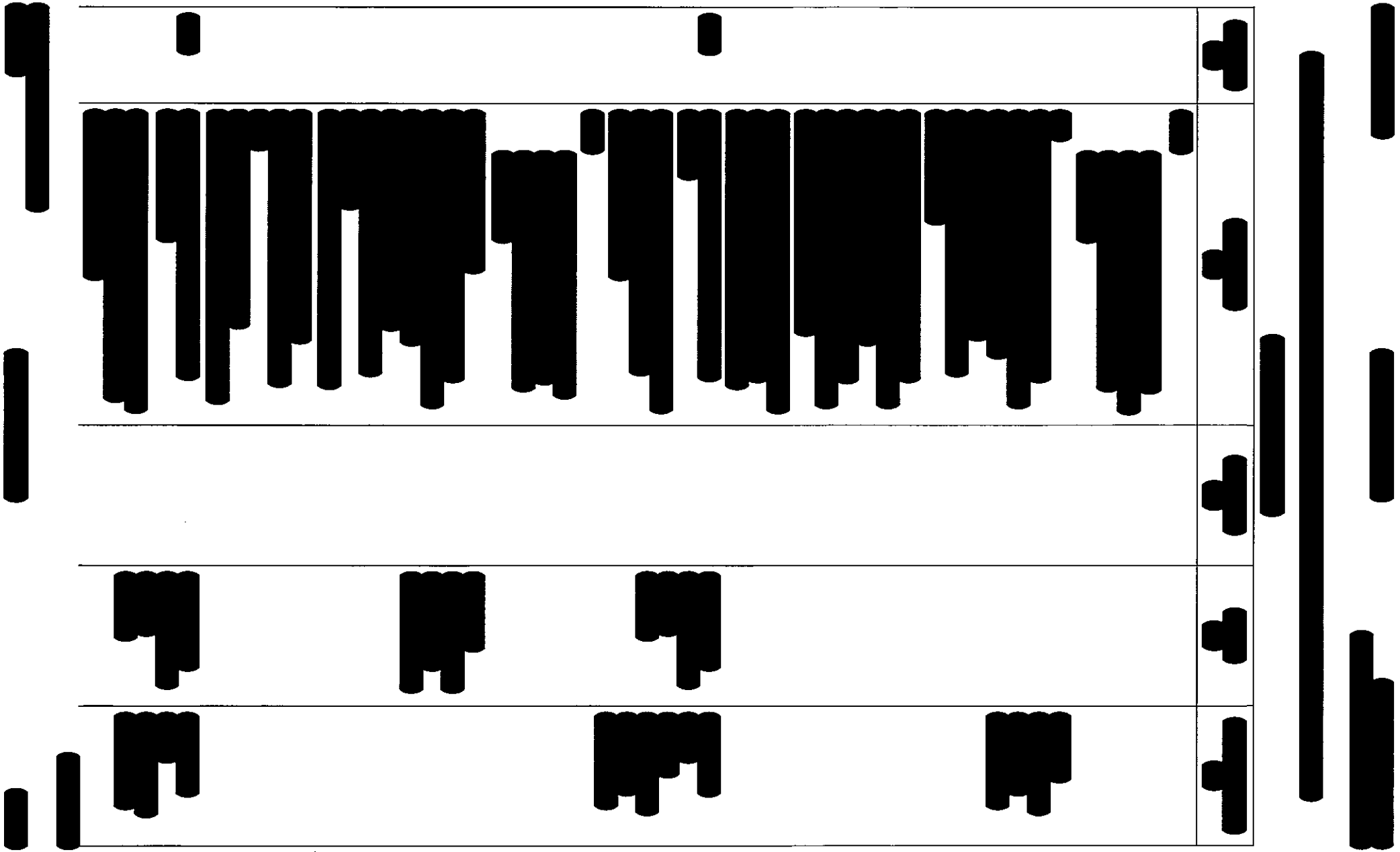

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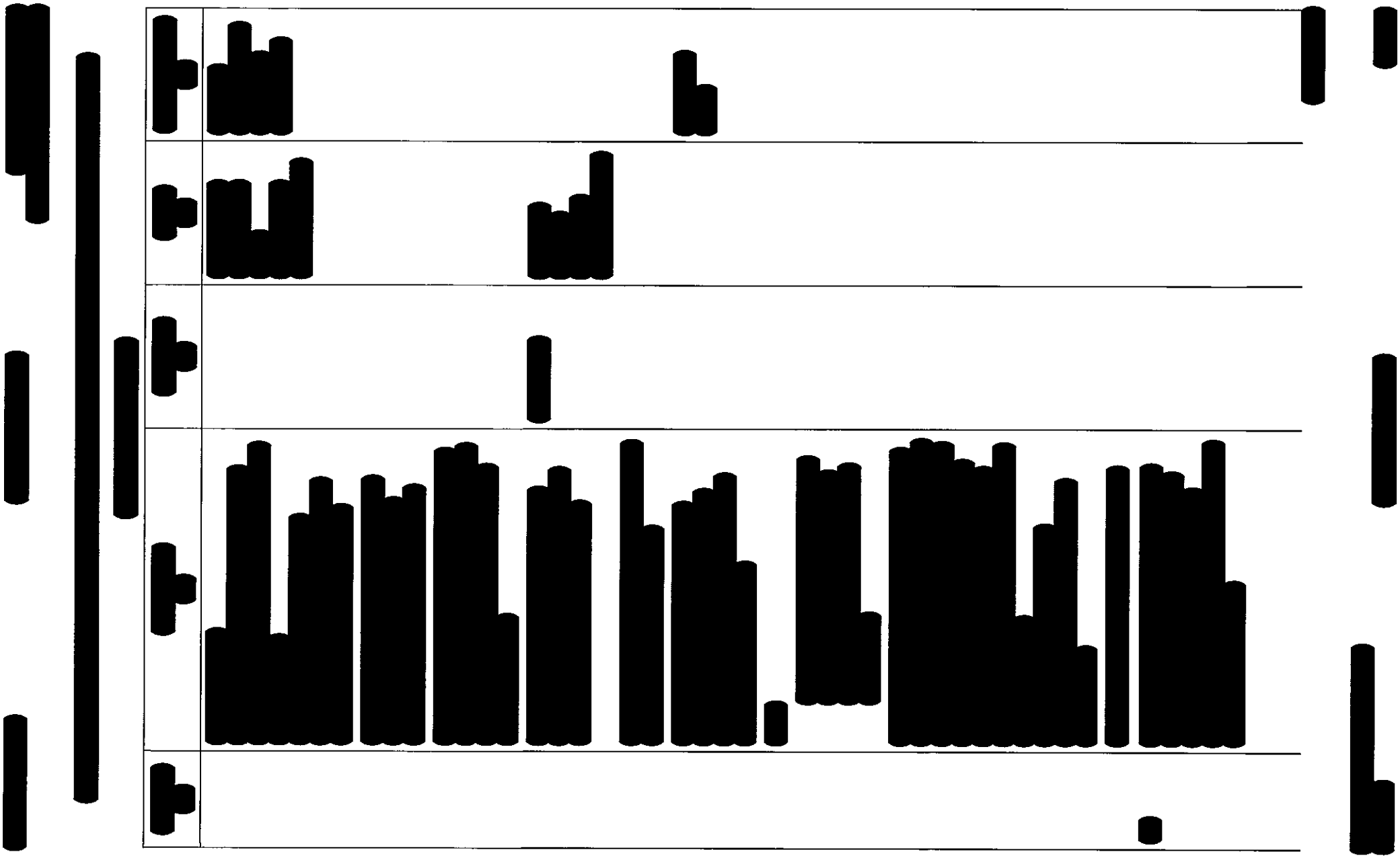

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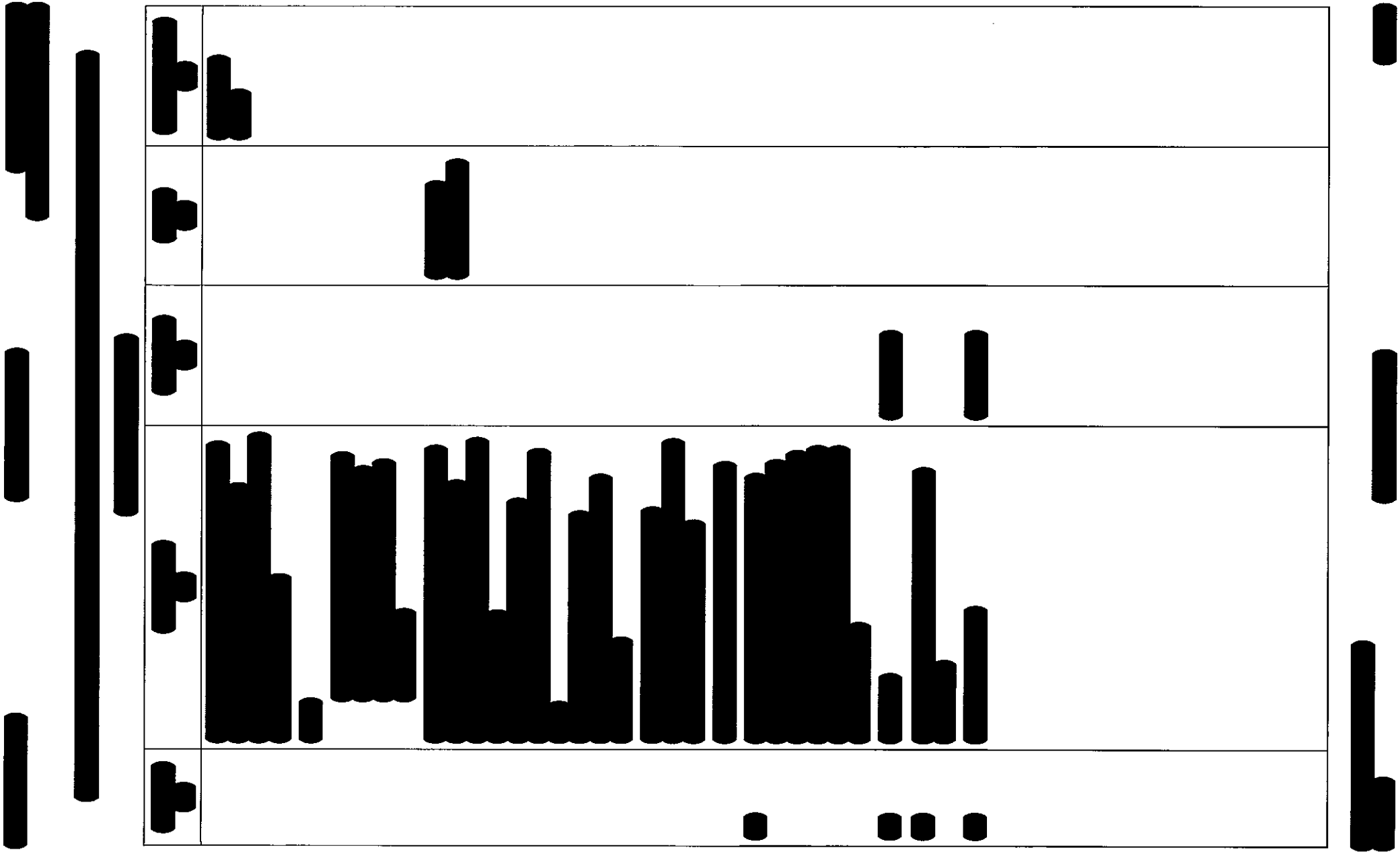


CHAPTER 10 ANNEX B APPENDIX 26

STRESS CORROSION – SPONSON, LH FRONT - INTERNAL

CONTENTS

Para

Table Page

Fig

SPONSON, LH FRONT – INTERNAL

Application

1 This repair method is to be used when cracking is present in the LH Sponson of Salamander (Scorpion) or Scimitar vehicles between the front plate of the vehicle and the first bulkhead.

Drawing reference – FV 839793 and FV 839791

Synopsis of method

2 Remove two bosses and dress flush with the surface of the plate. Fit Repair Plate FV 839791 to the internal surface of the LH Sponson plate and secure with 3/8 in. UNC Countersunk Socket Head screws inserted from the external surface of the Sponson plate. Secure bulkhead to Sponson plate using Gusset Pieces FV 840156/3 and if necessary Packing Pieces FV 840155/3. Fit stud FV 840151. Hermetite Jointing Compound is to be used between the Repair Plate and the Sponson and all screws are to be fitted using Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 and torque loaded to 34 Nm (25 lbf ft).

NOTES

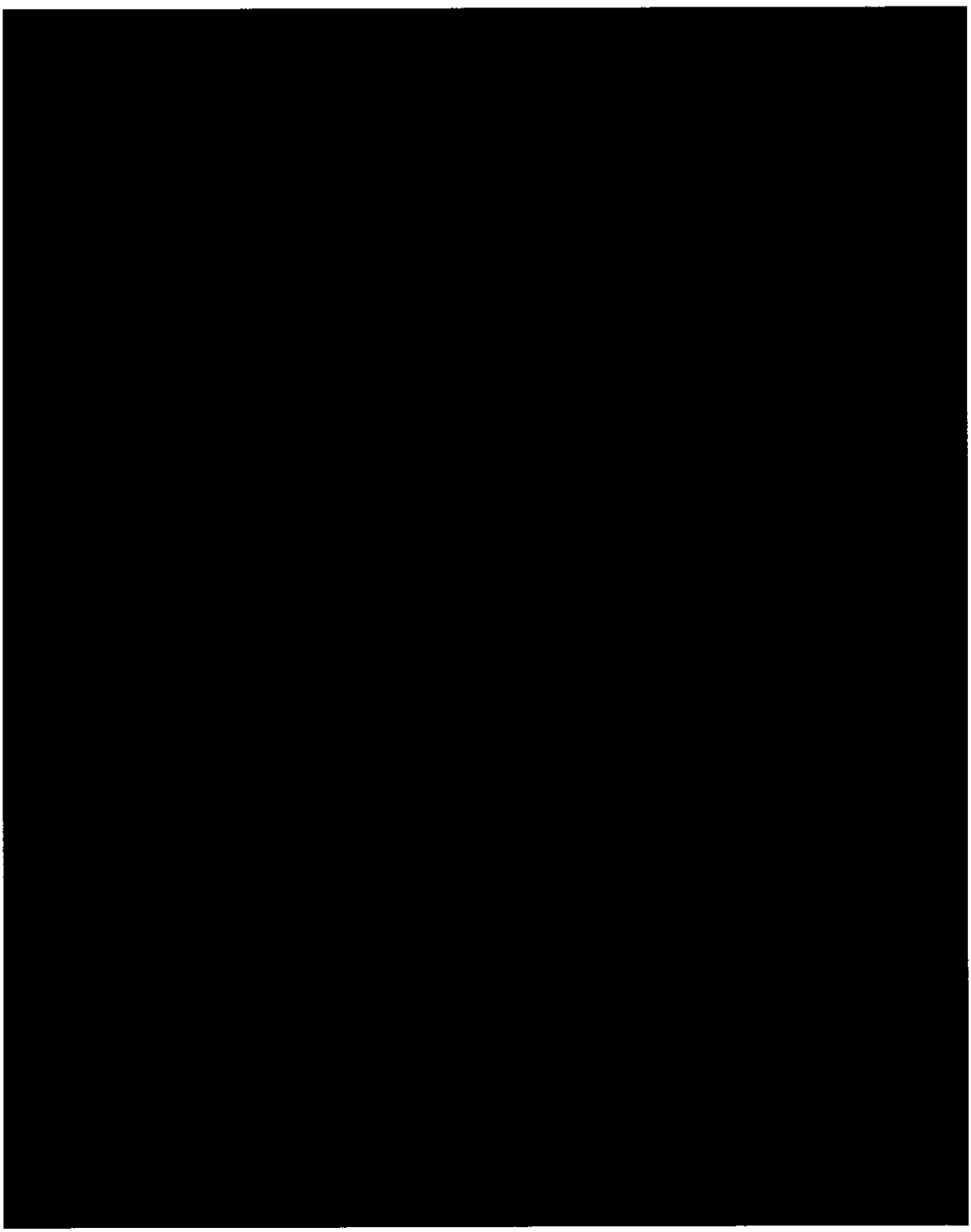
(1) When the external repair method (Appendix 24) is used in conjunction with this repair method, the holes marked 'Y' on drawing FV 839793 must be machined by transfer drilling from the external surface through the corresponding holes in Repair Plate FV 839820.

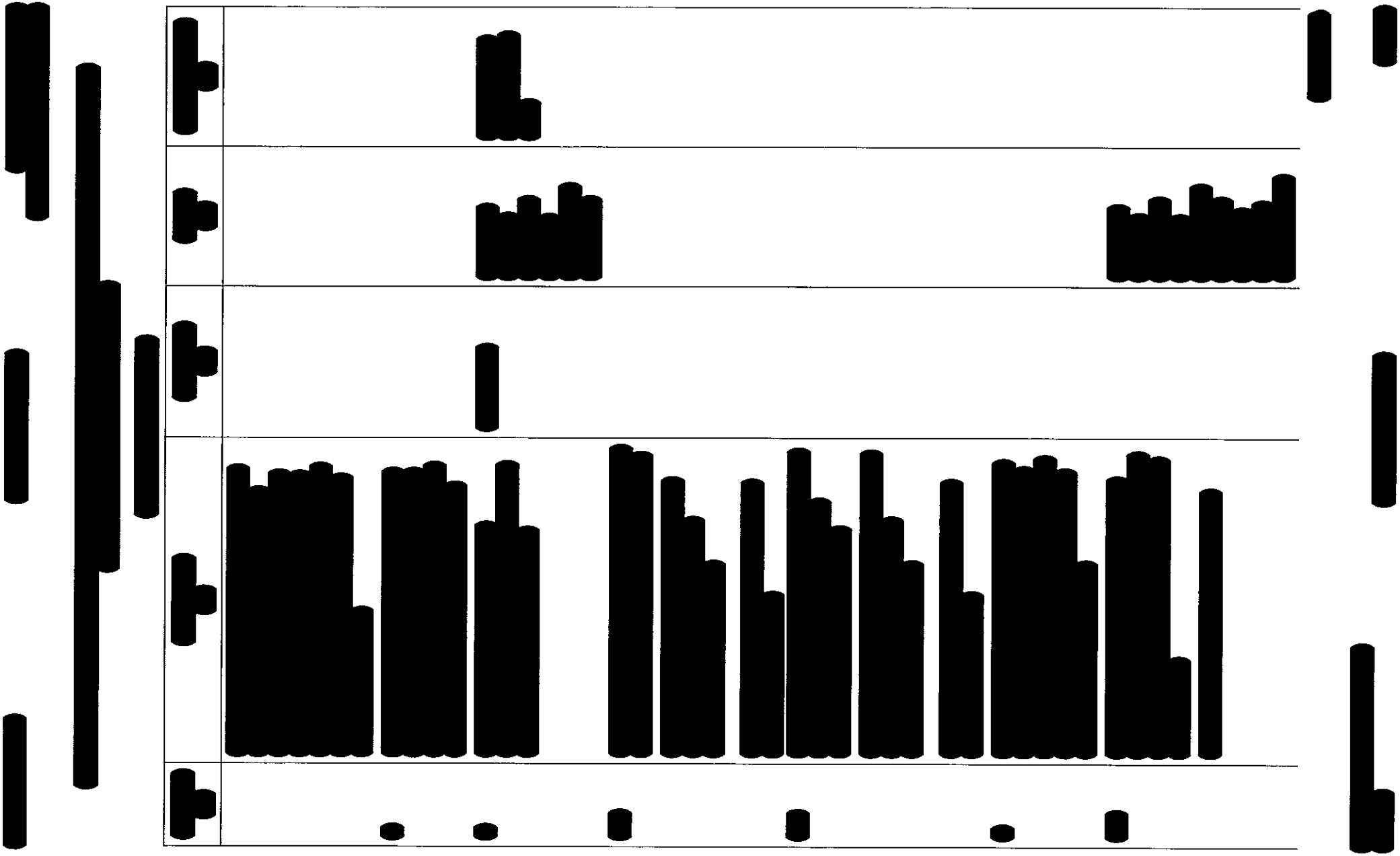
(2) In the above case increased lengths of bolts are required as detailed on drawing FV 839793.

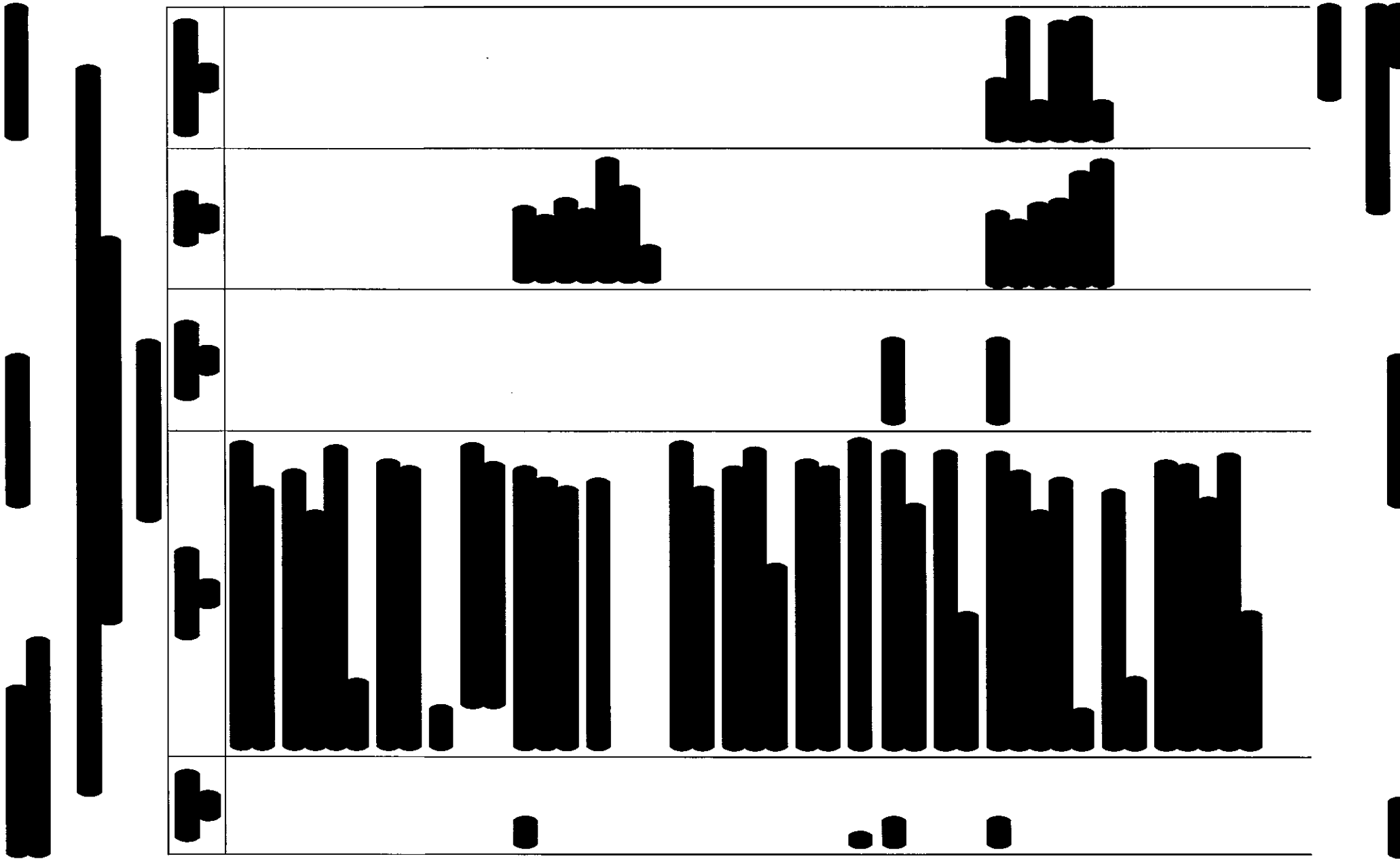
(3) In early Salamander (Scorpion) vehicles the 'patch plate' at the front of the Sponsons, which was added as a modification to increase track clearance, is not present. On these vehicles, the Repair Plate Part No. FV 839791 is to be fitted as supplied.

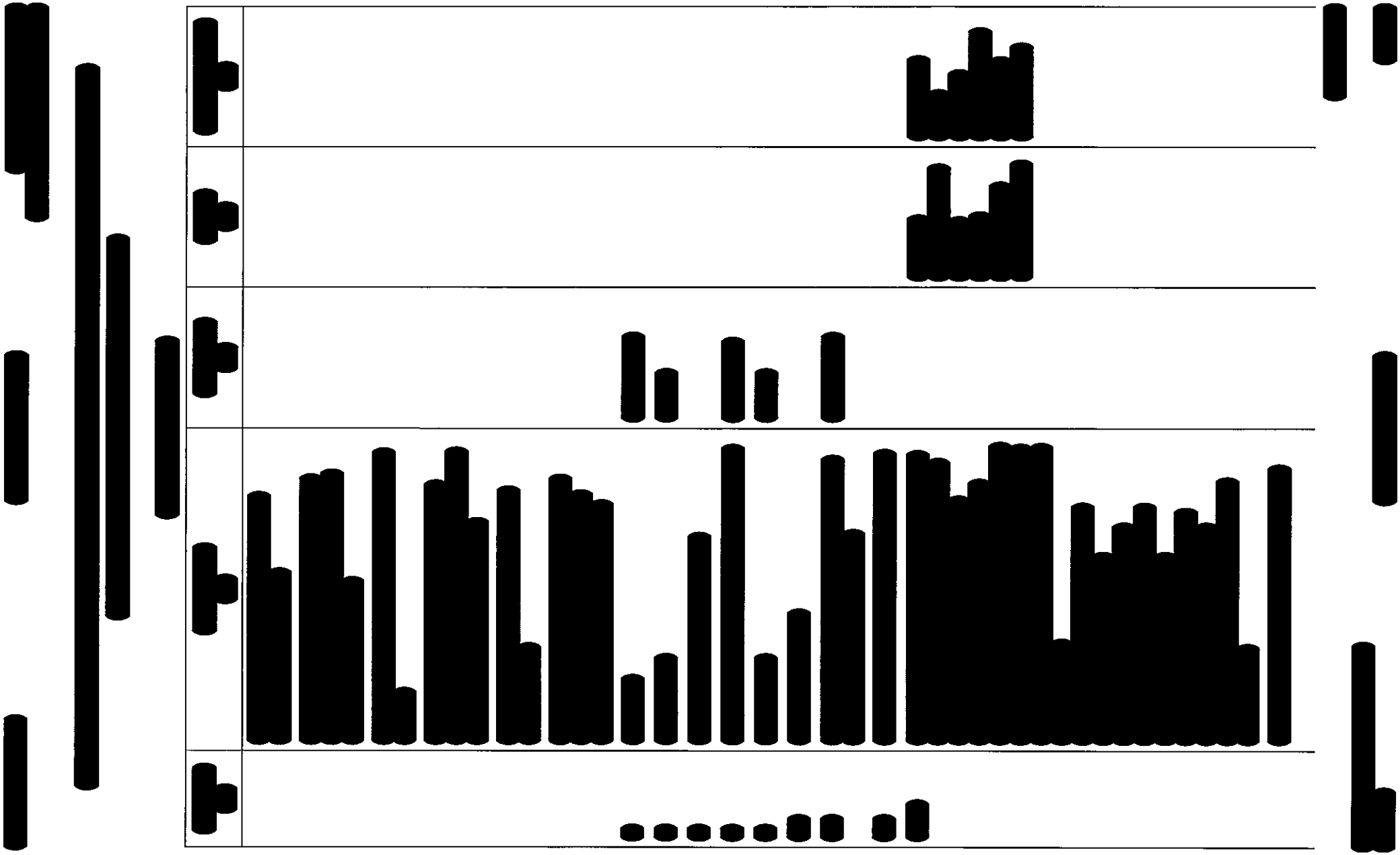
Where the 'patch plate' is present the Repair Plate is to be cut as indicated on drawing FV 839791 prior to fitting. Table 1 gives the fitting instructions for vehicles which have patch plates fitted, Table 2 gives the fitting instructions for vehicles without patch plates.

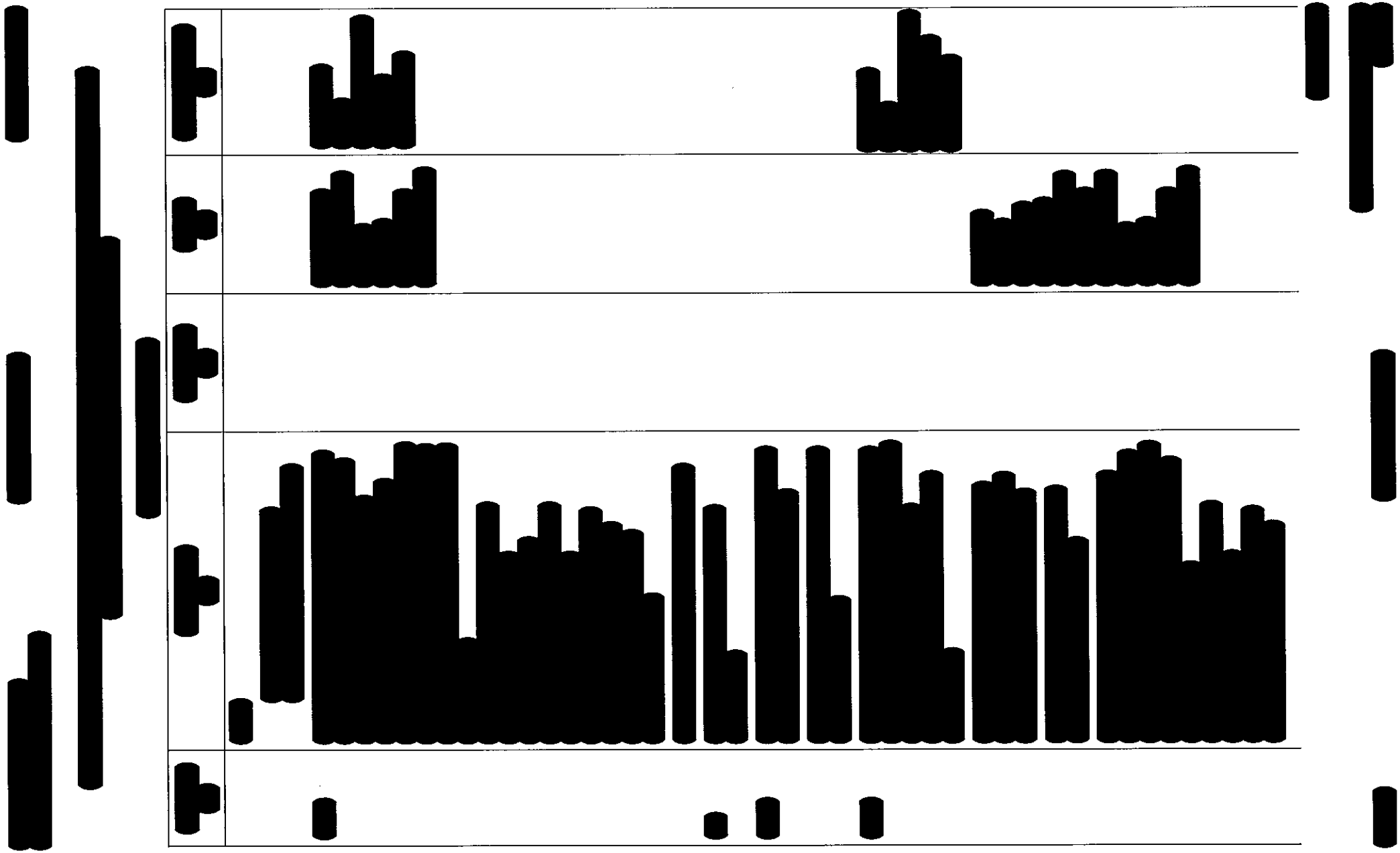
The illustration Fig 1 shows the case where the patch plate is present.

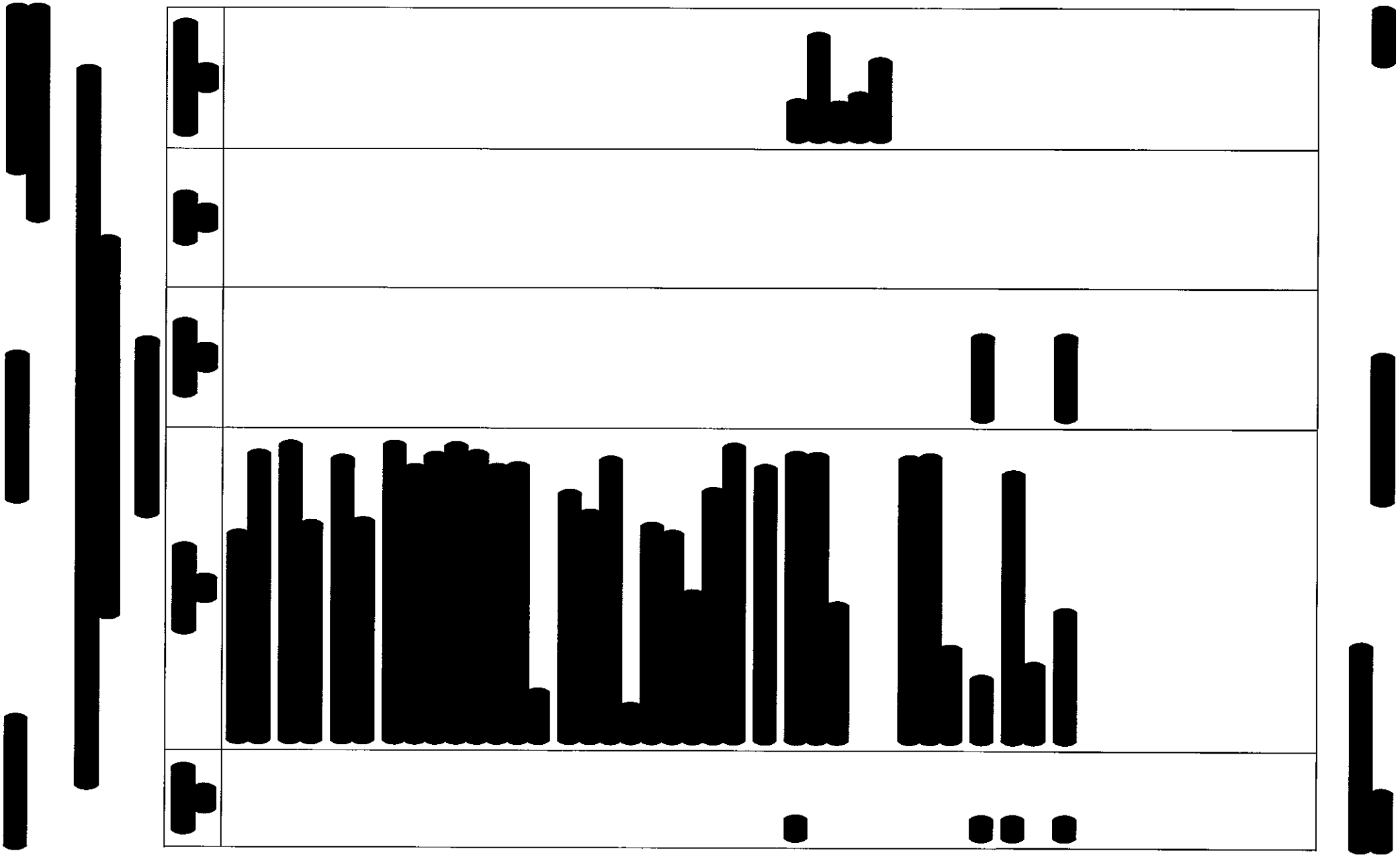


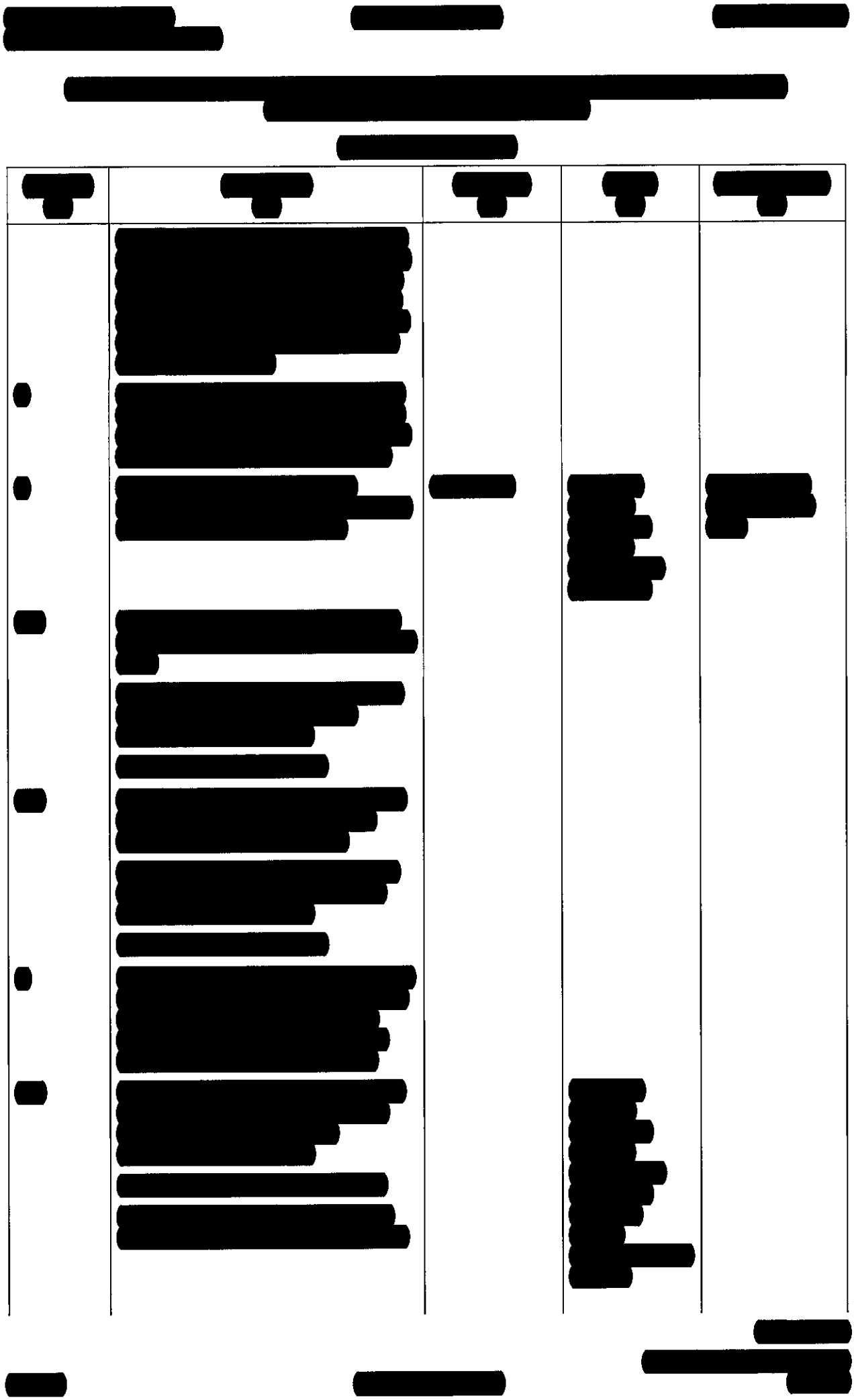


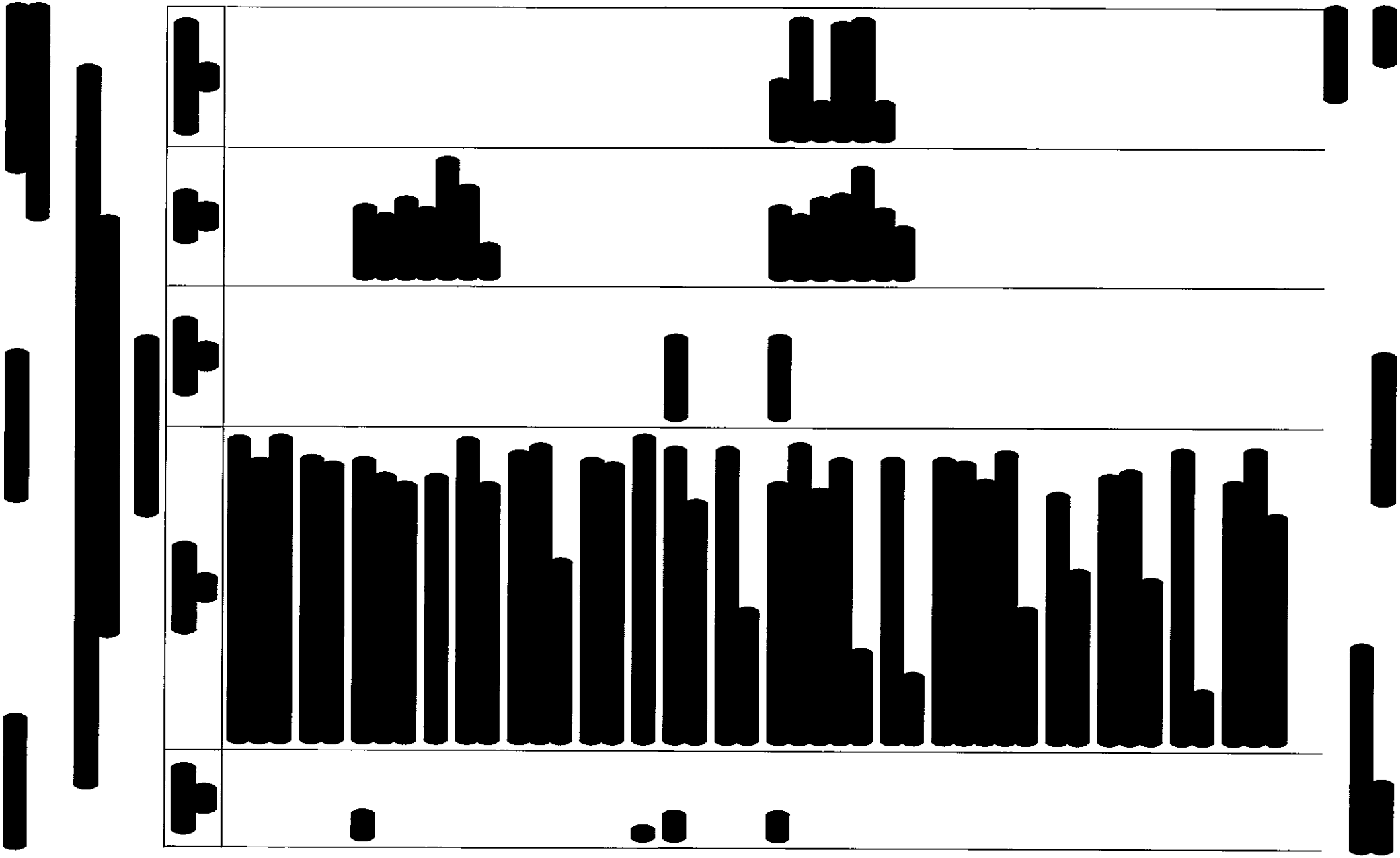


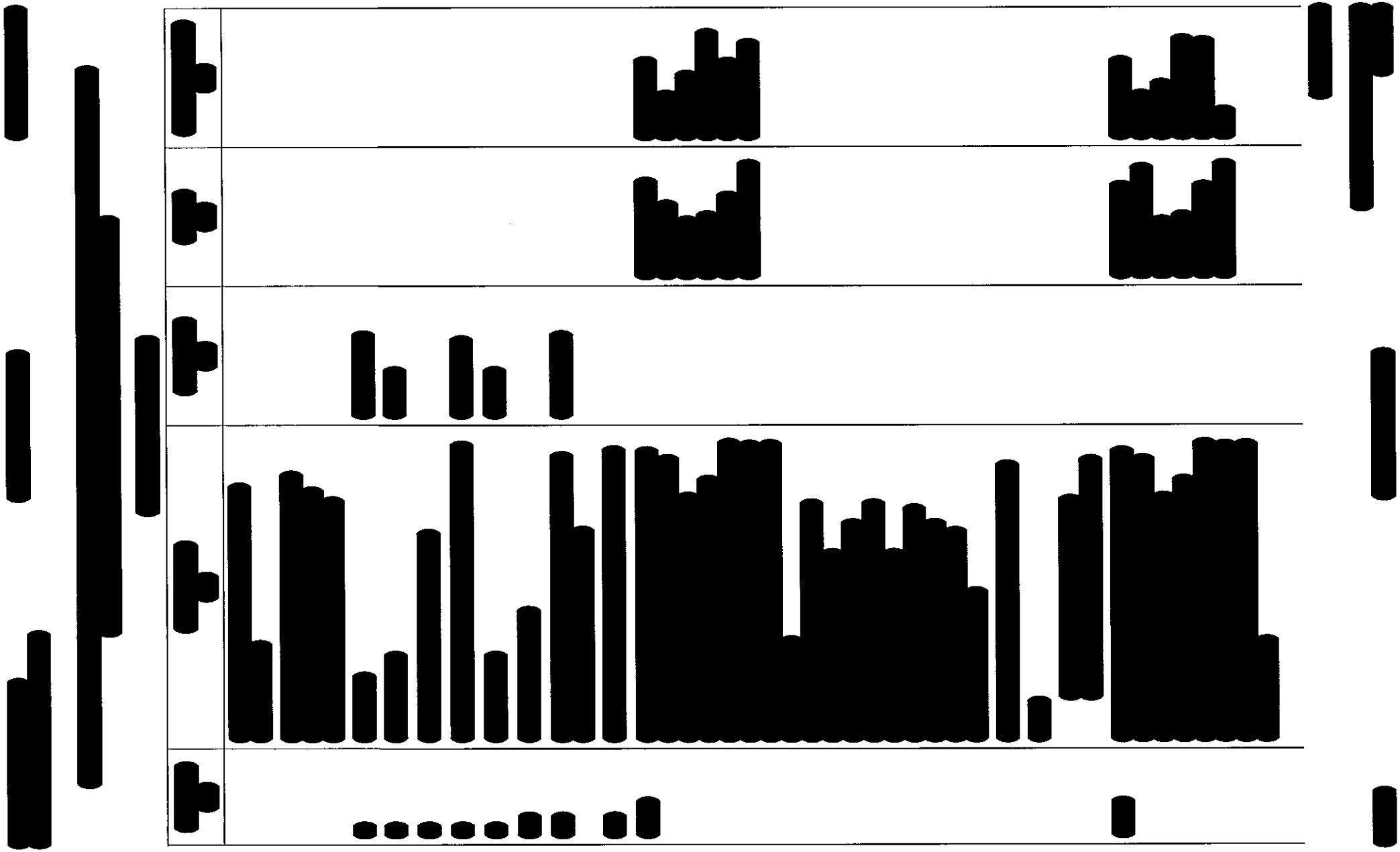












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CHAPTER 10 ANNEX B APPENDIX 27

STRESS CORROSION – TURRET-SILL PLATE/TURRET SECTIONS MECHANICAL LOCK – SALAMANDER (SCORPION)

CONTENTS

TURRET-SILL PLATE/TURRET SECTIONS – MECHANICAL LOCK – SALAMANDER (SCORPION)

Application

1 This repair method is to be used when cracking is present in the edge of the turret sill plate visible from within the turret. This repair is designed to replace the mechanical lock which may have been lost if the cracking has extended into the mechanical joint between the turret sill plate and the lower turret sections.

Drawing reference – FV 840101 Sheets 1, 3 and 4

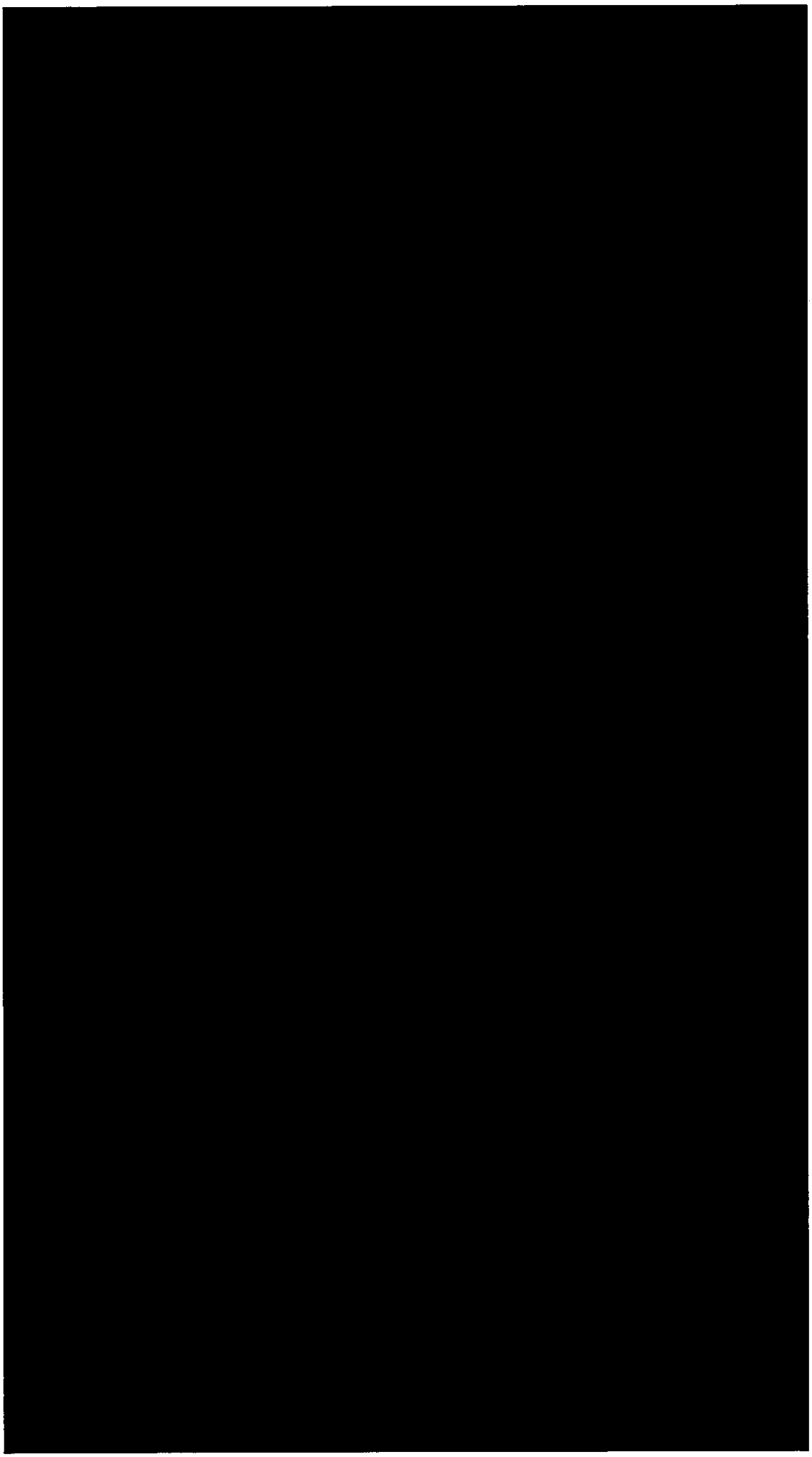
Synopsis of method

2 Position turret with sill plate uppermost and using a marking out template (local manufacture) mark out the holes to be drilled. Drill and tap to suit 3/8 in. UNC countersunk socket headed screws. Drill clearance holes through sill plate to the depths indicated and then countersink [redacted] diameter. 'Slave' screws must be used during the peening operation and these must be removed one at a time, and replaced with new screws coated with Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 after peening. Torque load all screws to 34 Nm (25 lbf ft).

NOTES

(1) The full repair may not be necessary in every case, but sufficient screws to encompass the cracking plus at least 305 mm (12 in.) beyond the extremities of each crack, are to be fitted.

(2) When practicable, the screw/bolt procedure for the repair of short transverse cracking (Appendix 5) should be used in addition to this method.



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CHAPTER 10 ANNEX B APPENDIX 28

STRESS CORROSION – TURRET-SILL PLATE/TURRET SECTIONS MECHANICAL LOCK - SCIMITAR

CONTENTS

TURRET-SILL PLATE/TURRET SECTIONS – MECHANICAL LOCK - SCIMITAR

Application

1 This repair method is to be used when cracking is present in the edge of the turret sill plate visible from within the turret. This repair is designed to replace the mechanical lock which may have been lost if the cracking has extended into the mechanical joint between the turret sill plate and the lower turret sections.

Drawing reference – FV 840101 Sheets 2, 3 and 4

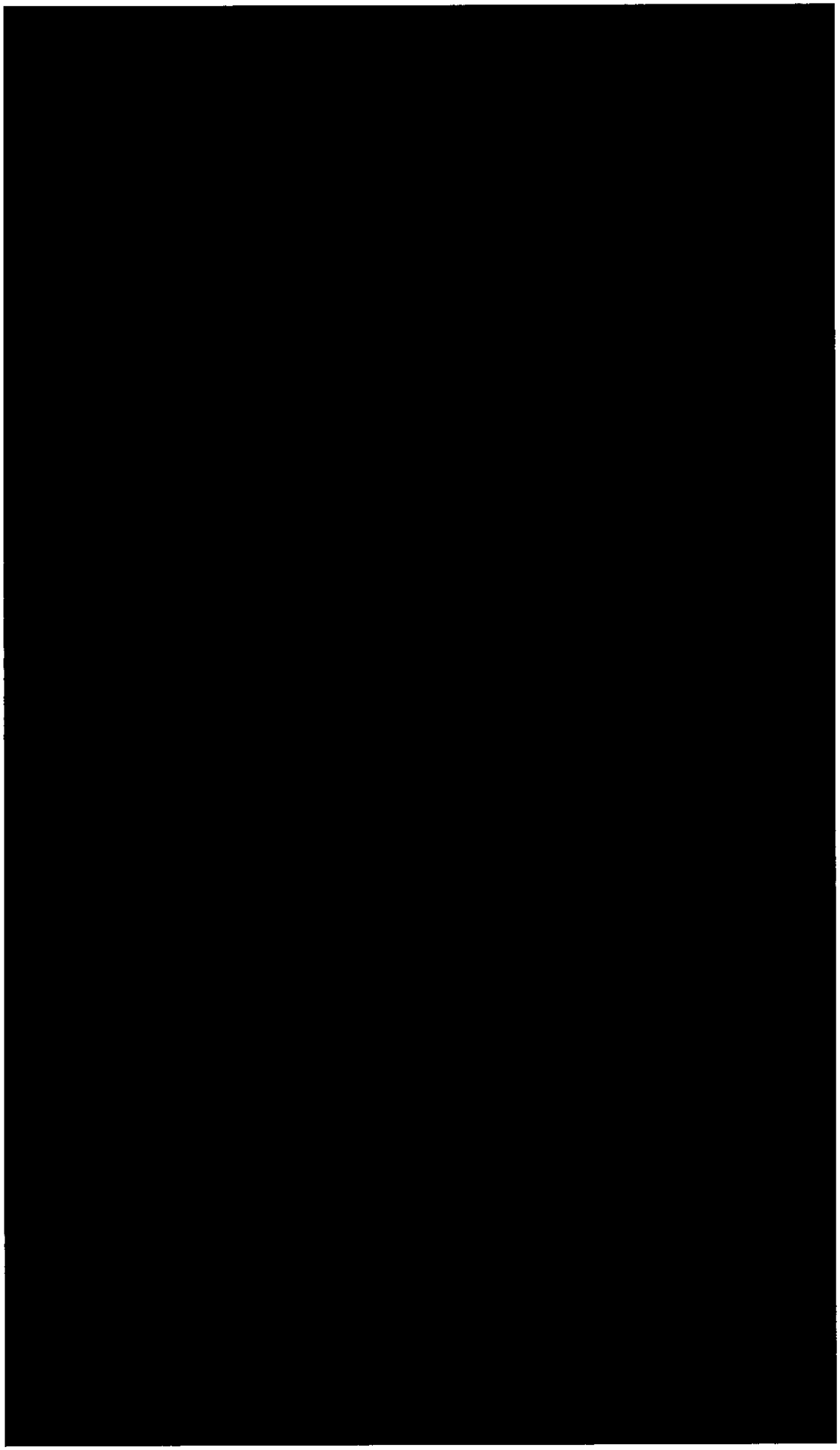
Synopsis of method

2 Position turret with sill plate uppermost and using a marking out template (local manufacture) mark out the holes to be drilled. Drill and tap to suit 3/8 in. UNC countersunk socket headed screws. Drill clearance holes through sill plate to the depths indicated and then countersink [redacted] diameter. 'Slave' screws must be used during the peening operation and these must be removed one at a time, and replaced with new screws coated with Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 after peening. Torque load all screws to 34 Nm (25 lbf ft).

NOTES

(1) The full repair may not be necessary in every case, but sufficient screws to encompass the cracking plus at least 305 mm (12 in.) beyond the extremities of each crack, are to be fitted.

(2) When practicable, the screw/bolt procedure for the repair of short transverse cracking (Appendix 5) should be used in addition to this method.



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CHAPTER 10 ANNEX B APPENDIX 29

STRESS CORROSION – BOLT REPAIR FOR TURRET FRONT PLATES - SALAMANDER (SCORPION) AND SCIMITAR

CONTENTS

BOLT REPAIR FOR TURRET FRONT PLATES - SALAMANDER (SCORPION) AND SCIMITAR

Application

1 Where cracks which exceed the Repair Criteria (paras 2 and 3), are found in the upper or lower front plates (Y, L, X and W) adjacent to the internal welded joints to the front 1/4 side plates (O, A, P and B), the appropriate bolt repair is to be carried out in accordance with Figs 1 and 2 and the method detailed in para 4.

Repair criteria

Upper plates, left and right (Y and L)

2 Cracks totalling more than 125 mm (5 in.) where a feeler gauge 0.075 mm (0.003 in.) can be inserted anywhere along a crack to a depth exceeding 12 mm (1/2 in.).

Lower plates, left and right (X and W)

3 Cracks totalling more than 75 mm (3 in.) where a feeler gauge 0.075 mm (0.003 in.) can be inserted anywhere along a crack to a depth exceeding 12 mm (1/2 in.).

NOTE

When the left upper plate has been repaired, it may be necessary to reposition electrical plug mounting bracket to clear a bolt head.

Synopsis of method

4 Carry out the procedure as follows:

NOTE

See Fig 1 for upper plates and Fig 2 for lower plates.

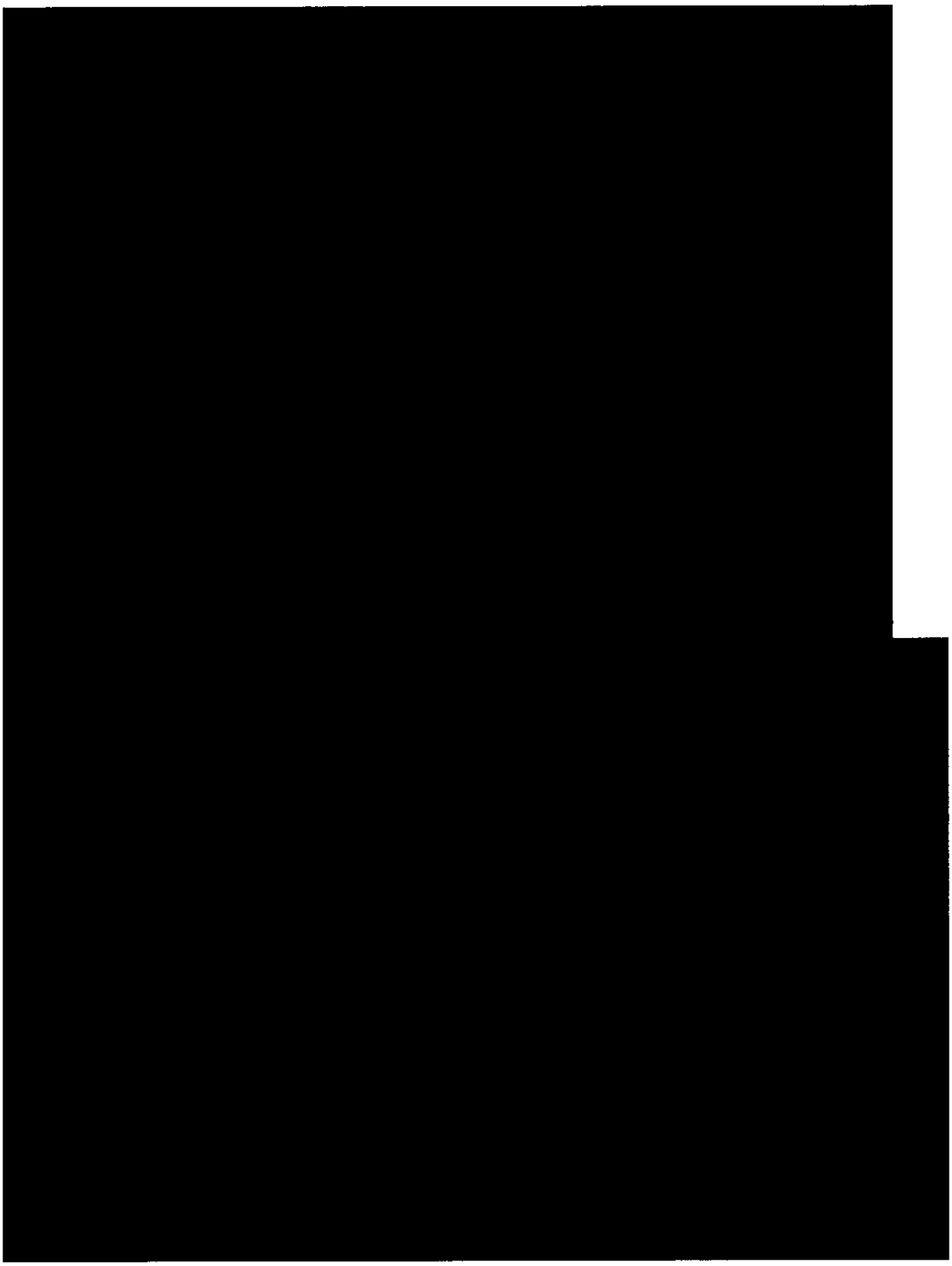
4.1 Drill, counterbore and tap holes as shown (qty 5 in upper plates, qty 4 in lower plates).

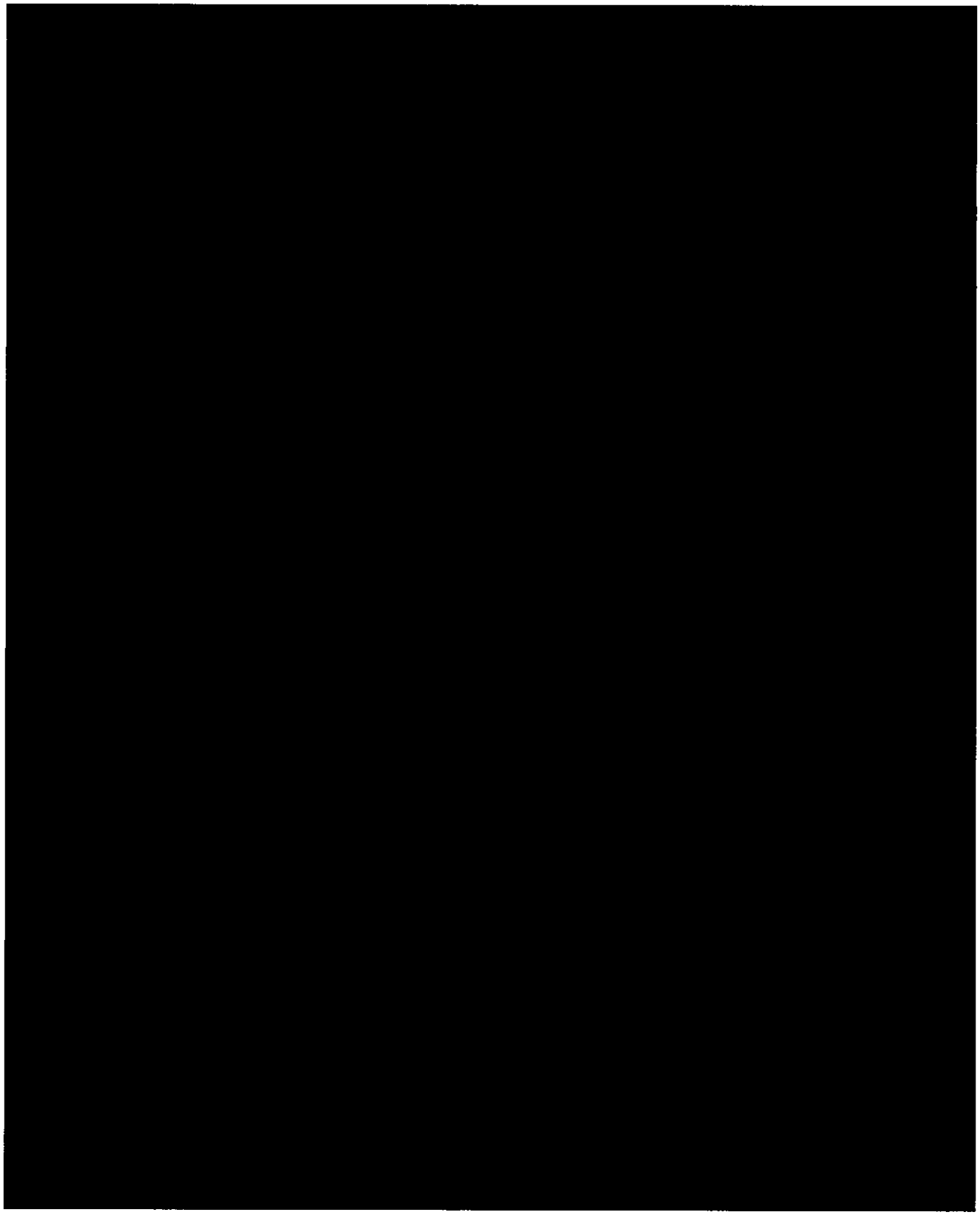
4.2 Blank off holes for peening of counterbore edges with studs screwed almost flush with bottom of counterbores.

4.3 Shot peen and remove blanking studs.

4.4 Coat bolt threads and underside of bolt heads with Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 and fit bolts. Torque tighten to 39 Nm (28 to 30 lbf ft).

4.5 Fill around bolt heads with epoxy filler (Appendix 2) and dress flush.





CHAPTER 10 ANNEX B APPENDIX 30

STRESS CORROSION – TURRET – RIGHT HAND FRONT UPPER PLATE (SCIMITAR)

CONTENTS

TURRET – RIGHT HAND FRONT UPPER PLATE (SCIMITAR)

Application

1 This repair is to be applied if cracks are present around the turret right hand front upper patch plate, part number FV 745229 and the right hand lifting eye part number FV 745458.

NOTE

Authority to implement this repair on any particular turret must be obtained through the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication).

Drawing reference – FV 969275, FV 969251
FV 969273, FV 969276

Synopsis of method

2 Remove right hand smoke discharger and bracket. Remove lifting eye and patch plate, dress flush with plate surface and dress buttering on the top edge of the lower plate to allow the repair plate assembly to fit flush. Dress the weld contour on the turret upper front plate to match the 10 mm chamfer on the repair plate. Produce a chamfer on the edge of the right hand upper front plate of not less than 30° (Fig 1 Section 'AA'). Dress the edges of the cut-out to give a good lift around the spigot on the Repair Plate. Remove all paint within 100 mm (4 in.) of all weld areas and locate the Repair Plate assembly on the turret, further details of the preparation and welding technique are given in Appendix 1.

3 Apply tack welds 1, 2 and 3; 6 mm fillet welds 20-25 mm long. Apply welds 4, 5, 6 and 7, weld run 4 must be complete but limitations on access may not allow complete runs on 5, 6 and 7, this is acceptable. Apply weld runs 8, 9 and 10.

NOTE

Weld runs 5, 6 and 7 should not be applied if SCC is present in the edges of the cut out.

4 Remove tack weld 1 and cold start of runs 8 and 10 and apply weld run 11.

5 Remove tack weld 2 and apply weld run 12 from the centre. Remove tack weld 3 and cold start of run 12 and apply weld run 13.

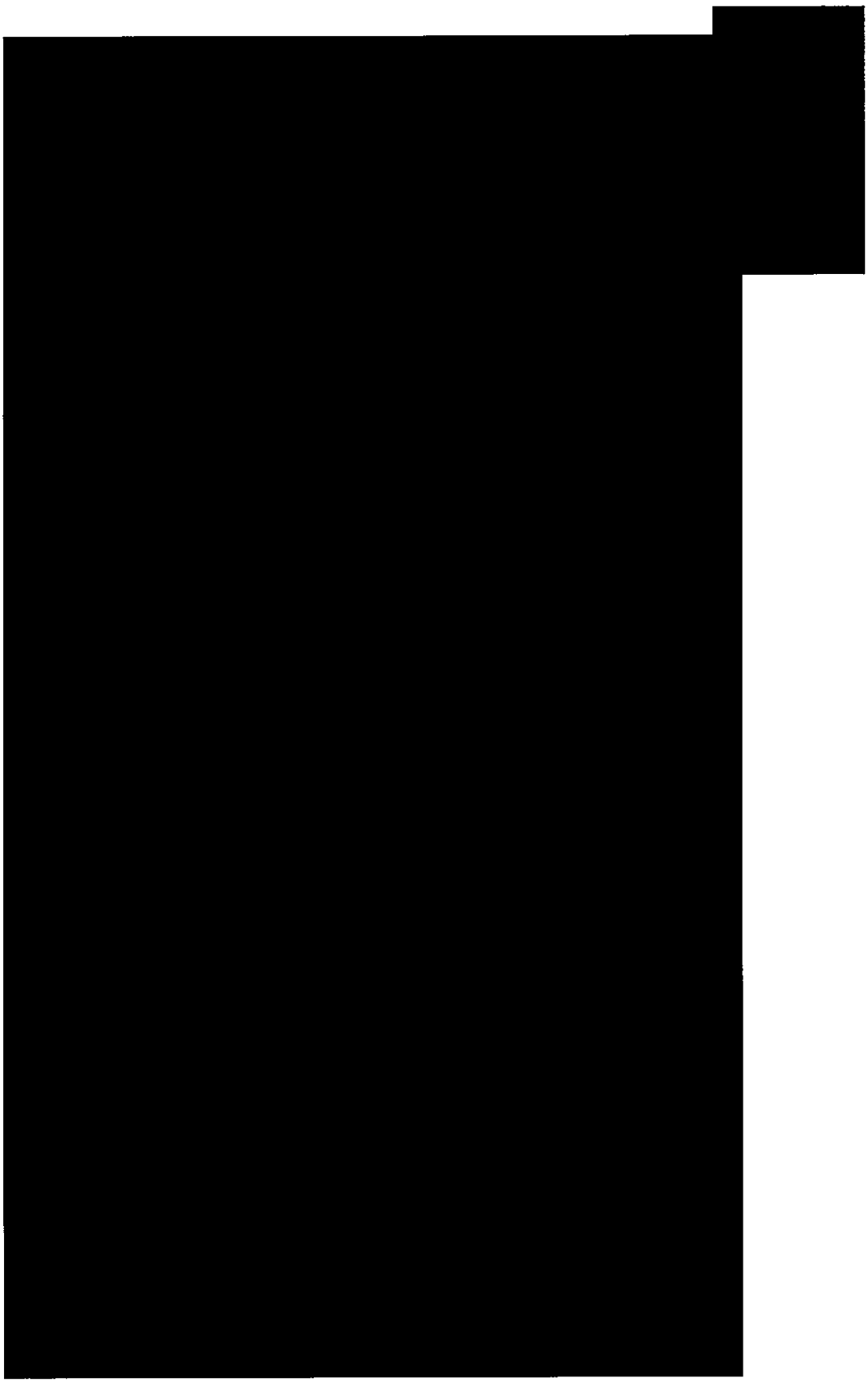
6 Apply weld runs 14 and 15, remove tack welds applied during manufacture of Repair Plate and apply weld runs 16 and 17.

7 Apply butting on the edges detailed in Fig 1 and carry out peening and painting.

8 Refit smoke discharger, using mounting bracket, Part No. FV 969273.

NOTE

Details of the welding sequence are also given in drawing number FV 969275 and Fig 1.



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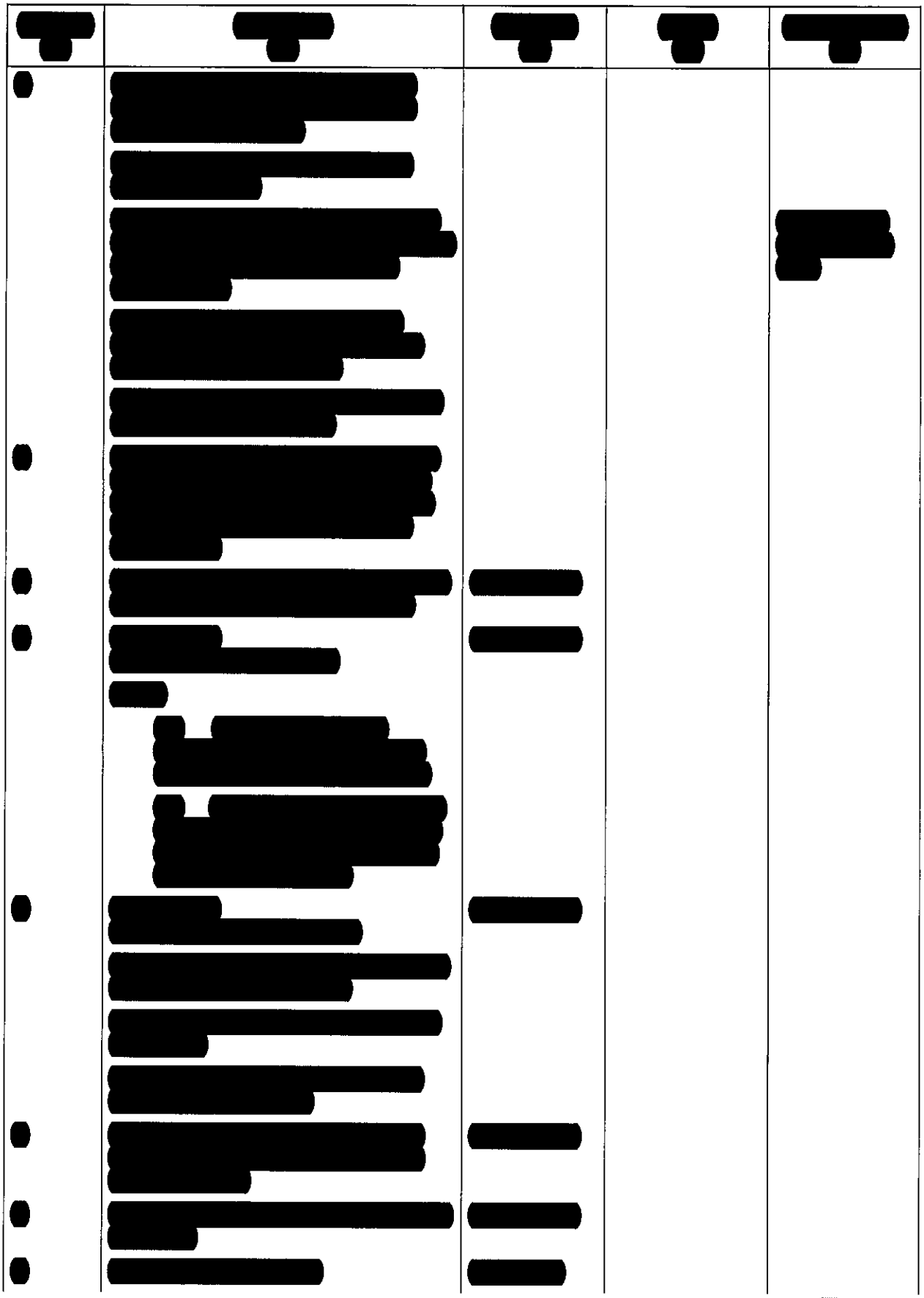

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CHAPTER 10 ANNEX B APPENDIX 31

STRESS CORROSION – TURRET – CHEEK PLATE – MACHINED SURFACE SALAMANDER (SCORPION)

CONTENTS

TURRET CHEEK PLATE – MACHINED SURFACE - SALAMANDER (SCORPION)

Application

1 This repair method is to be used when cracks are present in the leading edges of turret cheek plates and in trunnion bores in a position between the centreline and machined surface of the plate.

Drawing reference – FV 840078

Synopsis of method

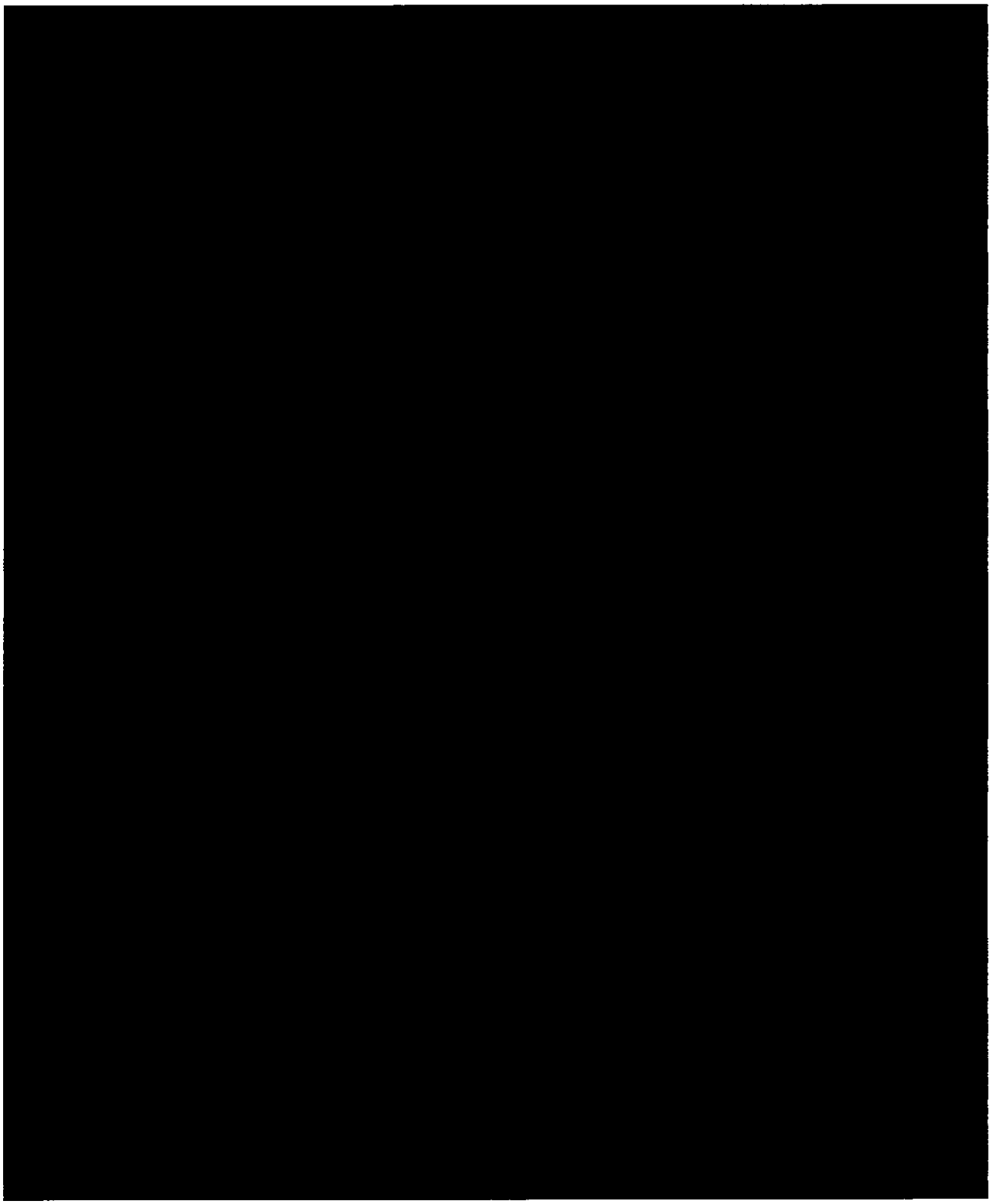
2 Drill and tap holes for 3/8 in. UNC countersunk socket headed screws using a marking out template (local manufacture). Drill clearance holes to the depth of the crack and then countersink [redacted] 'Slave' screws are to be used during the peening operation and these must be removed one at a time and replaced with new screws coated with Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 after peening. Torque load all screws to 34 Nm (25 lbf ft).

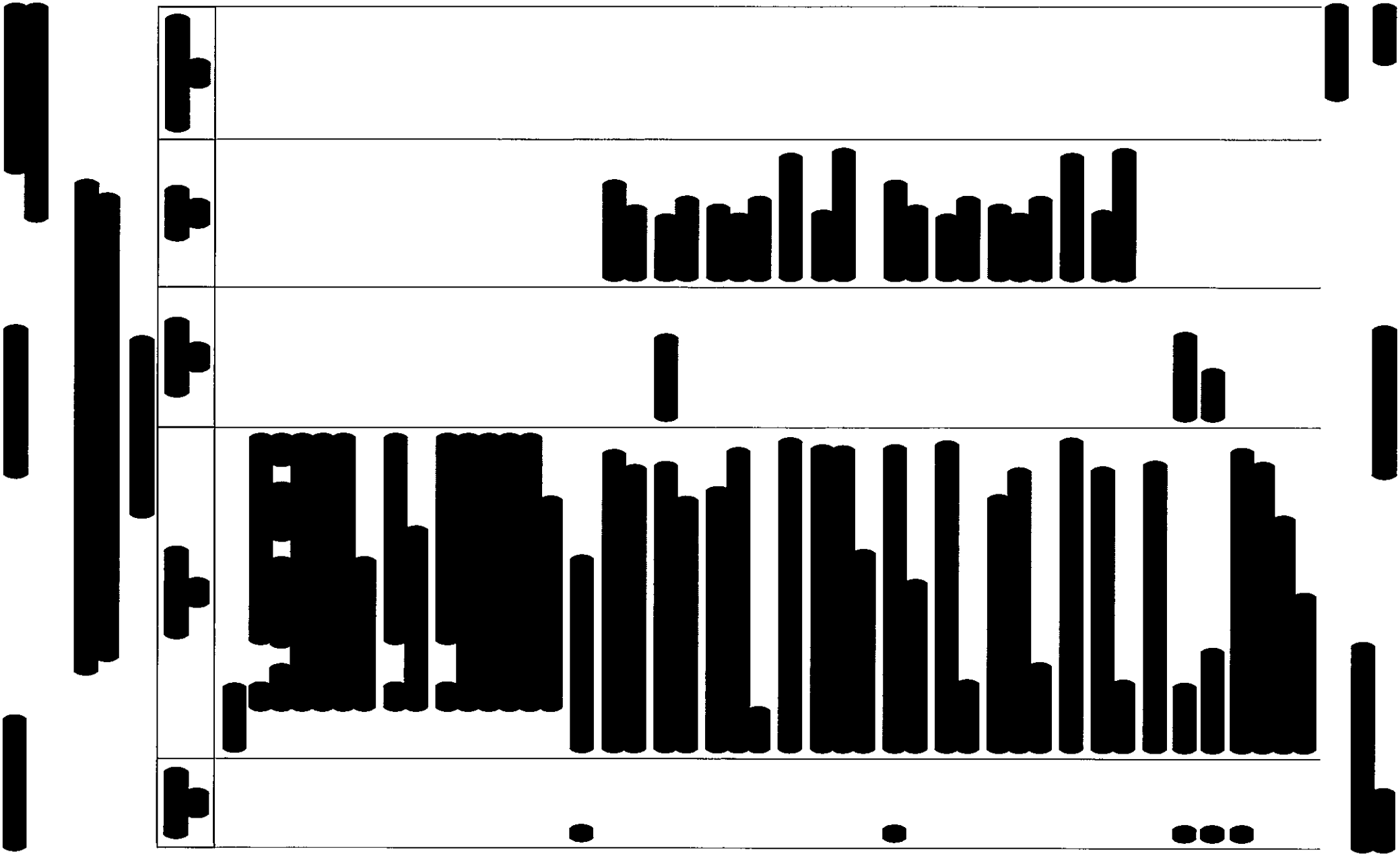
NOTES

(1) The machined surface is defined as the surface adjacent to the gun mantlet.

(2) If no cracks are present in the trunnion bore, that section of the repair may be omitted.

(3) If the cracking present in the leading edge of the turret cheek plate is between the centreline of the plate and the machined surface, and the cracking present in the trunnion bore is between the centreline of the plate the unmachined surface, then the leading edge of cheek plate must be repaired to this method and the trunnion bore repaired to the appropriate section of Appendix 33.





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CHAPTER 10 ANNEX B APPENDIX 32

STRESS CORROSION – TURRET CHEEK PLATE – MACHINED SURFACE (SCIMITAR)

CONTENTS

TURRET CHEEK PLATE – MACHINED SURFACE (SCIMITAR)

Application

1 This repair method is to be used when cracks are present in the leading edges of turret cheek plates and in a position between the centreline and machined surface of the plate.

Drawing reference – FV 840214

Synopsis of method

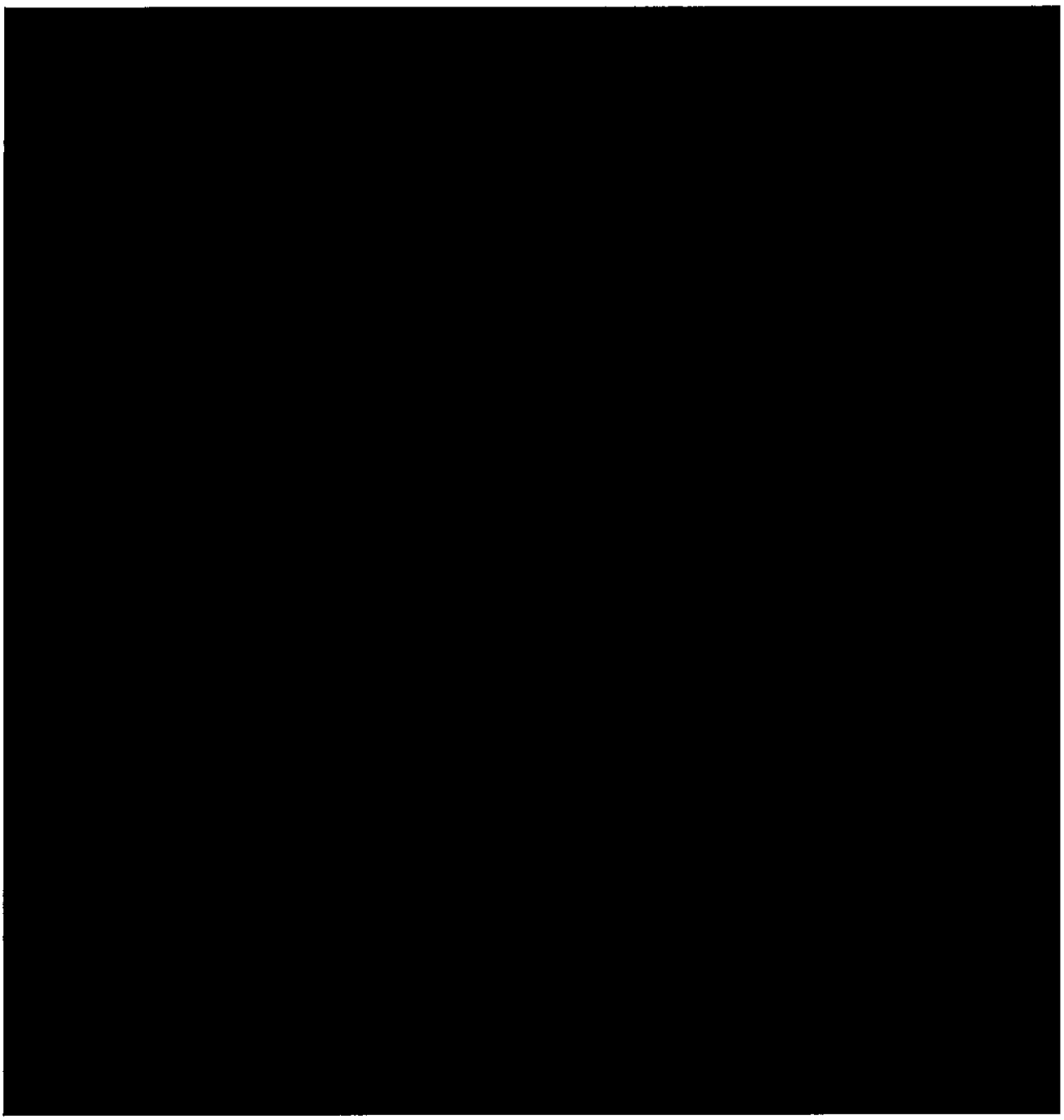
2 Drill and tap holes for countersunk socket headed screws using a marking out template (local manufacture). Drill clearance holes to the depth of the crack and then countersink [redacted] diameter. 'Slave' screws are to be used during the peening operation and these must be removed one at a time and replaced with new screws coated with Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 after peening. Torque load all 3/8 in. UNC screws to 34 Nm (25 lbf ft) and 1/4 in. UNC screws to 9.5 Nm (7 lbf ft).

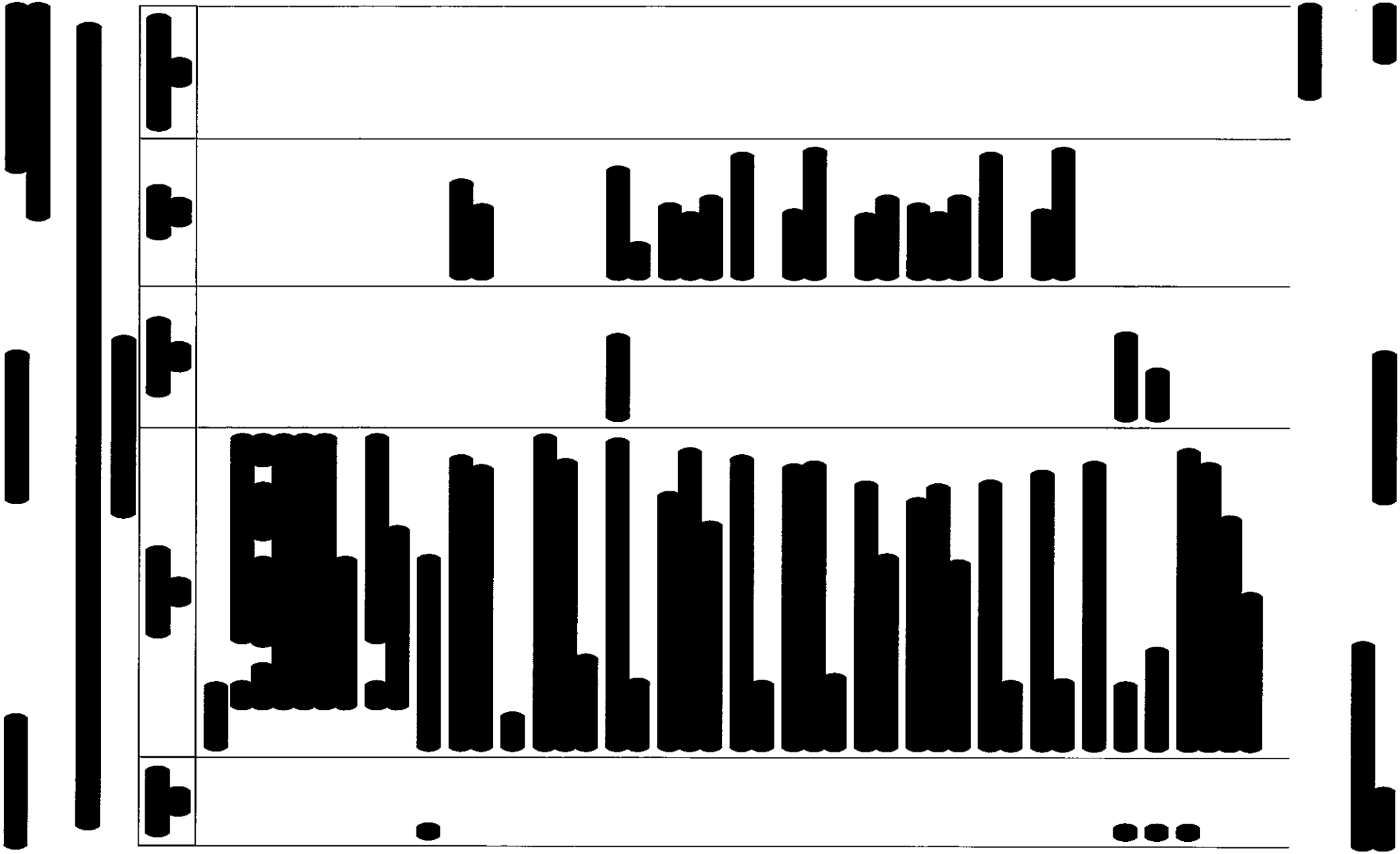
NOTES

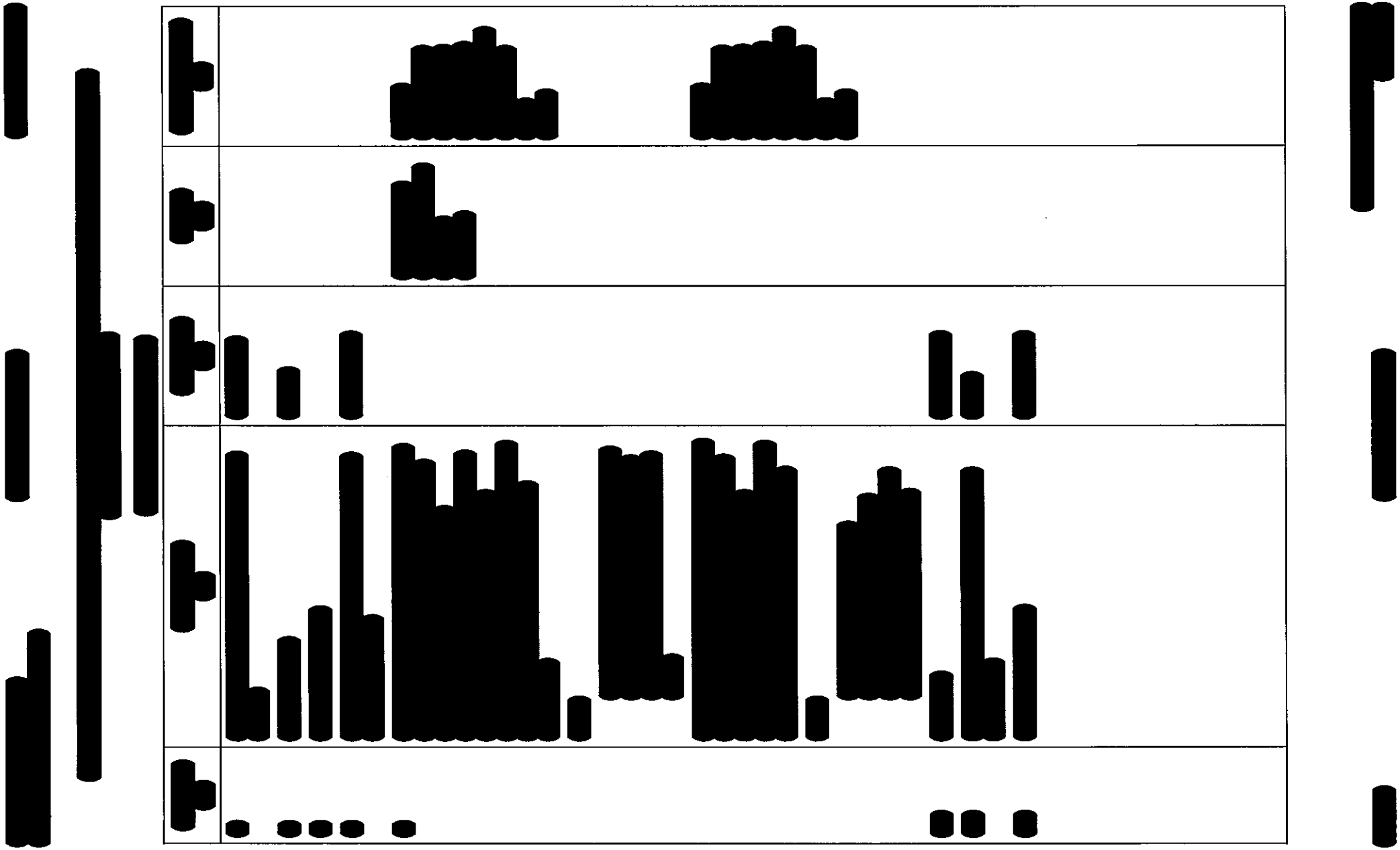
(1) The machined surface is defined as the surface adjacent to the gun mantlet.

(2) The two 1/4 in. UNC countersunk socket headed screws should not be fitted unless the crack extends beyond the screw position marked 'X'.

(3) No repair scheme is available for repair of cracks in trunnion bores of Scimitar turret cheek plates, if cracks are found in this position advice should be sought through the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication) before any repairs to the turret are undertaken.







CHAPTER 10 ANNEX B APPENDIX 33

STRESS CORROSION – TURRET CHEEK PLATE – UNMACHINED SURFACE SALAMANDER (SCORPION)

CONTENTS

TURRET CHEEK PLATE – UNMACHINED SURFACE SALAMANDER (SCORPION)

Application

1 This repair method is to be used when cracks are present in the leading edges of turret cheek plates and in trunnion bore in a position between the centreline and unmachined surface of the plate.

Drawing reference – FV 840077

Synopsis of method

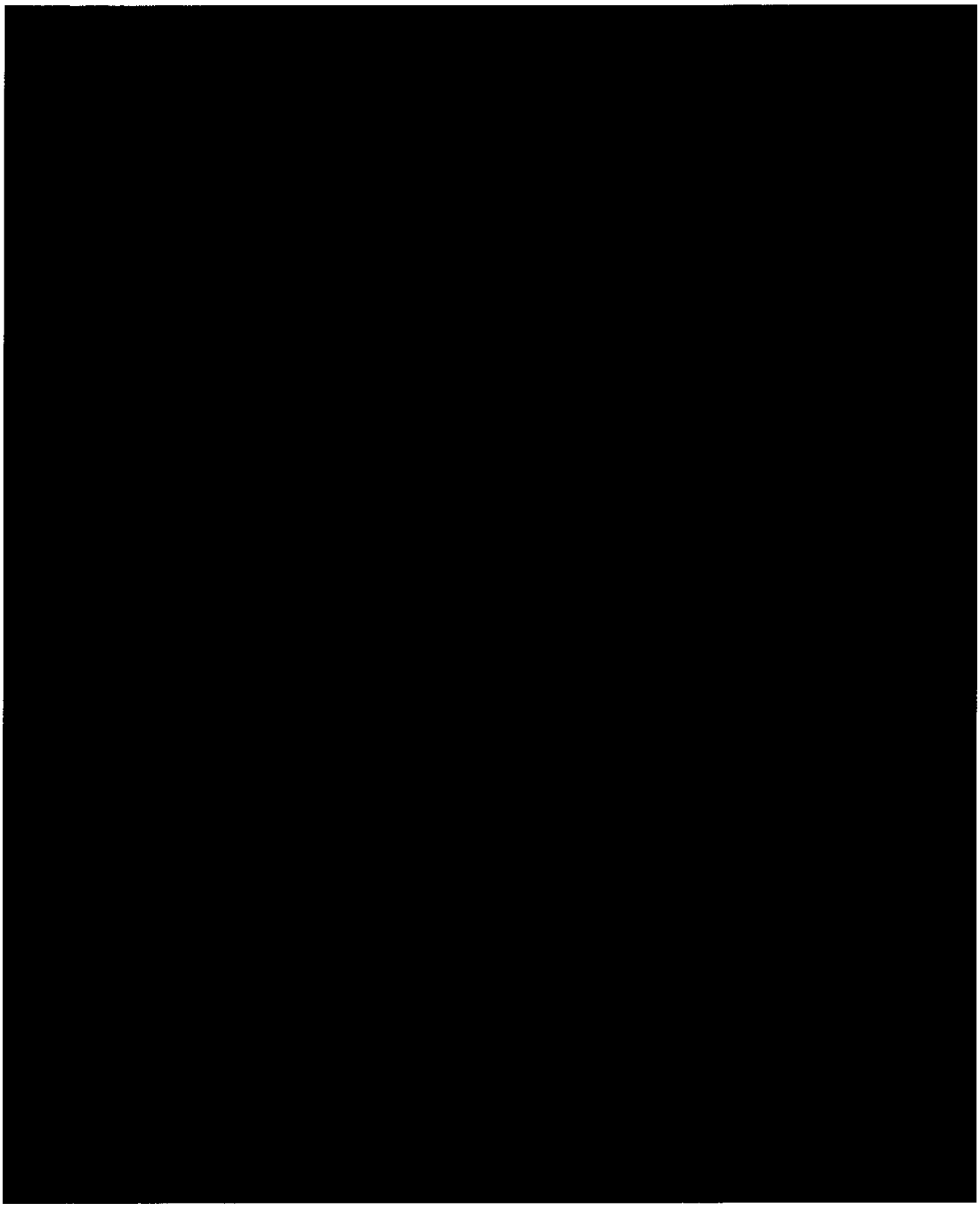
2 Drill and tap holes for 3/8 in. UNC socket head cap screws and 3/8 in. UNC socket head countersunk screws using a marking out template (local manufacture). Drill clearance holes to the depth of the crack and then countersink [redacted] diameter where indicated. Slave screws are to be used during the peening operation and these must be removed one at a time and replaced with new screws coated with Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 after peening. Torque load cap head screws to 45 Nm (33 lbf ft) and countersunk screws to 34 Nm (25 lbf ft).

NOTES

(1) The unmachined surface is defined as the surface adjacent to the gun mantlet.

(2) If no cracks are present in the trunnion bore, that section of the repair may be omitted.

(3) If the cracking present in the leading edge of the turret cheek plate is between the centreline of the plate and the unmachined surface of the plate, and the cracking present in the trunnion bore is between the centreline of the plate the machined surface, then the leading edge of the cheek plate must be repaired to this method and the trunnion bore repaired to the appropriate section of Appendix 31.



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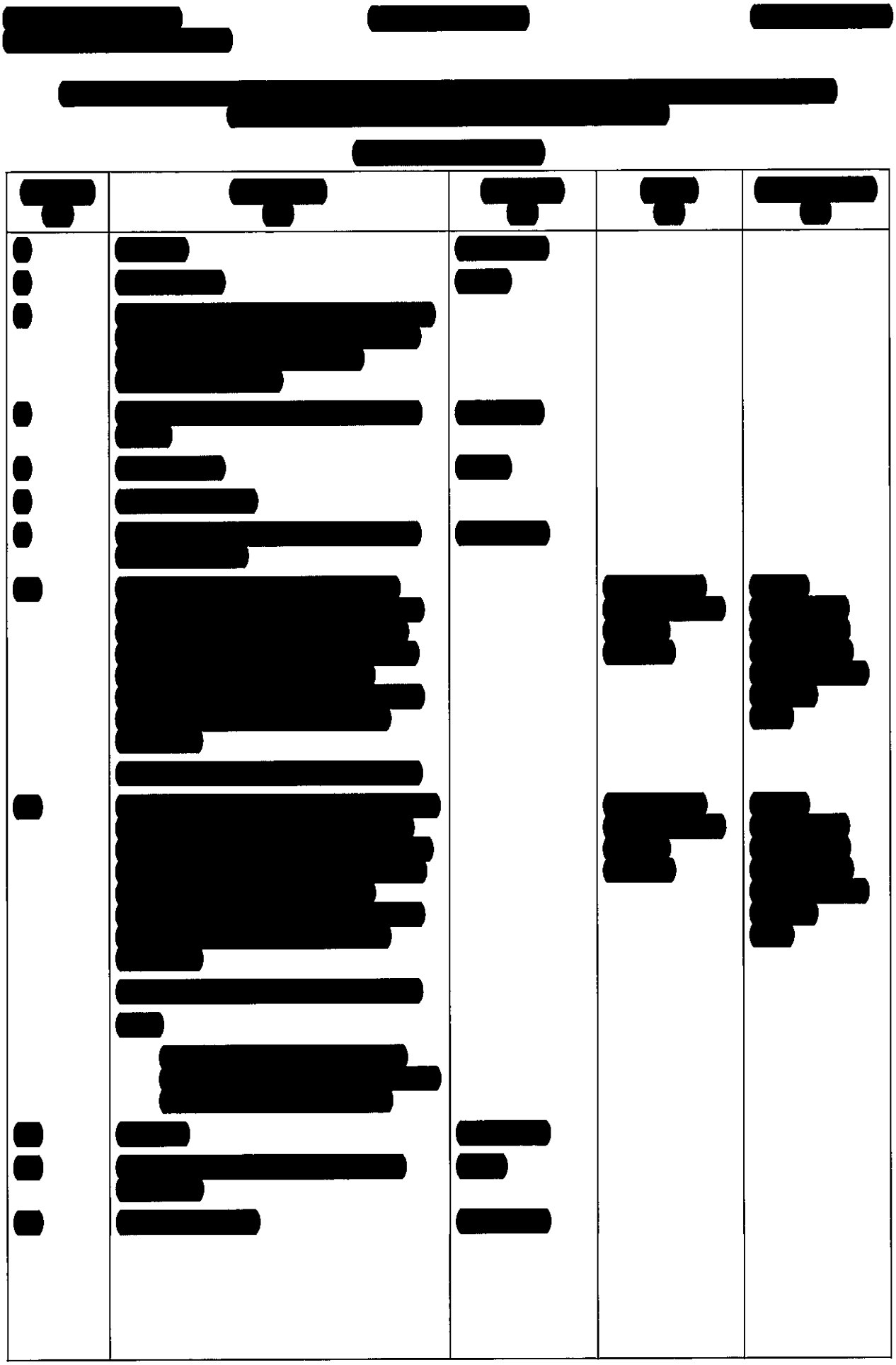


CHAPTER 10 ANNEX B APPENDIX 34

STRESS CORROSION – TURRET CHEEK PLATE – UNMACHINED SURFACE (SCIMITAR)

CONTENTS

TURRET CHEEK PLATE – UNMACHINED SURFACE (SCIMITAR)

Application

1 This repair method is to be used when cracks are present in the leading edges of the cheek plates and in a position between the centreline and unmachined surface of the plate.

Drawing reference – FV 840214

Synopsis of method

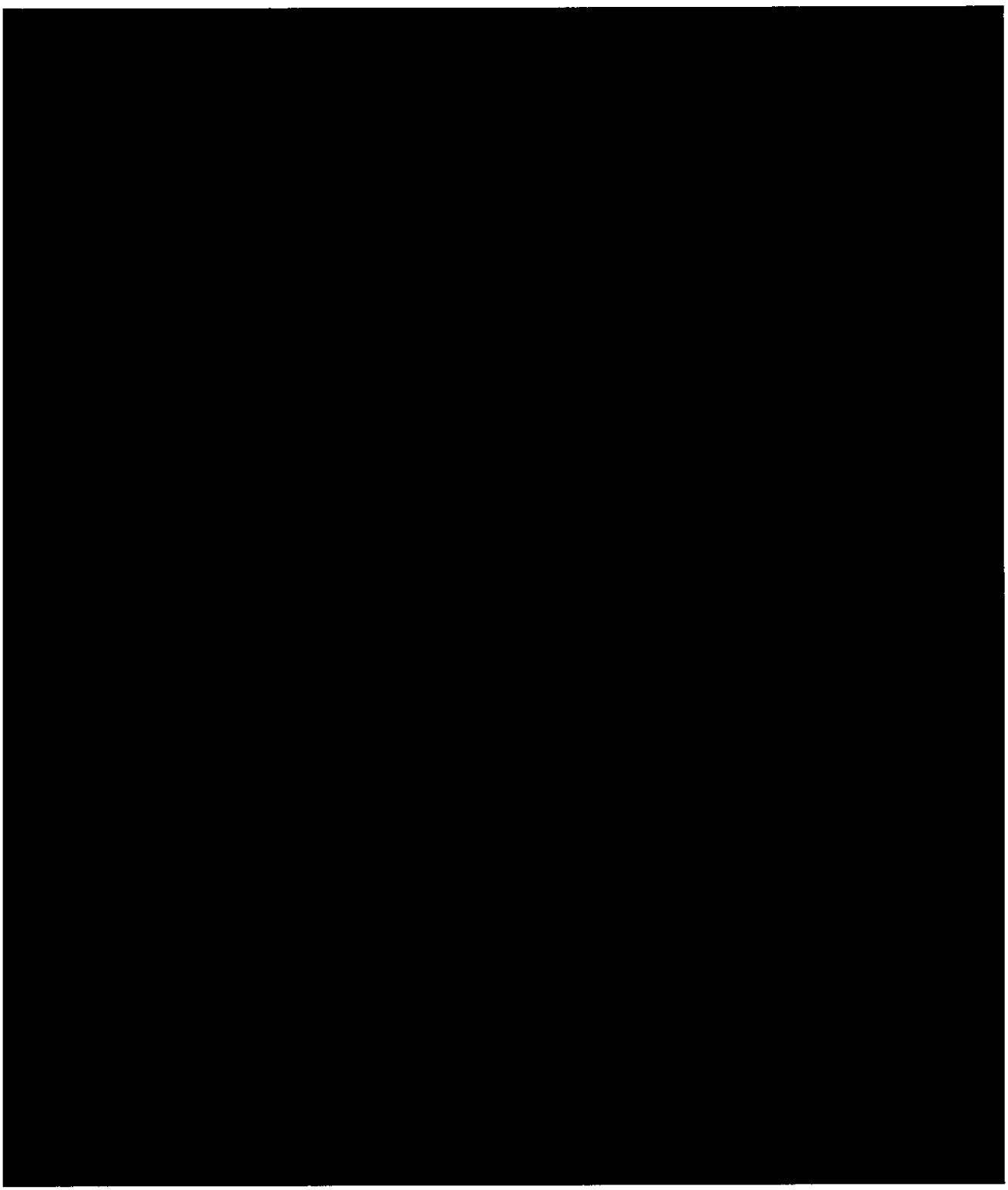
2 Drill and tap holes for cap head socket screws using a marking out template (local manufacture). Drill clearance holes to the depth of the crack from the unmachined surface of the plate. Slave screws are to be used during the peening operation and these must be removed one at a time and replaced with new screws coated with Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 after peening. Torque load all 3/8 in. UNC cap screws to 45 Nm (33 lbf ft) and 1/4 in. UNC cap screws to 12.5 Nm (9 lbf ft).

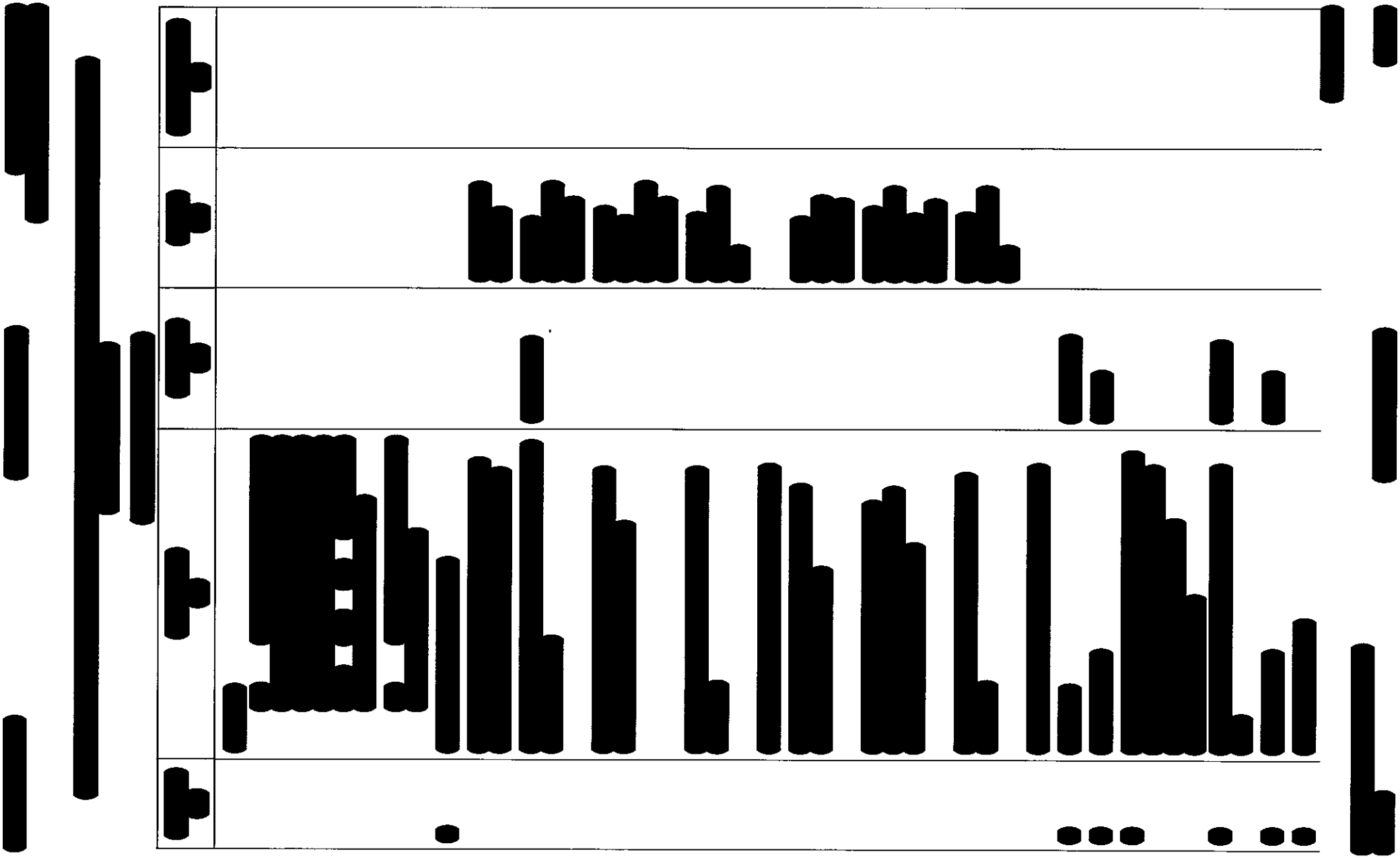
NOTES

(1) The unmachined surface is defined as the surface furthest to the gun mantlet.

(2) The two 1/4 in. UNC cap head screws should not be fitted unless the crack extends beyond the screw position marked X.

(3) No repair scheme is available for the repair of cracks in trunnion bores of Scimitar turret cheek plates and if cracks are found in this position, advice should be sought through the Publication Authority/Sponsor (refer to Table 1, Serial 1 of the Preliminary Pages of this publication) before any repairs to the turret are undertaken.





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CHAPTER 10 ANNEX B APPENDIX 35

STRESS CORROSION – REPAIR TO 30 MM GUN MANTLET FV 768670

CONTENTS

REPAIRS TO 30 MM GUN MANTLET (FV 768670)

Application

1 Repairs to Mantlet FV 768670 are permitted in the three following locations if the cracking has not reached the BER/BR sentencing limits in any position as defined in AESP 2350-R-110-532.

1.1 Left hand and right hand gun slides and webs, whether cracked or not.

1.2 Sub-calibre rifle mounting.

1.3 Weld metal or heat-affected zone of weld between Bottom Plate FV 687390 and the base of the mantlet casting.

Drawing references

2 The drawing references are as follows:

2.1 Location 1 – FV 840126

2.2 Location 2 – FV 775793

2.3 Location 3 – FV 840805

Synopsis of methods

WARNING

HAZARD TO HEALTH, ACETONE SOLVENT. AVOID BREATHING IN OR SKIN CONTACT. DO NOT INGEST. ACETONE SOLVENT CAN IRRITATE EYES, NOSE, THROAT AND LUNGS. GOGGLES AND RUBBER GLOVES ARE TO BE WORN WHEN USING ACETONE SOLVENT.

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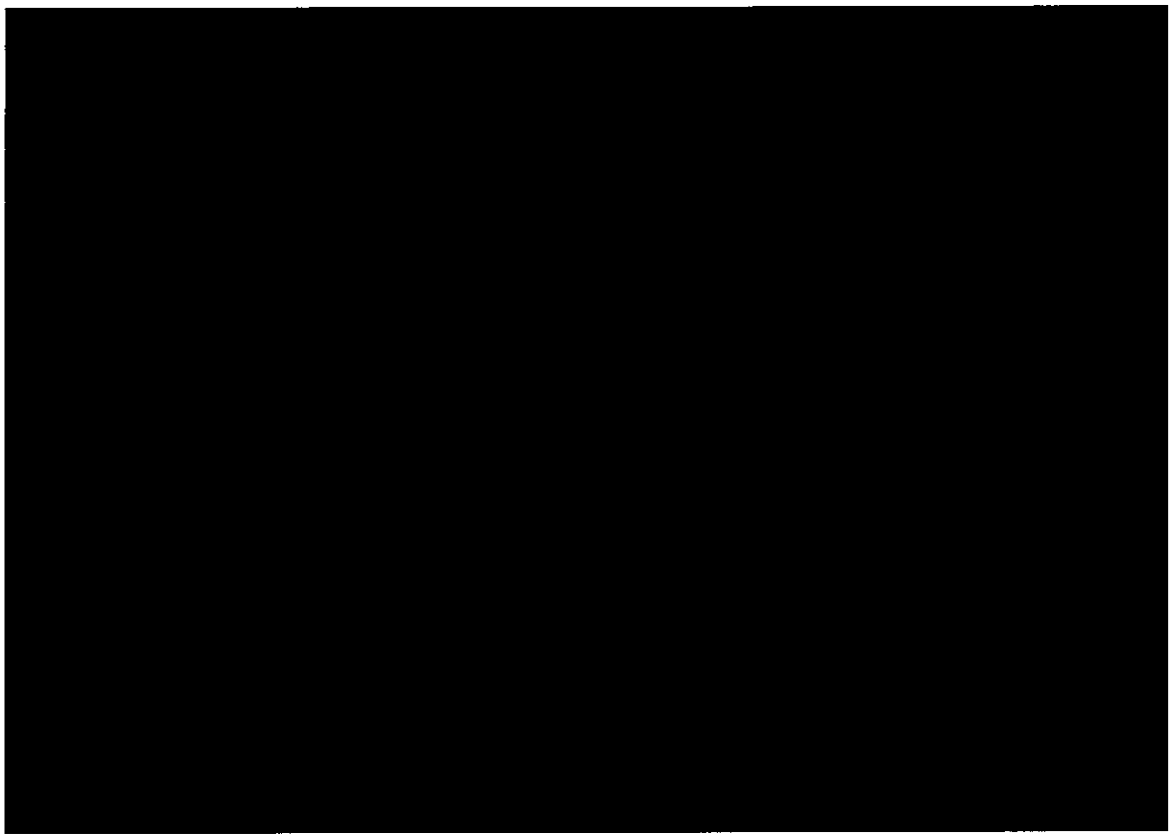
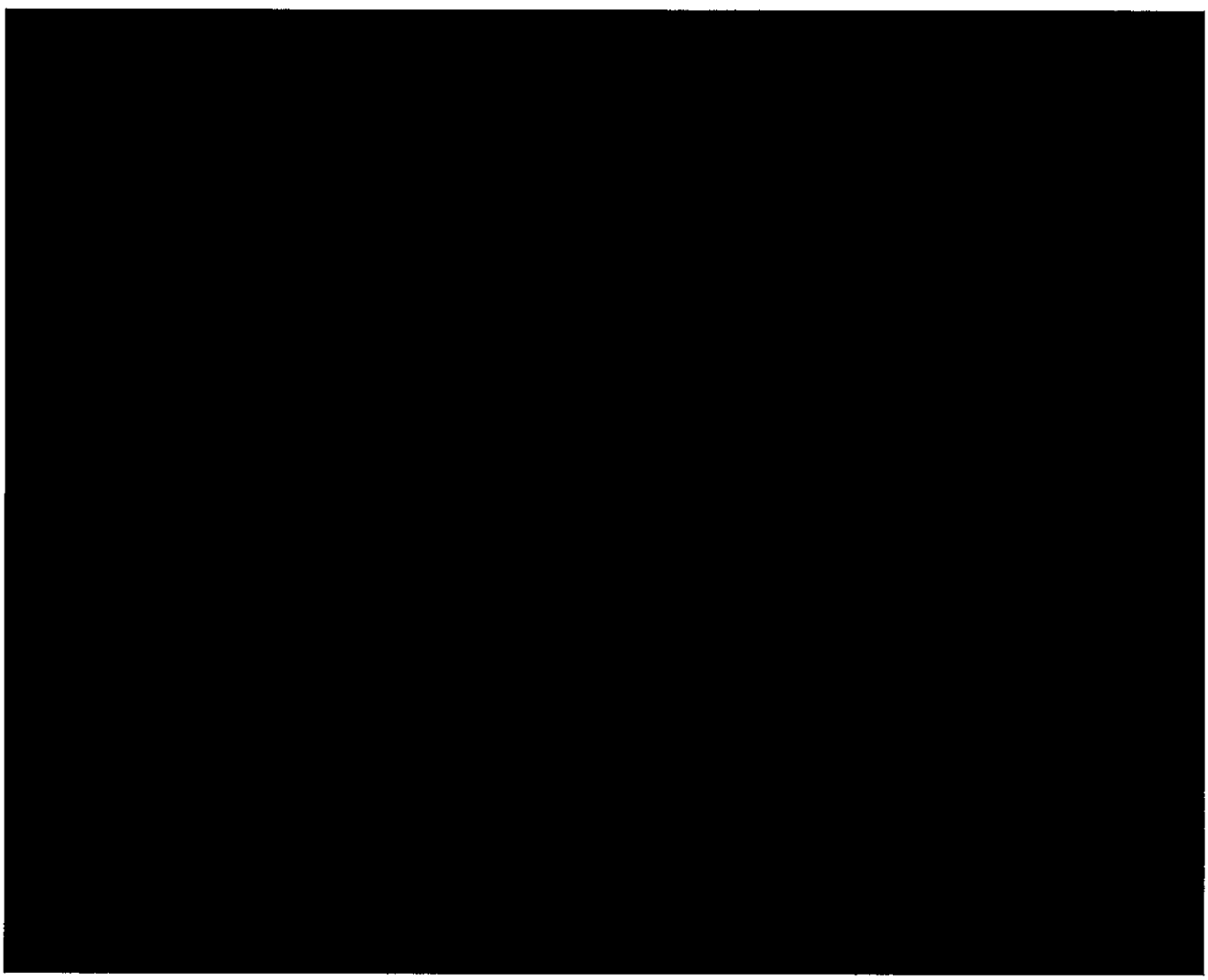
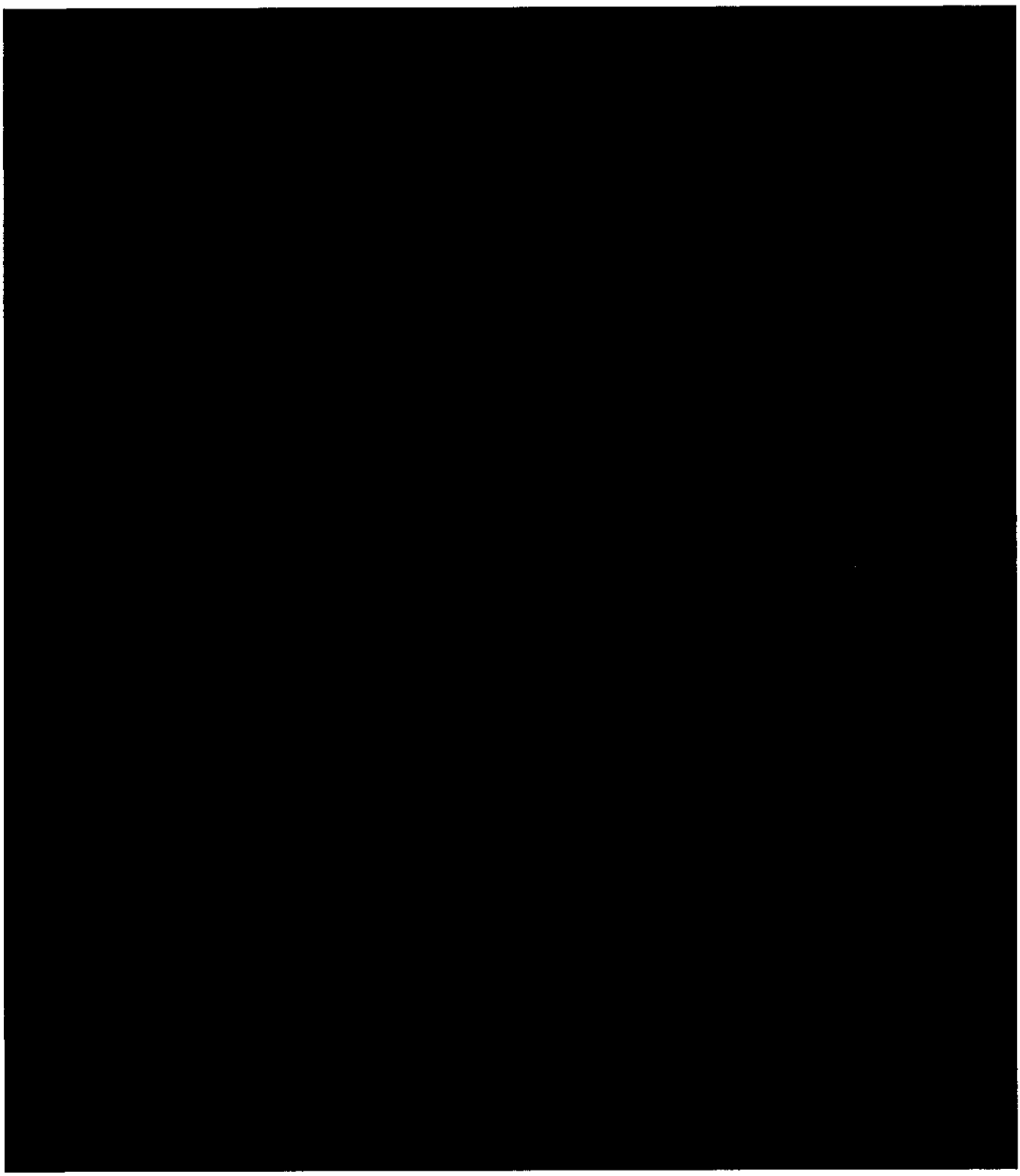
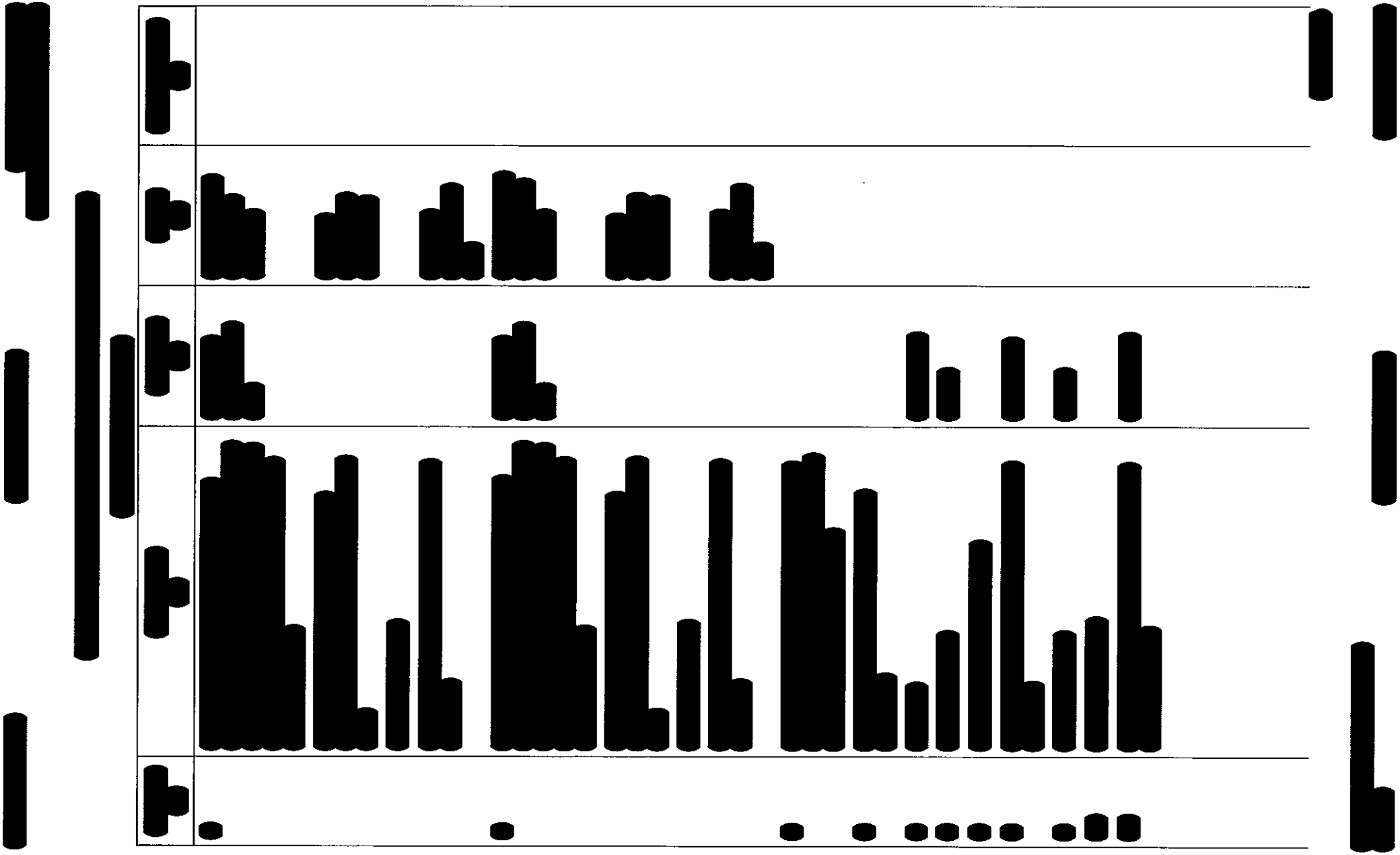
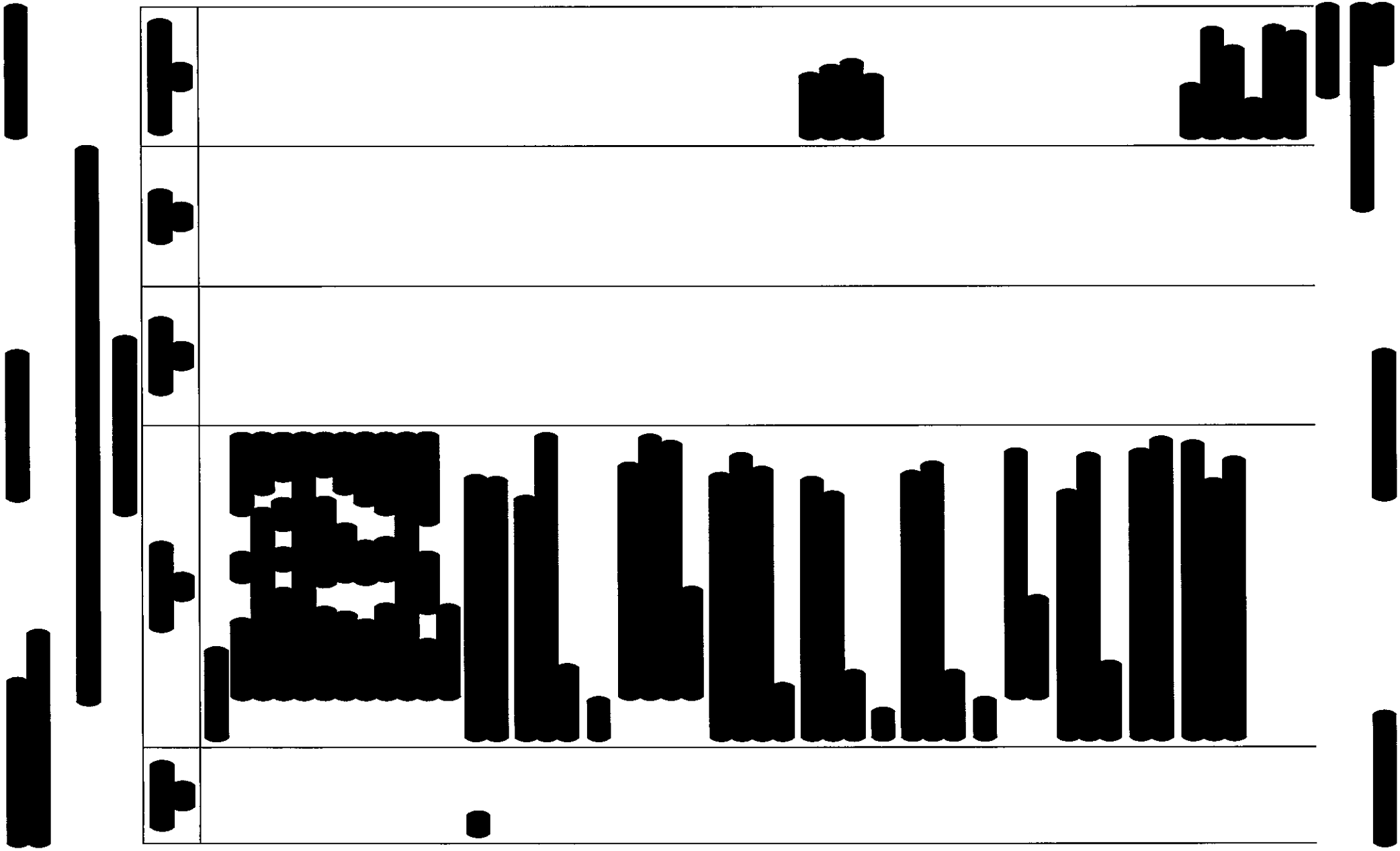
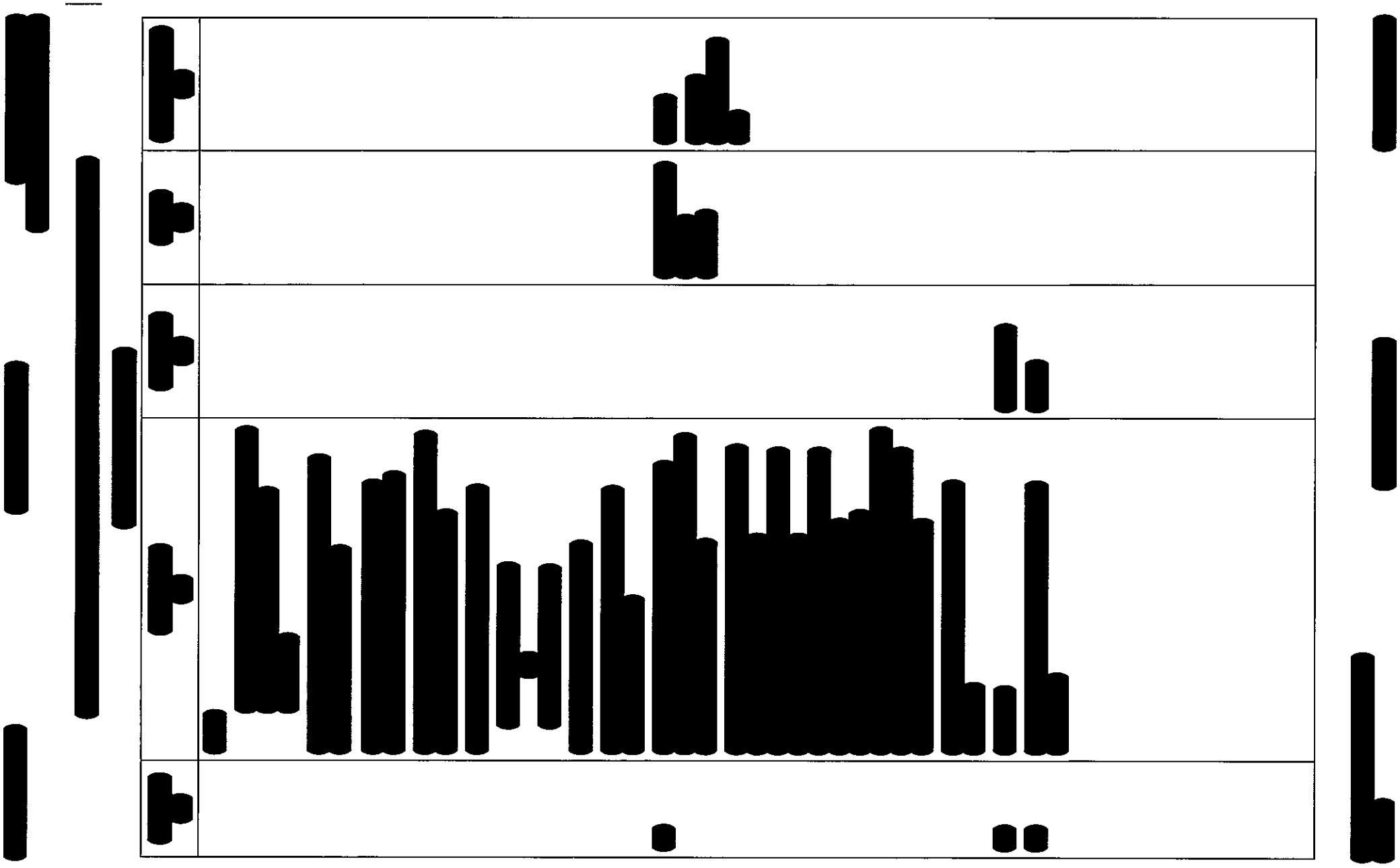












CHAPTER 10 ANNEX B APPENDIX 36

STRESS CORROSION – REPAIR TO FLOOR SUPPORTS S70 - S75 AND BATTERY MOUNT B12 (SULTAN ONLY)

CONTENTS

FLOOR SUPPORTS S70-S75 AND BATTERY MOUNT B12

Application

1 This repair is to be applied to exfoliation corrosion around floor supports S70-S75 and battery mount B12 on the Sultan where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture Repair Plates and replacement bosses. Fit Repair Plates to underside of hull. Locate and fit battery plate to hull. Drill through damaged bosses on hull for locating replacement bosses on Repair Plates. Weld replacement bosses to Repair Plates. Machine hull to allow insertion of replacement bosses. Fit and screw Repair Plates to the underside to hull. Mazel around bosses internally. Paint to DEFENCE STANDARD 03-32 (Part 3).

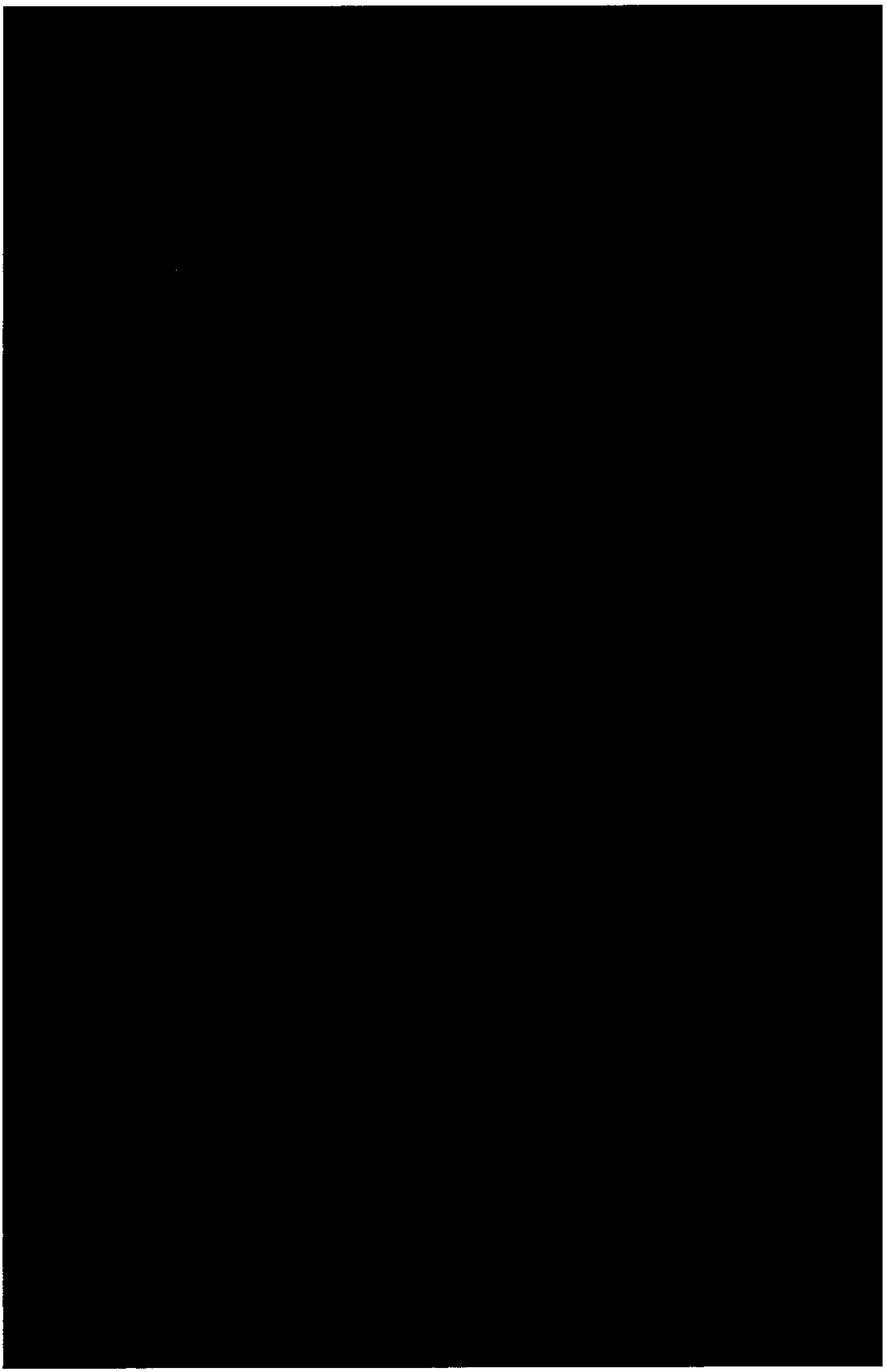
NOTES

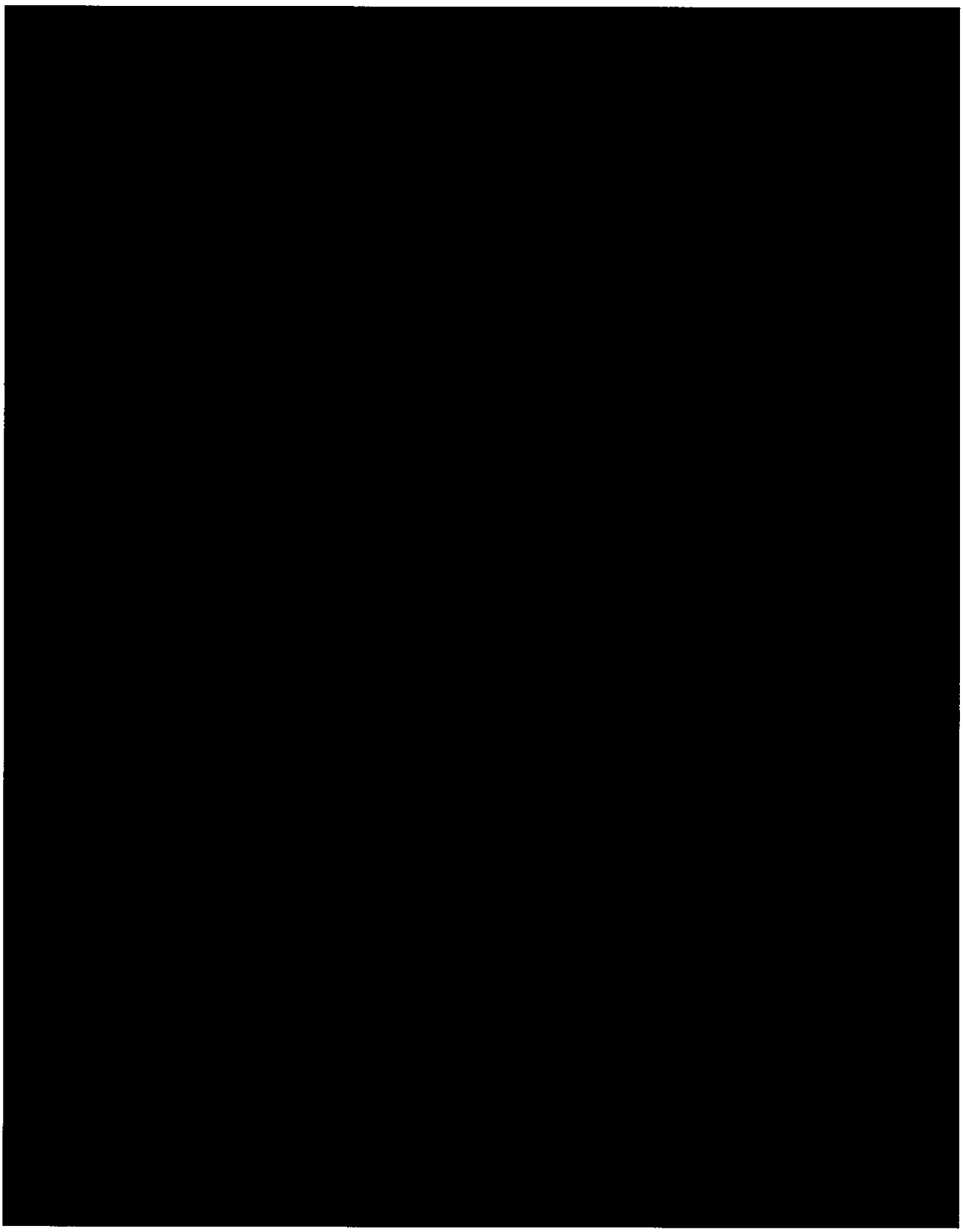
(1) Use only aluminium plate that conforms to [redacted]

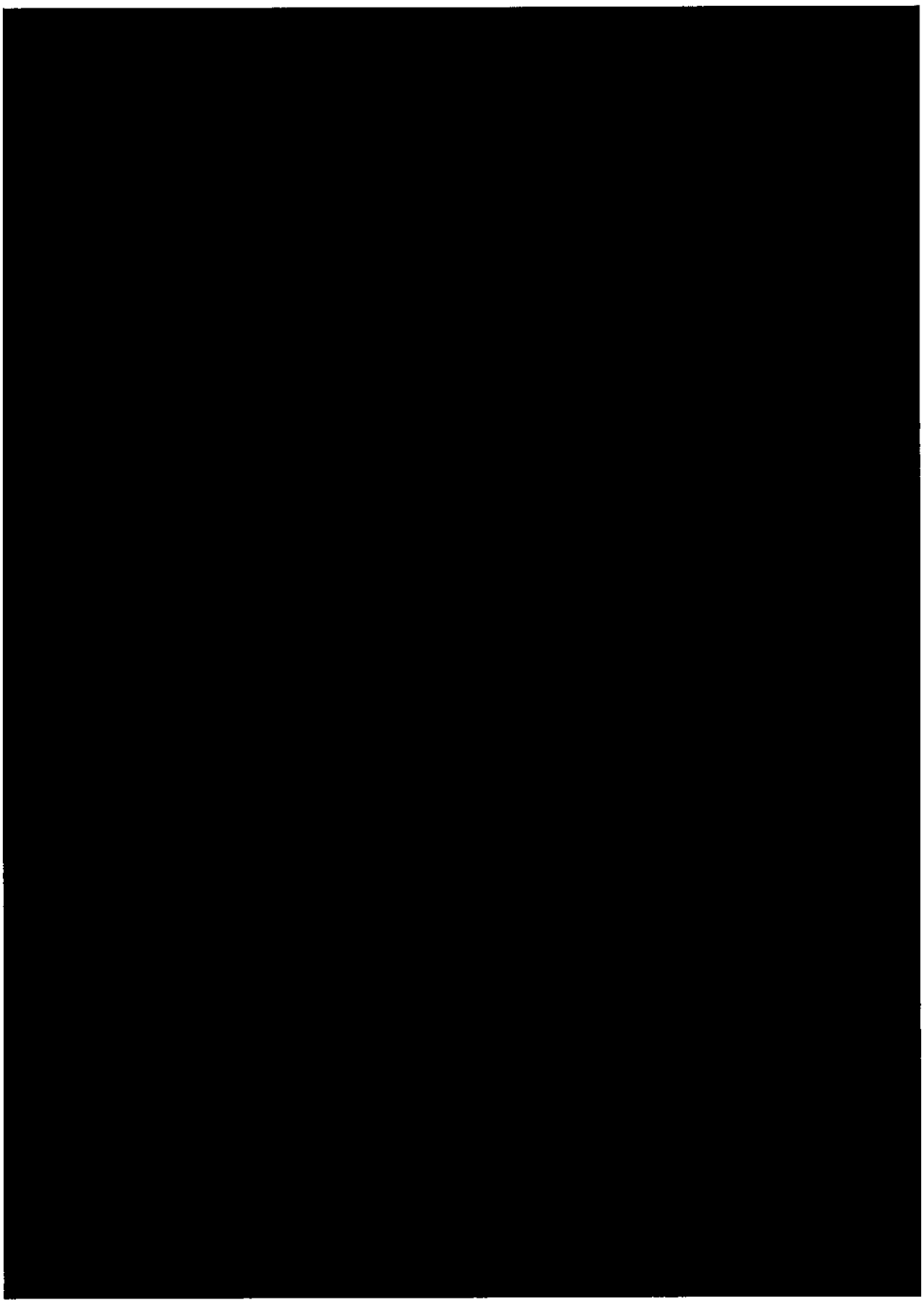
(2) Use only plate with a Certificate of Conformity.

(3) Stamp batch number on edge of Repair Plate after manufacture.

(4) For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.







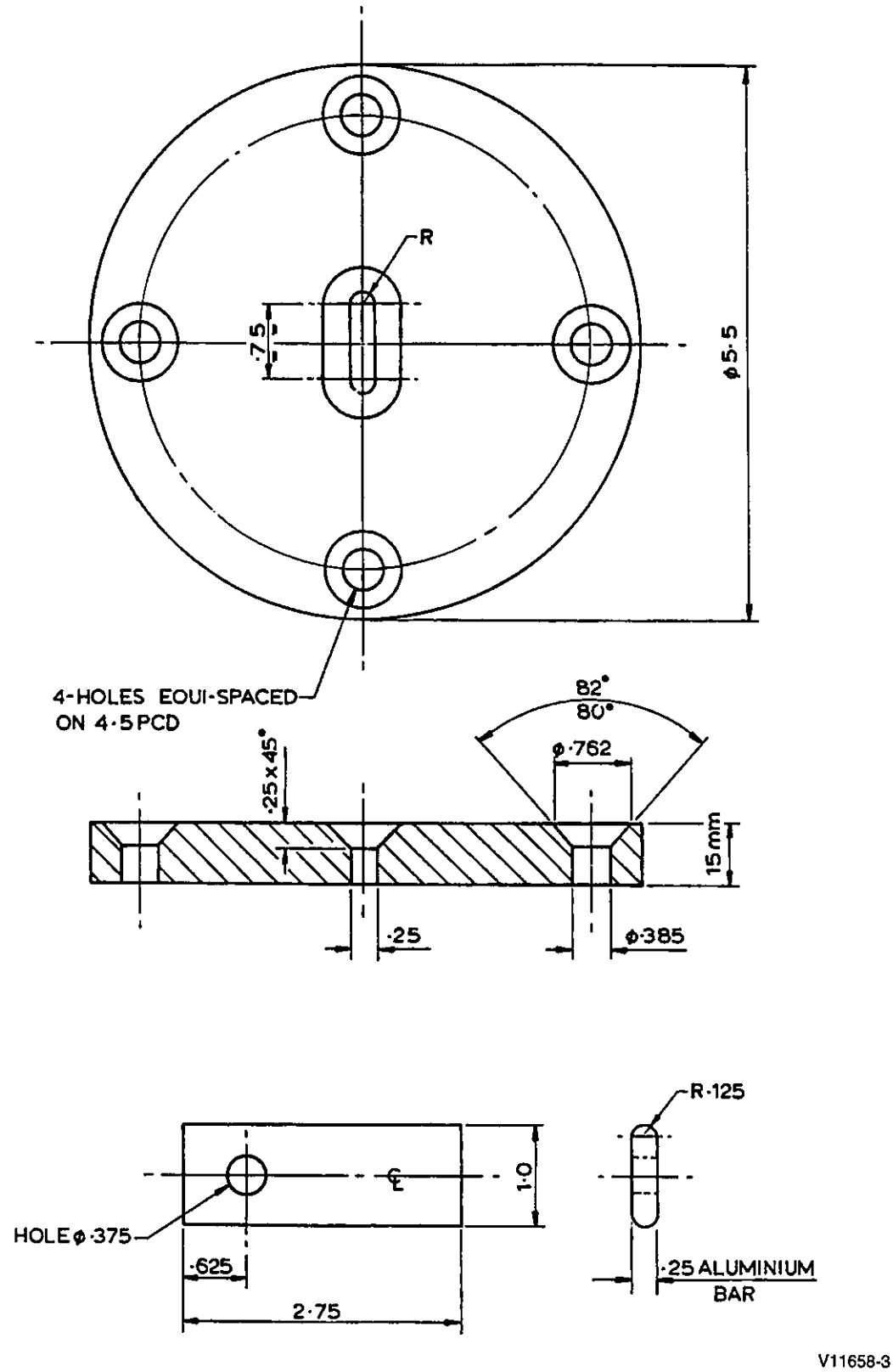
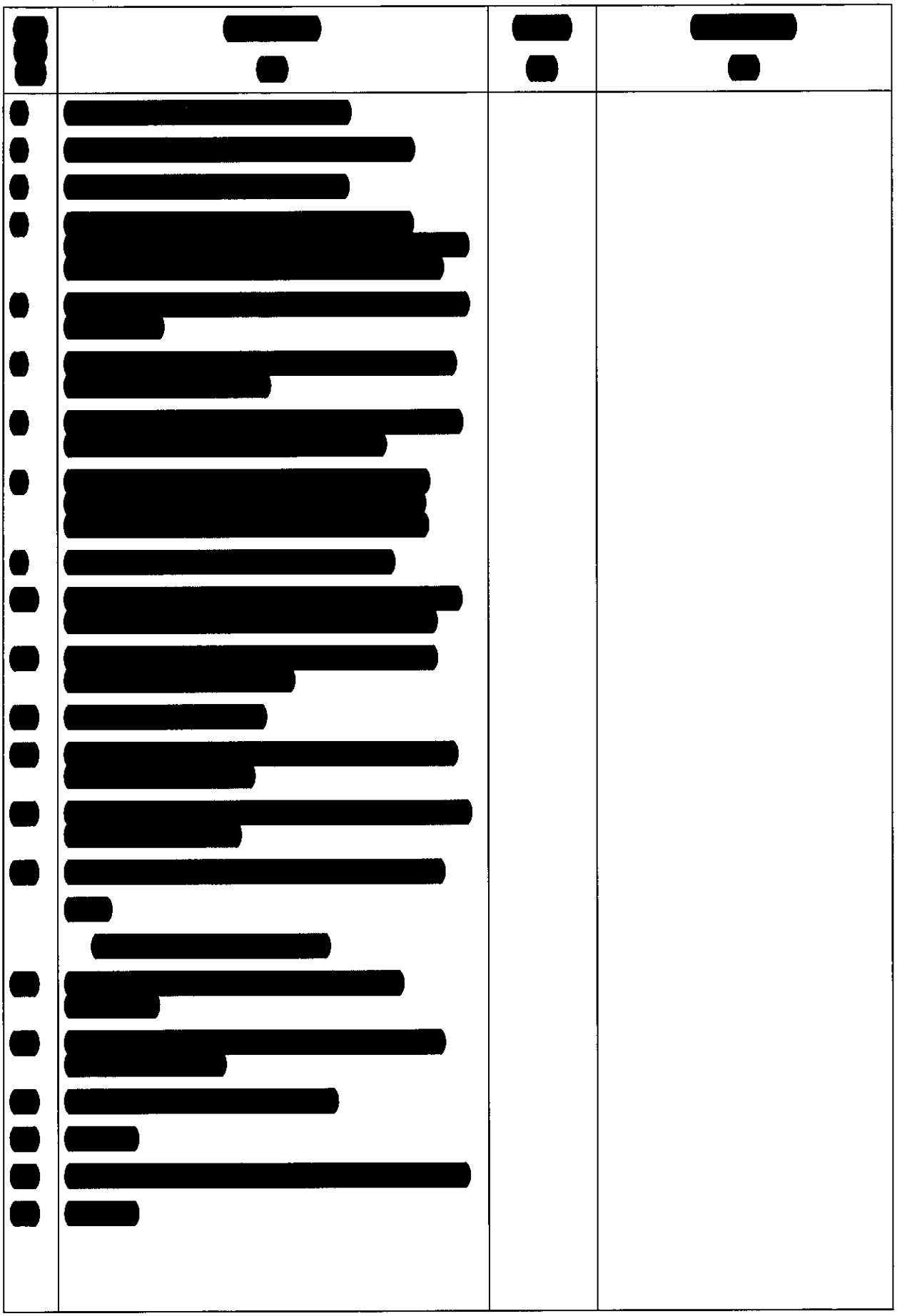


Fig 4 Battery Repair Plate

[redacted]



CHAPTER 10 ANNEX B APPENDIX 37

STRESS CORROSION – REPAIR TO BOSSES S76 - S81, S88 – S91 AND F3 (SULTAN ONLY)

CONTENTS

HULL BOSSES S76 – S81, S88 – S91 AND F3

Application

1 This repair is required for exfoliation corrosion around bosses S76 – S81, S88 – S91 and F3 on the Sultan hull where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture Repair Plates and replacement bosses. Locate the Repair Plate on the underside of the underside of the hull and spot through for the retaining screws. Using slave screws fit the plate to the hull. Drill through the damaged bosses onto the Repair Plate as boss location points. Remove Plate. Screw bosses to plate and weld in position, peen after welding. Machine out hull to accept new bosses. Fit Repair Plate to underside of hull. Mazel around bosses internally. Paint to DEFENCE STANDARD 03-32 (Part 3).

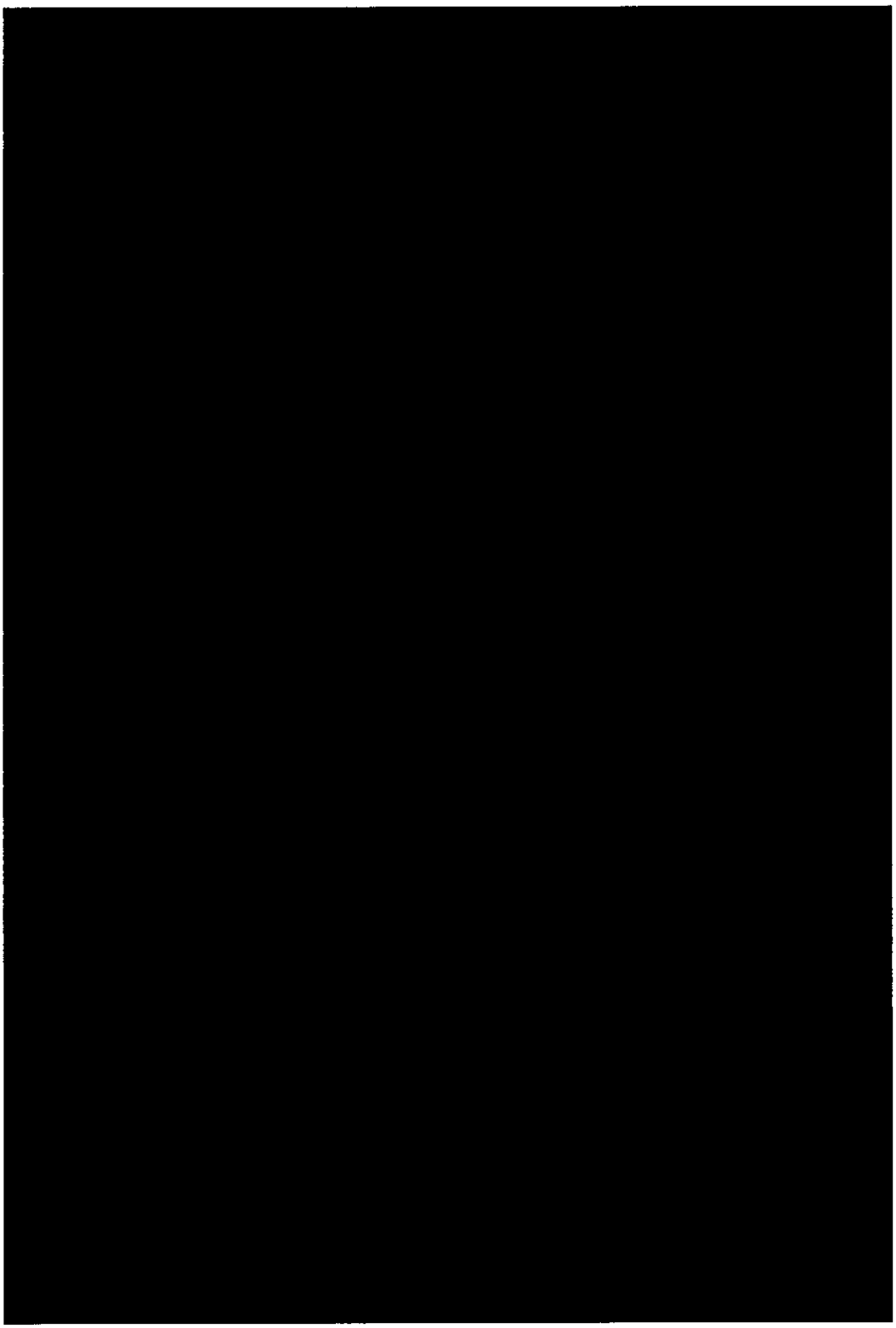
NOTES

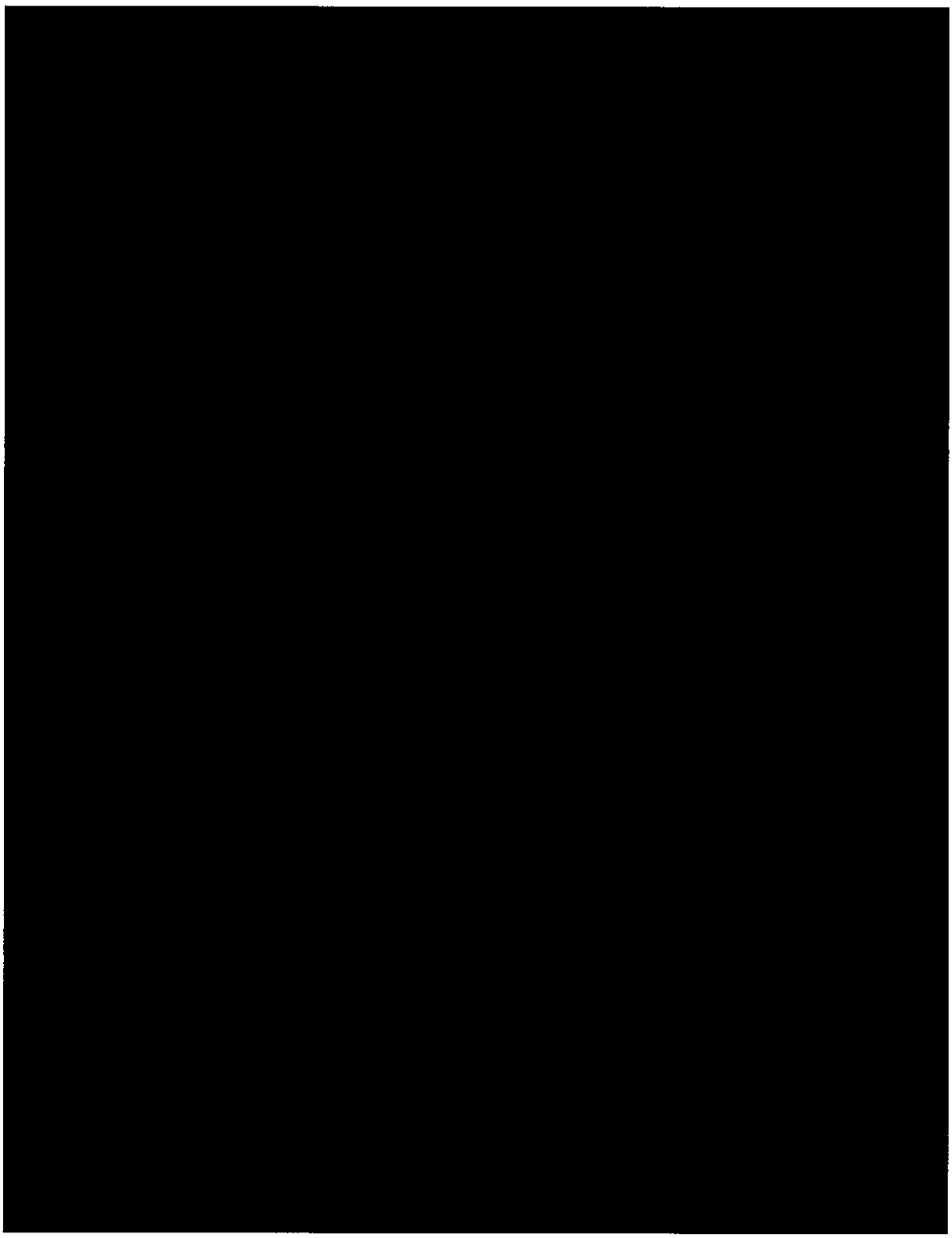
(1) Use only aluminium plate that conforms to [redacted]

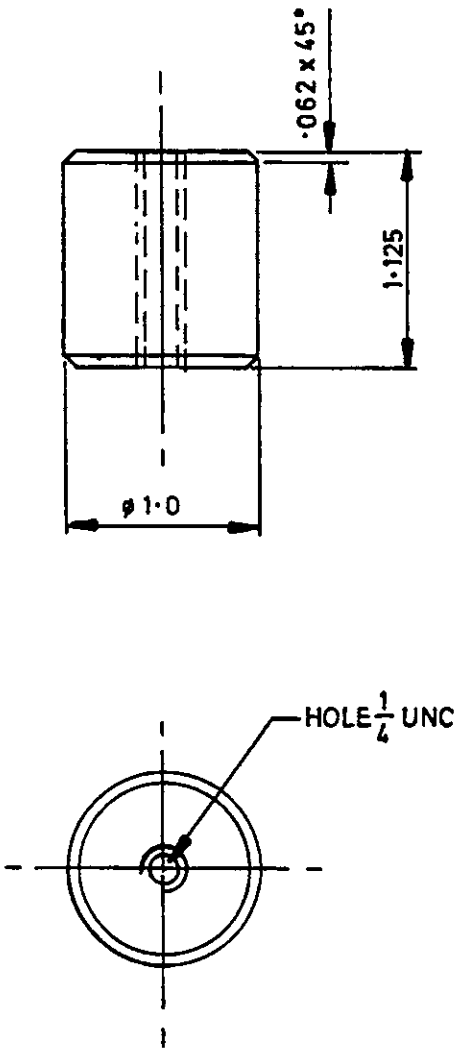
(2) Use only plate with a Certificate of Conformity.

(3) Stamp batch number on edge of Repair Plate after manufacture.

(4) For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.







V11658/12

Fig 3 Boss (S88 – S91)

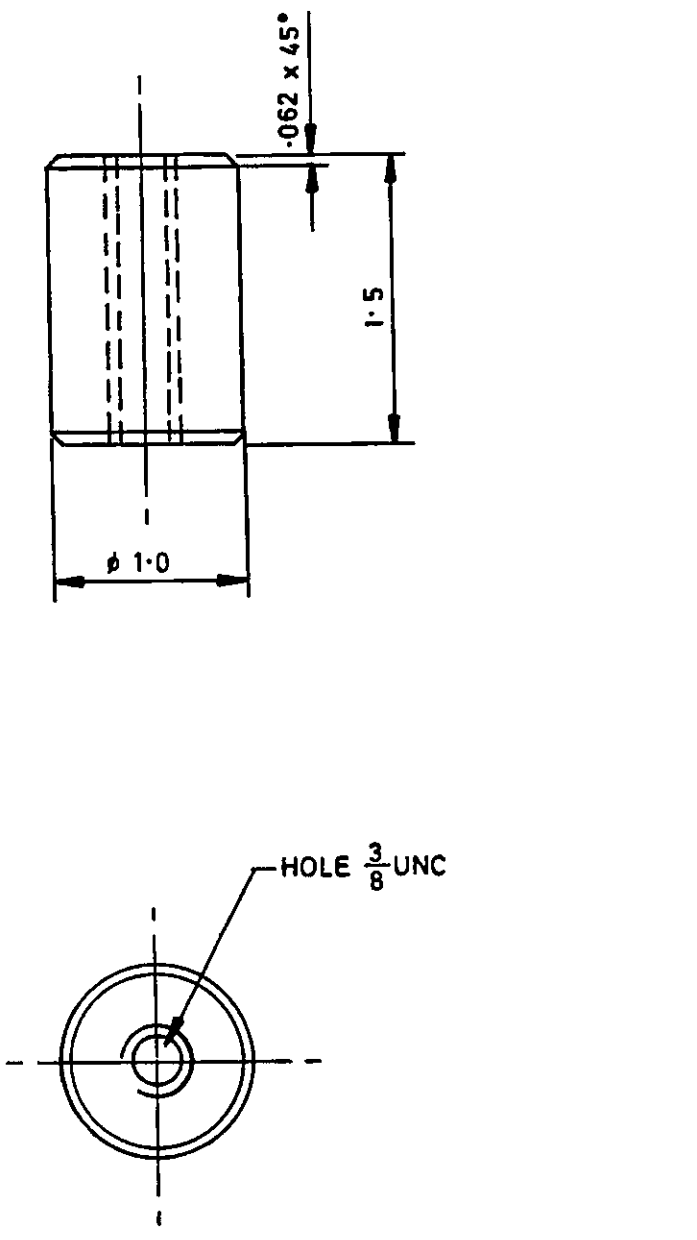


Fig 4 Boss (F3)

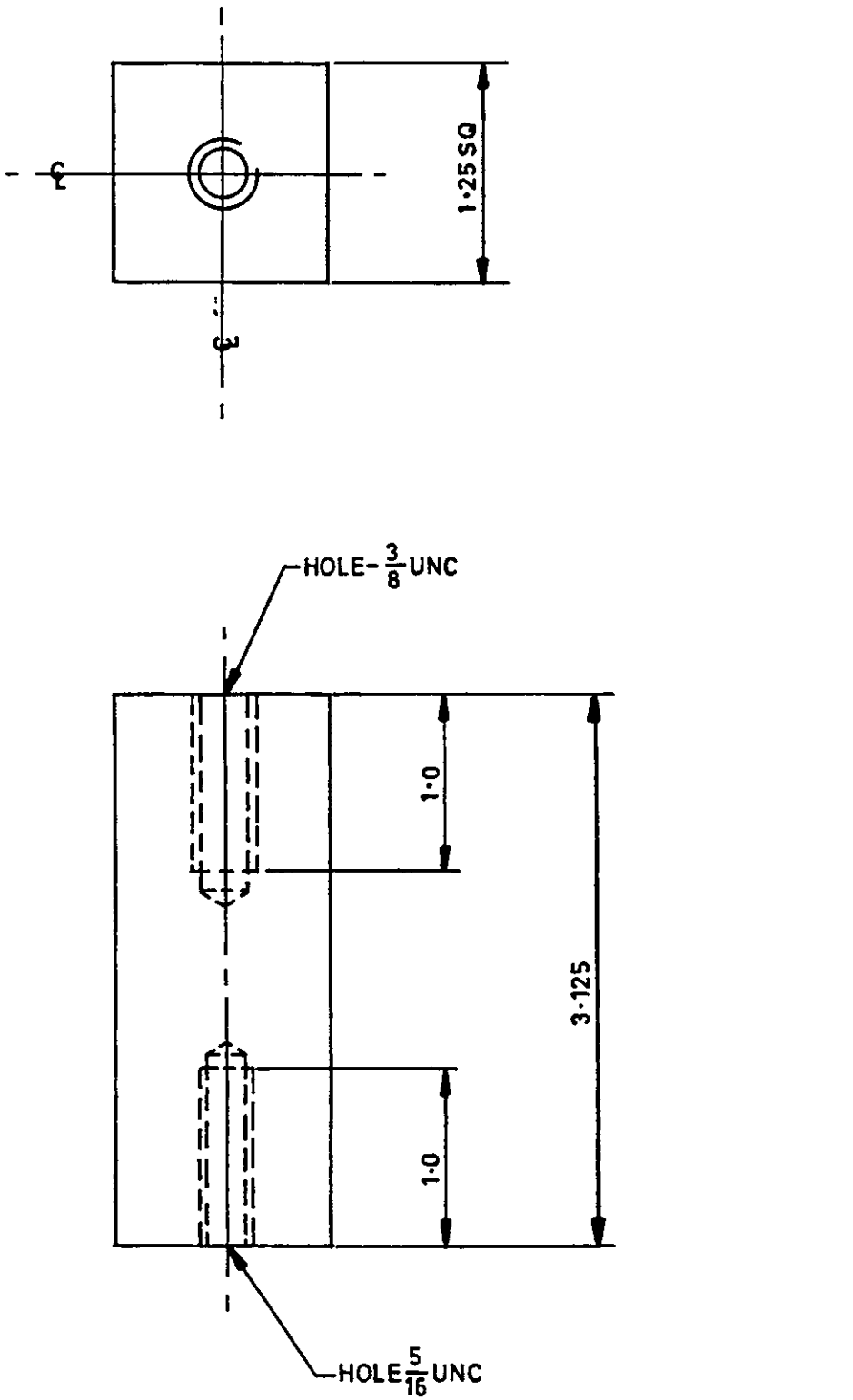


Fig 5 Boss (S76 – S81)

TABLE 1 REPAIR TO BOSSES S76 – S81, S88 – S91 AND F3

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture Repair Plate (Fig 2).		
2	Manufacture S88 – S91 bosses 4 off (Fig 3).		
3	Manufacture F3 boss 1 off (Fig 4).		
4	Manufacture S76 – S81 bosses 6 off (Fig 5).		
5	Position Repair Plate (Fig 2) on the underside of the hull as shown in Fig 1. Spot through retaining holes 25 off.		
6	Remove plate from hull.		
7	Drill and tap 25 holes 3/8 UNC in hull.		
8	Fit Repair Plate to the hull using slave screws.		
9	Spot through bosses S76 – S81, S88 – S91 and F3. Note S88 – S91 are 1/4 UNC.		
10	Remove Repair Plate (Fig 2) from hull.		
11	Drill Repair Plate through spotted holes to suit 3/8 and 1/4 UNC c'sk socket headed screws.		
12	Secure bosses to Repair Plate after coating screws with red Hermetite.		
13	Torque load to 25 lbf ft.		
14	Weld all bosses to Def Stan 08-39.		
15	Peen to DEF STAN 03-21 in positions indicated by MVEE Spec 826.		
16	Machine out hull floor to accept new bosses.		
17	Coat faces and screws with red Hermetite.		
18	Fit Repair Plate, tighten screws to 25 lbf ft torque.		
19	Inspect.		
20	Mazel around bosses internally.		
21	Paint to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 38

STRESS CORROSION – REPAIR TO TORSION BAR COVER ON LOWER WALLS OF HULL WHEN FLOOR IS REMOVED (ALL VARIANTS)

CONTENTS

TORSION BAR COVERS

Application

1 This repair is required for exfoliation corrosion between torsion bar cover and the wall of the hull when the floor is removed.

Synopsis of method

2 Remove affected bar cover from side of hull. Machine out corrosion from the hull to a uniform depth. Manufacture plate with lip dimension depending on depth of the corrosion removed. Locate plate on the hull mark off, drill and tap retaining holes. Fit plate to hull. Manufacture and weld replacement bar covers to hull.

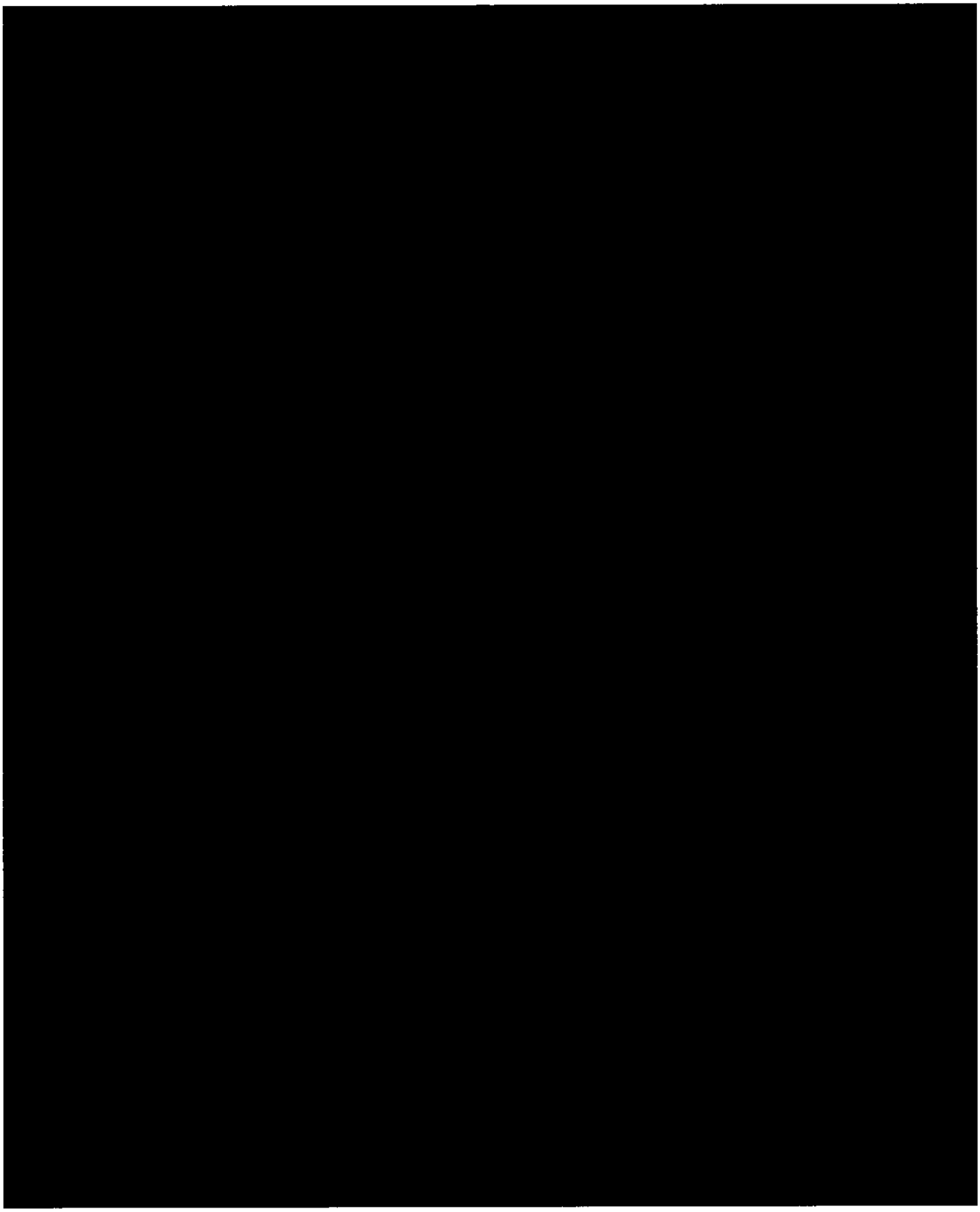
NOTES

(1) Use only aluminium plate that conforms to [redacted]

(2) Use only plate with a Certificate of Conformity.

(3) Stamp batch number on edge of Repair Plate after manufacture.

(4) For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.



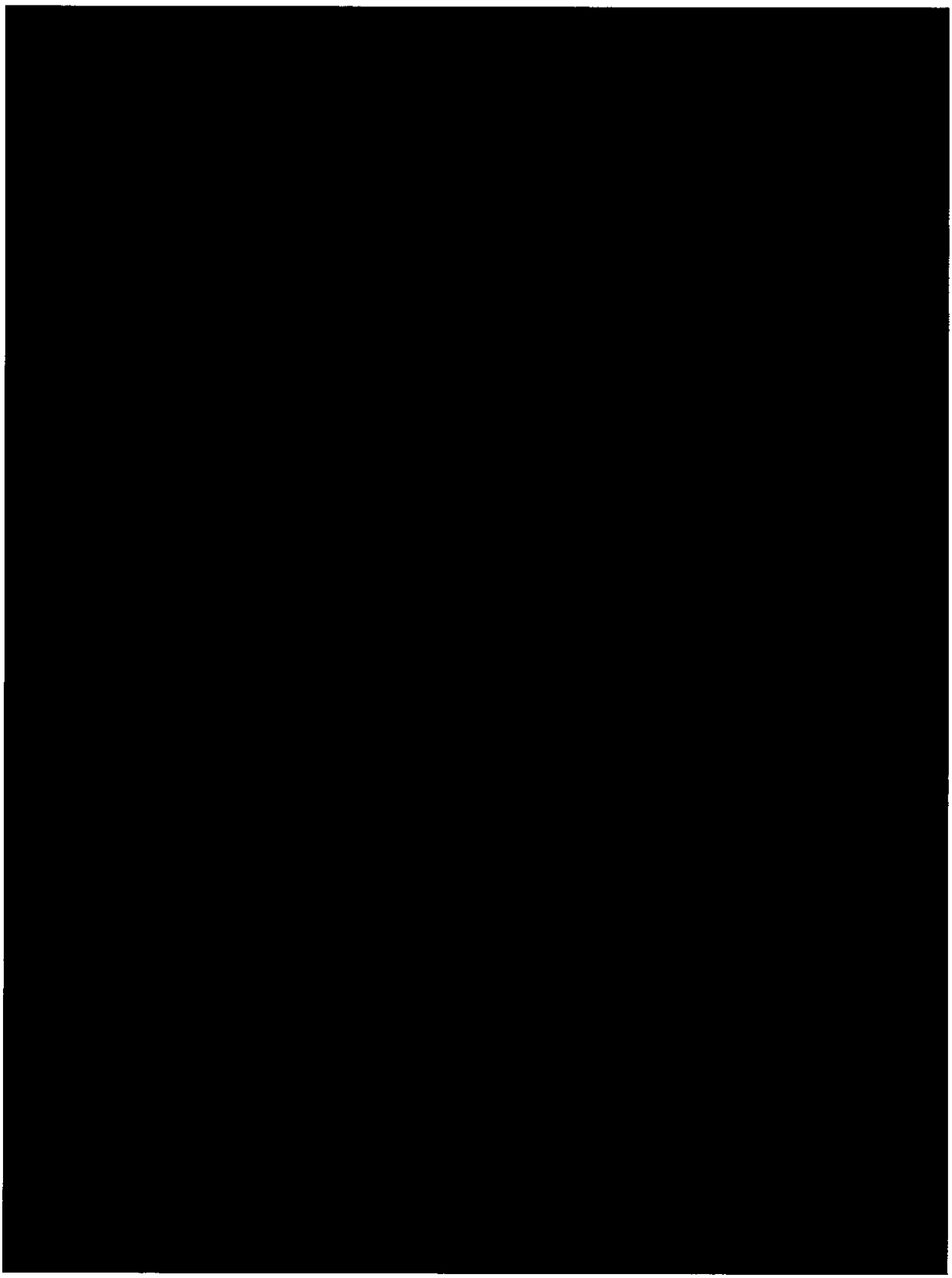


TABLE 1 REPAIR TO TORSION BAR COVER ON WALLS OF HULL WHEN FLOOR IS REMOVED

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Remove torsion bar cover from wall of hull.		
2	Machine out and remove all corrosion as necessary.		
3	Manufacture plate (Fig 2). Note Dimension 'X' varies depending on the amount of material machined away at Op 2.		
4	Drill and c/sk holes to suit 3/8 UNC s/sk socket head screws in the side wall of hull. See (Fig 1) for hole positions.		
5	Position plate (Fig 2) in recess and mark off holes from hull. Drill and tap 3/8 and 5/8 UNC through plate.		
6	Coat plate faces and all screw holes with red Hermetite, secure to inside of the hull.		
7	Torque load all screws to 25 lbf ft.		
8	Manufacture replacement bar covers.		
9	Weld on covers to Def Stan 08-39.		
10	Peen to DEF STAN 03-21 in positions indicated by MVEE Spec 826.		
11	Inspect.		
12	Paint to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 39

STRESS CORROSION – REPAIR TO TORSION BAR COVERS FOR EXFOLIATION ON LOWER WALLS OF HULL WHEN FLOOR IN POSITION (ALL VARIANTS)

CONTENTS

TORSION BAR COVERS

Application

1 This repair is required for exfoliation corrosion between the side wall of the hull and torsion bar covers where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture Repair Plate. Remove torsion bar end cover to allow access to affected area. Grout out and remove all corrosion. Mark out and drill holes to retain Repair Plate. Locate plate on the hull. Spot through, drill and tap plate. Fit Repair Plate. Manufacture and weld replacement bar cover to hull. Peen all affected welds.

NOTES

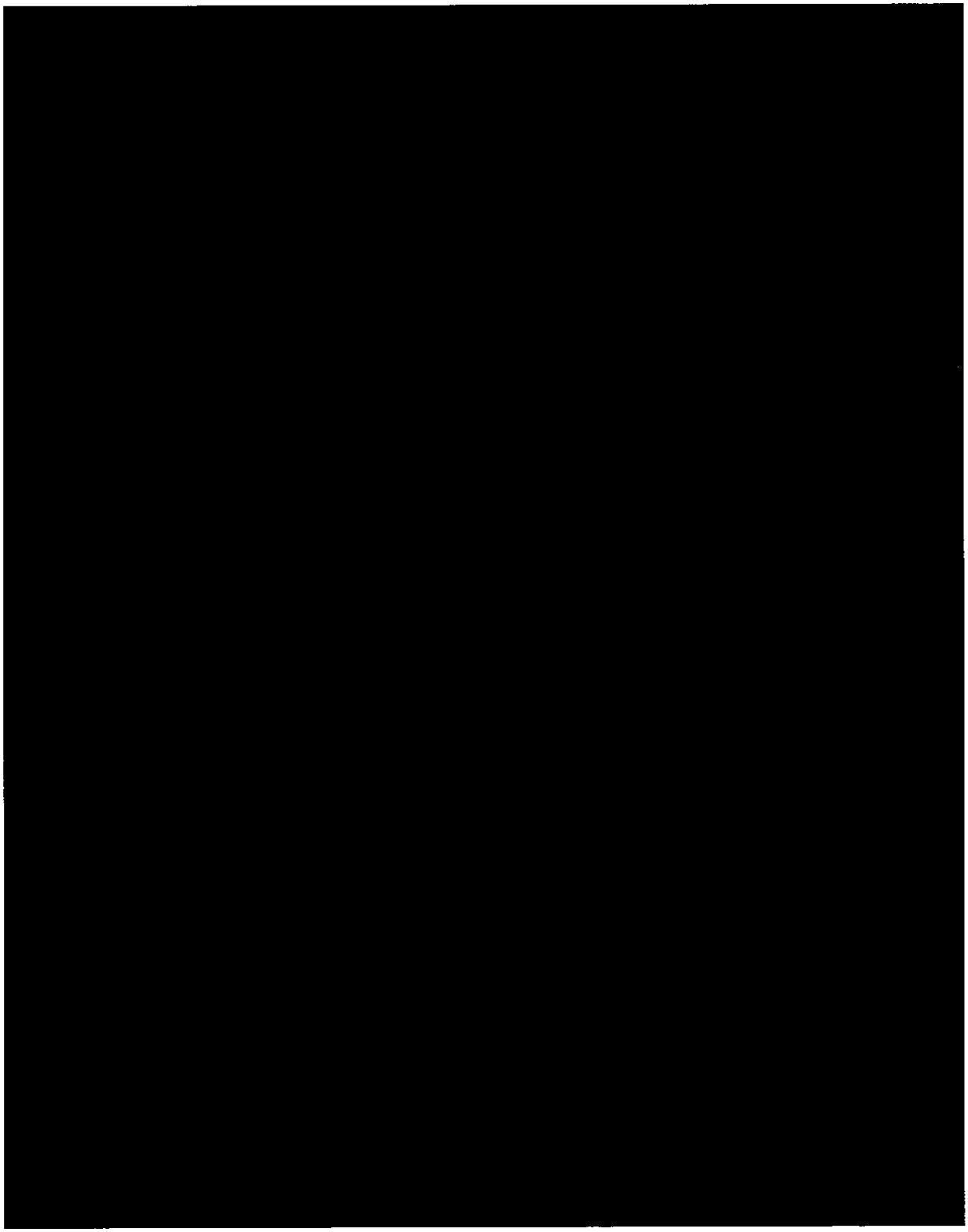
(1) Shorten the torsion bar end cover by the thickness of the Repair Plate.

(2) Use only aluminium plate that conforms to [redacted]

(3) Use only plate with Certificate of Conformity.

(4) Stamp batch number on edge of Repair Plate after manufacture.

(5) For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.



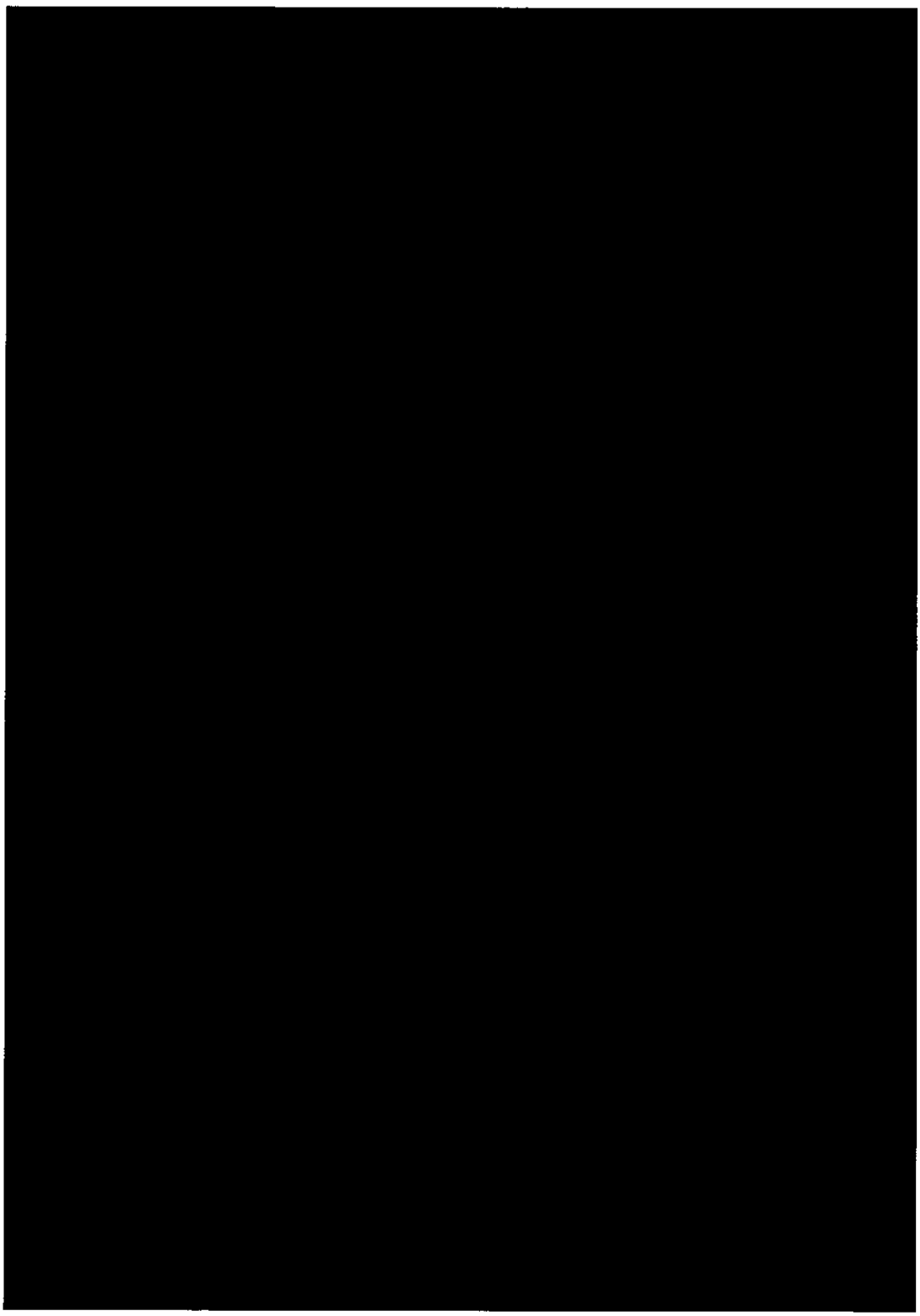


TABLE 1 REPAIR TO TORSION BAR COVERS FOR EXFOLIATION ON LOWER WALLS OF HULL WITH FLOOR IN PLACE

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture plate (Fig 2).		
2	Remove torsion bar end cover by 6 inches, from the side wall of hull.		
3	Grout out and remove all corrosion as necessary.		
4	Drill and c/sk holes to suit 3/8 UNC c/sk socket head screws on the side wall of hull. See (Fig 1) for hole positions.		
5	Position plate centrally with torsion bar holes and mark off holes from hull. Drill and tap 3/8 and 5/8 UNC through plate.		
6	Coat plate faces and all screw holes with red Hermetite.		
7	Torque load all screws to 25 lbf ft.		
8	Manufacture replacement bar covers.		
9	Weld on covers to Def Stan 08-39.		
10	Peen to DEF STAN 03-21 in positions indicated by MVEE Spec 826.		
11	Inspect.		
12	Paint to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 40

STRESS CORROSION – REPAIR TO BOSSES S88, S89, S90 AND S91 (SULTAN ONLY)

CONTENTS

BOSSES S88, S89, S90 AND S91

Application

1 This repair is to be applied to exfoliation corrosion around floor bosses S88, S89, S90 and S91 on the Sultan hull where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture the Repair Plate and bosses. Transfer holes through damaged bosses and hull for location purposes. Position Repair Plate to the underside of the hull, spot drill and tap for the plate fixing screws. Fit the Repair Plate with slave screws and spot drill for the new bosses. Remove the Repair Plate, position and weld bosses. Machine through hull floor to accommodate the new bosses. Fit the competed plate to the underside of the hull.

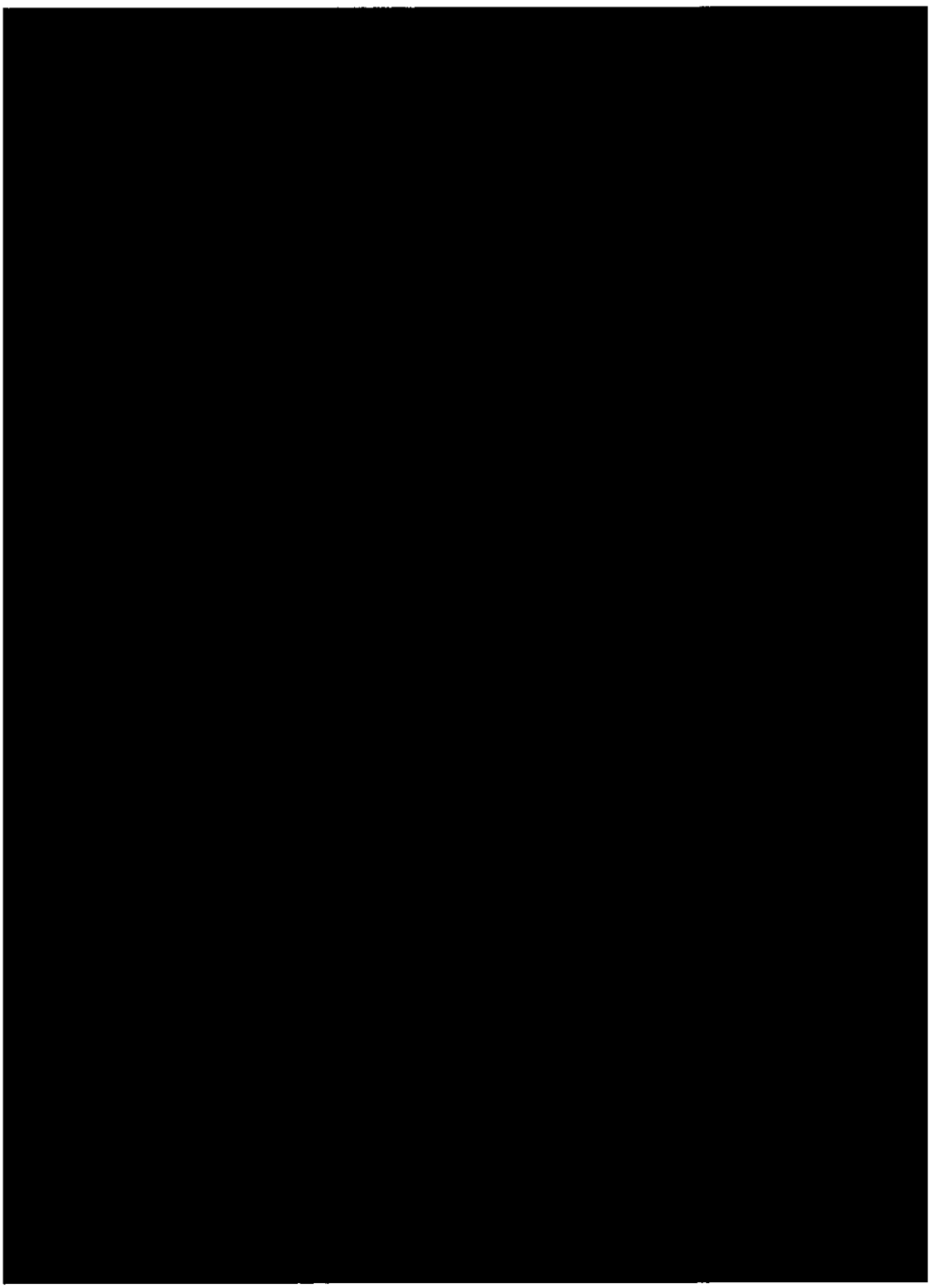
NOTES

(1) Use only aluminium plate that conforms to [redacted]

(2) Use only plate with Certificate of Conformity.

(3) Stamp batch number on edge of Repair Plate after manufacture.

(4) For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.



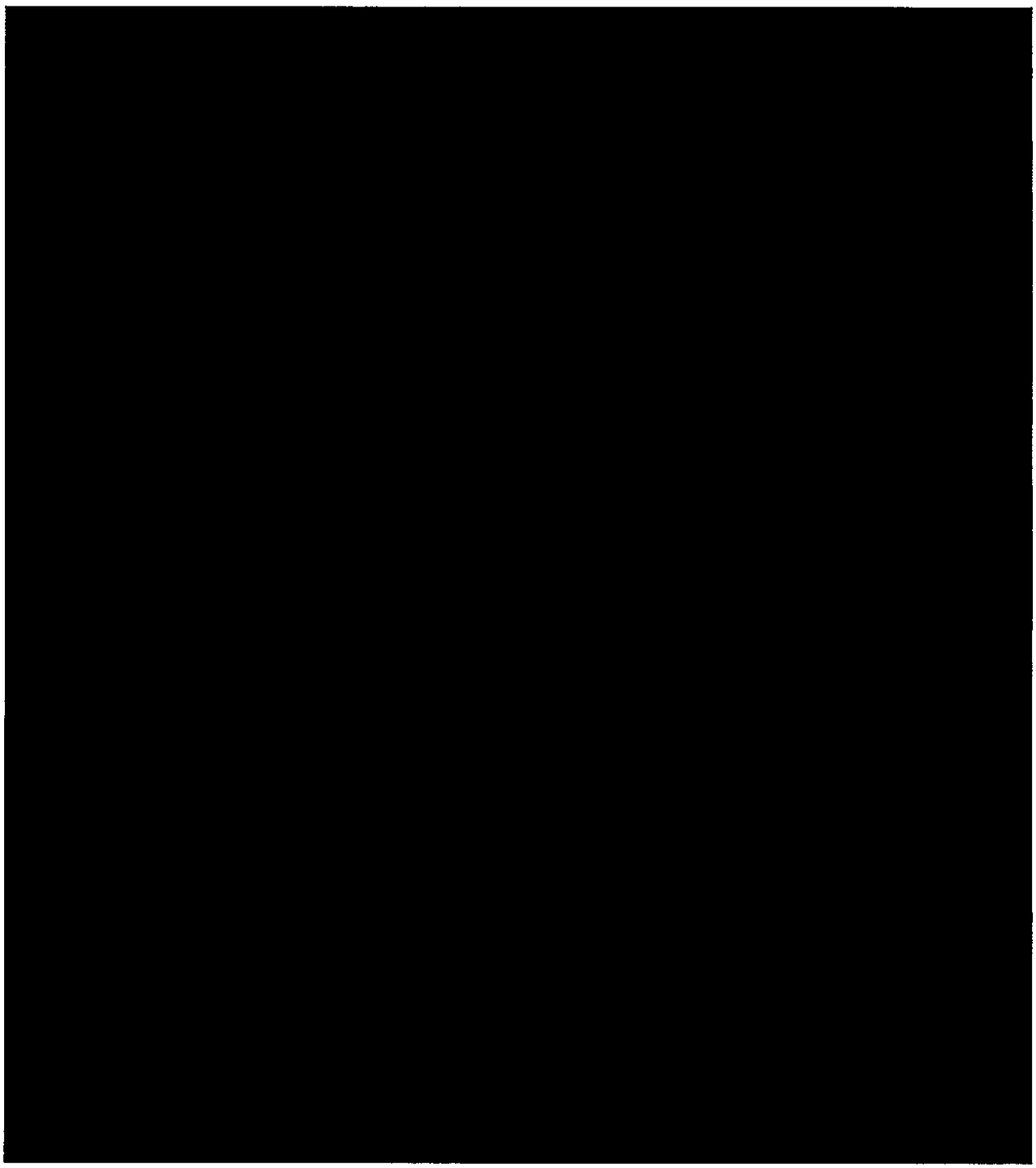


TABLE 1 REPAIR TO BOSSES S88, S89, S90 AND S91 (SULTAN ONLY)

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture Repair Plate (Fig 3), minus 4 off bosses.		
2	Manufacture 4 off bosses (Fig 3).		
3	Transfer 1/4 UNC holes from four bosses S88, S89, S90 and S91 through hull floor (Fig 2).		
4	Position Repair Plate (Fig 3) on the underside of the hull floor (Fig 2).		
5	Using the Repair Plate as a template, spot drill and tap holes 3/8 UNC on the hull floor (Fig 2).		
6	Secure plate to hull floor with slave screws.		
7	Transfer 4 off 1/4 UNC holes from hull floor onto Repair Plate, (for locating bosses).		
8	Remove plate, position bosses 4 off (Fig 3), weld to plate.		
9	Peen to DEF STAN 03-21 in positions indicated by MVEE Spec 826.		
10	Machine out four holes in hull floor to receive bosses on Repair Plate.		
11	Inspect.		
12	Coat all mating faces and screws with red Hermetite.		
13	Refit plate to hull.		
14	Torque load all screws to 25 lbf ft.		
15	Inspect.		
16	Paint to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 41

STRESS CORROSION – REPAIR TO FINAL DRIVE APERTURE ON ALL VARIANTS

CONTENTS

FINAL DRIVE APERTURE ON ALL VARIANTS

Application

1 This repair is to be applied to cracks on the inside of the final drive aperture.

Synopsis of method

2 Depending on the length of the crack, drill and tap holes equ-distance between the existing holes on the final drive aperture. Use clearance drill to the depth of the crack, and countersunk screws to contain the crack. Peen over to close.

NOTE

Extend the repair screws approx two inches beyond the end of the crack.

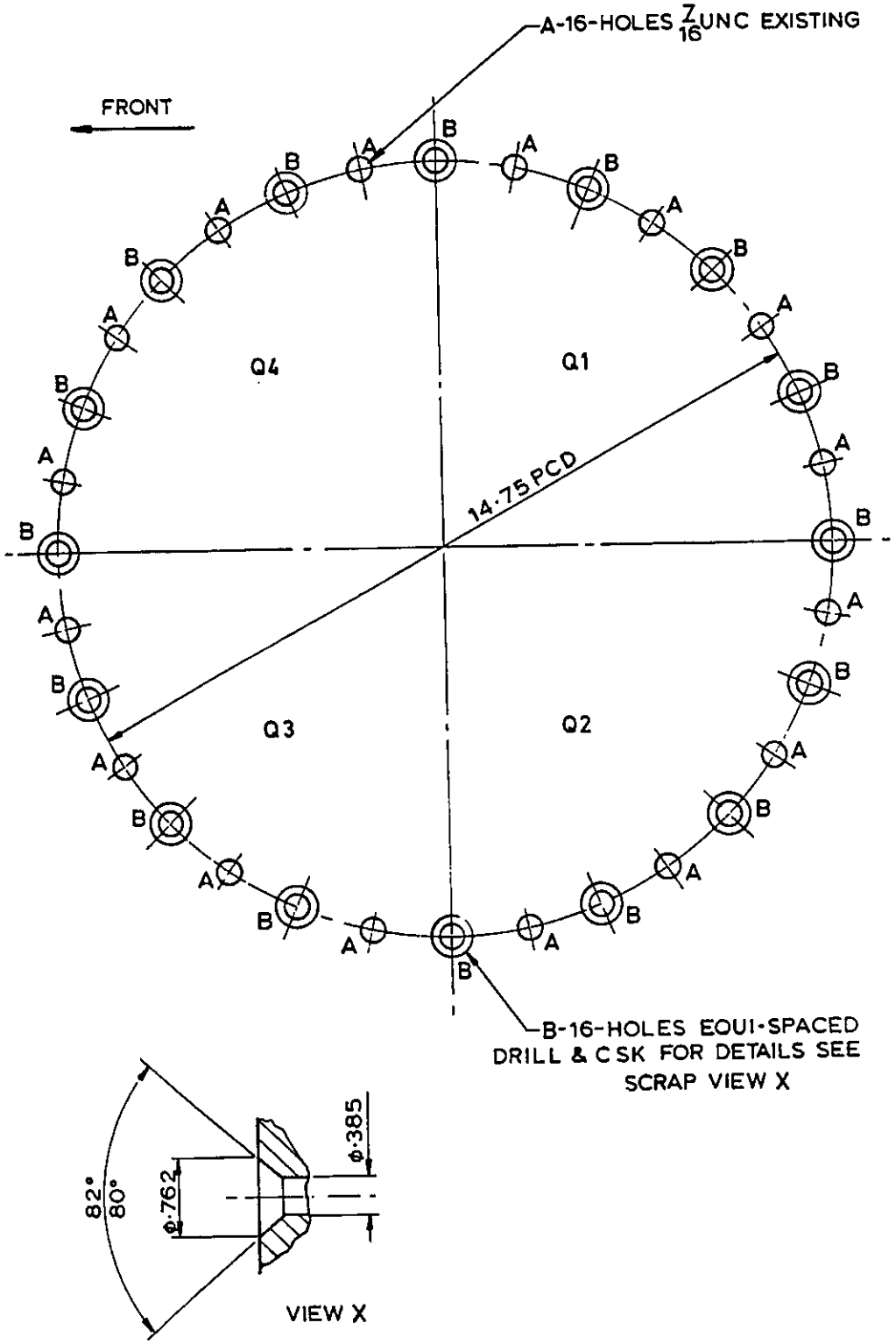


Fig 1 Position of repair screws

TABLE 1 FINAL DRIVE APERTURE

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Drill and tap to suit 3/8 UNC c/sk screws marked 'B'.		
2	Position equi-spaced between existing holes on 14.75 inch PCD in quadrants marked Q1, Q2, Q3 and Q4 (Fig 1).		
3	C/Bore 9.9 mm dia to depth of crack. Refer to Annex B App 5 for further information.		
4	Cut screws to length.		
5	Red Hermetite all screws then torque to 25 lbf ft.		
6	Inspect.		
7	Paint to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 42

STRESS CORROSION – REPAIR FOR BATTERY MOUNTS B1 – B6 SALAMANDER (SCORPION) AND SCIMITAR ONLY

CONTENTS

REPAIR FOR BATTERY MOUNTS B1 – B6

Application

1 This repair is to be applied to exfoliation corrosion effecting battery mounts B1 to B6 on Salamander (Scorpion) and Scimitar hulls where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture the Repair Plate and position on the underside of the hull. Using the plate as a template mark off drill and tap 20 holes in the hull floor. Fit Repair Plate to hull using countersunk screws.

NOTES

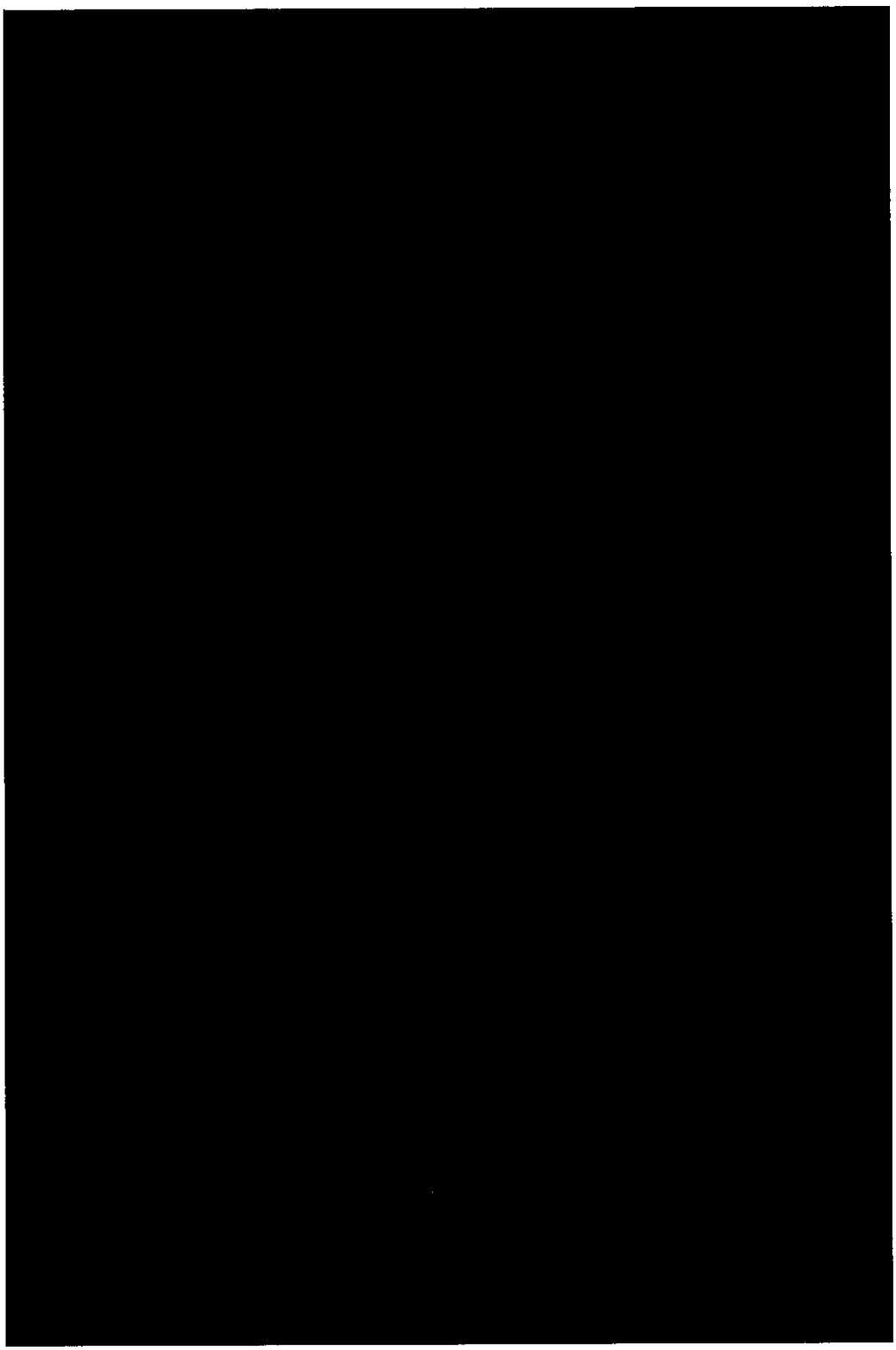
[redacted]

(2) Use only plate with Certificate of Conformity.

(3) Stamp batch number on edge of Repair Plate after manufacture.

(4) This repair is to be carried out in conjunction with Annex B App 23.

[redacted]



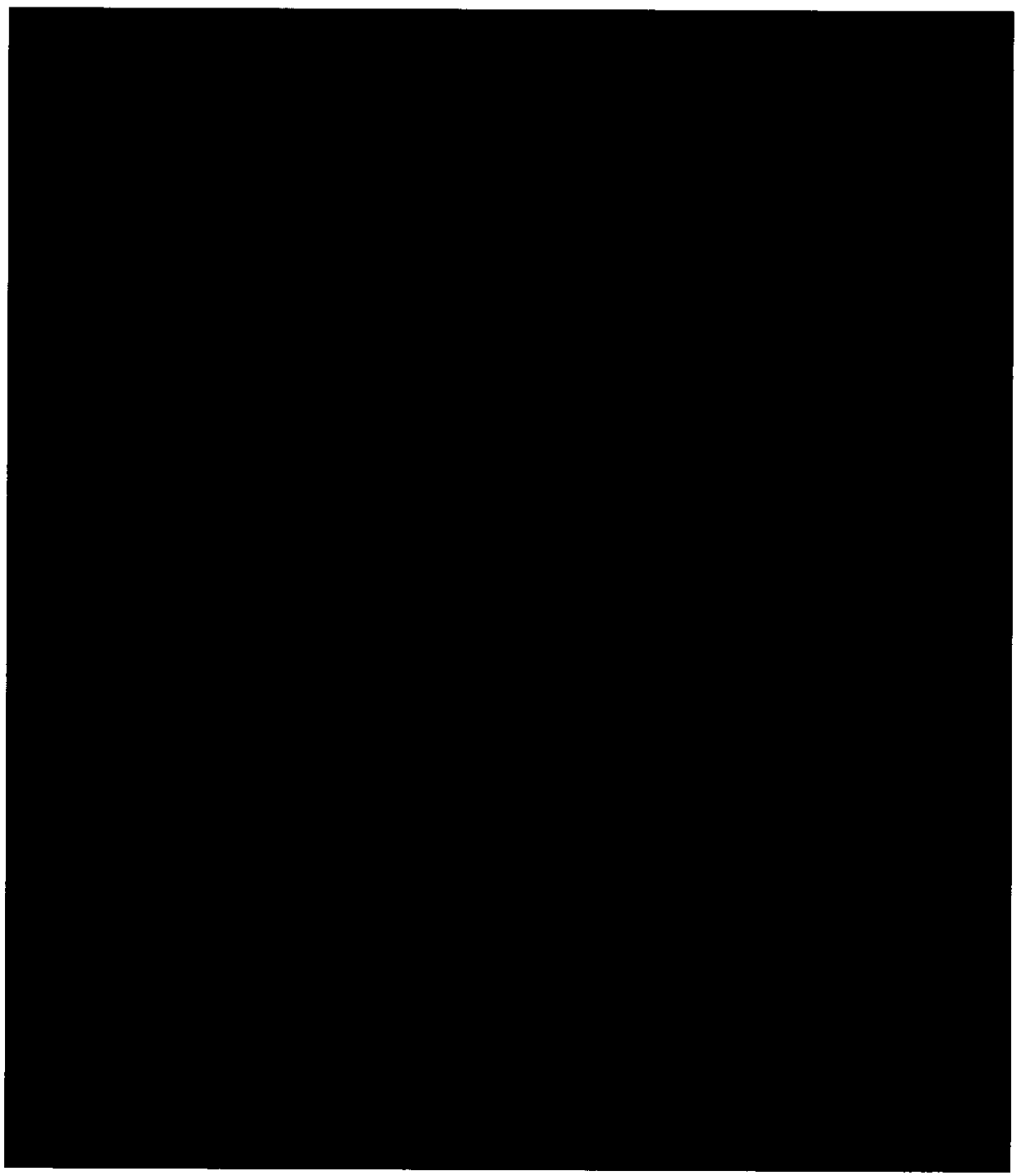


TABLE 1 REPAIR FOR BATTERY MOUNTS B1 – B6

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture plate (Fig 2).		
2	Position plate (Fig 2) on the underside of the hull floor (Fig 1).		
3	Using plate (Fig 2) as a template, mark off, drill and tap 20 off holes 3/8 UNC from plate onto the hull floor.		
4	Remove plate (Fig 2) from hull.		
5	Proceed to do repair as Annex B Appendix 23.		
6	Coat mating faces and screws with red Hermetite.		
7	Torque load all screws to 25 lbf ft.		
8	Inspect.		

CHAPTER 10 ANNEX B APPENDIX 43

STRESS CORROSION – REPLACEMENT OF FUEL TANK BOSSES ON SPARTAN

CONTENTS

REPLACEMENT OF FUEL TANK BOSSES ON SPARTAN

Application

1 This repair is to be applied to exfoliation corrosion affecting fuel tank bosses fitted to the hull where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Cut away the affected bosses and dress flush. Mazel the surface before positioning the new bosses. Drill and tap through hull to secure bosses.

NOTE

For the manufacture of the bosses a standard engineering aluminium alloy that conforms to BS [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.

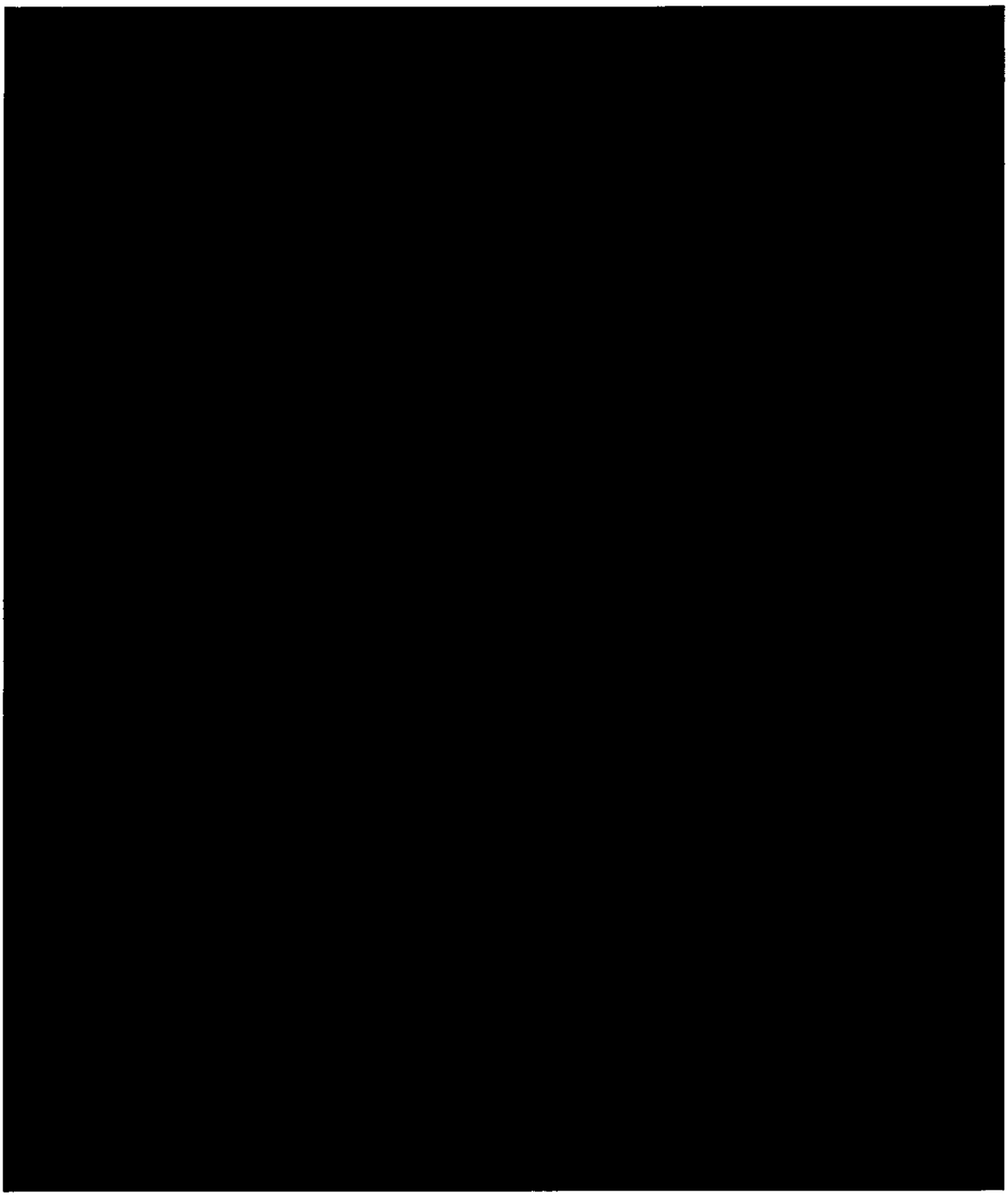


TABLE 1 REPLACEMENT OF FUEL TANK BOSSES ON SPARTAN

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Remove fuel tank bosses.		
2	Grout out corrosion and dress flush.		
3	Mazel surface.		
4	Position new bosses (Fig 1). Part No 2910-99-835-0266.		
5	Drill and tap to suit 5/16 hex head UNC bolts.		
6	Coat the bosses and bolts with red Hermetite.		
7	Torque load all screws to 25 lbf ft.		
8	Inspect.		
9	Paint to DEFENCE STANDARD 03.32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 45

STRESS CORROSION – REPAIR TO FLOOR MOUNTINGS S12, S13 AND S14 (SPARTAN ONLY)

CONTENTS

Para

Table Page

Fig

FLOOR MOUNTINGS S12, S13 AND S14

Application

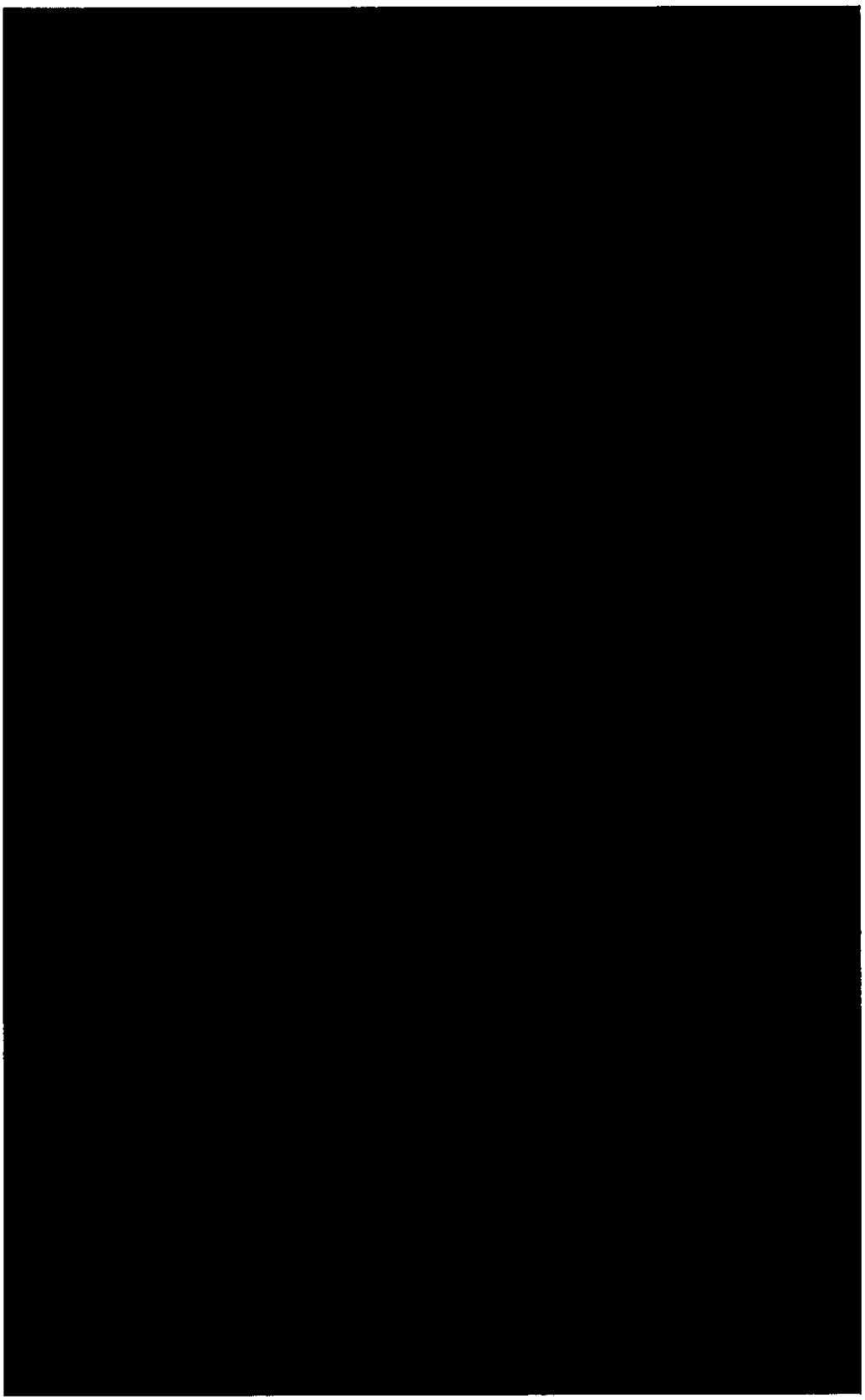
1 This repair is to be applied to exfoliation corrosion around floor mountings S12, S13 and S14 where the criteria in Appendix 4 is exceeded.

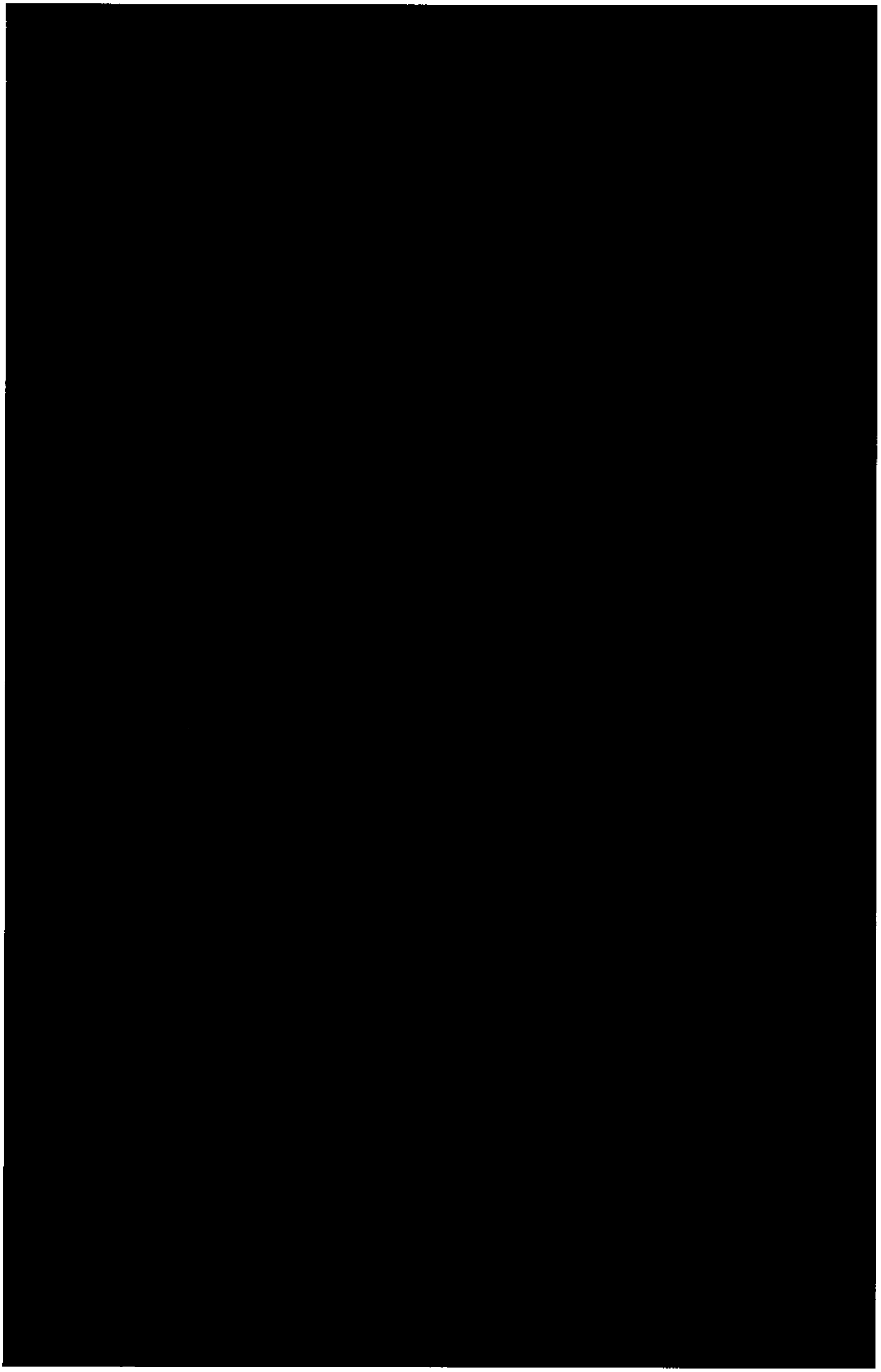
Synopsis of method

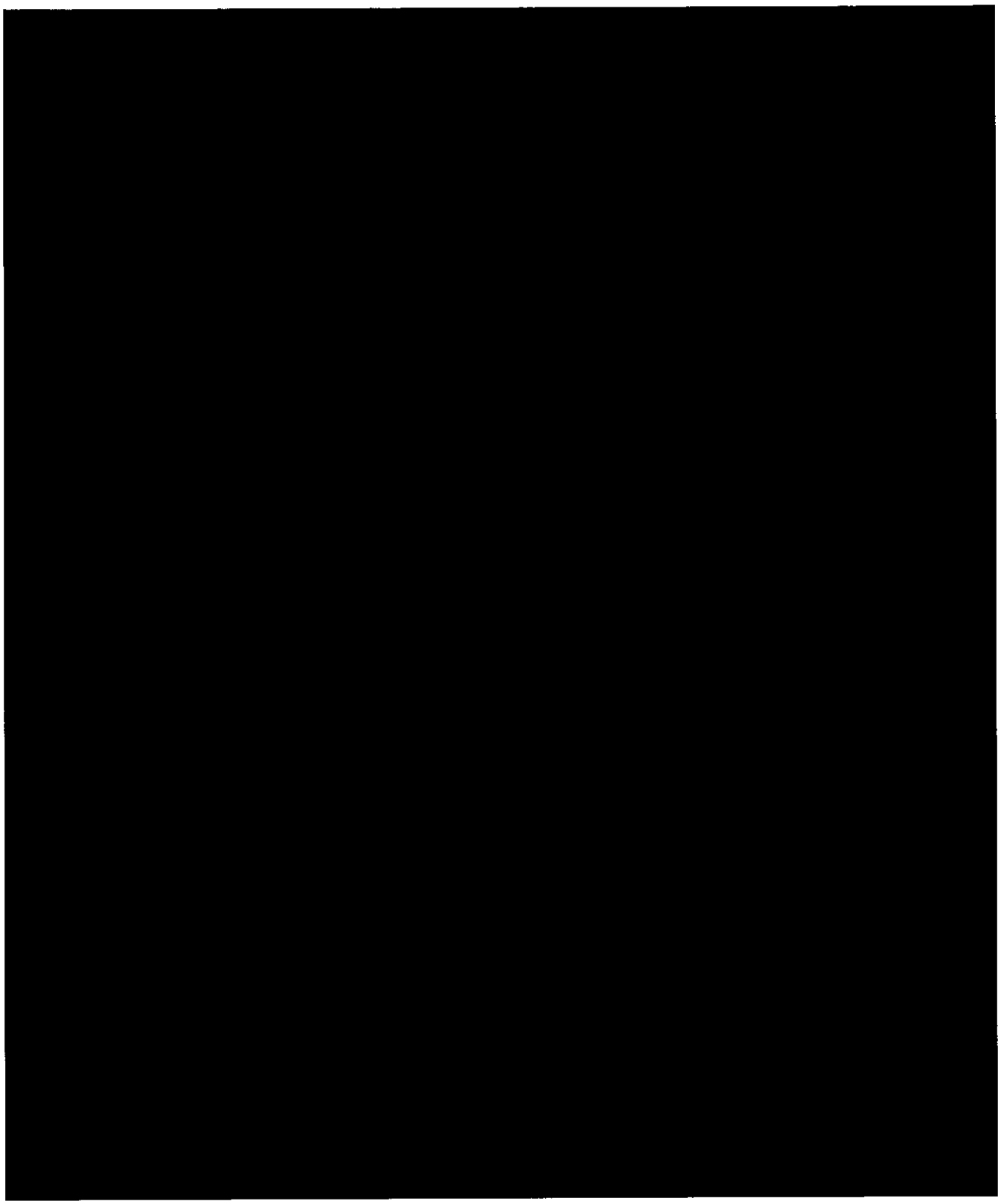
2 Modify 2 off Repair Plates to the drawing specification. Position 3 off Repair Plates to underside of the hull. Spot through, drill and tap 3/8 UNC holes for securing Repair Plates to the hull. Use slave screws to fit plates to the hull. Drill and tap through damaged bosses, hull and Repair Plates. Remove plates and counterbore hull floor through to the affected bosses. Drill and c/sk the plates to suit the socket headed screws for securing the bosses. Coat mating faces with red Hermetite before fixing the plate to the hull floor.

NOTE

For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.







[redacted]

CHAPTER 10 ANNEX B APPENDIX 46

STRESS CORROSION – REPAIR TO BATTERY MOUNTINGS B11 AND B12 (ALL VARIANTS)

CONTENTS

BATTERY MOUNTINGS B11 AND B12

Application

1 This repair is to be applied to exfoliation corrosion around battery mountings where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture Repair Plates to drawing specifications. Remove the defective mountings and dress flush with the floor. Produce a slot in the floor to accept the brackets on the Repair Plate. Mark out, drill and tap 3/8 UNC holes in hull floor for fixing the plates. Coat mating surfaces and screws with red Hermetite prior to fixing to the underside of the hull. Paint to DEFENCE STANDARD 03-32 (Part 3).

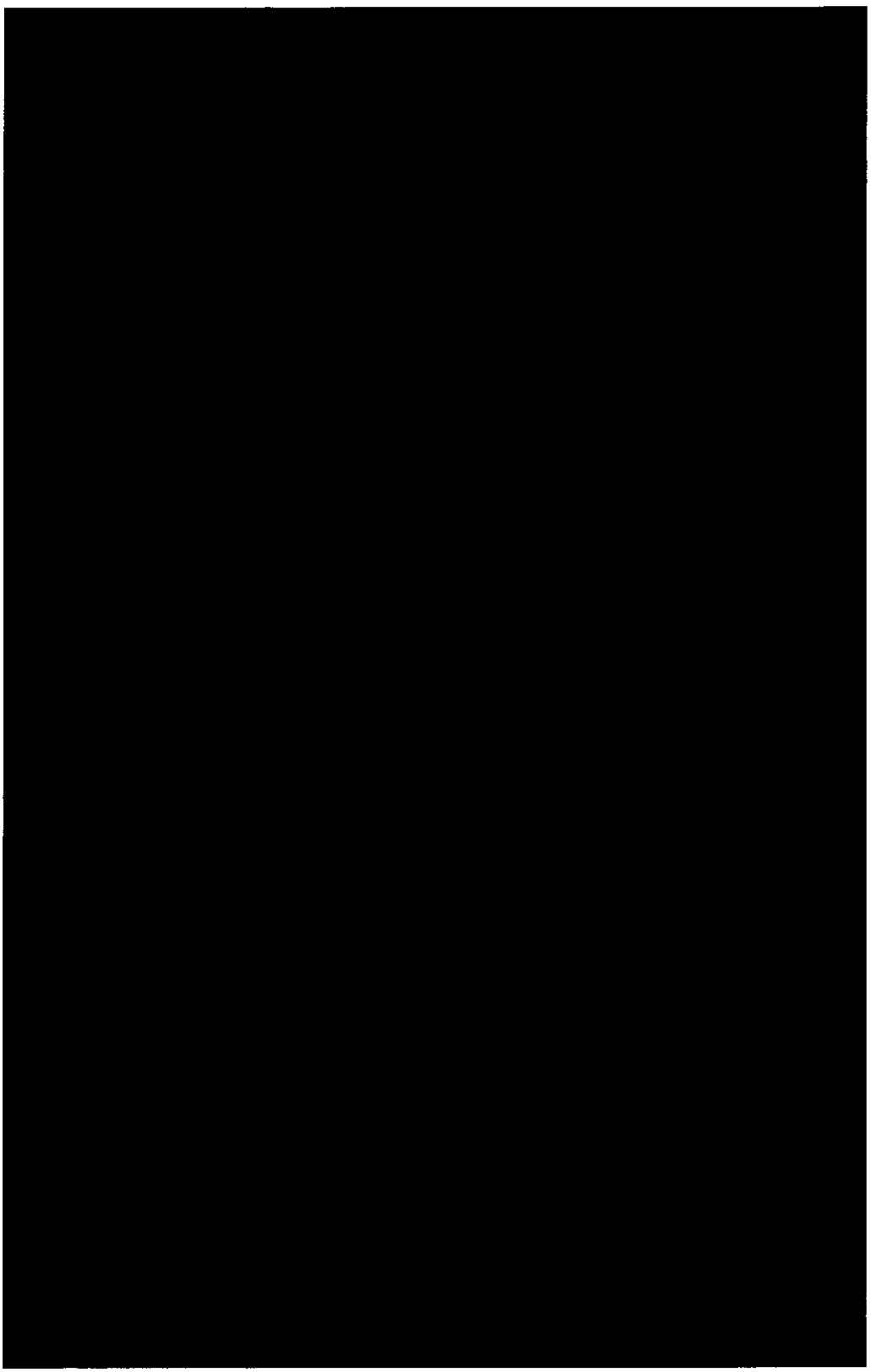
NOTES

(1) Use only aluminium plate that conforms to [redacted]

(2) Use only plate with a Certificate of Conformity.

(3) Stamp batch number on edge or Repair Plate after manufacture.

(4) For the manufacture of the bosses a [redacted] engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.



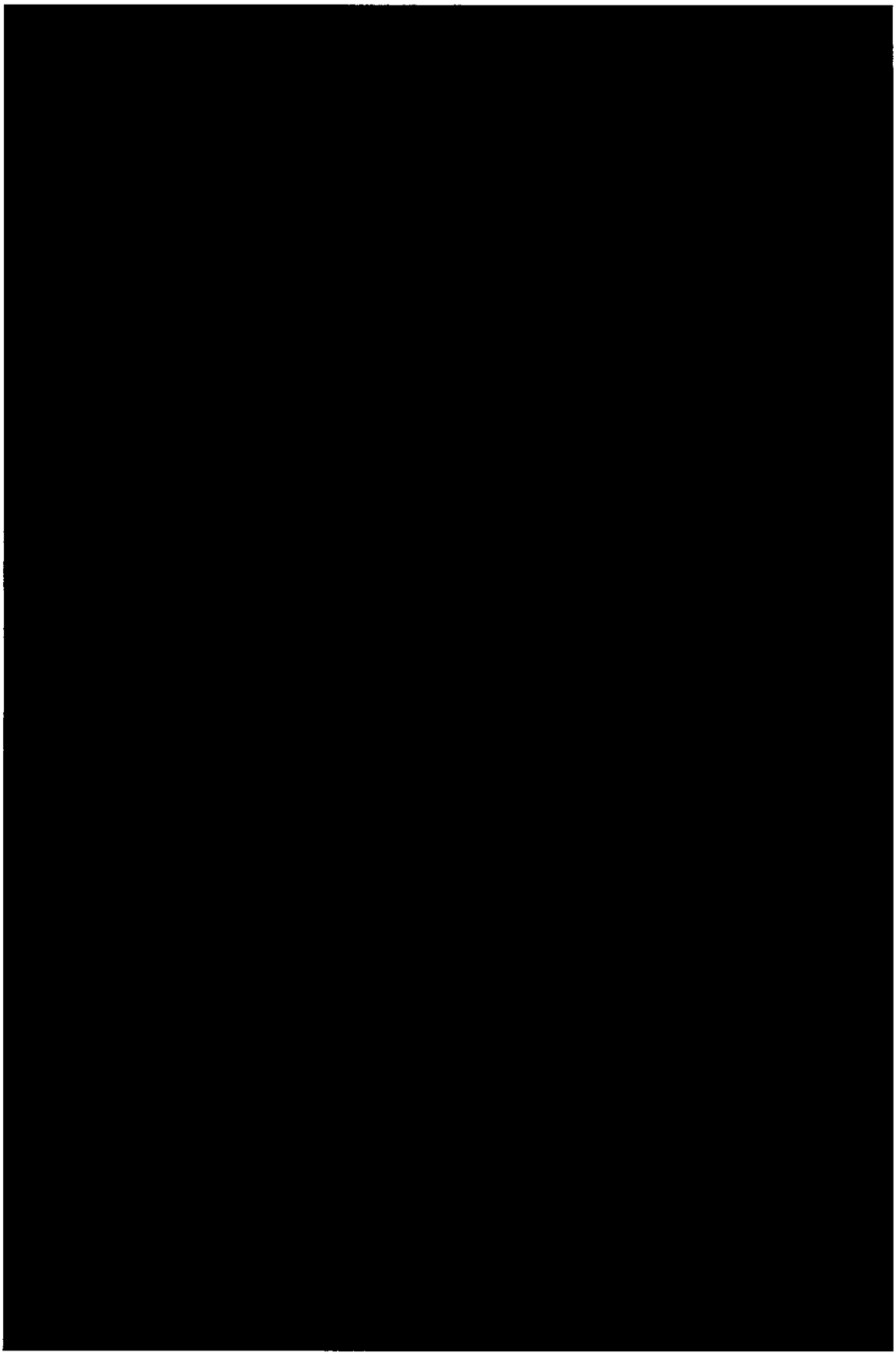


TABLE 1 REPAIR TO BATTERY MOUNTINGS B11 AND B12

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture Repair Plates (Fig 2).		
2	Remove damaged brackets and dress the floor flush.		
3	Machine slot in hull floor to accept brackets and chamfer slot from the outside to receive the brackets.		
4	Position Repair Plates on the underside of the hull and spot through 4 off holes.		
5	Remove plates from the hull.		
6	Drill and tap 8 off holes 3/8 UNC through the hull.		
7	Coat mating faces and screws with red Hermetite.		
8	Fit plates to the hull and torque screws to 25 lbf ft.		
9	Inspect.		
10	Mazel around the bracket internally.		
11	Paint repair to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 47

STRESS CORROSION – REPAIR TO FUEL TANK BOSS F3 (SULTAN ONLY)

CONTENTS

FUEL TANK BOSS F3

Application

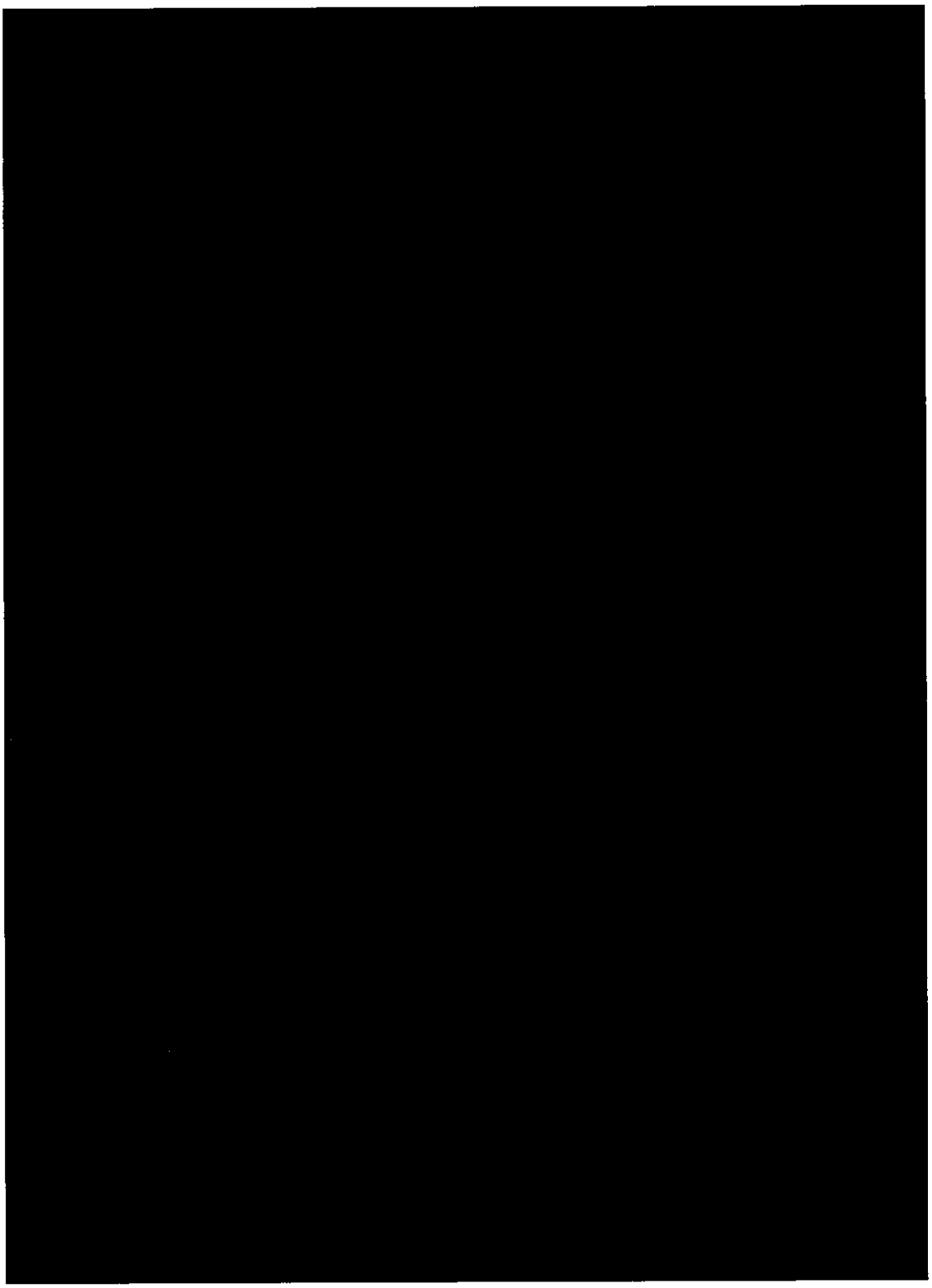
1 This repair is to be applied to exfoliation corrosion around fuel tank boss F3 where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture Repair Plates to drawing specifications. Remove the defective boss. Machine the hull floor to accept the replacement boss. Position plate on the underside of hull, mark out, drill and tap 3/8 UNC holes to fix the plate to the hull. Coat mating faces and screws with red Hermetite. Fix to the underside of the hull, and mazel around the boss internally.

NOTE

For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.



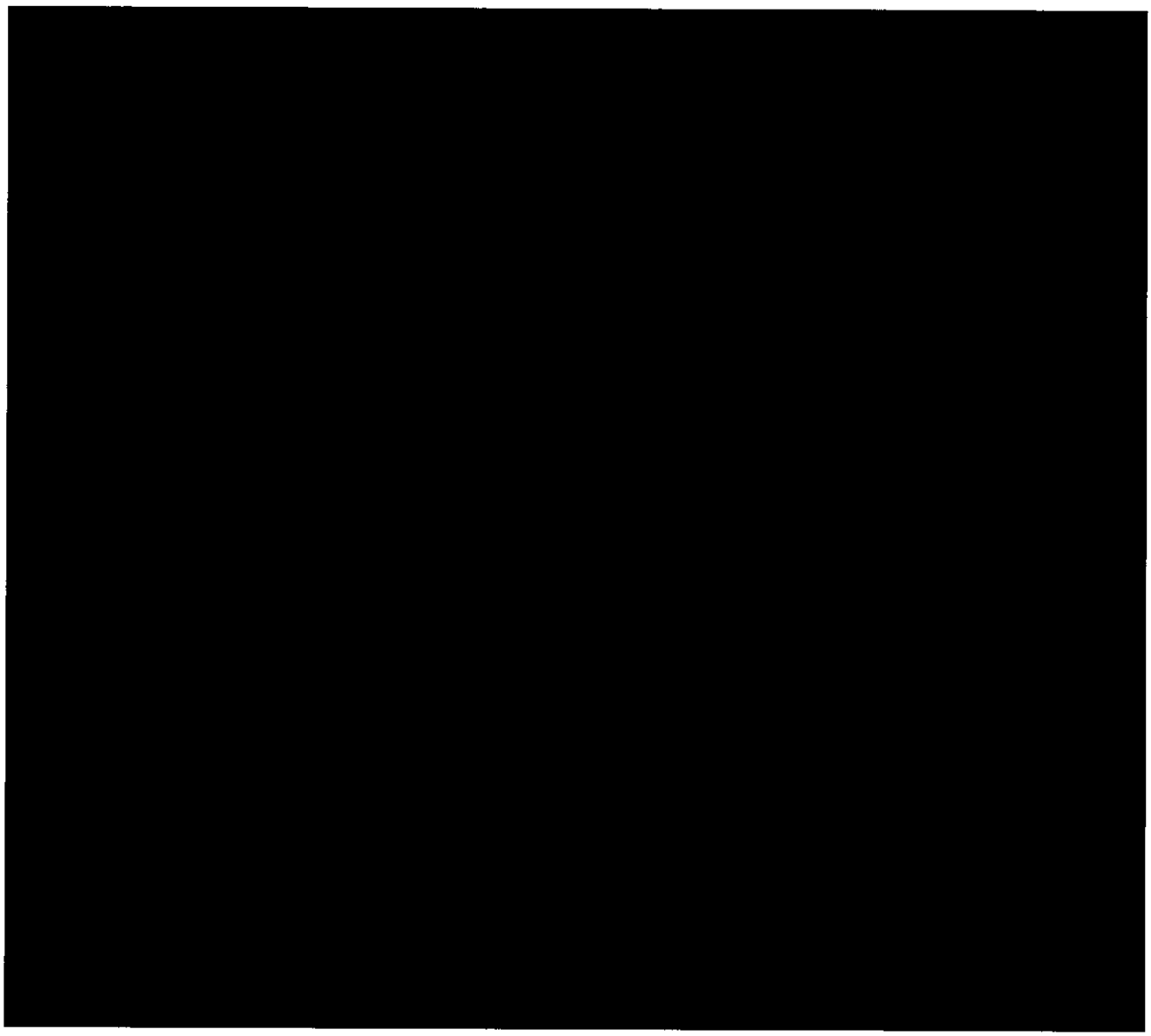


TABLE 1 REPAIR TO FUEL TANK BOSS F3

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Modify the Repair Plate (FV 839787), as in Fig 3.		
2	Remove damaged boss and dress the floor flush.		
3	Machine out floor to receive the new boss.		
4	Position plate on the underside of the hull floor.		
5	Spot through, drill and tap 5 off, 3/8 UNC holes in the hull floor.		
6	Remove Repair Plates from hull.		
7	Coat faces and screws with red Hermetite.		
8	Fit plate to the hull and torque screws to 25 lbf ft.		
9	Mazel around the bracket internally.		
10	Inspect.		
11	Paint repair to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 48

STRESS CORROSION – REPAIR TO FLOOR MOUNTINGS S15, S16 AND S26 (SPARTAN ONLY)

CONTENTS

Para

Table Page

Fig

FLOOR MOUNTINGS S15, S16 AND S26

Application

1 This repair is to be applied to exfoliation corrosion around floor mountings S15, S16 and S26 where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture Repair Plate and mountings to drawing specification. Remove defective mountings S15 and S26, and dress flush with the floor. Position Repair Plate on the underside of the hull. Spot through 25 off holes for fixing plate to the hull. Slot through floor to accommodate replacement mountings (S15 and S26). Spot through the effected S16 mounting. Remove plate, drill and c/sk 2 off holes for securing S16 mounting. Welds S15 and S26 mountings to the Repair Plate. Peen welds. Coat mating faces and screws with red Hermetite prior to fitting. Torque all screws to 25 lbf ft on the underside of the hull.

NOTES

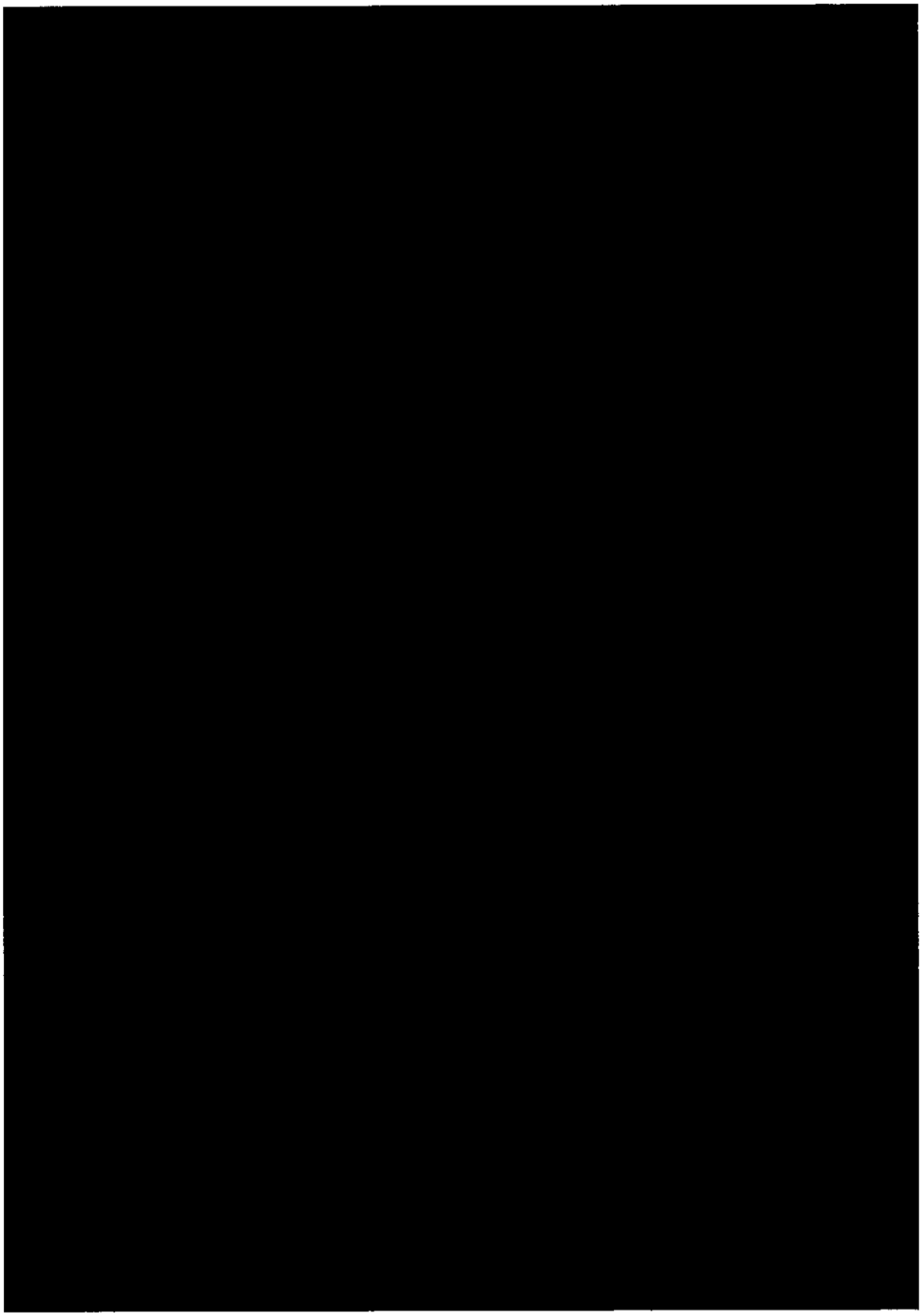
(1) This application assumes that mountings S15 and S26 are beyond repair as opposed to the S16 mounting.

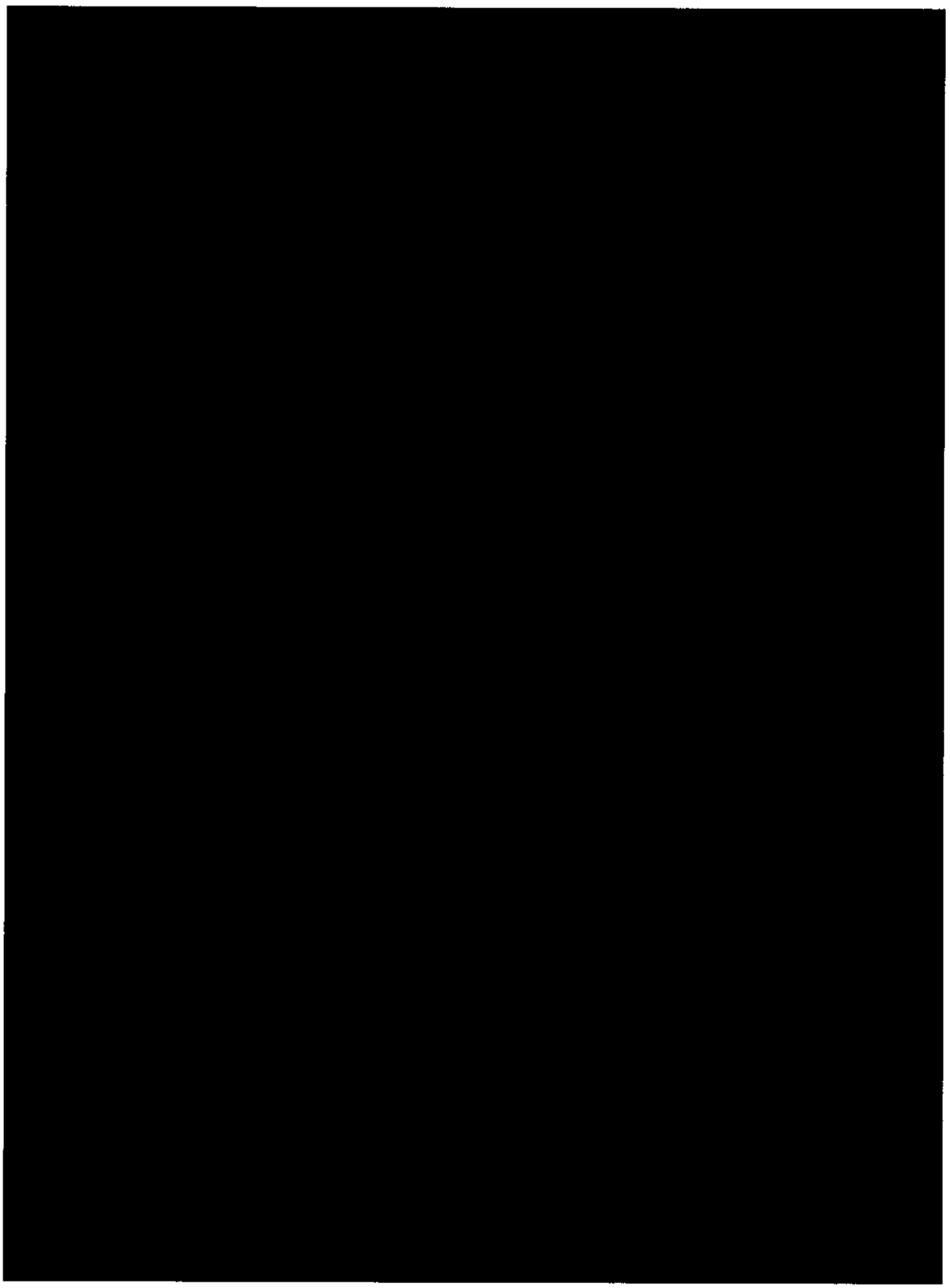
(2) Use only aluminium plate that conforms to [redacted]

(3) Use only plate with a Certificate of Conformity.

(4) Stamp batch number on edge of Repair Plate after manufacture.

(5) For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.





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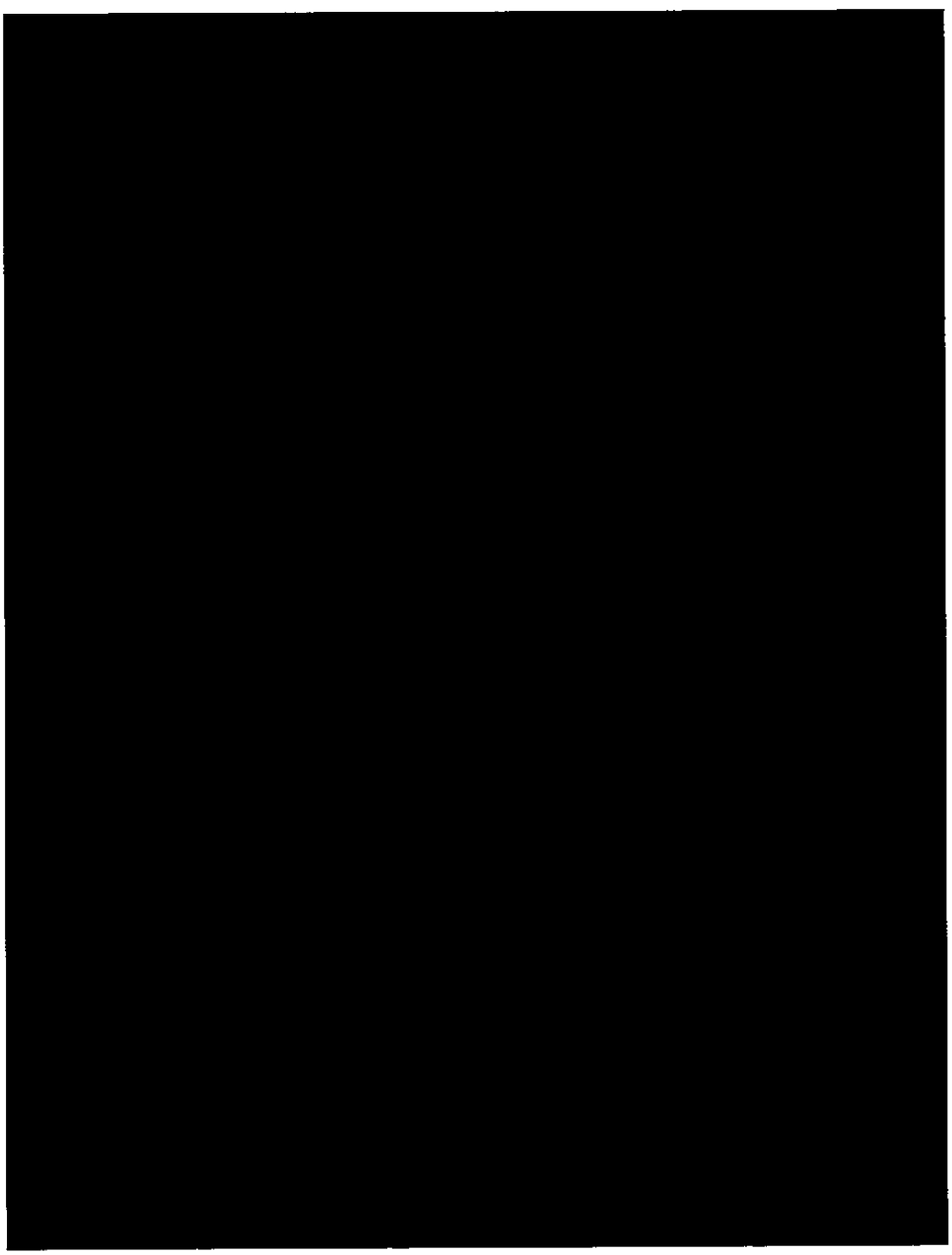


V11933-13

[redacted]

TABLE 1 REPAIR TO FLOOR MOUNTINGS S15, S16 AND S26

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture Repair Plate (Fig 2).		
2	Manufacture mountings (Fig 3).		
3	Remove mountings S15 and S26, dress flush and spot through hull for location purposes.		
4	Drill and tap 2 off 3/8 UNC holes into mounting S16 and through hull floor, for location and strengthening purposes.		
5	Position plate on the underside of the hull floor, using location holes from mountings S15 and S26.		
6	Spot through onto the Repair Plate the position of mounting S16.		
7	Spot through onto the underside of the hull, 25 off retaining holes from the Repair Plate.		
8	Slot through the hull to accept replacement mountings S15 and S26.		
9	Remove plate from the hull.		
10	Drill and tap 3/8 UNC holes in the hull floor, 25 off for fixing the plate and 2 off for the mountings S16.		
11	Weld replacement mounting S15 and S16 to Repair Plate, using Def Stan 08-39.		
12	Peen to DEF STAN 03-21. In positions indicated by MVEE Spec 826.		
13	Inspect.		
14	Coat all mating surfaces and screws with red Hermetite. NOTE Longer screws required to secure S16 mounting.		
15	Fit Repair Plate to hull and torque screws to 25 lbf ft.		
16	Inspect.		
17	Paint to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 49

STRESS CORROSION – REPAIR TO FLOOR BOSSES S72, S73 AND S74 (SULTAN ONLY)

CONTENTS

Para

Table

Fig

FLOOR BOSSES S72, S73 AND S74

Application

1 This repair is to be applied to exfoliation corrosion around floor S72, S73 and S74 on the Sultan where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture Repair Plate and replacement bosses. Fit Repair Plate to the underside of the hull. Drill through damaged bosses on the hull for location of new bosses on the plate. Weld replacement bosses to Repair Plate. Machine the hull to allow insertion of the replacement bosses. Fit and screw Repair Plate to the underside of the hull. Mazel around bosses internally. Paint to DEFENCE STANDARD 03-32 (Part 3).

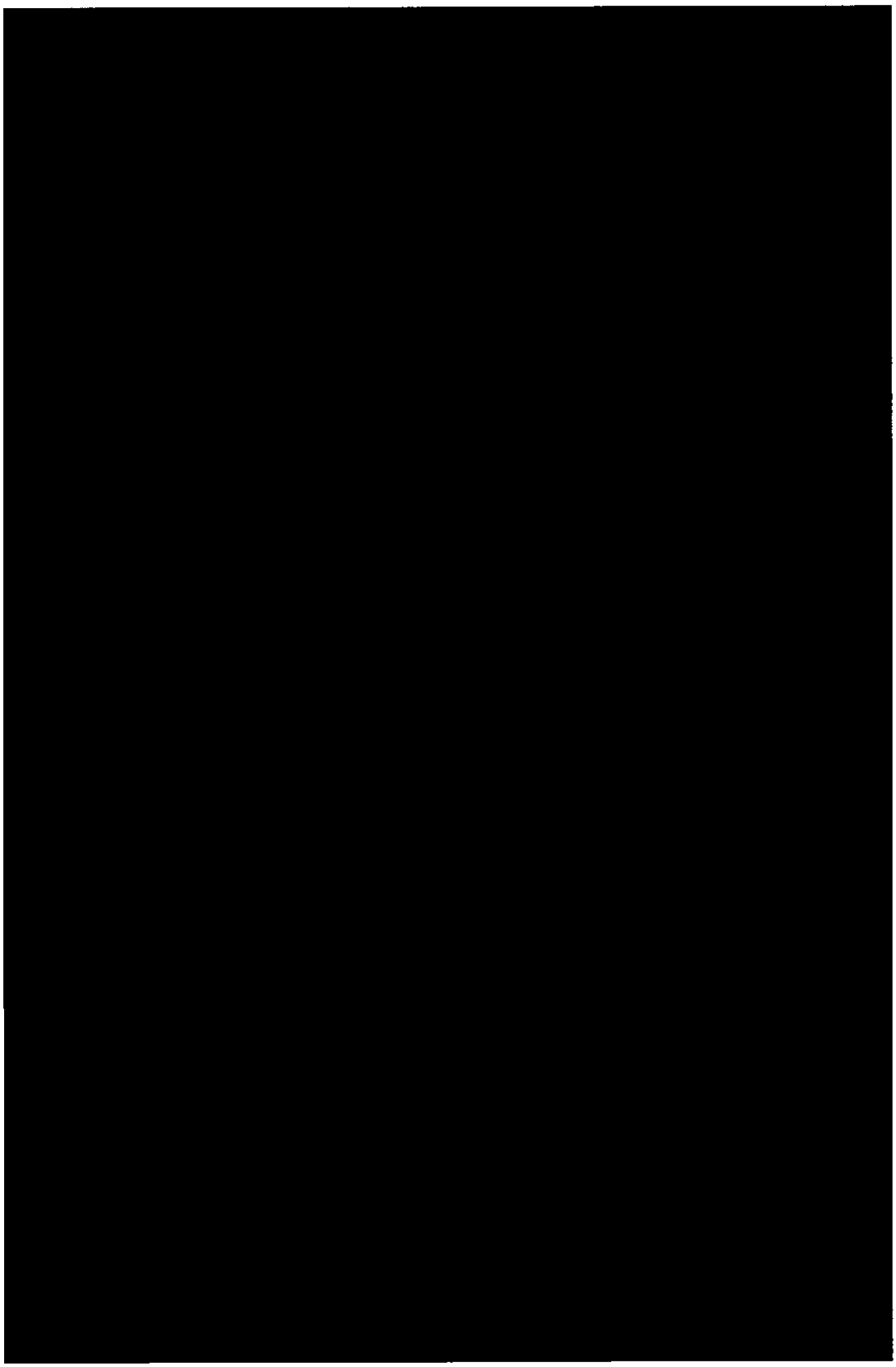
NOTES

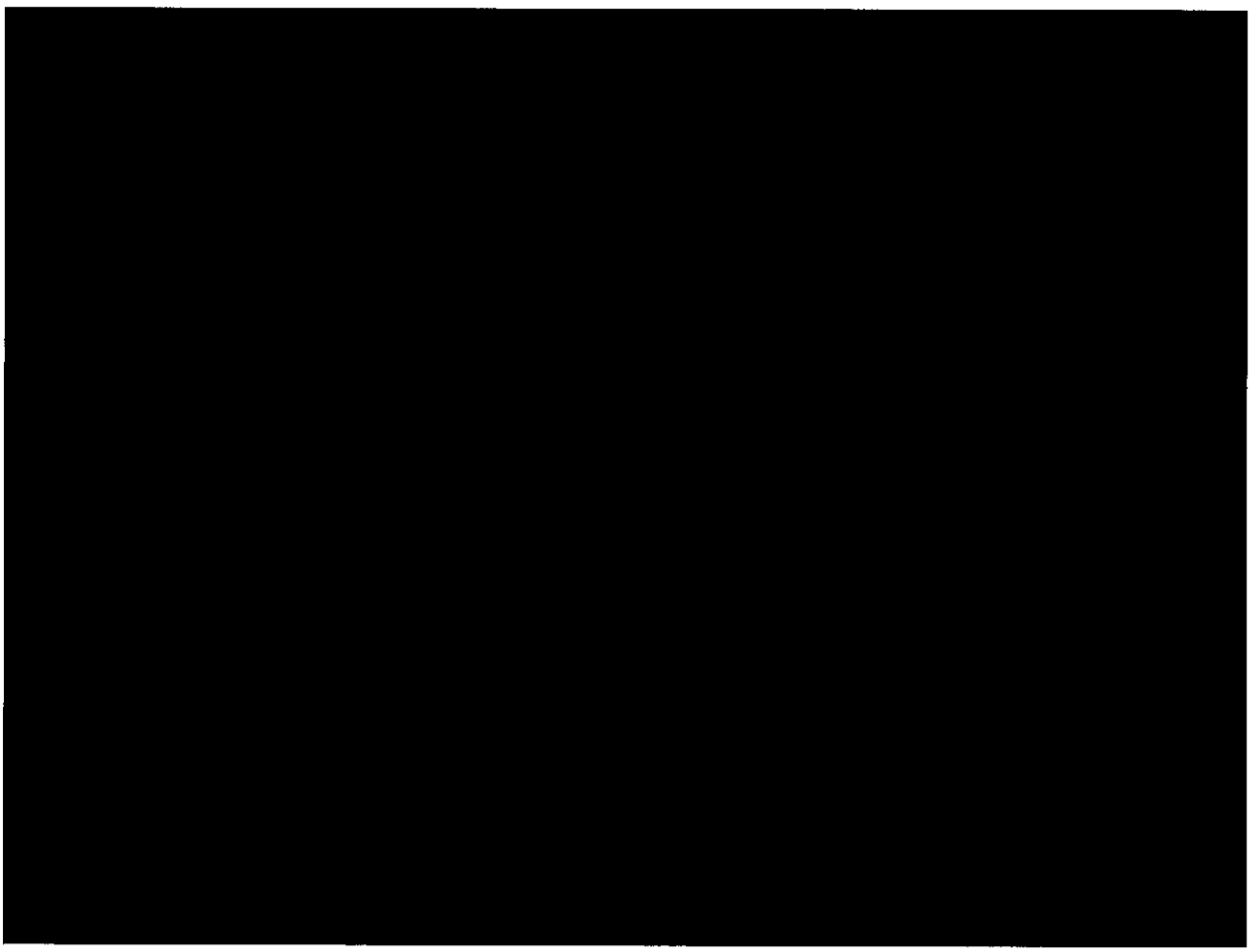
(1) Use only aluminium plate that conforms to [redacted]

(2) Use only plate with a Certificate of Conformity.

(3) Stamp batch number on edge of Repair Plate after manufacture.

(4) For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.





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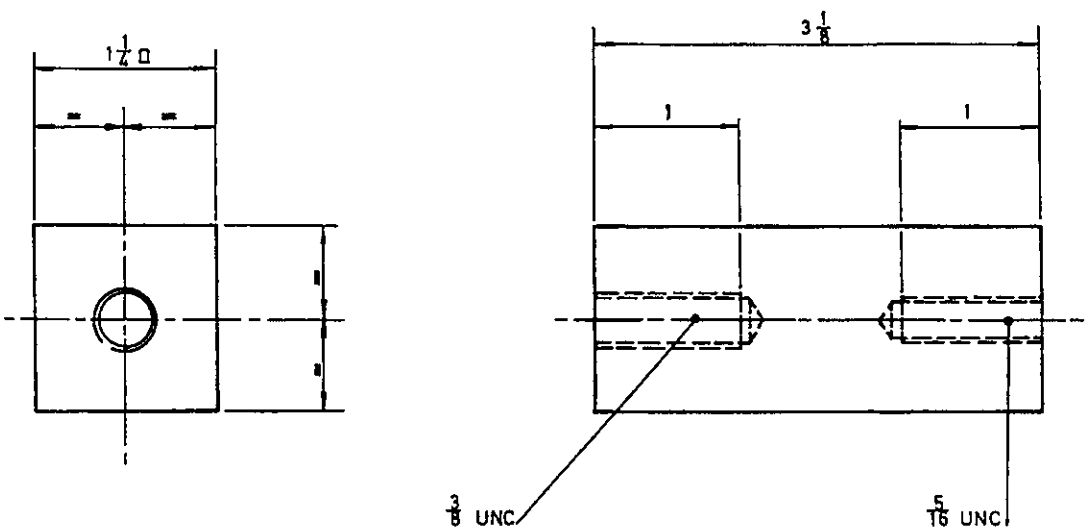


V11933-16

Fig 3 Boss

TABLE 1 REPAIR TO FLOOR BOSSES S72, S73 AND S74

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture 15 MM thick Repair Plate (Fig 2).		
2	Manufacture bosses 3 off (Fig 3).		
3	Position Repair Plate on the underside of the hull floor.		
4	Spot through plate retaining holes, drill and tap 3/8 UNC in hull floor.		
5	Spot through bosses S72, S73 and S74 into Repair Plate.		
6	Remove plate from hull.		
7	Drill Repair Plate through spotted holes to suit 3/8 UNC c/sk socket headed screws.		
8	Secure bosses to Repair Plate after coating screws and bosses with red Hermetite. Torque load screws to 25 lbf ft.		
9	Weld bosses to Repair Plate using Def Stan 08-39.		
10	Needle peen to DEF STAN 03-21 in positions indicated by MVEE Spec 826.		
11	Machine out hull floor to accept new bosses.		
12	Coat Repair Plate and screws with red Hermetite and secure to floor. Torque load screws to 25 lbf ft.		
13	Inspect.		
14	Mazel around bosses internally.		
15	Inspect.		
16	Paint to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 50

STRESS CORROSION – REPAIR TO BOSSES D1, D2, D3, S1, S2 AND LEFT HAND SPONSON PLATE ON ALL VARIANTS EXCEPT SALAMANDER (SCORPION) AND SCIMITAR

CONTENTS

BOSSES D1, D2, D3, S1, S2 AND LEFT HAND SPONSON PLATE

Application

1 This repair is to be applied to exfoliation corrosion around bosses D1, D2, D3, S1, S2 and left hand Sponson plate on all variants except Salamander (Scorpion) and Scimitar where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture Repair Plate and replacement bosses. Position Repair Plate on the underside of the Sponson plate. Spot, drill and tap 24 off 3/8 UNC holes for attaching Repair Plate to the hull. Secure plate to the hull. Spot through the damaged bosses for location purposes on the Repair Plate. Remove plate from hull and drill the location holes to suit countersunk UNC screws. Fit and weld bosses to Repair Plate. Machine out damaged bosses on the hull to allow plate to be fitted. Coat mating faces and screws with red Hermetite before fixing to the hull. Paint to DEFENCE STANDARD 03-32 (Part 3).

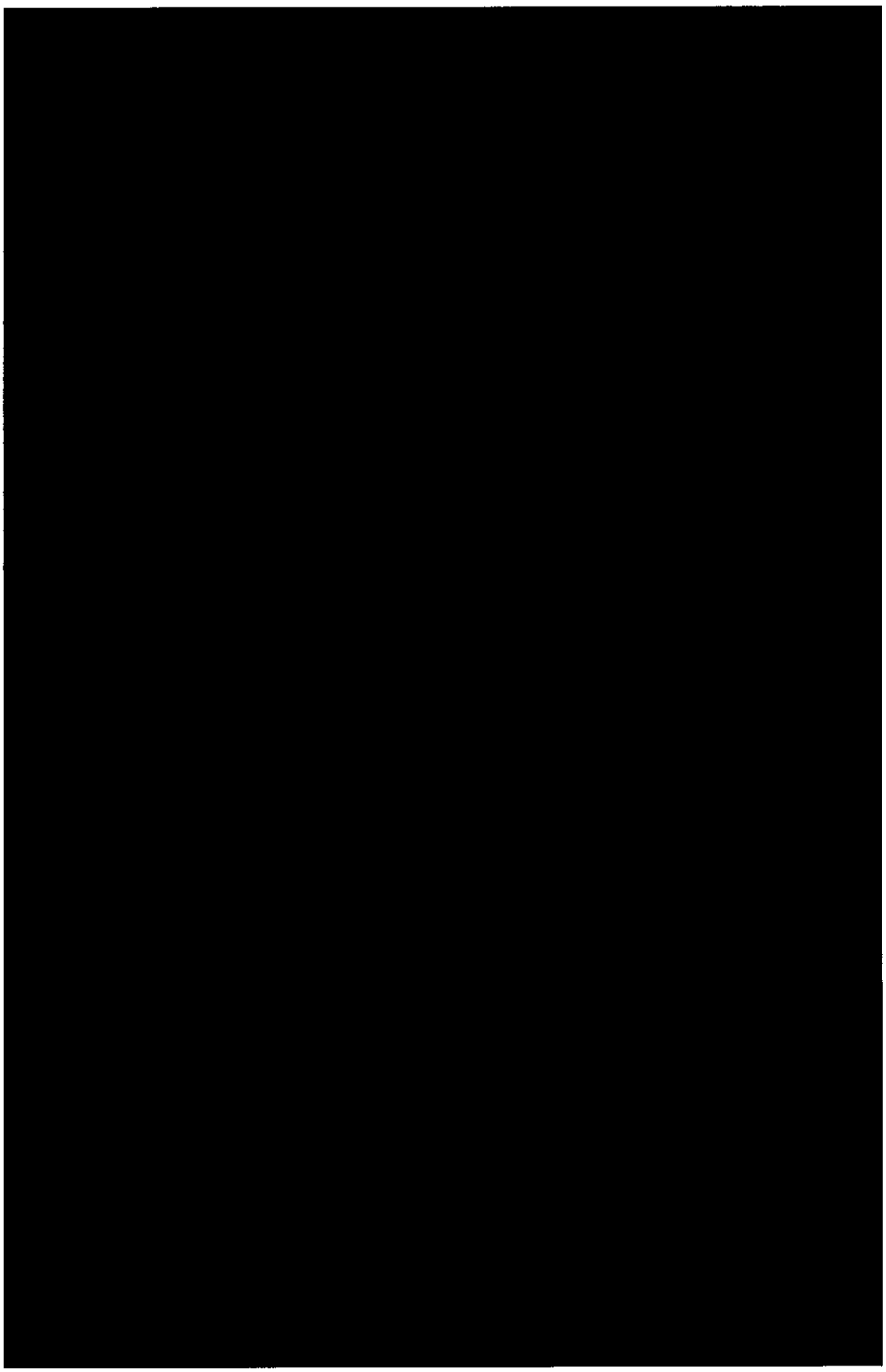
NOTES

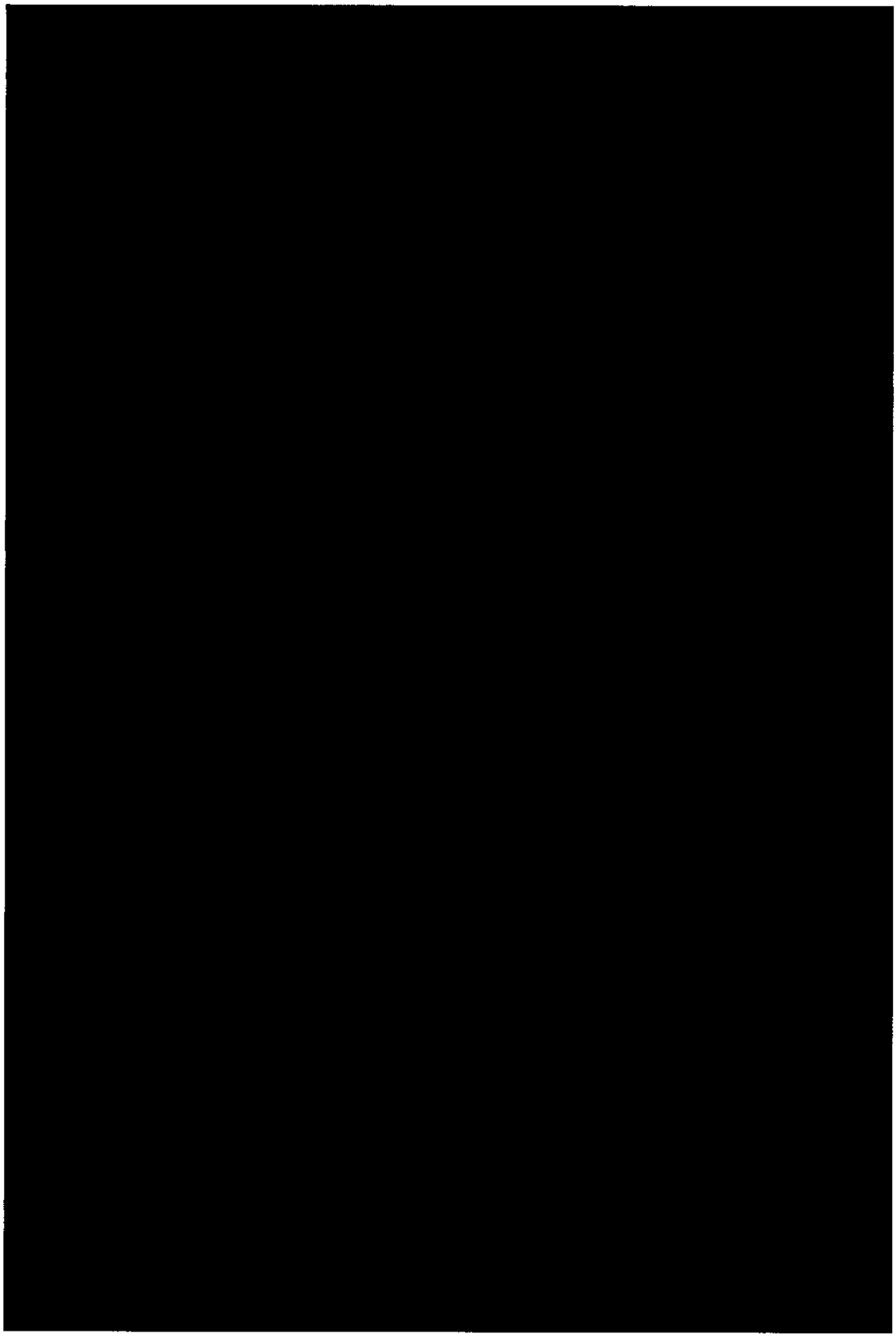
(1) Use only aluminium plate that conforms to [redacted]

(2) Use only plate with a Certificate of Conformity.

(3) Stamp batch number on edge of Repair Plate after manufacture.

(4) For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.





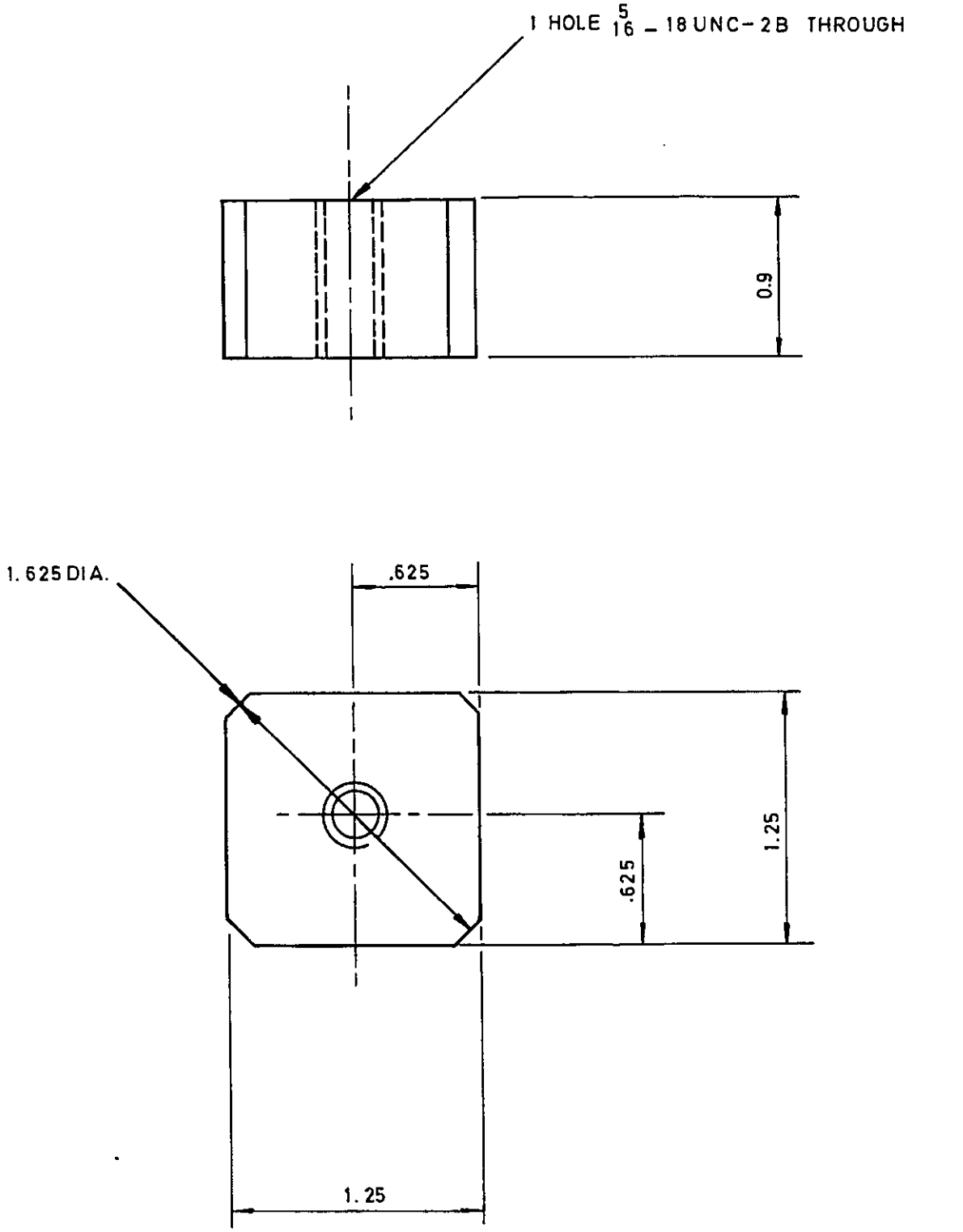


Fig 3 Bosses (D1, D2 and D3)

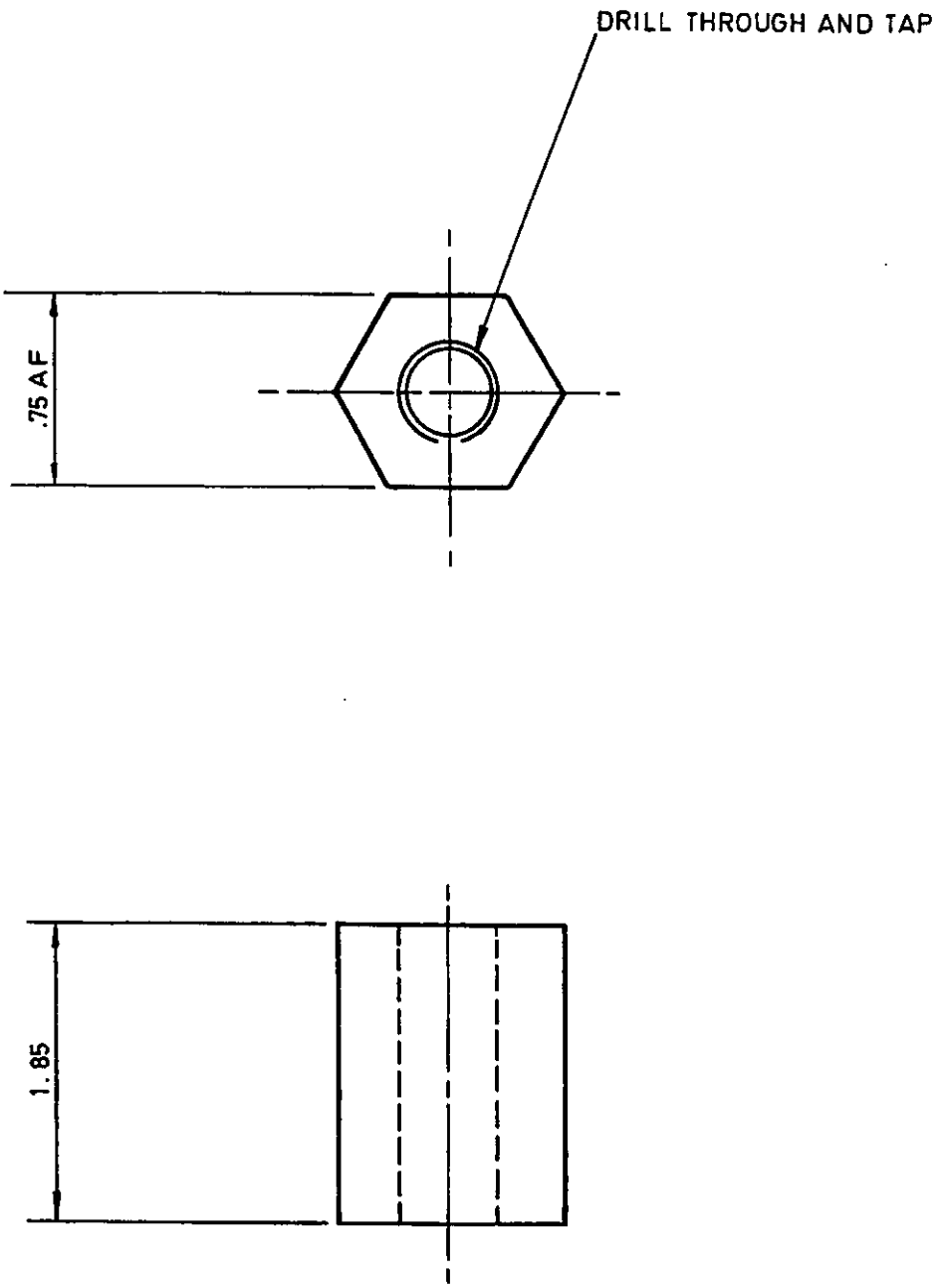


Fig 4 Bosses (S1 and S2)

TABLE 1 REPAIR TO BOSSES D1, D2, D3, S1, S2 AND LEFT HAND SPONSON PLATE

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture Repair Plate (Fig 2).		
2	Manufacture 5 off bosses (Figs 3 and 4).		
3	Position Repair Plate 12 inches from end of the existing sponson plate.		
4	Spot through Repair Plate, drill and tap 24 holes 3/8 UNC into sponson plate.		
5	Secure plate to sponson plate with slave screws.		
6	Spot through damaged bosses for location purposes onto the Repair Plate.		
7	Remove plate from the hull.		
8	Drill Repair Plate through the spotted holes to suit UNC c/sk socket headed screws.		
9	Secure bosses to Repair Plate after coating screws and bosses with red Hermetite. Torque load screws to 25 lbf ft.		
10	Weld all bosses to Repair Plate to Def Stan 08-39.		
11	Needle peen to DEF STAN 03-21 in positions indicated by MVEE Spec 826.		
12	Machine out sponson plate to accept replacement bosses.		
13	Inspect.		
14	Coat Repair Plate and screws with red Hermetite and secure to the hull. Torque load the screws to 25 lbf ft.		
15	Paint to DEFENCE STANDARD 03-32 (Part 3).		
16	Inspect.		

CHAPTER 10 ANNEX B APPENDIX 51

STRESS CORROSION – REPAIR TO BOSSES A1, A2 AND RIGHT HAND SPONSON PLATE ON ALL VARIANTS EXCEPT SALAMANDER (SCORPION) AND SCIMITAR

CONTENTS

BOSSES A1, A2 AND RIGHT HAND SPONSON PLATE

Application

1 This repair is to be applied to exfoliation around bosses A1, A2 and right hand Sponson plate on all variants except Salamander (Scorpion) and Scimitar where the criteria in Appendix 4 is exceeded.

Synopsis of method

2 Manufacture Repair Plate and replacement bosses. Position Repair Plate on the underside of the Sponson plate. Spot, drill and tap 24 off 3/8 UNC holes for attaching Repair Plate to the hull. Secure plate to the hull. Spot through the damaged bosses for location purposes on the Repair Plate. Remove plate from hull and drill the location holes to suit UNC countersunk screws. Fit and weld bosses to Repair Plate. Machine out bosses on the hull to allow plate to be fitted. Coat mating faces and screws with red Hermetite before fixing to the hull. Paint to DEFENCE STANDARD 03-32 (Part 3).

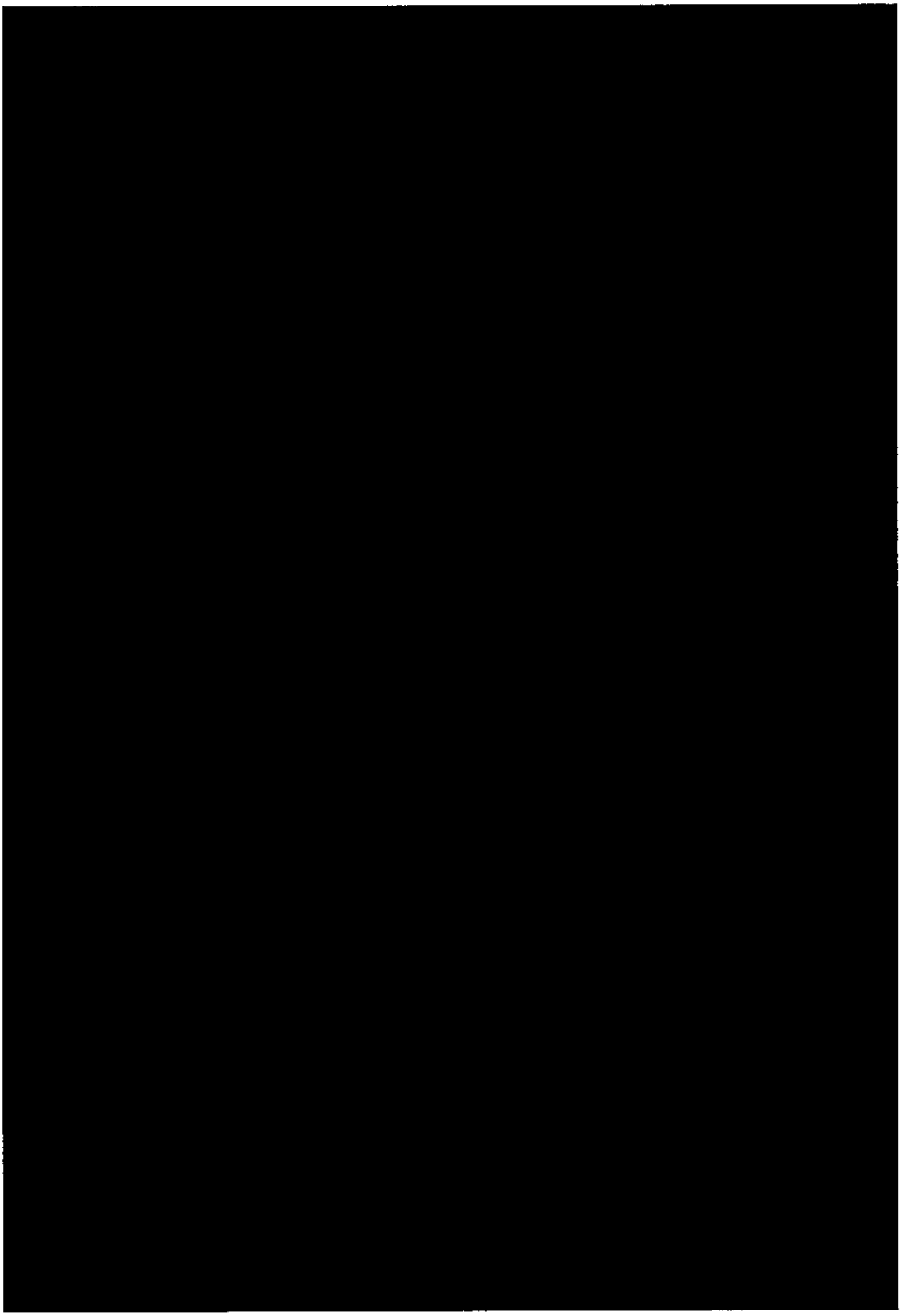
NOTES

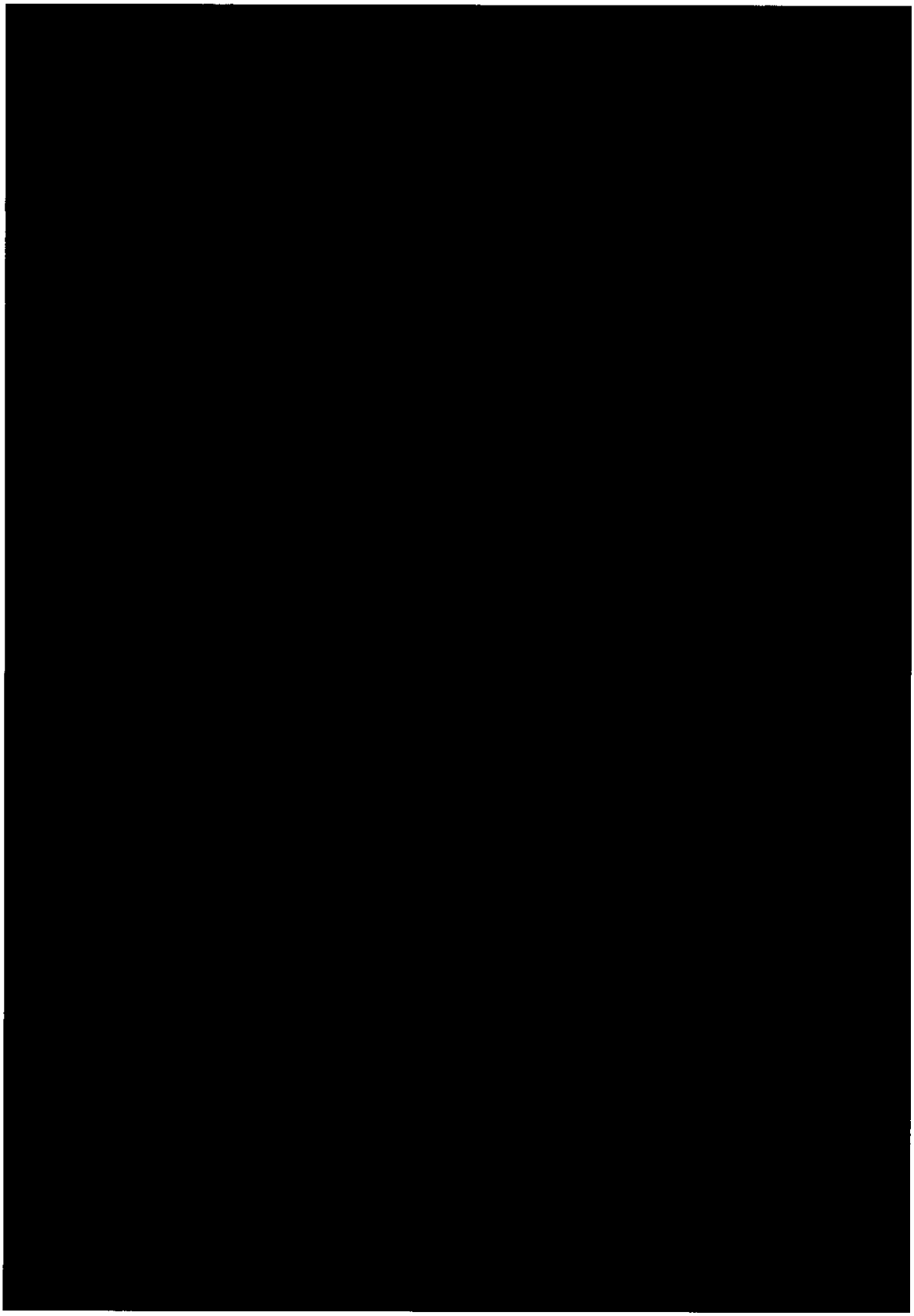
(1) Use only aluminium plate that conforms to [redacted]

(2) Use only plate with a Certificate of Conformity.

(3) Stamp batch number on edge of Repair Plate after manufacture.

(4) For the manufacture of the bosses a standard engineering aluminium alloy that conforms to [redacted] should be used, it is undesirable to use aluminium armour for the bosses as they may crack.





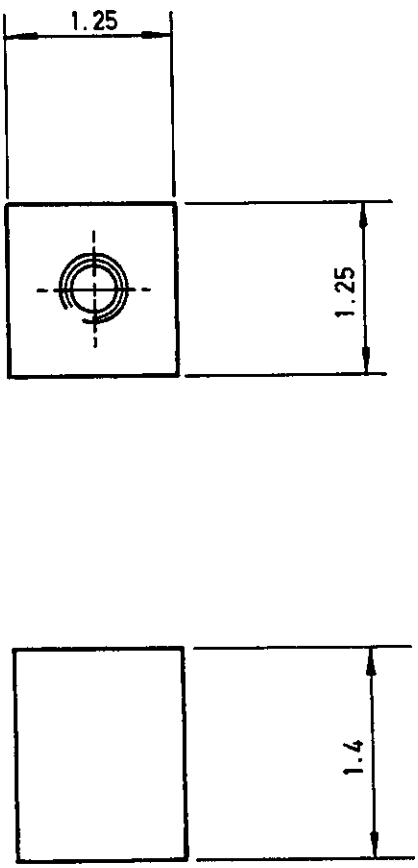


Fig 3 Bosses (A1 and A2)

TABLE 1 REPAIR TO BOSSES A1, A2 AND RIGHT HAND SPONSON PLATE

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture Repair Plate (Fig 2).		
2	Manufacture 2 off bosses. Drill and tap 1/2 UNF helicoil insert (Fig 3).		
3	Position Repair Plate 12 inches from end of the existing sponson plate.		
4	Spot through Repair Plate, drill and tap 24 holes 3/8 UNC into sponson plate.		
5	Secure plate to sponson plate with slave screws.		
6	Spot through damaged bosses for location purposes onto the Repair Plate.		
7	Remove plate from the hull.		
8	Drill Repair Plate through the spotted holes to suit UNC c/sk socket headed screws.		
9	Secure bosses to Repair Plate after coating screws and bosses with red Hermetite. Torque load screws to 25 lbf ft.		
10	Weld all bosses to Repair Plate to Def Stan 08-39.		
11	Needle peen to DEF STAN 03-21 in positions indicated by MVEE Spec 826.		
12	Machine out sponson plate to accept replacement bosses.		
13	Inspect.		
14	Coat Repair Plate and screws with red Hermetite and secure to the hull.		
15	Torque load the screws to 25 lbf ft.		
16	Paint to DEFENCE STANDARD 03-32 (Part 3).		
17	Inspect.		

CHAPTER 10 ANNEX B APPENDIX 52

STRESS CORROSION – REPAIR TO HULL FLOOR BY REMOVAL OF A SECTION (SPARTAN ONLY)

CONTENTS

HULL FLOOR BY REMOVAL OF A SECTION (SPARTAN ONLY)

Application

1 This repair is to be applied to exfoliation corrosion surrounding 3, 4 and 5 torsion bar covers on the floor of the Spartan where the criteria in Appendix 4 is exceeded.

Synopsis of method

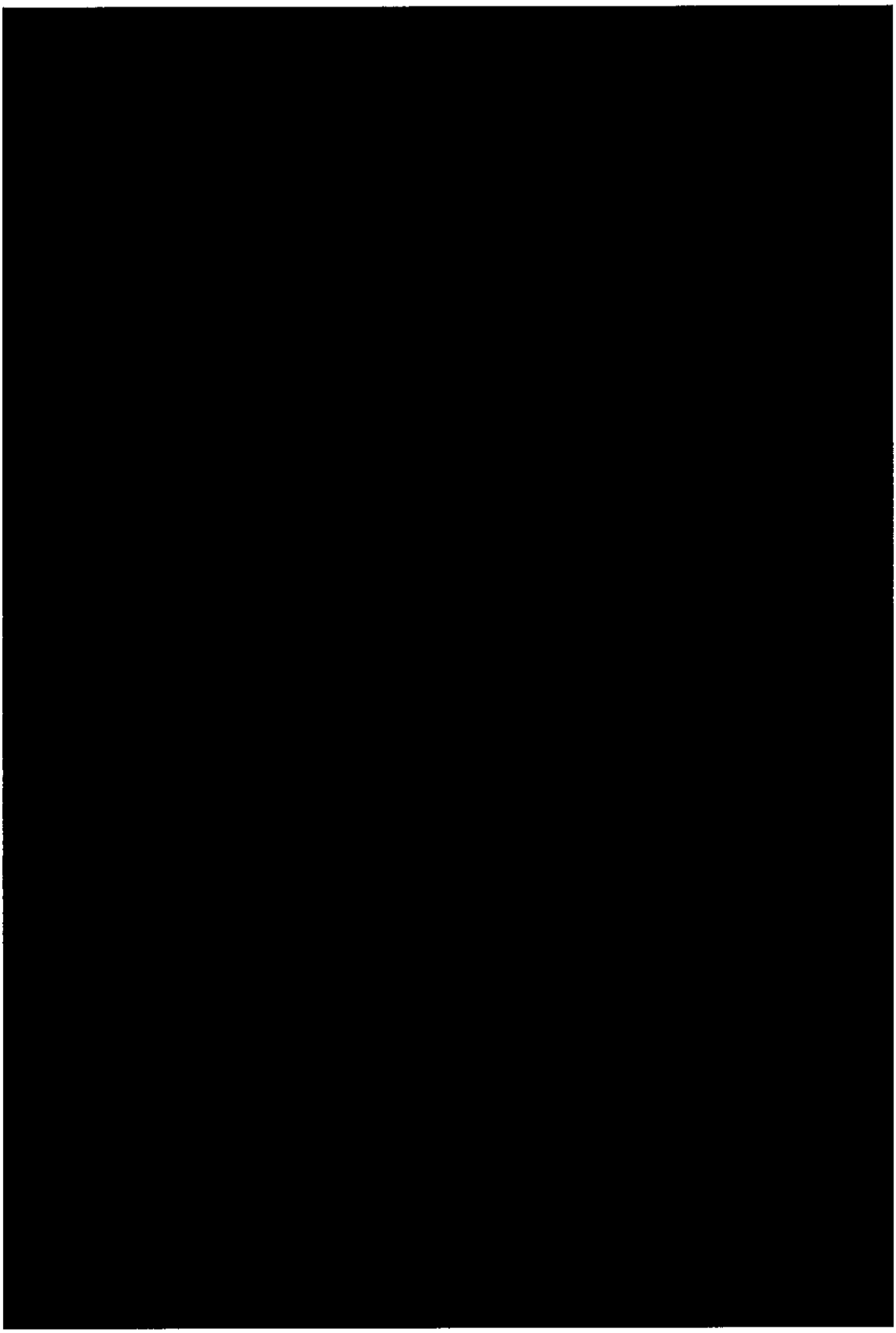
2 Remove the blast plate (if fitted) from the underside of the hull. Remove torsion bar covers. Machine out damaged floor section. Manufacture and weld the replacement plate to the hull floor. Refit torsion bar covers. Manufacture the weld cover plates and fit to the underside of the floor. Paint the repair area to DEF STAN 03-32 (Part 3).

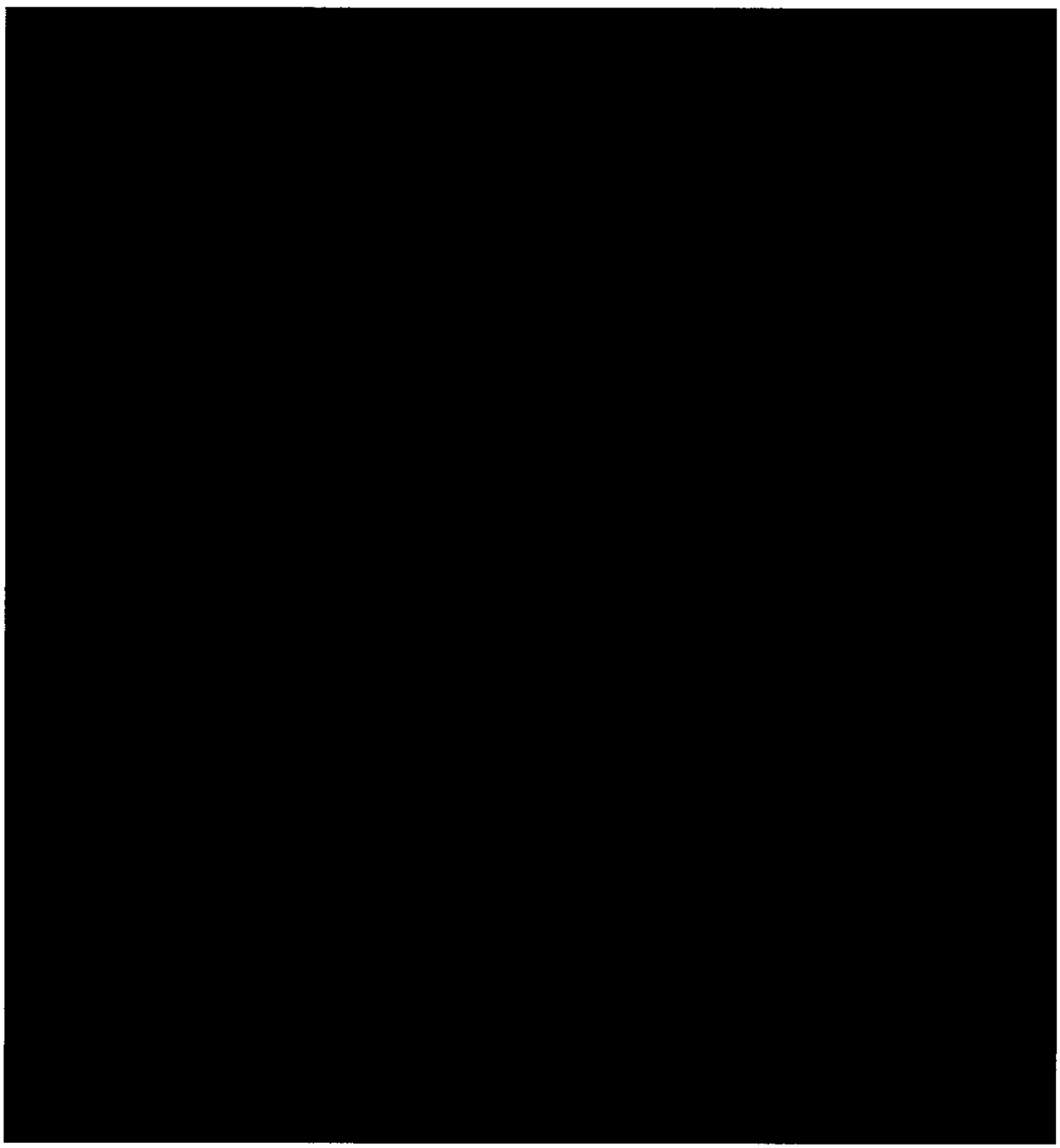
NOTES

(1) Use only aluminium plate that conforms to [redacted]

(2) Use only plate with a Certificate of Conformity.

(3) Stamp batch number on edge of Repair Plate after manufacture.





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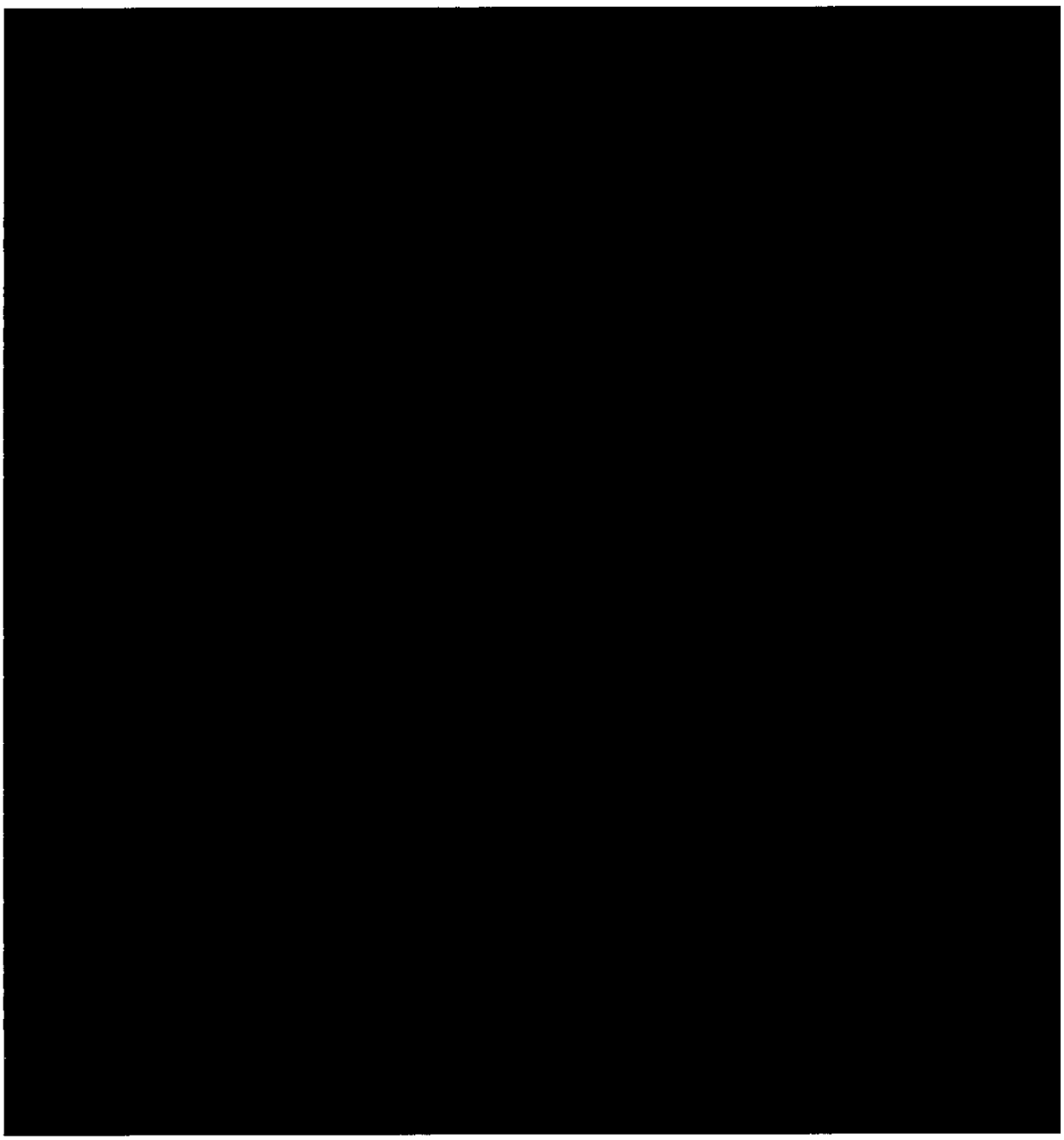

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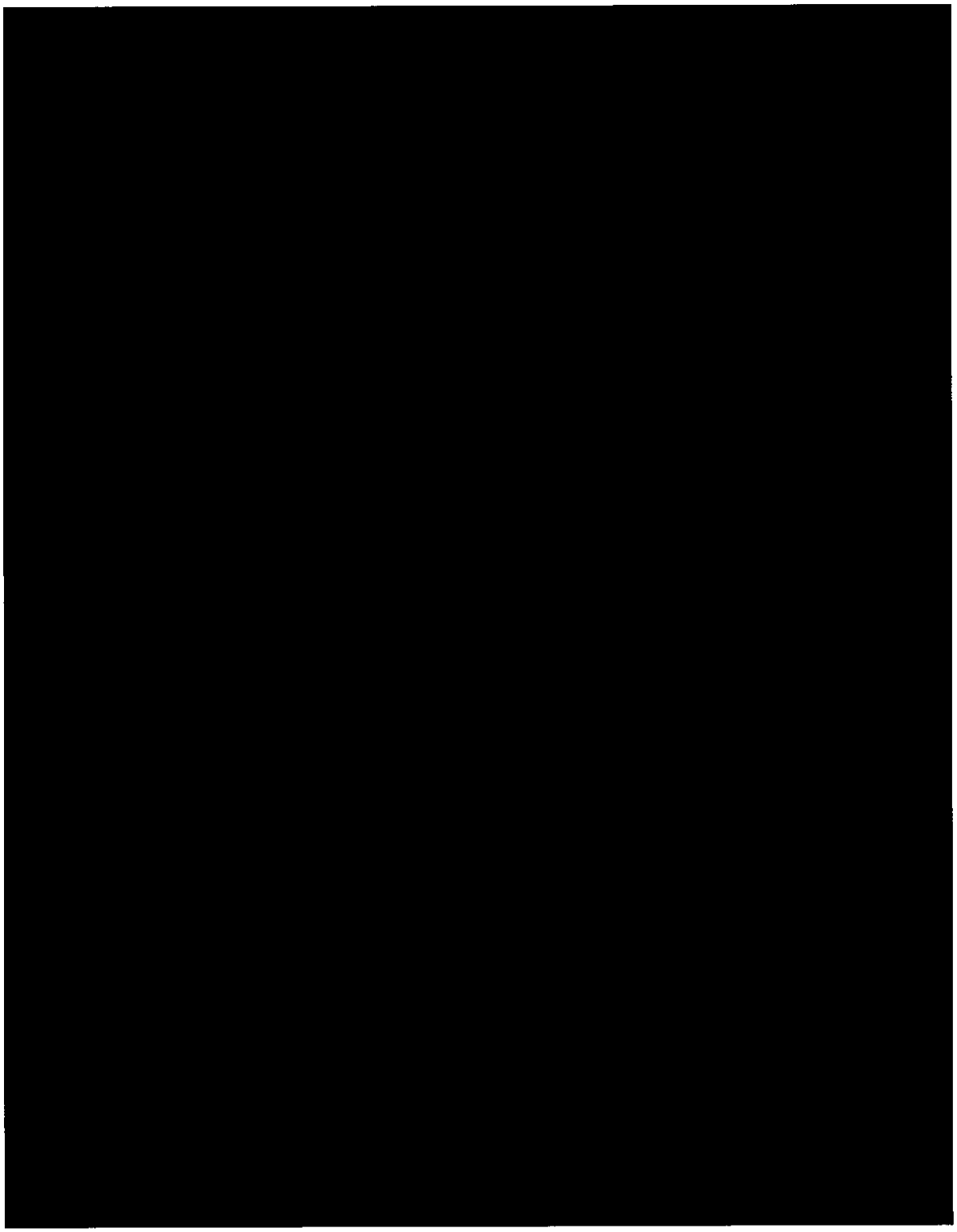


TABLE 1 REPAIR TO HULL FLOOR BY REMOVAL OF A SECTION (SPARTAN ONLY)

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Remove blast plate from underside of the hull.		
2	Remove torsion bar covers.		
3	Machine out damaged floor section as required (Figs 4 and 5).		
4	Manufacture replacement floor plate (Fig 2).		
5	Weld replacement floor plate in the hull floor to Def Stan 08-39 (Fig 5).		
6	Replace and weld torsion bar covers. Peen effected area, referring to DEF STAN 03-21.		
7	Manufacture the long and short weld cover plates (Fig 3).		
8	Position the weld cover plates on the underside of the hull (Fig 5). Using them as templates, mark out the hull/replacement plate for 3/8 UNC holes.		
9	Needle peen the bottom edges of the lower side plates to the requirements of DEF STAN 03-21 where indicated by MVEE Spec 826.		
10	Red Hermetite all plate mating faces and 3/8 UNC c/sk screws, before fitting them to the hull floor. Torque load to 25 lbf ft.		
11	Red Hermetite, position and fit new mountings S12, S13 and S14 on replaced hull floor (Fig 1). NOTE The mountings are to be fitted using 3/8 UNC c/sk screws with the heads on the underside of the hull floor. Torque load to 25 lbf ft.		
12	Paint to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 53

STRESS CORROSION – CRACK IN THE FRONT TOP PLATE ON THE SALAMANDER (SCORPION) HULL

CONTENTS

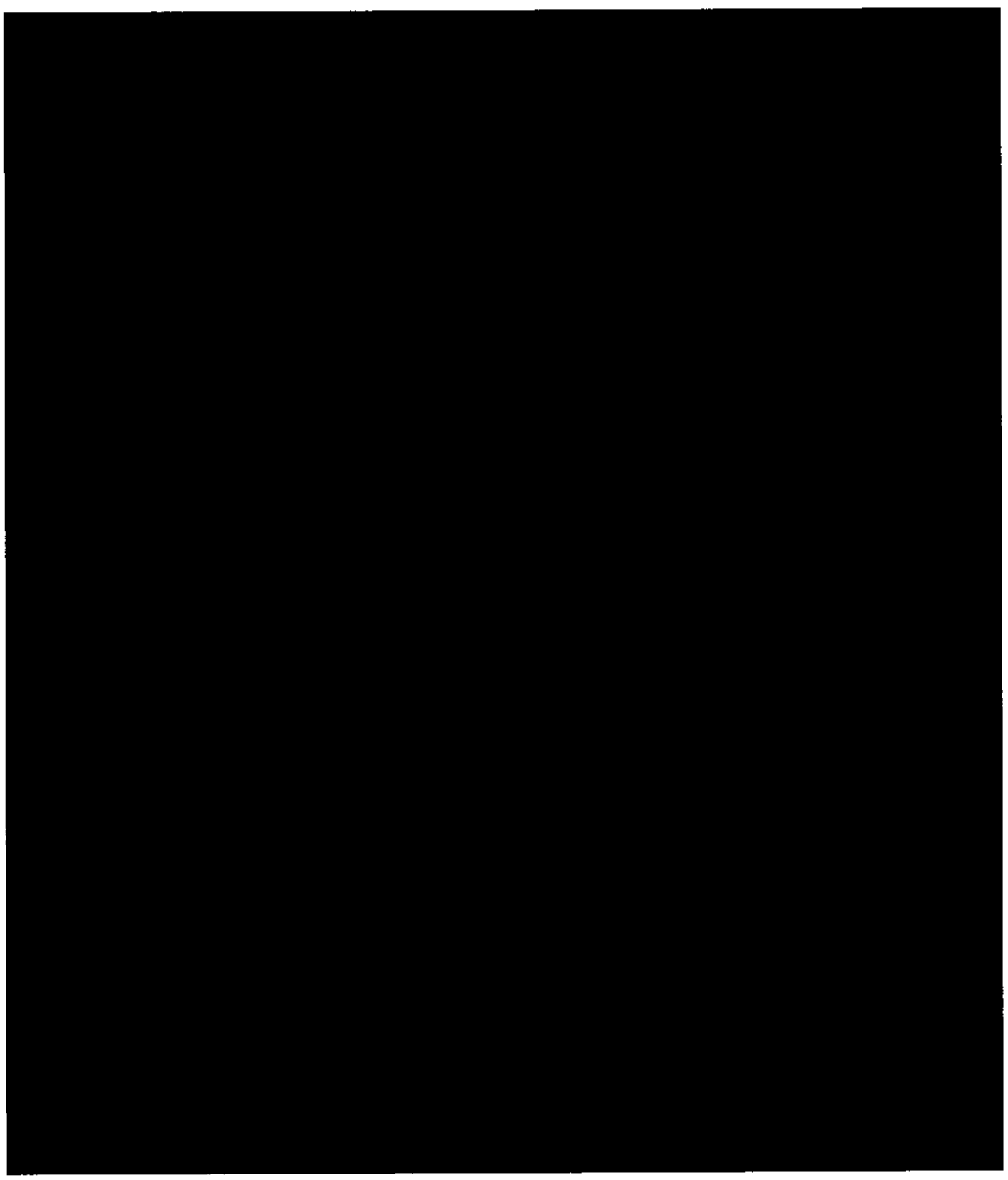
CRACK IN THE FRONT TOP PLATE BETWEEN THE TOWING EYES ON THE SALAMANDER (SCORPION) HULL

Application

1 This repair to be applied to a crack running between the towing eyes on the front top plate of the hull.

Synopsis of method

2 Manufacture a 15 mm thick plate that will cover the proposed repair area, the edge of which must overlap the surface weld between the top and bottom hull plates. Remove a section of the wading screen support plate to allow access for repair. Machine the top and bottom plates to accept the patch plate. Make good and dress the exposed surface weld between top and bottom plates. Shot or needle peen the exposed surface. Weld the 15 mm thick patch plate to the hull.



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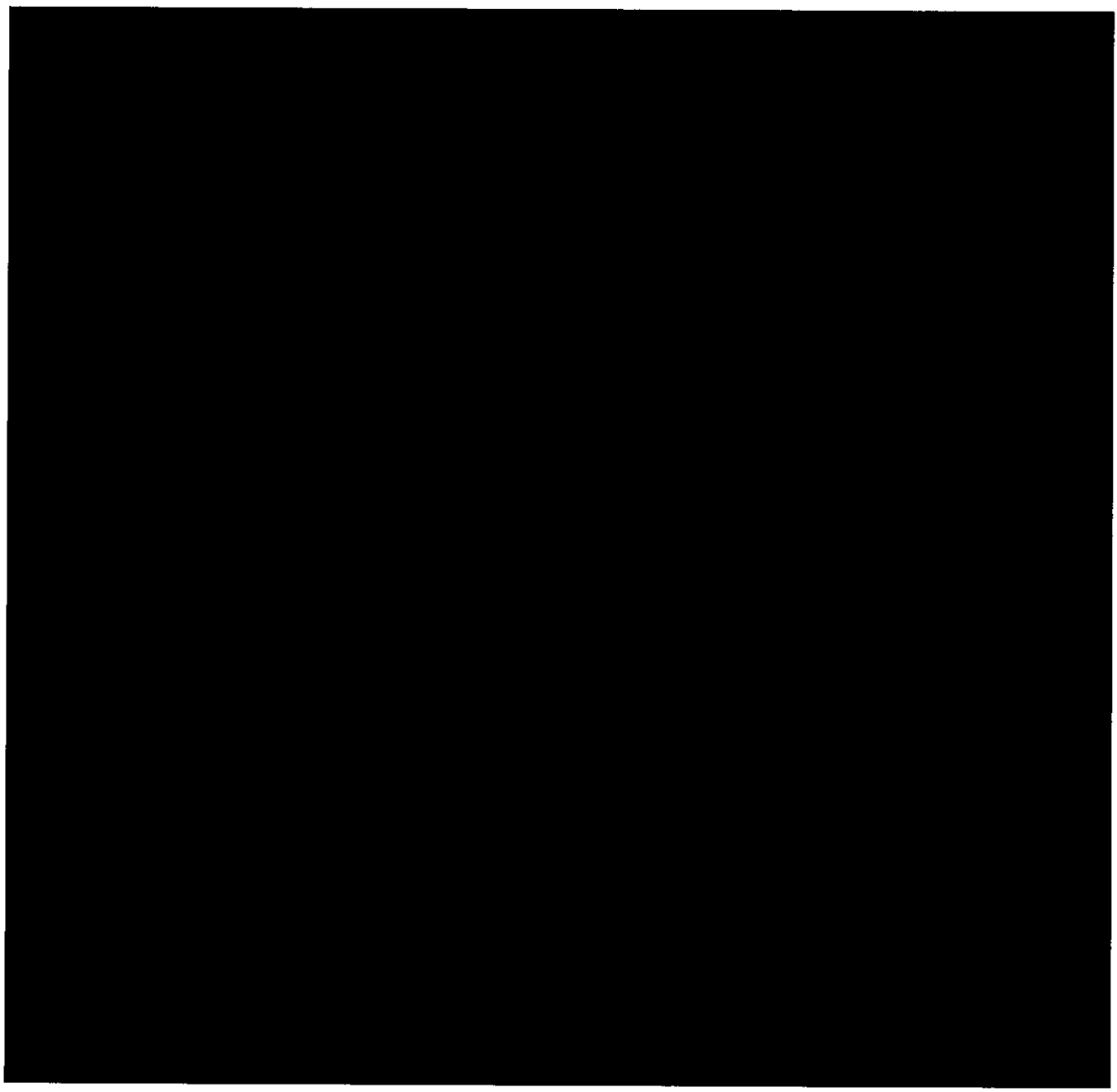

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CHAPTER 10 ANNEX B APPENDIX 54

STRESS CORROSION – CRACK IN THE FRONT TOP PLATE ON THE SALAMANDER (SCORPION) OR SCIMITAR HULL

CONTENTS

Para

Table Page

Fig

CRACK IN THE FRONT TOP PLATE ON THE SALAMANDER (SCORPION) OR SCIMITAR HULL

Application

1 This repair is to be applied to a 180 mm crack in the front top plate on the Salamander (Scorpion) or Scimitar hull.

Synopsis of method

2 Manufacture the Repair Plate, then use the plate as a jig to mark out the threaded holes on the inside of the hull plate. Coat with Sealant, dissimilar metals JC5A H1ATS/8030-99-168-8255 both mating faces of hull and plate, then bolt together. Tack weld bolt heads after torquing down.

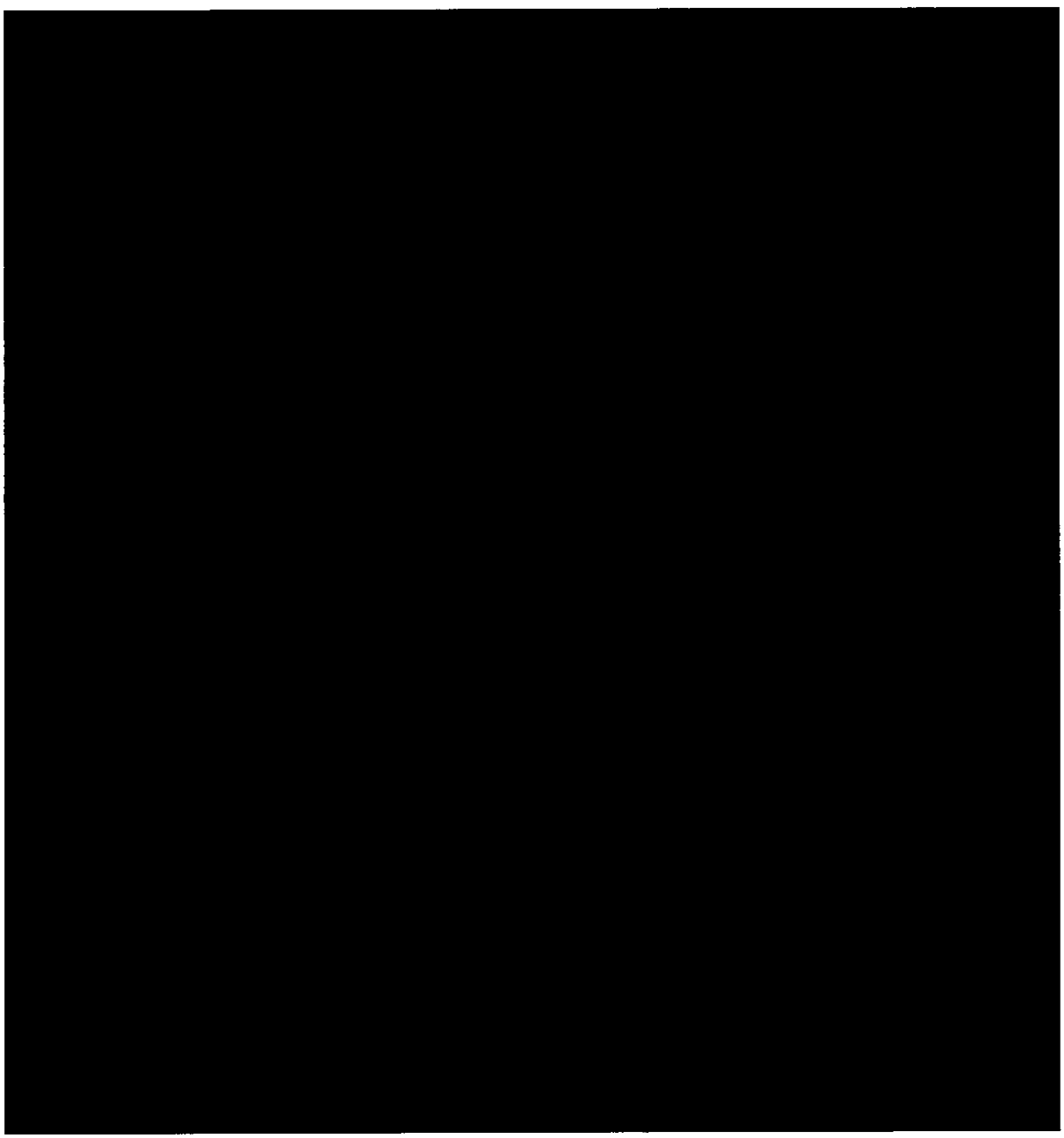

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TABLE 1 REPAIR TO CRACK IN THE FRONT TOP PLATE ON THE SALAMANDER (SCORPION) OR SCIMITAR HULL

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Manufacture Repair Plate (Fig 2). NOTE Plate to be manufactured from steel to RARDE SPEC 816.		
2	Referring to Fig 3, use the Repair Plate as a jig, drill and tap 3 off 3/8 UNC holes in the position shown. NOTE The threaded hole in the front plate, traversed by the crack, to have the helicoil replaced if necessary (1/2 – 13 UNC-2B NO 3585-8-CN-3).		
3	Coat mating face of Repair Plate with JC5A before assembly.		
4	3/8 UNC bolt threads to be coated with JC5A.		
5	Clamping bolts to be torqued to 30 lbf ft.		
6	Bolt heads to be tack welded as shown in Fig 3.		
7	Inspect.		
8	Paint to DEFENCE STANDARD 03-32 (Part 3).		

CHAPTER 10 ANNEX B APPENDIX 55

STRESS CORROSION – CRACK ON EXTERNAL FACE OF THE REAR LOWER PLATE ON THE SCIMITAR HULL

CONTENTS

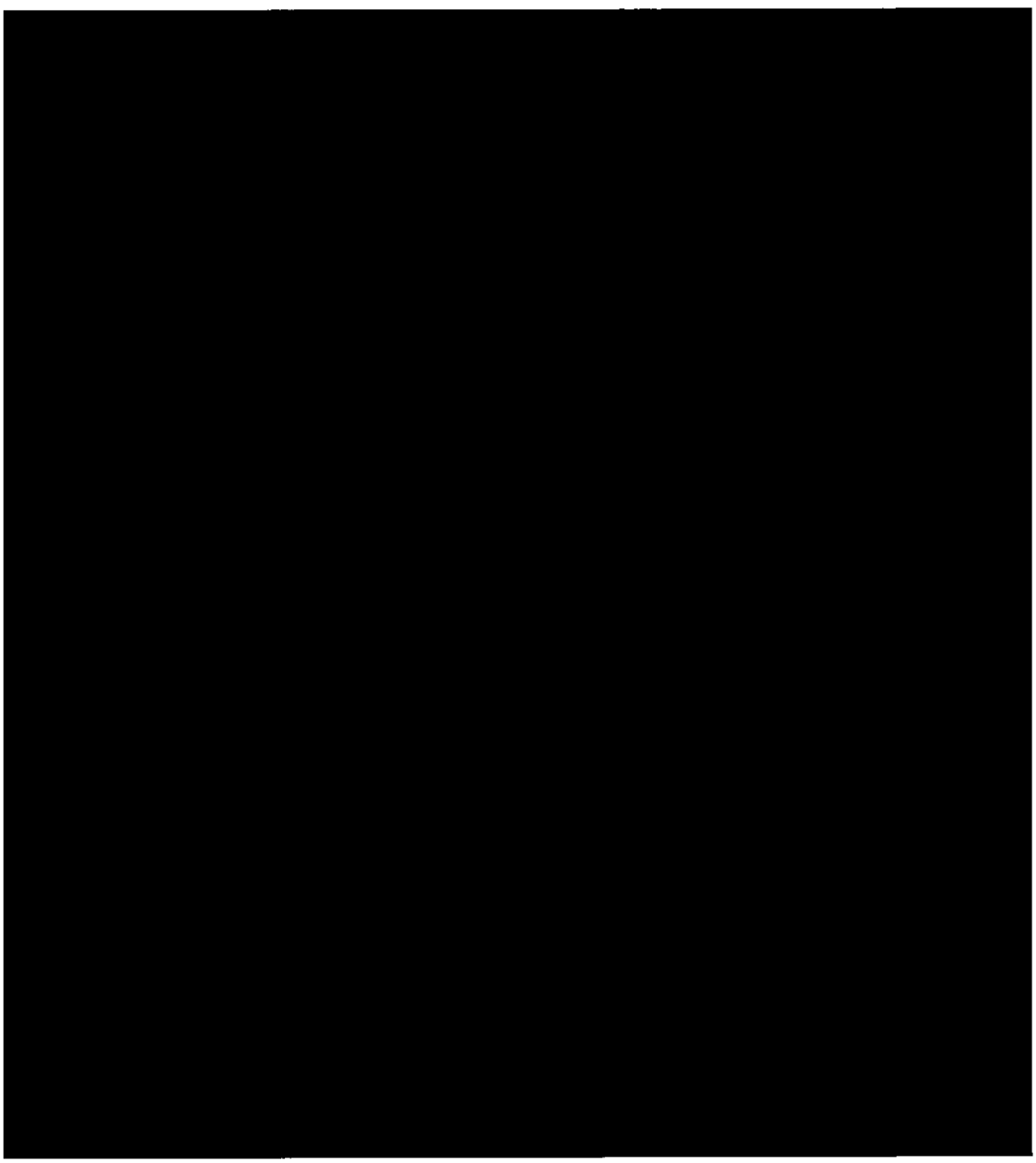
CRACK ON EXTERNAL FACE OF THE REAR LOWER PLATE ON THE SCIMITAR HULL

Application

1 This repair method is to be applied to cracks on the external face of the lower hull plate.

Synopsis of method

2 Using rotor cutters, hand tools or aluminium grinding discs, remove the crack down to the good metal. Wire brush plate either side of the weld preparation. Weld the weld surface, then dress the weld flush with the plate. Shot or needle peen the exposed surface. Manufacture Repair Plate. Use the Repair Plate as a jig for marking out 3/8 UNC holes, drill and tap 3/8 UNC threads in hull. Apply red Hermetite to mating surfaces before fitting plate.



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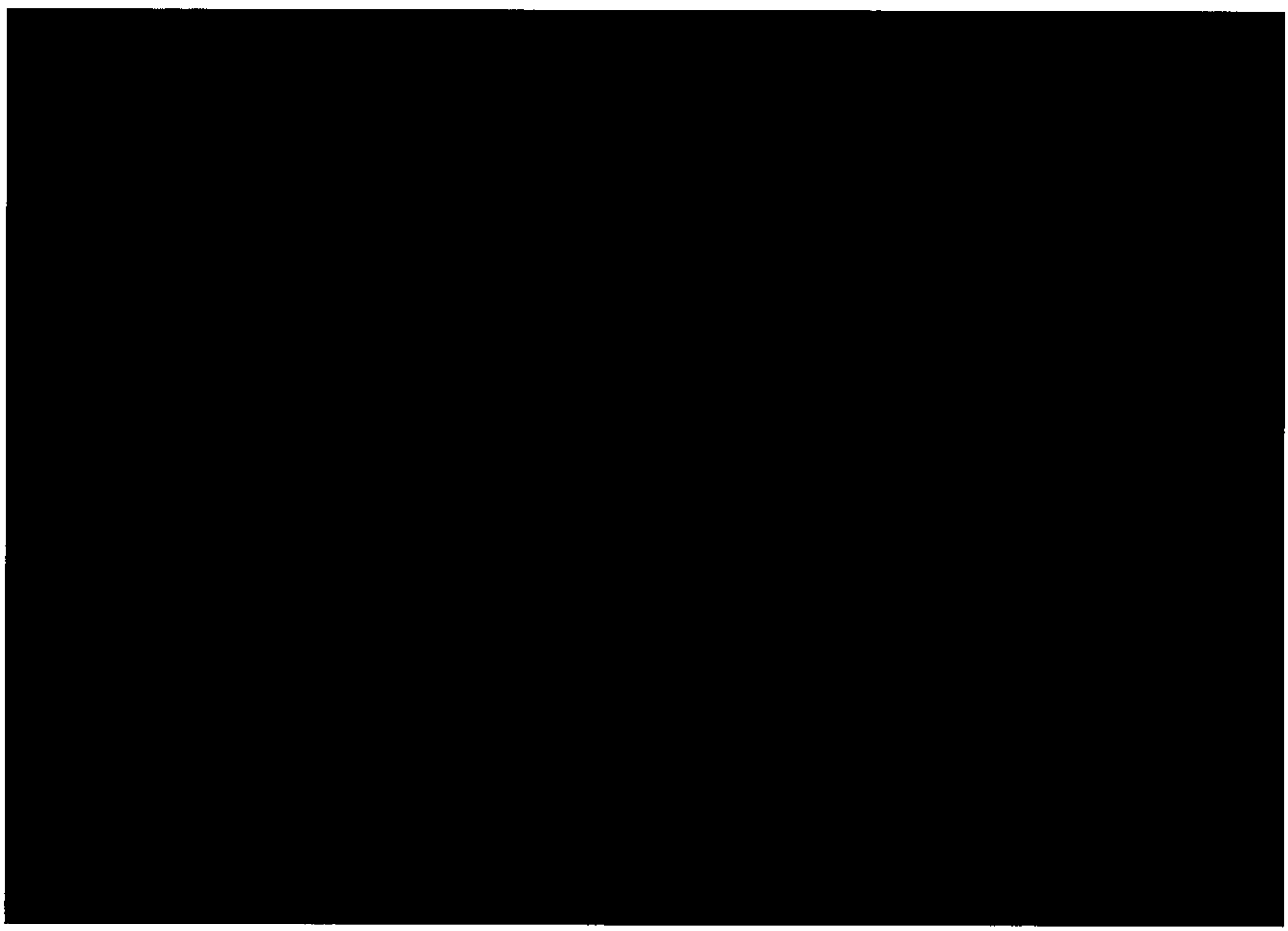

TABLE 1 REPAIR TO CRACK ON EXTERNAL FACE OF THE REAR LOWER PLATE ON THE SCIMITAR HULL

Op No (1)	Operation (2)	Tools (3)	Comments (4)
1	Produce a 90 degree 'V' weld preparation along the paths of the cracks using rotary cutters, hand tools or alumina abrasive discs. The weld preparation must extend at least 1/4 in beyond the visible ends and be greater that the depth of the cracks, so that only sound metal remains.		
2	Wire brush and clean plate surface from 2 in either side of weld preparation.		
3	Fill the weld preparation using the MIG process and NG61 wire. NOTE A maximum inter run temperature of 50°C must be observed.		
4	Dress surface of weld flush with plate surface.		
5	Shot or needle peen (with reference to DEF STAN 03-21) exposed surface of plate within 4 in of the weld.		
6	Manufacture the Repair Plate (Fig 2). NOTE Material to [redacted]		
7	Position the Repair Plate to cover the cracked area. Using the plate as a jig, drill and tap 9 off holes 3/8 UNC through the rear lower plate.		
8	Apply a coating of red Hermetite to the mating face of the Repair Plate.		
9	Apply a coating of JC5A to the heads and threads of the fixing 'S' range hexagonal headed screws.		
10	Fit Repair Plate to rear lower plate using a torque setting of 25 lbf ft.		

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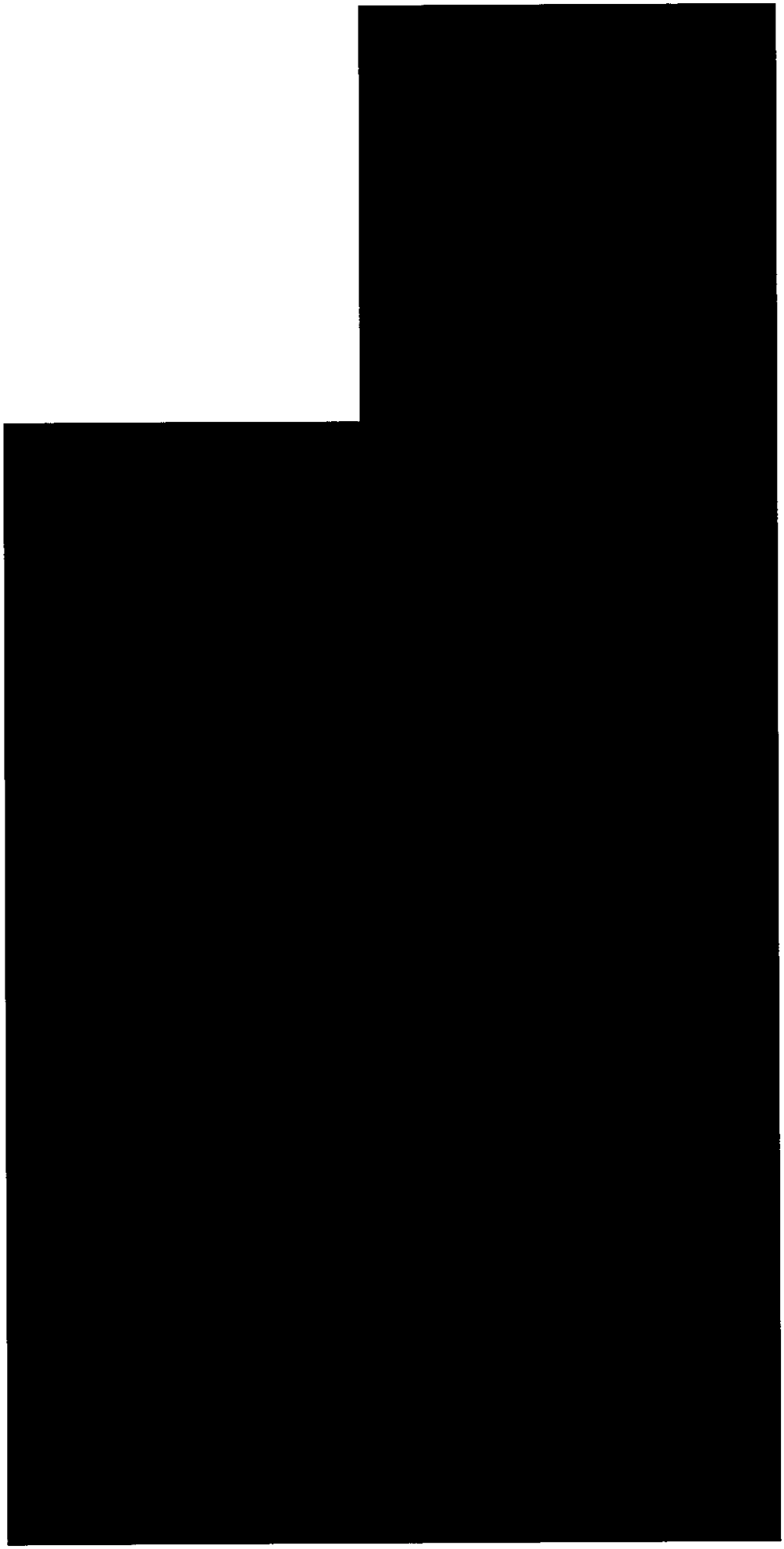

CHAPTER 10 ANNEX B APPENDIX 57

EXTENSIVE CORROSION - FINAL DRIVE APERTURES CVR(T)

CONTENTS

FINAL DRIVE APERTURES

Application

1 This general repair scheme is to be used when the faces of the final drive apertures are extensively corroded and considered to be beyond repair. The corrosion is removed by machining out a section of the front lower side plate and replacing with a rebated, welded insert plate.

Drawing reference

2 The drawings associated with this repair are:

2.1 Scimitar Repair Front Lower Side LH W/A, FV2281941.

2.2 Scimitar Repair Front Lower Side RH W/A, FV2281942.

2.3 Report No. CVR(T) RPT 19985.

TABLE 1 MATERIALS

Serial (1)	NSN (2)	Manufacturer's No. (3)	Designation (4)
1	-	-	[redacted]
2	-	-	[redacted]
3	-	35854CN4	Helicoil insert 1/4 UNC x 1-1/2 in. lg
4	-	358585	Wire thread insert 1/2 UNC x 1 in. lg
5	-	80007539/1	Helicoil insert 5/8 UNC x 1 in. lg
6	-	1185124	Wire thread insert 3/4 UNC x 1-1/8 in. lg
7	-	358575	Wire thread insert 7/16 UNC x 7/8 in. lg
8	8030-99-220-2495	-	Sealant dissimilar metals (JC5A)

Synopsis of method

3 Remove the full height front section of lower side plate by machining.

4 Weld replacement insert plate in position.

5 Weld torsion bar cover end plate in position.

6 Weld front bulkhead lower support in position.

7 Machine welded insert plate to restore original features.

8 Apply SCC protection.

9 Repaint affected area.

NOTES

(1) Hull to be in a completely stripped down condition.

(2) Any extra features incorporated for the installation of Mine Blast Protection must be restored as part of this repair scheme.

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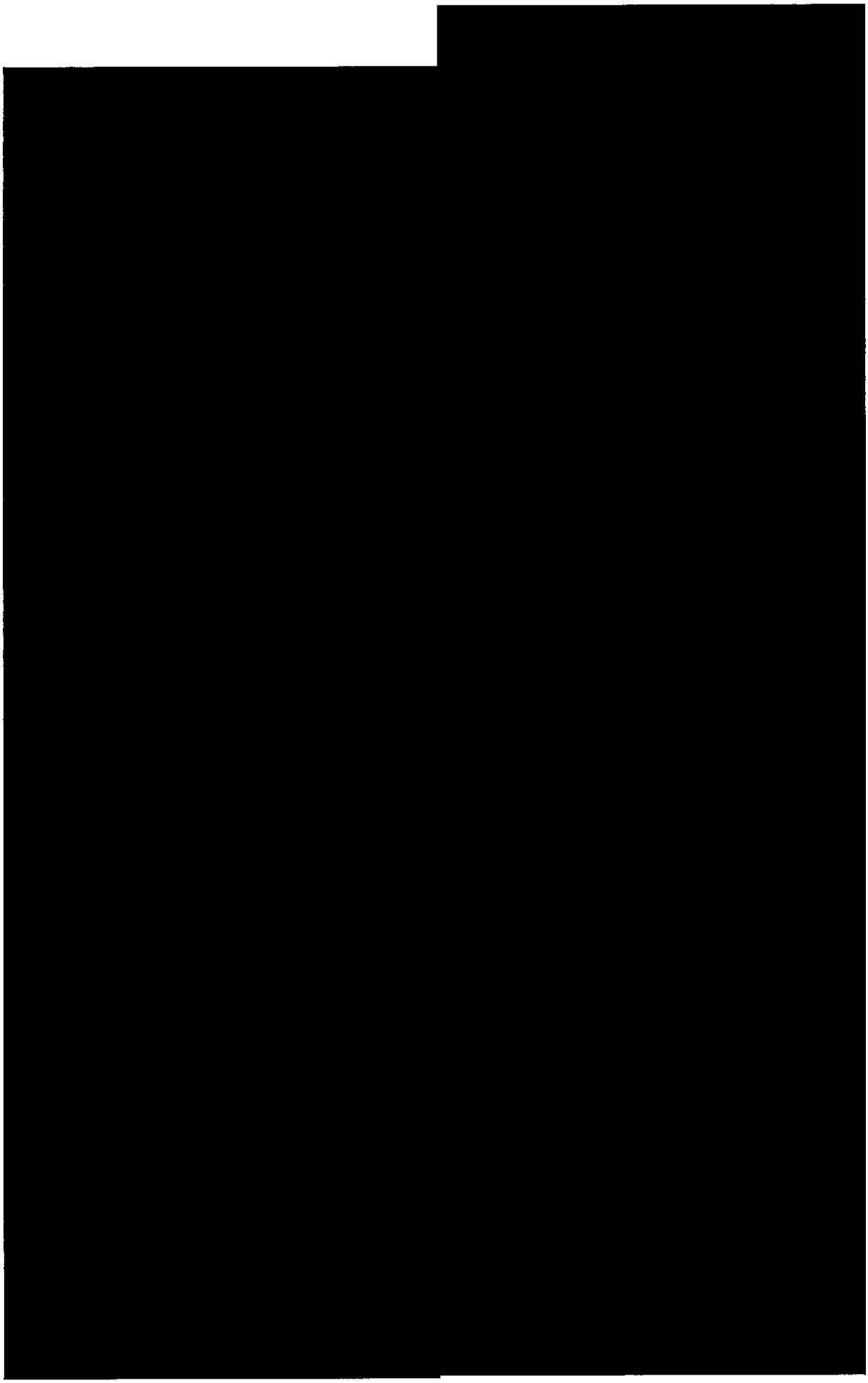

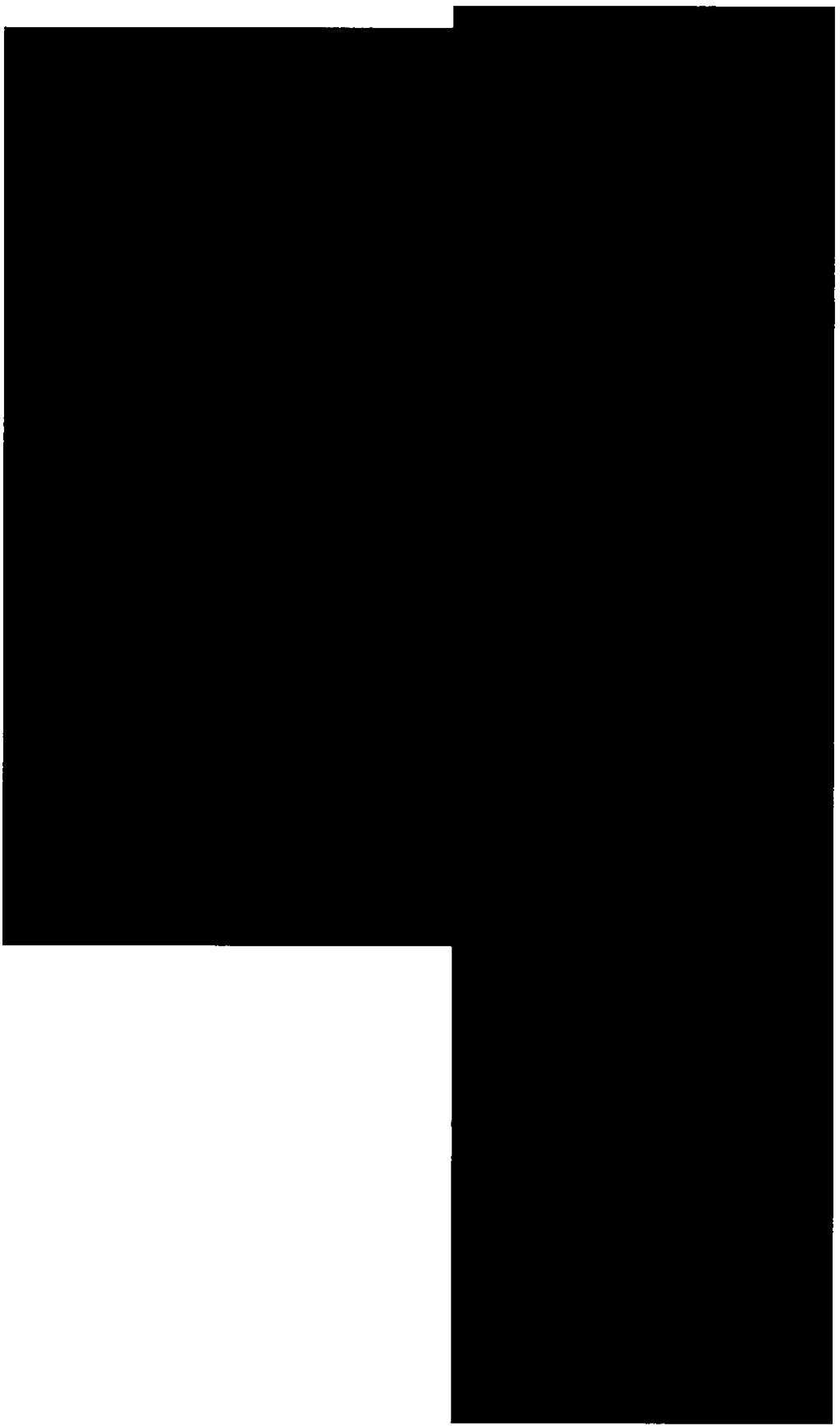

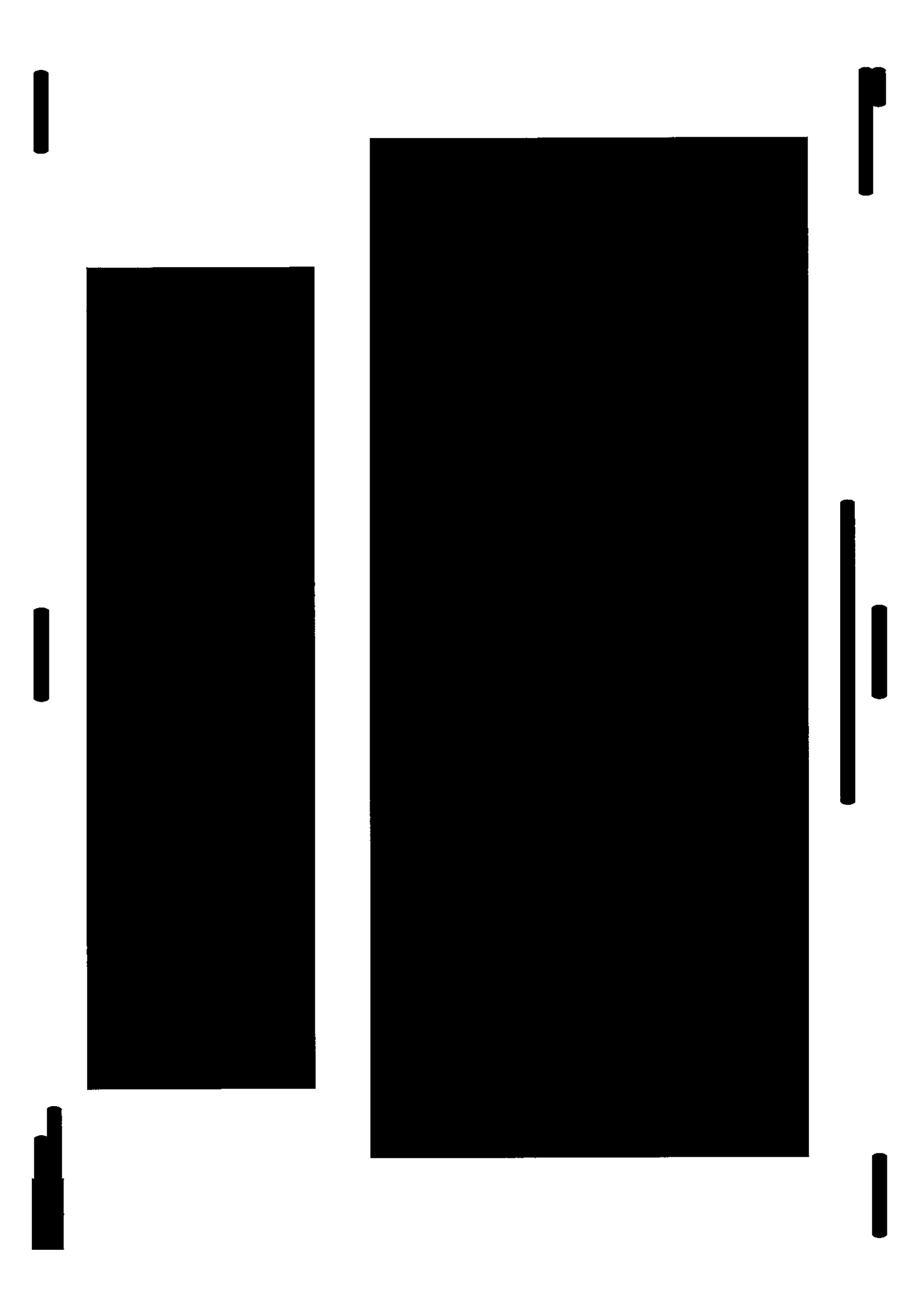

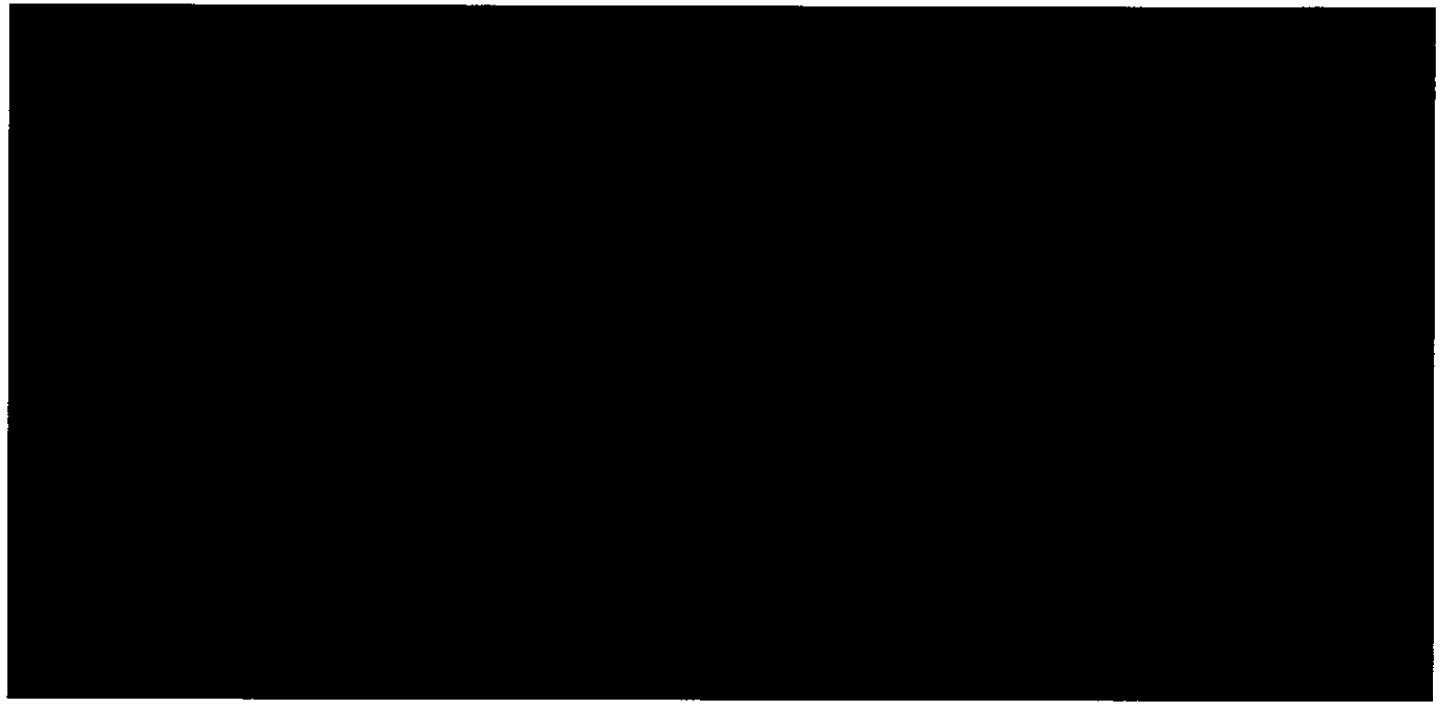

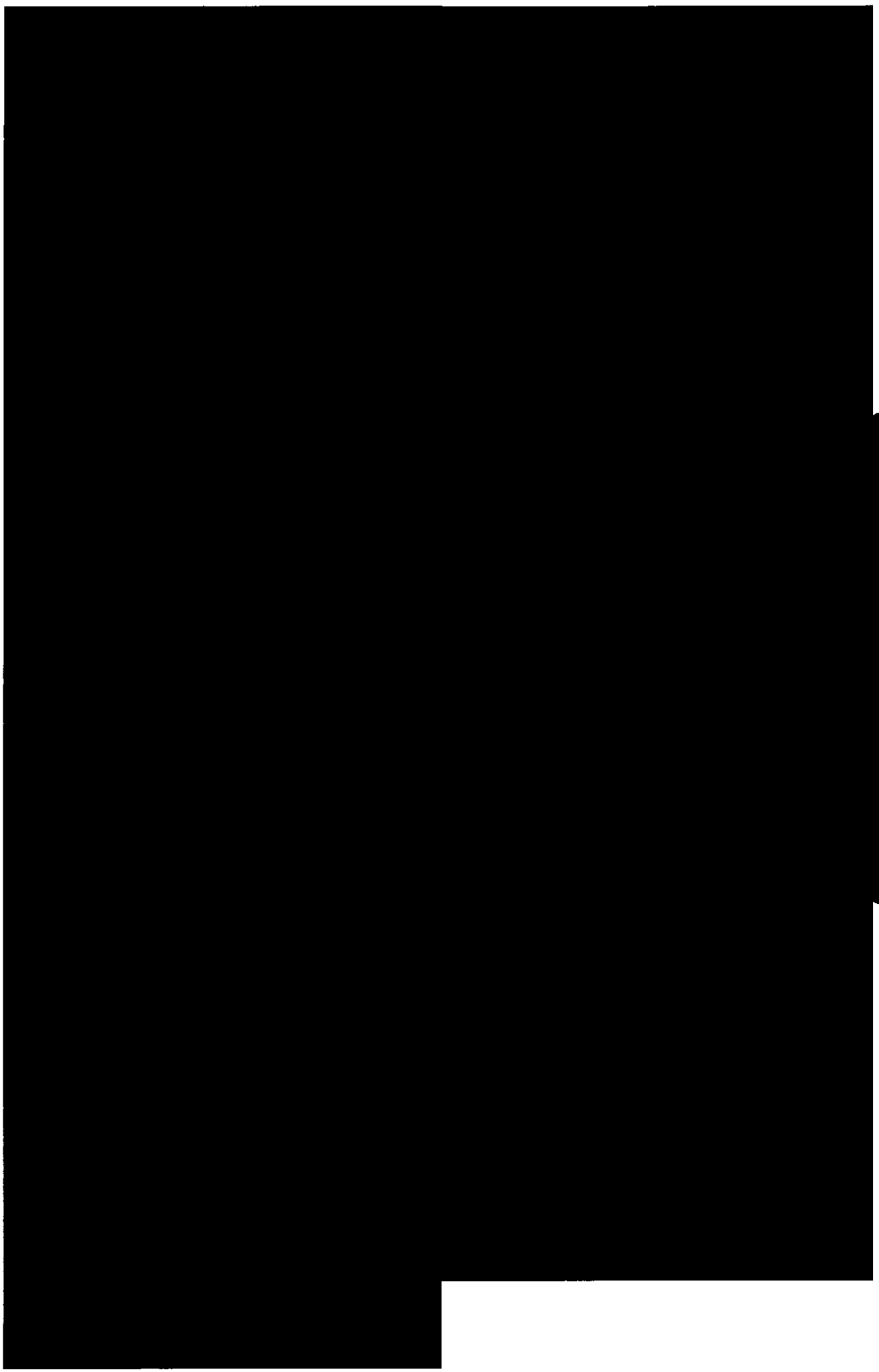

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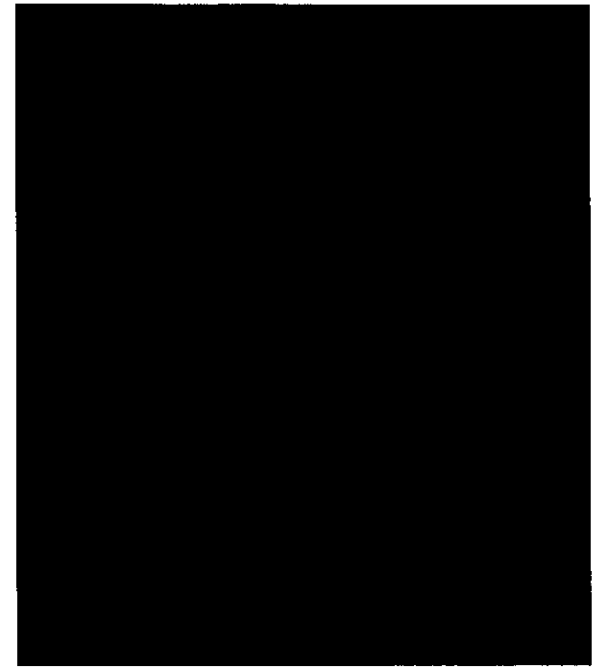

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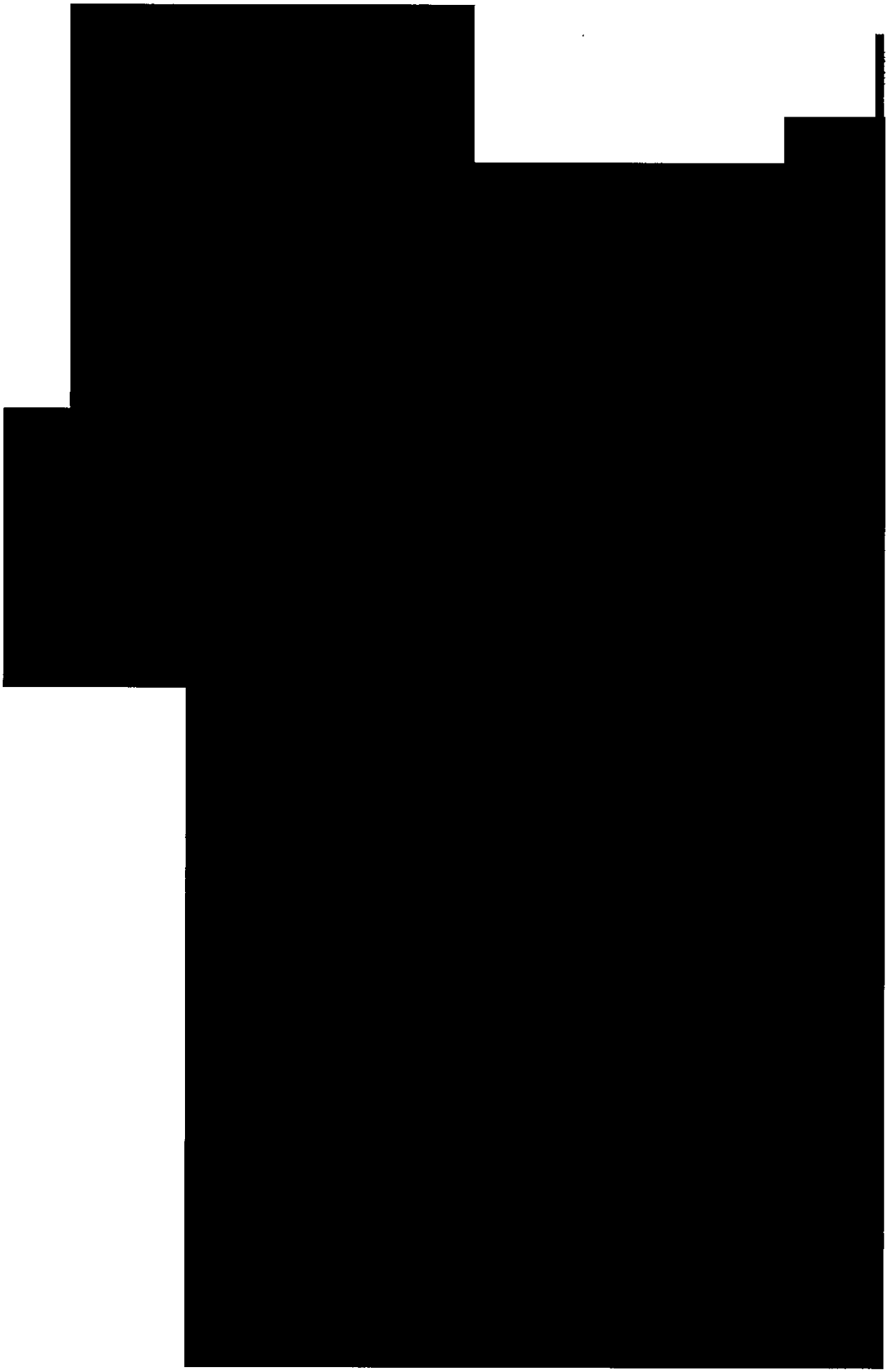

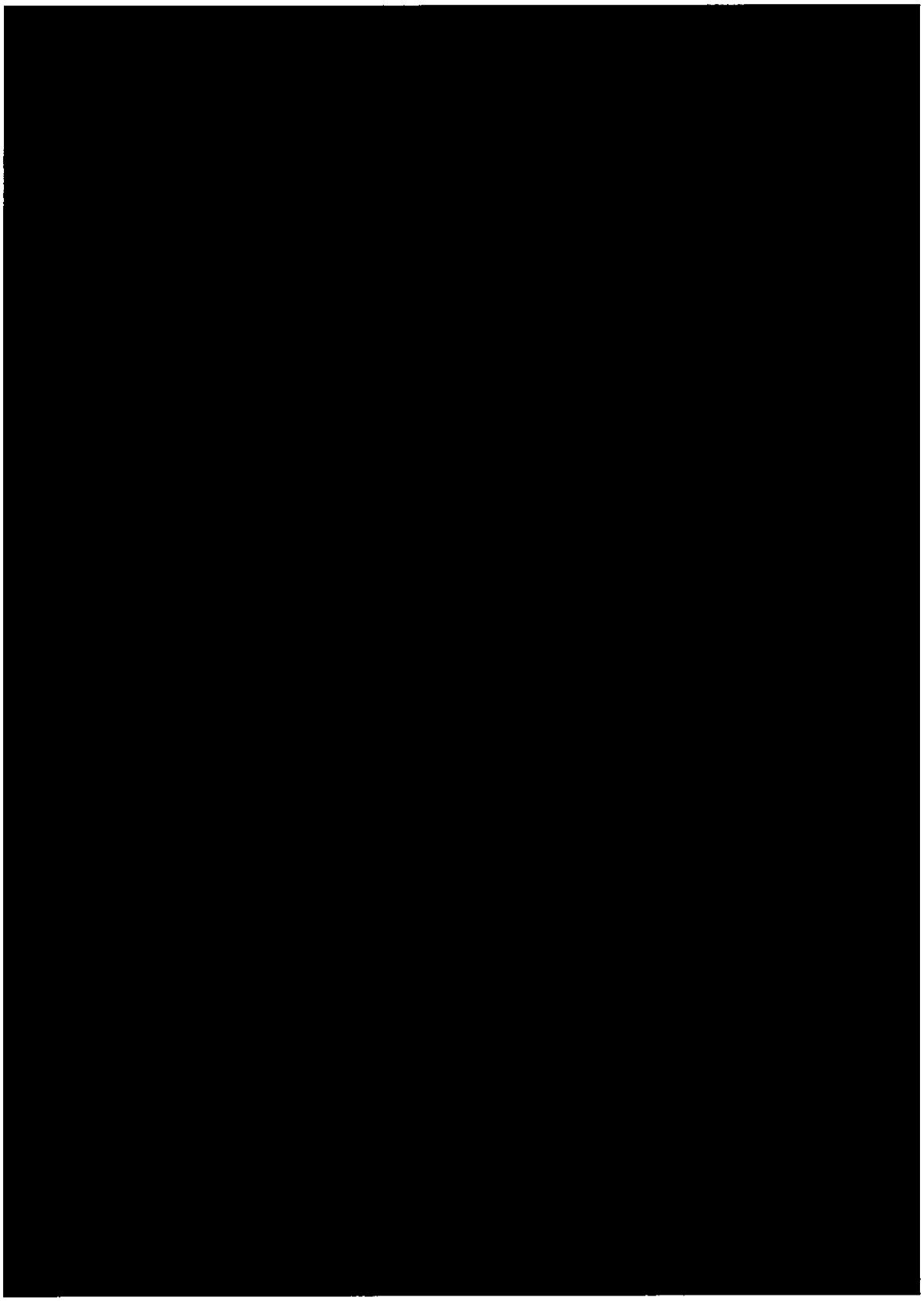

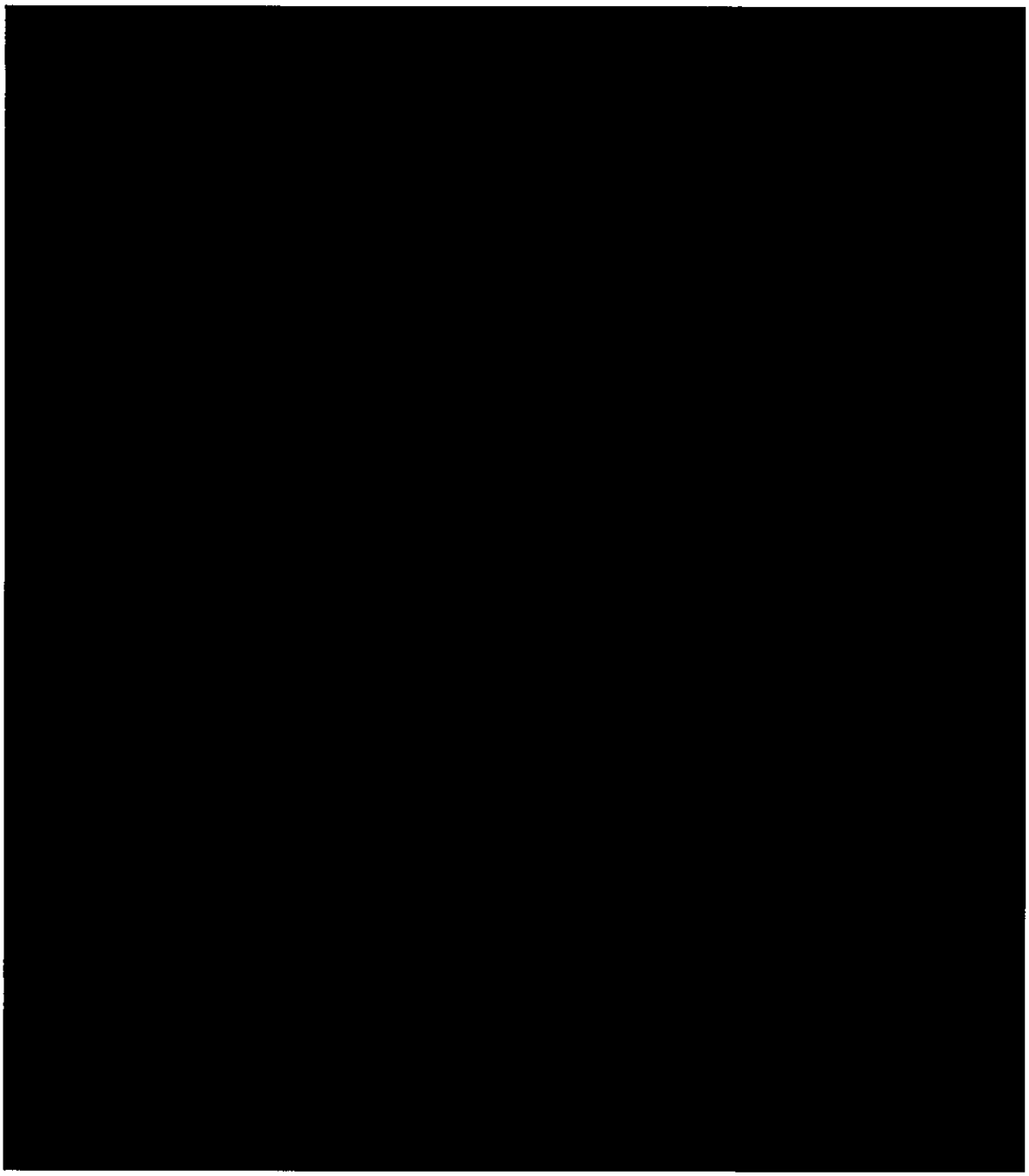

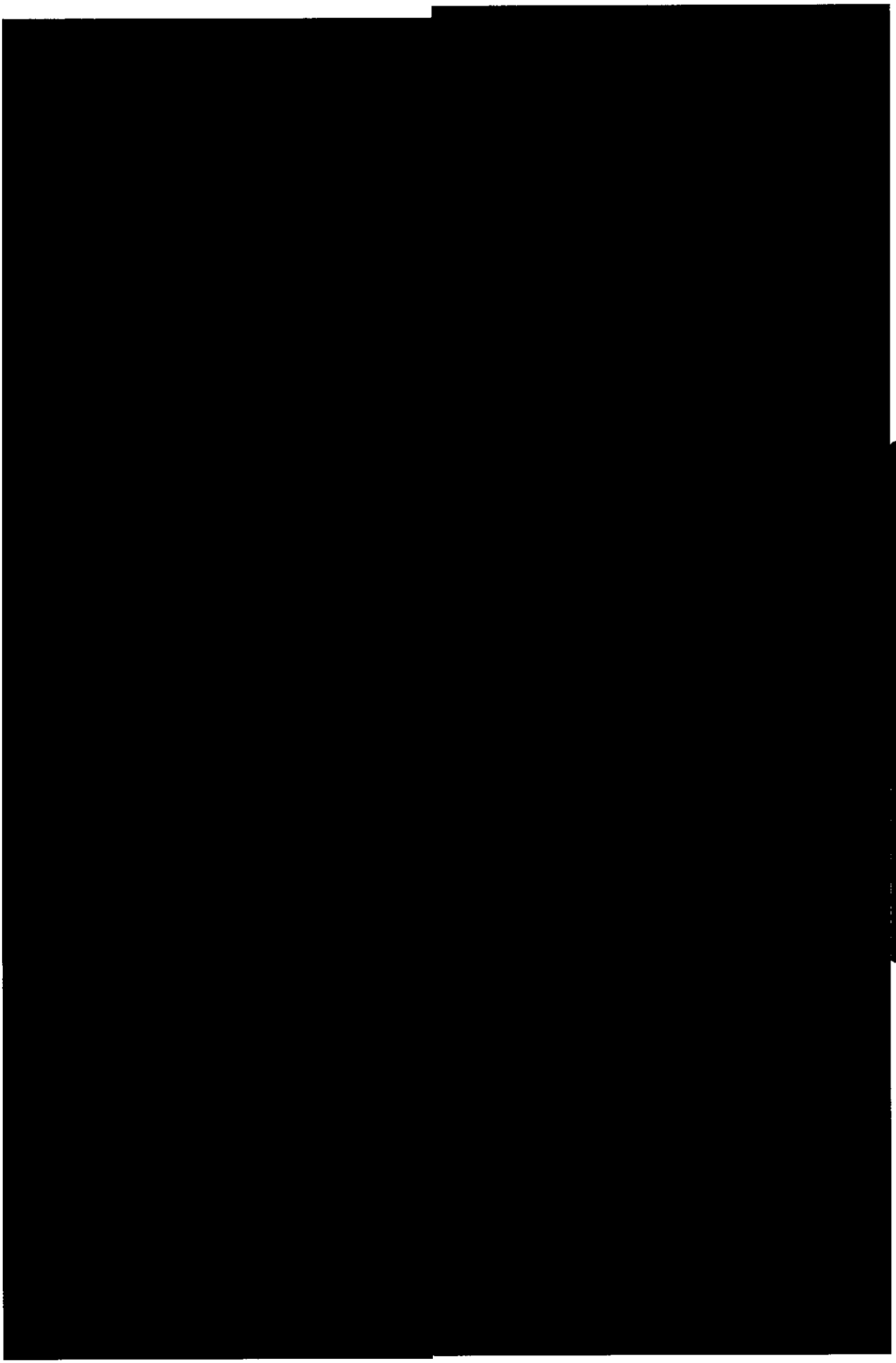

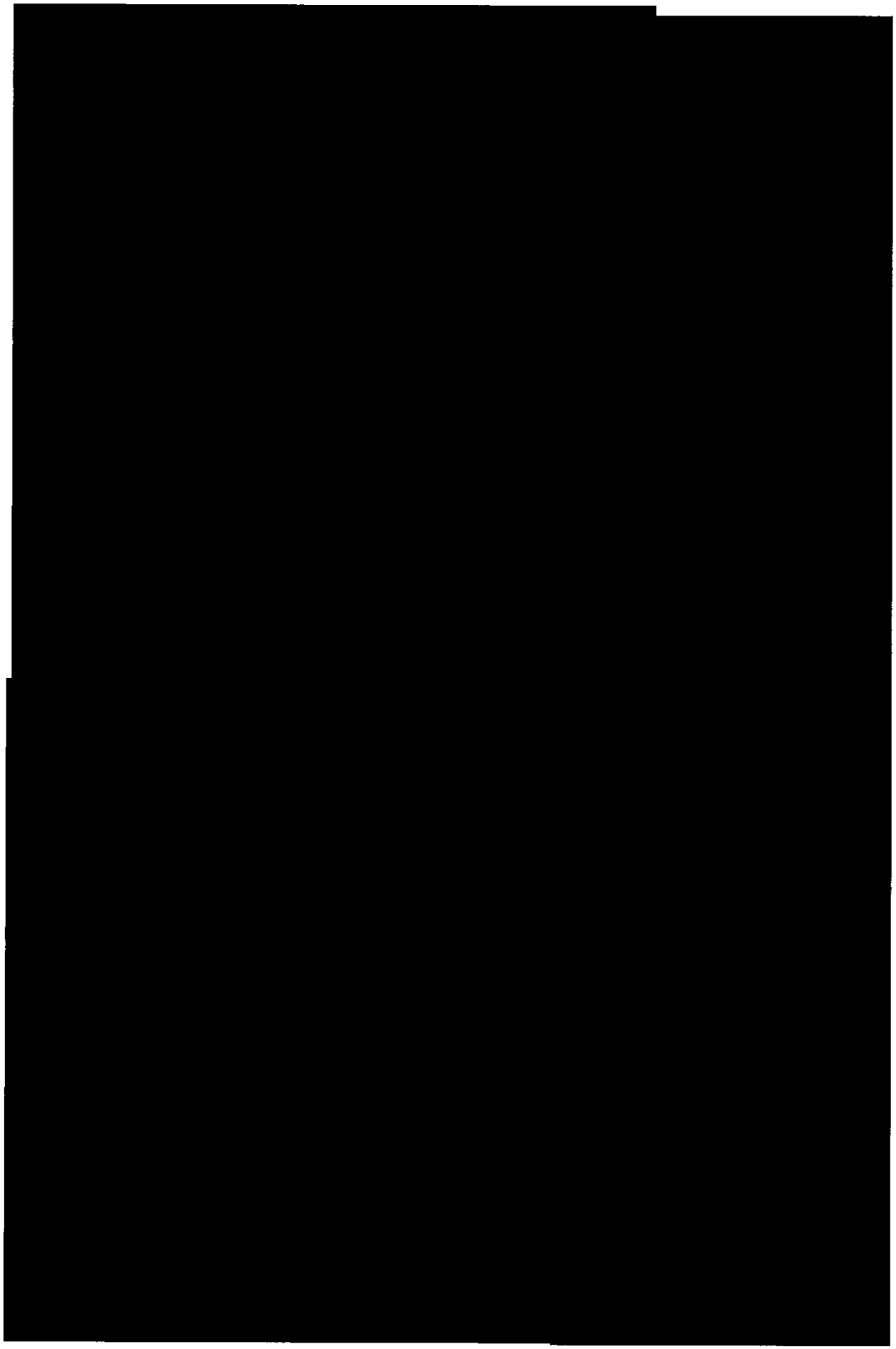

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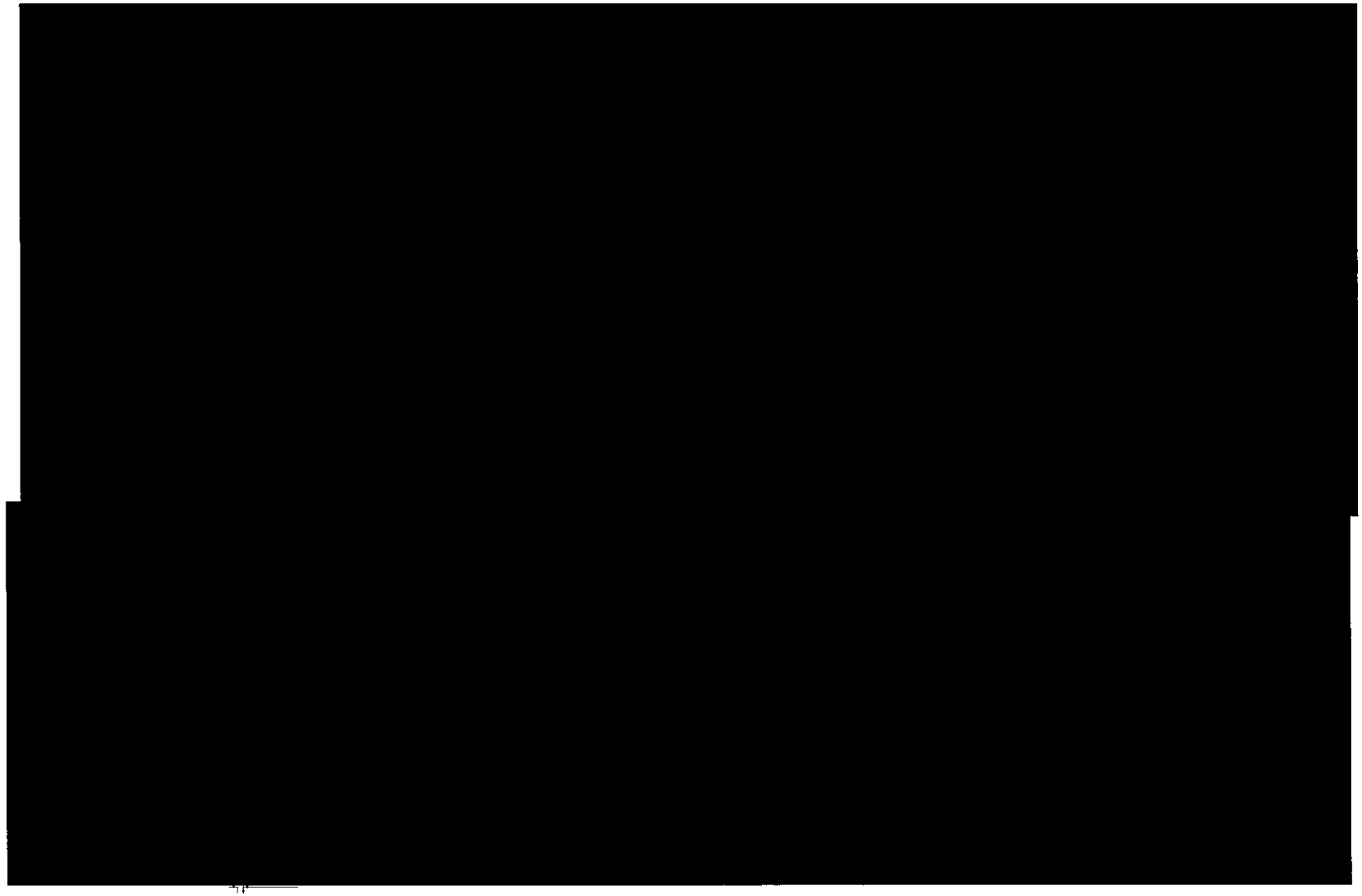

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CHAPTER 10 ANNEX B APPENDIX 58

EXTENSIVE CORROSION - LOWER SIDE PLATE PIVOT BRACKET REBATE CVR(T)

CONTENTS

LOWER SIDE PLATE PIVOT BRACKET REBATE

Application

1 This general repair scheme is to be used when the faces of the machined pivot bracket rebated sections are extensively corroded and considered to be beyond repair. The corrosion is removed by machining out a section of the lower side plate and replacing with a screwed and welded insert plate.

Drawing Reference

2 The drawings associated with this repair are:

2.1 FV2303404 Issue 1

2.2 FV2303405 Issue 1

2.3 FV2303406 Issue 2

2.4 FV2282220 Issue 1 (Scimitar only)

2.5 Report No CVR(T)RPT 20010

TABLE 1 MATERIALS

Serial (1)	NSN (2)	Manufacturer's No. (3)	Designation (4)
1	-	-	[redacted]
2	[redacted]	-	Screw, csk hex skt head 3/8 UNC x [redacted]
3	8030-99-220-2495	60170110000150	Sealant dissimilar metals (JC5A)

Synopsis of method

3 Manufacture repair plate.

4 Machine out lower side plate at specified position.

5 Screw and weld insert plate in position

6 Machine to restore original features.

7 Apply SCC protection to repaired areas.

NOTES

(1) Hull to be in a completely stripped down condition.

(2) Any extra features incorporated for the installation of Mine Blast Protection must be restored as part of this repair scheme.

TABLE 2 REPAIR TO LOWER SIDE PLATE PIVOT BRACKET REBATE

Op No (1)	Operation (2)	Tools (3)	Components (4)
1	Manufacture Lower Side torsion Bar Insert CVR(T) as detailed on Drawing No. FV2303404 (Fig 1).		
2	Load subject hull onto the bed of a universal milling, drilling and boring machine. Set the required side square to the boring head and ensure alignment with the X, Y and Z axis.	Elga-Mill	
3	Machine out the required section of the lower side plate as detailed on Drawing No. FV2303405 (Fig 2).		
4	Using the insert plate as a template, transfer the four holes on the periphery of the insert plate to the hull. Drill and tap hull to suit 3/8 UNC screws as detailed on Drawing No. FV2303405 (Fig 2)		FV2303404
5	Secure the insert plate into the rebated section in the hull using the four countersunk socket head screws (Table 1, Serial 2) as shown on Drawing No. FV2303406 (Fig 3).		FV2303404
6	Load the hull into a manipulator suitable for 360 degree rotation		
7	Weld the insert plate to the floor and lower side plate as detailed on Drawing No. FV2303406 (Fig 3)	MIG welder	
8	Load subject hull onto the bed of a universal milling, drilling and boring machine. Set the required side square to the boring head and ensure alignment with the X, Y and Z axis.	Elga-Mill	
9	Machine the pivot bracket rebated face in accordance with the appropriate wheel station details on Drawing No. FV2282220 (Figs 4 - 7) (Scimitar) NOTE Refer to Hull Final Machining drawing relevant to Variant.		
10	Apply SCC protection to repaired areas as detailed on Drawing No. FV2303406 (Fig 3).		
11	Restore internal and external paint finish, refer to Chap 10, Annex F.		

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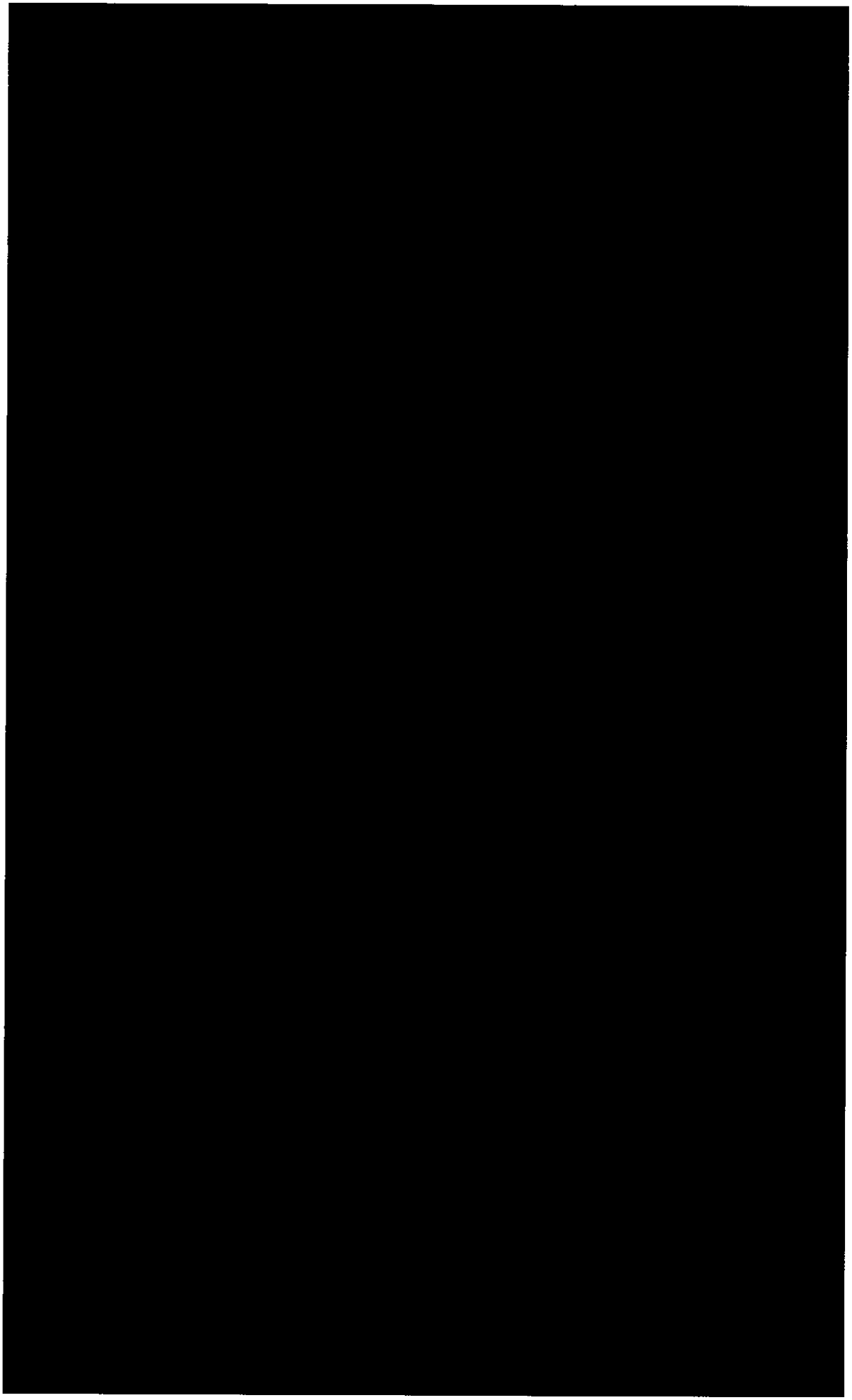

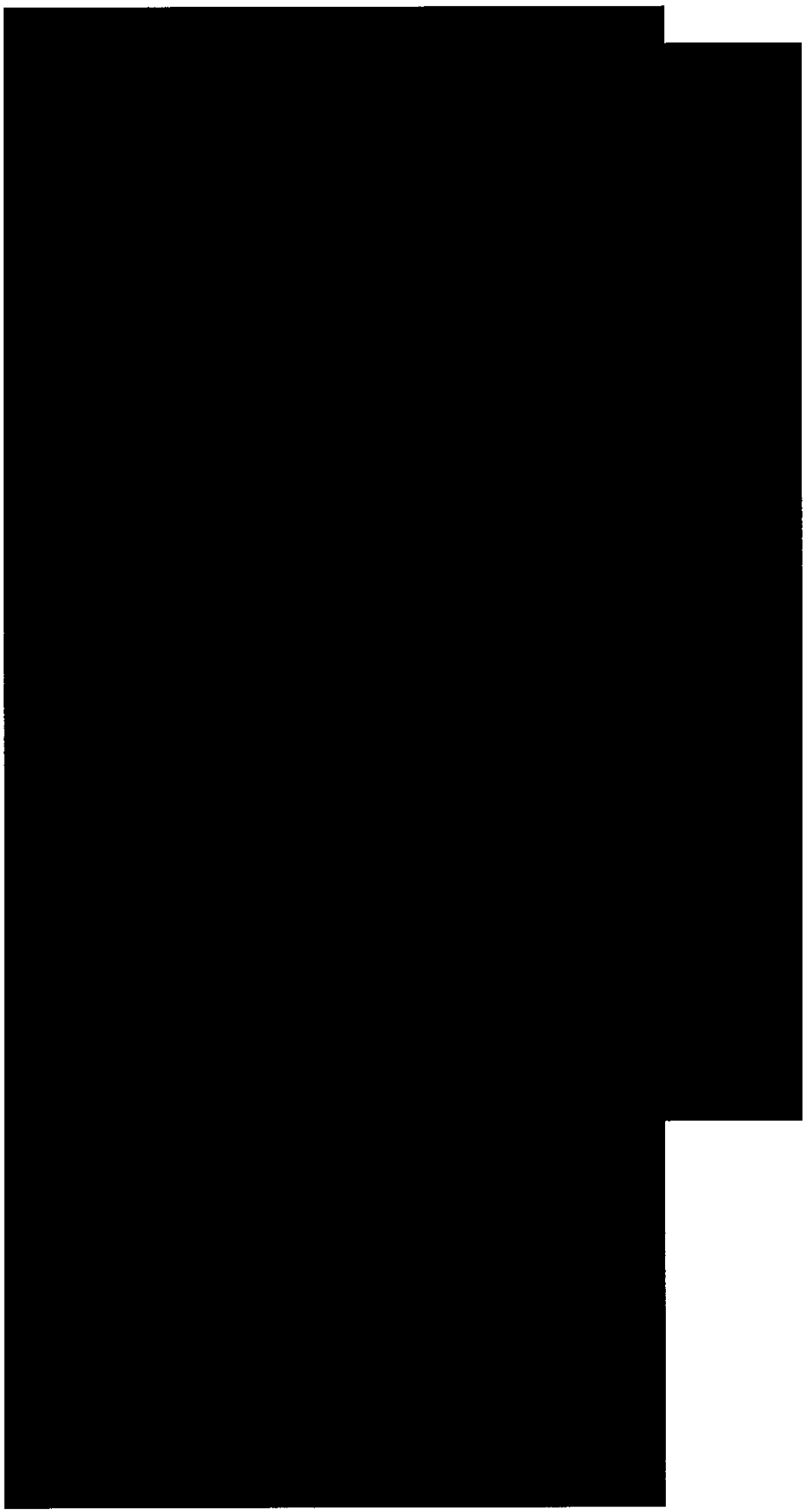

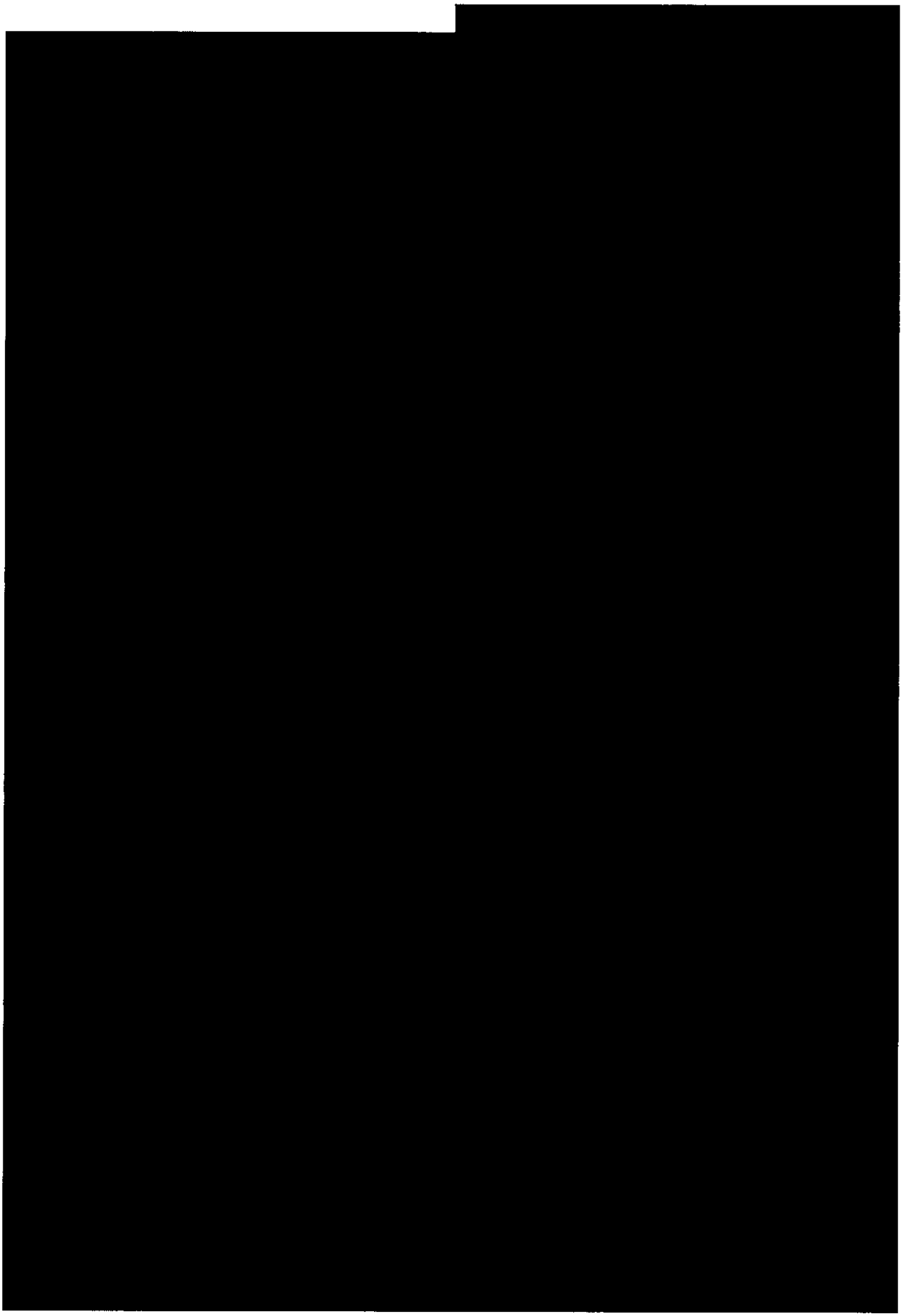

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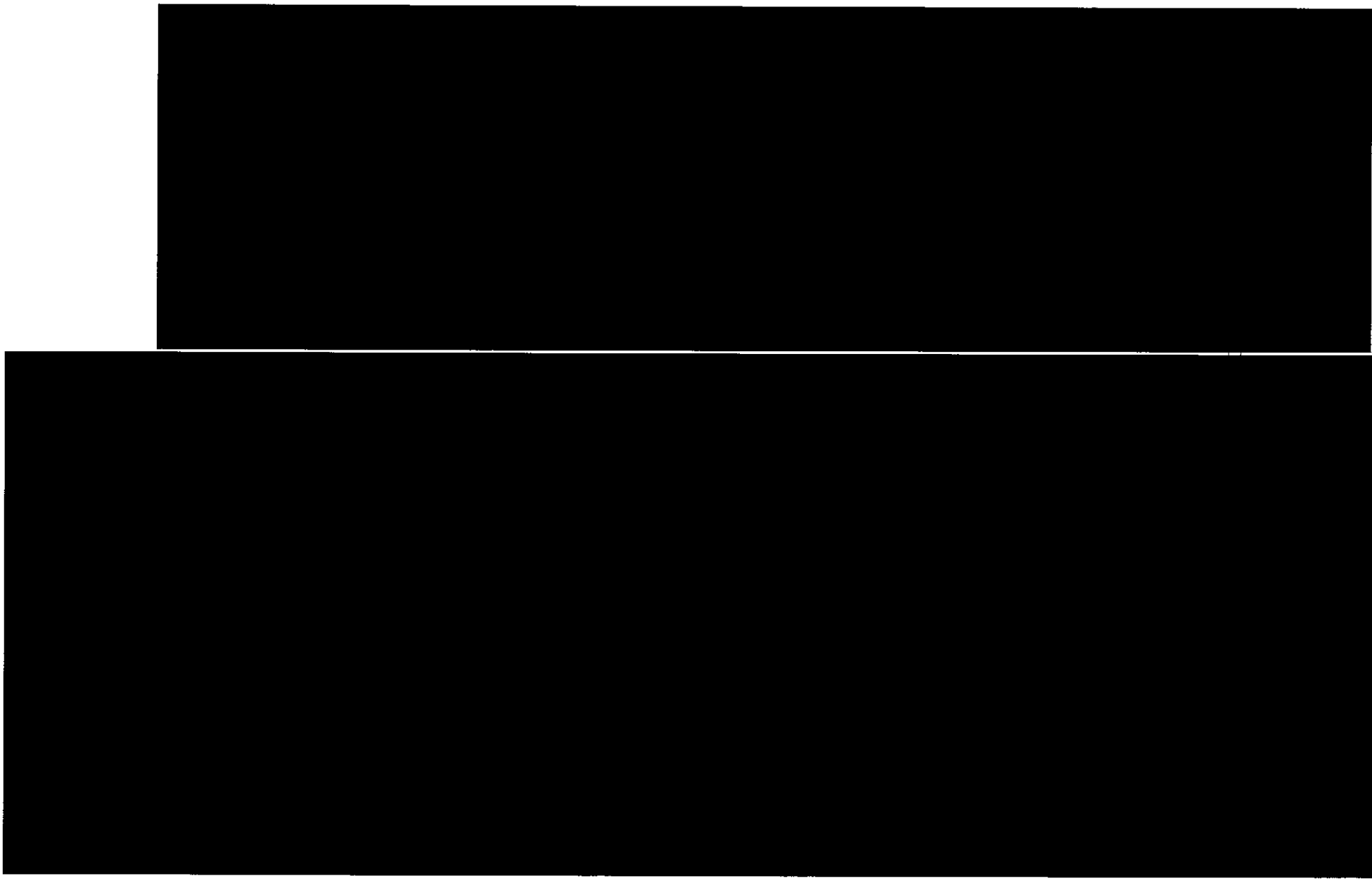

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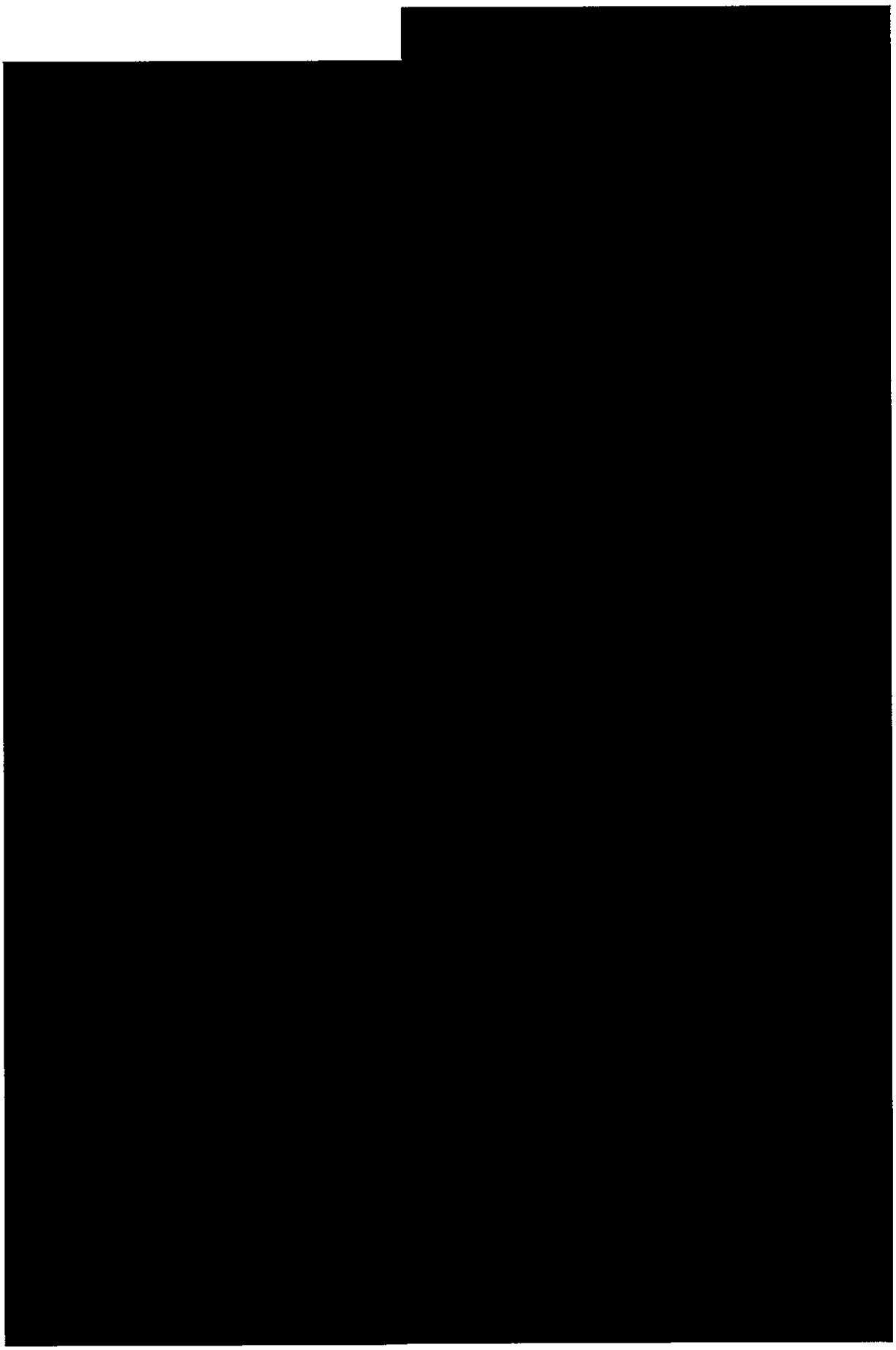


CHAPTER 10 ANNEX C

ACCIDENT DAMAGE

CONTENTS

INTRODUCTION

1 Annex C contains approved repair schemes for repair of accident damage. For areas where accident damage is likely and the form of damage is predictable an Appendix detailing a repair scheme is included (see contents list).

2 Most forms of accident damage are by definition unpredictable in form and extent of damage. Therefore when accident damage repairs are required reference should be made to similar types of repair requirements in Annexes D, E or B for common types of repair.

WARNINGS AND CAUTIONS

3 Specific warnings and cautions are given in the text of the appendices, when required.

CHAPTER 10 ANNEX C APPENDIX 1

FLOTATION SCREEN PLATFORM

CONTENTS

To be published

CHAPTER 10 ANNEX C APPENDIX 2

CENTRAL REAR TOWING EYE – SALAMANDER (SCORPION)/SCIMITAR

CONTENTS

To be published

CHAPTER 10 ANNEX C APPENDIX 3

REPLACEMENT OF HULL CENTRE REAR PLATE - SCIMITAR

CONTENTS

REPLACEMENT OF HULL CENTRE REAR PLATE

Application

1 This repair method is to be used for the replacement of the hull centre rear plate.

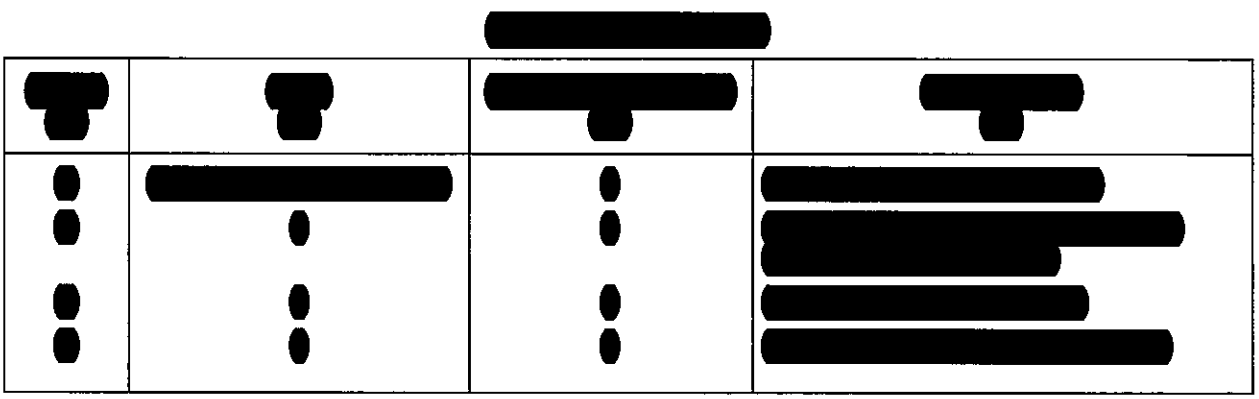
Warnings and Cautions

2 Throughout this procedure, special clothing and suitable eye protection will be required and must be used at all times.

Drawing Reference

3 The drawing associated with this repair is:

3.1 N/A Report CVR(T) RPT 19932 only.



Synopsis of method

4 This repair is to fit a replacement hull centre rear plate.

4.1 Machine out the complete Hull Centre Rear Plate.

4.2 Prepare areas to be welded.

4.3 Manufacture and prepare required replacement parts.

4.4 Locate and weld replacement parts.

4.5 Apply SCC protection (grit blast/metal spray).

4.6 Finish and paint affected areas.

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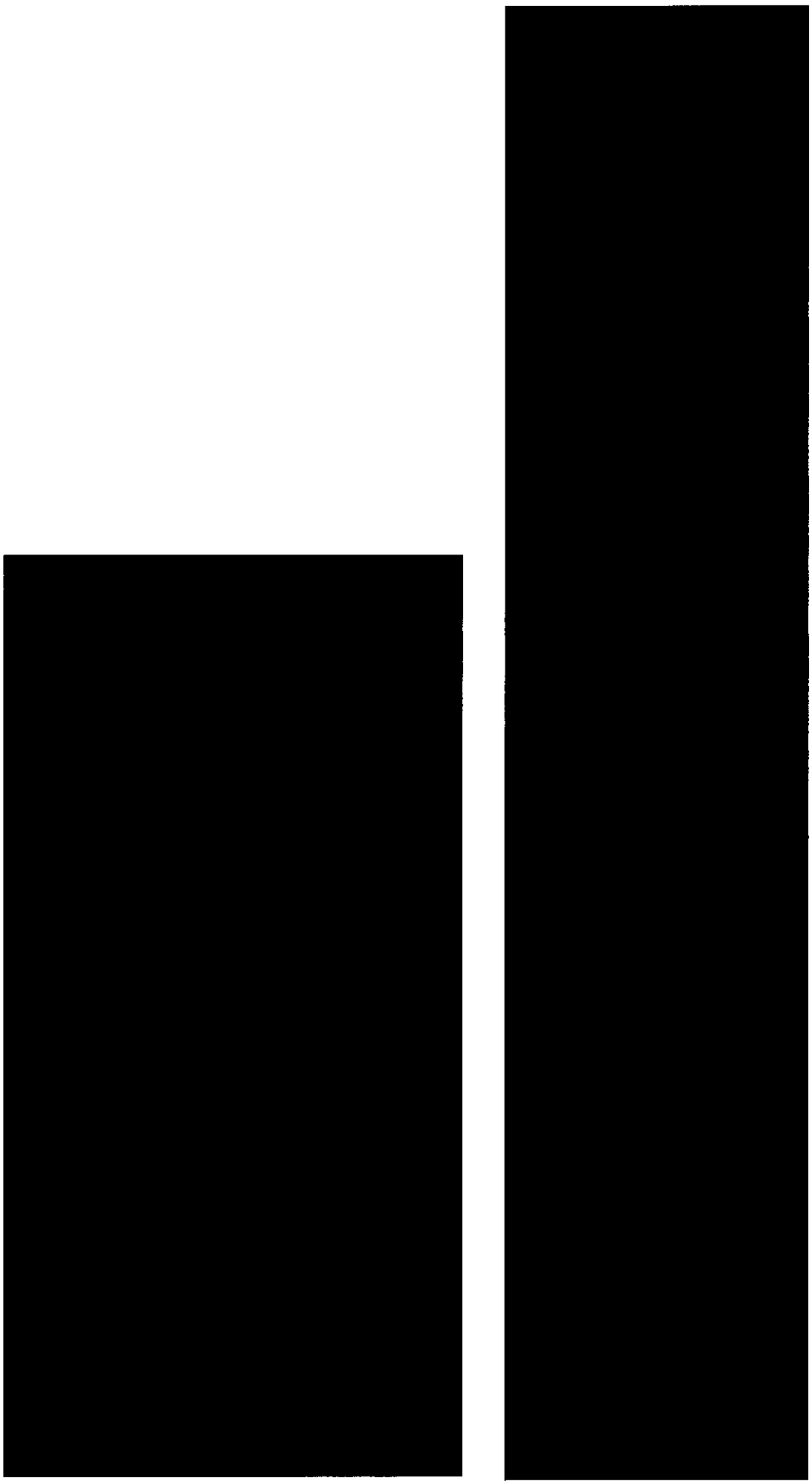

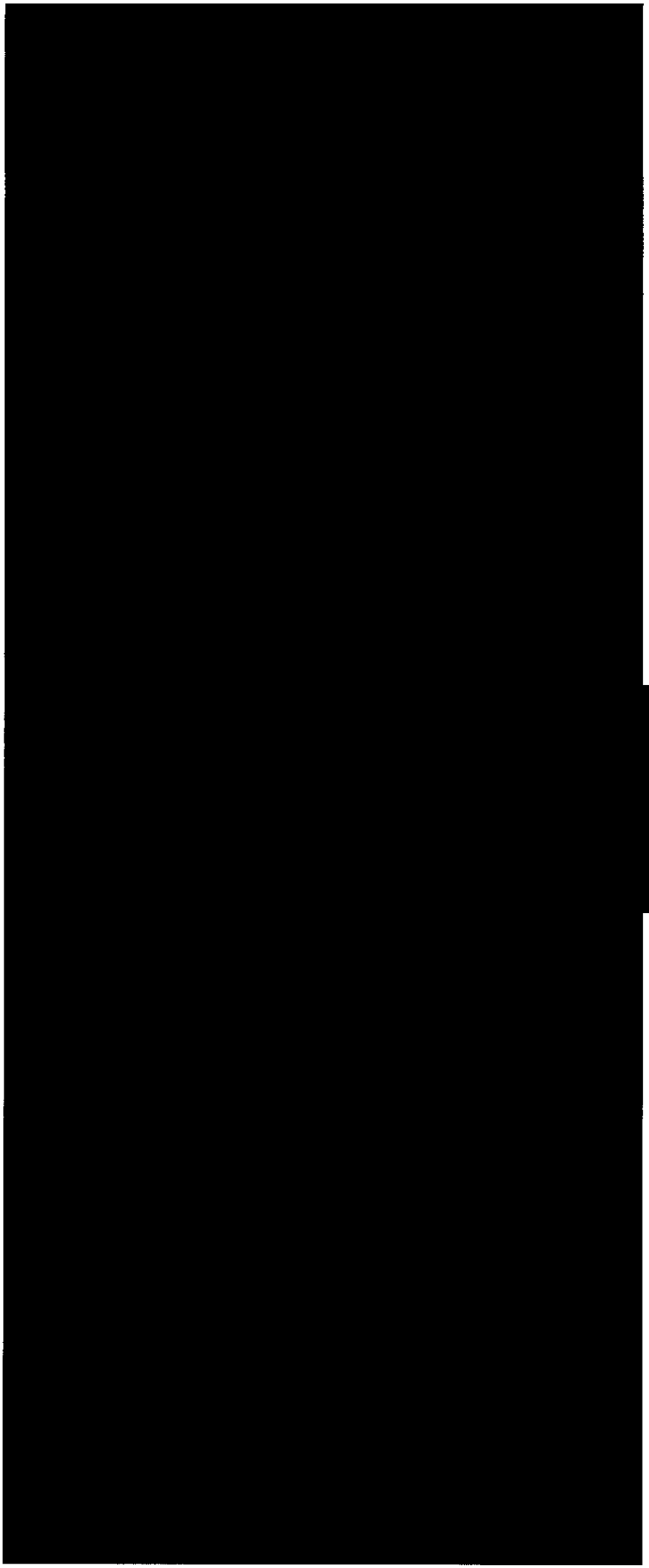

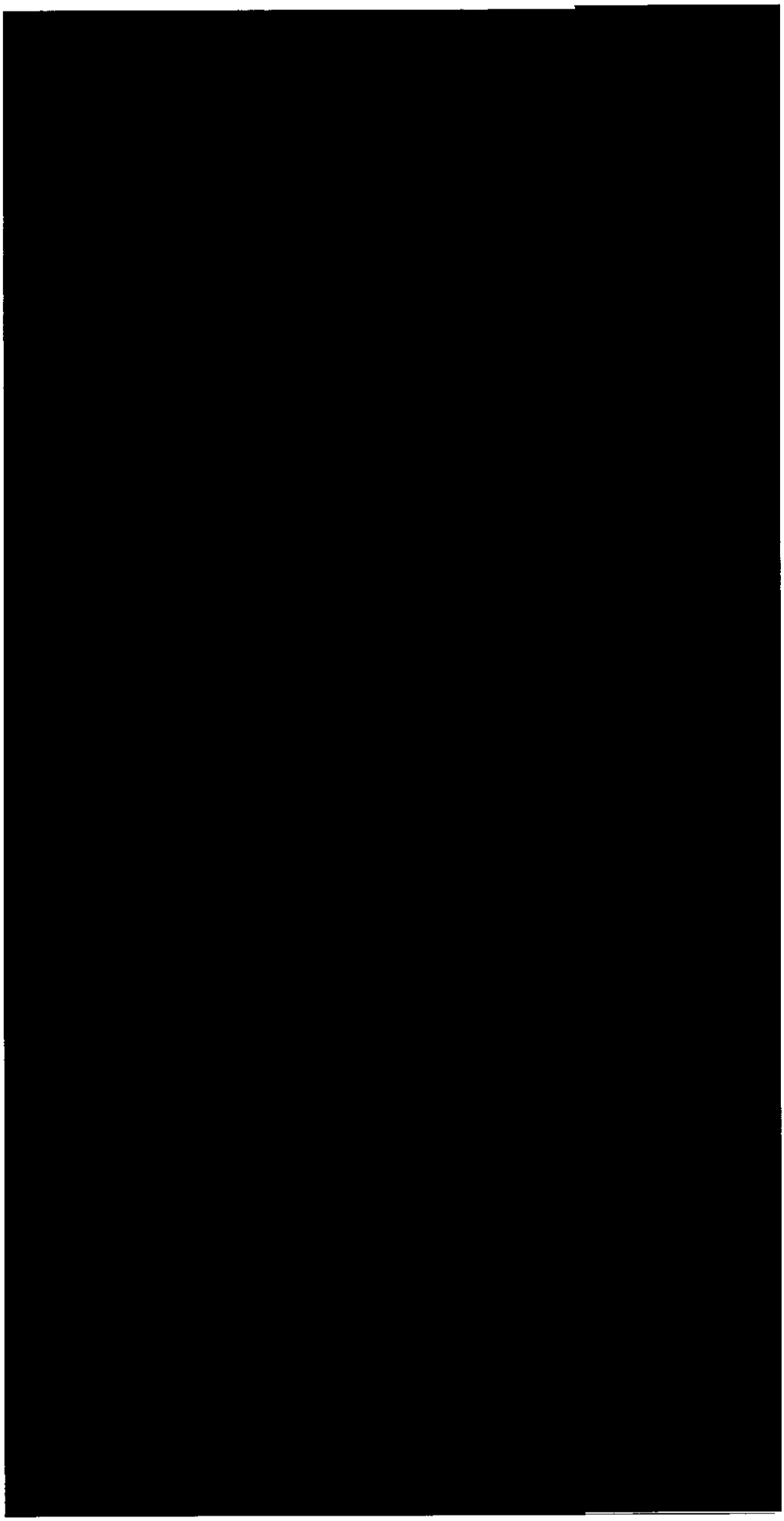

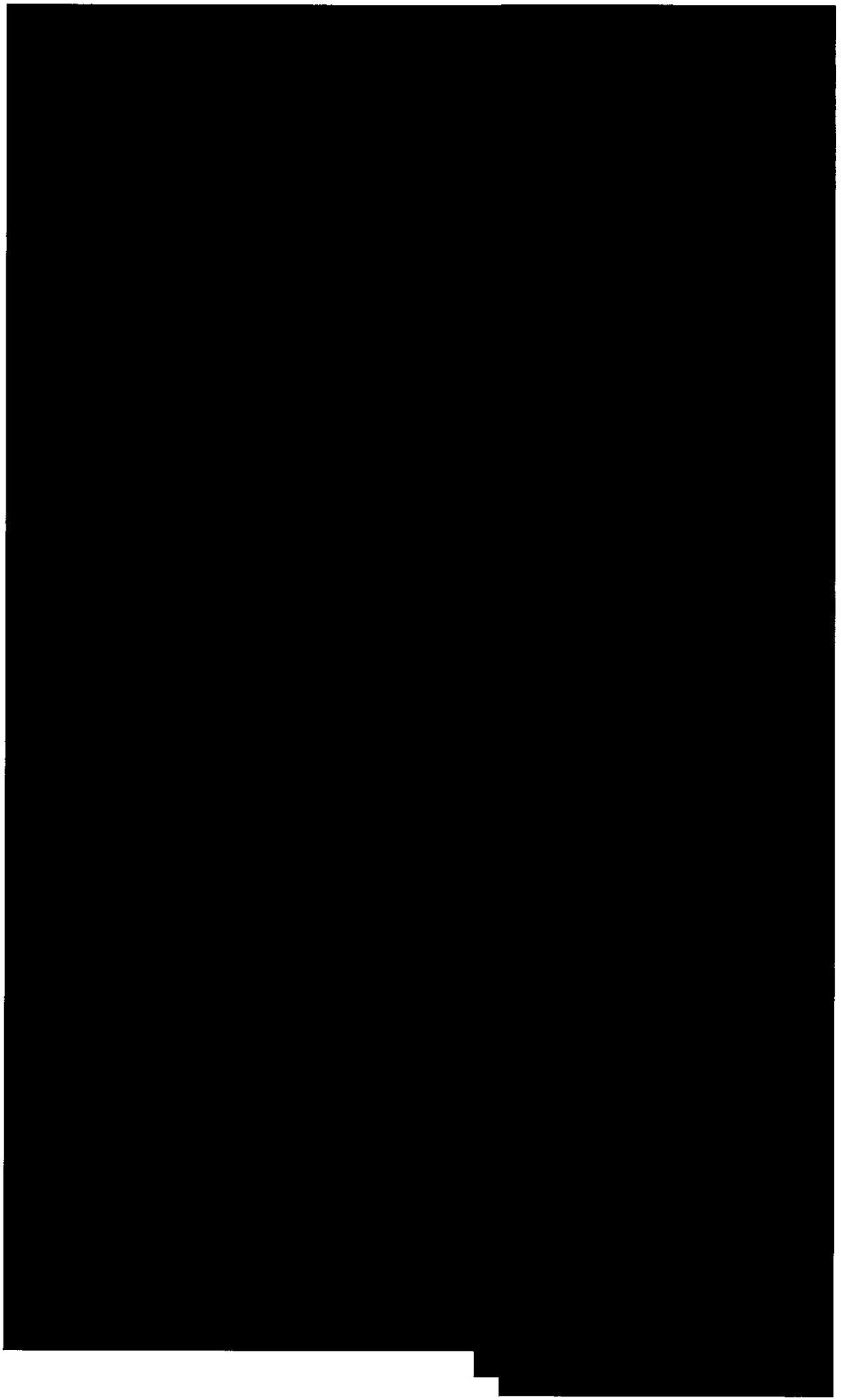

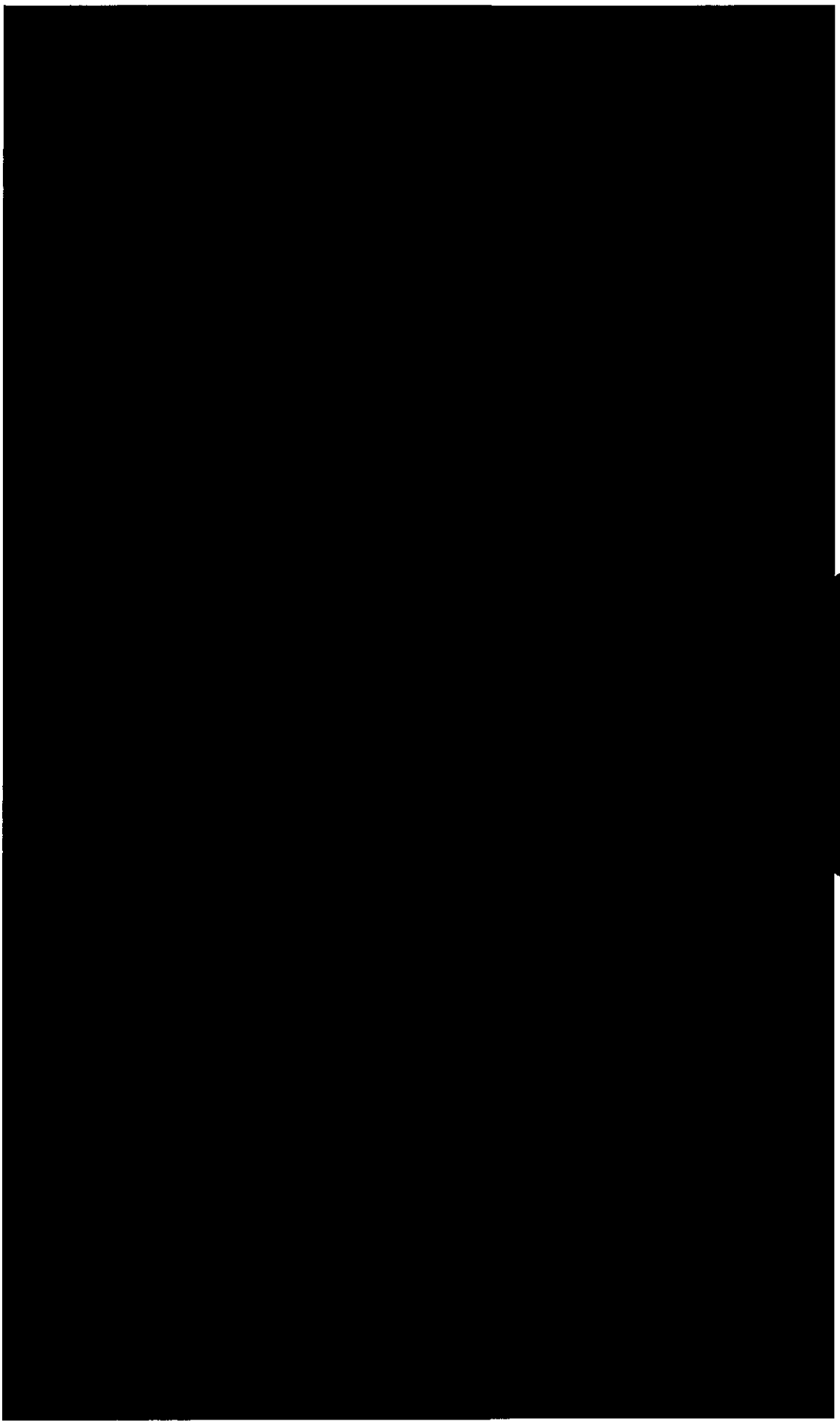

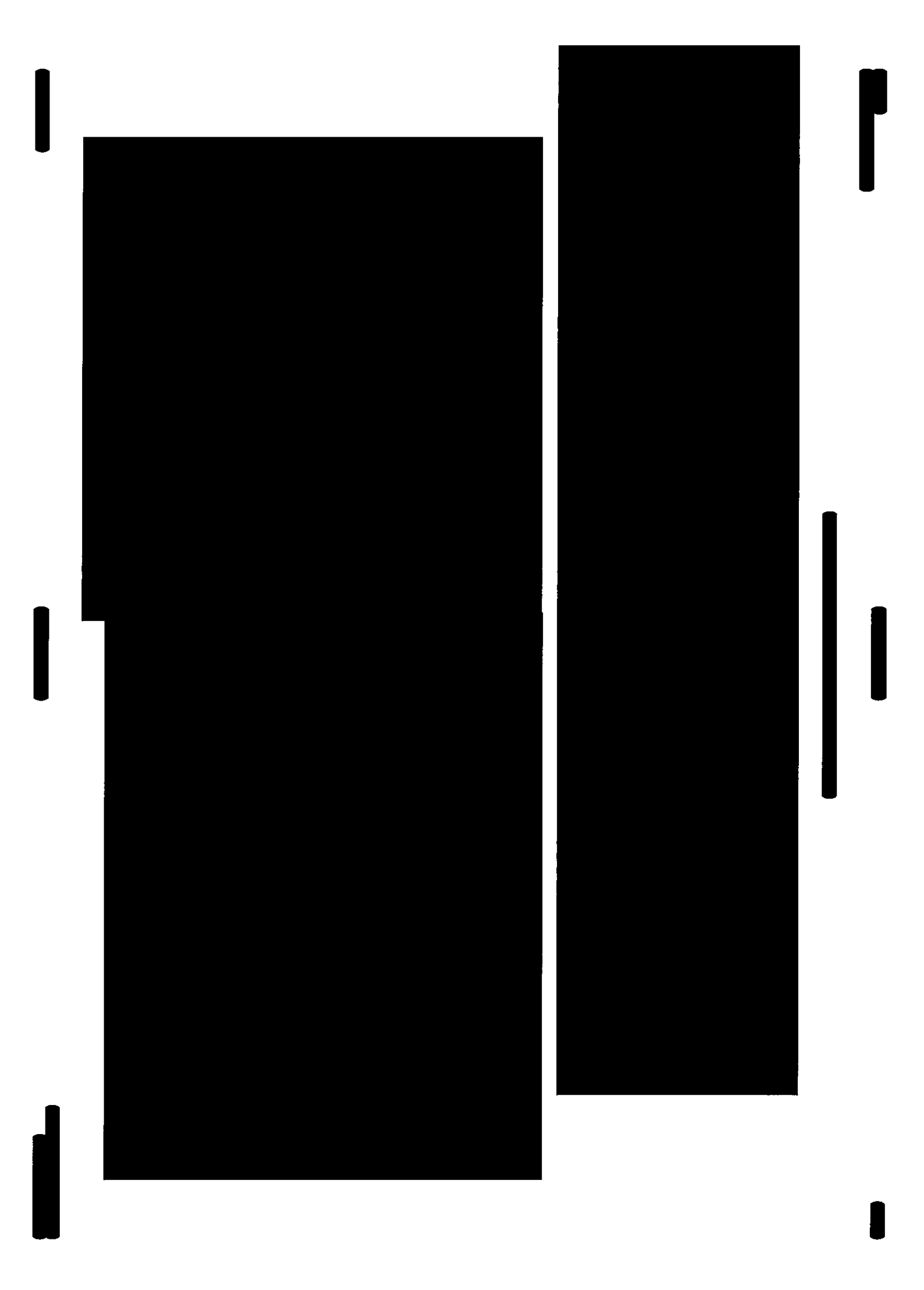

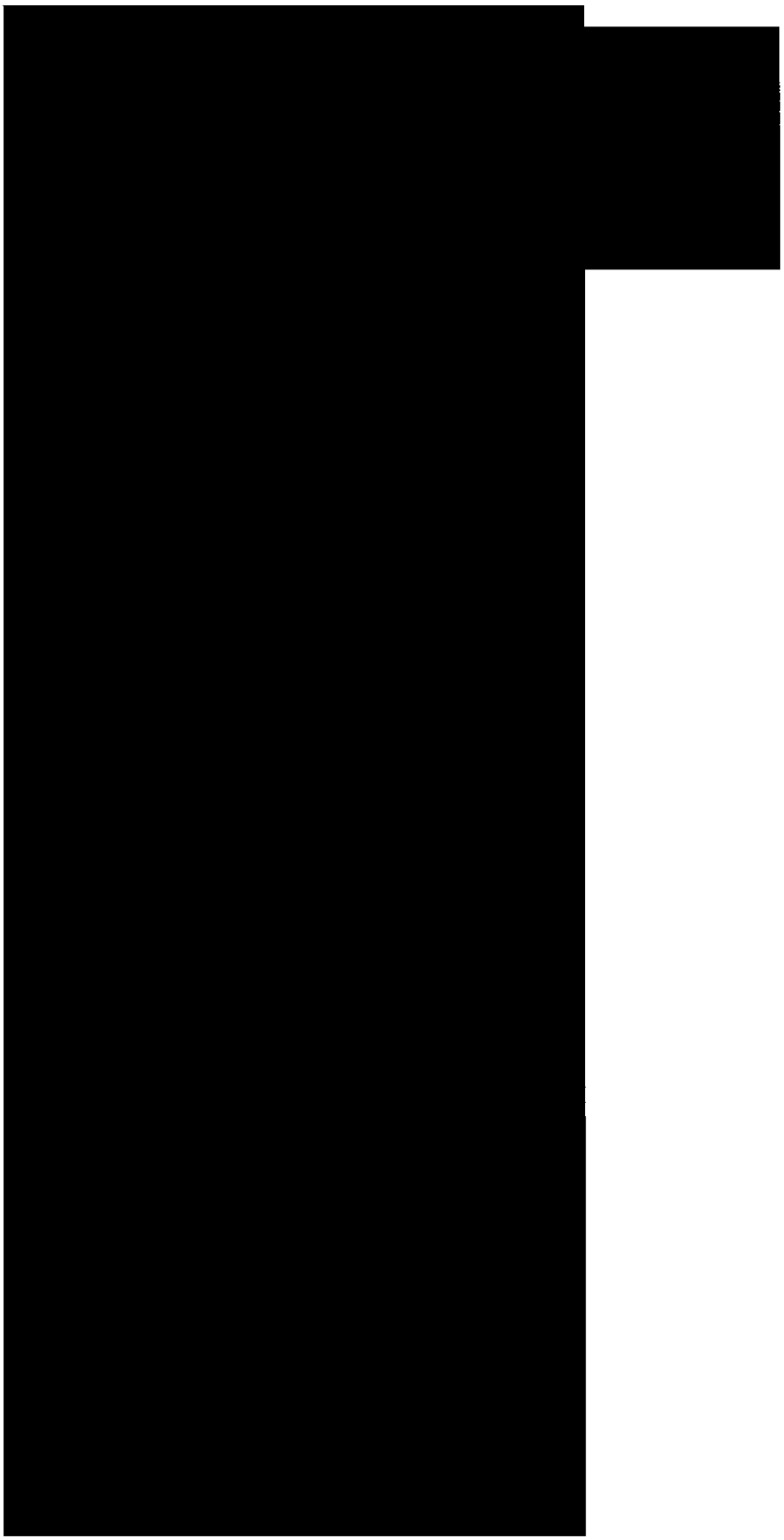

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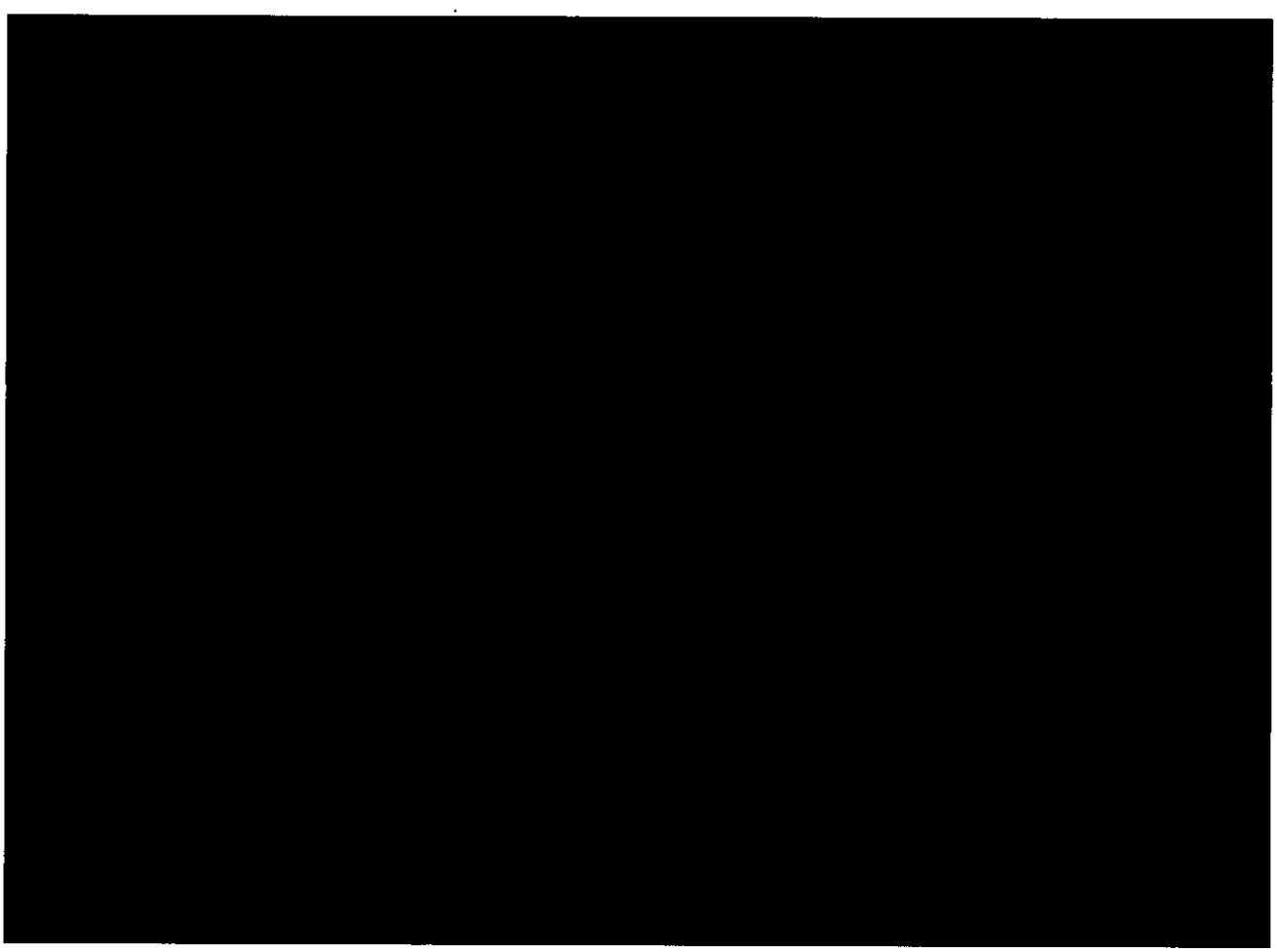

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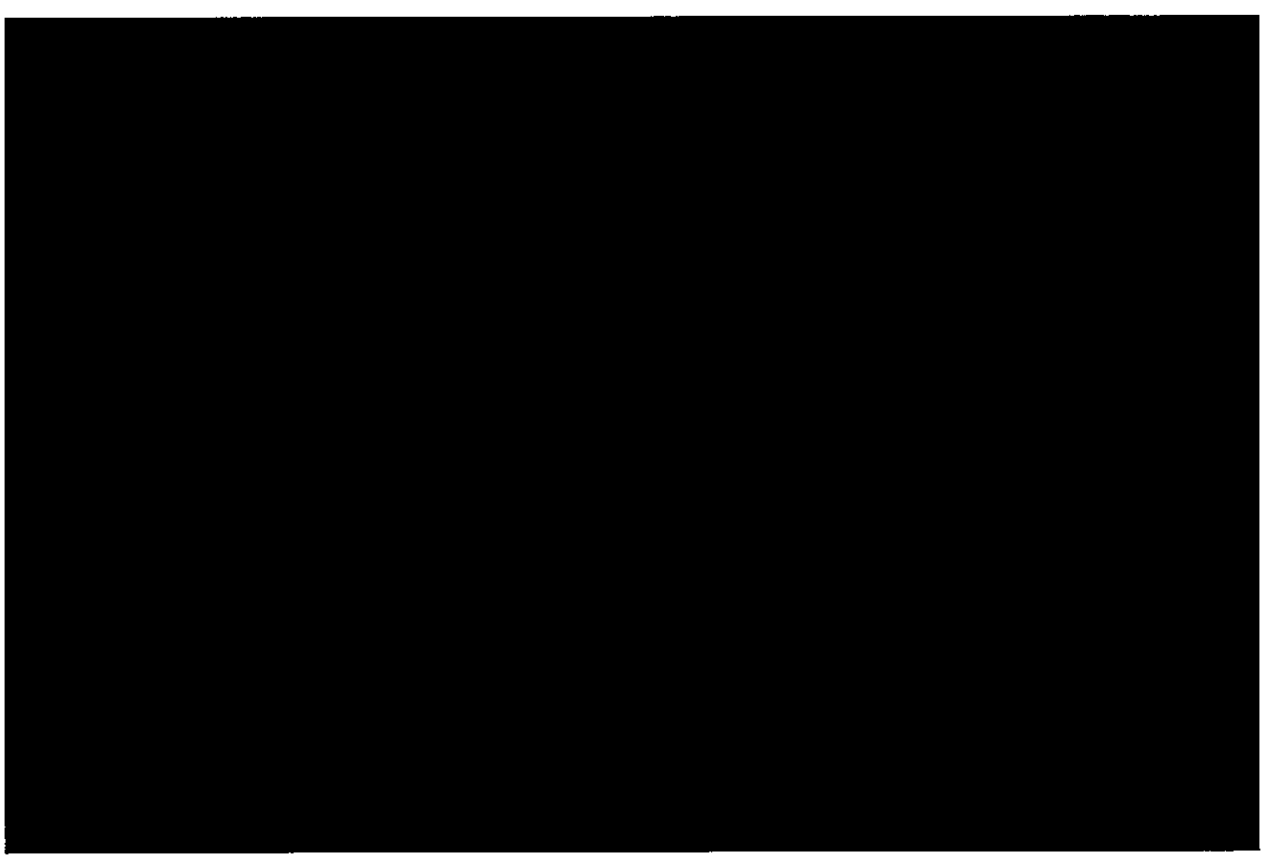

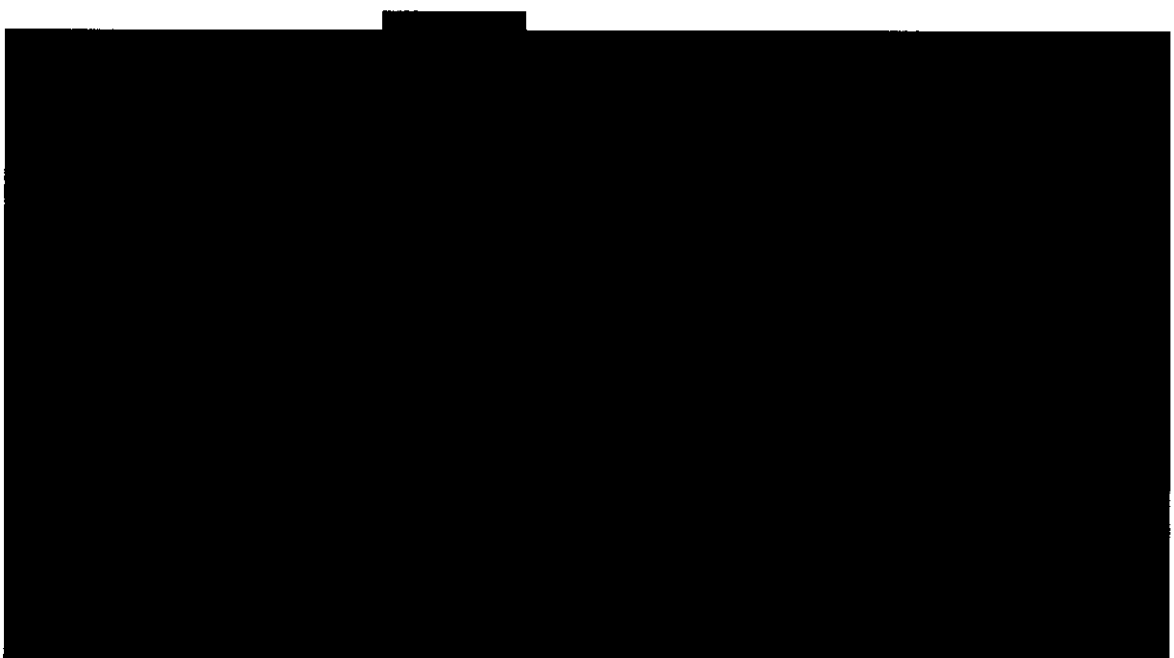

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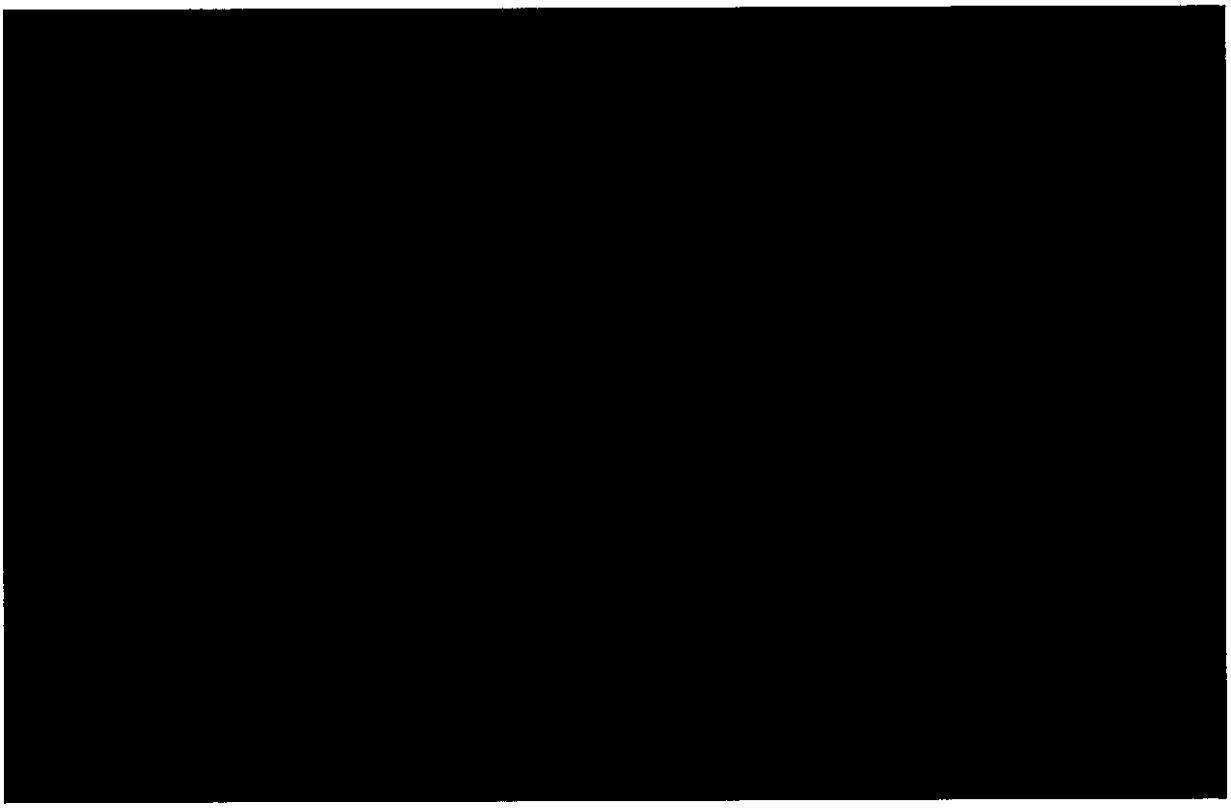

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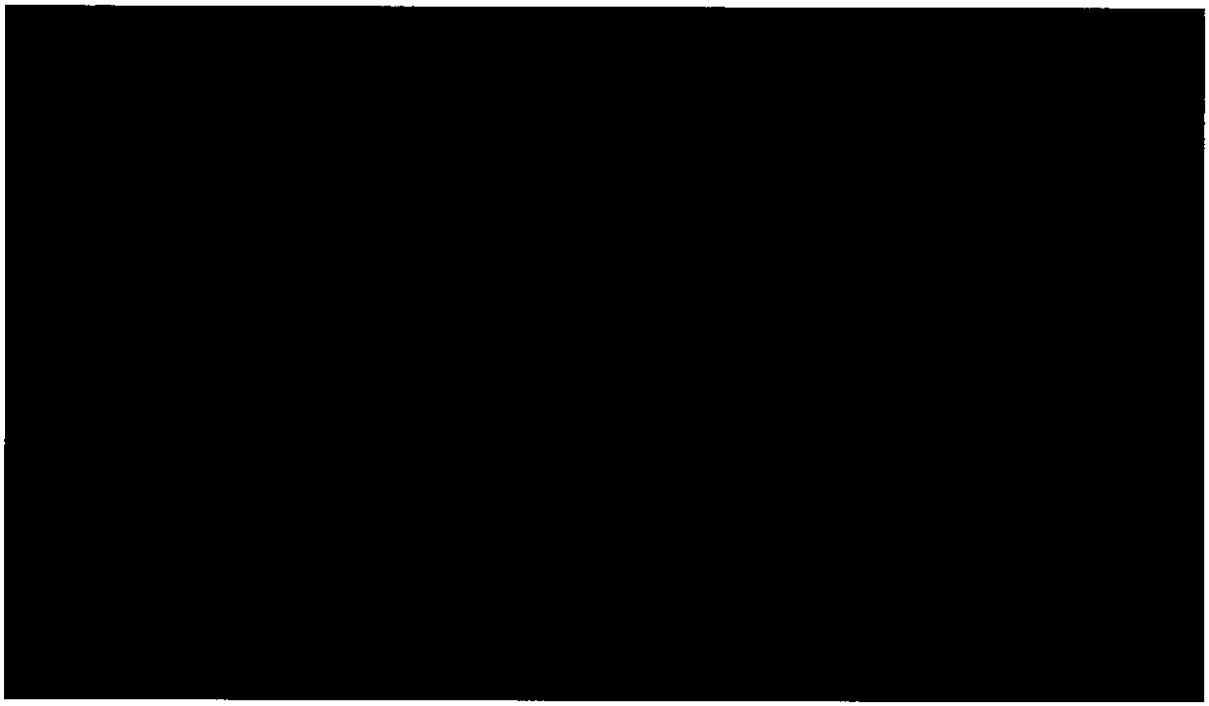

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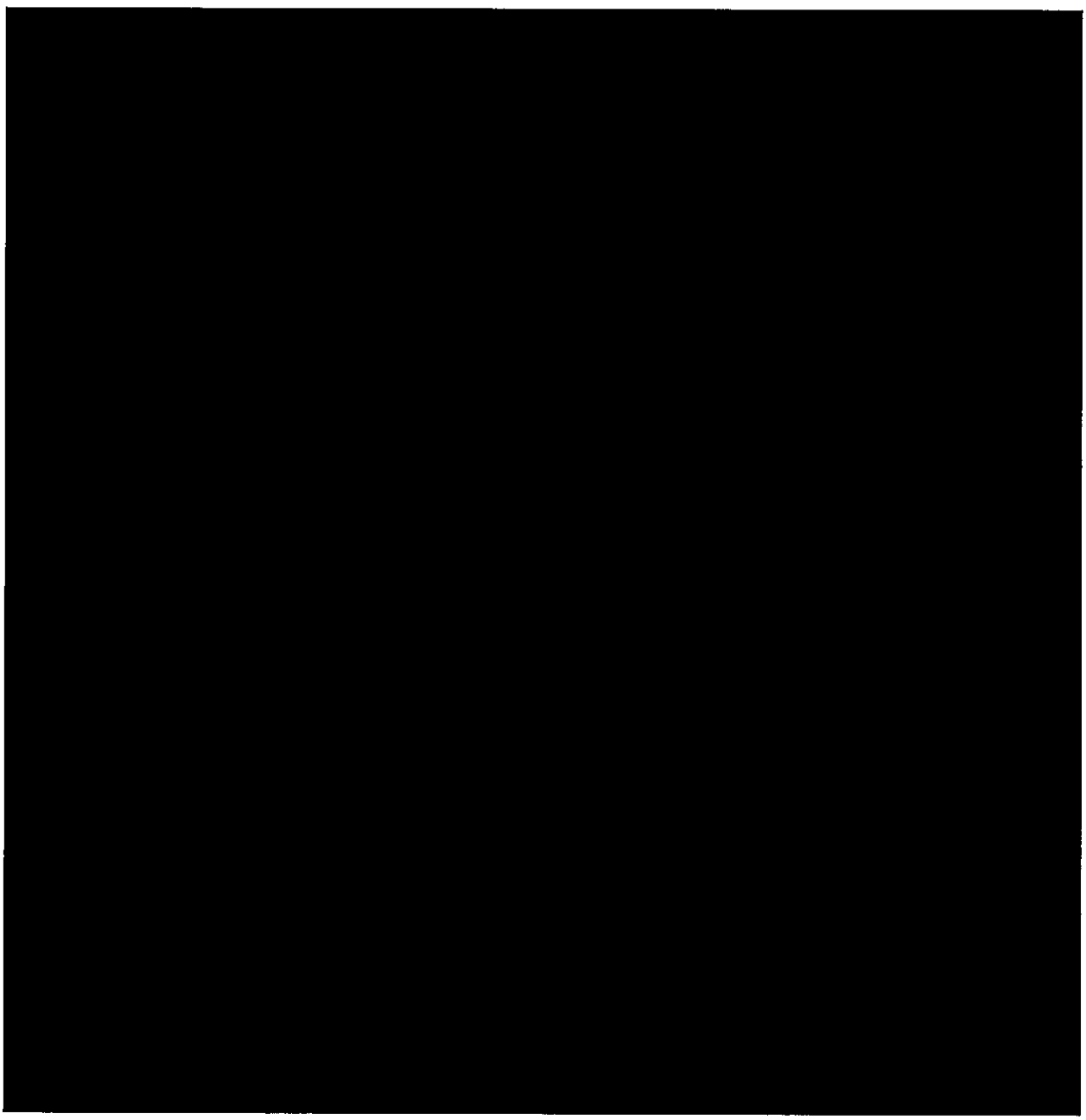

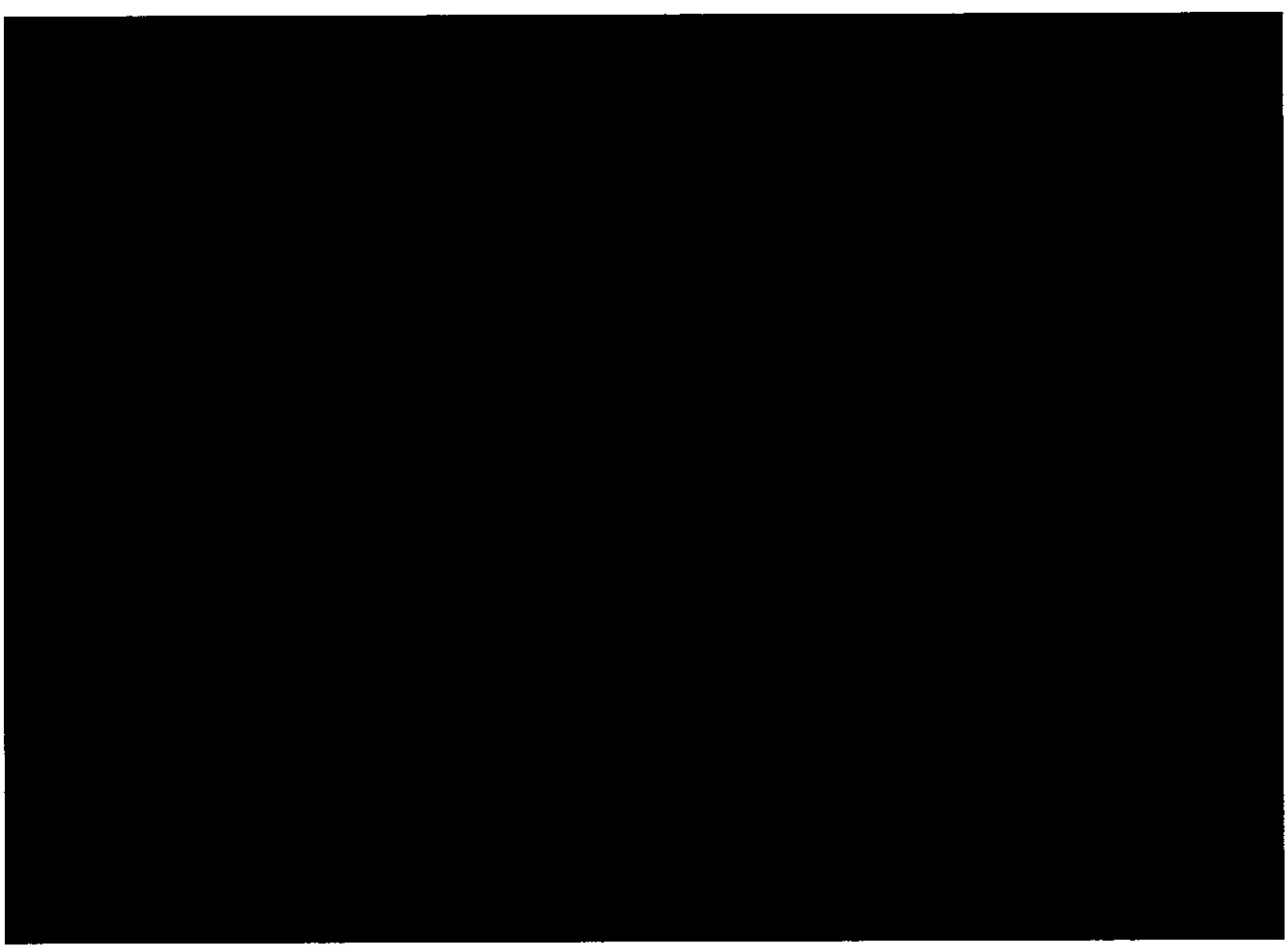

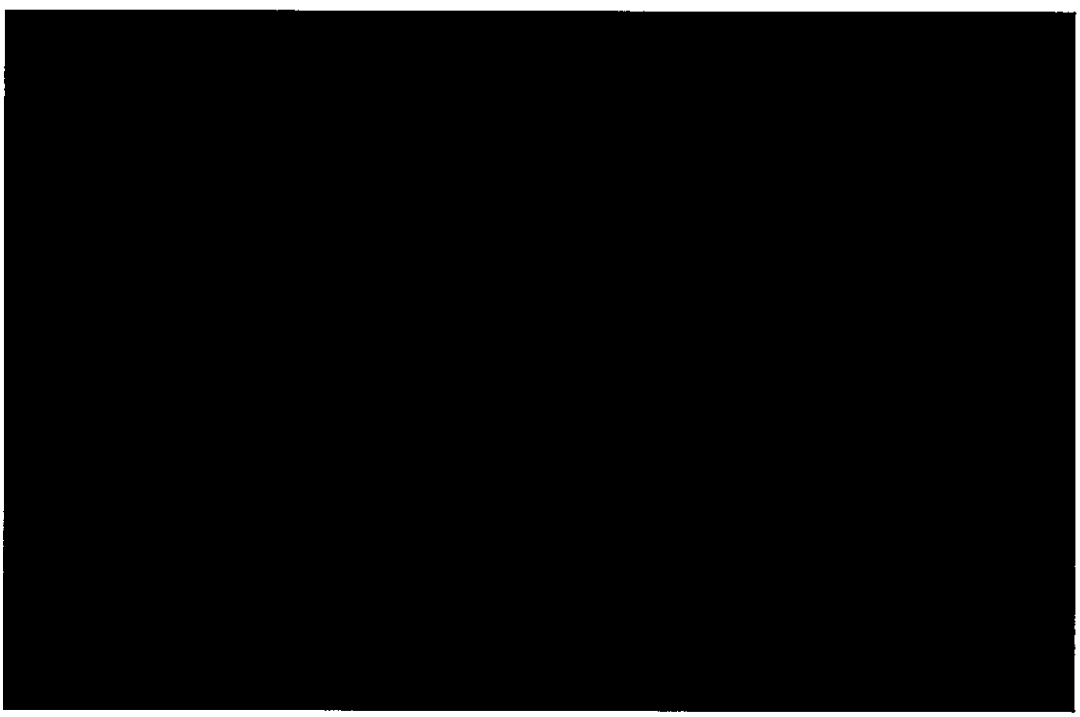

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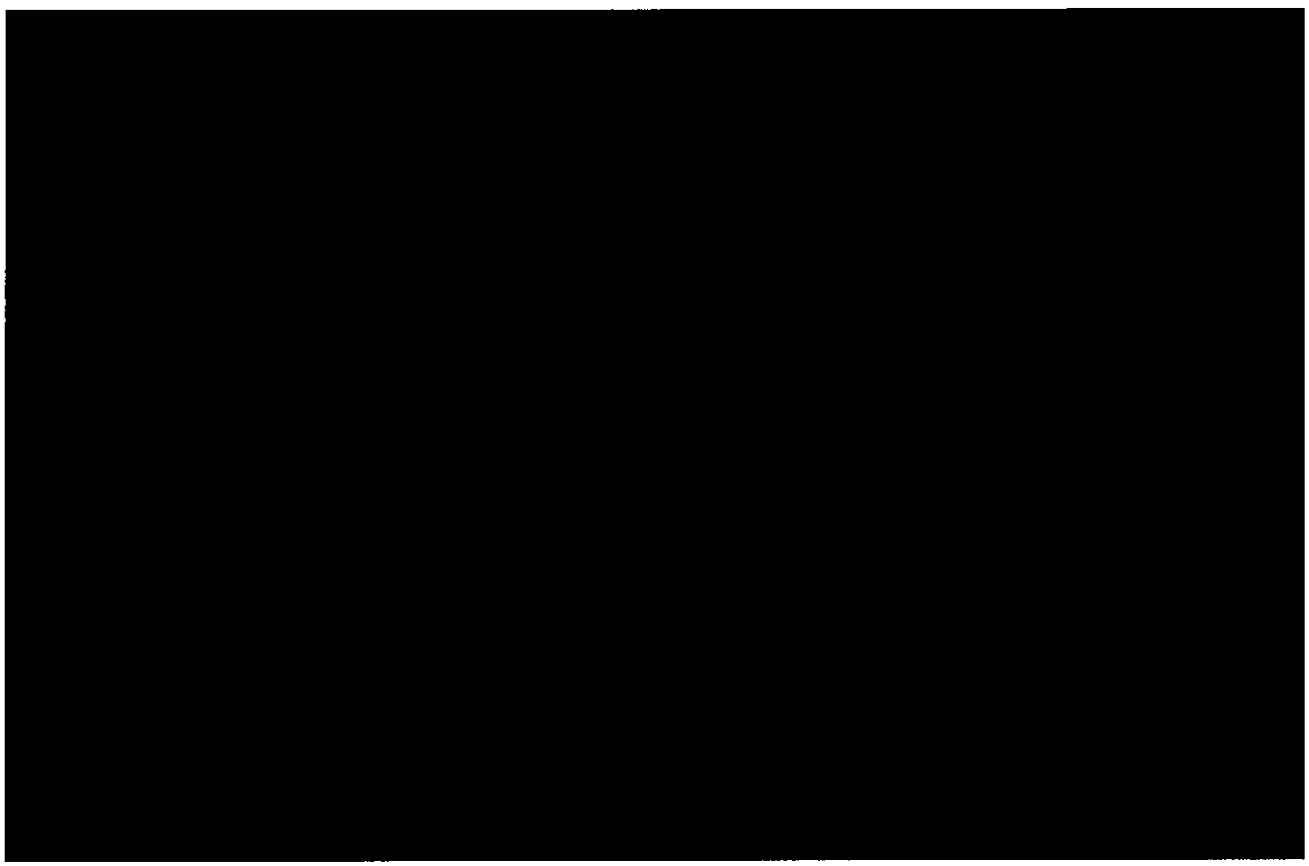

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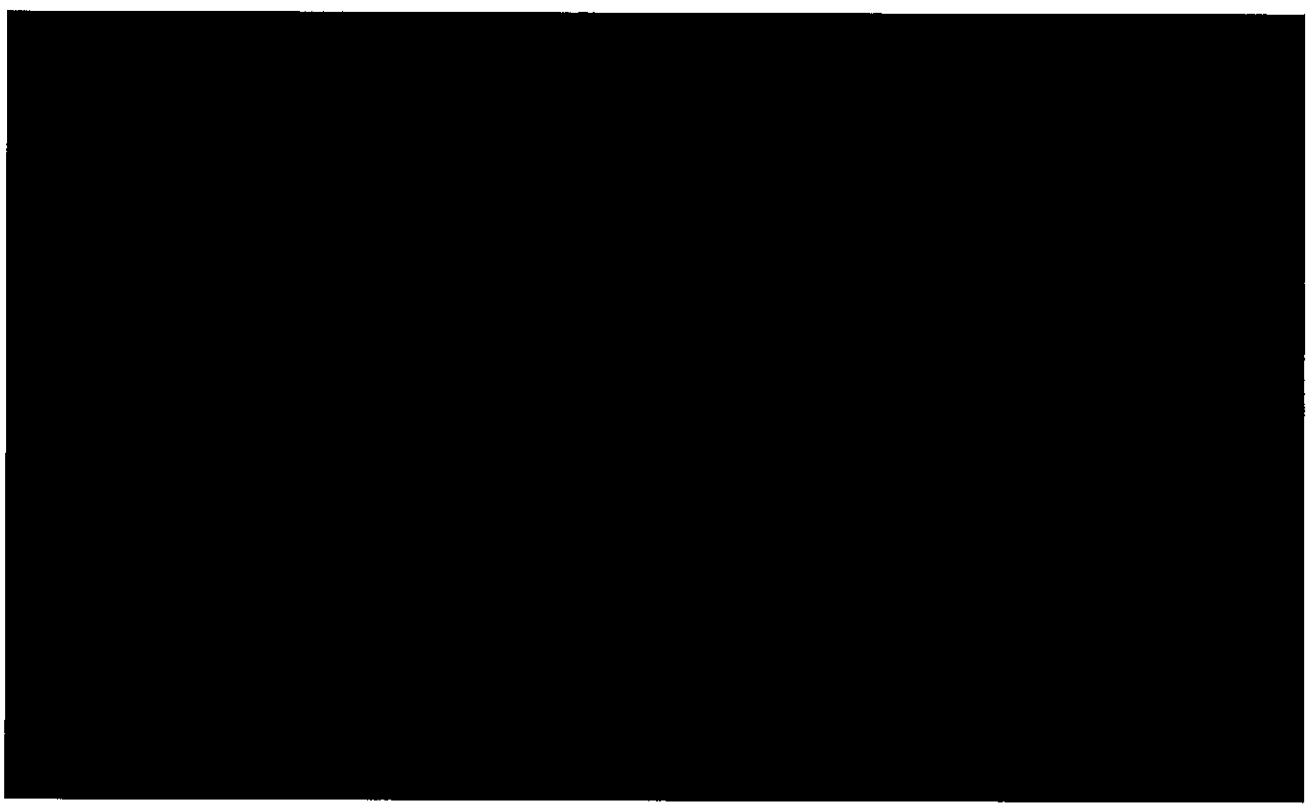

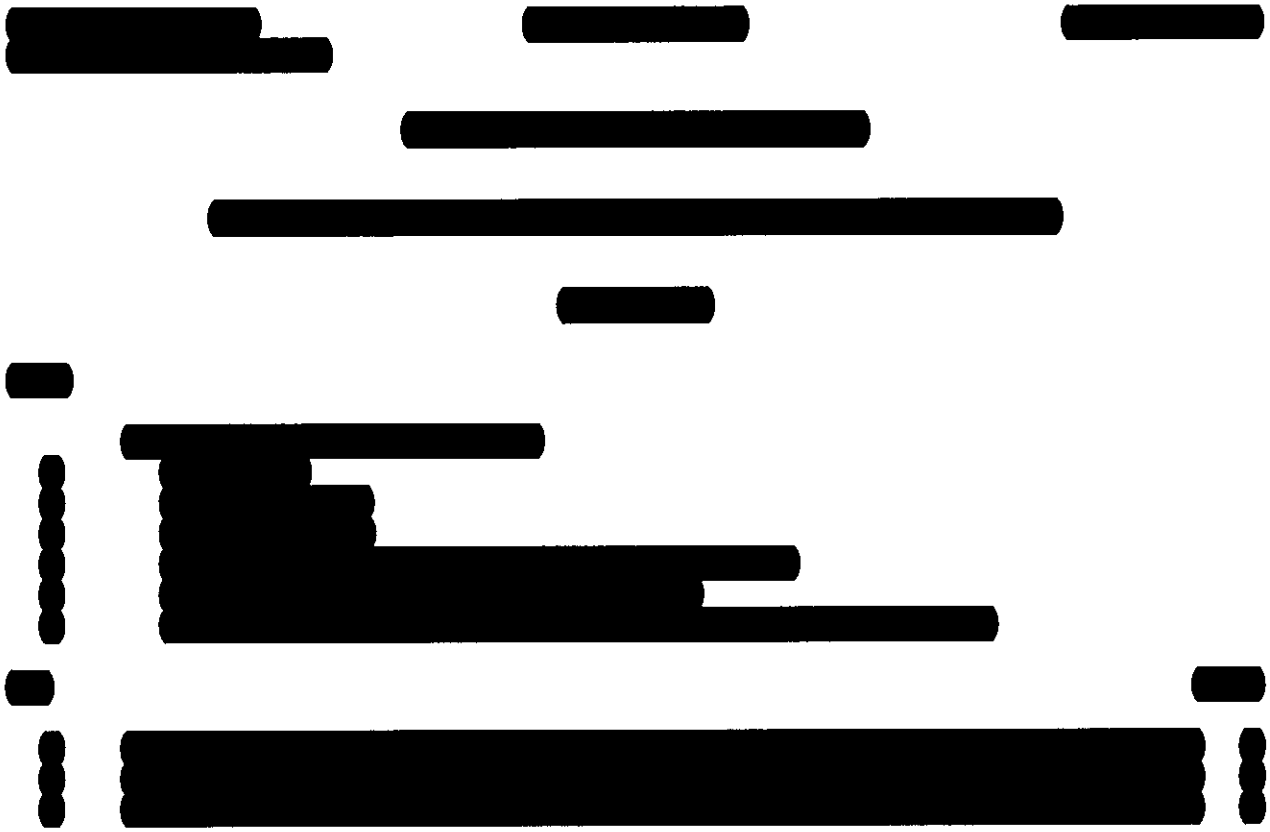

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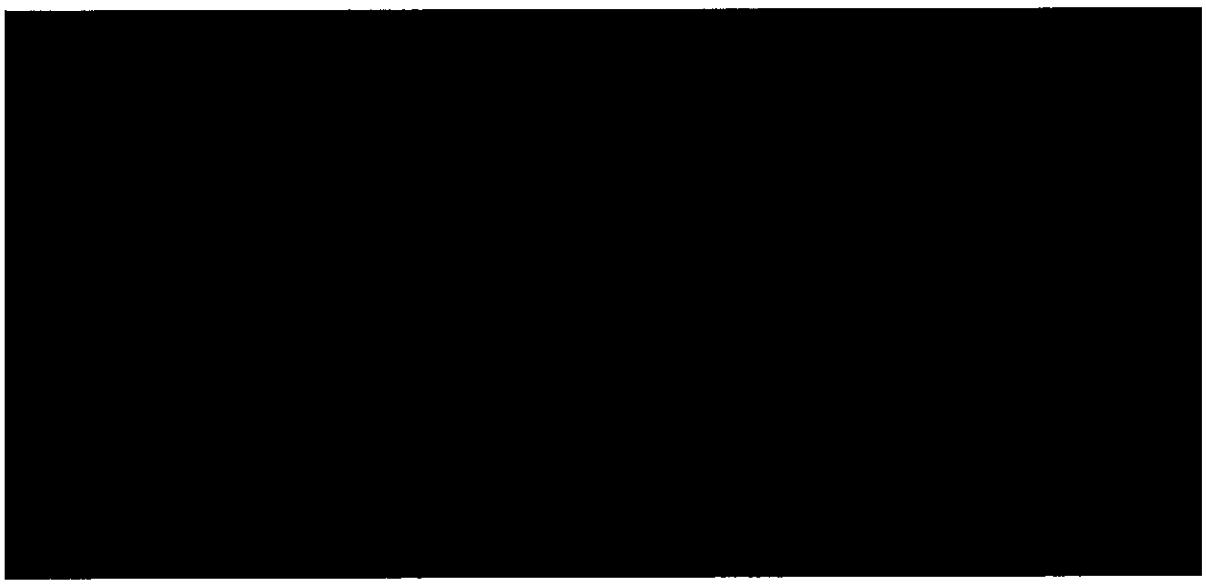

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CHAPTER 10 ANNEX E

STRUCTURAL

CONTENTS

INTRODUCTION

1 Annex E contains approved repair scheme for repair of structural damage. The annex is presented in the form of appendices. Where alternative repair schemes are given, details of the preferred scheme are given at the beginning of the Appendix.

2 Appendices 1 and 2 detail approved repair techniques and the applicability of the techniques. Appendices 3 to 11 detail specific repair schemes. Each appendix detailing a repair scheme commences with and explanation of the applicability of the scheme.

WARNINGS AND CAUTIONS

3 Specific warnings and cautions are given in the text of the appendices, when required.

CHAPTER 10 ANNEX F

ANTI-CORROSION PAINT SCHEMES

CONTENTS

Para

Appendix

INTRODUCTION

1 Annex F contains details of paint schemes to be applied to CVR(T) hulls to provide an enhanced degree of corrosion resistance.

2 The Annex is presented in the form of Appendices. Appendices 1 to 3 detail specific paint schemes and the applicability of the techniques.

WARNINGS AND CAUTIONS

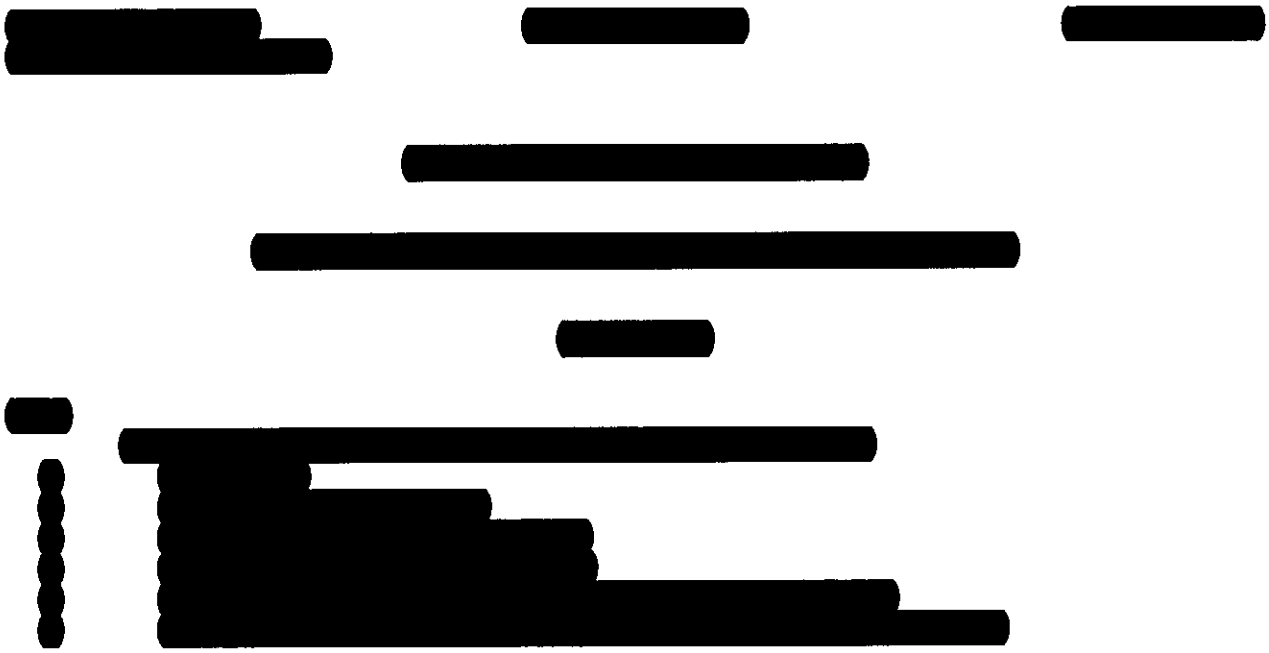
3 Specific warnings and cautions are given in the text of the appendices, when required.

GENERAL INSTRUCTIONS (ALL SCHEMES)

4 Before using any of the products specified in this report, the users must consult the manufacturer's technical and safety data sheets. Particular attention is drawn to the application of chromate containing primers and of polyurethane topcoats.

5 The old paint is to be removed from both the inside and outside surfaces using the Doornboss high pressure water system only to ensure that hull corrosion remains visible. The grit blast method of paint removal should not be used as it removes the differential appearance between corroded and non-corroded parts and therefore makes it difficult to identify correctly which areas of the hull are corroded and hence which areas need to be treated.

6 The preparation of the hull for painting is grit blasting in accordance with Defence Standard 08-39. Where previously applied Stress Corrosion Cracking (SCC) protection (Metal spray and Peening), has been removed during the Base Overhaul process. It is most important that it is reinstated to give the full level of protection following the procedures in Defence standard 08-39.



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CHAPTER 10 ANNEX F APPENDIX 3

PAINTING OF VEHICLES [redacted]

CONTENTS

PAINTING OF VEHICLES [redacted]

WARNINGS

(1) HAZARDOUS SUBSTANCES. CONSULT MANUFACTURER'S TECHNICAL AND SAFETY DATA SHEETS BEFORE USING ANY PRODUCTS SPECIFIED IN THIS SCHEME.

(2) HAZARDOUS SUBSTANCES. WEAR PROTECTIVE CLOTHING AND EYE PROTECTION.

Applicability

1 This paint scheme is to be applied to vehicle hulls which have had all corrosion removed/repaired and have been prepared for painting as detailed in Annex F.

Application of epoxy primer

2 Apply epoxy primer PR219 as follows:

2.1 Remove all traces of grit blasting media with suitable equipment.

2.2 Solvent wipe to de-grease hull using CN59 cleaner poured onto a lint free cloth or blast with dry ice.

2.3 Hull to be baked for 2 hours at 60 deg C to ensure all water has been removed from crevices. Leave the hull to cool to 30 deg C prior to application of epoxy primer. Epoxy primer to be applied within 4 hours after the completion of the degreasing process.

2.4 Allow all materials to achieve a minimum of 15 deg C before use. Stir or shake PR219 (Base) thoroughly to incorporate any settlement. Mix 3 volumes of primer PR219 base with 1 volume of activator No 224 and stir thoroughly. Pot life is 8 hours.

2.5 Fit paint masks as detailed on Paint Masks for CVR(T) Hulls Drawing No FV2281958.

2.6 Spray apply 2 double track coats of the 2-pack primer PR219 allowing 15-30 minutes to flash off after each double track coat has been applied to both internal and external services.

2.7 Remove all masks from machined faces.

2.8 Spray apply a final double track coat of the 2-pack primer PR219 to meet the required dry film thickness (DFT) of 60-100µm. Allow to cure for a minimum of 4 hours at 18-23 deg C, 1.5 hours at 40-48 deg C or 1 hour at 70 deg C.

2.9 Refit all paint masks.

Application of erosion resistant paint

3 Apply PR1432 GP erosion resistant paint (Approved to Boeing Materials Specification BMS 5-95) as follows

3.1 The erosion resistant paint is to be applied within 72 hours after the application of the primer.

3.2 Fit 4 off M16 washers (NSN 5310-99-666-5998) to each of the four off locations where the RH and LH Messier damper units are secured to the hull with 4 off screw hex head 5/8 in. x 1 in. long (NSN 5305-99-941-0750).

3.3 The erosion resistant paint should be applied to the external surfaces of the floor plate, LH and RH lower side and sponson plates and the lower 175mm of the nose and rear plates. The paint masks will prevent the erosion resistant paint being applied to the machined surfaces.

3.4 Any exposed primer PR219 over 72 hours old should be abraded with red scotchbrite. Blow off any dust with clean compressed air and then degrease with cleaner CN59. Lightly wipe the surface with clean 'tack rags' or blast with dry ice.

3.5 Spray apply sealant PR 1432GP to the previously stated areas to give a dry film thickness of 100 - 150µm. Allow to cure for a minimum of 12 hours at 18-23 deg C, 6 hours at 40-48 deg C or 3 hours at 48 deg C, and 10 hours at 15 deg C minimum. For mixing instructions refer to PR1432GP technical data sheet.

3.6 Remove masking washers from the 4 off Messier damper positions prior to application of top coat.

Preparation and application of polyurethane topcoat (external)

4 Apply polyurethane topcoat CA8360GB0285R (external) as follows:

4.1 Topcoat to be applied within 72 hours after the application of the primer or erosion resistant sealant.

4.2 Spray apply polyurethane topcoat CA8360GB0285R, two coats to give a dry film thickness of minimum 40µm. For mixing instructions, refer to CA8360 technical data sheet.

4.3 Allow to cure for a minimum of 6 hours at 18-23 deg C (16 hours if need to walk on vehicle), 3 hours at 40-48 deg C (8 hours if need to walk on vehicle) or 45 minutes at 70 deg C (3 hours if need to walk on vehicle).

4.4 Remove masks from machined faces.

Preparation and application of two pack low VOC epoxy finish (internal)

5 Apply two pack low VOC epoxy finish glossy (internal), to DEF STAN 80-161, as follows:

5.1 Mix the activator and base in accordance with manufacturer's instructions.

5.2 Apply one double track coat to achieve the required dry film thickness of 55 ± 5µm, and leave to cure for a minimum of 12 hours at 18-23 deg C (24 hours if need to walk on vehicle), 4 hours at 40-48 deg C (8 hours if need to walk on vehicle) or 1 hour at 70 deg C (2 hours if need to walk on vehicle).